SECTION EC
ENGINE CONTROL SYSTEM

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Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the Type approval number on the identification plate. Refer to GI-46, "IDENTIFICATION PLATE" .

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-136, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
A/T 1ST GR FNCTN	P0731	0731	2	×	AT-121
A/T 2ND GR FNCTN	P0732	0732	2	×	AT-126
A/T 3RD GR FNCTN	P0733	0733	2	×	AT-131
A/T 4TH GR FNCTN	P0734	0734	2	×	AT-136
APP SEN 1/CIRC	P2122	2122	1	×	EC-412
APP SEN 1/CIRC	P2123	2123	1	×	EC-412
APP SEN 2/CIRC	P2127	2127	1	×	EC-419
APP SEN 2/CIRC	P2128	2128	1	×	EC-419
APP SENSOR	P2138	2138	1	×	EC-435
ASCD BRAKE SW*8	P1572	1572	1	—	EC-390
ASCD SW *8	P1564	1564	1	—	EC-380
ASCD VHL SPD SEN*8	P1574	1574	1	—	EC-399
ATF TEMP SEN/CIRC	P0710	0710	2	×	AT-103
BRAKE SW/CIRCUIT	P1805	1805	2	—	EC-408
CAN COMM CIRCUIT	U1000	1000*5	1 (A/T) 2 (M/T)	× (A/T) — (M/T)	EC-136
CAN COMM CIRCUIT	U1001	1001*5	2	—	EC-136
CKP SEN/CIRCUIT	P0335	0335	2	×	EC-253
CMP SEN/CIRC-B1	P0340	0340	2	×	EC-260
CTP LEARNING	P1225	1225	2	—	EC-371
CTP LEARNING	P1226	1226	2	—	EC-373
CYL 1 MISFIRE	P0301	0301	2	×	EC-242
CYL 2 MISFIRE	P0302	0302	2	×	EC-242
CYL 3 MISFIRE	P0303	0303	2	×	EC-242
CYL 4 MISFIRE	P0304	0304	2	×	EC-242
ECM	P0605	0605	1 or 2	× or —	EC-286
ECM BACK UP/CIRCUIT	P1065	1065	2	×	EC-289
ECT SEN/CIRC	P0117	0117	1	×	EC-168
ECT SEN/CIRC	P0118	0118	1	×	EC-168
ENG OVER TEMP	P1217	1217	1	×	EC-355
ENGINE SPEED SIG	P0725	0725	2	×	AT-116
ETC ACTR	P1121	1121	1	×	EC-297
ETC FUNCTION/CIRC	P1122	1122	1	×	EC-299
ETC MOT	P1128	1128	1	×	EC-317
ETC MOT PWR	P1124	1124	1	×	EC-309
ETC MOT PWR	P1126	1126	1	×	EC-309

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
FUEL SYS-LEAN-B1	P0171	0171	2	×	EC-222
FUEL SYS-RICH-B1	P0172	0172	2	×	EC-228
HO2S1 (B1)	P0132	0132	2	×	EC-182
HO2S1 (B1)	P0133	0133	2	×	EC-189
HO2S1 (B1)	P0134	0134	2	×	EC-199
HO2S1 (B1)	P1143	1143	2	×	EC-325
HO2S1 (B1)	P1144	1144	2	×	EC-331
HO2S1 HTR (B1)	P0031	0031	2	×	EC-142
HO2S1 HTR (B1)	P0032	0032	2	×	EC-142
HO2S2 (B1)	P0138	0138	2	×	EC-207
HO2S2 (B1)	P0139	0139	2	×	EC-214
HO2S2 (B1)	P1146	1146	2	×	EC-337
HO2S2 (B1)	P1147	1147	2	×	EC-345
HO2S2 HTR (B1)	P0037	0037	2	×	EC-148
HO2S2 HTR (B1)	P0038	0038	2	×	EC-148
IAT SEN/CIRCUIT	P0112	0112	2	×	EC-162
IAT SEN/CIRCUIT	P0113	0113	2	×	EC-162
INT/V TIM CONT-B1	P0011	0011	2	—	EC-139
INT/V TIM V/CIR-B1	P1111	1111	2	×	EC-293
KNOCK SEN/CIRC-B1	P0327	0327	2	—	EC-248
KNOCK SEN/CIRC-B1	P0328	0328	2	—	EC-248
L/PRESS SOL/CIRC	P0745	0745	2	×	AT-150
MAF SEN/CIRCUIT	P0102	0102	1	×	EC-154
MAF SEN/CIRCUIT	P0103	0103	1	×	EC-154
MULTI CYL MISFIRE	P0300	0300	2	×	EC-242
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	2	—	BL-107
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*4	—	Flashing*4	EC-68
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	**—**
O/R CLTCH SOL/CIRC	P1760	1760	2	×	AT-174
P-N POS SW/CIRCUIT	P1706	1706	2	×	EC-401
PNP SW/CIRC	P0705	0705	2	×	AT-98
PURG VOLUME CONT/V	P0444	0444	2	×	EC-272
PW ST P SEN/CIRC	P0550	0550	2	—	EC-281
SENSOR POWER/CIRC	P1229	1229	1	×	EC-375
SFT SOL A/CIRC	P0750	0750	1	×	AT-157
SFT SOL B/CIRC	P0755	0755	1	×	AT-163
TCC SOLENOID/CIRC	P0740	0740	2	×	AT-144
TCS C/U FUNCTN*6	P1211	1211	2	—	EC-353
TCS/CIRC*6	P1212	1212	2	—	EC-354

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
TP SEN 1/CIRC	P0222	0222	1	×	EC-234
TP SEN 1/CIRC	P0223	0223	1	×	EC-234
TP SEN 2/CIRC	P0122	0122	1	×	EC-174
TP SEN 2/CIRC	P0123	0123	1	×	EC-174
TP SENSOR	P2135	2135	1	×	EC-427
TP SEN/CIRC A/T	P1705	1705	1	×	AT-169
TW CATALYST SYS-B1	P0420	0420	2	×	EC-267
V/SP SEN (A/T OUT)	P1720	1720	2	—	EC-406
VEH SPD SEN/CIR AT*7	P0720	0720	2	×	AT-109
VEH SPEED SEN/CIRC*7	P0500	0500	2	×	EC-279

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by ISO 15031-5.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: When engine is running
*5: The troubleshooting for this DTC needs CONSULT-II.
*6: For models with ESP system
*7: When the fail-safe operation for both self-diagnoses occur, the MI illuminates.
*8: For QR25DE engine models

DTC No. Index

BBS00190

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-136, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
No DTC	Flashing*4	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	Flashing*4	EC-68
U1000	1000*5	CAN COMM CIRCUIT	1 (A/T) 2 (M/T)	× (A/T) — (M/T)	EC-136
U1001	1001*5	CAN COMM CIRCUIT	2	—	EC-136
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	**—**
P0011	0011	INT/V TIM CONT-B1	2	—	EC-139
P0031	0031	HO2S1 HTR (B1)	2	×	EC-142
P0032	0032	HO2S1 HTR (B1)	2	×	EC-142
P0037	0037	HO2S2 HTR (B1)	2	×	EC-148
P0038	0038	HO2S2 HTR (B1)	2	×	EC-148
P0102	0102	MAF SEN/CIRCUIT	1	×	EC-154
P0103	0103	MAF SEN/CIRCUIT	1	×	EC-154
P0112	0112	IAT SEN/CIRCUIT	2	×	EC-162
P0113	0113	IAT SEN/CIRCUIT	2	×	EC-162
P0117	0117	ECT SEN/CIRC	1	×	EC-168
P0118	0118	ECT SEN/CIRC	1	×	EC-168
P0122	0122	TP SEN 2/CIRC	1	×	EC-174
P0123	0123	TP SEN 2/CIRC	1	×	EC-174
P0132	0132	HO2S1 (B1)	2	×	EC-182
P0133	0133	HO2S1 (B1)	2	×	EC-189
P0134	0134	HO2S1 (B1)	2	×	EC-199
P0138	0138	HO2S2 (B1)	2	×	EC-207
P0139	0139	HO2S2 (B1)	2	×	EC-214
P0171	0171	FUEL SYS-LEAN-B1	2	×	EC-222
P0172	0172	FUEL SYS-RICH-B1	2	×	EC-228
P0222	0222	TP SEN 1/CIRC	1	×	EC-234
P0223	0223	TP SEN 1/CIRC	1	×	EC-234
P0300	0300	MULTI CYL MISFIRE	2	×	EC-242
P0301	0301	CYL 1 MISFIRE	2	×	EC-242
P0302	0302	CYL 2 MISFIRE	2	×	EC-242
P0303	0303	CYL 3 MISFIRE	2	×	EC-242
P0304	0304	CYL 4 MISFIRE	2	×	EC-242
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-248
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-248
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-253
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-260

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P0420	0420	TW CATALYST SYS-B1	2	×	EC-267
P0444	0444	PURG VOLUME CONT/V	2	×	EC-272
P0500	0500	VEH SPEED SEN/CIRC*7	2	×	EC-279
P0550	0550	PW ST P SEN/CIRC	2	—	EC-281
P0605	0605	ECM	1 or 2	× or —	EC-286
P0705	0705	PNP SW/CIRC	2	×	AT-98
P0710	0710	ATF TEMP SEN/CIRC	2	×	AT-103
P0720	0720	VEH SPD SEN/CIR AT*7	2	×	AT-109
P0725	0725	ENGINE SPEED SIG	2	×	AT-116
P0731	0731	A/T 1ST GR FNCTN	2	×	AT-121
P0732	0732	A/T 2ND GR FNCTN	2	×	AT-126
P0733	0733	A/T 3RD GR FNCTN	2	×	AT-131
P0734	0734	A/T 4TH GR FNCTN	2	×	AT-136
P0740	0740	TCC SOLENOID/CIRC	2	×	AT-144
P0745	0745	L/PRESS SOL/CIRC	2	×	AT-150
P0750	0750	SFT SOL A/CIRC	1	×	AT-157
P0755	0755	SFT SOL B/CIRC	1	×	AT-163
P1065	1065	ECM BACK UP/CIRCUIT	2	×	EC-289
P1111	1111	INT/V TIM V/CIR-B1	2	×	EC-293
P1121	1121	ETC ACTR	1	×	EC-297
P1122	1122	ETC FUNCTION/CIRC	1	×	EC-299
P1124	1124	ETC MOT PWR	1	×	EC-309
P1126	1126	ETC MOT PWR	1	×	EC-309
P1128	1128	ETC MOT	1	×	EC-317
P1143	1143	HO2S1 (B1)	2	×	EC-325
P1144	1144	HO2S1 (B1)	2	×	EC-331
P1146	1146	HO2S2 (B1)	2	×	EC-337
P1147	1147	HO2S2 (B1)	2	×	EC-345
P1211	1211	TCS C/U FUNCTN*6	2	—	EC-353
P1212	1212	TCS/CIRC*6	2	—	EC-354
P1217	1217	ENG OVER TEMP	1	×	EC-355
P1225	1225	CTP LEARNING	2	—	EC-371
P1226	1226	CTP LEARNING	2	—	EC-373
P1229	1229	SENSOR POWER/CIRC	1	×	EC-375
P1564	1564	ASCD SW*8	1	—	EC-380
P1572	1572	ASCD BRAKE SW*8	1	—	EC-390
P1574	1574	ASCD VHL SPD SEN*8	1	—	EC-399
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	2	—	BL-107
P1705	1705	TP SEN/CIRC A/T	1	×	AT-169
P1706	1706	P-N POS SW/CIRCUIT	2	×	EC-401
P1720	1720	V/SP SEN (A/T OUT)	2	—	EC-406

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P1760	1760	O/R CLTCH SOL/CIRC	2	×	AT-174
P1805	1805	BRAKE SW/CIRCUIT	2	—	EC-408
P2122	2122	APP SEN 1/CIRC	1	×	EC-412
P2123	2123	APP SEN 1/CIRC	1	×	EC-412
P2127	2127	APP SEN 2/CIRC	1	×	EC-419
P2128	2128	APP SEN 2/CIRC	1	×	EC-419
P2135	2135	TP SENSOR	1	×	EC-427
P2138	2138	APP SENSOR	1	×	EC-435

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by ISO 15031-5.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: When engine is running
*5: The troubleshooting for this DTC needs CONSULT-II.
*6: For models with ESP system
*7: When the fail-safe operations for both self-diagnoses occur, the MI illuminates.
*8: For QR25DE engine models

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

BBS00191

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

On Board Diagnostic (OBD) System of Engine and A/T

BBS00192

The ECM has an on board diagnostic system. It will light up the malfunction indicator (MI) to warn the driver of a malfunction causing emission deterioration.

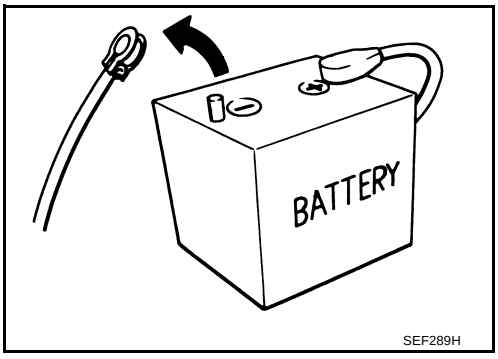
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery ground cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-74, "HARNESS CONNECTOR" .**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the fuel injection system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM and TCM (Transmission control module) before returning the vehicle to the customer.**

Precaution

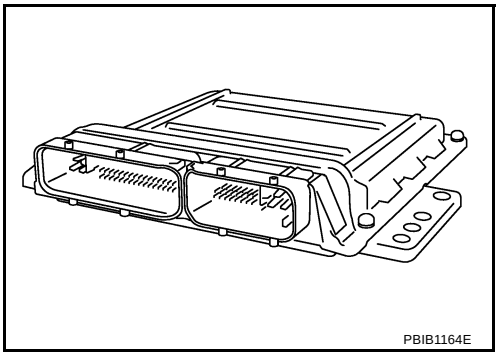
BBS00193

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery ground cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**

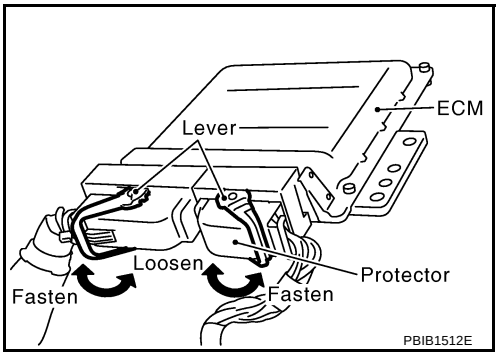


SEF289H

- **Do not disassemble ECM.**
- **If battery cable is disconnected, the memory will return to the initial ECM values.**
  The ECM will now start to self-control at its initial values. Engine operation can vary slightly when the cable is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

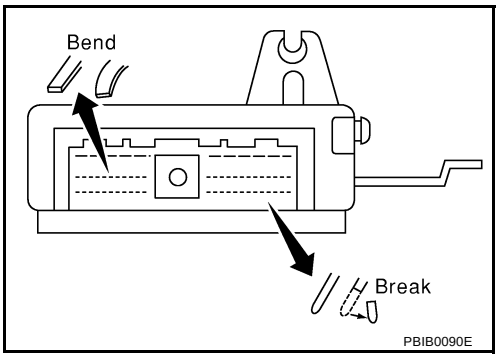

PBIB1164E

- **When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.**



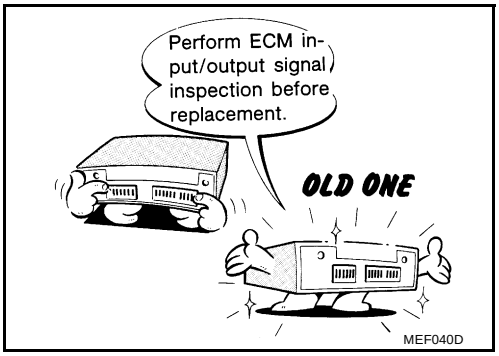
PBIB1512E

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**



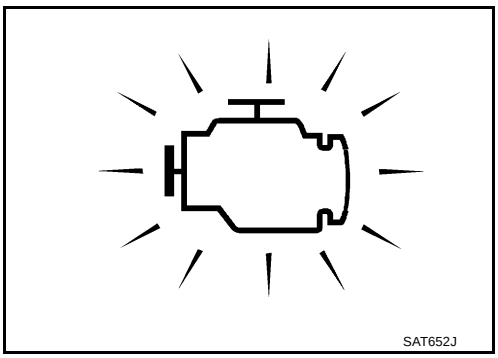
PBIB0090E

- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-98, "ECM Terminals and Reference Value" .**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**

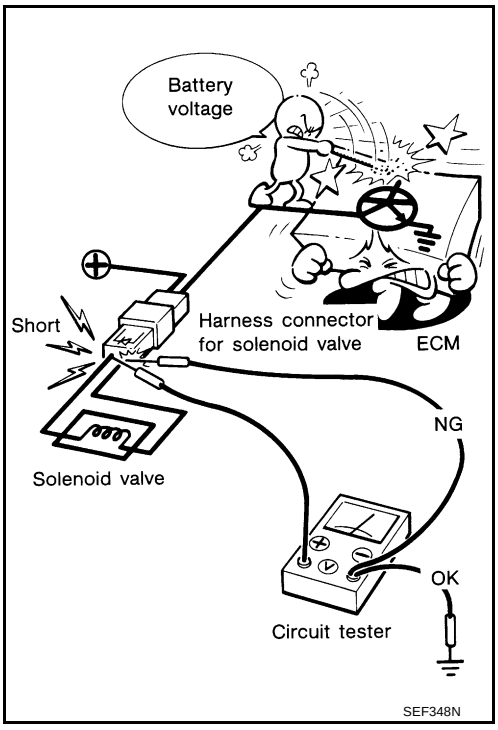


MEF040D

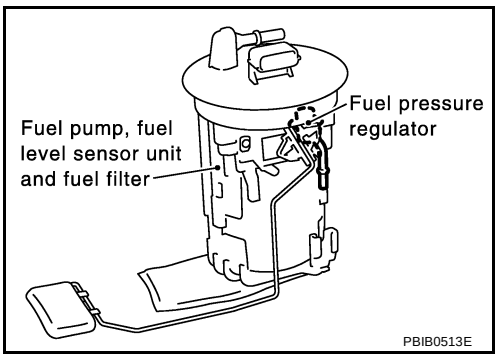
- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.



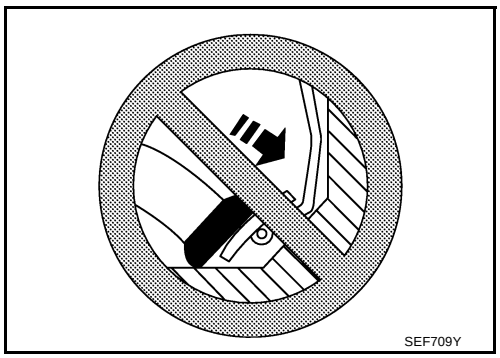
- **When measuring ECM signals with a circuit tester, connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.**
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



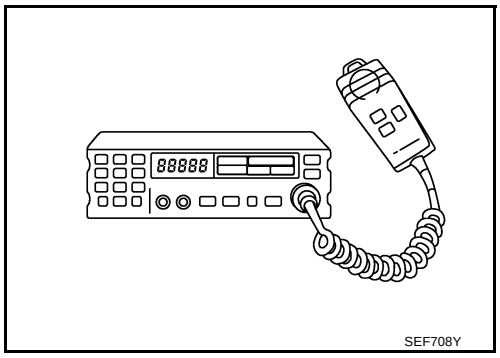
- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**



- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**


SEF709Y

- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
  - **Keep the antenna as far as possible from the electronic control units.**
  - **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
    Do not let them run parallel for a long distance.
  - **Adjust the antenna and feeder line so that the standing-wave radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**



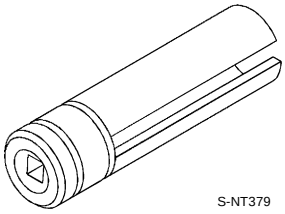
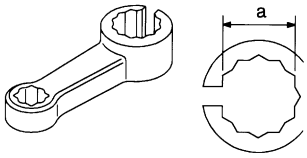
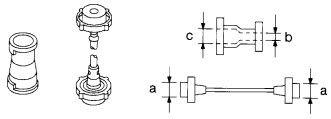
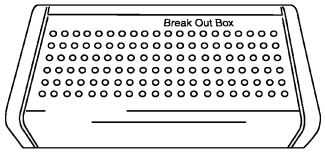
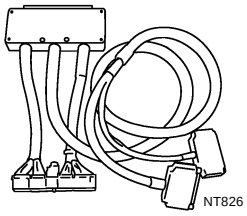
SEF708Y

PREPARATION

PFP:00002

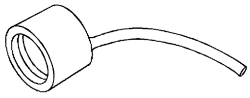
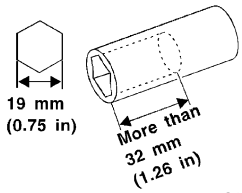
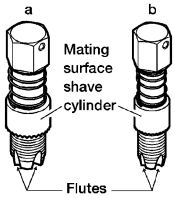
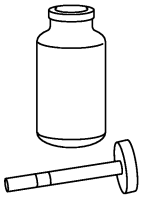
Special Service Tools

BBS00195

Tool number Tool name		Description
KV10117100 Heated oxygen sensor wrench	 S-NT379	Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench	 S-NT636	Loosening or tightening heated oxygen sensor **a: 22 mm (0.87 in)**
EG17650301 Radiator cap tester adapter	 S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV109E0010 Break-out box	 NT825	Measuring ECM signals with a circuit tester
KV109E0080 Y-cable adapter	 NT826	Measuring ECM signals with a circuit tester

Commercial Service Tools

BBS00196

Tool name	Description
Quick connector release PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Part No. 16441 6N210)
Fuel filler cap adapter  S-NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner  AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)  S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

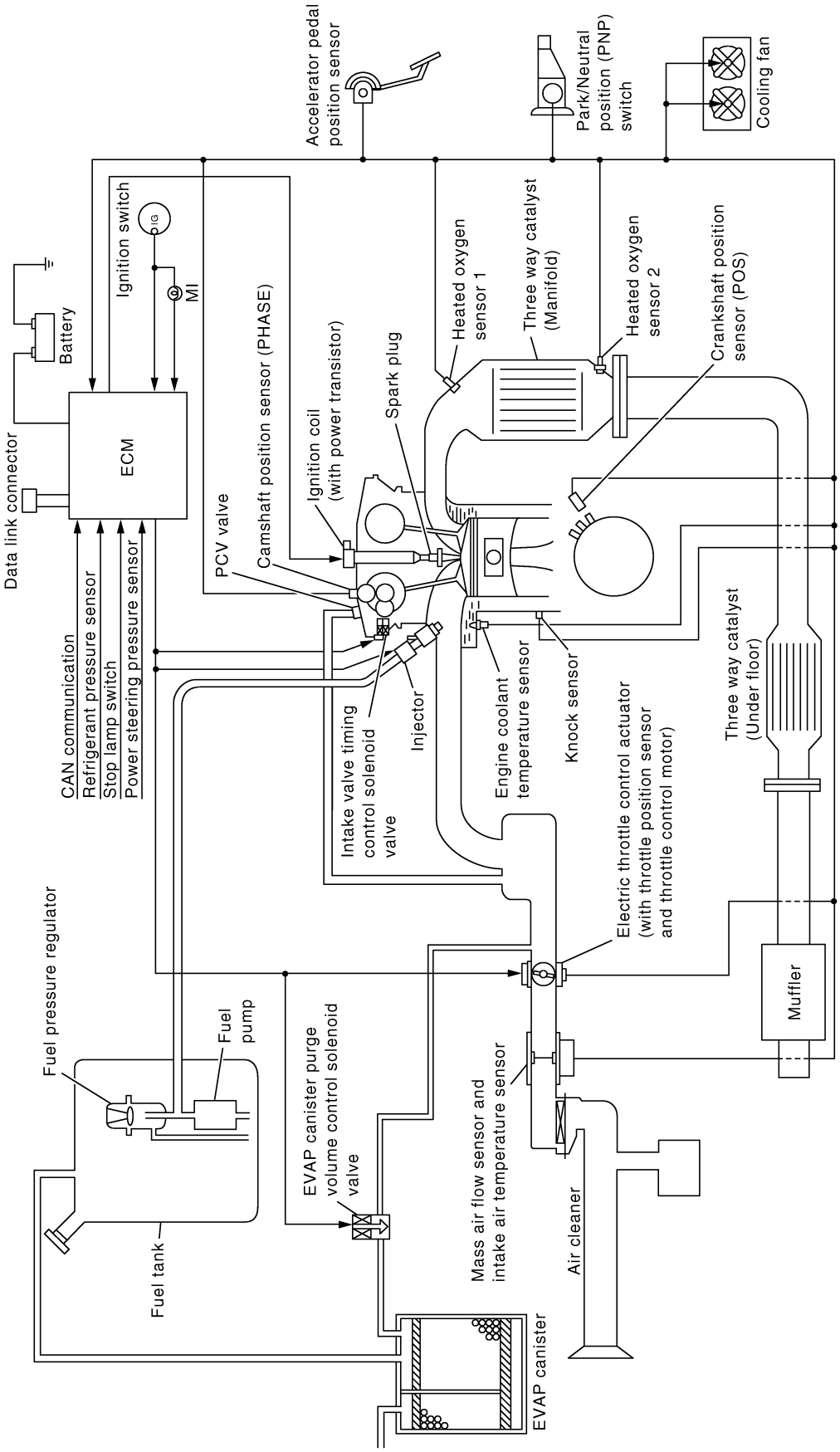
ENGINE CONTROL SYSTEM

PFP:23710

BBS00197

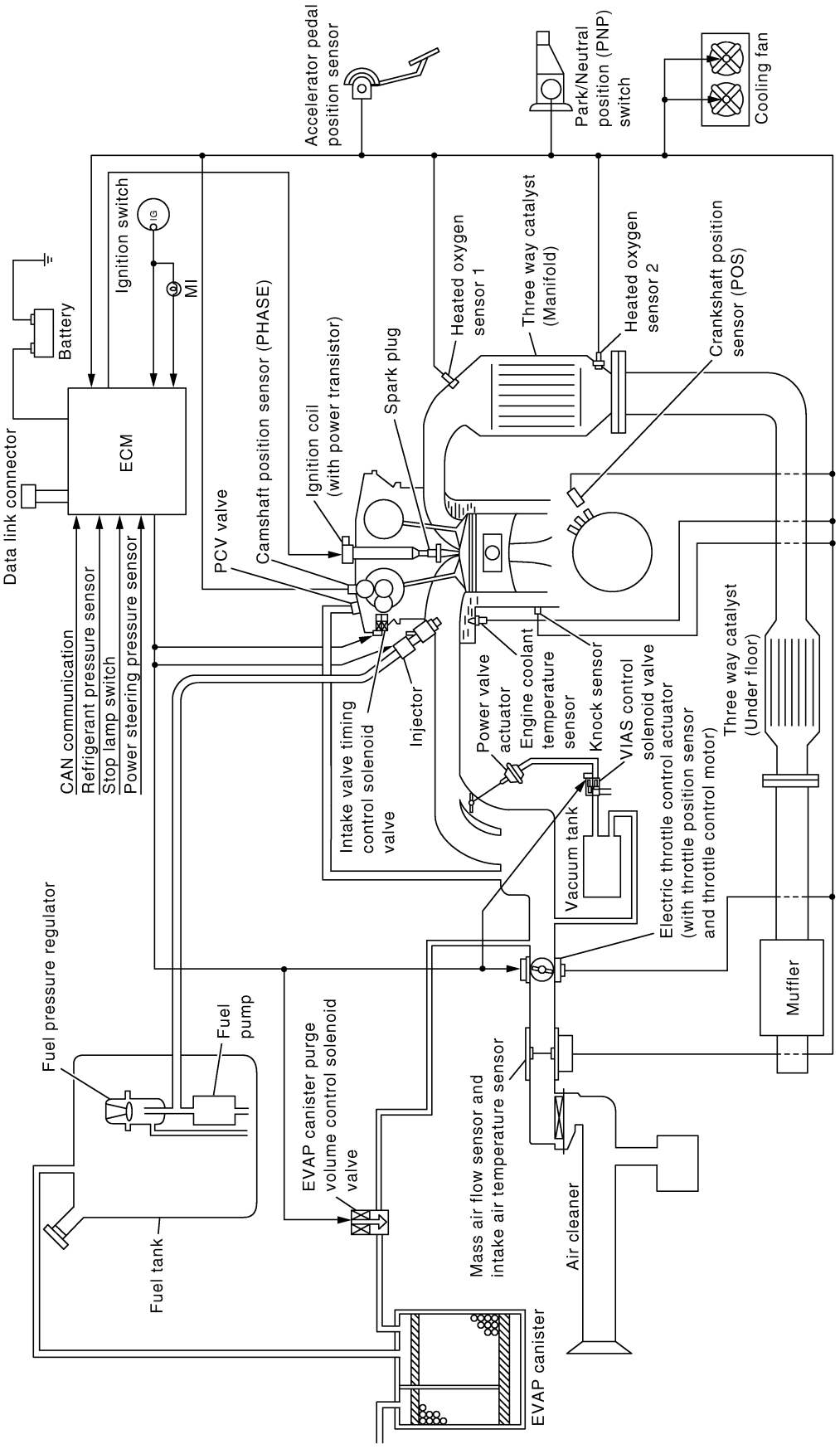
System Diagram

QR20DE ENGINE MODELS



PBIB2455E

QR25DE ENGINE MODELS

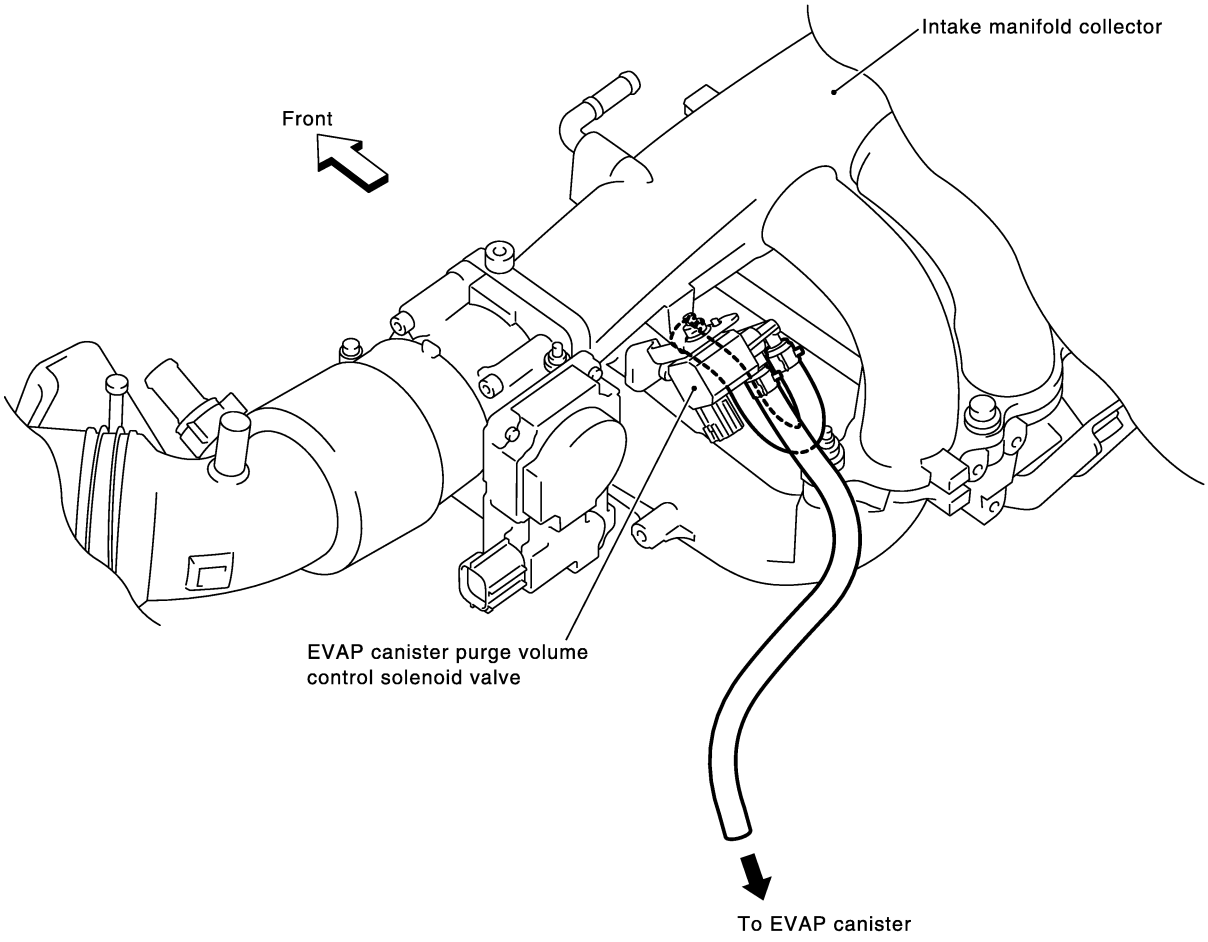


PBIB2456E

Vacuum Hose Drawing

BBS00198

QR20DE ENGINE MODELS

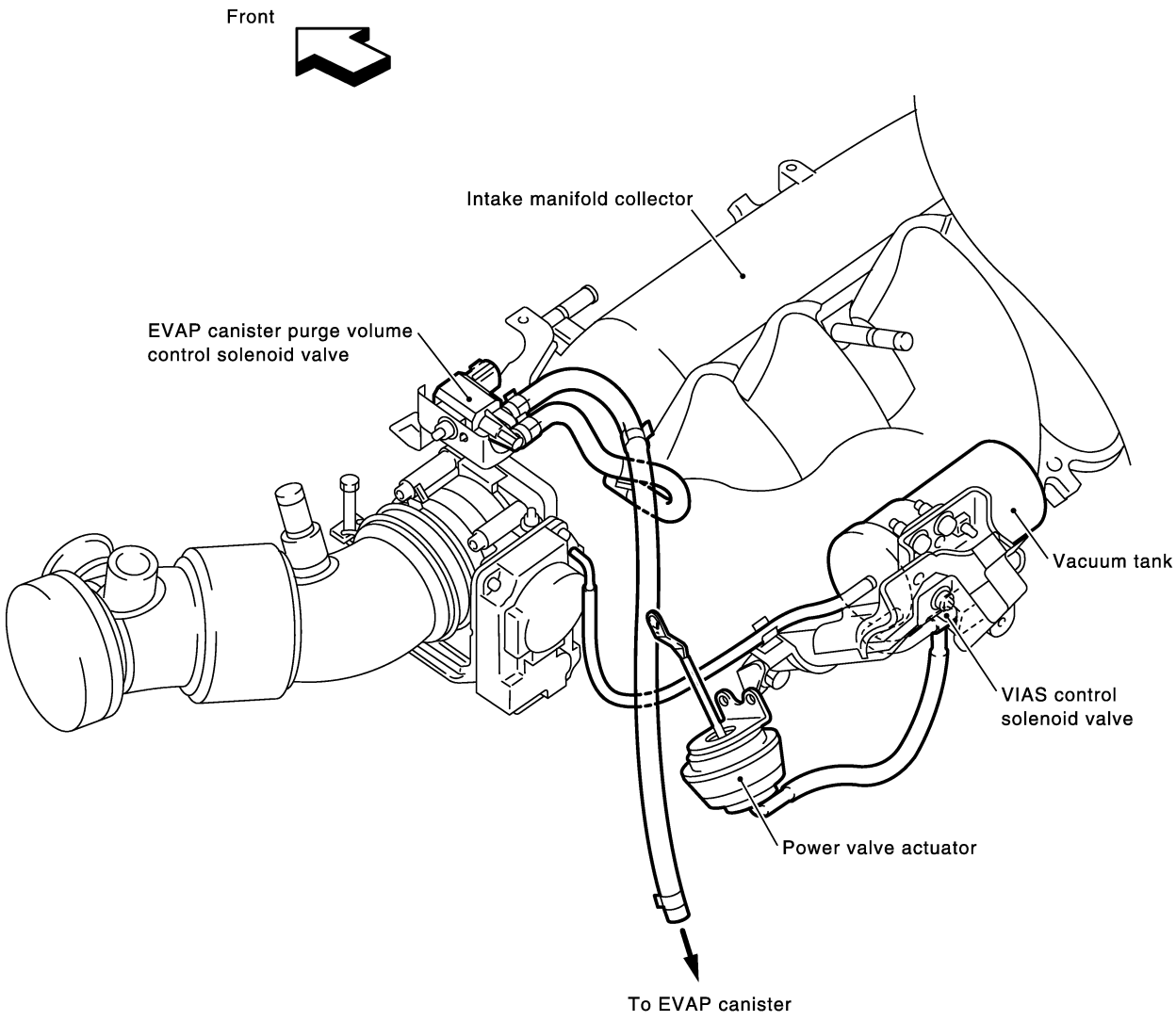


NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB0489E

Refer to EC-33, "QR20DE ENGINE MODELS" for Vacuum Control System.

QR25DE ENGINE MODELS



NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB1445E

Refer to EC-34, "QR25DE ENGINE MODELS" for Vacuum Control System.

System Chart

BBS00199

Input (Sensor)	ECM function	Output (Actuator)
● Camshaft position sensor (PHASE) ● Crankshaft position sensor (POS) ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 ● Throttle position sensor ● Accelerator pedal position sensor ● Park/neutral position (PNP) switch ● Intake air temperature sensor ● Power steering pressure sensor ● Ignition switch ● Battery voltage ● Knock sensor ● Refrigerant pressure sensor ● Stop lamp switch ● Heated oxygen sensor 2*1 ● TCM (Transmission control module)*2 ● ESP/TCS/ABS control unit*2 *4 ● ABS actuator and electric unit (control unit)*2 *5 ● Air conditioner switch ● Wheel sensor*2 ● Electrical load signal ● ASCD steering switch*6 ● ASCD brake switch*6 ● ASCD clutch switch*6 ● Stop lamp switch	Fuel injection & mixture ratio control	Fuel injector
	Electronic ignition system	Power transistor
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MI (On the instrument panel)*3
	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	Power valve control*6	VIAS control solenoid valve
	ASCD vehicle speed control*6	Electric throttle control actuator
	Cooling fan control	Cooling fan relay

*1: This sensor is not used to control the engine system under normal conditions.
*2: This input signal is sent to the ECM through CAN communication line.
*3: This output signal is sent from the ECM through CAN communication line.
*4: For models with ESP
*5: For models without ESP
*6: For QR25DE engine models

Multiport Fuel Injection (MFI) System

BBS0019A

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*3 Piston position	Fuel injection & mixture ratio control	Fuel injector
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Knock sensor	Engine knocking condition		
Battery	Battery voltage*3		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
Wheel sensor	Vehicle speed*2		
Air conditioner switch	Air conditioner operation		

*1: This sensor is not used to control the engine system under normal conditions.
*2: This signal is sent to the ECM through CAN communication line.
*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the crankshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

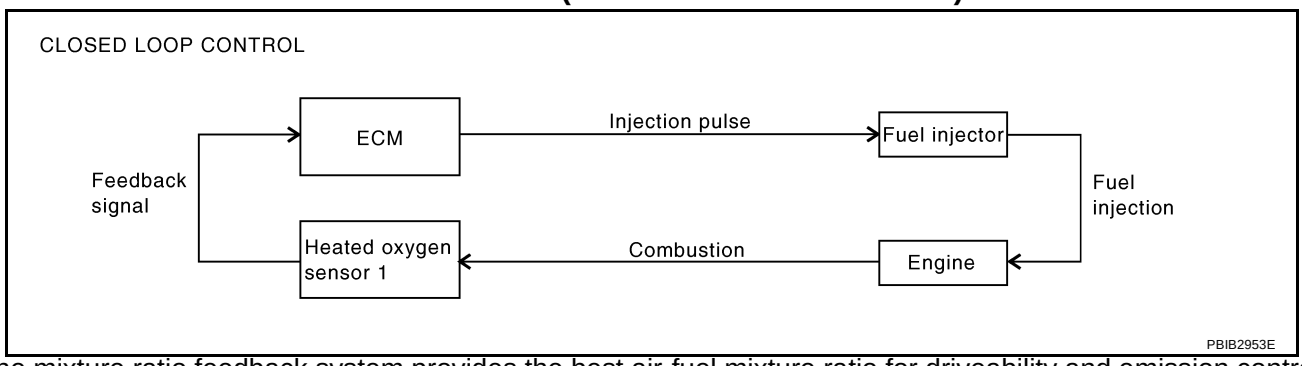
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses heated oxygen sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1, refer to EC-182, "DTC P0132 HO2S1" . This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

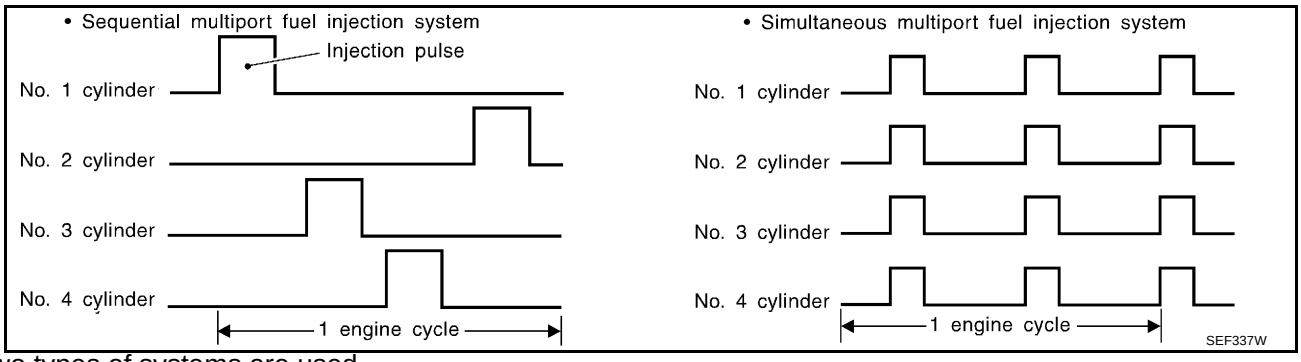
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., fuel injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.
“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from heated oxygen sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
“Long term fuel trim” is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multiport Fuel Injection System

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The four fuel injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.

Electronic Ignition (EI) System

BBS0019B

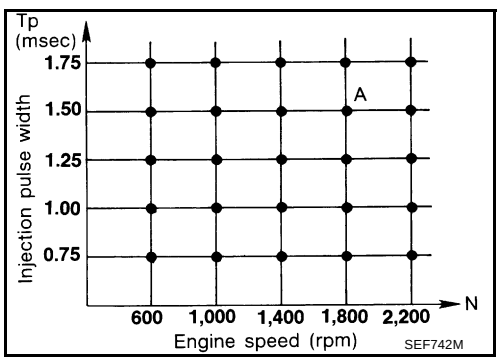
INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 Piston position	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*2		
Wheel sensor	Vehicle speed*1		

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order:1-3-4-2
The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
e.g., N: 1,800 rpm, Tp: 1.50 msec
A °BTDC
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.



- At starting
- During warm-up

- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Air Conditioning Cut Control

BBS0019C

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		
Wheel sensor	Vehicle speed*1		

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

Fuel Cut Control (At No Load and High Engine Speed)

BBS0019D

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Wheel sensor	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

If the engine speed is above 1,800 rpm under no load (for example, the shift position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:
This function is different from deceleration control listed under EC-38, "Multiport Fuel Injection (MFI) System" .

CAN Communication Unit

BBS0019E

SYSTEM DESCRIPTION

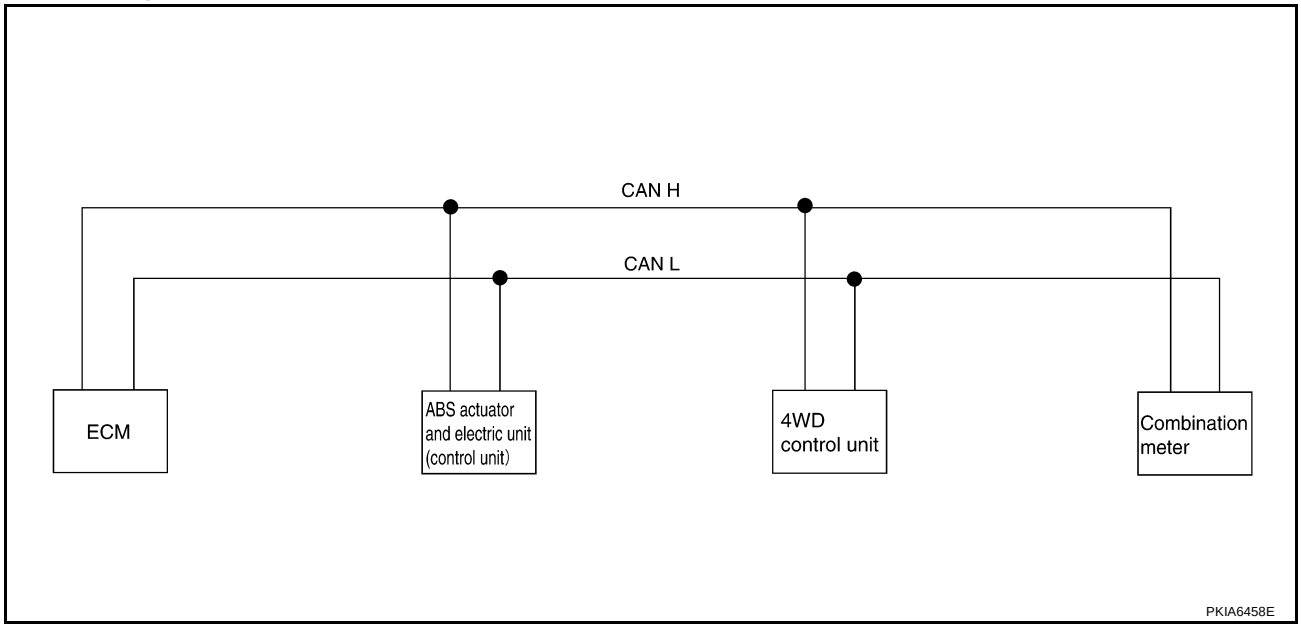
CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

CAN COMMUNICATION UNIT

Body type	Wagon				
Axle	4WD				2WD
Transmission	M/T	A/T	M/T	A/T	M/T
Brake control	ABS		ESP		ABS
CAN system type	2	3	5	6	7
ECM	×	×	×	×	×
TCM		×		×	
ESP/TCS/ABS control unit			×	×	
ABS actuator and electric unit (control unit)	×	×			×
Steering angle sensor			×	×	
4WD control unit	×	×	×	×	
Combination meter	×	×	×	×	×

TYPE 2

System Diagram



Input/output Signal Chart

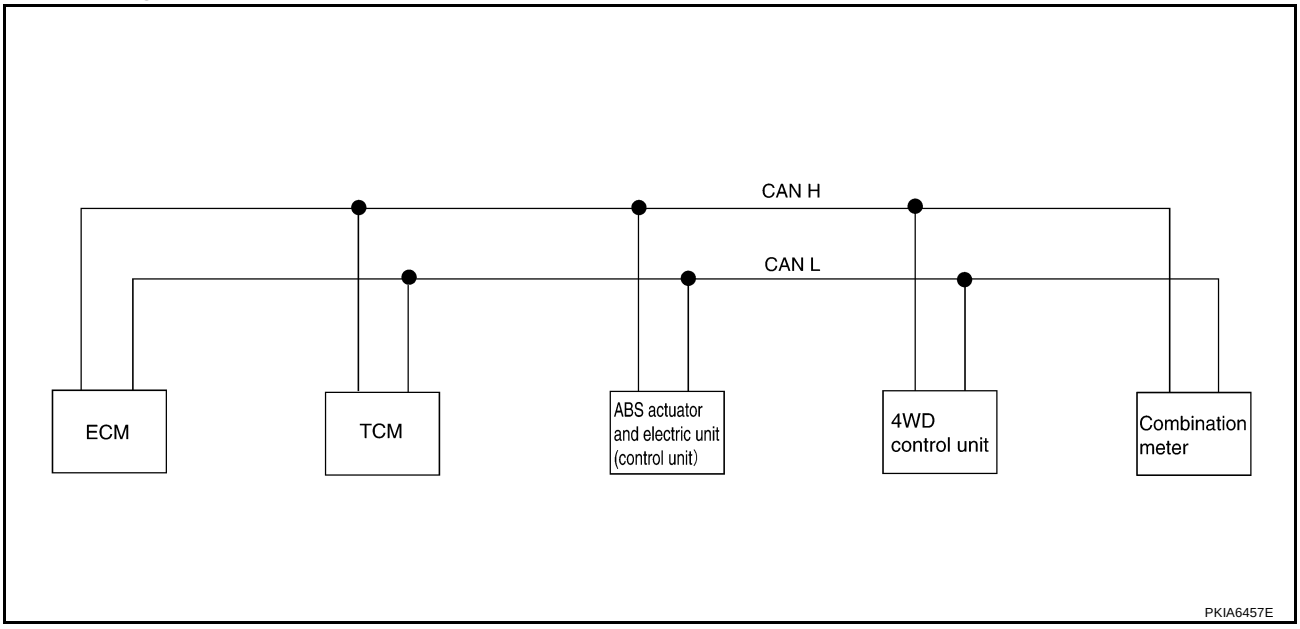
T: Transmit R: Receive

Signals	ECM	ABS actuator and electric unit (control unit)	4WD control unit	Combination meter
4WD mode indicator lamp signal			T	R
4WD warning lamp signal			T	R
A/C compressor feedback signal	T			R
ABS warning lamp signal		T		R

Signals	ECM	ABS actuator and electric unit (control unit)	4WD control unit	Combination meter
Accelerator pedal position signal	T		R	
Engine coolant temperature signal	T			R
Engine speed signal	T		R	R
MI signal	T			R
Parking brake switch signal			R	T
Stop lamp switch signal		T	R	
Vehicle speed signal		T	R	R
	R			T
ASCD SET lamp signal	T			R
ASCD CRUISE lamp signal	T			R
Stop lamp switch signal	T			R

TYPE 3

System Diagram



Input/output Signal Chart

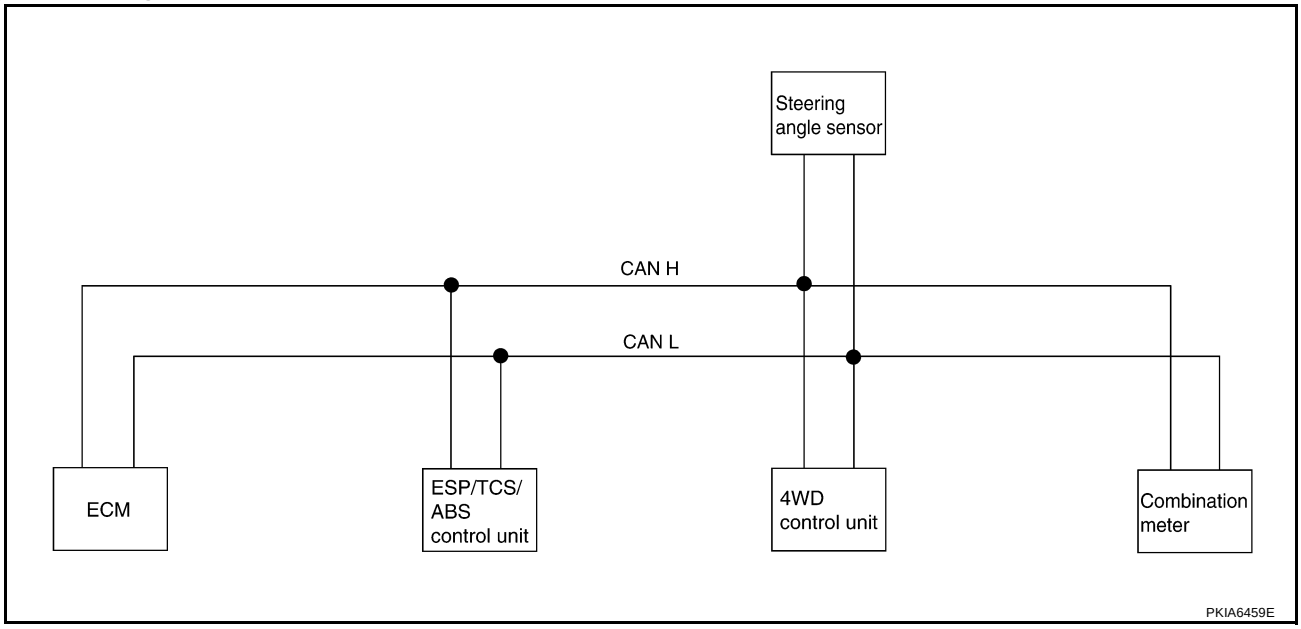
T: Transmit R: Receive

Signals	ECM	TCM	ABS actuator and electric unit (control unit)	4WD control unit	Combination meter
4WD mode indicator lamp signal				T	R
4WD warning lamp signal				T	R
A/C compressor feedback signal	T				R
A/T position indicator lamp signal		T			R
A/T self-diagnosis signal	R	T			
ABS warning lamp signal			T		R
Accelerator pedal position signal	T			R	
Closed throttle position signal	T	R			
Engine and A/T integrated control signal	T	R			
	R	T			

Signals	ECM	TCM	ABS actuator and electric unit (control unit)	4WD control unit	Combination meter
Engine coolant temperature signal	T				R
Engine speed signal	T			R	R
MI signal	T				R
OD OFF indicator signal		T			R
Output shaft revolution signal	R	T			
Overdrive control switch signal		R			T
P·N range signal		R			T
Parking brake switch signal				R	T
Stop lamp switch signal		R			T
			T	R	
Vehicle speed signal			T	R	R
	R				T
Wide open throttle position signal	T	R			
ASCD SET lamp signal	T				R
ASCD CRUISE lamp signal	T				R

TYPE 5

System Diagram



Input/output Signal Chart

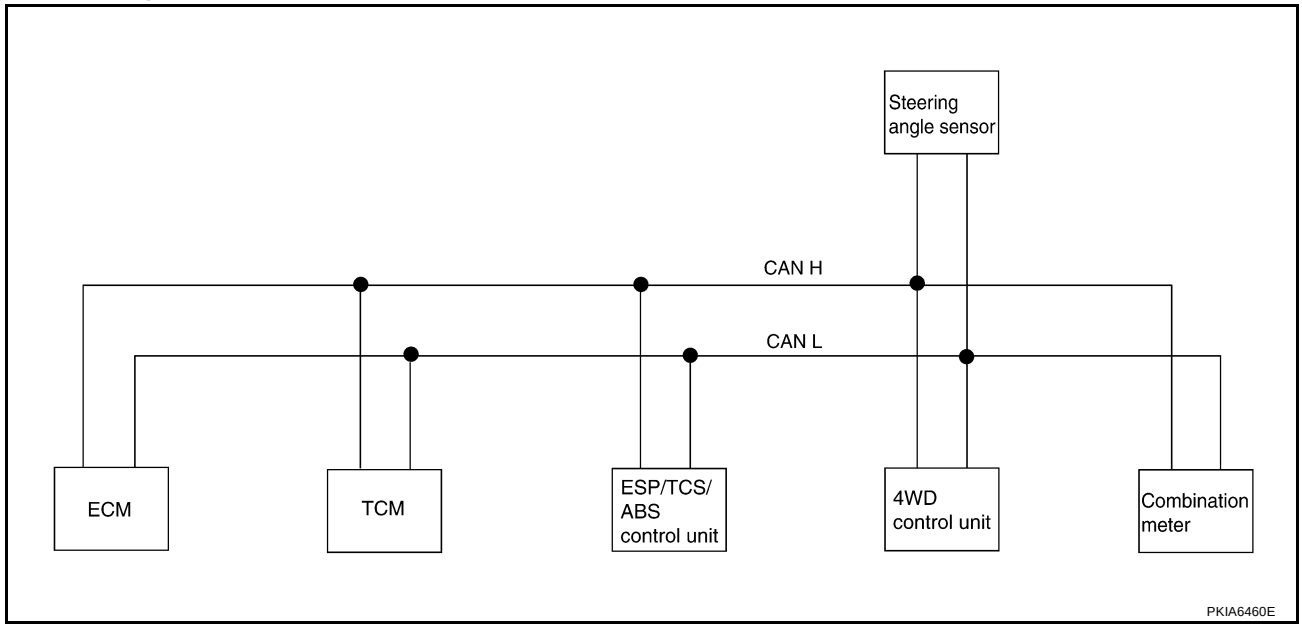
T: Transmit R: Receive

Signals	ECM	ESP/TCS/ABS control unit	Steering angle sensor	4WD control unit	Combination meter
4WD mode indicator lamp signal				T	R
4WD warning lamp signal				T	R
A/C compressor feedback signal	T				R
ABS warning lamp signal		T			R
Accelerator pedal position signal	T	R		R	
Brake warning lamp signal		T			R
Engine coolant temperature signal	T				R

Signals	ECM	ESP/TCS/ABS control unit	Steering angle sensor	4WD control unit	Combination meter
Engine speed signal	T	R		R	R
ESP OFF indicator lamp signal		T			R
MI signal	T				R
Stop lamp switch signal		T		R	
Vehicle speed signal		T		R	R
	R				T
SLIP indicator lamp signal		T			R
Parking brake switch signal				R	T
Steering angle sensor signal		R	T		
ASCD SET lamp signal	T				R
ASCD CRUISE lamp signal	T				R

TYPE 6

System Diagram



Input/output Signal Chart

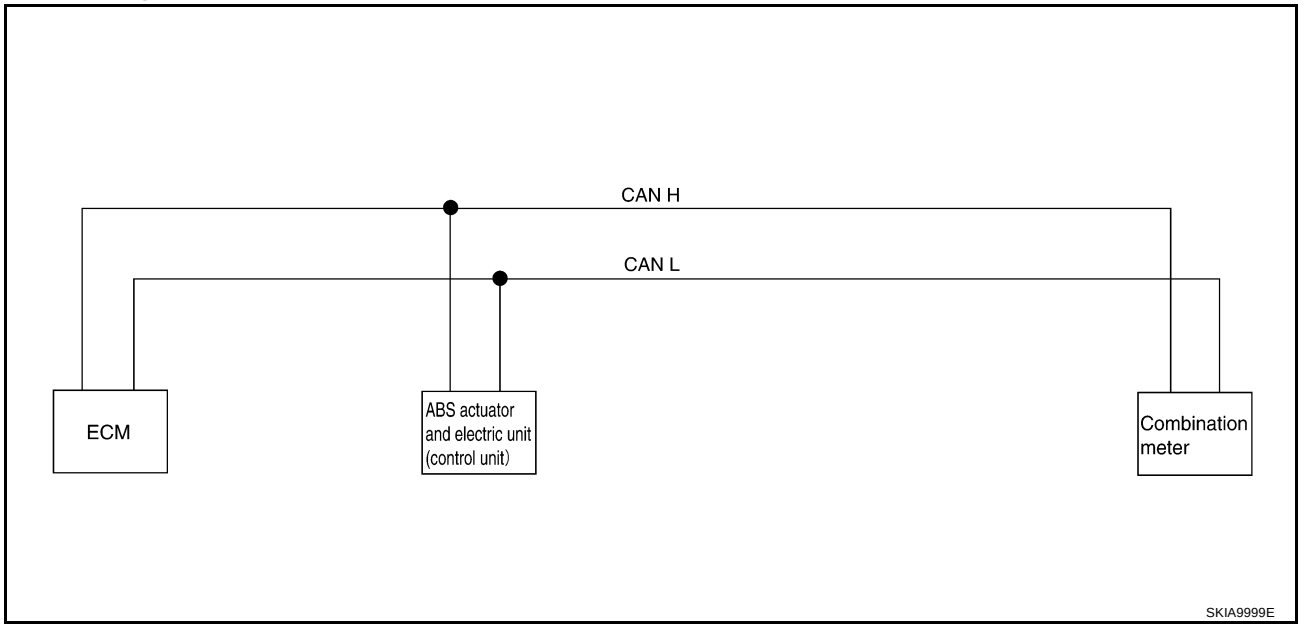
T: Transmit R: Receive

Signals	ECM	TCM	ESP/TCS/ ABS control unit	Steering angle sensor	4WD control unit	Combination meter
4WD mode indicator lamp signal					T	R
4WD warning lamp signal					T	R
A/C compressor feedback signal	T					R
A/T position indicator lamp signal		T	R			R
A/T self-diagnosis signal	R	T				
ABS warning lamp signal			T			R
Accelerator pedal position signal	T		R		R	
Brake warning lamp signal			T			R
Closed throttle position signal	T	R				
Engine and A/T integrated control signal	T	R				
	R	T				

Signals	ECM	TCM	ESP/TCS/ ABS control unit	Steering angle sensor	4WD control unit	Combination meter
Engine coolant temperature signal	T					R
Engine speed signal	T		R		R	R
ESP OFF indicator lamp signal			T			R
MI signal	T					R
OD OFF indicator signal		T				R
Output shaft revolution signal	R	T				
Overdrive control switch signal		R				T
P·N range signal		R				T
SLIP indicator lamp signal			T			R
Steering angle sensor signal			R	T		
Stop lamp switch signal		R				T
			T		R	
Vehicle speed signal			T		R	R
	R					T
Parking brake switch signal					R	T
Wide open throttle position signal	T	R				
ASCD SET lamp signal	T					R
ASCD CRUISE lamp signal	T					R

TYPE 7

System diagram



Input/output signal chart

T: Transmit R: Receive

Signals	ECM	ABS actuator and electric unit (control unit)	Combination meter
A/C compressor feedback signal	T		R
ABS warning lamp signal		T	R
Engine coolant temperature signal	T		R
Engine speed signal	T		R
MI signal	T		R

Signals	ECM	ABS actuator and electric unit (control unit)	Combination meter
Vehicle speed signal		T	R
	R		T
ASCD SET lamp signal	T		R
ASCD CRUISE lamp signal	T		R
Stop lamp switch signal	T		R

BASIC SERVICE PROCEDURE

PFP:00018

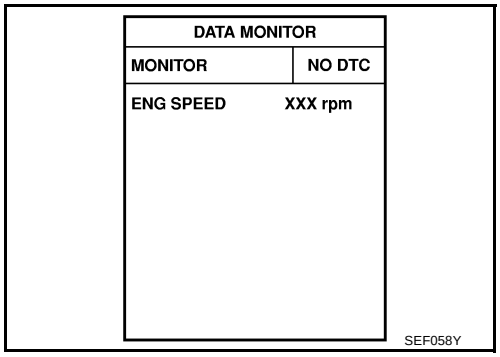
Idle Speed and Ignition Timing Check

BBS0019F

IDLE SPEED

With CONSULT-II

Check idle speed in “DATA MONITOR” mode with CONSULT-II.



With GST

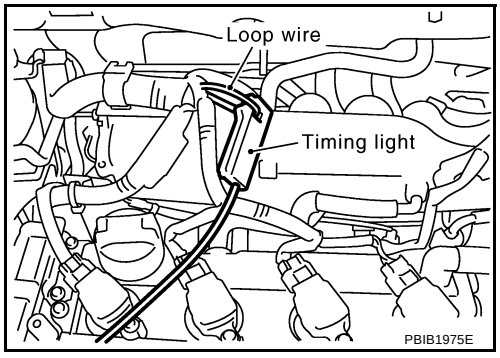
Check idle speed with GST.

IGNITION TIMING

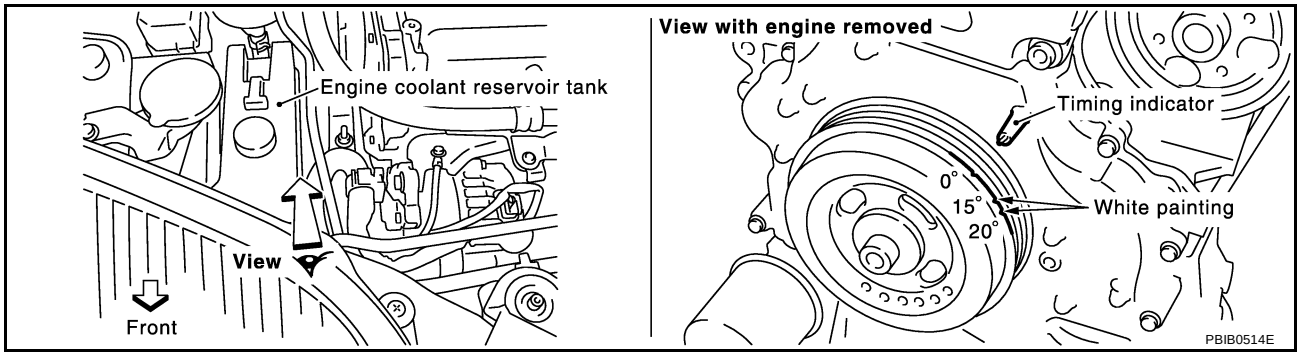
Any of following two methods may be used.

Method A

1. Slide the harness protector of ignition coil No.1 to clear the wires.
2. Attach timing light to the wire as shown in the figure.

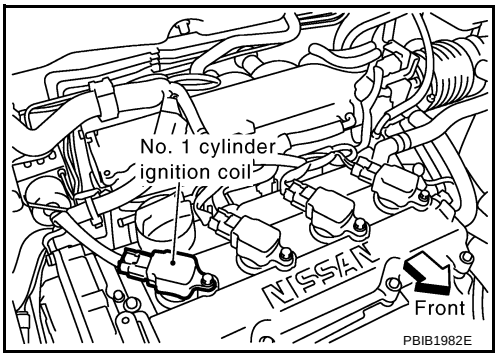


3. Check ignition timing.

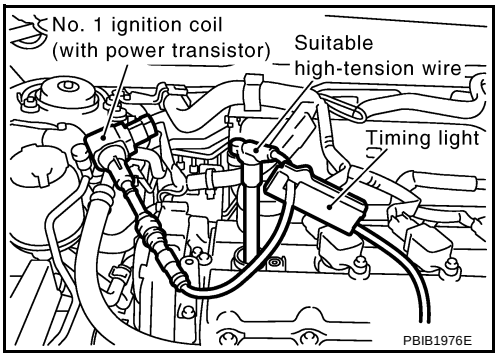


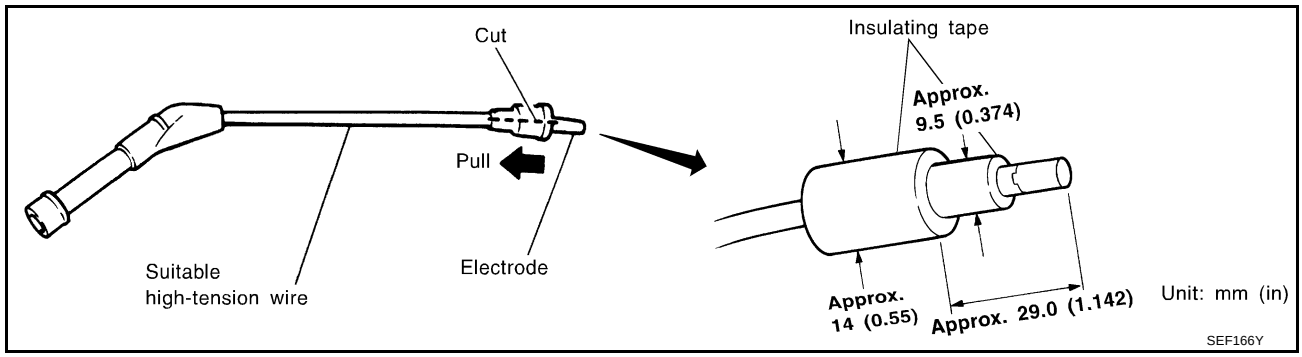
Method B

1. Remove No. 1 ignition coil.

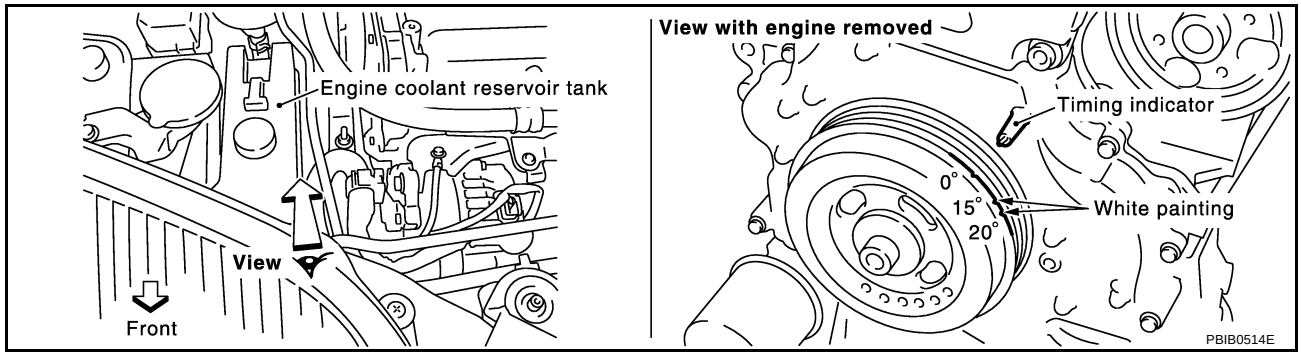


2. Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.





3. Check ignition timing.



Accelerator Pedal Released Position Learning

BBS0019G

DESCRIPTION

Accelerator Pedal Released Position Learning is an operation to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.

3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

Throttle Valve Closed Position Learning

BBS0019H

DESCRIPTION

Throttle Valve Closed Position Learning is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning

BBS0019I

DESCRIPTION

Idle Air Volume Learning is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PREPARATION

Before performing Idle Air Volume Learning, make sure that all of the following conditions are satisfied.
Learning will be cancelled if any of the following conditions are missed for even a moment.

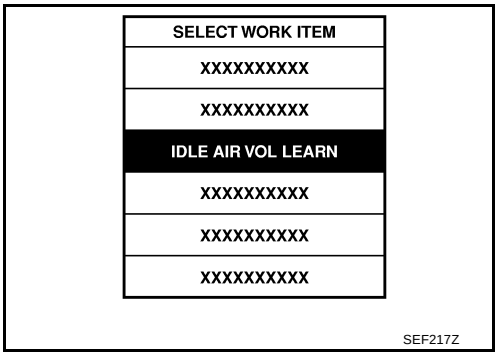
- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 95°C (158 - 203°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, headlamp, rear window defogger)
  On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
  - M/T models: Drive vehicle for 10 minutes.
  - A/T models
    - With CONSULT-II: Drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
    - Without CONSULT-II: Drive vehicle for 10 minutes.

OPERATION PROCEDURE

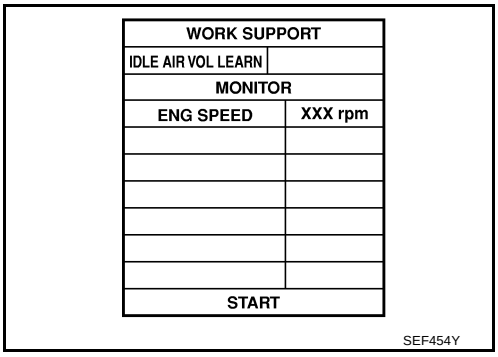
With CONSULT-II

1. Perform EC-49, "Accelerator Pedal Released Position Learning" .
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.

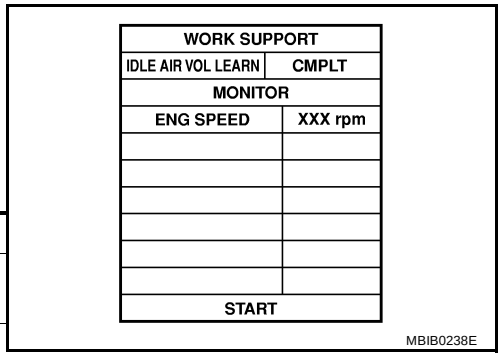
5. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.



6. Touch “START” and wait 20 seconds.



7. Make sure that “CMPLT” is displayed on CONSULT-II screen. If “CMPLT” is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.



ITEM	SPECIFICATION
Idle speed	QR20DE with M/T models: 650 ± 50 rpm (in Neutral position) Except above: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]
Ignition timing	M/T: 15 ± 5° BTDC (in Neutral position) A/T: 15 ± 5° BTDC (in P or N position)

Without CONSULT-II

NOTE:

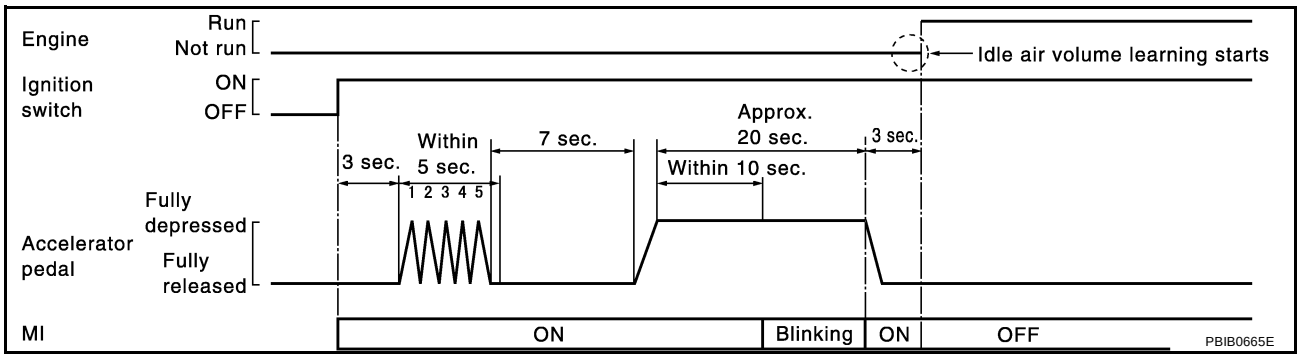
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform EC-49, "Accelerator Pedal Released Position Learning" .
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
7. Repeat the following procedure quickly 5 times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

8. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
9. Fully release the accelerator pedal within 3 seconds after the MI turned ON.
10. Start engine and let it idle.

11. Wait 20 seconds.



12. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION
Idle speed	QR20DE with M/T models: 650 ± 50 rpm (in Neutral position) Except above: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]
Ignition timing	M/T: 15 ± 5° BTDC (in Neutral position) A/T: 15 ± 5° BTDC (in P or N position)

13. If idle speed and ignition timing are not within the specification, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. **Check that throttle valve is fully closed.**
2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   It is useful to perform EC-123, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
5. **If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:**
   - **Engine stalls.**
   - **Erroneous idle.**

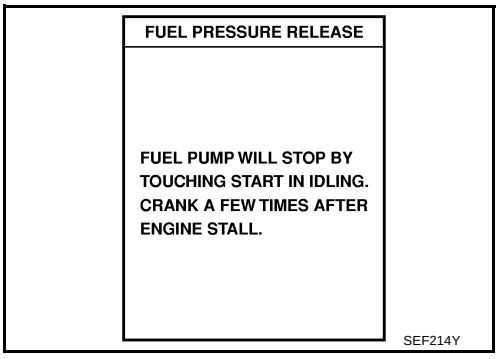
Fuel Pressure Check

BBS0019J

FUEL PRESSURE RELEASE

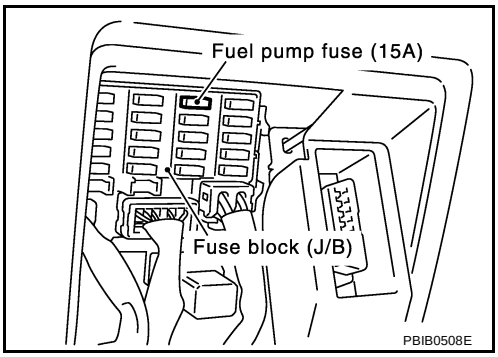
With CONSULT-II

1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.



Without CONSULT-II

1. Remove fuel pump fuse located in fuse box.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.



FUEL PRESSURE CHECK

CAUTION:

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

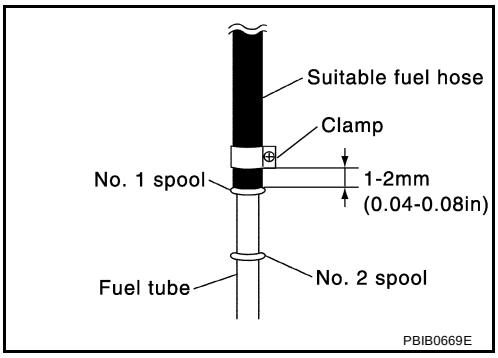
NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because T30 models do not have fuel return system.

CAUTION:

- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **When installing fuel hose quick connector, refer to EM-18, "INTAKE MANIFOLD" .**

1. Release fuel pressure to zero. Refer to EC-52, "FUEL PRESSURE RELEASE" .
2. Prepare fuel hose and fuel hose clamp for fuel pressure check, and connect fuel pressure gauge.
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.
3. Remove fuel hose. Refer to EM-18, "INTAKE MANIFOLD" .
   - Do not twist or kink fuel hose because it is plastic hose.
   - Do not remove fuel hose from quick connector.
   - Keep the original fuel hose to be free from intrusion of dust or foreign substances with a suitable cover.
4. Install the fuel pressure gauge as shown in the figure.
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube and No.1 spool.
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - When reconnecting fuel hose, check the original fuel hose for damage and abnormality.
   - Use a torque driver to tighten clamps.

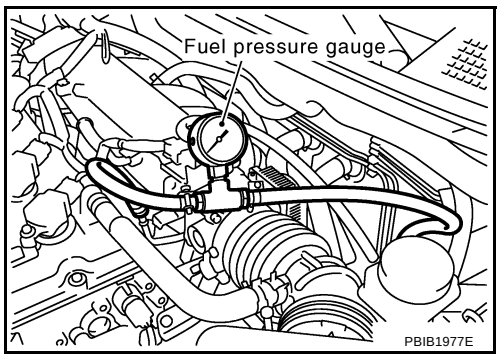


- Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).

Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- Make sure that clamp screw does not contact adjacent parts.

5. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
6. Turn ignition switch ON, and check for fuel leakage.
7. Start engine and check for fuel leakage.
8. Read the indication of fuel pressure gauge.



- Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
- During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.

At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2 , 51 psi)

9. If result is unsatisfactory, go to next step.
10. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

BBS0019K

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	ISO Standard
Diagnostic Trouble Code (DTC)	Service $03 of ISO 15031-5
Freeze Frame data	Service $02 of ISO 15031-5
System Readiness Test (SRT) code	Service $01 of ISO 15031-5
1st Trip Diagnostic Trouble Code (1st Trip DTC)	Service $07 of ISO 15031-5
1st Trip Freeze Frame data	
Test values and Test limits	Service $06 of ISO 15031-5
Calibration ID	Service $09 of ISO 15031-5

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data	SRT code	Test value
CONSULT-II	×	×	×	×	×	—
GST	×	×	×	—	×	×
ECM	×	×*	—	—	—	—

*: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator (MI) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-81, "Fail-Safe Chart" .)

Two Trip Detection Logic

BBS0019L

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MI will not light up at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MI lights up. The MI lights up at the same time when the DTC is stored. <2nd trip>
The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. Specific on board diagnostic items will cause the ECM to light up or blink the MI, and store DTC and Freeze Frame data, even in the 1st trip, as shown below.

×: Applicable —: Not applicable

Items	MI				DTC		1st trip DTC	
	1st trip		2nd trip		1st trip displaying	2nd trip displaying	1st trip displaying	2nd trip displaying
	Blinking	Lighting up	Blinking	Lighting up				
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	×	—	—	—	—	—	×	—
Misfire (Possible three way catalyst damage) — DTC: P0300 - P0304 is being detected	—	—	×	—	—	×	—	—
One trip detection diagnoses (Refer to EC-21, "INDEX FOR DTC")	—	×	—	—	×	—	—	—
Except above	—	—	—	×	—	×	×	—

When there is an open circuit on MI circuit, the ECM can not warn the driver by lighting up MI when there is trouble on engine control system.

Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system has trouble and MI circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the trouble.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Emission-Related Diagnostic Information

BBS0019M

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test Valve/ Test Limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST*2	ECM*3				
CAN COMM CIRCUIT	U1000	1000*4	—	—	— (A/T) × (M/T)	EC-136
CAN COMM CIRCUIT	U1001	1001*4	—	—	×	EC-136
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—	—
INT/V TIM CONT-B1	P0011	0011	—	—	×	EC-139
HO2S1 HTR (B1)	P0031	0031	×	×	×	EC-142
HO2S1 HTR (B1)	P0032	0032	×	×	×	EC-142
HO2S2 HTR (B1)	P0037	0037	×	×	×	EC-148
HO2S2 HTR (B1)	P0038	0038	×	×	×	EC-148
MAF SEN/CIRCUIT	P0102	0102	—	—	—	EC-154
MAF SEN/CIRCUIT	P0103	0103	—	—	—	EC-154
IAT SEN/CIRCUIT	P0112	0112	—	—	×	EC-162
IAT SEN/CIRCUIT	P0113	0113	—	—	×	EC-162
ECT SEN/CIRCU	P0117	0117	—	—	—	EC-168
ECT SEN/CIRCU	P0118	0118	—	—	—	EC-168
TP SEN 2/CIRC	P0122	0122	—	—	—	EC-174
TP SEN 2/CIRC	P0123	0123	—	—	—	EC-174
HO2S1 (B1)	P0132	0132	—	×	×	EC-182
HO2S1 (B1)	P0133	0133	×	×	×	EC-189
HO2S1 (B1)	P0134	0134	—	×	×	EC-199
HO2S2 (B1)	P0138	0138	—	×	×	EC-207
HO2S2 (B1)	P0139	0139	×	×	×	EC-214
FUEL SYS-LEAN-B1	P0171	0171	—	—	×	EC-222
FUEL SYS-RICH-B1	P0172	0172	—	—	×	EC-228
TP SEN 1/CIRC	P0222	0222	—	—	—	EC-234
TP SEN 1/CIRC	P0223	0223	—	—	—	EC-234
MULTI CYL MISFIRE	P0300	0300	—	—	×	EC-242
CYL 1 MISFIRE	P0301	0301	—	—	×	EC-242
CYL 2 MISFIRE	P0302	0302	—	—	×	EC-242
CYL 3 MISFIRE	P0303	0303	—	—	×	EC-242
CYL 4 MISFIRE	P0304	0304	—	—	×	EC-242
KNOCK SEN/CIRC-B1	P0327	0327	—	—	×	EC-248
KNOCK SEN/CIRC-B1	P0328	0328	—	—	×	EC-248
CKP SEN/CIRCUIT	P0335	0335	—	—	×	EC-253

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test Valve/ Test Limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST*2	ECM*3				
CMP SEN/CIRC-B1	P0340	0340	—	—	×	EC-260
TW CATALYST SYS-B1	P0420	0420	×	×	×	EC-267
PURG VOLUME CONT/V	P0444	0444	—	—	×	EC-272
VEH SPEED SEN/CIRC*7	P0500	0500	—	—	×	EC-279
PW ST P SEN/CIRC	P0550	0550	—	—	×	EC-281
ECM	P0605	0605	—	—	× or —	EC-286
PNP SW/CIRC	P0705	0705	—	—	×	AT-98
ATF TEMP SEN/CIRC	P0710	0710	—	—	×	AT-103
VEH SPD SEN/CIR AT*7	P0720	0720	—	—	×	AT-109
ENGINE SPEED SIG	P0725	0725	—	—	×	AT-116
A/T 1ST GR FNCTN	P0731	0731	—	—	×	AT-121
A/T 2ND GR FNCTN	P0732	0732	—	—	×	AT-126
A/T 3RD GR FNCTN	P0733	0733	—	—	×	AT-131
A/T 4TH GR FNCTN	P0734	0734	—	—	×	AT-136
TCC SOLENOID/CIRC	P0740	0740	—	—	×	AT-144
L/PRESS SOL/CIRC	P0745	0745	—	—	×	AT-150
SFT SOL A/CIRC	P0750	0750	—	—	—	AT-157
SFT SOL B/CIRC	P0755	0755	—	—	—	AT-163
ECM BACK UP/CIRC	P1065	1065	—	—	×	EC-289
INT/V TIM V/CIR-B1	P1111	1111	—	—	×	EC-293
ETC ACTR	P1121	1121	—	—	—	EC-297
ETC FUNCTION/CIRC	P1122	1122	—	—	—	EC-299
ETC MOT PWR	P1124	1124	—	—	—	EC-309
ETC MOT PWR	P1126	1126	—	—	—	EC-309
ETC MOT	P1128	1128	—	—	—	EC-317
HO2S1 (B1)	P1143	1143	×	×	×	EC-325
HO2S1 (B1)	P1144	1144	×	×	×	EC-331
HO2S2 (B1)	P1146	1146	×	×	×	EC-337
HO2S2 (B1)	P1147	1147	×	×	×	EC-345
TCS CU FUNCTN*5	P1211	1211	—	—	×	EC-353
TCS/CIRC*5	P1212	1212	—	—	×	EC-354
ENG OVER TEMP	P1217	1217	—	—	—	EC-355
CTP LEARNING	P1225	1225	—	—	×	EC-371
CTP LEARNING	P1226	1226	—	—	×	EC-373
SENSOR POWER/CIRC	P1229	1229	—	—	—	EC-375
ASCD SW*6	P1564	1564	—	—	—	EC-380
ASCD BRAKE SW*6	P1572	1572	—	—	—	EC-390
ASCD VHL SPD SEN*6	P1574	1574	—	—	—	EC-399
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	—	—	×	BL-107
TP SEN/CIRC A/T	P1705	1705	—	—	—	AT-169
P-N POS SW/CIRCUIT	P1706	1706	—	—	×	EC-401

Items (CONSULT-II screen terms)	DTC*1		SRT code	Test Valve/ Test Limit (GST only)	1st trip DTC	Reference page
	CONSULT-II GST*2	ECM*3				
V/SP SEN (A/T OUT)	P1720	1720	—	—	×	EC-406
O/R CLTCH SOL/CIRC	P1760	1760	—	—	×	AT-174
BRAKE SW/CIRCUIT	P1805	1805	—	—	×	EC-408
APP SEN 1/CIRC	P2122	2122	—	—	—	EC-412
APP SEN 1/CIRC	P2123	2123	—	—	—	EC-412
APP SEN 2/CIRC	P2127	2127	—	—	—	EC-419
APP SEN 2/CIRC	P2128	2128	—	—	—	EC-419
TP SENSOR	P2135	2135	—	—	—	EC-427
APP SENSOR	P2138	2138	—	—	—	EC-435

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by ISO 15031-5.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: The troubleshooting for this DTC needs CONSULT-II.
*5: For models with ESP
*6: For QR25DE engine models
*7: When the fail-safe operation for both self-diagnoses occur at the same time, the MI illuminates.

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MI will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MI lights up. In other words, the DTC is stored in the ECM memory and the MI lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For malfunctions that blink or light up the MI during the 1st trip, the DTC and 1st trip DTC are stored in the ECM memory.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in EC-66, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
For malfunctions in which 1st trip DTCs are displayed, refer to EC-56, "EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS" . These items are required by legal regulations to continuously monitor the system/component. In addition, the items monitored non-continuously are also displayed on CONSULT-II.
1st trip DTC is specified in Service $07 of ISO 15031-5. 1st trip DTC detection occurs without lighting up the MI and therefore does not warn the driver of a malfunction. However, 1st trip DTC detection will not prevent the vehicle from being tested, for example during Inspection/Maintenance (I/M) tests.
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step II, refer to EC-77, "WORK FLOW" . Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

With CONSULT-II

With GST

CONSULT-II or GST (Generic Scan Tool) Examples: P0340, P0740, P0745, etc.
This DTC is prescribed by ISO 15031-5.
(CONSULT-II also displays the malfunctioning component or system.)

No Tools

The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0102, 0340 etc.
This DTC is controlled by NISSAN.

- **1st trip DTC No. is the same as DTC No.**

- **Output of a DTC indicates a malfunction. However, GST or the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be [0].
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	1t

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FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II or GST. The 1st trip freeze frame data can only be displayed on the CONSULT-II screen, not on the GST. For details, see EC-109, "Freeze Frame Data and 1st Trip Freeze Frame Data" .
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MI on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM. The ECM has the following priorities to update the data.

Priority	Items	
1	Freeze frame data	Misfire — DTC: P0300 - P0304 Fuel Injection System Function — DTC: P0171, P0172
2		Except the above items (Includes A/T related items)
3	1st trip freeze frame data	

For example, the EGR malfunction (Priority: 2) was detected and the freeze frame data was stored in the 2nd trip. After that when the misfire (Priority: 1) is detected in another trip, the freeze frame data will be updated from the EGR malfunction to the misfire. The 1st trip freeze frame data is updated each time a different malfunction is detected. There is no priority for 1st trip freeze frame data. However, once freeze frame data is stored in the ECM memory, 1st trip freeze data is no longer stored (because only one freeze frame data or 1st trip freeze frame data can be stored in the ECM). If freeze frame data is stored in the ECM memory and freeze frame data with the same priority occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in EC-66, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

SYSTEM READINESS TEST (SRT) CODE

System Readiness Test (SRT) code is specified in Service $01 of ISO 15031-5.
As part of an enhanced emissions test for Inspection & Maintenance (I/M), certain states require the status of SRT be used to indicate whether the ECM has completed self-diagnosis of major emission systems and components. Completion must be verified in order for the emissions inspection to proceed.
If a vehicle is rejected for a State emissions inspection due to one or more SRT items indicating “INCMP”, use the information in this Service Manual to set the SRT to “CMPLT”.

In most cases the ECM will automatically complete its self-diagnosis cycle during normal usage, and the SRT status will indicate “CMPLT” for each application system. Once set as “CMPLT”, the SRT status remains “CMPLT” until the self-diagnosis memory is erased.
Occasionally, certain portions of the self-diagnostic test may not be completed as a result of the customer's normal driving pattern; the SRT will indicate “INCMP” for these items.

NOTE:
The SRT will also indicate “INCMP” if the self-diagnosis memory is erased for any reason or if the ECM memory power supply is interrupted for several hours.
If, during the state emissions inspection, the SRT indicates “CMPLT” for all test items, the inspector will continue with the emissions test. However, if the SRT indicates “INCMP” for one or more of the SRT items the vehicle is returned to the customer untested.

NOTE:
If MI is “ON” during the state emissions inspection, the vehicle is also returned to the customer untested even though the SRT indicates “CMPLT” for all test items. Therefore, it is important to check SRT (“CMPLT”) and DTC (No DTCs) before the inspection.

SRT Item

The table below shows required self-diagnostic items to set the SRT to “CMPLT”.

SRT item (CONSULT-II indication)	Performance Priority*	Required self-diagnostic items to set the SRT to “CMPLT”	Corresponding DTC No.
CATALYST	2	Three way catalyst function	P0420
HO2S	1	Heated oxygen sensor 1	P0133
		Heated oxygen sensor 1	P1143
		Heated oxygen sensor 1	P1144
		Heated oxygen sensor 2	P0139
		Heated oxygen sensor 2	P1146
		Heated oxygen sensor 2	P1147
HO2S HTR	1	Heated oxygen sensor 1 heater	P0031, P0032
		Heated oxygen sensor 2 heater	P0037, P0038

*: If completion of several SRTs is required, perform driving patterns (DTC confirmation procedure), one by one based on the priority for models with CONSULT-II.

SRT Set Timing

SRT is set as “CMPLT” after self-diagnosis has been performed one or more times. Completion of SRT is done regardless of whether the result is OK or NG. The set timing is different between OK and NG results and is shown in the table below.

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle			
			← ON → OFF	← ON → OFF	← ON → OFF	← ON →
All OK	Case 1	P0400	OK (1)	— (1)	OK (2)	— (2)
		P0402	OK (1)	— (1)	— (1)	OK (2)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“CMPLT”	“CMPLT”	“CMPLT”	“CMPLT”
	Case 2	P0400	OK (1)	— (1)	— (1)	— (1)
		P0402	— (0)	— (0)	OK (1)	— (1)
		P1402	OK (1)	OK (2)	— (2)	— (2)
		SRT of EGR	“INCMP”	“INCMP”	“CMPLT”	“CMPLT”

Self-diagnosis result		Example				
		Diagnosis	Ignition cycle ← ON → OFF ← ON → OFF ← ON → OFF ← ON →			
NG exists	Case 3	P0400	OK	OK	—	—
		P0402	—	—	—	—
		P1402	NG	—	NG	NG (Consecutive NG)
		(1st trip) DTC	1st trip DTC	—	1st trip DTC	DTC (= MI “ON”)
		SRT of EGR	“INCMP”	“INCMP”	“INCMP”	“CMPLT”

OK: Self-diagnosis is carried out and the result is OK.
NG: Self-diagnosis is carried out and the result is NG.
—: Self-diagnosis is not carried out.

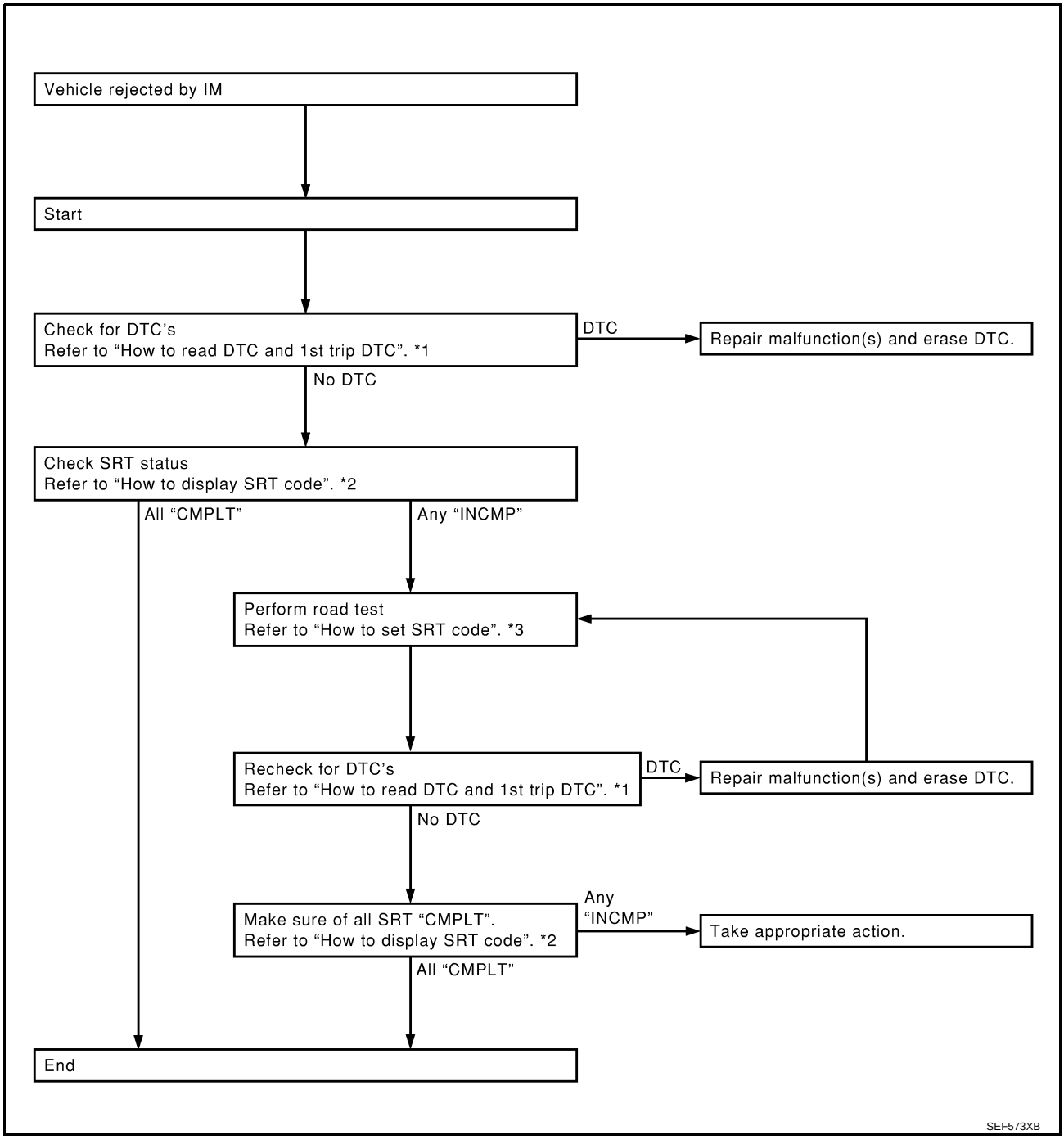
When all SRT related self-diagnoses showed OK results in a single cycle (Ignition OFF-ON-OFF), the SRT will indicate “CMPLT”. → Case 1 above
When all SRT related self-diagnoses showed OK results through several different cycles, the SRT will indicate “CMPLT” at the time the respective self-diagnoses have at least one OK result. → Case 2 above
If one or more SRT related self-diagnoses showed NG results in 2 consecutive cycles, the SRT will also indicate “CMPLT”. → Case 3 above
The table above shows that the minimum number of cycles for setting SRT as “INCMP” is one (1) for each self-diagnosis (Case 1 & 2) or two (2) for one of self-diagnoses (Case 3). However, in preparation for the state emissions inspection, it is unnecessary for each self-diagnosis to be executed twice (Case 3) for the following reasons:

- The SRT will indicate “CMPLT” at the time the respective self-diagnoses have one (1) OK result.
- The emissions inspection requires “CMPLT” of the SRT only with OK self-diagnosis results.
- When, during SRT driving pattern, 1st trip DTC (NG) is detected prior to “CMPLT” of SRT, the self-diagnosis memory must be erased from ECM after repair.
- If the 1st trip DTC is erased, all the SRT will indicate “INCMP”.

  NOTE:
  SRT can be set as “CMPLT” together with the DTC(s). Therefore, DTC check must always be carried out prior to the state emission inspection even though the SRT indicates “CMPLT”.

SRT Service Procedure

If a vehicle has failed the state emissions inspection due to one or more SRT items indicating “INCMP”, review the flowchart diagnostic sequence on the next page.



*1 EC-58, "How to Read DTC and 1st Trip DTC" *2 EC-62, "How to Display SRT Code" *3 EC-63, "How to Set SRT Code"

How to Display SRT Code

WITH CONSULT-II

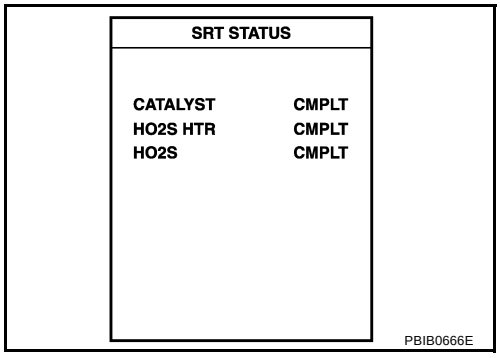
Selecting "SRT STATUS" in "DTC CONFIRMATION" mode with CONSULT-II.

For items whose SRT codes are set, a "CMPLT" is displayed on the CONSULT-II screen; for items whose SRT codes are not set, "INCMP" is displayed.

A sample of CONSULT-II display for SRT code is shown at right.

"INCMP" means the self-diagnosis is incomplete and SRT is not set.

"CMPLT" means the self-diagnosis is complete and SRT is set.



WITH GST

Selecting Service $01 with GST (Generic Scan Tool)

How to Set SRT Code

To set all SRT codes, self-diagnosis for the items indicated above must be performed one or more times. Each diagnosis may require a long period of actual driving under various conditions.

WITH CONSULT-II

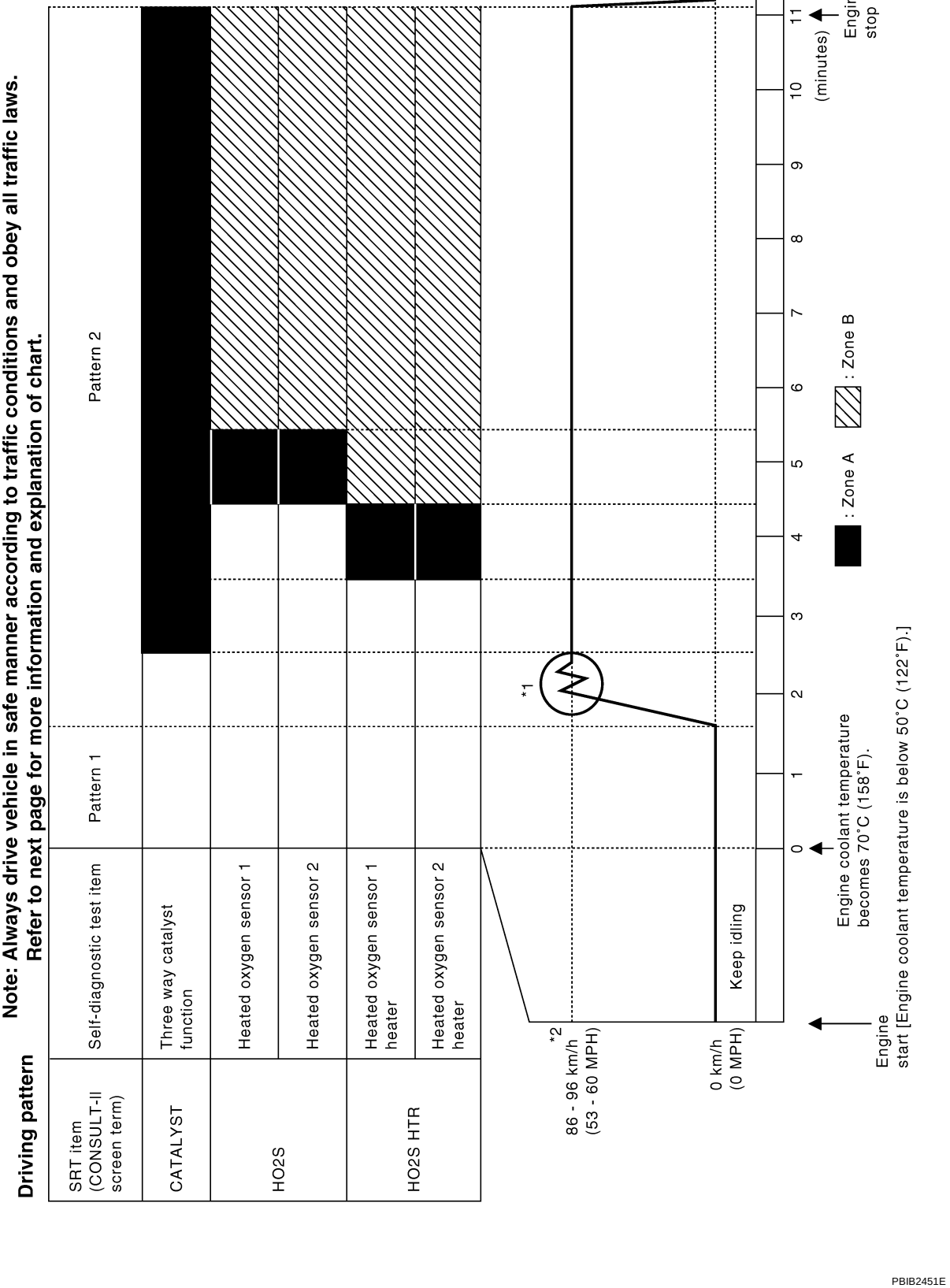
Perform corresponding DTC Confirmation Procedure one by one based on Performance Priority in the table on EC-60, "SRT Item" .

WITHOUT CONSULT-II

The most efficient driving pattern in which SRT codes can be properly set is explained on the next page. The driving pattern should be performed one or more times to set all SRT codes.

Driving Pattern

Note: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.
Refer to next page for more information and explanation of chart.



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- The time required for each diagnosis varies with road surface conditions, weather, altitude, individual driving habits, etc.
  Zone A refers to the range where the time, required for the diagnosis under normal conditions*, is the shortest.
  Zone B refers to the range where the diagnosis can still be performed if the diagnosis is not completed within zone A.

*: Normal conditions refer to the following:

- Sea level
- Flat road
- Ambient air temperature: 20 - 30°C (68 - 86°F)
- Diagnosis is performed as quickly as possible under normal conditions.
  Under different conditions [For example: ambient air temperature other than 20 - 30°C (68 - 86°F)], diagnosis may also be performed.

Pattern 1:

- **The engine is started at the engine coolant temperature of −10 to 35°C (14 to 95°F) (where the voltage between the ECM terminal 72 and ground is 3.0 - 4.3V).**
- **The engine must be operated at idle speed until the engine coolant temperature is greater than 70°C (158°F) (where the voltage between the ECM terminal 72 and ground is lower than 1.4V).**

Pattern 2:

- When steady-state driving is performed again even after it is interrupted, each diagnosis can be conducted. In this case, the time required for diagnosis may be extended.

*1: Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH), then release the accelerator pedal and keep it released for more than 10 seconds. Depress the accelerator pedal until vehicle speed is 90 km/h (56 MPH) again.
*2: Checking the vehicle speed with GST is advised.

TEST VALUE AND TEST LIMIT (GST ONLY — NOT APPLICABLE TO CONSULT-II)

The following is the information specified in Service $06 of ISO 15031-5.
The test value is a parameter used to determine whether a system/circuit diagnostic test is OK or NG while being monitored by the ECM during self-diagnosis. The test limit is a reference value which is specified as the maximum or minimum value and is compared with the test value being monitored.
These data (test value and test limit) are specified by Test ID (TID) and Component ID (CID) and can be displayed on the GST screen.

SRT item	Self-diagnostic test item	DTC	Test value (GST display)		Test limit
			TID	CID	
CATALYST	Three way catalyst function	P0420	01H	01H	Max.
		P0420	02H	81H	Min.
HO2S	Heated oxygen sensor 1	P0133	09H	04H	Max.
		P1143	0AH	84H	Min.
		P1144	0BH	04H	Max.
		P0132	0CH	04H	Max.
		P0134	0DH	04H	Max.
	Heated oxygen sensor 2	P0139	19H	86H	Min.
		P1147	1AH	86H	Min.
		P1146	1BH	06H	Max.
		P0138	1CH	06H	Max.
HO2S HTR	Heated oxygen sensor 1 heater	P0032	29H	08H	Max.
		P0031	2AH	88H	Min.
	Heated oxygen sensor 2 heater	P0038	2DH	0AH	Max.
		P0037	2EH	8AH	Min.

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

With CONSULT-II

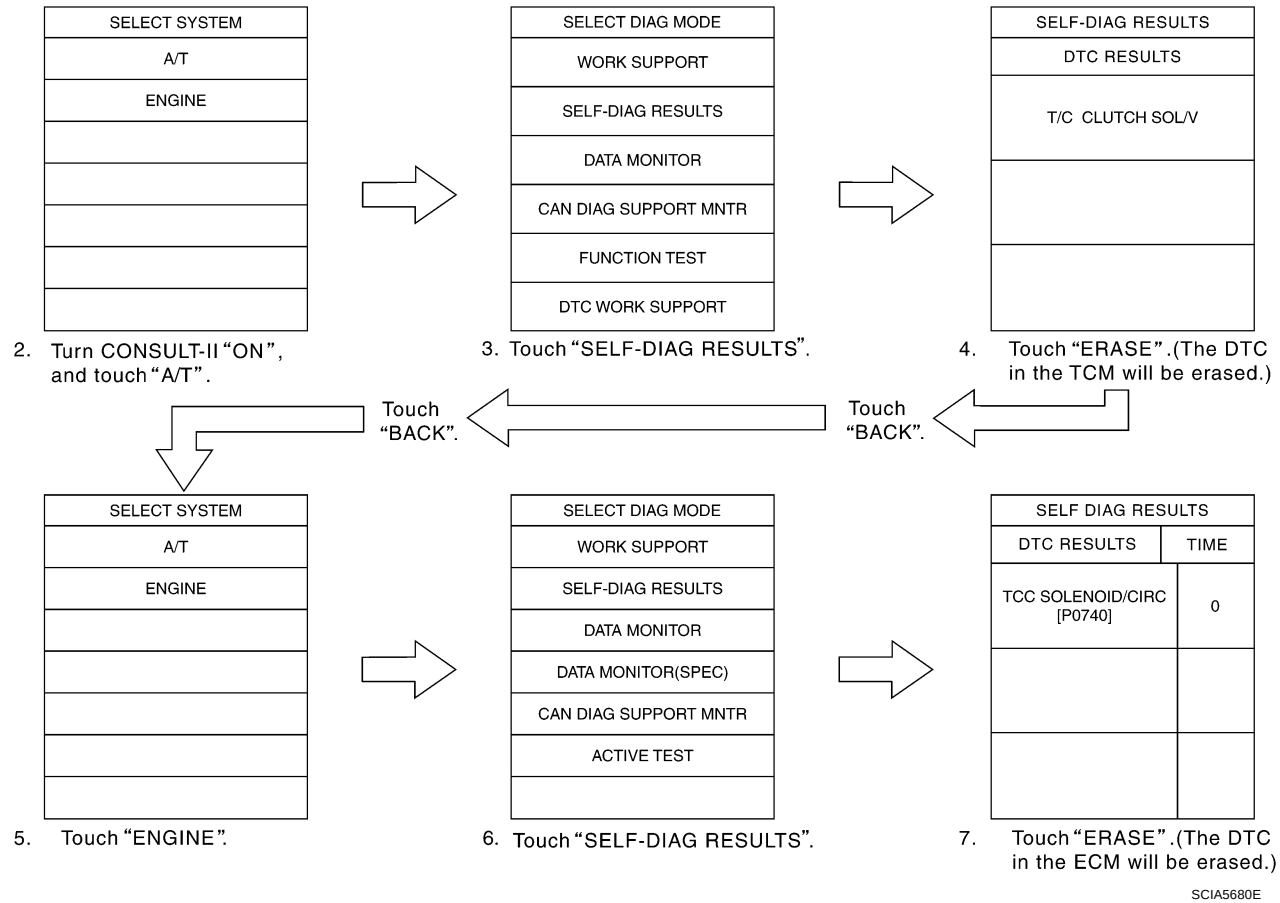
The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.
If DTCs are displayed for both ECM and TCM (Transmission control module), they need to be erased individually from the ECM and TCM (Transmission control module).

NOTE:
If the DTC is not for A/T related items (see EC-21, "INDEX FOR DTC"), skip steps 2 through 4.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Turn CONSULT-II ON and touch “A/T”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. [The DTC in the TCM (Transmission control module) will be erased.] Then touch “BACK” twice.
5. Touch “ENGINE”.
6. Touch “SELF-DIAG RESULTS”.
7. Touch “ERASE”. (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 5 seconds and then turn it “ON” (engine stopped) again.



With GST

The emission related diagnostic information in the ECM can be erased by selecting Service $04 with GST.

NOTE:
If the DTC is not for A/T related items (see EC-21, "INDEX FOR DTC"), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.

2. Perform AT-41, "HOW TO ERASE DTC (WITH GST)" . (The DTC in the TCM will be erased.)
3. Select Service $04 with GST (Generic Scan Tool).

No Tools

NOTE:
If the DTC is not for A/T related items (see EC-21, "INDEX FOR DTC"), skip step 2.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Perform AT-41, "HOW TO ERASE DTC (NO TOOLS)" . (The DTC in TCM will be erased.)
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-69, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

– Diagnostic trouble codes
– 1st trip diagnostic trouble codes
– Freeze frame data
– 1st trip freeze frame data
– System readiness test (SRT) codes
– Test values

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

NATS (Nissan Anti-Theft System)

BBS0019N

- **If the security indicator lights up with the ignition switch in the ON position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to BL-107, "NATS (NISSAN ANTI-THEFT SYSTEM)" .**
- **Confirm no self-diagnostic results of NATS is displayed before touching "ERASE" in "SELF-DIAG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner.
  Regarding the procedures of NATS initialization and all NATS ignition key ID registration, refer to CONSULT-II Operation Manual, NATS.

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

SEF515Y

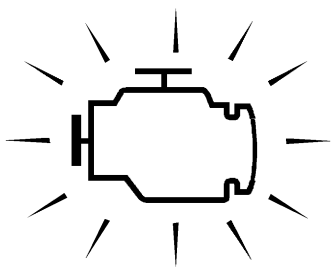
Malfunction Indicator (MI)

BBS0019O

DESCRIPTION

The MI is located on the instrument panel.

1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MI does not light up, refer to DI-34, "WARNING LAMPS" or see EC-521, "MI & DATA LINK CONNECTORS" .
2. When the engine is started, the MI should go off.
   If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



SAT652J

ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following four functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position Engine stopped	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.
	Engine running	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MI will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up or blink the MI in the 1st trip. ● Misfire (Possible three way catalyst damage) ● One trip detection diagnoses
Mode II	Ignition switch in ON position Engine stopped	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

When there is an open circuit on MI circuit, the ECM can not warn the driver by lighting up MI when there is trouble on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system has trouble and MI circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the trouble.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

MI Flashing without DTC

If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode. EC-69, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
How to switch the diagnostic test (function) modes, and details of the above functions are described later, EC-69, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

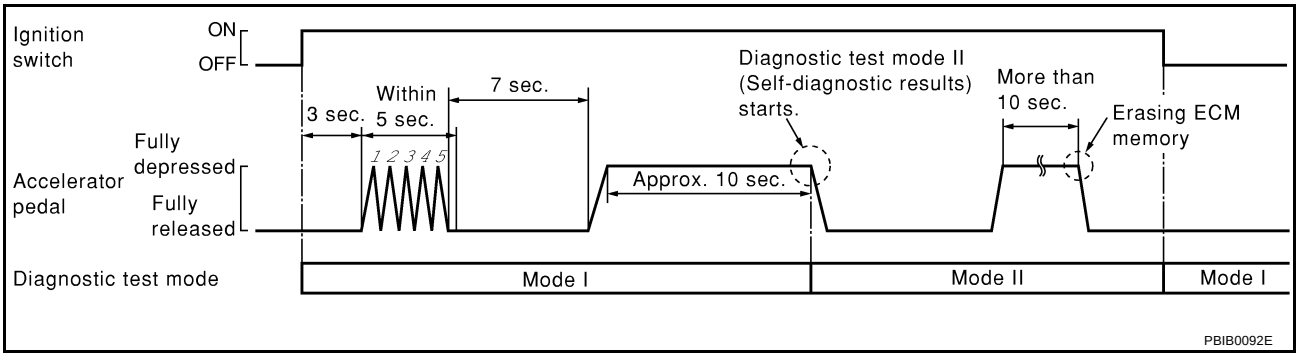
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.

b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Set Diagnostic Test Mode II (Heated Oxygen Sensor 1 Monitor)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-69, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Start Engine.
   ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-69, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to DI-34, "WARNING LAMPS" or see EC-521, "MI & DATA LINK CONNECTORS" .

DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

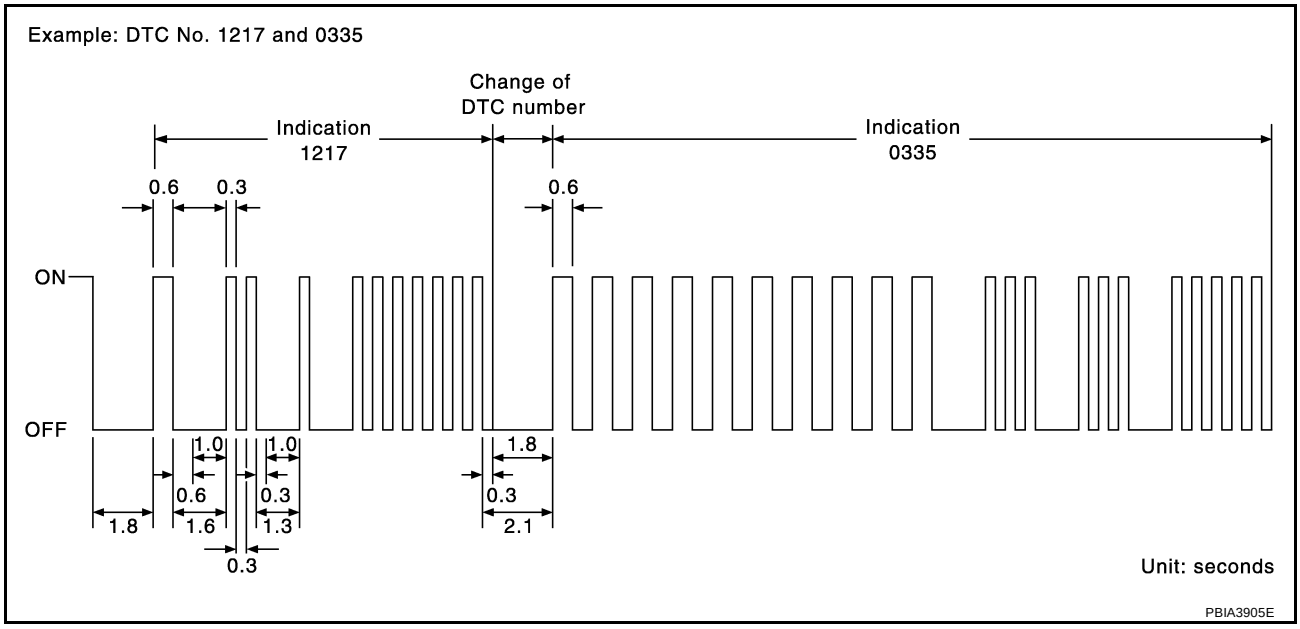
MI	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

- These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below.
The DTC and 1st trip DTC are displayed at the same time. If the MI does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MI illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified

codes can be identified by using the CONSULT-II or GST. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-21, "INDEX FOR DTC")

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to EC-69, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

DIAGNOSTIC TEST MODE II — HEATED OXYGEN SENSOR 1 MONITOR

In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MI	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no-load conditions. Then make sure that the MI comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no-load.

OBD System Operation Chart

BBS0019P

RELATIONSHIP BETWEEN MI, 1ST TRIP DTC, DTC, AND DETECTABLE ITEMS

- When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data are stored in the ECM memory.
- When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data are stored in the ECM memory, and the MI will come on. For details, refer to EC-55, "Two Trip Detection Logic" .
- The MI will go off after the vehicle is driven 3 times (driving pattern B) with no malfunction. The drive is counted only when the recorded driving pattern is met (as stored in the ECM). If another malfunction occurs while counting, the counter will reset.
- The DTC and the freeze frame data will be stored until the vehicle is driven 40 times (driving pattern A) without the same malfunction recurring (except for Misfire and Fuel Injection System). For Misfire and Fuel Injection System, the DTC and freeze frame data will be stored until the vehicle is driven 80 times (driving pattern C) without the same malfunction recurring. The “TIME” in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II will count the number of times the vehicle is driven.
- The 1st trip DTC is not displayed when the self-diagnosis results in OK for the 2nd trip.

SUMMARY CHART

Items	Fuel Injection System	Misfire	Other
MI (goes off)	3 (pattern B)	3 (pattern B)	3 (pattern B)
DTC, Freeze Frame Data (no display)	80 (pattern C)	80 (pattern C)	40 (pattern A)
1st Trip DTC (clear)	1 (pattern C), *1	1 (pattern C), *1	1 (pattern B)
1st Trip Freeze Frame Data (clear)	*1 , *2	*1 , *2	1 (pattern B)

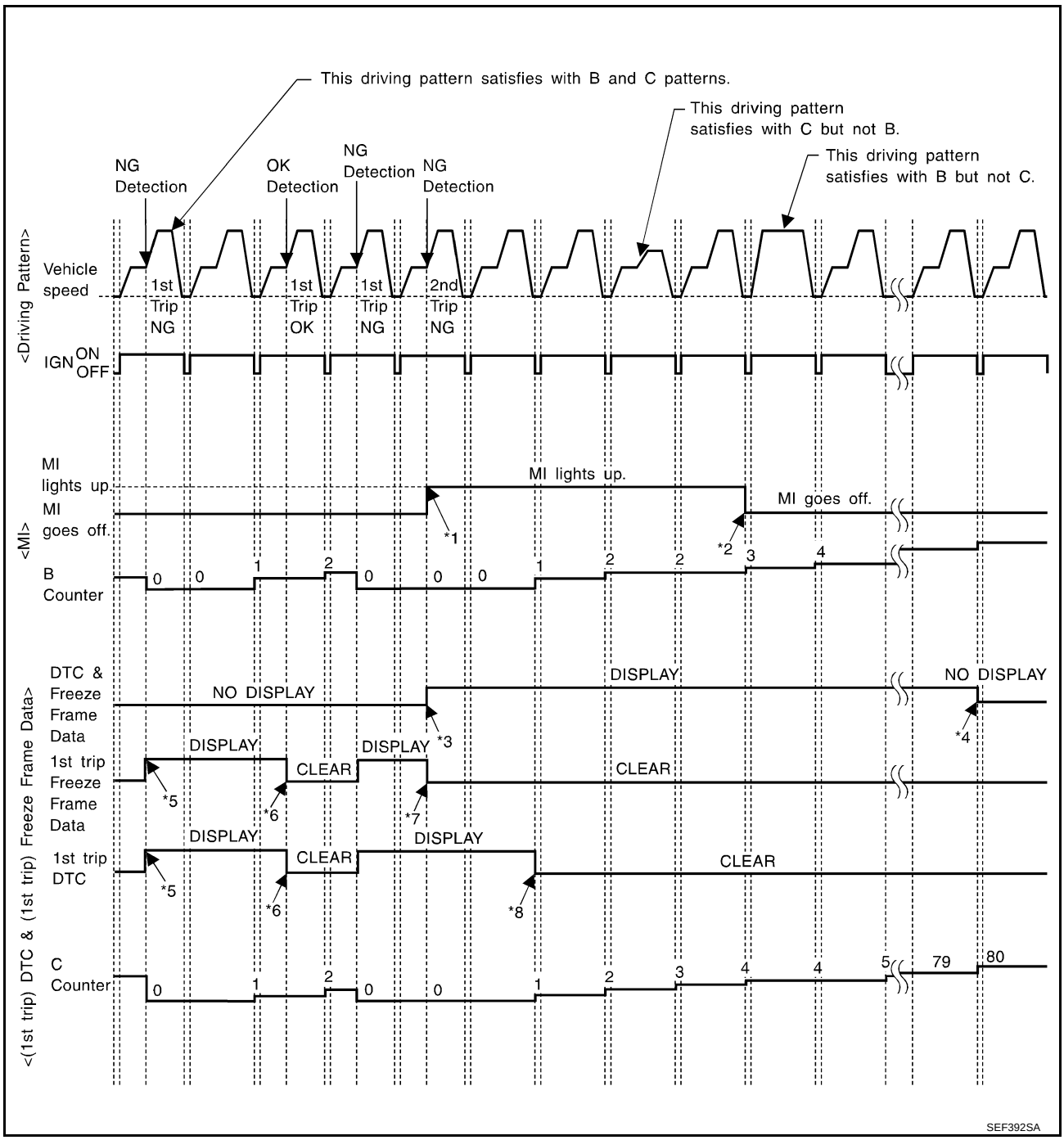
For details about patterns B and C under “Fuel Injection System” and “Misfire”, see EC-73, "EXPLANATION FOR DRIVING PATTERNS FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”" .

For details about patterns A and B under “Other”, see EC-75, "EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR “MISFIRE <EXHAUST QUALITY DETERIORATION>”, “FUEL INJECTION SYSTEM”" .

*1: Clear timing is at the moment OK is detected.

*2: Clear timing is when the same malfunction is detected in the 2nd trip.

RELATIONSHIP BETWEEN MI, DTC, 1ST TRIP DTC AND DRIVING PATTERNS FOR "MISFIRE" <EXHAUST QUALITY DETERIORATION>, "FUEL INJECTION SYSTEM"



*1: When the same malfunction is detected in two consecutive trips, MI will light up.

*2: MI will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 80 times (pattern C) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: The 1st trip DTC and the 1st trip freeze frame data will be cleared at the moment OK is detected.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

*8: 1st trip DTC will be cleared when vehicle is driven once (pattern C) without the same malfunction after DTC is stored in ECM.

EXPLANATION FOR DRIVING PATTERNS FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunction.
- The MI will go off when the B counter reaches 3. (*2 in OBD SYSTEM OPERATION CHART)

<Driving Pattern C>

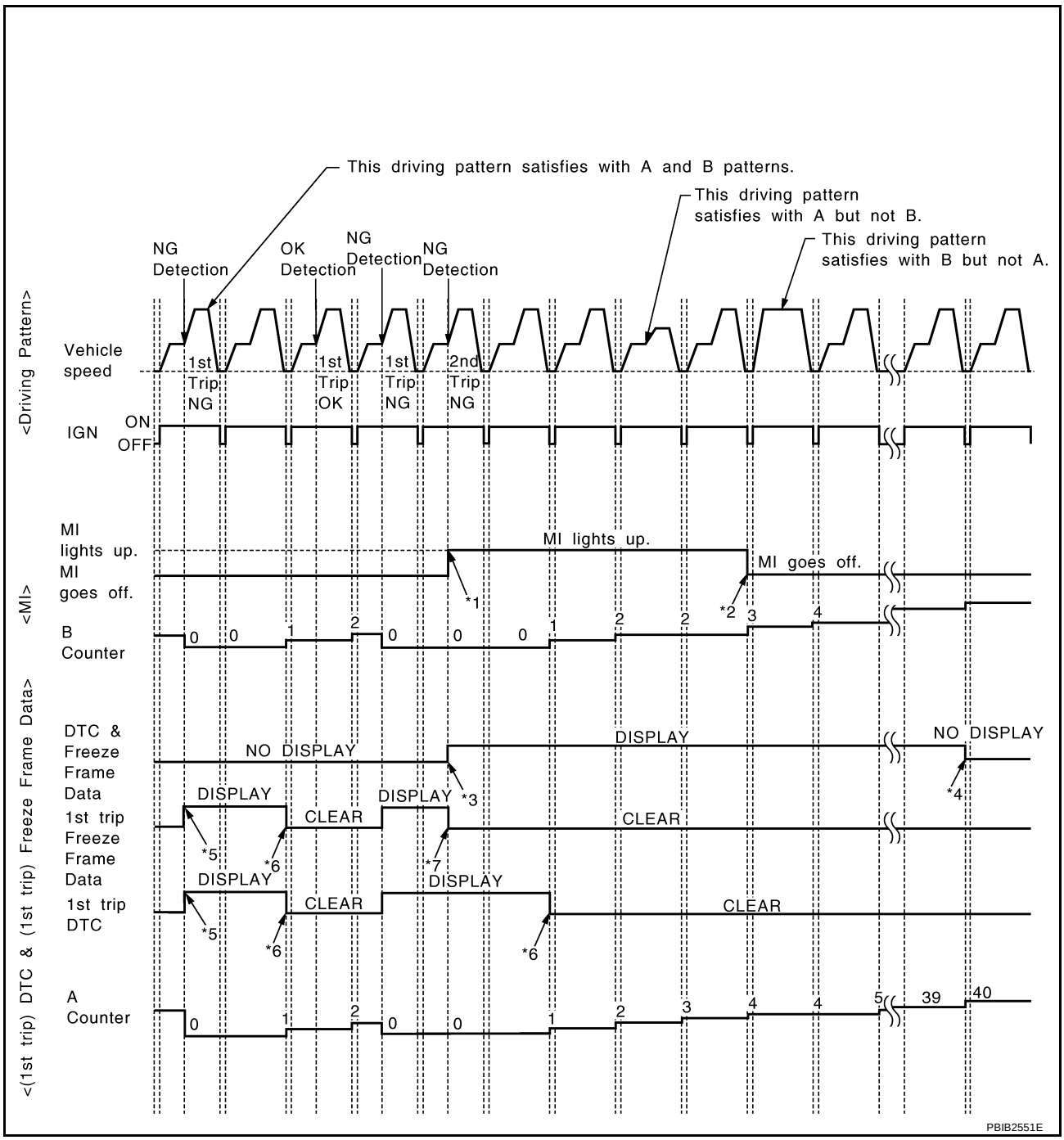
Driving pattern C means the vehicle operation as follows:
The following conditions should be satisfied at the same time:
Engine speed: (Engine speed in the freeze frame data) ±375 rpm
Calculated load value: (Calculated load value in the freeze frame data) x (1±0.1) [%]
Engine coolant temperature (T) condition:

- When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F).
- When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F).

Example:
If the stored freeze frame data is as follows:
Engine speed: 850 rpm, Calculated load value: 30%, Engine coolant temperature: 80°C (176°F)
To be satisfied with driving pattern C, the vehicle should run under the following conditions:
Engine speed: 475 - 1,225 rpm, Calculated load value: 27 - 33%, Engine coolant temperature: more than 70°C (158°F)

- The C counter will be cleared when the malfunction is detected regardless of vehicle conditions above.
- The C counter will be counted up when vehicle conditions above is satisfied without the same malfunction.
- The DTC will not be displayed after C counter reaches 80.
- The 1st trip DTC will be cleared when C counter is counted once without the same malfunction after DTC is stored in ECM.

RELATIONSHIP BETWEEN MI, DTC, 1ST TRIP DTC AND DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"



*1: When the same malfunction is detected in two consecutive trips, MI will light up.

*2: MI will go off after vehicle is driven 3 times (pattern B) without any malfunctions.

*3: When the same malfunction is detected in two consecutive trips, the DTC and the freeze frame data will be stored in ECM.

*4: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 40 times (pattern A) without the same malfunction. (The DTC and the freeze frame data still remain in ECM.)

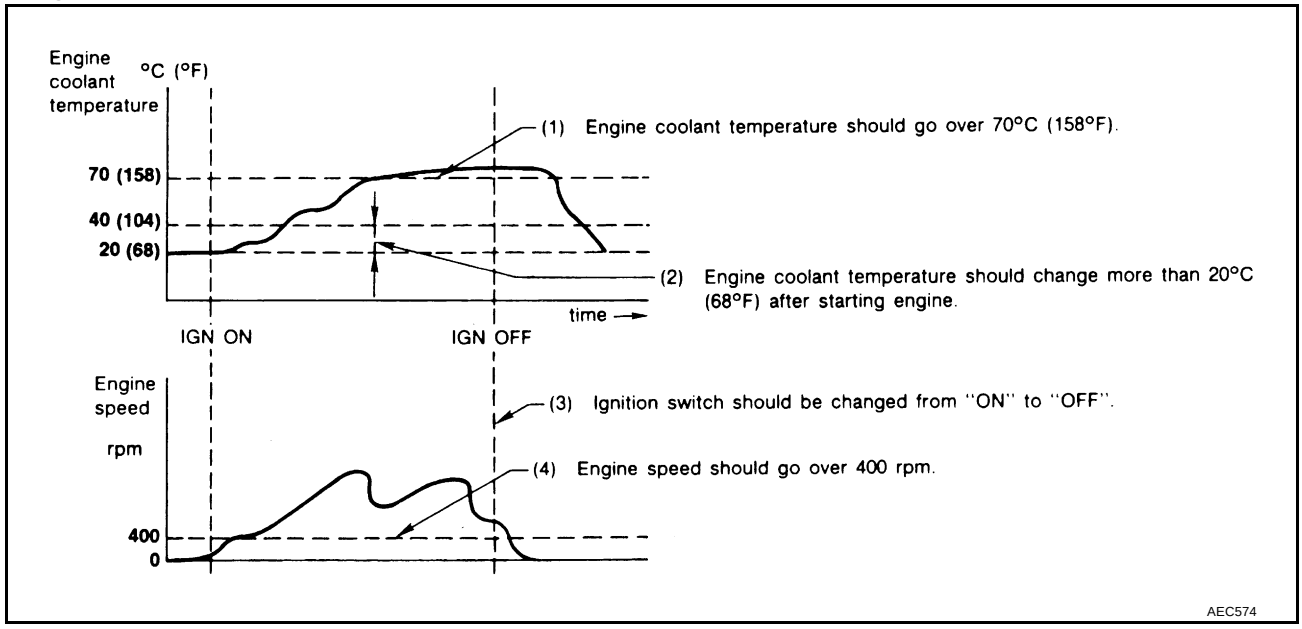
*5: When a malfunction is detected for the first time, the 1st trip DTC and the 1st trip freeze frame data will be stored in ECM.

*6: 1st trip DTC will be cleared after vehicle is driven once (pattern B) without the same malfunction.

*7: When the same malfunction is detected in the 2nd trip, the 1st trip freeze frame data will be cleared.

EXPLANATION FOR DRIVING PATTERNS EXCEPT FOR "MISFIRE <EXHAUST QUALITY DETERIORATION>", "FUEL INJECTION SYSTEM"

<Driving Pattern A>



- The A counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The A counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the A counter reaches 40.

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
All components and systems should be monitored at least once by the OBD system.

- The B counter will be cleared when the malfunction is detected once regardless of the driving pattern.
- The B counter will be counted up when driving pattern B is satisfied without any malfunctions.
- The MI will go off when the B counter reaches 3 (*2 in OBD SYSTEM OPERATION CHART).

TROUBLE DIAGNOSIS

PFP:00004

Trouble Diagnosis Introduction

BBS0019Q

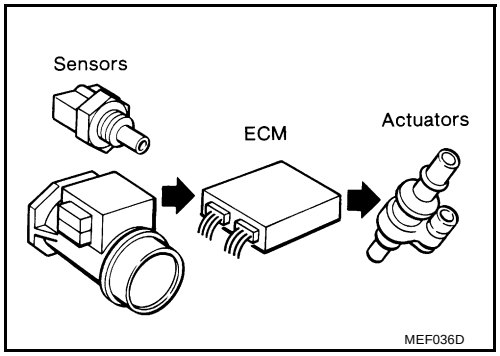
INTRODUCTION

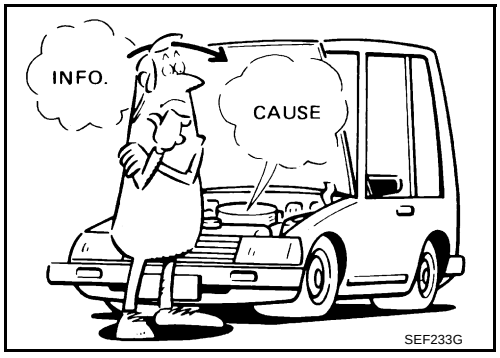
The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine. It is much more difficult to diagnose an incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

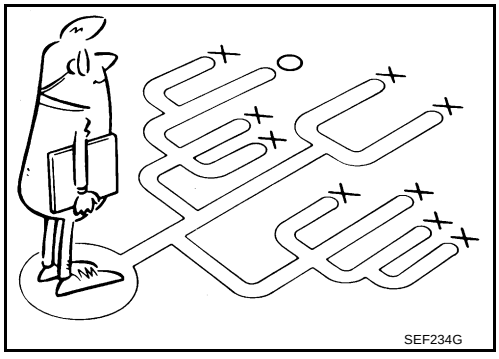
A visual check only may not find the cause of the incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow EC-77, "WORK FLOW" .

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on EC-79, "Worksheet Sample" should be used.

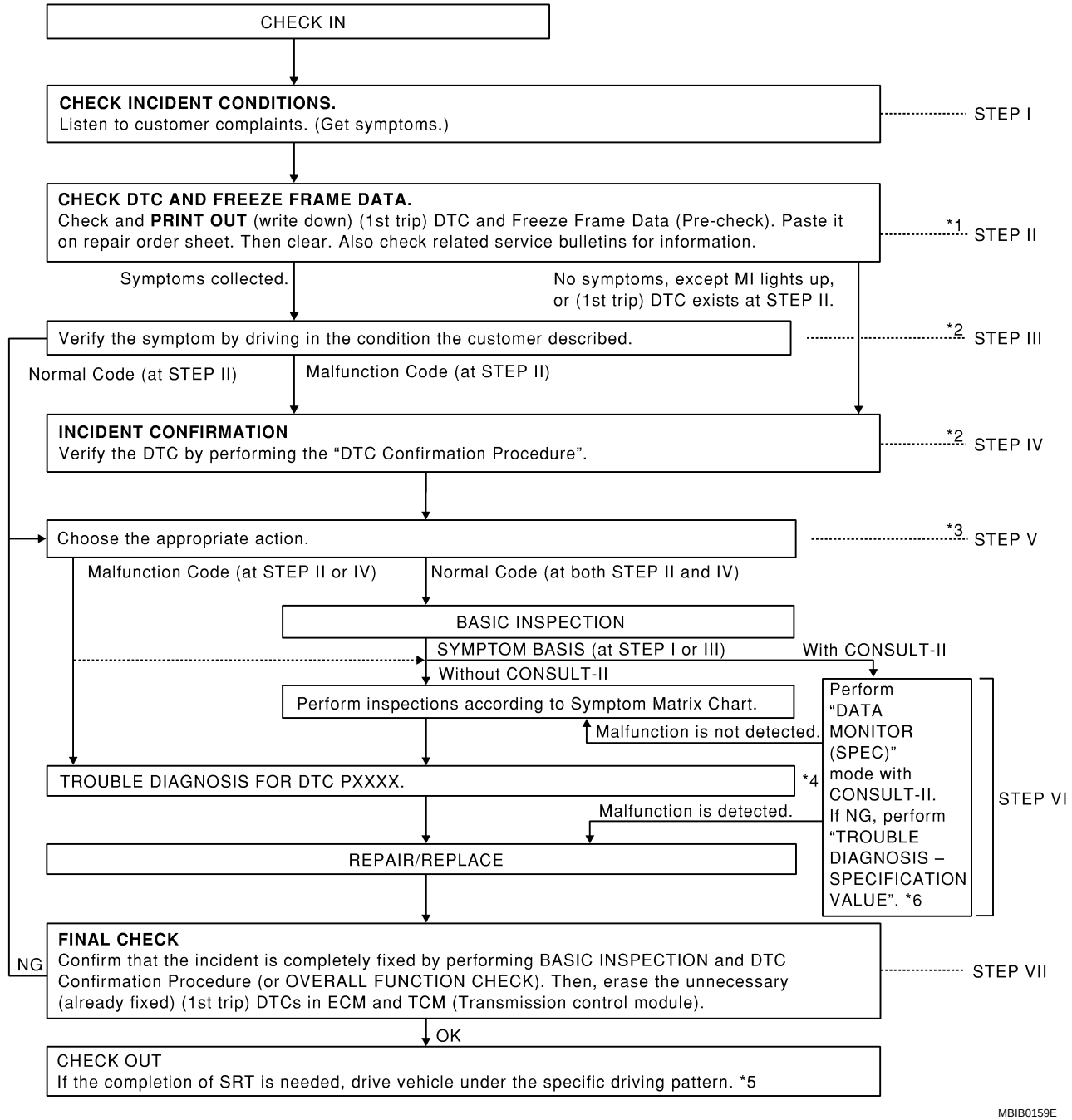
Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.







WORK FLOW
Flow Chart



MBIB0159E

*1 If time data of “SELF-DIAG RESULTS” is other than [0] or [1t], perform EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*2 If the incident cannot be verified, perform EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-128, "POWER SUPPLY AND GROUND CIRCUIT" .

*4 If malfunctioning part cannot be detected, perform EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*5 EC-64, "Driving Pattern"

*6 EC-123, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using EC-79, "DIAGNOSTIC WORKSHEET" .
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-66, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The Symptom Matrix Chart will be useful. See EC-87, "Symptom Matrix Chart" .) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The DIAGNOSTIC WORK SHEET and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results. If the incident cannot be verified, perform EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the DTC Confirmation Procedure. Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II or GST. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results. If the incident cannot be verified, perform EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . In case the DTC Confirmation Procedure is not available, perform the Overall Function Check instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified check is an effective alternative. The NG result of the Overall Function Check is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-82, "Basic Inspection" .)Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-87, "Symptom Matrix Chart" .)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) Harness Layouts. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-98, "ECM Terminals and Reference Value" , EC-118, "CONSULT-II Reference Value in Data Monitor Mode" . The Diagnostic Procedure in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident" . Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the DTC Confirmation Procedure and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a method different from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM and TCM (Transmission control module). (Refer to EC-66, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" and AT-40, "HOW TO ERASE DTC" .)

DIAGNOSTIC WORKSHEET

Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.
Some conditions may cause the MI to come on steady or blink and DTC to be detected. Examples:

- Vehicle ran out of fuel, which caused the engine to misfire.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Fuel and fuel filler cap		☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp		☐ Turned on ☐ Not turned on	

MTBL0017

DTC Inspection Priority Chart

BBS0019R

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:
If DTC U1000 and/or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000 and U1001. Refer to EC-136, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

Priority	Detected items (DTC)
1	● U1000 U1001 CAN communication line ● P0102 P0103 Mass air flow sensor ● P0112 P0113 Intake air temperature sensor ● P0117 P0118 Engine coolant temperature sensor ● P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor ● P0327 P0328 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0500 Vehicle speed sensor ● P0605 ECM ● P0705 Park/Neutral position (PNP) sensor ● P1229 Sensor power supply ● P1610 - P1615 NATS ● P1706 Park/Neutral position (PNP) switch ● P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	● P0031 P0032 Heated oxygen sensor 1 heater ● P0037 P0038 Heated oxygen sensor 2 heater ● P0132 P0133 P0134 P1143 P1144 Heated oxygen sensor 1 ● P0138 P0139 P1146 P1147 Heated oxygen sensor 2 ● P0444 EVAP canister purge volume control solenoid valve ● P0550 Power steering pressure sensor ● P0710 P0720 P725 P0740 P0745 P0750 P0755 P1705 P1760 A/T related sensors and solenoid valves ● P1065 ECM power supply ● P1111 Intake valve timing control solenoid valve ● P1122 Electric throttle control function ● P1124 P1126 Throttle control motor relay ● P1128 Throttle control mother ● P1211 TCS control unit ● P1212 TCS communication line ● P1720 Vehicle speed sensor ● P1805 Brake switch
3	● P0011 Intake valve timing control ● P0171 P0172 Fuel injection system function ● P0300 - P0304 Misfire ● P0420 Three way catalyst function ● P0731 - P0734 A/T function ● P1121 Electric throttle control actuator ● P1217 Engine over temperature (OVERHEAT) ● P1564 ASCD steering switch* ● P1572 ASCD brake switch* ● P1574 ASCD vehicle speed sensor*

*: For QR25DE engine models

Fail-Safe Chart

BBS0019S

When the DTC listed bellow is detected, the ECM enters fail-safe mode and the MI lights up.

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.
P0117 P0118	Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.
		Condition: Just as ignition switch is turned ON or START — Engine coolant temperature decided (CONSULT-II display): 40°C (104°F)
		Condition: More than approx. 4 minutes after ignition ON or START — Engine coolant temperature decided (CONSULT-II display): 80°C (176°F)
		Condition: Except as shown above — Engine coolant temperature decided (CONSULT-II display): 40 - 80°C (104 - 176°F) (Depends on the time)
		When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.
P0122 P0123 P0221 P0222 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
		(ECM detect the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T), neutral position (M/T) and engine speed will not exceed 1,000 rpm or more.
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1124 P1126	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1128	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1229	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

When there is an open circuit on MI circuit, the ECM can not warn the driver by lighting up MI when there is trouble on engine control system.
Therefore, when electrical controlled throttle and part of ECM related diagnoses are continuously detected as NG for 5 trips, ECM warns the driver that engine control system has trouble and MI circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the trouble.

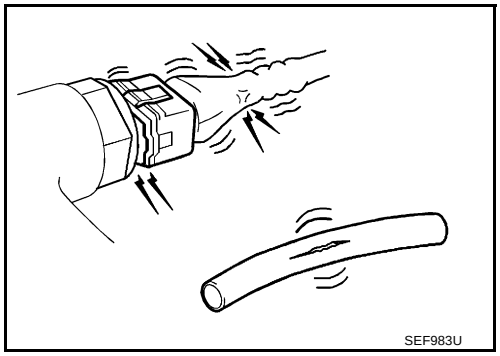
Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Basic Inspection

BBS0019T

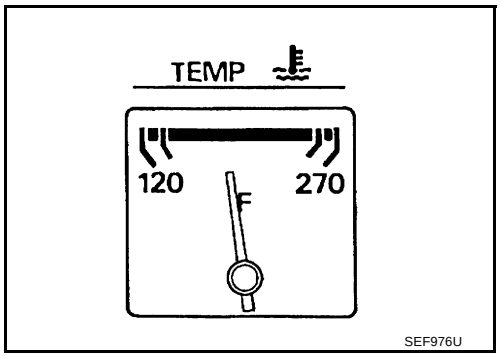
1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket


SEF983U

3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.

4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
Ensure engine stays below 1,000 rpm.

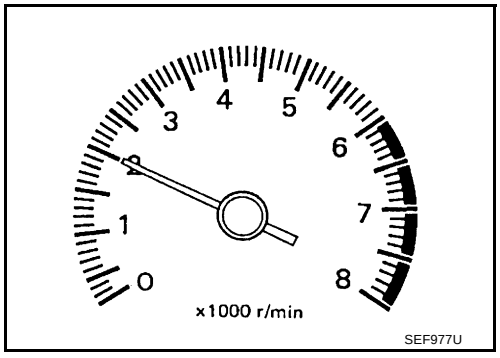


SEF976U

5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed with CONSULT-II or GST.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



SEF977U

2. REPAIR OR REPLACE

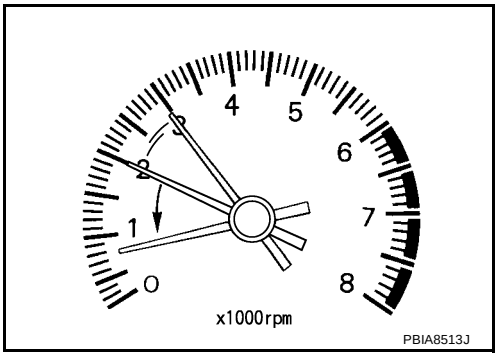
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3

3. CHECK TARGET IDLE SPEED

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.



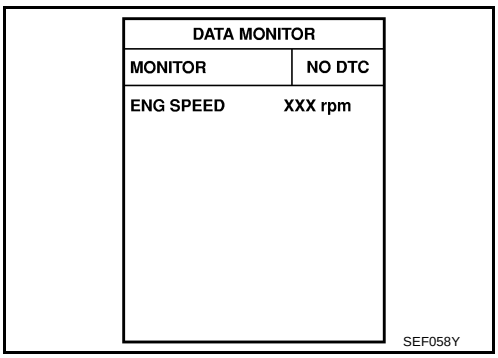
3. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

QR20DE with M/T models

: 650 ± 50 rpm (in Neutral position)

Except above

: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
3. Check idle speed.

QR20DE with M/T models

: 650 ± 50 rpm (in Neutral position)

Except above

: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-50, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-50, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

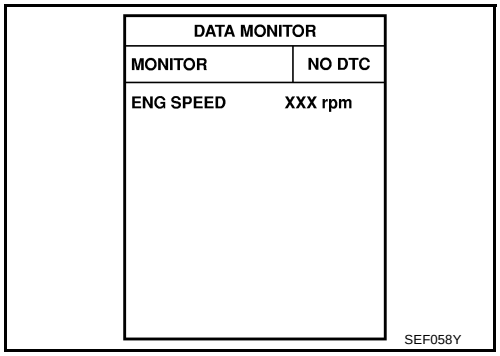
Yes or No

Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.



QR20DE with M/T models
: 650 ± 50 rpm (in Neutral position)
Except above
: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

QR20DE with M/T models
: 650 ± 50 rpm (in Neutral position)
Except above
: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]

OK or NG

OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-260, "DTC P0340 CMP SENSOR (PHASE)" .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-253, "DTC P0335 CKP SENSOR (POS)" .

OK or NG

OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

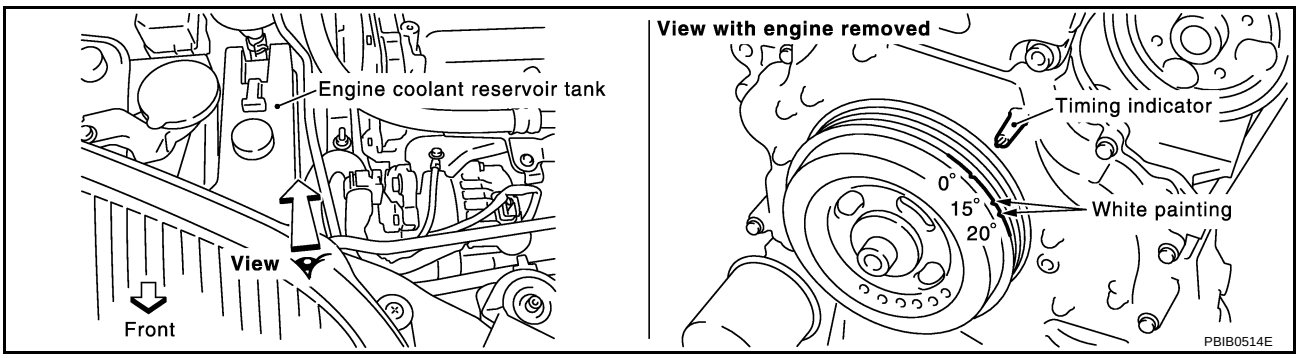
9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-107, "NATS (NISSAN ANTI-THEFT SYSTEM)" .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.



M/T: 15 ± 5° BTDC (in Neutral position)
A/T: 15 ± 5° BTDC (in P or N position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-50, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-50, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

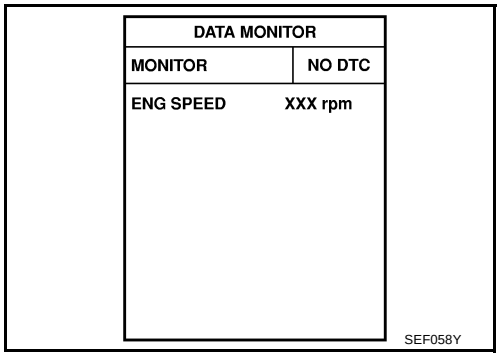
Yes or No

Yes >> GO TO 14.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.



QR20DE with M/T models

: 650 ± 50 rpm (in Neutral position)

Except above

: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

QR20DE with M/T models

: 650 ± 50 rpm (in Neutral position)

Except above

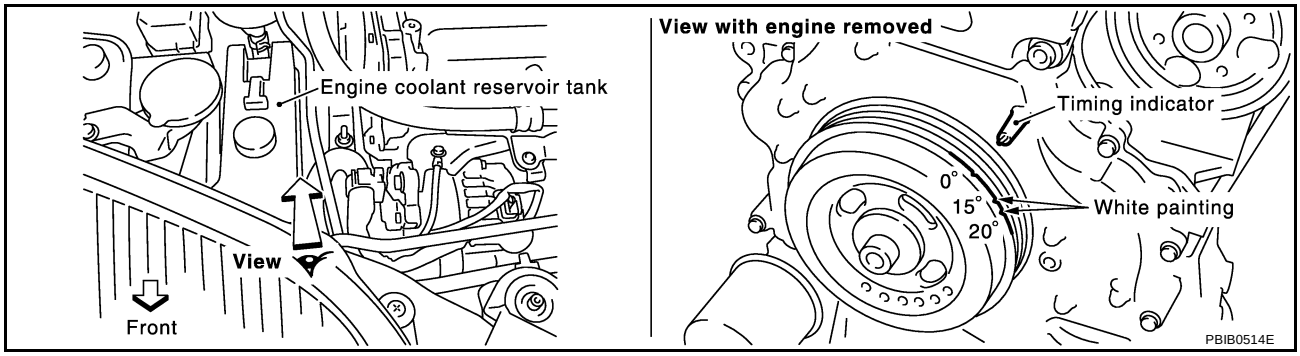
: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]

OK or NG

OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.



M/T: 15 ± 5° BTDC (in Neutral position)
A/T: 15 ± 5° BTDC (in P or N position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-46, "TIMING CHAIN" .

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-260, "DTC P0340 CMP SENSOR (PHASE)" .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-253, "DTC P0335 CKP SENSOR (POS)" .

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-107, "NATS (NISSAN ANTI-THEFT SYSTEM)" .

>> GO TO 4.

Symptom Matrix Chart

BBS0019U

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-469
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-52
	Fuel injector circuit	1	1	2	3	2		2	2			2			EC-454
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-525
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-530
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-82
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-297, EC-299 , EC-309 , EC-317
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-82
	Ignition circuit	1	1	2	2	2		2	2			2			EC-443
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-128

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Mass air flow sensor circuit	1	1	2	2	2		2	2			2			EC-154
Engine coolant temperature sensor circuit	1	1	2	2	2	3	2	2	3	1	2			EC-168
Throttle position sensor circuit		1	2		2	2	2	2	2		2			EC-174, EC-234 , EC-371 , EC-373 , EC-427
Accelerator pedal position sensor circuit			3	2	1	2			2					EC-375, EC-412 , EC-419 , EC-435
Heated oxygen sensor 1 circuit		1	2	3	2		2	2			2			EC-182, EC-189 , EC-199 , EC-325 , EC-331
Knock sensor circuit			2	2							3			EC-248
Crankshaft position sensor (POS) circuit	2	2												EC-253
Camshaft position sensor (PHASE) circuit	2	2												EC-260
Vehicle speed signal circuit		2	3		3						3			EC-279
Power steering pressure sensor circuit		2				3	3	3	3					EC-281
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-286, EC-289
Intake valve timing control solenoid valve circuit	3	3	2		1	3	2	2	3		3			EC-293
PNP switch circuit			3		3	3	3	3	3		3			EC-401
Refrigerant pressure sensor circuit		2				3	3	3	3		4			EC-477
Electrical load signal circuit						3	3	3	3					EC-483
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	ATC-33
ESP/TCS/ABS CONTROL UNIT (models with ESP) ABS actuator and electric unit (control unit) (models without ESP)			4											BRC-9, BRC-52

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

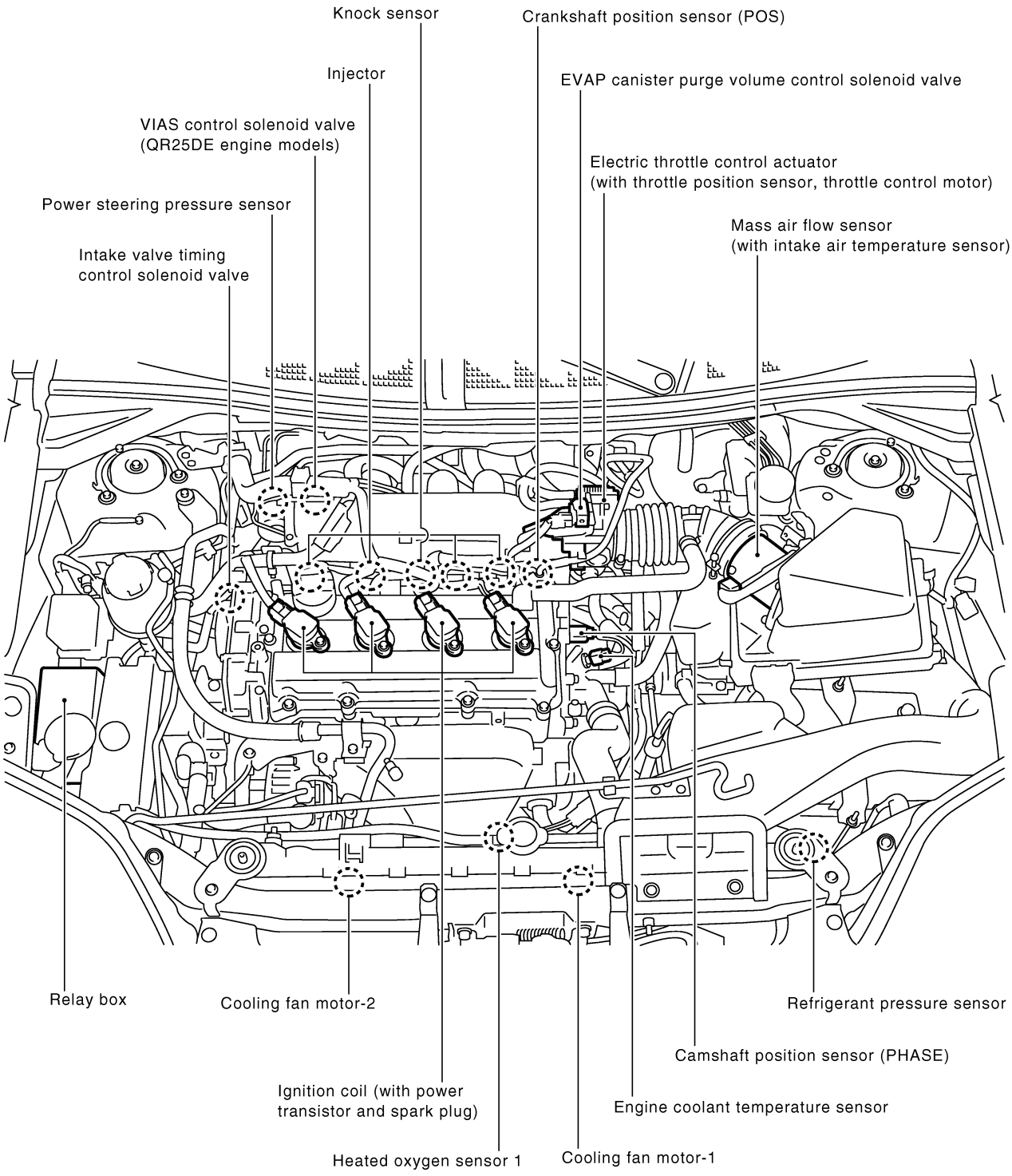
		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-11
	Fuel piping			5	5	5		5	5			5			FL-3, EM-34
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct	5	5	5	5	5	5	5	5	5		5			EM-16
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor —electric throttle control actuator)														
	Electric throttle control actuator														EM-18
	Air leakage from intake manifold/ Collector/Gasket														
Cranking	Battery	1	1	1		1		1	1			1		1	SC-4
	Alternator circuit														SC-13
	Starter circuit	3													SC-23
	Signal plate/Flywheel/Drive plate	6													EM-89
	PNP switch	4													MT-15 or AT-98
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-70
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-89
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM-46
	Camshaft														EM-56
	Intake valve timing control														EM-46
	Intake valve												3		EM-70
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-25, EX-2
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5	2		EM-27, LU-13 , LU-10 , LU-5
	Oil level (Low)/Filthy oil														LU-7
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		2	5			CO-12
	Thermostat									5					CO-23
	Water pump														CO-21
	Water gallery														CO-7
	Cooling fan									5					CO-19
	Coolant level (low)/Contaminated coolant														CO-9
NATS (Nissan Anti-theft System)		1	1												EC-67 or BL-107

1 - 6: The numbers refer to the order of inspection.

Engine Control Component Parts Location

BBS0019V



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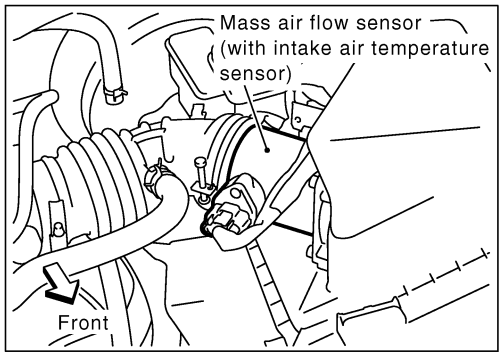
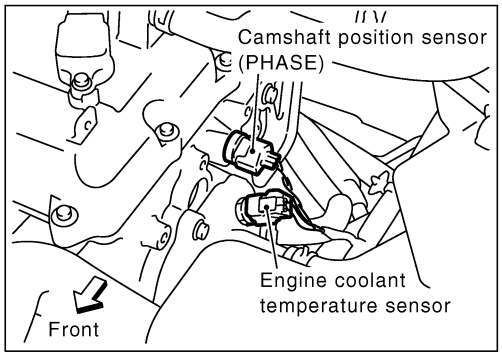
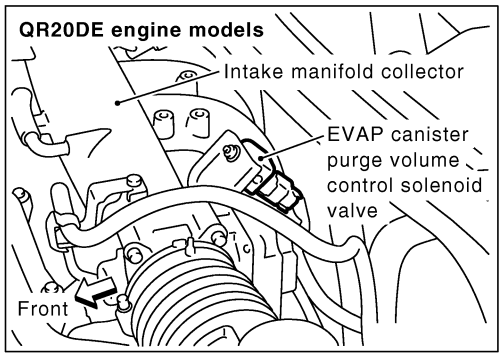
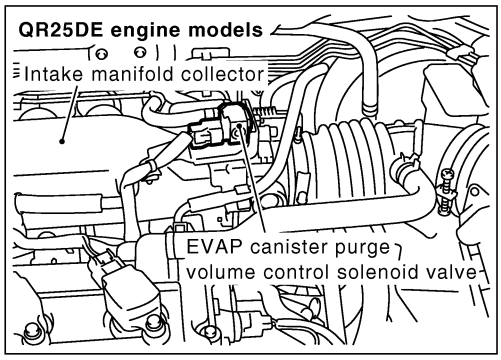
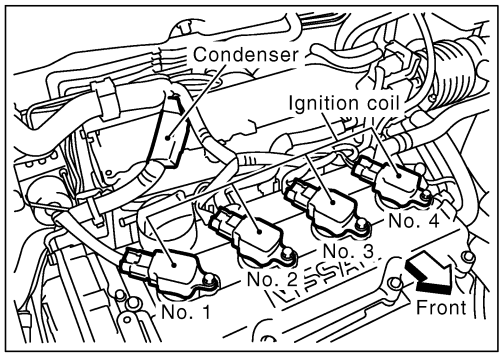
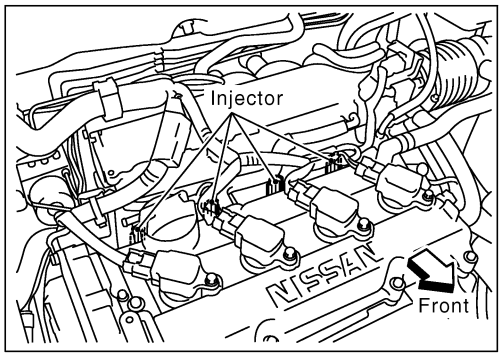

Mass air flow sensor
(with intake air temperature
sensor)
Front

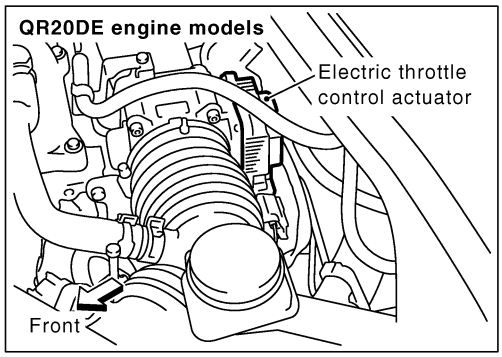

Camshaft position sensor
(PHASE)
Engine coolant
temperature sensor
Front

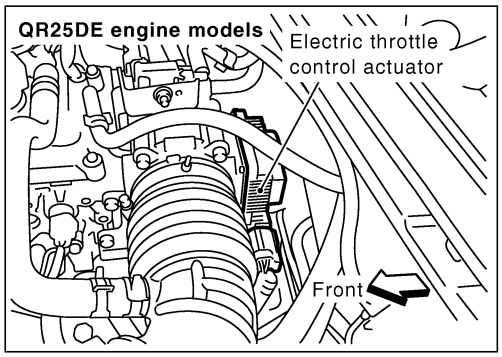

QR20DE engine models
Intake manifold collector
EVAP canister
purge volume
control solenoid
valve
Front


QR25DE engine models
Intake manifold collector
EVAP canister purge
volume control solenoid valve

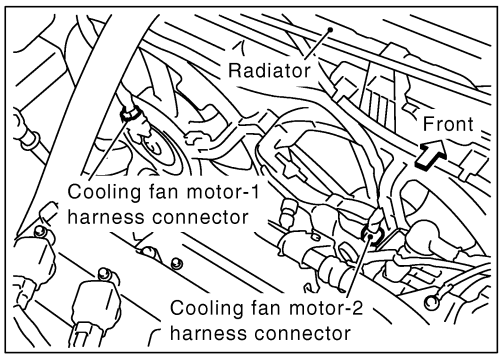

Condenser
Ignition coil
No. 4
No. 3
No. 2
No. 1
Front

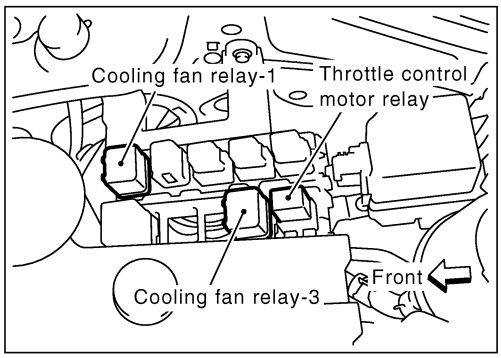

Injector
Front

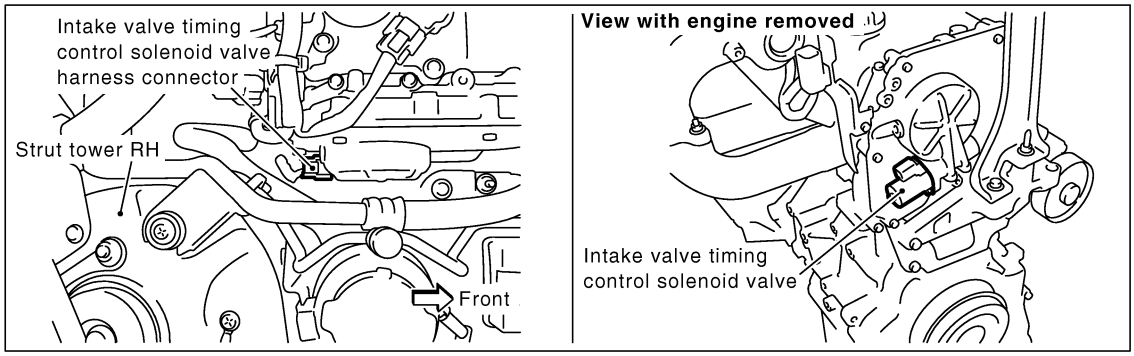

QR20DE engine models
Electric throttle
control actuator
Front

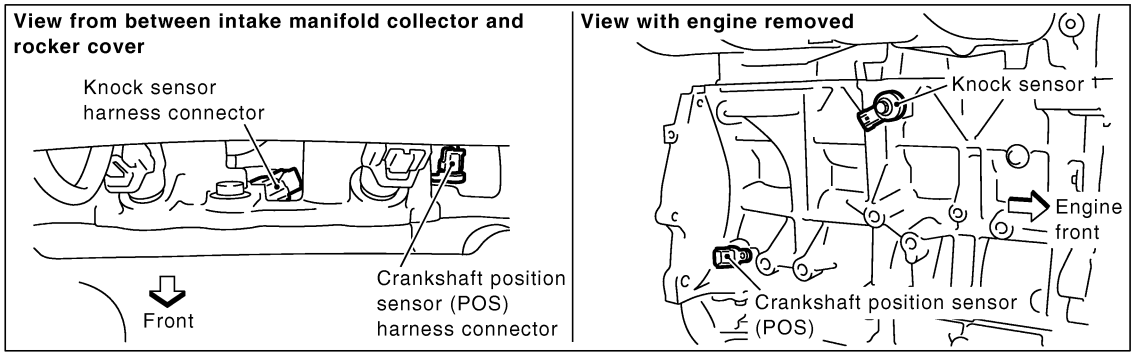

QR25DE engine models
Electric throttle
control actuator
Front

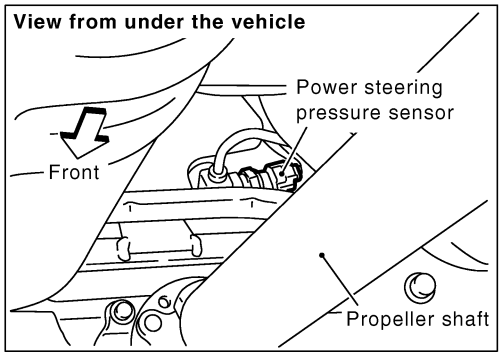
PBIB1979E

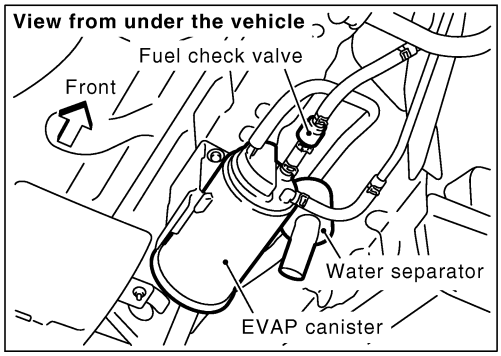

Radiator
Front
Cooling fan motor-1
harness connector
Cooling fan motor-2
harness connector


Cooling fan relay-1
Throttle control
motor relay
Front
Cooling fan relay-3

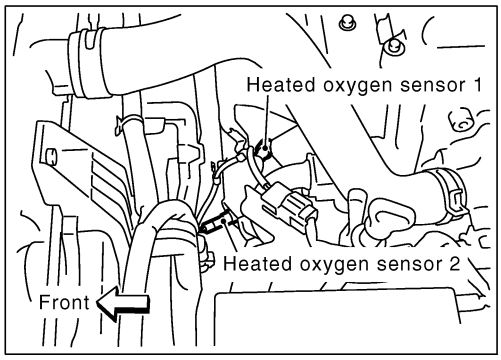

Intake valve timing
control solenoid valve
harness connector
Strut tower RH
Front
View with engine removed
Intake valve timing
control solenoid valve

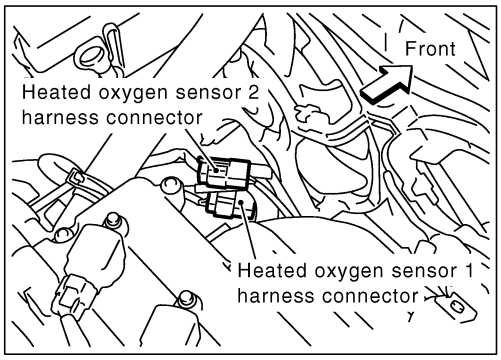

View from between intake manifold collector and
rocker cover
Knock sensor
harness connector
Front
Crankshaft position
sensor (POS)
harness connector
View with engine removed
Knock sensor
Engine
front
Crankshaft position sensor
(POS)

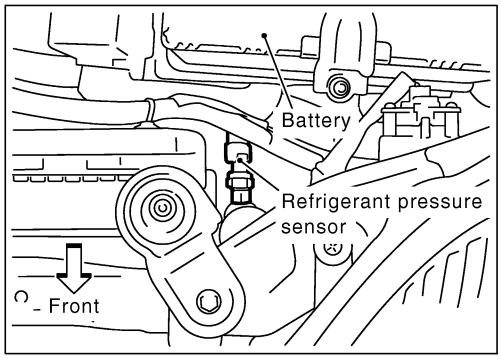

View from under the vehicle
Power steering
pressure sensor
Front
Propeller shaft

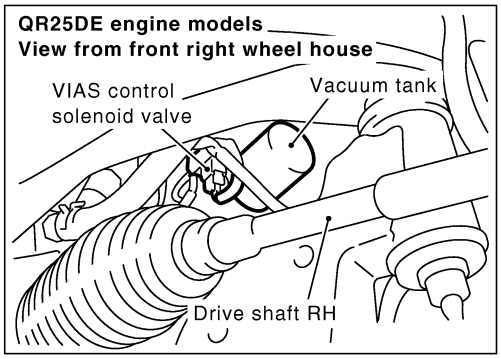

View from under the vehicle
Fuel check valve
Front
Water separator
EVAP canister

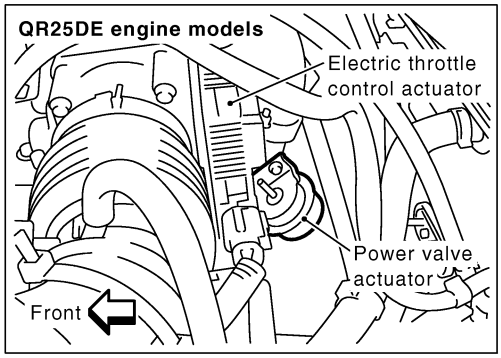
PBIB1980E


Heated oxygen sensor 1
Heated oxygen sensor 2
Front

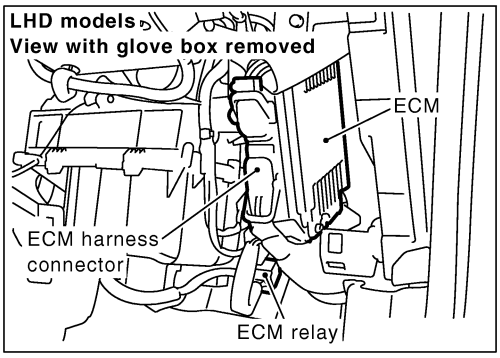

Front
Heated oxygen sensor 2
harness connector
Heated oxygen sensor 1
harness connector

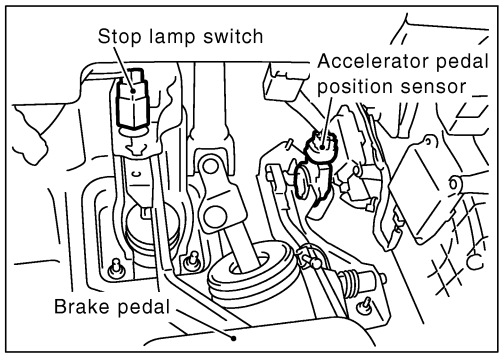

Battery
Refrigerant pressure
sensor
Front

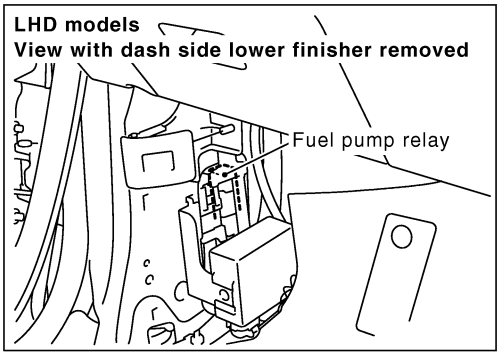

QR25DE engine models
View from front right wheel house
VIAS control
solenoid valve
Vacuum tank
Drive shaft RH

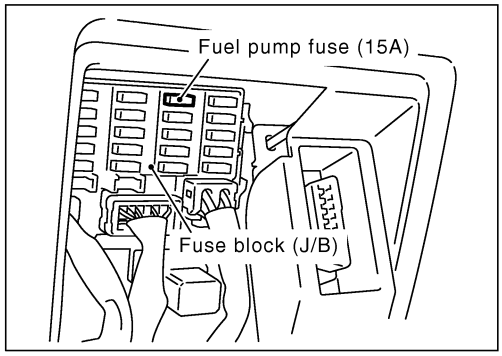

QR25DE engine models
Electric throttle
control actuator
Power valve
actuator
Front

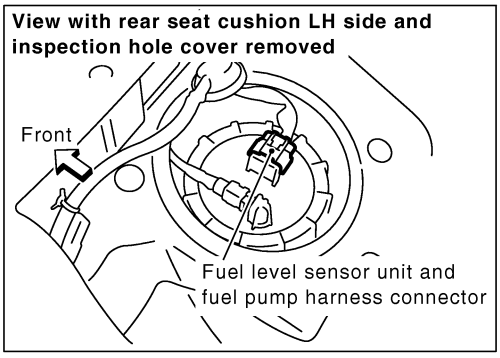
PBIB1997E

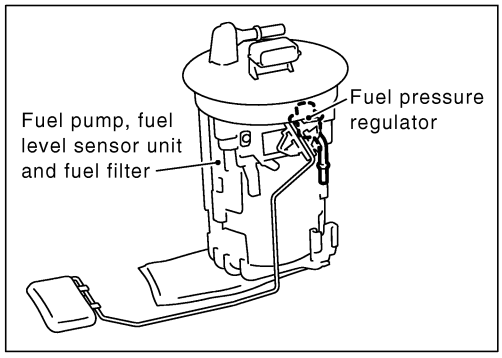

LHD models
View with glove box removed
ECM
ECM harness connector
ECM relay

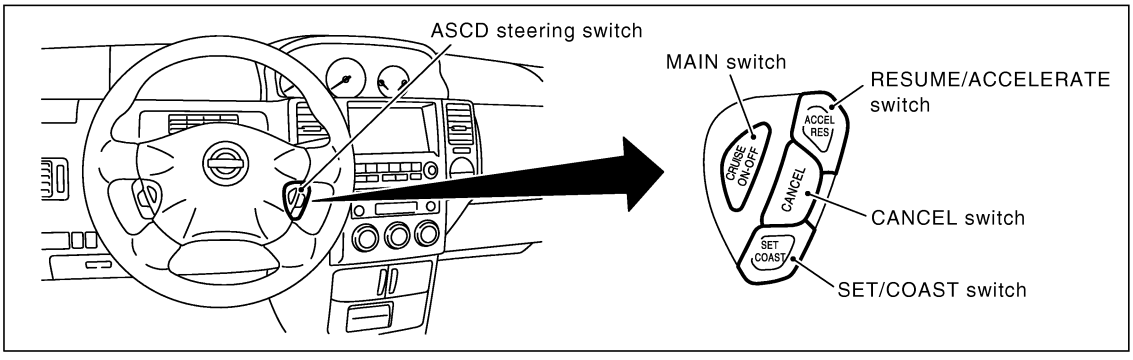

Stop lamp switch
Accelerator pedal position sensor
Brake pedal


LHD models
View with dash side lower finisher removed
Fuel pump relay


Fuel pump fuse (15A)
Fuse block (J/B)


View with rear seat cushion LH side and inspection hole cover removed
Front
Fuel level sensor unit and fuel pump harness connector

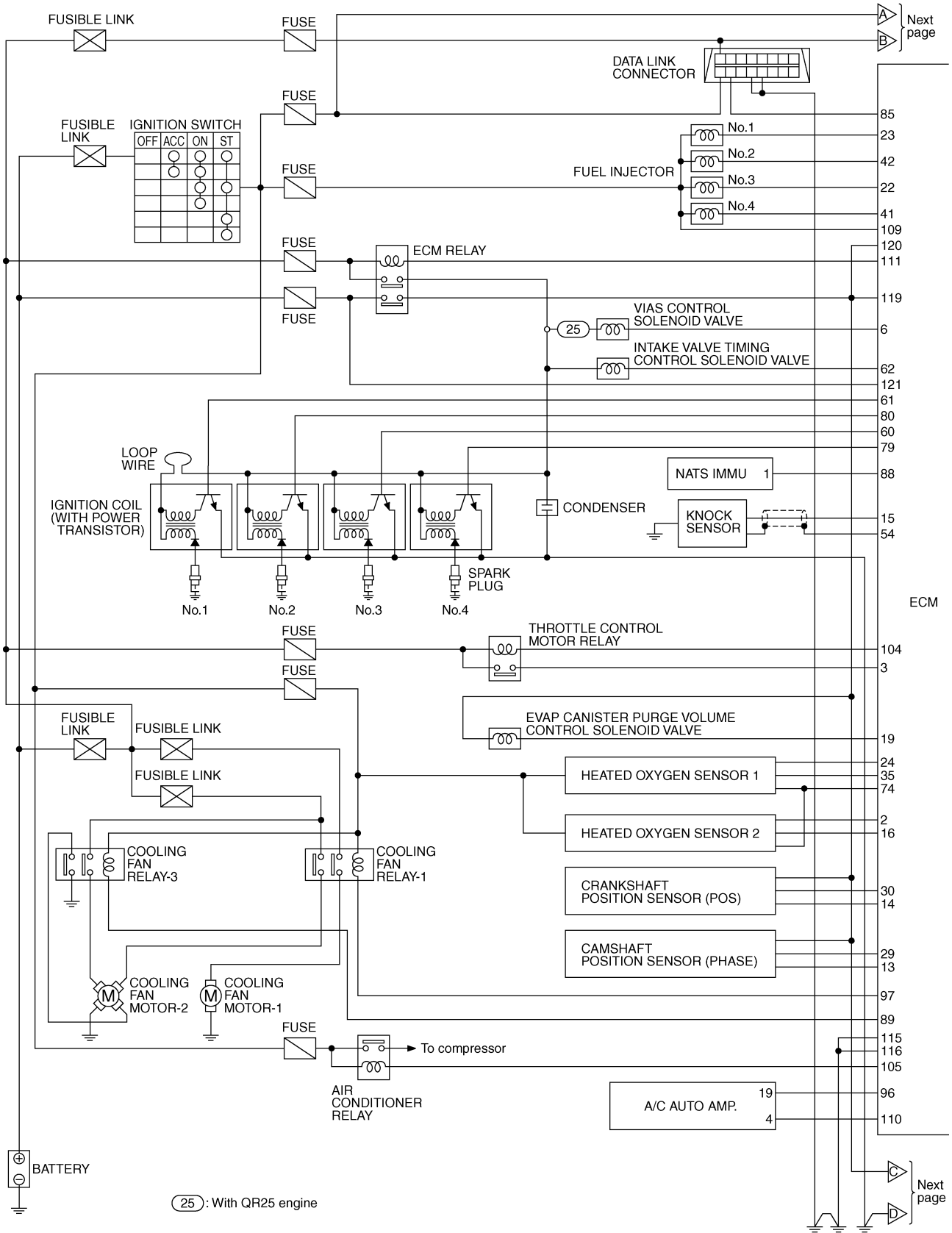

Fuel pump, fuel level sensor unit and fuel filter
Fuel pressure regulator


ASCD steering switch
MAIN switch
RESUME/ACCELERATE switch
ACCEL RES
CRUISE ON-OFF
CANCEL
SET COAST
CANCEL switch
SET/COAST switch

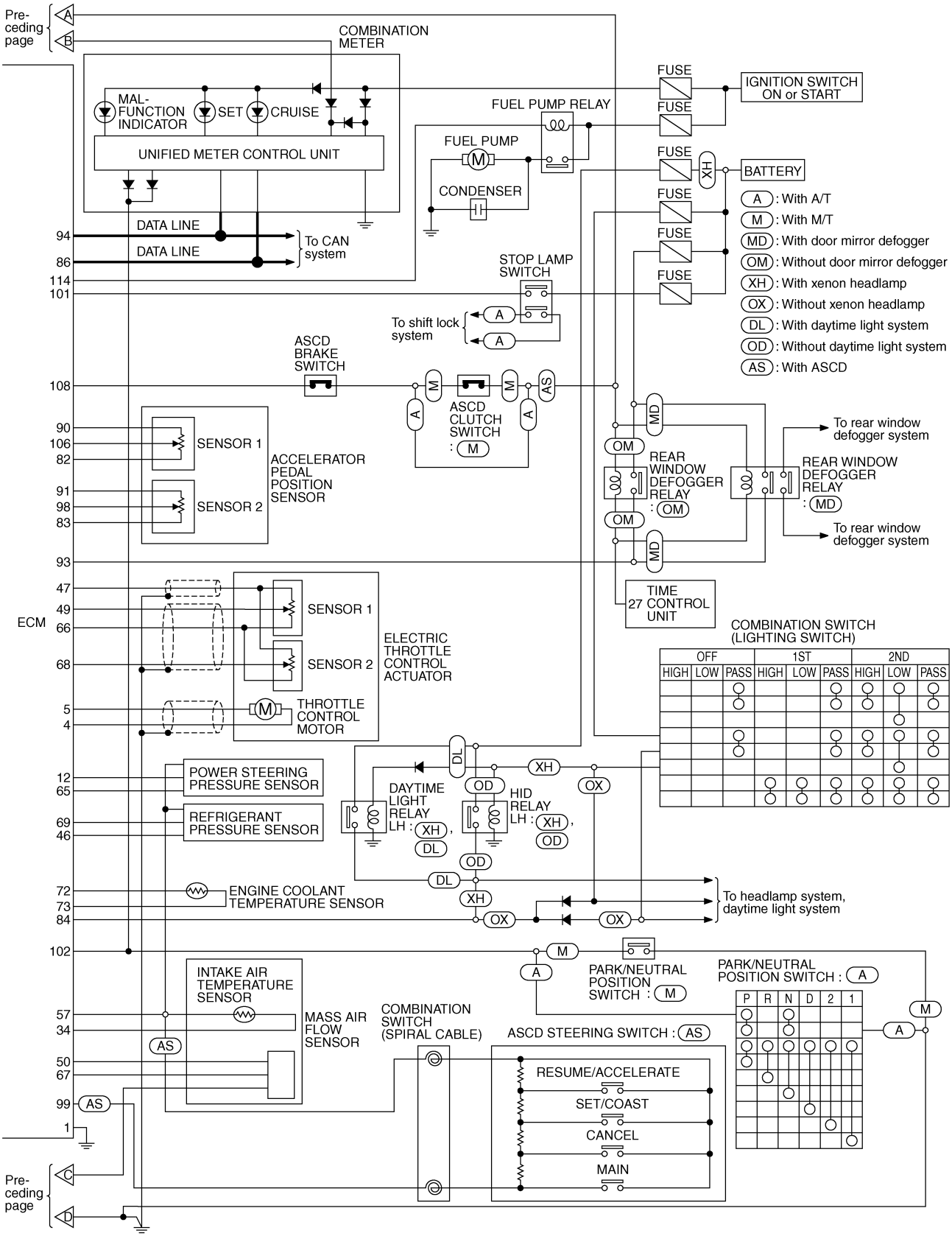
PBIB2887E

Circuit Diagram

BBS0019W



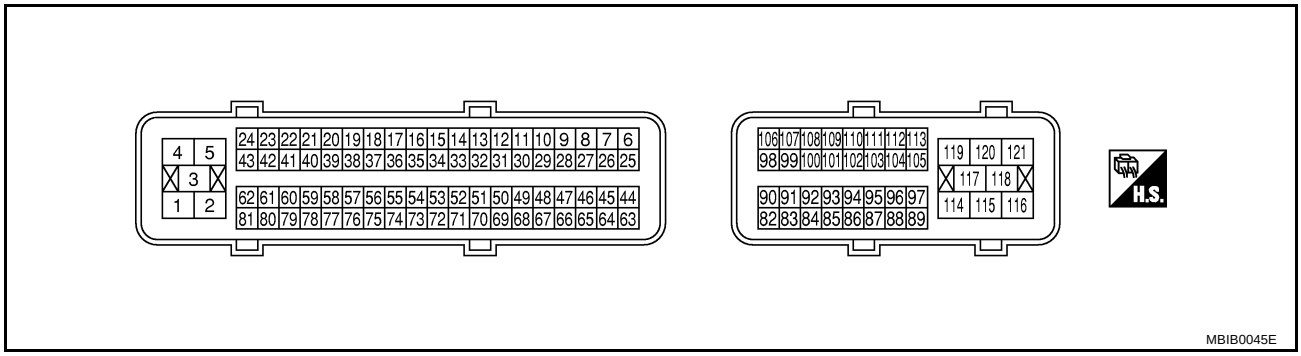
TBWB0691E


Pre-ceding page
A
B
COMBINATION METER
MAL-FUNCTION INDICATOR
SET
CRUISE
UNIFIED METER CONTROL UNIT
DATA LINE
DATA LINE
To CAN system
94
86
114
101
FUEL PUMP RELAY
FUEL PUMP
CONDENSER
FUSE
IGNITION SWITCH ON or START
BATTERY
STOP LAMP SWITCH
To shift lock system
ASCD BRAKE SWITCH
ASCD CLUTCH SWITCH : M
108
90
106
82
91
98
83
SENSOR 1
SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR
93
REAR WINDOW DEFOGGER RELAY : OM
REAR WINDOW DEFOGGER RELAY : MD
To rear window defogger system
TIME 27 CONTROL UNIT
ECM
47
49
66
68
5
4
ELECTRIC THROTTLE CONTROL ACTUATOR
THROTTLE CONTROL MOTOR
COMBINATION SWITCH (LIGHTING SWITCH)
OFF
1ST
2ND
HIGH
LOW
PASS
12
65
69
46
POWER STEERING PRESSURE SENSOR
REFRIGERANT PRESSURE SENSOR
DAYTIME LIGHT RELAY LH : XH, DL
HID RELAY LH : XH, OD
72
73
84
ENGINE COOLANT TEMPERATURE SENSOR
To headlamp system, daytime light system
102
PARK/NEUTRAL POSITION SWITCH : M
PARK/NEUTRAL POSITION SWITCH : A
P
R
N
D
2
1
INTAKE AIR TEMPERATURE SENSOR
57
34
50
67
99
1
MASS AIR FLOW SENSOR
COMBINATION SWITCH (SPIRAL CABLE)
ASCD STEERING SWITCH : AS
RESUME/ACCELERATE
SET/COAST
CANCEL
MAIN
Pre-ceding page
C
D

TBWB0898E

ECM Harness Connector Terminal Layout

BBS0019X

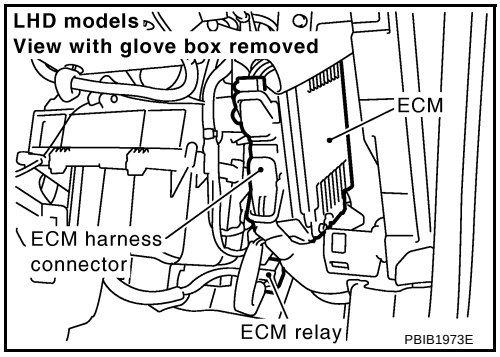


ECM Terminals and Reference Value

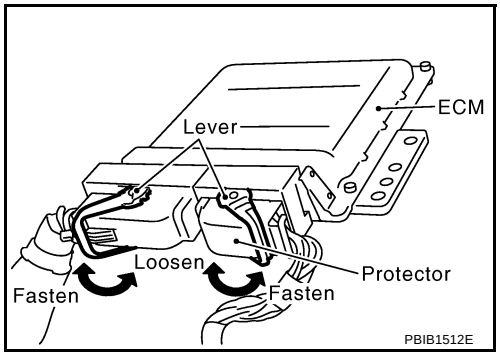
BBS0019Y

PREPARATION

1. ECM is located behind the glove box. For this inspection, remove glove box.
2. Remove ECM harness protector.



3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown in the figure.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.



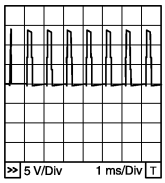
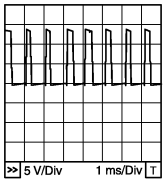
ECM INSPECTION TABLE

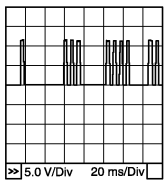
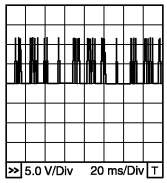
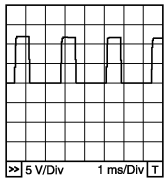
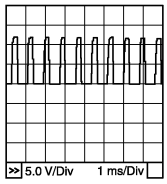
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

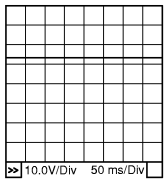
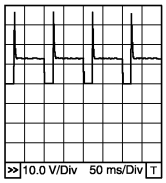
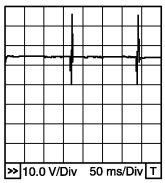
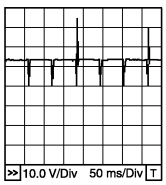
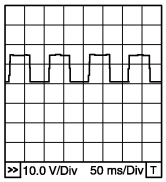
CAUTION:

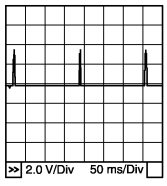
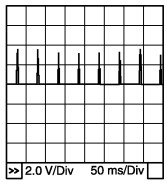
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

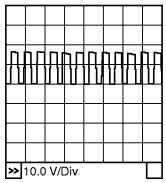
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	PU/R	Heated oxygen sensor 2 heater	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
3	W/B	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	G	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	R	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
6*1	Y	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V
12	P	Power steering pressure sensor	**[Engine is running]** ● Steering wheel: Being turned	0.5 - 4.0V
			[Engine is running] ● Steering wheel: Not being turned	0.4 - 0.8V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	L/W	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm	1.0 - 4.0V★  PBIB0526E
14	PU/R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
16	OR/B	Heated oxygen sensor 2	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
19	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E
22 23 41 42	G/B R/B L/B Y/B	Fuel injector No. 3 Fuel injector No. 1 Fuel injector No. 4 Fuel injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E
24	G/W	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm	Approximately 7.0V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
29	B	Sensor ground (Camshaft position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
30	B	Sensor ground (Crankshaft position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
34	Y/G	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	P/L	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)
46	R	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
47	R	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
50	OR	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.4V
			[Engine is running] ● **Warm-up condition** ● Idle speed	0.7 - 1.1V (QR20DE) 0.8 - 1.2V (QR25DE)
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm	0.7 - 1.1 to Approximately 4.0V (QR20DE) 0.8 - 1.2 to Approximately 4.0V (QR25DE) (Check for liner voltage rise in response to engine being increased to about 4,000 rpm.)
54	—	Sensor ground (Knock sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
57	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
60 61 79 80	L/R BR GY/R PU	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 0.2V★  PBIB0522E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	Y	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	Approximately 4V - BATTERY VOLTAGE (11 - 14V)★  PBIB1790E
65	R	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B/P	Sensor ground (Mass air flow sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
69	Y	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch: ON (Compressor operates)	1.0 - 4.0V
72	BR/Y	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
73	B	Sensor ground (Engine coolant temperature sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
82	RY	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	L	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	L/Y	Electrical load signal (Headlamp signal)	**[Ignition switch: ON]** ● Lighting switch: 2ND position (placed in LOW position for models with Xenon headlamp)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Lighting switch: OFF	Approximately 0V
85	LG	DATA link connector	**[Ignition switch: ON]** ● CONSULT-II or GST is disconnected	BATTERY VOLTAGE (11 - 14V)
86	GY/R	CAN communication line	**[Ignition switch: ON]**	1.0 - 2.5V
89	G	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is high speed operating	0 - 1.0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
93	BR	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V
94	G/R	CAN communication line	**[Ignition switch: ON]**	2.5 - 4.0V
96	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	BATTERY VOLTAGE (11 - 14V)
97	PU	Cooling fan relay (Low)	**[Ignition switch: ON]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Cooling fan is operating	0 - 1.0V
98	B/W	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.15 - 0.6V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	1.95 - 2.4V
99*1	W/R	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch: OFF	Approximately 4V
			[Ignition switch: ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch: Pressed	Approximately 2V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	P	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
102	G/OR	PNP switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	**A/T models** BATTERY VOLTAGE (11 - 14V) **M/T models** Approximately 5V
104	W/B	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	3.9 - 4.7V
108*1	GY/L	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Slightly depressed ● Clutch pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released ● Clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
109	B/R	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	G/W	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
114	B/OR	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
115 116	B B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
119 120	SB GY	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

*1: For QR25DE engine models

CONSULT-II Function (ENGINE)

BBS0019Z

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
DTC & SRT confirmation	The status of system monitoring tests and the self-diagnosis status/result can be confirmed.
ECM part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data
- System readiness test (SRT) codes
- Test values

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

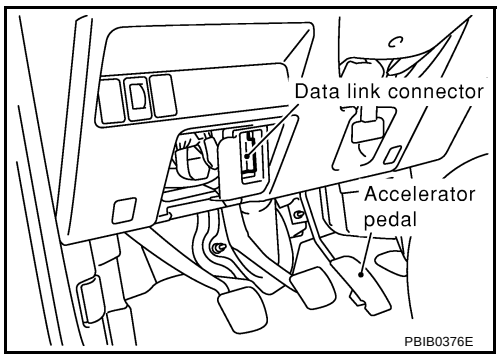
		Item	DIAGNOSTIC TEST MODE							
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST	DTC & SRT CONFIRMATION	
				DTC*1	FREEZE FRAME DATA*2				SRT STATUS	DTC WORK SUPPORT
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×			
		Camshaft position sensor (PHASE)		×		×	×			
		Mass air flow sensor		×		×	×			
		Engine coolant temperature sensor		×	×	×	×	×		
		Heated oxygen sensor 1		×		×	×		×	×
		Heated oxygen sensor 2		×		×	×		×	×
		Vehicle speed signal		×	×	×	×			
		Accelerator pedal position sensor		×		×	×			
		Throttle position sensor		×		×	×			
		Intake air temperature sensor		×	×	×	×			
		Knock sensor		×						
		Refrigerant pressure sensor				×	×			
		Closed throttle position switch (accelerator pedal position sensor signal)				×	×			
		Air conditioner switch				×	×			
		Park/neutral position (PNP) switch		×		×	×			
		Stop lamp switch		×		×	×			
		Power steering pressure sensor		×		×	×			
		Battery voltage				×	×			
		Electrical load signal				×	×			
		ASCD steering switch*3		×		×	×			
		ASCD brake switch*3		×		×	×			
		ASCD clutch switch*3		×		×	×			
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Fuel injector				×	×	×		
		Power transistor (Ignition timing)				×	×	×		
		Throttle control motor relay		×		×	×			
		Throttle control motor		×						
		EVAP canister purge volume control solenoid valve		×		×	×	×		
		Air conditioner relay				×	×			
		Fuel pump relay	×			×	×	×		
		Cooling fan relay		×		×	×	×		
		Heated oxygen sensor 1 heater		×		×	×		×	
		Heated oxygen sensor 2 heater		×		×	×		×	
		Intake valve timing control solenoid valve		×		×	×	×		
		VIAS control solenoid valve				×	×	×		
		Calculated load value			×	×	×			

X: Applicable

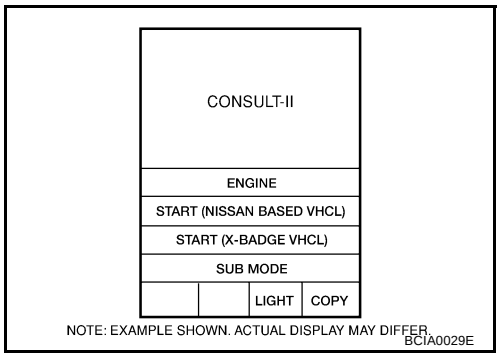
*1: This item includes 1st trip DTCs.
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-59, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
*3: For QR25DE engine models

INSPECTION PROCEDURE

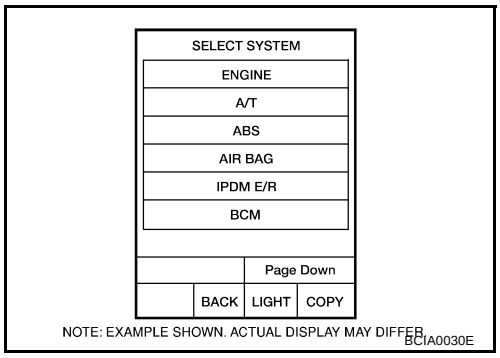
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector, which is located under driver side dash panel.
3. Turn ignition switch ON.



4. Touch “START(NISSAN BASED VHCL)”.

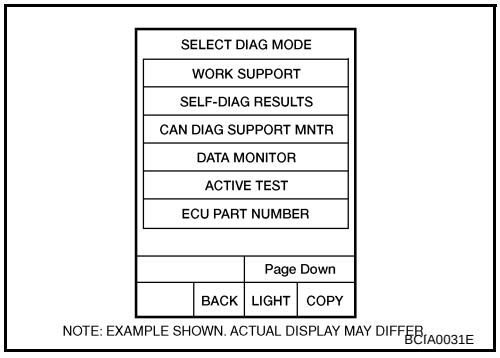


5. Touch “ENGINE”.
   If “ENGINE” is not indicated, go to GI-35, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing the coefficient of self-learning control value
TARGET IDLE RPM ADJ*	● IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	● IDLE CONDITION	When adjusting target ignition timing

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-21, "INDEX FOR DTC" .

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-21, "INDEX FOR DTC" .)
FUEL SYS-B1	● “Fuel injection system status” at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	● “Long-term fuel trim” at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	● “Short-term fuel trim” at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE
Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIG-NALS	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the signals of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	● Accuracy becomes poor if engine speed drops below the idle rpm. ● If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		×	● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S [°C] or [°F]	×	×	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	● When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1) [V]	×	×	● The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1) [V]	×		● The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR (B1) [RICH/LEAN]	×	×	● Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH: means the mixture became “rich”, and control is being affected toward a leaner mixture. LEAN: means the mixture became “lean”, and control is being affected toward a rich mixture.	● After turning ON the ignition switch, “RICH” is displayed until air-fuel mixture ratio feedback control begins. ● When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S2 MNTR (B1) [RICH/LEAN]	×		● Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large.	● When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	×	×	● The vehicle speed computed from the vehicle speed signal is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
ACCEL SEN 1 [V]	×	×	● The accelerator pedal position sensor signal voltage is displayed.	● ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2 [V]	×			
THRTL SEN 1 [V]	×	×	● The throttle position sensor signal voltage is displayed.	● THRTL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
THRTL SEN 2 [V]	×			

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
INT/A TEMP SE [°C] or [°F]	×	×	● The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	
START SIGNAL [ON/OFF]	×	×	● Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	● After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	×	×	● Indicates idle position [ON/OFF] computed by the ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×	● [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor) is indicated.	
LOAD SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position (placed in LOW position for models with Xenon headlamp). OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW [ON/OFF]	×		● Indicates [ON/OFF] condition from ignition switch.	
HEATER FAN SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1 [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
IGN TIMING [BTDC]		×	● Indicates the ignition timing computed by ECM according to the input signals.	● When the engine is stopped, a certain value is indicated.
CAL/LD VALUE [%]			● “Calculated load value” indicates the value of the current airflow divided by peak airflow.	
MASS AIRFLOW [g·m/s]			● Indicates the mass airflow computed by ECM according to the signal voltage of the mass air flow sensor.	
PURG VOL C/V [%]			● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/V TIM (B1) [°CA]			● Indicates [°CA] of intake camshaft advanced angle.	
INT/V SOL (B1) [%]			● The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signal) is indicated. ● The advance angle becomes larger as the value increases	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
VIAS S/V* [ON/OFF]			● The control condition of the VIAS control solenoid valve (determined by ECM according to the input signals) is indicated. ON: VIAS control solenoid valve is operating. OFF: VIAS control solenoid valve is not operating.	
AIR COND RLY [ON/OFF]		×	● The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY [ON/OFF]		×	● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
THRTL RELAY [ON/OFF]		×	● Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN [HI/LOW/OFF]			● Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S1 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
IDL A/V LEARN [YET/CMPLT]			● Display the condition of idle air volume learning YET: Idle Air Volume Learning has not been performed yet. CMPLT: Idle Air Volume Learning has already been performed successfully.	
TRVL AFTER MIL [km] or [mile]			● Distance traveled while MI is activated.	
AC PRESS SEN [V]	×		● The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE* [km/h] or [mph]			● The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
SET VHCL SPD* [km/h] or [mph]			● The preset vehicle speed is displayed.	
MAIN SW* [ON/OFF]			● Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW* [ON/OFF]			● Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW* [ON/OFF]			● Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW* [ON/OFF]			● Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1* [ON/OFF]			● Indicates [ON/OFF] condition from ASCD brake switch signal.	
BRAKE SW2* [ON/OFF]			● Indicates [ON/OFF] condition of stop lamp switch signal.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIG-NALS	Description	Remarks
VHCL SPD CUT* [NON/CUT]			● Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off.	
LO SPEED CUT* [NON/CUT]			● Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
AT OD MONITOR [ON/OFF]			● Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	● For M/T models, always “OFF” is displayed.
AT OD CANCEL [ON/OFF]			● Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	● For M/T models, always “OFF” is displayed.
CRUISE LAMP* [ON/OFF]			● Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP* [ON/OFF]			● Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
Voltage [V]			● Voltage, frequency, duty cycle or pulse width measured by the probe.	● Only “#” is displayed if item is unable to be measured. ● Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				

*: For QR25DE engine models

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

DATA MONITOR (SPEC) MODE

Monitored Item

Monitored item [Unit]	ECM input signals	Main signals	Description	Remarks
ENG SPEED [rpm]	×		● Indicates the engine speed computed from the signals of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When engine is running specification range is indicated.
B/FUEL SCHDL [msec]			● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	● When engine is running specification range is indicated.
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When engine is running specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	● Engine: Return to the original trouble condition ● Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Fuel injector ● Heated oxygen sensor 1
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Perform Idle Air Volume Learning.
POWER BALANCE	● Engine: After warming up, idle the engine. ● Air conditioner switch: OFF ● Shift lever: N (A/T), Neutral (M/T) ● Cut off each fuel injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injector ● Power transistor ● Spark plug ● Ignition coil
COOLING FAN*1	● Ignition switch: ON ● Turn the cooling fan LOW, HI, OFF with CONSULT-II.	Cooling fan moves and stops.	● Harness and connectors ● Cooling fan relay ● Cooling fan motor
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injector
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay ON and OFF using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	● Harness and connectors ● Fuel pump relay
VIAS SOL VALVE*2	● Ignition switch: ON ● Turn solenoid valve ON and OFF with CONSULT-II and listen for operating sound.	Solenoid valve makes an operating sound.	● Harness and connectors ● Solenoid valve
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connectors ● Solenoid valve
V/T ASSIGN ANGLE	● Engine: Return to the original trouble condition ● Change intake valve timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Intake valve timing control solenoid valve

*1: Leaving cooling fan OFF with CONSULT-II while engine is running may cause the engine to overheat.
*2: For QR25DE engine models

DTC & SRT CONFIRMATION MODE

SRT STATUS Mode

For details, refer to EC-59, "SYSTEM READINESS TEST (SRT) CODE" .

SRT WORK SUPPORT Mode

This mode enables a technician to drive a vehicle to set the SRT while monitoring the SRT status.

DTC WORK SUPPORT Mode

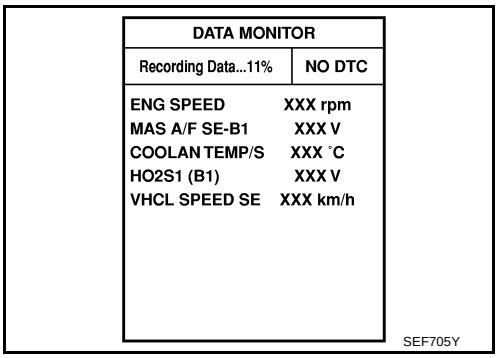
Test mode	Test item	Condition	Reference page
HO2S1	HO2S1 (B1) P0133	Refer to corresponding trouble diagnosis for DTC.	EC-189
	HO2S1 (B1) P0134		EC-199
	HO2S1 (B1) P1143		EC-325
	HO2S1 (B1) P1144		EC-331
H02S2	HO2S2 (B1) P0139		EC-214
	HO2S2 (B1) P1146		EC-337
	HO2S2 (B1) P1147		EC-345

REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

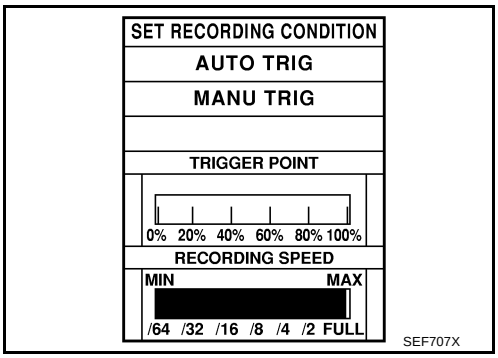
Description

CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

1. “AUTO TRIG” (Automatic trigger):
   - The malfunction will be identified on the CONSULT-II screen in real time.
     In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
     At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown at right, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
     The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II Operation Manual.



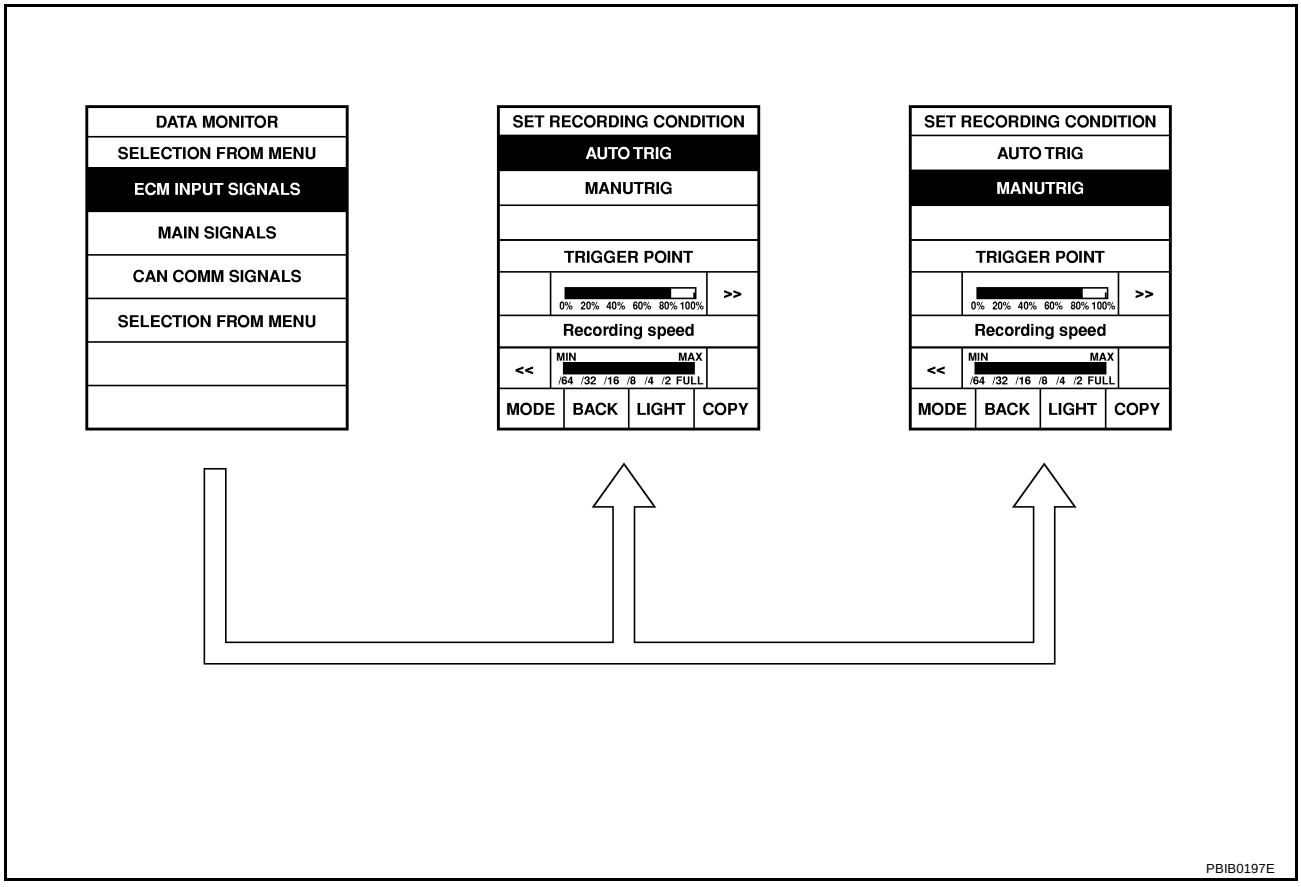
2. “MANU TRIG” (Manual trigger):
   - DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
     DATA MONITOR can be performed continuously even though a malfunction is detected.



Operation

1. “AUTO TRIG”
   - While trying to detect the DTC/1st trip DTC by performing the DTC Confirmation Procedure, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
   - While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
     When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the “DTC Confirmation Procedure”, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to “Incident Simulation Tests” in GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident" .)
2. “MANU TRIG”

- If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.

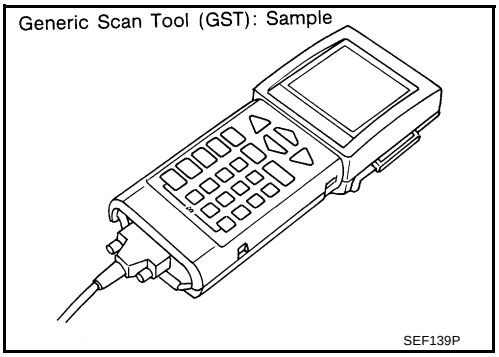


Generic Scan Tool (GST) Function

BBS001A0

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with ISO 15031-4 has 8 different functions explained below.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



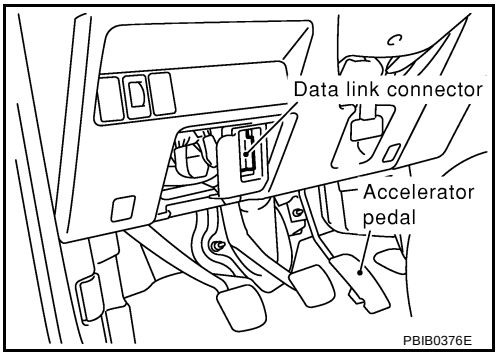
FUNCTION

Diagnostic test mode		Function
Service $01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service $02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-59, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
Service $03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.

Diagnostic test mode		Function
Service $04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (Service $01) ● Clear diagnostic trouble codes (Service $03) ● Clear trouble code for freeze frame data (Service $01) ● Clear freeze frame data (Service $02) ● Reset status of system monitoring test (Service $01) ● Clear on board monitoring test results (Service $06 and $07)
Service $06	(ON BOARD TESTS)	This diagnostic service accesses the results of on board diagnostic monitoring tests of specific components/systems that are not continuously monitored.
Service $07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service $08	—	This diagnostic service is not applicable on this vehicle.
Service $09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

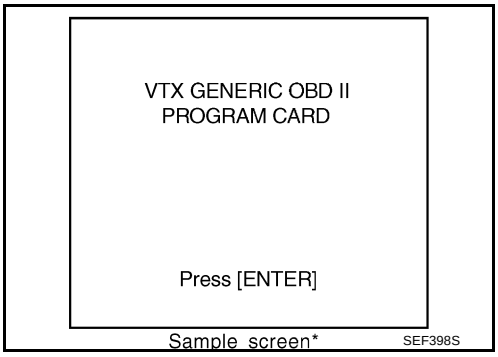
INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect GST to data link connector, which is located under driver side dash panel near the fuse box cover.
3. Turn ignition switch ON.



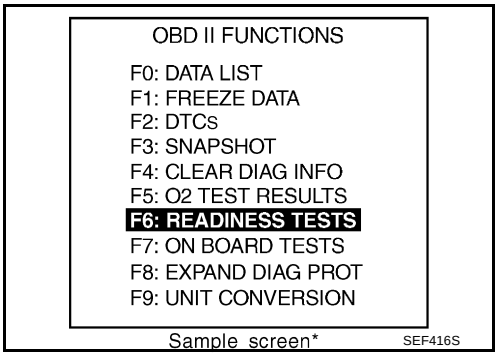
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.



CONSULT-II Reference Value in Data Monitor Mode

BBS001A1

Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  * Specification data may not be directly related to their components signals/values/operations.
  i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-123, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
B/FUEL SCHDL	See EC-123, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
A/F ALPHA-B1	See EC-123, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 (B1)	Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,800 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.
HO2S2 MNTR (B1)	Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,800 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.		LEAN ←→ RICH
VEH SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication.		Almost the same speed as the speedometer indication.
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.7V
ACCEL SEN 2*1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
THRTL SEN 1 THRTL SEN 2*1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is not turned.	OFF
		Steering wheel is turned.	ON

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd (placed in LOW position for models with Xenon headlamp).	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	● Ignition switch: ON	Heater fan is operating.	ON
		Heater fan is not operating	OFF
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	13° - 17° BTDC
		2,000 rpm	25° - 45° BTDC
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	0%
		2,000 rpm	20 - 30%
INT/V TIM (B1)	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
INT/V SOL (B1)	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 50%
VIAS S/V*2	● Engine: After warming up	Idle	OFF
		More than 5,000 rpm	ON

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND RLY	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	● For 1 second after turning ignition switch ON ● Engine running or cranking		ON
	● Except above conditions		OFF
THRTL RELAY	● Ignition switch: ON		ON
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S1 HTR (B1)	● Engine: After warming up ● Engine speed: Below 3,600 rpm		ON
	● Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	● Engine speed is below 3,600 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.		ON
	● Engine speed: Above 3,600 rpm		OFF
TRVL AFTER MIL	● Ignition switch: ON	Vehicle has traveled after MI has turned ON.	0 - 65,535 km (0 - 40,723 mile)
O2SEN HTR DTY	● Engine coolant temperature when engine started: More than 80°C (176°F) ● Engine speed: below 3,600 rpm		Approx. 50%
AC PRESS SEN	● Engine: Idle ● Air conditioner switch: ON (Compressor operates)		1.0 - 4.0V
VEH SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication.		Almost the same speed as the speedometer indication
SET VHCL SPD*2	● Engine: Running	ASCD: Operating.	The preset vehicle speed is displayed.
MAIN SW*2	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW*2	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW*2	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW*2	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1*2	● Ignition switch: ON	Both clutch pedal (M/T) and brake pedal: Fully released	ON
		Clutch pedal (M/T) and/or brake pedal: Slightly depressed	OFF
BRAKE SW2*2	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP*2	● Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP*2	● MAIN switch: ON ● Vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signal.
*2: For QR25DE engine models

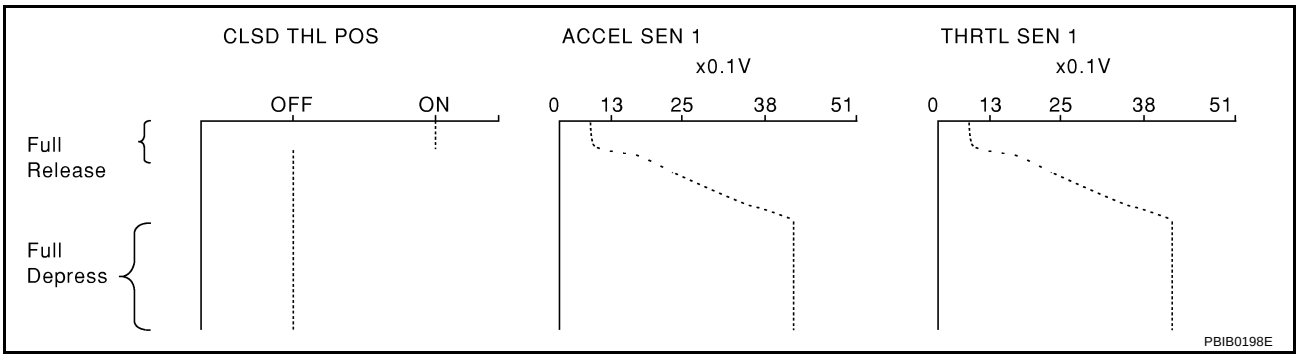
Major Sensor Reference Graph in Data Monitor Mode

BBS001A2

The following are the major sensor reference graphs in “DATA MONITOR” mode.

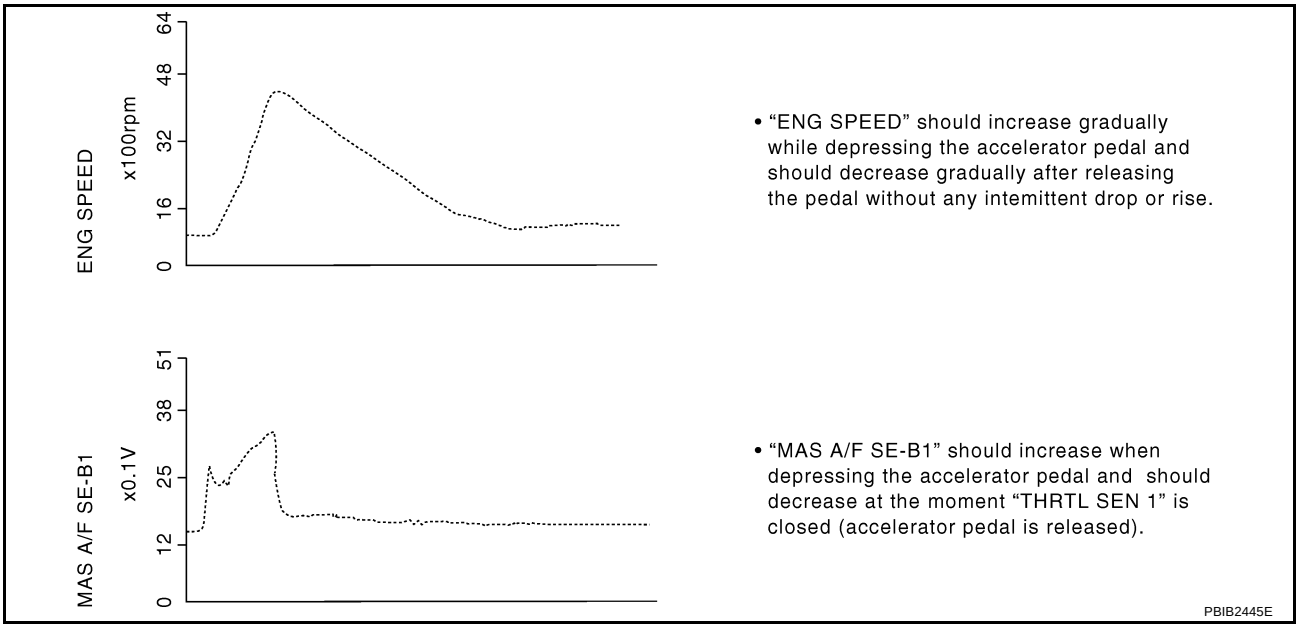
CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

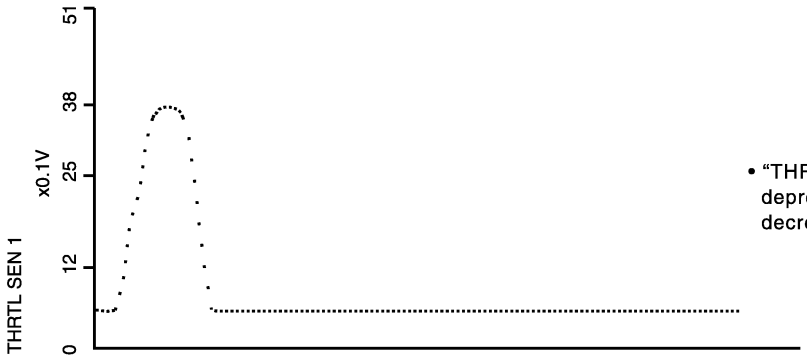
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch ON and with selector lever in D position (A/T models) or with shift lever in 1st position (M/T models).
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”.



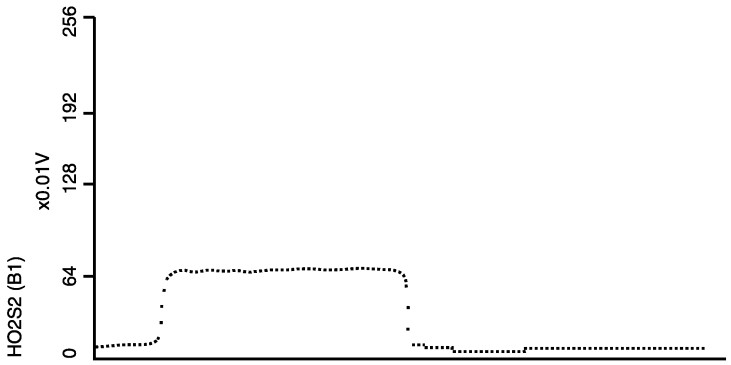
ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.

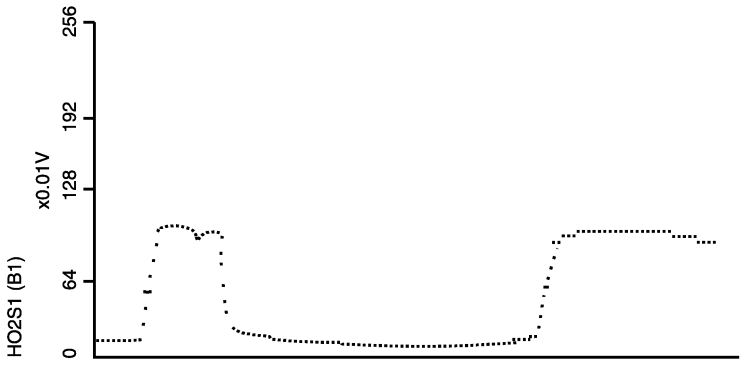




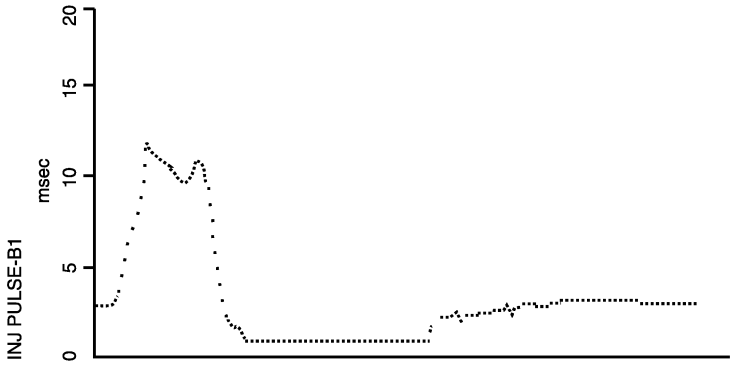
• "THRTL SEN 1" should increase while depressing the accelerator pedal and should decrease while releasing it.



• "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



• "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



• "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

PBIB0668E

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

BBS001A3

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.
The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

BBS001A4

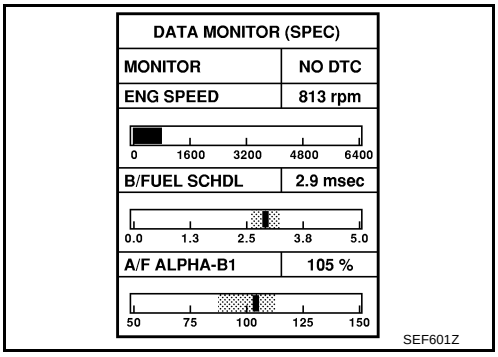
- Vehicle driven distance: More than 5,000 km (3,017 miles)
- Barometric pressure: 98.3 - 104.3 kPa (0.983 - 1.043 bar, 1.003 - 1.064 kg/cm^2 , 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Engine speed: Idle
- Transmission: Warmed-up
  - A/T models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F).
  - M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
  - Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

Inspection Procedure

BBS001A5

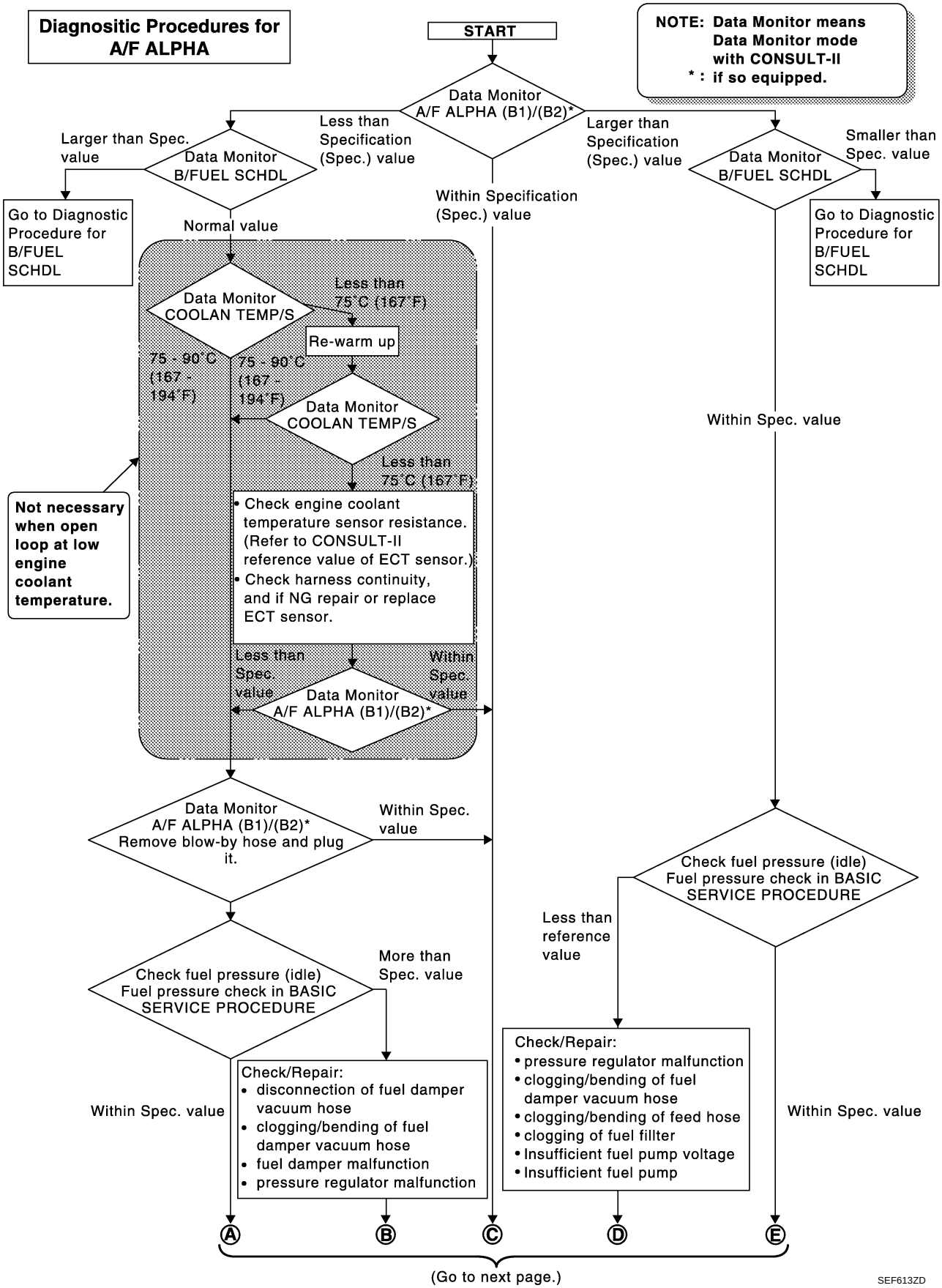
NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

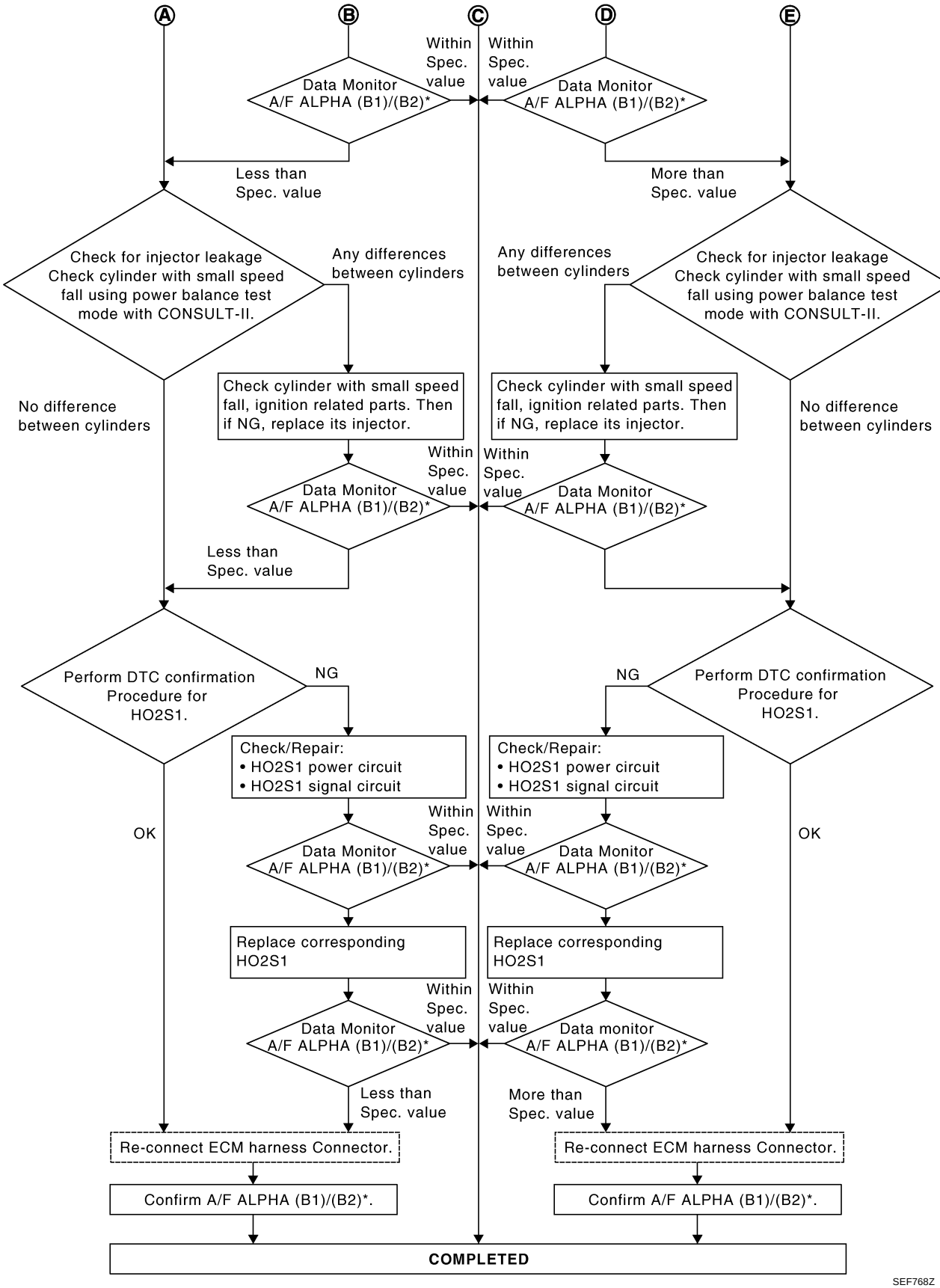
1. Perform EC-82, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-124, "Diagnostic Procedure" .



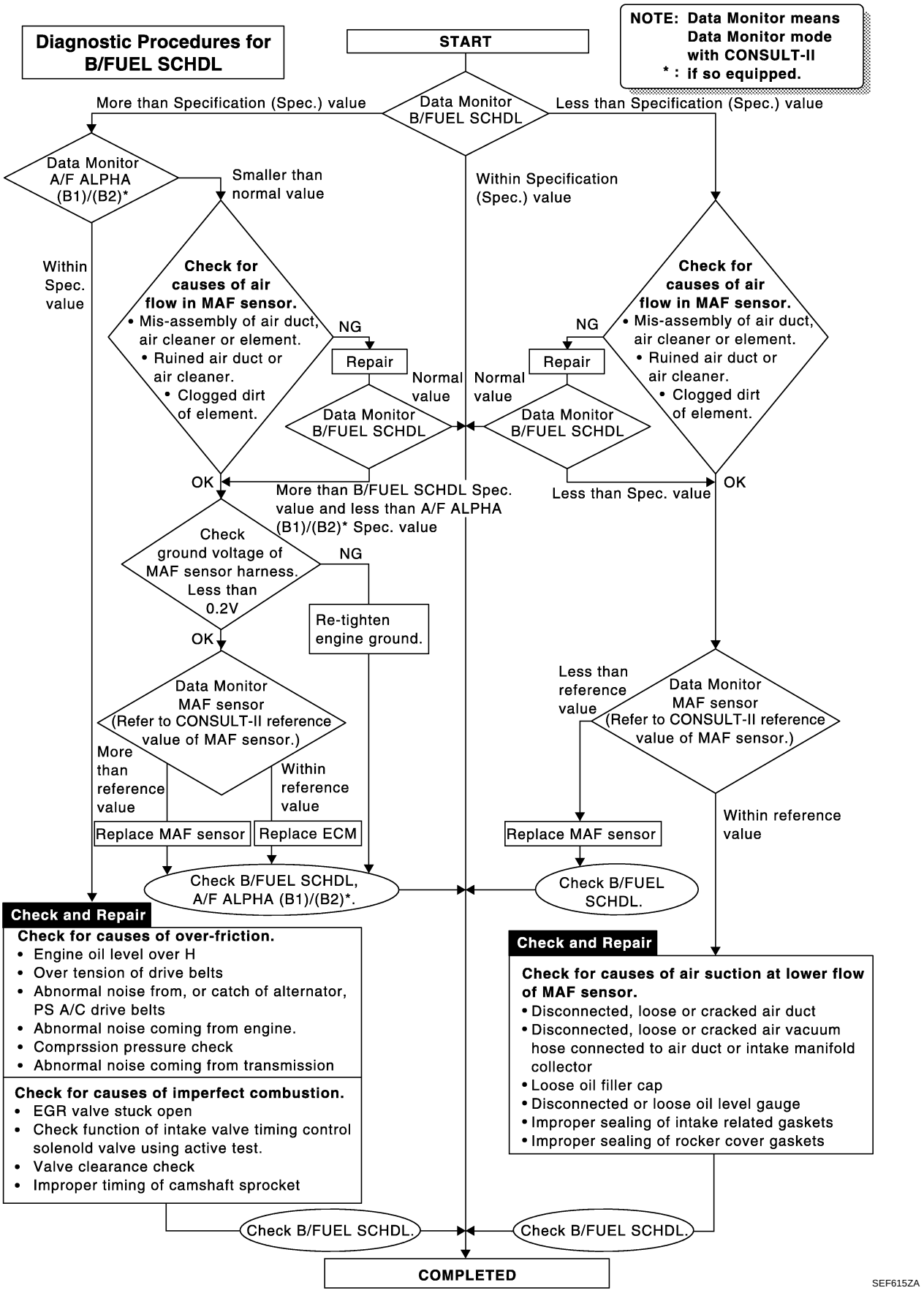
Diagnostic Procedure

BBS001A6




Ⓐ
Ⓑ
Ⓒ
Ⓓ
Ⓔ
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
Any differences between cylinders
Any differences between cylinders
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
No difference between cylinders
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
No difference between cylinders
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
Perform DTC confirmation Procedure for HO2S1.
NG
NG
Perform DTC confirmation Procedure for HO2S1.
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
OK
Within Spec. value
Within Spec. value
OK
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Replace corresponding HO2S1
Replace corresponding HO2S1
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Re-connect ECM harness Connector.
Re-connect ECM harness Connector.
Confirm A/F ALPHA (B1)/(B2)*.
Confirm A/F ALPHA (B1)/(B2)*.
COMPLETED

SEF768Z


Diagnostic Procedures for B/FUEL SCHDL
START
NOTE: Data Monitor means Data Monitor mode with CONSULT-II
* : if so equipped.
Data Monitor B/FUEL SCHDL
More than Specification (Spec.) value
Less than Specification (Spec.) value
Within Specification (Spec.) value
Data Monitor A/F ALPHA (B1)/(B2)*
Smaller than normal value
Within Spec. value
Check for causes of air flow in MAF sensor.
• Mis-assembly of air duct, air cleaner or element.
• Ruined air duct or air cleaner.
• Clogged dirt of element.
NG
Repair
Normal value
Data Monitor B/FUEL SCHDL
OK
More than B/FUEL SCHDL Spec. value and less than A/F ALPHA (B1)/(B2)* Spec. value
Check ground voltage of MAF sensor harness. Less than 0.2V
NG
Re-tighten engine ground.
OK
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor.)
More than reference value
Within reference value
Replace MAF sensor
Replace ECM
Check B/FUEL SCHDL, A/F ALPHA (B1)/(B2)*.
Check and Repair
Check for causes of over-friction.
• Engine oil level over H
• Over tension of drive belts
• Abnormal noise from, or catch of alternator, PS A/C drive belts
• Abnormal noise coming from engine.
• Comprssion pressure check
• Abnormal noise coming from transmission
Check for causes of imperfect combustion.
• EGR valve stuck open
• Check function of intake valve timing control solenold valve using active test.
• Valve clearance check
• Improper timing of camshaft sprocket
Check B/FUEL SCHDL.
Less than Specification (Spec.) value
Check for causes of air flow in MAF sensor.
• Mis-assembly of air duct, air cleaner or element.
• Ruined air duct or air cleaner.
• Clogged dirt of element.
NG
Repair
Normal value
Data Monitor B/FUEL SCHDL
OK
Less than Spec. value
Less than reference value
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor.)
Within reference value
Replace MAF sensor
Check B/FUEL SCHDL.
Check and Repair
Check for causes of air suction at lower flow of MAF sensor.
• Disconnected, loose or cracked air duct
• Disconnected, loose or cracked air vacuum hose connected to air duct or intake manifold collector
• Loose oil filler cap
• Disconnected or loose oil level gauge
• Improper sealing of intake related gaskets
• Improper sealing of rocker cover gaskets
Check B/FUEL SCHDL.
COMPLETED
SEF615ZA

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

BBS001A7

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of intermittent incident occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common Intermittent Incident Report Situations

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than [0] or [1t].
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnostic Procedure

BBS001A8

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-66, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to EC-135, "Ground Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident" , “Incident Simulation Tests”.

OK or NG

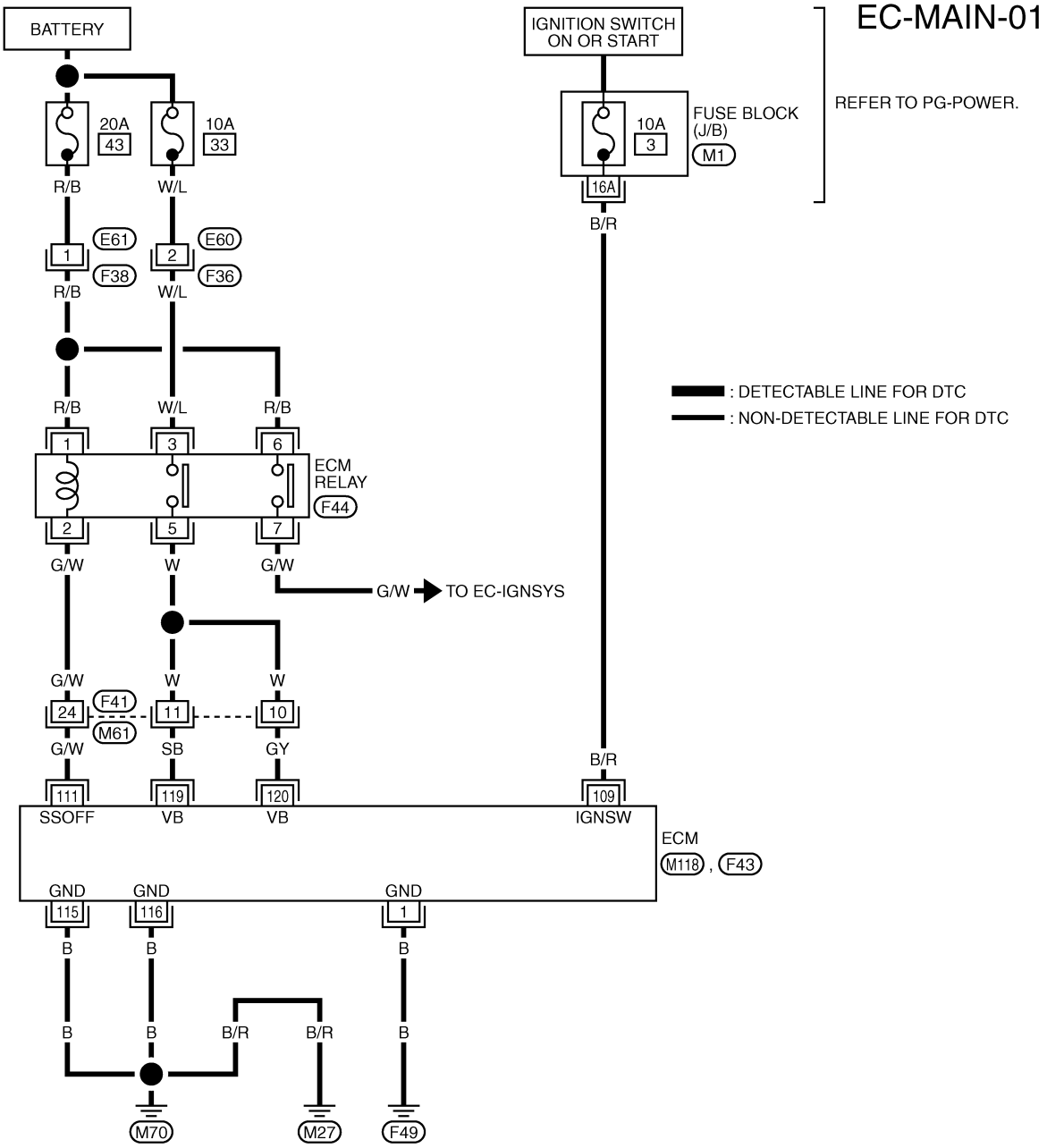
OK >> **INSPECTION END**
NG >> Repair or replace.

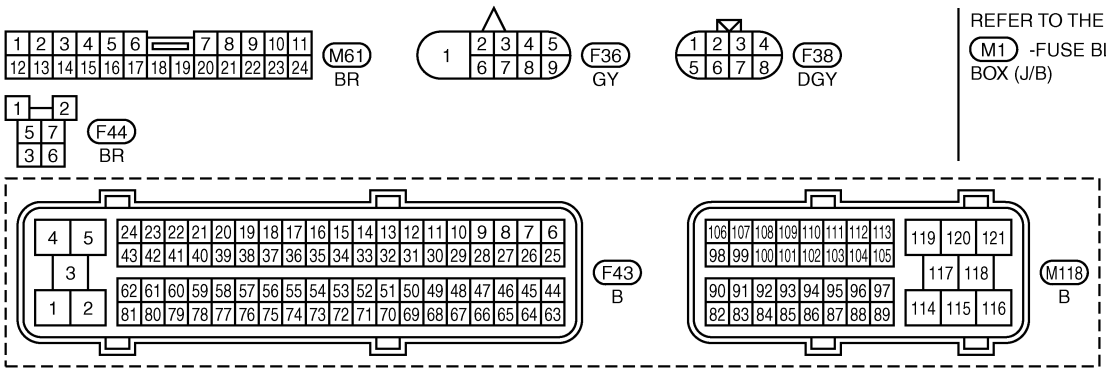
POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

Wiring Diagram

BBS001A9





TBWA0594E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
109	B/R	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	G/W	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds passed turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
115 116	B B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
119 120	SB GY	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS001AA

1. INSPECTION START

Start engine.
Is engine running?

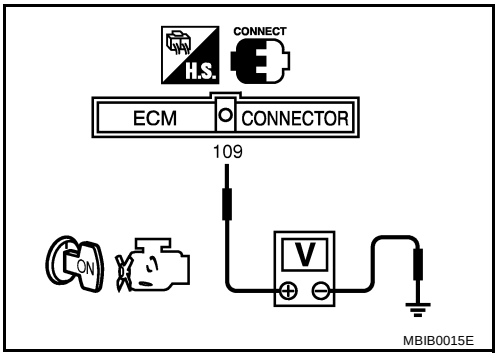
Yes or No

Yes >> GO TO 11.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminal 109 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

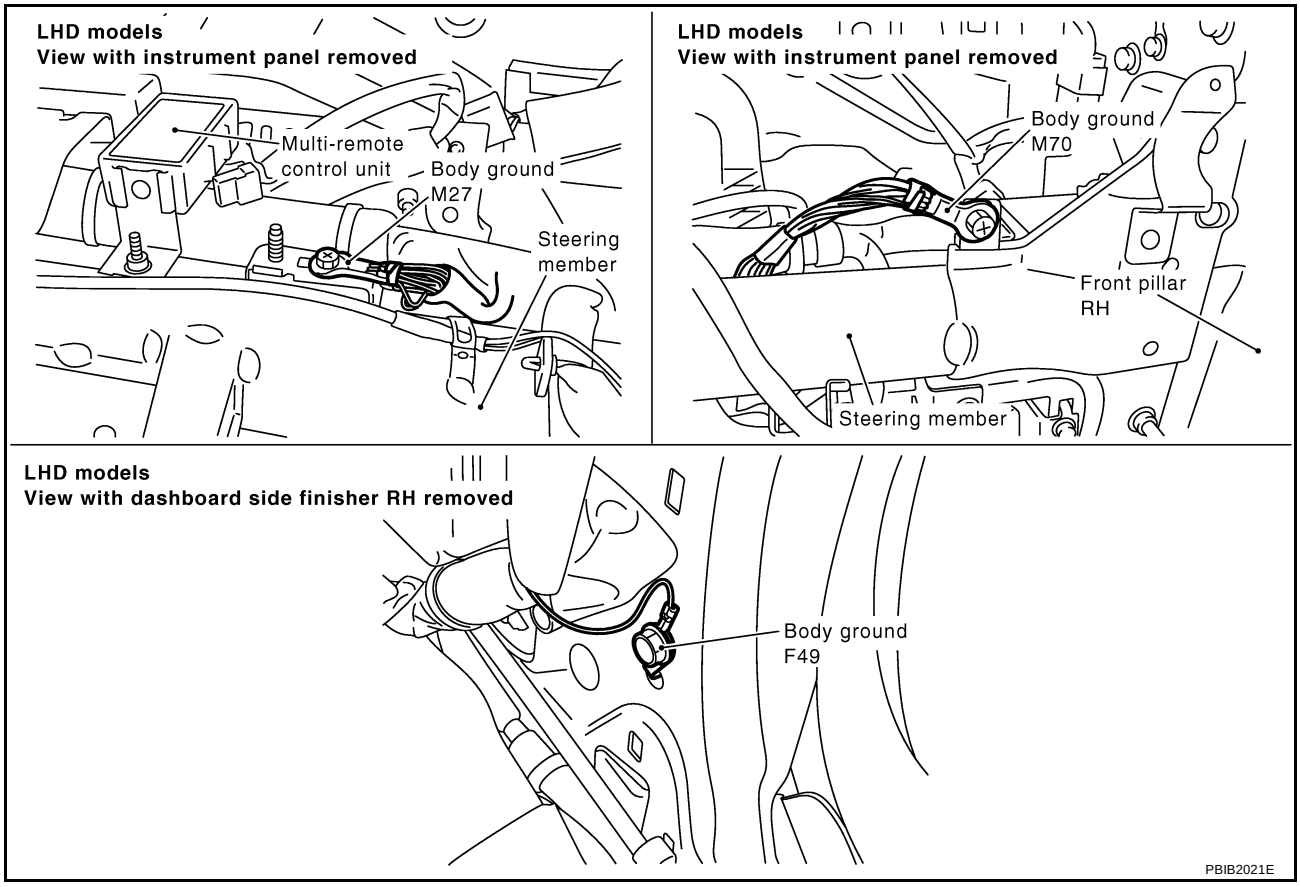
Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .



OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

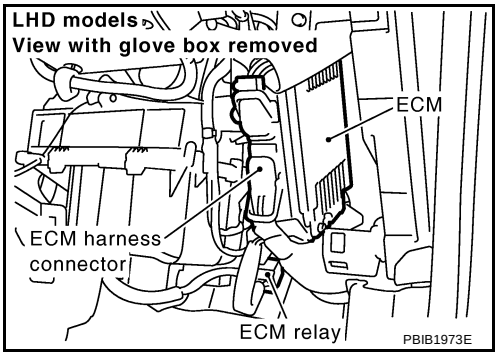
4. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

6. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM relay.

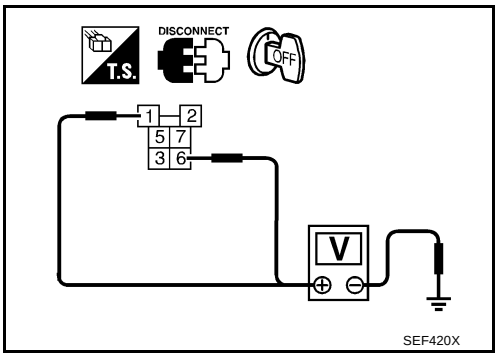


2. Check voltage between ECM relay terminals 1, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.



7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- 20A fuse
- Harness for open or short between ECM relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 111 and ECM relay terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F41, M61
- Harness for open or short between ECM relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ECM RELAY

Refer to EC-135, "Component Inspection" .

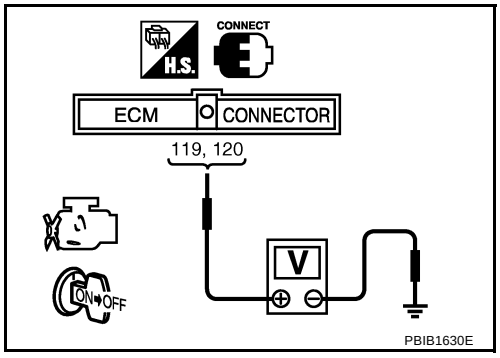
OK or NG

OK >> Go to EC-443, "IGNITION SIGNAL" .
NG >> Replace ECM relay.

11. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and then OFF.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

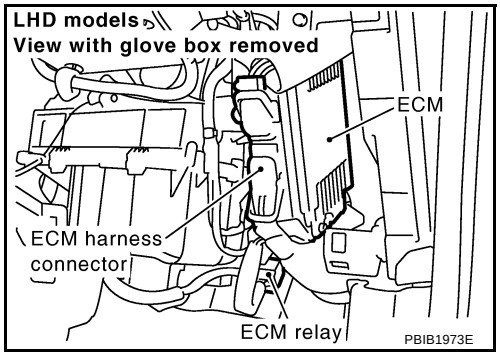


OK or NG

OK >> GO TO 17.
NG (Battery voltage does not exist.)>>GO TO 12.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 14.

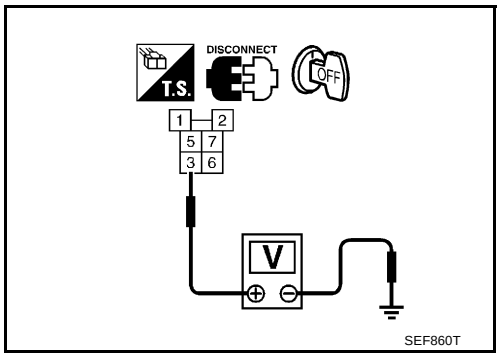
12. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.



2. Check voltage between ECM relay terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E60, F36
- 10A fuse
- Harness for open or short between ECM relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 119, 120 and ECM relay terminal 5. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F41, M61
- Harness for open or short between ECM relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK ECM RELAY

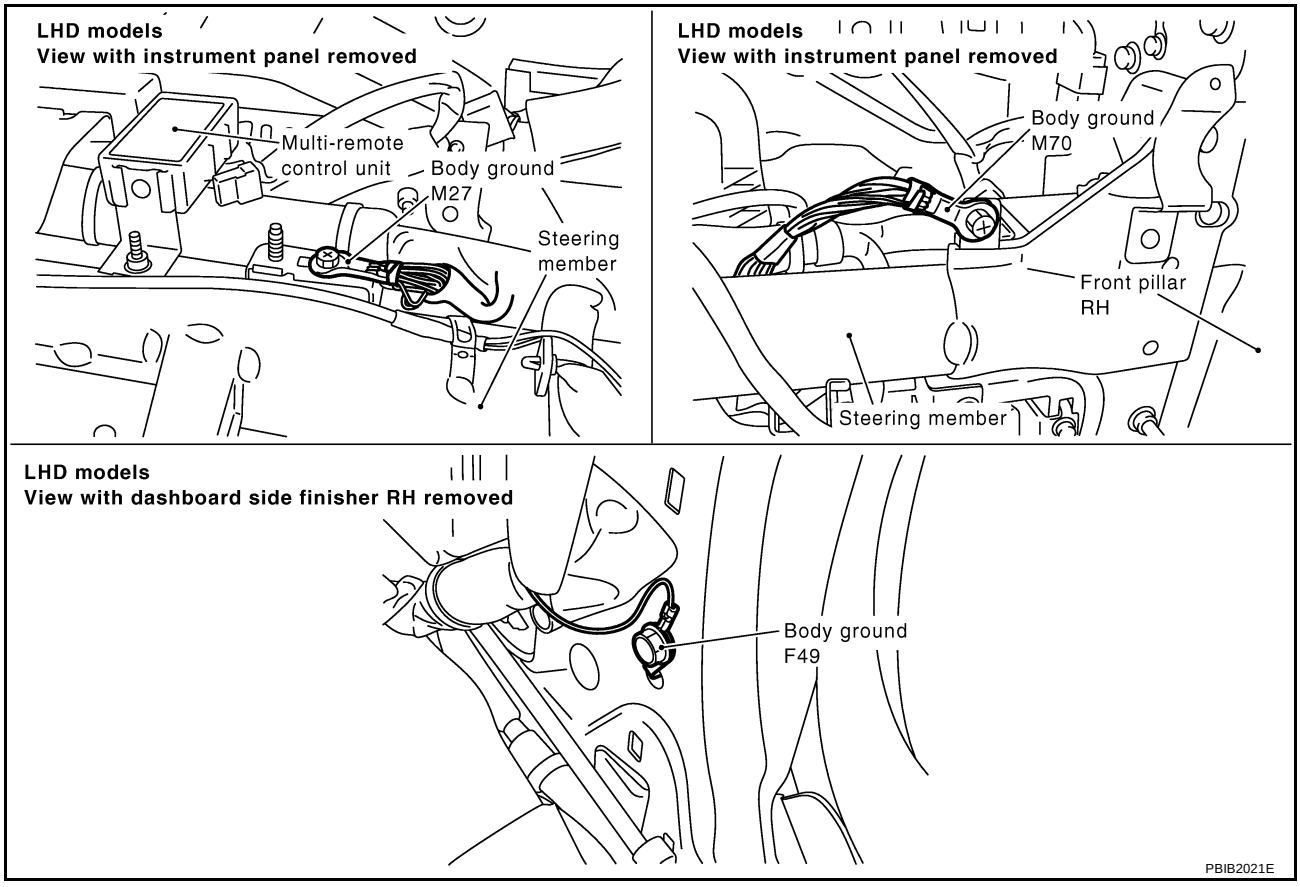
Refer to EC-135, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ECM relay.

17. CHECK GROUND CONNECTIONS

Loosen and retighten three ground screws on the body.
Refer to EC-135, "Ground Inspection" .



OK or NG

OK >> GO TO 18.
NG >> Repair or replace ground connections.

18. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 115, 116 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 19.
NG >> Repair open circuit or short to power in harness or connectors.

19. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

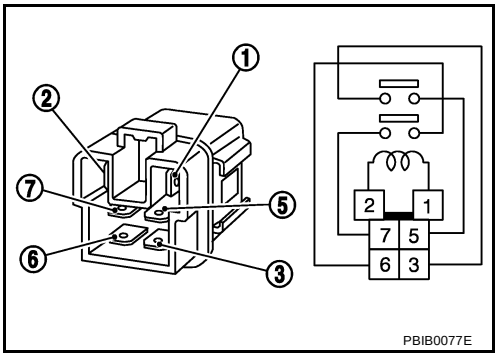
BBS001AB

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.



Ground Inspection

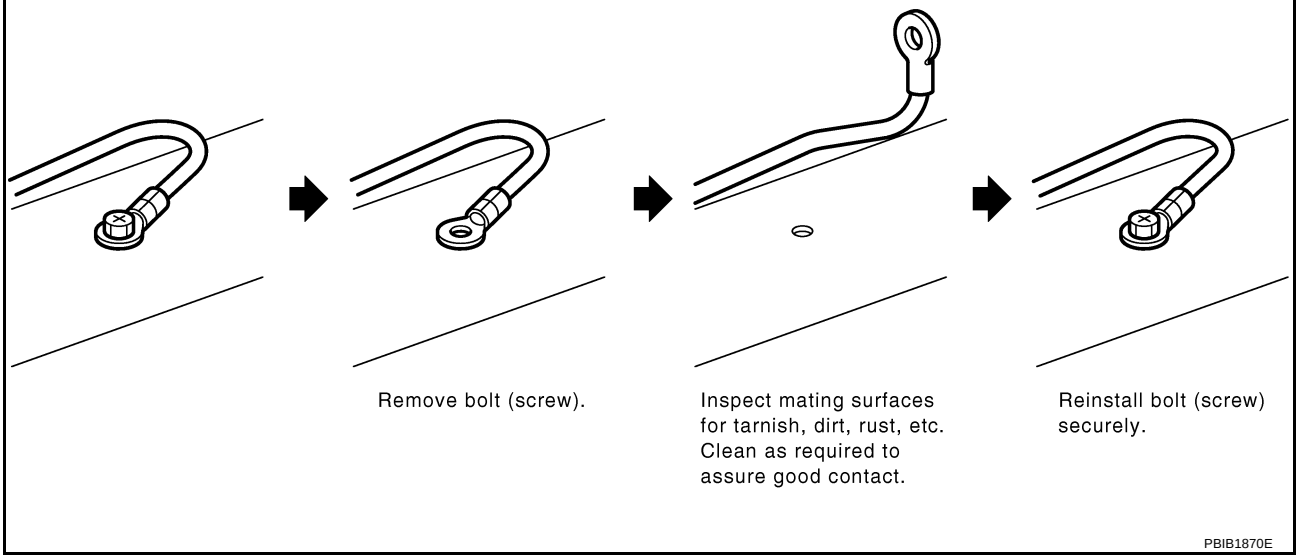
BBS001AC

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to PG-13, "Ground Distribution" .

Ground Inspection



DTC U1000, U1001 CAN COMMUNICATION LINE

PFP:23710

Description

BBS001AD

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

BBS001AE

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000 1000	CAN communication line	● ECM cannot communicate to other control units. ● ECM cannot communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted.)
U1001*1 1001*1			

*1: **The MI will not light up for this self-diagnosis.**

DTC Confirmation Procedure

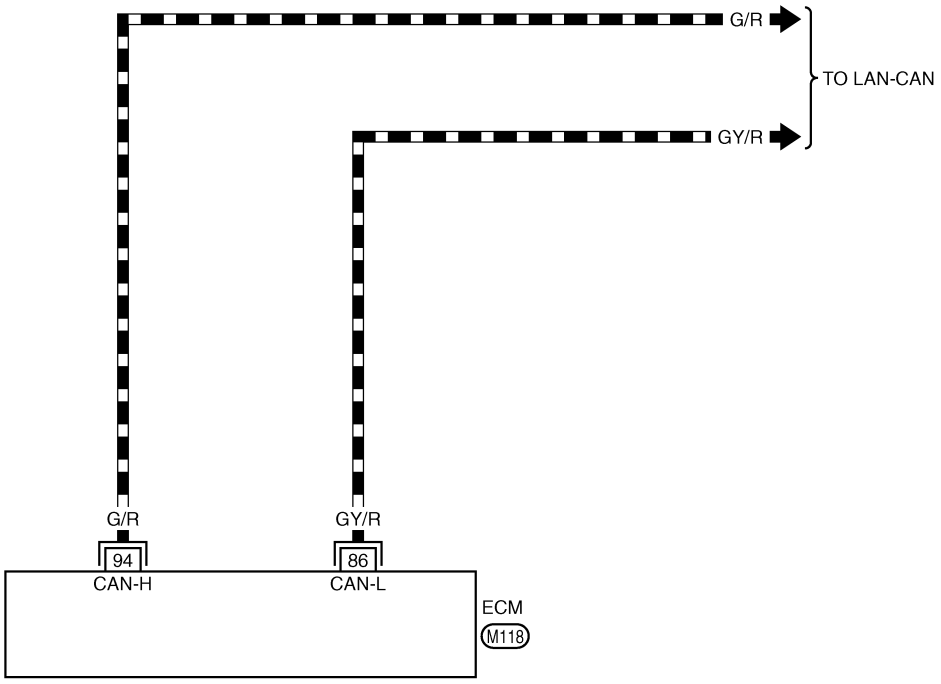
BBS001AF

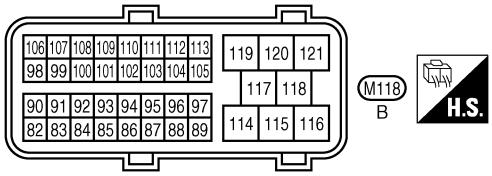
1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-138, "Diagnostic Procedure" .

Wiring Diagram

BBS001AG

EC-CAN-01





TBWA0595E

Diagnostic Procedure

BBS001AH

Go to LAN-25, "CAN Communication Unit" .

DTC P0011 IVT CONTROL

PFP:23796

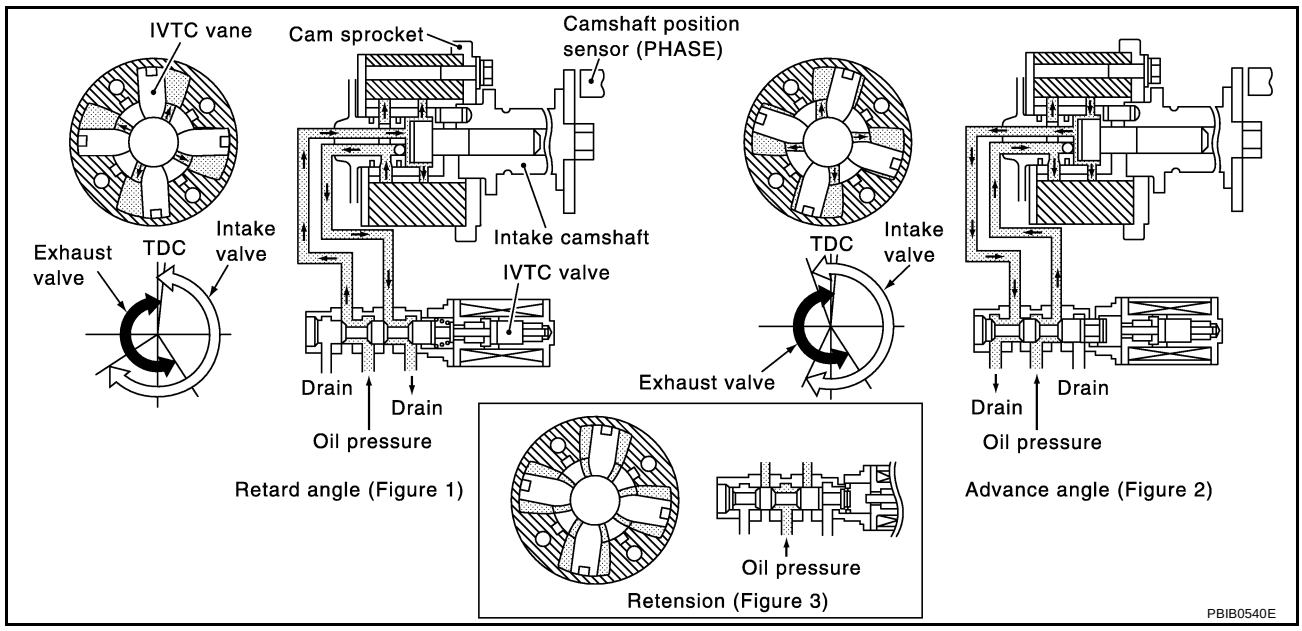
Description

BBS001AI

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed and piston position	Intake valve timing control	Intake valve timing control solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
Wheel sensor	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line.



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

CONSULT-II Reference Value in Data Monitor Mode

BBS001AJ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1)	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
INT/V SOL (B1)	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 50%

On Board Diagnosis Logic

BBS001AK

The MI will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011 0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	● Crankshaft position sensor (POS) ● Camshaft position sensor (PHASE) ● Accumulation of debris to the signal pick-up portion of the camshaft

FAIL-SAFE MODE

ECM enters in fail-safe mode when the malfunction is detected.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function

DTC Confirmation Procedure

BBS001AL

CAUTION:
Always drive at a safe speed.

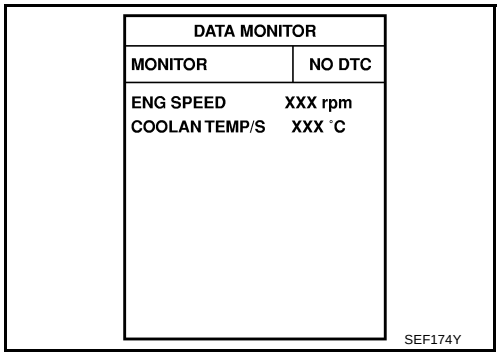
NOTE:

- **If DTC P0011 is displayed with DTC P1111, first perform trouble diagnosis for DTC P1111. See EC-293, "DTC P1111 IVT CONTROL SOLENOID VALVE" .**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds.
   Hold the accelerator pedal as steady as possible.



ENG SPEED	1,200 - 2,000 rpm (A constant rotation is maintained.)
COOLANT TEMPS	60 - 120°C (176 - 194°F)
Shift lever	A/T: P or N position M/T: Neutral position

4. Let engine idle for 10 seconds.
5. If the 1st trip DTC is detected, go to EC-141, "Diagnostic Procedure" .
   If the 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	1,700 - 3,175 rpm (A constant rotation is maintained.)
COOLANT TEMPS	70 - 105°C (176 - 194°F)
Shift lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

7. If 1st trip DTC is detected, go to EC-141, "Diagnostic Procedure" .

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001AM

1. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-258, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace crankshaft position sensor (POS).

2. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-265, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace camshaft position sensor (PHASE).

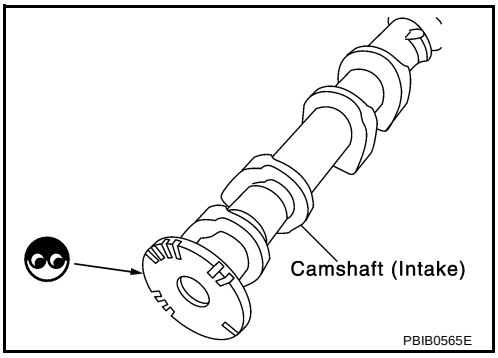
3. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 4.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



4. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For wiring diagram, refer to EC-254, "Wiring Diagram" for CKP sensor (POS) and EC-261, "Wiring Diagram" for CMP sensor (PHASE).

>> **INSPECTION END**

DTC P0031, P0032 HO2S1 HEATER

PFP:22690

Description

BBS001AN

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Engine coolant temperature sensor	Engine coolant temperature		

The ECM performs ON/OFF duty control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

BBS001AO

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine: After warming up ● Engine speed: Below 3,600 rpm	ON
	● Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

BBS001AP

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0031 0031	Heated oxygen sensor 1 heater control circuit low	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is open or shorted.) ● Heater oxygen sensor 1 heater
P0032 0032	Heated oxygen sensor 1 heater control circuit high	The current amperage in the heated oxygen sensor 1 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 1 heater.)	● Harness or connectors (The heated oxygen sensor 1 heater circuit is shorted.) ● Heater oxygen sensor 1 heater

DTC Confirmation Procedure

BBS001AQ

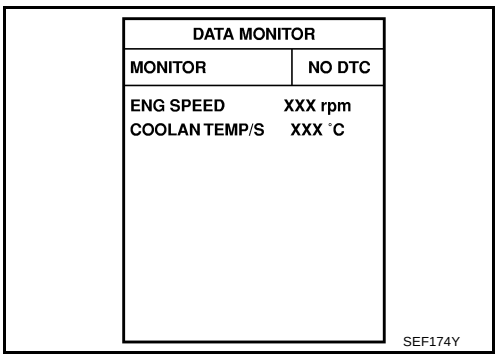
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.

3. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and run it for at least 6 seconds at idle speed.
5. If 1st trip DTC is detected, go to EC-145, "Diagnostic Procedure" .



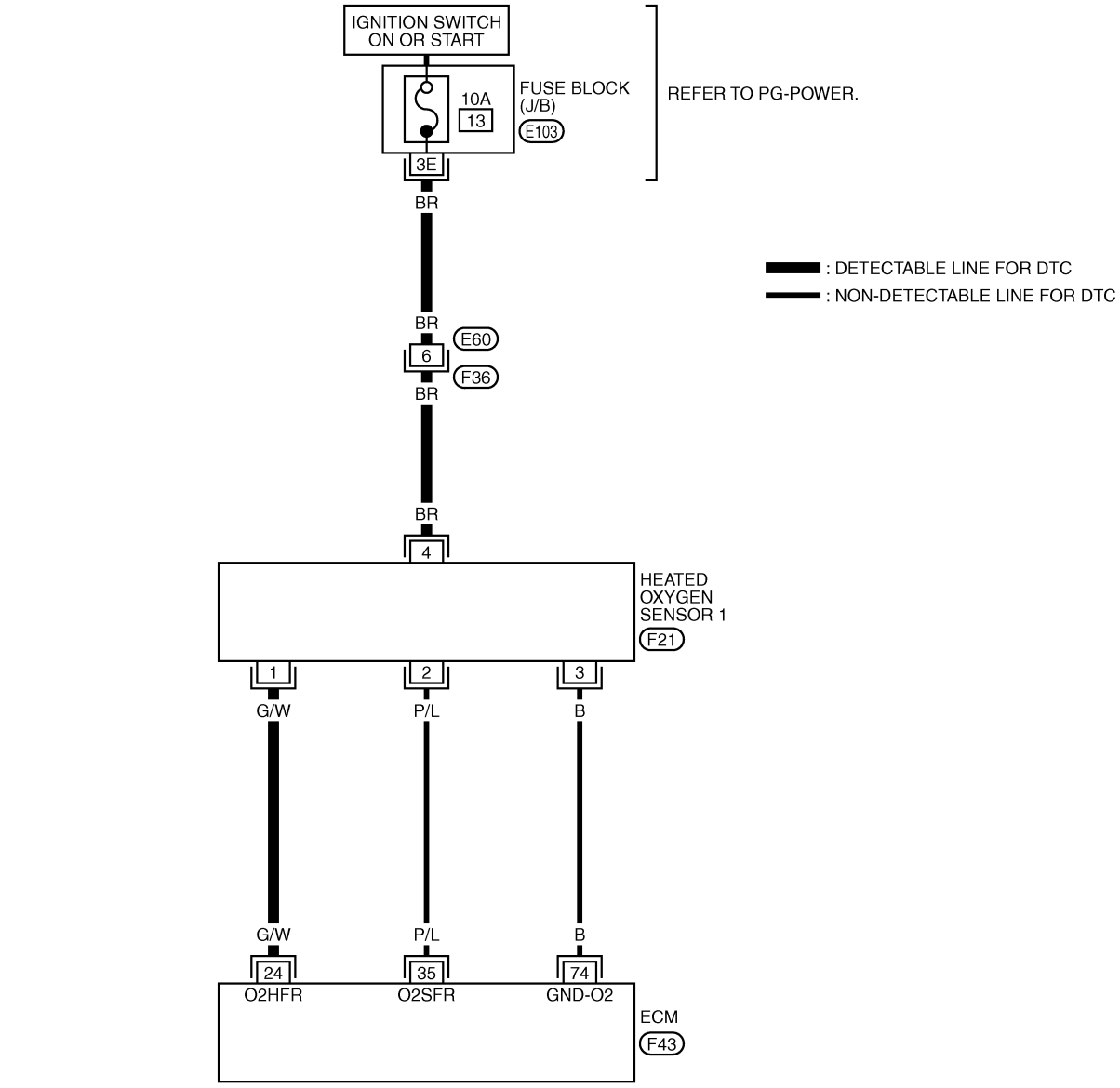
WITH GST

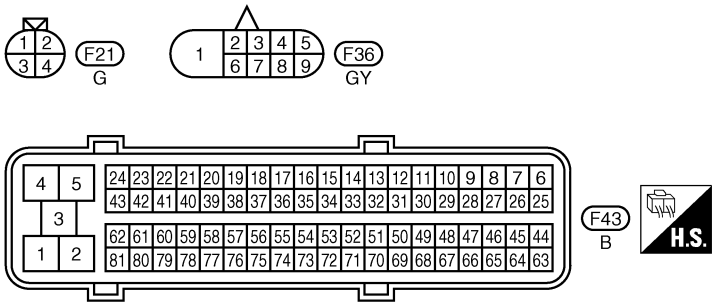
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001AR

EC-HO2S1H-01



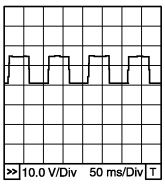


REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0596E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G/W	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,600 rpm	Approximately 7.0V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

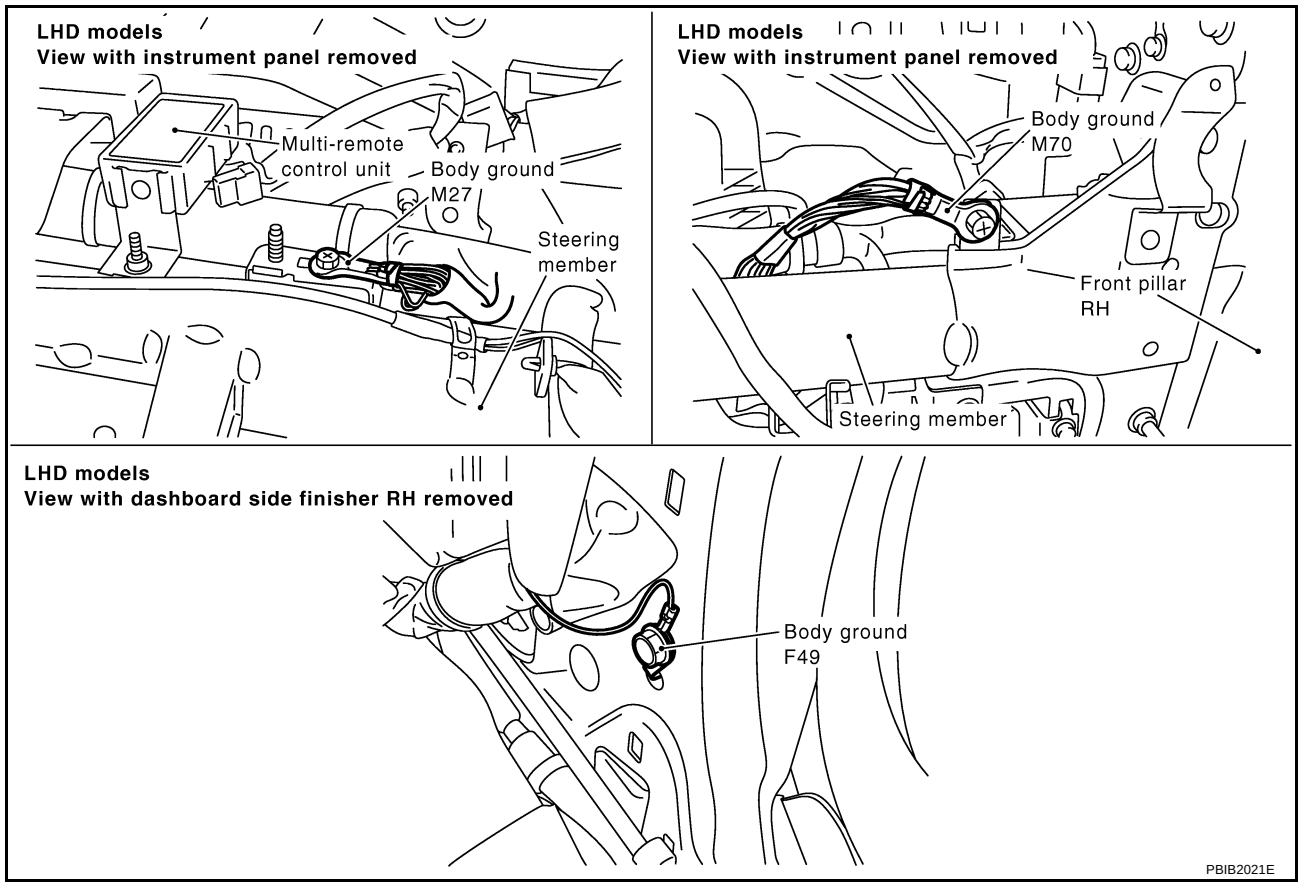
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001AS

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

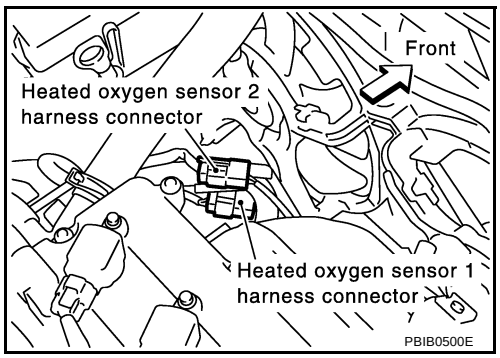


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

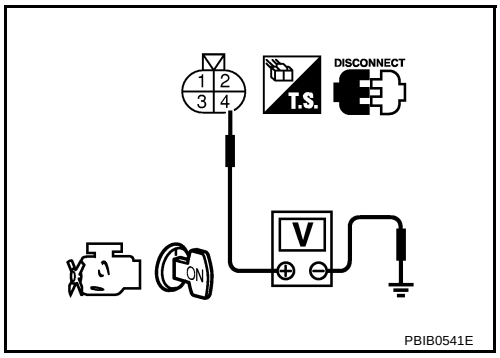
2. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 1 harness connector.
2. Turn ignition switch ON.



3. Check voltage between HO2S1 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E60, F36
- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 24 and HO2S1 terminal 1. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-147, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

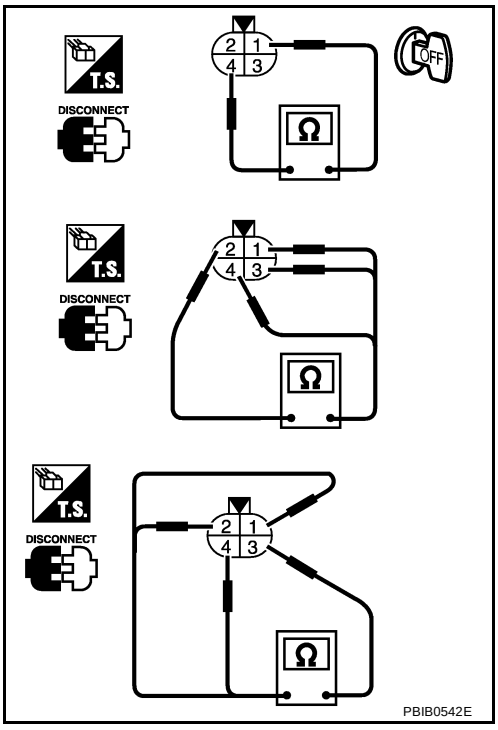
BBS001AT

HEATED OXYGEN SENSOR 1 HEATER

1. Check resistance between HO2S1 terminals as follows.

Terminal No.	Resistance
1 and 4	3.3 - 4.0 Ω [at 25°C (77°F)]
2 and 1, 3, 4	∞ Ω (Continuity should not exist)
3 and 1, 2, 4	

2. If NG, replace heated oxygen sensor 1.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001AU

HEATED OXYGEN SENSOR 1

Refer to EM-25, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

DTC P0037, P0038 HO2S2 HEATER

PFP:226A0

Description

BBS001AV

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

BBS001AW

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON
	● Engine speed: Above 3,600 rpm	OFF

On Board Diagnosis Logic

BBS001AX

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0037 0037	Heated oxygen sensor 2 heater control circuit low	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively low voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is open or shorted.) ● Heater oxygen sensor 2 heater
P0038 0038	Heated oxygen sensor 2 heater control circuit high	The current amperage in the heated oxygen sensor 2 heater circuit is out of the normal range. (An excessively high voltage signal is sent to ECM through the heated oxygen sensor 2 heater.)	● Harness or connectors (The heated oxygen sensor 2 heater circuit is shorted.) ● Heater oxygen sensor 2 heater

DTC Confirmation Procedure

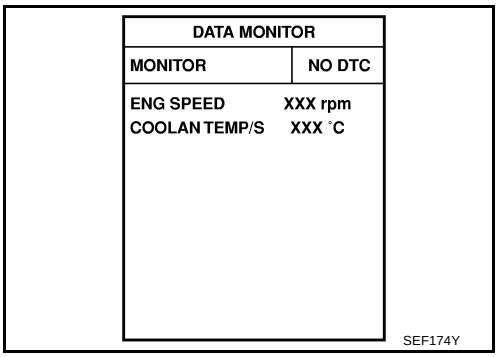
BBS001AY

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10.5V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 1 minute.
6. If 1st trip DTC is detected, go to EC-151, "Diagnostic Procedure" .



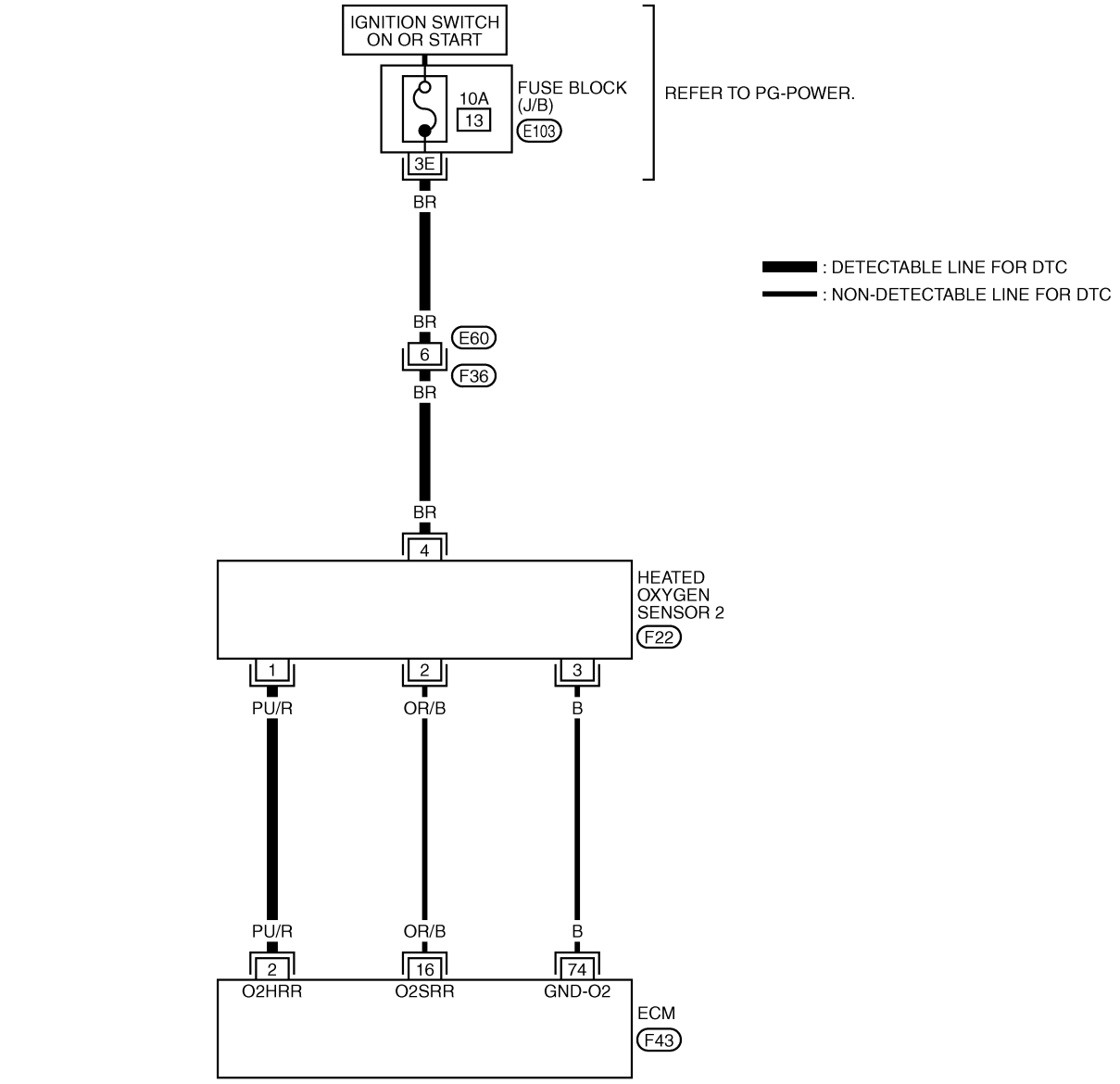
WITH GST

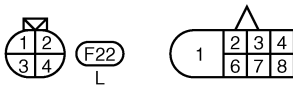
Follow the procedure “WITH CONSULT-II” above.

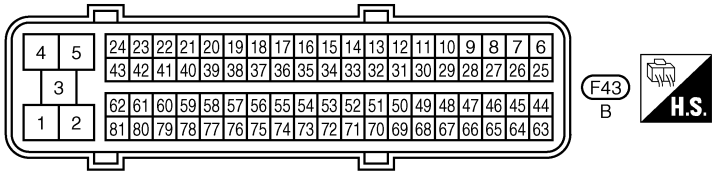
Wiring Diagram

BBS001AZ

EC-HO2S2H-01







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0597E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

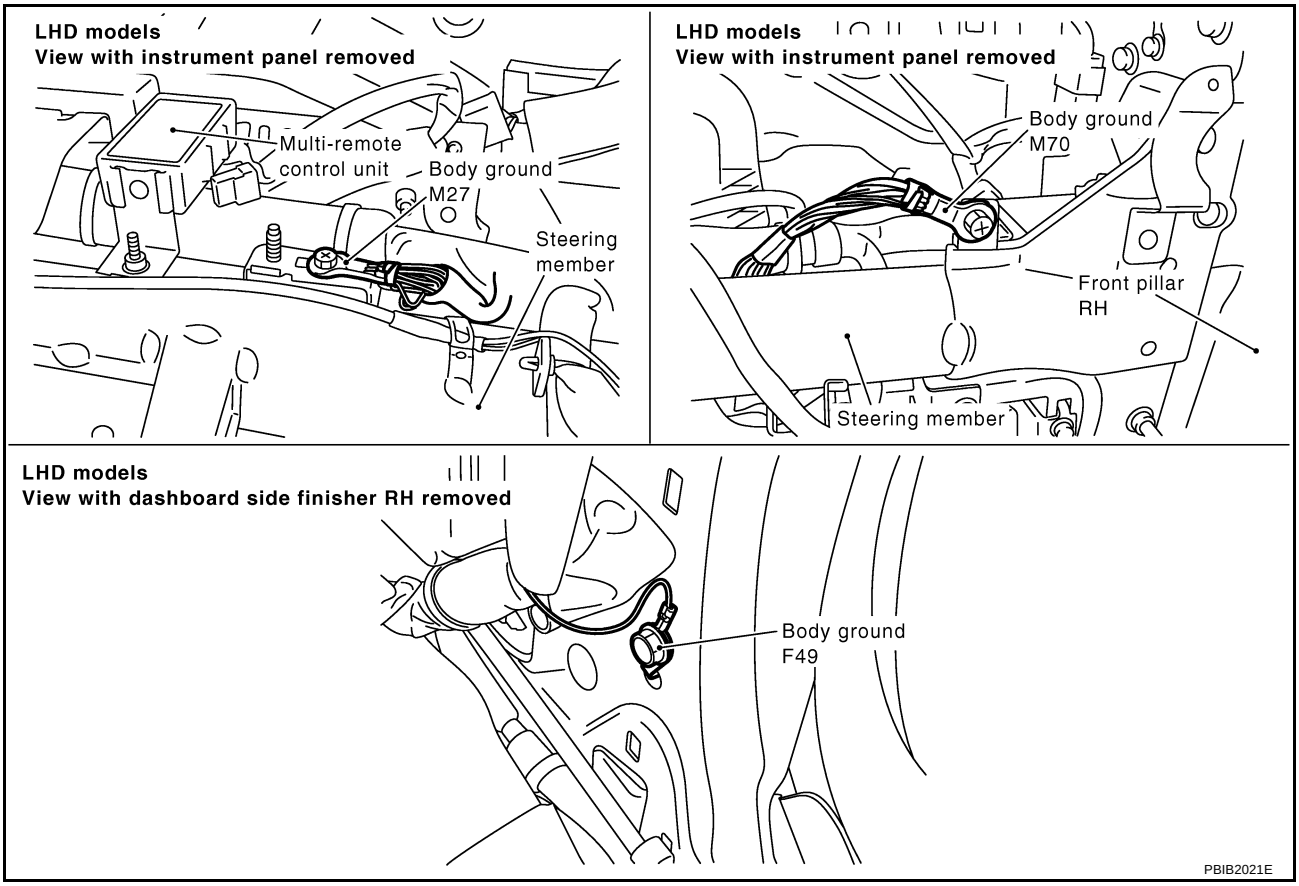
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	PU/R	Heated oxygen sensor 2 heater	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS001B0

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-135, "Ground Inspection" .

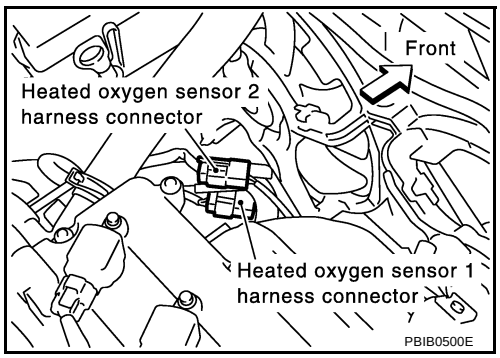


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

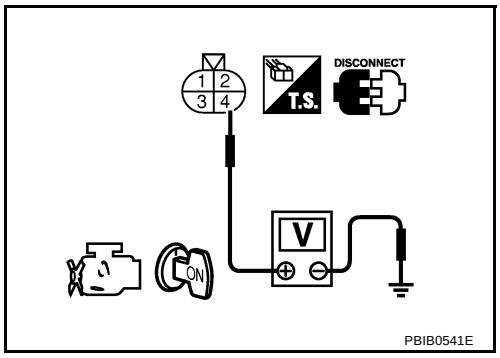
2. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Disconnect heated oxygen sensor 2 harness connector.
2. Turn ignition switch ON.



3. Check voltage between HO2S2 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E60, F36
- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit or short to ground or short or power in harness or connectors.

4. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 2 and HO2S2 terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-153, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

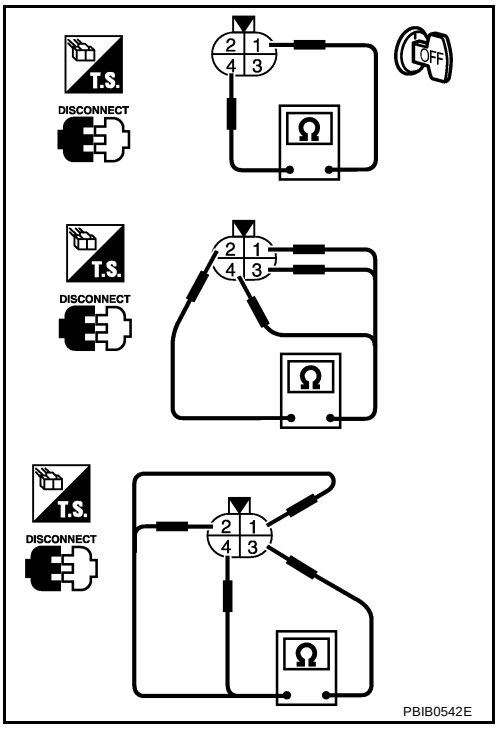
BBS001B1

HEATED OXYGEN SENSOR 2 HEATER

1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
1 and 4	5.0 - 7.0 Ω [at 25°C (77°F)]
2 and 1, 3, 4	∞ Ω (Continuity should not exist)
3 and 1, 2, 4	

2. If NG, replace heated oxygen sensor 2.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001B2

HEATED OXYGEN SENSOR 2

Refer to EX-2, "EXHAUST SYSTEM" .

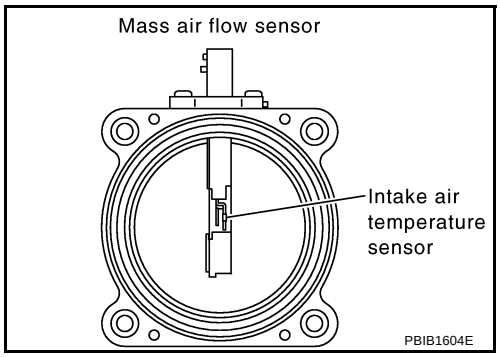
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

BBS001B3

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

BBS001B4

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS A/F SE-B1	See EC-123, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
CAL/LD VALUE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	10% - 35%
		2,500 rpm	10% - 35%
MASS AIRFLOW	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	1.0 - 4.0 g·m/s
		2,500 rpm	4.0 - 10.0 g·m/s

On Board Diagnosis Logic

BBS001B5

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

BBS001B6

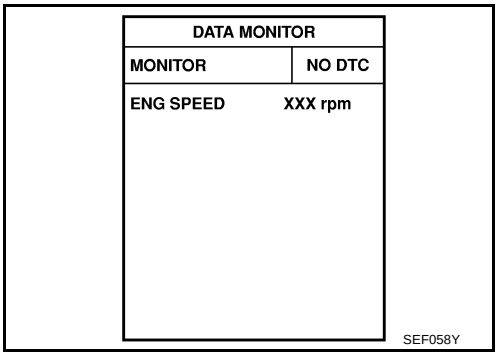
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

With CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If DTC is detected, go to EC-157, "Diagnostic Procedure" .



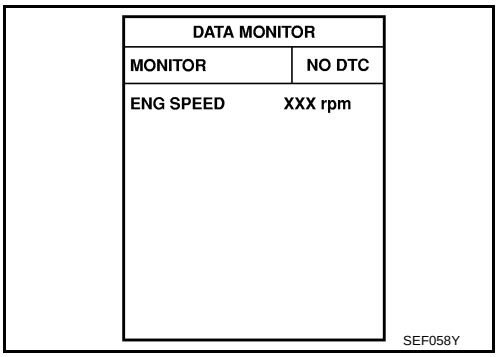
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P0103

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-157, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Start engine and wait at least 5 seconds.
6. If DTC is detected, go to EC-157, "Diagnostic Procedure" .



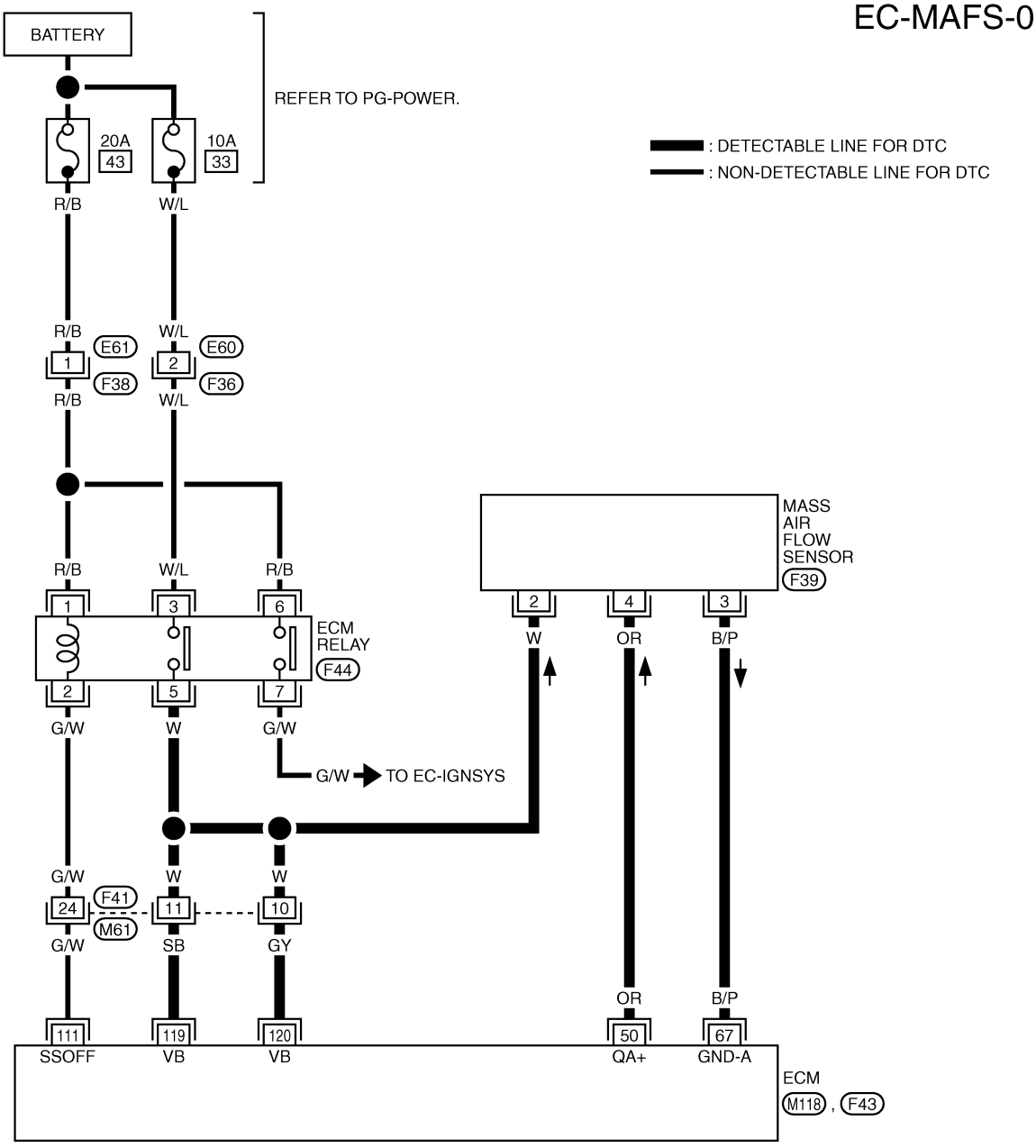
With GST

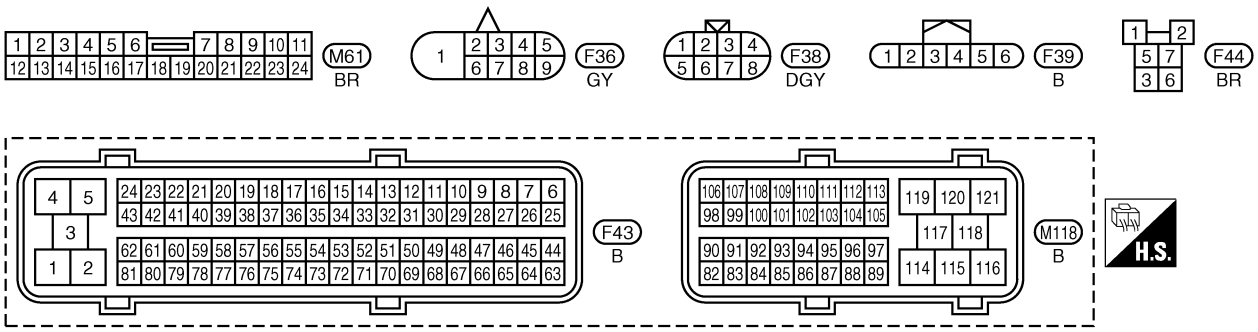
Follow the procedure “With CONSULT-II” above.

Wiring Diagram

BBS001B7

EC-MAFS-01





TBWA0598E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	OR	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.4V
			[Engine is running] ● **Warm-up condition** ● Idle speed	0.7 - 1.1V (QR20DE) 0.8 - 1.2V (QR25DE)
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm	0.7 - 1.1 to Approximately 4.0V (QR20DE) 0.8 - 1.2 to Approximately 4.0V (QR25DE) (Check for liner voltage rise in response to engine being increased to about 4,000 rpm.)
67	B/P	Sensor ground (Mass air flow sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001B8

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.

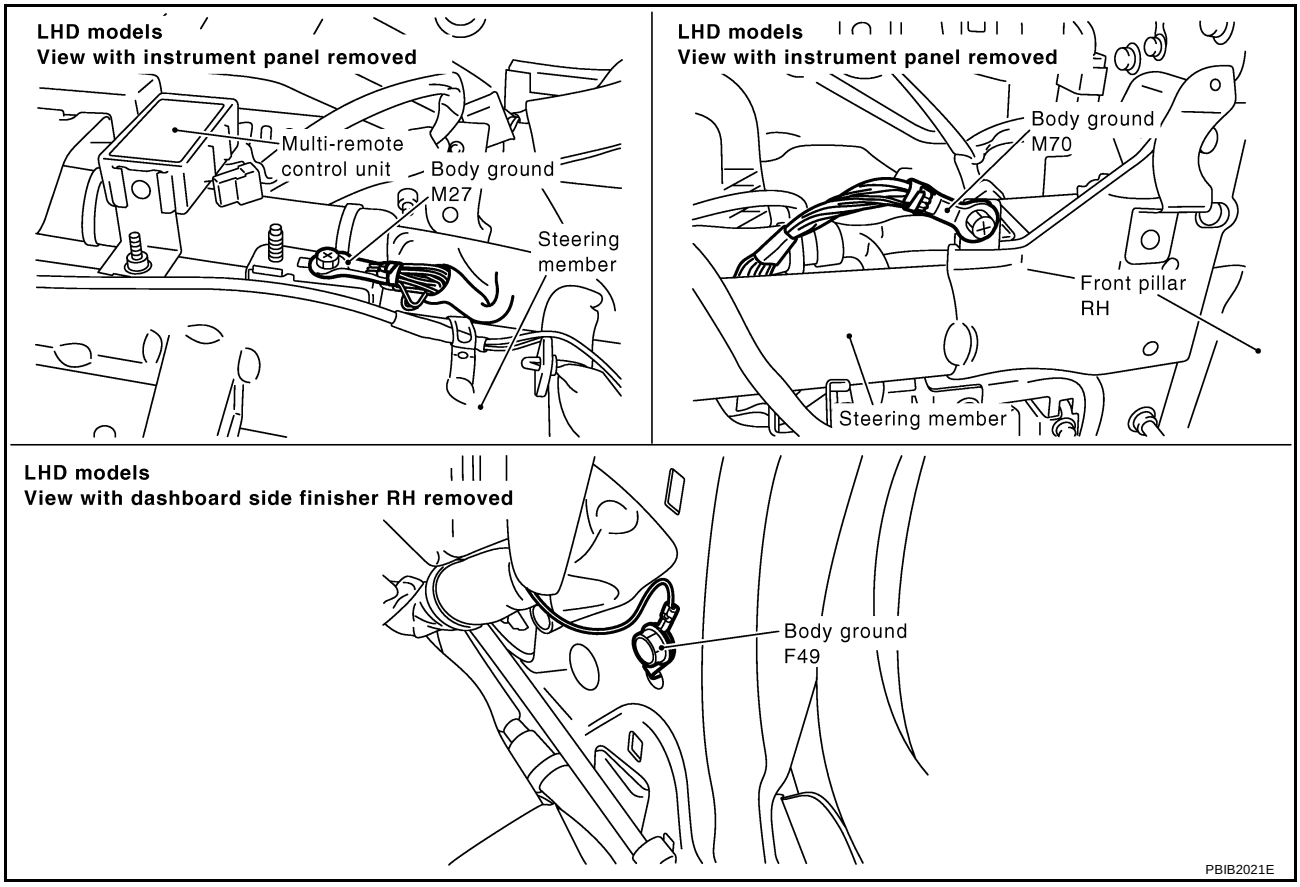
- Air duct
- Vacuum hoses
- Intake air passage between air duct and intake manifold

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

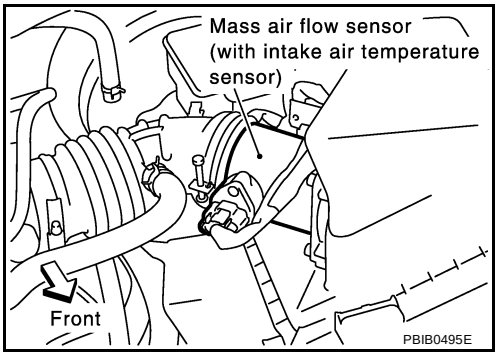


OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

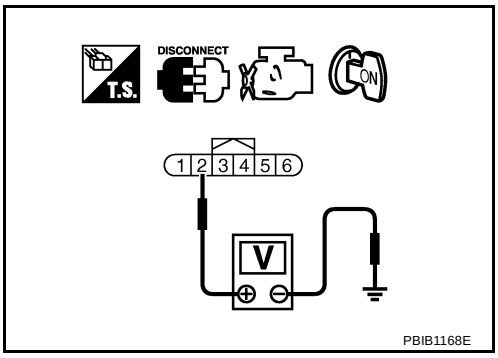
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect MAF sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminals 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F41, M61
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 67.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 50.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-160, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001B9

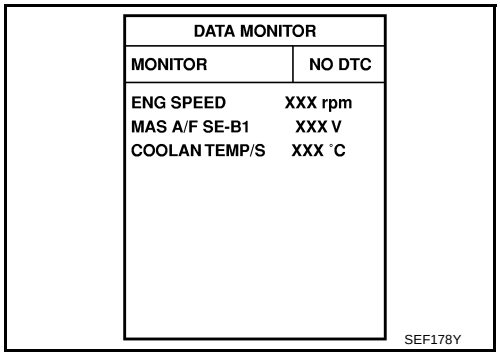
MASS AIR FLOW SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.
4. Select “MAS A/F SE-B1” and check indication under the following conditions.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1V (QR20DE) 0.8 - 1.2V (QR25DE)
Idle to about 4,000 rpm	0.7 - 1.1 to 2.4 (QR20DE)* 0.8 - 1.2 to 2.4 (QR25DE)*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.



5. If the voltage is out of specification, proceed the following.

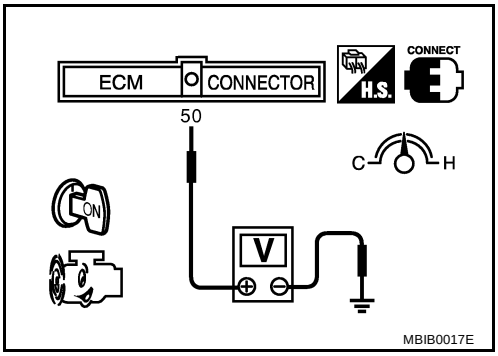
a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 50 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1V (QR20DE) 0.8 - 1.2V (QR25DE)
Idle to about 4,000 rpm	0.7 - 1.1 to 2.4 (QR20DE)* 0.8 - 1.2 to 2.4 (QR25DE)*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 3 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

BBS001BA

MASS AIR FLOW SENSOR

Refer to EM-16, "AIR CLEANER AND AIR DUCT" .

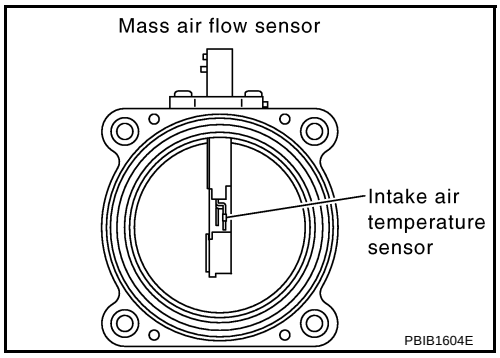
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

BBS001BB

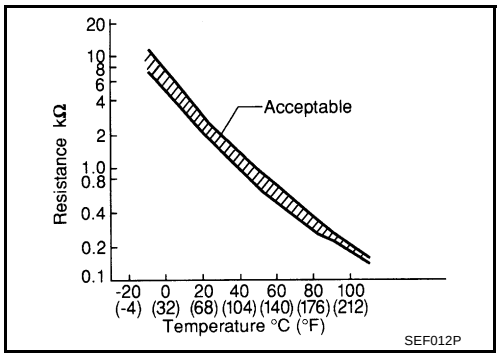
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.3	1.800 - 2.200
80 (176)	1.2	0.283 - 0.359

*: These data are reference values and are measured between ECM terminal 34 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

BBS001BC

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

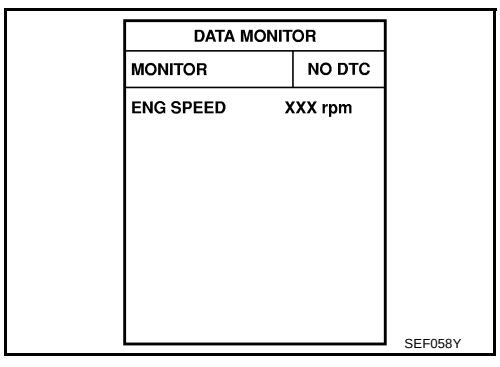
DTC Confirmation Procedure

BBS001BD

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-165, "Diagnostic Procedure"
.



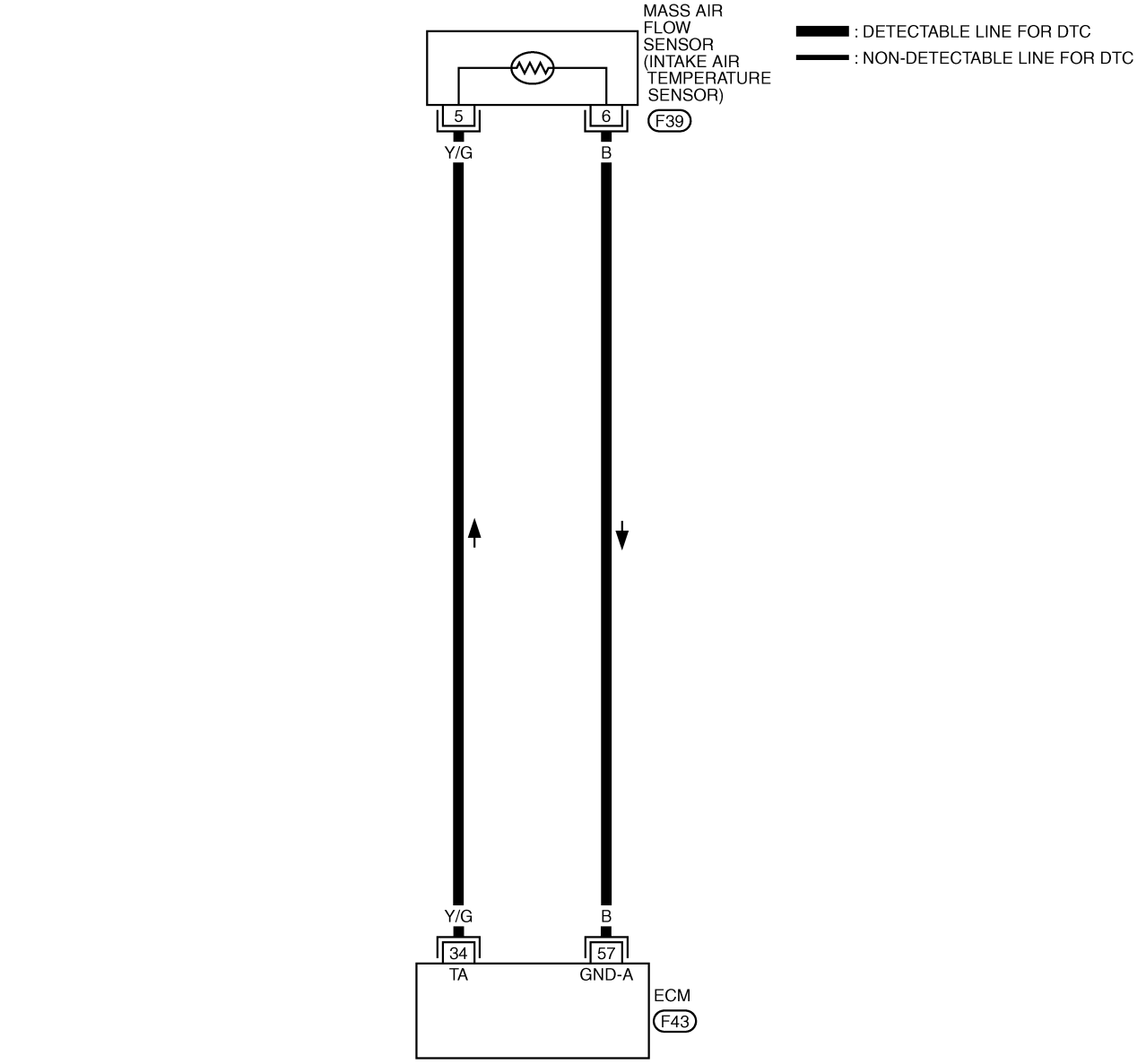
WITH GST

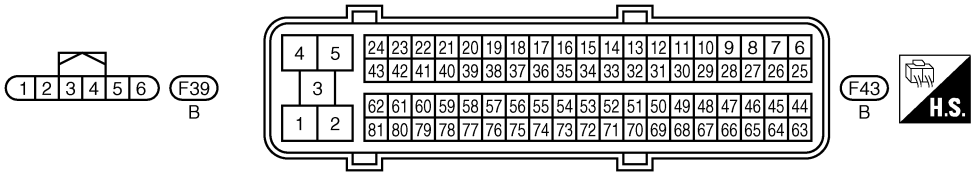
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001BE

EC-IATS-01





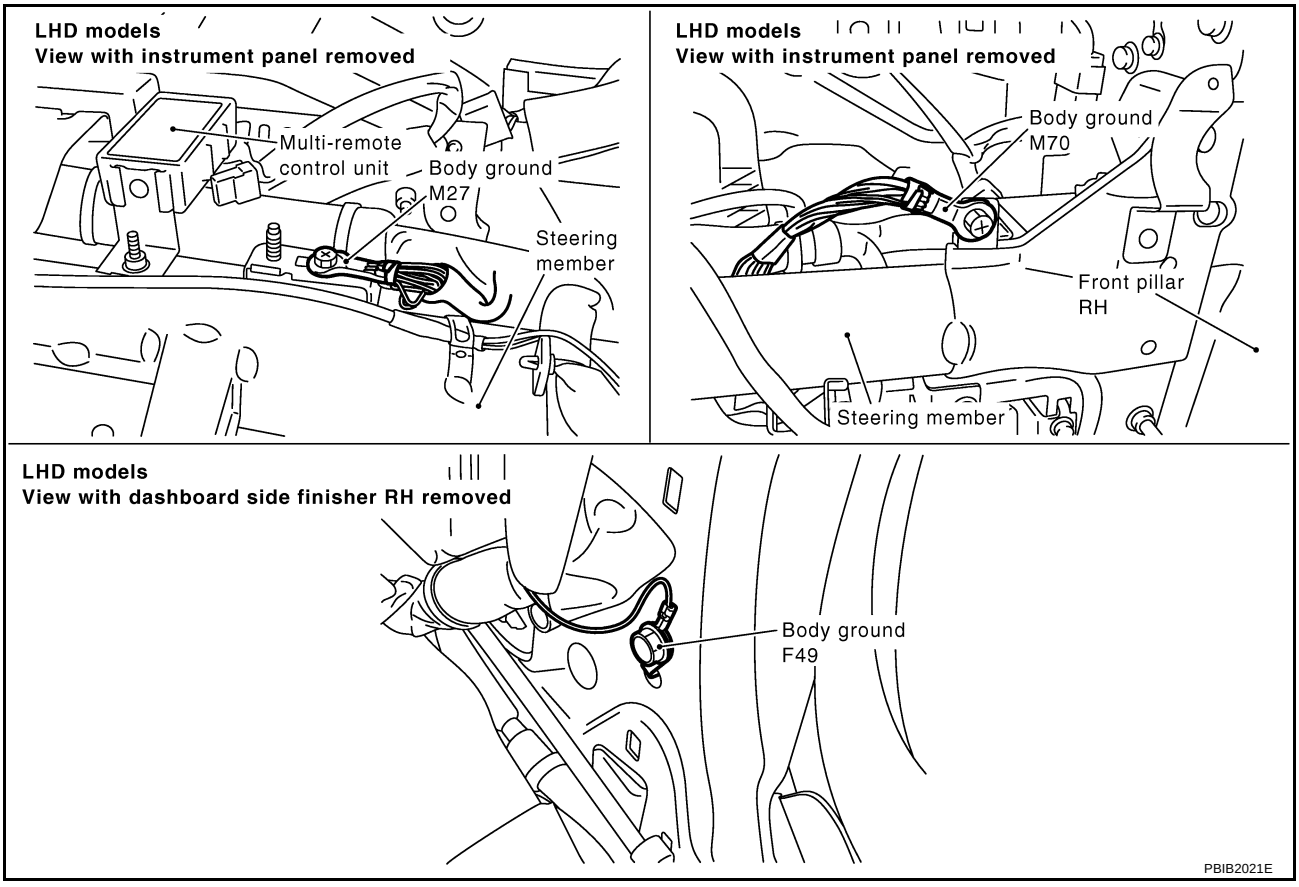
TBWA0599E

Diagnostic Procedure

BBS001BF

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

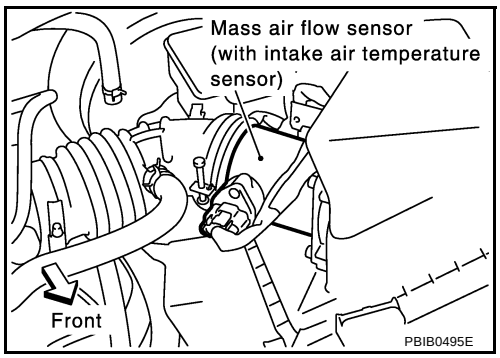


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

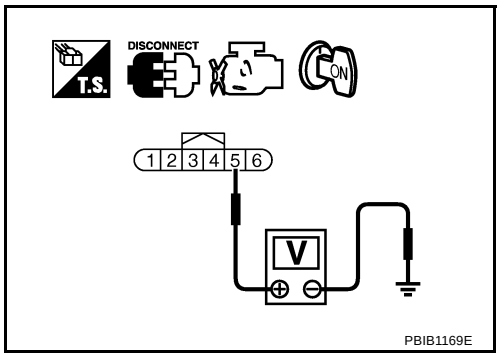
2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 6 and ECM terminal 57. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-167, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

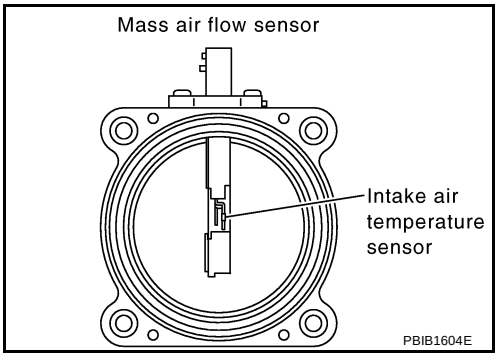
BBS001BG

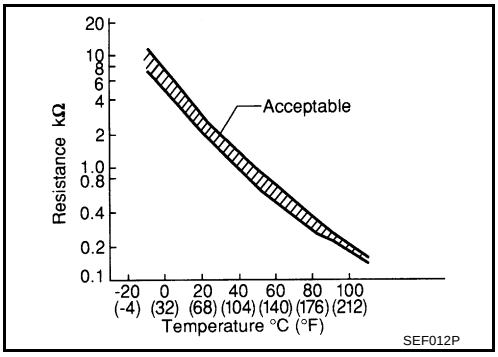
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

BBS001BH

MASS AIR FLOW SENSOR

Refer to EM-16, "AIR CLEANER AND AIR DUCT" .

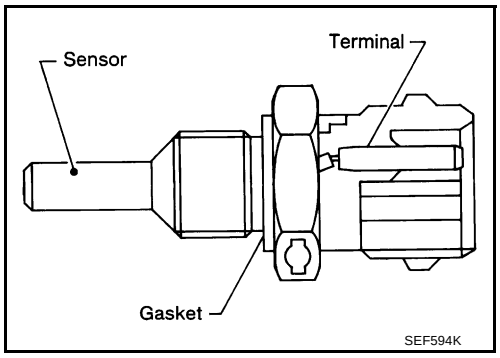
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

BBS001BI

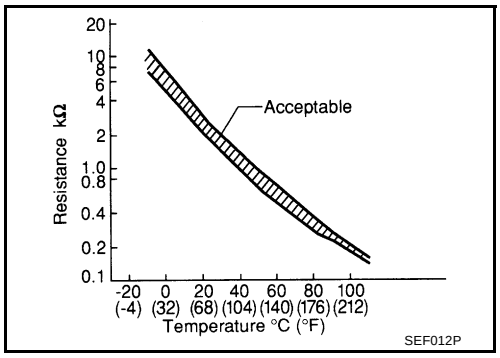
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: These data are reference values and are measured between ECM terminal 72 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

BBS001BJ

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When this malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II display)
	Just as ignition switch is turned ON or START	40°C (104°F)
	More than approx. 4 minutes after ignition ON or START	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	

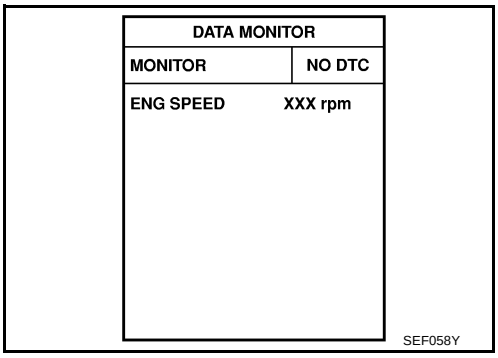
DTC Confirmation Procedure

BBS001BK

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-171, "Diagnostic Procedure" .



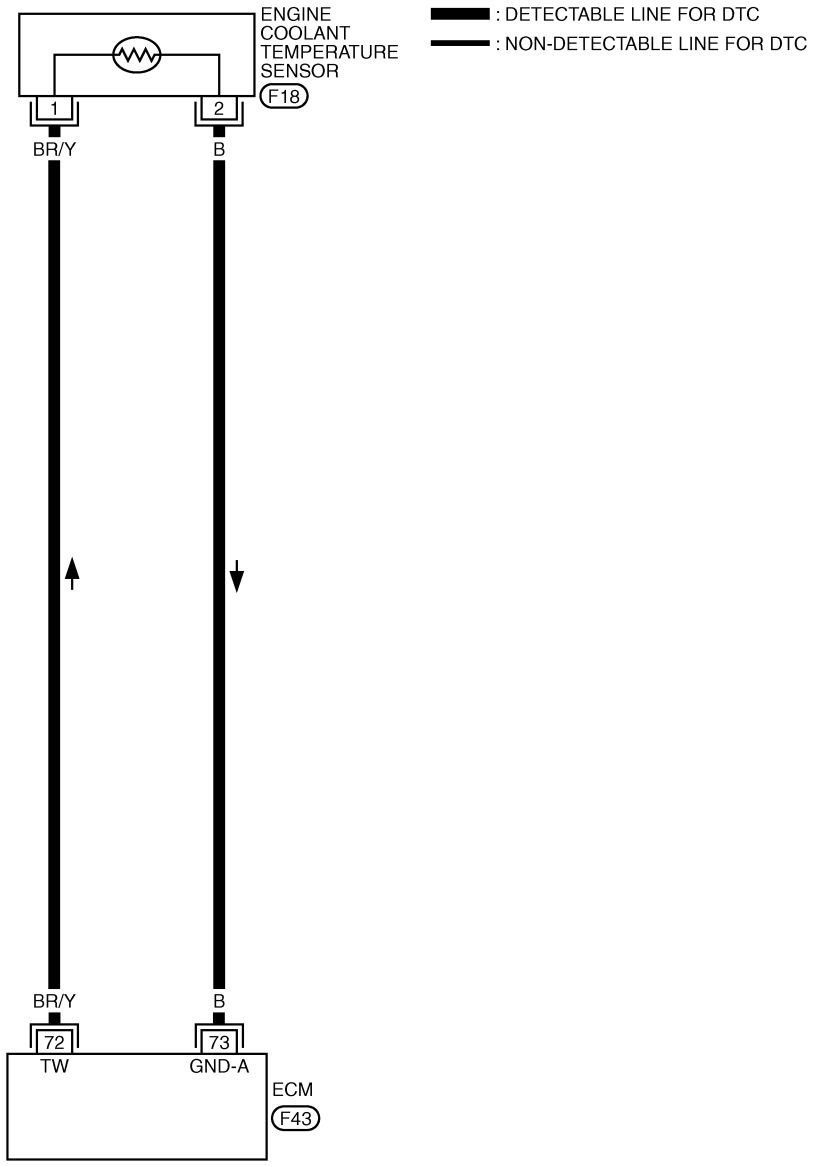
WITH GST

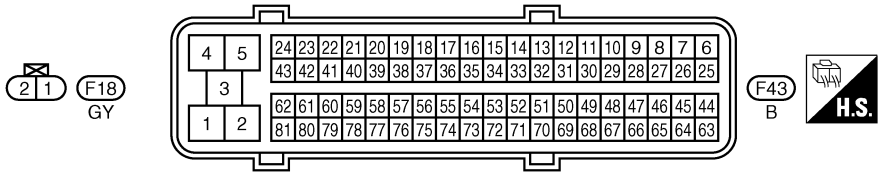
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001BL

EC-ECTS-01





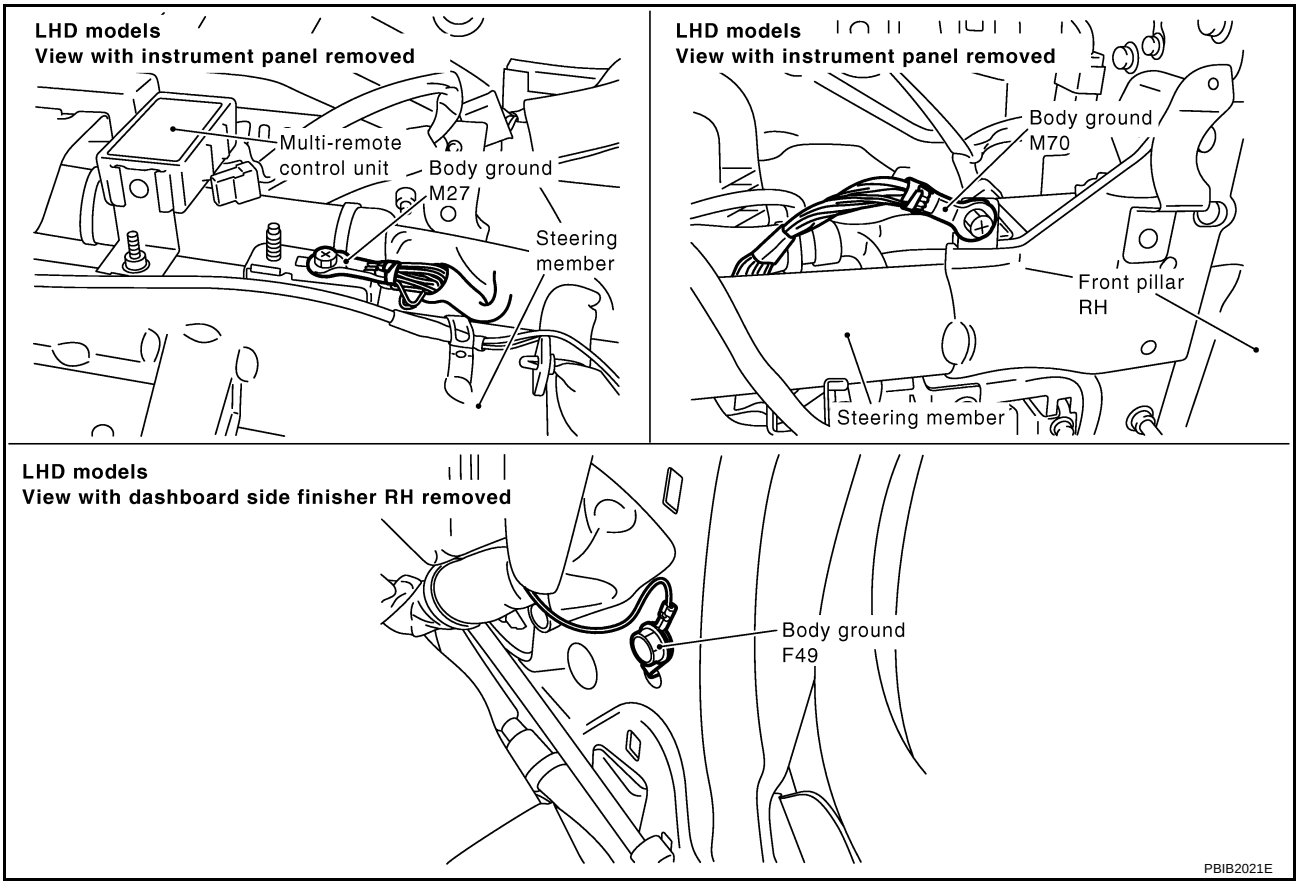
TBWA0600E

Diagnostic Procedure

BBS001BM

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

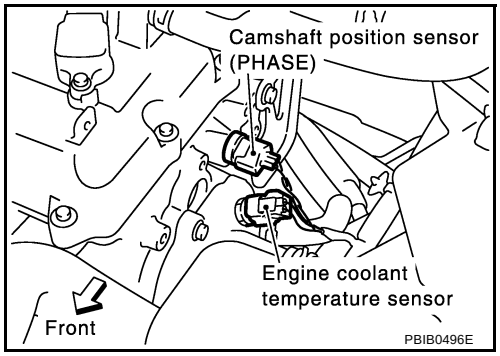


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

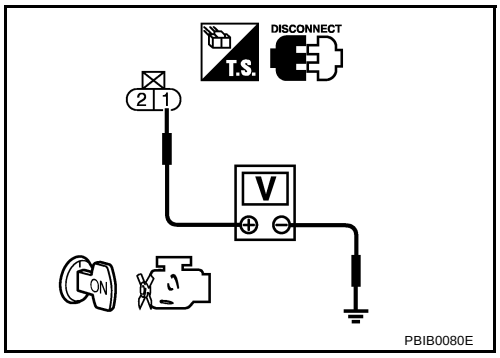
2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 73. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-173, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

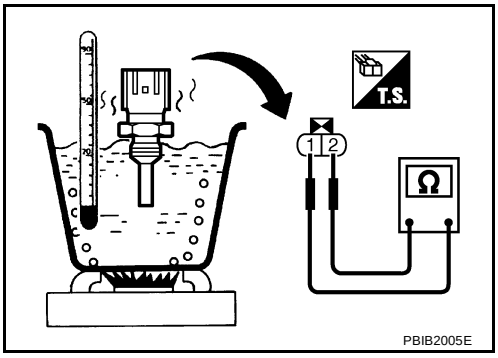
>> **INSPECTION END**

Component Inspection

BBS001BN

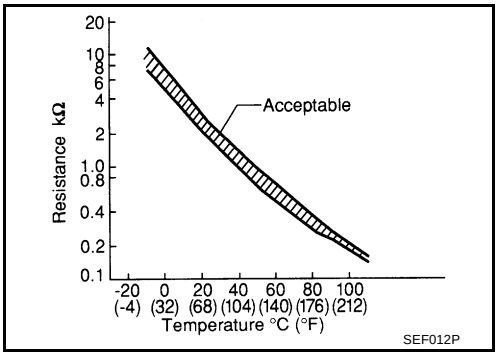
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

BBS001BO

ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-23, "THERMOSTAT AND WATER CONTROL VALVE" .

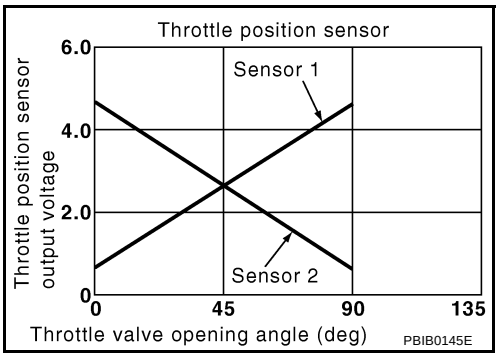
DTC P0122, P0123 TP SENSOR

PFP:16119

Component Description

BBS001BP

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

BBS001BQ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

BBS001BR

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	● Harness or connectors (TP sensor 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 2) ● Accelerator pedal position sensor (APP sensor 2)
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

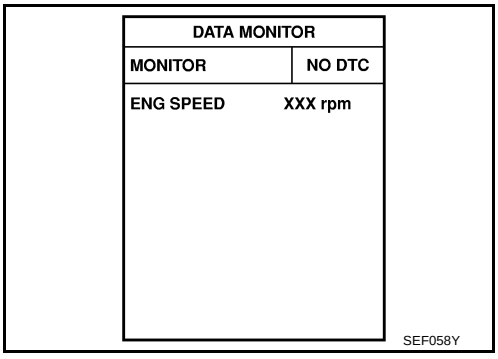
DTC Confirmation Procedure

BBS001BS

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-178, "Diagnostic Procedure" .



WITH GST

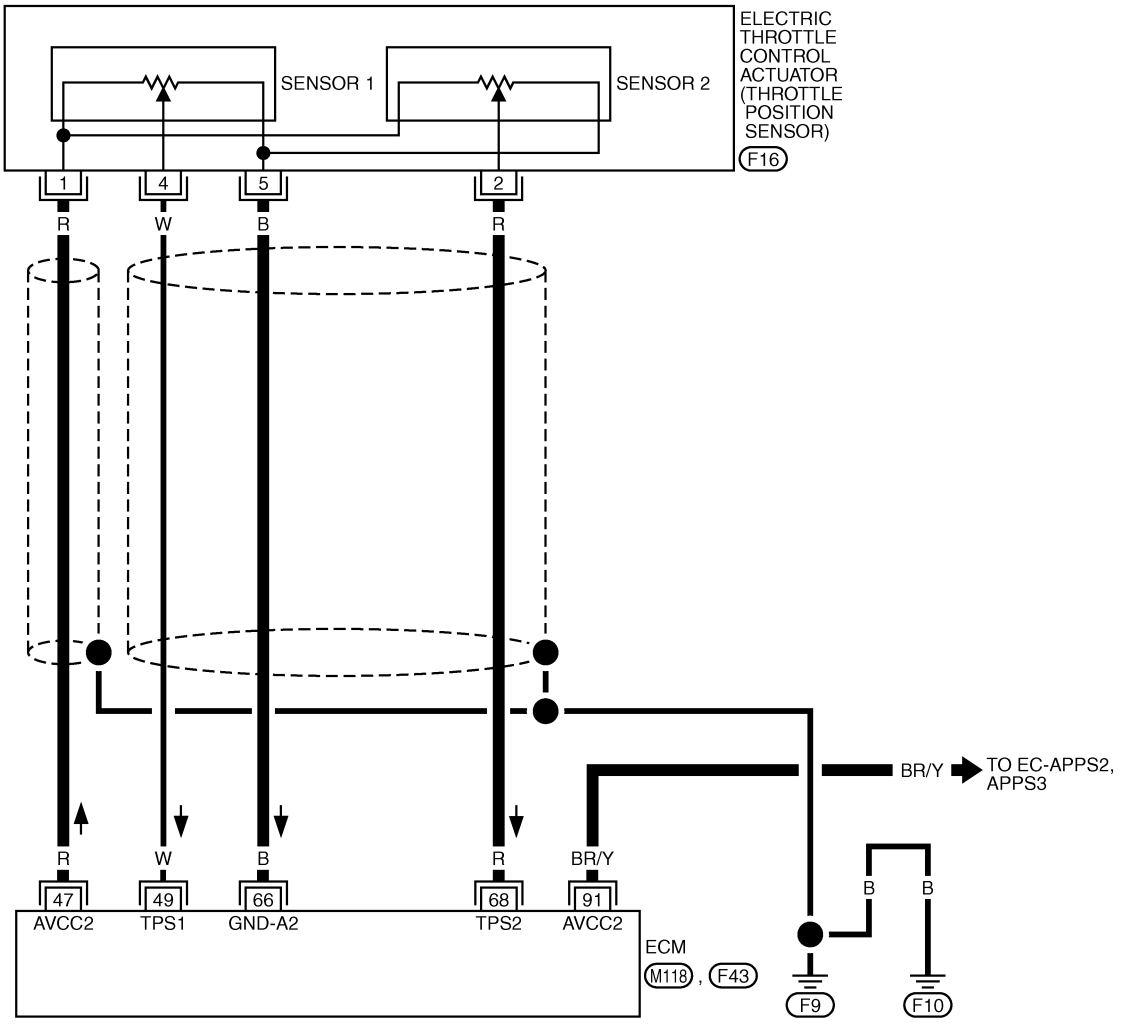
Follow the procedure “WITH CONSULT-II” above.

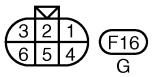
Wiring Diagram

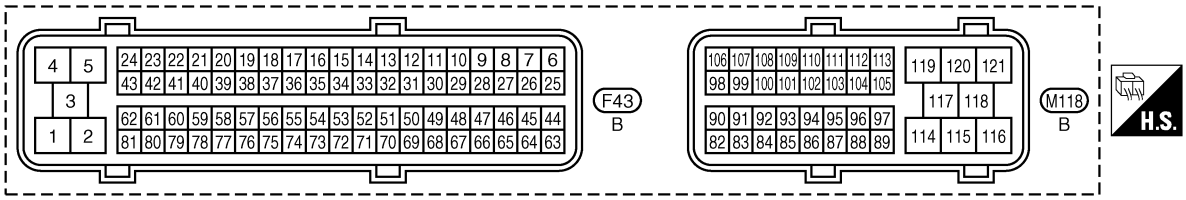
BBS001BT

EC-TPS2-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC







TBWB0260E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

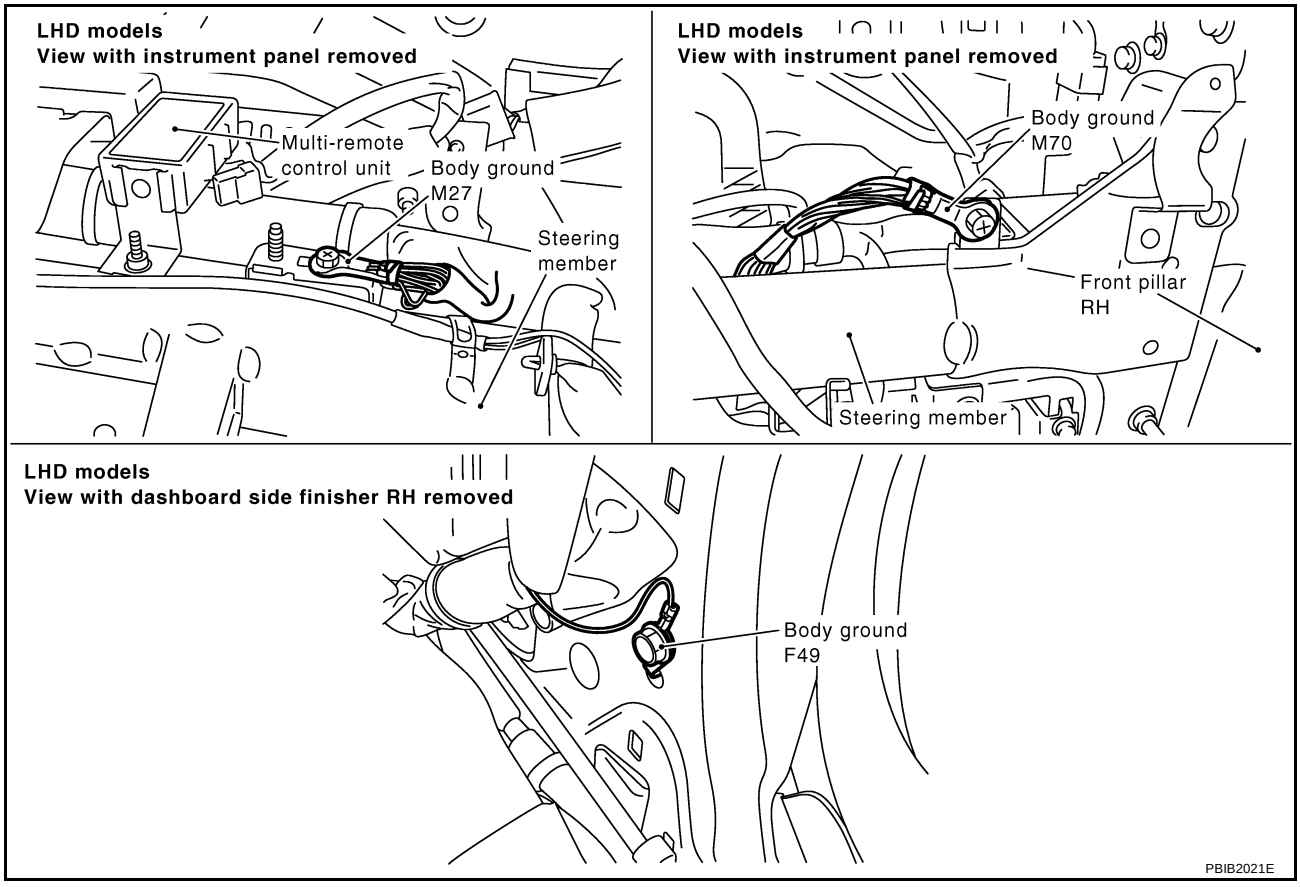
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	R	Throttle position sensor power supply	**[Ignition switch: ON]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

BBS001BU

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

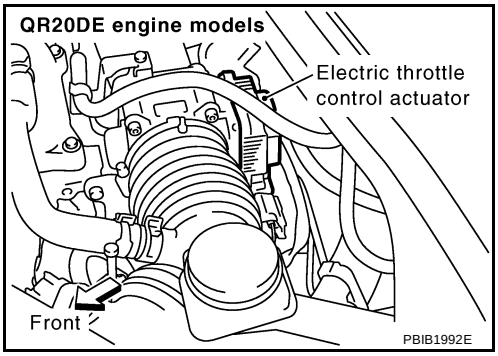


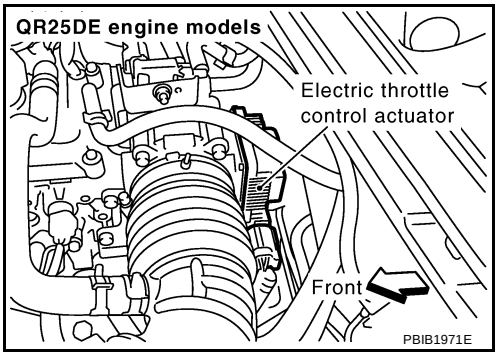
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

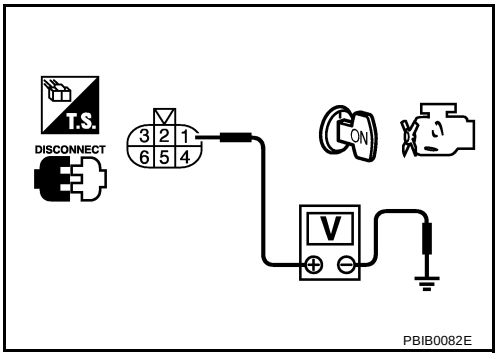
1. Disconnect electric throttle control actuator harness connector.





2. Turn ignition switch ON.
3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-176
91	APP sensor terminal 4	EC-437

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-442, "Component Inspection" .

OK or NG

OK >> GO TO 11
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .
3. Perform EC-50, "Throttle Valve Closed Position Learning" .
4. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between electric throttle control actuator terminal 2 ECM terminal 68. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-181, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

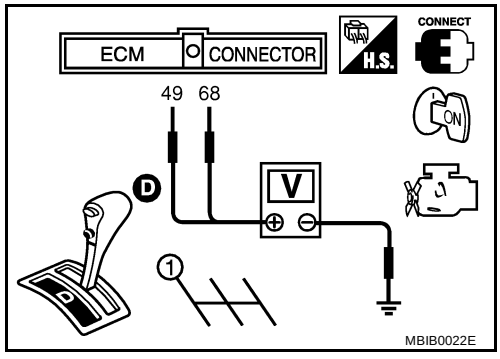
Component Inspection

BBS001BV

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T) or 1st position (M/T).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-50, "Throttle Valve Closed Position Learning" .
8. Perform EC-50, "Idle Air Volume Learning" .

Removal and Installation

BBS001BW

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

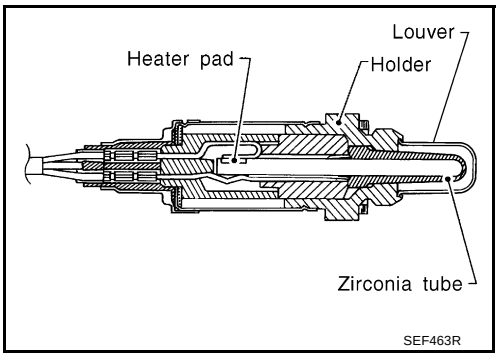
DTC P0132 HO2S1

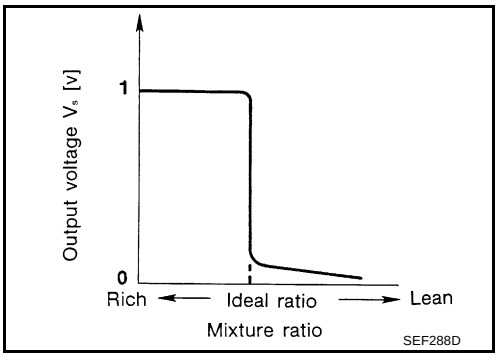
PFP:22690

Component Description

BBS001BX

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

BBS001BY

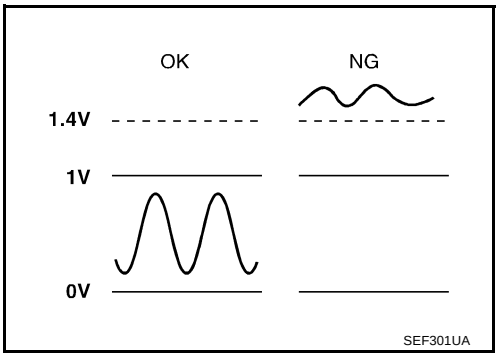
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

BBS001BZ

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132 0132	Heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1

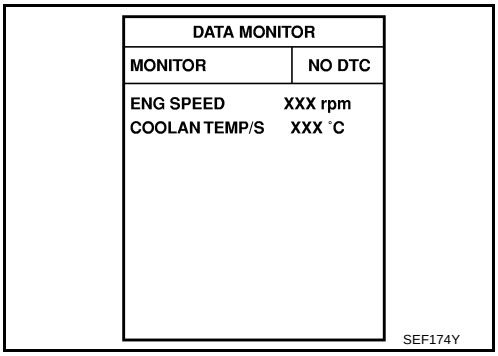
DTC Confirmation Procedure

BBS001C0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-185, "Diagnostic Procedure"
.



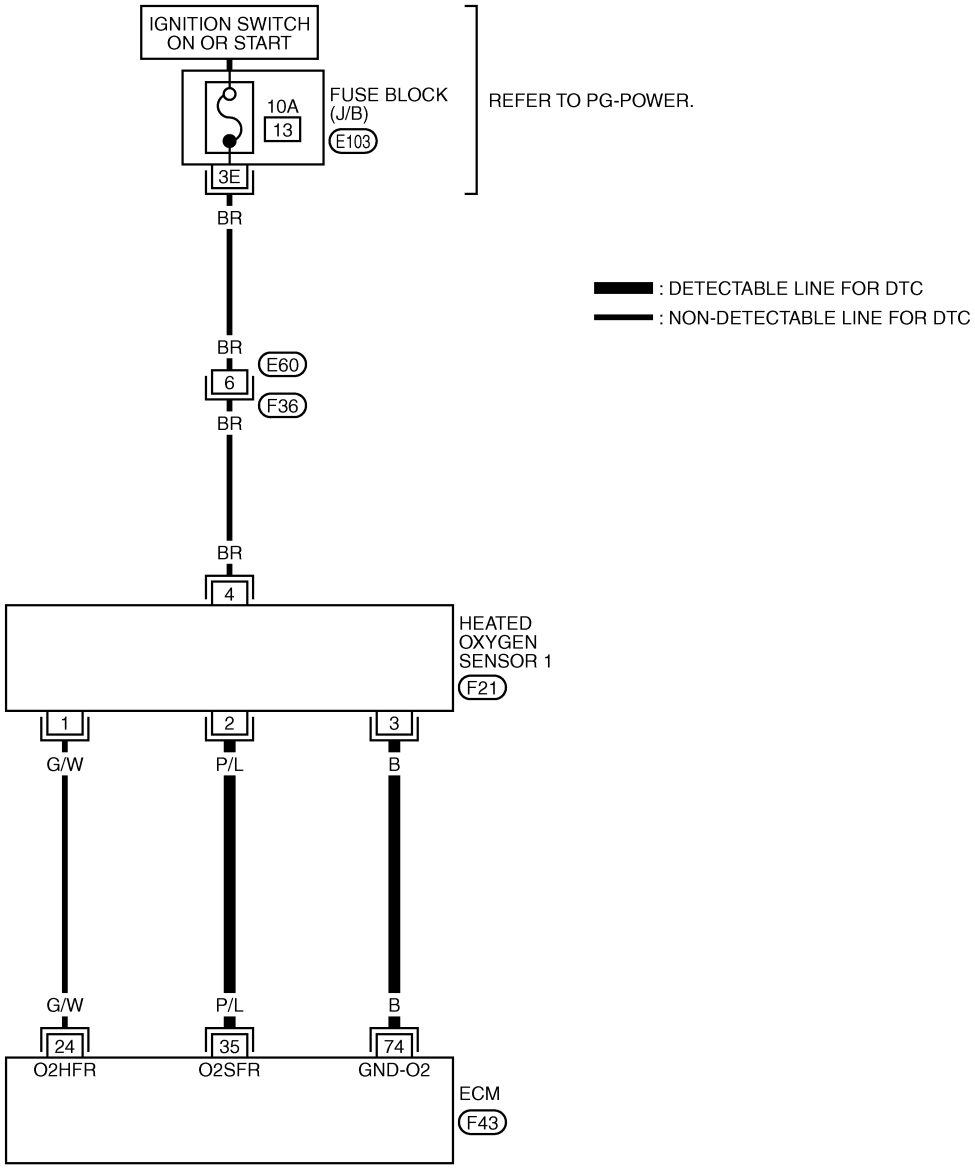
WITH GST

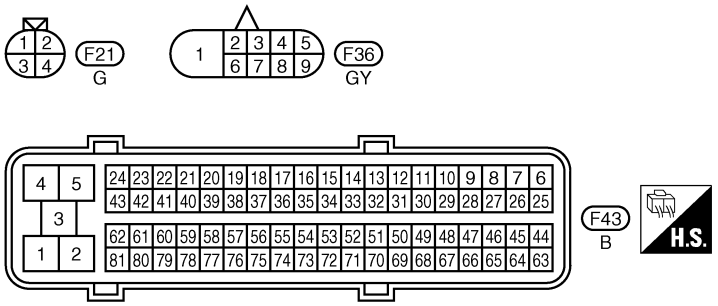
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001C1

EC-HO2S1-01





REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0602E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

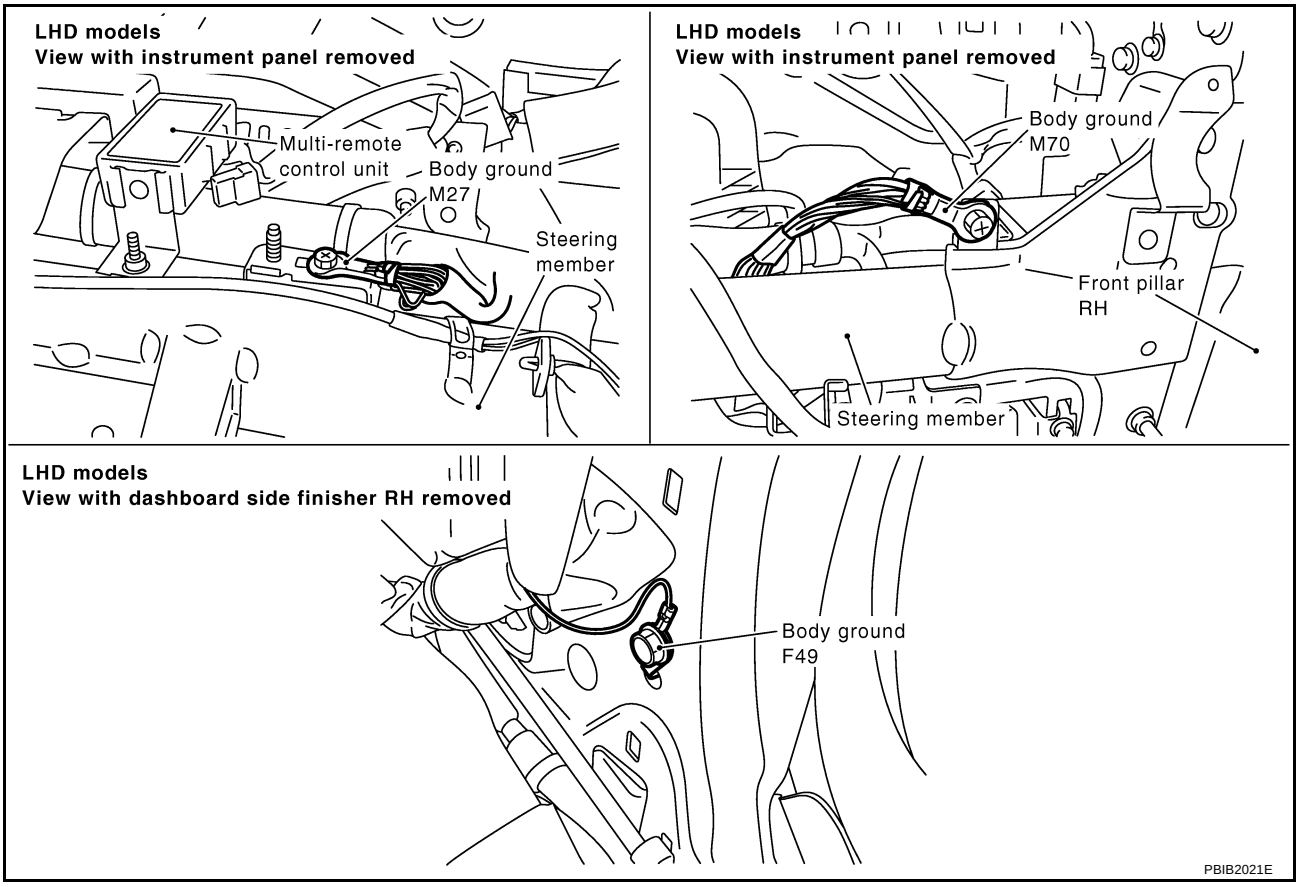
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	P/L	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001C2

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .



OK or NG

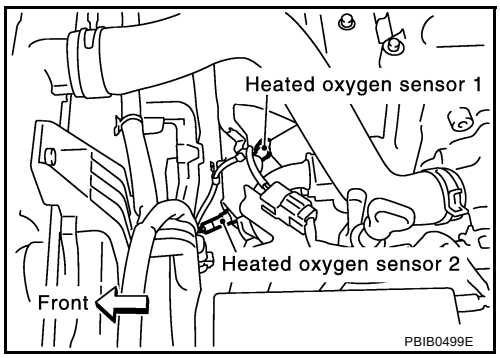
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN HEATED OXYGEN SENSOR 1

1. Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.



3. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

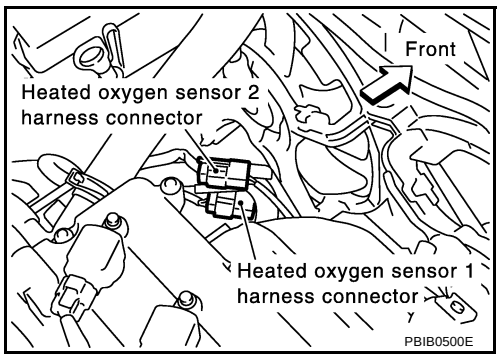
1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 terminal 3 and ECM terminal 74.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 terminal 2 and ECM terminal 35.
   Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-187, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001C3

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

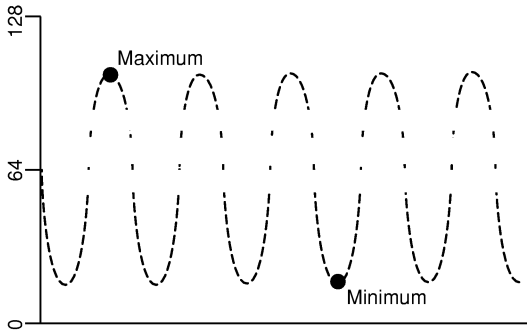
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown in the figure.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

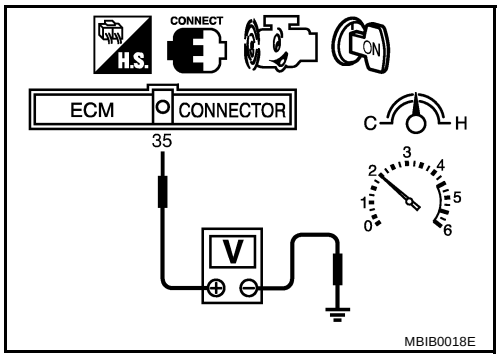
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001C4

HEATED OXYGEN SENSOR 1

Refer to EM-25, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

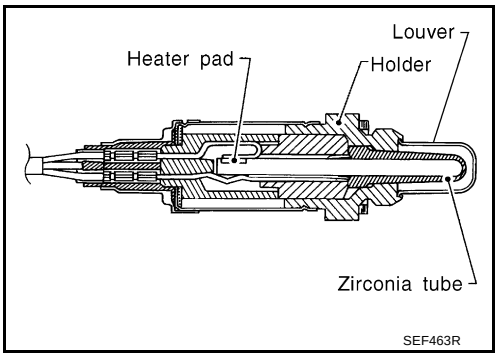
DTC P0133 HO2S1

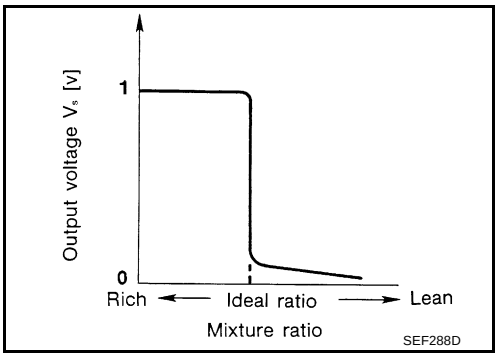
PFP:22690

Component Description

BBS001C5

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

BBS001C6

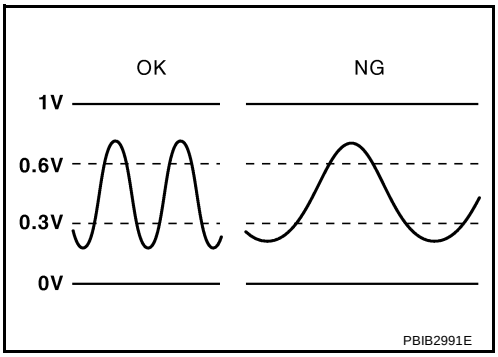
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm.	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

BBS001C7

To judge the malfunction of heated oxygen sensor 1, this diagnosis measures response time of heated oxygen sensor 1 signal. The time is compensated by engine operating (speed and load), fuel feedback control constant, and heated oxygen sensor 1 temperature index. Judgment is based on whether the compensated time (heated oxygen sensor 1 cycling time index) is inordinately long or not.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0133 0133	Heated oxygen sensor 1 circuit slow response	The response of the voltage signal from the sensor takes more than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1 ● Fuel pressure ● Fuel injector ● Intake air leaks ● Exhaust gas leaks ● PCV valve ● Mass air flow sensor

DTC Confirmation Procedure

BBS001C8

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

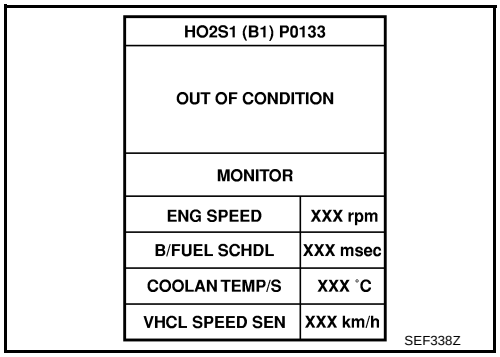
TESTING CONDITION:

- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

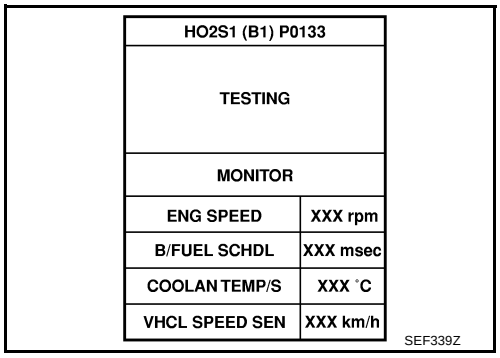
1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P0133” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.



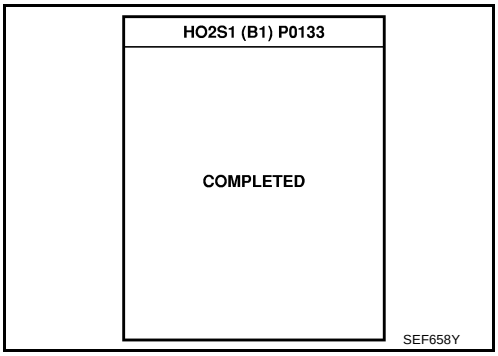
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 40 to 50 seconds.)

ENG SPEED	QR20DE: 1,650 - 3,600 rpm QR25DE: 1,600 - 3,300 rpm
VHCL SPEED SE	More than 80 km/h (50 MPH)
B/FUEL SCHDL	QR20DE: 4.0 - 14.5 msec QR25DE: 4.3 - 14.5 msec
Shift lever	Suitable position



If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-193, "Diagnostic Procedure" .



Overall Function Check

BBS001C9

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

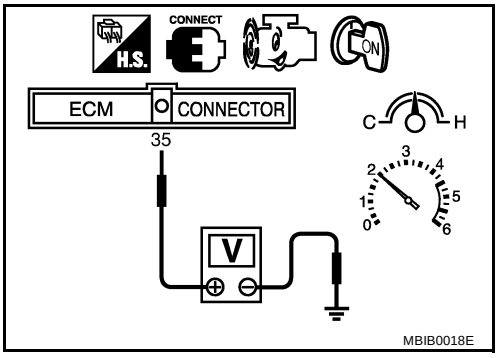
1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.

1 time: **0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**

2 times: **0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V**

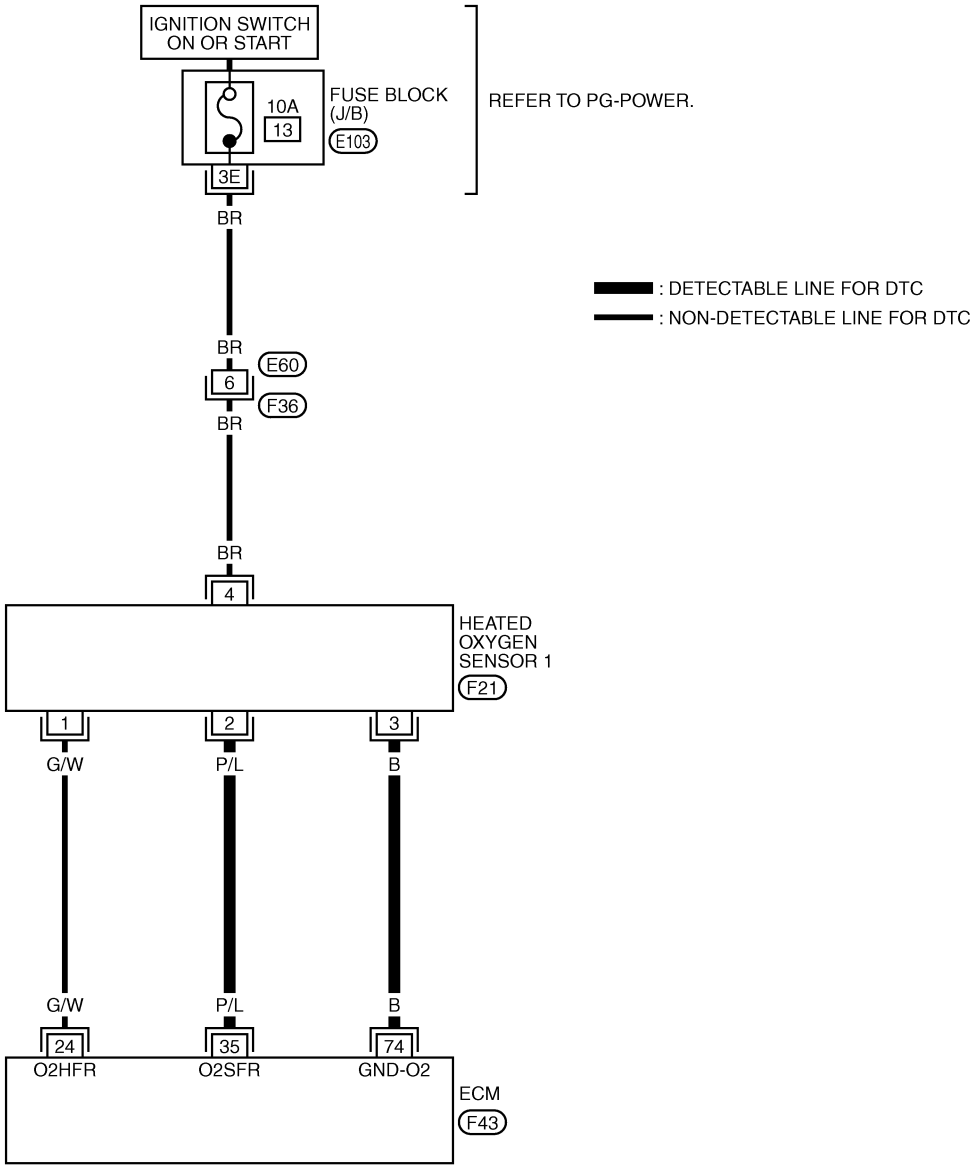
4. If NG, go to EC-193, "Diagnostic Procedure" .

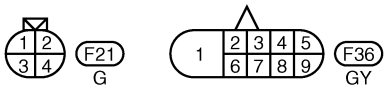


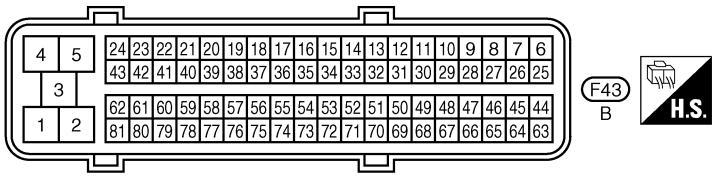
Wiring Diagram

BBS001CA

EC-HO2S1-01







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0602E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

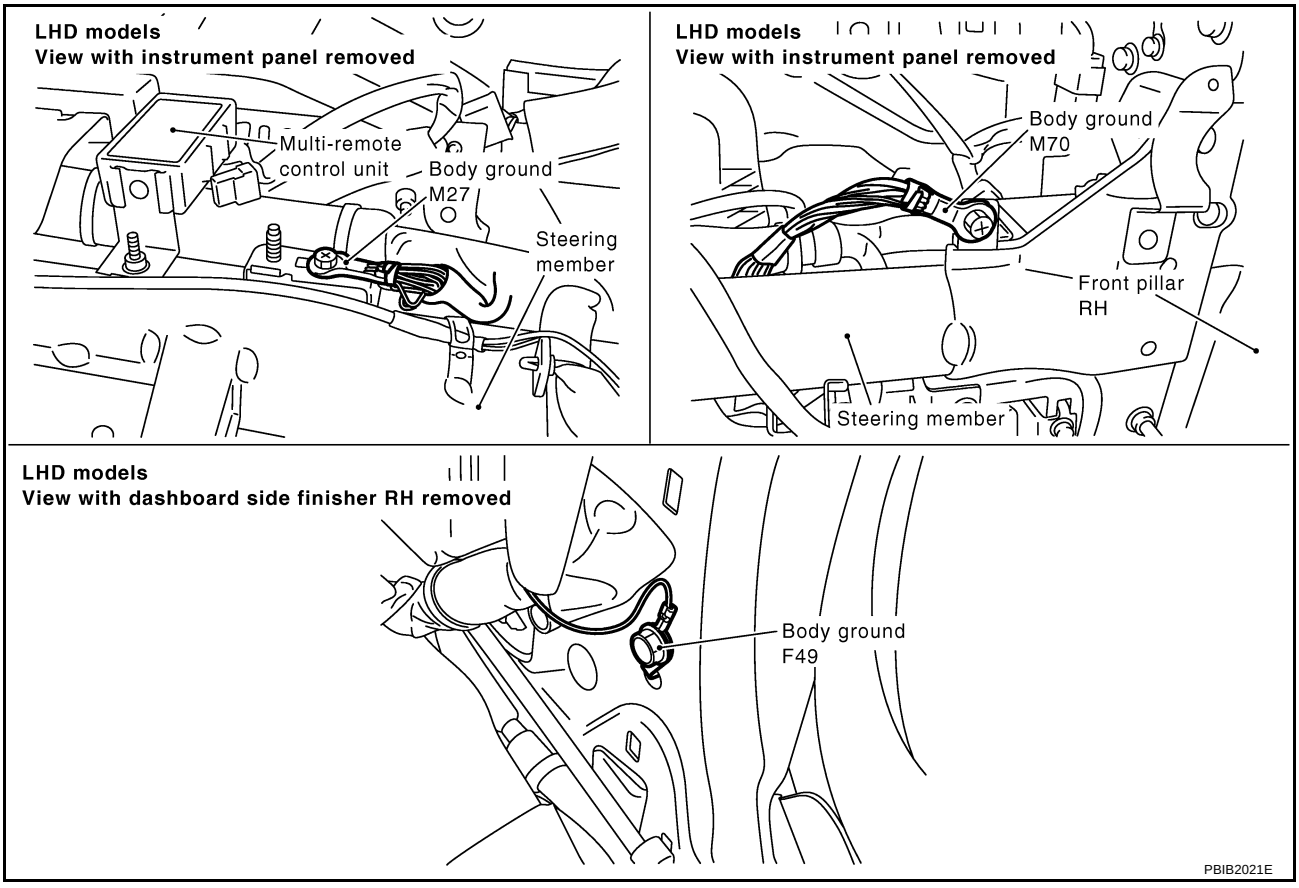
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	P/L	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001CB

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .



OK or NG

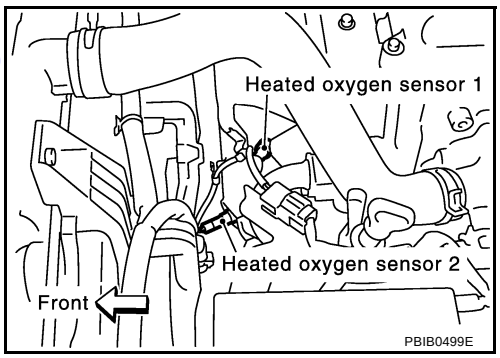
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

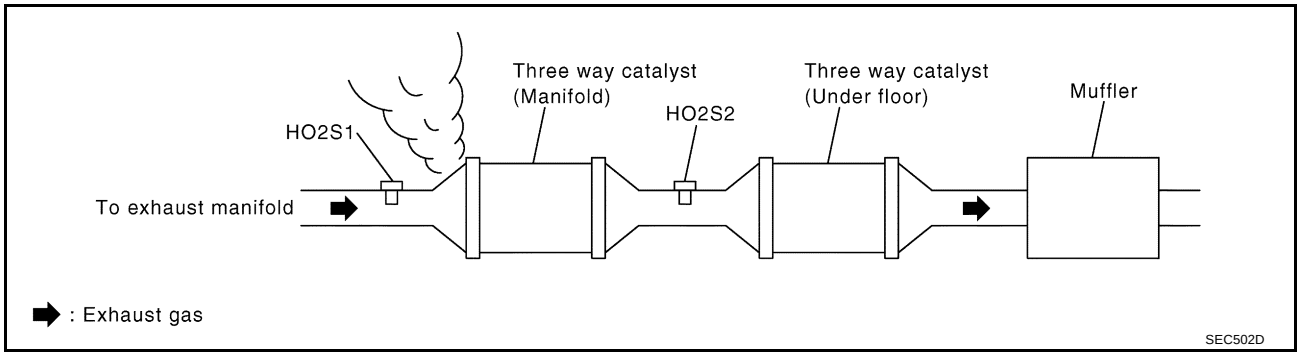
Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

>> GO TO 3.



3. CHECK FOR EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

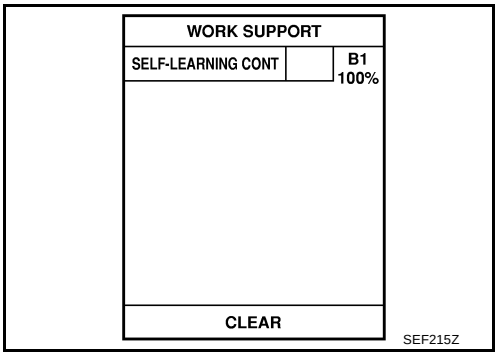
OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. CLEAR THE SELF-LEARNING DATA

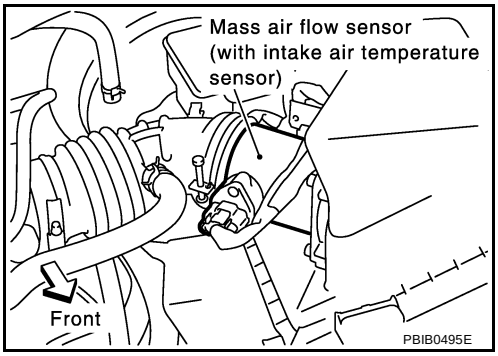
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-66, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or DTC P0172 (Refer to EC-222, "DTC P0171 FUEL INJECTION SYSTEM FUNCTION" or EC-228, "DTC P0172 FUEL INJECTION SYSTEM FUNCTION").

No >> GO TO 6.

6. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S1 terminal 3 and ECM terminal 74. Refer to Wiring Diagram.

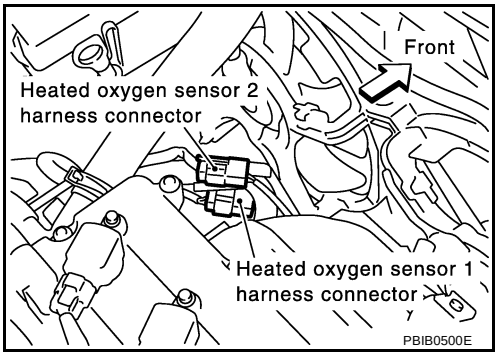
   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



7. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 terminal 2 and ECM terminal 35.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-160, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK PCV VALVE

Refer to EC-530, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace PCV valve.

10. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-196, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace heated oxygen sensor 1.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001CC

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.

3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

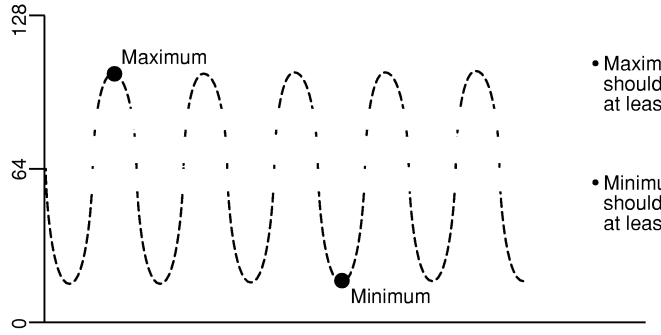
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown in the figure.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

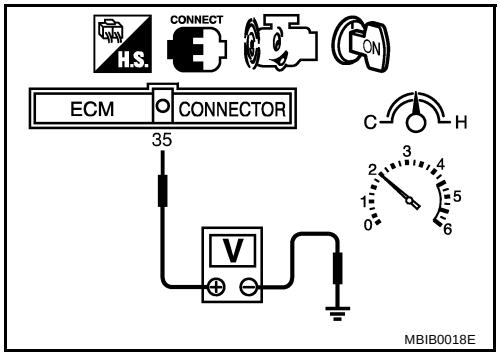
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001CD

HEATED OXYGEN SENSOR 1

Refer to EM-25, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

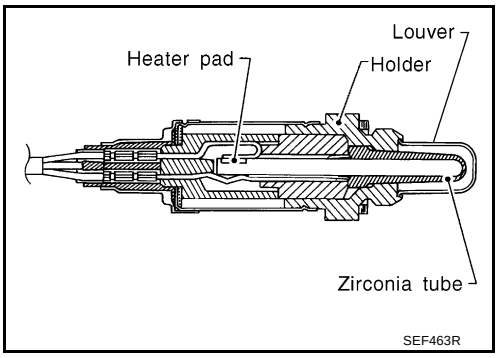
DTC P0134 HO2S1

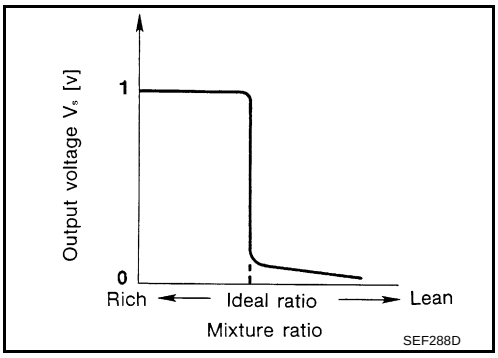
PFP:22690

Component Description

BBS001CE

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

BBS001CF

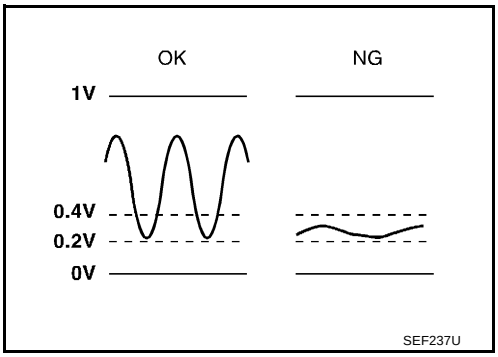
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm.	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

BBS001CG

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1

DTC Confirmation Procedure

BBS001CH

CAUTION:
Always drive vehicle at a safe speed.

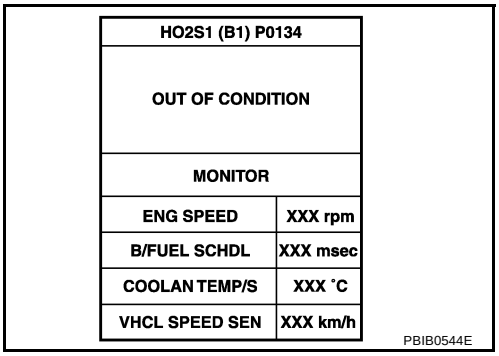
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V at idle.

WITH CONSULT-II

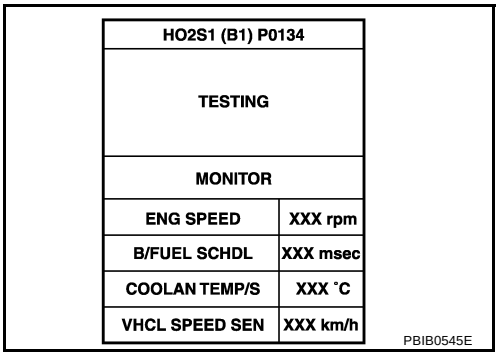
1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 (B1) P0134” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
3. Touch “START”.
4. Let it idle for at least 3 minutes.

   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 4.



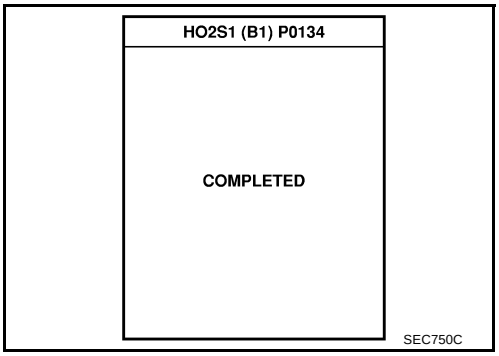
5. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 10 to 60 seconds.)

ENG SPEED	QR20DE: 1,550 - 4,100 rpm QR25DE: 1,500 - 3,300 rpm
VHCL SPEED SE	More than 64 km/h (40 MPH)
B/FUEL SCHDL	QR20DE: 2.9 - 14.5 msec QR25DE: 1.9 - 14.5 msec
Shift lever	Suitable position



If “TESTING” is not displayed after 5 minutes, retry from step 2.

6. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-203, "Diagnostic Procedure" .



Overall Function Check

BBS001CI

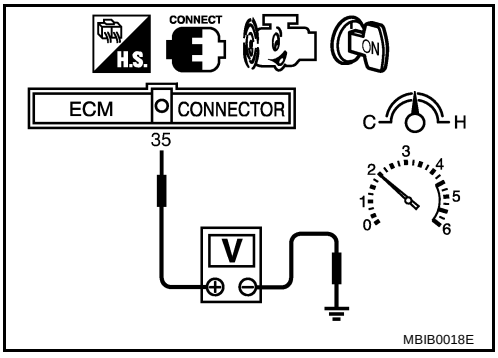
Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage does not remain in the range of 0.2 to 0.4V.

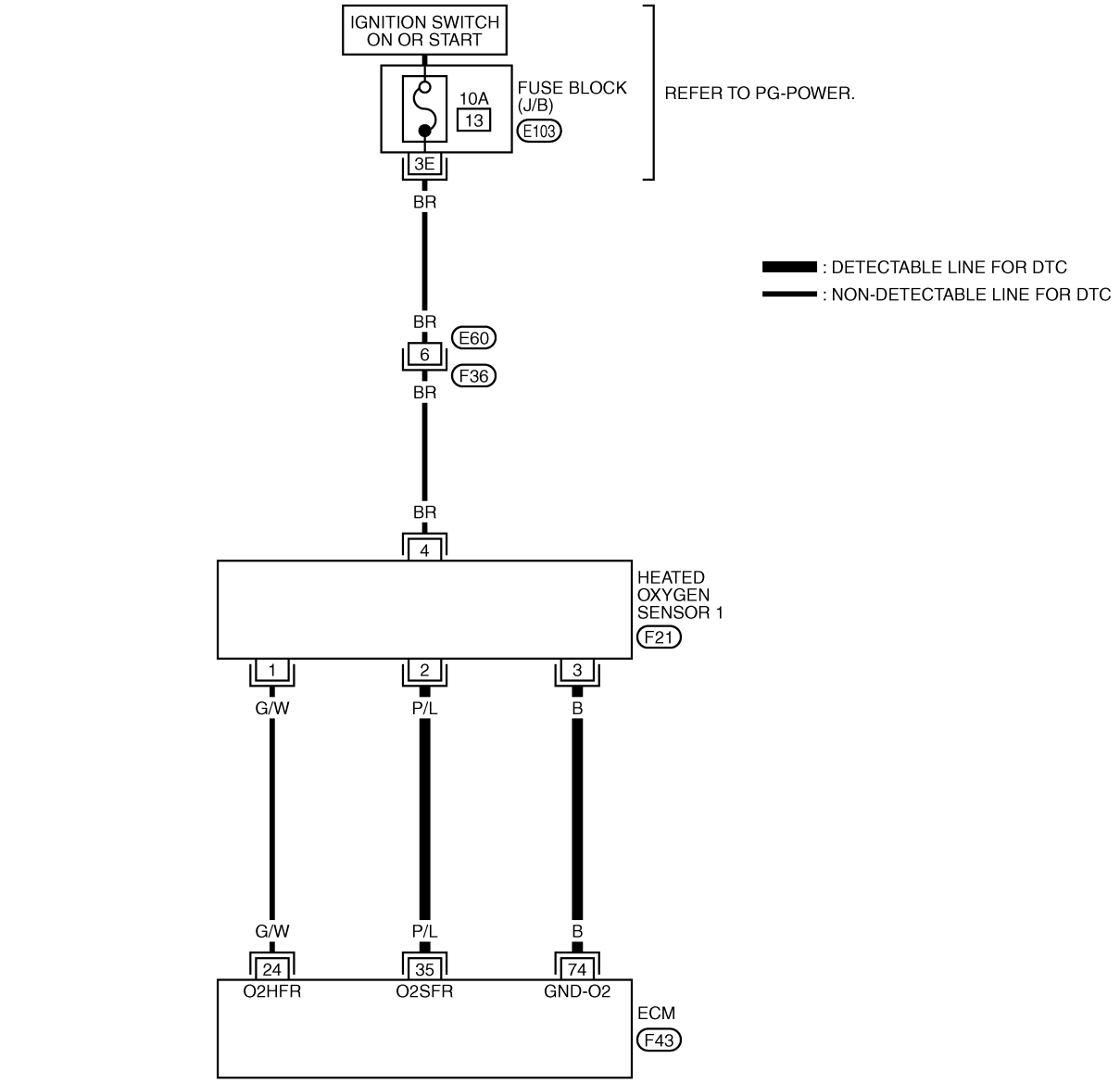
4. If NG, go to EC-203, "Diagnostic Procedure" .

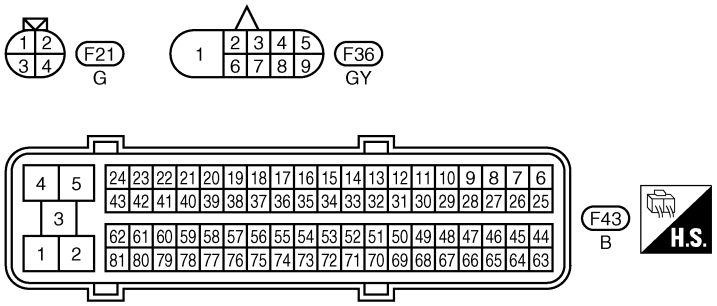


Wiring Diagram

BBS001CJ

EC-HO2S1-01





REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0602E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

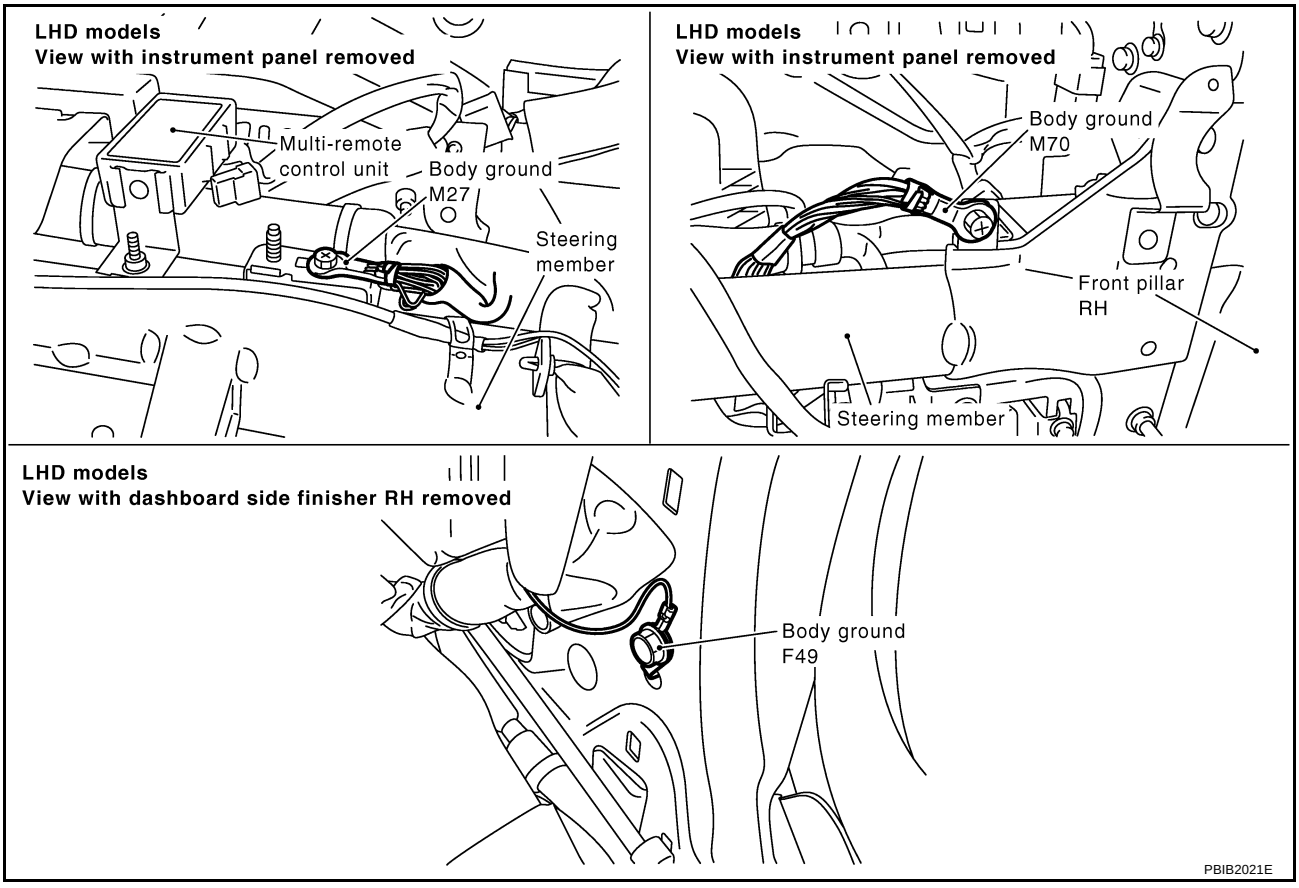
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	P/L	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001CK

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

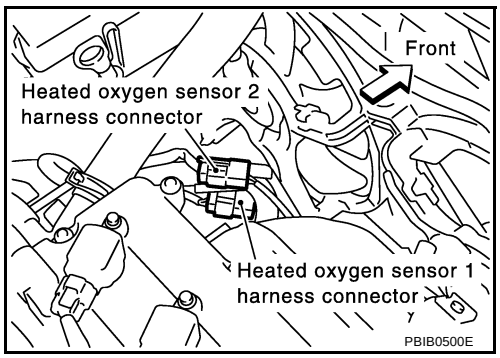
1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 terminal 3 and ECM terminal 74. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S1 terminal 2 and ECM terminal 35. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-204, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001CL

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.

3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

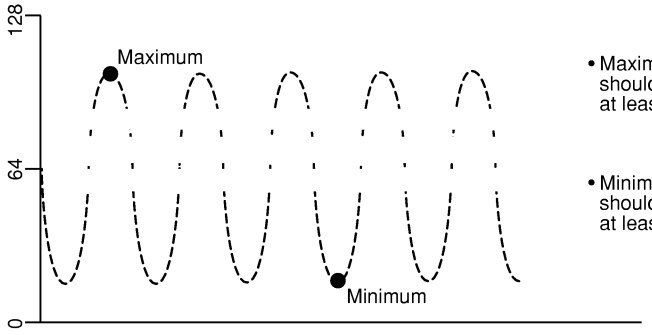
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown in the figure.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

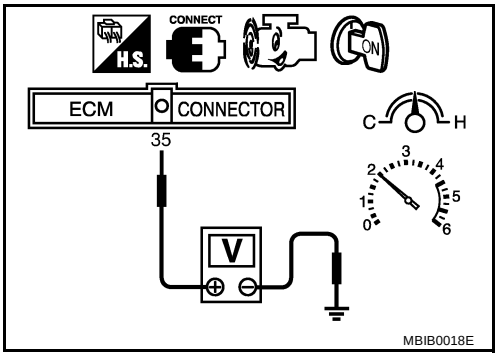
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V



MBIB0018E

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001CM

HEATED OXYGEN SENSOR 1

Refer to EM-25, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

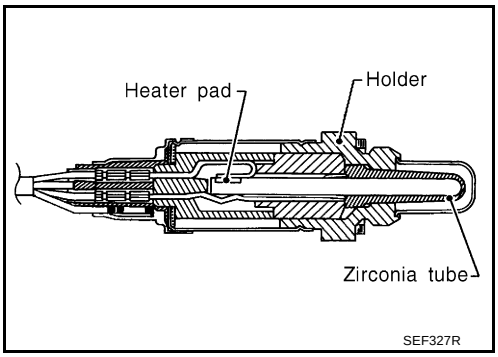
DTC P0138 HO2S2

PFP:226A0

Component Description

BBS001CN

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

BBS001CO

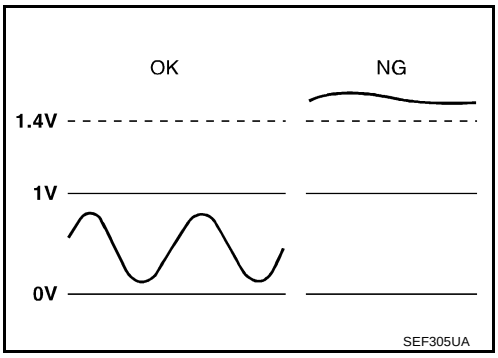
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ←→ RICH

On Board Diagnosis Logic

BBS001CP

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the voltage is unusually high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0138 0138	Heated oxygen sensor 2 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2

DTC Confirmation Procedure

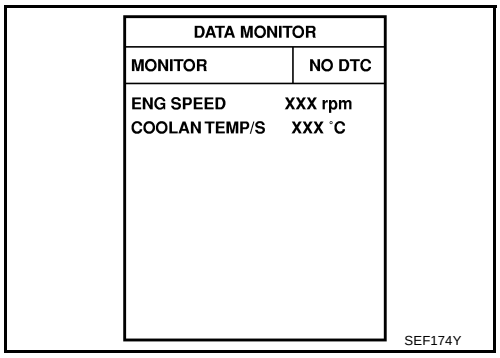
BBS001CQ

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
5. Let engine idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-210, "Diagnostic Procedure" .



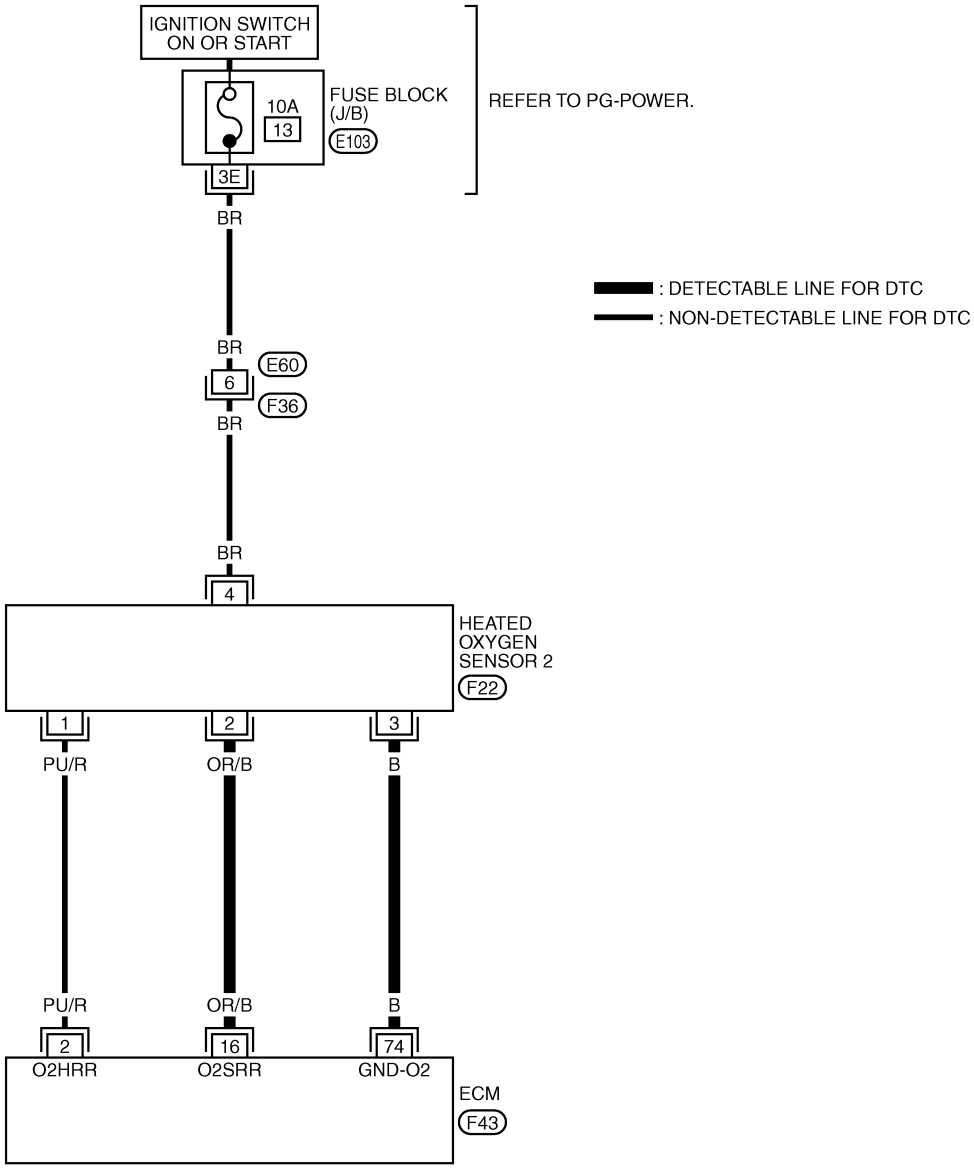
WITH GST

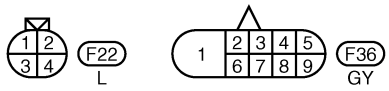
Follow the procedure “WITH CONSULT-II” above.

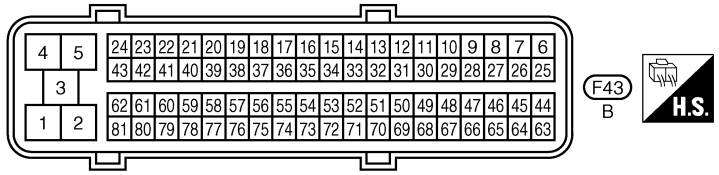
Wiring Diagram

BBS001CR

EC-HO2S2-01







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0603E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

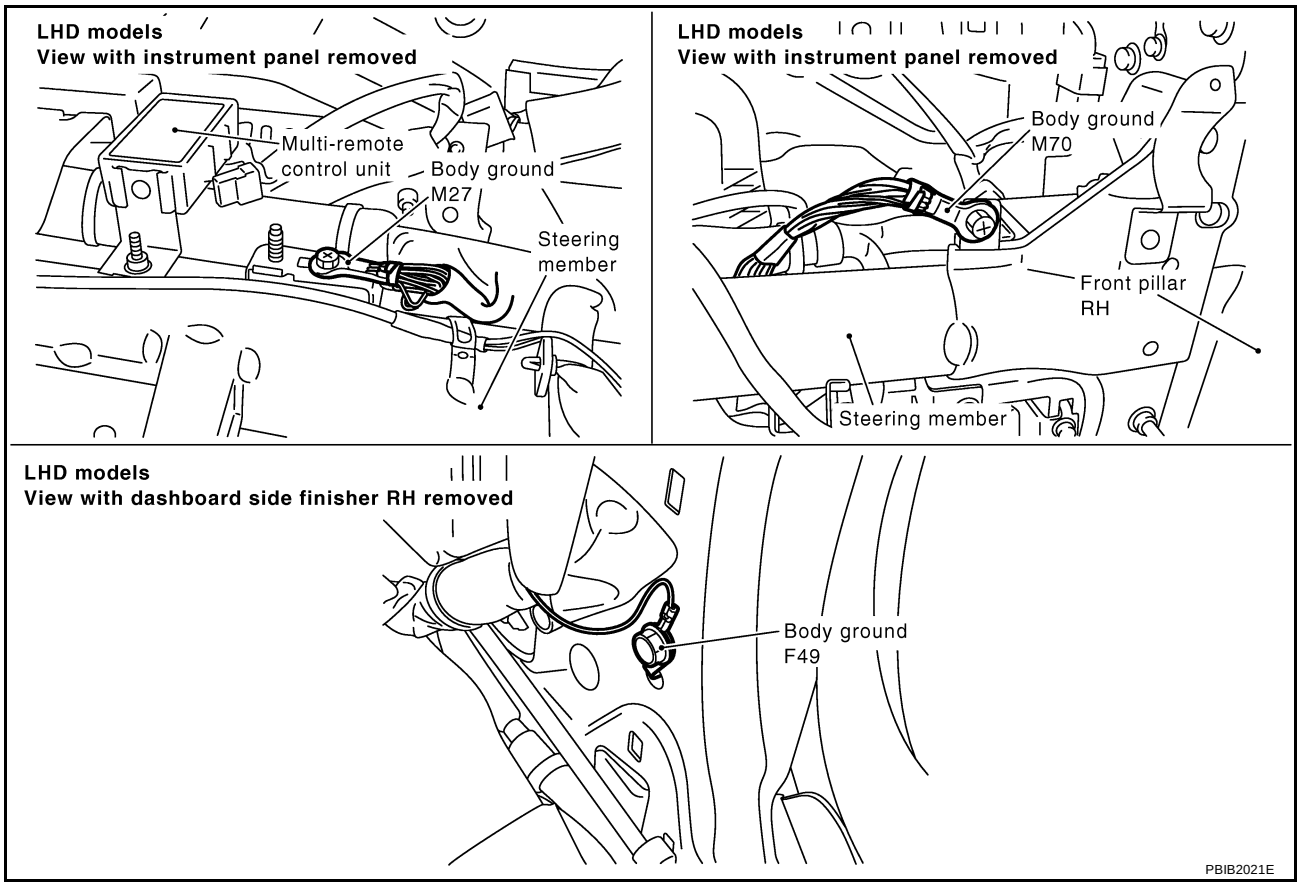
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/B	Heated oxygen sensor 2	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001CS

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

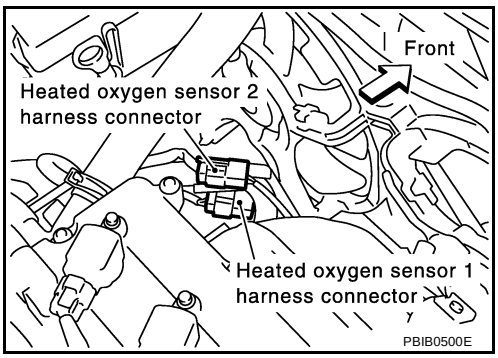
1. Disconnect heated oxygen sensor 2 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S2 terminal 3 and ECM terminal 74.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 2 ECM terminal 16.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-211, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 2.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001CT

HEATED OXYGEN SENSOR 2

With CONSULT-II

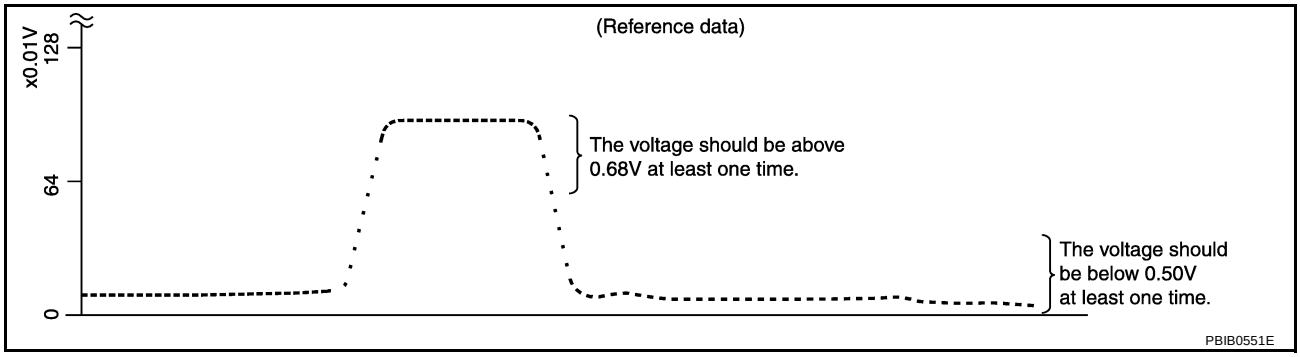
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.

5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2(B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



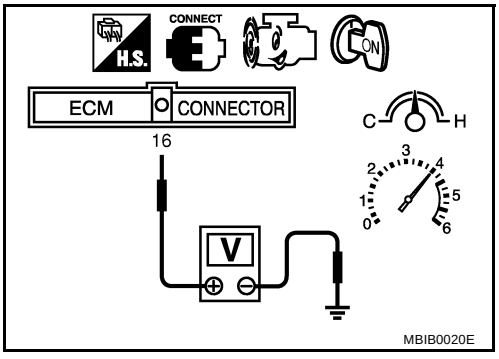
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.50V at least once during this procedure.



8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001CU

HEATED OXYGEN SENSOR 2

Refer to EX-2, "EXHAUST SYSTEM" .

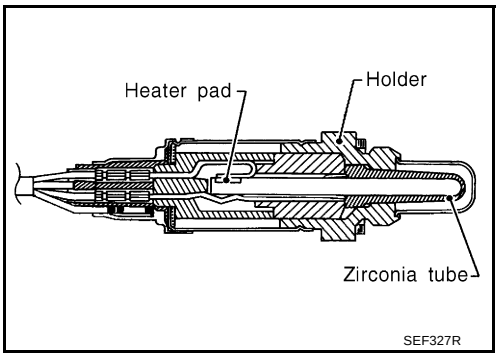
DTC P0139 HO2S2

PFP:226A0

Component Description

BBS001CV

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

BBS001CW

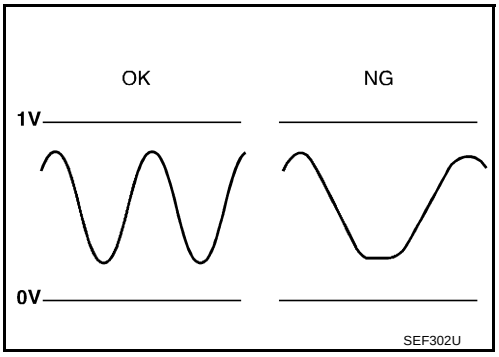
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ←→ RICH

On Board Diagnosis Logic

BBS001CX

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the switching response of the sensor's voltage is faster than specified during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0139 0139	Heated oxygen sensor 2 circuit slow response	It takes more time for the sensor to respond between rich and lean than the specified time.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

BBS001CY

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
- **"COMPLETED" will appear on CONSULT-II screen when all tests "COND1", "COND2" and "COND3" are completed.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Never stop engine during this procedure. If the engine is stopped, retry this procedure from step 2 in Procedure for COND1.

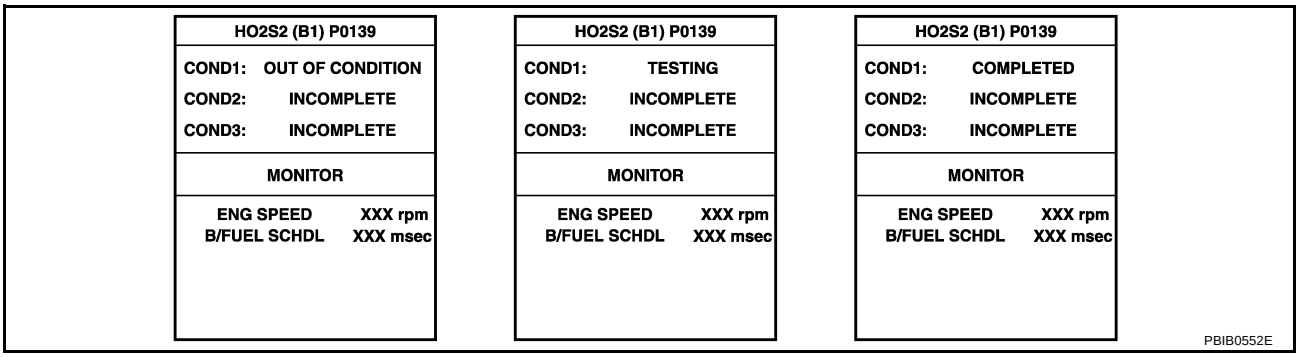
WITH CONSULT-II

Procedure for COND1

For the best results, perform DTC WORK SUPPORT at a temperature of 0 to 30°(32 to 86°F).

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Select "HO2S2 (B1) P0139" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch "START".
7. Start engine and let it idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm two or three times quickly under no load.
   If "COMPLETED" appears on CONSULT-II screen, go to step 2 in Procedure for COND3.
   If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
9. When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	70 - 105 °C
Shift level	Suitable position

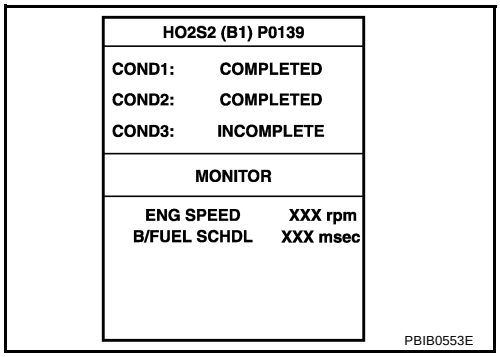


NOTE:
- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in Procedure for COND1.**
- **If "COMPLETED" already appears at "COND2" on CONSULT-II screen before Procedure for COND2 is conducted, it is unnecessary to conduct step 1 in Procedure for COND2.**

Procedure for COND2

1. While driving, release accelerator pedal completely with “OD” OFF (A/T) from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED”. (It will take approximately 4 seconds.)

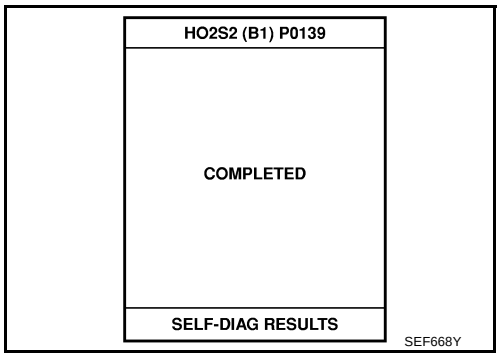
NOTE:
If “COMPLETED” already appears at “COND3” on CONSULT-II screen before Procedure for COND3 is conducted, it is unnecessary to conduct step 1 in Procedure for COND3.



Procedure for COND3

1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-218, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
c. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-II.
d. When “COOLAN TEMP/S” indication reaches to 70°(158°F), go to Procedure for COND1 step 3.



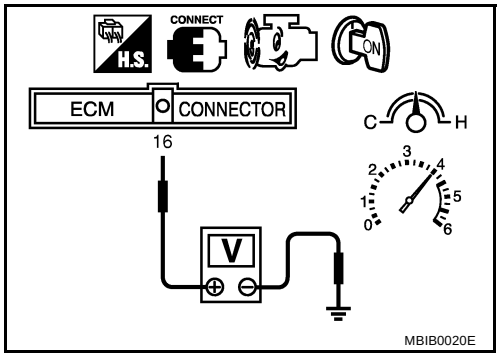
Overall Function Check

BBS001CZ

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

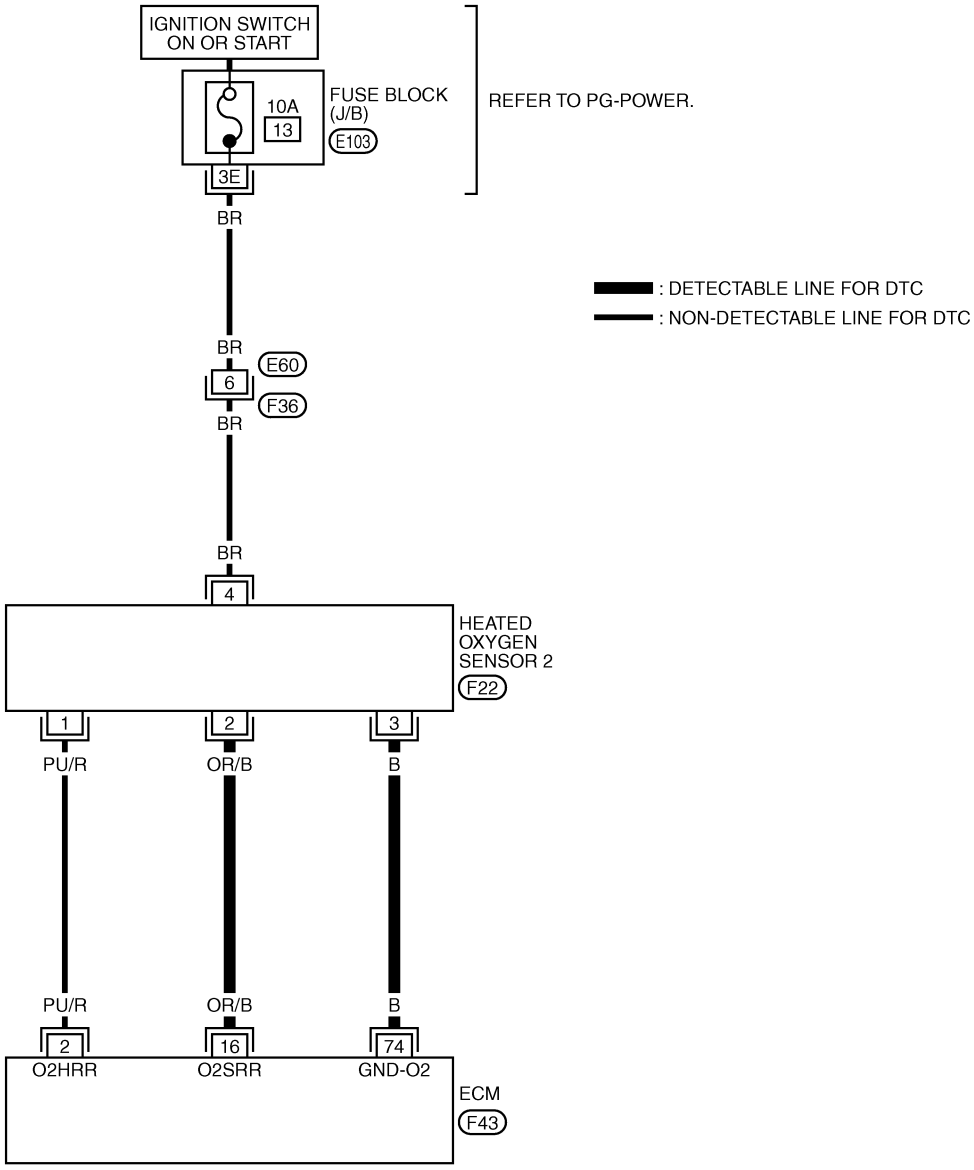
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   A change of voltage should be more than 0.06V for 1 second during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   A change of voltage should be more than 0.06V for 1 second during this procedure.
8. If NG, go to EC-218, "Diagnostic Procedure" .

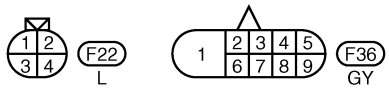


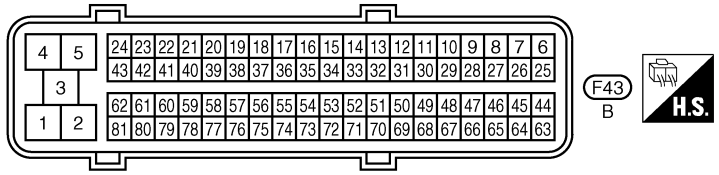
Wiring Diagram

BBS001D0

EC-HO2S2-01







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0603E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

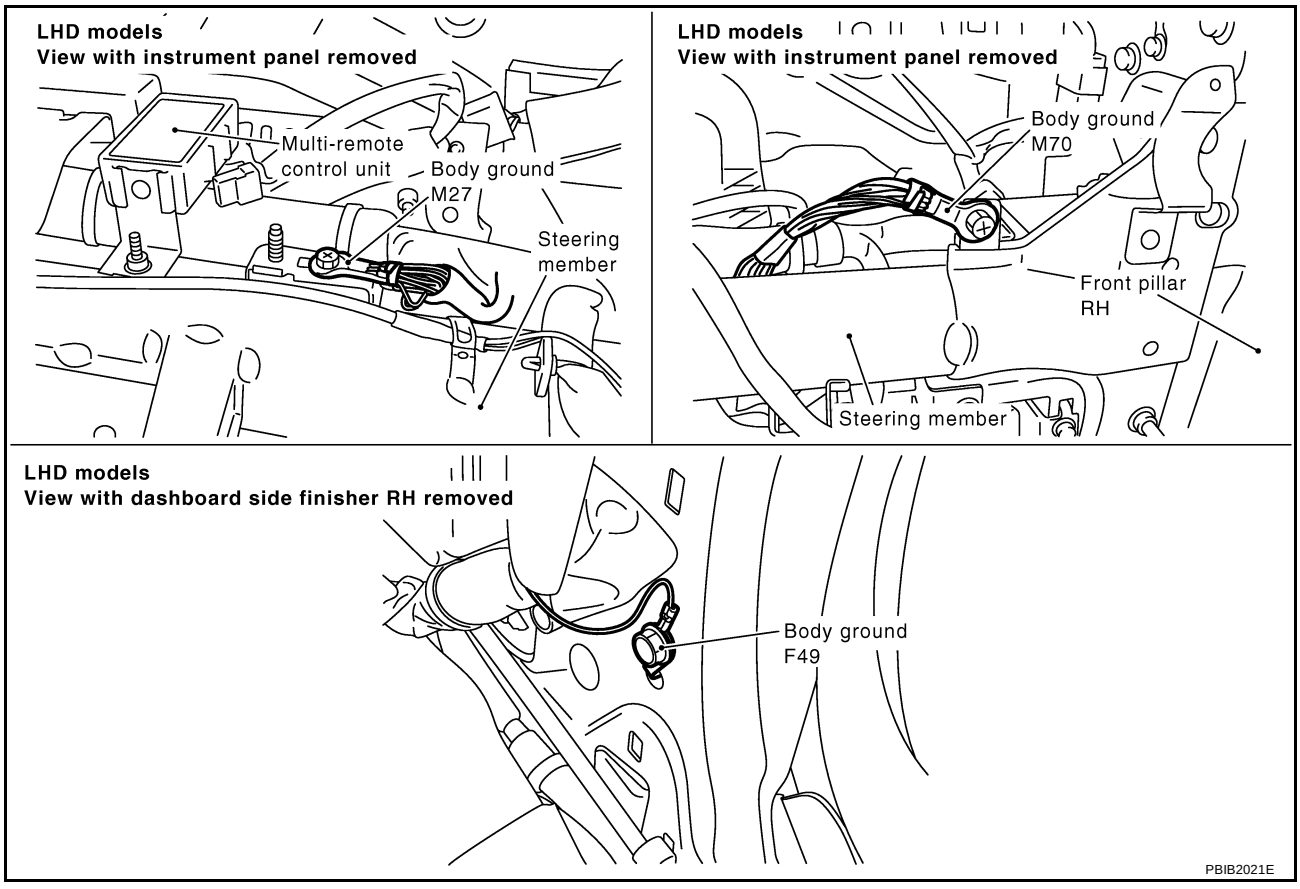
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/B	Heated oxygen sensor 2	**[Engine is running]** ● Revving engine form idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001D1

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .



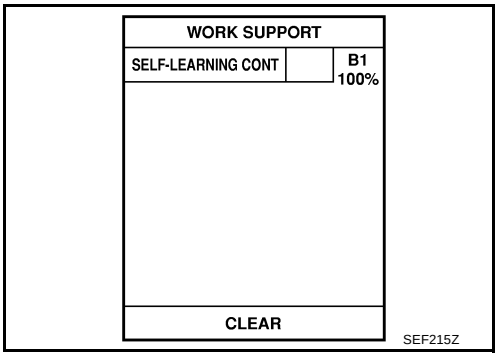
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

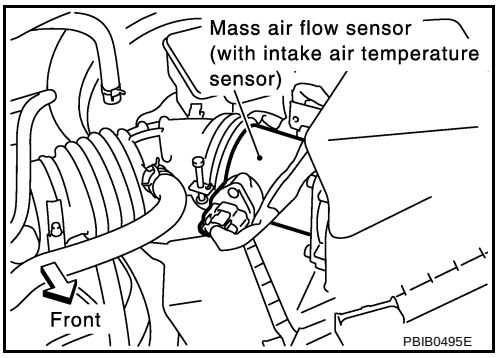
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-66, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 or P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171 or P0172. Refer to EC-222, "DTC P0171 FUEL INJECTION SYSTEM FUNCTION" or EC-228, "DTC P0172 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between and HO2S2 terminal 3 and ECM terminal 74.
   Refer to Wiring Diagram.

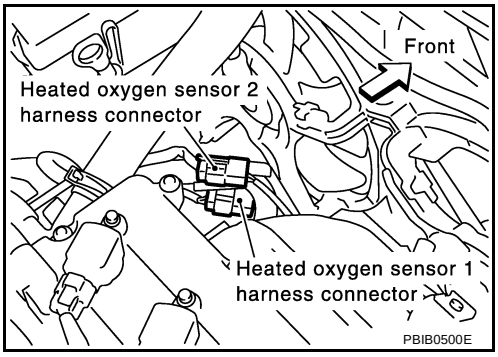
   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 2 and ECM terminal 16.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-220, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001D2

HEATED OXYGEN SENSOR 2

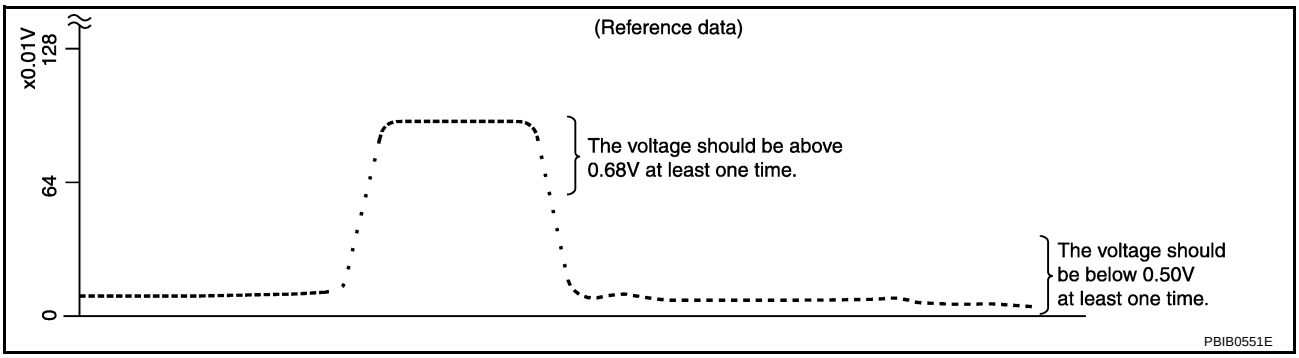
With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



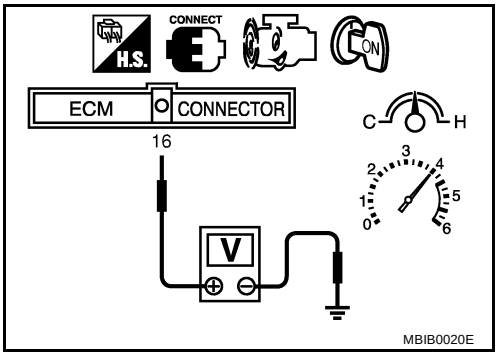
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.50V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001D3

HEATED OXYGEN SENSOR 2

Refer to EX-2, "EXHAUST SYSTEM" .

DTC P0171 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

BBS001D4

With the Air-Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensor 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too lean.), the ECM judges the condition as the fuel injection system malfunction and lights up the MI (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0171 0171	Fuel injection system too lean	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too lean.)	● Intake air leaks ● Heated oxygen sensor 1 ● Fuel injector ● Exhaust gas leaks ● Incorrect fuel pressure ● Lack of fuel ● Mass air flow sensor ● Incorrect PCV hose connection

DTC Confirmation Procedure

BBS001D5

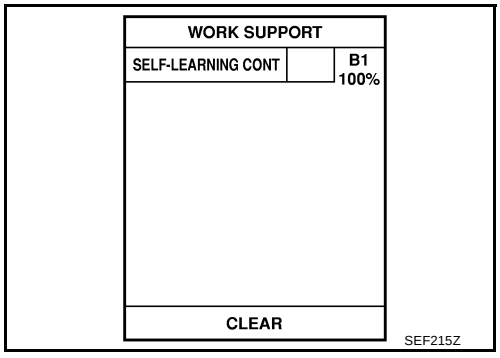
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-225, "Diagnostic Procedure" .

   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
   Hold the accelerator pedal as steady as possible.



The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

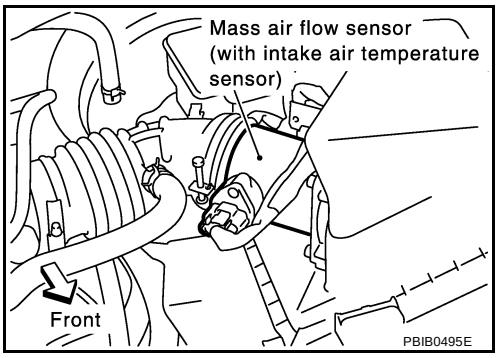
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)

Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.
8. Crank engine while depressing accelerator pedal. If engine starts, go to EC-225, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST. Make sure DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine again and let it idle for at least 10 minutes.
9. Select Service $07 with GST. The 1st trip DTC P0171 should be detected at this stage, if a malfunction exists. If so, go to EC-225, "Diagnostic Procedure" .



NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

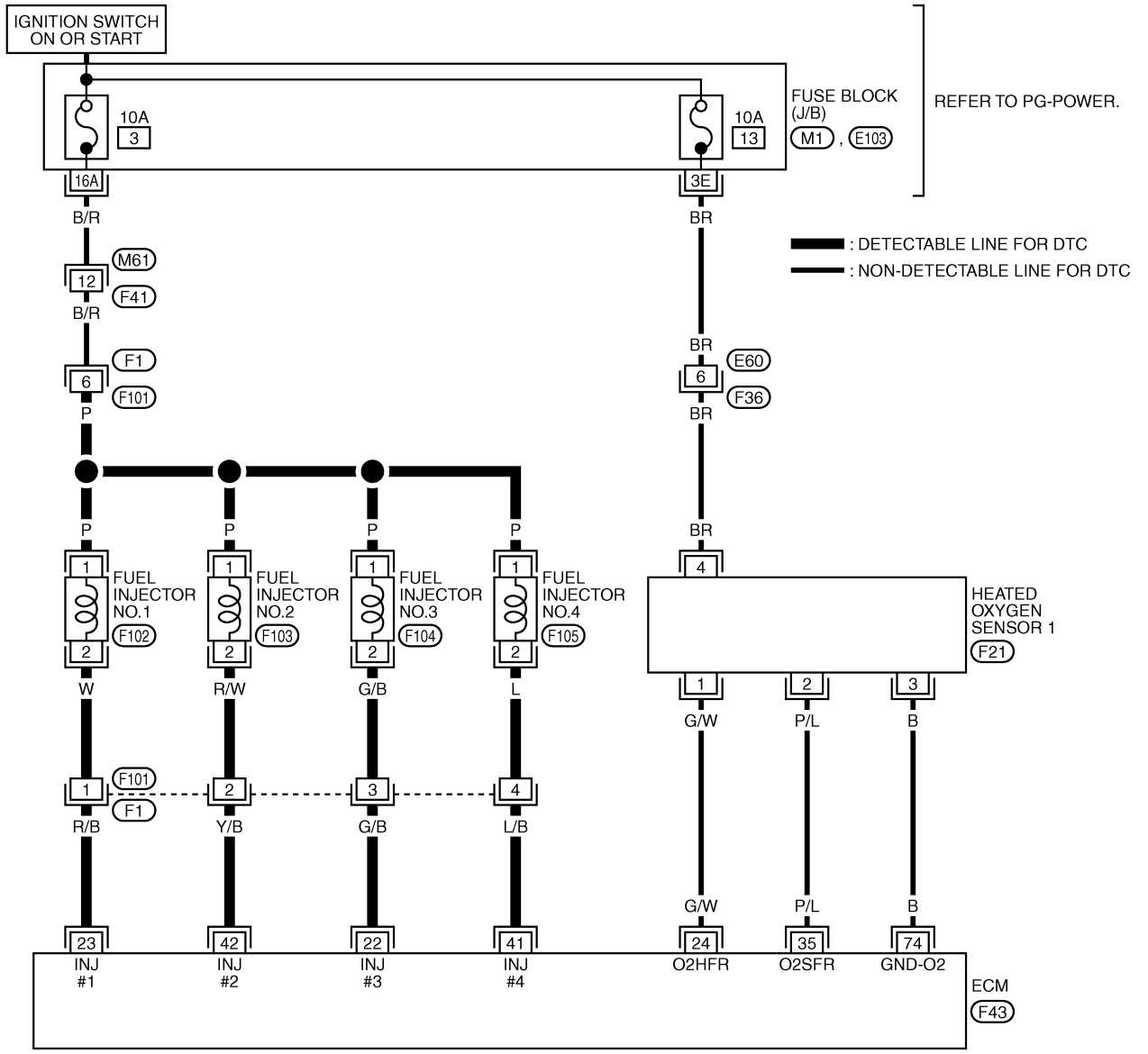
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

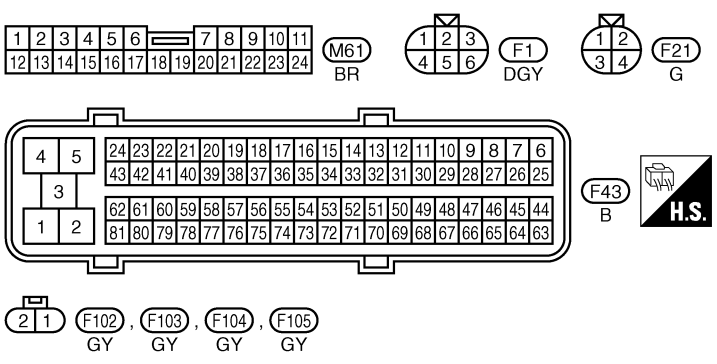
10. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
11. Crank engine while depressing accelerator pedal. If engine starts, go to EC-225, "Diagnostic Procedure" . If engine does not start, check exhaust and intake air leak visually.

Wiring Diagram

BBS001D6

EC-FUEL-01





REFER TO THE FOLLOWING.
M1, E103 -FUSE BLOCK-JUNCTION BOX (J/B)

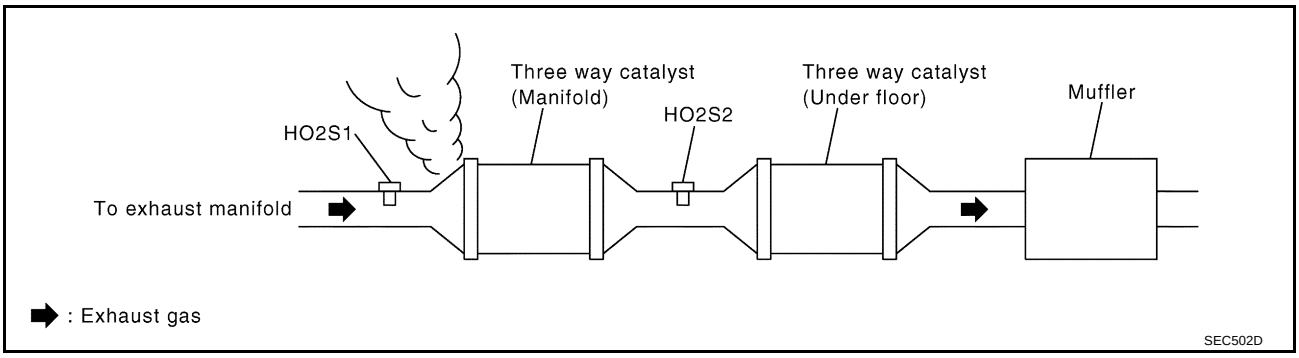
TBWB0699E

Diagnostic Procedure

BBS001D7

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Listen for an intake air leak after the mass air flow sensor.
2. Check PCV hose connection.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

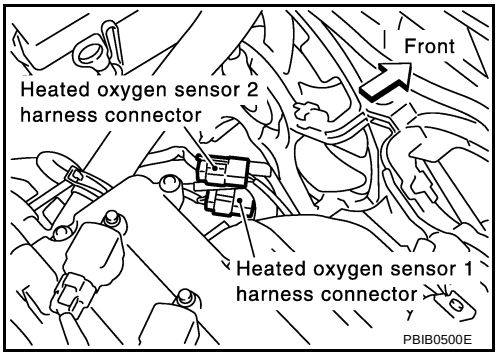
3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S1 terminal 2 and ECM terminal 35.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-52, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-53, "FUEL PRESSURE CHECK" .

At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 5.
NG >> Follow the construction of EC-53, "FUEL PRESSURE CHECK" .

5. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10 g·m/sec: at 2,500 rpm

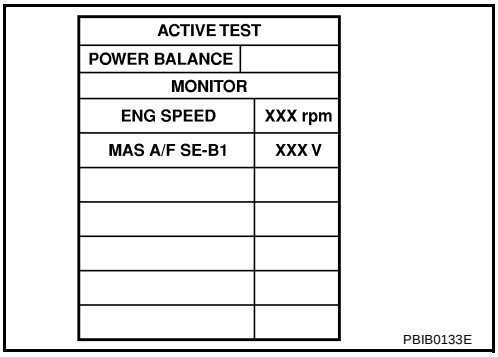
OK or NG

OK >> GO TO 6.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-154, "DTC P0102, P0103 MAF SENSOR" .

6. CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



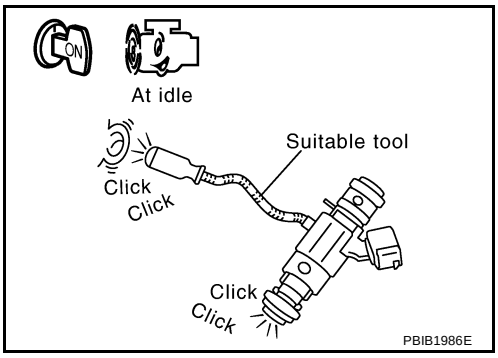
Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.

OK or NG

OK >> GO TO 7.
NG >> Perform trouble diagnosis for EC-454, "INJECTOR CIRCUIT" .



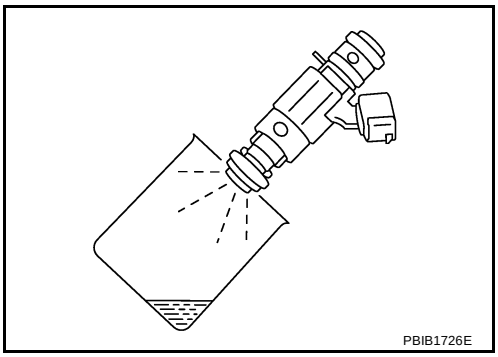
7. CHECK INJECTOR

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Turn ignition switch OFF.
3. Remove injector gallery assembly. Refer to EM-34, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
   The injector harness connectors should remain connected.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injector.
6. Crank engine for about 3 seconds. Make sure that fuel sprays out from injectors.

Fuel should be sprayed evenly for each injector.

OK or NG

OK >> GO TO 8.
NG >> Replace injectors from which fuel does not spray out. Always replace O-ring with new ones.



8. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0172 FUEL INJECTION SYSTEM FUNCTION

PFP:16600

On Board Diagnosis Logic

BBS001D8

With the Air-Fuel Mixture Ratio Self-Learning Control, the actual mixture ratio can be brought closely to the theoretical mixture ratio based on the mixture ratio feedback signal from the heated oxygen sensors 1. The ECM calculates the necessary compensation to correct the offset between the actual and the theoretical ratios.
In case the amount of the compensation value is extremely large (The actual mixture ratio is too rich.), the ECM judges the condition as the fuel injection system malfunction and lights up the MI (2 trip detection logic).

Sensor	Input Signal to ECM	ECM function	Actuator
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)	Fuel injection control	Fuel injector

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0172 0172	Fuel injection system too rich	● Fuel injection system does not operate properly. ● The amount of mixture ratio compensation is too large. (The mixture ratio is too rich.)	● Heated oxygen sensor 1 ● Fuel injector ● Exhaust gas leaks ● Incorrect fuel pressure ● Mass air flow sensor

DTC Confirmation Procedure

BBS001D9

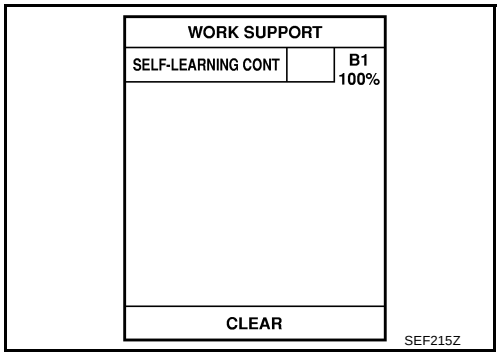
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON and select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
4. Clear the self-learning control coefficient by touching “CLEAR”.
5. Select “DATA MONITOR” mode with CONSULT-II.
6. Start engine again and let it idle for at least 10 minutes.
   The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-231, "Diagnostic Procedure" .

   NOTE:
   If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
   Hold the accelerator pedal as steady as possible.



The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

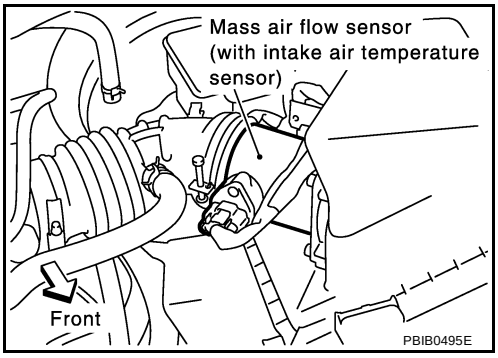
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

7. If it is difficult to start engine at step 6, the fuel injection system has a malfunction, too.

8. Crank engine while depressing accelerator pedal.
If engine starts, go to EC-231, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Disconnect mass air flow sensor harness connector.
4. Restart engine and let idle for at least 5 seconds.
5. Stop engine and reconnect mass air flow sensor harness connector.
6. Select Service $03 with GST. Make sure DTC P0102 is detected.
7. Select Service $04 with GST and erase the DTC P0102.
8. Start engine again and let it idle for at least 10 minutes.
9. Select Service $07 with GST. The 1st trip DTC P0172 should be detected at this stage, if a malfunction exists. If so, go to EC-231, "Diagnostic Procedure" .



NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

a. Turn ignition switch OFF and wait at least 10 seconds.
b. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for 10 minutes. Refer to the table below.
Hold the accelerator pedal as steady as possible.

The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following conditions should be satisfied at the same time.

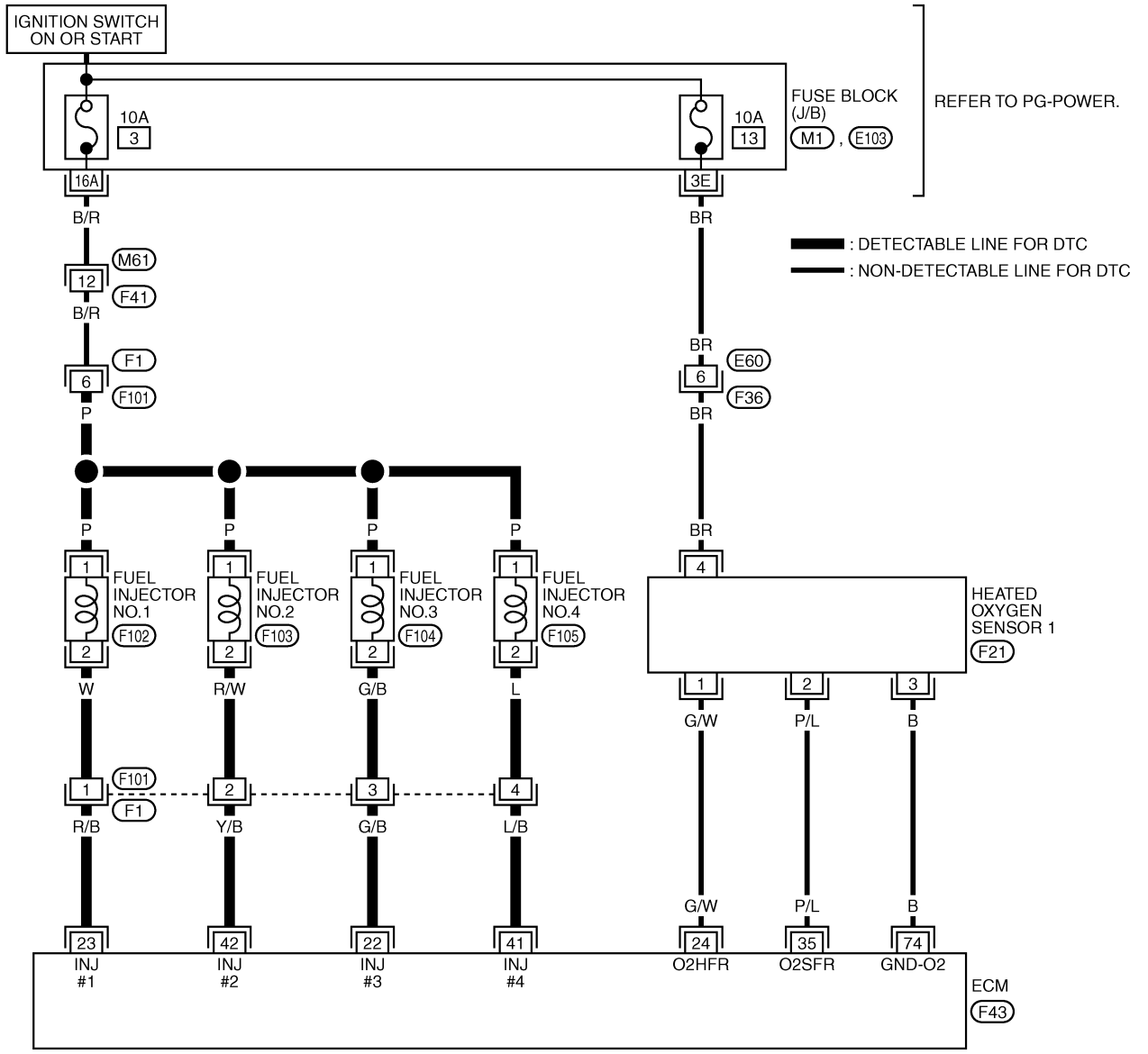
Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70 °C (158 °F), T should be lower than 70 °C (158 °F).
	When the freeze frame data shows higher than or equal to 70 °C (158 °F), T should be higher than or equal to 70 °C (158 °F).

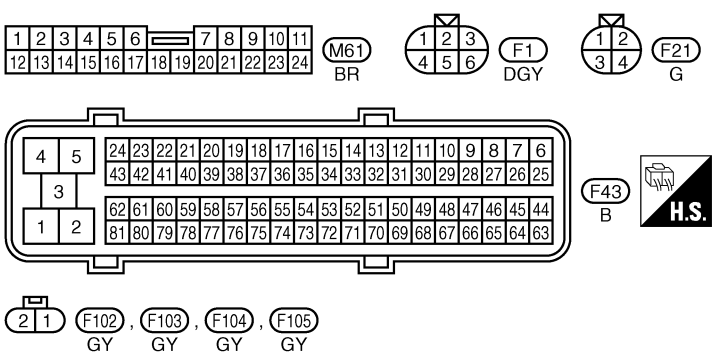
10. If it is difficult to start engine at step 8, the fuel injection system has a malfunction.
11. Crank engine while depressing accelerator pedal.
If engine starts, go to EC-231, "Diagnostic Procedure" . If engine does not start, remove ignition plugs and check for fouling, etc.

Wiring Diagram

BBS001DA

EC-FUEL-01





REFER TO THE FOLLOWING.
M1, E103 -FUSE BLOCK-JUNCTION BOX (J/B)

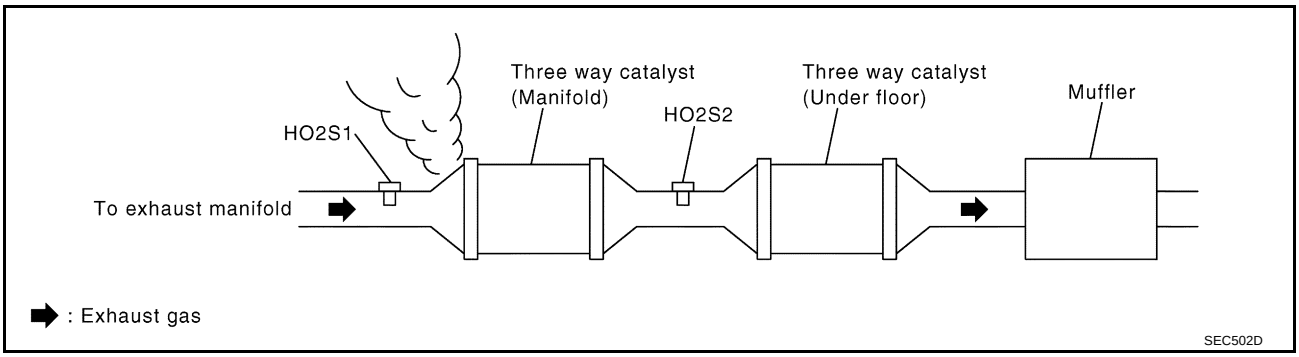
TBWB0699E

Diagnostic Procedure

BBS001DB

1. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before three way catalyst (manifold).



OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

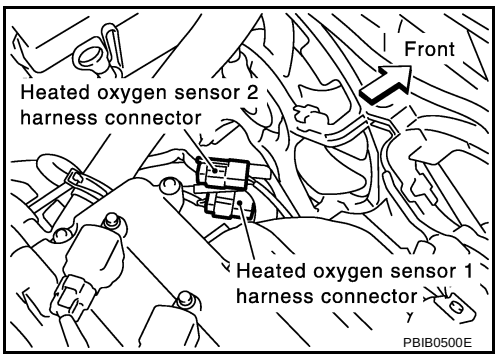
3. CHECK HEATED OXYGEN SENSOR 1 CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 (HO2S1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S1 terminal 2 and ECM terminal 35.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.



6. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PRESSURE

1. Release fuel pressure to zero. Refer to EC-52, "FUEL PRESSURE RELEASE" .
2. Install fuel pressure gauge and check fuel pressure. Refer to EC-53, "FUEL PRESSURE CHECK" .

   At idling: 350 kPa (3.5 bar, 3.57 kg/cm2, 51 psi)

OK or NG

OK >> GO TO 5.
NG >> Follow the construction of EC-53, "FUEL PRESSURE CHECK" .

5. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

1. Install all removed parts.
2. Check “MASS AIR FLOW” in “DATA MONITOR” mode with CONSULT-II.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10 g·m/sec: at 2,500 rpm

With GST

1. Install all removed parts.
2. Check mass air flow sensor signal in Service $01 with GST.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10 g·m/sec: at 2,500 rpm

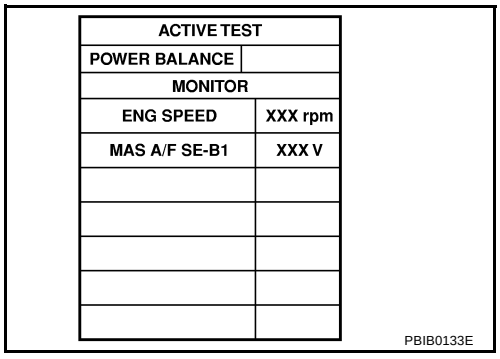
OK or NG

OK >> GO TO 6.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or grounds. Refer to EC-154, "DTC P0102, P0103 MAF SENSOR" .

6. CHECK FUNCTION OF INJECTORS

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



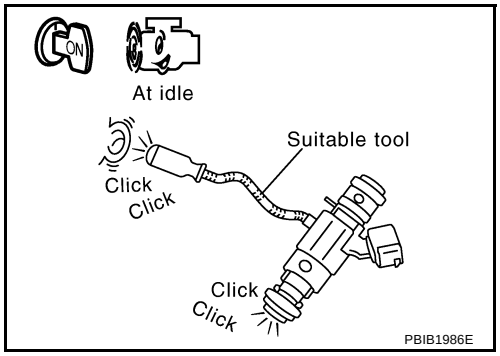
Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.

OK or NG

OK >> GO TO 7.
NG >> Perform trouble diagnosis for EC-454, "INJECTOR CIRCUIT" .



7. CHECK INJECTOR

1. Remove injector assembly. Refer to EM-34, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect injector harness connectors.
4. Disconnect all ignition coil harness connectors.
5. Prepare pans or saucers under each injectors.
6. Crank engine for about 3 seconds.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 8.
NG (Drips.)>>Replace the injectors from which fuel is dripping. Always replace O-ring with new one.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

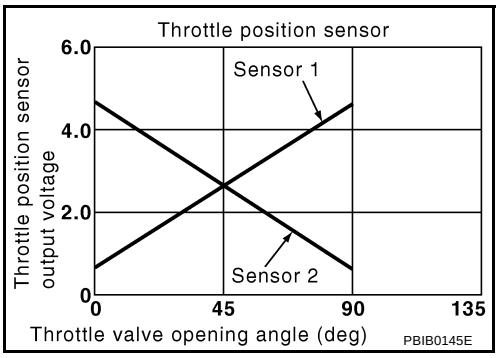
DTC P0222, P0223 TP SENSOR

PFP:16119

Component Description

BBS001DC

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

BBS001DD

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

BBS001DE

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	● Harness or connectors (TP sensor 1 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1) ● Accelerator pedal position sensor (APP sensor 2)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

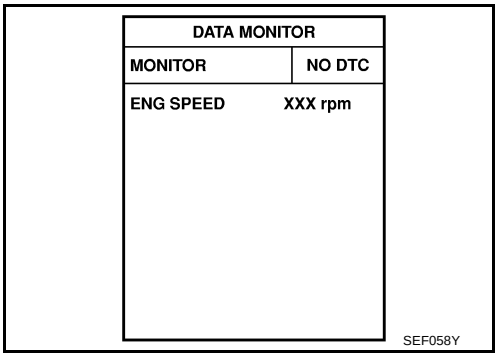
DTC Confirmation Procedure

BBS001DF

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-238, "Diagnostic Procedure" .



WITH GST

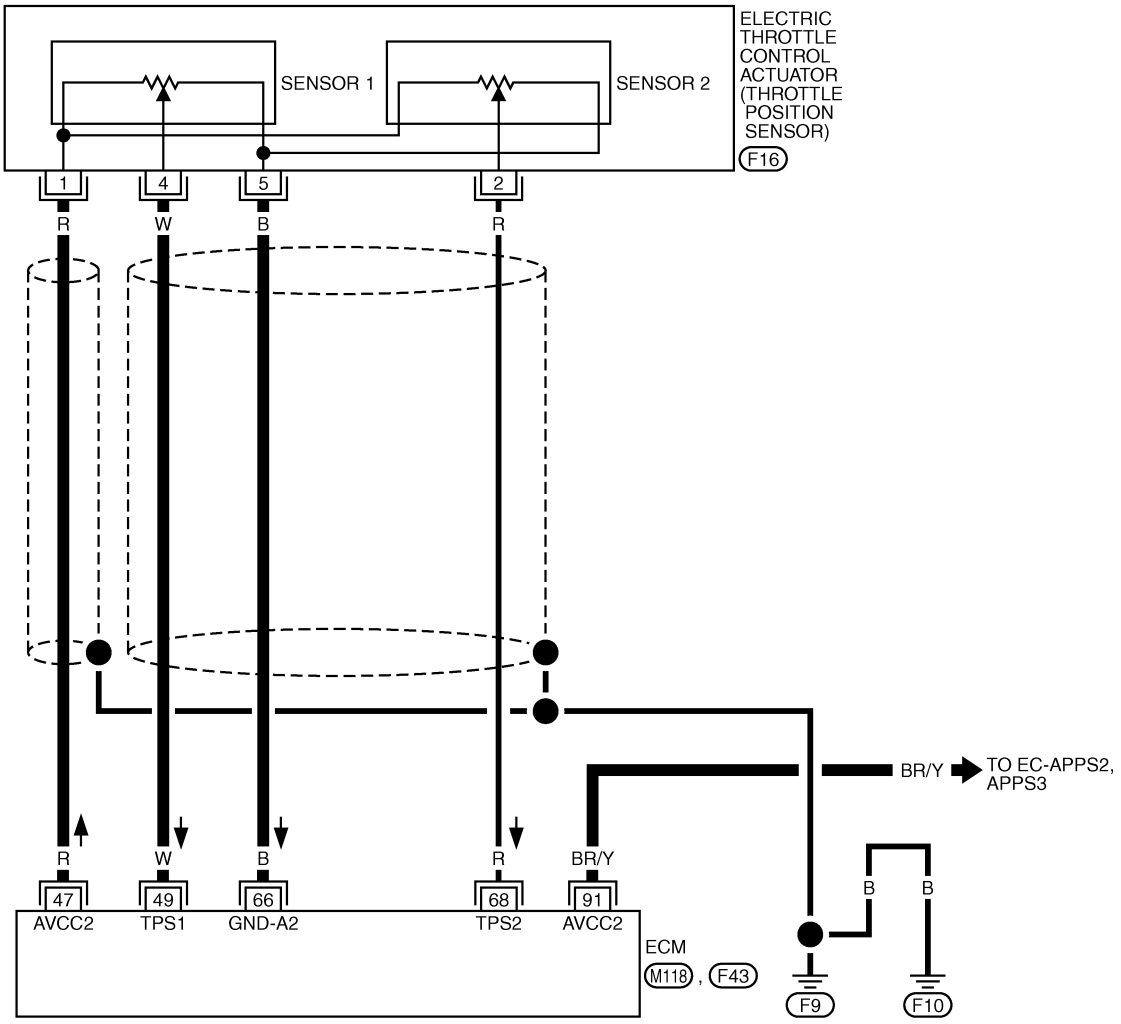
Follow the procedure “WITH CONSULT-II” above.

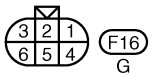
Wiring Diagram

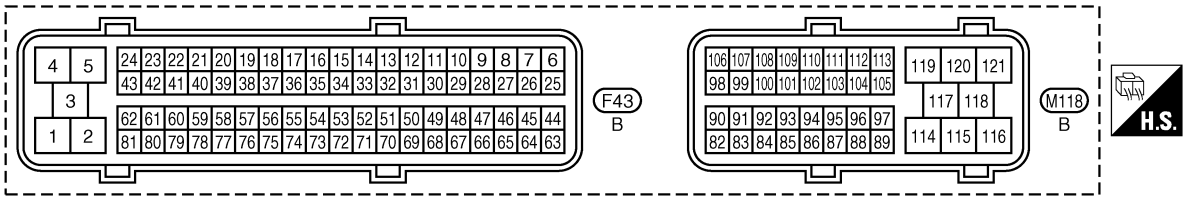
BBS001DG

EC-TPS1-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC







TBWB0261E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

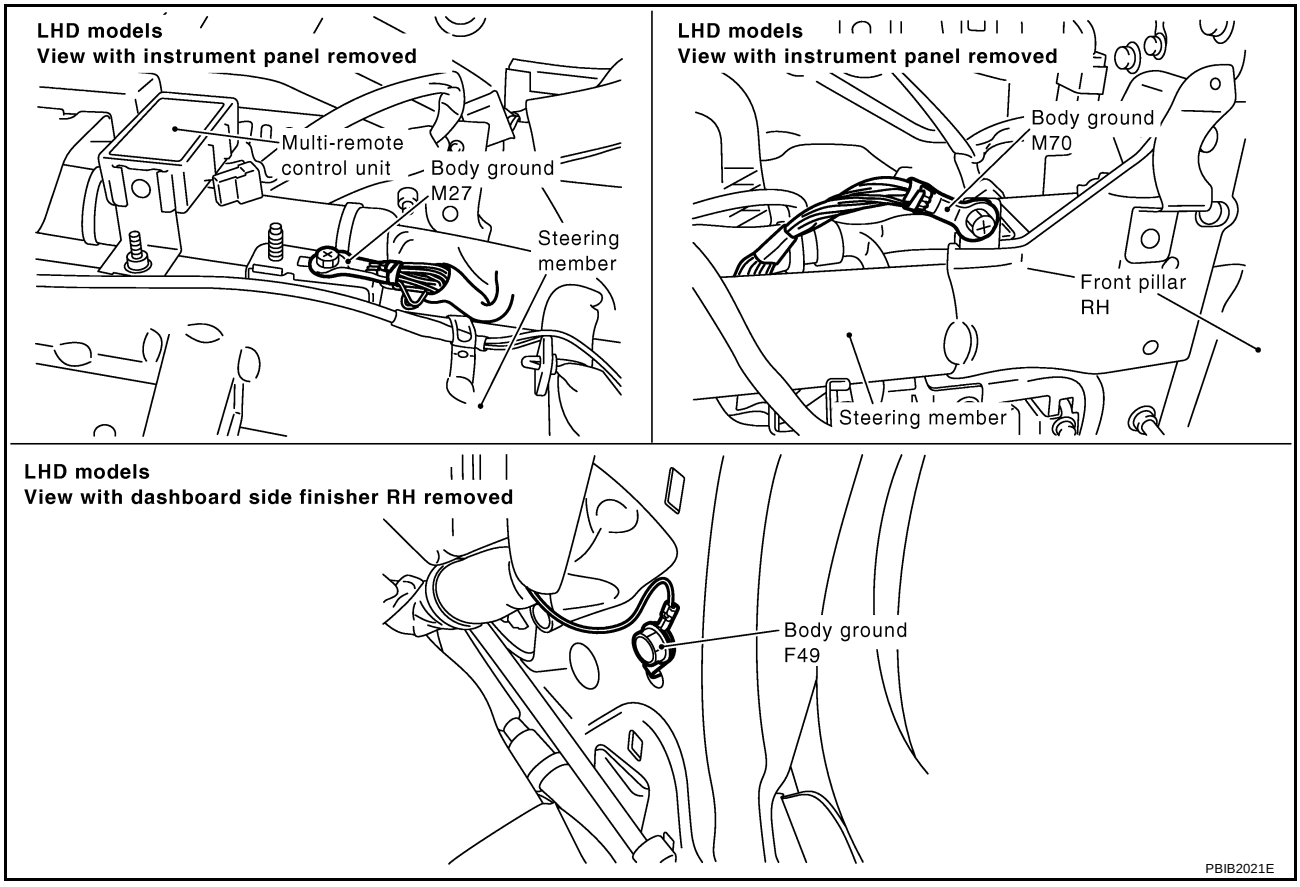
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	R	Throttle position sensor power supply	**[Ignition switch: ON]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

BBS001DH

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

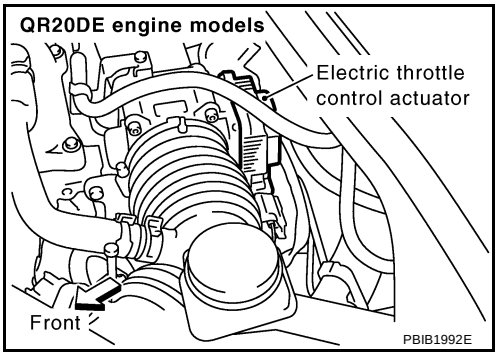


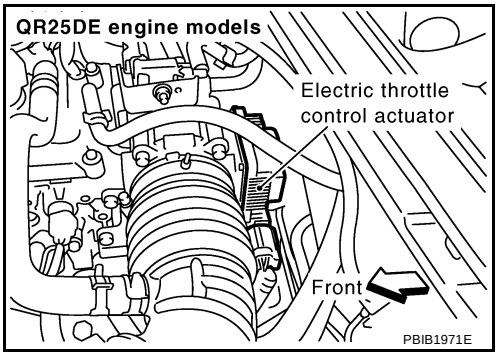
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

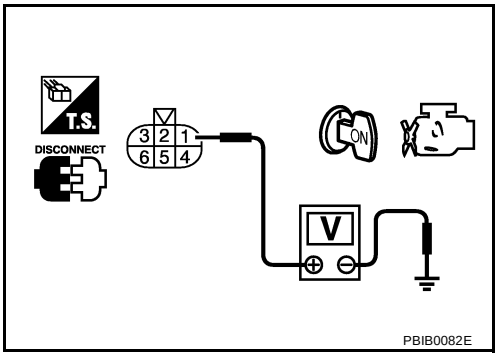
1. Disconnect electric throttle control actuator harness connector.





2. Turn ignition switch ON.
3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-236
91	APP sensor terminal 4	EC-437

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-442, "Component Inspection" .

OK or NG

OK >> GO TO 11
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .
3. Perform EC-50, "Throttle Valve Closed Position Learning" .
4. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 49. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-241, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

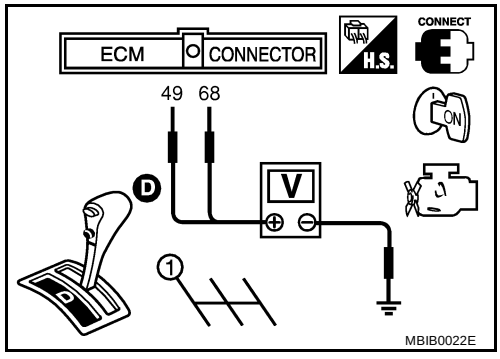
Component Inspection

BBS001DI

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T) or 1st position (M/T).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-50, "Throttle Valve Closed Position Learning" .
8. Perform EC-50, "Idle Air Volume Learning" .

Removal and Installation

BBS001DJ

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P0300 - P0304 MULTIPLE CYLINDER MISFIRE, NO. 1 - 4 CYLINDER MISFIRE

PFP:00000

On Board Diagnosis Logic

BBS001DK

When a misfire occurs, engine speed will fluctuate. If the engine speed fluctuates enough to cause the crankshaft position (CKP) sensor (POS) signal to vary, ECM can determine that a misfire is occurring.

Sensor	Input Signal to ECM	ECM function
Crankshaft position sensor (POS)	Engine speed	On board diagnosis of misfire

The misfire detection logic consists of the following two conditions.

1. One Trip Detection Logic (Three Way Catalyst Damage)
   On the first trip that a misfire condition occurs that can damage the three way catalyst (TWC) due to overheating, the MI will blink.
   When a misfire condition occurs, the ECM monitors the CKP sensor (POS) signal every 200 engine revolutions for a change.
   When the misfire condition decreases to a level that will not damage the TWC, the MI will turn off.
   If another misfire condition occurs that can damage the TWC on a second trip, the MI will blink.
   When the misfire condition decreases to a level that will not damage the TWC, the MI will remain on.
   If another misfire condition occurs that can damage the TWC, the MI will begin to blink again.
2. Two Trip Detection Logic (Exhaust quality deterioration)
   For misfire conditions that will not damage the TWC (but will affect vehicle emissions), the MI will only light when the misfire is detected on a second trip. During this condition, the ECM monitors the CKP sensor signal every 1,000 engine revolutions.
   A misfire malfunction can be detected on any one cylinder or on multiple cylinders.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0300 0300	Multiple cylinder misfire detected	Multiple cylinder misfire.	● Improper spark plug ● Insufficient compression ● Incorrect fuel pressure ● The injector circuit is open or shorted ● Fuel injector ● Intake air leak ● The ignition signal circuit is open or shorted ● Lack of fuel ● Drive plate or flywheel ● Heated oxygen sensor 1 ● Incorrect PCV hose connection
P0301 0301	No.1 cylinder misfire detected	No. 1 cylinder misfires.	
P0302 0302	No. 2 cylinder misfire detected	No. 2 cylinder misfires.	
P0303 0303	No. 3 cylinder misfire detected	No. 3 cylinder misfires.	
P0304 0304	No. 4 cylinder misfire detected	No. 4 cylinder misfires.	

DTC Confirmation Procedure

BBS001DL

CAUTION:

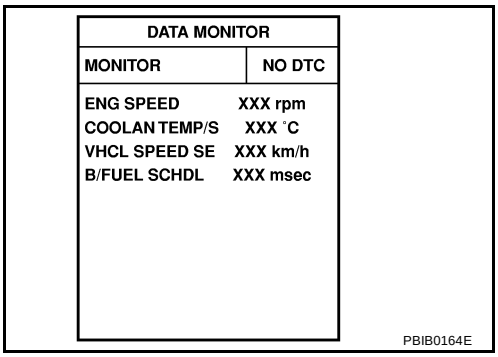
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON, and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to normal operating temperature.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Restart engine and let it idle for about 15 minutes.
5. If 1st trip DTC is detected, go to EC-243, "Diagnostic Procedure" .



NOTE:
If 1st trip DTC is not detected during above procedure, performing the following procedure is advised.

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Start engine and drive the vehicle under the similar conditions to (1st trip) Freeze Frame Data for a certain time. Refer to table below.
   Hold the accelerator pedal as steady as possible.

   The similar conditions to (1st trip) Freeze Frame Data means the vehicle operation that the following condition should be satisfied at the same time:

Engine speed	Engine speed in the freeze frame data ± 400 rpm
Vehicle speed	Vehicle speed in the freeze frame data ± 10 km/h (6 MPH)
Engine coolant temperature (T) condition	When the freeze frame data shows lower than 70°C (158°F), T should be lower than 70°C (158°F)
	When the freeze frame data shows higher than or equal to 70°C (158°F), T should be higher than or equal to 70°C (158°F)

   The time to driving varies according to the engine speed in the freeze frame data.
   Refer to the following table.

Engine speed	Time
Around 1,000 rpm	Approximately 10 minutes
Around 2,000 rpm	Approximately 5 minutes
More than 3,000 rpm	Approximately 3.5 minutes

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001DM

1. CHECK FOR INTAKE AIR LEAK AND PCV HOSE

1. Start engine and run it at idle speed.
2. Listen for the sound of the intake air leak.
3. Check PCV hose connection.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK FOR EXHAUST SYSTEM CLOGGING

Stop engine and visually check exhaust tube, three way catalyst and muffler for dents.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. PERFORM POWER BALANCE TEST

With CONSULT-II

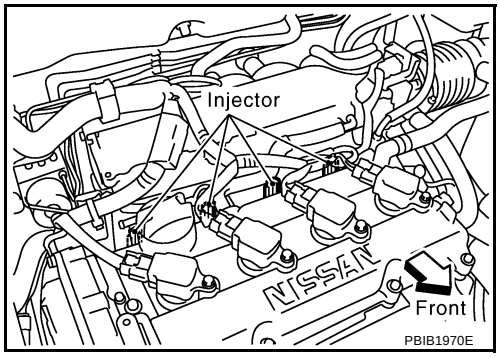
1. Perform “POWER BALANCE” in “ACTIVE TEST” mode.
2. Is there any cylinder which does not produce a momentary engine speed drop?

ACTIVE TEST	
POWER BALANCE	
MONITOR	
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V

PBIB0133E

Without CONSULT-II

When disconnecting each injector harness connector one at a time, is there any cylinder which does not produce a momentary engine speed drop?



PBIB1970E

Yes or No

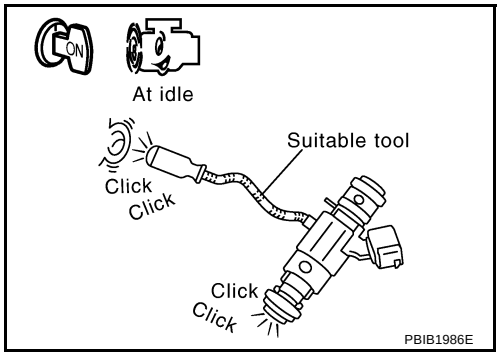
Yes >> GO TO 4.
No >> GO TO 7.

4. CHECK INJECTOR

Does each injector make an operating sound at idle?

Yes or No

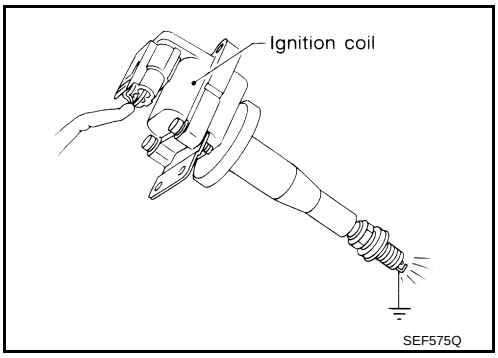
Yes >> GO TO 5.
No >> Check injector(s) and circuit(s). Refer to EC-454, "INJECTOR CIRCUIT" .



PBIB1986E

5. CHECK IGNITION SPARK

1. Stop engine.
2. Disconnect ignition coil assembly from rocker cover.
3. Disconnect spark plug from ignition coil assembly.
4. Connect a known-good spark plug to the ignition coil assembly.
5. Disconnect all injector harness connectors.
6. Place end of spark plug against a suitable ground and crank engine.
7. Check for spark.

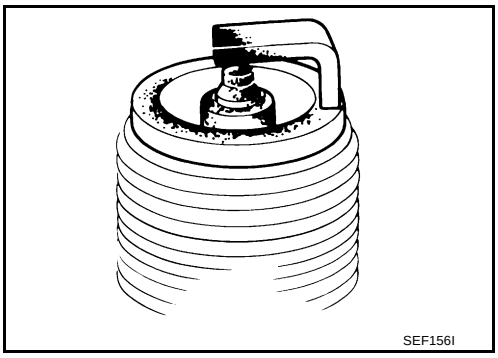


OK or NG

OK >> GO TO 6.
NG >> Check ignition coil, power transistor and their circuits. Refer to EC-443, "IGNITION SIGNAL" .

6. CHECK SPARK PLUGS

Remove the spark plugs and check for fouling, etc.



OK or NG

OK >> GO TO 7.
NG >> Repair or replace spark plug(s) with standard type one(s). For spark plug type, refer to MA-26, "Checking and Changing Spark Plugs" .

7. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-70, "CHECKING COMPRESSION PRESSURE" .

Standard:	**1,190 kPa (11.9 bar, 12.1 kg/cm^2 , 172 psi)/250 rpm**
Minimum:	**990 kPa (9.9 bar, 10.1 kg/cm^2 , 144 psi)/250 rpm**
Difference between each cylinder:	**98 kPa (0.98 bar, 1.0 kg/cm^2 , 14 psi)/250 rpm**

OK or NG

OK >> GO TO 8.
NG >> Check pistons, piston rings, valves, valve seats and cylinder head gaskets.

8. CHECK FUEL PRESSURE

1. Install all removed parts.
2. Release fuel pressure to zero. Refer to EC-52, "FUEL PRESSURE RELEASE" .
3. Install fuel pressure gauge and check fuel pressure. Refer to EC-53, "FUEL PRESSURE CHECK" .

At idle: Approx. 350 kPa (3.5 bar, 3.57 kg/cm^2 , 51 psi)

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Fuel pump and circuit (Refer to EC-469, "FUEL PUMP CIRCUIT" .)
- Fuel pressure regulator (Refer to EC-53, "FUEL PRESSURE CHECK" .)
- Fuel lines
- Fuel filter for clogging

>> Repair or replace.

10. CHECK IGNITION TIMING

Check the following items. Refer to EC-82, "Basic Inspection" .

Items	Specifications	
Target idle speed	QR20DE with M/T models	650 ± 50 rpm (in Neutral position)
	Except above	700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]
Ignition timing	15 ± 5° BTDC [in P or N (A/T), Neutral (M/T) position]	

OK or NG

OK >> GO TO 11.
NG >> Follow the EC-82, "Basic Inspection" .

11. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-187, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace heated oxygen sensor 1.

12. CHECK MASS AIR FLOW SENSOR

With CONSULT-II

Check mass air flow sensor signal in “DATA MONITOR” mode with CONSULT-II.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

With GST

Check mass air flow sensor signal in Service $01 with GST.

1.0 - 4.0 g·m/sec: at idling
4.0 - 10.0 g·m/sec: at 2,500 rpm

OK or NG

OK >> GO TO 13.
NG >> Check connectors for rusted terminals or loose connections in the mass air flow sensor circuit or engine grounds. Refer to EC-154, "DTC P0102, P0103 MAF SENSOR" .

13. CHECK SYMPTOM MATRIX CHART

Check items on the rough idle symptom in EC-87, "Symptom Matrix Chart" .

OK or NG

OK >> GO TO 14.
NG >> Repair or replace.

14. ERASE THE 1ST TRIP DTC

Some tests may cause a 1st trip DTC to be set.
Erase the 1st trip DTC from the ECM memory after performing the tests. Refer to EC-66, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 15.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

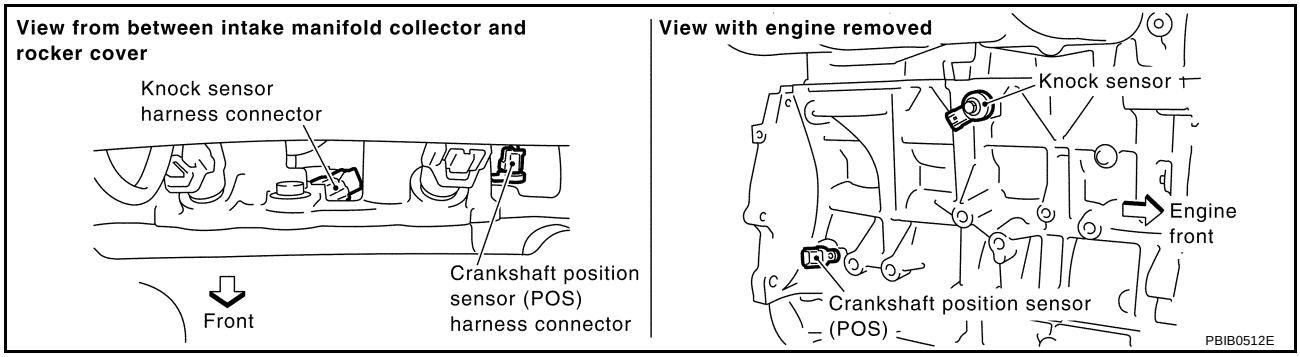
DTC P0327, P0328 KS

PFP:22060

Component Description

BBS001DN

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



On Board Diagnosis Logic

BBS001DO

The MI will not light up for these self-diagnoses.

DTC No.	Trouble Diagnosis Name	DTC Detected Condition	Possible Cause
P0327 0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Knock sensor
P0328 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

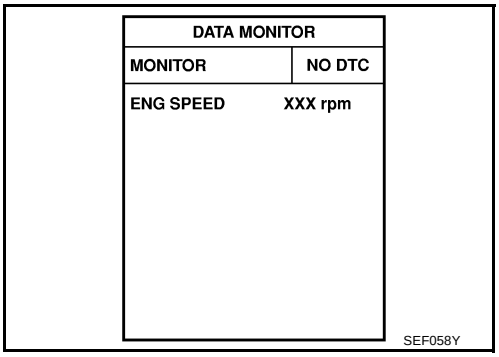
BBS001DP

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-250, "Diagnostic Procedure" .



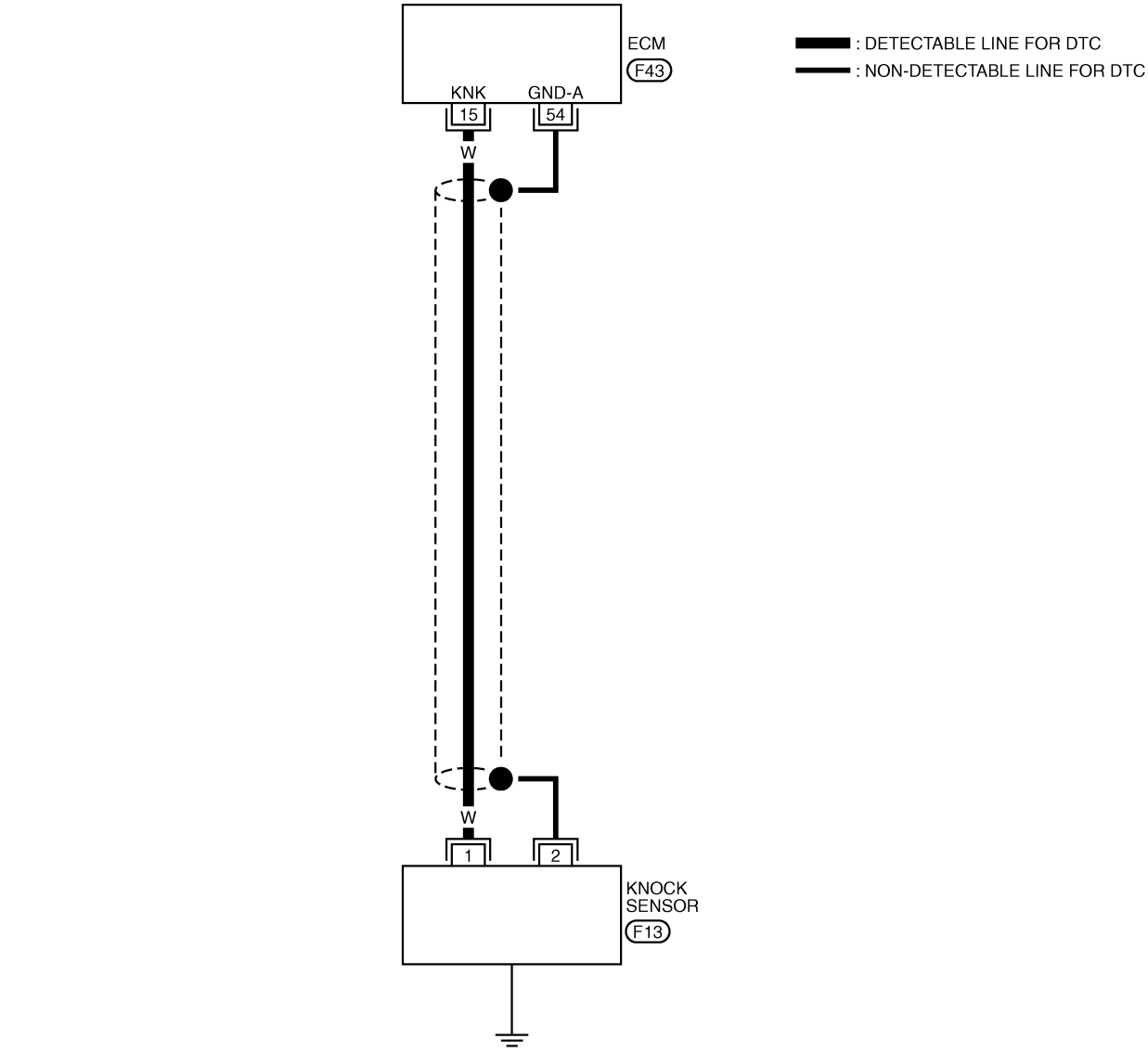
WITH GST

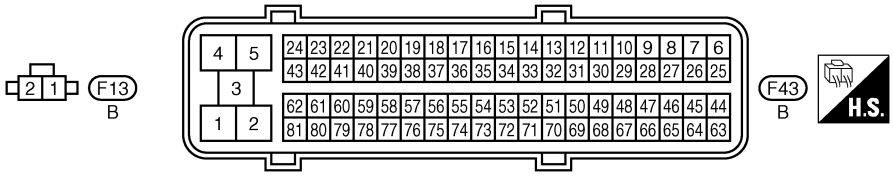
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001DQ

EC-KS-01





TBWA0606E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
54	—	Sensor ground (Knock sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001DR

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 15 and ground. Refer to Wiring Diagram.

   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

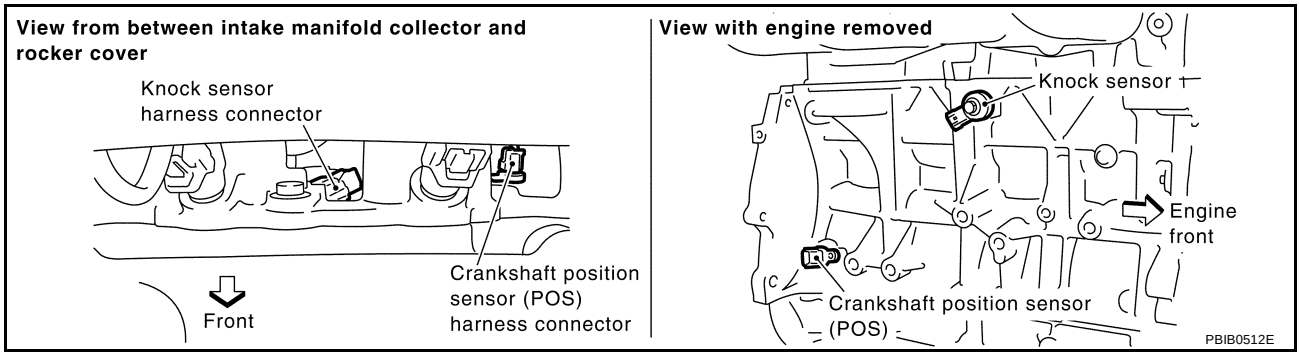
4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-II

1. Disconnect knock sensor harness connector.



2. Check harness continuity between ECM terminal 15 and knock sensor terminal 1. Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK KNOCK SENSOR

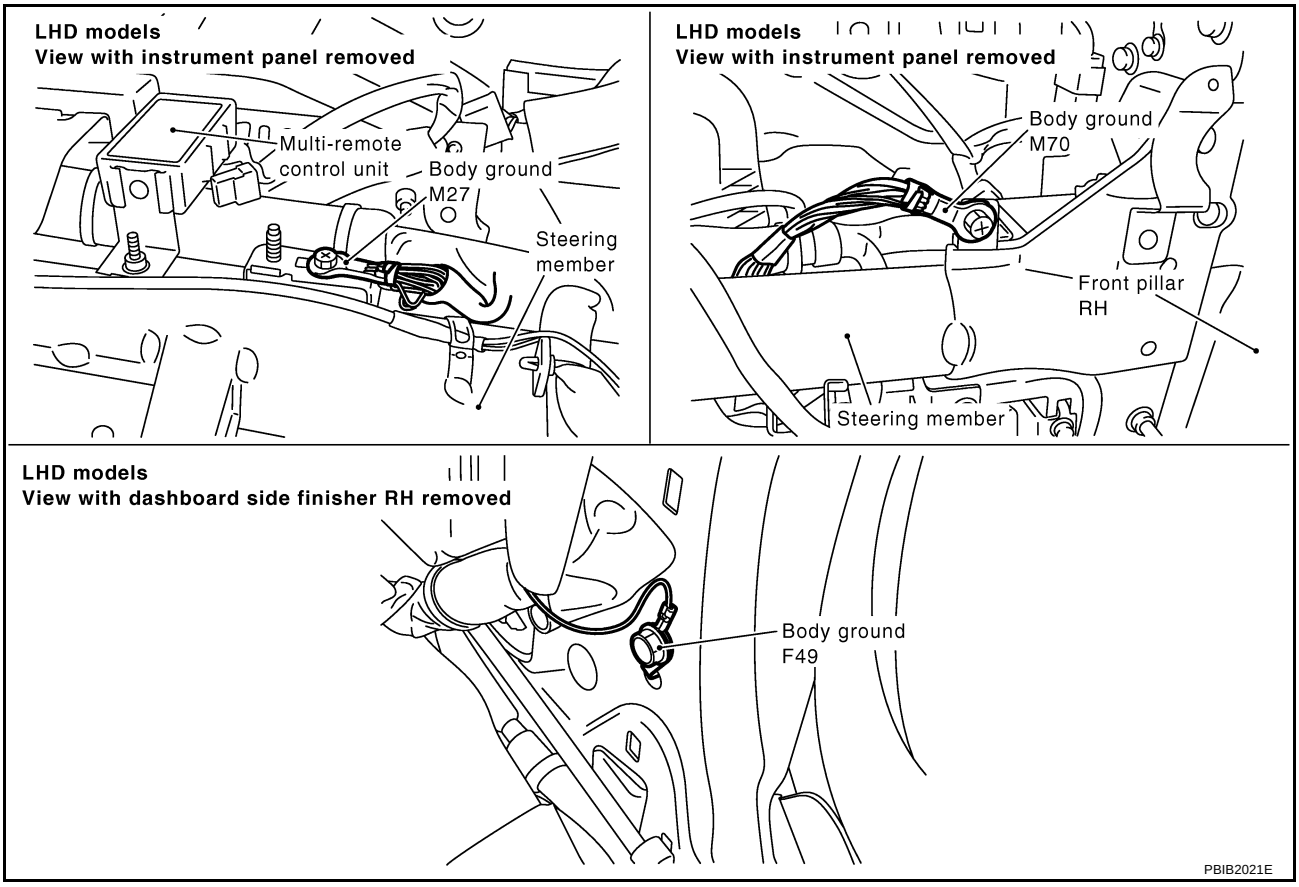
Refer to EC-252, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace knock sensor.

4. CHECK GROUND CONNECTIONS

Loosen and retighten three ground screws on the body.
Refer to EC-135, "Ground Inspection" .



OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Reconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 54 and ground.

Continuity should exist

3. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001DS

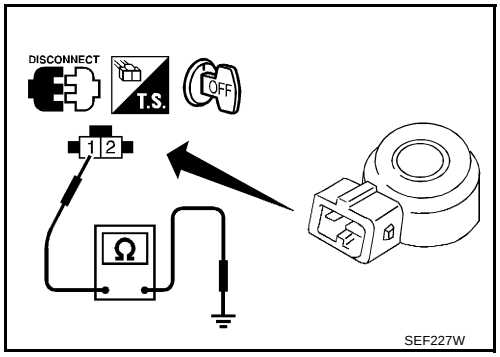
KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



Removal and Installation

BBS001DT

KNOCK SENSOR

Refer to EM-89, "CYLINDER BLOCK" .

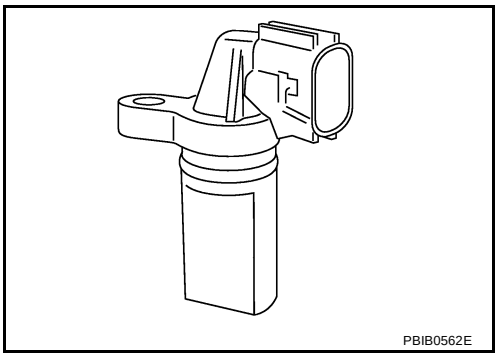
DTC P0335 CKP SENSOR (POS)

PFP:23731

Component Description

BBS001DU

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


PBIB0562E

CONSULT-II Reference Value in Data Monitor Mode

BBS001DV

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

BBS001DW

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	● The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. ● The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. ● The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor (POS) ● Signal plate

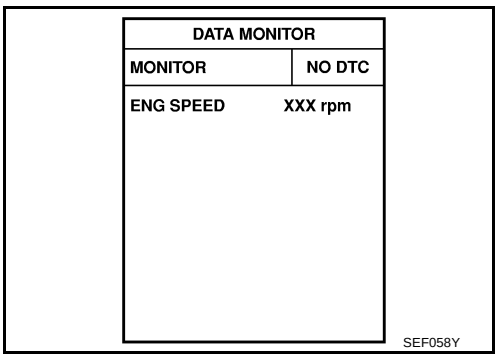
DTC Confirmation Procedure

BBS001DX

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-256, "Diagnostic Procedure".
   If 1st trip DTC is not detected, go to next step.
4. Maintain engine speed at more than 800 rpm for at least 5 seconds.
5. If 1st trip DTC is detected, go to EC-256, "Diagnostic Procedure".



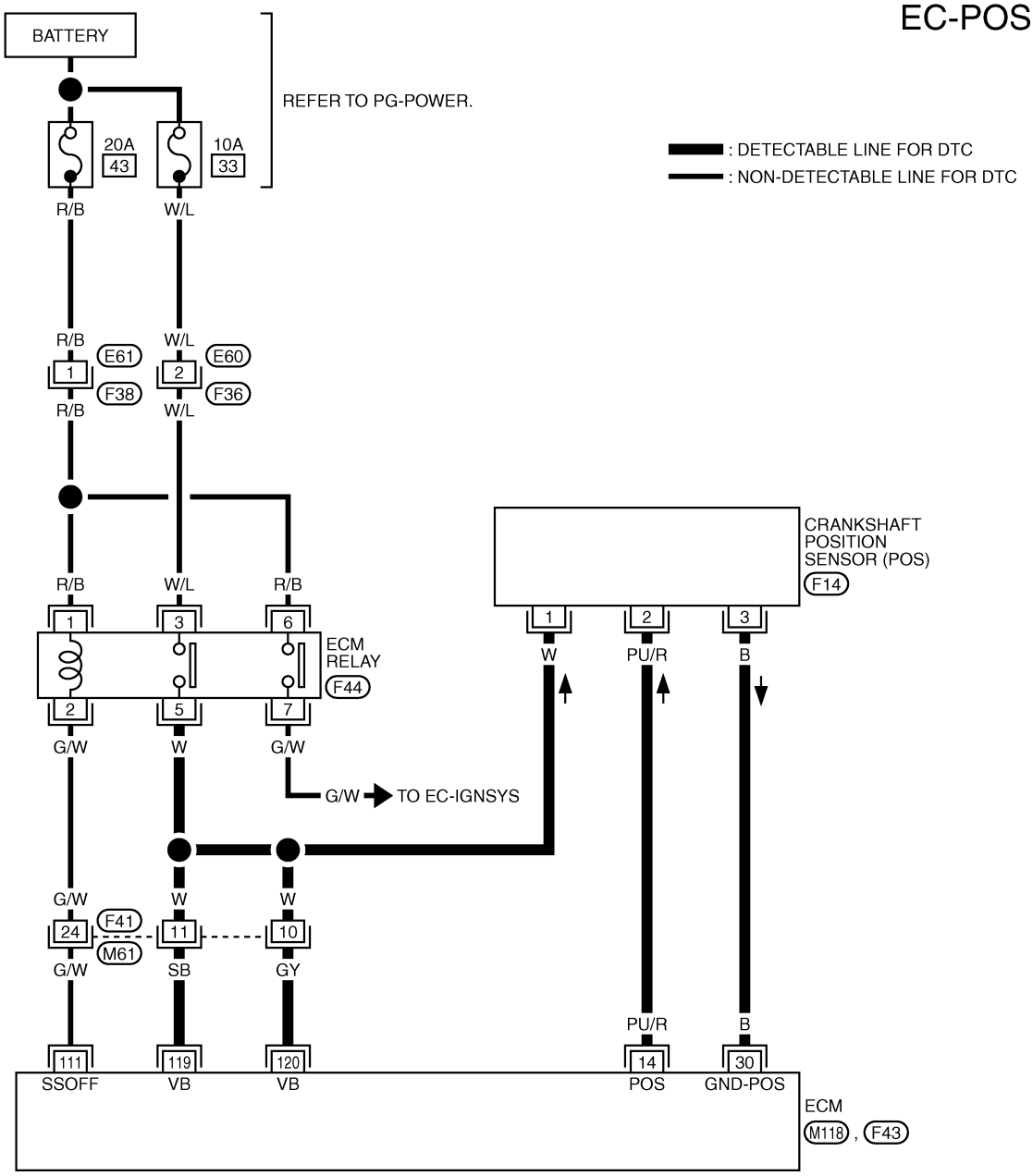
SEF058Y

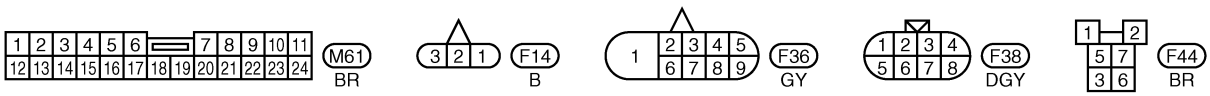
WITH GST

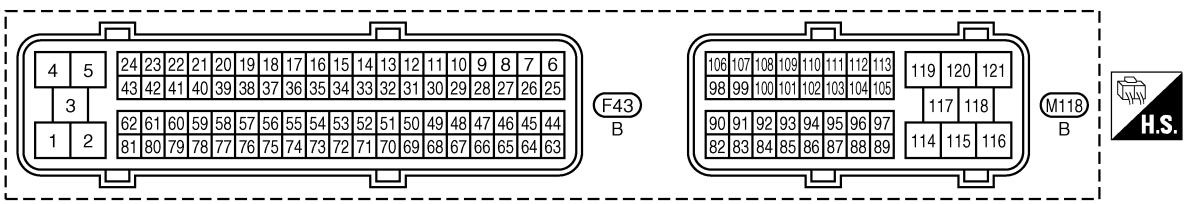
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001DY



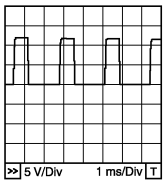
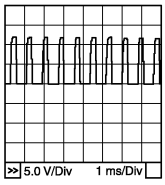




TBWA0607E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	PU/R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E
30	B	Sensor ground (Crankshaft position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

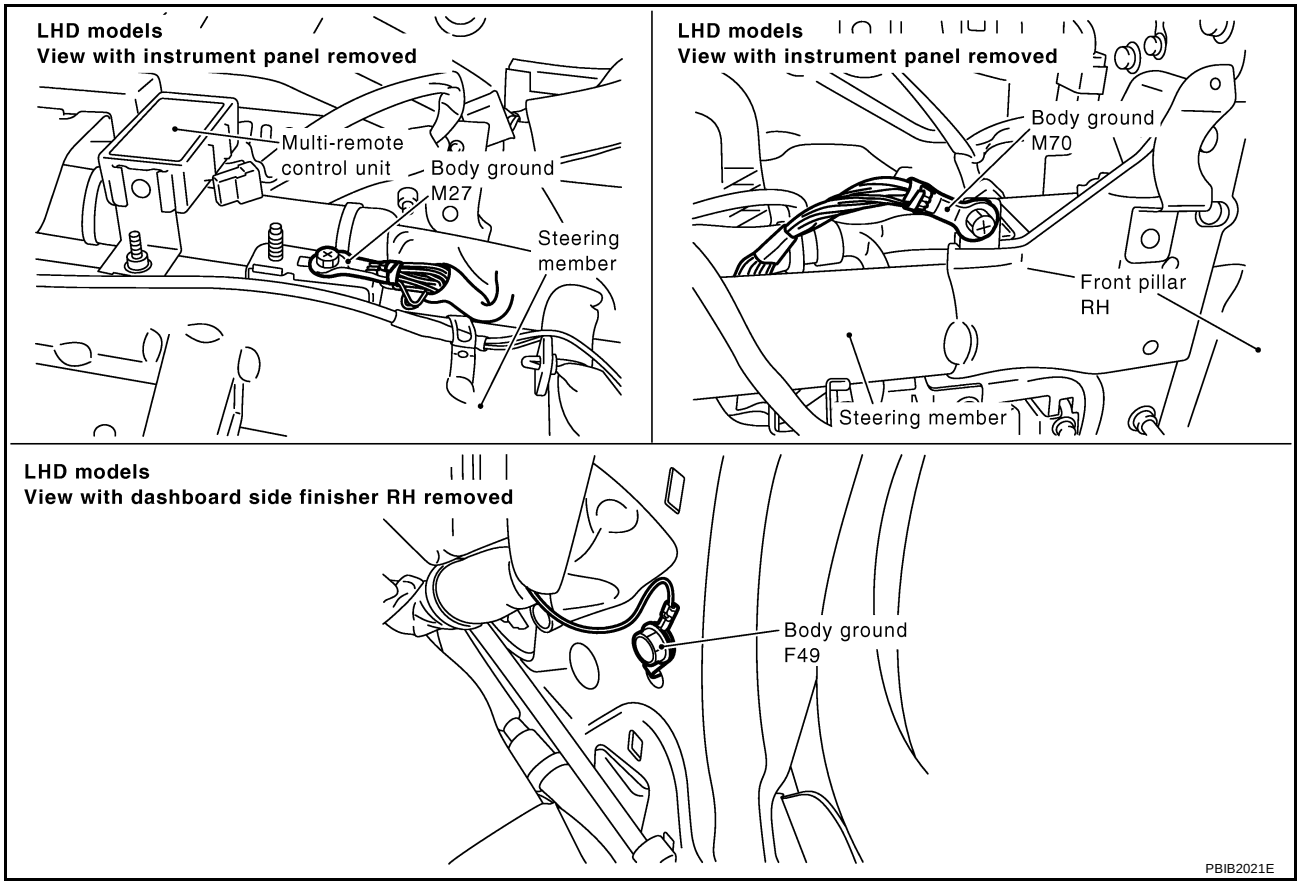
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001DZ

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

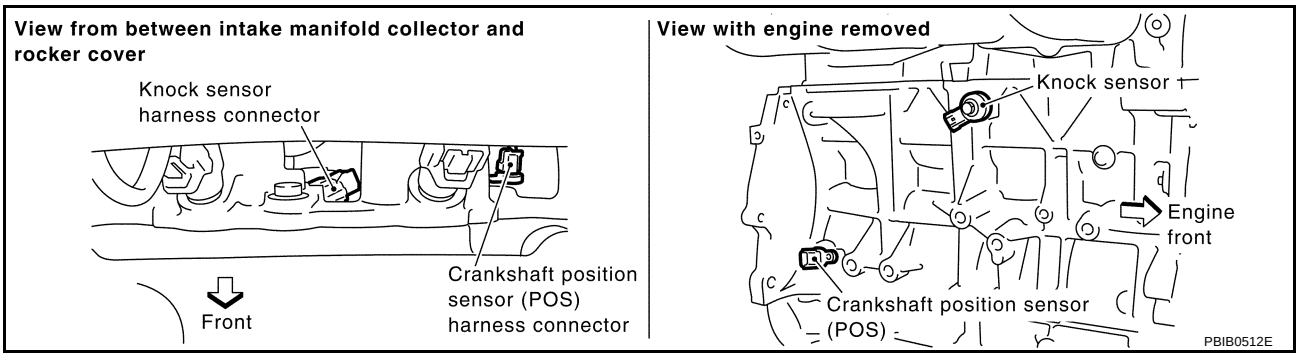


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

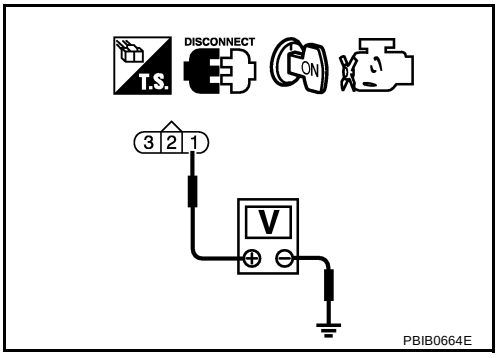
2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.



2. Turn ignition switch ON.
3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F41, M61
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CKP sensor (POS) terminal 3 and ECM terminal 30. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CKP sensor (POS) terminal 2 and ECM terminal 14. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-258, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace crankshaft position sensor (POS).

7. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 8.
NG >> Replace the signal plate.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

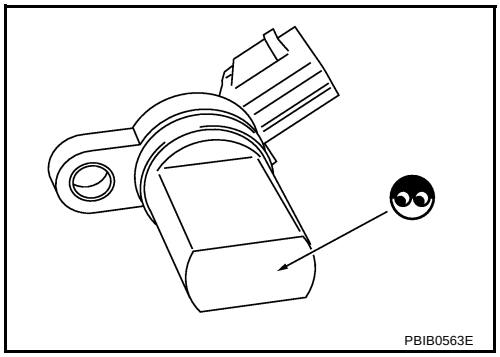
>> **INSPECTION END**

Component Inspection

BBS001E0

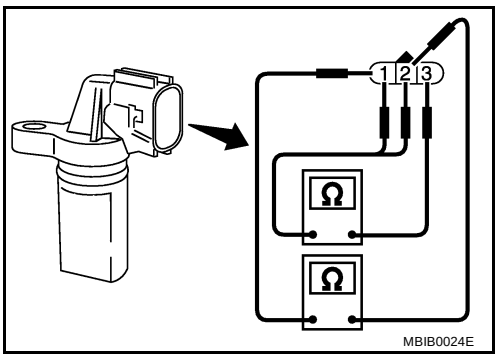
CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	



BBS001E1

6. If NG, replace crankshaft position sensor (POS).

Removal and Installation

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-89, "CYLINDER BLOCK" .

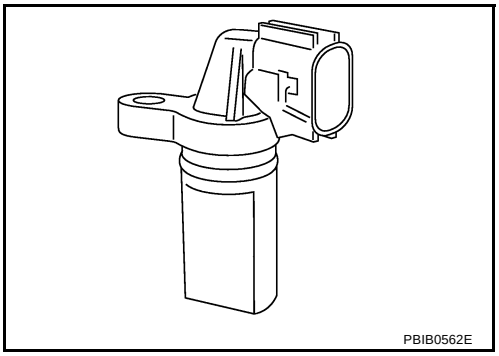
DTC P0340 CMP SENSOR (PHASE)

PFP:23731

Component Description

BBS001E2

The camshaft position sensor (PHASE) senses the retraction of intake valve camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.


PBIB0562E

On Board Diagnosis Logic

BBS001E3

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	Camshaft position sensor (PHASE) circuit	● The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. ● The cylinder No. signal is not set to ECM during engine running. ● The cylinder No. signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Camshaft position sensor (PHASE) ● Camshaft (Intake) ● Starter motor (Refer to SC-23, "STARTING SYSTEM" .) ● Starting system circuit (Refer to SC-23, "STARTING SYSTEM" .) ● Dead (Weak) battery

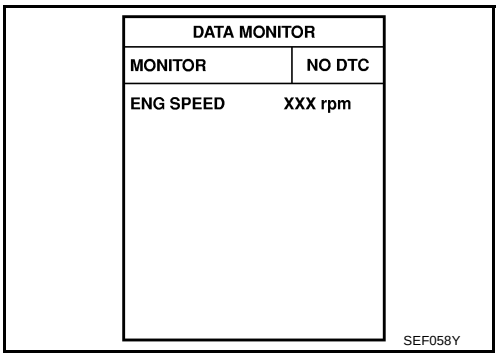
DTC Confirmation Procedure

BBS001E4

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-262, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
5. Maintain engine speed at more than 800 rpm for at least 5 seconds.
6. If 1st trip DTC is detected, go to EC-262, "Diagnostic Procedure" .



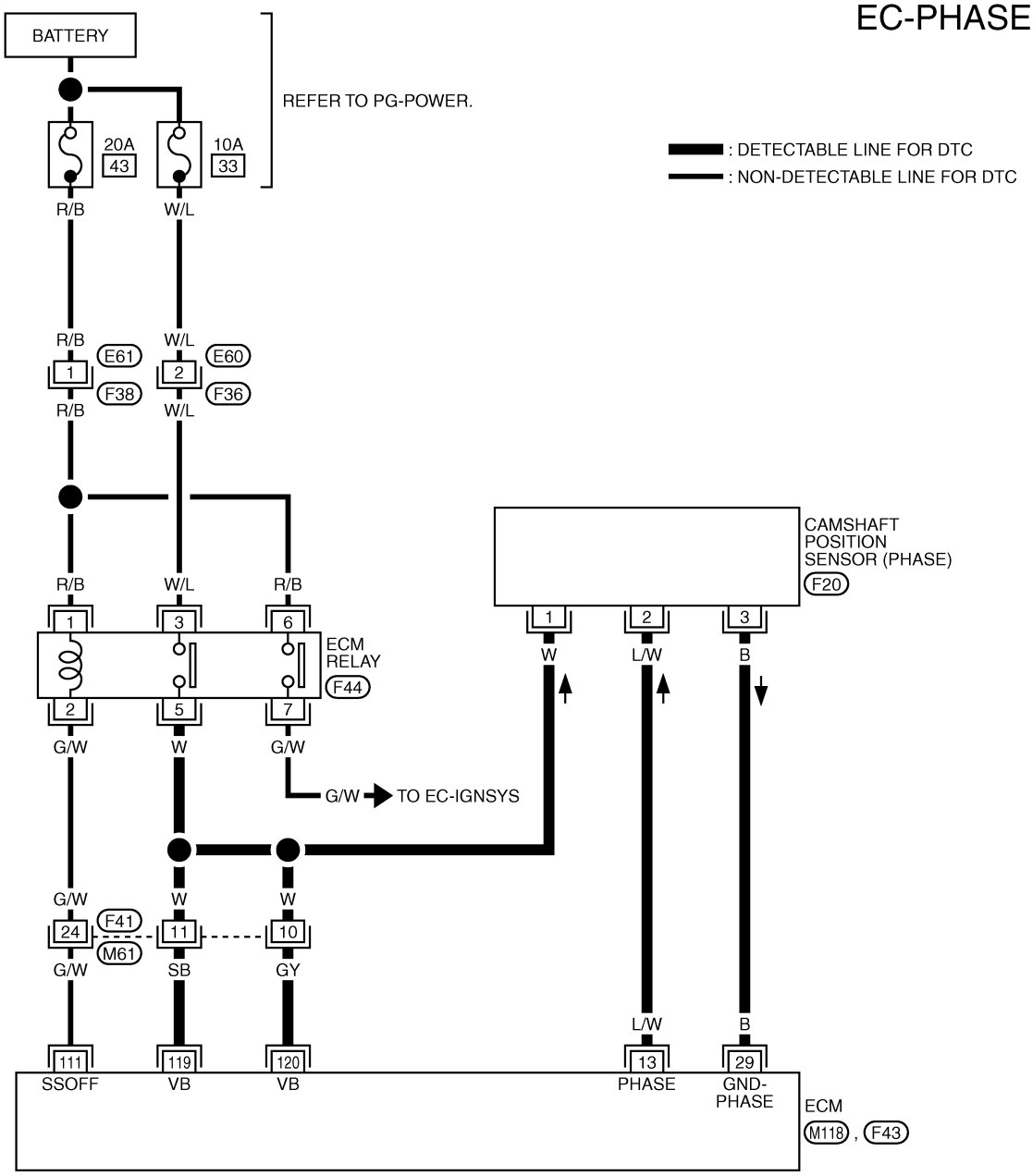
SEF058Y

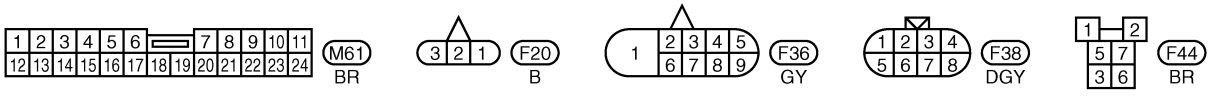
WITH GST

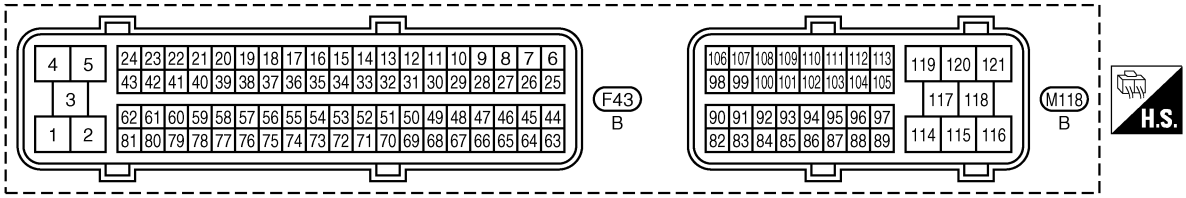
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001E5





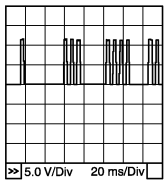
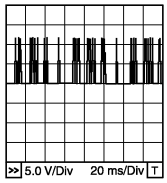


TBWA0608E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	L/W	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm	1.0 - 4.0V★  PBIB0526E
29	B	Sensor ground (Camshaft position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001E6

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

Does the starter motor operate?

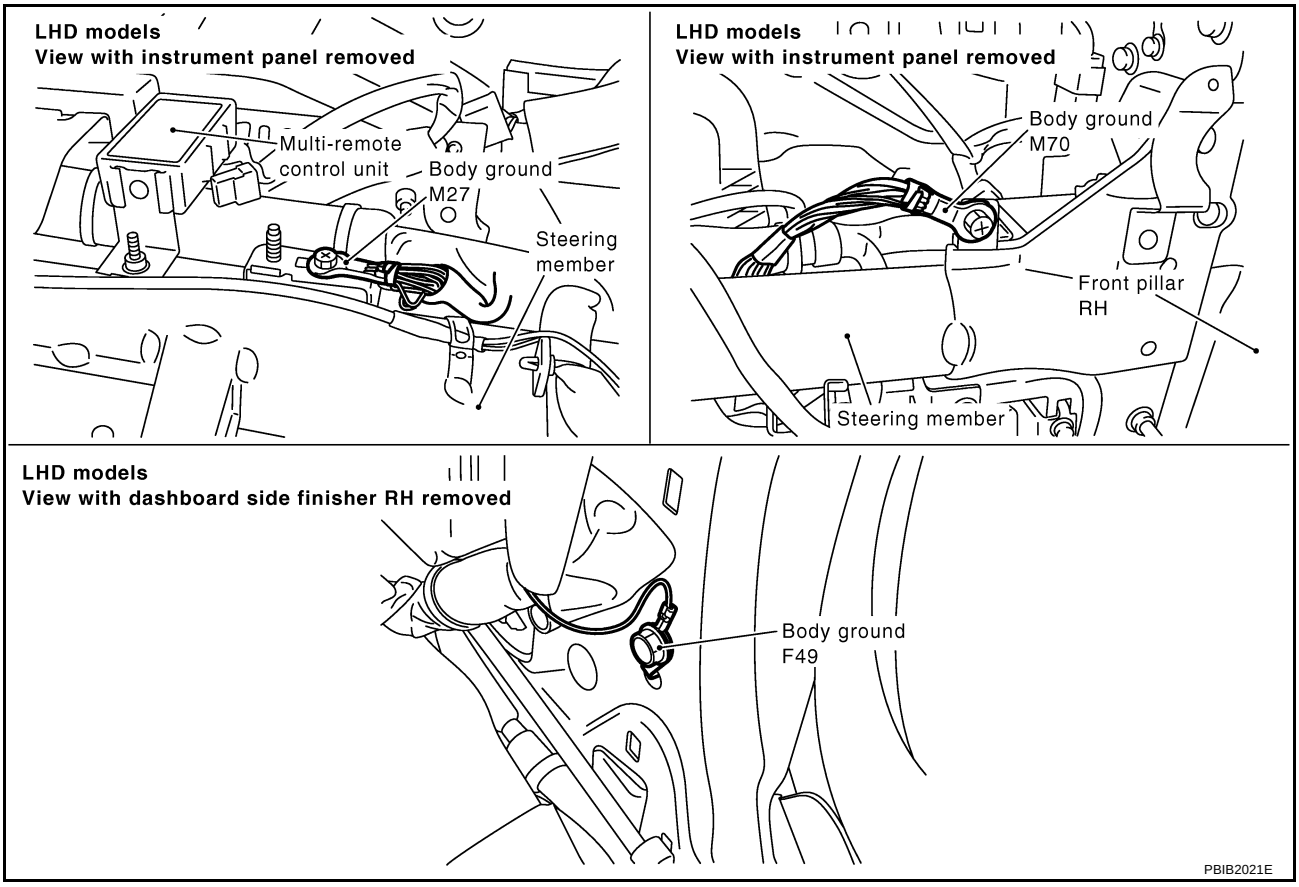
Yes or No

Yes >> GO TO 2.

No >> Check starting system. (Refer to SC-23, "STARTING SYSTEM" .)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

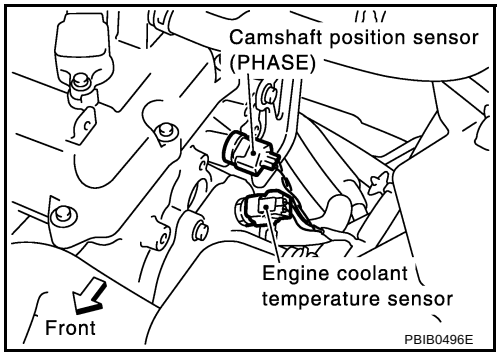


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

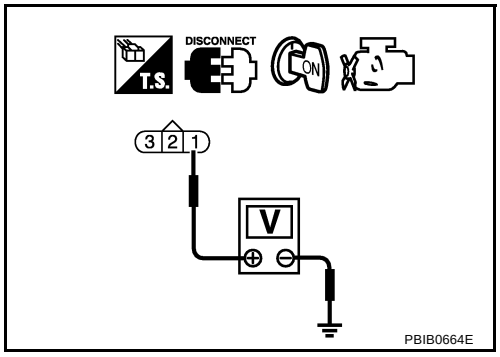
1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.



3. Check voltage between CMP sensor (PHASE) terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F41, M61
- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CMP sensor (PHASE) terminal 3 and ECM terminal 29. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CMP sensor (PHASE) terminal 2 and ECM terminal 13. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-265, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace camshaft position sensor (PHASE).

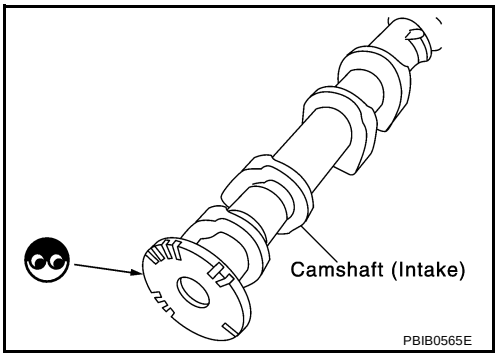
8. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 9.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



9. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

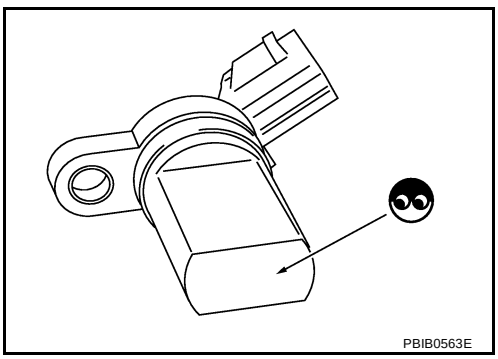
>> **INSPECTION END**

Component Inspection

BBS001E7

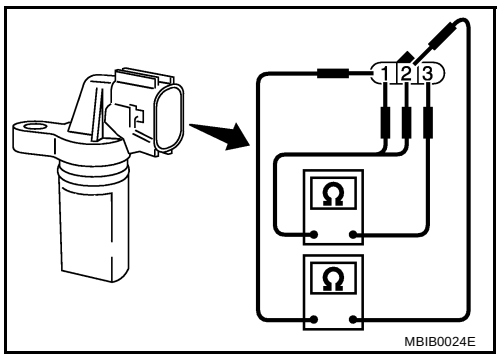
CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	



Removal and Installation

BBS001E8

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-56, "CAMSHAFT" .

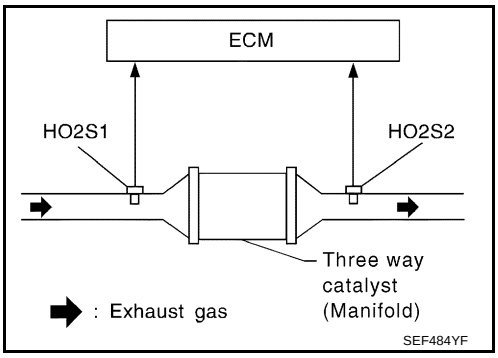
DTC P0420 THREE WAY CATALYST FUNCTION

PFP:20905

On Board Diagnosis Logic

BBS001E9

The ECM monitors the switching frequency ratio of heated oxygen sensors 1 and 2.
A three way catalyst (manifold) with high oxygen storage capacity will indicate a low switching frequency of heated oxygen sensor 2. As oxygen storage capacity decreases, the heated oxygen sensor 2 switching frequency will increase.
When the frequency ratio of heated oxygen sensors 1 and 2 approaches a specified limit value, the three way catalyst (manifold) malfunction is diagnosed.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0420 0420	Catalyst system efficiency below threshold	● Three way catalyst (manifold) does not operate properly. ● Three way catalyst (manifold) does not have enough oxygen storage capacity.	● Three way catalyst (manifold) ● Exhaust tube ● Intake air leaks ● Fuel injector ● Fuel injector leaks ● Spark plug ● Improper ignition timing

DTC Confirmation Procedure

BBS001EA

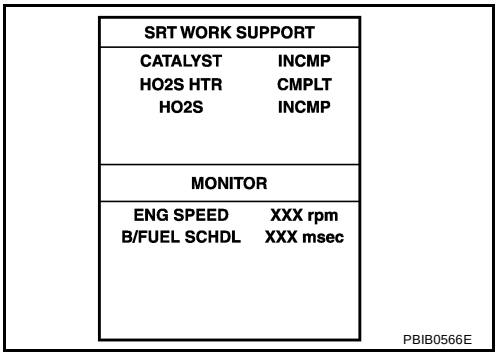
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

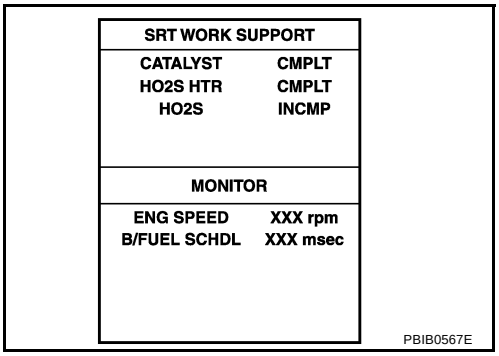
TESTING CONDITION:

- **Open engine hood before conducting the following procedure.**
- **Do not hold engine speed for more than the specified minutes below.**

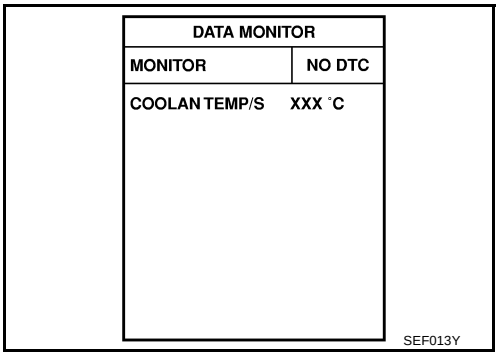
1. Start Engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,00 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “DTC & SRT CONFIRMATION” then “SRT WORK SUPPORT” mode with CONSULT-II.
6. Start engine.
7. Rev engine up to 2,000 to 3,000 rpm and hold it for 3 consecutive minutes then release the accelerator pedal completely.
   If “INCMP” of “CATALYST” changed to “COMPLT”, go to step 10
8. Wait 5 seconds at idle.



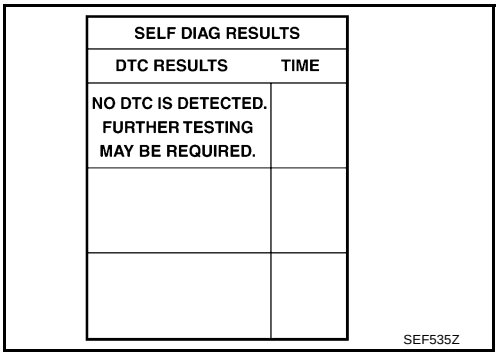
9. Rev engine up to 2,000 to 3,000 rpm and maintain it until “INCMP” of “CATALYST” changes to “CMPLT” (It will take approximately 5 minutes).
If not “CMPLT”, stop engine and cool it down to less than 70°C (158°F) and then retest from step 1.



a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle)
b. Turn ignition switch ON and select “COOLANT TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
c. Start engine and warm it up while monitoring “COOLANT TEMP/S” indication on CONSULT-II.
d. When “COOLANT TEMP/S” indication reaches to 70°(158°F), go to step 3.



10. Select “SELF-DIAG RESULTS” mode with CONSULT-II.
11. Confirm that the 1st trip DTC is not detected.
If the 1st trip DTC is detected, go to EC-269, "Diagnostic Procedure" .



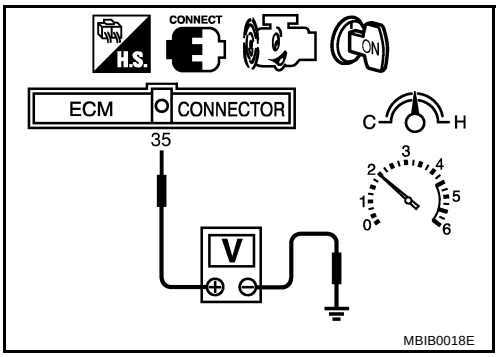
Overall Function Check

BBS001EB

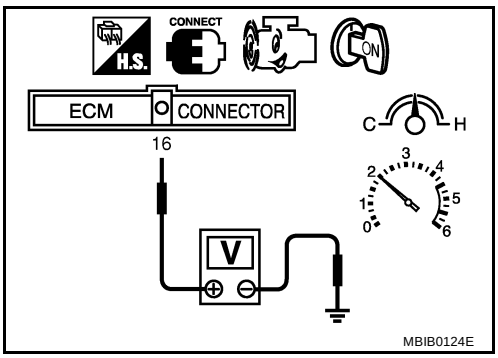
Use this procedure to check the overall function of the three way catalyst (manifold). During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,00 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeters probes between ECM terminal 35 (HO2S1 signal) and ground, and ECM terminal 16 (HO2S2 signal) and ground.
6. Keep engine speed at 2,000 rpm constant under no load.



7. Make sure that the voltage switching frequency (high & low) between ECM terminal 16 and ground is very less than that of ECM terminal 35 and ground.
Switching frequency ratio = A/B
A: Heated oxygen sensor 2 voltage switching frequency
B: Heated oxygen sensor 1 voltage switching frequency
This ratio should be less than 0.75.
If the ratio is greater than above, it means three way catalyst does not operate properly. Go to EC-269, "Diagnostic Procedure" .



NOTE:
If the voltage at terminal 35 does not switch periodically more than 5 times within 10 seconds at step 7, perform trouble diagnosis for DTC P0133 first. (See EC-189, "DTC P0133 HO2S1" .)

Diagnostic Procedure

BBS001EC

1. CHECK EXHAUST SYSTEM

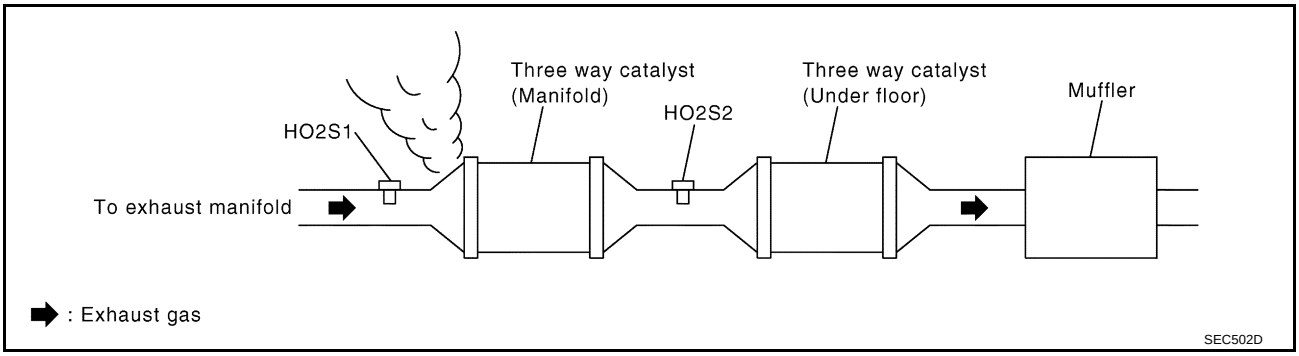
Visually check exhaust tubes and muffler for dent.

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK EXHAUST GAS LEAK

1. Start engine and run it at idle.
2. Listen for an exhaust gas leak before the three way catalyst (manifold).



OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace.

4. CHECK IGNITION TIMING

Check the following items. Refer to EC-82, "Basic Inspection" .

Items	Specifications	
Target idle speed	QR20DE with M/T models	650 ± 50 rpm (in Neutral position)
	Except above	700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]
Ignition timing	15 ± 5° BTDC [in P or N (A/T), Neutral (M/T) position]	

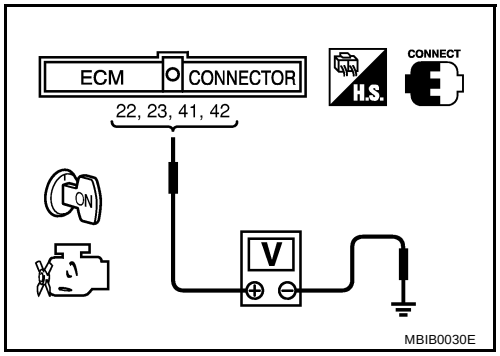
OK or NG

OK >> GO TO 5.
NG >> Follow the EC-82, "Basic Inspection" .

5. CHECK INJECTORS

1. Refer to Wiring Diagram for Injectors, EC-455 .
2. Stop engine and then turn ignition switch ON.
3. Check voltage between ECM terminals 22, 23, 41, 42 and ground with CONSULT-II or tester.

Voltage: Battery voltage

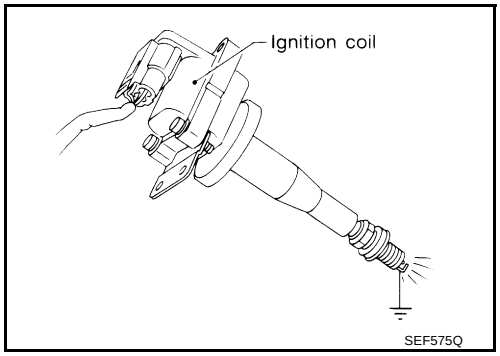


OK or NG

OK >> GO TO 6.
NG >> Perform EC-456, "Diagnostic Procedure" .

6. CHECK IGNITION SPARK

1. Turn ignition switch OFF.
2. Disconnect all injector harness connectors.
3. Disconnect ignition coil assembly from rocker cover.
4. Disconnect spark plug from ignition coil assembly.
5. Connect a known-good spark plug to the ignition coil assembly.
6. Place end of spark plug against a suitable ground and crank engine.
7. Check for spark.



OK or NG

OK >> GO TO 7.
NG >> Check ignition coil with power transistor and their circuit. Refer to EC-443, "IGNITION SIGNAL" .

7. CHECK INJECTOR

1. Turn ignition switch OFF.
2. Remove injector assembly.
   Refer to EM-34, "FUEL INJECTOR AND FUEL TUBE" .
   Keep fuel hose and all injectors connected to injector gallery.
3. Disconnect all ignition coil harness connectors.
4. Reconnect all injector harness connectors disconnected.
5. Turn ignition switch ON.
   Make sure fuel does not drip from injector.

OK or NG

OK (Does not drip.)>>GO TO 8.
NG (Drips.)>>Replace the injector(s) from which fuel is dripping.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Trouble is fixed.>>**INSPECTION END**
Trouble is not fixed.>>Replace three way catalyst (manifold).

DTC P0444 EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

BBS001ED

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Closed throttle position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Wheel sensor	Vehicle speed*2		

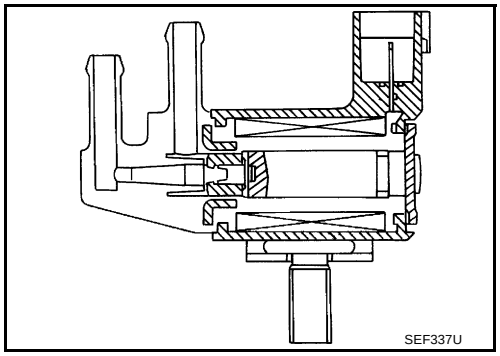
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT-II Reference Value in Data Monitor Mode

BBS001EE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	0%
		2,000 rpm	20 - 30%

On Board Diagnosis Logic

BBS001EF

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0444 0444	EVAP canister purge volume control solenoid valve circuit open	An excessively low voltage signal is sent to ECM through the valve	● Harness or connectors (The solenoid valve circuit is open or shorted.) ● EVAP canister purge volume control solenoid valve

DTC Confirmation Procedure

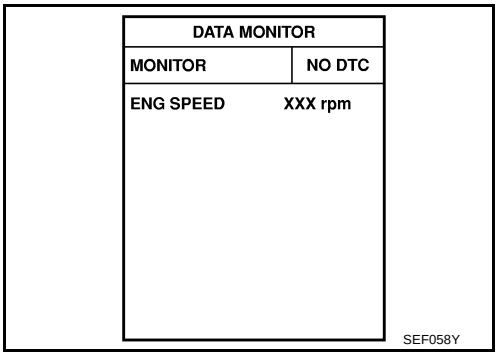
BBS001EG

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm battery voltage is more than 11V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 13 seconds.
4. If 1st trip DTC is detected, go to EC-276, "Diagnostic Procedure"
.

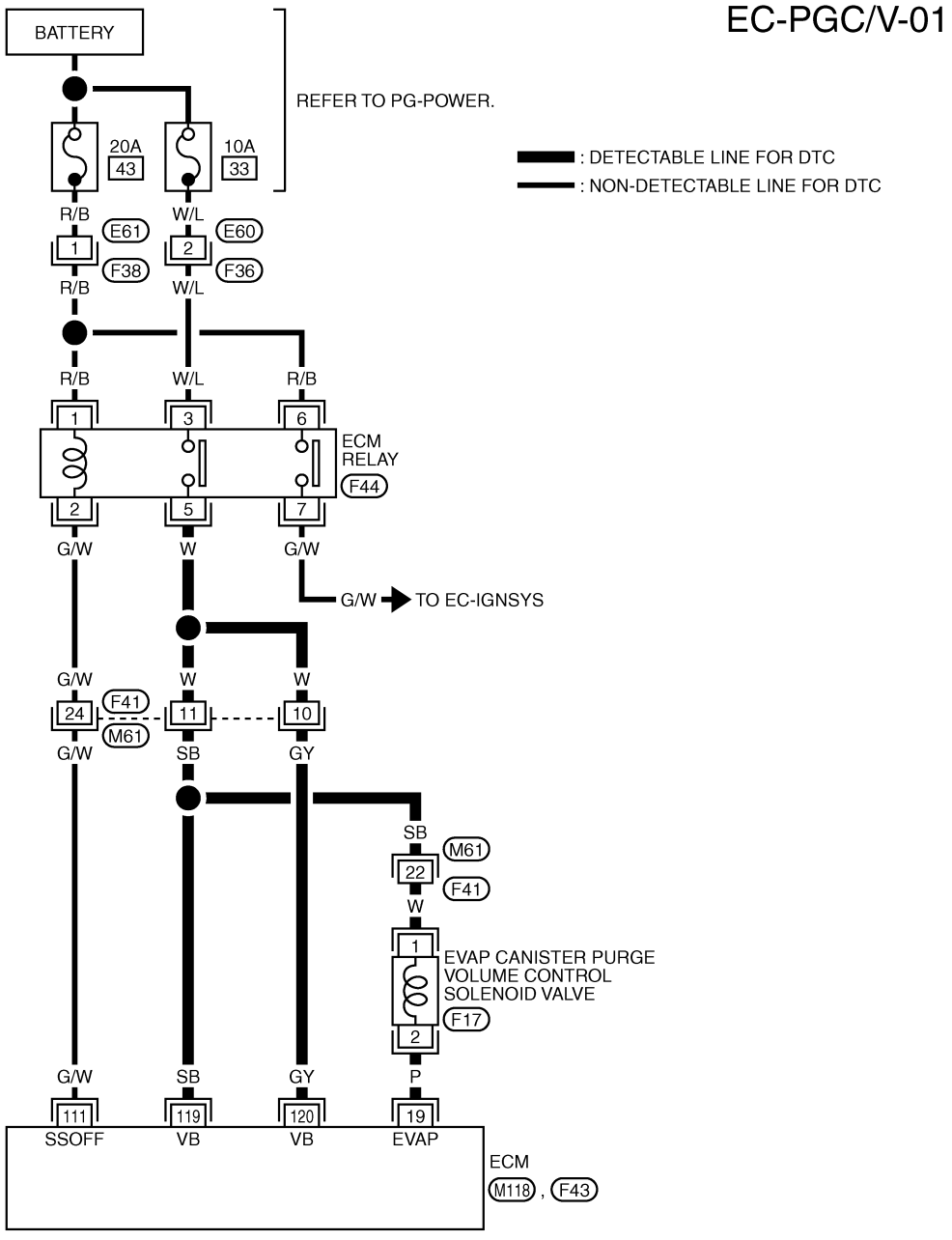


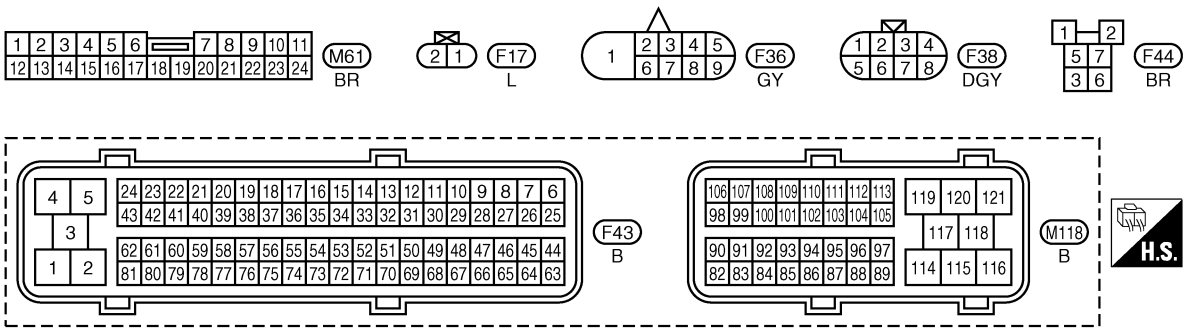
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001EH

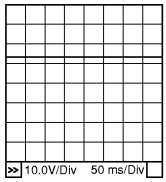
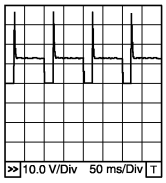




TBWA0609E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
19	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E

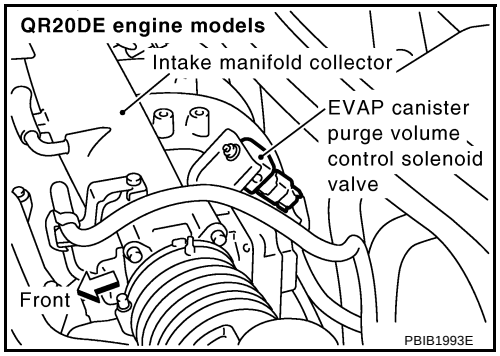
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

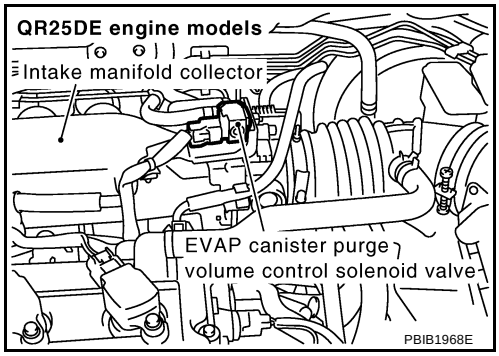
Diagnostic Procedure

BBS001EI

1. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

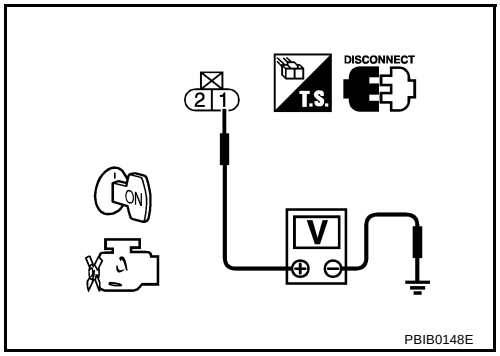
1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.





4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M61, F41
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay.
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair harness or connectors.

3. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP canister purge volume control solenoid valve terminal 2 and ECM terminal 19. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

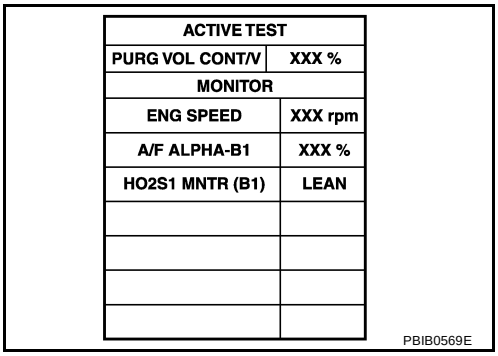
OK or NG

OK (With CONSULT-II)>>GO TO 4.
OK (Without CONSULT-II)>>GO TO 5.
NG >> Repair open circuit or short to ground and short to power in harness or connectors.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-278, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace EVAP canister purge volume control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

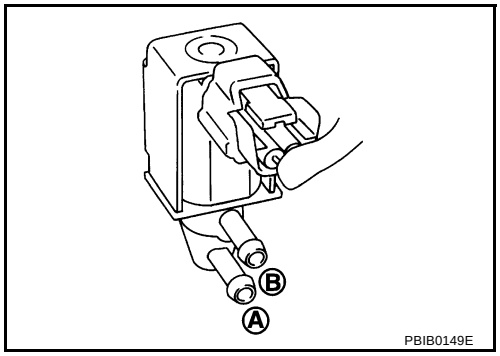
BBS001EJ

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

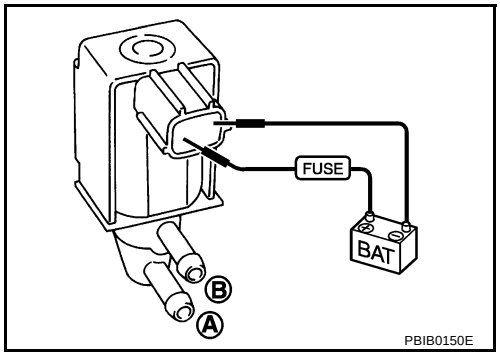
Condition (PURG VOL CONT/V value)	Air passage continuity between A and B
100%	Yes
0%	No



Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

BBS001EK

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P0500 VSS

PFP:32702

Description

BBS001EL

NOTE:
If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-136, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
The vehicle speed signal is sent to the combination meter from the “ESP/TCS/ABS control unit” (with ESP models) or “ABS actuator and electric unit (control unit)” (without ESP models) through CAN communication line. The combination meter then sends a signal to the ECM through CAN communication line.

On Board Diagnosis Logic

BBS001EM

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connectors (The CAN communication line is open or shorted.) ● ESP/TCS/ABS control unit (with ESP models) ● ABS actuator and electric unit (control unit) (without ESP models) ● Wheel sensor ● Combination meter

DTC Confirmation Procedure

BBS001EN

CAUTION:
Always drive vehicle at a safe speed.

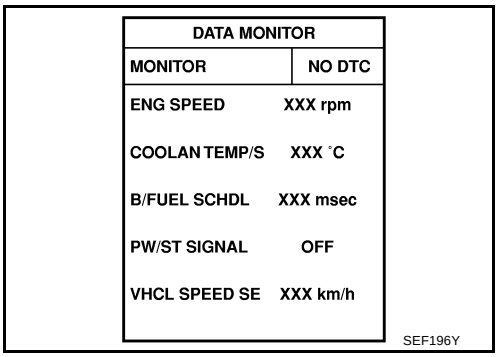
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to EC-280, "Diagnostic Procedure" .
   If OK, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED		M/T: 2,000 - 6,000 rpm A/T: 1,750 - 6,000 rpm
COOLAN TEMP/S		More than 70°C (158°F)
B/FUEL SCHDL	QR20DE	4.9 - 31.8 msec
	QR25DE	M/T: 5.0 - 31.8 msec A/T: 6.0 - 31.8 msec
Shift lever		Suitable position
PW/ST SIGNAL		OFF



6. If 1st trip DTC is detected, go to EC-280, "Diagnostic Procedure" .

Overall Function Check

BBS001EO

Use this procedure to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed signal in Service $01 with GST.
   The vehicle speed signal on GST should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-280, "Diagnostic Procedure" .

Diagnostic Procedure

BBS001EP

1. CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)” (WITHOUT ESP MODELS) OR “ESP/TCS/ABS CONTROL UNIT” (WITH ESP MODELS)

Refer to BRC-9, "TROUBLE DIAGNOSIS" (Without ESP models) or BRC-52, "TROUBLE DIAGNOSIS" (With ESP models).

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

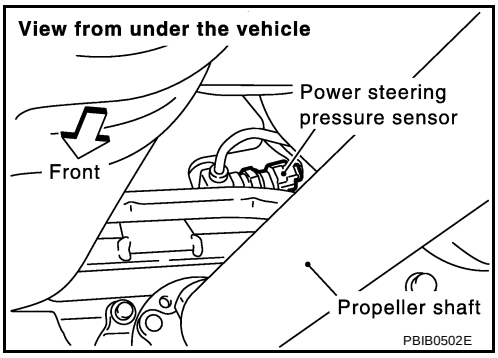
DTC P0550 PSP SENSOR

PFP:49763

Component Description

BBS001EQ

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

BBS001ER

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is not being turned.	OFF
		Steering wheel is being turned.	ON

On Board Diagnosis Logic

BBS001ES

The MI will not light up for this self-diagnosis.

NOTE:

If DTC P0550 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-375, "DTC P1229 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Power steering pressure sensor

DTC Confirmation Procedure

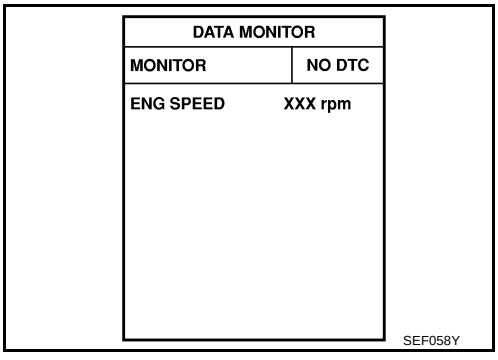
BBS001ET

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-283, "Diagnostic Procedure" .



WITH GST

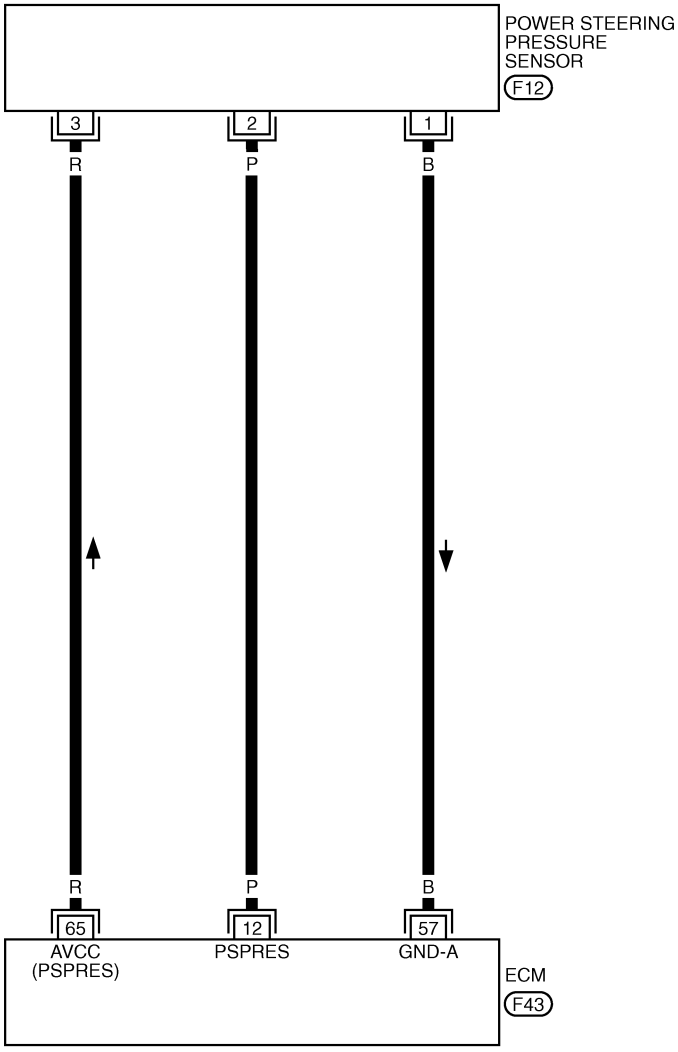
Follow the procedure “WITH CONSULT-II” above.

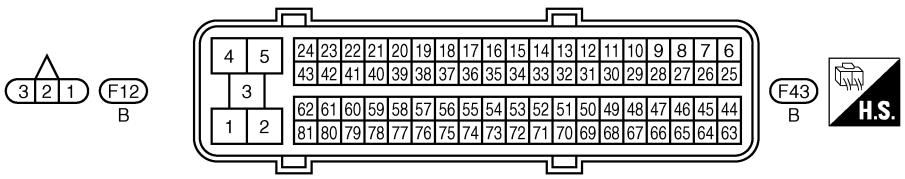
Wiring Diagram

BBS001EU

EC-PS/SEN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWA0610E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

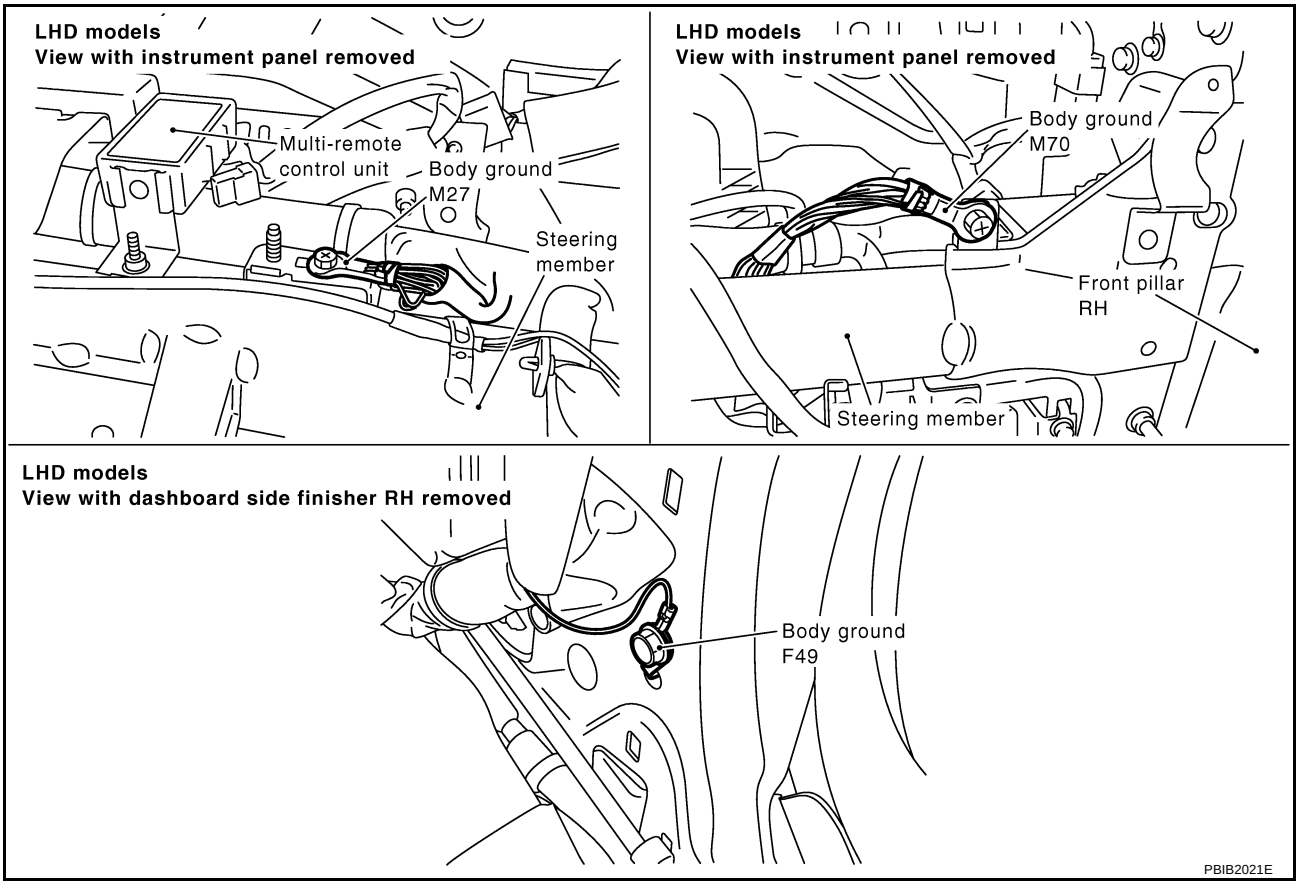
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned	0.4 - 0.8V
57	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
65	R	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

BBS001EV

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

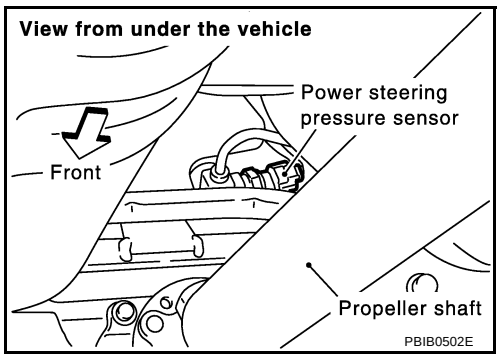


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

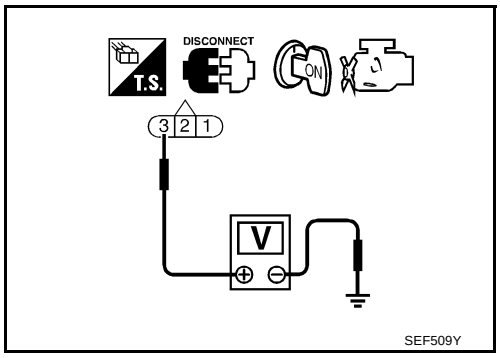
2. CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect PSP sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between PSP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PSP sensor terminal 1 and ECM terminal 57. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between PSP sensor terminal 2 and ECM terminal 12.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PSP SENSOR

Refer to EC-285, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace PSP sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

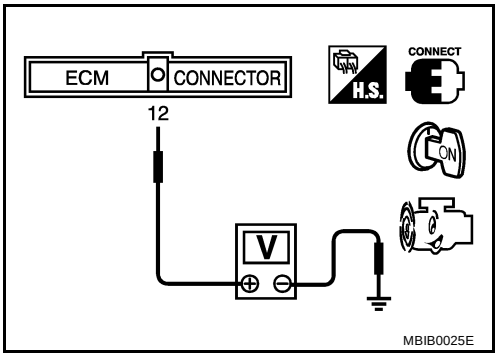
Component Inspection

BBS001EW

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel is being turned.	0.5 - 4.0V
Steering wheel is not being turned.	0.4 - 0.8V



Removal and Installation

BBS001EX

POWER STEERING PRESSURE SENSOR

Refer to PS-37, "HYDRAULIC LINE" .

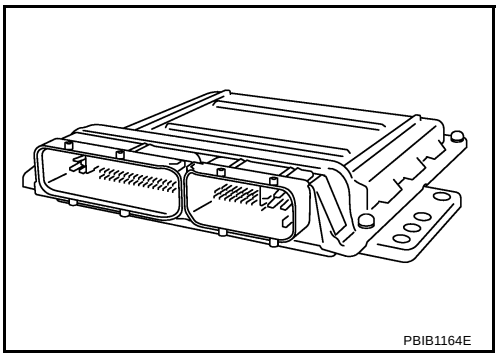
DTC P0605 ECM

PFP:23710

Component Description

BBS001EY

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


PBIB1164E

On Board Diagnosis Logic

BBS001EZ

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	Engine control module	A)	ECM calculation function is malfunctioning.	● ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

FAIL-SAFE MODE

ECM enters fail-safe mode when malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	● ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ● ECM deactivates ASCD operation.

DTC Confirmation Procedure

BBS001F0

Perform PROCEDURE FOR MALFUNCTION A first. If the 1st trip DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no problem on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.

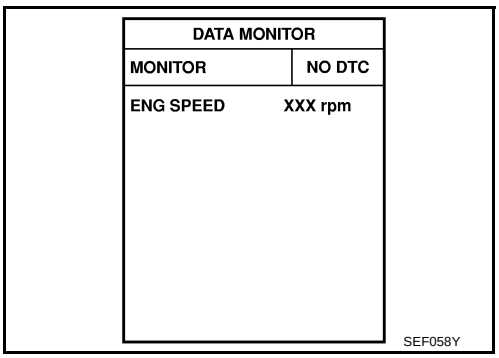
NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-287, "Diagnostic Procedure" .



SEF058Y

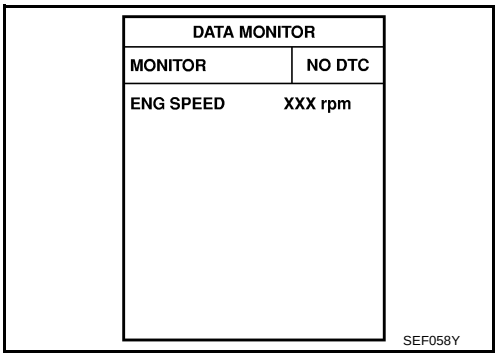
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. If 1st trip DTC is detected, go to EC-287, "Diagnostic Procedure" .



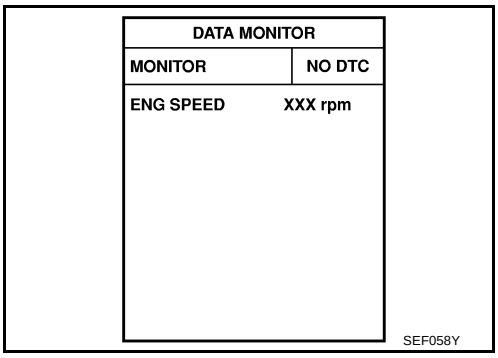
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to EC-287, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

BBS001F1

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-286, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. **Perform DTC Confirmation Procedure.**
   See EC-286, "DTC Confirmation Procedure" .
4. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-107, "NATS (NISSAN ANTI-THEFT SYSTEM)" .
3. Perform EC-49, "Accelerator Pedal Released Position Learning" .
4. Perform EC-50, "Throttle Valve Closed Position Learning" .
5. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

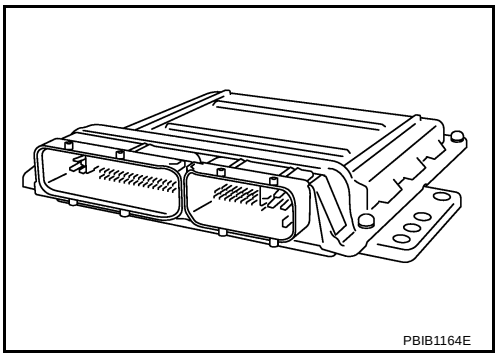
DTC P1065 ECM POWER SUPPLY

PFP:23710

Component Description

BBS001F2

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air-fuel ratio feedback compensation value memory, the Idle Air Volume Learning value memory, etc.


PBIB1164E

On Board Diagnosis Logic

BBS001F3

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back-up RAM system does not function properly.	● Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] ● ECM

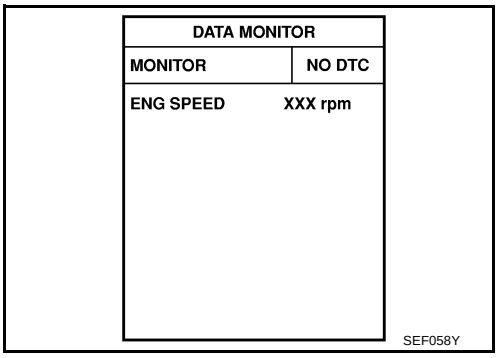
DTC Confirmation Procedure

BBS001F4

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Repeat steps 3 and 4 for 4 times.
6. If 1st trip DTC is detected, go to EC-291, "Diagnostic Procedure".



SEF058Y

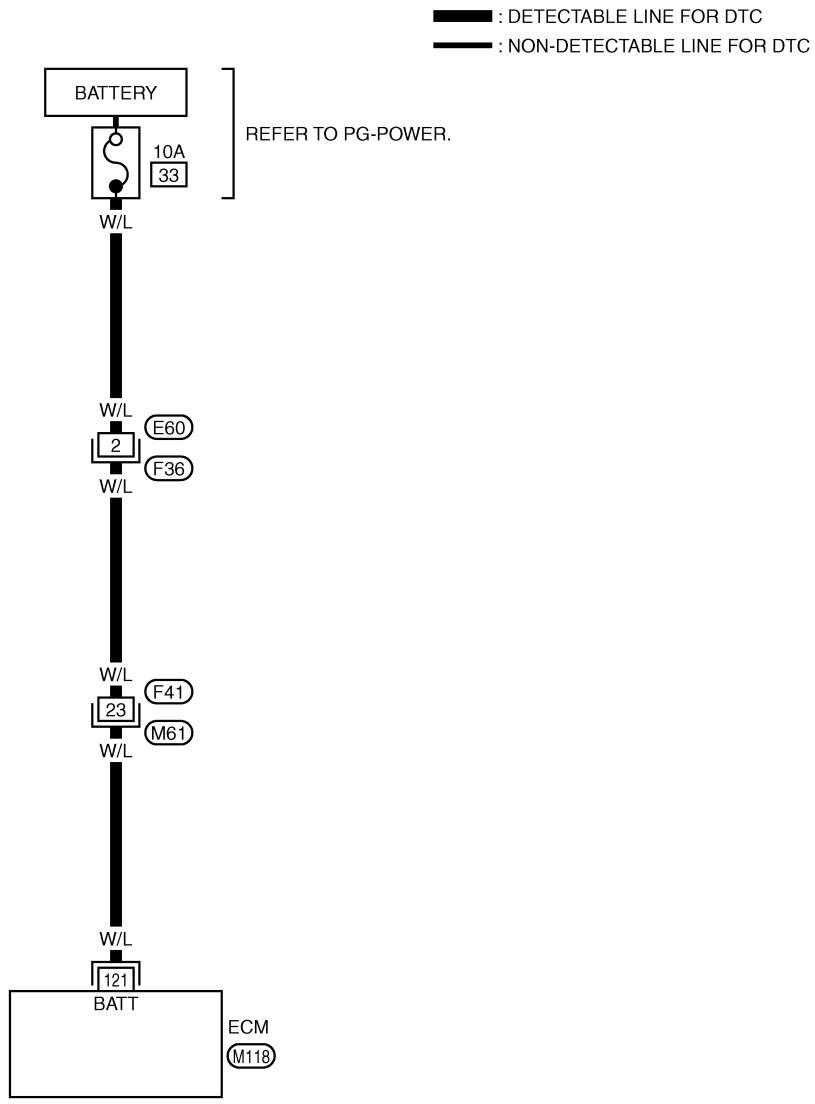
WITH GST

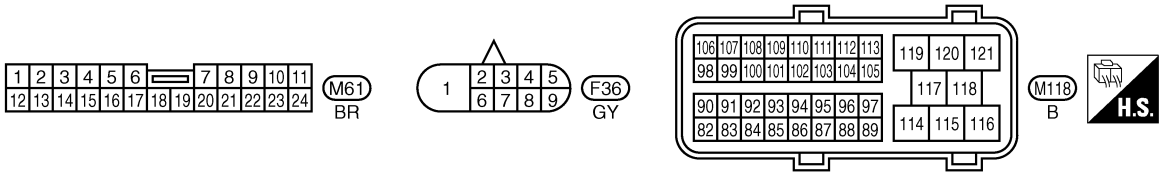
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001F5

EC-ECM/PW-01





TBWA0611E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

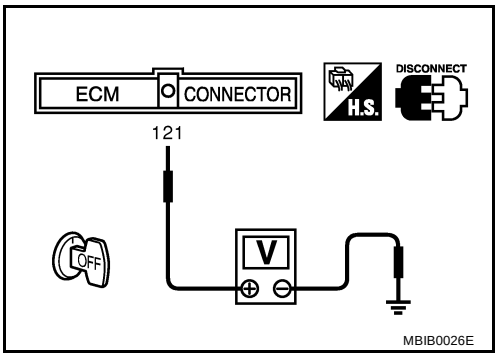
Diagnostic Procedure

BBS001F6

1. CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E60, M36
- Harness connectors F41, M61
- 10A fuse
- Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 4.
NG >> Repair or replace harness or connectors.

4. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-289, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P1065 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. **Perform DTC Confirmation Procedure.**
   See EC-289, "DTC Confirmation Procedure" .
4. Is the 1st trip DTC P1065 displayed again?

Yes or No

Yes >> GO TO 5.
No >> **INSPECTION END**

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-107, "NATS (NISSAN ANTI-THEFT SYSTEM)" .
3. Perform EC-49, "Accelerator Pedal Released Position Learning" .
4. Perform EC-50, "Throttle Valve Closed Position Learning" .
5. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

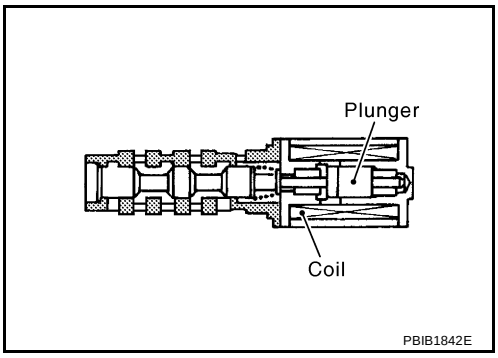
DTC P1111 IVT CONTROL SOLENOID VALVE

PFP:23796

Component Description

BBS001F7

Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.
The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.
The longer pulse width advances valve angle.
The shorter pulse width retards valve angle.
When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



CONSULT-II Reference Value in Data Monitor Mode

BBS001F8

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V SOL (B1)	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 50%

On Board Diagnosis Logic

BBS001F9

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1111 1111	Intake valve timing control solenoid valve circuit	An improper voltage is sent to the ECM through intake valve timing control solenoid valve.	● Harness or connectors (Solenoid valve circuit is open or shorted.) ● Intake valve timing control solenoid valve

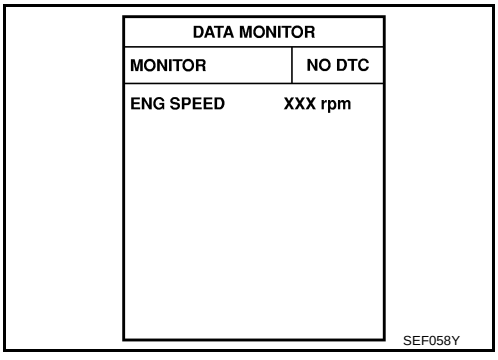
DTC Confirmation Procedure

BBS001FA

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If 1st trip DTC is detected, go to EC-295, "Diagnostic Procedure" .



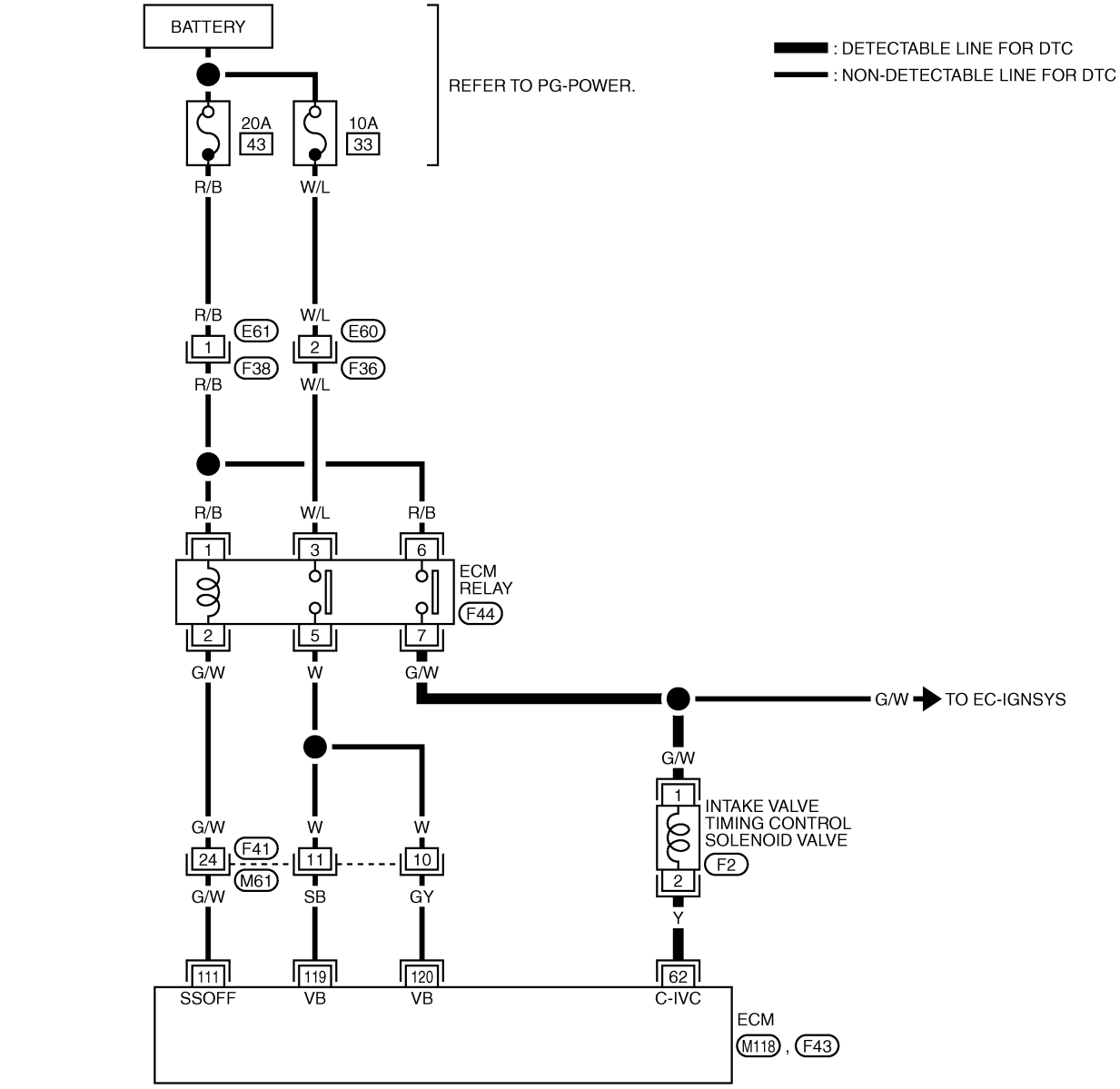
WITH GST

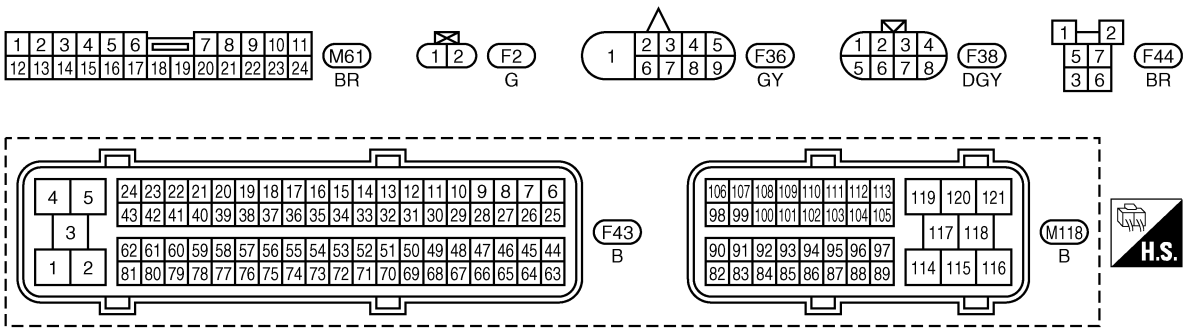
Following the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001FB

EC-IVC-01

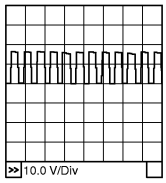




TBWA0612E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	Y	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	Approximately 4V - BATTERY VOLTAGE (11 - 14V)★  PBIB1790E

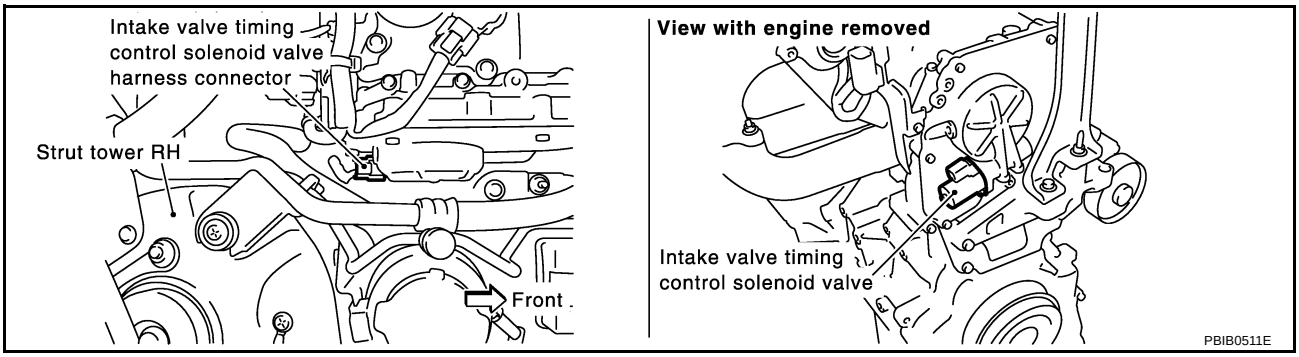
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001FC

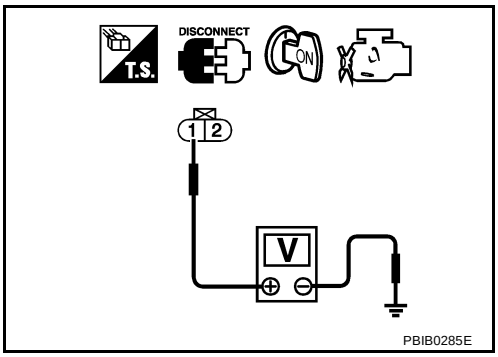
1. CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.



3. Turn ignition switch ON.
4. Check voltage between intake valve timing control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTION PART

Check harness for open or short between intake valve timing control solenoid valve and ECM relay.

>> Repair or replace harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between intake valve timing control solenoid valve terminal 2 and ECM terminal 62. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-296, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace intake valve timing control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

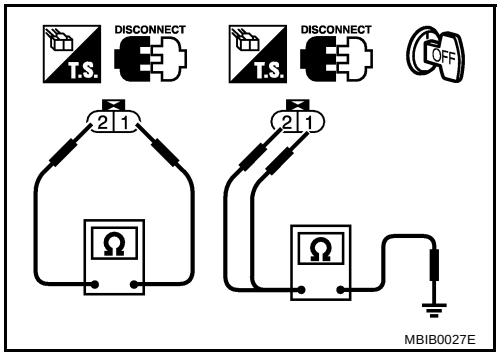
Component Inspection

BBS001FD

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve terminals 1 and 2 under the following conditions.

Terminals	Resistance
1 and 2	Approximately 8Ω [at 20°C (68°F)]
1 or 2 and ground	∞Ω (Continuity should not exist)



Removal and Installation

BBS001FE

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-46, "TIMING CHAIN" .

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PFP:16119

Component Description

BBS001FF

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

BBS001FG

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	● Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	The ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

BBS001FH

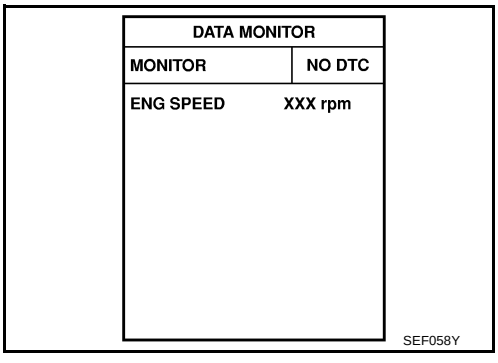
NOTE:

- **Perform PROCEDURE FOR MALFUNCTION A AND B first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

With CONSULT-II

1. Turn ignition witch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to D position (A/T), 1st position (M/T) and wait at least 3 seconds.
4. Shift selector lever to P position (A/T), Neutral position (M/T).
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Turn ignition switch ON and wait at least 1 second.
7. Shift selector lever to D position (A/T), 1st position (M/T) and wait at least 3 seconds.
8. Shift selector lever to P position (A/T), Neutral position (M/T).
9. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
10. If DTC is detected, go to EC-298, "Diagnostic Procedure" .



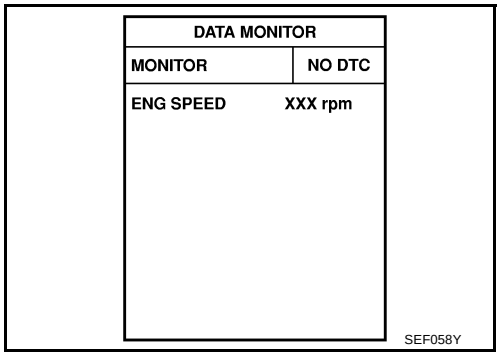
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to D position (A/T), 1st position (M/T) and wait at least 3 seconds.
4. Shift selector lever to P position (A/T), Neutral position (M/T).
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to EC-298, "Diagnostic Procedure" .



With GST

Follow the procedure “With CONSULT-II” above.

Diagnostic Procedure

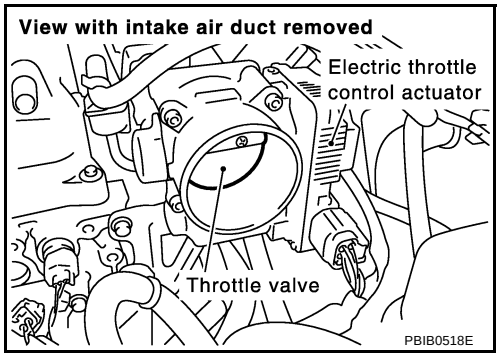
BBS001FI

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

Removal and Installation

BBS001FJ

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

PFP:16119

Description

BBS001FK

NOTE:
If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-297, "DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR" or EC-309, "DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY" .

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

BBS001FL

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122 1122	Electric throttle control performance problem	Electric throttle control function does not operate properly.	● Harness or connectors (Throttle control motor circuit is open or shorted.) ● Harness or connectors (Throttle control motor relay circuit is open or shorted.) ● Electric throttle control actuator ● Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

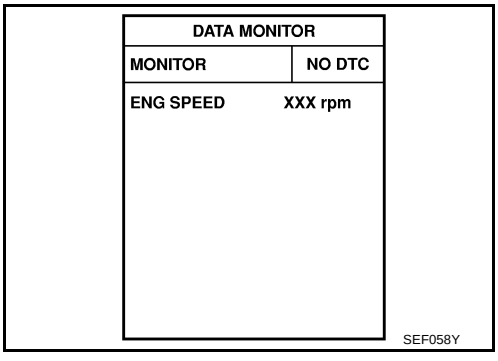
DTC Confirmation Procedure

BBS001FM

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-304, "Diagnostic Procedure" .



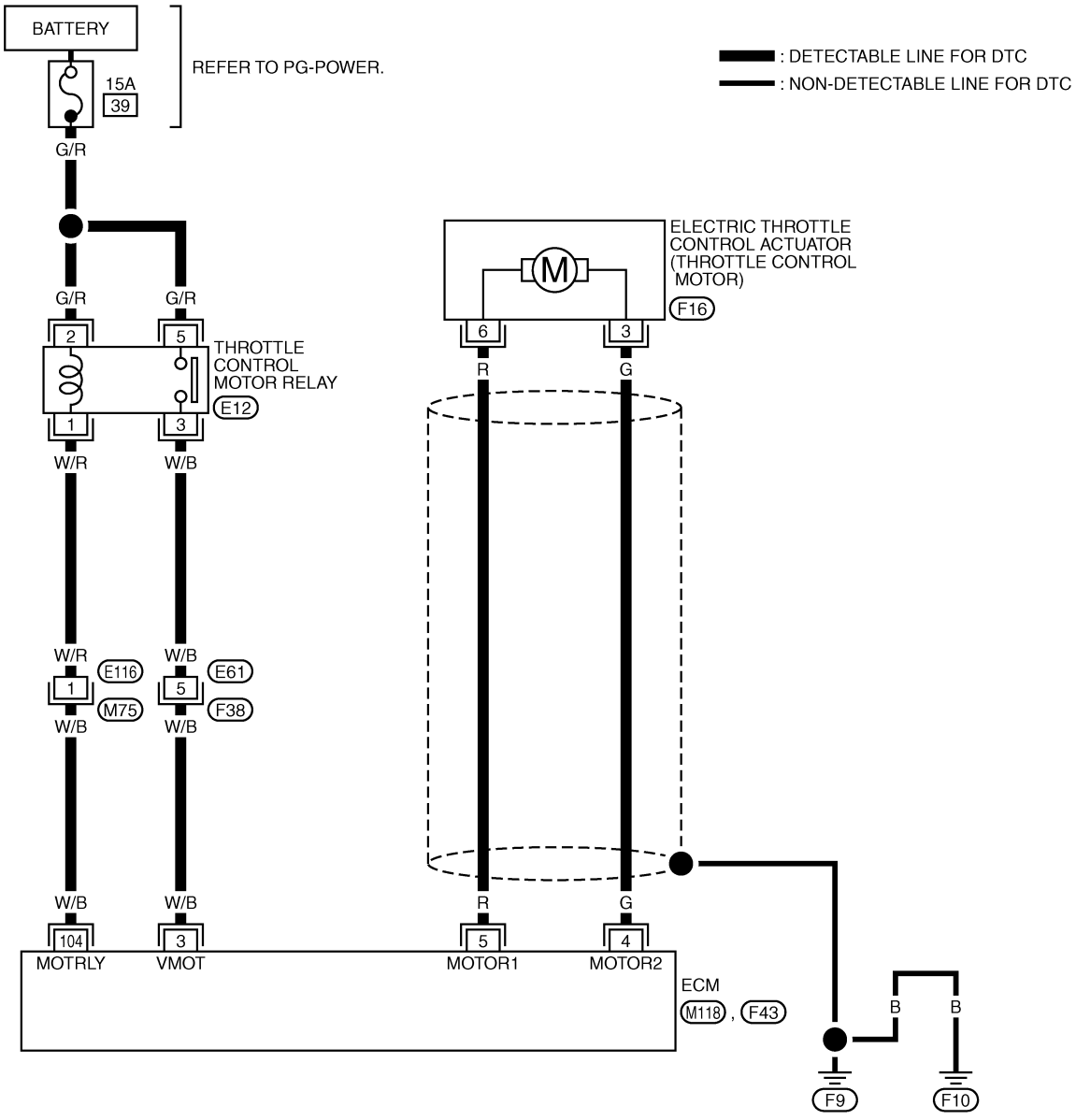
WITH GST

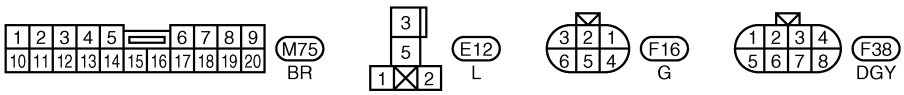
Follow the procedure “WITH CONSULT-II” above.

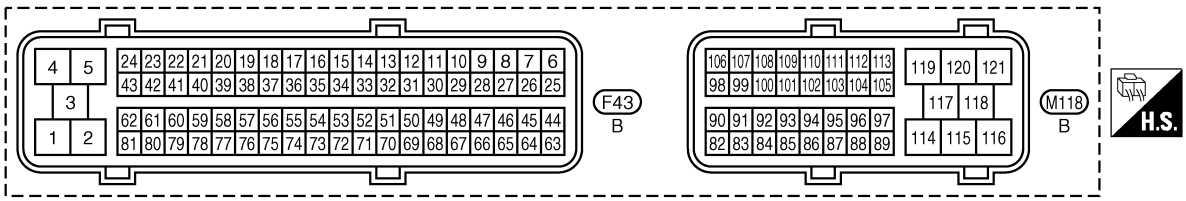
Wiring Diagram
LHD MODELS

BBS001FN

EC-ETC1-01





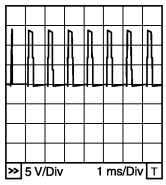
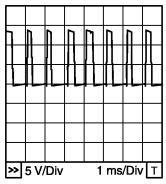


TBWA0613E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

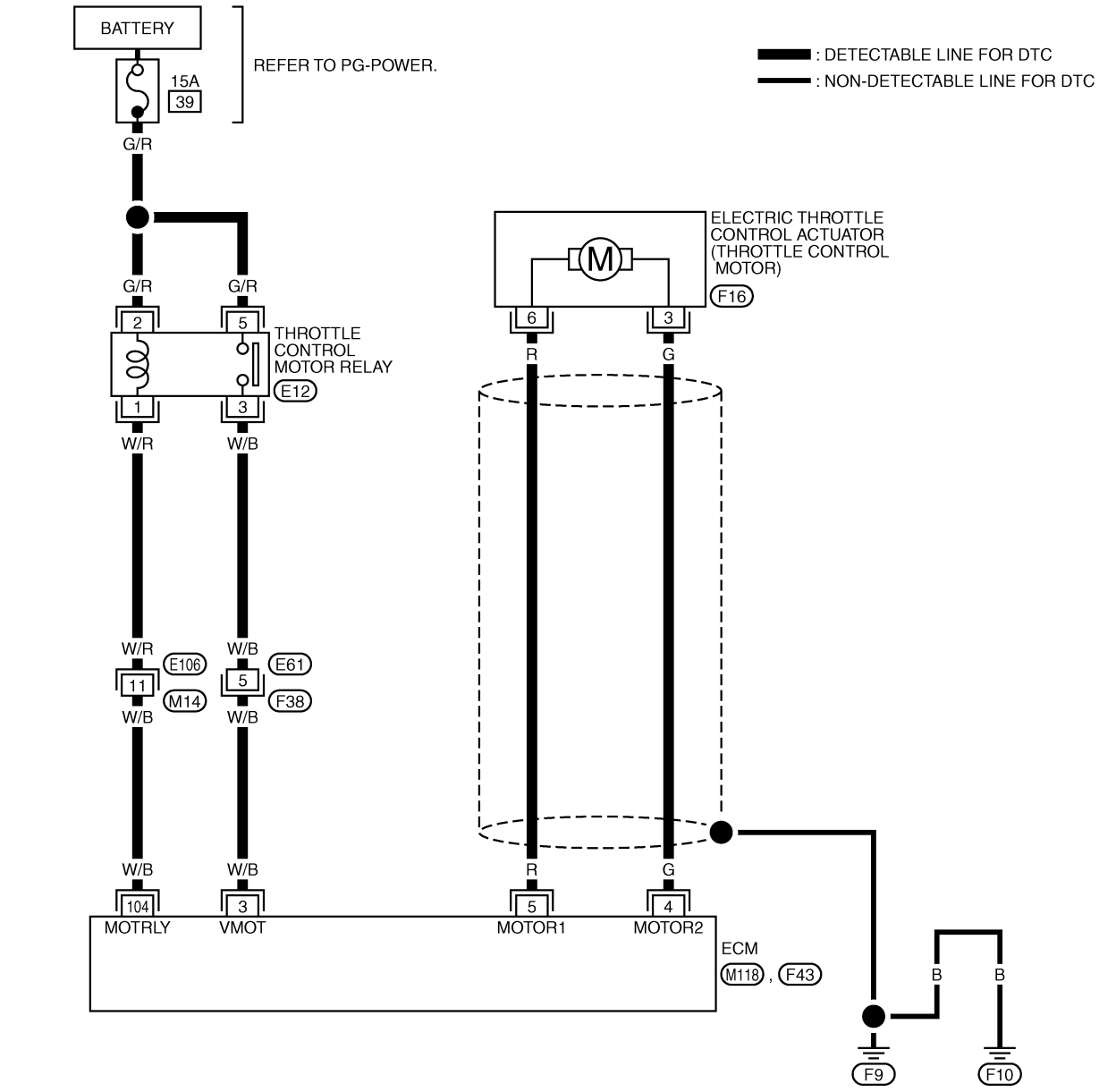
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

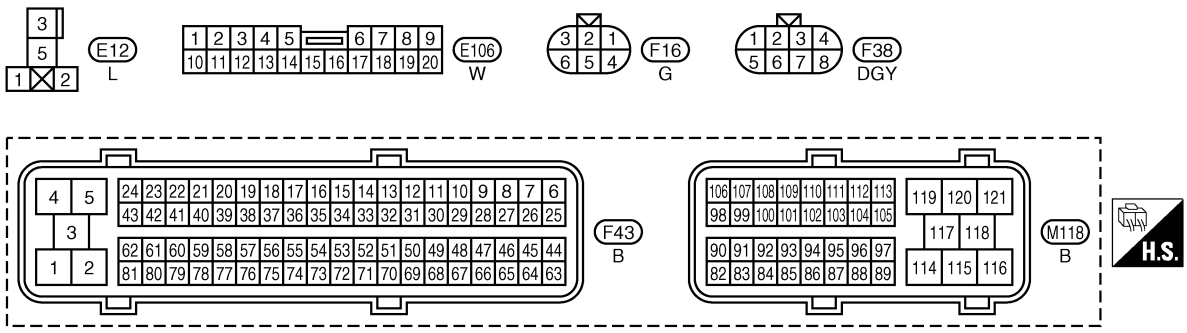
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	W/B	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	G	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	R	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	W/B	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

RHD MODELS

EC-ETC1-02

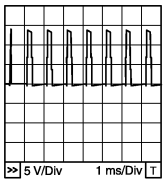
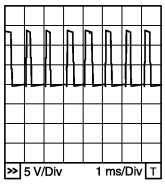




TBWA0614E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	W/B	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	G	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	R	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	W/B	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

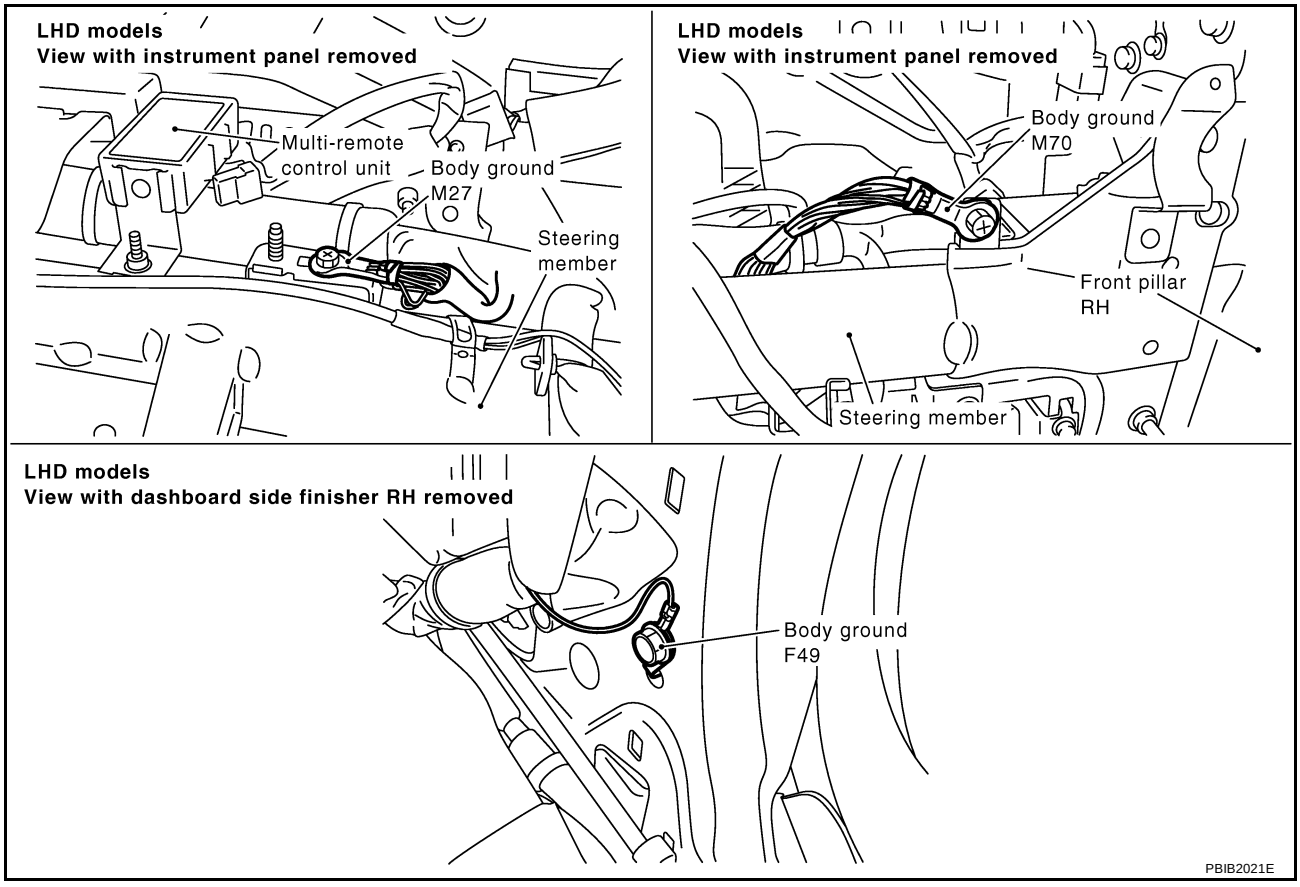
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001FO

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .



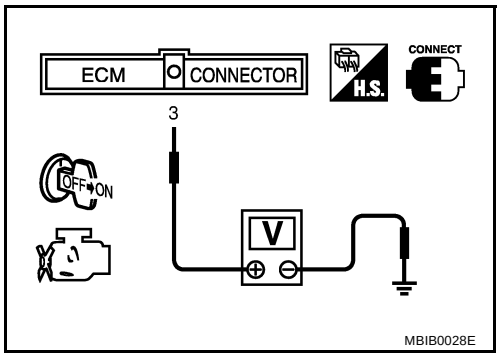
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE CONTROL MOTOR RELAY SIGNAL CIRCUIT

Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

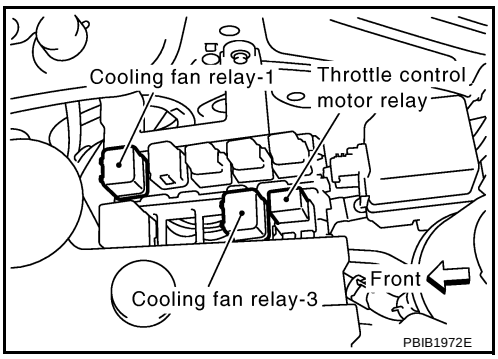


OK or NG

OK >> GO TO 10.
NG >> GO TO 3.

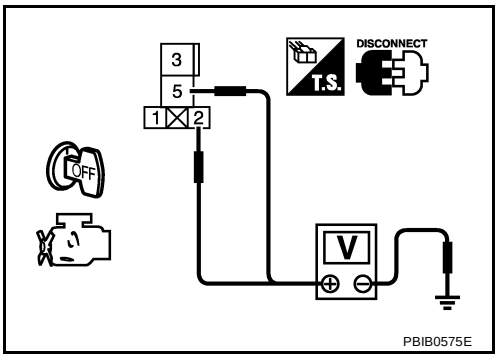
3. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle control motor relay.



3. Check voltage between throttle control motor relay terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Harness for open or short between throttle control motor relay and battery

>> Repair or replace harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between throttle control motor relay terminal 3 and ECM terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- Harness for open or short between throttle control motor relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT

1. Check continuity between throttle control motor relay terminal 1 and ECM terminal 104. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E116, M75 (LHD models)
- Harness connectors E106, M14 (RHD models)
- Harness for open or short between throttle control motor relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE CONTROL MOTOR RELAY

Refer to EC-307, "Component Inspection" .

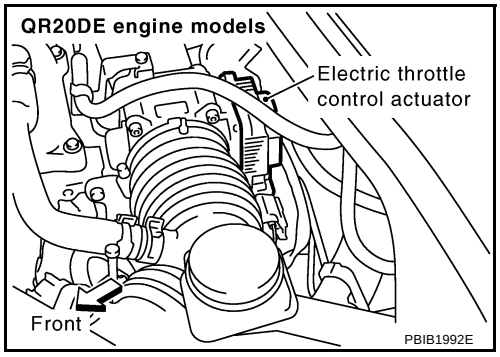
OK or NG

OK >> GO TO 13.
NG >> Replace throttle control motor relay.

10. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

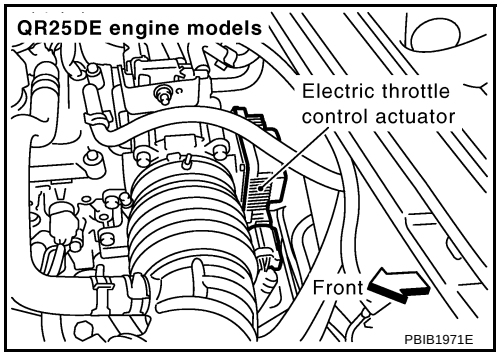
Electric throttle control actuator terminal	ECM terminal	Continuity
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist



5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

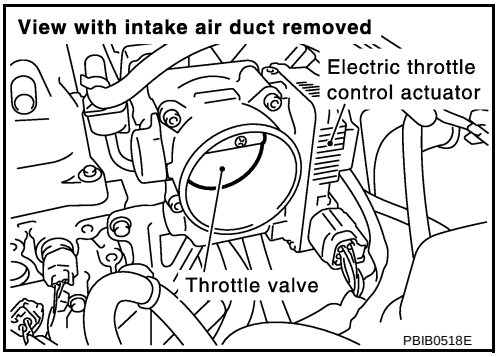


11. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 12.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



12. CHECK THROTTLE CONTROL MOTOR

Refer to EC-307, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 14.
NG >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

Component Inspection

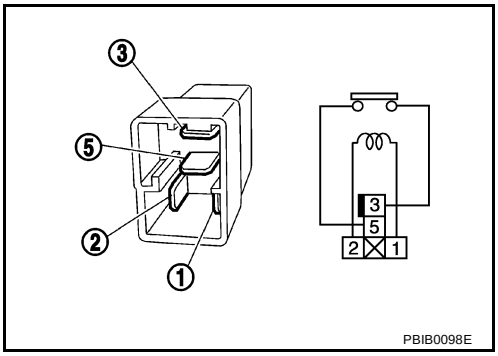
BBS001FP

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



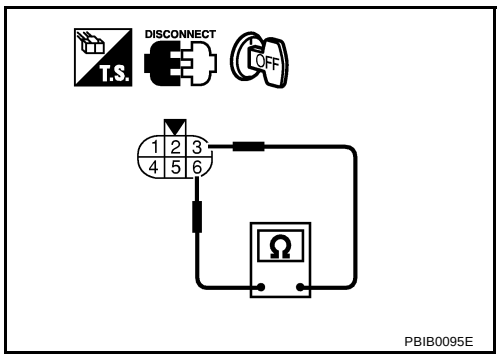
THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.

2. Check resistance between terminals 3 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-50, "Throttle Valve Closed Position Learning" .
5. Perform EC-50, "Idle Air Volume Learning" .



Removal and Installation

BBS001FQ

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

PFP:16119

Component Description

BBS001FR

Power supply for the throttle control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

CONSULT-II Reference Value in Data Monitor Mode

BBS001FS

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

BBS001FT

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124 1124	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	● Harness or connectors (Throttle control motor relay circuit is shorted.) ● Throttle control motor relay
P1126 1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	● Harness or connectors (Throttle control motor relay circuit is open.) ● Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

BBS001FU

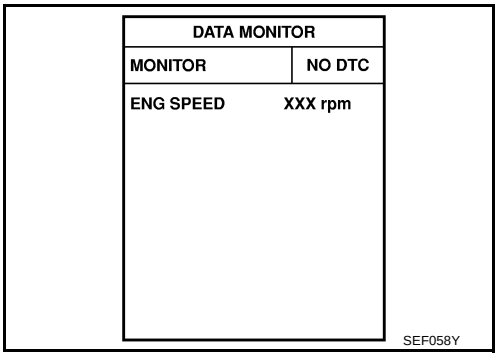
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V.

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-314, "Diagnostic Procedure" .



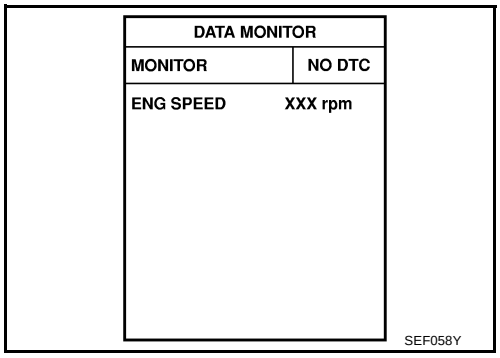
With GST

Follow the procedure “With CONSULT-II” above.

PROCEDURE FOR DTC P1126

With CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-314, "Diagnostic Procedure" .



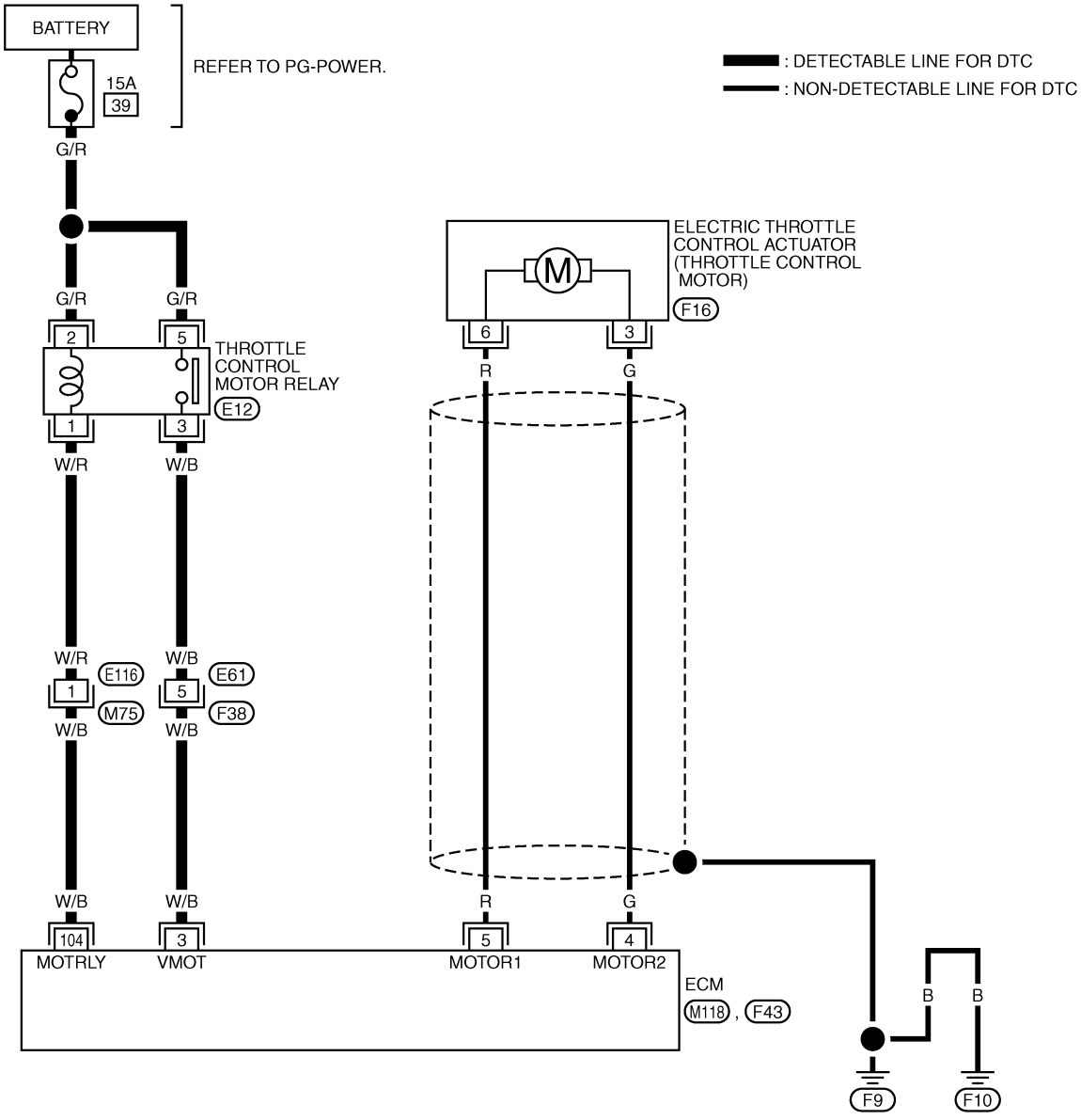
With GST

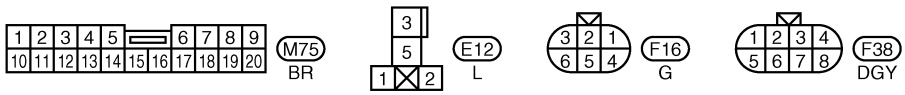
Follow the procedure “With CONSULT-II” above.

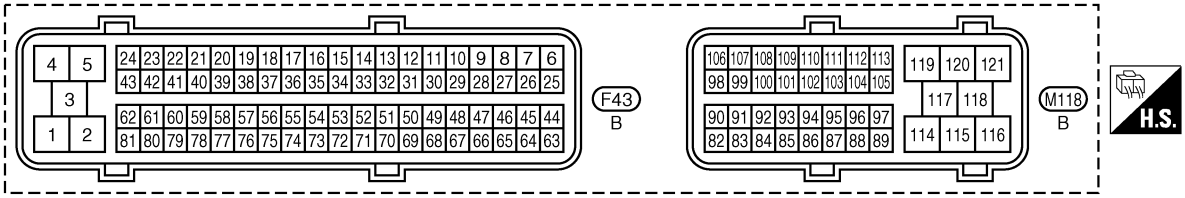
Wiring Diagram
LHD MODELS

BBS001FV

EC-ETC2-01







TBWA0615E

Specification data are reference values and are measured between each terminal and ground.

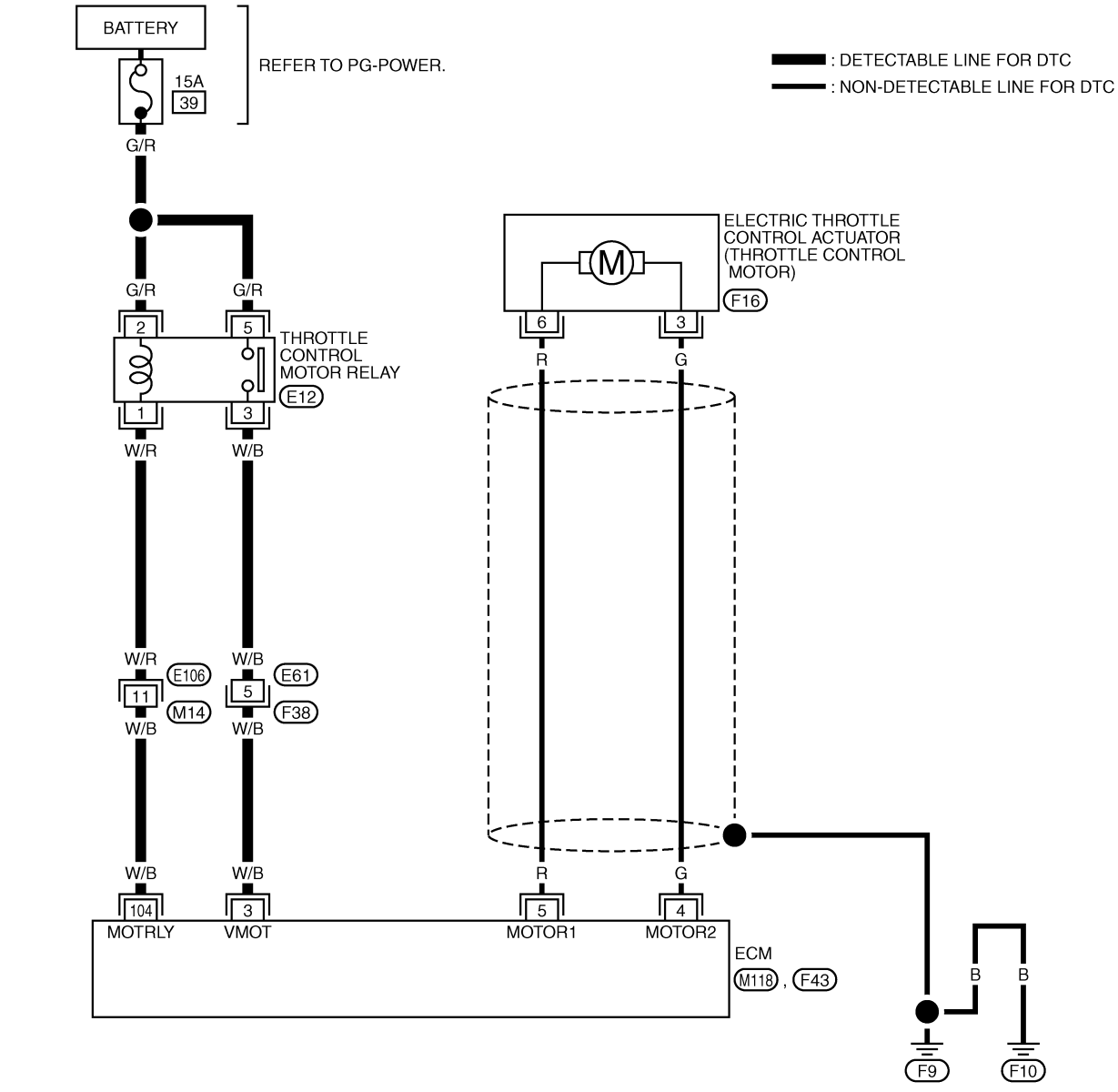
CAUTION:

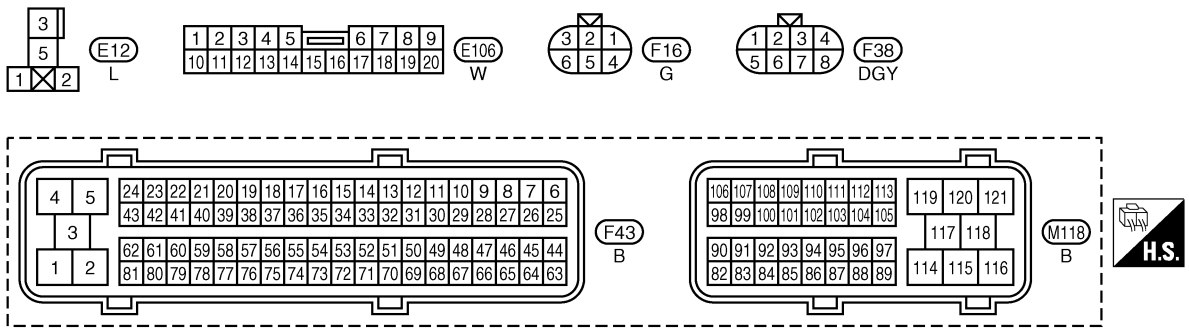
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	W/B	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
104	W/B	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

RHD MODELS

EC-ETC2-02





TBWA0616E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

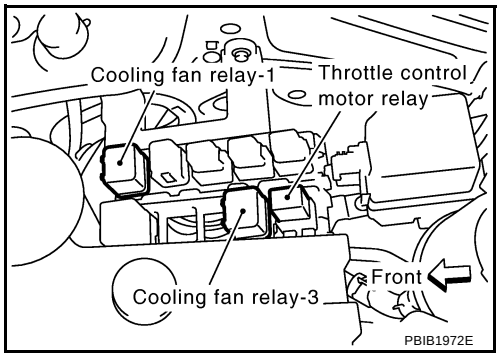
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	W/B	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
104	W/B	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

Diagnostic Procedure

BBS001FW

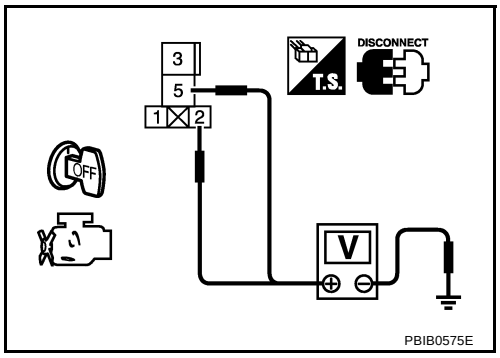
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle control motor relay.



3. Check voltage between throttle control motor relay terminals 2, 5 and ground.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Harness for open or short between throttle control motor relay and battery

>> Repair or replace harness or connectors.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between throttle control motor relay terminal 3 and ECM terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- Harness for open or short between throttle control motor relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT

1. Check continuity between throttle control motor relay terminal 1 and ECM terminal 104. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E116, M75 (LHD models)
- Harness connectors E106, M14 (RHD models)
- Harness for open or short between throttle control motor relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK THROTTLE CONTROL MOTOR RELAY

Refer to EC-316, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace throttle control motor relay.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

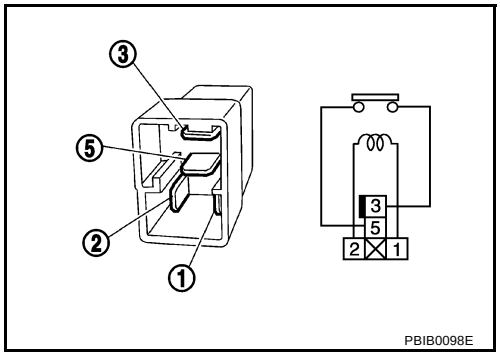
BBS001FX

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



DTC P1128 THROTTLE CONTROL MOTOR

PFP:16119

Component Description

BBS001FY

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

BBS001FZ

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128 1128	Throttle control motor circuit short	ECM detects short in both circuits between ECM and throttle control motor.	● Harness or connectors (Throttle control motor circuit is shorted.) ● Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

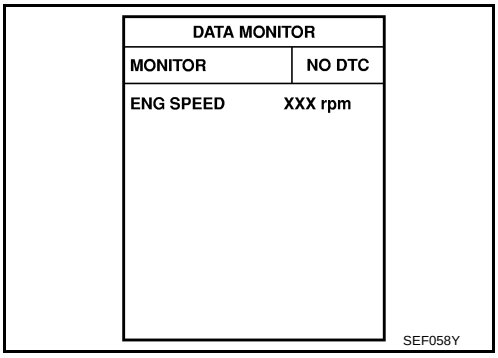
DTC Confirmation Procedure

BBS001G0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-322, "Diagnostic Procedure" .



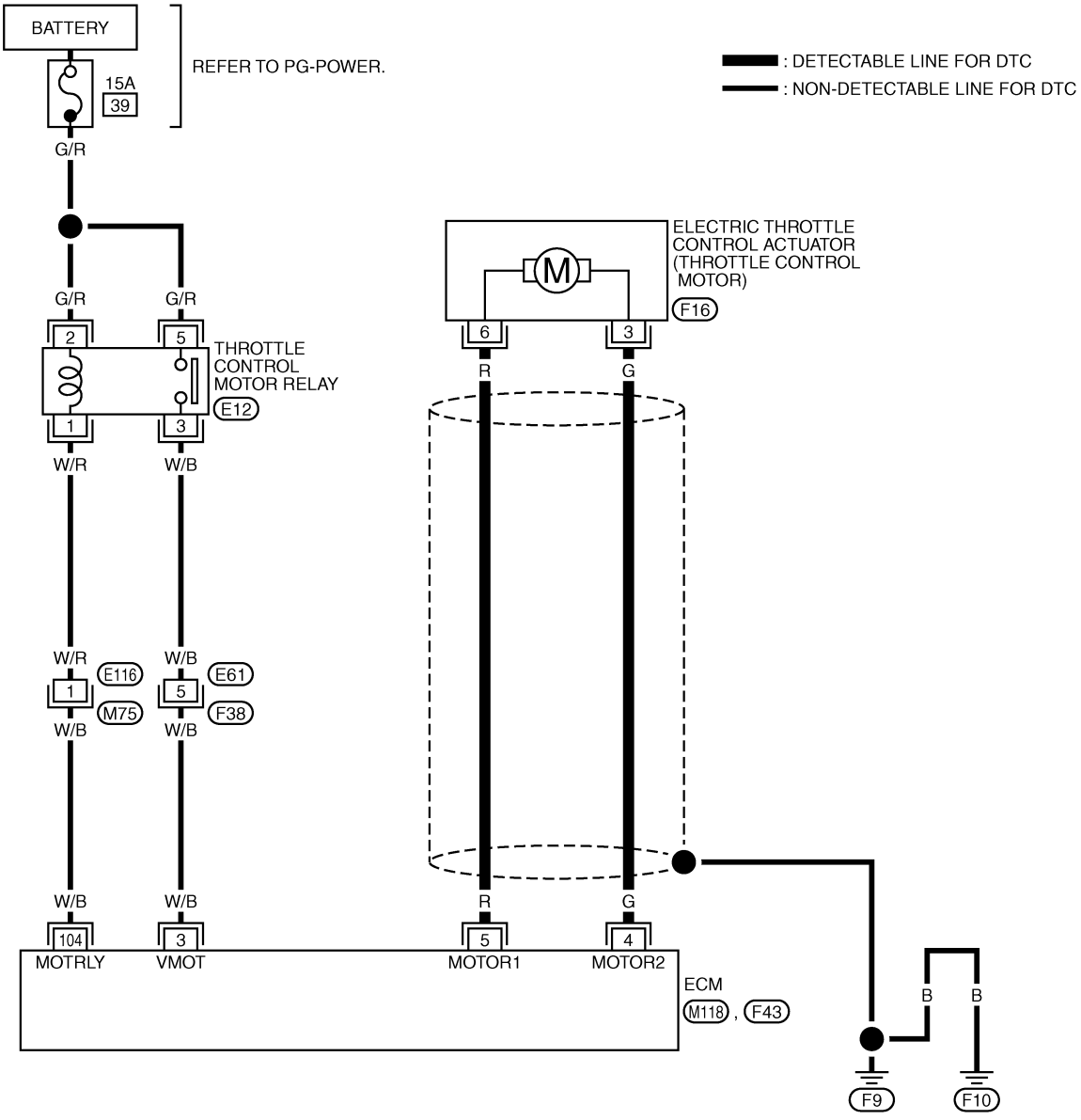
WITH GST

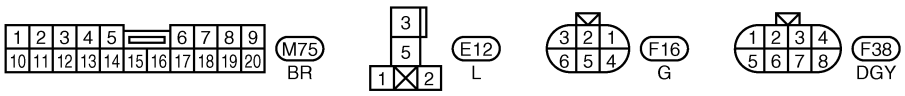
Follow the procedure “WITH CONSULT-II” above.

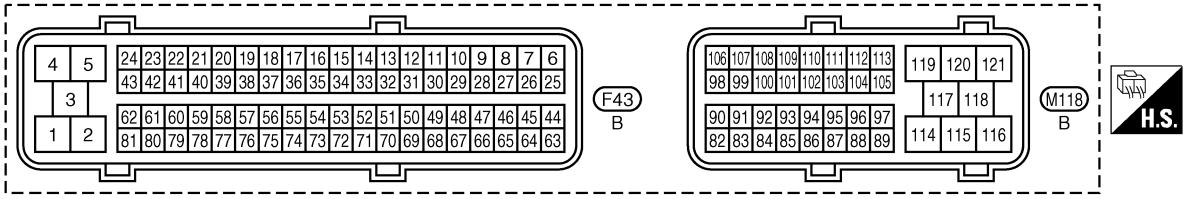
Wiring Diagram
LHD MODELS

BBS001G1

EC-ETC3-01





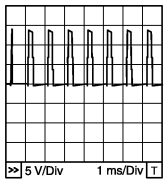
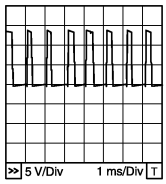


TBWA0617E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

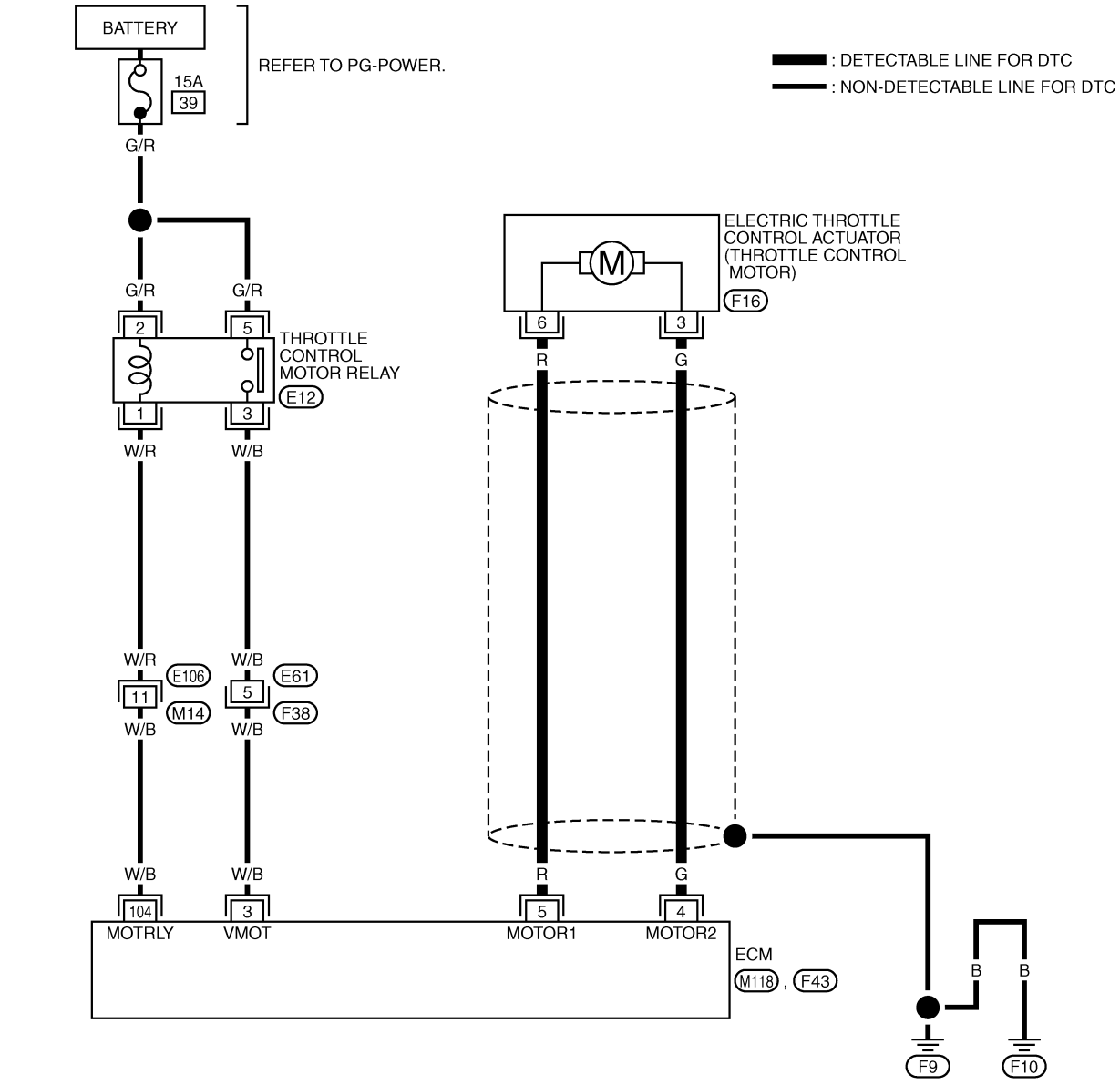
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

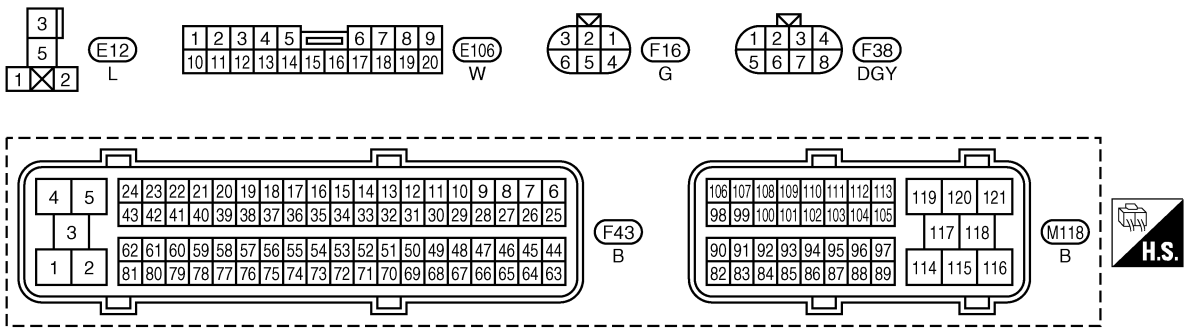
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	G	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	R	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

RHD MODELS

EC-ETC3-02

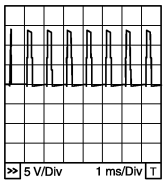
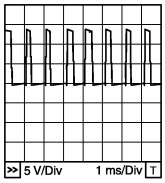




TBWA0618E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	G	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	R	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E

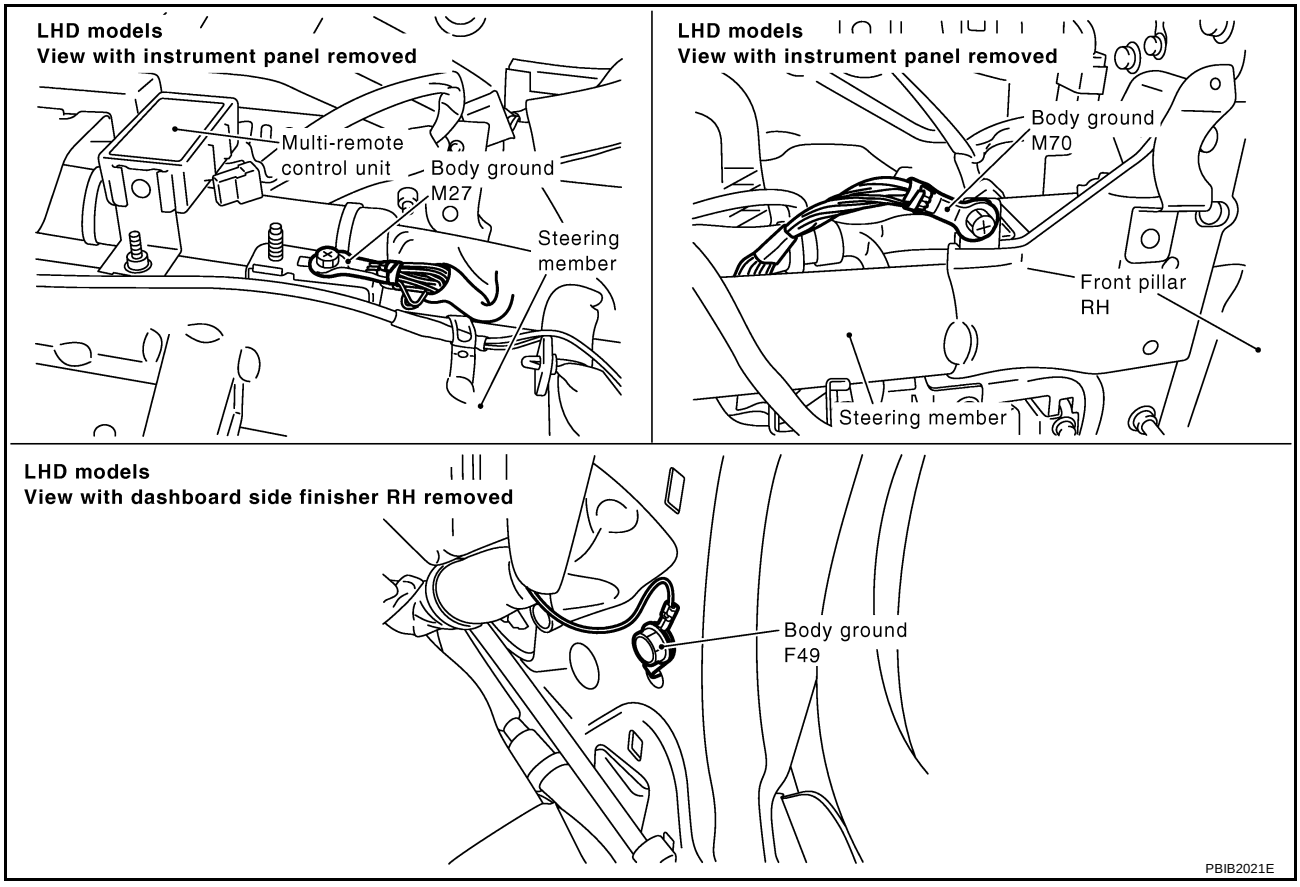
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001G2

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

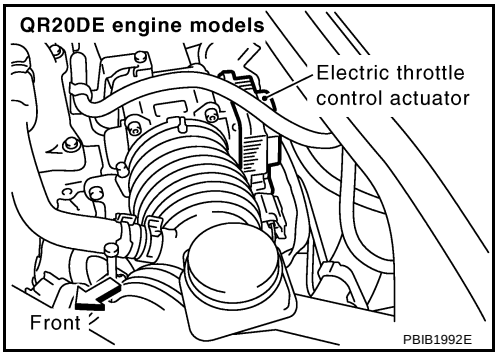
1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

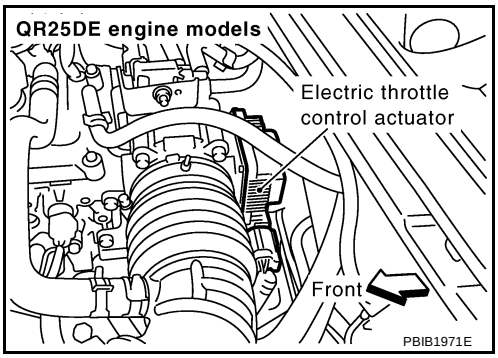
Electric throttle control actuator terminal	ECM terminal	Continuity
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.





3. CHECK THROTTLE CONTROL MOTOR

Refer to EC-323, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

Component Inspection

BBS001G3

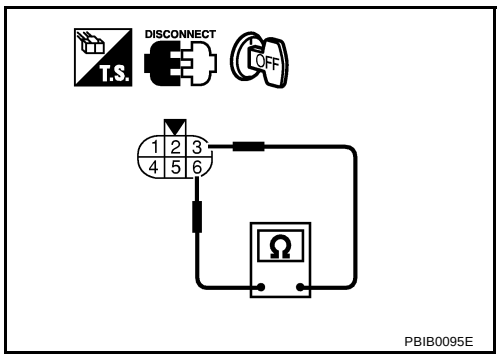
THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.

2. Check resistance between terminals 3 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-50, "Throttle Valve Closed Position Learning" .
5. Perform EC-50, "Idle Air Volume Learning" .



Removal and Installation

BBS001G4

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

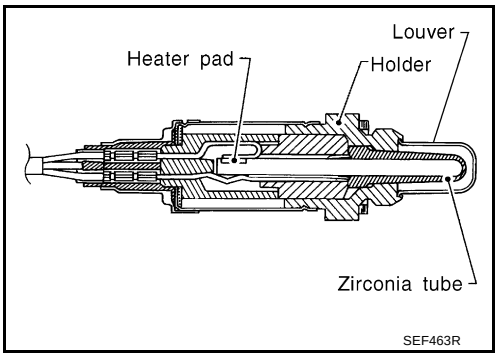
DTC P1143 HO2S1

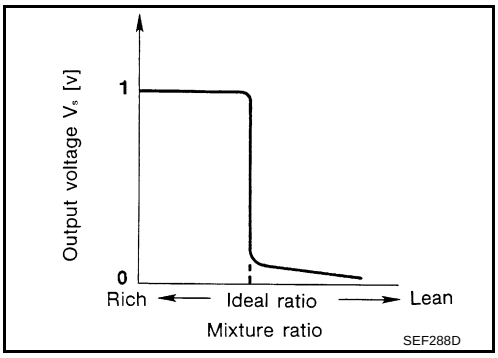
PFP:22690

Component Description

BBS001G5

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

BBS001G6

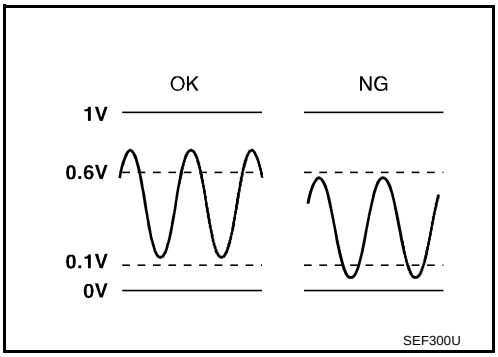
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

BBS001G7

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and whether the “lean” output is sufficiently low. When both the outputs are shifting to the lean side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1143 1143	Heated oxygen sensor 1 lean shift monitoring	The maximum and minimum voltage from the sensor are not reached to the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

BBS001G8

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

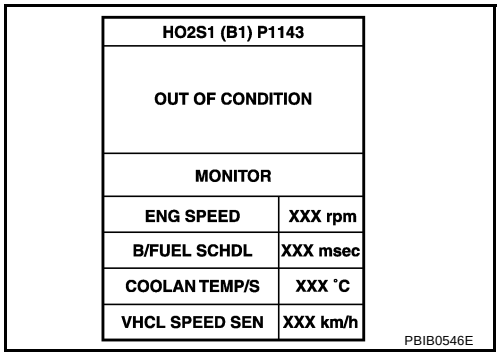
TESTING CONDITION:

- **Always perform at a temperature above −10°C (14°F).**
- **Before performing following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

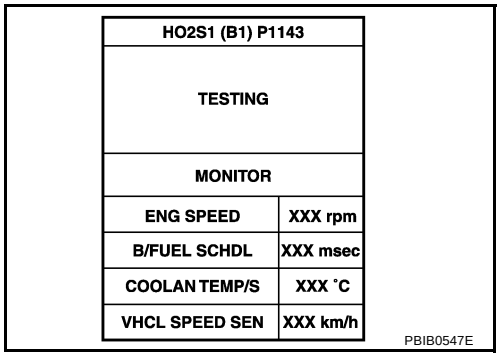
1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1143” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.



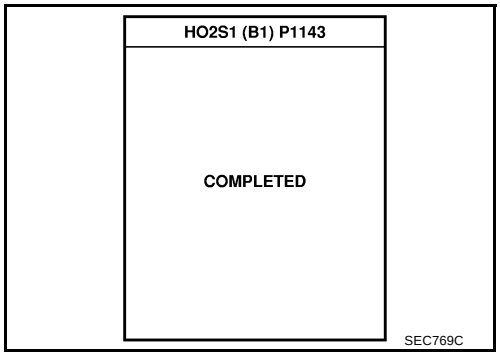
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	QR20DE: 1,400 - 3,200 rpm QR25DE: 1,200 - 2,800 rpm
VHCL SPEED SE	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	QR20DE: 2.9 - 14.5 msec QR25DE: 1.9 - 14.5 msec
Shift lever	Suitable position



If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-327, "Diagnostic Procedure" .



Overall Function Check

BBS001G9

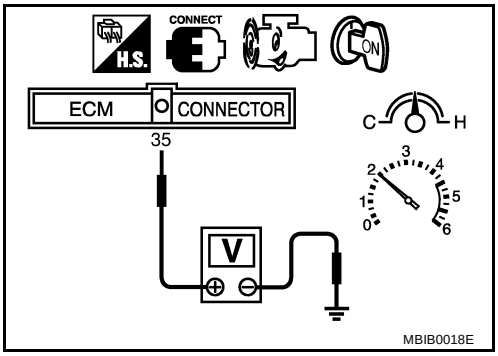
Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.

- The maximum voltage is over 0.6V at at least 1 time.
- The minimum voltage is over 0.1V at least 1 time.

4. If NG, go to EC-327, "Diagnostic Procedure" .

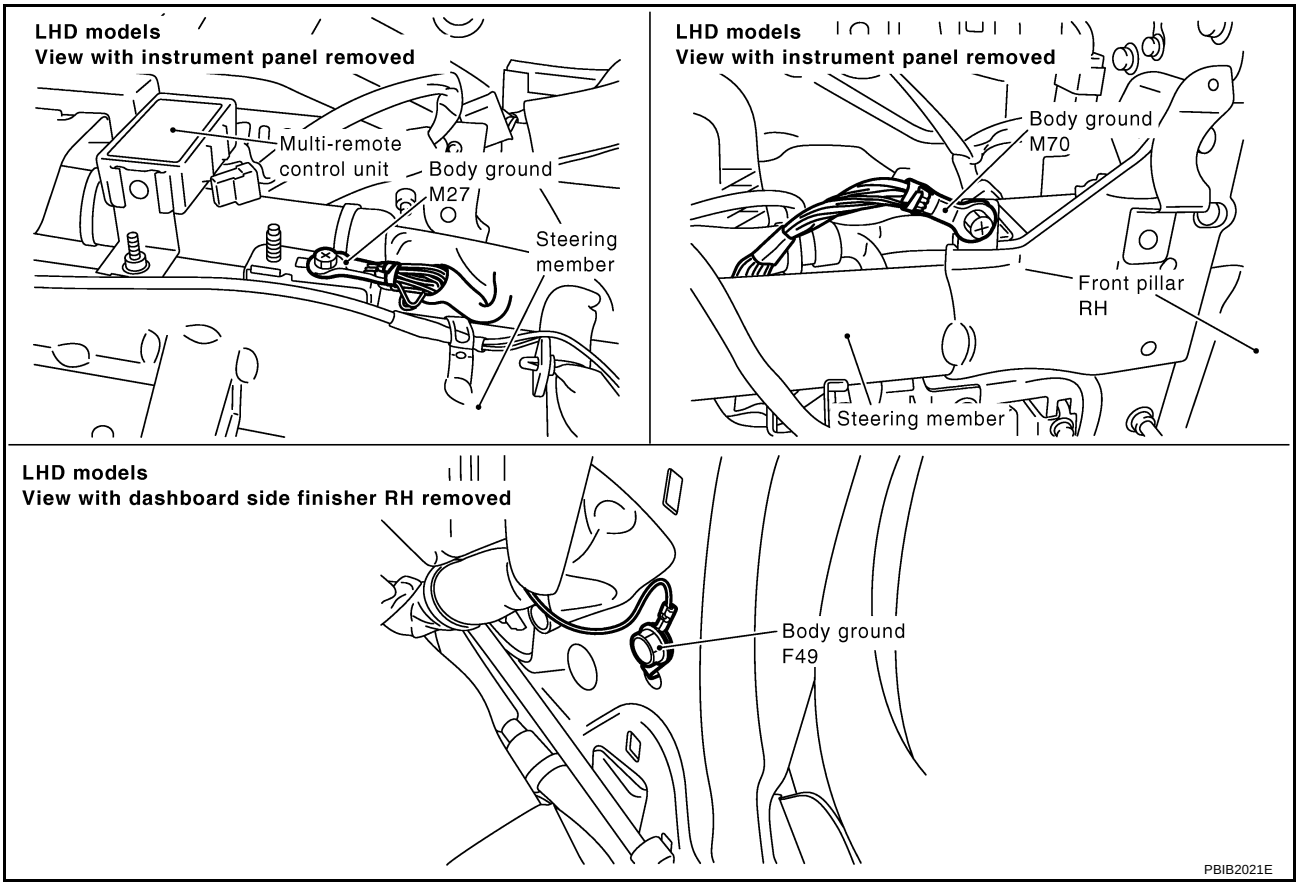


Diagnostic Procedure

BBS001GA

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-135, "Ground Inspection" .



OK or NG

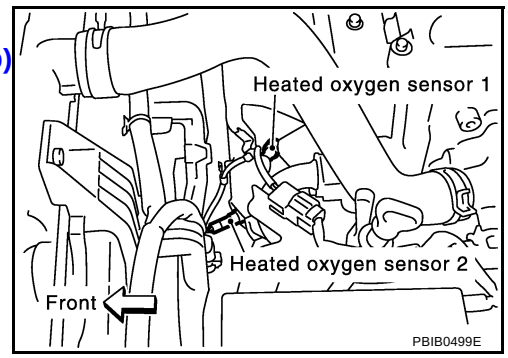
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

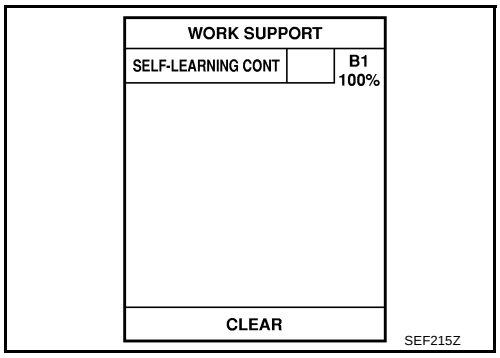
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA

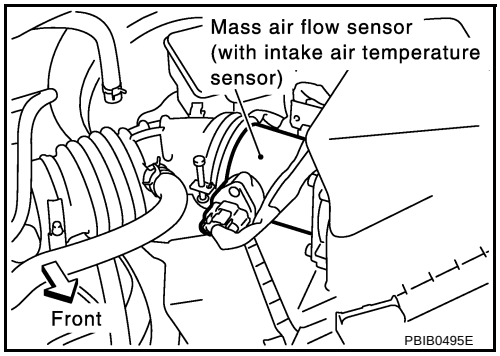
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-66, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-222, "DTC P0171 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 4.

4. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-147, "Component Inspection" .

OK or NG

OK >> GO TO 5.

NG >> Replace heated oxygen sensor 1.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-329, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-184, "Wiring Diagram" .

>> **INSPECTION END**

Component Inspection

BBS001GB

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

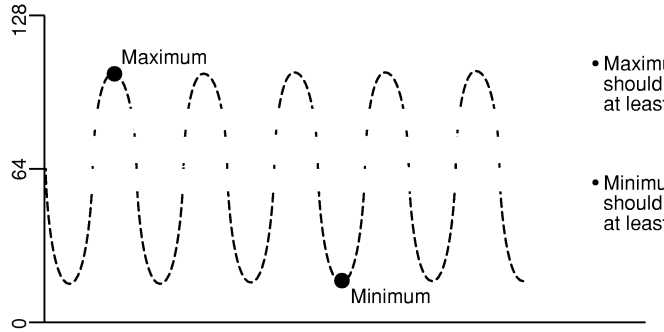
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown in the figure.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

CAUTION:

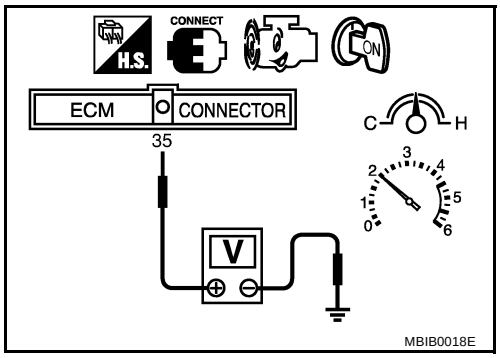
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001GC

HEATED OXYGEN SENSOR 1

Refer to EM-25, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

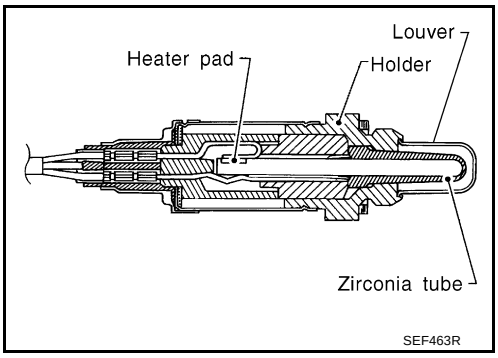
DTC P1144 HO2S1

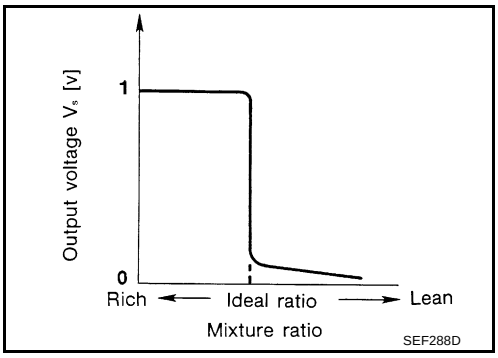
PFP:22690

Component Description

BBS001GD

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

BBS001GE

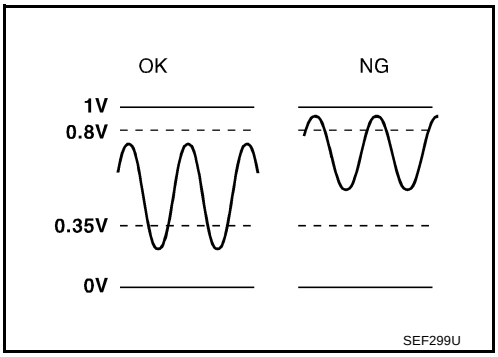
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

BBS001GF

To judge the malfunction, the output from the heated oxygen sensor 1 is monitored to determine whether the “rich” output is sufficiently high and “lean” output is sufficiently low. When both the outputs are shifting to the rich side, the malfunction will be detected.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1144 1144	Heated oxygen sensor 1 rich shift monitoring	The maximum and minimum voltages from the sensor are beyond the specified voltages.	● Heated oxygen sensor 1 ● Heated oxygen sensor 1 heater ● Fuel pressure ● Fuel injector

DTC Confirmation Procedure

BBS001GG

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

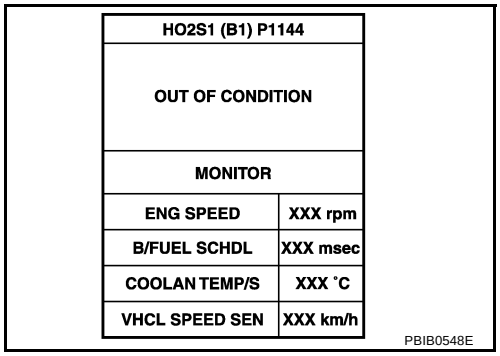
TESTING CONDITION:

- **Always perform at a temperature above −10°C (14°F).**
- **Before performing the following procedure, confirm that battery voltage is more than 11V at idle.**

WITH CONSULT-II

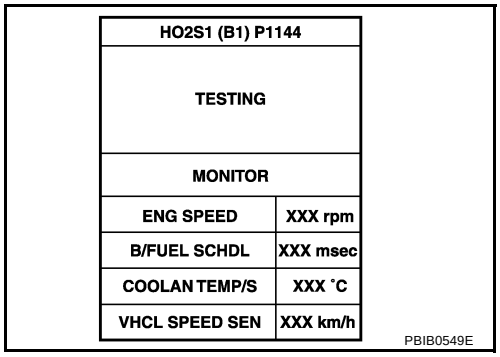
1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 5 seconds.
3. Turn ignition switch ON and select “HO2S1 (B1) P1144” of “HO2S1” in “DTC WORK SUPPORT” mode with CONSULT-II.
4. Touch “START”.
5. Start engine and let it idle for at least 3 minutes.

   NOTE:
   Never raise engine speed above 3,600 rpm after this step. If the engine speed limit is exceeded, return to step 5.



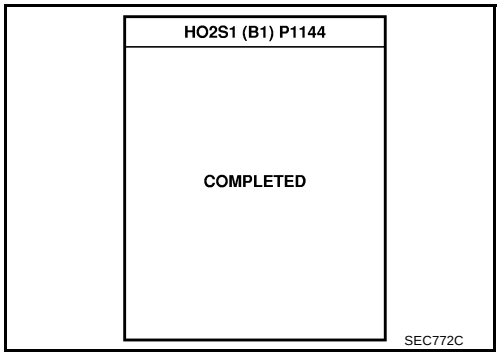
6. When the following conditions are met, “TESTING” will be displayed on the CONSULT-II screen. Maintain the conditions continuously until “TESTING” changes to “COMPLETED”. (It will take approximately 50 seconds or more.)

ENG SPEED	QR20DE: 1,400 - 3,200 rpm QR25DE: 1,200 - 2,800 rpm
VHCL SPEED SE	Less than 100 km/h (62 MPH)
B/FUEL SCHDL	QR20DE: 2.9 - 14.5 msec QR25DE: 1.9 - 14.5 msec
Shift lever	Suitable position



If “TESTING” is not displayed after 5 minutes, retry from step 2.

7. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”. If “NG” is displayed, refer to EC-333, "Diagnostic Procedure" .



Overall Function Check

BBS001GH

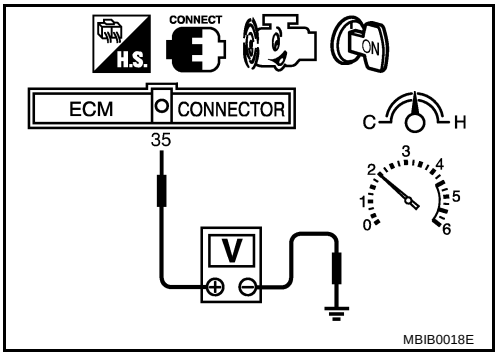
Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check one of the following with engine speed held at 2,000 rpm constant under no load.

- The maximum voltage is below 0.8V at least 1 time.
- The minimum voltage is below 0.35V at least 1 time.

4. If NG, go to EC-333, "Diagnostic Procedure" .

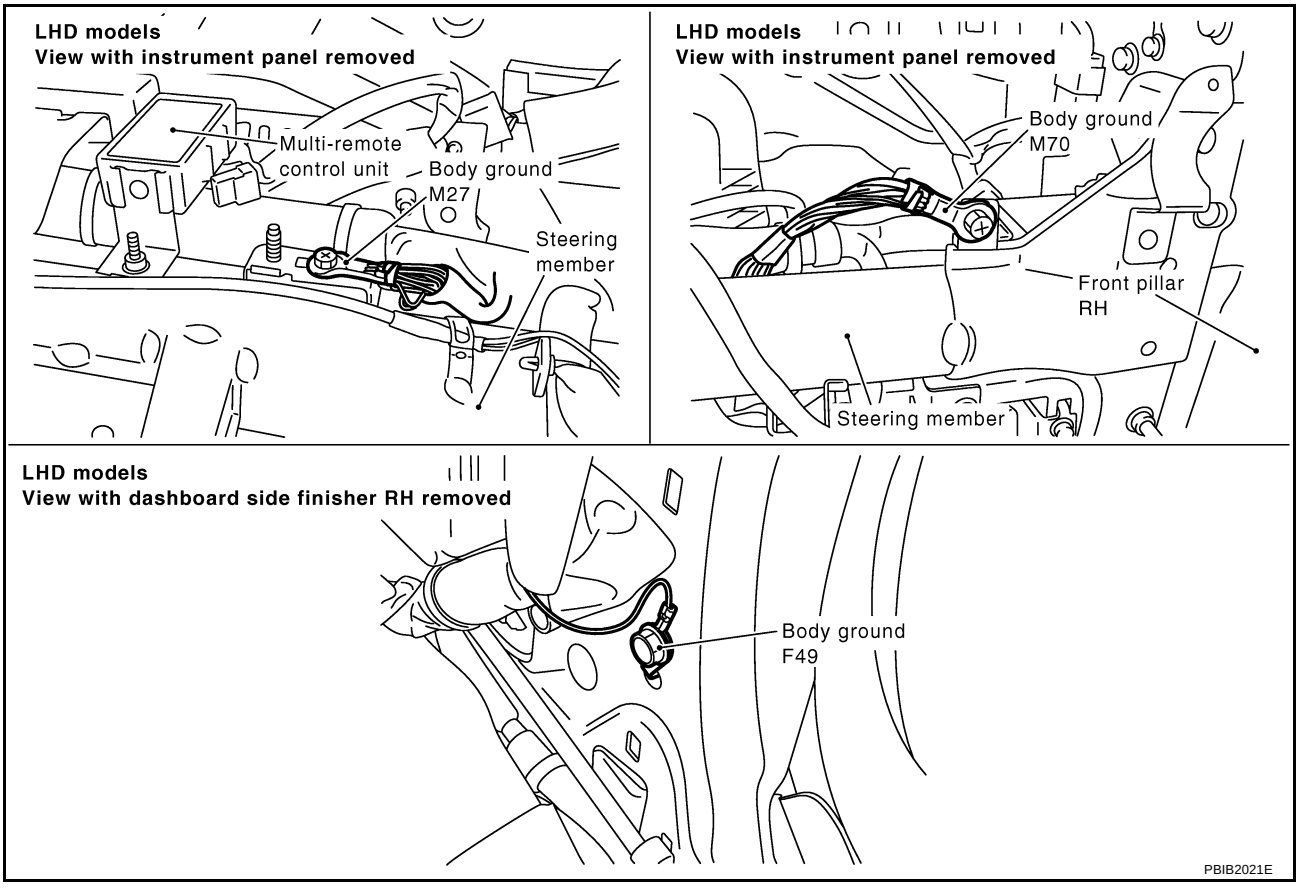


Diagnostic Procedure

BBS001GI

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-135, "Ground Inspection" .



OK or NG

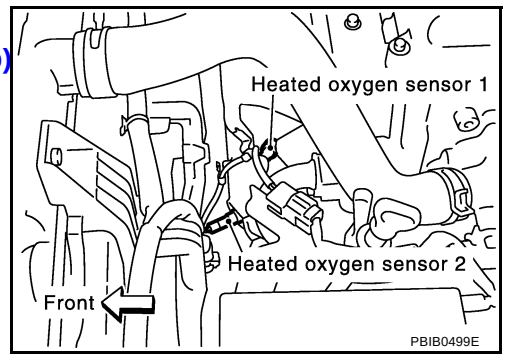
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN HEATED OXYGEN SENSOR 1

Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.1 kg-m, 30 - 44 ft-lb)

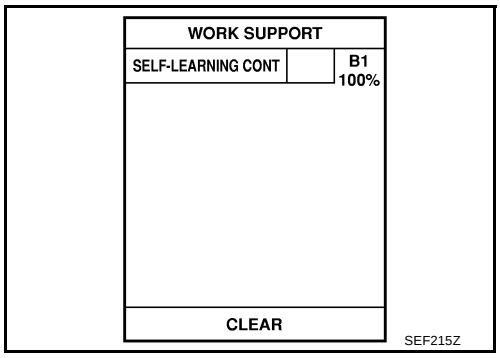
>> GO TO 3.



3. CLEAR THE SELF-LEARNING DATA

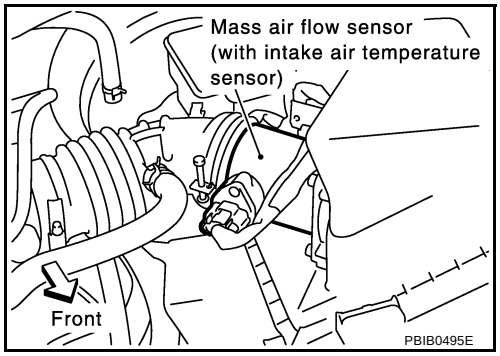
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-66, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Yes or No

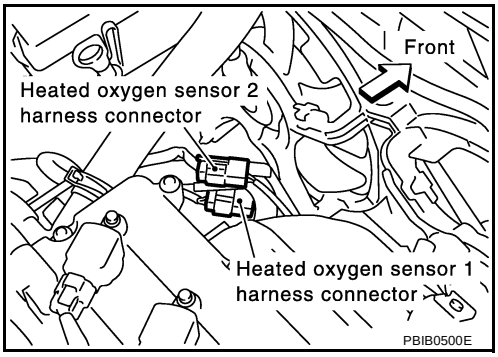
Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-228, "DTC P0172 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 4.

4. CHECK HO2S1 CONNECTOR FOR WATER

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Check connectors for water.

Water should not exist.



OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-147, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-335, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For circuit, refer to EC-184, "Wiring Diagram" .

>> **INSPECTION END**

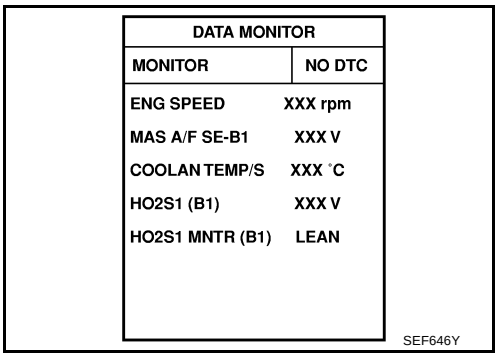
Component Inspection

BBS001GJ

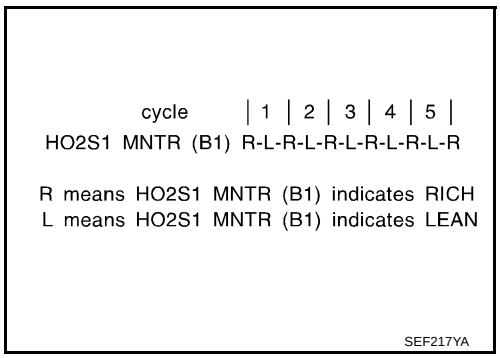
HEATED OXYGEN SENSOR 1

With CONSULT-II

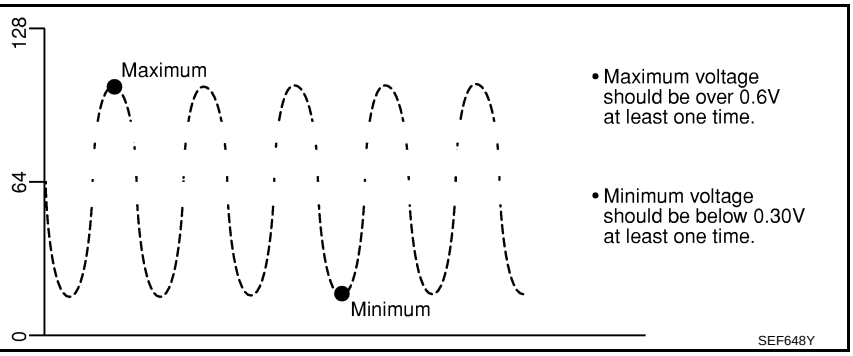
1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.



6. Check the following.
   - "HO2S1 MNTR (B1)" in "DATA MONITOR" mode changes from "RICH" to "LEAN" to "RICH" more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown in the figure.
   - "HO2S1 (B1)" voltage goes above 0.6V at least once.
   - "HO2S1 (B1)" voltage goes below 0.3V at least once.
   - "HO2S1 (B1)" voltage never exceeds 1.0V.



Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX

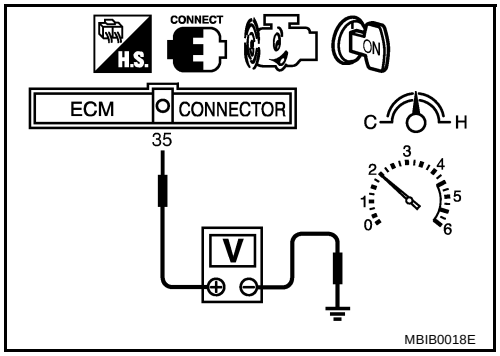


CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V



CAUTION:
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001GK

HEATED OXYGEN SENSOR 1

Refer to EM-25, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

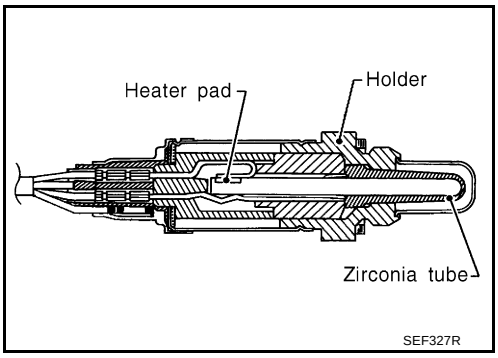
DTC P1146 HO2S2

PFP:226A0

Component Description

BBS001GL

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

BBS001GM

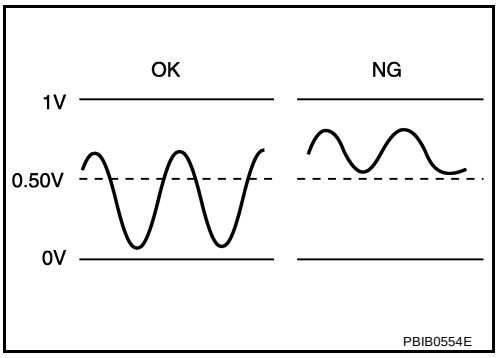
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ←→ RICH

On Board Diagnosis Logic

BBS001GN

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity of the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the minimum voltage of sensor is sufficiently low during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1146 1146	Heated oxygen sensor 2 minimum voltage monitoring	The minimum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector

DTC Confirmation Procedure

BBS001GO

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
- **"COMPLETED" will appear on CONSULT-II screen when all tests "COND1", "COND2" and "COND3" are completed.**
- If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Never stop engine during this procedure. If the engine is stopped, retry procedure from step 2 in Procedure for COND1

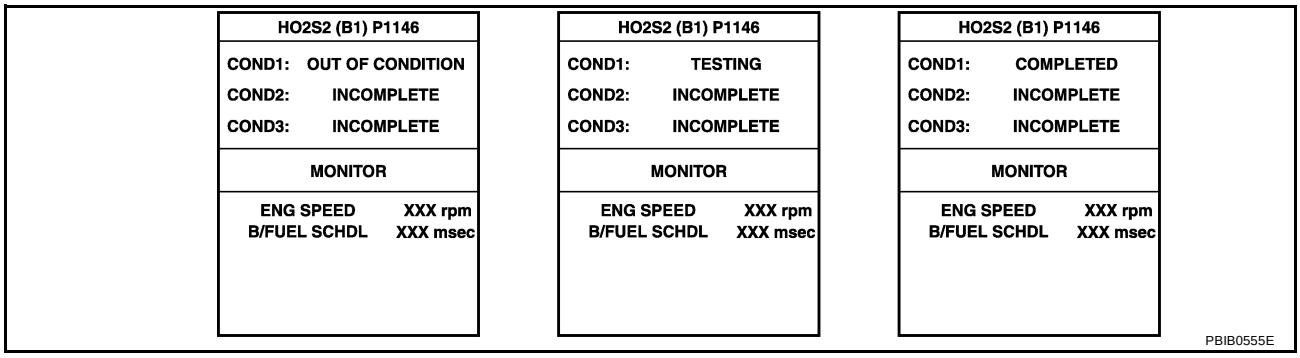
WITH CONSULT-II

Procedure for COND1

For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C(32 to 86°F).

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Select "HO2S2 (B1) P1146" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch "START".
7. Start engine and let it idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm two or three times quickly under no load.
   If "COMPLETED" appears on CONSULT-II screen, go to step 2 in Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
9. When the following conditions are met, "TESTING" will be displayed at "COND1" on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	70 - 105°C
Shift lever	Suitable position

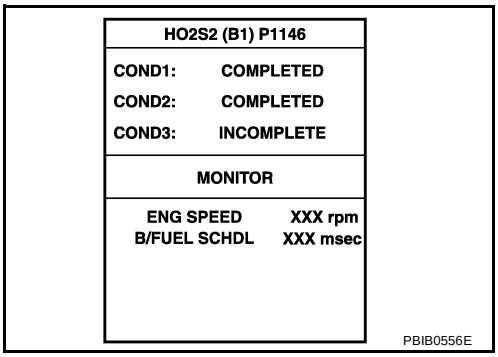


NOTE:
- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in Procedure for COND1.**
- **If "COMPLETED" already appears at "COND2" on CONSULT-II screen before Procedure for COND2 is conducted, it is unnecessary to conduct step 1 in Procedure for COND2.**

Procedure for COND2

1. While driving, release accelerator pedal completed with “OD” OFF (A/T) from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED” (It will take approximately 4 seconds.)

   NOTE:
   If “COMPLETE” already appears at “COND3” on CONSULT-II screen before Procedure for COND3 is conducted, it is unnecessary to conduct step 1 in Procedure for COND3.



Procedure for COND3

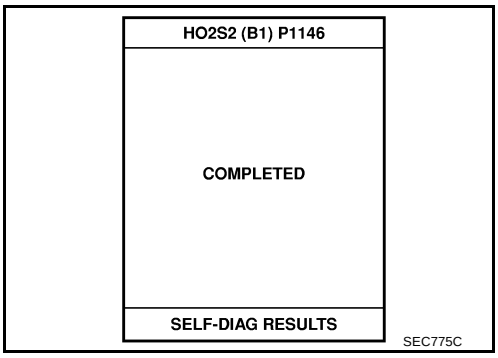
1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-341, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, performed the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).

b. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.

c. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-II.

d. When “COOLAN TEMP/S” indication reaches to 70°C(158°F), go to Procedure for COND1 step 3.



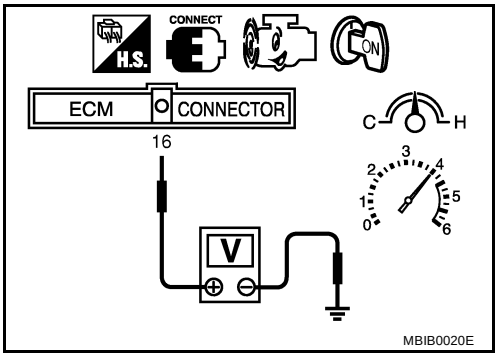
Overall Function Check

BBS001GP

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

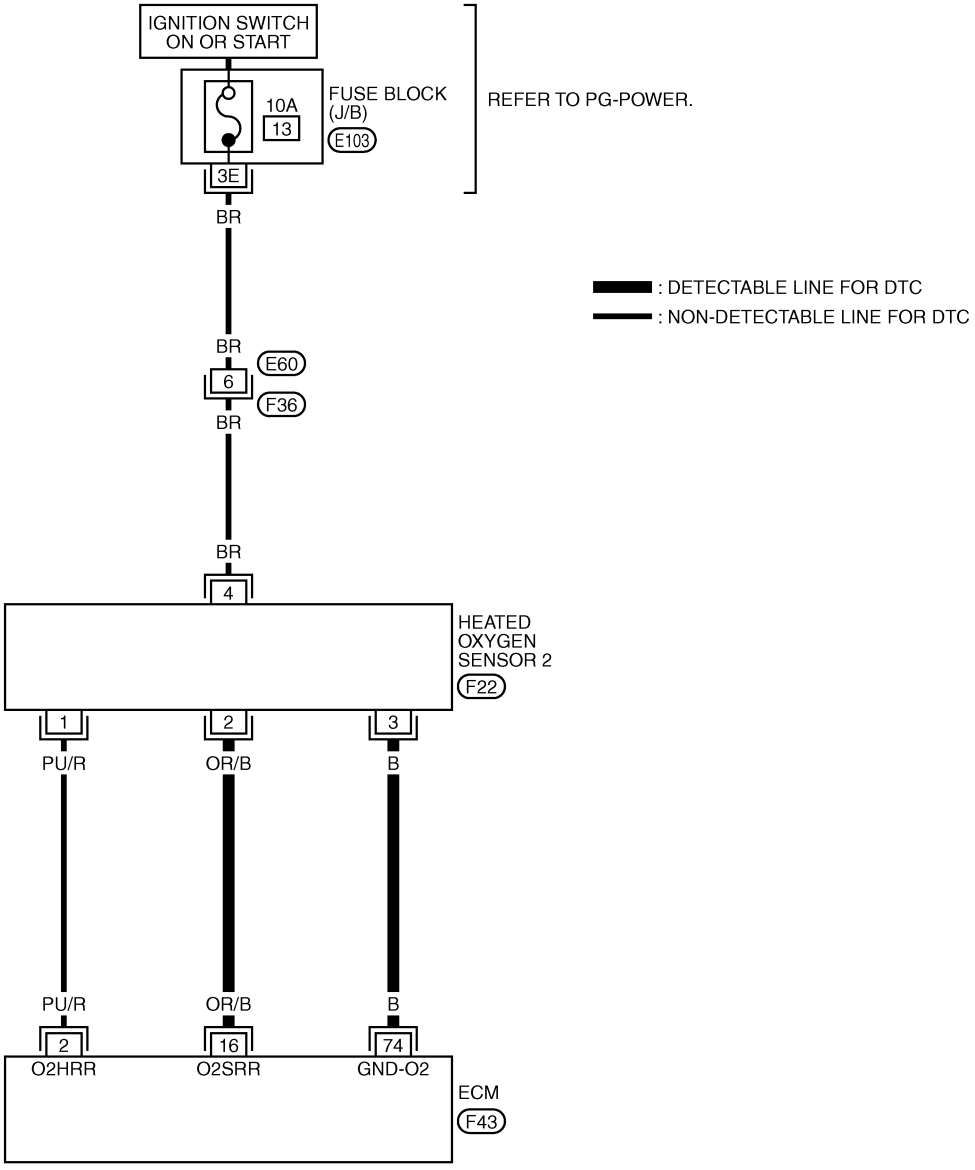
1. Start engine and warm it up to the operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be below 0.50V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle at idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.50V at least once during this procedure.
8. If NG, go to EC-341, "Diagnostic Procedure" .

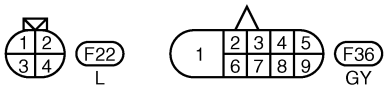


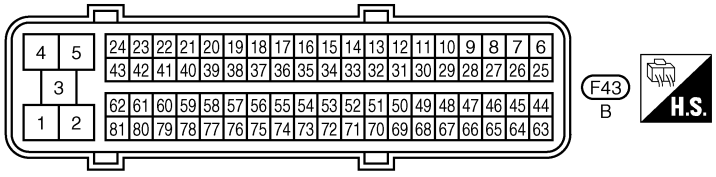
Wiring Diagram

BBS001GQ

EC-HO2S2-01







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0603E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

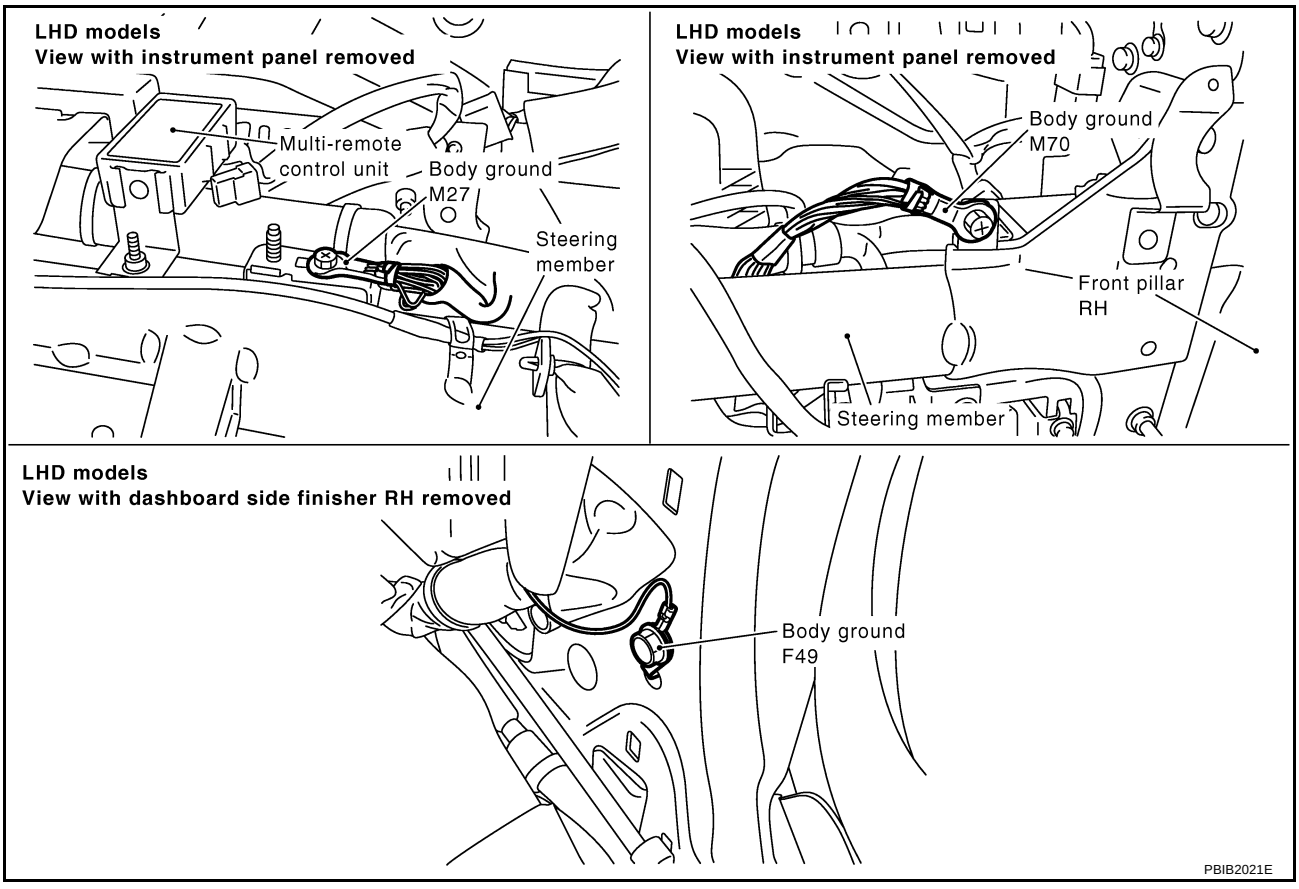
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/B	Heated oxygen sensor 2	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001GR

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .



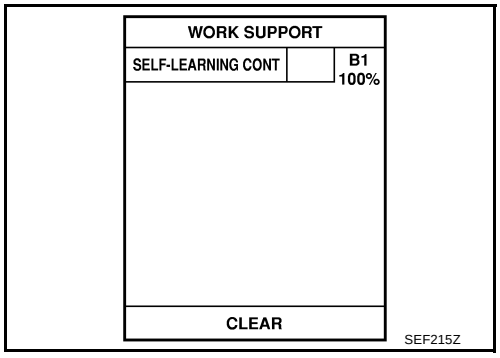
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

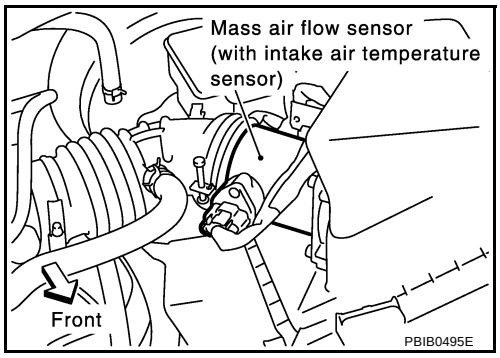
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-66, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0172 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0172. Refer to EC-228, "DTC P0172 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 3 and ECM terminal 74.
   Refer to Wiring Diagram.

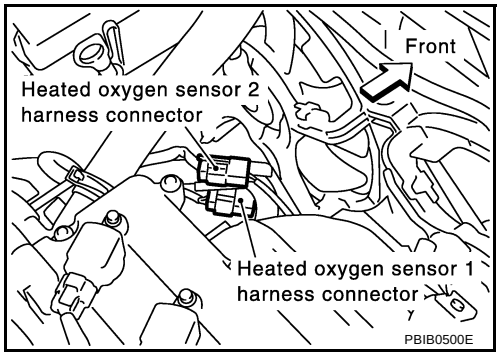
   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 2 and ECM terminal 16.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-343, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001GS

HEATED OXYGEN SENSOR 2

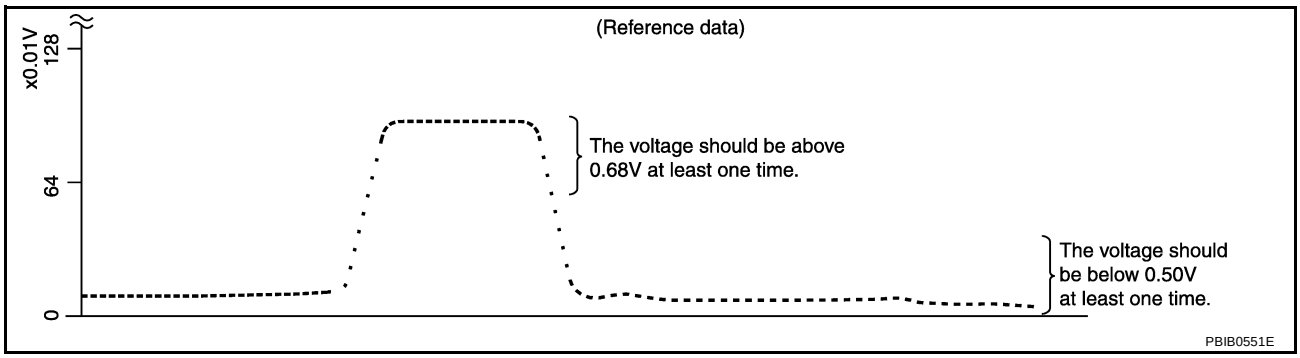
With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



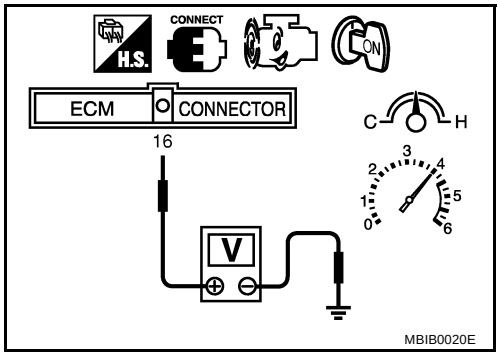
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.



7. Keep vehicle at idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.50V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001GT

HEATED OXYGEN SENSOR 2

Refer to EX-2, "EXHAUST SYSTEM" .

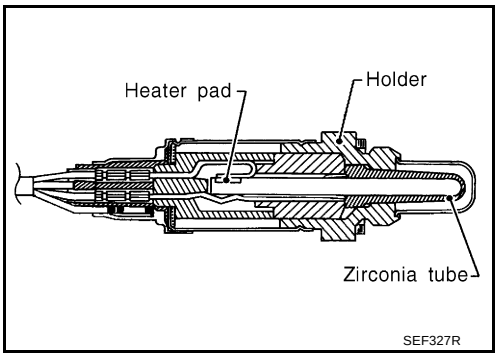
DTC P1147 HO2S2

PFP:226A0

Component Description

BBS001GU

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

BBS001GV

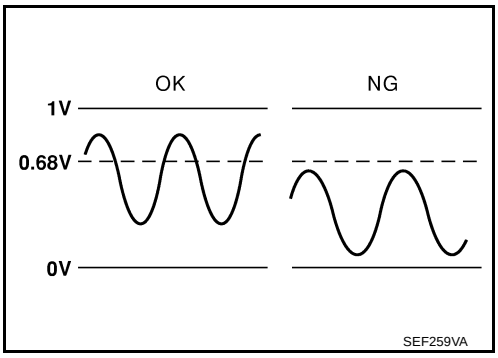
Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ←→ RICH

On Board Diagnosis Logic

BBS001GW

The heated oxygen sensor 2 has a much longer switching time between rich and lean than the heated oxygen sensor 1. The oxygen storage capacity before the three way catalyst (manifold) causes the longer switching time. To judge the malfunctions of heated oxygen sensor 2, ECM monitors whether the maximum voltage of the sensor is sufficiently high during the various driving condition such as fuel-cut.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1147 1147	Heated oxygen sensor 2 maximum voltage monitoring	The maximum voltage from the sensor is not reached to the specified voltage.	● Harness or connectors (The sensor circuit open or shorted.) ● Heated oxygen sensor 2 ● Fuel pressure ● Fuel injector ● Intake air leaks

DTC Confirmation Procedure

BBS001GX

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
- **"COMPLETED" will appear on CONSULT-II screen when all tests "COND1", "COND2" and "COND3" are completed.**
- If DTC confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Never stop engine during this procedure. If the engine is stopped, retry procedure from step 2 in "Procedure for COND1"

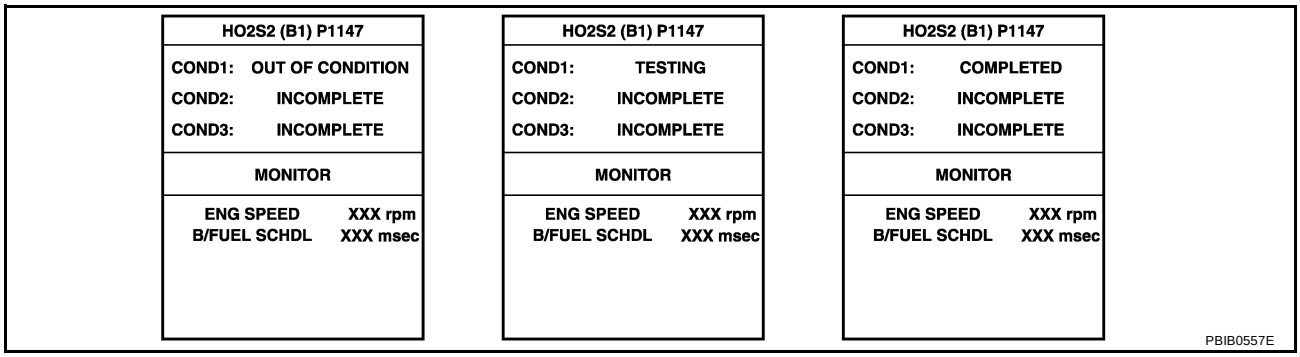
WITH CONSULT-II

Procedure for COND1

For the best results, perform "DTC WORK SUPPORT" at a temperature of 0 to 30°C(32 to 86°F).

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle 1 minute.
5. Select "HO2S2 (B1) P1147" of "HO2S2" in "DTC WORK SUPPORT" mode with CONSULT-II.
6. Touch "START".
7. Start engine and let it idle for at least 30 seconds.
8. Rev engine up to 2,000 rpm two or three times quickly under no load.
   If "COMPLETED" appears on CONSULT-II screen, go to step 2 in "Procedure for COND3".
   If "COMPLETED" does not appear on CONSULT-II screen, go to the following step.
9. When the following conditions are met, "TESTING" will be displayed at COND1" on the CONSULT-II screen. Maintain the conditions continuously until "TESTING" changes to "COMPLETED". (It will take approximately 60 seconds.)

ENG SPEED	More than 1,000 rpm
B/FUEL SCHDL	More than 1.0 msec
COOLAN TEMP/S	70 - 105°C
Shift lever	Suitable position

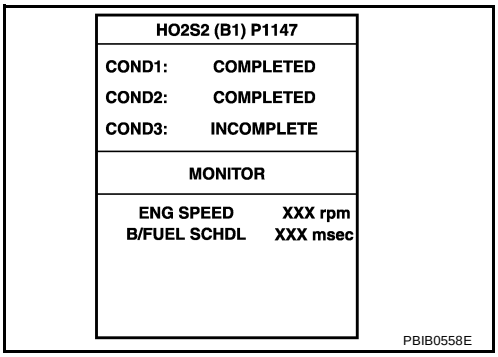


NOTE:
- **If "TESTING" is not displayed after 5 minutes, retry from step 2 in Procedure for COND1.**
- **If "COMPLETED" already appears at "COND2" on CONSULT-II screen before Procedure for COND2 is conducted, it is unnecessary to conduct step 1 in Procedure for COND2.**

Procedure for COND2

1. While driving, release accelerator pedal completed with “OD” OFF (A/T) from the above condition [step 9] until “INCOMPLETE” at “COND2” on CONSULT-II screen has turned to “COMPLETED” (It will take approximately 4 seconds.)

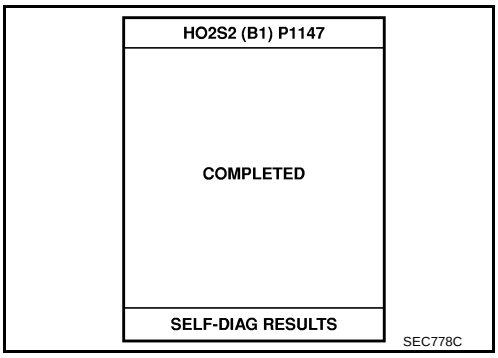
   NOTE:
   If “COMPLETE” already appears at “COND3” on CONSULT-II screen before Procedure for COND3 is conducted, it is unnecessary to conduct step 1 in “Procedure for COND3”.



Procedure for COND3

1. Stop vehicle and let it idle until “INCOMPLETE” of “COND3” on CONSULT-II screen has turned to “COMPLETED”. (It will take a maximum of approximately 6 minutes.)
2. Make sure that “OK” is displayed after touching “SELF-DIAG RESULTS”.
   If “NG” is displayed, refer to EC-349, "Diagnostic Procedure" .
   If “CAN NOT BE DIAGNOSED” is displayed, perform the following.

a. Turn ignition switch OFF and leave the vehicle in a cool place (soak the vehicle).
b. Turn ignition switch ON and select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
c. Start engine and warm it up while monitoring “COOLAN TEMP/S” indication on CONSULT-II.
d. When “COOLAN TEMP/S” indication reaches to 70°C(158°F), go to Procedure for COND1 step 3.



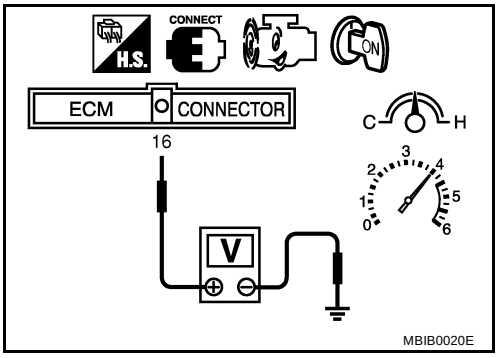
Overall Function Check

BBS001GY

Use this procedure to check the overall function of the heated oxygen sensor 2 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

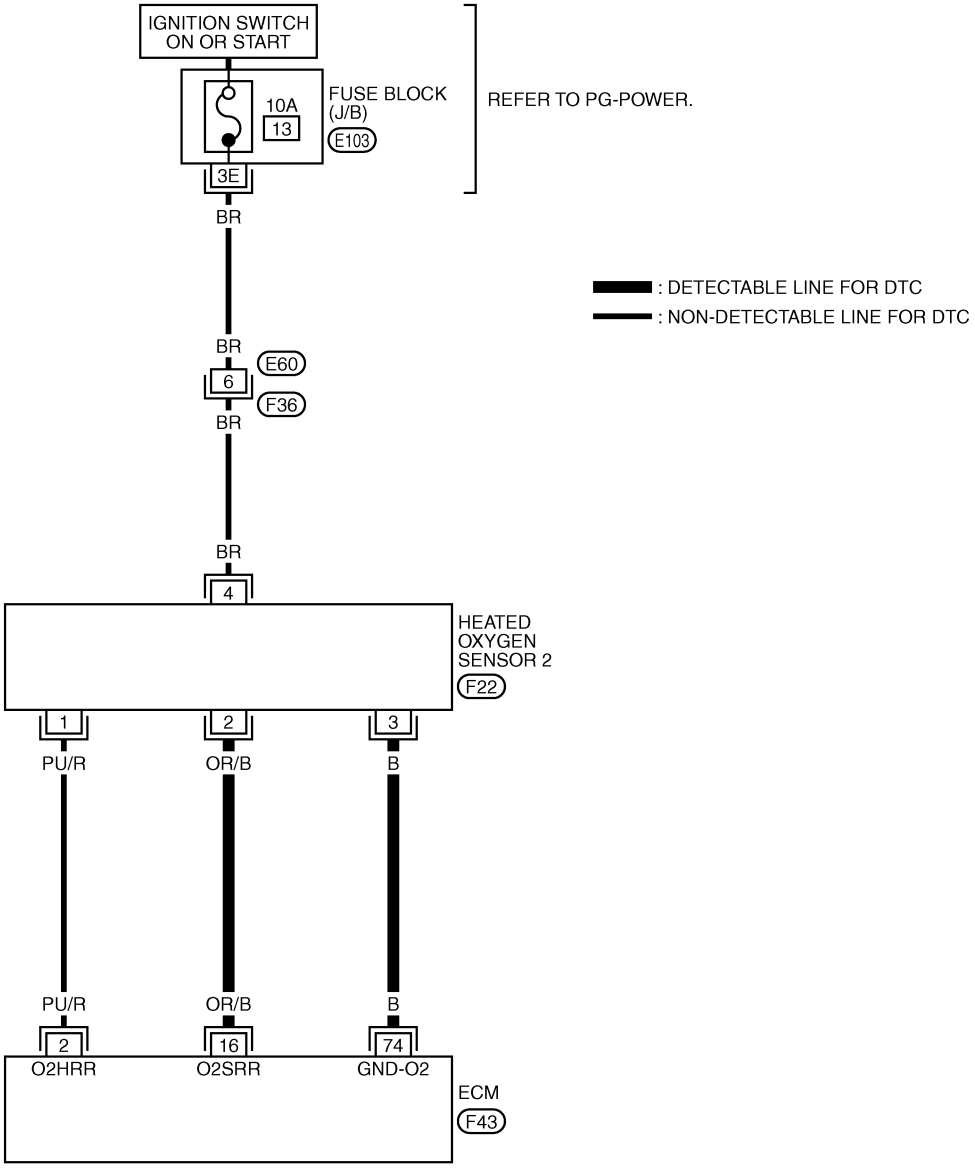
1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage can be confirmed in step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check the voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be above 0.68V at least once during this procedure.
8. If NG, go to EC-349, "Diagnostic Procedure" .

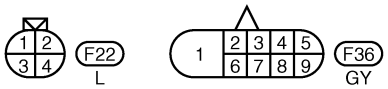


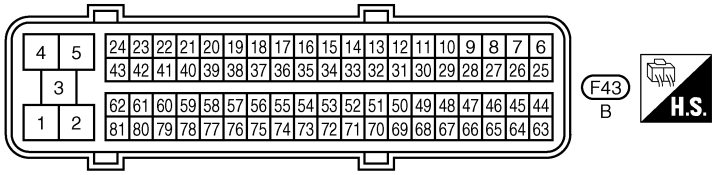
Wiring Diagram

BBS001GZ

EC-HO2S2-01







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0603E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

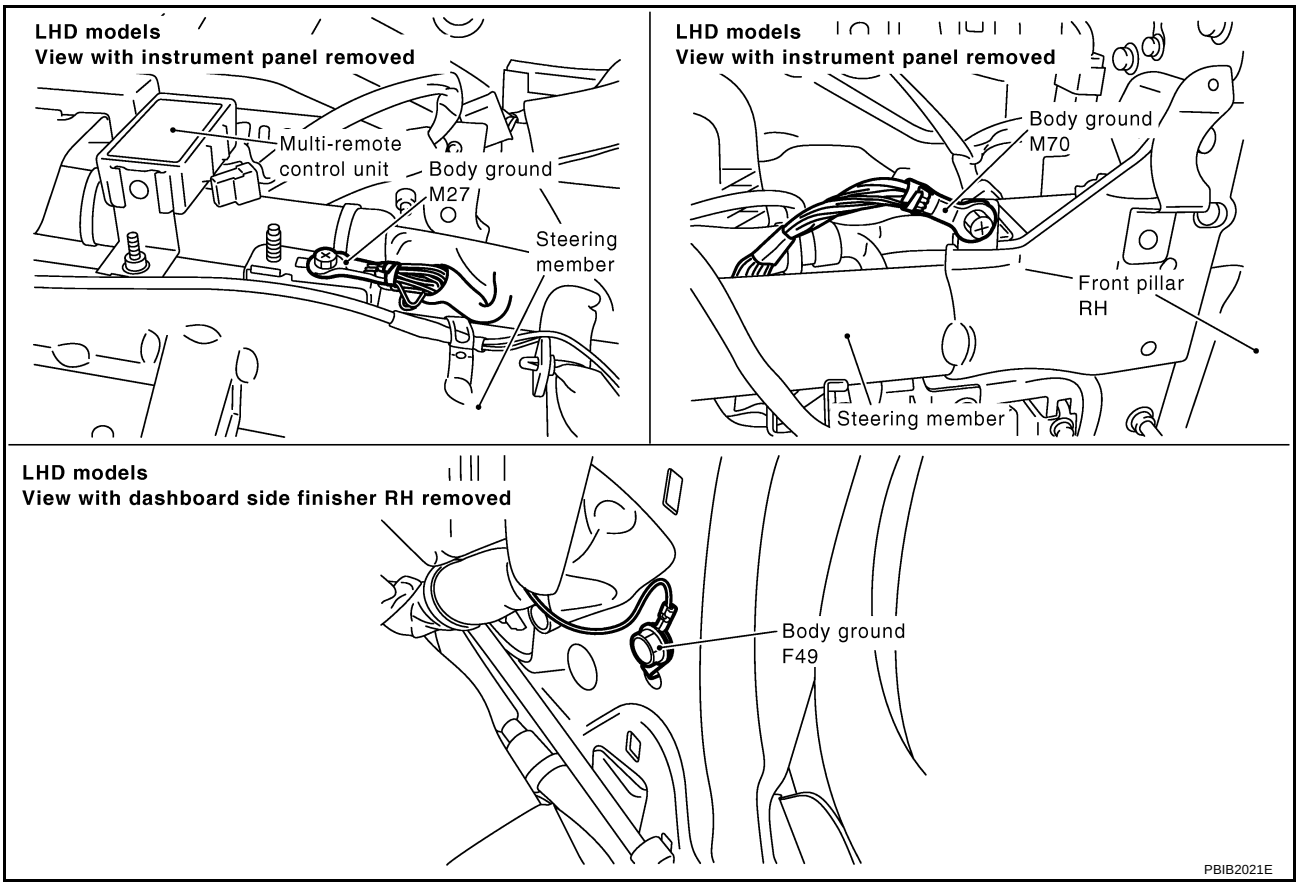
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/B	Heated oxygen sensor 2	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001H0

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .



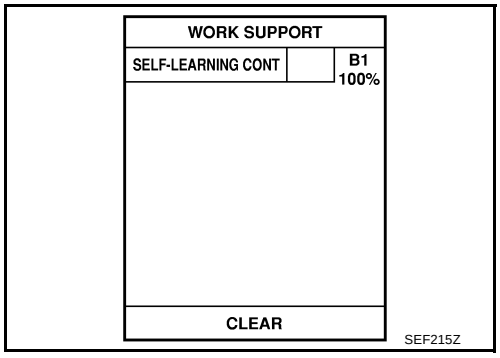
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CLEAR THE SELF-LEARNING DATA

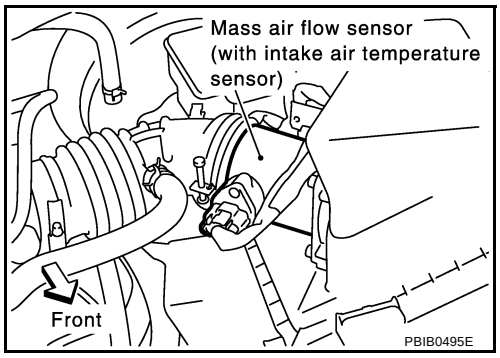
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “SELF-LEARNING CONT” in “WORK SUPPORT” mode with CONSULT-II.
3. Clear the self-learning control coefficient by touching “CLEAR”.
4. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF.
3. Disconnect mass air flow sensor harness connector, and restart and run engine for at least 5 seconds at idle speed.
4. Stop engine and reconnect mass air flow sensor harness connector.
5. Make sure that DTC P0102 is displayed.
6. Erase the DTC memory. Refer to EC-66, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
7. Make sure that DTC P0000 is displayed.
8. Run engine for at least 10 minutes at idle speed.
   Is the 1st trip DTC P0171 detected?
   Is it difficult to start engine?



Yes or No

Yes >> Perform trouble diagnosis for DTC P0171. Refer to EC-222, "DTC P0171 FUEL INJECTION SYSTEM FUNCTION" .

No >> GO TO 3.

3. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between HO2S2 terminal 3 and ECM terminal 74.
   Refer to Wiring Diagram.

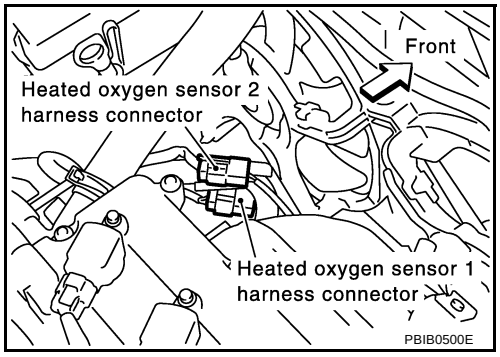
   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.

NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between HO2S2 terminal 2 and ECM terminal 16.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-351, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001H1

HEATED OXYGEN SENSOR 2

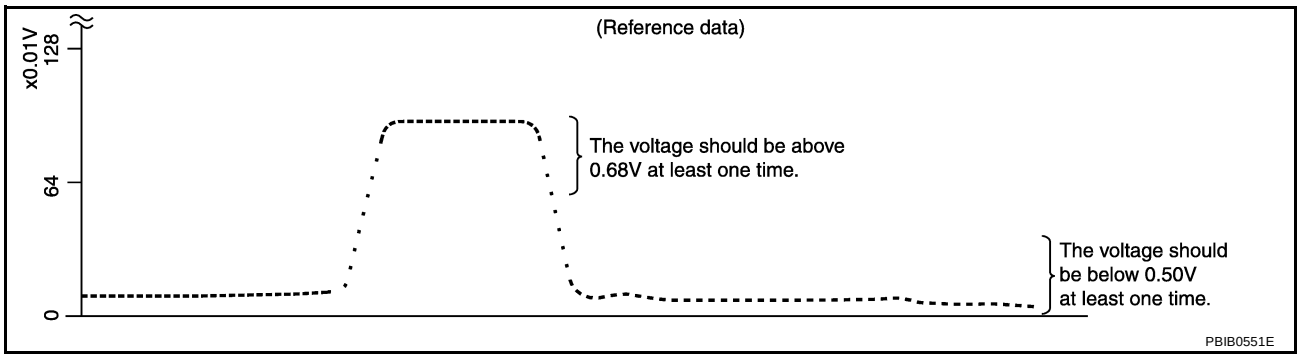
With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



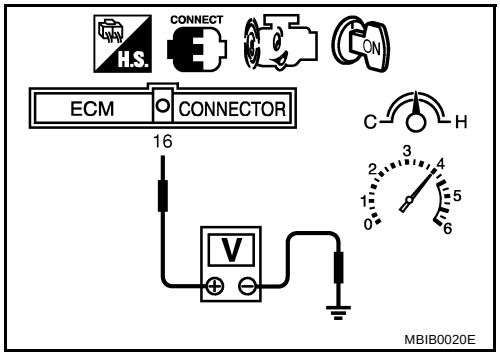
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.



7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T), 3rd gear position (M/T).
   The voltage should be below 0.50V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001H2

HEATED OXYGEN SENSOR 2

Refer to EX-2, "EXHAUST SYSTEM" .

DTC P1211 TCS CONTROL UNIT

PFP:47850

Description

BBS001H3

The malfunction information related to TCS is transferred through the CAN communication line from ESP/TCS/ABS control unit to ECM.

Be sure to erase the malfunction information such as DTC not only for ESP/TCS/ABS control unit but also for ECM after TCS related repair.

On Board Diagnosis Logic

BBS001H4

Freeze frame data is not stored in the ECM for this self-diagnosis.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211 1211	TCS control unit	ECM receives a malfunction information from ESP/TCS/ABS control unit.	● ESP/TCS/ABS control unit ● TCS related parts

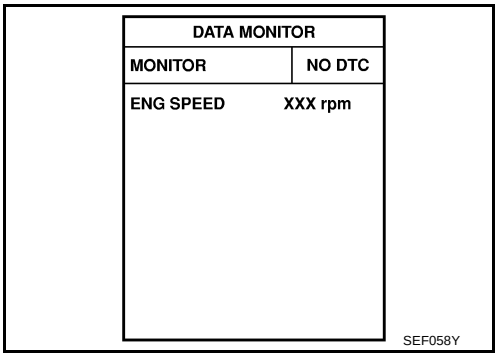
DTC Confirmation Procedure

BBS001H5

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 60 seconds.
4. If 1st trip DTC is detected, go to EC-353, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001H6

Go to BRC-52, "TROUBLE DIAGNOSIS" .

DTC P1212 TCS COMMUNICATION LINE

PFP:47850

Description

BBS001H7

NOTE:
If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-136, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and ESP/TCS/ABS control unit.
Be sure to erase the malfunction information such as DTC not only for ESP/TCS/ABS control unit but also for ECM after TCS related repair.

On Board Diagnosis Logic

BBS001H8

Freeze frame data is not stored in the ECM for this self-diagnosis.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212 1212	TCS communication line	ECM can not receive the information from ESP/TCS/ABS control unit continuously.	● Harness or connectors (The CAN communication line is open or shorted.) ● ESP/TCS/ABS control unit ● Dead (Weak) battery

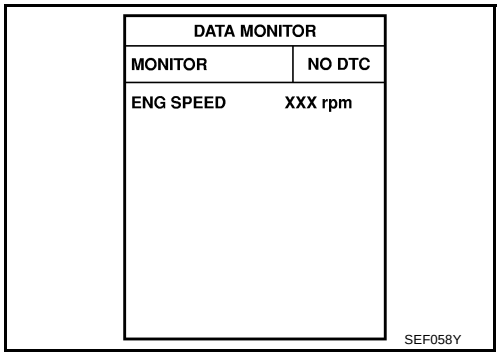
DTC Confirmation Procedure

BBS001H9

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
4. If a 1st trip DTC is detected, go to EC-354, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001HA

Go to BRC-52, "TROUBLE DIAGNOSIS" .

DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

System Description

BBS001HB

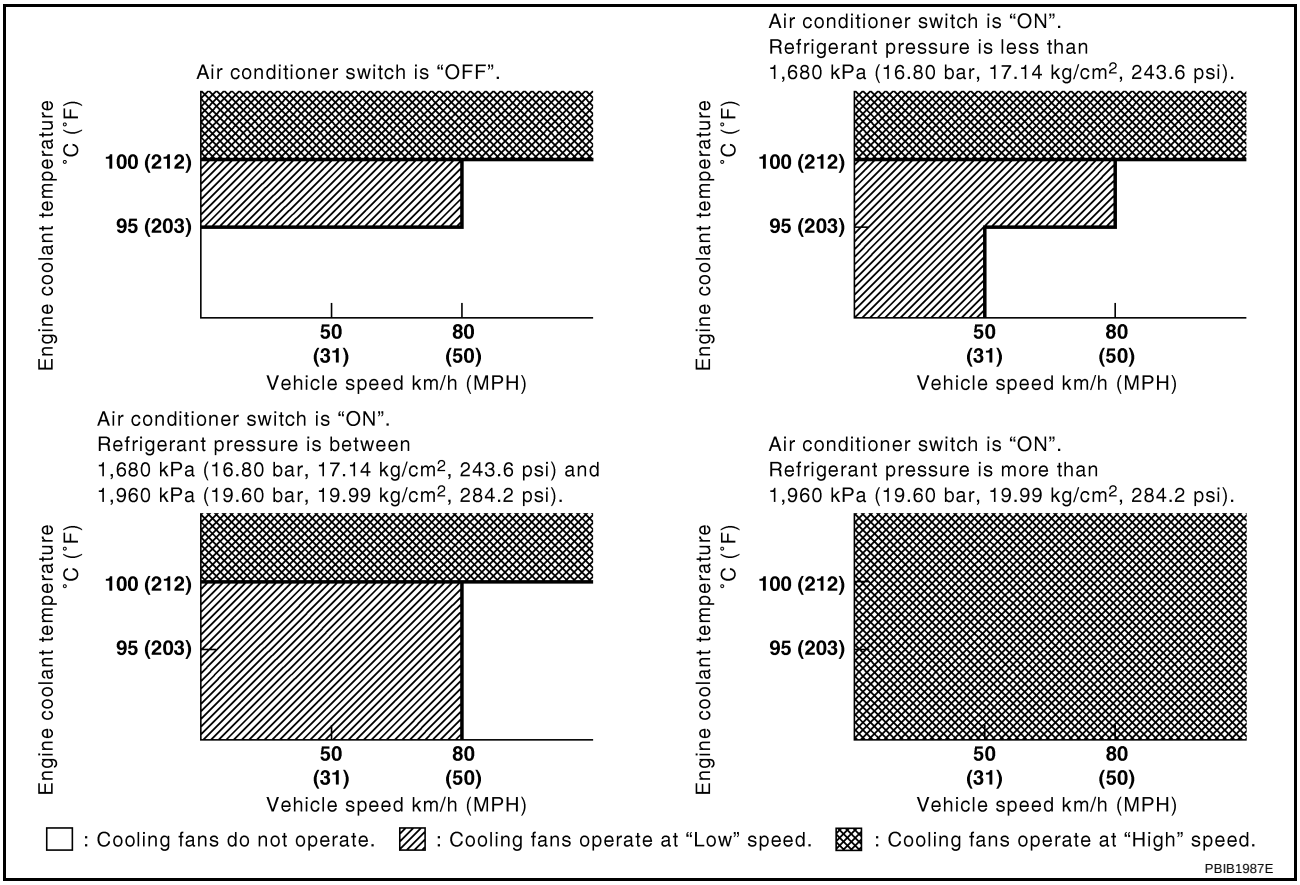
COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2	Cooling fan control	Cooling fan relay
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Air conditioner switch	Air conditioner ON signal		
Refrigerant pressure sensor	Refrigerant pressure		
Wheel sensor	Vehicle speed*1		

*1: This signal is sent to ECM through CAN communication line.
*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

BBS001HC

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 99°C (210°F) or more	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH

On Board Diagnosis Logic

BBS001HD

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method. ● Engine coolant is not within the specified range.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● Cooling fan ● Cooling fan relays ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-369, "Main 12 Causes of Overheating" .

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-9, "Changing Engine Coolant" . Also, replace the engine oil. Refer to LU-8, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-19, "Engine Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

BBS001HE

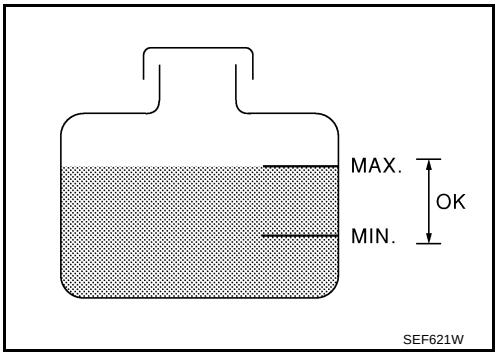
Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

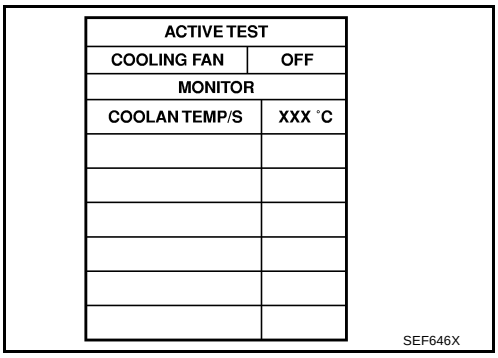
Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

WITH CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-362, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-362, "Diagnostic Procedure" .
3. Turn ignition switch ON.



4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-362, "Diagnostic Procedure" .

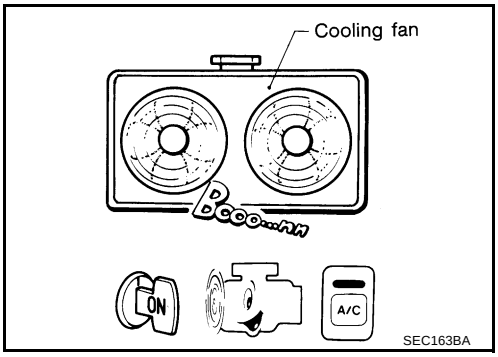


WITH GST

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-362, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-362, "Diagnostic Procedure" .
3. Start engine.

   CAUTION:
   Be careful not to overheat engine.
4. Set temperature control dial to full cold position.
5. Turn air conditioner switch ON.
6. Turn blower fan switch ON.
7. Run engine at idle for a few minutes with air conditioner operating.

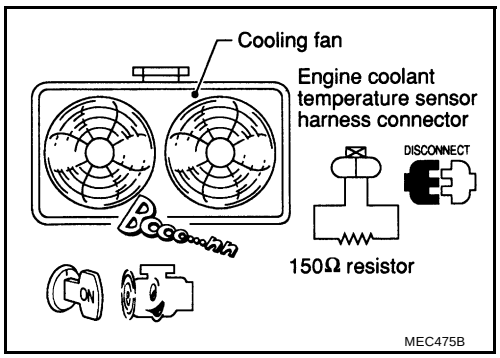
   CAUTION:
   Be careful not to overheat engine.
8. Make sure that cooling fans operates at low speed.
   If NG, go to EC-362, "Diagnostic Procedure" .
   If OK, go to the following step.
9. Turn ignition switch OFF.
10. Turn air conditioner switch and blower fan switch OFF.
11. Disconnect engine coolant temperature sensor harness connector.
12. Connect 150Ω resistor to engine coolant temperature sensor harness connector.



13. Restart engine and make sure that cooling fan operates at higher speed than low speed.

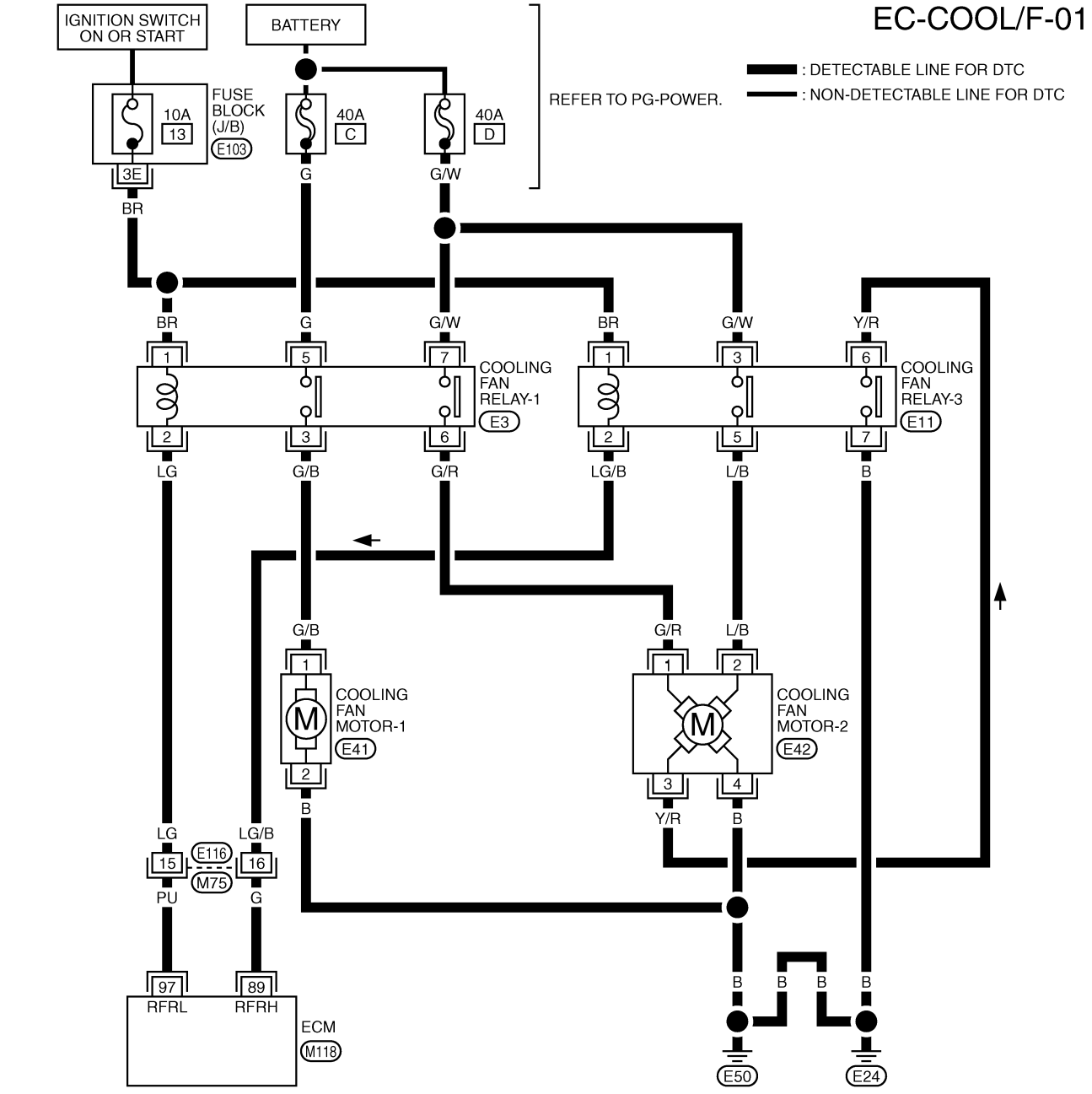
    CAUTION:
    Be careful not to overheat engine.

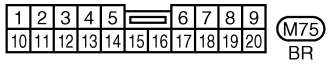
14. If NG, go to EC-362, "Diagnostic Procedure" .

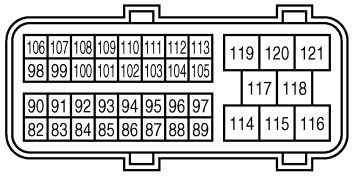


Wiring Diagram
LHD MODELS

BBS001HF







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0619E

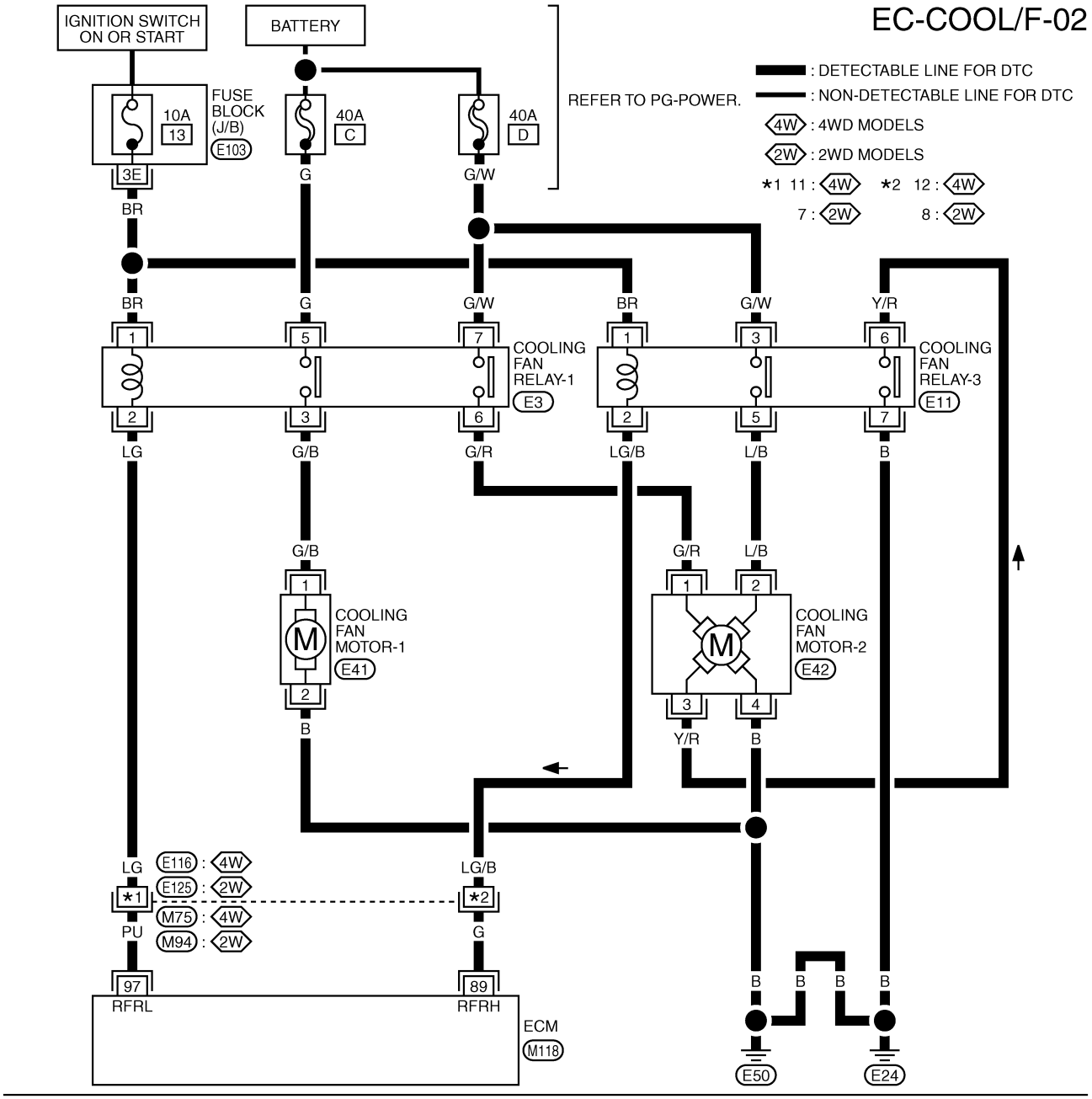
Specification data are reference values and are measured between each terminal and ground.

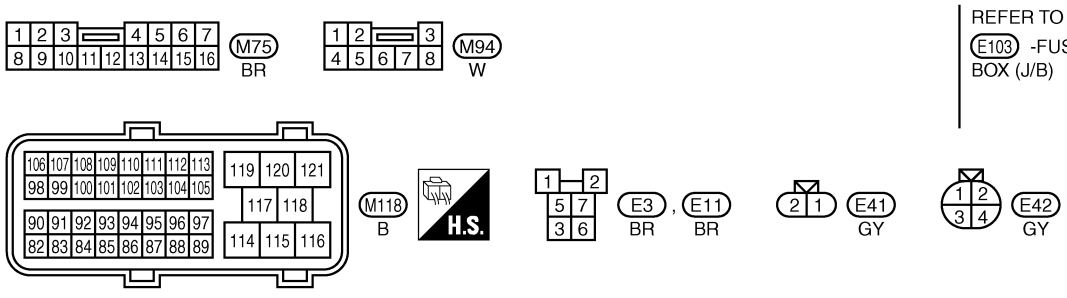
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	G	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is high speed operating	0 - 1.0V
97	PU	Cooling fan relay (Low)	**[Ignition switch: ON]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Cooling fan is operating	0 - 1.0V

RHD MODELS





REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0690E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	G	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is high speed operating	0 - 1.0V
97	PU	Cooling fan relay (Low)	**[Ignition switch: ON]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Cooling fan is operating	0 - 1.0V

Diagnostic Procedure

BBS001HG

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

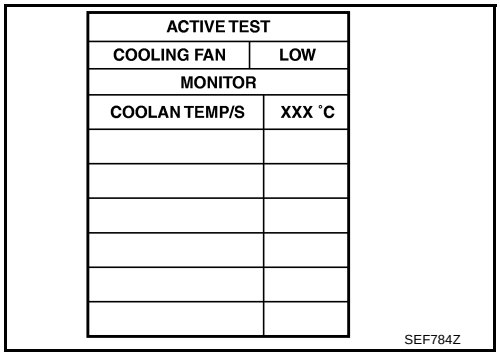
2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “LOW” on the CONSULT-II screen.
3. Make sure that cooling fans-1 and -2 operates at low speed.

OK or NG

OK >> GO TO 3.
NG >> Check cooling fan low speed control circuit. (Go to EC-366, "PROCEDURE A" .)



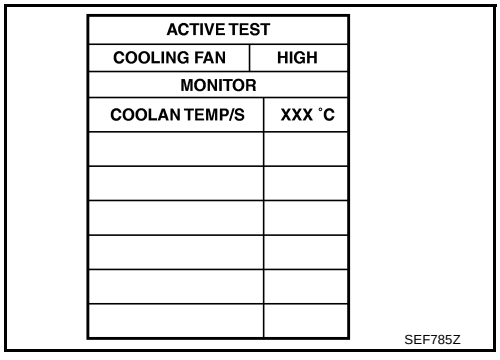
3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Touch “HIGH”on the CONSULT-II screen.
2. Make sure that cooling fan-2 operate at higher speed than low speed.

OK or NG

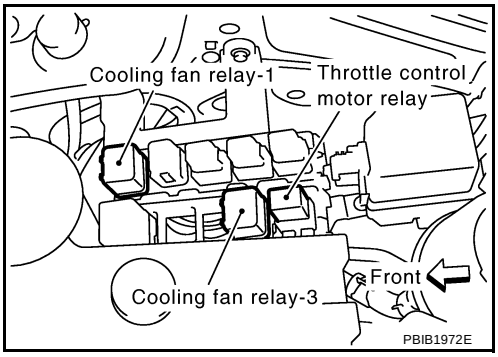
OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-368, "PROCEDURE B" .)



4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

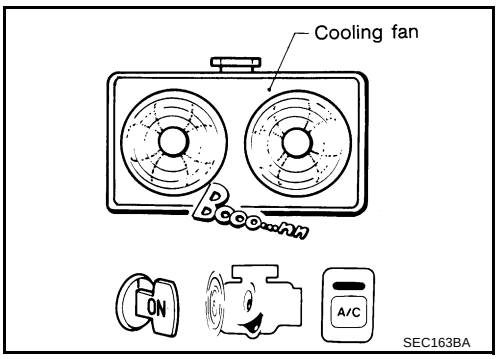
1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-3.
3. Start engine and let it idle.
4. Turn air conditioner switch ON.
5. Turn blower fan switch ON.



6. Make sure that cooling fans-1 and -2 operates at low speed.

OK or NG

OK >> GO TO 5.
NG >> Check cooling fan low speed control circuit. (Go to EC-366, "PROCEDURE A" .)



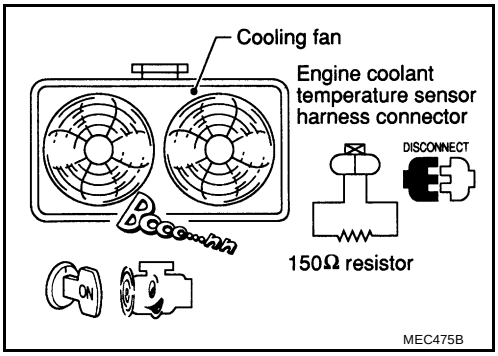
5. CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch OFF.
2. Reconnect cooling fan relay-3.
3. Turn air conditioner switch and blower fan switch OFF.
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Restart engine and make sure that cooling fan-2 operates at higher speed than low speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-368, "PROCEDURE B" .)



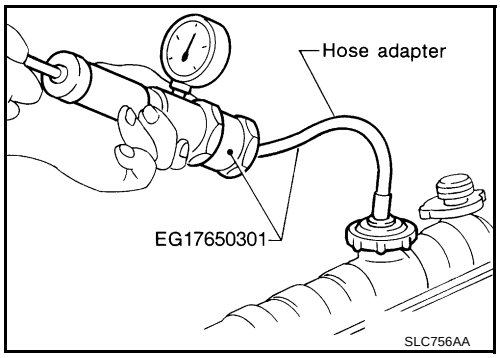
6. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm^2 , 23psi)

CAUTION:
Higher than the specified pressure may cause radiator damage.

Pressure should not drop.



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following for leak.

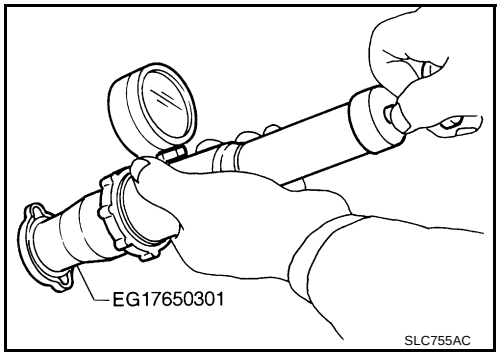
- Hose
- Radiator
- Water pump (Refer to CO-21, "WATER PUMP" .)

>> Repair or replace.

8. CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.

Radiator cap relief pressure: **59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm^2 , 9 - 14 psi)**



OK or NG

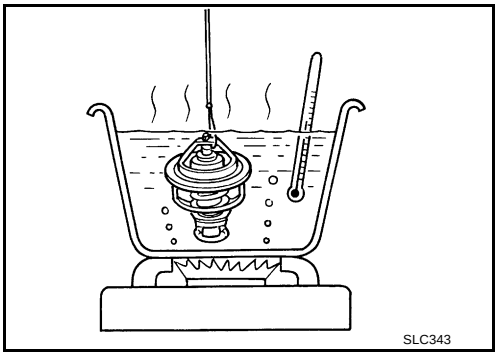
OK >> GO TO 9.
NG >> Replace radiator cap.

9. CHECK THERMOSTAT

1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
   It should seat tightly.
3. Check valve opening temperature and valve lift.

   Valve opening temperature: **82 °C (180 °F) [standard]**

   Valve lift: **More than 8 mm/95 °C (0.31 in/203 °F)**



4. Check if valve is closed at 5°C (9°F) below valve opening temperature.
   For details, refer to CO-23, "THERMOSTAT AND WATER CONTROL VALVE" .

OK or NG

OK >> GO TO 10.
NG >> Replace thermostat.

10. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-173, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace engine coolant temperature sensor.

11. CHECK MAIN 12 CAUSES

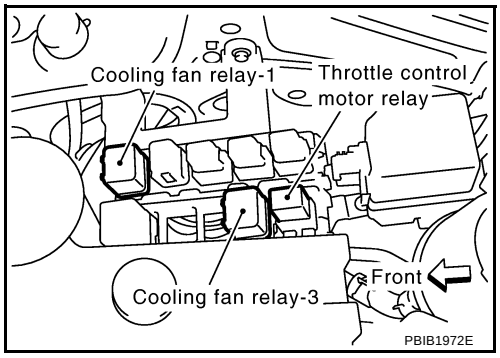
If the cause cannot be isolated, go to EC-369, "Main 12 Causes of Overheating" .

>> **INSPECTION END**

PROCEDURE A

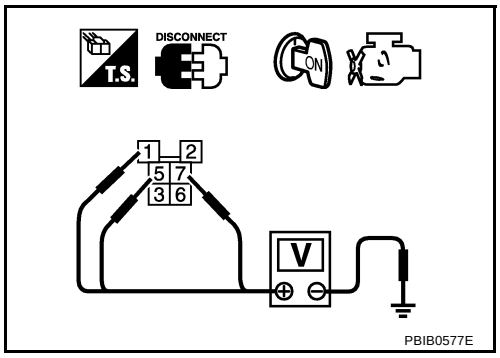
1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch ON.



4. Check voltage between cooling fan relay-1 terminals 1, 5, 7 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

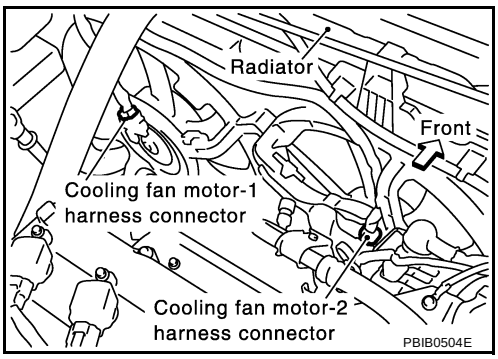
- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN MOTORS CONTROL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-1 terminal 3 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 2 and ground.

Continuity should exist.



4. Also check harness for short to ground and short to power.
5. Check harness continuity between cooling fan relay-1 terminal 6 and cooling fan motor-2 terminal 1, cooling fan motor-2 terminal 4 and ground.

Continuity should exist.

6. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between cooling fan relay-1 terminal 2 and ECM terminal 97. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E116, M75
- Harness for open or short between cooling fan relay-1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-1

Refer to EC-370, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-370, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

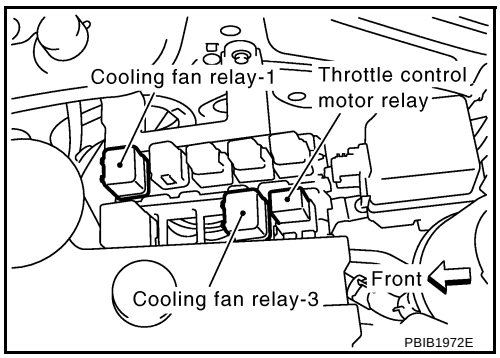
Perform EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

PROCEDURE B

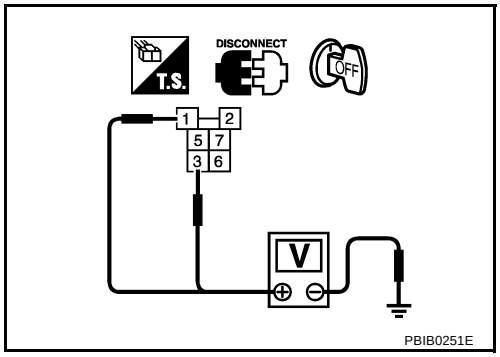
1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-3.
3. Turn ignition switch ON.



4. Check voltage between cooling fan relay-3 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness for open or short between cooling fan relay-3 and fuse
- Harness for open or short between cooling fan relay-3 and battery

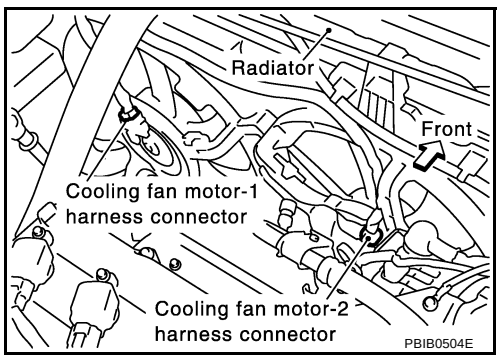
>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN MOTORS CONTROL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 2, cooling fan motor-2 terminal 3 and cooling fan relay-3 terminal 6, cooling fan relay-3 terminal 7 and ground.

Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between cooling fan relay-3 terminal 2 and ECM terminal 89. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E116, M75
- Harness for open or short between cooling fan relay-3 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-3

Refer to EC-370, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK INTERMITTENT INCIDENT

Perform EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

BBS001HH

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-19 .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See CO-9 .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-13 .
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-9 .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-23 , and CO-12 .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-355).
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See CO-9 .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-9 .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-70 .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-89 .

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-5, "OVERHEATING CAUSE ANALYSIS" .

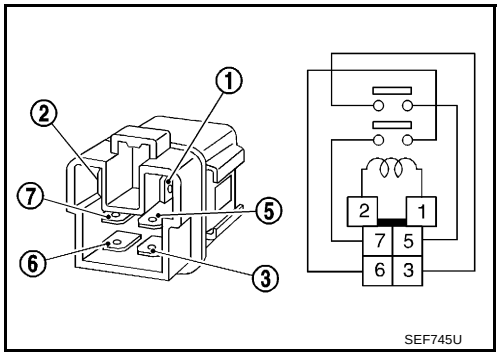
Component Inspection

BBS001HI

COOLING FAN RELAYS-1 AND -3

Check continuity between terminals 3 and 5, 6 and 7.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

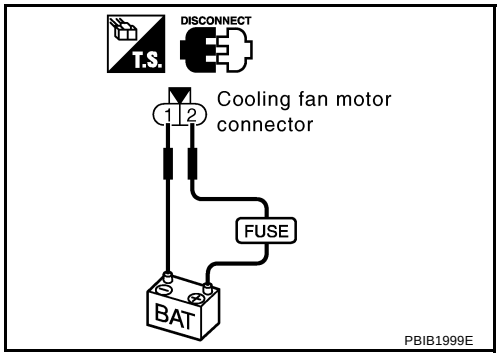


SEF745U

COOLING FAN MOTOR-1

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(-)
Cooling fan motor	1	2

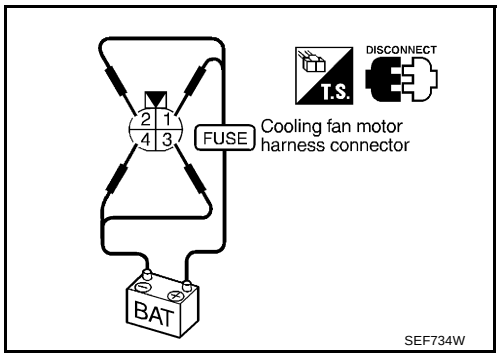


PBIB1999E

COOLING FAN MOTOR-2

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(+)	(-)
Cooling fan motor	Low	1	4
	High	1, 2	3, 4



SEF734W

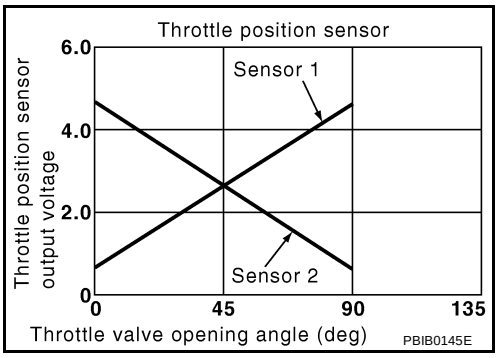
DTC P1225 TP SENSOR

PFP:16119

Component Description

BBS001HJ

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

BBS001HK

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance problem	Closed throttle position learning value is excessively low.	● Electric throttle control actuator (TP sensor 1 and 2)

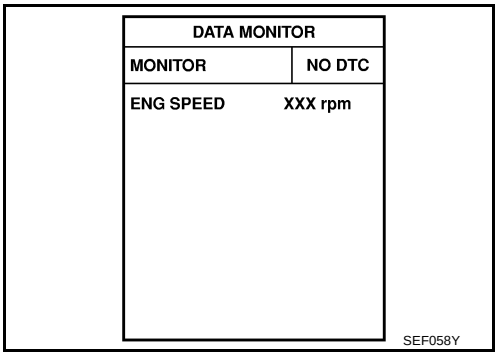
DTC Confirmation Procedure

BBS001HL

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. If 1st trip DTC is detected, go to EC-372, "Diagnostic Procedure" .



WITH GST

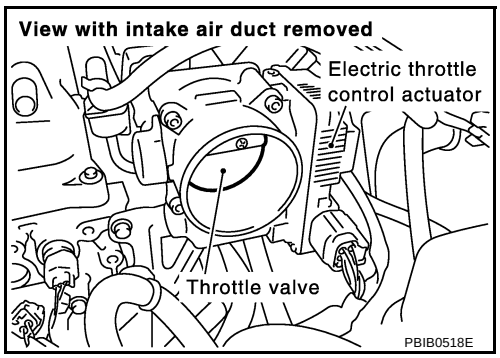
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001HM

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

Removal and Installation

BBS001HN

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

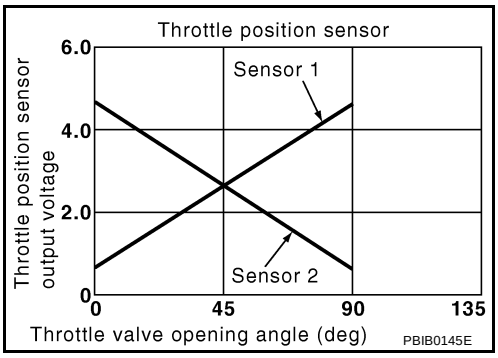
DTC P1226 TP SENSOR

PFP:16119

Component Description

BBS001HO

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

BBS001HP

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance problem	Closed throttle position learning is not performed successfully, repeatedly.	● Electric throttle control actuator (TP sensor 1 and 2)

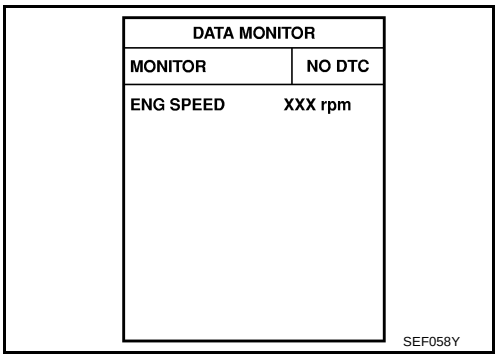
DTC Confirmation Procedure

BBS001HQ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Repeat steps 3 and 4 for 32 times.
6. If 1st trip DTC is detected, go to EC-374, "Diagnostic Procedure"
.



WITH GST

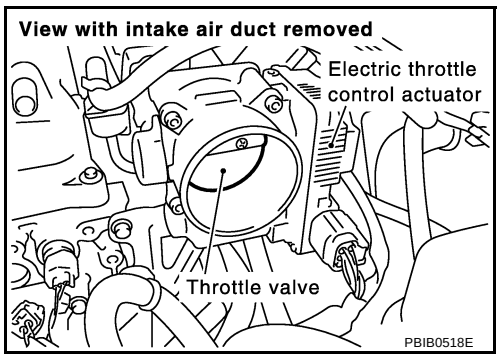
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001HR

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

Removal and Installation

BBS001HS

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P1229 SENSOR POWER SUPPLY

PFP:16119

On Board Diagnosis Logic

BBS001HT

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229 1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	● Harness or connectors (APP sensor 1 circuit is shorted.) (PSP sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) ● Accelerator pedal position sensor (APP sensor 1) ● Power steering pressure sensor ● Refrigerant pressure sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

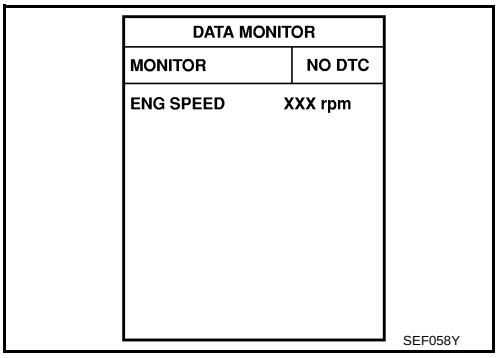
DTC Confirmation Procedure

BBS001HU

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-377, "Diagnostic Procedure" .



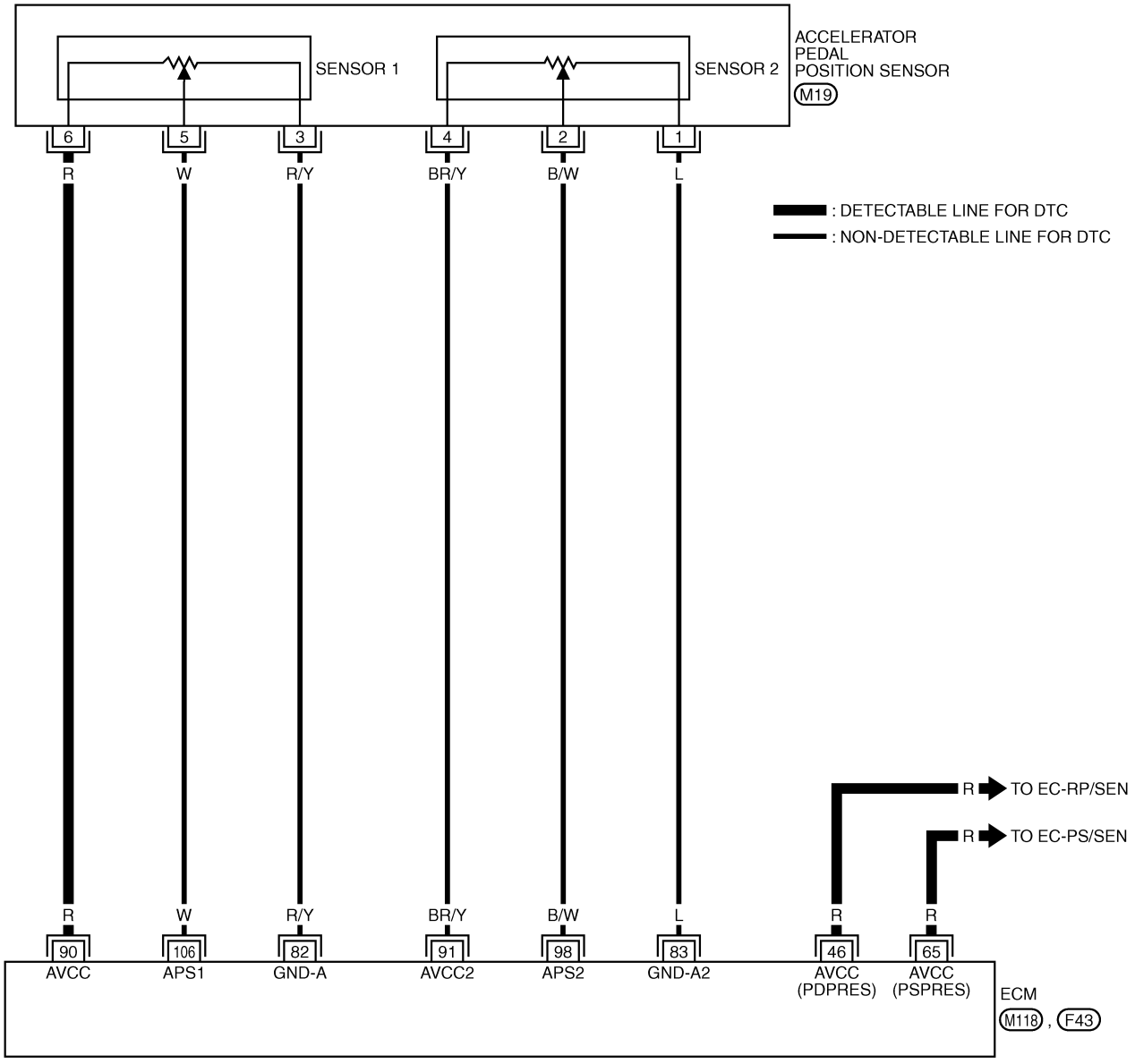
WITH GST

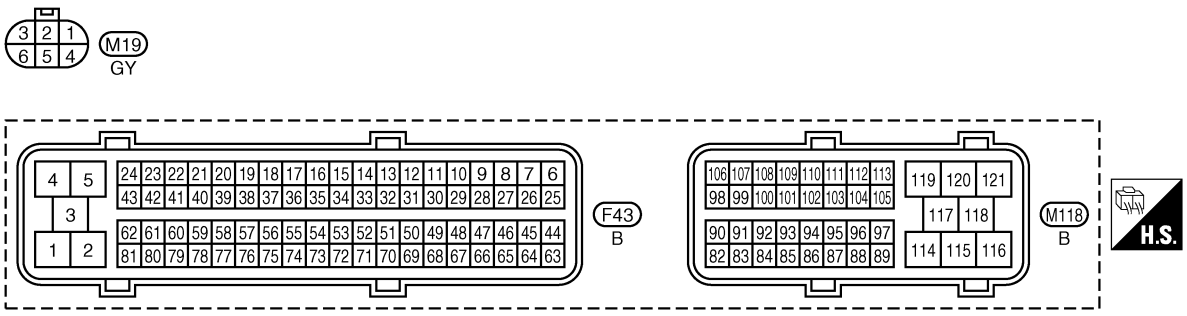
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001HV

EC-SEN/PW-01





TBWB0262E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

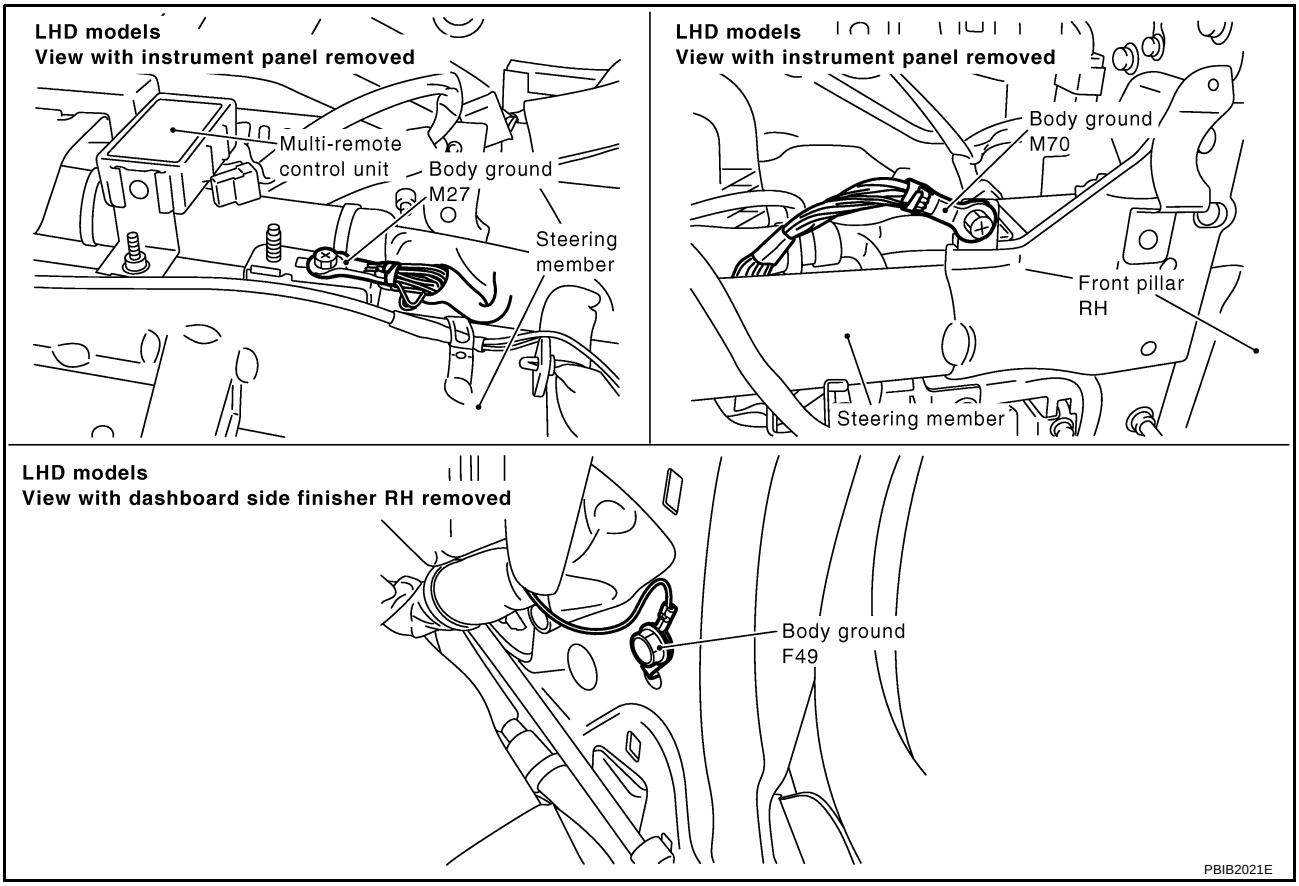
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	R	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
65	R	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

BBS001HW

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

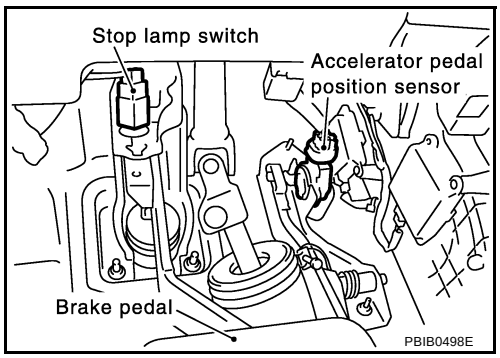


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

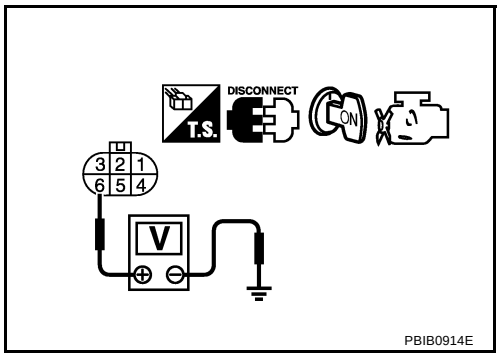
2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position sensor (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals

ECM terminal	Sensor terminal	Reference Wiring Diagram
90	APP sensor terminal 6	EC-376
46	Refrigerant pressure sensor terminal 3	EC-478
65	PSP sensor terminal 3	EC-281

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

- Refrigerant pressure sensor (Refer to ATC-90, "COMPONENT INSPECTION" .)
- Power steering pressure sensor (Refer to EC-285, "Component Inspection" .)

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning component.

5. CHECK APP SENSOR

Refer to EC-442, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .
3. Perform EC-50, "Throttle Valve Closed Position Learning" .
4. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

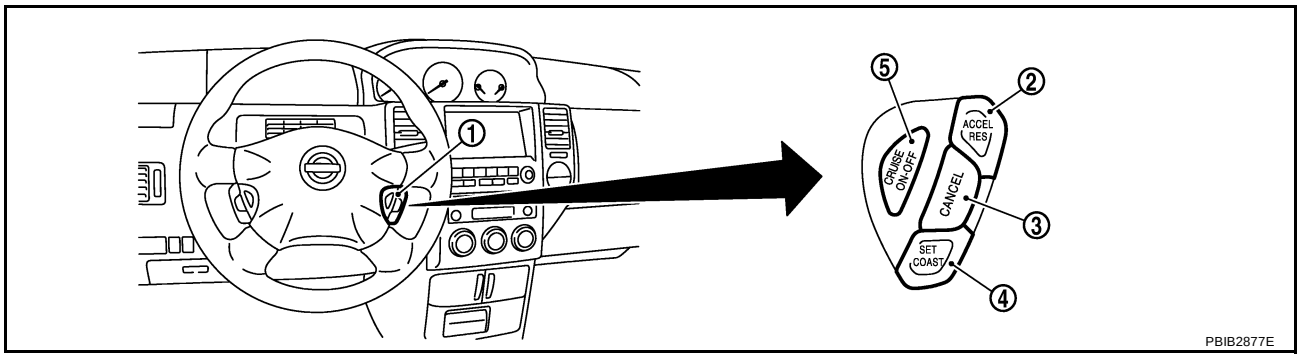
DTC P1564 ASCD STEERING SWITCH

PFP:25551

Component Description

BBS001HX

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. CANCEL switch
4. SET/COAST switch
5. MAIN switch

Refer to EC-532, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

BBS001HY

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF

On Board Diagnosis Logic

BBS001HZ

This self-diagnosis has the one trip detection logic.
The MI will not light up for this diagnosis.

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605.
Refer to EC-286, "DTC P0605 ECM".

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1564 1564	ASCD steering switch	● An excessively high voltage signal from the ASCD steering switch is sent to ECM. ● ECM detects that input signal from the ASCD steering switch is out of the specified range. ● ECM detects that the ASCD steering switch is stuck ON.	● Harness or connectors (The switch circuit is open or shorted.) ● ASCD steering switch ● ECM

DTC Confirmation Procedure

BBS001I0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If DTC is detected, go to EC-386, "Diagnostic Procedure" .

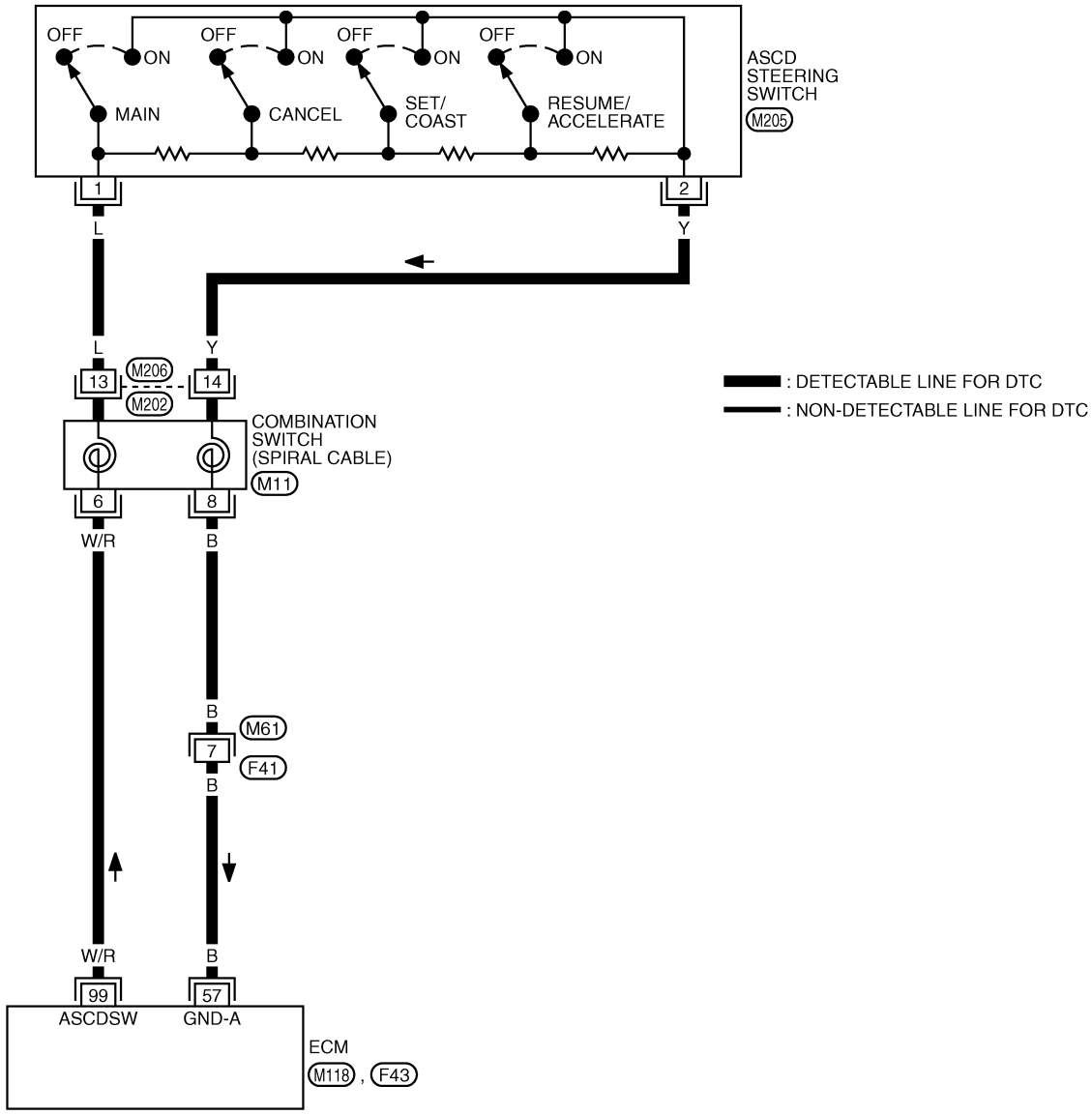
WITH GST

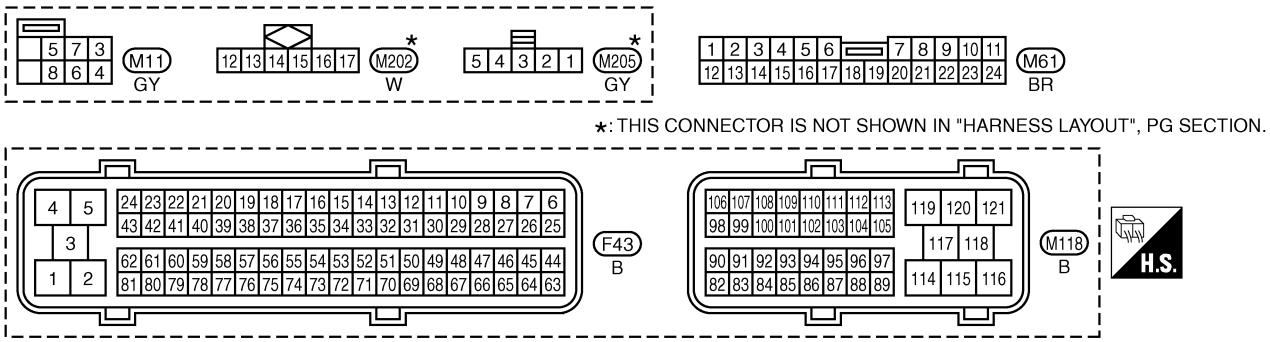
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram
LHD MODELS

BBS001I1

EC-ASC/SW-01





TBWB0463E

Specification data are reference values and are measured between each terminal and ground.

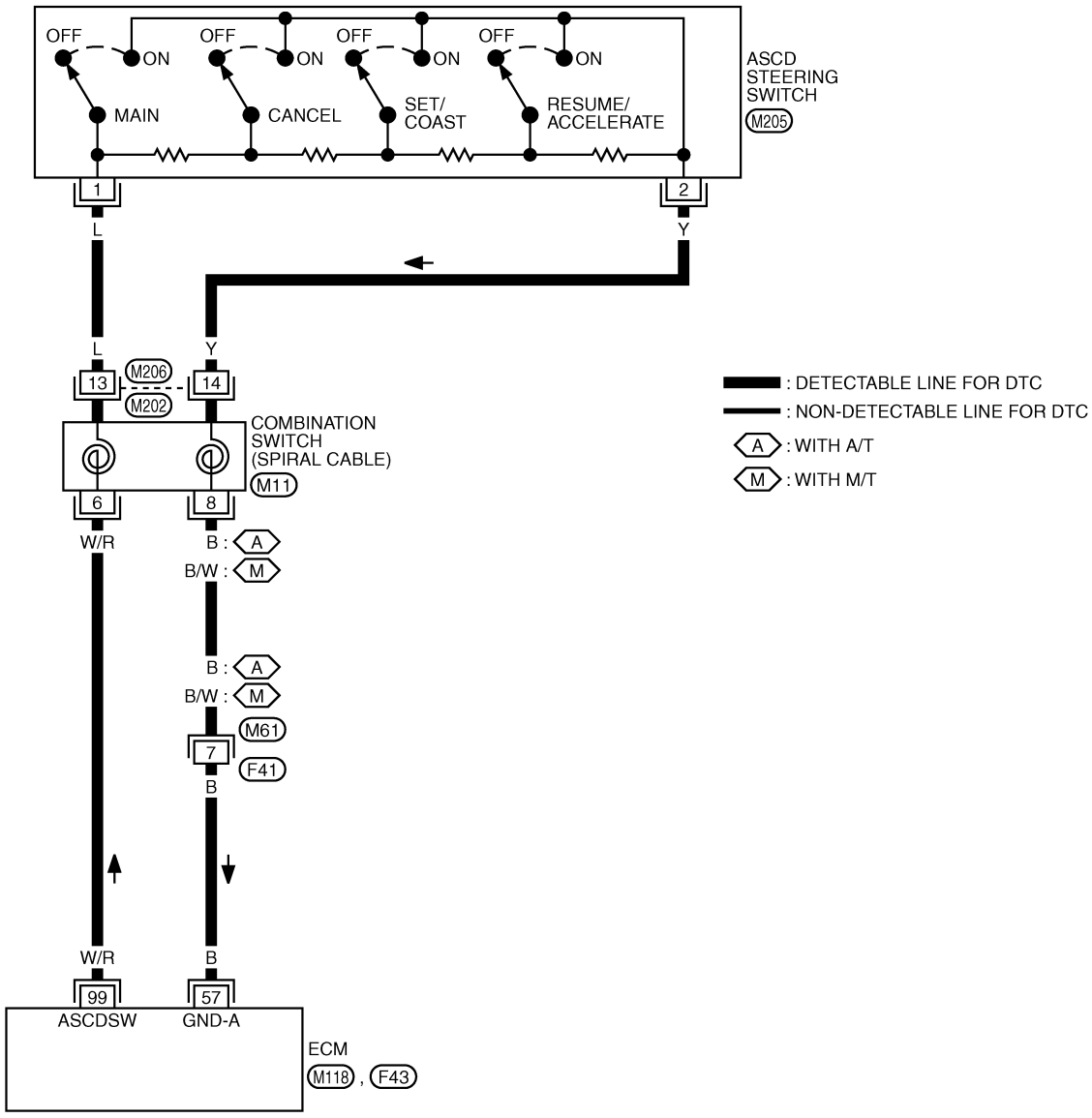
CAUTION:

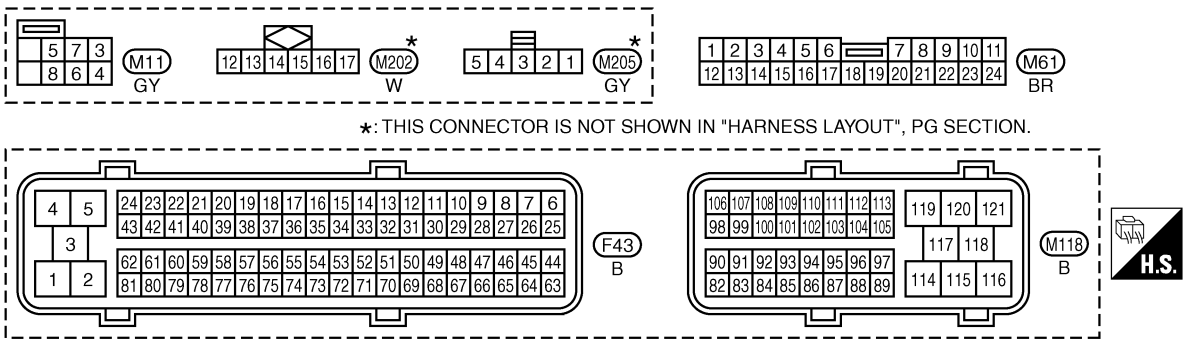
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
99	W/R	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch: OFF	Approximately 4V
			[Ignition switch: ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch: Pressed	Approximately 2V

RHD MODELS

EC-ASC/SW-02





TBWB0464E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

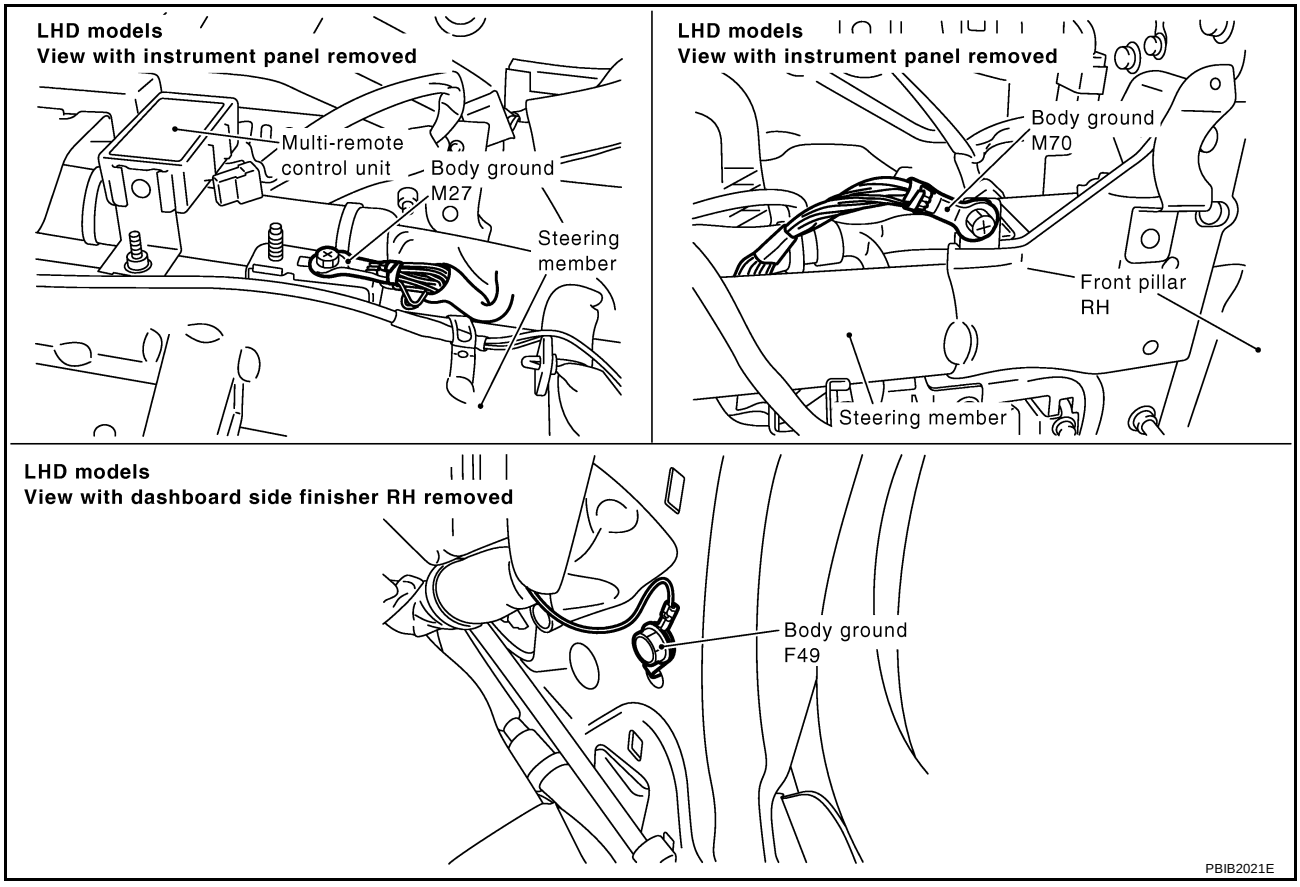
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
99	W/R	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch: OFF	Approximately 4V
			[Ignition switch: ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch: Pressed	Approximately 2V

Diagnostic Procedure

BBS001I2

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .



OK or NG

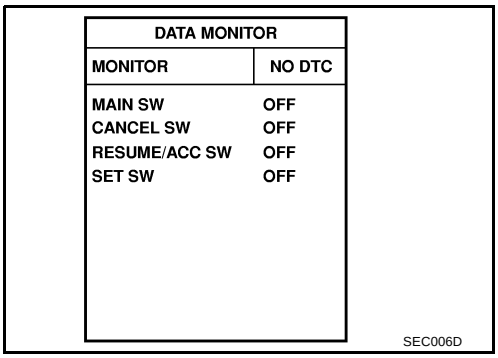
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-II

1. Turn ignition switch ON.
2. Select “MAIN SW”, “RESUME/ACC SW”, “SET SW” and “CANCEL SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check each item indication under the following conditions.

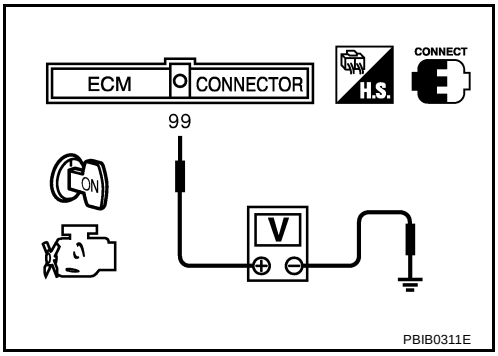
Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF
RESUME/ACCEL-ERARE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 99 and ground with pressing each button.

Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4
CANCEL switch	Pressed	Approx. 1
	Released	Approx. 4
RESUME/ACCELERATE switch	Pressed	Approx. 3
	Released	Approx. 4
SET/COAST switch	Pressed	Approx. 2
	Released	Approx. 4



OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

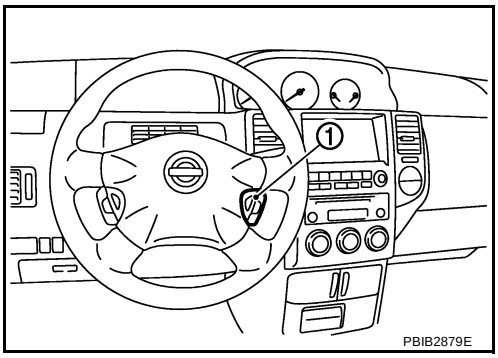
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect ASCD steering switch (1) harness connector M205.
4. Check harness continuity between ASCD steering switch terminal 2 and ECM terminal 57. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M202, M206
- Harness connectors M61, F41
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 99 and ASCD steering switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M202, M206
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-386, "Diagnostic Procedure" .

OK or NG

OK >> GO TO 8.
NG >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

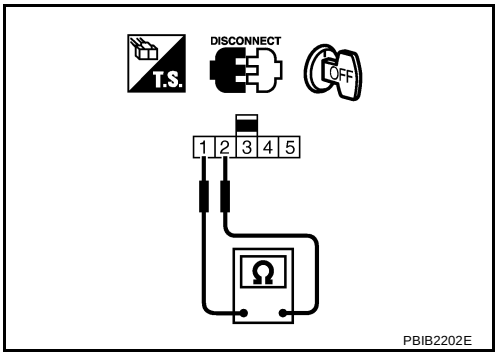
Component Inspection

BBS001I3

ASCD STEERING SWITCH

1. Disconnect ASCD steering switch harness connector M205.
2. Check continuity between ASCD steering switch terminals 1 and 2 with pushing each switch.

Switch	Condition	Resistance [Ω]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000



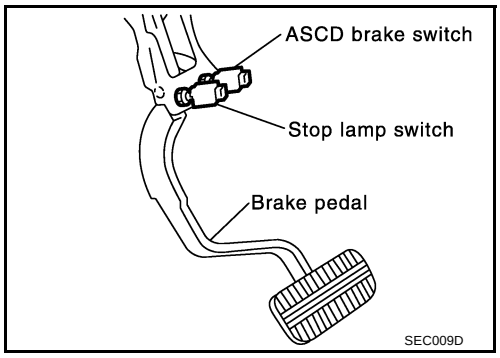
DTC P1572 ASCD BRAKE SWITCH

PFP:25320

Component Description

BBS001I4

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-532, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

BBS001I5

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	● Ignition switch: ON	Clutch pedal (M/T) and brake pedal: Fully released	ON
		Clutch pedal (M/T) and/or brake pedal: Slightly depressed	OFF
BRAKE SW2 (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

BBS001I6

This self-diagnosis has the one trip detection logic.
The MI will not light up for this diagnosis.

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-286, "DTC P0605 ECM".**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition		Possible Cause
P1572 1572	ASCD brake switch	A)	When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time.	● Harness or connectors (The stop lamp switch circuit is shorted.) ● Harness or connectors (The ASCD brake switch circuit is shorted.)
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	● Harness or connectors (The ASCD clutch switch circuit is shorted.) (M/T models) ● Stop lamp switch ● ASCD brake switch ● ASCD clutch switch (M/T models) ● Incorrect stop lamp switch installation ● Incorrect ASCD brake switch installation ● Incorrect ASCD clutch switch installation (M/T models) ● ECM

DTC Confirmation Procedure

BBS001I7

CAUTION:
Always drive vehicle at a safe speed.

NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

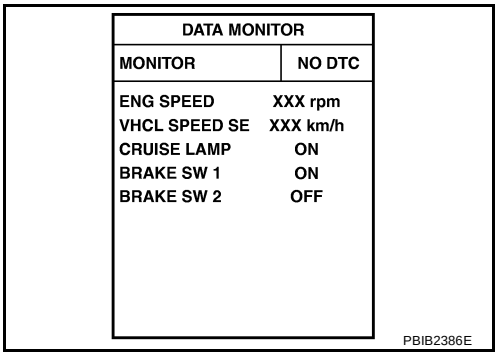
TESTING CONDITION:
Steps 4 and 5 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine (EPS switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Press MAIN switch and make sure that CRUISE indicator lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Shift lever	Suitable position

If 1st trip DTC is detected, go to EC-393, "Diagnostic Procedure" .
If 1st trip DTC is not detected, go to the following step.



5. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Shift lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

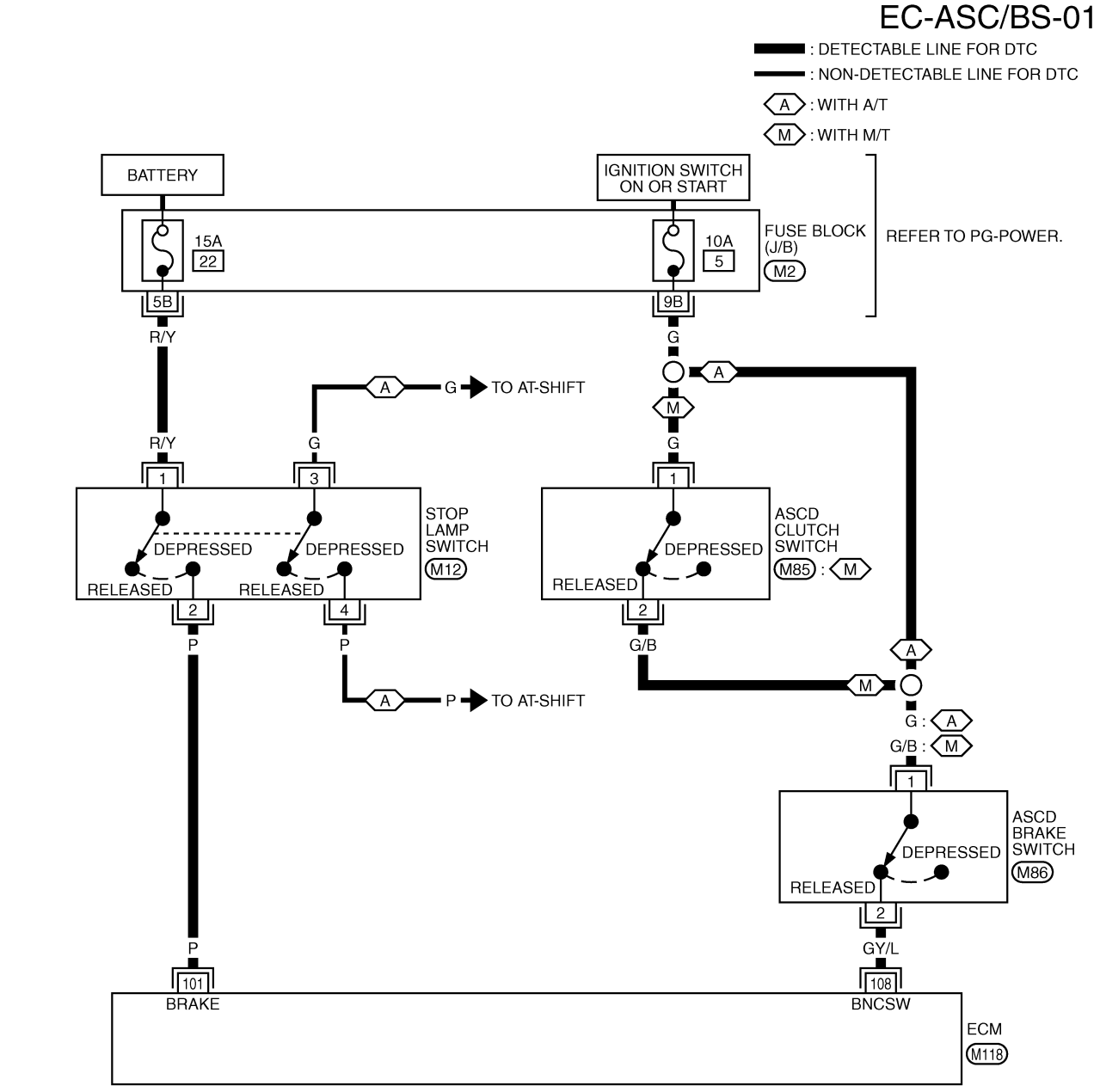
6. If 1st trip DTC is detected, go to EC-393, "Diagnostic Procedure" .

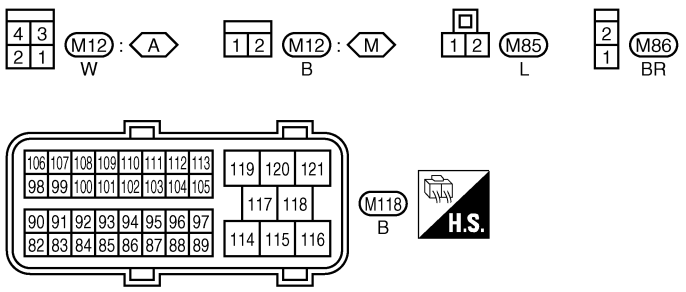
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001I8





REFER TO THE FOLLOWING.

M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0756E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	P	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	GY/L	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal and/or clutch pedal (M/T): Slightly depressed	Approximately 0V
			[Ignition switch: ON] ● Brake pedal and clutch pedal (M/T): Fully released	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS001I9

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

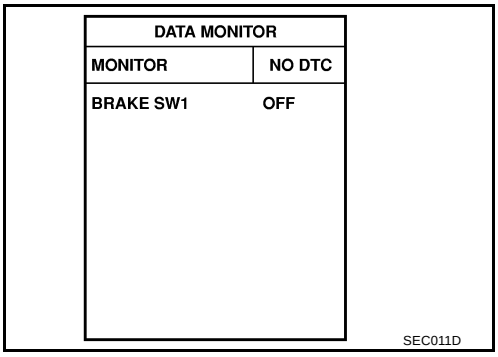
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

A/T models

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

M/T models

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON



Without CONSULT-II

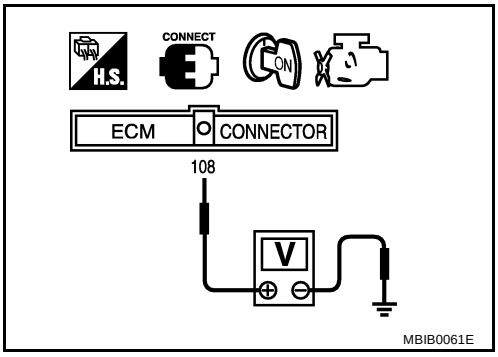
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

A/T models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

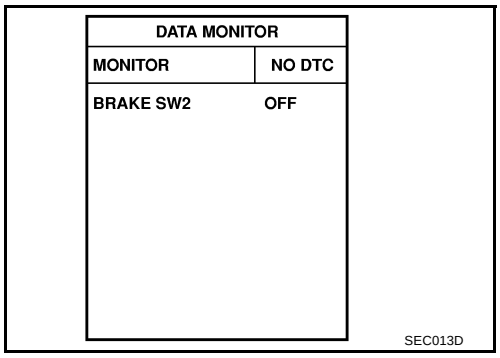
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

1. Select “BRAKE SW2” in “DATA MONITOR” mode with CONSULT-II.
2. Check “BRAKE SW2” indication under the following conditions.

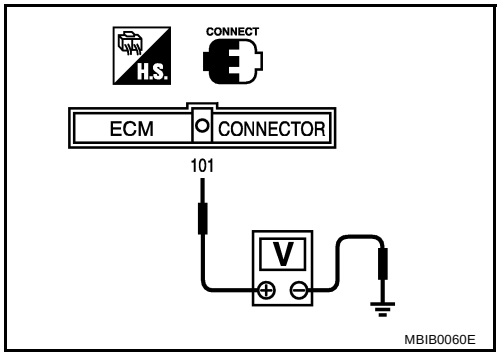
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

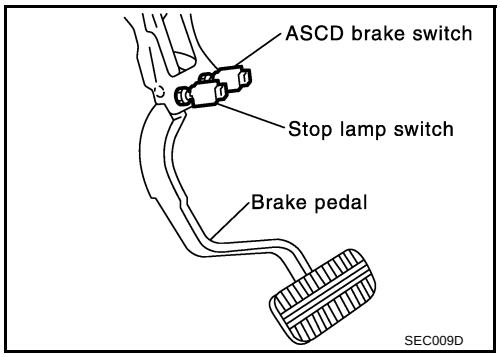


OK or NG

OK >> GO TO 15.
NG >> GO TO 11.

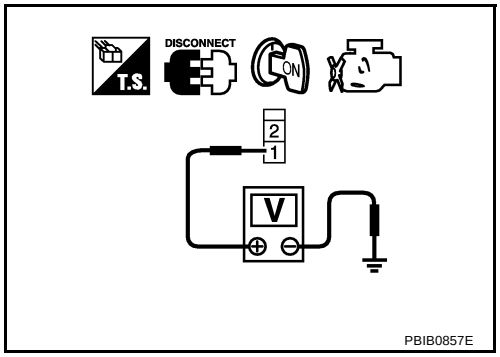
3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG (A/T models)>>GO TO 4.
NG (M/T models)>>GO TO 5.

4. DETECT MALFUNCTIONING PART

Check the following.

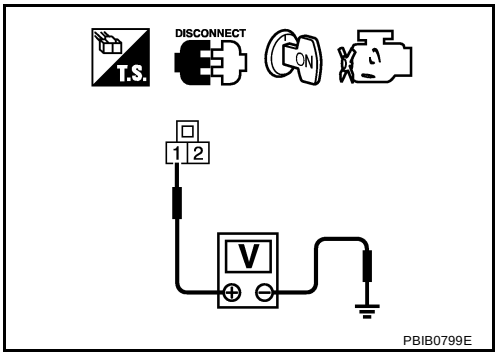
- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between ASCD clutch switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD clutch switch terminal 2 and ASCD brake switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK ASCD CLUTCH SWITCH

Refer to EC-398, "Component Inspection"

OK or NG

OK >> GO TO 15.
NG >> Replace ASCD clutch switch.

9. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ASCD brake switch terminal 2 and ECM terminal 108. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH

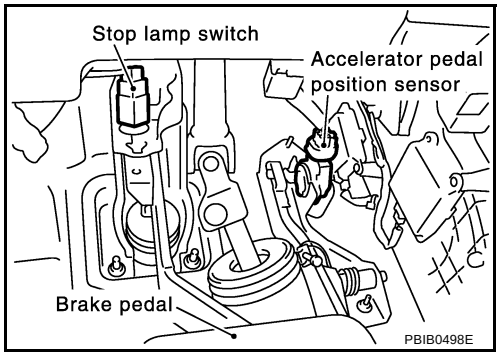
Refer to EC-398, "Component Inspection" .

OK or NG

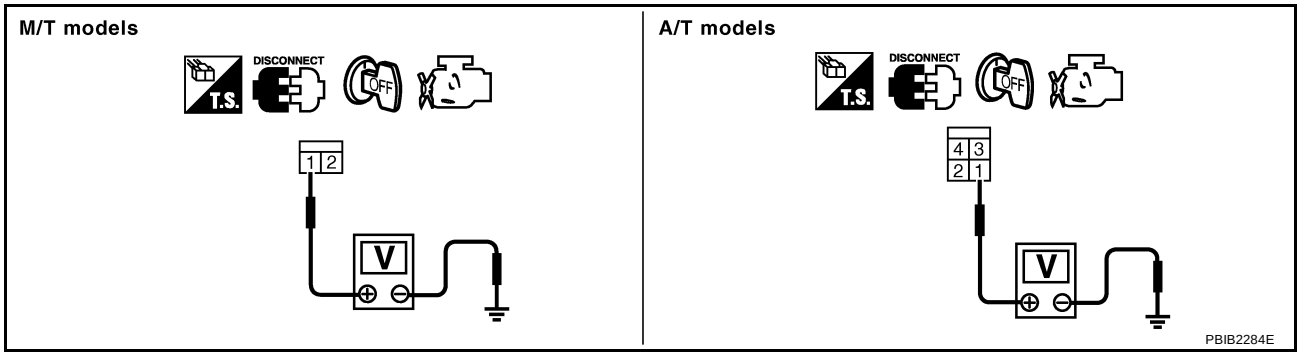
OK >> GO TO 15.
NG >> Replace ASCD brake switch.

11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 15A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK STOP LAMP SWITCH

Refer to EC-398, "Component Inspection"

OK or NG

OK >> GO TO 15.
NG >> Replace stop lamp switch.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

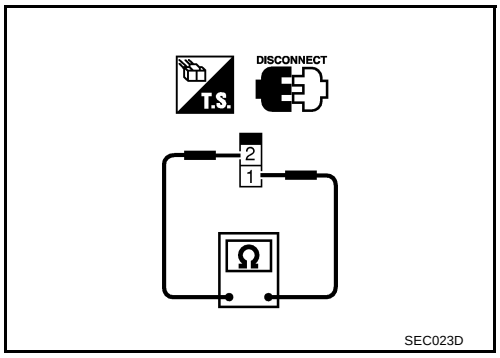
Component Inspection

BBS001IA

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

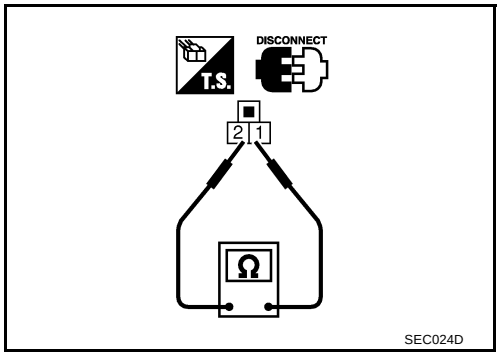


If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

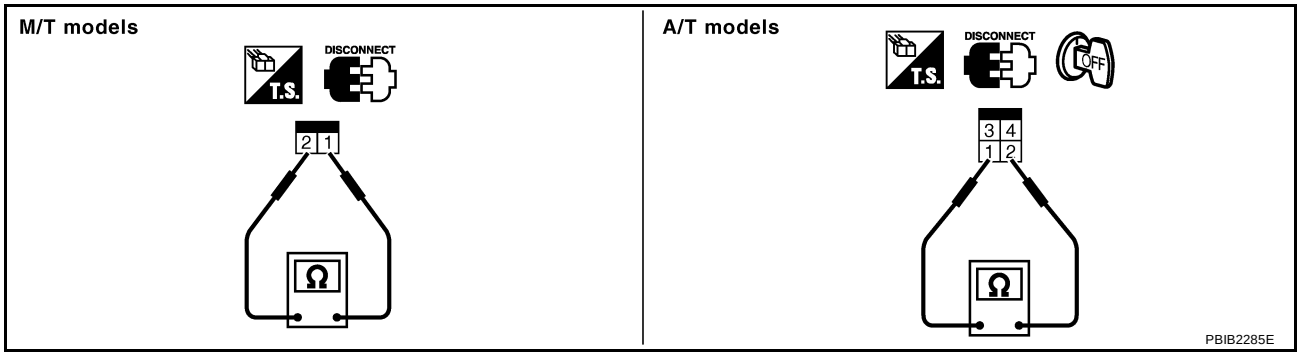
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist



If NG, adjust ASCD clutch switch installation, refer to CL-5, "CLUTCH PEDAL" , and perform step 3 again.

STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

DTC P1574 ASCD VEHICLE SPEED SENSOR

PFP:31036

System Description

BBS001IB

ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from ESP/TCS/ABS control unit (models with ESP) or “ABS actuator and electric unit (control unit)”(models without ESP), and the other is from TCM (Transmission control module).

The ECM uses these signals for ASCD control. Refer to EC-532, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

BBS001IC

This self-diagnosis has the one trip detection logic.
The MI will not light up for this diagnosis.

NOTE:

- **If DTC P1574 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-136, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-279, "DTC P0500 VSS" .**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-286, "DTC P0605 ECM" .**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1574 1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (Revolution sensor circuit is open or shorted) ● Harness or connectors (Wheel sensor circuit is open or shorted.) ● TCM ● ESP/TCS/ABS control unit (models with ESP) ● “ABS actuator and electric unit (control unit)” (models without ESP) ● Combination meter ● Wheel sensor ● Revolution sensor ● ECM

DTC Confirmation Procedure

BBS001ID

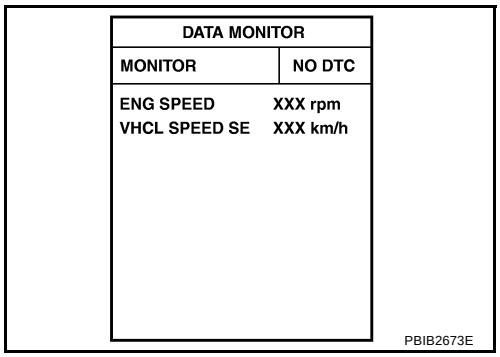
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine (ESP switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 40 km/h (25 MPH).
4. If DTC is detected, go to EC-400, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001IE

1. CHECK DTC WITH TCM

Check DTC with TCM.
Refer to AT-38, "HOW TO READ DTC AND 1ST TRIP DTC" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. CHECK DTC WITH ESP/TCS/ABS CONTROL UNIT (MODELS WITH ESP), “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)” (MODELS WITHOUT ESP)

Check DTC with ESP/TCS/ABS control unit (models with ESP), “ABS actuator and electric unit (control unit)” (models without ESP). Refer to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP), BRC-9, "TROUBLE DIAGNOSIS" (models without ESP).

OK or NG

OK >> GO TO 3.
NG >> Perform trouble shooting relevant to DTC indicated.

3. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

DTC P1706 PNP SWITCH

PFP:32006

Component Description

BBS001IF

When the shift lever position is P or N (A/T), Neutral (M/T), park/neutral position (PNP) switch is ON.
ECM detects the position because the continuity of the line (the ON signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

BBS001IG

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF

On Board Diagnosis Logic

BBS001IH

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706 1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	● Harness or connectors (PNP switch circuit is open or shorted.) ● Park/neutral position (PNP) switch

DTC Confirmation Procedure

BBS001II

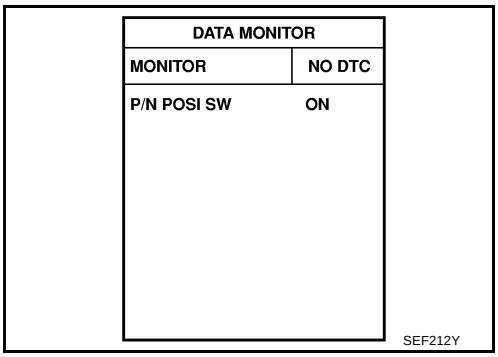
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.

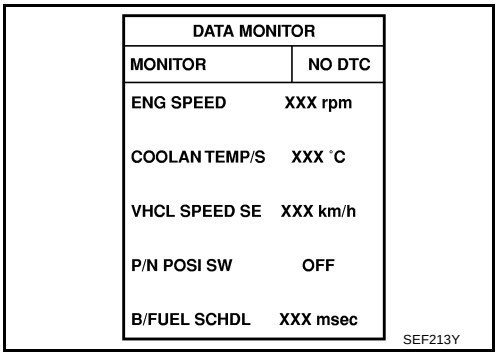
Position (Selector lever)	Known-good signal
N or P position (A/T) Neutral position (M/T)	ON
Except above position	OFF



If NG, go to EC-404, "Diagnostic Procedure" .
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,500 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.0 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Shift lever	Suitable position



6. If 1st trip DTC is detected, go to EC-404, "Diagnostic Procedure" .

Overall Function Check

BBS001IJ

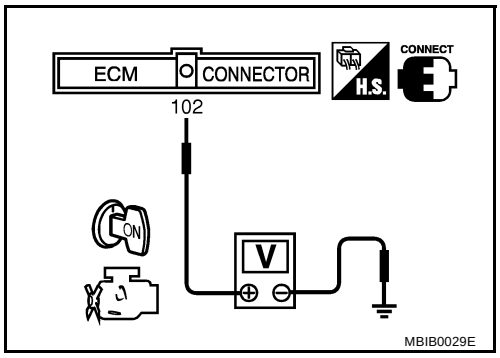
Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITH GST

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 (PNP switch signal) and body ground under the following conditions.

Condition (Gear position)	Voltage V (Known-good data)
P or N position (A/T) Neutral position (M/T)	Approx. 0
Except above position	A/T: Battery voltage M/T: Approximately 5V

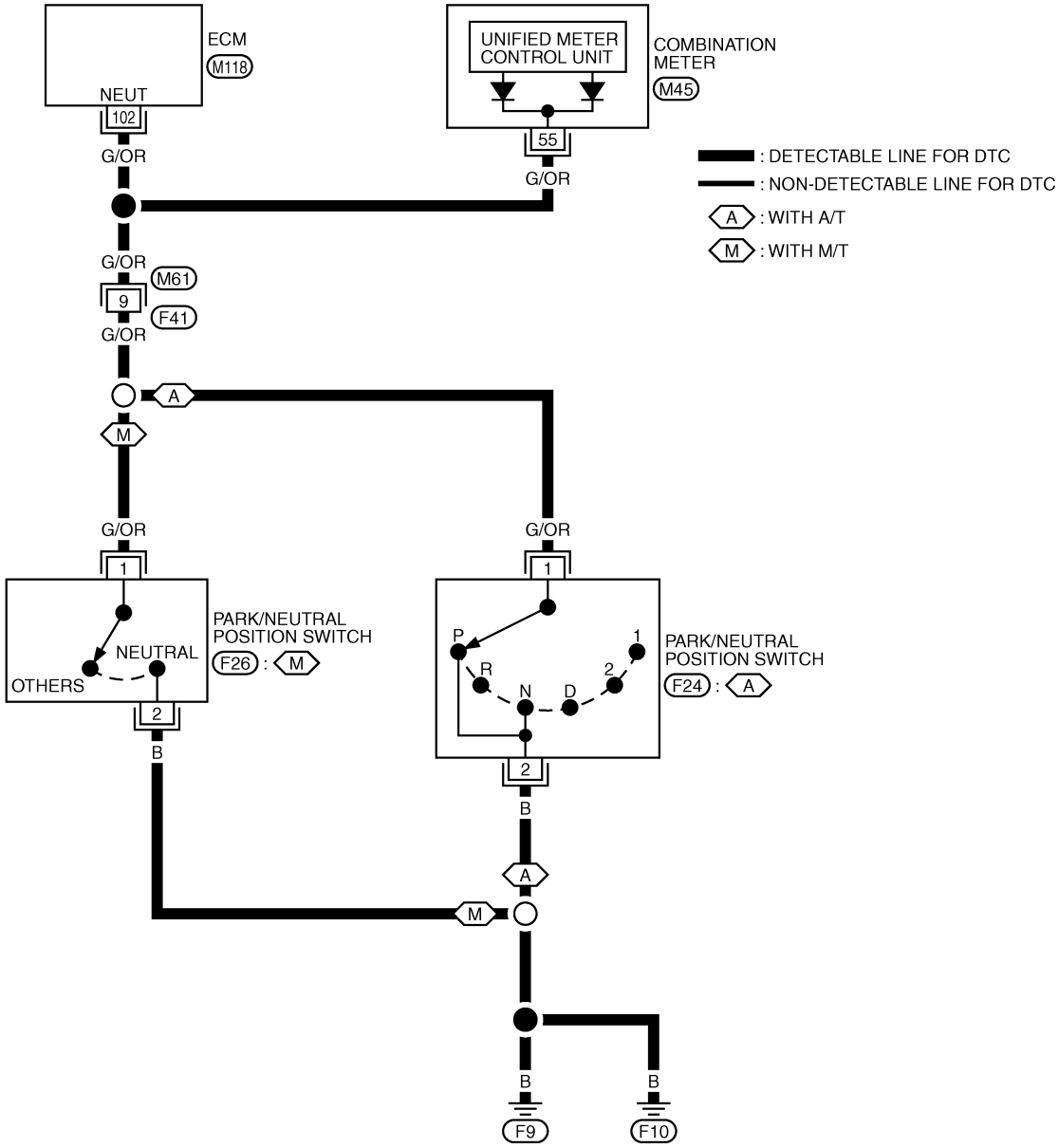
3. If NG, go to EC-404, "Diagnostic Procedure" .

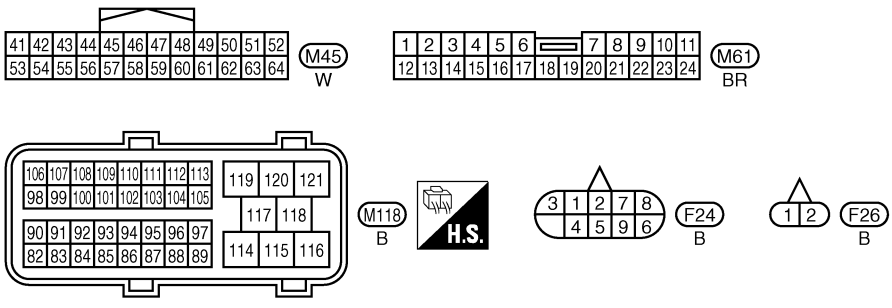


Wiring Diagram

BBS001IK

EC-PNP/SW-01





TBWA0622E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	G/OR	PNP switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	**A/T models** BATTERY VOLTAGE (11 - 14V) **M/T models** Approximately 5V

Diagnostic Procedure

BBS001IL

1. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect PNP switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to power in harness or connectors.

2. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect combination meter harness connector.
3. Check harness continuity between PNP switch terminal 1 and ECM terminal 102, combination meter terminal 55. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M61, F41
- Harness for open or short between PNP switch and ECM
- Harness for open or short between PNP switch and combination meter

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK PNP SWITCH

Refer to AT-400, "Park/Neutral Position (PNP) Switch" (A/T) or MT-15, "PARK/NEUTRAL POSITION (PNP) SWITCH" (M/T).

OK or NG

OK >> GO TO 5.
NG >> Replace PNP switch.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1720 VSS

PFP:31036

Description

BBS001IM

NOTE:
If DTC P1720 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-136, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from ESP/TCS/ABS control unit (models with ESP) or “ABS actuator and electric unit (control unit)”(models without ESP), and the other is from TCM (Transmission control module). ECM uses these two signals for engine control.

CONSULT-II Reference Value in Data Monitor Mode

BBS001IN

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VEH SPEED SE	● Turn drive wheels and compare the CONSULT-II value with speedometer indication	Almost the same speed as the speedometer indication

On Board Diagnosis Logic

BBS001IO

The MI will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1720 1720	Vehicle speed sensor (A/T output)	ECM detects a difference between two vehicle speed sensor signals is out of the specified range.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (Revolution sensor circuit is open or shorted) ● Harness or connectors (Wheel sensor circuit is open or shorted.) ● TCM ● ESP/TCS/ABS control unit (models with ESP) ● “ABS actuator and electric unit (control unit)” (models without ESP) ● Combination meter ● Wheel sensor ● Revolution sensor

DTC Confirmation Procedure

BBS001IP

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine.
4. Drive vehicle at a speed of 20 km/h (12 MPH) or more for at least 5 seconds without brake pedal depressing.
5. If 1st trip DTC is detected, go to EC-407, "Diagnostic Procedure" .

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001IQ

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-6, "TROUBLE DIAGNOSIS — INDEX" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. CHECK DTC WITH ESP/TCS/ABS CONTROL UNIT (MODELS WITH ESP), “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)” (MODELS WITHOUT ESP)

Check DTC with ESP/TCS/ABS control unit (models with ESP), “ABS actuator and electric unit (control unit)” (models without ESP). Refer to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP), BRC-9, "TROUBLE DIAGNOSIS" (models without ESP).

OK or NG

OK >> GO TO 3.
NG >> Perform trouble shooting relevant to DTC indicated.

3. CHECK COMBINATION METER

Check combination meter function. Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

DTC P1805 BRAKE SWITCH

PFP:25320

Description

BBS001IR

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.

CONSULT-II Reference Value in Data Monitor Mode

BBS001IS

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

BBS001IT

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	● Harness or connectors (Stop lamp switch circuit is open or shorted.) ● Stop lamp switch

FAIL-SAFE MODE

BBS001IU

When the malfunction is detected, the ECM enters in fail-safe mode.

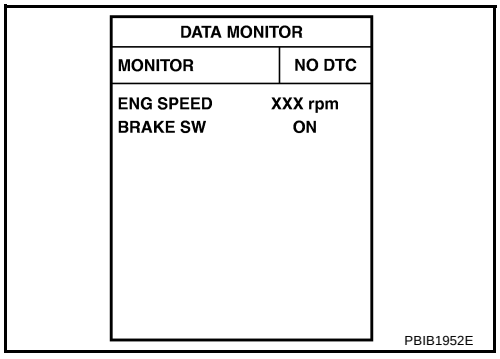
Engine operation condition in fail-fail safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range.Therefore,acceleration will be poor.	
Vehicle condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

DTC Confirmation Procedure

BBS001IV

WITH CONSULT-II

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If 1st trip DTC is detected, go to EC-410, "Diagnostic Procedure" .

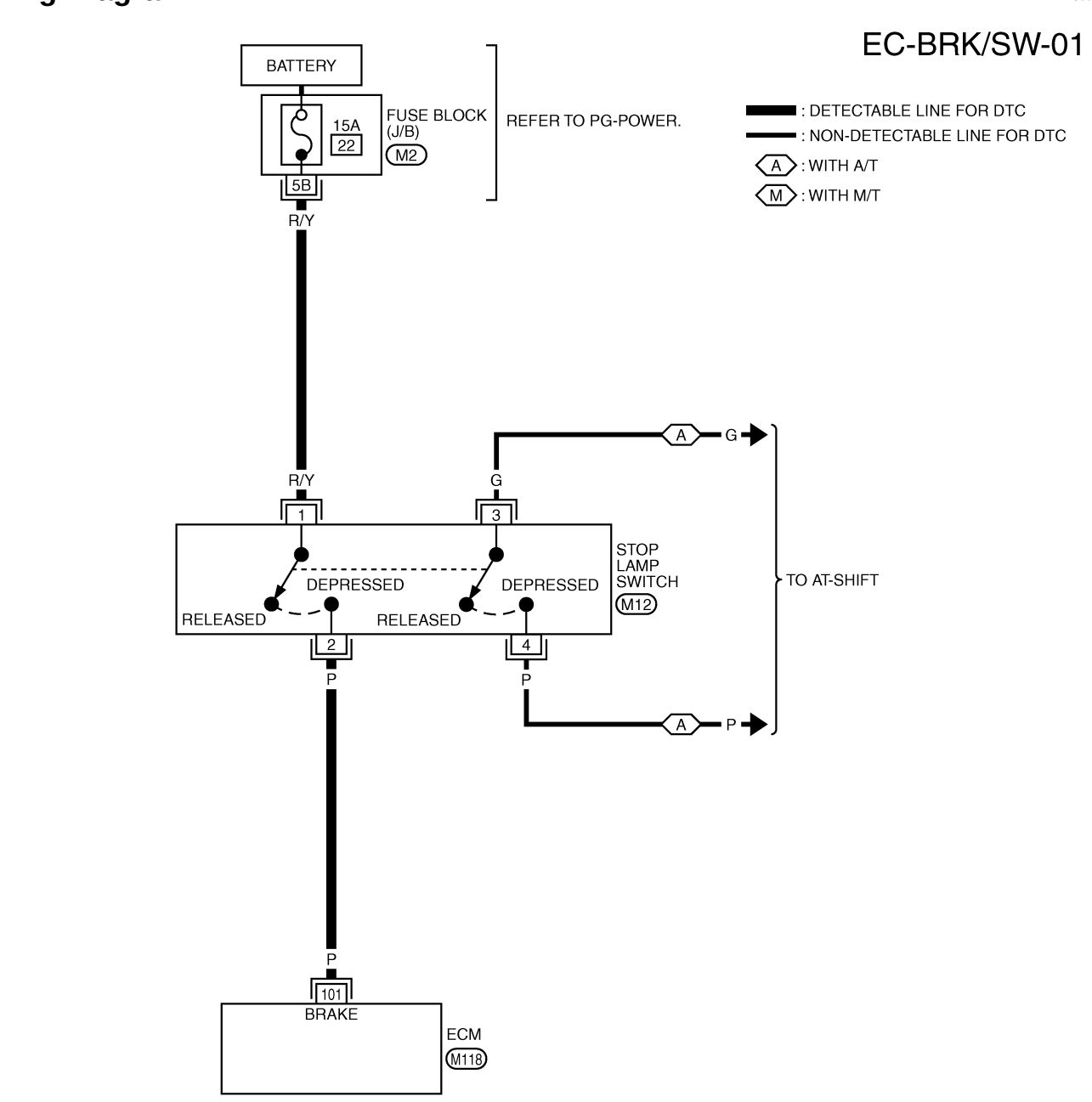


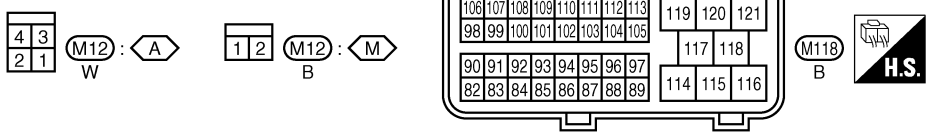
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001IW





REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0623E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	P	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS001IX

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

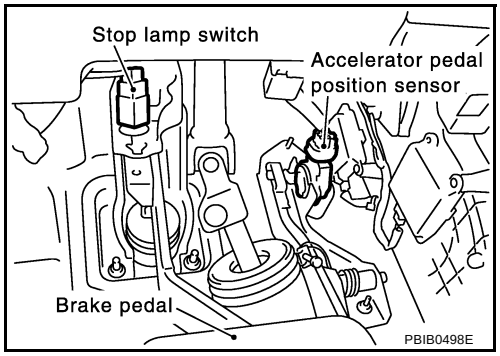
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

OK or NG

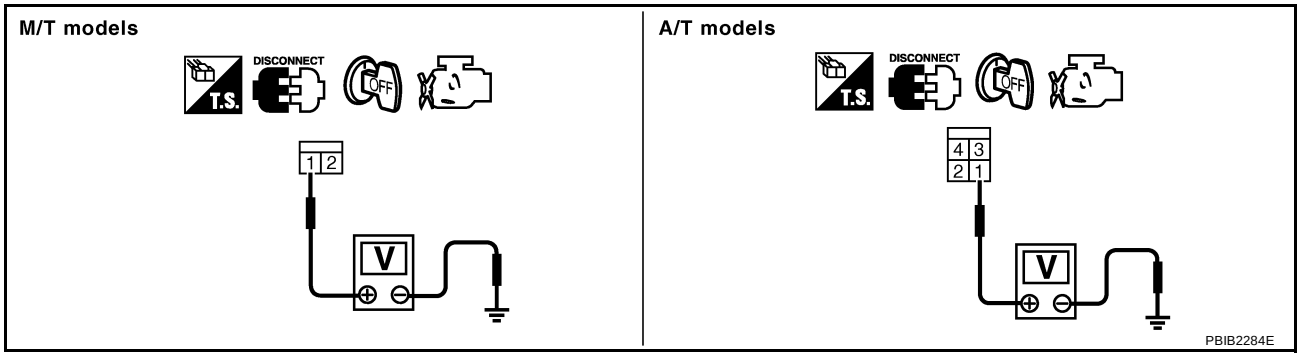
OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.



2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Fuse block (J/B) connector M2
- Harness for open and short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between stop lamp switch terminal 2 and ECM terminal 101. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH

Refer to EC-411, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

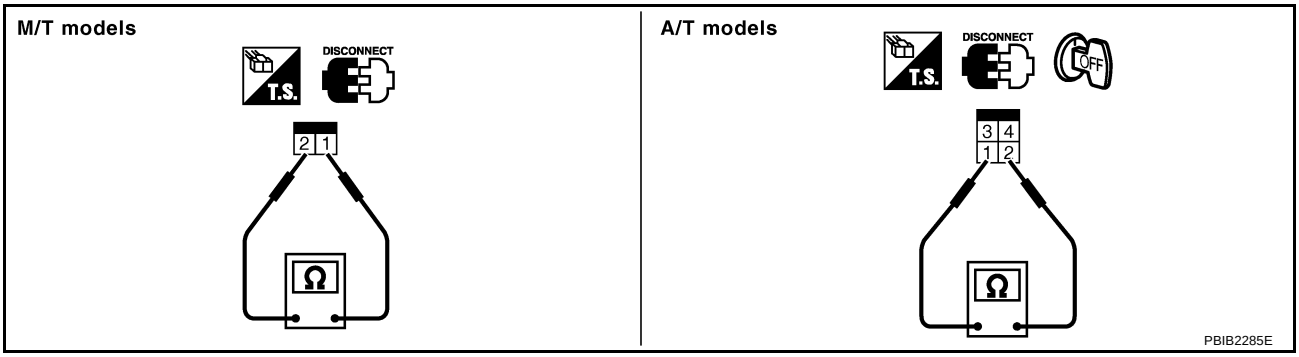
>> **INSPECTION END**

Component Inspection

BBS001IY

STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released.	Should not exist.
Brake pedal: Slightly depressed.	Should exist.

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

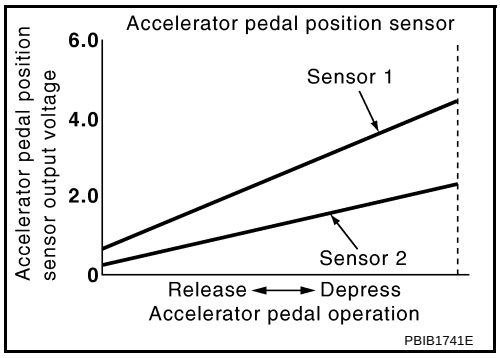
DTC P2122, P2123 APP SENSOR

PFP:18002

Component Description

BBS001IZ

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

BBS001J0

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.7V
ACCEL SEN 2*	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

BBS001J1

These self-diagnoses have the one trip detection logic.

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-375, "DTC P1229 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (APPsensor 1)
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

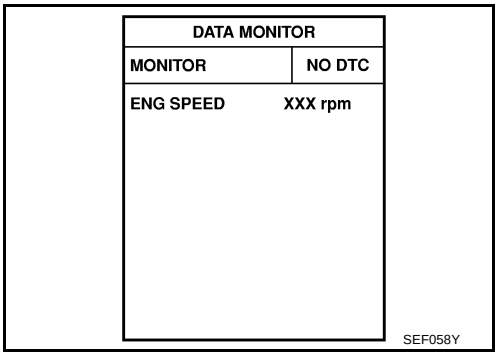
BBS001J2

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-416, "Diagnostic Procedure" .



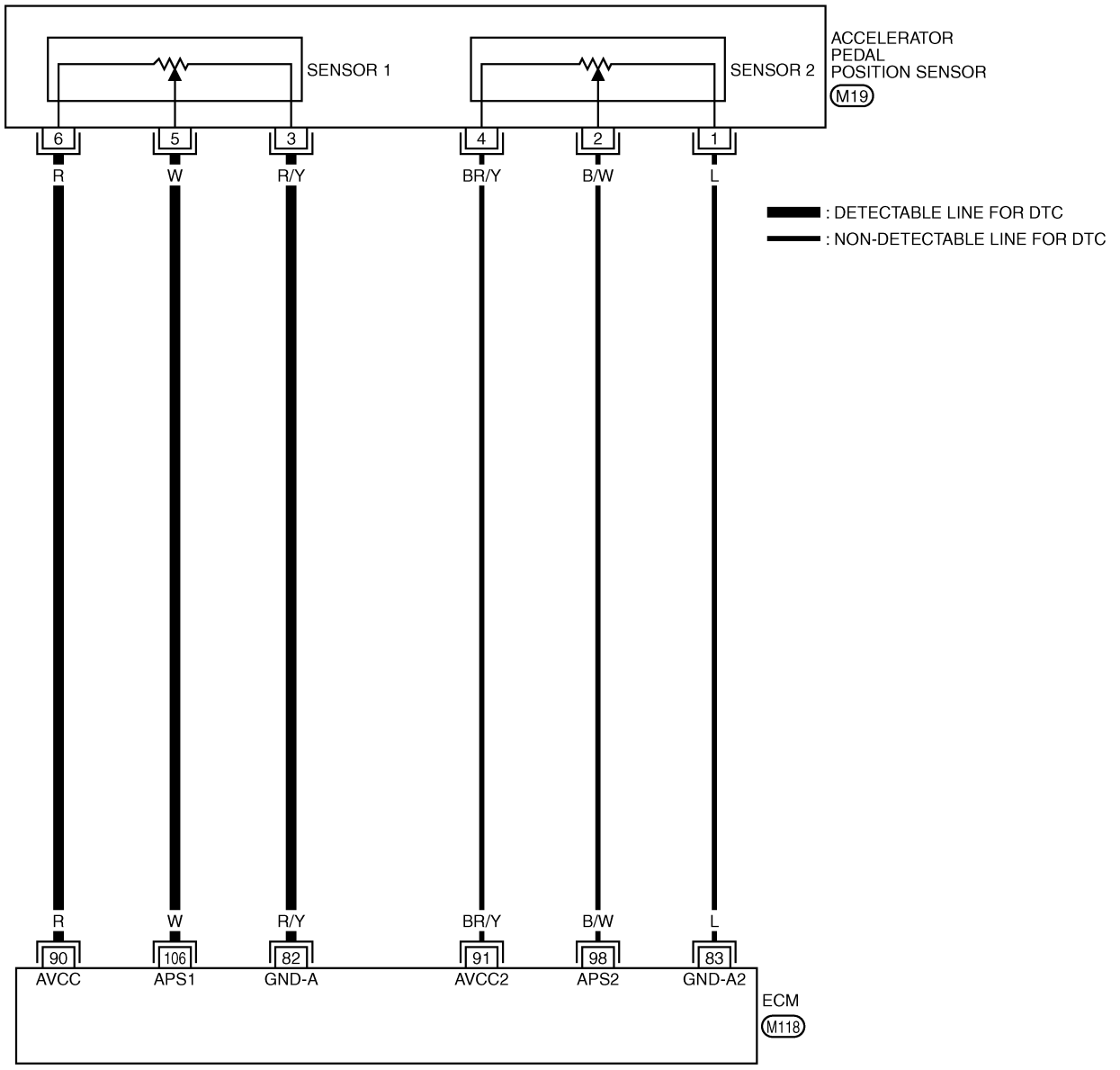
WITH GST

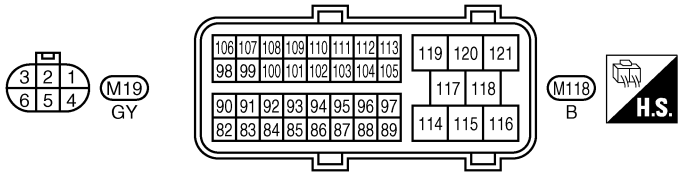
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001J3

EC-APPS1-01





TBWA0624E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

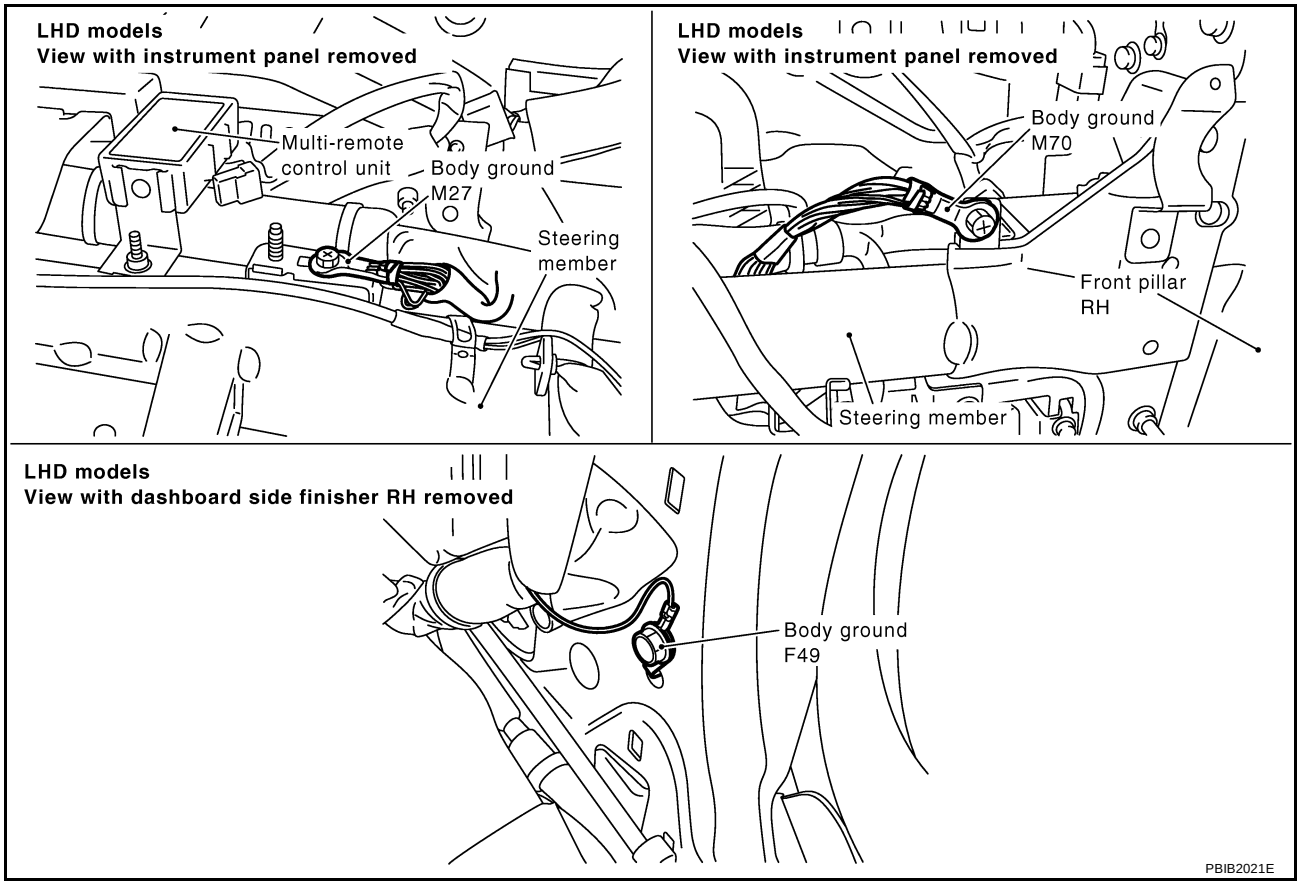
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	R/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	L	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	B/W	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.15 - 0.6V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	3.9 - 4.7V

Diagnostic Procedure

BBS001J4

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

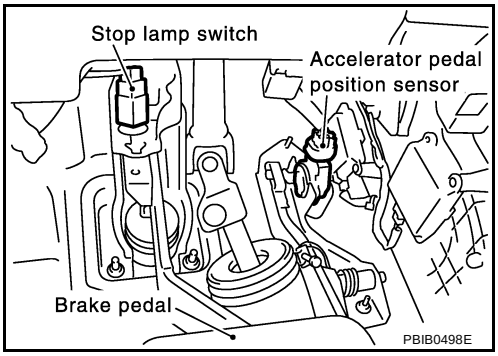


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

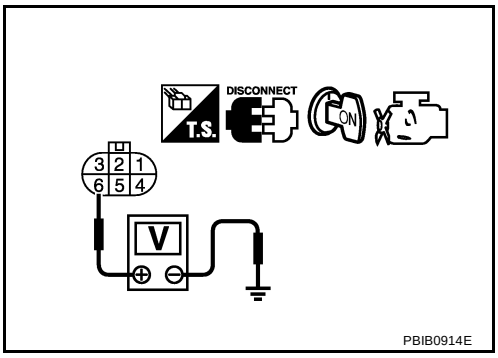
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 3 and ECM terminal 82. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between APP sensor terminal 5 and ECM terminal 106. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-418, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace the accelerator pedal assembly.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .
3. Perform EC-50, "Throttle Valve Closed Position Learning" .
4. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

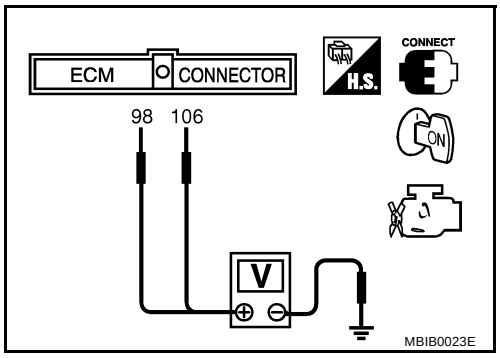
Component Inspection

BBS001J5

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.15 - 0.6V
	Fully depressed	1.95 - 2.4V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-49, "Accelerator Pedal Released Position Learning" .
6. Perform EC-50, "Throttle Valve Closed Position Learning" .
7. Perform EC-50, "Idle Air Volume Learning" .

Removal and Installation

BBS001J6

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

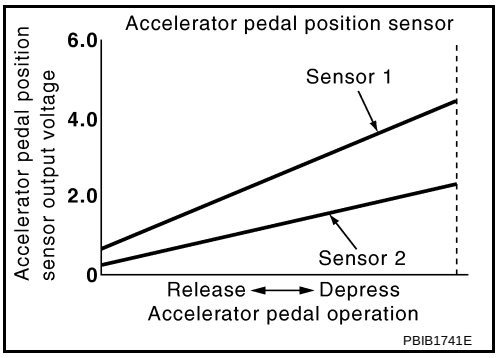
DTC P2127, P2128 APP SENSOR

PFP:18002

Component Description

BBS001J7

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

BBS001J8

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.7V
ACCEL SEN 2*	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

BBS001J9

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (APP sensor 2 circuit is open or shorted.) (TP sensor circuit is shorted.) ● Accelerator pedal position sensor (APP sensor 2) ● Electric throttle control actuator (TP sensor 1 and 2)
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of throttle valve to be shower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

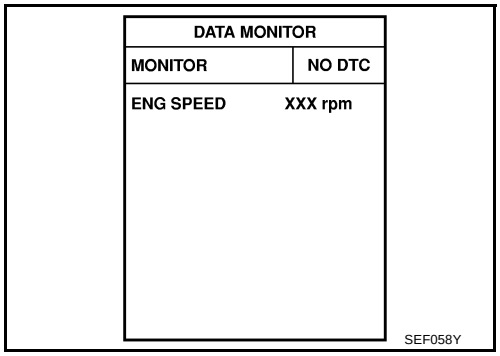
BBS001JA

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-423, "Diagnostic Procedure" .



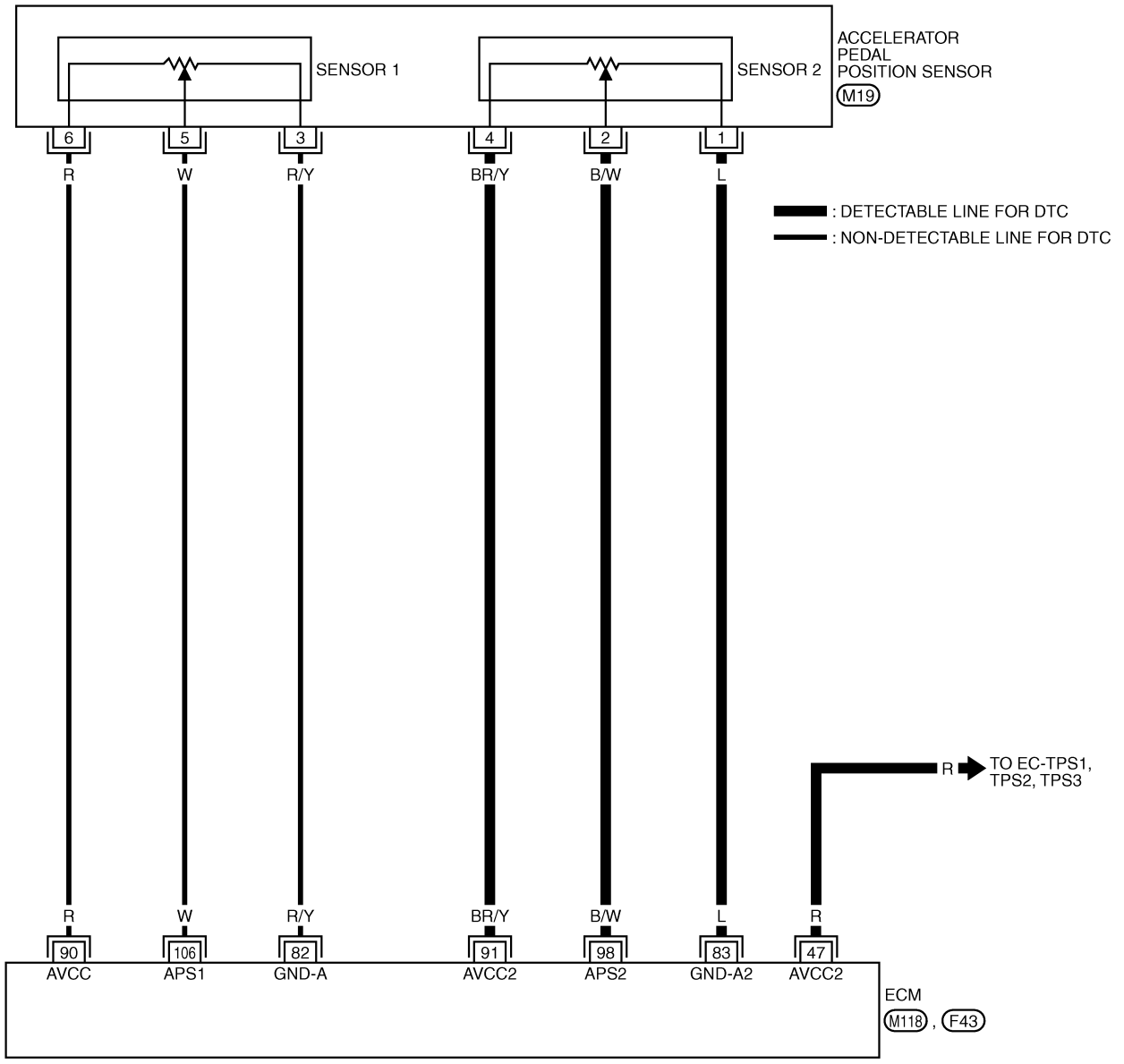
WITH GST

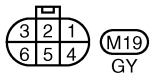
Follow the procedure “WITH CONSULT-II” above.

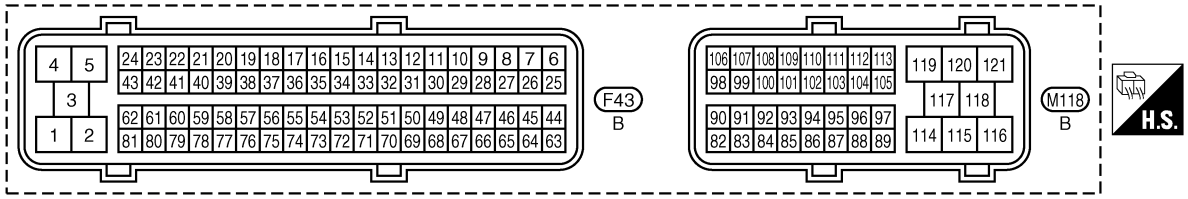
Wiring Diagram

BBS001JB

EC-APPS2-01







TBWB0263E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

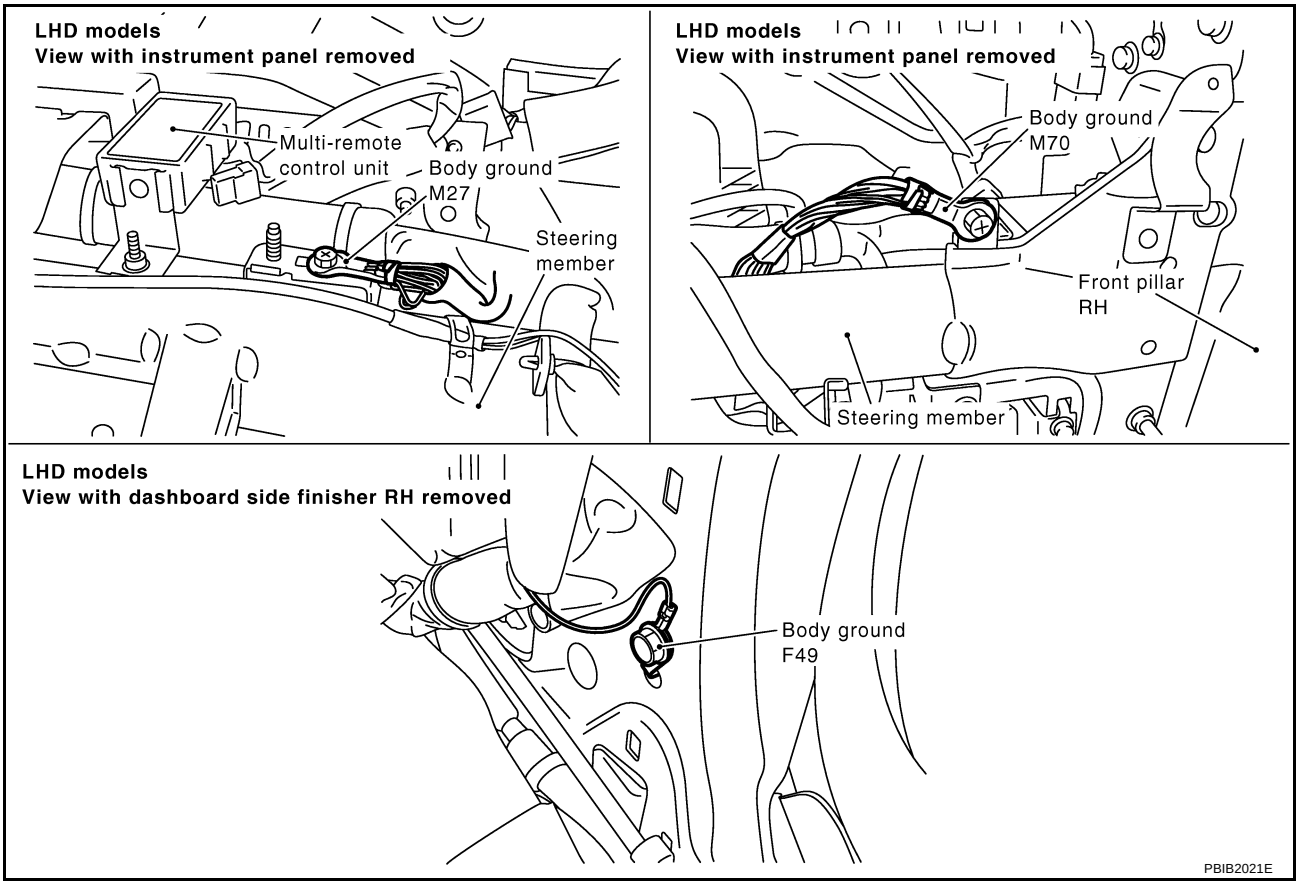
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	R	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
82	R/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	L	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	B/W	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.15 - 0.6V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	3.9 - 4.7V

Diagnostic Procedure

BBS001JC

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

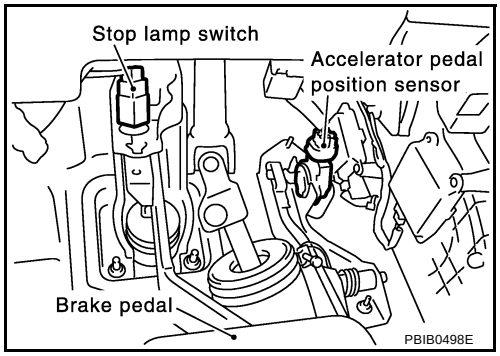


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

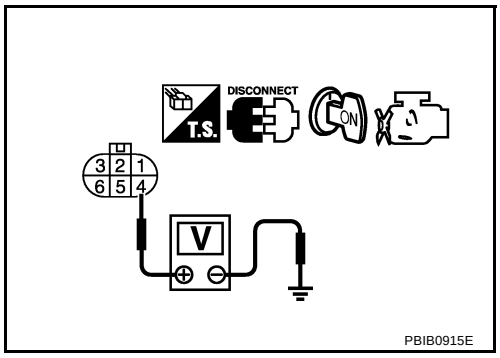
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 91. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 4	EC-421
47	Electric throttle control actuator terminal 1	EC-429

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-434, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 83.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between APP sensor terminal 2 and ECM terminal 98.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK APP SENSOR

Refer to EC-426, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace the accelerator pedal assembly.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .
3. Perform EC-50, "Throttle Valve Closed Position Learning" .
4. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

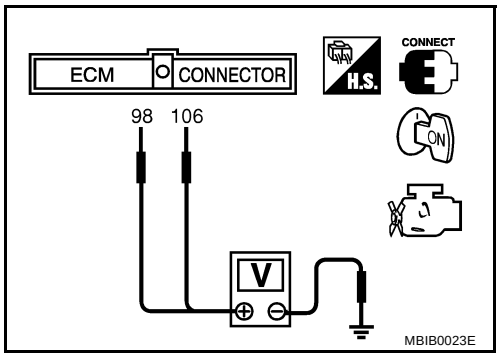
>> **INSPECTION END**

Component Inspection

BBS001JD

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.15 - 0.6V
	Fully depressed	1.95 - 2.4V

4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-49, "Accelerator Pedal Released Position Learning" .
6. Perform EC-50, "Throttle Valve Closed Position Learning" .
7. Perform EC-50, "Idle Air Volume Learning" .

Removal and Installation

BBS001JE

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

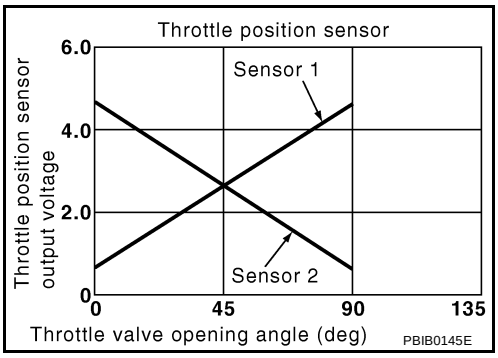
DTC P2135 TP SENSOR

PFP:16119

Component Description

BBS001JF

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

BBS001JG

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

BBS001JH

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	● Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1 and 2) ● Accelerator pedal position sensor (APP sensor 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

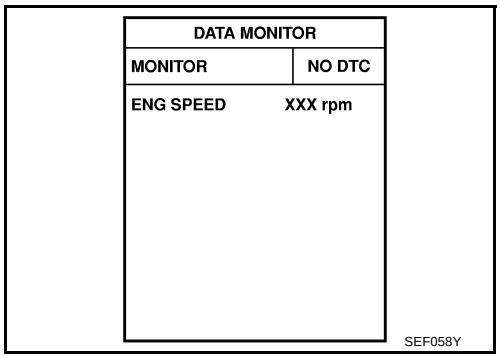
DTC Confirmation Procedure

BBS001JI

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-431, "Diagnostic Procedure" .



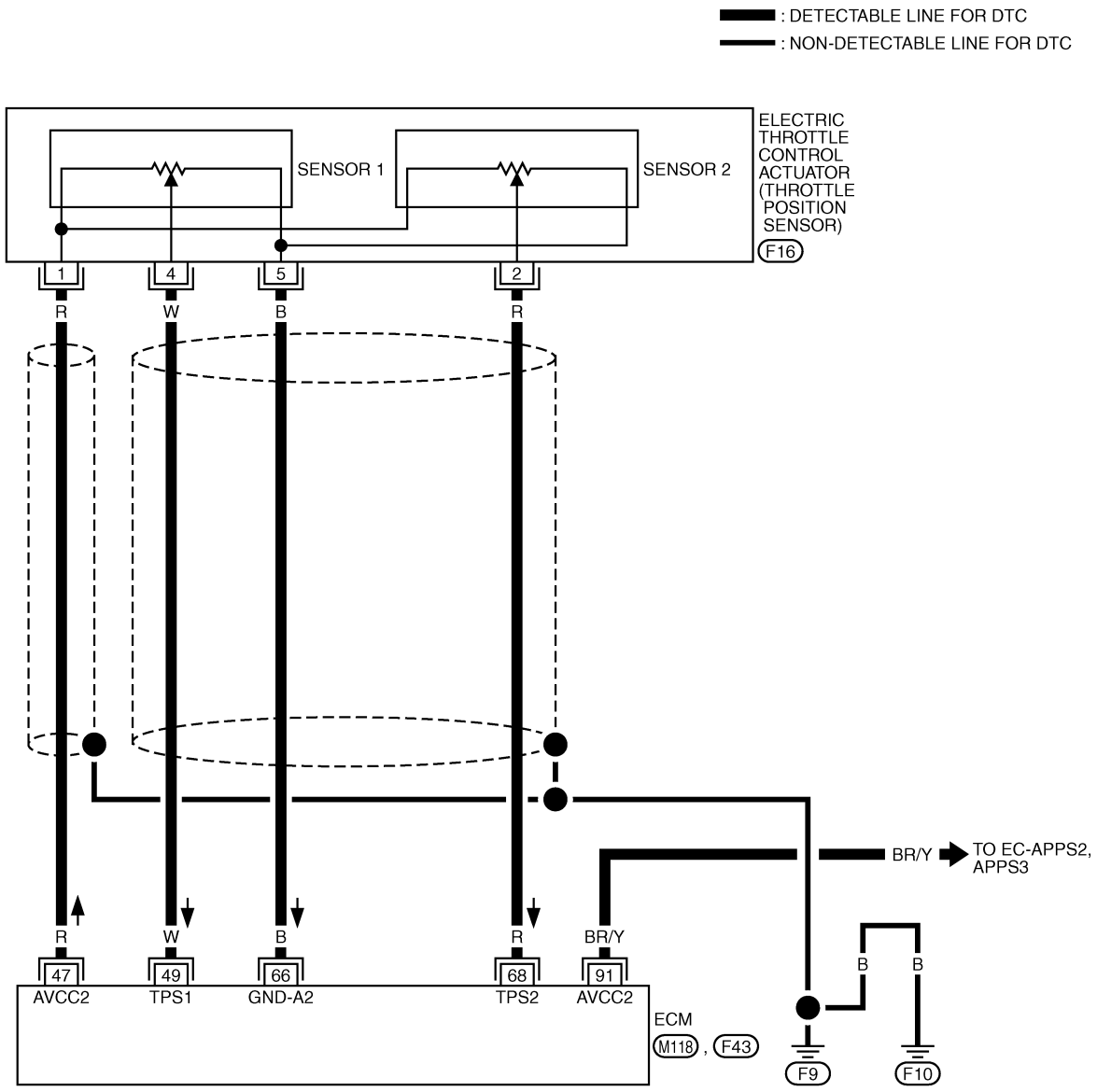
WITH GST

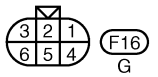
Follow the procedure “WITH CONSULT-II” above.

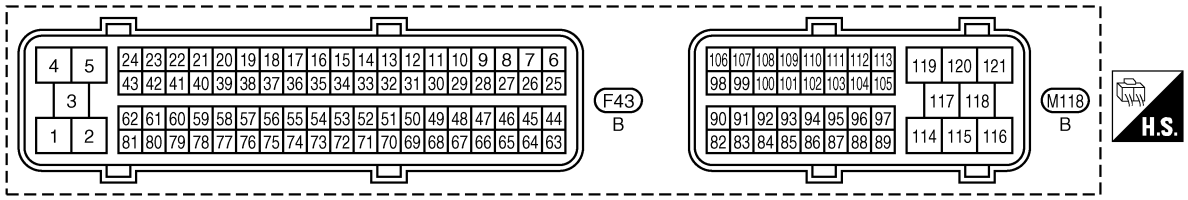
Wiring Diagram

BBS001JJ

EC-TPS3-01







TBWB0264E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

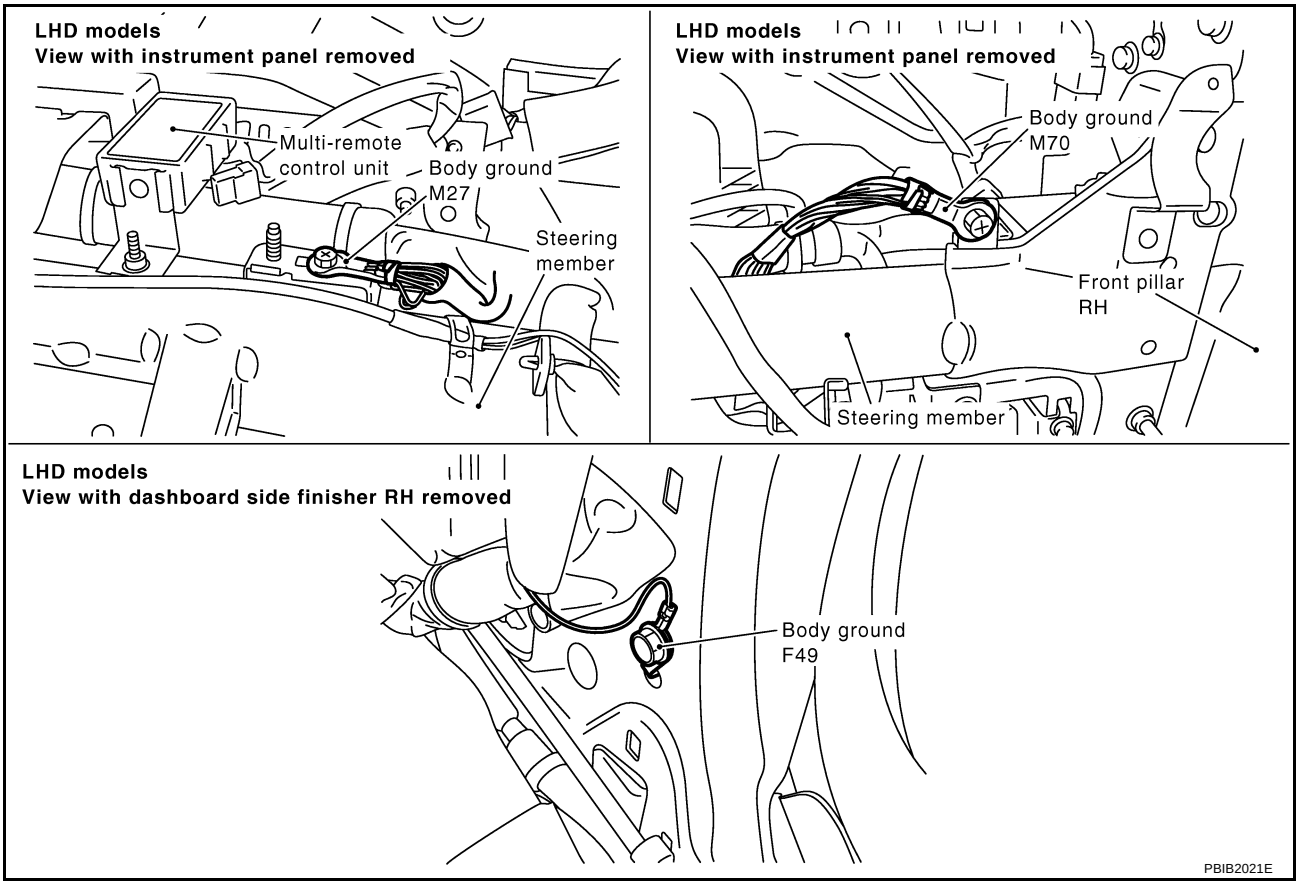
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	R	Throttle position sensor power supply	**[Ignition switch: ON]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

BBS001JK

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

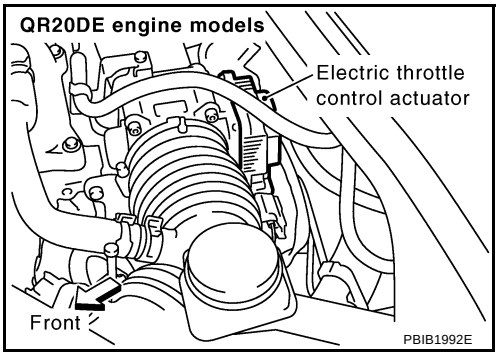


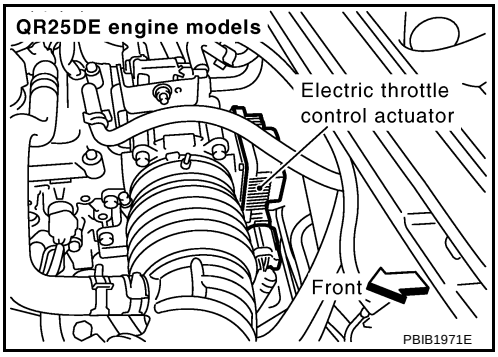
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

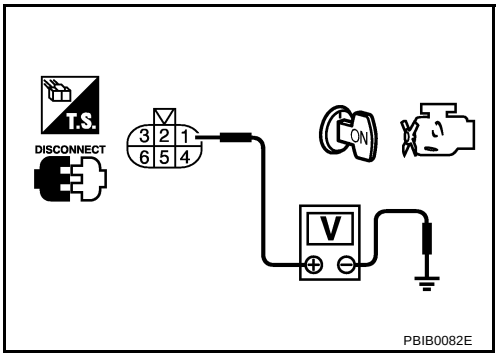
1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.





3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-429
91	APP sensor terminal 4	EC-421

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-426, "Component Inspection" .

OK or NG

OK >> GO TO 11
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .
3. Perform EC-50, "Throttle Valve Closed Position Learning" .
4. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 49, electric throttle control actuator terminal 2 and ECM terminal 68. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-434, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

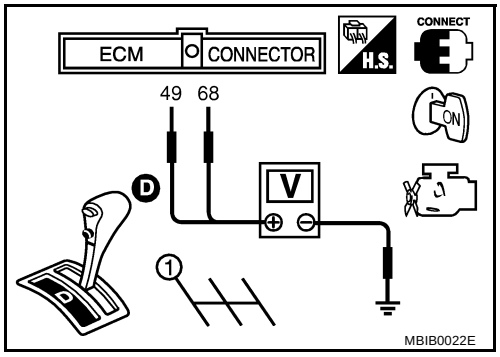
Component Inspection

BBS001JL

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T) or 1st position (M/T).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-50, "Throttle Valve Closed Position Learning" .
8. Perform EC-50, "Idle Air Volume Learning" .

Removal and Installation

BBS001JM

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

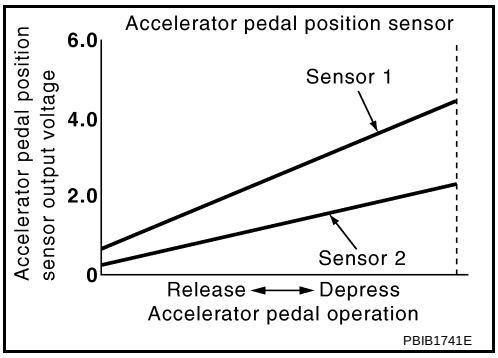
DTC P2138 APP SENSOR

PFP:18002

Component Description

BBS001JN

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

BBS001JO

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.7V
ACCEL SEN 2*	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

BBS001JP

This self-diagnosis has the one trip detection logic.

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-375, "DTC P1229 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	● Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) (TP sensor circuit is shorted.) ● Accelerator pedal position sensor (APP sensor 1 and 2) ● Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

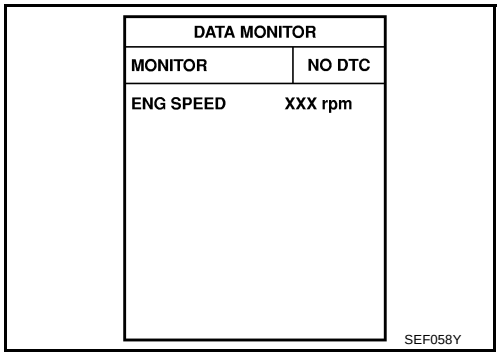
DTC Confirmation Procedure

BBS001JQ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-439, "Diagnostic Procedure" .



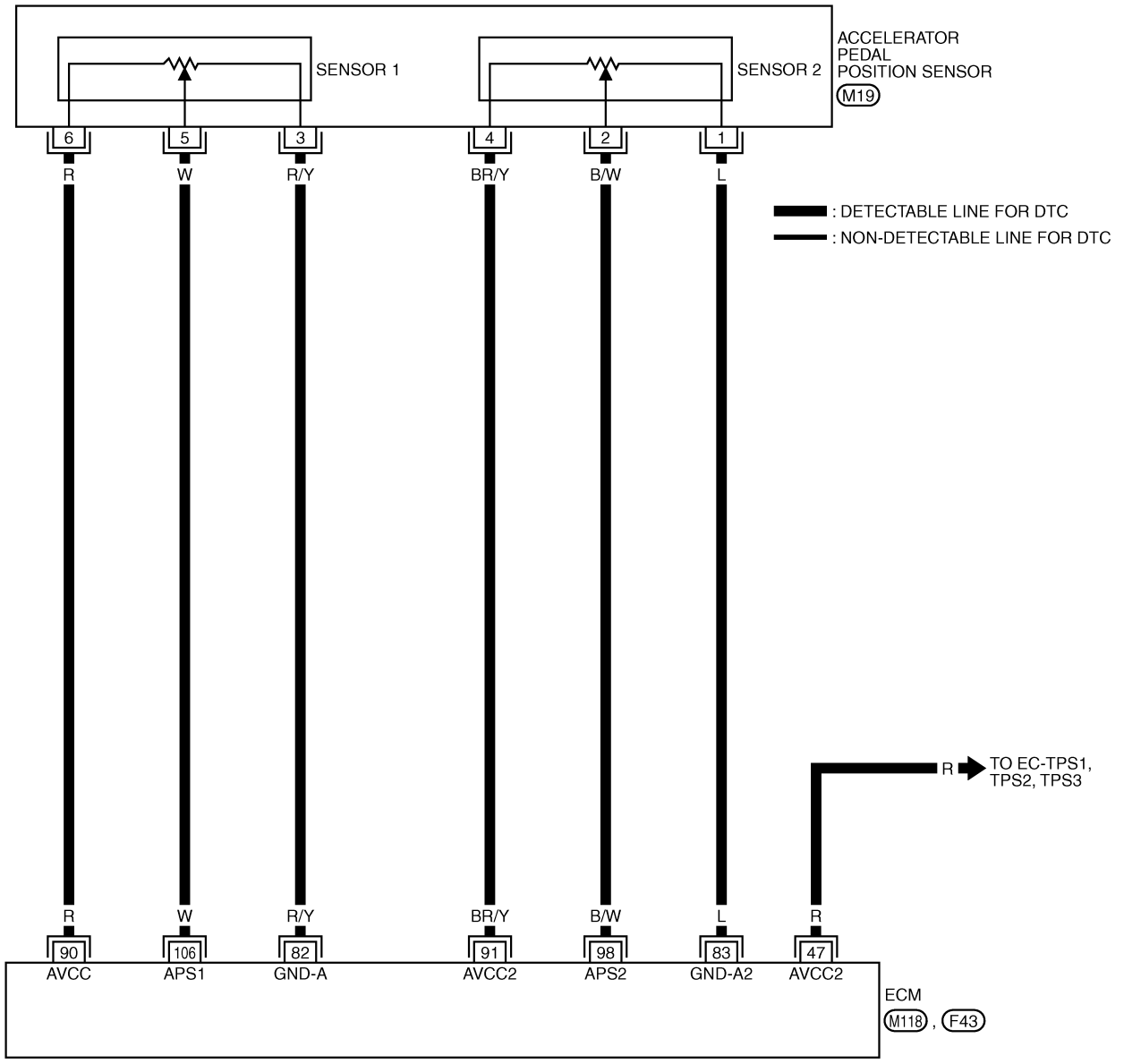
WITH GST

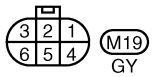
Follow the procedure “WITH CONSULT-II” above.

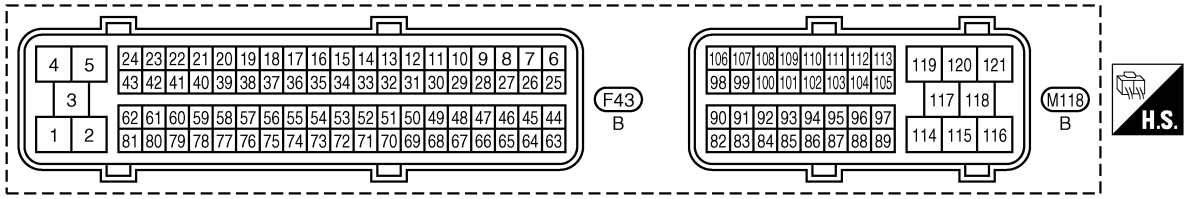
Wiring Diagram

BBS001JR

EC-APPS3-01







TBWB0265E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

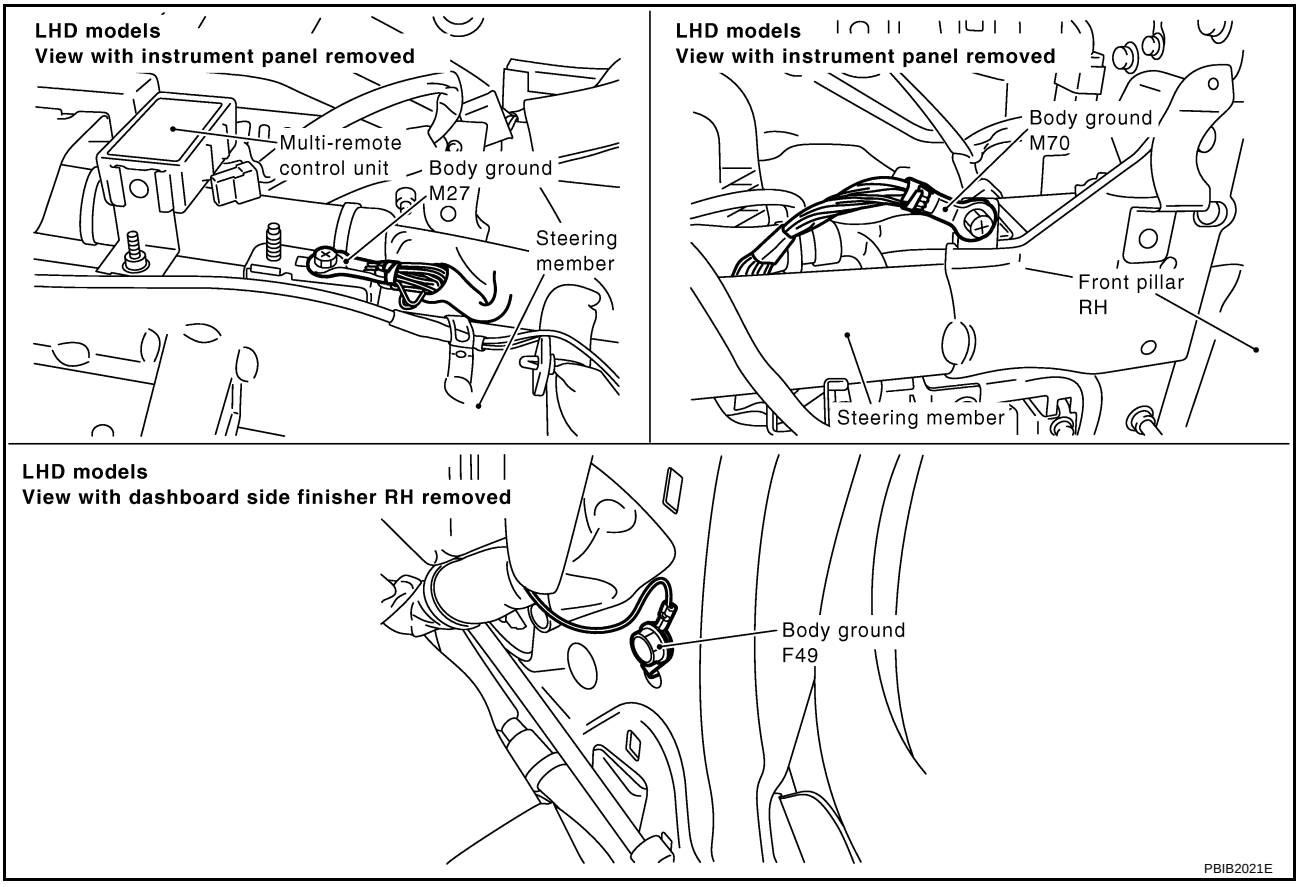
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	R	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
82	R/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	L	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	B/W	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.15 - 0.6V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	3.9 - 4.7V

Diagnostic Procedure

BBS001JS

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

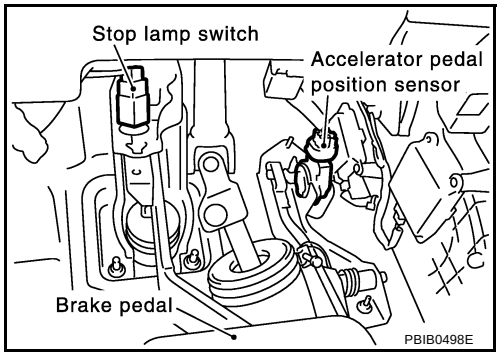


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

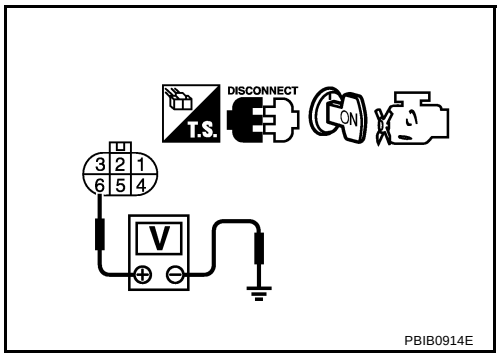
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



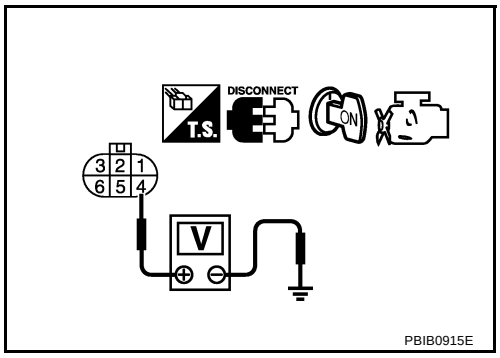
OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 8.
NG >> GO TO 4.

4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 91. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace open circuit.

5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 4	EC-437
47	Electric throttle control actuator terminal 1	EC-429

OK or NG

OK >> GO TO 6.
NG >> Repair short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-434, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-50, "Throttle Valve Closed Position Learning" .
3. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

8. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 3 and ECM terminal 82, APP sensor terminal 1 and ECM terminal 83.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between APP sensor terminal 5 and ECM terminal 106, APP sensor terminal 2 and ECM terminal 98.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK APP SENSOR

Refer to EC-442, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace the accelerator pedal assembly.
2. Perform EC-49, "Accelerator Pedal Released Position Learning" .
3. Perform EC-50, "Throttle Valve Closed Position Learning" .
4. Perform EC-50, "Idle Air Volume Learning" .

>> **INSPECTION END**

12. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

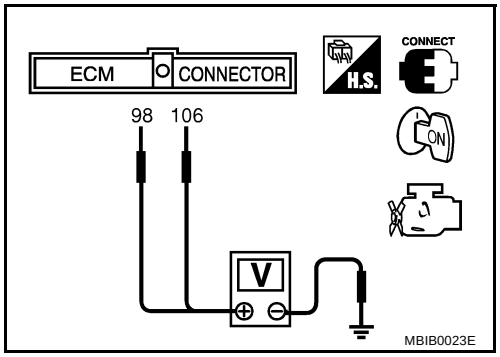
Component Inspection

BBS001JT

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.15 - 0.6V
	Fully depressed	1.95 - 2.4V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-49, "Accelerator Pedal Released Position Learning" .
6. Perform EC-50, "Throttle Valve Closed Position Learning" .
7. Perform EC-50, "Idle Air Volume Learning" .

Removal and Installation

BBS001JU

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

IGNITION SIGNAL

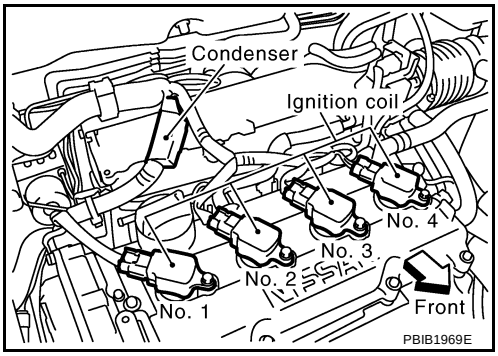
PFP:22448

Component Description

BBS001JV

IGNITION COIL & POWER TRANSISTOR

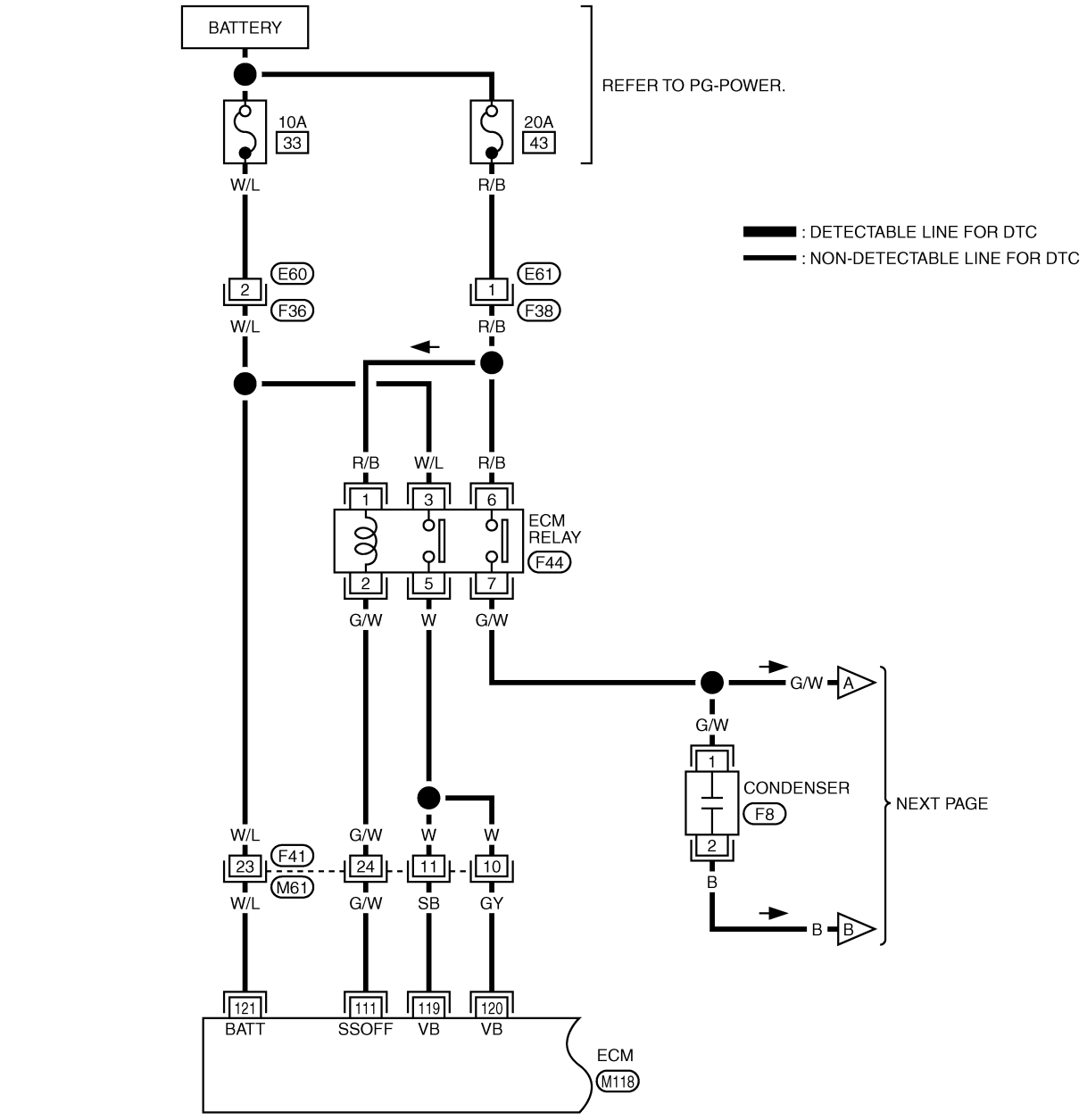
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

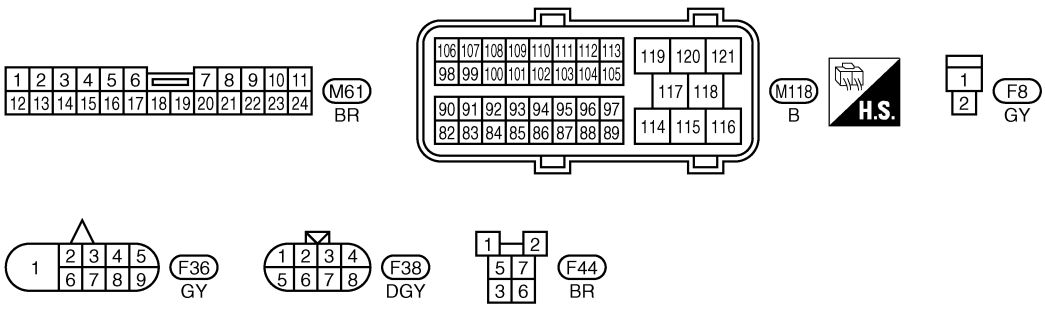


Wiring Diagram

BBS001JW

EC-IGNSYS-01





TBWA0628E

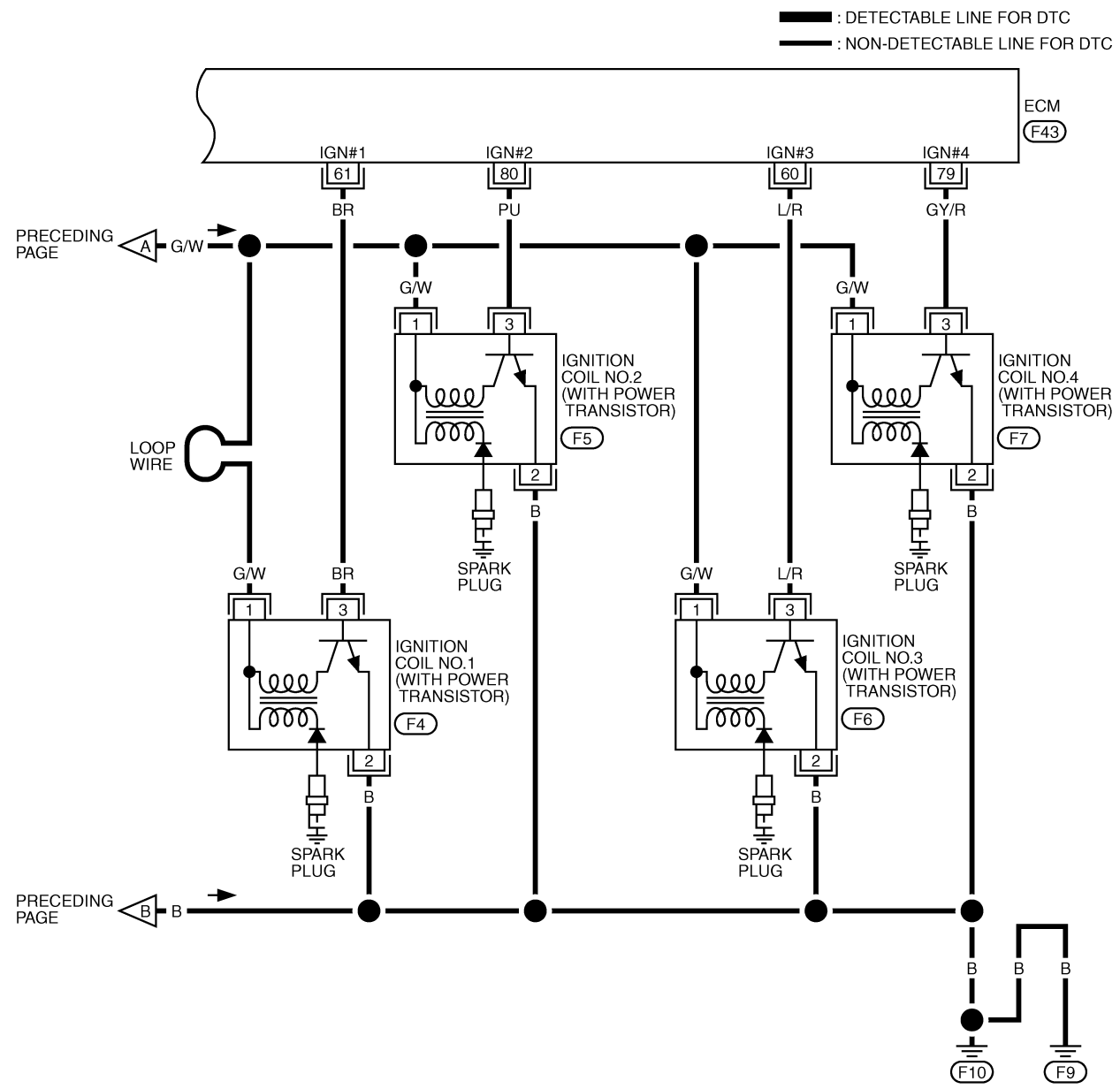
Specification data are reference values and are measured between each terminal and ground.

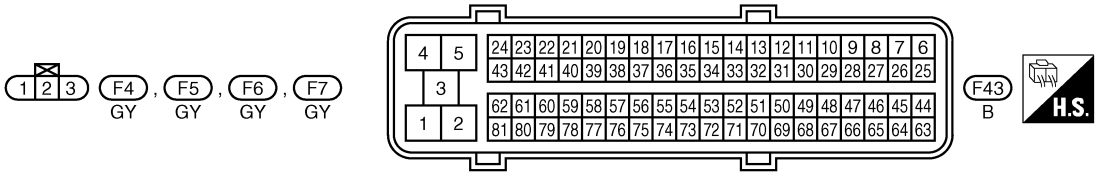
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	G/W	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	SB GY	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

EC-IGNSYS-02

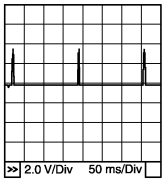
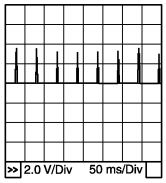




TBWA0629E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 79 80	L/R BR GY/R PU	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 0.2V★  PBIB0522E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001JX

1. CHECK ENGINE START

Turn ignition switch OFF, and restart engine.
Is engine running?

Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 4.

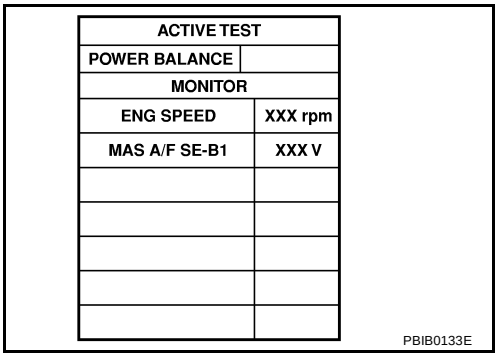
2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

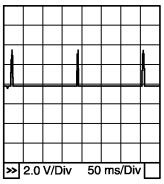


3. CHECK OVERALL FUNCTION

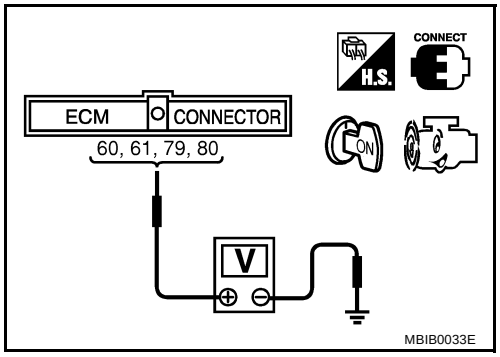
Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminals 60, 61, 79, 80 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.

NOTE:
The pulse cycle changes depending on rpm at idle.



PBIB0521E



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

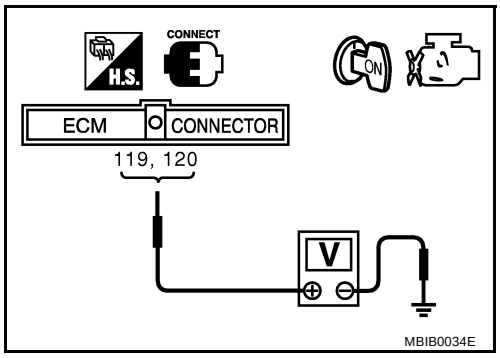
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: Battery voltage

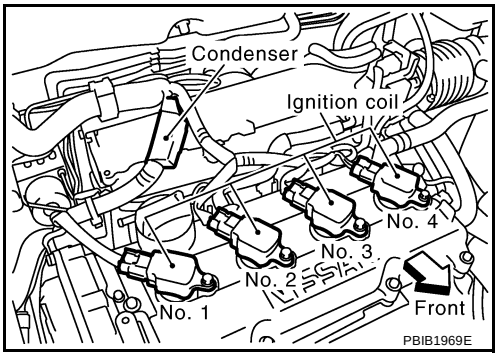
OK or NG

OK >> GO TO 5.
NG >> Go to EC-128, "POWER SUPPLY AND GROUND CIRCUIT" .



5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.

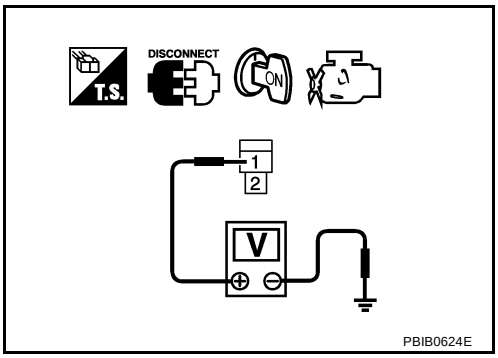


4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 6.



6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

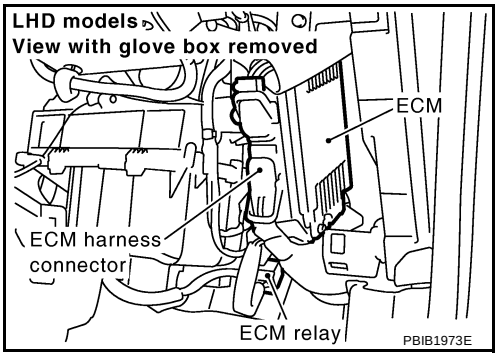
1. Turn ignition switch OFF.
2. Disconnect ECM relay.
3. Check harness continuity between ECM relay terminal 7 and condenser terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



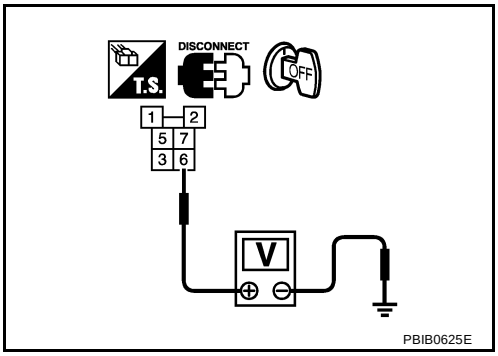
7. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- 20A fuse
- Harness for open or short between ECM relay and battery

>> Repair or replace harness or connectors.

9. CHECK ECM RELAY

Refer to EC-452, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ECM relay.

10. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser terminal 2 and ground.
   Refer to Wiring diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to power in harness or connector.

11. CHECK CONDENSER

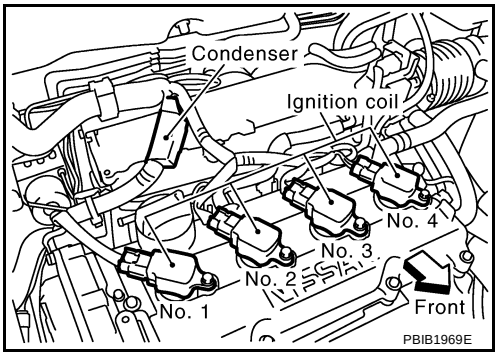
Refer to EC-452, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace condenser.

12. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.
4. Turn ignition switch ON.

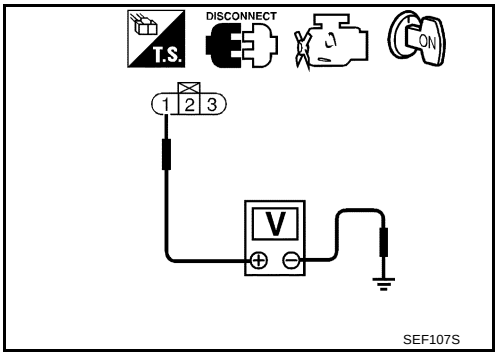


5. Check voltage between ignition coil terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.



13. DETECT MALFUNCTIONING PART

Check harness for open or short between ignition coil and ECM relay.

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 15.
NG >> Repair open circuit or short to power in harness or connectors.

15. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 60, 61, 79, 80 and ignition coil terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-452, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ignition coil with power transistor.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

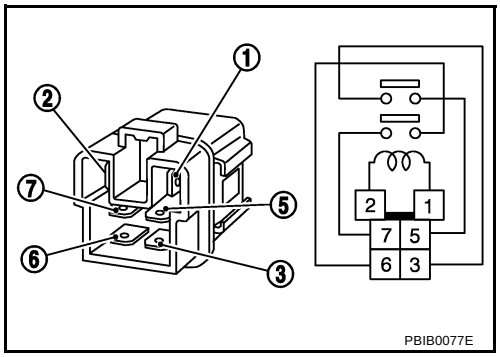
BBS001JY

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.

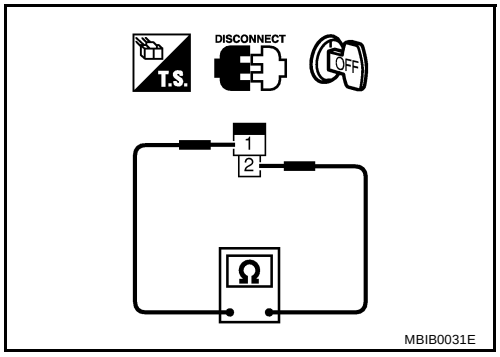


PBIB0077E

CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals 1 and 2.

Resistance: Above 1 MΩ at 25°C (77°F)

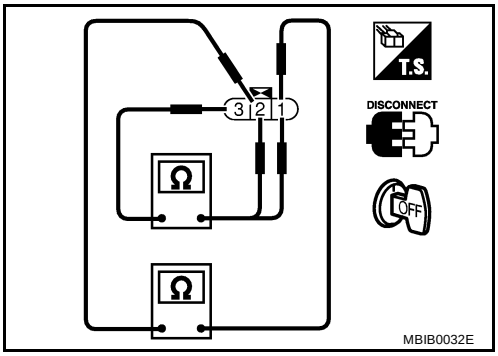


MBIB0031E

IGNITION COIL WITH POWER TRANSISTOR

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No.	Resistance Ω [at 25°C (77°F)]
2 and 3	Except 0 or ∞
1 and 2	Except 0
1 and 3	



BBS001JZ

Removal and Installation

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-31, "IGNITION COIL" .

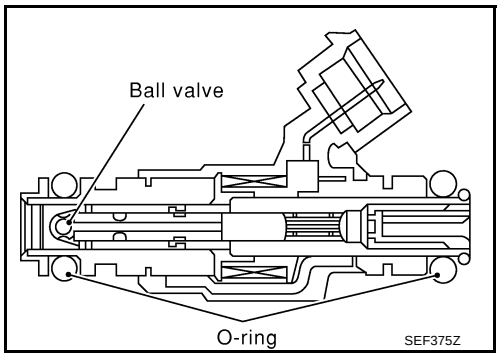
INJECTOR CIRCUIT

PFP:16600

Component Description

BBS001K0

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

BBS001K1

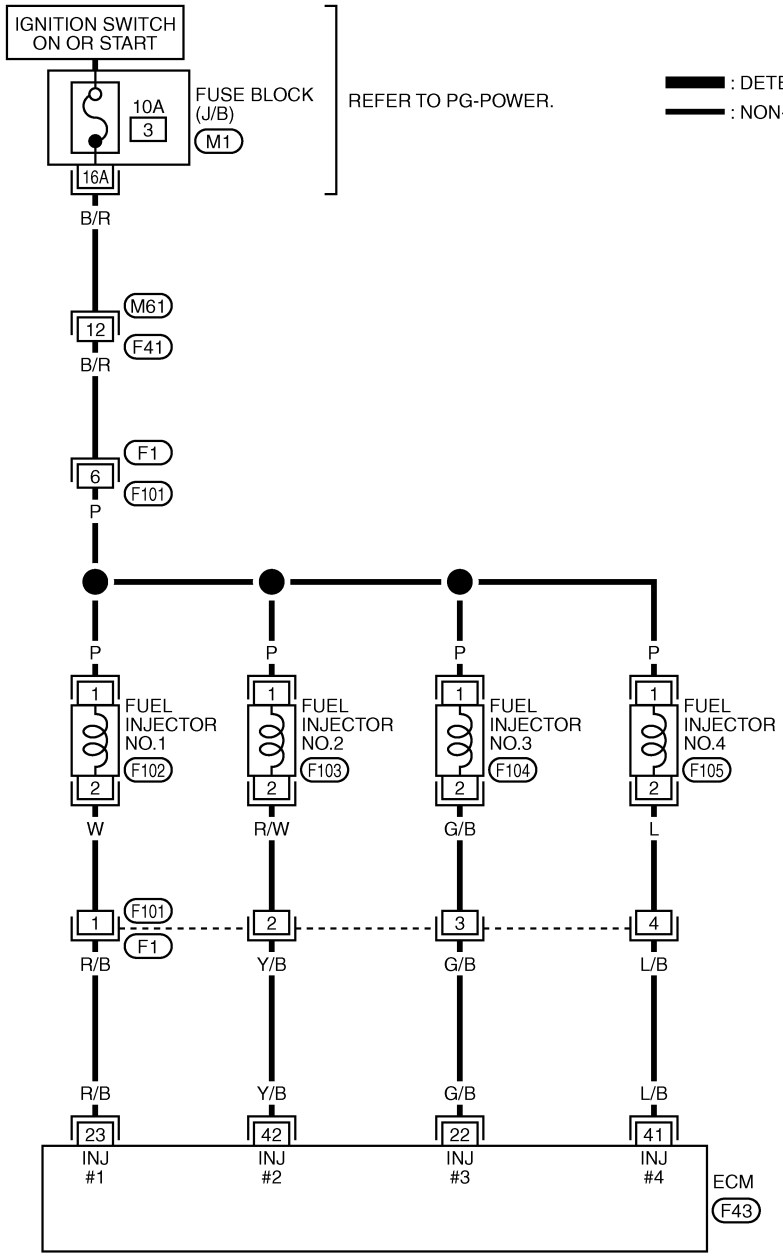
Specification data are reference values.

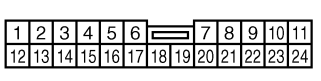
MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	See EC-123, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec

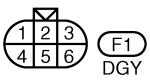
Wiring Diagram

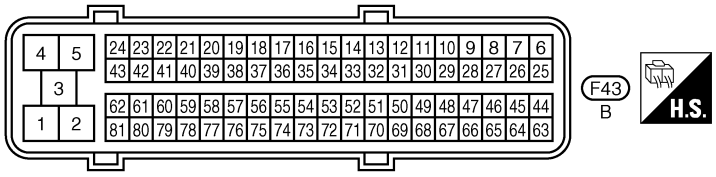
BBS001K2

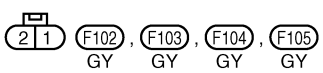
EC-INJECT-01









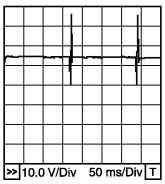
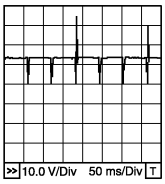


REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0697E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001K3

1. INSPECTION START

Turn ignition switch to START.
Is any cylinder ignited?

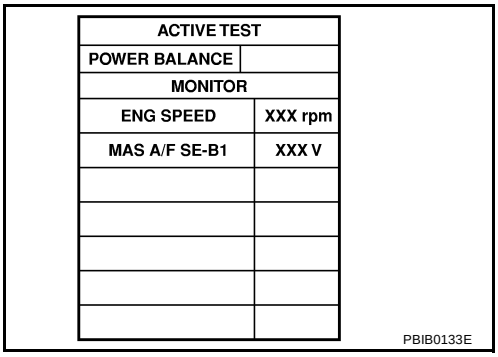
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

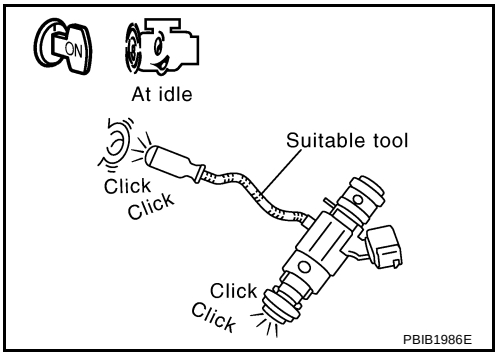
1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.

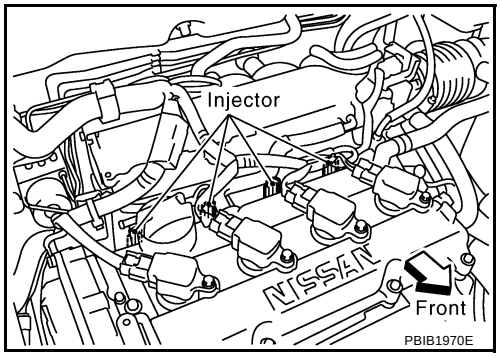


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect injector harness connector.
3. Turn ignition switch ON.

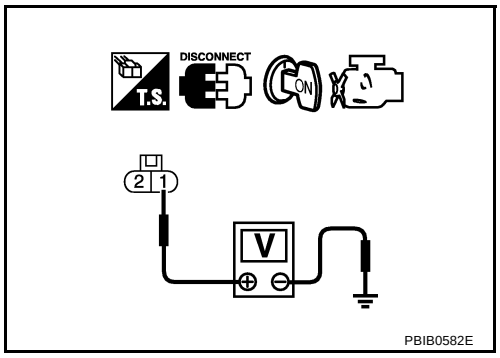


4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M61, F41
- Harness connectors F1, F101
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 22, 23, 41, 42. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFONCTIONING PART

Check the following.

- Harness connectors F101, F1
- Harness for open or short between injector and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INJECTOR

Refer to EC-459, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace injector.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

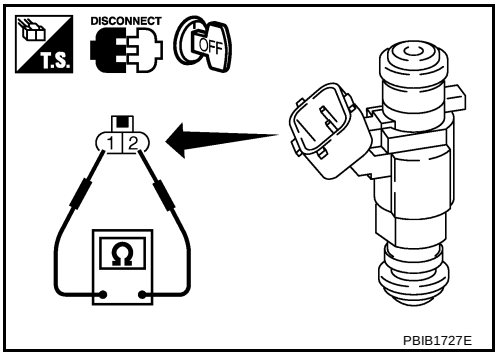
Component Inspection

BBS001K4

INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 13.5 - 17.5Ω [at 10 - 60°C (50 - 140°F)]



Removal and Installation

BBS001K5

INJECTOR

Refer to EM-34, "FUEL INJECTOR AND FUEL TUBE" .

VIAS

PFP:14956

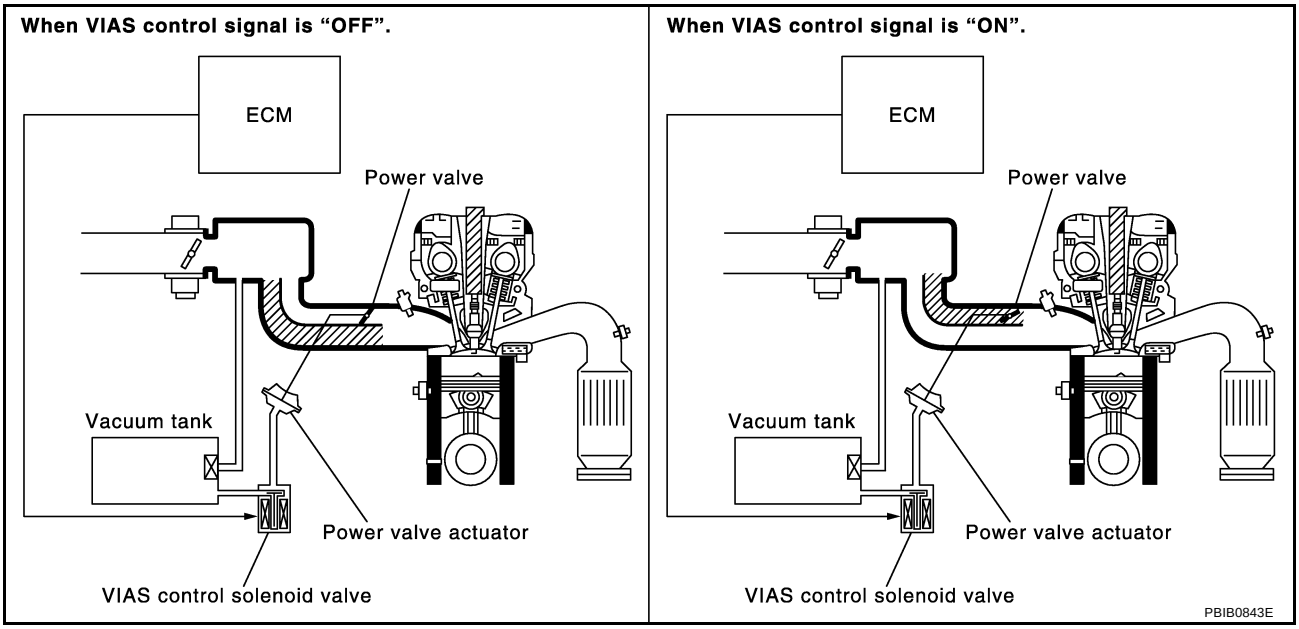
Description

BBS001K6

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	VIAS control	VIAS control solenoid valve
Mass air flow sensor	Amount of intake air		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*		
Engine coolant temperature sensor	Engine coolant temperature		

*: The ECM determines the start signal status by the signals of engine speed and battery voltage.



When the engine is running at low or medium speed, the power valve is fully closed. Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector's suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation.

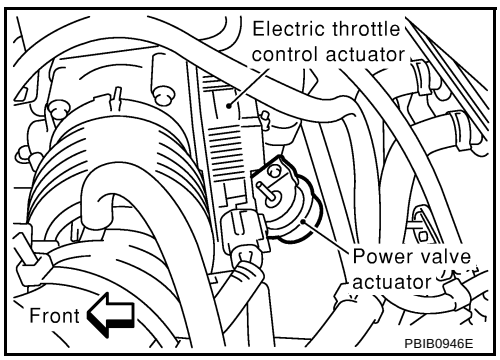
The surge tank and one-way valve are provided. When engine is running at high speed, the ECM sends the signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore opens the power valve to two suction passages together in the collector.

Under this condition, the effective port length is equivalent to the length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds.

COMPONENT DESCRIPTION

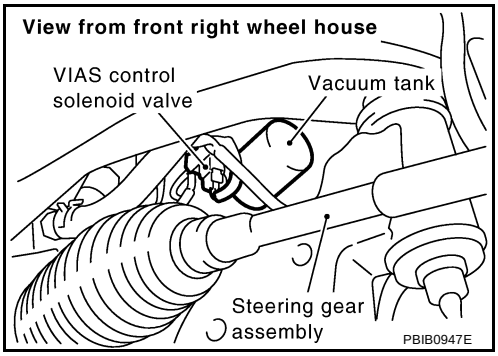
Power Valve

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.



VIAS Control Solenoid Valve

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



CONSULT-II Reference Value in Data Monitor Mode

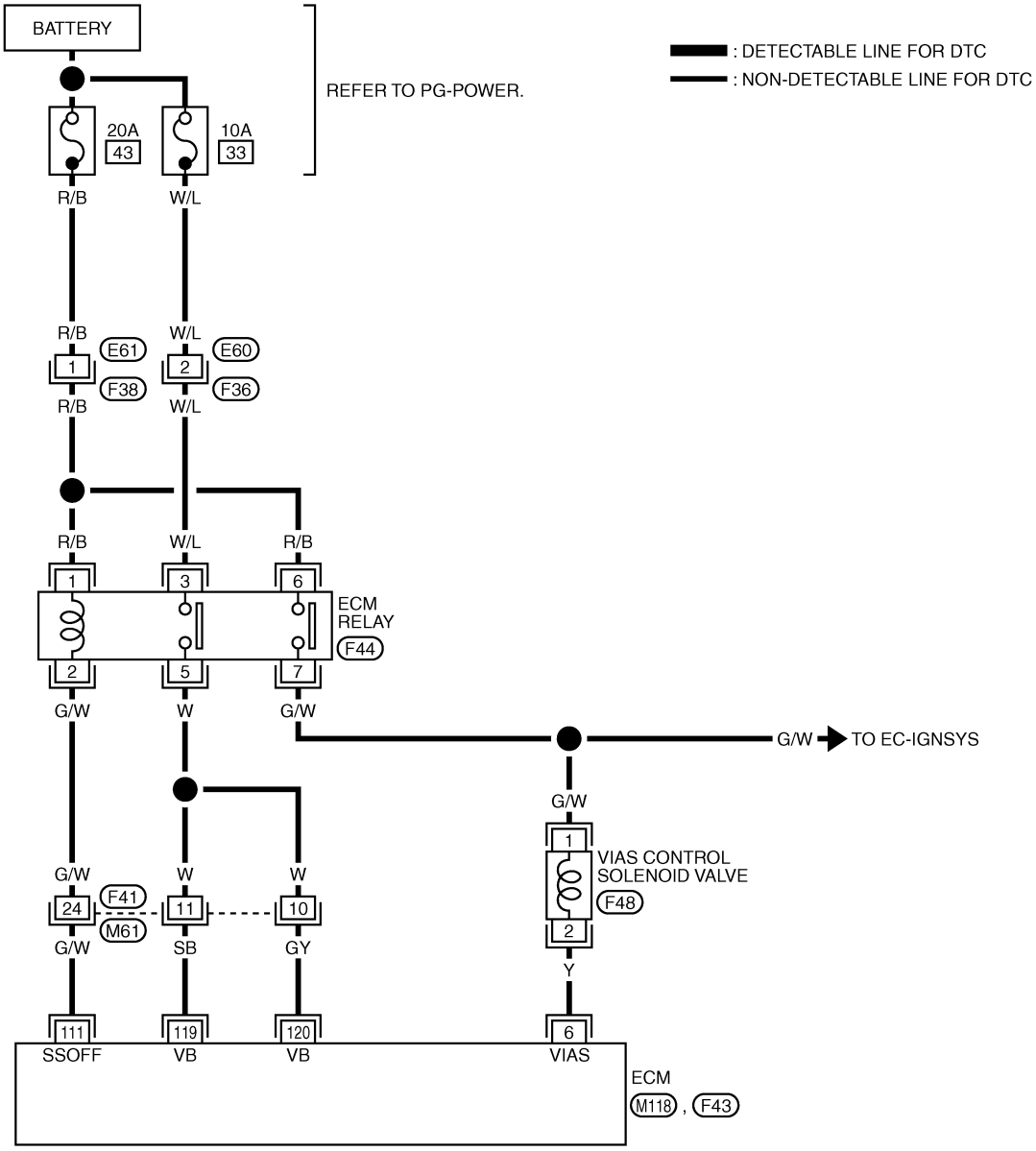
BBS001K7

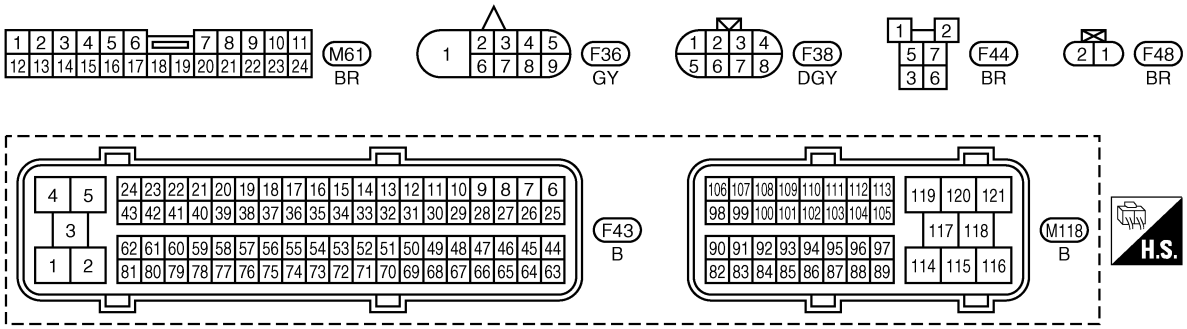
MONITOR ITEM	CONDITION		SPECIFICATION
VIAS S/V	● Engine: After warming up	Idle	OFF
		More than 5,000 rpm	ON

Wiring Diagram

BBS001K8

EC-VIAS-01





TBWA0651E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	Y	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V

Diagnostic Procedure

BBS001K9

1. CHECK OVERALL FUNCTION

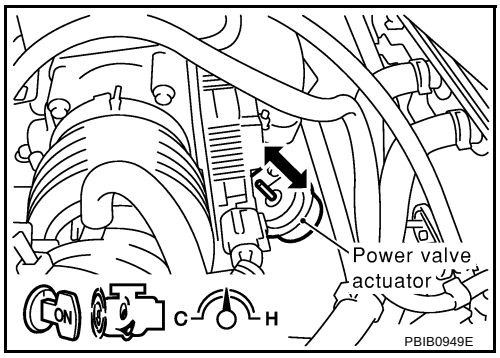
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

PBIB0844E

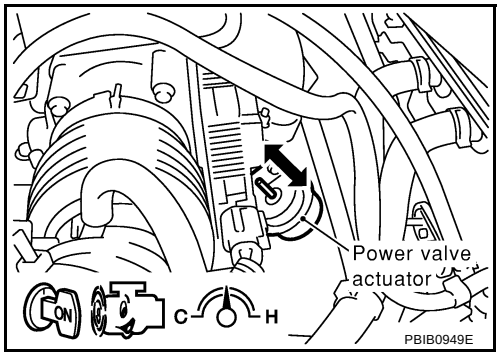
3. Turn VIAS control solenoid valve ON and OFF, and make sure that power valve actuator rod moves.



PBIB0949E

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Rev engine quickly up to above 5,000 rpm and make sure that power valve actuator rod moves.



PBIB0949E

OK or NG

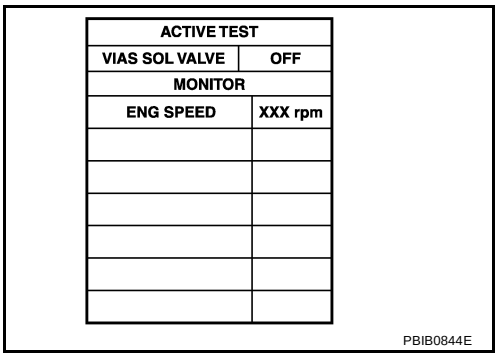
OK >> **INSPECTION END**
NG (With CONSULT-II) >>GO TO 2.
NG (Without CONSULT-II) >>GO TO 3.

2. CHECK VACUUM EXISTENCE

With CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Start engine and let it idle.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
4. Turn VIAS control solenoid valve ON and OFF, and check vacuum existence under the following conditions.

VIAS SOL VALVE	Vacuum
ON	Should exist
OFF	Should not exist



OK or NG

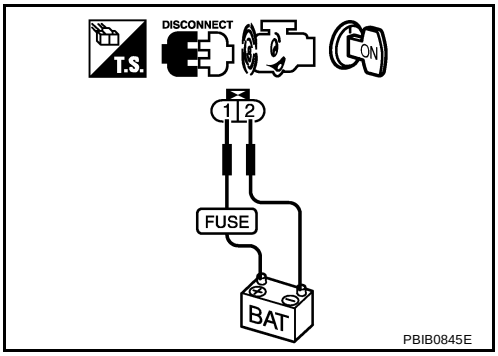
OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

3. CHECK VACUUM EXISTENCE

Without CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Disconnect VIAS control solenoid valve harness connector.
3. Start engine and let it idle.
4. Apply 12V of direct current between VIAS control solenoid valve terminals 1 and 2.
5. Check vacuum existence under the following conditions.

Condition	Vacuum
12V direct current supply	Should exist
No supply	Should not exist



OK or NG

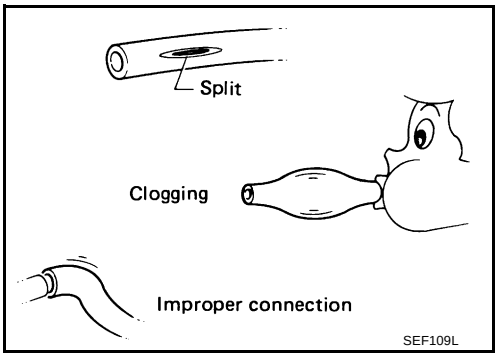
OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

4. CHECK VACUUM HOSE

1. Stop engine.
2. Check hoses and tubes between intake manifold and power valve actuator for crack, clogging, improper connection or disconnection. Refer to EC-35, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 5.
NG >> Repair hoses or tubes.



5. CHECK VACUUM TANK

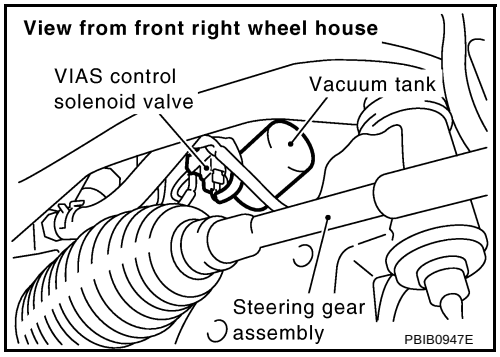
Refer to EC-467, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace vacuum tank.

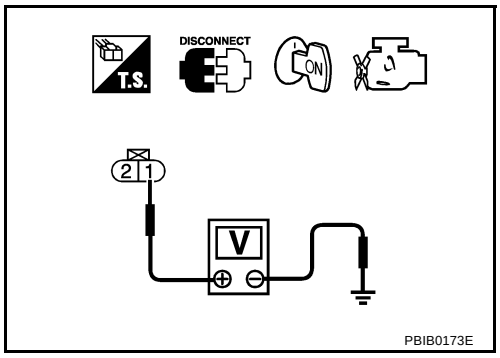
6. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect VIAS control solenoid valve harness connector.
2. Turn ignition switch ON.



3. Check voltage between VIAS control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check harness for open or short between VIAS control solenoid valve and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between VIAS control solenoid valve terminal 2 and ECM terminal 6. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK VIAS CONTROL SOLENOID VALVE

Refer to EC-467, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace VIAS control solenoid valve.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001KA

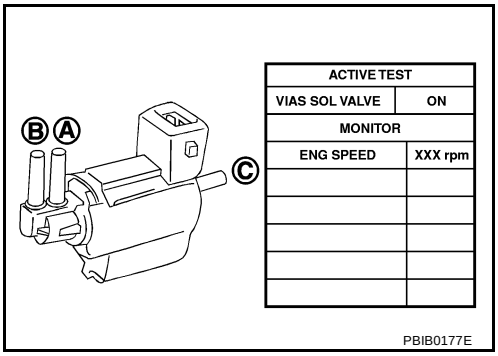
VIAS CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS SOL VALVE	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

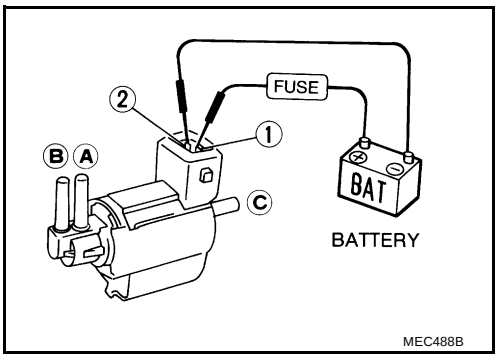


Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

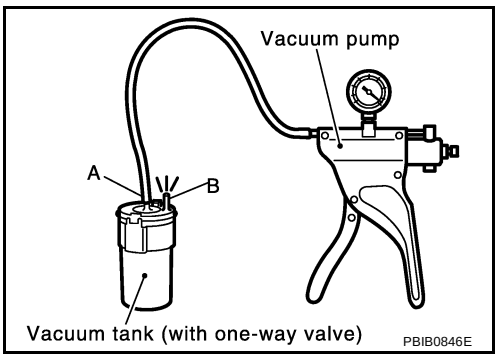
Condition	Air passage continuity between A and B	Air passage continuity between A and C
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.



VACUUM TANK

1. Disconnect vacuum hose connected to vacuum tank.
2. Connect a vacuum pump to the port **A** of vacuum pump.
3. Apply vacuum and make sure that vacuum exists at the port **B** .



Removal and Installation

BBS001KB

VIAS CONTROL SOLENOID VALVE

Refer to EM-18, "INTAKE MANIFOLD" .

FUEL PUMP CIRCUIT

PFP:17042

Description

BBS001KC

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

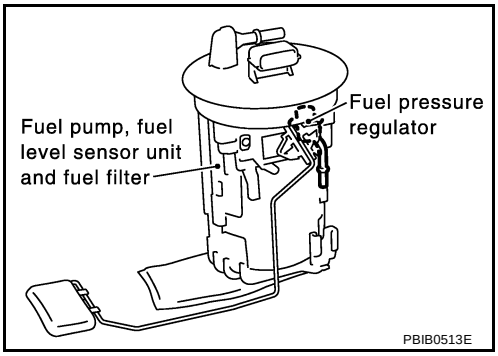
*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the crankshaft position sensor (POS) and camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON	Operates for 1 second
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops

COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.



CONSULT-II Reference Value in Data Monitor Mode

BBS001KD

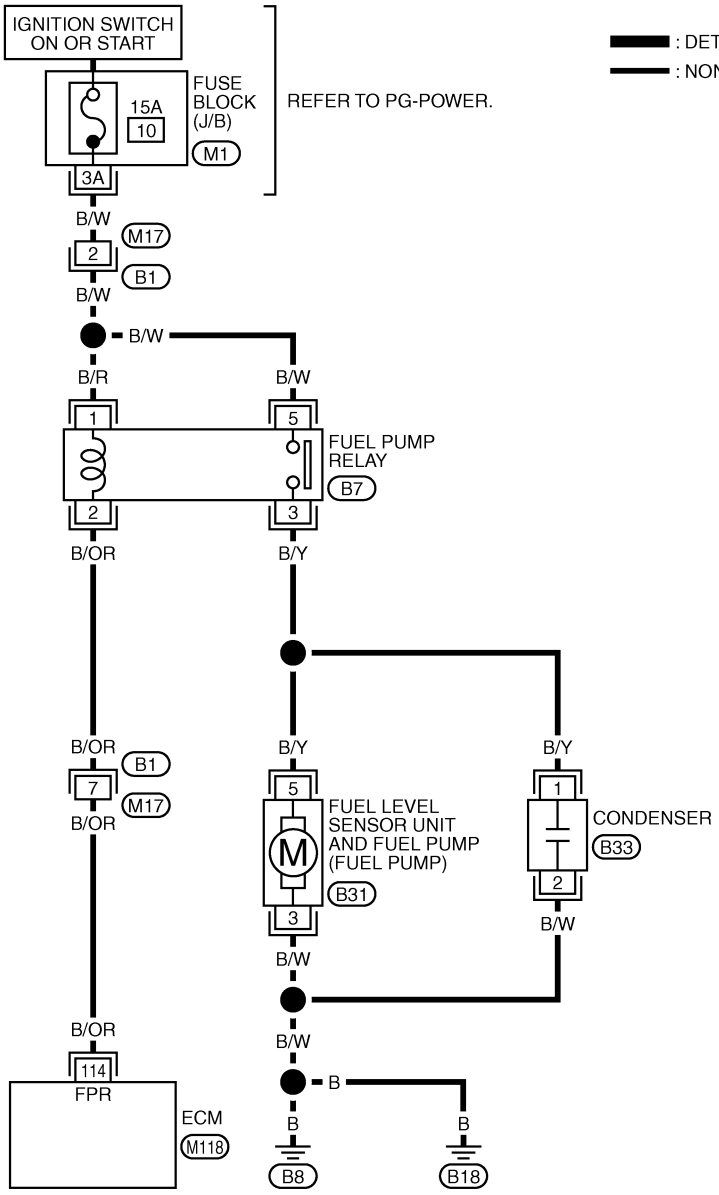
Specification data are reference values.

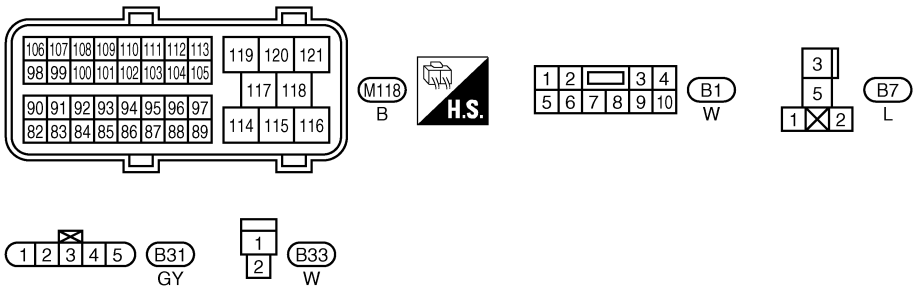
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● For 1 second after turning ignition switch ON ● Engine running or cranking	ON
	● Except above conditions	OFF

Wiring Diagram
LHD MODELS

BBS001KE

EC-F/PUMP-01





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0632E

Specification data are reference values and are measured between each terminal and ground.

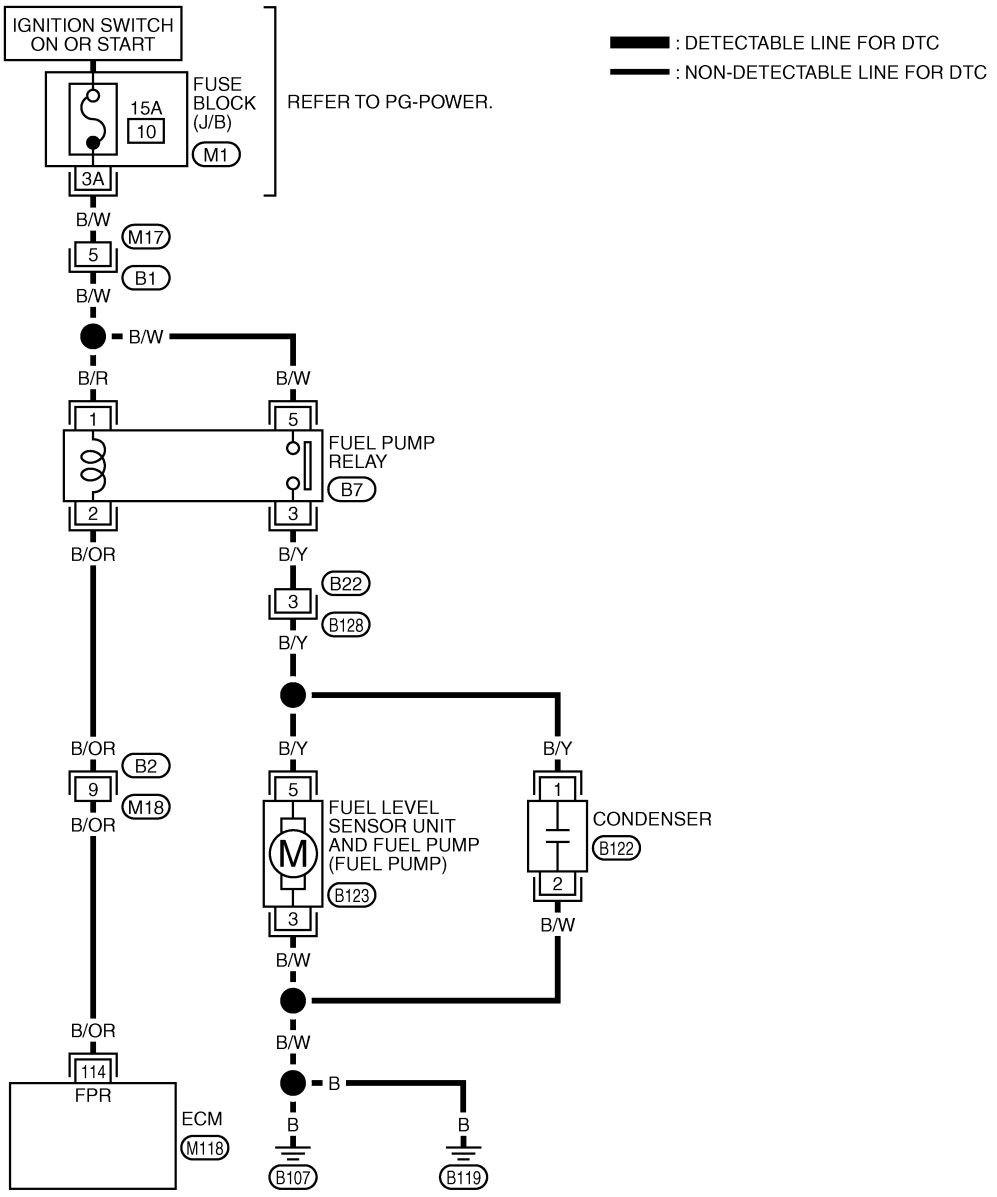
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
114	B/OR	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

RHD MODELS

EC-F/PUMP-02



TBWA0633E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
114	B/OR	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

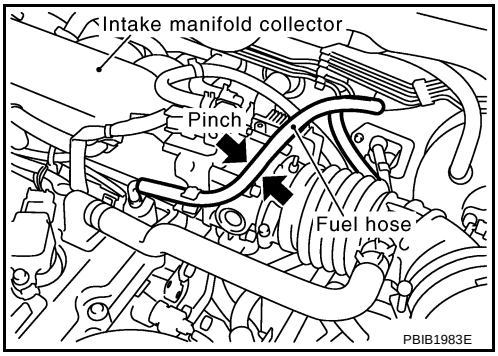
Diagnostic Procedure

BBS001KF

1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

Fuel pressure pulsation should be felt on the fuel hose for 1 second after ignition switch is turned ON.

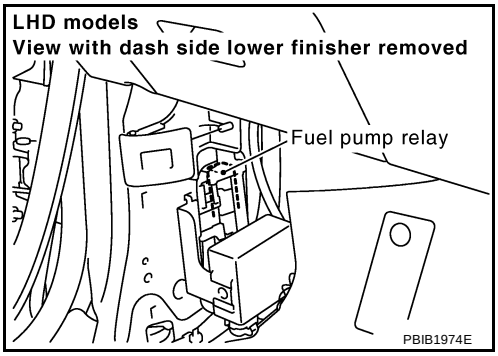


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

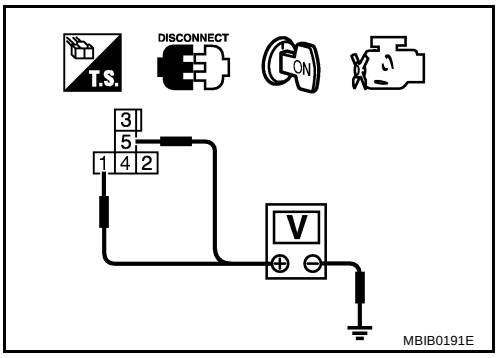
2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel pump relay.
3. Turn ignition switch ON.



4. Check voltage between fuel pump relay terminals 1, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M17, B1
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between fuel pump relay and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CONDENSER CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check harness continuity between fuel pump relay terminal 3 and condenser terminal 1, condenser terminal 2 and ground.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B22, B128 (RHD models)
- Harness for open or short between fuel pump relay and condenser
- Harness for open or short between condenser and ground

>> Repair open circuit or short to ground or short to power in harness connectors.

6. CHECK CONDENSER

Refer to EC-476, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace condenser.

7. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

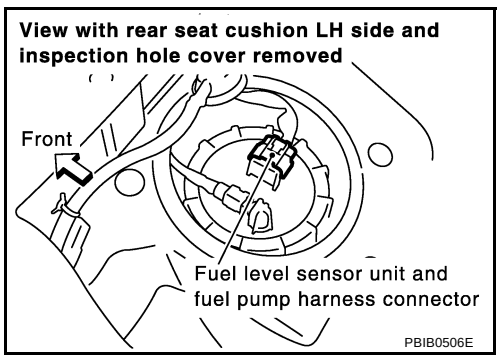
1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check harness continuity between fuel pump relay terminal 3 and “fuel level sensor unit and fuel pump” terminal 5, “fuel level sensor unit and fuel pump” terminal 3 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B22, B128 (RHD models)
- Harness for open or short between fuel pump relay and “fuel level sensor unit and fuel pump”
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground

>> Repair open circuit or short to ground or short to power in harness connectors.

9. CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between fuel pump relay terminal 2 and ECM terminal 114. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M17 (LHD models)
- Harness connectors B2, M18 (RHD models)
- Harness for open or short between fuel pump relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK FUEL PUMP RELAY

Refer to EC-476, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace fuel pump relay.

12. CHECK FUEL PUMP

Refer to EC-476, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace fuel pump.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

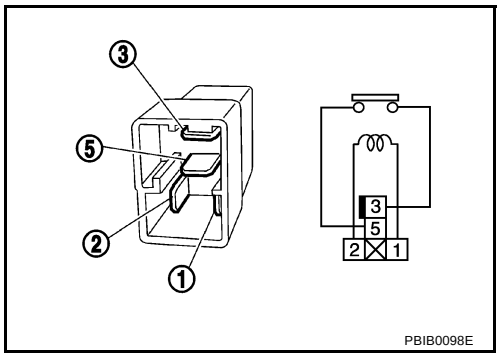
Component Inspection

BBS001KG

FUEL PUMP RELAY

Check continuity between terminals 3 and 5 under the following conditions.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

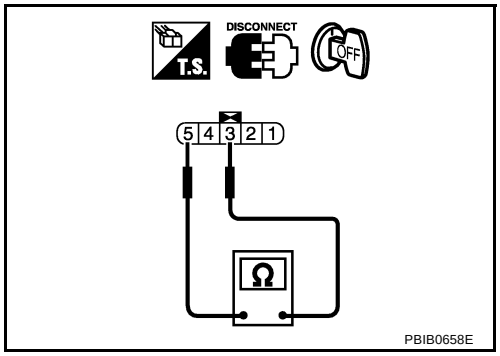


PBIB0098E

FUEL PUMP

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 3 and 5.

Resistance: Approximately 0.2 - 5.0Ω [at 25°C (77°F)]

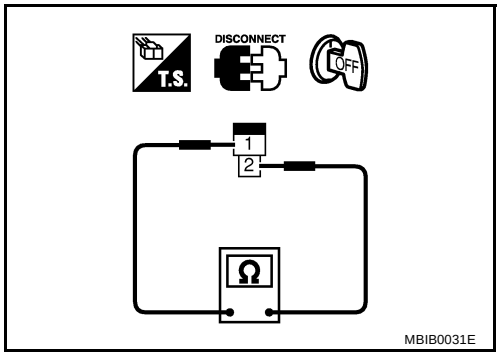


PBIB0658E

CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminal 1 and 2.

Resistance: Above 1MΩ [at 25°C (77°F)]



MBIB0031E

Removal and Installation

BBS001KH

FUEL PUMP

Refer to FL-4, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

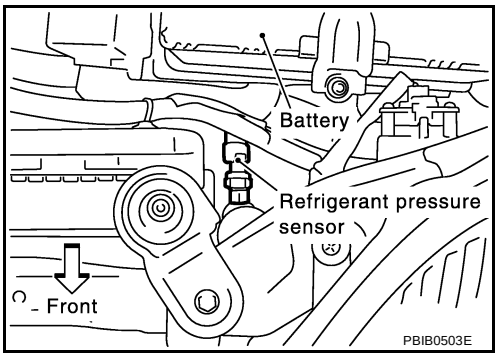
REFRIGERANT PRESSURE SENSOR

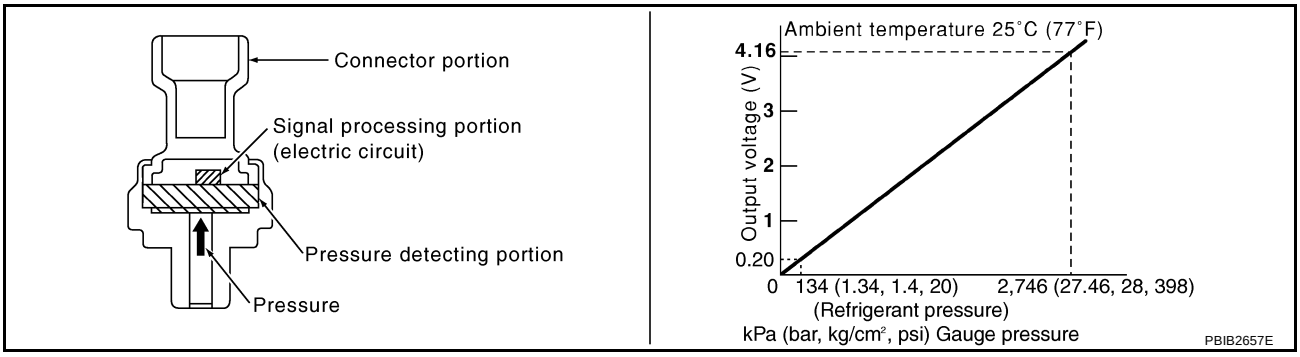
PFP:92136

Component Description

BBS001KI

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



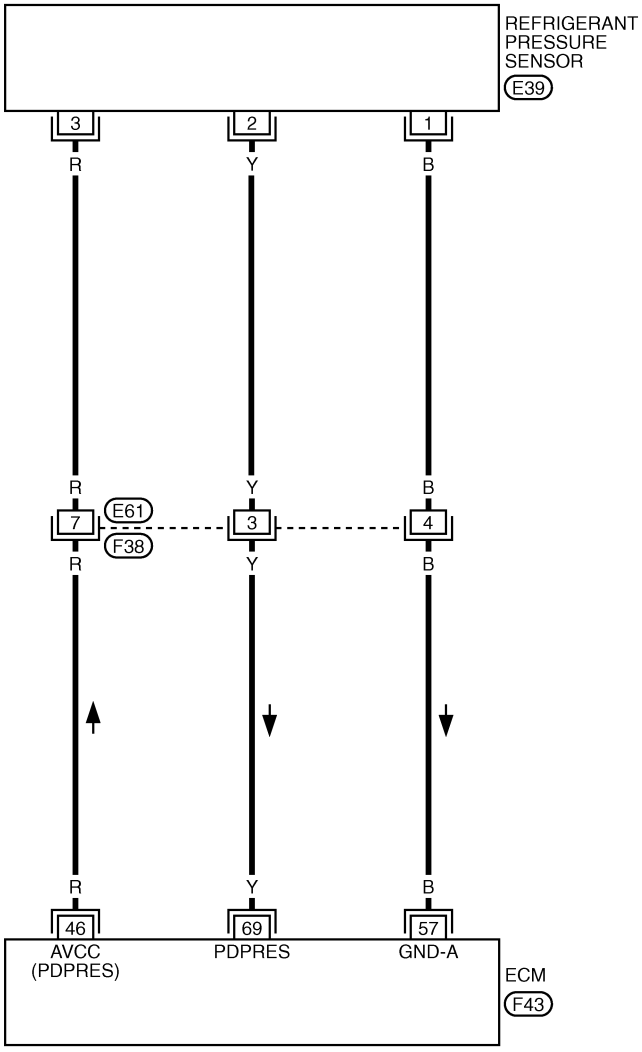


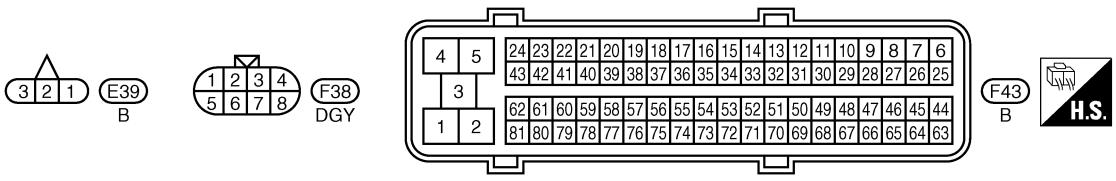
Wiring Diagram

BBS001KJ

EC-RP/SEN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWA0634E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	R	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
57	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	Y	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are ON (Compressor operates)	1.0 - 4.0V

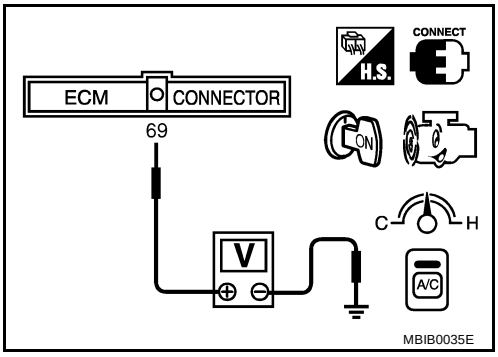
Diagnostic Procedure

BBS001KK

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 69 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

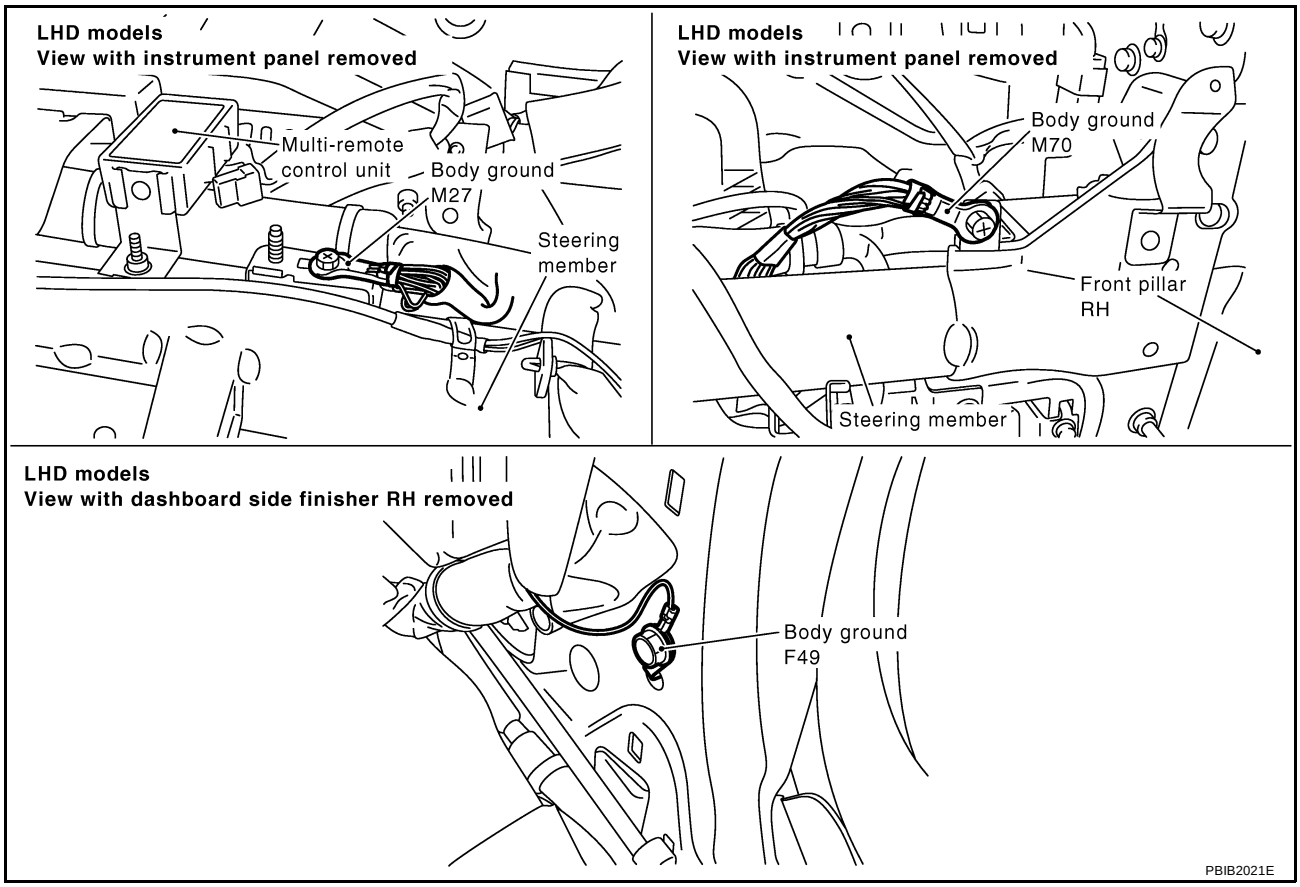


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower switch OFF.
2. Stop engine.
3. Loosen and retighten three ground screws on the body.
   Refer to EC-135, "Ground Inspection" .

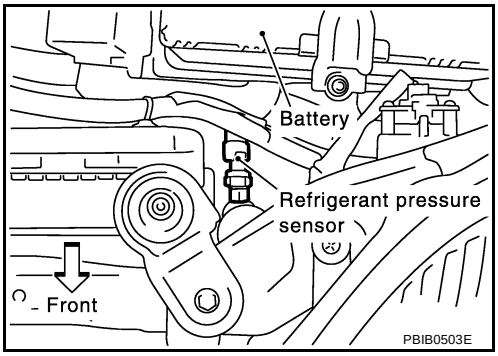


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

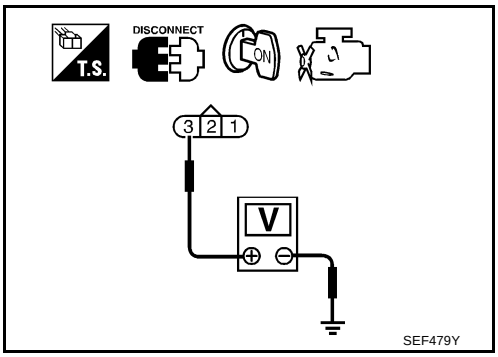
3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 57. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between refrigerant pressure sensor terminal 2 and ECM terminal 69. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

BBS001KL

REFRIGERANT PRESSURE SENSOR

Refer to ATC-139, "REFRIGERANT LINES" .

ELECTRICAL LOAD SIGNAL

PFP:25350

CONSULT-II Reference Value in Data Monitor Mode

BBS001KM

Specification data are reference values.

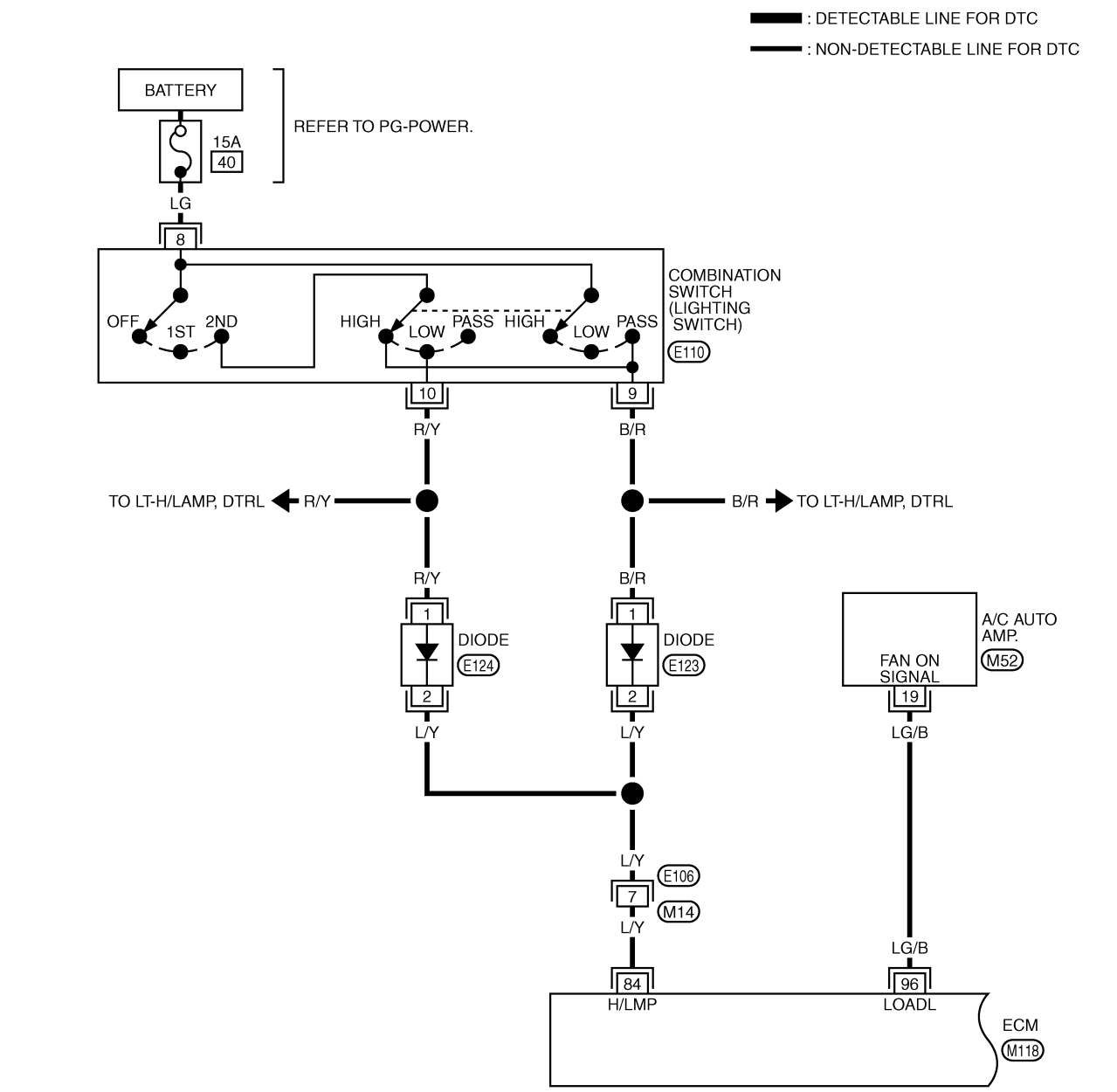
MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd position (placed in LOW position for models with Xenon headlamp).	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
HEATER FAN SW	● Ignition switch: ON	Heater fan is operating.	ON
		Heater fan is not operating.	OFF

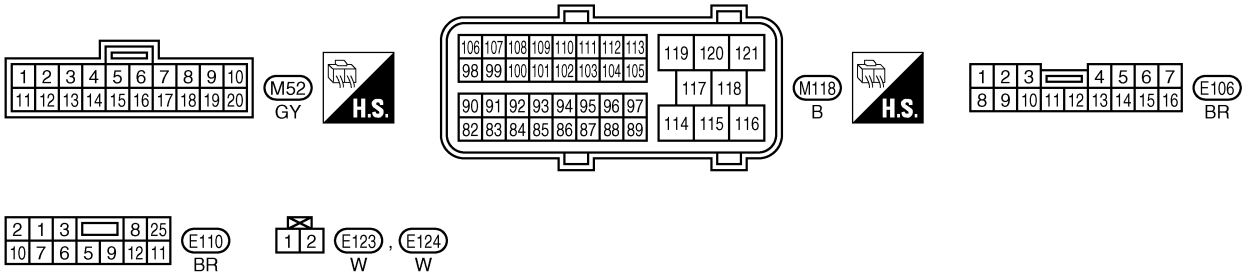
Wiring Diagram

BBS001KN

LHD MODELS WITHOUT XENON HEADLAMP

EC-LOAD-01





TBWB0468E

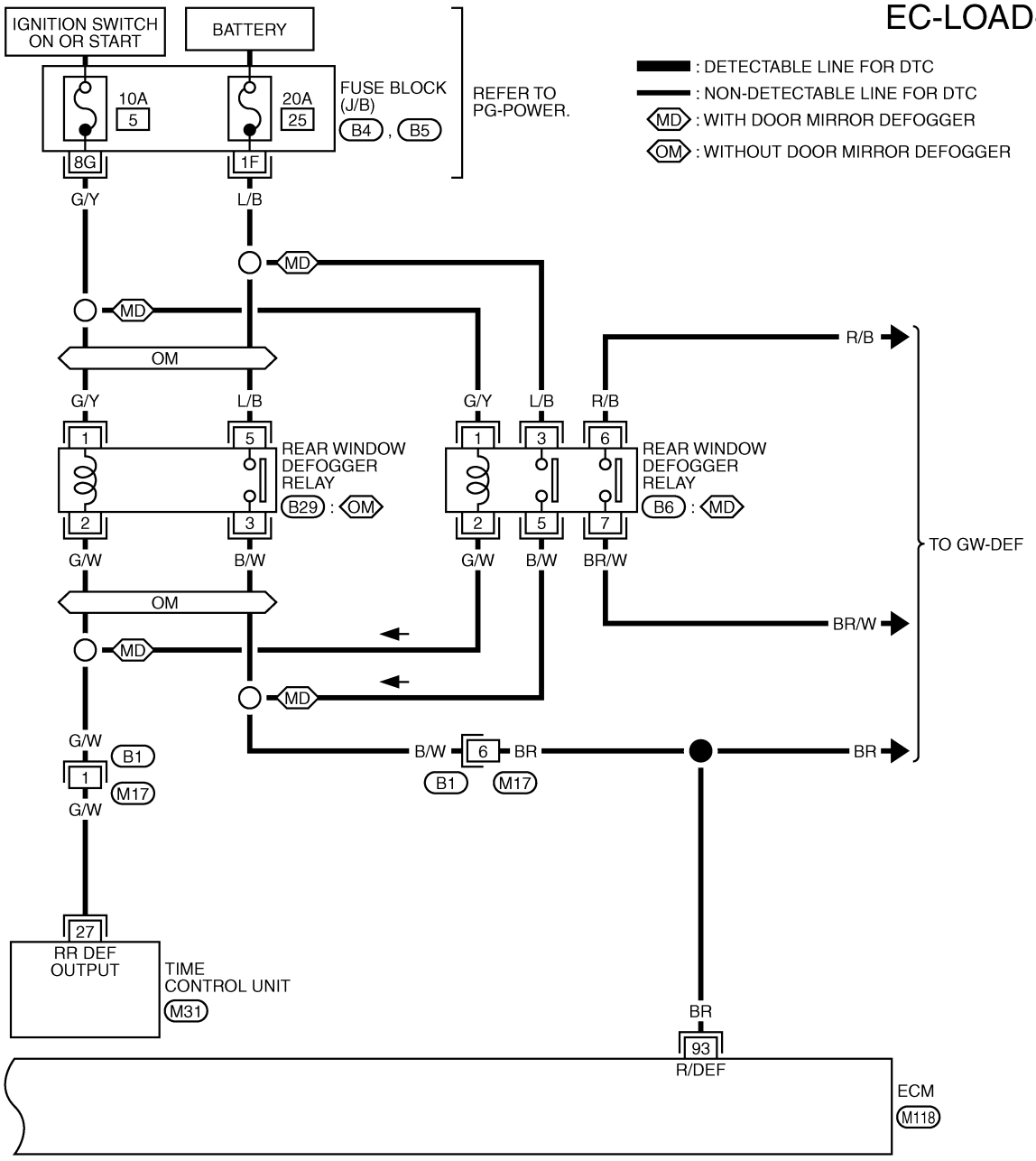
Specification data are reference values and are measured between each terminal and ground.

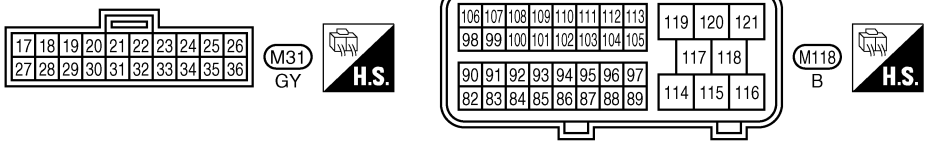
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	L/Y	Electrical load signal (Headlamp signal)	**[Ignition switch: ON]** ● Lighting switch: 2nd position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Lighting switch: OFF	Approximately 0V
96	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	BATTERY VOLTAGE (11 - 14V)

EC-LOAD-02





REFER TO THE FOLLOWING.
B4 , B5 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0636E

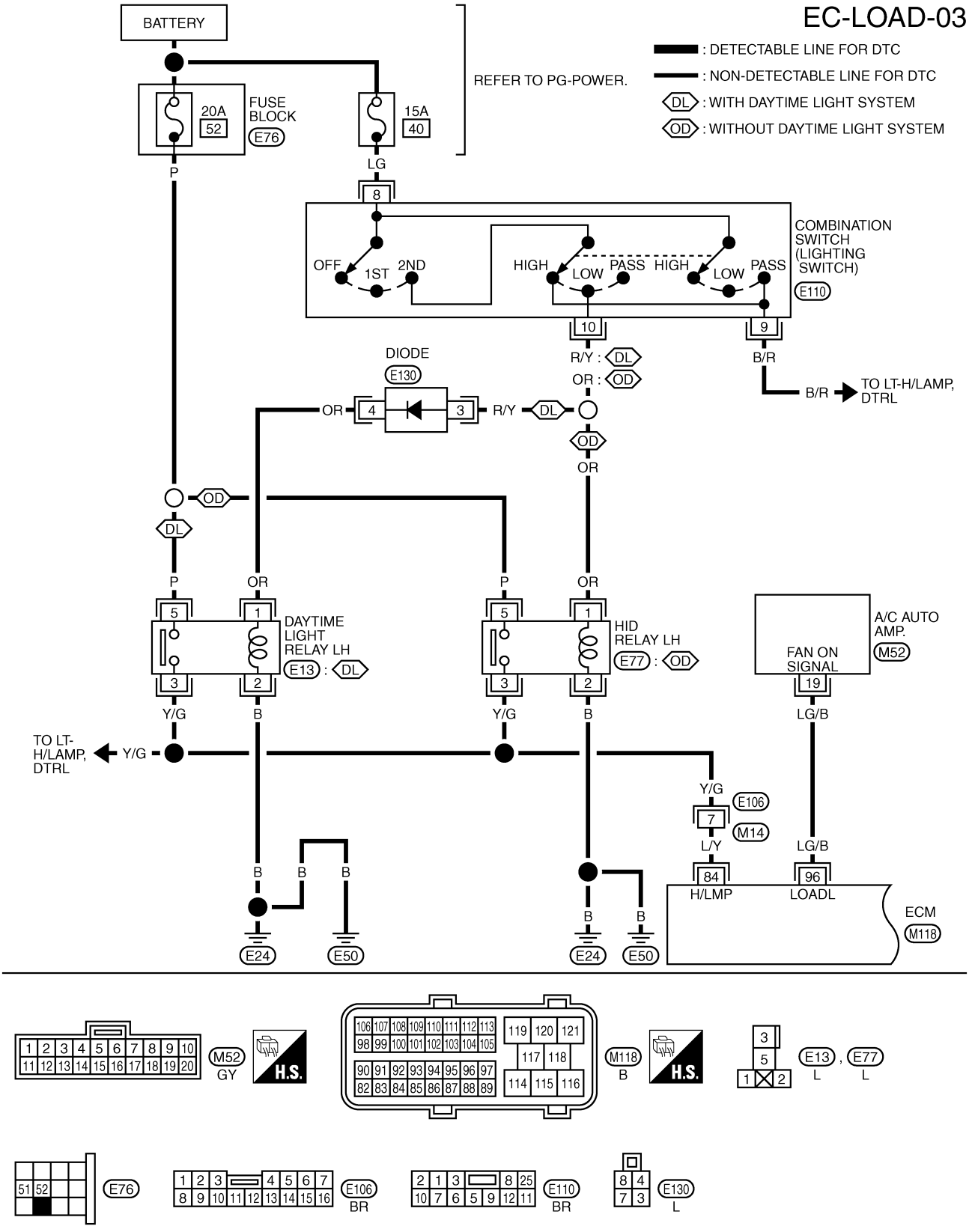
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
93	BR	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V

LHD MODELS WITH XENON HEADLAMP



TBWB0469E

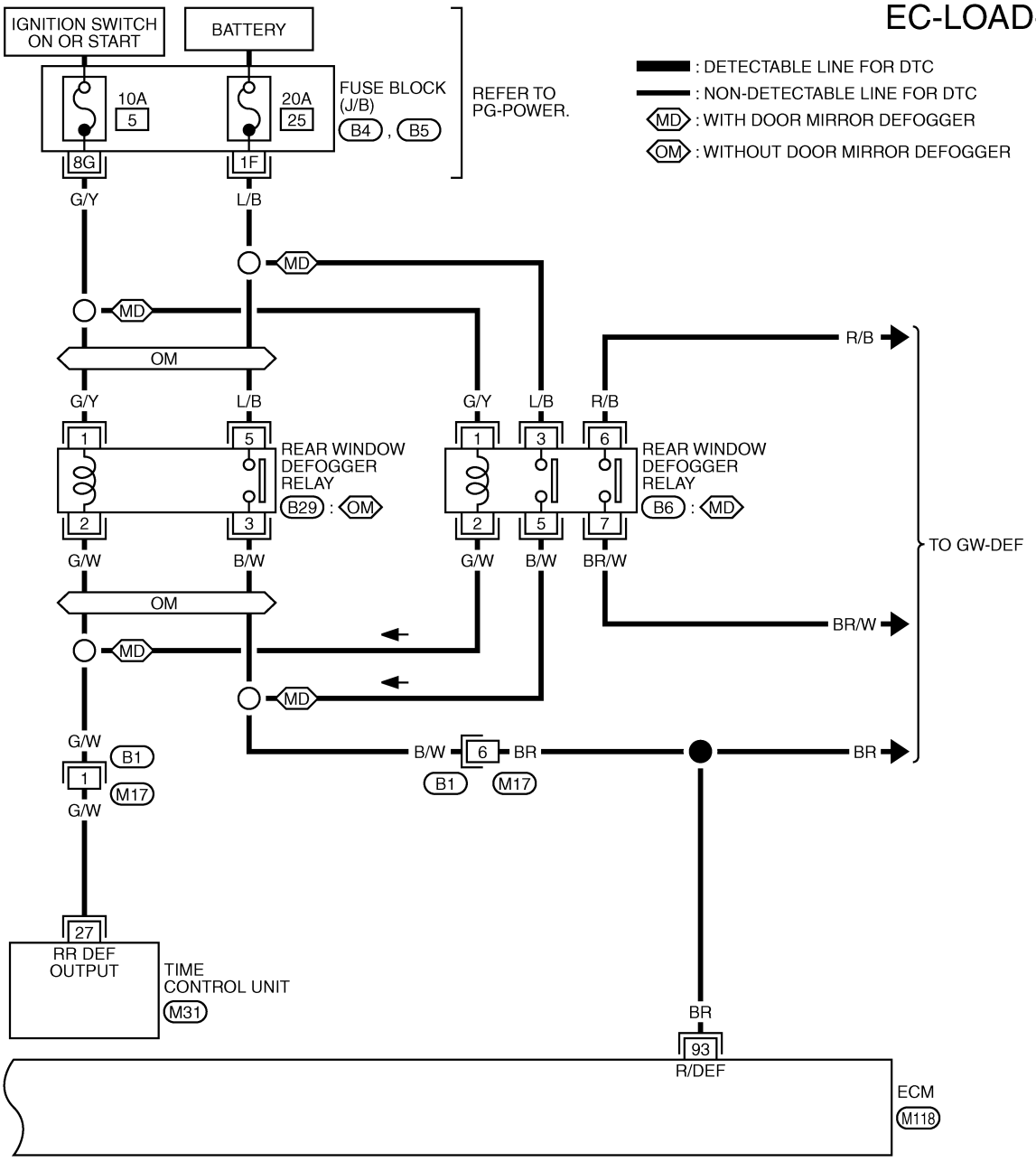
Specification data are reference values and are measured between each terminal and ground.

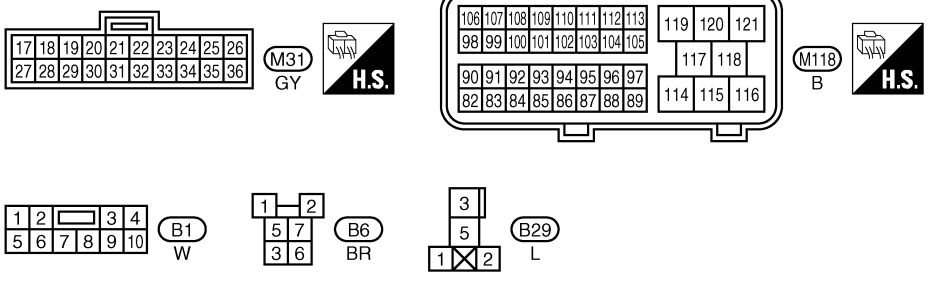
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	L/Y	Electrical load signal (Headlamp signal)	**[Ignition switch: ON]** ● Lighting switch: 2nd position (placed in LOW position)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Lighting switch: OFF	Approximately 0V
96	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	BATTERY VOLTAGE (11 - 14V)

EC-LOAD-04





REFER TO THE FOLLOWING.
B4 , B5 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0470E

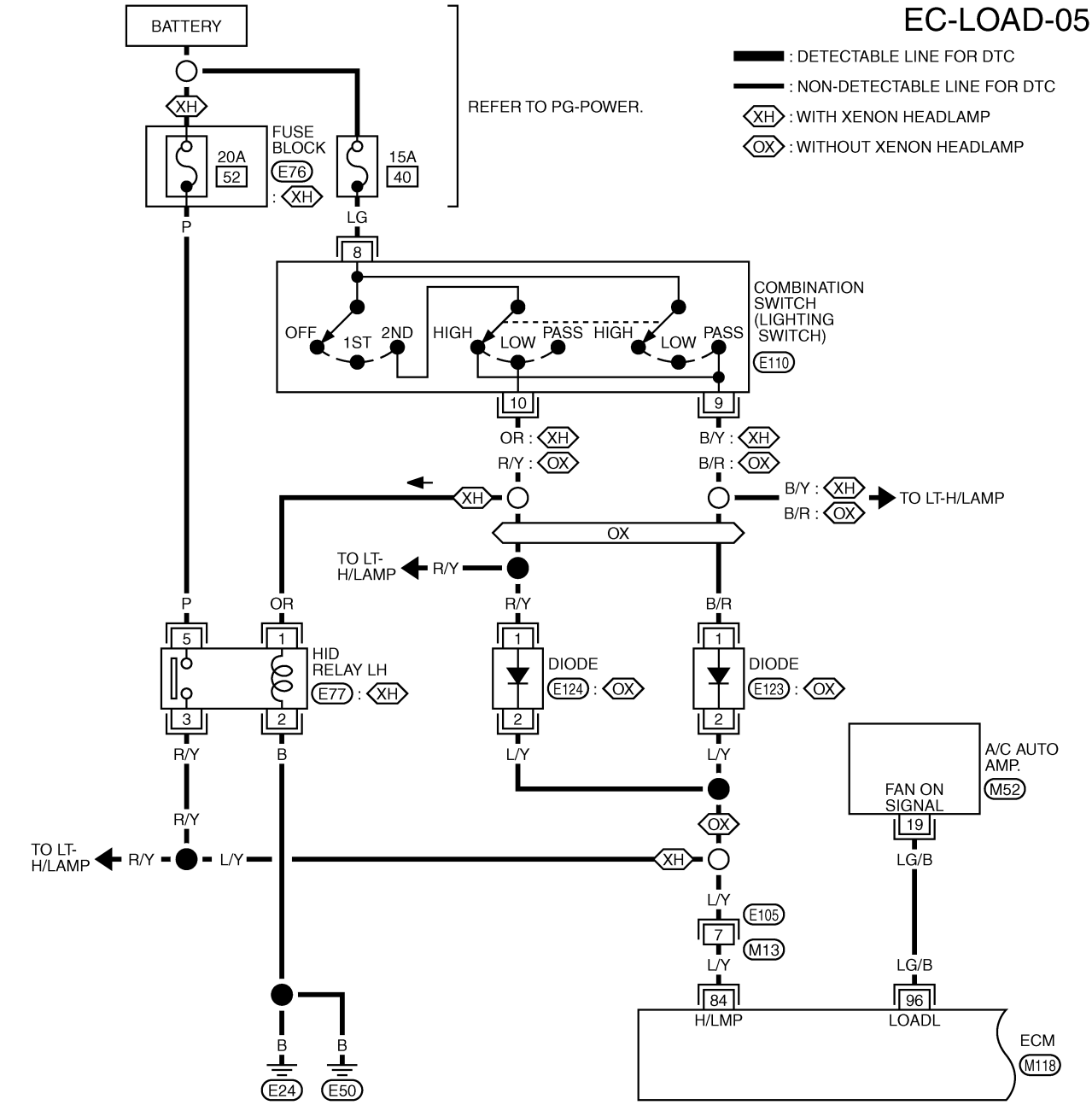
Specification data are reference values and are measured between each terminal and ground.

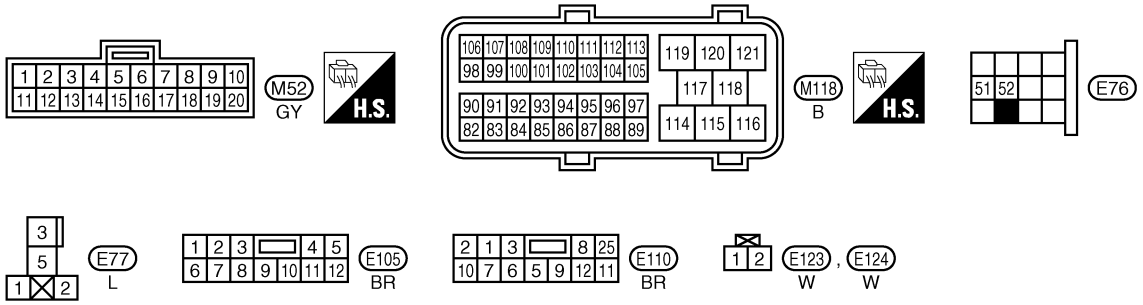
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
93	BR	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V

RHD MODELS





TBWB0471E

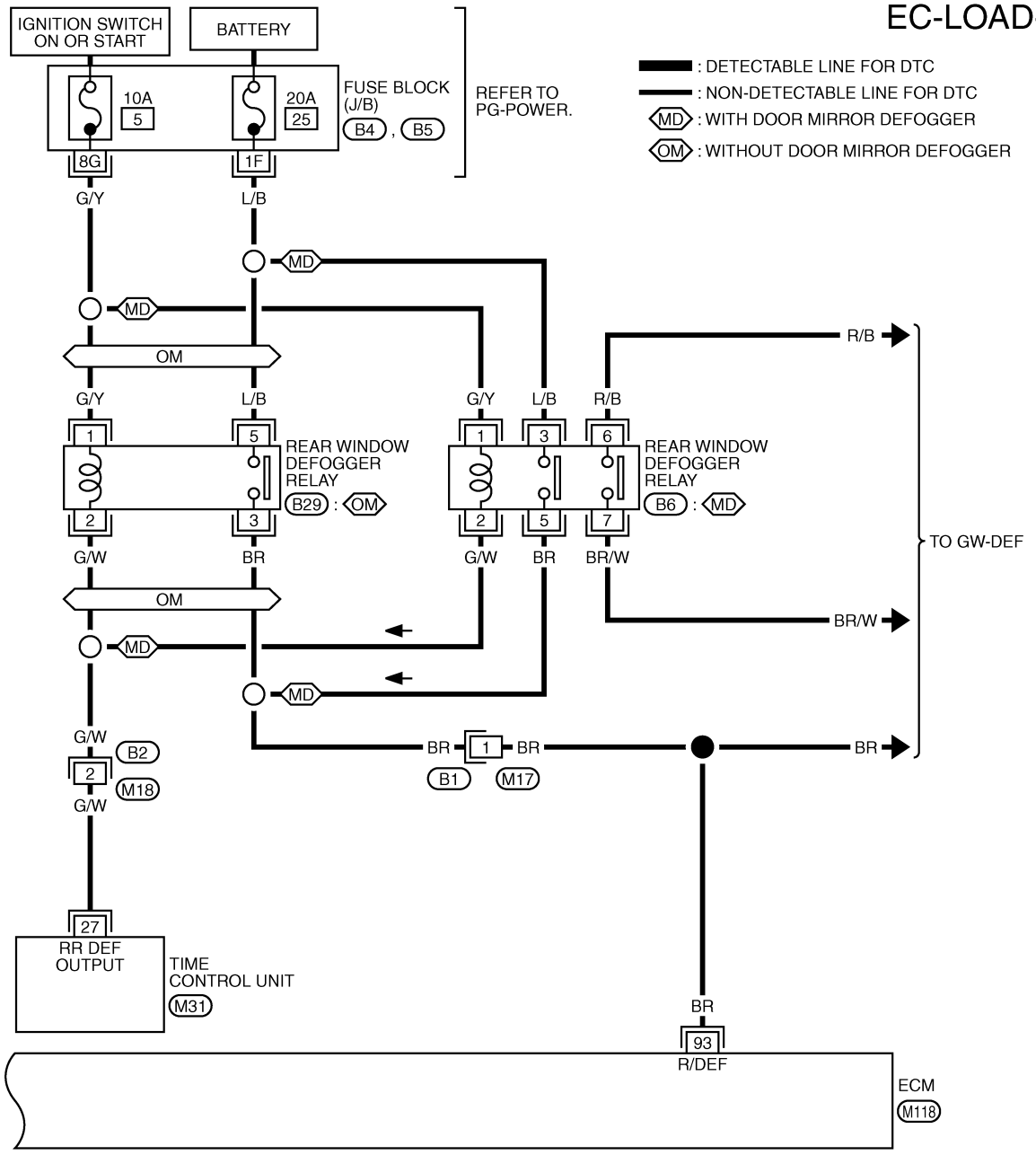
Specification data are reference values and are measured between each terminal and ground.

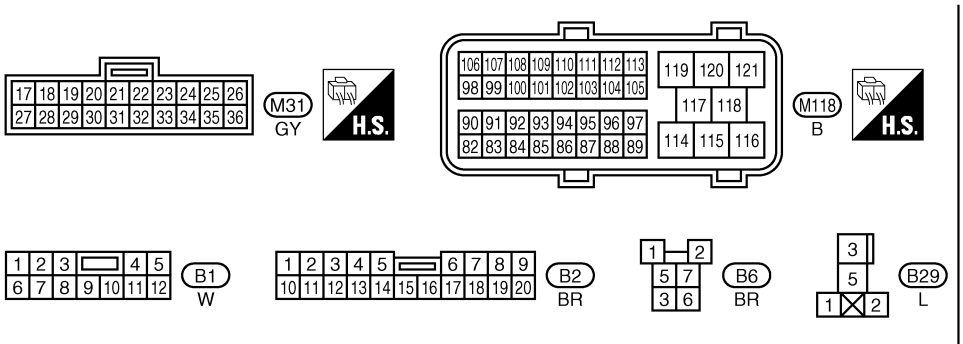
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	L/Y	Electrical load signal (Headlamp signal)	**[Ignition switch: ON]** ● Lighting switch: 2nd position (placed in LOW position for models with Xenon headlamp)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Lighting switch: OFF	Approximately 0V
96	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	BATTERY VOLTAGE (11 - 14V)

EC-LOAD-06





REFER TO THE FOLLOWING.
B4 , B5 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0472E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
93	BR	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V

Diagnostic Procedure

BBS001KO

LHD MODELS WITHOUT XENON HEADLAMP

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

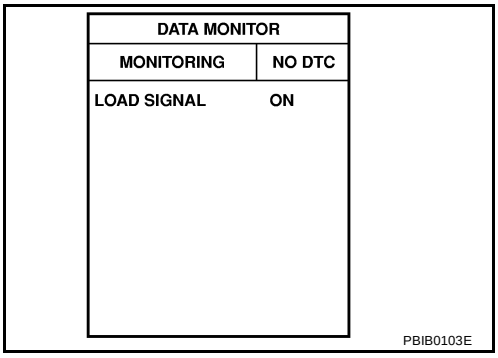
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCITION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF



OK or NG

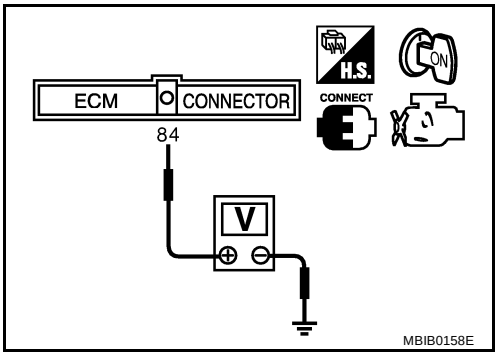
OK >> GO TO 4.
NG >> GO TO 8.

3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 84 and ground under the following conditions.

Condition	Voltage
Lighting switch: ON at 2nd position	BATTERY VOLTAGE
Lighting switch: OFF	0V



OK or NG

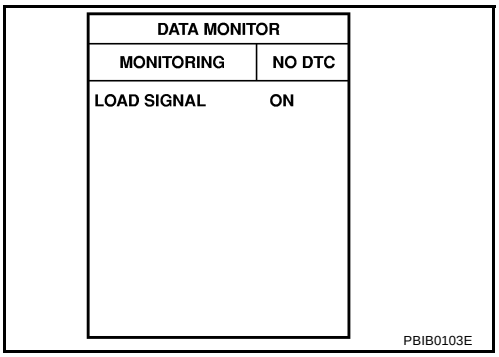
OK >> GO TO 5.
NG >> GO TO 8.

4. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

With CONSULT-II

Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF



OK or NG

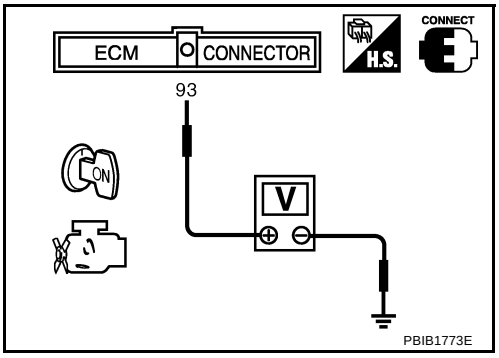
OK >> GO TO 6.
NG >> GO TO 11.

5. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Without CONSULT-II

Check voltage between ECM terminal 93 and ground under the following conditions.

Condition	Voltage
Rear window defogger switch: ON	BATTERY VOLTAGE
Rear window defogger switch: OFF	0V



OK or NG

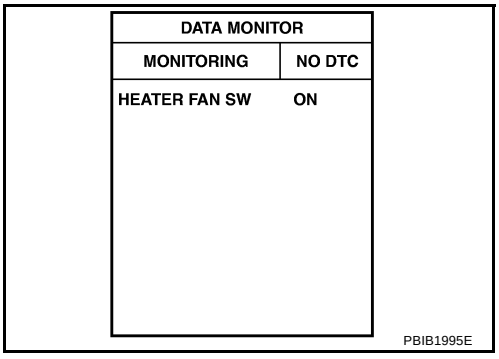
OK >> GO TO 7.
NG >> GO TO 11.

6. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

With CONSULT-II

Check “HEATER FAN SW” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF



OK or NG

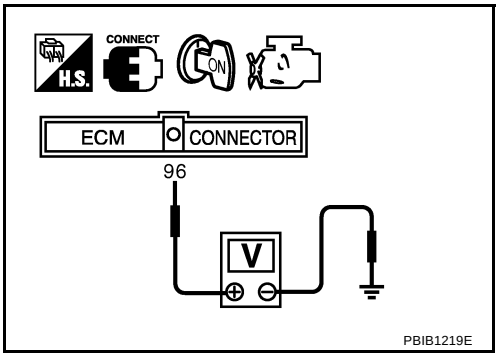
OK >> **INSPECTION END**.
NG >> GO TO 14.

7. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 96 and ground under the following conditions.

Condition	Voltage
Heater fan control switch: ON	0V
Heater fan control switch: OFF	BATTERY VOLTAGE



OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 14.

8. CHECK HEADLAMP FUNCTION

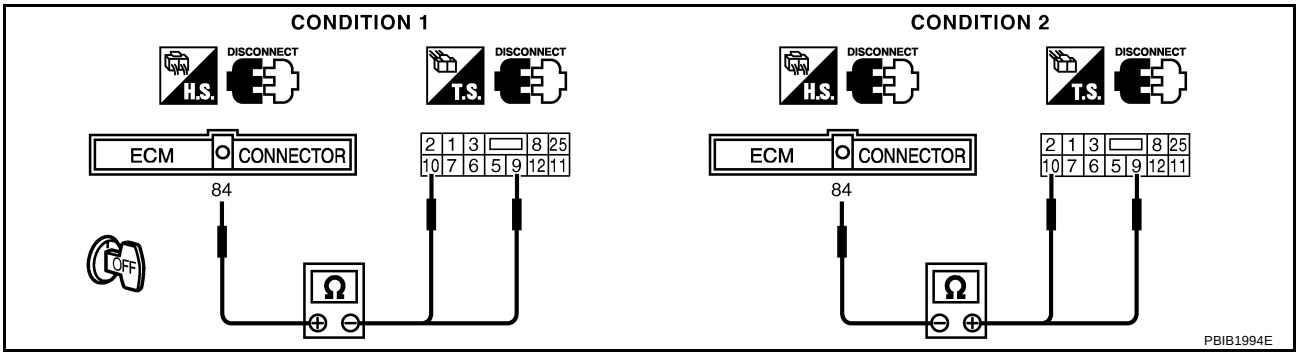
1. Start engine.
2. Turn the lighting switch ON at 2nd position.
3. Check that headlamps are illuminated.

OK or NG

OK >> GO TO 9.
NG >> Refer to LT-27, "HEADLAMP - CONVENTIONAL TYPE -" or LT-53, "HEADLAMP (WITH DAY-TIME) - CONVENTIONAL TYPE -" .

9. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connectors.
4. Check harness continuity between lighting switch terminal 9, 10 and ECM terminal 84 under the following conditions.



Condition	Continuity
1	Should exist
2	Should not exist

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M14
- Diode E123
- Diode E124
- Harness for open and short between lighting switch and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK REAR WINDOW DEFOGGER FUNCTION

1. Start engine.
2. Turn ON the rear window defogger switch.
3. Check the rear windshield.
   Is the rear windshield heated up?

Yes or No

Yes >> GO TO 12.
No >> Refer to GW-17, "REAR WINDOW DEFOGGER" .

12. CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between rear window defogger relay 3 (models without door mirror defogger), 5 (models with door mirror defogger) and ECM terminal 93.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M17
- Harness for open and short between rear window defogger relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK HEATER FAN CONTROL FUNCTION

1. Start engine.
2. Turn ON the fan control switch.
3. Check the blower fan motor.
   Does the blower fan motor activate?

Yes or No

Yes >> GO TO 15.
No >> Refer to ATC-33, "TROUBLE DIAGNOSIS" .

15. CHECK HEATER FAN SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect A/C AUTO AMP. harness connector.
4. Check harness continuity between A/C AUTO AMP. terminal 19 and ECM terminal 96. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK INTERMITTENT INCIDENT

Perform EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

LHD MODELS WITH XENON HEADLAMP

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCITION-I

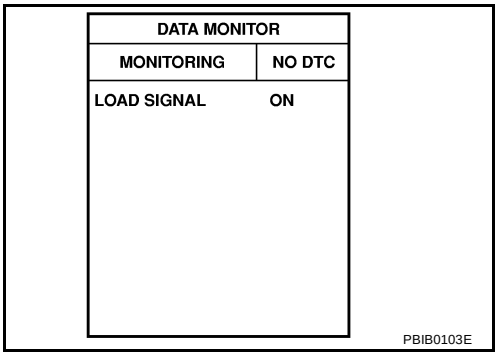
With CONSULT-II

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Lighting switch: ON at 2nd position and placed in LOW position	ON
Lighting switch: OFF	OFF

OK or NG

OK >> GO TO 4.
NG >> GO TO 8.

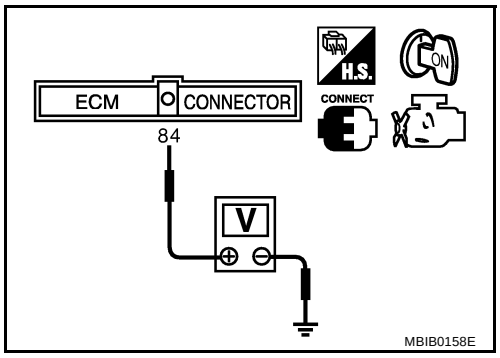


3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 84 and ground under the following conditions.

Condition	Voltage
Lighting switch: ON at 2nd position and placed in LOW position	BATTERY VOLTAGE
Lighting switch: OFF	0V



OK or NG

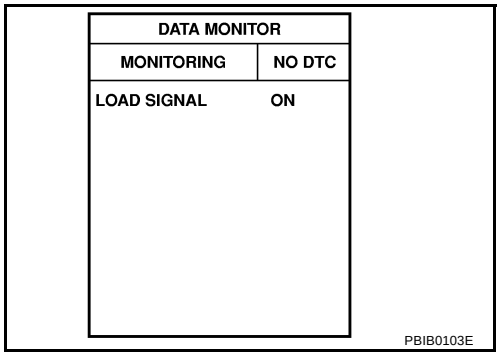
OK >> GO TO 5.
NG >> GO TO 8.

4. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

With CONSULT-II

Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF



OK or NG

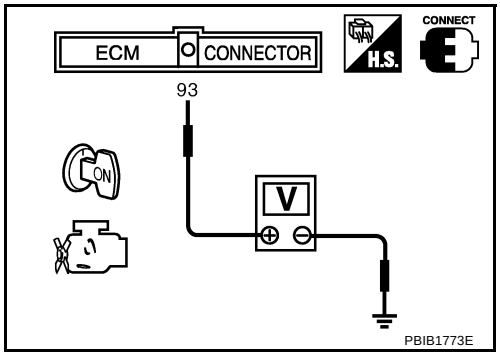
OK >> GO TO 6.
NG >> GO TO 11.

5. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Without CONSULT-II

Check voltage between ECM terminal 93 and ground under the following conditions.

Condition	Voltage
Rear window defogger switch: ON	BATTERY VOLTAGE
Rear window defogger switch: OFF	0V



OK or NG

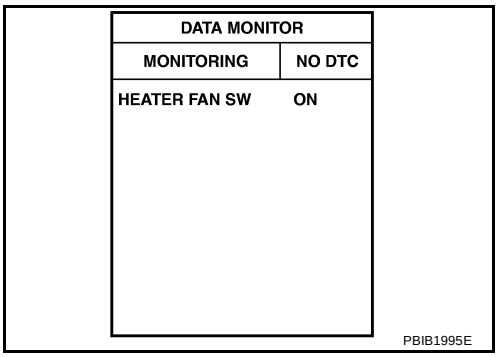
OK >> GO TO 7.
NG >> GO TO 11.

6. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

With CONSULT-II

Check “HEATER FAN SW” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF



OK or NG

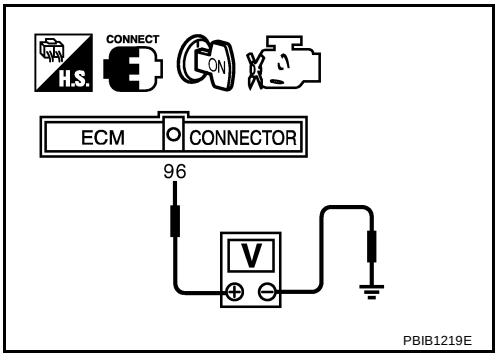
OK >> **INSPECTION END**.
NG >> GO TO 14.

7. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 96 and ground under the following conditions.

Condition	Voltage
Heater fan control switch: ON	0V
Heater fan control switch: OFF	BATTERY VOLTAGE



OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 14.

8. CHECK HEADLAMP FUNCTION

1. Start engine.
2. Turn the lighting switch ON at 2nd position and placed in LOW position.
3. Check that headlamps are illuminated.

OK or NG

OK >> GO TO 9.
NG >> Refer to LT-5, "HEADLAMP - XENON TYPE -" or LT-43, "HEADLAMP (WITH DAYTIME) - XENON TYPE -" .

9. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect daytime light relay LH or HID relay LH.
4. Check harness continuity between ECM terminal 84 and daytime light relay LH terminal 3 or HID relay LH terminal 3.
   Refer to Wiring Diagram.
5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M14
- Harness for open and short between ECM and daytime light relay LH or HID relay LH

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK REAR WINDOW DEFOGGER FUNCTION

1. Start engine.
2. Turn ON the rear window defogger switch.
3. Check the rear windshield.
   Is the rear windshield heated up?

Yes or No

Yes >> GO TO 12.
No >> Refer to GW-17, "REAR WINDOW DEFOGGER" .

12. CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between rear window defogger relay 3 (models without door mirror defogger), 5 (models with door mirror defogger) and ECM terminal 93.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M17
- Harness for open and short between rear window defogger relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK HEATER FAN CONTROL FUNCTION

1. Start engine.
2. Turn ON the fan control switch.
3. Check the blower fan motor.
   Does the blower fan motor activate?

Yes or No

Yes >> GO TO 15.
No >> Refer to ATC-33, "TROUBLE DIAGNOSIS" .

15. CHECK HEATER FAN SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect A/C AUTO AMP. harness connector.
4. Check harness continuity between A/C AUTO AMP. terminal 19 and ECM terminal 96. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK INTERMITTENT INCIDENT

Perform EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

RHD MODELS

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCITION-I

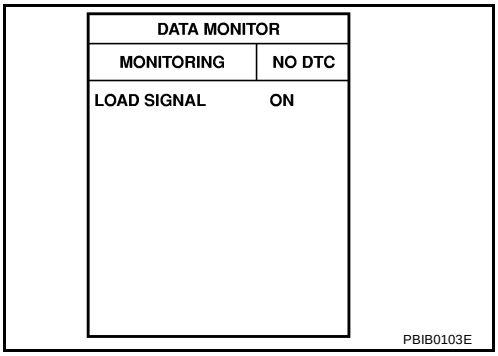
With CONSULT-II

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Lighting switch: ON at 2nd position (placed in LOW position for models with Xenon headlamp)	ON
Lighting switch: OFF	OFF

OK or NG

OK >> GO TO 4.
NG >> GO TO 8.

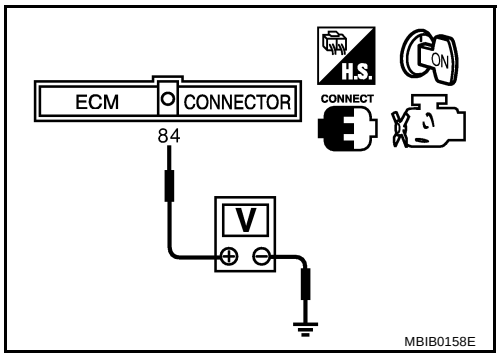


3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 84 and ground under the following conditions.

Condition	Voltage
Lighting switch: ON at 2nd position (placed in LOW position for models with Xenon headlamp)	BATTERY VOLTAGE
Lighting switch: OFF	0V



OK or NG

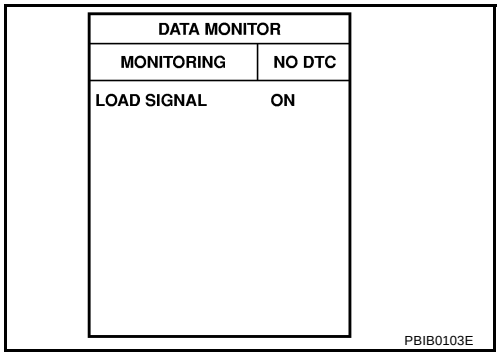
OK >> GO TO 5.
NG >> GO TO 8.

4. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

With CONSULT-II

Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF



OK or NG

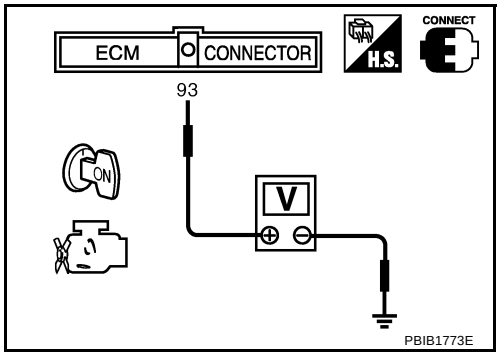
OK >> GO TO 6.
NG >> GO TO 13.

5. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Without CONSULT-II

Check voltage between ECM terminal 93 and ground under the following conditions.

Condition	Voltage
Rear window defogger switch: ON	BATTERY VOLTAGE
Rear window defogger switch: OFF	0V



OK or NG

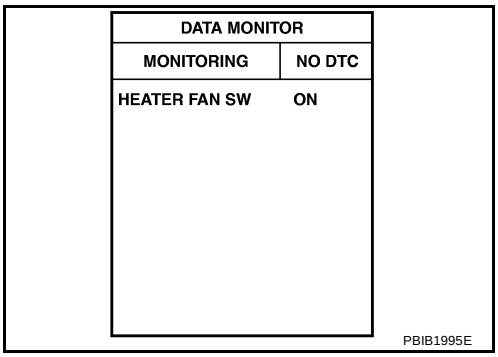
OK >> GO TO 7.
NG >> GO TO 13.

6. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

With CONSULT-II

Check “HEATER FAN SW” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF



OK or NG

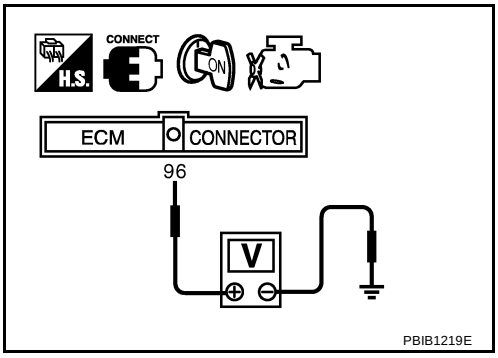
OK >> **INSPECTION END**.
NG >> GO TO 16.

7. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 96 and ground under the following conditions.

Condition	Voltage
Heater fan control switch: ON	0V
Heater fan control switch: OFF	BATTERY VOLTAGE



OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 16.

8. CHECK HEADLAMP FUNCTION

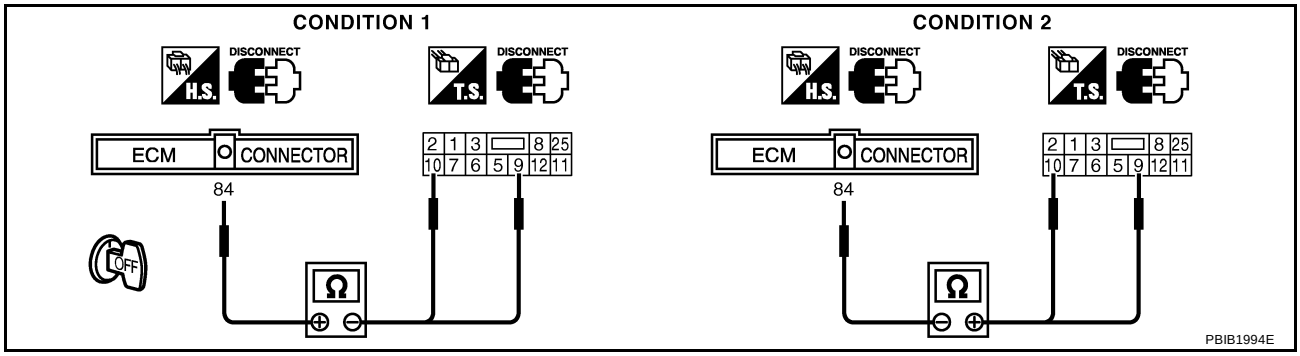
1. Start engine.
2. Turn the lighting switch ON at 2nd position (placed in LOW position for models with Xenon headlamp).
3. Check that headlamps are illuminated.

OK or NG

OK (Models without Xenon headlamp)>>GO TO 9.
OK (Models with Xenon headlamp)>>GO TO 11.
NG >> Refer to LT-5, "HEADLAMP - XENON TYPE -" , LT-27, "HEADLAMP - CONVENTIONAL TYPE -" , LT-43, "HEADLAMP (WITH DAYTIME) - XENON TYPE -" or LT-53, "HEADLAMP (WITH DAYTIME) - CONVENTIONAL TYPE -" .

9. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connectors.
4. Check harness continuity between lighting switch terminal 9, 10 and ECM terminal 84 under the following conditions.



Condition	Continuity
1	Should exist
2	Should not exist

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 18.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M13
- Diode E123
- Diode E124
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect HID relay LH.
4. Check harness continuity between ECM terminal 84 and HID relay LH terminal 3. Refer to Wiring Diagram.
5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 18.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M13
- Harness for open and short between ECM and HID relay LH

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK REAR WINDOW DEFOGGER FUNCTION

1. Start engine.
2. Turn ON the rear window defogger switch.
3. Check the rear windshield.
   Is the rear windshield heated up?

Yes or No

Yes >> GO TO 14.
No >> Refer to GW-17, "REAR WINDOW DEFOGGER" .

14. CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between rear window defogger relay 3 (models without door mirror defogger), 5 (models with door mirror defogger) and ECM terminal 93.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 18.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M17
- Harness for open and short between rear window defogger relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK HEATER FAN CONTROL FUNCTION

1. Start engine.
2. Turn ON the fan control switch.
3. Check the blower fan motor.
   Does the blower fan motor activate?

Yes or No

Yes >> GO TO 17.
No >> Refer to ATC-33, "TROUBLE DIAGNOSIS" .

17. CHECK HEATER FAN SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect A/C AUTO AMP. harness connector.
4. Check harness continuity between A/C AUTO AMP. terminal 19 and ECM terminal 96.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 18.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

18. CHECK INTERMITTENT INCIDENT

Perform EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

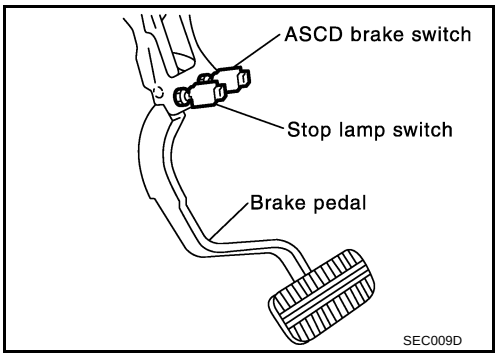
ASCD BRAKE SWITCH

PFP:25320

Component Description

BBS001KP

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-532, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

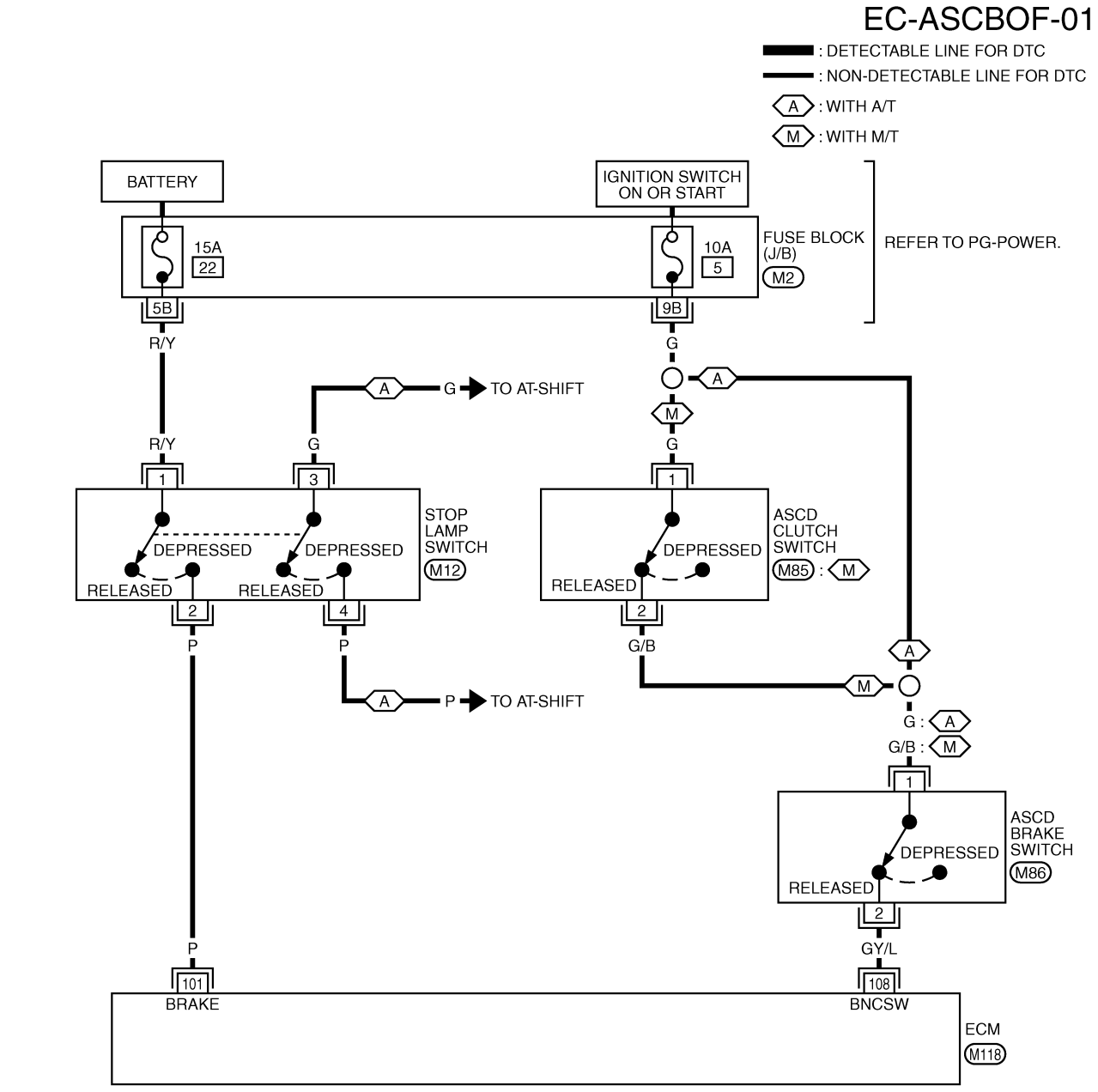
BBS001KQ

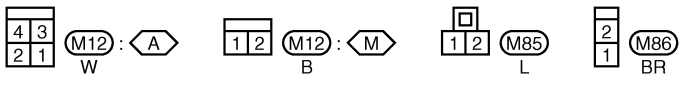
Specification data are reference values.

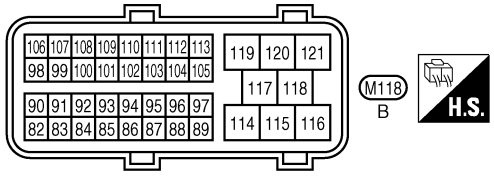
MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	● Ignition switch: ON	Clutch pedal (M/T) and brake pedal: Fully released	ON
		Clutch pedal (M/T) and/or brake pedal: Slightly depressed	OFF
BRAKE SW2 (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

Wiring Diagram

BBS001KR







REFER TO THE FOLLOWING.

M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0763E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	P	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	GY/L	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal and/or clutch pedal (M/T): Slightly depressed	Approximately 0V
			[Ignition switch: ON] ● Brake pedal and clutch pedal (M/T): Fully released	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS001KS

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

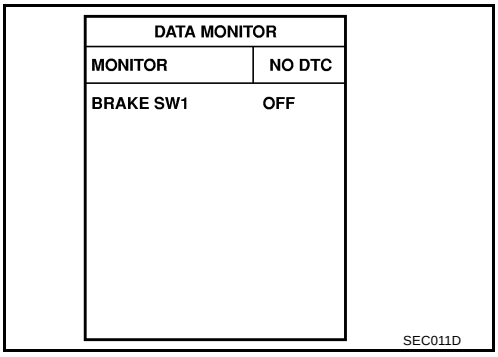
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

A/T models

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

M/T models

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON



Without CONSULT-II

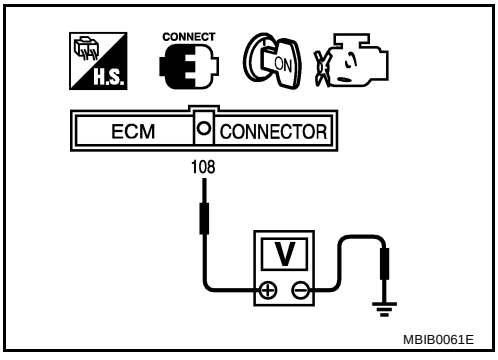
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

A/T models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

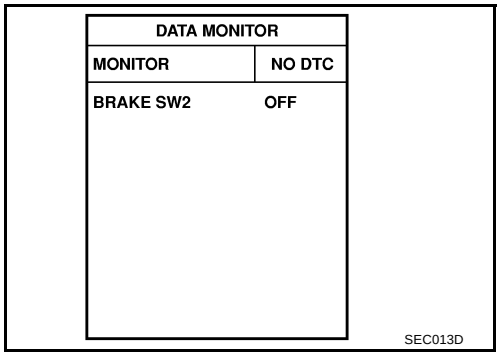
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

1. Select “BRAKE SW2” in “DATA MONITOR” mode with CONSULT-II.
2. Check “BRAKE SW2” indication under the following conditions.

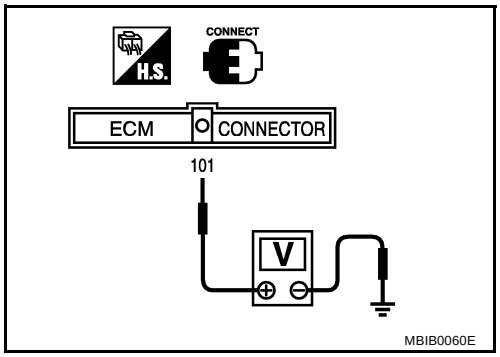
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

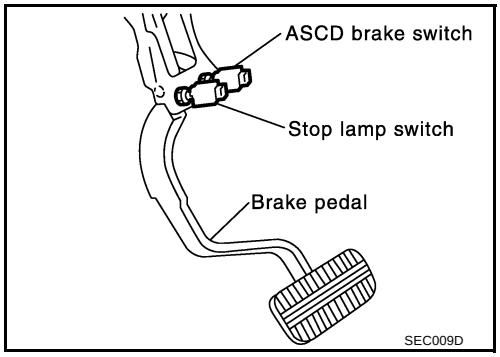


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

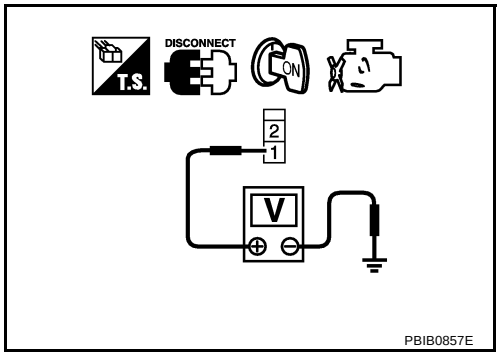
3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG (A/T models)>>GO TO 4.
NG (M/T models)>>GO TO 5.

4. DETECT MALFUNCTIONING PART

Check the following.

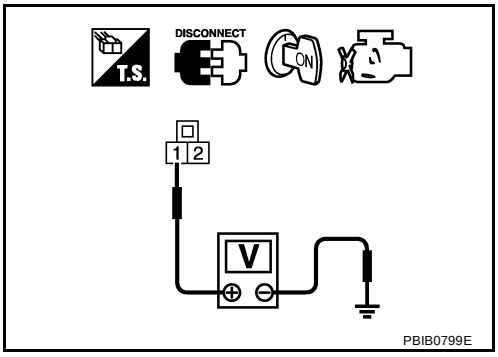
- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between ASCD clutch switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD clutch switch terminal 2 and ASCD brake switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK ASCD CLUTCH SWITCH

Refer to EC-516, "Component Inspection"

OK or NG

OK >> GO TO 15.
NG >> Replace ASCD clutch switch.

9. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ASCD brake switch terminal 2 and ECM terminal 108. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH

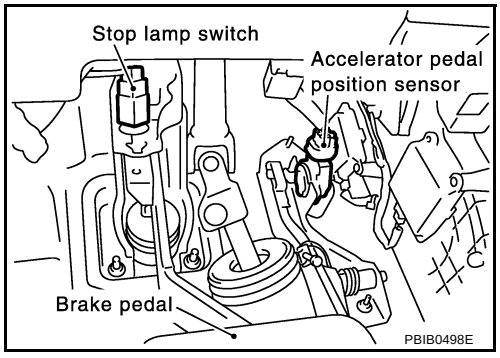
Refer to EC-516, "Component Inspection" .

OK or NG

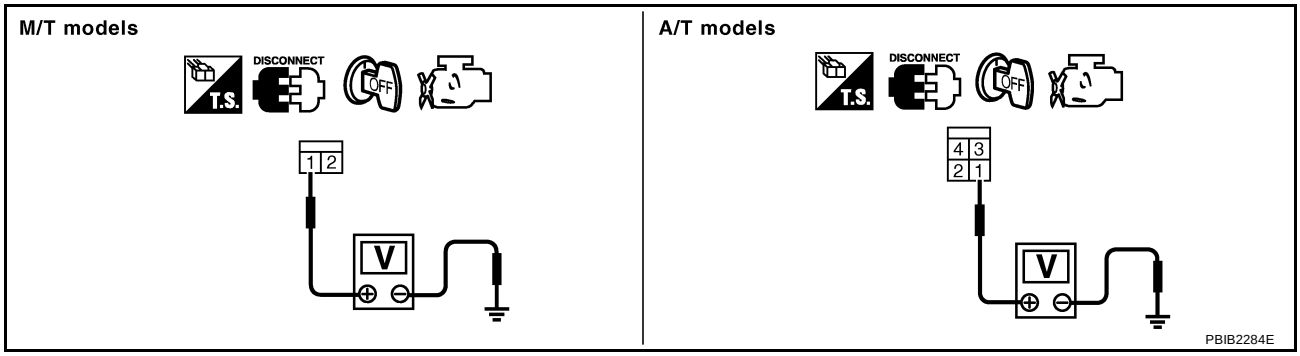
OK >> GO TO 15.
NG >> Replace ASCD brake switch.

11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 15A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK STOP LAMP SWITCH

Refer to EC-516, "Component Inspection"

OK or NG

OK >> GO TO 15.
NG >> Replace stop lamp switch.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

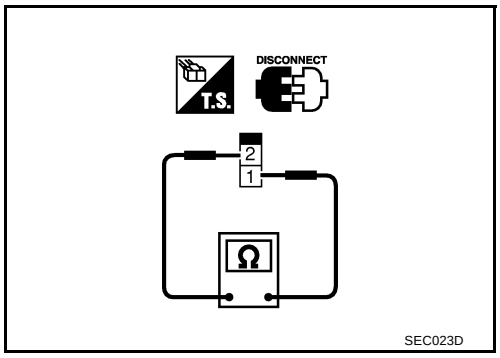
Component Inspection

BBS001KT

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

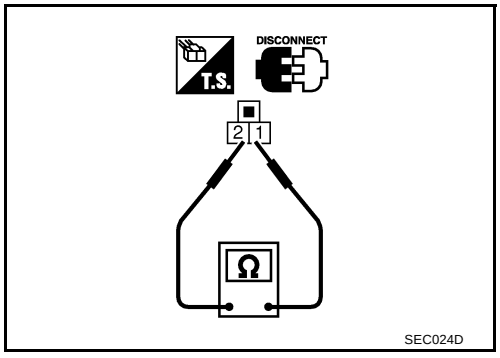


If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

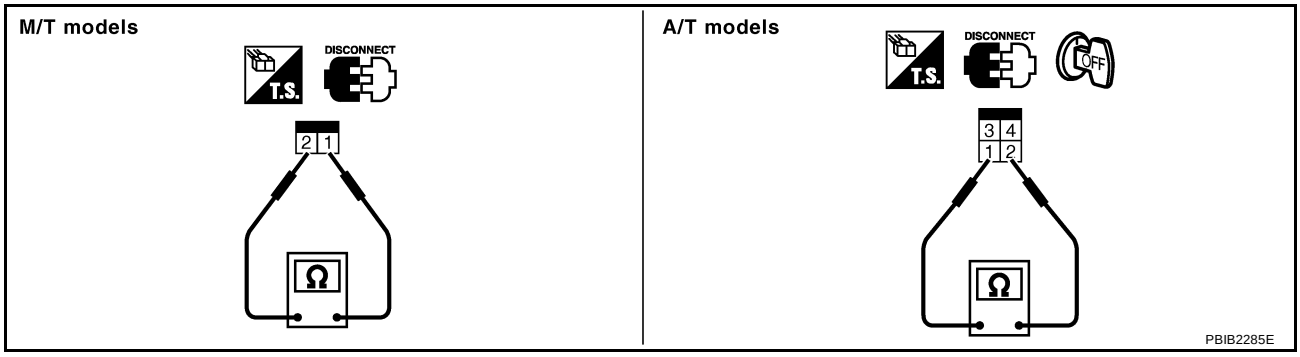
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist



If NG, adjust ASCD clutch switch installation, refer to CL-5, "CLUTCH PEDAL" , and perform step 3 again.

STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

ASCD INDICATOR

PFP:24814

Component Description

BBS001KU

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE, SET, and is integrated in combination meter.
CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET indicator illuminates when following conditions are met.

- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.
Refer to EC-532, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

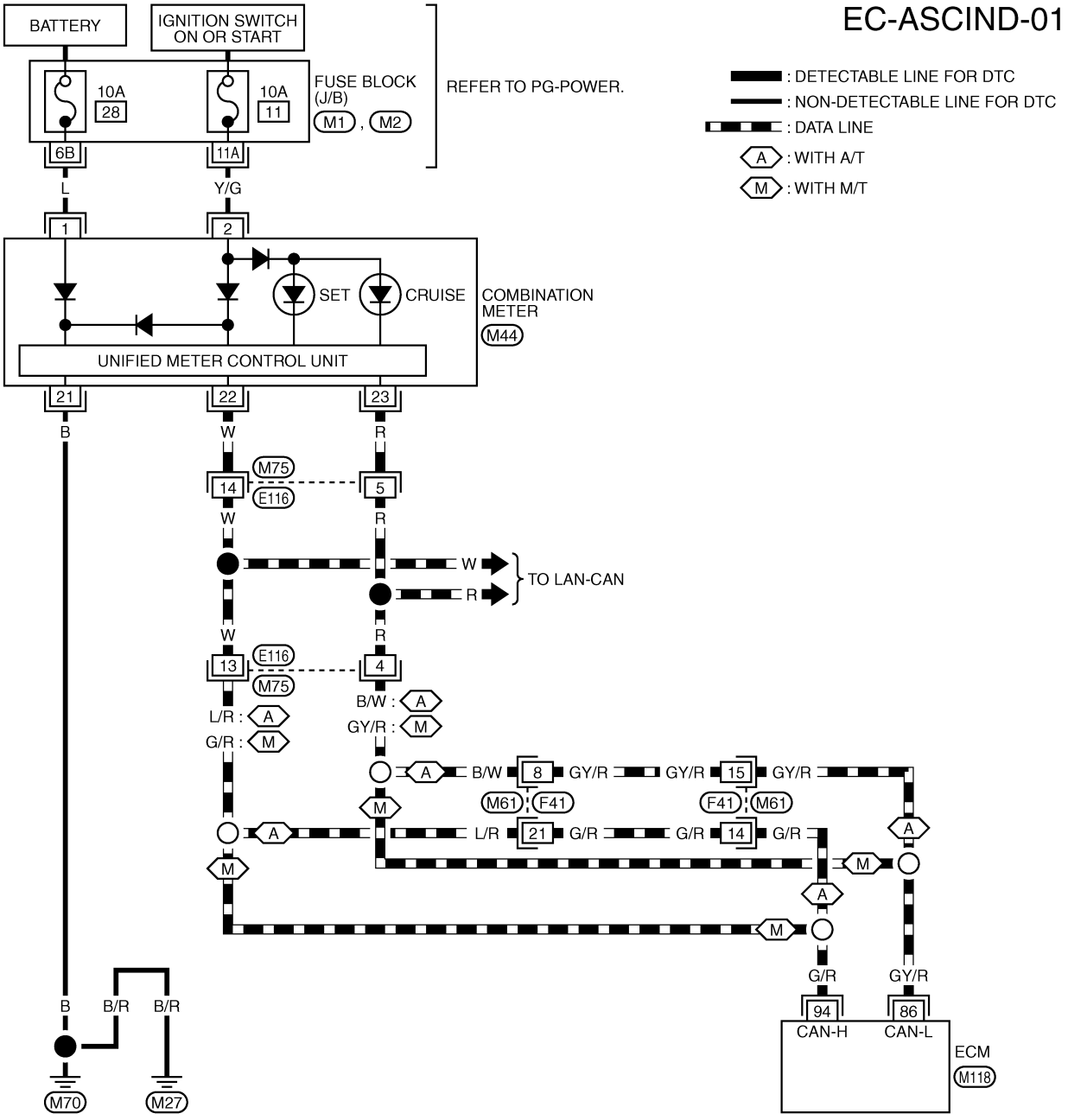
BBS001KV

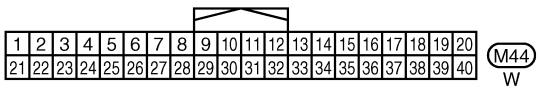
Specification data are reference value.

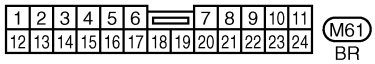
MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON	ASCD: Operating	ON
	● Vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Not operating	OFF

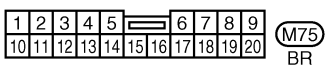
Wiring Diagram
LHD MODELS

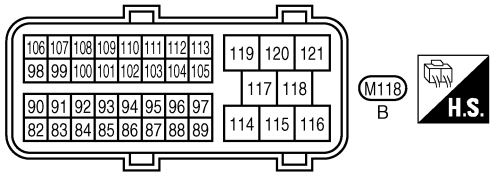
BBS001KW









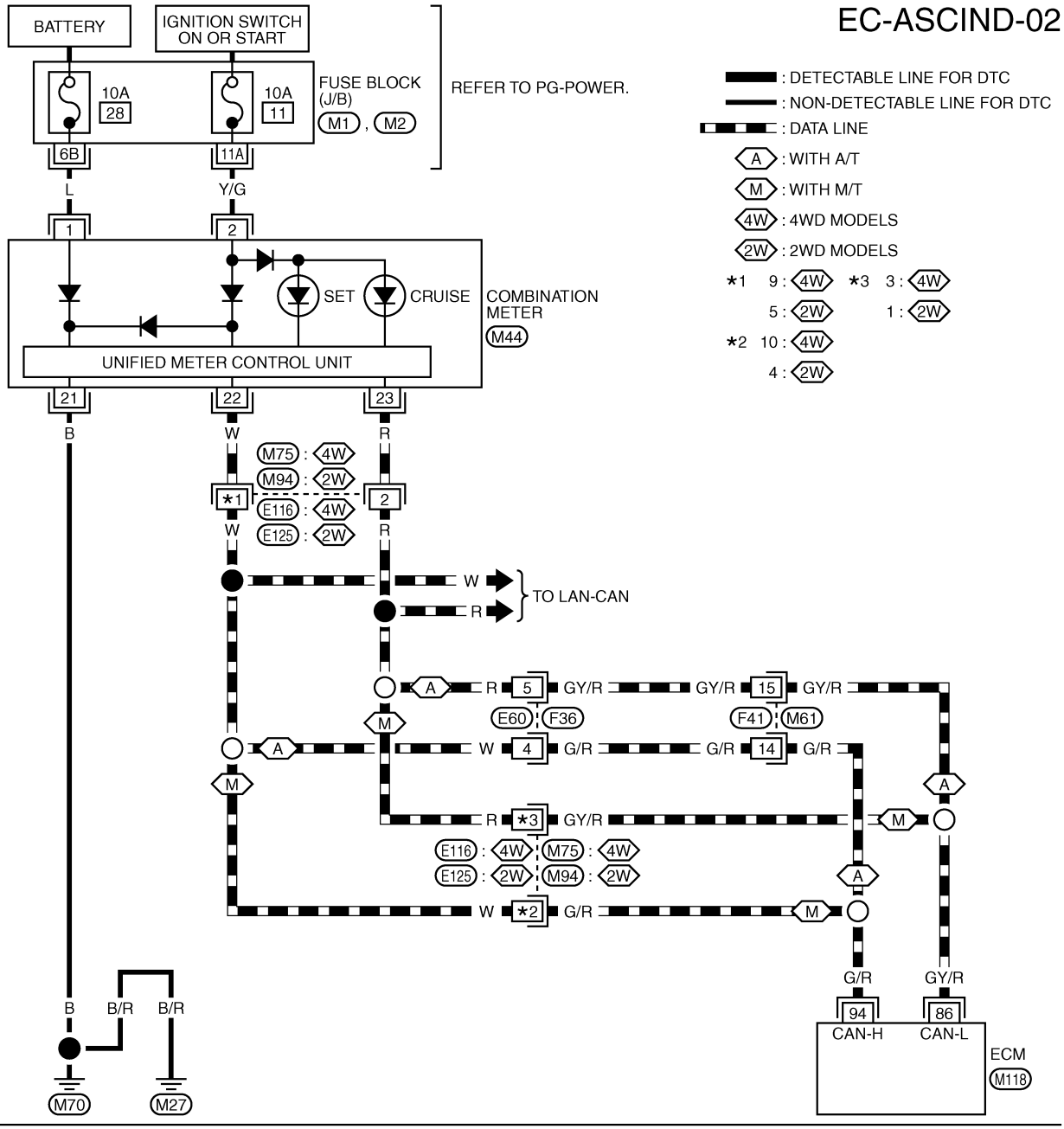


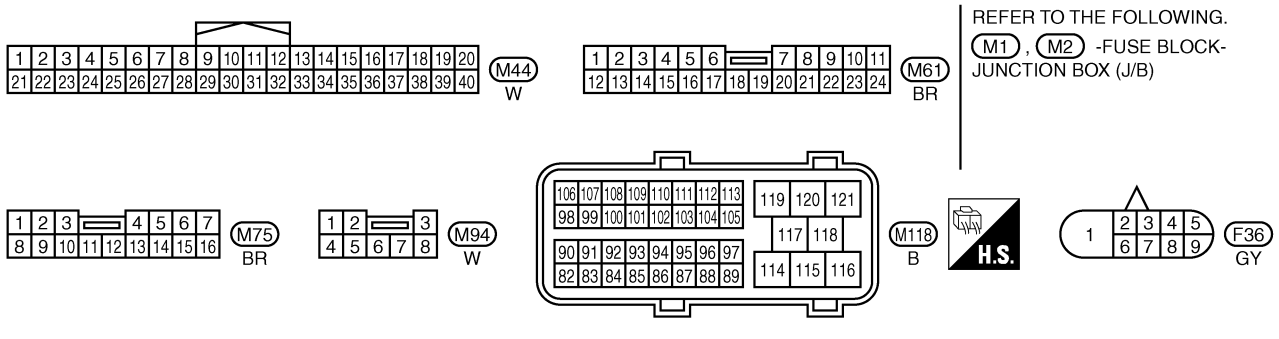
REFER TO THE FOLLOWING.
M1, M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0764E

RHD MODELS

EC-ASCIND-02





TBWB0687E

Diagnostic Procedure

BBS001KX

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (130 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

OK or NG

OK >> GO TO 3.
NG >> Perform trouble diagnoses for DTC U1000, U1001. Refer to EC-136, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

3. CHECK COMBINATION METER FUNCTION

Refer to DI-4, "COMBINATION METERS" .

OK or NG

OK >> GO TO 4.
NG >> Replace combination meter.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-127, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

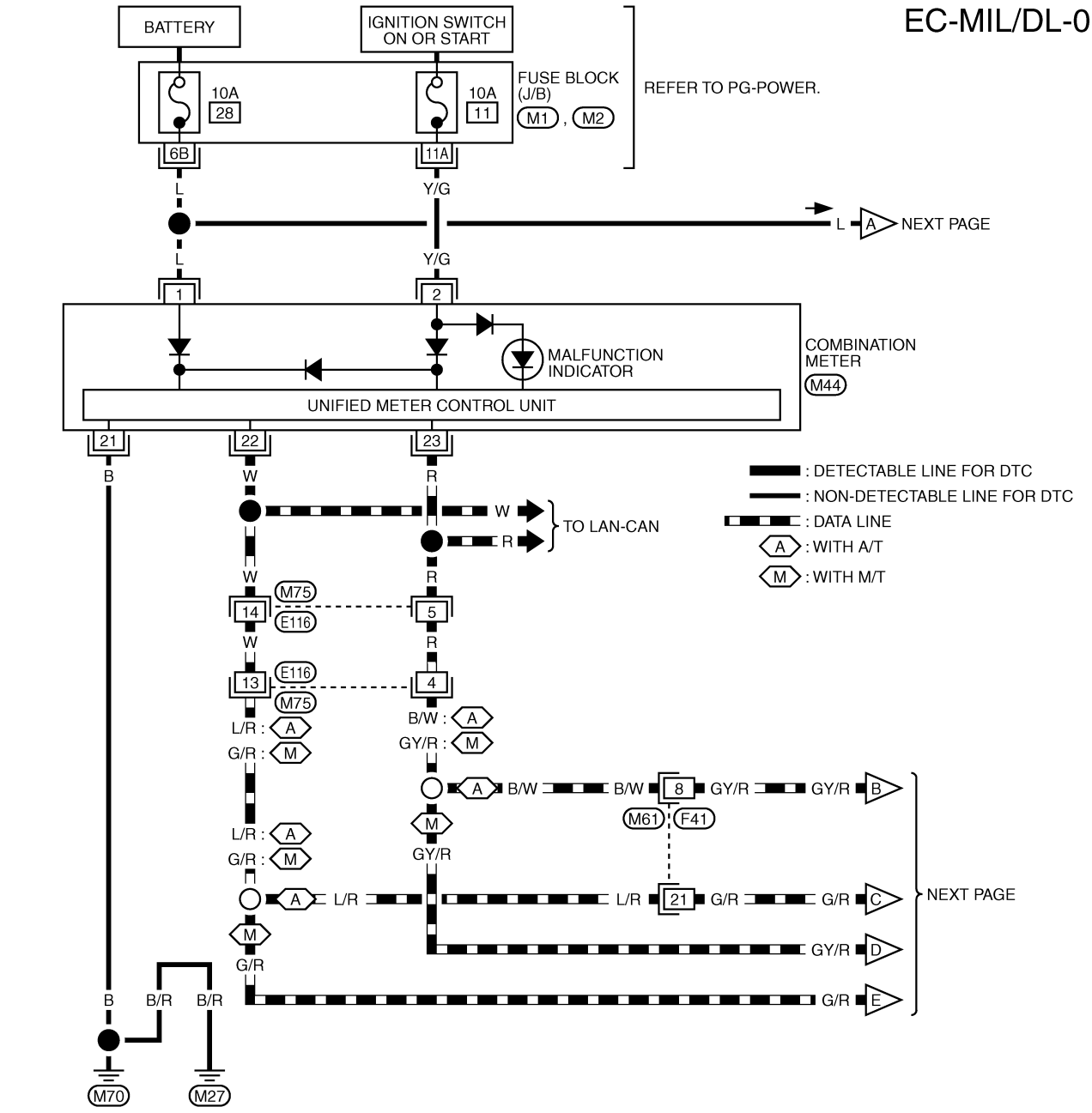
MI & DATA LINK CONNECTORS

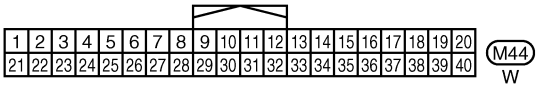
PFP:24814

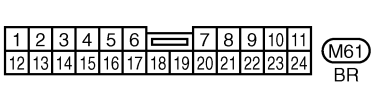
Wiring Diagram

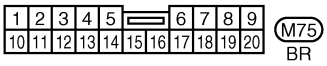
BBS001KY

LHD MODELS





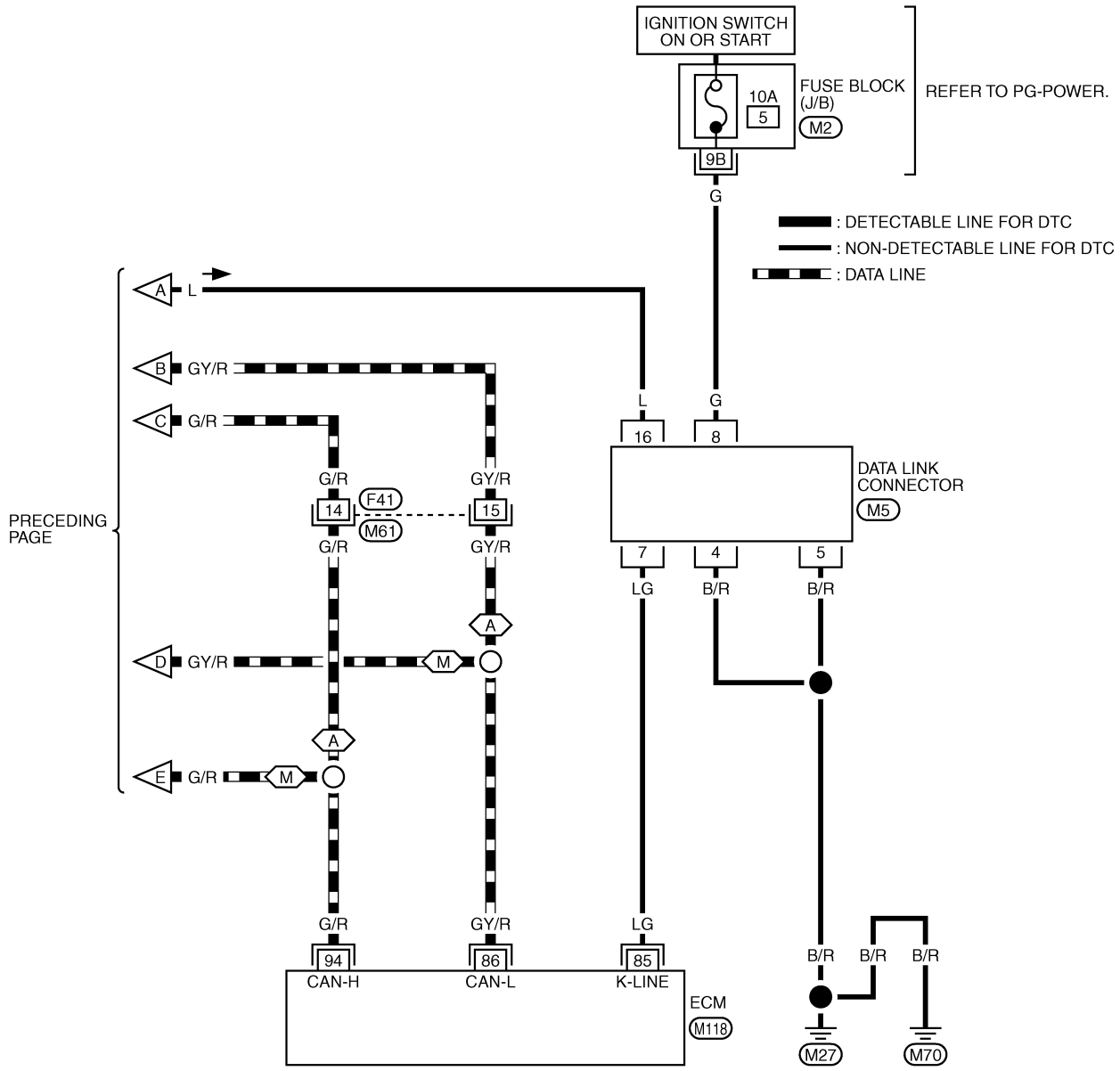


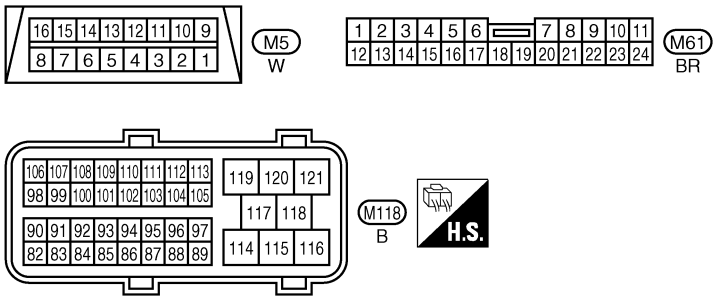


REFER TO THE FOLLOWING.
M1 , M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0639E

EC-MIL/DL-02



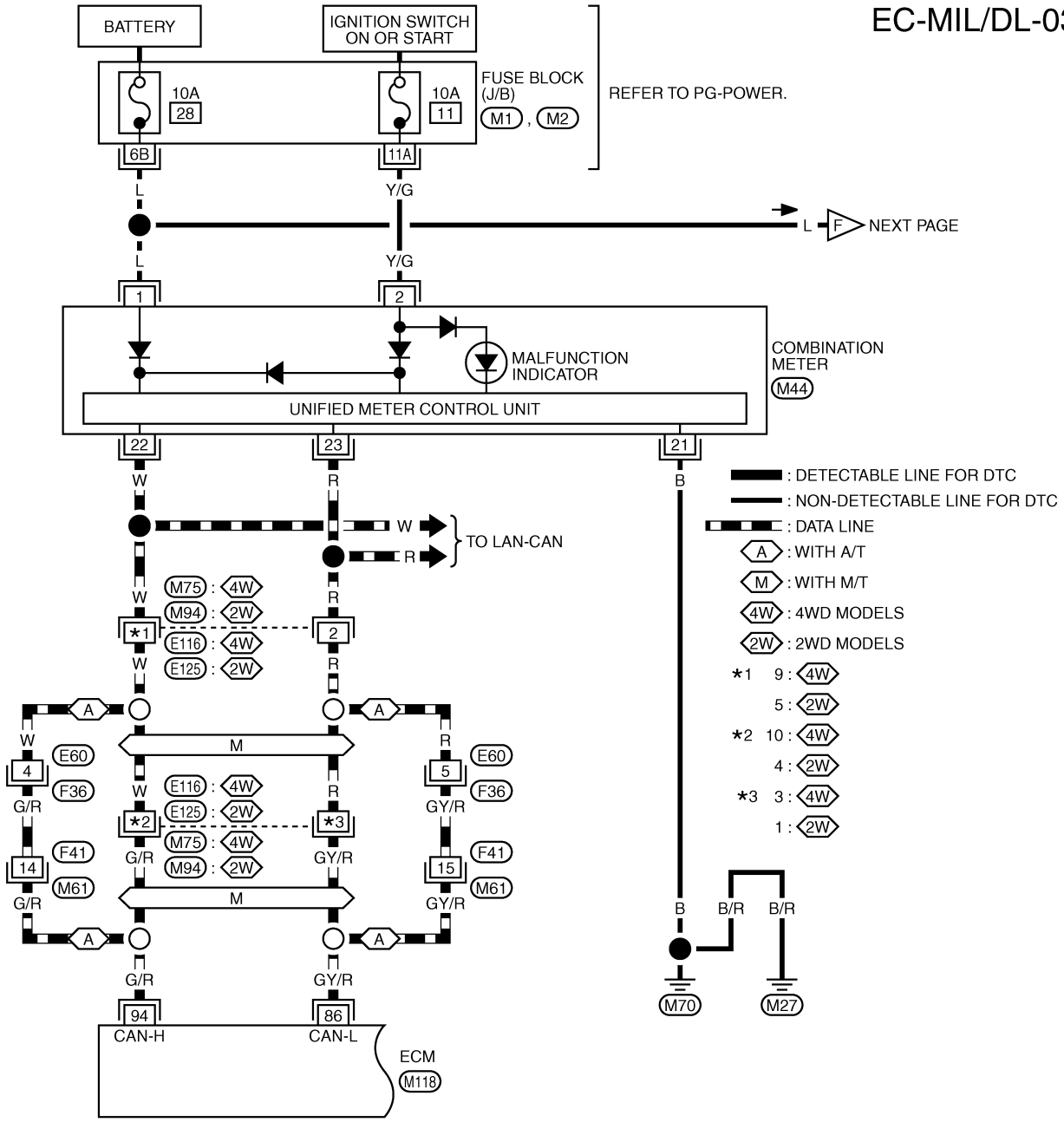


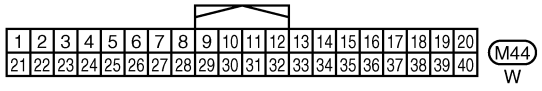
REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

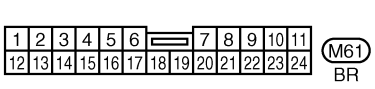
TBWA0640E

RHD MODELS

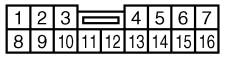
EC-MIL/DL-03

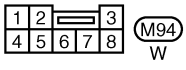


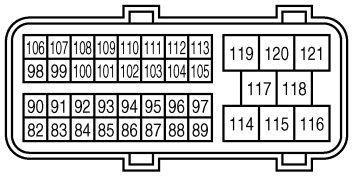


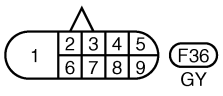


REFER TO THE FOLLOWING.
M1 , M2 -FUSE BLOCK-JUNCTION BOX (J/B)



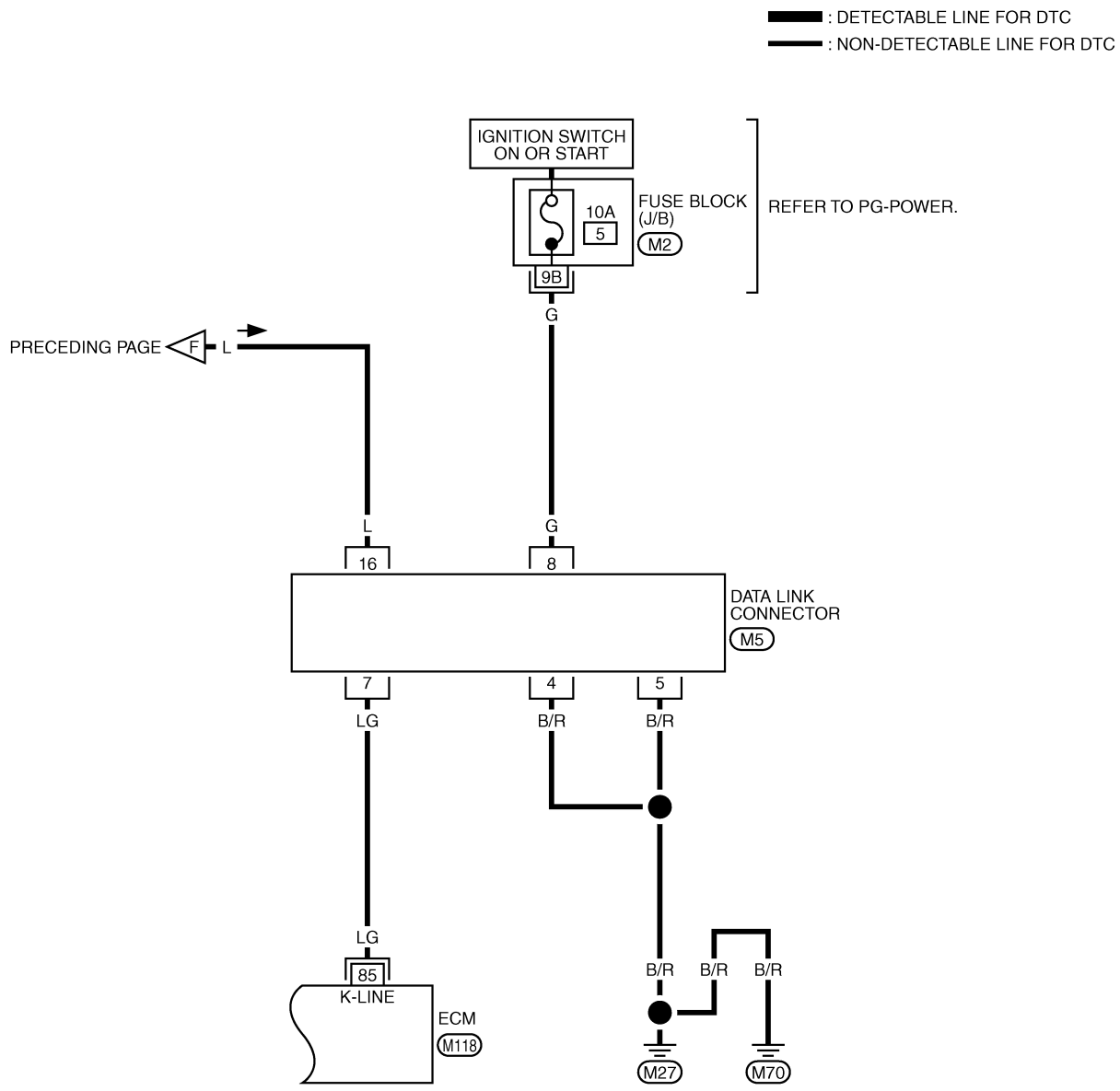


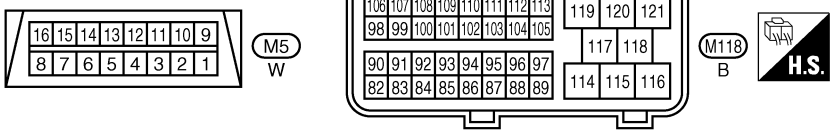




TBWB0688E

EC-MIL/DL-04





REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0642E

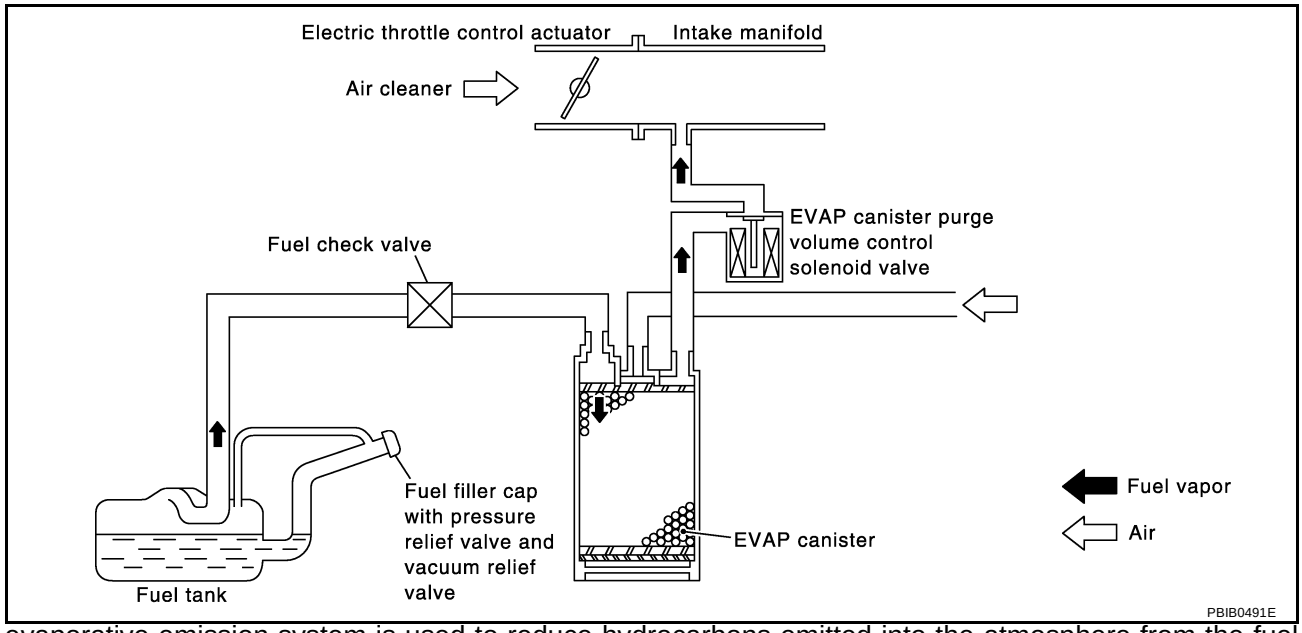
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

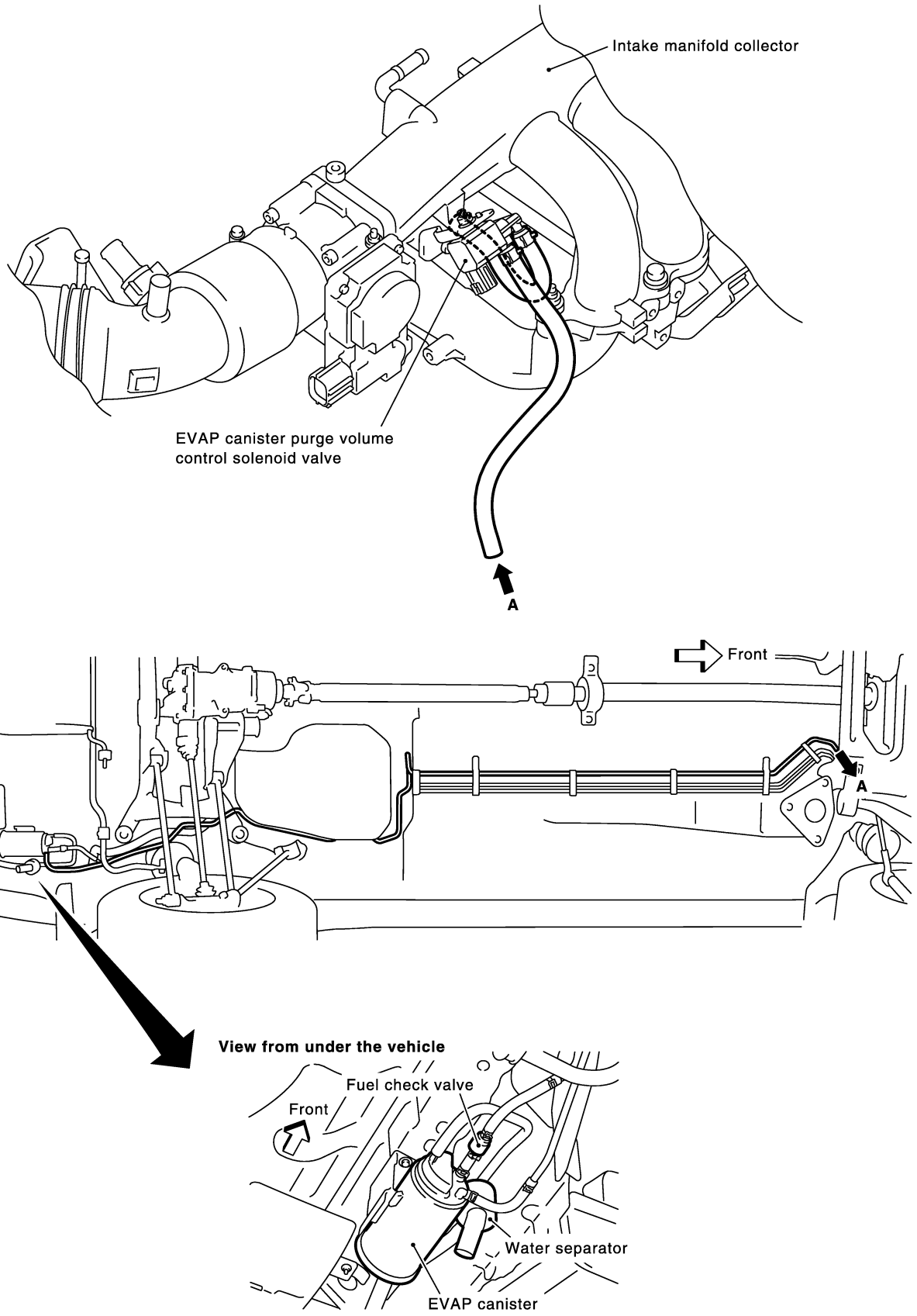
BBS001KZ

SYSTEM DESCRIPTION



The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

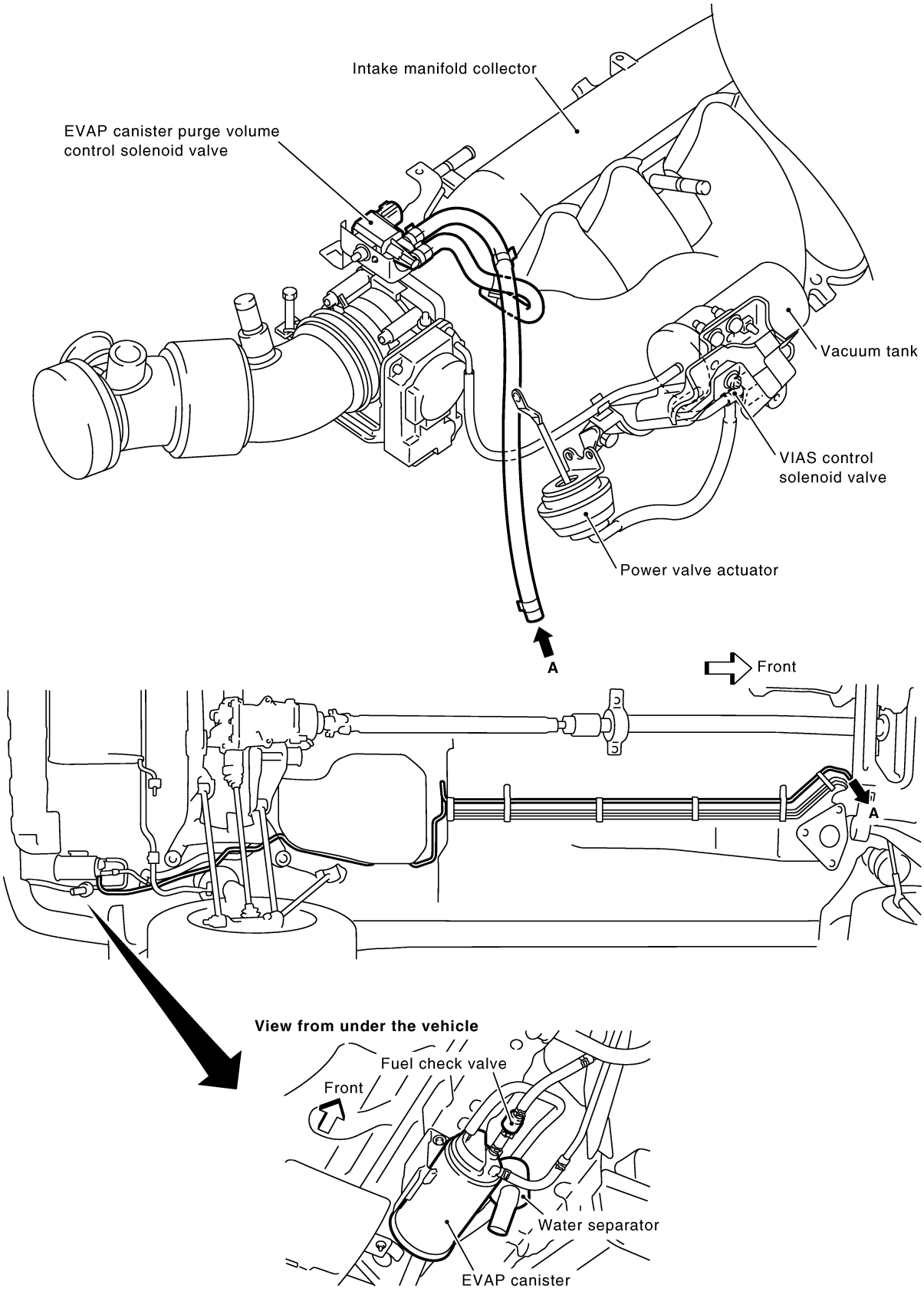
EVAPORATIVE EMISSION LINE DRAWING
QR20DE Engine Models



NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB0490E

QR25DE Engine Models



NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB1998E

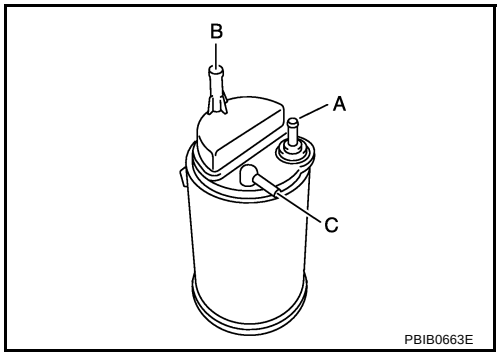
Component Inspection

BBS001L0

EVAP CANISTER

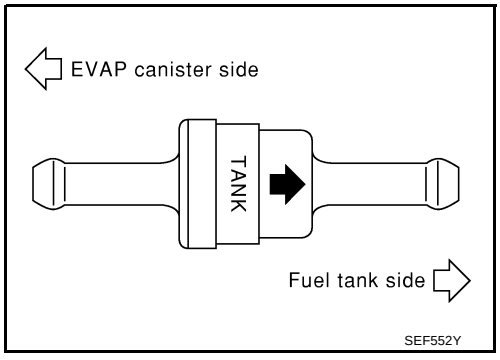
Check EVAP canister as follows:

1. Block port **B** . Orally blow air through port **A** . Check that air flows freely through port **C** .
2. Block port **A** . Orally blow air through port **B** . Check that air flows freely through port **C** .



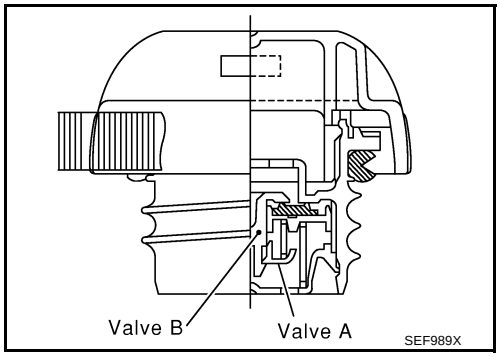
FUEL CHECK VALVE

1. Blow air through connector on fuel tank side. A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.
2. Blow air through connector on EVAP canister side. Air flow should be smoothly directed toward fuel tank side.
3. If fuel check valve is suspected of not properly functioning in steps 1 and 2 above, replace it.



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

1. Wipe clean valve housing.

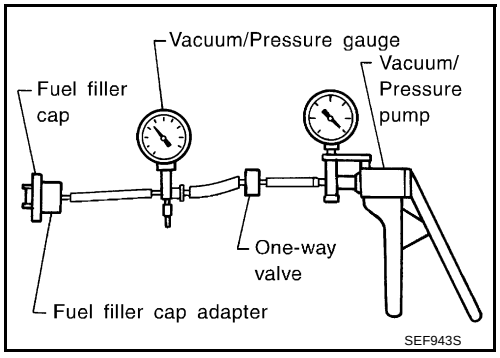


2. Check valve opening pressure and vacuum.

Pressure: 15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)

Vacuum: –6.0 to –3.4 kPa (–0.060 to –0.034 bar, –0.061 to –0.035 kg/cm^2 , –0.87 to –0.49 psi)

3. If out of specification, replace fuel filler cap as an assembly.

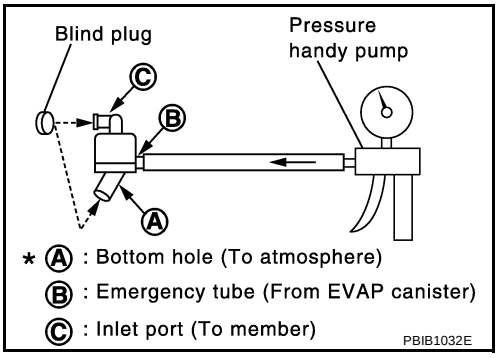


WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.



EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-278, "Component Inspection" .

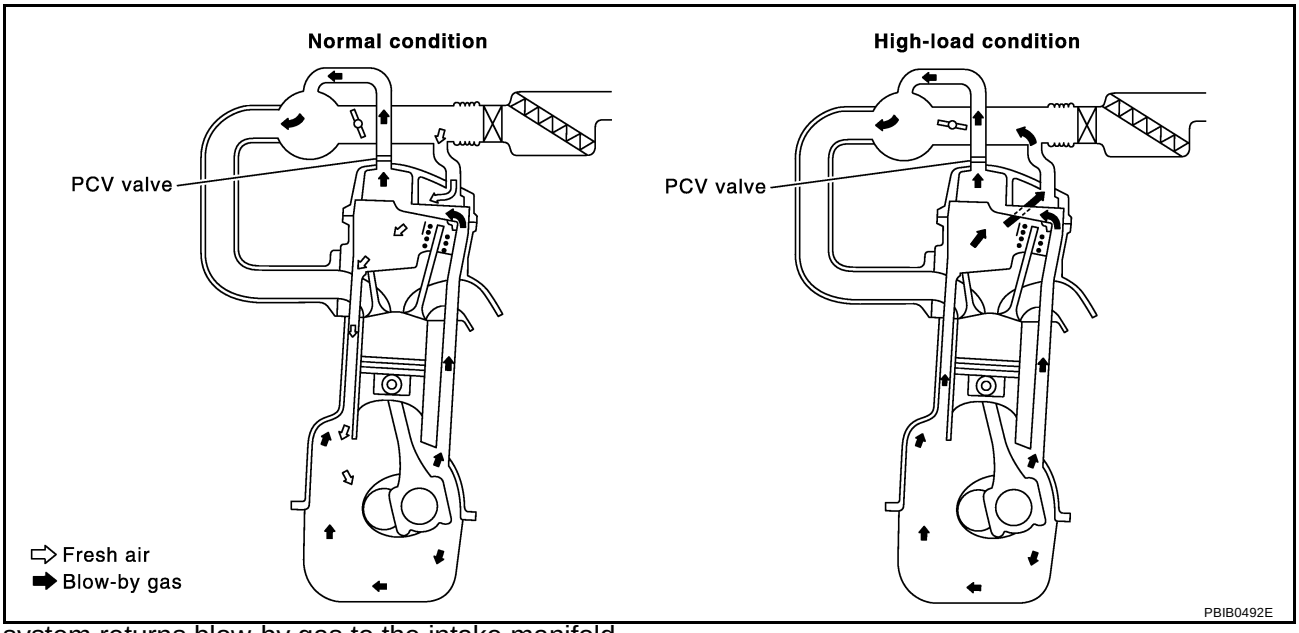
POSITIVE CRANKCASE VENTILATION

PFP:11810

Description

BBS001L1

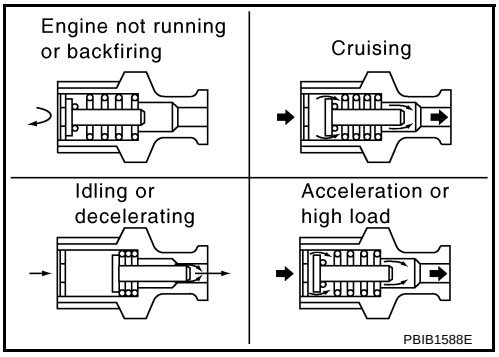
SYSTEM DESCRIPTION



This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

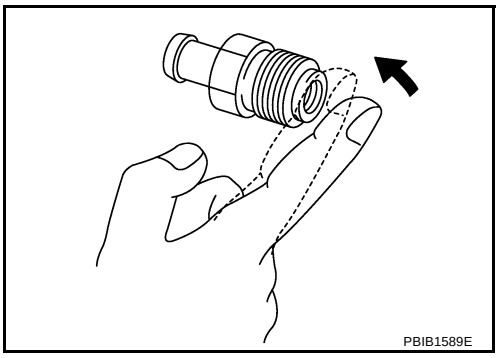


Component Inspection

BBS001L2

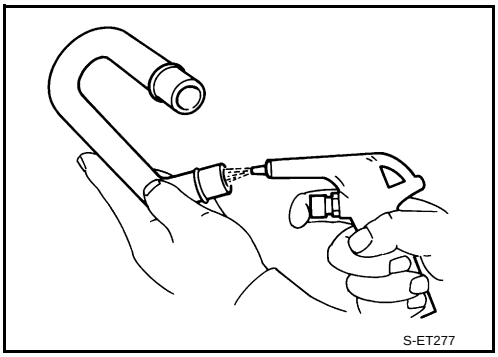
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



PCV VALVE VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



AUTOMATIC SPEED CONTROL DEVICE (ASCD)

PFP:18930

System Description

BBS001L3

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD clutch switch (M/T)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/Neutral position (PNP) switch	Gear position		
wheel sensor*	Vehicle speed		

*: This signal is sent to the ECM through CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press ASCD MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to the neutral position (M/T models)
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- ESP/TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is fully released
- Clutch pedal is fully released (M/T models)
- A/T selector lever is in other than P and N position (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

Component Description

BBS001L4

ASCD STEERING SWITCH

Refer to EC-380 .

ASCD BRAKE SWITCH

Refer to EC-390 and EC-509 .

ASCD CLUTCH SWITCH

Refer to EC-390 and EC-509

STOP LAMP SWITCH

Refer to EC-390 , EC-408 and EC-509 .

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EC-297 , EC-299 , EC-309 and EC-317 .

ASCD INDICATOR

Refer to EC-517 .

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure

BBS001L5

Fuel pressure at idle	Approximately 350 kPa (3.5bar, 3.57kg/cm^2 , 51psi)

Idle Speed and Ignition Timing

BBS001L6

Target idle speed	QR20DE	M/T	No load* (in Neutral position)	650±50 rpm
		A/T	No load* (in P or N position)	700±50 rpm
	QR25DE	M/T	No load* (in Neutral position)	
		A/T	No load* (in P or N position)	
Air conditioner: ON	QR20DE	M/T	In Neutral position	725 rpm or more
		A/T	In P or N position	
	QR25DE	M/T	In Neutral position	750 rpm or more
		A/T	In P or N position	700 rpm or more
Ignition timing	QR20DE	M/T	In Neutral position	15°±5° BTDC
		A/T	In P or N position	
	QR25DE	M/T	In Neutral position	
		A/T	In P or N position	

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Calculated Load Value

BBS001L7

	Calculated load value% (Using CONSULT-II or GST)
At idle	10 - 35
At 2,500 rpm	10 - 35

Mass Air Flow Sensor

BBS001L8

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	0.7 - 1.1*V (QR20DE) 0.8 - 1.2*V (QR25DE)
Mass air flow (Using CONSULT-II or GST)	1.0 - 4.0 g·m/sec at idle* 4.0 - 10.0 g·m/sec at 2,500 rpm*

*: Engine is warmed up to normal operating temperature and running under no-load.

Intake Air Temperature Sensor

BBS001L9

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200
80 (176)	0.283 - 0.359

Engine Coolant Temperature Sensor

BBS001LA

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater

BBS001LB

Resistance [at 25°C (77°F)]	3.3 - 4.0Ω

Heated Oxygen sensor 2 Heater

BBS001LC

Resistance [at 25°C (77°F)]	5.0 - 7.0Ω

Crankshaft Position Sensor (POS)

BBS001LD

Refer to EC-258, "Component Inspection" .

Camshaft Position Sensor (PHASE)

BBS001LE

Refer to EC-265, "Component Inspection" .

Throttle Control Motor

BBS001LF

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Injector

BBS001LG

Resistance [at 10 - 60°C (50 - 140°F)]	13.5 - 17.5Ω

Fuel Pump

BBS001LH

Resistance [at 25°C (77°F)]	Approximately 0.2 - 5.0Ω

INDEX FOR DTC

PFP:00024

Alphabetical Index

BBS001LI

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the Type approval number on the identification plate. Refer to GI-46, "IDENTIFICATION PLATE" .

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-635, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II*2	ECM*3			
APP SEN 1/CIRC	P2122	2122	1	×	EC-817
APP SEN 1/CIRC	P2123	2123	1	×	EC-817
APP SEN 2/CIRC	P2127	2127	1	×	EC-824
APP SEN 2/CIRC	P2128	2128	1	×	EC-824
APP SENSOR	P2138	2138	1	×	EC-840
ASCD BRAKE SW*7	P1572	1572	1	—	EC-792
ASCD SW *7	P1564	1564	1	—	EC-782
ASCD VHL SPD SEN*7	P1574	1574	1	—	EC-802
BRAKE SW/CIRCUIT	P1805	1805	1	×	EC-811
CAN COMM CIRCUIT	U1000	1000*5	2	—	EC-635
CAN COMM CIRCUIT	U1001	1001*5	2	—	EC-635
CKP SEN/CIRCUIT	P0335	0335	2	×	EC-695
CMP SEN/CIRC-B1	P0340	0340	2	×	EC-703
CTP LEARNING	P1225	1225	2	—	EC-773
CTP LEARNING	P1226	1226	2	—	EC-775
ECM	P0605	0605	1 or 2	× or —	EC-718
ECM BACK UP/CIRCUIT	P1065	1065	2	×	EC-721
ECT SEN/CIRC	P0117	0117	2	×	EC-654
ECT SEN/CIRC	P0118	0118	2	×	EC-654
ENG OVER TEMP	P1217	1217	1	×	EC-757
ETC ACTR	P1121	1121	1	×	EC-725
ETC FUNCTION/CIRC	P1122	1122	1	×	EC-728
ETC MOT	P1128	1128	1	×	EC-747
ETC MOT PWR	P1124	1124	1	×	EC-739
ETC MOT PWR	P1126	1126	1	×	EC-739
HO2S1 (B1)	P0132	0132	2	×	EC-668
HO2S1 (B1)	P0134	0134	2	×	EC-675
INT/V TIM CONT-B1	P0011	0011	2	—	EC-638
KNOCK SEN/CIRC-B1	P0327	0327	2	—	EC-690
KNOCK SEN/CIRC-B1	P0328	0328	2	—	EC-690
MAF SEN/CIRCUIT	P0102	0102	1	×	EC-646
MAF SEN/CIRCUIT	P0103	0103	1	×	EC-646
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	2	—	EC-570
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	No DTC	Flashing*4	—	Flashing*4	EC-571

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II*2	ECM*3			
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—
PW ST P SEN/CIRC	P0550	0550	2	—	EC-713
P-N POS SW/CIRCUIT	P1706	1706	2	—	EC-804
SENSOR POWER/CIRC	P1229	1229	1	×	EC-777
TCS C/U FUNCTN*6	P1211	1211	2	—	EC-755
TCS/CIRC*6	P1212	1212	2	—	EC-756
TP SEN 1/CIRC	P0222	0222	1	×	EC-682
TP SEN 1/CIRC	P0223	0223	1	×	EC-682
TP SEN 2/CIRC	P0122	0122	1	×	EC-660
TP SEN 2/CIRC	P0123	0123	1	×	EC-660
TP SENSOR	P2135	2135	1	×	EC-832
VEH SPEED SEN/CIRC	P0500	0500	2	×	EC-711
V/SP SEN (A/T OUT)	P1720	1720	2	—	EC-809

*1: 1st trip DTC No. is the same as DTC No.
*2: This number is prescribed by ISO 15031-5.
*3: In Diagnostic Test Mode II (Self-diagnostic results), this number is controlled by NISSAN.
*4: When engine is running.
*5: The troubleshooting for this DTC needs CONSULT-II.
*6: For models with ESP system.
*7: For QR25DE engine models.

DTC No. Index

BBS001LJ

NOTE:
If DTC U1000 or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-635, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II*2	ECM*3				
No DTC	Flashing*4	NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	—	Flashing*4	EC-571
U1000	1000*5	CAN COMM CIRCUIT	2	—	EC-635
U1001	1001*5	CAN COMM CIRCUIT	2	—	EC-635
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—
P0011	0011	INT/V TIM CONT-B1	2	—	EC-638
P0102	0102	MAF SEN/CIRCUIT	1	×	EC-646
P0103	0103	MAF SEN/CIRCUIT	1	×	EC-646
P0117	0117	ECT SEN/CIRC	2	×	EC-654
P0118	0118	ECT SEN/CIRC	2	×	EC-654
P0122	0122	TP SEN 2/CIRC	1	×	EC-660
P0123	0123	TP SEN 2/CIRC	1	×	EC-660
P0132	0132	HO2S1 (B1)	2	×	EC-668
P0134	0134	HO2S1 (B1)	2	×	EC-675
P0222	0222	TP SEN 1/CIRC	1	×	EC-682
P0223	0223	TP SEN 1/CIRC	1	×	EC-682
P0327	0327	KNOCK SEN/CIRC-B1	2	—	EC-690
P0328	0328	KNOCK SEN/CIRC-B1	2	—	EC-690
P0335	0335	CKP SEN/CIRCUIT	2	×	EC-695
P0340	0340	CMP SEN/CIRC-B1	2	×	EC-703
P0500	0500	VEH SPEED SEN/CIRC	2	×	EC-711
P0550	0550	PW ST P SEN/CIRC	2	—	EC-713
P0605	0605	ECM	1 or 2	× or —	EC-718
P1065	1065	ECM BACK UP/CIRCUIT	2	×	EC-721
P1121	1121	ETC ACTR	1	×	EC-725
P1122	1122	ETC FUNCTION/CIRC	1	×	EC-728
P1124	1124	ETC MOT PWR	1	×	EC-739
P1126	1126	ETC MOT PWR	1	×	EC-739
P1128	1128	ETC MOT	1	×	EC-747
P1211	1211	TCS C/U FUNCTN*6	2	—	EC-755
P1212	1212	TCS/CIRC*6	2	—	EC-756
P1217	1217	ENG OVER TEMP	1	×	EC-757
P1225	1225	CTP LEARNING	2	—	EC-773
P1226	1226	CTP LEARNING	2	—	EC-775
P1229	1229	SENSOR POWER/CIRC	1	×	EC-777
P1564	1564	ASCD SW*7	1	—	EC-782
P1572	1572	ASCD BRAKE SW*7	1	—	EC-792

DTC*1		Items (CONSULT-II screen terms)	Trip	MI lighting up	Reference page
CONSULT-II*2	ECM*3				
P1574	1574	ASCD VHL SPD SEN*7	1	—	EC-802
P1610 - P1615	1610 - 1615	NATS MALFUNCTION	2	—	EC-570
P1706	1706	P-N POS SW/CIRCUIT	2	—	EC-804
P1720	1720	V/SP SEN (A/T OUT)	2	—	EC-809
P1805	1805	BRAKE SW/CIRCUIT	1	×	EC-811
P2122	2122	APP SEN 1/CIRC	1	×	EC-817
P2123	2123	APP SEN 1/CIRC	1	×	EC-817
P2127	2127	APP SEN 2/CIRC	1	×	EC-824
P2128	2128	APP SEN 2/CIRC	1	×	EC-824
P2135	2135	TP SENSOR	1	×	EC-832
P2138	2138	APP SENSOR	1	×	EC-840

*1: 1st trip DTC No. is the same as DTC No.
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*6: For models with ESP system.
*7: For QR25DE engine models.

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

BBS001LK

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

On Board Diagnostic (OBD) System of Engine

BBS001LL

The ECM has an on board diagnostic system. It will light up the malfunction indicator (MI) to warn the driver of a malfunction causing emission deterioration.

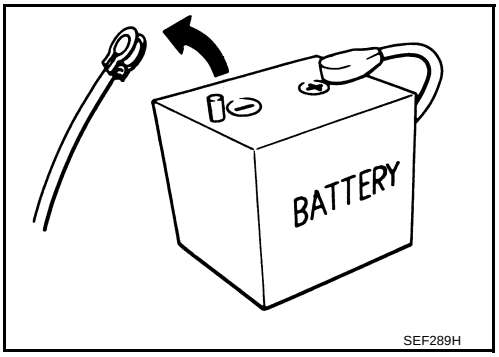
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery ground cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-74, "HARNESS CONNECTOR" .**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM.**

Precaution

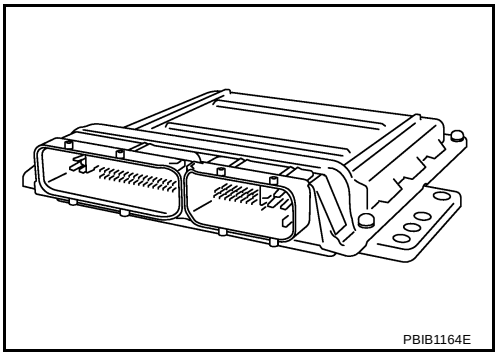
BBS001LM

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery ground cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery ground cable.**

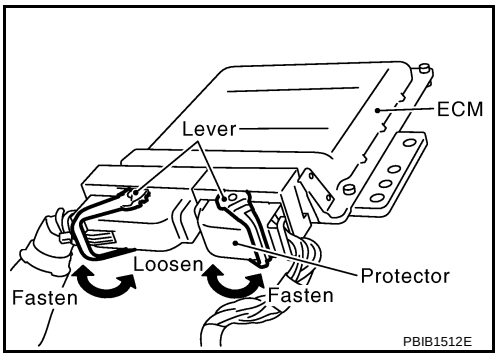


SEF289H

- **Do not disassemble ECM.**
- **If battery cable is disconnected, the memory will return to the initial ECM values.**
  The ECM will now start to self-control at its initial values. Engine operation can vary slightly when the cable is disconnected. However, this is not an indication of a malfunction. Do not replace parts because of a slight variation.

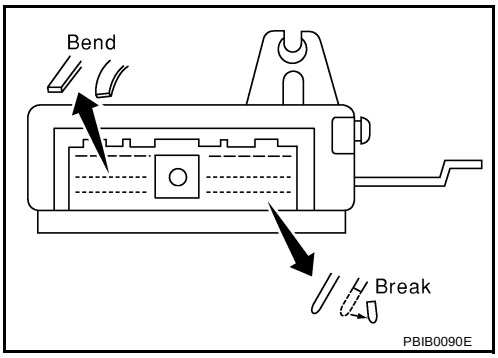

PBIB1164E

- **When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.**



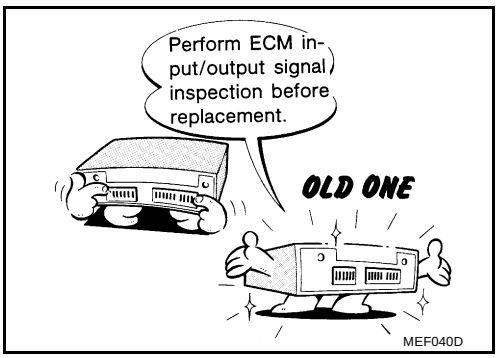
PBIB1512E

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to ICs.
- **Keep engine control system harness at least 10 cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of ICs, etc.**
- **Keep engine control system parts and harness dry.**



PBIB0090E

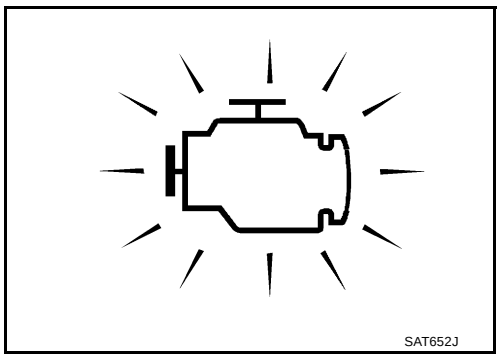
- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-597, "ECM Terminals and Reference Value".**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Do not disassemble electric throttle control actuator.**
- **Even a slight leak in the air intake system can cause serious incidents.**



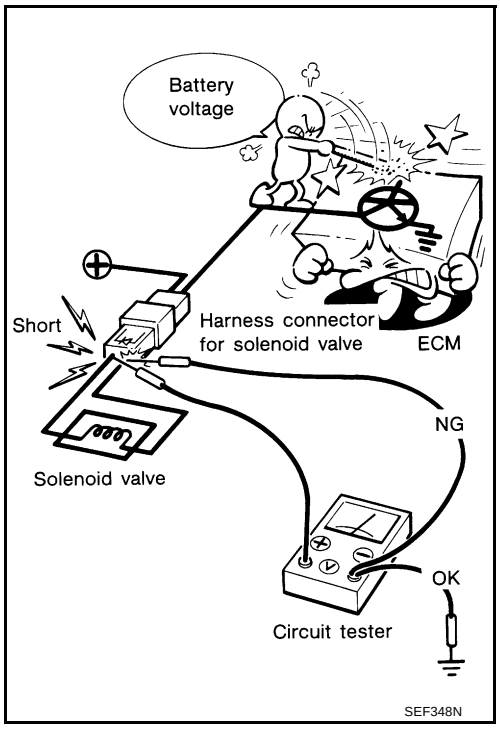
MEF040D

- **Do not shock or jar the camshaft position sensor (PHASE), crankshaft position sensor (POS).**

- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.

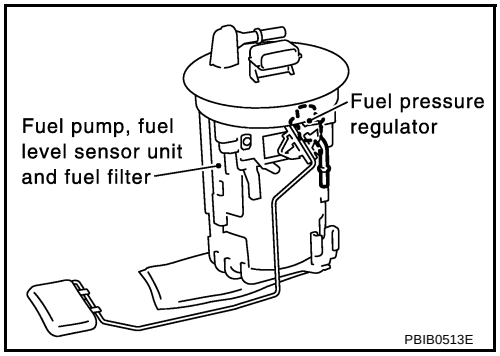

SAT652J

- **When measuring ECM signal with a circuit tester, connect break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.**
- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**



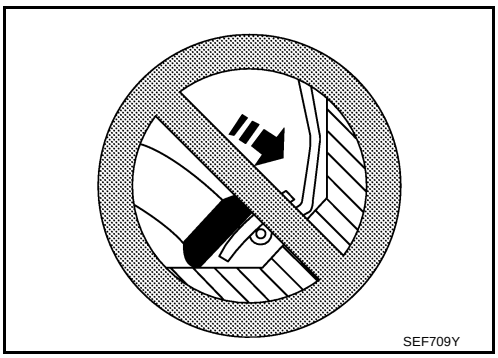
SEF348N

- **Do not operate fuel pump when there is no fuel in lines.**
- **Tighten fuel hose clamps to the specified torque.**

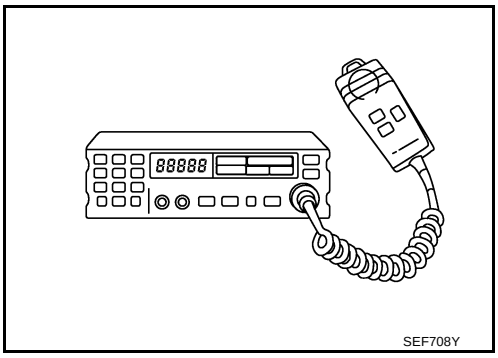


PBIB0513E

- **Do not depress accelerator pedal when starting.**
- **Immediately after starting, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**


SEF709Y

- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
  - **Keep the antenna as far as possible from the electronic control units.**
  - **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
    Do not let them run parallel for a long distance.
  - **Adjust the antenna and feeder line so that the standing-wave radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**

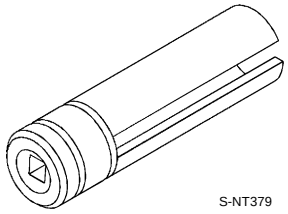
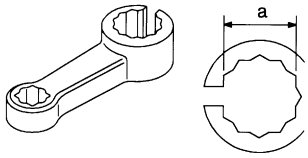
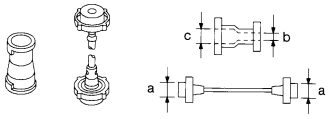
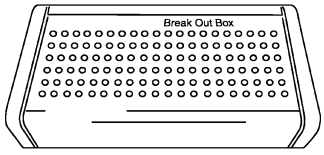
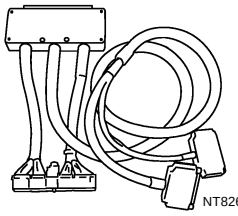

SEF708Y

PREPARATION

PFP:00002

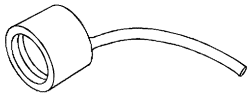
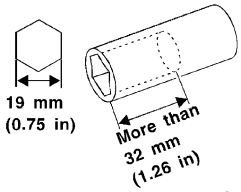
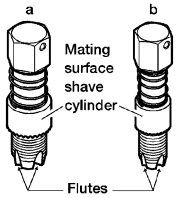
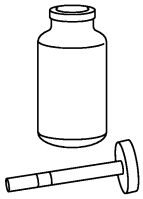
Special Service Tools

BBS001LO

Tool number Tool name		Description
KV10117100 Heated oxygen sensor wrench	 S-NT379	Loosening or tightening heated oxygen sensor with 22 mm (0.87 in) hexagon nut
KV10114400 Heated oxygen sensor wrench	 S-NT636	Loosening or tightening heated oxygen sensor **a: 22 mm (0.87 in)**
EG17650301 Radiator cap tester adapter	 S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV109E0010 Break-out box	 NT825	Measuring ECM signals with a circuit tester
KV109E0080 Y-cable adapter	 NT826	Measuring ECM signals with a circuit tester

Commercial Service Tools

BBS001LP

Tool name	Description	Description
Quick connector release	PBIC0198E	Removing fuel tube quick connectors in engine room (Available in SEC. 164 of PARTS CATALOG: Part No. 16441 6N210)
Fuel filler cap adapter	 S-NT653	Checking fuel tank vacuum relief valve opening pressure
Socket wrench	 S-NT705	Removing and installing engine coolant temperature sensor
Oxygen sensor thread cleaner	 AEM488	Reconditioning the exhaust system threads before installing a new oxygen sensor. Use with anti-seize lubricant shown below. **a: 18 mm diameter with pitch 1.5 mm for Zirconia Oxygen Sensor** **b: 12 mm diameter with pitch 1.25 mm for Titania Oxygen Sensor**
Anti-seize lubricant i.e.: (Permatex™ 133AR or equivalent meeting MIL specification MIL-A-907)	 S-NT779	Lubricating oxygen sensor thread cleaning tool when reconditioning exhaust system threads.

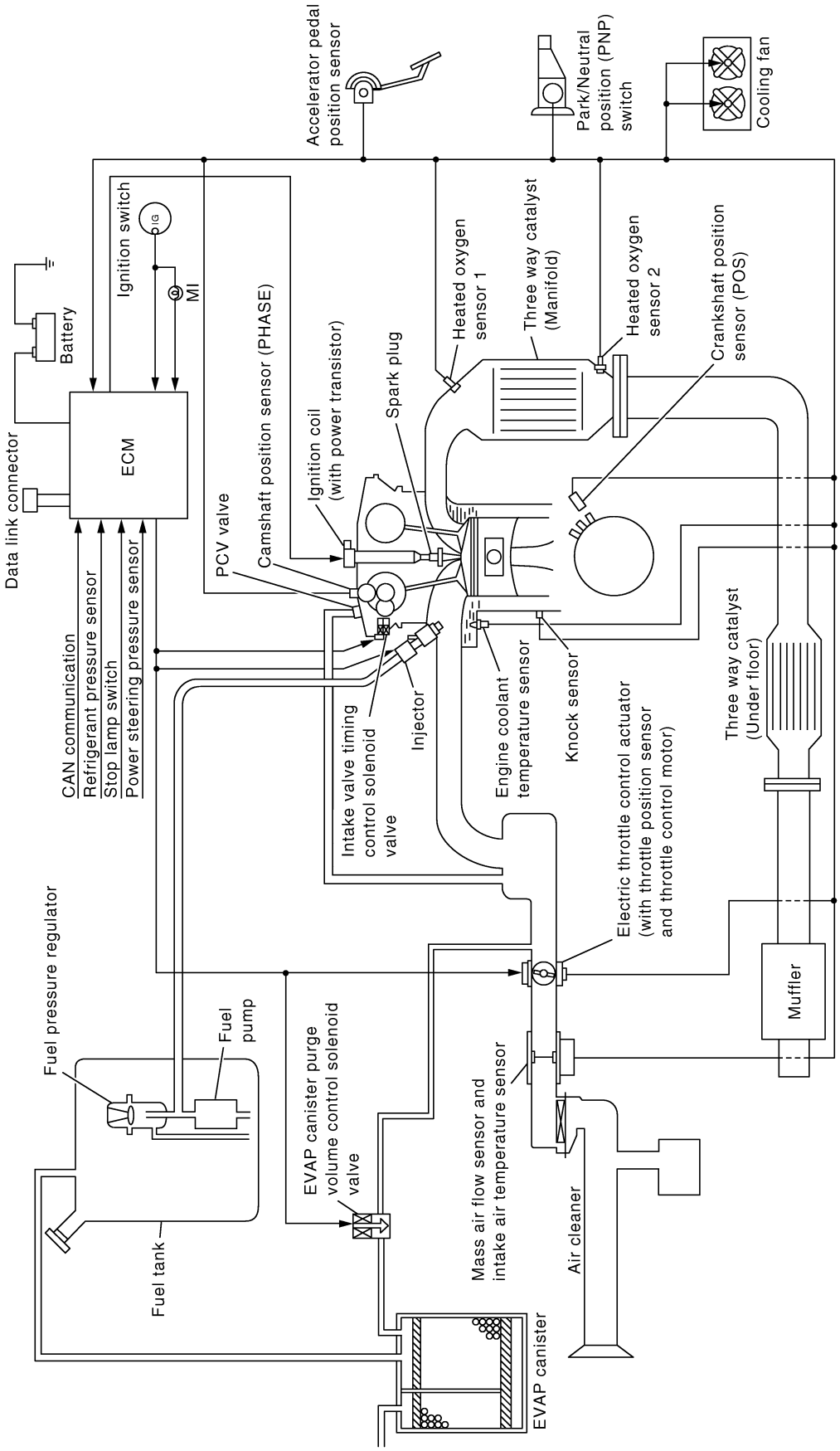
ENGINE CONTROL SYSTEM

PFP:23710

System Diagram

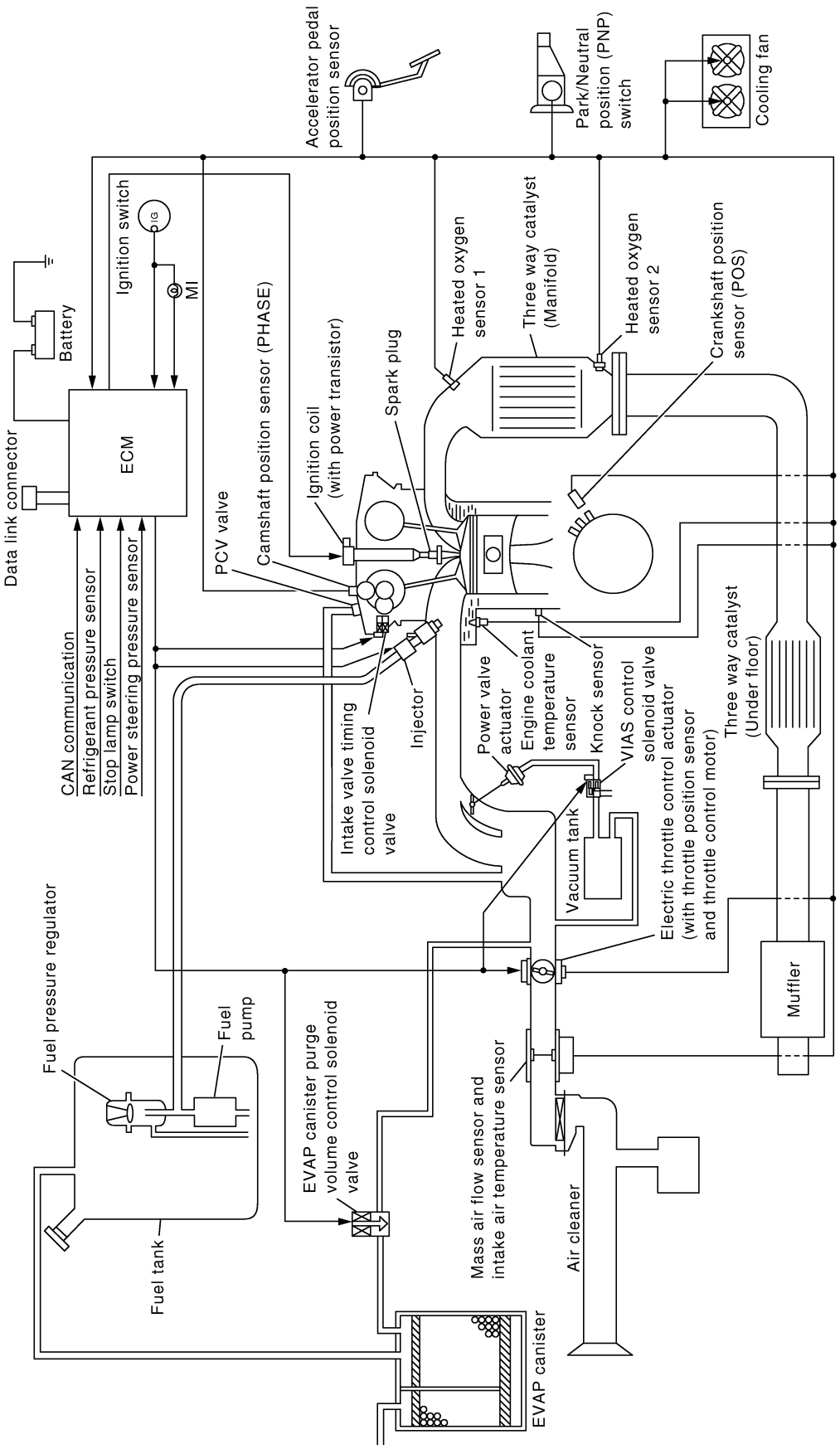
BBS001LQ

QR20DE ENGINE MODELS



PBIB2455E

QR25DE ENGINE MODELS

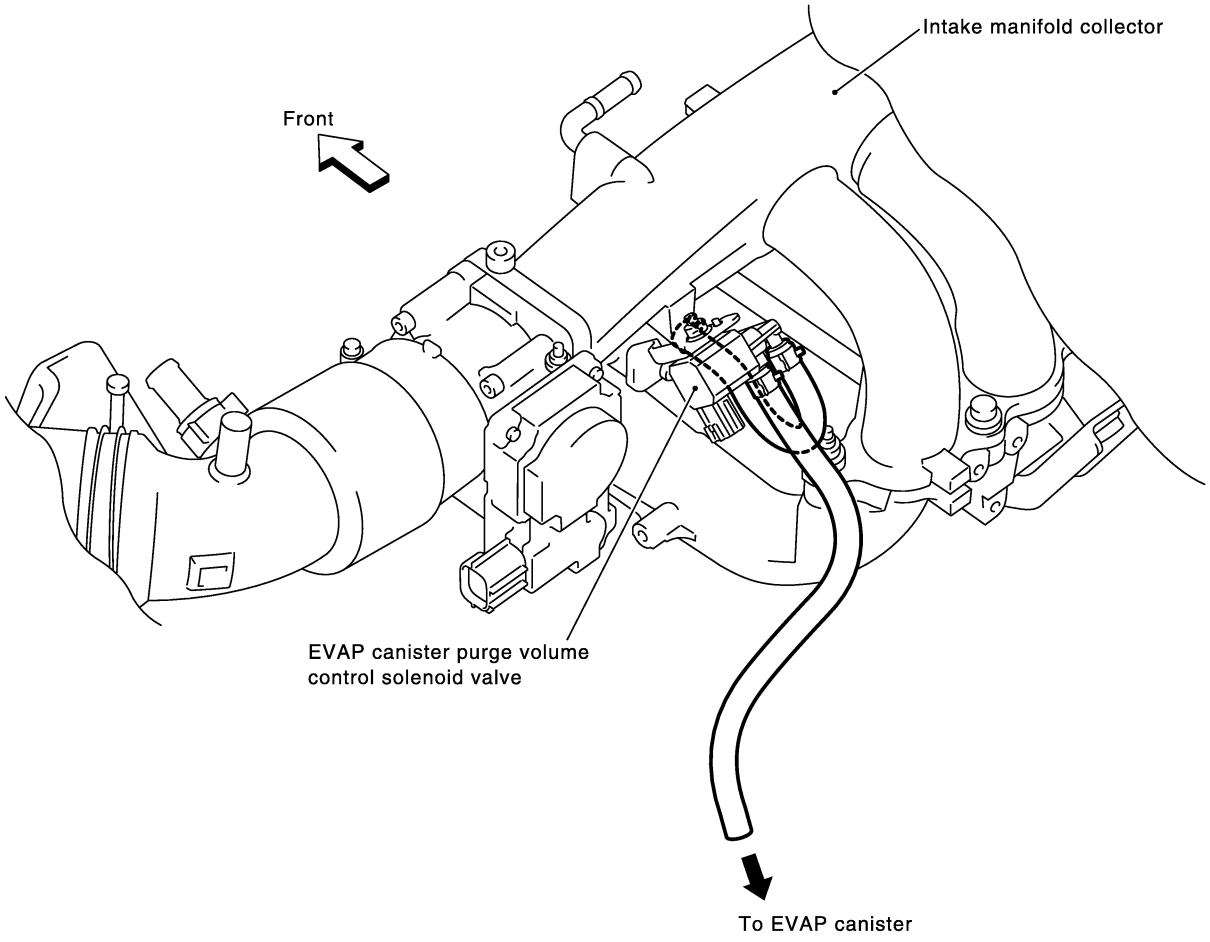


PBIB2456E

Vacuum Hose Drawing

BBS001LR

QR20DE ENGINE MODELS

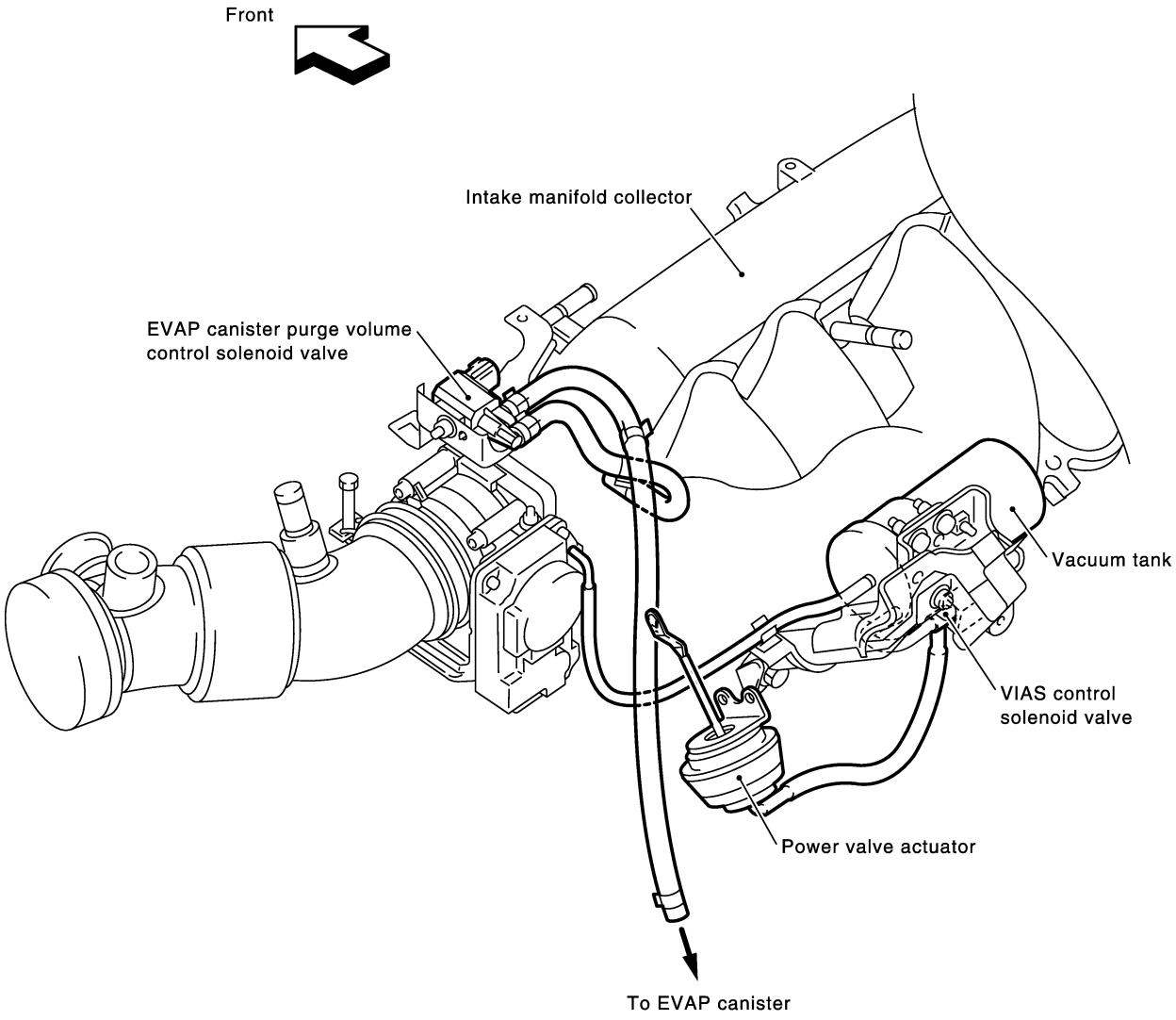


NOTE: Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB0489E

Refer to EC-548, "QR20DE ENGINE MODELS" for Vacuum Control System.

QR25DE ENGINE MODELS



NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB1445E

Refer to EC-549, "QR25DE ENGINE MODELS" for Vacuum Control System.

System Chart

BBS001LS

Input (Sensor)	ECM function	Output (Actuator)
● Camshaft position sensor (PHASE) ● Crankshaft position sensor (POS) ● Mass air flow sensor ● Engine coolant temperature sensor ● Heated oxygen sensor 1 ● Throttle position sensor ● Accelerator pedal position sensor ● Park/neutral position (PNP) switch ● Intake air temperature sensor ● Power steering pressure sensor ● Ignition switch ● Battery voltage ● Knock sensor ● Refrigerant pressure sensor ● Stop lamp switch ● Heated oxygen sensor 2*1 ● TCM (Transmission control module)*2 ● ESP/TCS/ABS control unit*2 *4 ● ABS actuator and electric unit (control unit)*2 *5 ● Air conditioner switch ● Wheel sensor*2 ● Electrical load signal ● ASCD steering switch*6 ● ASCD brake switch*6 ● ASCD clutch switch*6	Fuel injection & mixture ratio control	Fuel injector
	Electronic ignition system	Power transistor
	Fuel pump control	Fuel pump relay
	On board diagnostic system	MI (On the instrument panel)*3
	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
	Air conditioning cut control	Air conditioner relay
	Power valve control*6	VIAS control solenoid valve
	ASCD vehicle speed control*6	Electric throttle control actuator
	Cooling fan control	Cooling fan relay

*1: This sensor is not used to control the engine system under normal conditions.
*2: This input signal is sent to the ECM through CAN communication line.
*3: This output signal is sent from the ECM through CAN communication line.
*4: With ESP models.
*5: Without ESP models.
*6: For QR25DE engine models

Multiport Fuel Injection (MFI) System

BBS001LT

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*3 and piston position	Fuel injection & mixture ratio control	Fuel injector
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Heated oxygen sensor 1	Density of oxygen in exhaust gas		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Park/neutral position (PNP) switch	Gear position		
Knock sensor	Engine knocking condition		
Battery	Battery voltage*3		
Power steering pressure sensor	Power steering operation		
Heated oxygen sensor 2*1	Density of oxygen in exhaust gas		
Wheel sensor	Vehicle speed*2		
Air conditioner switch	Air conditioner operation		

*1: This sensor is not used to control the engine system under normal conditions.
*2: This signal is sent to the ECM through CAN communication line.
*3: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

The amount of fuel injected from the fuel injector is determined by the ECM. The ECM controls the length of time the valve remains open (injection pulse duration). The amount of fuel injected is a program value in the ECM memory. The program value is preset by engine operating conditions. These conditions are determined by input signals (for engine speed and intake air) from both the crankshaft position sensor and the mass air flow sensor.

VARIOUS FUEL INJECTION INCREASE/DECREASE COMPENSATION

In addition, the amount of fuel injected is compensated to improve engine performance under various operating conditions as listed below.

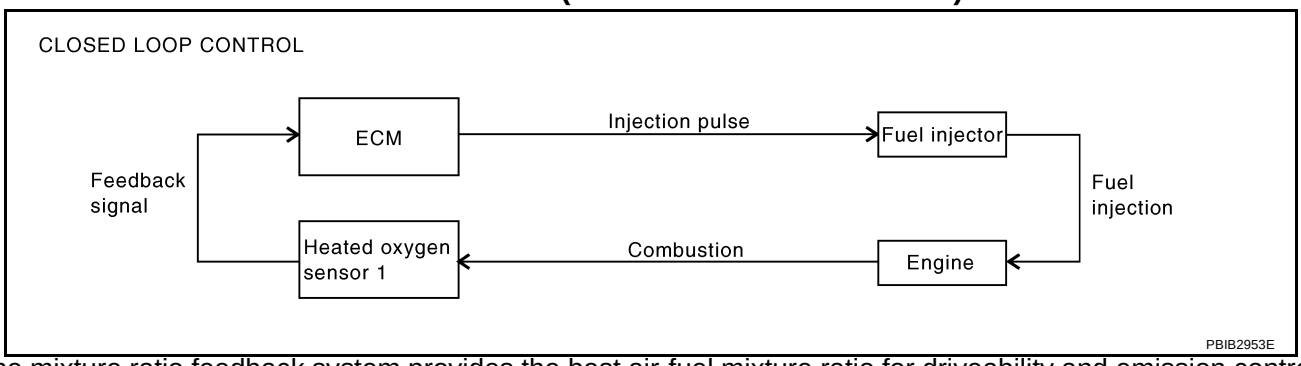
<Fuel increase>

- During warm-up
- When starting the engine
- During acceleration
- Hot-engine operation
- When selector lever is changed from N to D (A/T models)
- High-load, high-speed operation

<Fuel decrease>

- During deceleration
- During high engine speed operation

MIXTURE RATIO FEEDBACK CONTROL (CLOSED LOOP CONTROL)



The mixture ratio feedback system provides the best air-fuel mixture ratio for driveability and emission control. The three way catalyst (manifold) can then better reduce CO, HC and NOx emissions. This system uses heated oxygen sensor 1 in the exhaust manifold to monitor whether the engine operation is rich or lean. The ECM adjusts the injection pulse width according to the sensor voltage signal. For more information about heated oxygen sensor 1, refer to EC-668, "DTC P0132 HO2S1" . This maintains the mixture ratio within the range of stoichiometric (ideal air-fuel mixture).
This stage is referred to as the closed loop control condition.
Heated oxygen sensor 2 is located downstream of the three way catalyst (manifold). Even if the switching characteristics of heated oxygen sensor 1 shift, the air-fuel ratio is controlled to stoichiometric by the signal from heated oxygen sensor 2.

Open Loop Control

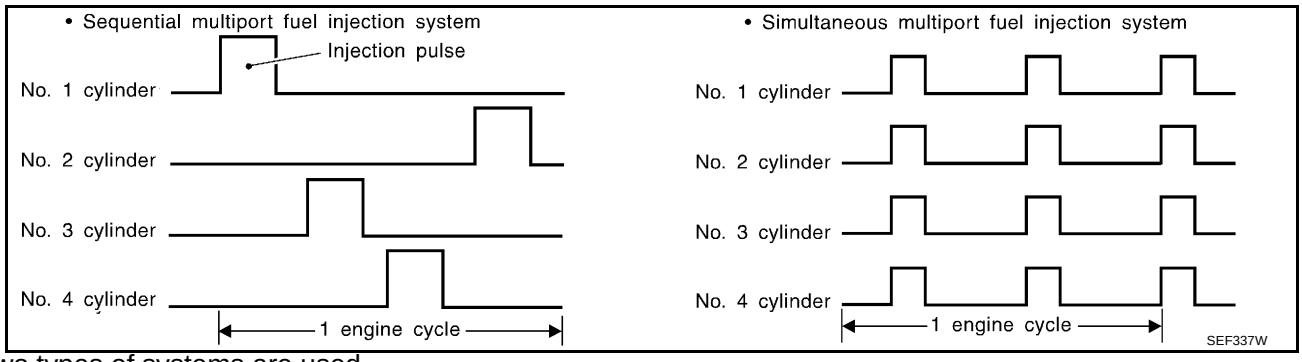
The open loop system condition refers to when the ECM detects any of the following conditions. Feedback control stops in order to maintain stabilized fuel combustion.

- Deceleration and acceleration
- High-load, high-speed operation
- Malfunction of heated oxygen sensor 1 or its circuit
- Insufficient activation of heated oxygen sensor 1 at low engine coolant temperature
- High engine coolant temperature
- During warm-up
- After shifting from N to D (A/T models)
- When starting the engine

MIXTURE RATIO SELF-LEARNING CONTROL

The mixture ratio feedback control system monitors the mixture ratio signal transmitted from heated oxygen sensor 1. This feedback signal is then sent to the ECM. The ECM controls the basic mixture ratio as close to the theoretical mixture ratio as possible. However, the basic mixture ratio is not necessarily controlled as originally designed. Both manufacturing differences (i.e., mass air flow sensor hot wire) and characteristic changes during operation (i.e., injector clogging) directly affect mixture ratio.
Accordingly, the difference between the basic and theoretical mixture ratios is monitored in this system. This is then computed in terms of “injection pulse duration” to automatically compensate for the difference between the two ratios.
“Fuel trim” refers to the feedback compensation value compared against the basic injection duration. Fuel trim includes short term fuel trim and long term fuel trim.
“Short term fuel trim” is the short-term fuel compensation used to maintain the mixture ratio at its theoretical value. The signal from heated oxygen sensor 1 indicates whether the mixture ratio is RICH or LEAN compared to the theoretical value. The signal then triggers a reduction in fuel volume if the mixture ratio is rich, and an increase in fuel volume if it is lean.
“Long term fuel trim” is overall fuel compensation carried out long-term to compensate for continual deviation of the short term fuel trim from the central value. Such deviation will occur due to individual engine differences, wear over time and changes in the usage environment.

FUEL INJECTION TIMING



Two types of systems are used.

Sequential Multiport Fuel Injection System

Fuel is injected into each cylinder during each engine cycle according to the firing order. This system is used when the engine is running.

Simultaneous Multiport Fuel Injection System

Fuel is injected simultaneously into all four cylinders twice each engine cycle. In other words, pulse signals of the same width are simultaneously transmitted from the ECM.
The four injectors will then receive the signals two times for each engine cycle.
This system is used when the engine is being started and/or if the fail-safe system (CPU) is operating.

FUEL SHUT-OFF

Fuel to each cylinder is cut off during deceleration or operation of the engine at excessively high speeds.

Electronic Ignition (EI) System

BBS001LU

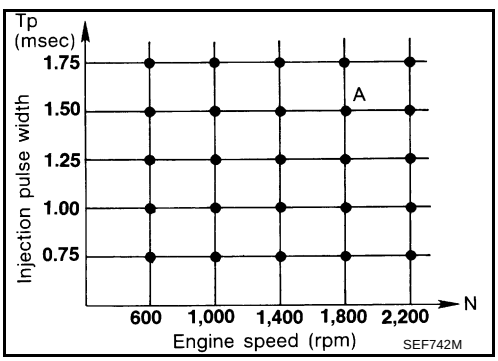
INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS)	Engine speed*2 and piston position	Ignition timing control	Power transistor
Camshaft position sensor (PHASE)			
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Knock sensor	Engine knocking		
Park/neutral position (PNP) switch	Gear position		
Battery	Battery voltage*2		
Wheel sensor	Vehicle speed*1		

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

Firing order: 1 - 3 - 4 - 2
The ignition timing is controlled by the ECM to maintain the best air-fuel ratio for every running condition of the engine. The ignition timing data is stored in the ECM. This data forms the map shown.
The ECM receives information such as the injection pulse width and camshaft position sensor signal. Computing this information, ignition signals are transmitted to the power transistor.
e.g., N: 1,800 rpm, Tp: 1.50 msec
A °BTDC
During the following conditions, the ignition timing is revised by the ECM according to the other data stored in the ECM.



- At starting
- During warm-up

- At idle
- At low battery voltage
- During acceleration

The knock sensor retard system is designed only for emergencies. The basic ignition timing is programmed within the anti-knocking zone, if recommended fuel is used under dry conditions. The retard system does not operate under normal driving conditions. If engine knocking occurs, the knock sensor monitors the condition. The signal is transmitted to the ECM. The ECM retards the ignition timing to eliminate the knocking condition.

Air Conditioning Cut Control

BBS001LV

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Air conditioner switch	Air conditioner ON signal	Air conditioner cut control	Air conditioner relay
Throttle position sensor	Throttle valve opening angle		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		
Power steering pressure sensor	Power steering operation		
Wheel sensor	Vehicle speed*1		

*1: This signal is sent to the ECM through CAN communication line.
*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

SYSTEM DESCRIPTION

This system improves engine operation when the air conditioner is used.
Under the following conditions, the air conditioner is turned off.

- When the accelerator pedal is fully depressed.
- When cranking the engine.
- At high engine speeds.
- When the engine coolant temperature becomes excessively high.
- When operating power steering during low engine speed or low vehicle speed.
- When engine speed is excessively low.
- When refrigerant pressure is excessively low or high.

Fuel Cut Control (At No Load and High Engine Speed)

BBS001LW

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
Park/neutral position (PNP) switch	Neutral position	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed		
Wheel sensor	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

If the engine speed is above 1,800 rpm under no load (for example, the shift position is neutral and engine speed is over 1,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed.
Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

NOTE:
This function is different from deceleration control listed under EC-551, "Multiport Fuel Injection (MFI) System"
.

CAN Communication Unit

BBS001LX

SYSTEM DESCRIPTION

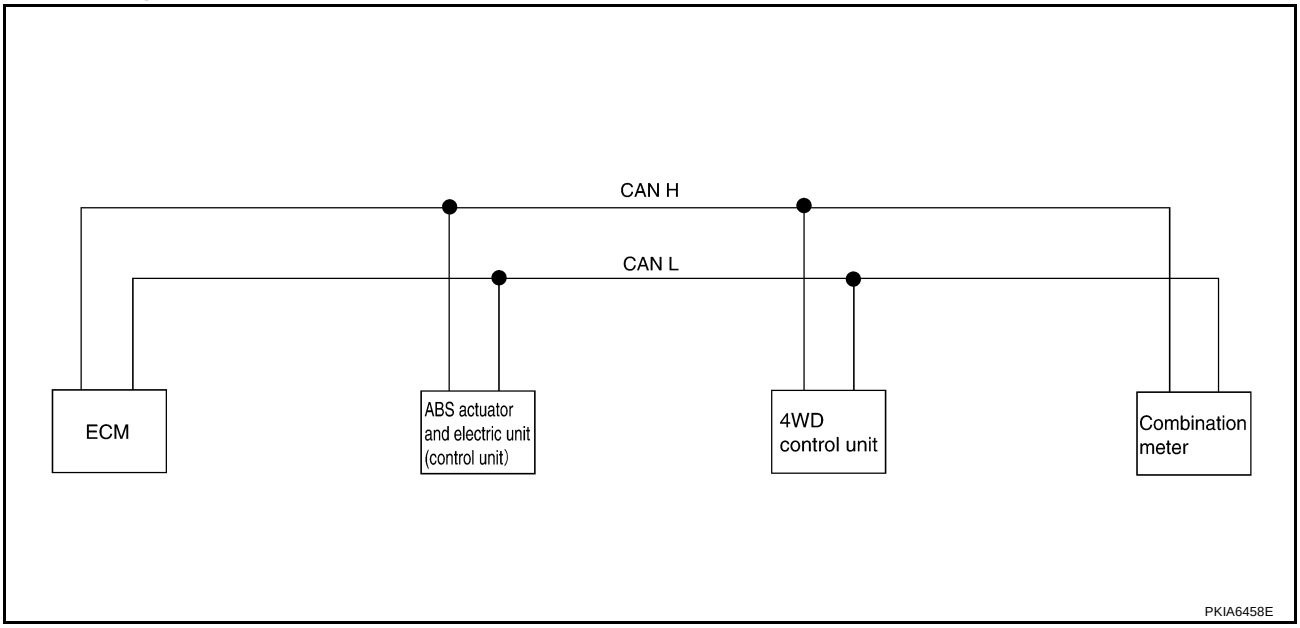
CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

CAN COMMUNICATION UNIT

Body type	Wagon				
Axle	4WD				2WD
Transmission	M/T	A/T	M/T	A/T	M/T
Brake control	ABS		ESP		ABS
CAN system type	2	3	5	6	7
ECM	×	×	×	×	×
TCM		×		×	
ESP/TCS/ABS control unit			×	×	
ABS actuator and electric unit (control unit)	×	×			×
Steering angle sensor			×	×	
4WD control unit	×	×	×	×	
Combination meter	×	×	×	×	×

TYPE 2

System Diagram



Input/output Signal Chart

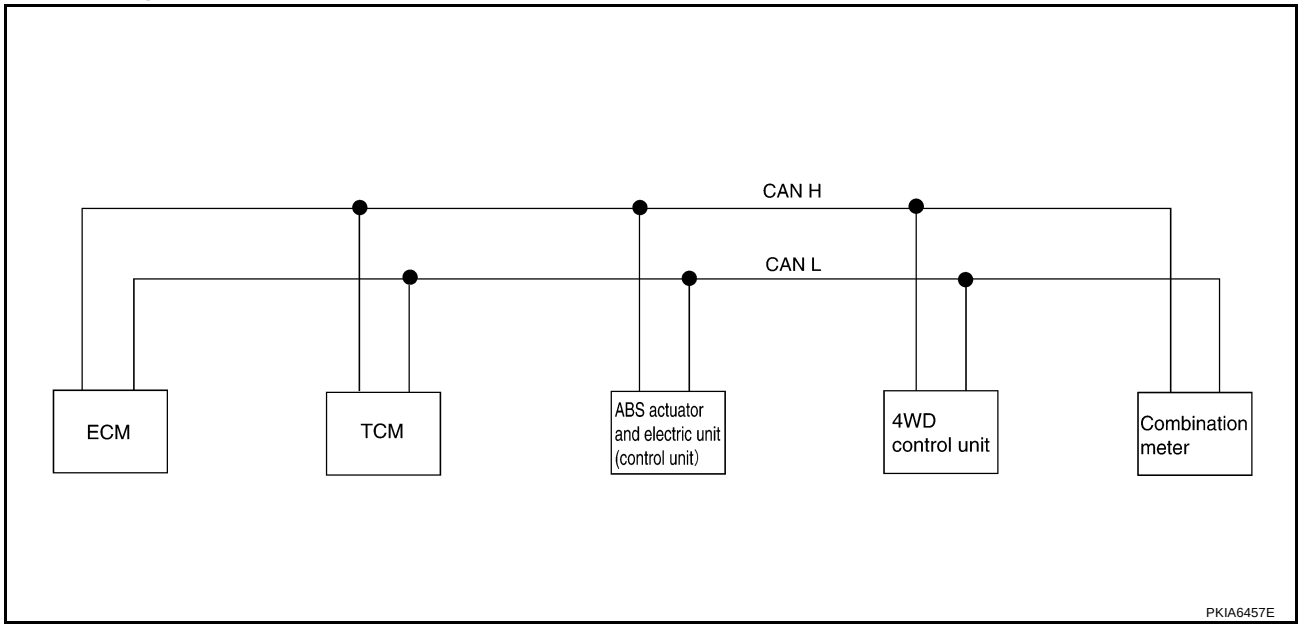
T: Transmit R: Receive

Signals	ECM	ABS actuator and electric unit (control unit)	4WD control unit	Combination meter
4WD mode indicator lamp signal			T	R
4WD warning lamp signal			T	R
A/C compressor feedback signal	T			R
ABS warning lamp signal		T		R

Signals	ECM	ABS actuator and electric unit (control unit)	4WD control unit	Combination meter
Accelerator pedal position signal	T		R	
Engine coolant temperature signal	T			R
Engine speed signal	T		R	R
MI signal	T			R
Parking brake switch signal			R	T
Stop lamp switch signal		T	R	
Vehicle speed signal		T	R	R
	R			T
ASCD SET lamp signal	T			R
ASCD CRUISE lamp signal	T			R
Stop lamp switch signal	T			R

TYPE 3

System Diagram



Input/output Signal Chart

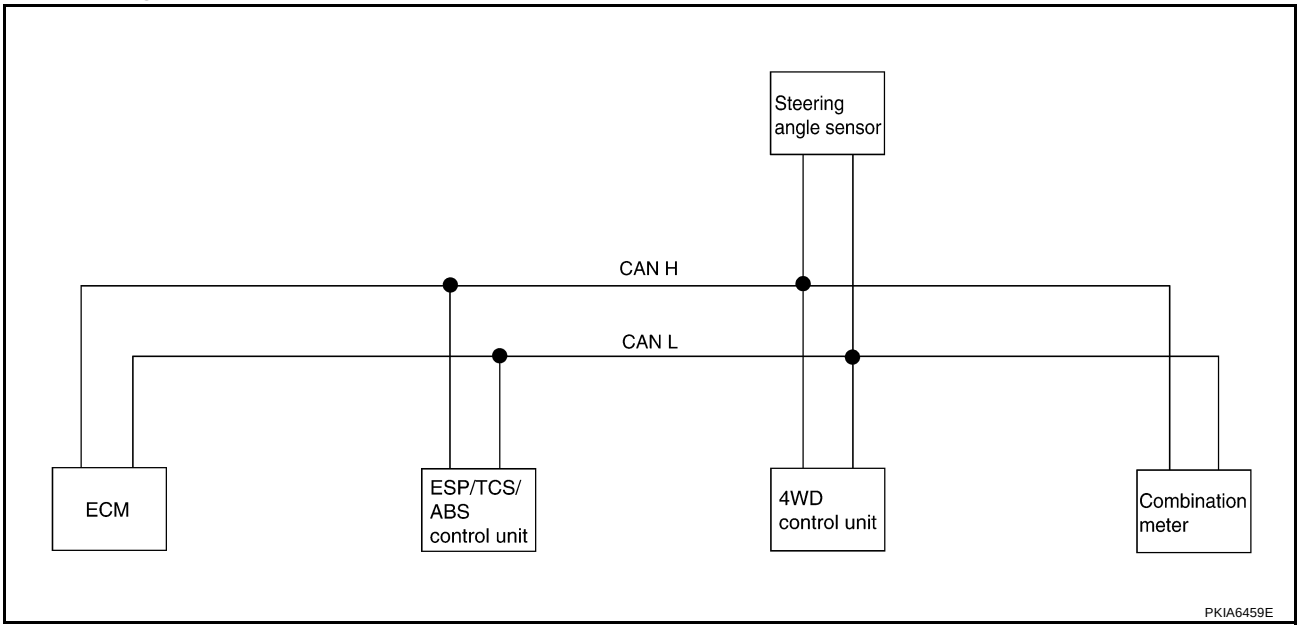
T: Transmit R: Receive

Signals	ECM	TCM	ABS actuator and electric unit (control unit)	4WD control unit	Combination meter
4WD mode indicator lamp signal				T	R
4WD warning lamp signal				T	R
A/C compressor feedback signal	T				R
A/T position indicator lamp signal		T			R
A/T self-diagnosis signal	R	T			
ABS warning lamp signal			T		R
Accelerator pedal position signal	T			R	
Closed throttle position signal	T	R			
Engine and A/T integrated control signal	T	R			
	R	T			

Signals	ECM	TCM	ABS actuator and electric unit (control unit)	4WD control unit	Combination meter
Engine coolant temperature signal	T				R
Engine speed signal	T			R	R
MI signal	T				R
OD OFF indicator signal		T			R
Output shaft revolution signal	R	T			
Overdrive control switch signal		R			T
P·N range signal		R			T
Parking brake switch signal				R	T
Stop lamp switch signal		R			T
			T	R	
Vehicle speed signal			T	R	R
	R				T
Wide open throttle position signal	T	R			
ASCD SET lamp signal	T				R
ASCD CRUISE lamp signal	T				R

TYPE 5

System Diagram



Input/output Signal Chart

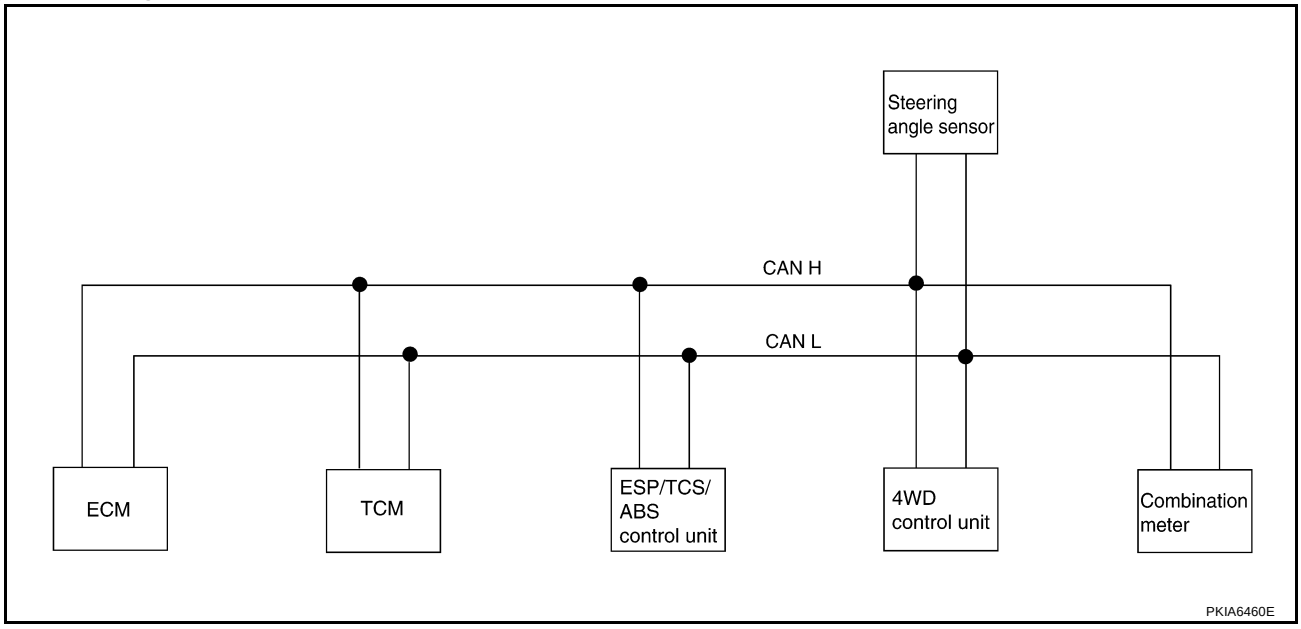
T: Transmit R: Receive

Signals	ECM	ESP/TCS/ABS control unit	Steering angle sensor	4WD control unit	Combination meter
4WD mode indicator lamp signal				T	R
4WD warning lamp signal				T	R
A/C compressor feedback signal	T				R
ABS warning lamp signal		T			R
Accelerator pedal position signal	T	R		R	
Brake warning lamp signal		T			R
Engine coolant temperature signal	T				R

Signals	ECM	ESP/TCS/ABS control unit	Steering angle sensor	4WD control unit	Combination meter
Engine speed signal	T	R		R	R
ESP OFF indicator lamp signal		T			R
MI signal	T				R
Stop lamp switch signal		T		R	
Vehicle speed signal		T		R	R
	R				T
SLIP indicator lamp signal		T			R
Parking brake switch signal				R	T
Steering angle sensor signal		R	T		
ASCD SET lamp signal	T				R
ASCD CRUISE lamp signal	T				R

TYPE 6

System Diagram



Input/output Signal Chart

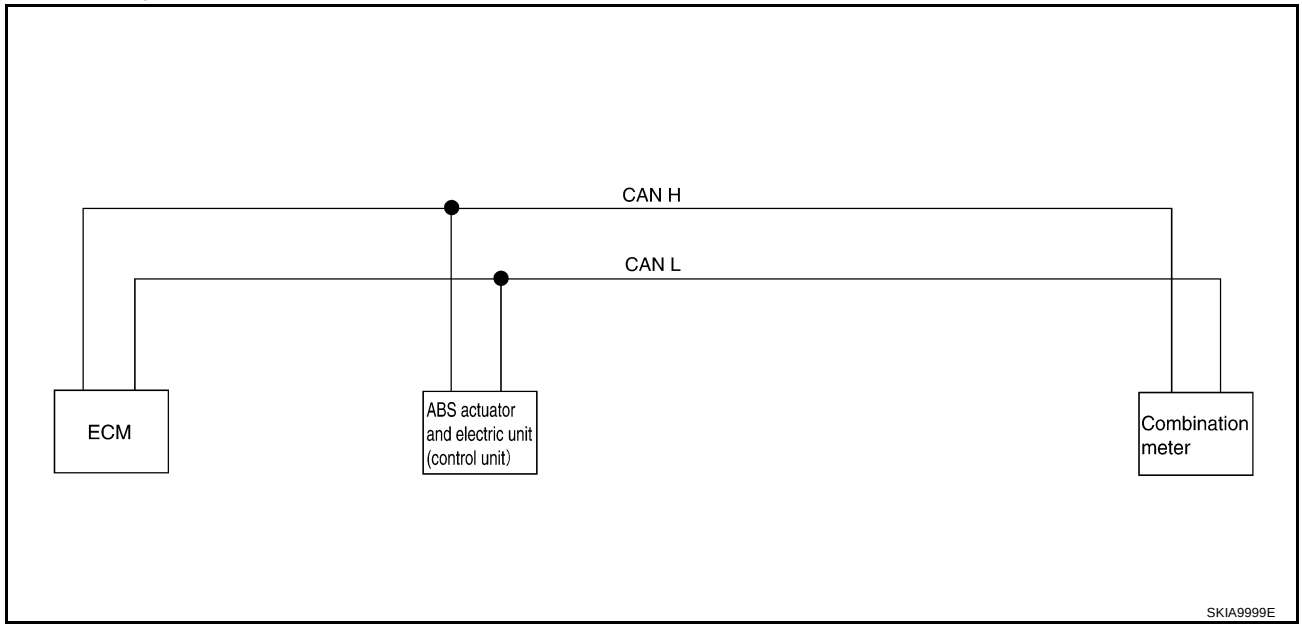
T: Transmit R: Receive

Signals	ECM	TCM	ESP/TCS/ ABS control unit	Steering angle sensor	4WD control unit	Combination meter
4WD mode indicator lamp signal					T	R
4WD warning lamp signal					T	R
A/C compressor feedback signal	T					R
A/T position indicator lamp signal		T	R			R
A/T self-diagnosis signal	R	T				
ABS warning lamp signal			T			R
Accelerator pedal position signal	T		R		R	
Brake warning lamp signal			T			R
Closed throttle position signal	T	R				
Engine and A/T integrated control signal	T	R				
	R	T				

Signals	ECM	TCM	ESP/TCS/ ABS control unit	Steering angle sensor	4WD control unit	Combination meter
Engine coolant temperature signal	T					R
Engine speed signal	T		R		R	R
ESP OFF indicator lamp signal			T			R
MI signal	T					R
OD OFF indicator signal		T				R
Output shaft revolution signal	R	T				
Overdrive control switch signal		R				T
P·N range signal		R				T
SLIP indicator lamp signal			T			R
Steering angle sensor signal			R	T		
Stop lamp switch signal		R				T
			T		R	
Vehicle speed signal			T		R	R
	R					T
Parking brake switch signal					R	T
Wide open throttle position signal	T	R				
ASCD SET lamp signal	T					R
ASCD CRUISE lamp signal	T					R

TYPE 7

System diagram



Input/output signal chart

T: Transmit R: Receive

Signals	ECM	ABS actuator and electric unit (control unit)	Combination meter
A/C compressor feedback signal	T		R
ABS warning lamp signal		T	R
Engine coolant temperature signal	T		R
Engine speed signal	T		R
MI signal	T		R

Signals	ECM	ABS actuator and electric unit (control unit)	Combination meter
Vehicle speed signal		T	R
	R		T
ASCD SET lamp signal	T		R
ASCD CRUISE lamp signal	T		R
Stop lamp switch signal	T		R

BASIC SERVICE PROCEDURE

PFP:00018

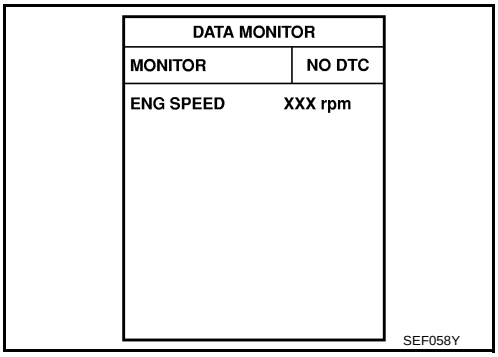
Idle Speed and Ignition Timing Check

BBS001LY

IDLE SPEED

With CONSULT-II

Check idle speed in “DATA MONITOR” mode with CONSULT-II.



Without CONSULT-II

Check the idle speed by installing the pulse type tachometer clamp on the loop wire or on suitable high-tension wire which installed between No.1 ignition coil and No.1 spark plug.

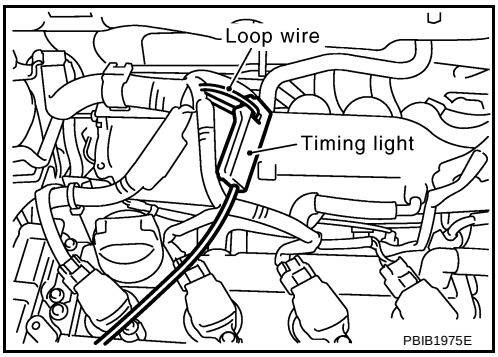
NOTE:
For the method of installing the tachometer, refer to EC-561, "IGNITION TIMING" .

IGNITION TIMING

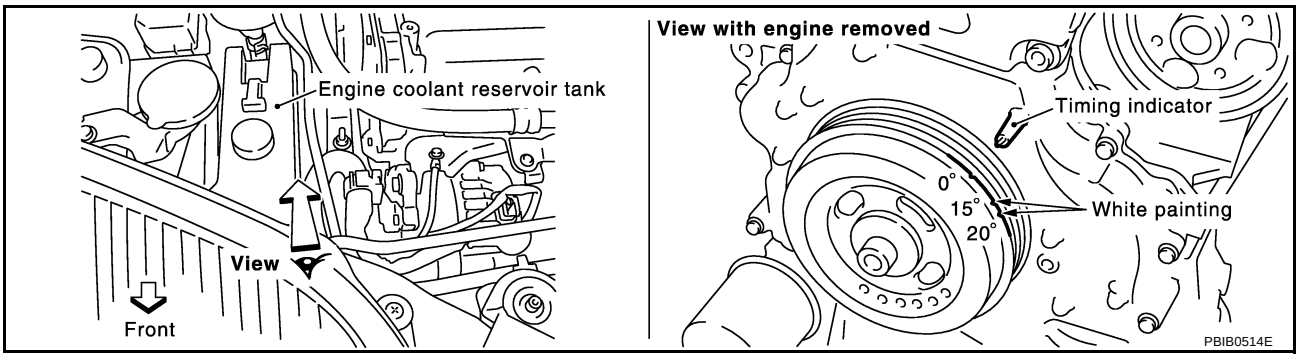
Any of following two methods may be used.

Method A

1. Slide the harness protector of ignition coil No.1 to clear the wires.
2. Attach timing light to the wire as shown in the figure.

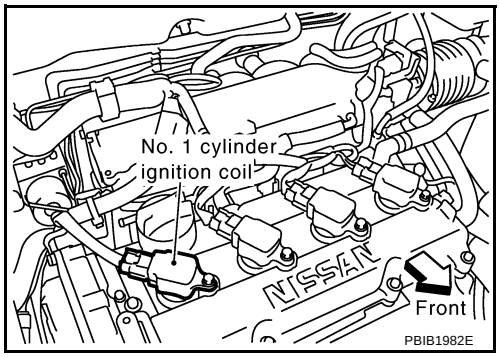


3. Check ignition timing.

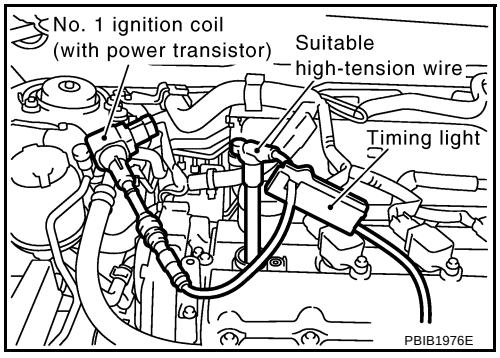


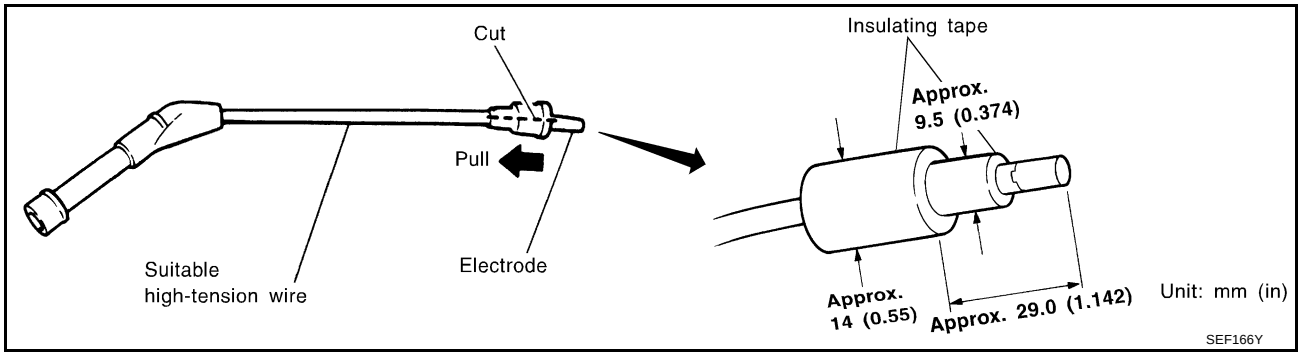
Method B

1. Remove No. 1 ignition coil.

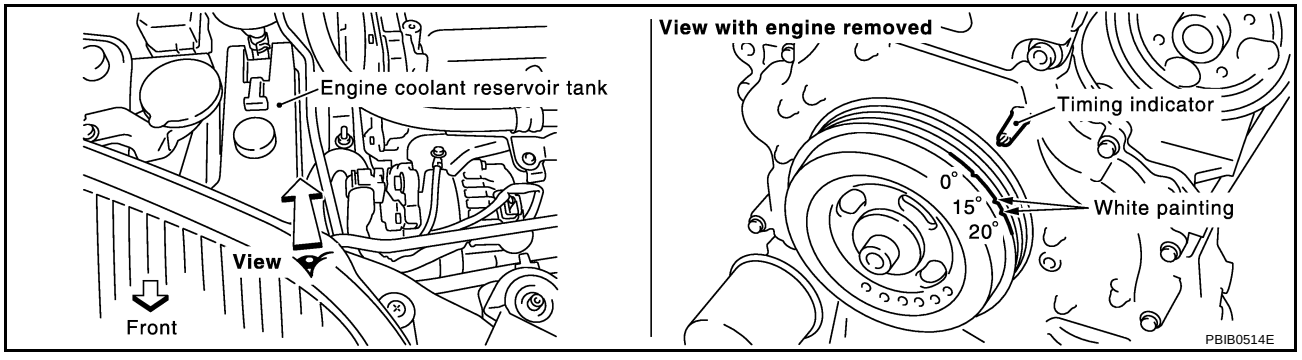


2. Connect No. 1 ignition coil and No. 1 spark plug with suitable high-tension wire as shown, and attach timing light clamp to this wire.





3. Check ignition timing.



Accelerator Pedal Released Position Learning

BBS001LZ

DESCRIPTION

Accelerator Pedal Released Position Learning is an operation to learn the fully released position of the accelerator pedal by monitoring the accelerator pedal position sensor output signal. It must be performed each time harness connector of accelerator pedal position sensor or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON and wait at least 2 seconds.

3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON and wait at least 2 seconds.
5. Turn ignition switch OFF and wait at least 10 seconds.

Throttle Valve Closed Position Learning

BBS001M0

DESCRIPTION

Throttle Valve Closed Position Learning is an operation to learn the fully closed position of the throttle valve by monitoring the throttle position sensor output signal. It must be performed each time harness connector of electric throttle control actuator or ECM is disconnected.

OPERATION PROCEDURE

1. Make sure that accelerator pedal is fully released.
2. Turn ignition switch ON.
3. Turn ignition switch OFF and wait at least 10 seconds.
   Make sure that throttle valve moves during above 10 seconds by confirming the operating sound.

Idle Air Volume Learning

BBS001M1

DESCRIPTION

Idle Air Volume Learning is an operation to learn the idle air volume that keeps each engine within the specific range. It must be performed under any of the following conditions:

- Each time electric throttle control actuator or ECM is replaced.
- Idle speed or ignition timing is out of specification.

PREPARATION

Before performing Idle Air Volume Learning, make sure that all of the following conditions are satisfied. Learning will be cancelled if any of the following conditions are missed for even a moment.

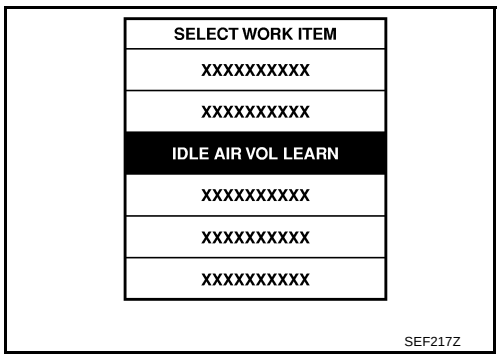
- Battery voltage: More than 12.9V (At idle)
- Engine coolant temperature: 70 - 95°C (158 - 203°F)
- PNP switch: ON
- Electric load switch: OFF
  (Air conditioner, head lamp, rear window defogger)
  On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.
- Steering wheel: Neutral (Straight-ahead position)
- Vehicle speed: Stopped
- Transmission: Warmed-up
  - A/T models
    - With CONSULT-II: Drive vehicle until “FLUID TEMP SE” in “DATA MONITOR” mode of “A/T” system indicates less than 0.9V.
    - Without CONSULT-II: Drive vehicle for 10 minutes.
  - M/T models: Drive vehicle for 10 minutes.

OPERATION PROCEDURE

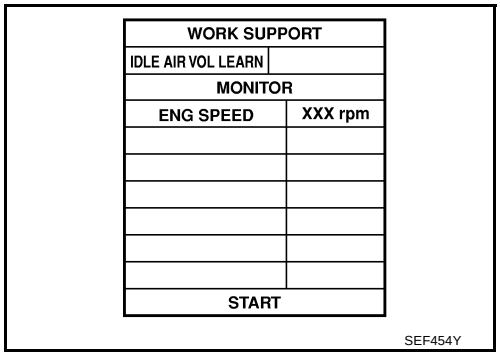
With CONSULT-II

1. Perform EC-562, "Accelerator Pedal Released Position Learning" .
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.

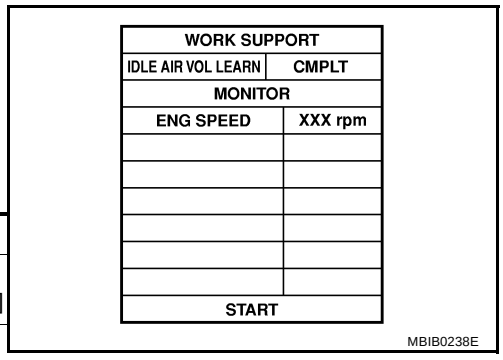
5. Select “IDLE AIR VOL LEARN” in “WORK SUPPORT” mode.



6. Touch “START” and wait 20 seconds.



7. Make sure that “CMPLT” is displayed on CONSULT-II screen. If “CMPLT” is not displayed, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.
8. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.



ITEM	SPECIFICATION
Idle speed	QR20DE with M/T models: 650 ± 50 rpm (in Neutral position) Except above: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]
Ignition timing	M/T: 15 ± 5° BTDC (in Neutral position) A/T: 15 ± 5° BTDC (in P or N position)

Without CONSULT-II

NOTE:

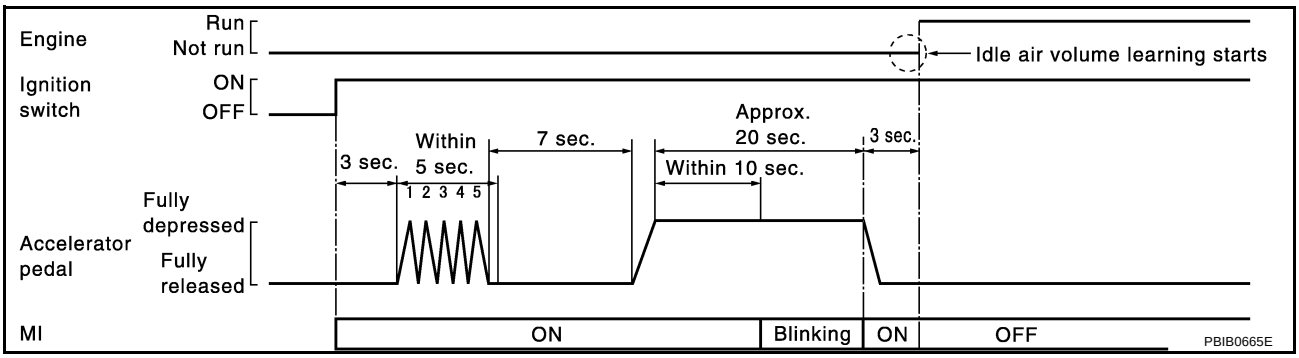
- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**

1. Perform EC-562, "Accelerator Pedal Released Position Learning" .
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Start engine and warm it up to normal operating temperature.
4. Check that all items listed under the topic PREPARATION (previously mentioned) are in good order.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
7. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

8. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 20 seconds until the MI stops blinking and turned ON.
9. Fully release the accelerator pedal within 3 seconds after the MI turned ON.
10. Start engine and let it idle.

11. Wait 20 seconds.



12. Rev up the engine two or three times and make sure that idle speed and ignition timing are within the specifications.

ITEM	SPECIFICATION
Idle speed	QR20DE with M/T models: 650 ± 50 rpm (in Neutral position) Except above: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]
Ignition timing	M/T: 15 ± 5° BTDC (in Neutral position) A/T: 15 ± 5° BTDC (in P or N position)

13. If idle speed and ignition timing are not within the specification, Idle Air Volume Learning will not be carried out successfully. In this case, find the cause of the incident by referring to the DIAGNOSTIC PROCEDURE below.

DIAGNOSTIC PROCEDURE

If idle air volume learning cannot be performed successfully, proceed as follows:

1. **Check that throttle valve is fully closed.**
2. **Check PCV valve operation.**
3. **Check that downstream of throttle valve is free from air leakage.**
4. **When the above three items check out OK, engine component parts and their installation condition are questionable. Check and eliminate the cause of the incident.**
   It is useful to perform EC-622, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .
5. **If any of the following conditions occur after the engine has started, eliminate the cause of the incident and perform Idle Air Volume Learning all over again:**
   - **Engine stalls.**
   - **Erroneous idle.**

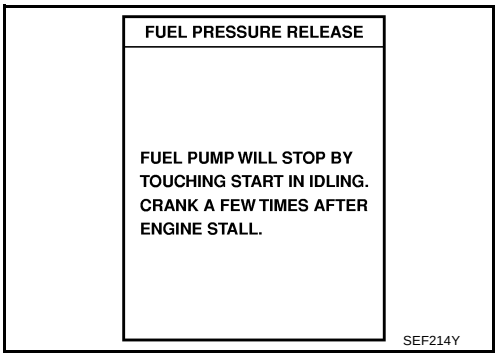
Fuel Pressure Check

BBS001M2

FUEL PRESSURE RELEASE

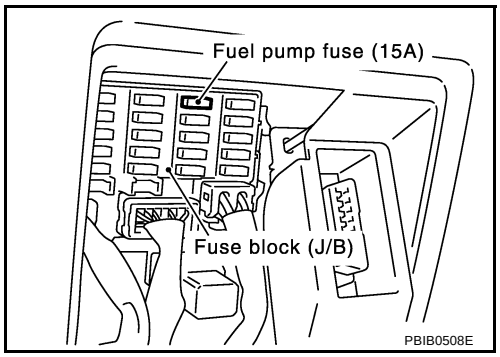
With CONSULT-II

1. Turn ignition switch ON.
2. Perform “FUEL PRESSURE RELEASE” in “WORK SUPPORT” mode with CONSULT-II.
3. Start engine.
4. After engine stalls, crank it two or three times to release all fuel pressure.
5. Turn ignition switch OFF.



Without CONSULT-II

1. Remove fuel pump fuse located in fuse box.
2. Start engine.
3. After engine stalls, crank it two or three times to release all fuel pressure.
4. Turn ignition switch OFF.
5. Reinstall fuel pump fuse after servicing fuel system.



FUEL PRESSURE CHECK

CAUTION:

Before disconnecting fuel line, release fuel pressure from fuel line to eliminate danger.

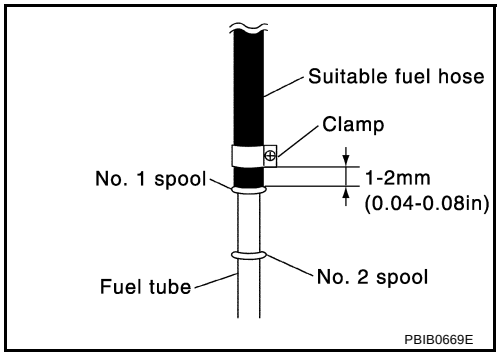
NOTE:

Prepare pans or saucers under the disconnected fuel line because the fuel may spill out. The fuel pressure cannot be completely released because T30 models do not have fuel return system.

CAUTION:

- **The fuel hose connection method used when taking fuel pressure check must not be used for other purposes.**
- **Be careful not to scratch or put debris around connection area when servicing, so that the quick connector maintains sealability with O-rings inside.**
- **When installing fuel hose quick connector, refer to EM-18, "INTAKE MANIFOLD" .**

1. Release fuel pressure to zero. Refer to EC-565, "FUEL PRESSURE RELEASE" .
2. Prepare fuel hose and fuel hose clamp for fuel pressure check, and connect fuel pressure gauge.
   - Use suitable fuel hose for fuel pressure check (genuine NISSAN fuel hose without quick connector).
   - To avoid unnecessary force or tension to hose, use moderately long fuel hose for fuel pressure check.
   - Do not use the fuel hose for checking fuel pressure with damage or cracks on it.
   - Use Pressure Gauge to check fuel pressure.
3. Remove fuel hose. Refer to EM-18, "INTAKE MANIFOLD" .
   - Do not twist or kink fuel hose because it is plastic hose.
   - Do not remove fuel hose from quick connector.
   - Keep the original fuel hose to be free from intrusion of dust or foreign substances with a suitable cover.
4. Install the fuel pressure gauge as shown in the figure.
   - Wipe off oil or dirt from hose insertion part using cloth moistened with gasoline.
   - Apply proper amount of gasoline between top of the fuel tube and No.1 spool.
   - Insert fuel hose for fuel pressure check until it touches the No.1 spool on fuel tube.
   - Use NISSAN genuine hose clamp (part number: 16439 N4710 or 16439 40U00).
   - When reconnecting fuel line, always use new clamps.
   - When reconnecting fuel hose, check the original fuel hose for damage and abnormality.
   - Use a torque driver to tighten clamps.

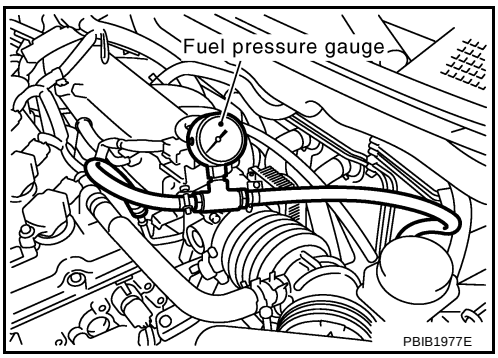


- Install hose clamp to the position within 1 - 2 mm (0.04 - 0.08 in).

Tightening torque: 1 - 1.5 N·m (0.1 - 0.15 kg-m, 9 - 13 in-lb)

- Make sure that clamp screw does not contact adjacent parts.

5. After connecting fuel hose for fuel pressure check, pull the hose with a force of approximately 98 N (10 kg, 22 lb) to confirm fuel tube does not come off.
6. Turn ignition switch ON, and check for fuel leakage.
7. Start engine and check for fuel leakage.
8. Read the indication of fuel pressure gauge.
   - Do not perform fuel pressure check with system operating. Fuel pressure gauge may indicate false readings.
   - During fuel pressure check, confirm for fuel leakage from fuel connection every 3 minutes.



At idling: Approximately 350 kPa (3.5 bar, 3.57 kg/cm^2 , 51 psi)

9. If result is unsatisfactory, go to next step.
10. Check the following.
    - Fuel hoses and fuel tubes for clogging
    - Fuel filter for clogging
    - Fuel pump
    - Fuel pressure regulator for clogging

    If OK, replace fuel pressure regulator.
    If NG, repair or replace.

ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

BBS001M3

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information
Diagnostic Trouble Code (DTC)
Freeze Frame data
1st Trip Diagnostic Trouble Code (1st Trip DTC)
1st Trip Freeze Frame data

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	Freeze Frame data	1st trip Freeze Frame data
CONSULT-II	×	×	×	×
ECM	×	×*1	—	—

*1: When DTC and 1st trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator (MI) on the instrument panel lights up when the same malfunction is detected in two consecutive trips (Two trip detection logic), or when the ECM enters fail-safe mode. (Refer to EC-579, "Fail-Safe Chart" .)

Two Trip Detection Logic

BBS001M4

When a malfunction is detected for the first time, 1st trip DTC and 1st trip Freeze Frame data are stored in the ECM memory. The MI will not light up at this stage. <1st trip>
If the same malfunction is detected again during the next drive, the DTC and Freeze Frame data are stored in the ECM memory, and the MI lights up. The MI lights up at the same time when the DTC is stored. <2nd trip>
The “trip” in the “Two Trip Detection Logic” means a driving mode in which self-diagnosis is performed during vehicle operation. When the ECM enters fail-safe mode (Refer to EC-579, "Fail-Safe Chart" .), the DTC is stored in the ECM memory even in the 1st trip.
When there is an open circuit on MI circuit, the ECM can not warn the driver by lighting up MI when there is trouble on engine control system. Therefore, when Electrical controlled throttle and part of the ECM related diagnoses are continuously detected as NG for 5-trips, ECM warns the driver that engine control system has trouble and MI circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the trouble.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Emission-Related Diagnostic Information

BBS001M5

DTC AND 1ST TRIP DTC

The 1st trip DTC (whose number is the same as the DTC number) is displayed for the latest self-diagnostic result obtained. If the ECM memory was cleared previously, and the 1st trip DTC did not reoccur, the 1st trip DTC will not be displayed.
If a malfunction is detected during the 1st trip, the 1st trip DTC is stored in the ECM memory. The MI will not light up (two trip detection logic). If the same malfunction is not detected in the 2nd trip (meeting the required driving pattern), the 1st trip DTC is cleared from the ECM memory. If the same malfunction is detected in the 2nd trip, both the 1st trip DTC and DTC are stored in the ECM memory and the MI lights up. In other words, the DTC is stored in the ECM memory and the MI lights up when the same malfunction occurs in two consecutive trips. If a 1st trip DTC is stored and a non-diagnostic operation is performed between the 1st and 2nd trips, only the 1st trip DTC will continue to be stored. For fail-safe items, DTC is stored in the ECM memory even in the 1st trip.
Procedures for clearing the DTC and the 1st trip DTC from the ECM memory are described in EC-569, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
When a 1st trip DTC is detected, check, print out or write down and erase (1st trip) DTC and Freeze Frame data as specified in Work Flow procedure Step II, refer to EC-575, "WORK FLOW" . Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, the item requires repair.

How to Read DTC and 1st Trip DTC

DTC and 1st trip DTC can be read by the following methods.

With CONSULT-II

CONSULT-II displays the DTC in “SELF-DIAG RESULTS” mode. Examples: P0117, P0340, P1065, etc. (CONSULT-II also displays the malfunctioning component or system.)

Without CONSULT-II

The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0117, 0340, 1065 etc.

- **1st trip DTC No. is the same as DTC No.**
- **Output of a DTC indicates a malfunction. However, the Diagnostic Test Mode II do not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

A sample of CONSULT-II display for DTC and 1st trip DTC is shown below. DTC or 1st trip DTC of a malfunction is displayed in “SELF-DIAGNOSTIC RESULTS” mode of CONSULT-II. Time data indicates how many times the vehicle was driven after the last detection of a DTC.
If the DTC is being detected currently, the time data will be [0].
If a 1st trip DTC is stored in the ECM, the time data will be [1t].

DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	0

1st trip DTC display

SELF DIAG RESULTS	
DTC RESULTS	TIME
CKP SEN/CIRCUIT [P0335]	1t

PBIB0911E

FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA

The ECM records the driving conditions such as fuel system status, calculated load value, engine coolant temperature, short term fuel trim, long term fuel trim, engine speed, vehicle speed, base fuel schedule and intake air temperature at the moment a malfunction is detected.
Data which are stored in the ECM memory, along with the 1st trip DTC, are called 1st trip freeze frame data. The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II. For details, see EC-609, "Freeze Frame Data and 1st Trip Freeze Frame Data" .
Only one set of freeze frame data (either 1st trip freeze frame data or freeze frame data) can be stored in the ECM. 1st trip freeze frame data is stored in the ECM memory along with the 1st trip DTC. There is no priority for 1st trip freeze frame data and it is updated each time a different 1st trip DTC is detected. However, once freeze frame data (2nd trip detection/MI on) is stored in the ECM memory, 1st trip freeze frame data is no longer stored. Remember, only one set of freeze frame data can be stored in the ECM.
Both 1st trip freeze frame data and freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in EC-569, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

With CONSULT-II

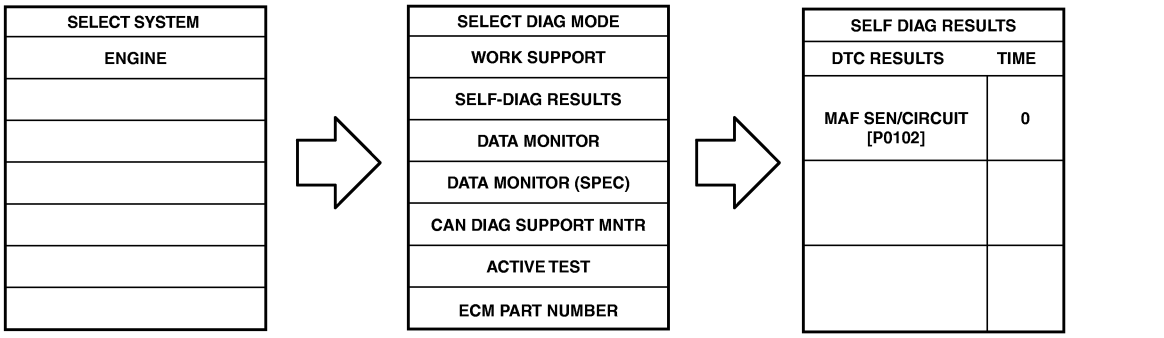
The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 10 seconds and then turn it ON (engine stopped) again.
2. Touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.

4. Touch “ERASE”. (The DTC in the ECM will be erased.)

How to erase DTC (With CONSULT-II)

1. If the ignition switch stays “ON” after repair work, be sure to turn ignition switch “OFF” once. Wait at least 10 seconds and then turn it “ON” again.



2. Turn **CONSULT-II** “ON” and touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (The DTC in the ECM will be erased.)

PBIB2454E

Without CONSULT-II

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once.
2. Wait at least 10 seconds and then turn it ON (engine stopped) again.
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-572, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

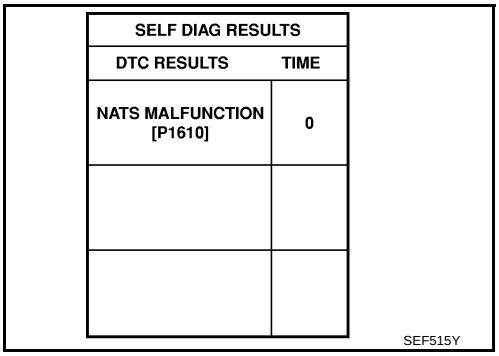
- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**
  - Diagnostic trouble codes
  - 1st trip diagnostic trouble codes
  - Freeze frame data
  - 1st trip freeze frame data

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

NATS (Nissan Anti-Theft System)

BBS001M6

- **If the security indicator lights up with the ignition switch in the ON position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to BL-107, "NATS (NISSAN ANTI-THEFT SYSTEM)" .**
- **Confirm no self-diagnostic results of NATS is displayed before touching “ERASE” in “SELF-DIAG RESULTS” mode with CONSULT-II.**
- **When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner.
  Regarding the procedures of NATS initialization and all NATS ignition key ID registration, refer to CONSULT-II Operation Manual, NATS.



SEF515Y

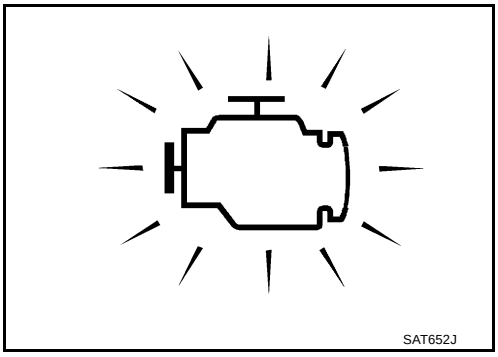
Malfunction Indicator (MI)

BBS001M7

DESCRIPTION

The MI is located on the instrument panel.

1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MI does not light up, refer to DI-34, "WARNING LAMPS" or see EC-960, "MI & DATA LINK CONNECTORS" .
2. When the engine is started, the MI should go off.
   If the MI remains on, the on board diagnostic system has detected an engine system malfunction.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ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following four functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position Engine stopped	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit.
	Engine running	MALFUNCTION WARNING	This is a usual driving condition. When a malfunction is detected twice in two consecutive driving cycles (two trip detection logic), the MI will light up to inform the driver that a malfunction has been detected. The following malfunctions will light up MI in the 1st trip. ● One trip detection diagnoses
Mode II	Ignition switch in ON position Engine stopped	SELF-DIAGNOSTIC RESULTS	This function allows DTCs and 1st trip DTCs to be read.
	Engine running	HEATED OXYGEN SENSOR 1 MONITOR	This function allows the fuel mixture condition (lean or rich), monitored by heated oxygen sensor 1, to be read.

When there is an open circuit on MI circuit, the ECM can not warn the driver by lighting MI up when there is trouble on engine control system. Therefore, when Electrical controlled throttle and part of the ECM related diagnoses are continuously detected as NG for 5-trips, ECM warns the driver that engine control system has trouble and MI circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the trouble.

Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

MI Flashing without DTC

If the ECM is in Diagnostic Test Mode II, MI may flash when engine is running. In this case, check ECM diagnostic test mode. EC-572, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

How to switch the diagnostic test (function) modes, and details of the above functions are described later, EC-572, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

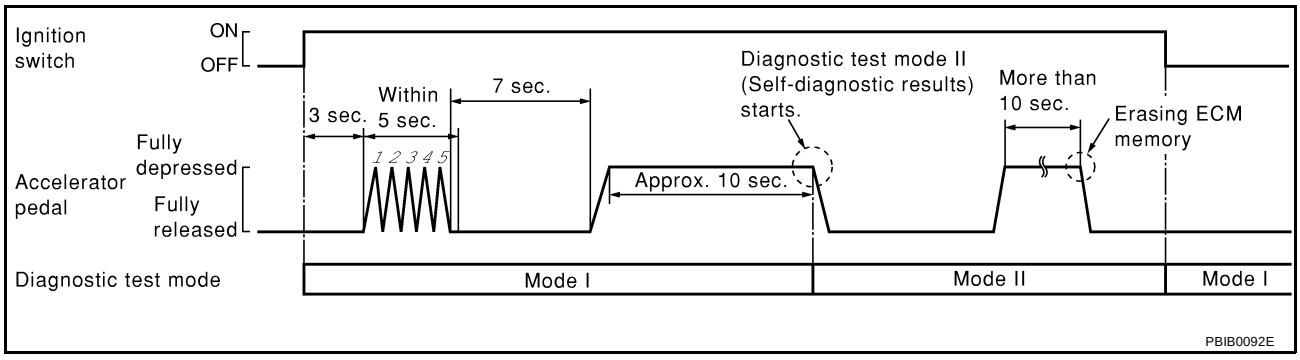
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.

b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Set Diagnostic Test Mode II (Heated Oxygen Sensor 1 Monitor)

1. Set the ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-572, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Start Engine.
   ECM has entered to Diagnostic Test Mode II (Heated oxygen sensor 1 monitor).

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-572, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to DI-34, "WARNING LAMPS" or see EC-960, "MI & DATA LINK CONNECTORS" .

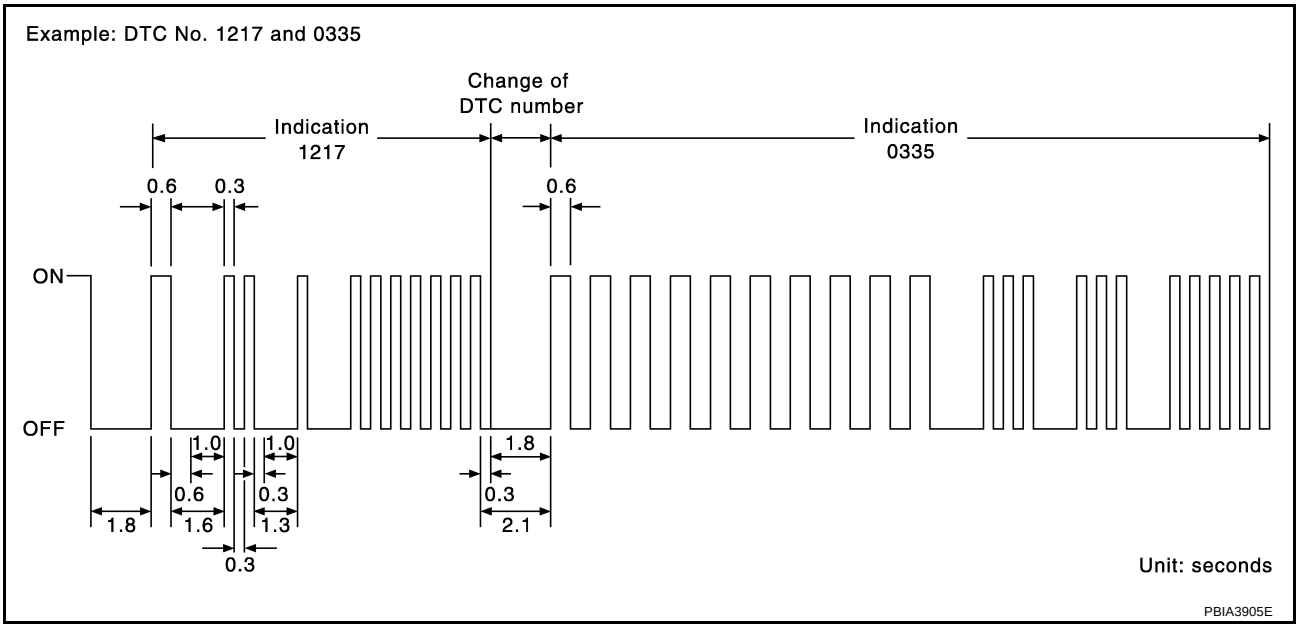
DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MI	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

- These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC and 1st trip DTC are indicated by the number of blinks of the MI as shown below.
The DTC and 1st trip DTC are displayed at the same time. If the MI does not illuminate in diagnostic test mode I (Malfunction warning), all displayed items are 1st trip DTCs. If only one code is displayed when the MI illuminates in diagnostic test mode II (SELF-DIAGNOSTIC RESULTS), it is a DTC; if two or more codes are displayed, they may be either DTCs or 1st trip DTCs. DTC No. is same as that of 1st trip DTC. These unidentified codes can be identified by using the CONSULT-II. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-536, "INDEX FOR DTC")

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to EC-572, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

DIAGNOSTIC TEST MODE II — HEATED OXYGEN SENSOR 1 MONITOR

In this mode, the MI displays the condition of the fuel mixture (lean or rich) which is monitored by the heated oxygen sensor 1.

MI	Fuel mixture condition in the exhaust gas	Air fuel ratio feedback control condition
ON	Lean	Closed loop system
OFF	Rich	
*Remains ON or OFF	Any condition	Open loop system

*: Maintains conditions just before switching to open loop.

To check the heated oxygen sensor 1 function, start engine in the Diagnostic Test Mode II and warm it up until engine coolant temperature indicator points to the middle of the gauge.
Next run engine at about 2,000 rpm for about 2 minutes under no load conditions. Then make sure that the MI comes ON more than 5 times within 10 seconds with engine running at 2,000 rpm under no load.

TROUBLE DIAGNOSIS

PFP:00004

Trouble Diagnosis Introduction

BBS001M8

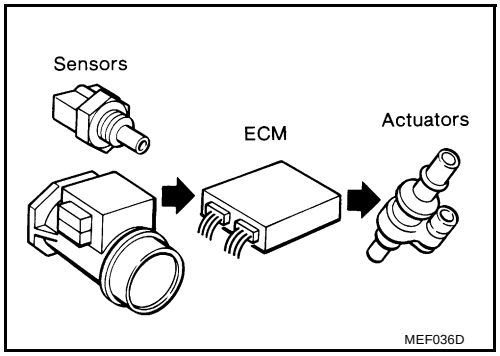
INTRODUCTION

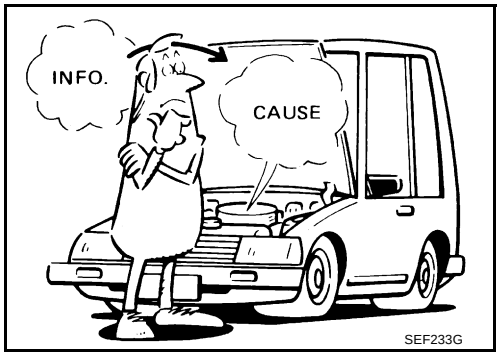
The engine has an ECM to control major systems such as fuel control, ignition control, idle air control system, etc. The ECM accepts input signals from sensors and instantly drives actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, fouled spark plugs, or other malfunctions with the engine. It is much more difficult to diagnose a incident that occurs intermittently rather than continuously. Most intermittent incidents are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.

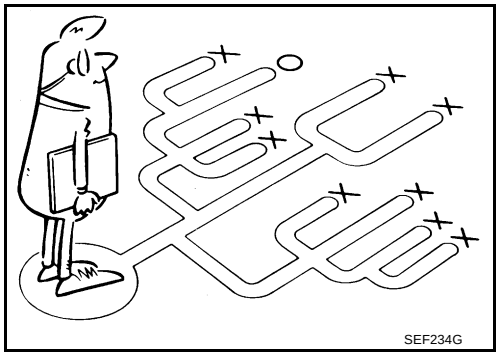
A visual check only may not find the cause of the incidents. A road test with CONSULT-II or a circuit tester connected should be performed. Follow EC-575, "WORK FLOW" .

Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like EC-577, "Worksheet Sample" should be used.

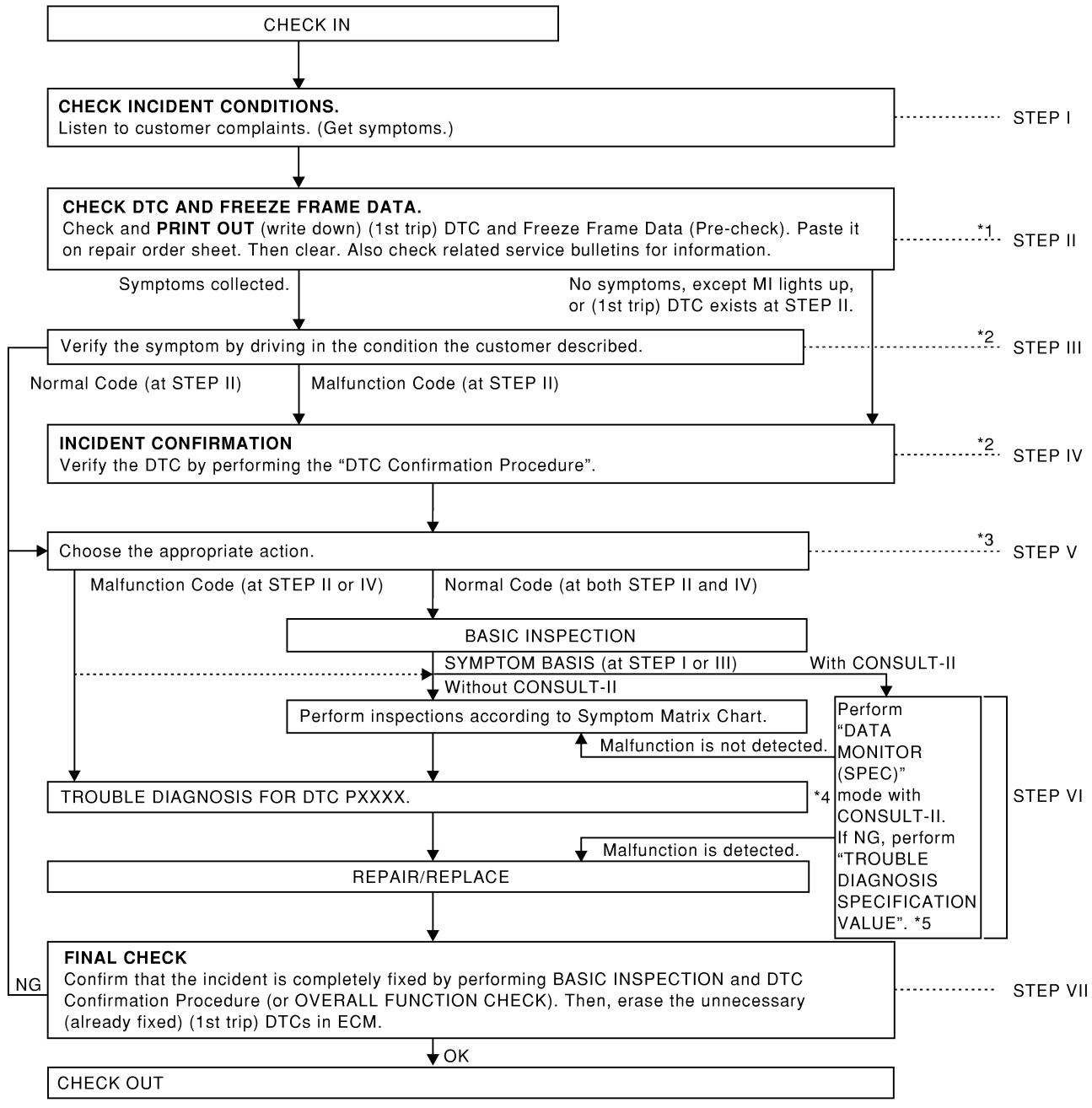
Start your diagnosis by looking for conventional malfunctions first. This will help troubleshoot driveability malfunctions on an electronically controlled engine vehicle.







WORK FLOW
Flow Chart



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*1 If time data of “SELF-DIAG RESULTS” is other than [0] or [1t], perform EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*2 If the incident cannot be verified, perform EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-627, "POWER SUPPLY AND GROUND CIRCUIT" .

*4 If malfunctioning part cannot be detected, perform EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*5 EC-622, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE"

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using EC-577, "DIAGNOSTIC WORKSHEET" .
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II) the (1st trip) DTC and the (1st trip) freeze frame data, then erase the DTC and the data. (Refer to EC-569, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .) The (1st trip) DTC and the (1st trip) freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . Study the relationship between the cause, specified by (1st trip) DTC, and the symptom described by the customer. (The Symptom Matrix Chart will be useful. See EC-586, "Symptom Matrix Chart" .) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The DIAGNOSTIC WORK SHEET and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results. If the incident cannot be verified, perform EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st trip) DTC by driving in (or performing) the DTC Confirmation Procedure. Check and read the (1st trip) DTC and (1st trip) freeze frame data by using CONSULT-II. During the (1st trip) DTC verification, be sure to connect CONSULT-II to the vehicle in“ DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results. If the incident cannot be verified, perform EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . In case the DTC Confirmation Procedure is not available, perform the Overall Function Check instead. The (1st trip) DTC cannot be displayed by this check, however, this simplified check is an effective alternative. The NG result of the Overall Function Check is the same as the (1st trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-580, "Basic Inspection" .) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-586, "Symptom Matrix Chart" .)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) Harness Layouts. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-597, "ECM Terminals and Reference Value" , EC-617, "CONSULT-II Reference Value in Data Monitor Mode" . The Diagnostic Procedure in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to “Circuit Inspection” in GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident" . Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the DTC Confirmation Procedure and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a method different from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st trip) DTC in ECM. (Refer to EC-569, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)

DIAGNOSTIC WORKSHEET

Description

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about a incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one on the next page in order to organize all the information for troubleshooting.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

Worksheet Sample

Customer name MR/MS	Model & Year	VIN
Engine #	Trans.	Mileage
Incident Date	Manuf. Date	In Service Date
Fuel and fuel filler cap	☐ Vehicle ran out of fuel causing misfire ☐ Fuel filler cap was left off or incorrectly screwed on.	
Symptoms — ☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion NOT affected by throttle position ☐ Possible but hard to start ☐ Others [ ]	
Symptoms — ☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
Symptoms — ☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Intake backfire ☐ Exhaust backfire ☐ Others [ ]	
Symptoms — ☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence	☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency	☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions	☐ Not affected	
Weather conditions — Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
Weather conditions — Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions	☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions	☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions	☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator lamp	☐ Turned on ☐ Not turned on	

MTBL0017

DTC Inspection Priority Chart

BBS001M9

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:
If DTC U1000 and/or U1001 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000 and U1001. Refer to EC-635, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

Priority	Detected items (DTC)
1	● U1000 U1001 CAN communication line ● P0102 P0103 Mass air flow sensor ● P0117 P0118 Engine coolant temperature sensor ● P0122 P0123 P0222 P0223 P1225 P1226 P2135 Throttle position sensor ● P0327 P0328 Knock sensor ● P0335 Crankshaft position sensor (POS) ● P0340 Camshaft position sensor (PHASE) ● P0500 Vehicle speed sensor ● P0605 ECM ● P1229 Sensor power supply ● P1610 - P1615 NATS ● P1706 Park/Neutral position (PNP) switch ● P2122 P2123 P2127 P2128 P2138 Accelerator pedal position sensor
2	● P0132 P0134 Heated oxygen sensor 1 ● P0550 Power steering pressure sensor ● P1065 ECM power supply ● P1122 Electric throttle control function ● P1124 P1126 Throttle control motor relay ● P1128 Throttle control motor ● P1211 TCS control unit ● P1212 TCS communication line ● P1720 Vehicle speed sensor ● P1805 Brake switch
3	● P0011 Intake valve timing control ● P1121 Electric throttle control actuator ● P1217 Engine over temperature (OVERHEAT) ● P1564 ASCD steering switch* ● P1572 ASCD brake switch* ● P1574 ASCD vehicle speed sensor*

*: For QR25DE engine models

Fail-Safe Chart

BBS001MA

When the DTC listed bellow is detected, the ECM enters fail-safe mode and the MI lights up.

DTC No.	Detected items	Engine operating condition in fail-safe mode
P0102 P0103	Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.
P0122 P0123 P0221 P0222 P2135	Throttle position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.
P1121	Electric throttle control actuator	(When electric throttle control actuator does not function properly due to the return spring malfunction:) ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
		(When throttle valve opening angle in fail-safe mode is not in specified range:) ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
		(ECM detect the throttle valve is stuck open:) While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position (A/T models), neutral position (M/T models), and engine speed will not exceed 1,000 rpm or more.
P1122	Electric throttle control function	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1124 P1126	Throttle control motor relay	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1128	Throttle control motor	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1229	Sensor power supply	ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.
P1805	Brake switch	ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.
		Vehicle condition: Driving condition
		When engine is idling: Normal
		When accelerating: Poor acceleration
P2122 P2123 P2127 P2128 P2138	Accelerator pedal position sensor	The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

When there is an open circuit on MI circuit, the ECM can not warn the driver by lighting up MI when there is trouble on engine control system. Therefore, when Electrical controlled throttle and part of the ECM related diagnoses are continuously detected as NG for 5-trips, ECM warns the driver that engine control system has trouble and MI circuit is open by means of operating fail-safe function.
The fail-safe function also operates when above diagnoses except MI circuit are detected and demands the driver to repair the trouble.

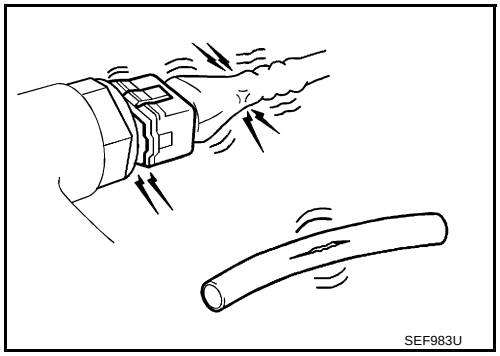
Engine operating condition in fail-safe mode	Engine speed will not rise more than 2,500 rpm due to the fuel cut

Basic Inspection

BBS001MB

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction, or a current need for scheduled maintenance.
2. Open engine hood and check the following:
- Harness connectors for improper connections
- Wiring harness for improper connections, pinches and cut
- Vacuum hoses for splits, kinks and improper connections
- Hoses and ducts for leaks
- Air cleaner clogging
- Gasket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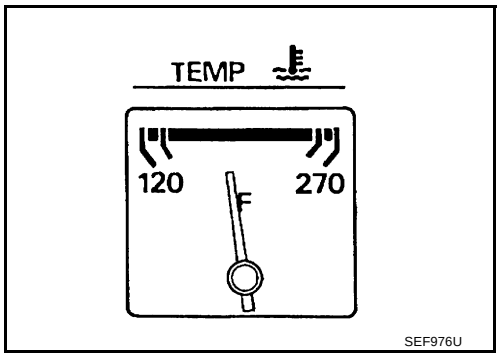
3. Confirm that electrical or mechanical loads are not applied.
- Headlamp switch is OFF.
- Air conditioner switch is OFF.
- Rear window defogger switch is OFF.
- Steering wheel is in the straight-ahead position, etc.

4. Start engine and warm it up until engine coolant temperature indicator points the middle of gauge.
Ensure engine stays below 1,000 rpm.



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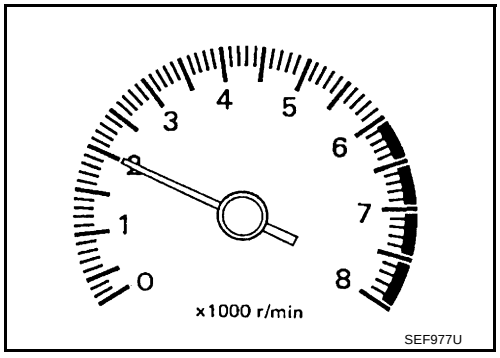
5. Run engine at about 2,000 rpm for about 2 minutes under no load.
6. Make sure that no DTC is displayed.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



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2. REPAIR OR REPLACE

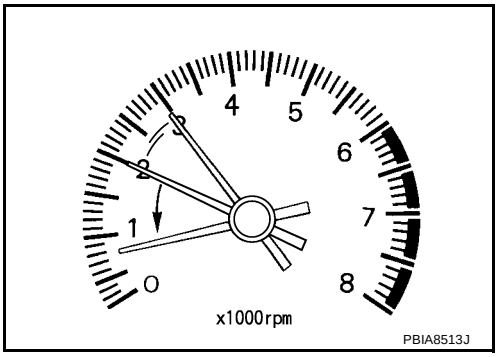
Repair or replace components as necessary according to corresponding Diagnostic Procedure.

>> GO TO 3

3. CHECK TARGET IDLE SPEED

With CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.



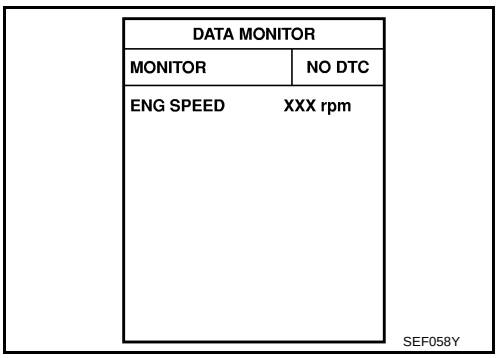
3. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

QR20DE with M/T models

: 650 ± 50 rpm (in Neutral position)

Except above

: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]



Without CONSULT-II

1. Run engine at about 2,000 rpm for about 2 minutes under no load.
2. Rev engine (2,000 to 3,000 rpm) two or three times under no load, then run engine at idle speed for about 1 minute.
3. Check idle speed.

QR20DE with M/T models

: 650 ± 50 rpm (in Neutral position)

Except above

: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]

OK or NG

OK >> GO TO 10.
NG >> GO TO 4.

4. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-562, "Accelerator Pedal Released Position Learning" .

>> GO TO 5.

5. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-563, "Throttle Valve Closed Position Learning" .

>> GO TO 6.

6. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-563, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

Yes or No

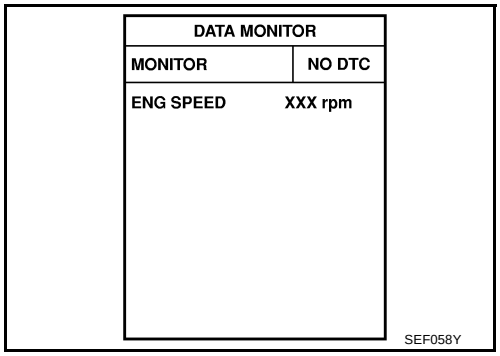
Yes >> GO TO 7.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

7. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.

QR20DE with M/T models
: 650 ± 50 rpm (in Neutral position)
Except above
: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]



Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

QR20DE with M/T models
: 650 ± 50 rpm (in Neutral position)
Except above
: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]

OK or NG

OK >> GO TO 10.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the Following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-703, "DTC P0340 CMP SENSOR (PHASE)" .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-695, "DTC P0335 CKP SENSOR (POS)" .

OK or NG

OK >> GO TO 9.
NG >> 1. Repair or replace.
2. GO TO 4.

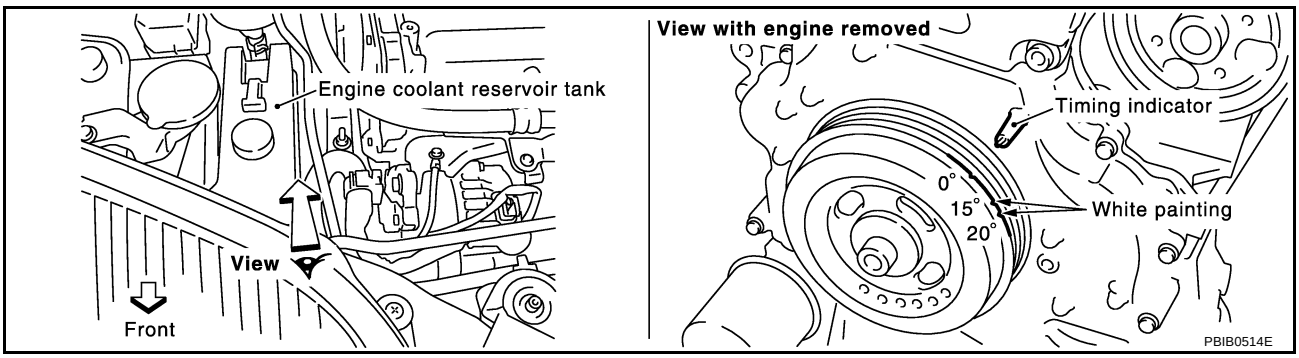
9. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-107, "NATS (NISSAN ANTI-THEFT SYSTEM)" .

>> GO TO 4.

10. CHECK IGNITION TIMING

1. Run engine at idle.
2. Check ignition timing with a timing light.



M/T: 15 ± 5° BTDC (in Neutral position)
A/T: 15 ± 5° BTDC (in P or N position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

11. PERFORM ACCELERATOR PEDAL RELEASED POSITION LEARNING

1. Stop engine.
2. Perform EC-562, "Accelerator Pedal Released Position Learning" .

>> GO TO 12.

12. PERFORM THROTTLE VALVE CLOSED POSITION LEARNING

Perform EC-563, "Throttle Valve Closed Position Learning" .

>> GO TO 13.

13. PERFORM IDLE AIR VOLUME LEARNING

Refer to EC-563, "Idle Air Volume Learning" .
Is Idle Air Volume Learning carried out successfully?

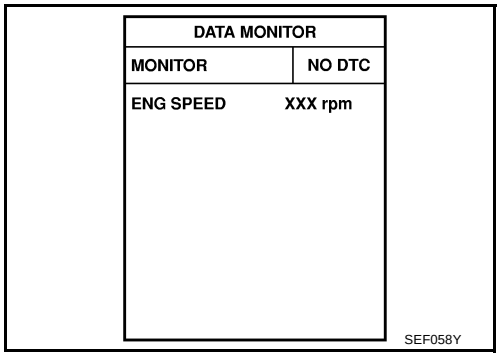
Yes or No

Yes >> GO TO 14.
No >> 1. Follow the instruction of Idle Air Volume Learning.
2. GO TO 4.

14. CHECK TARGET IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Read idle speed in “DATA MONITOR” mode with CONSULT-II.



QR20DE with M/T models

: 650 ± 50 rpm (in Neutral position)

Except above

: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Check idle speed.

QR20DE with M/T models

: 650 ± 50 rpm (in Neutral position)

Except above

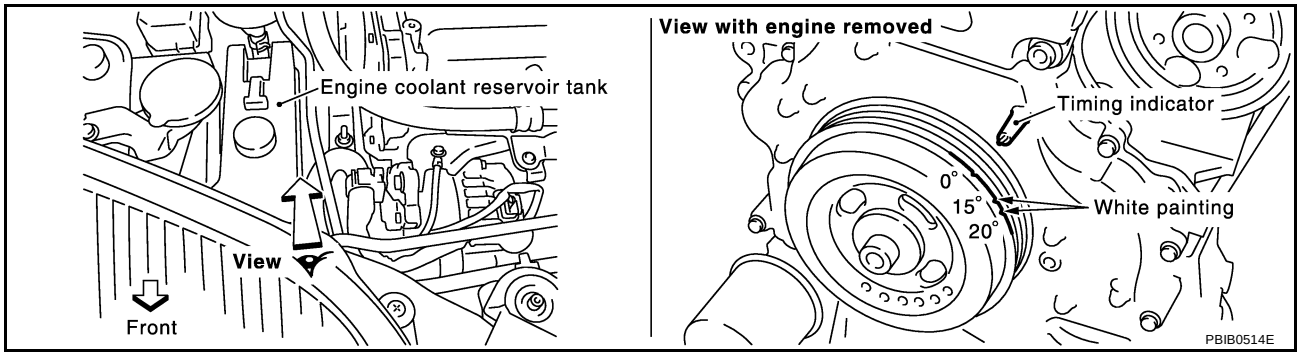
: 700 ± 50 rpm [in P or N (A/T), Neutral (M/T) position]

OK or NG

OK >> GO TO 15.
NG >> GO TO 17.

15. CHECK IGNITION TIMING AGAIN

1. Run engine at idle.
2. Check ignition timing with a timing light.



M/T: 15 ± 5° BTDC (in Neutral position)
A/T: 15 ± 5° BTDC (in P or N position)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 16.

16. CHECK TIMING CHAIN INSTALLATION

Check timing chain installation. Refer to EM-46, "TIMING CHAIN" .

OK or NG

OK >> GO TO 17.
NG >> 1. Repair the timing chain installation.
2. GO TO 4.

17. DETECT MALFUNCTIONING PART

Check the following.

- Check camshaft position sensor (PHASE) and circuit. Refer to EC-703, "DTC P0340 CMP SENSOR (PHASE)" .
- Check crankshaft position sensor (POS) and circuit. Refer to EC-695, "DTC P0335 CKP SENSOR (POS)" .

OK or NG

OK >> GO TO 18.
NG >> 1. Repair or replace.
2. GO TO 4.

18. CHECK ECM FUNCTION

1. Substitute another known-good ECM to check ECM function. (ECM may be the cause of an incident, but this is a rare case.)
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-107, "NATS (NISSAN ANTI-THEFT SYSTEM)" .

>> GO TO 4.

Symptom Matrix Chart

BBS001MC

SYSTEM — BASIC ENGINE CONTROL SYSTEM

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel pump circuit	1	1	2	3	2		2	2			3		2	EC-908
	Fuel pressure regulator system	3	3	4	4	4	4	4	4	4		4			EC-565
	Injector circuit	1	1	2	3	2		2	2			2			EC-893
	Evaporative emission system	3	3	4	4	4	4	4	4	4		4			EC-964
Air	Positive crankcase ventilation system	3	3	4	4	4	4	4	4	4		4	1		EC-969
	Incorrect idle speed adjustment	3	3				1	1	1	1		1			EC-580
	Electric throttle control actuator	1	1	2	3	3	2	2	2	2		2		2	EC-725, EC-728, EC-739, EC-747
Ignition	Incorrect ignition timing adjustment	3	3	1	1	1		1	1			1			EC-580
	Ignition circuit	1	1	2	2	2		2	2			2			EC-875
Main power supply and ground circuit		2	2	3	3	3		3	3		2	3			EC-627
Mass air flow sensor circuit		1	1	2	2	2		2	2			2			EC-646
Engine coolant temperature sensor circuit		1	1	2	2	2	3	2	2	3	1	2			EC-654
Throttle position sensor circuit			1	2		2	2	2	2	2		2			EC-660, EC-682, EC-773, EC-775, EC-832
Accelerator pedal position sensor circuit				3	2	1	2			2					EC-777, EC-817, EC-824, EC-840
Heated oxygen sensor 1 circuit			1	2	3	2		2	2			2			EC-668, EC-675, EC-863
Knock sensor circuit				2	2							3			EC-690
Crankshaft position sensor (POS) circuit		2	2												EC-695
Camshaft position sensor (PHASE) circuit		2	2												EC-703
Vehicle speed signal circuit			2	3		3						3			EC-711
Power steering pressure sensor circuit			2				3	3	3	3					EC-713

	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code	AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
ECM	2	2	3	3	3	3	3	3	3	3	3			EC-718, EC-721
Intake valve timing control solenoid valve circuit	3	3	2		1	3	2	2	3		3			EC-638
PNP switch circuit			3		3	3	3	3	3		3			EC-804, MT-15
Refrigerant pressure sensor circuit		2				3	3	3	3		4			EC-916
Electrical load signal circuit						3	3	3	3					EC-922
Air conditioner circuit	2	2	3	3	3	3	3	3	3		3		2	ATC-33
ESP/TCS/ABS CONTROL UNIT (models with ESP) ABS actuator and electric unit (control unit) (models without ESP)			4											BRC-9, BRC-52

1 - 6: The numbers refer to the order of inspection.
(continued on next page)

SYSTEM — ENGINE MECHANICAL & OTHER

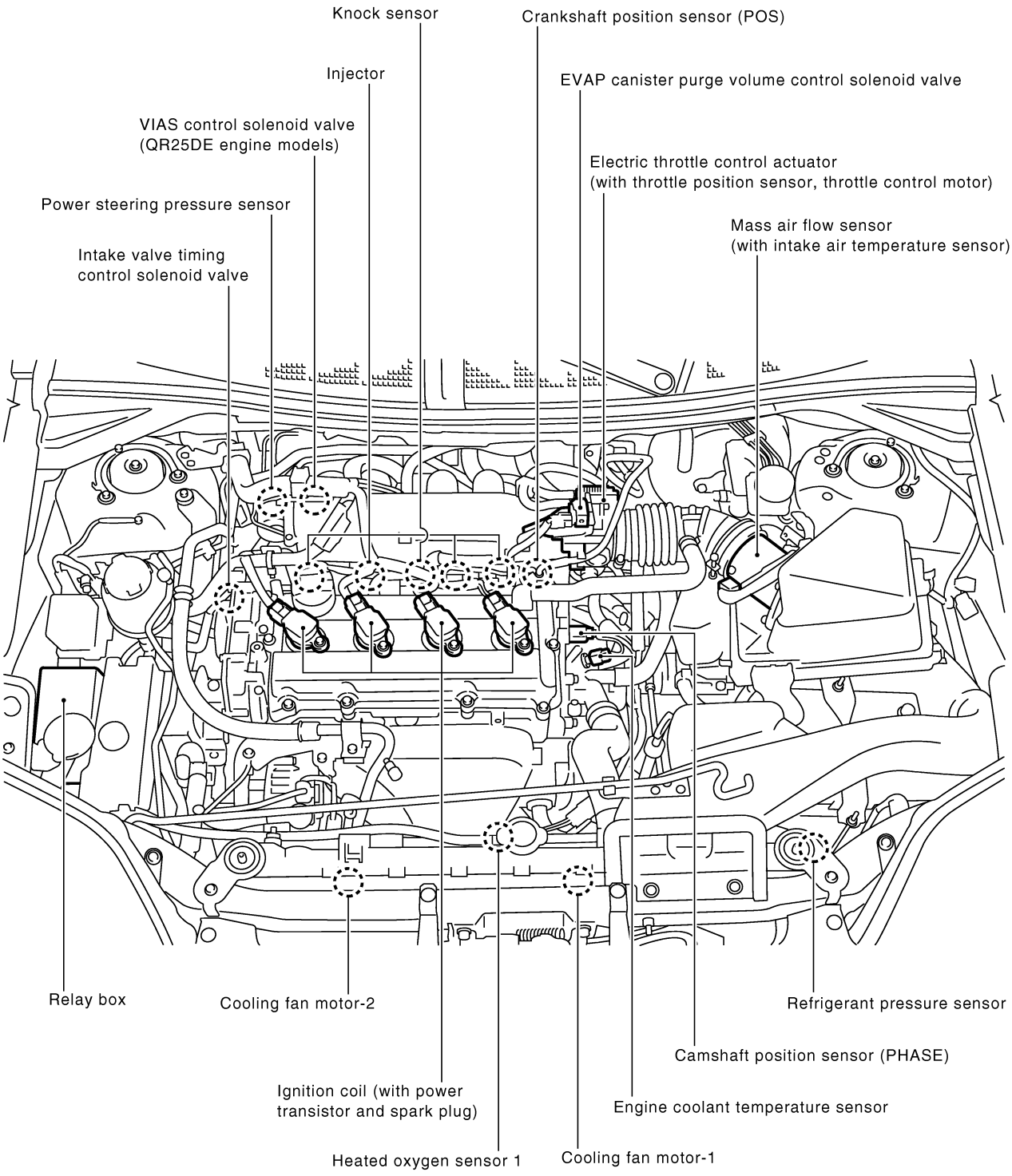
		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Fuel	Fuel tank	5	5												FL-11
	Fuel piping			5	5	5		5	5			5			FL-3, EM-34
	Vapor lock														—
	Valve deposit	5		5	5	5		5	5			5			—
	Poor fuel (Heavy weight gasoline, Low octane)														—
Air	Air duct	5	5	5	5	5	5	5	5	5		5			EM-16
	Air cleaner														
	Air leakage from air duct (Mass air flow sensor —electric throttle control actuator)														
	Electric throttle control actuator														EM-18
	Air leakage from intake manifold/ Collector/Gasket														
Cranking	Battery	1	1	1		1		1	1			1		1	SC-4
	Alternator circuit														SC-13
	Starter circuit	3													SC-23
	Signal plate/Flywheel/Drive plate	6													EM-89
	PNP switch	4													MT-15 or AT-400
Engine	Cylinder head	5	5	5	5	5		5	5			5			EM-70
	Cylinder head gasket										4		3		
	Cylinder block	6	6	6	6	6		6	6			6	4		EM-89
	Piston														
	Piston ring														
	Connecting rod														
	Bearing														
	Crankshaft														

		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)	ENGINE STALL	HESITATION/SURGING/FLAT SPOT	SPARK KNOCK/DETONATION	LACK OF POWER/POOR ACCELERATION	HIGH IDLE/LOW IDLE	ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEATS/WATER TEMPERATURE HIGH	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	BATTERY DEAD (UNDER CHARGE)	
Warranty symptom code		AA	AB	AC	AD	AE	AF	AG	AH	AJ	AK	AL	AM	HA	
Valve mechanism	Timing chain	5	5	5	5	5		5	5			5			EM-46
	Camshaft														EM-56
	Intake valve timing control														EM-46
	Intake valve												3		EM-70
	Exhaust valve														
Exhaust	Exhaust manifold/Tube/Muffler/Gasket	5	5	5	5	5		5	5			5			EM-25, EX-2
	Three way catalyst														
Lubrication	Oil pan/Oil strainer/Oil pump/Oil filter/Oil gallery	5	5	5	5	5		5	5			5	2		EM-27, LU-13 , LU-10 , LU-5
	Oil level (Low)/Filthy oil														LU-7
Cooling	Radiator/Hose/Radiator filler cap	5	5	5	5	5		5	5		2	5			CO-12
	Thermostat									5					CO-23
	Water pump														CO-21
	Water gallery														CO-7
	Cooling fan									5					CO-19
	Coolant level (low)/Contaminated coolant														CO-9
NATS (Nissan Anti-theft System)		1	1												EC-570 or BL-107

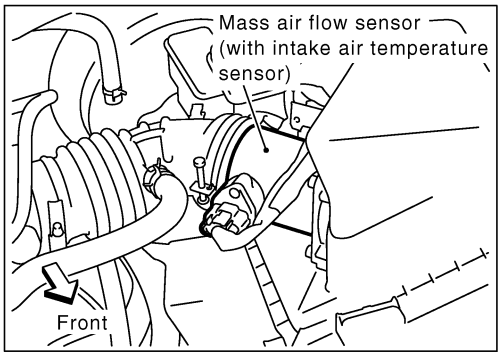
1 - 6: The numbers refer to the order of inspection.

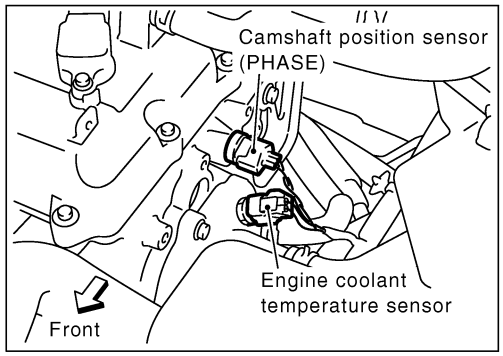
Engine Control Component Parts Location

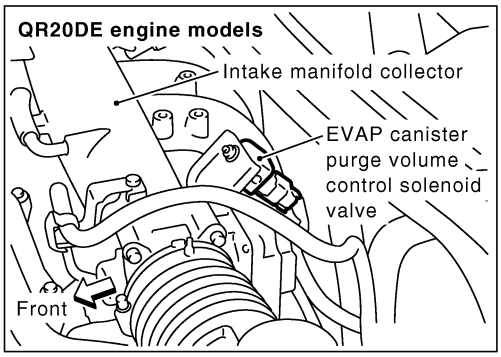
BBS001MD

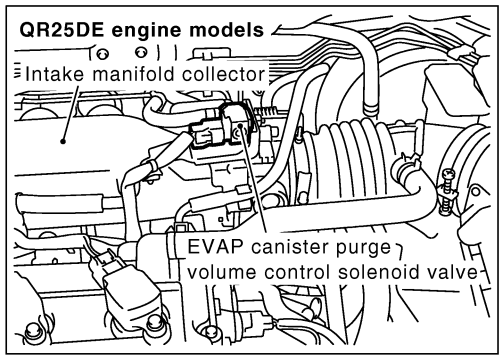


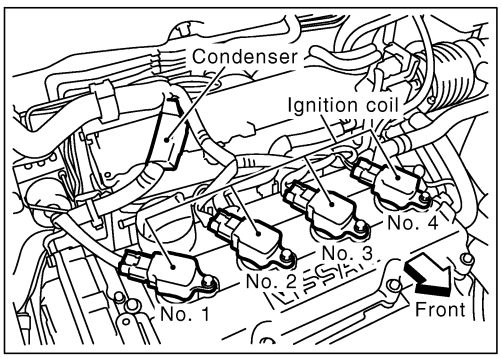
PBIB1978E

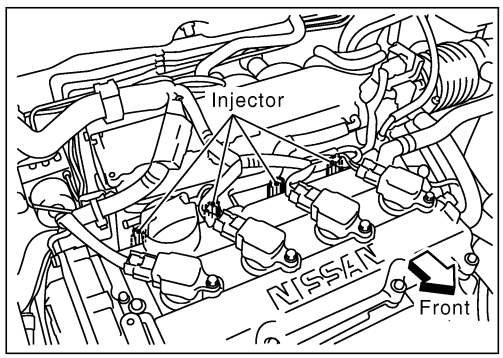

Mass air flow sensor
(with intake air temperature
sensor)
Front

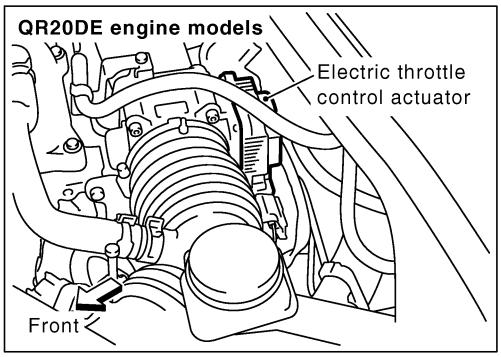

Camshaft position sensor
(PHASE)
Engine coolant
temperature sensor
Front

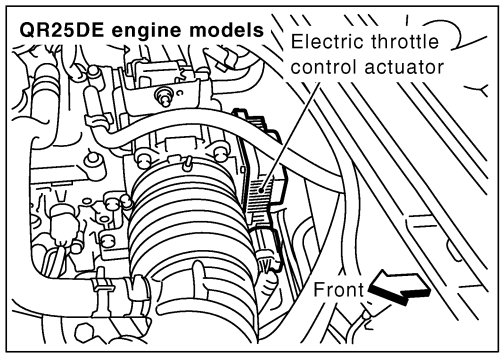

QR20DE engine models
Intake manifold collector
EVAP canister
purge volume
control solenoid
valve
Front


QR25DE engine models
Intake manifold collector
EVAP canister purge
volume control solenoid valve

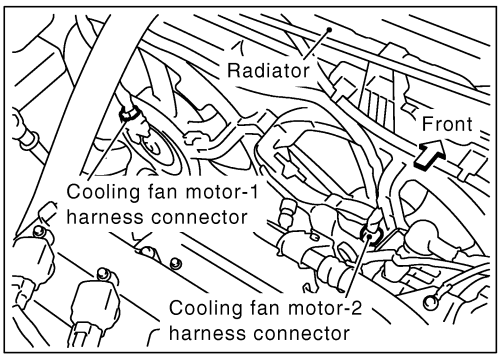

Condenser
Ignition coil
No. 4
No. 3
No. 2
No. 1
Front

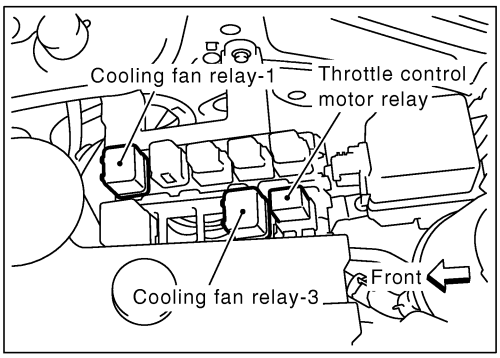

Injector
Front

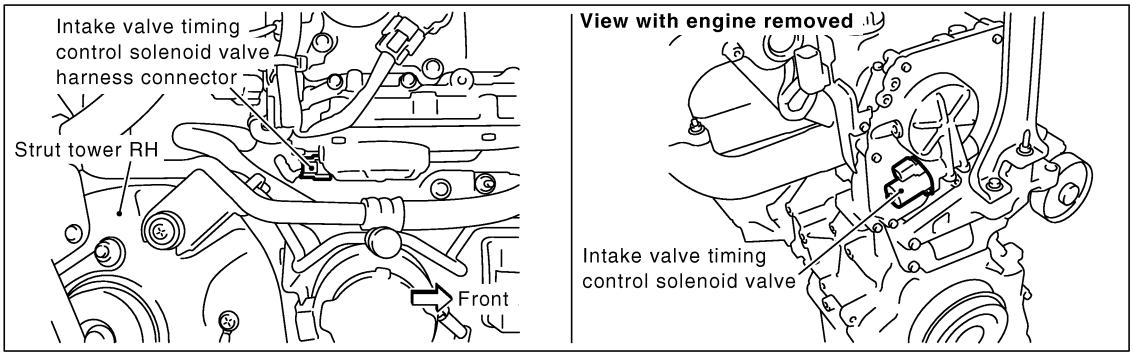

QR20DE engine models
Electric throttle
control actuator
Front

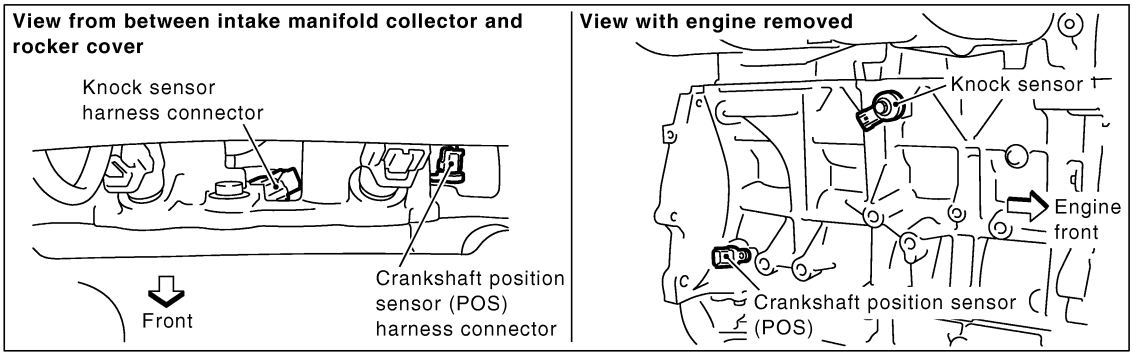

QR25DE engine models
Electric throttle
control actuator
Front

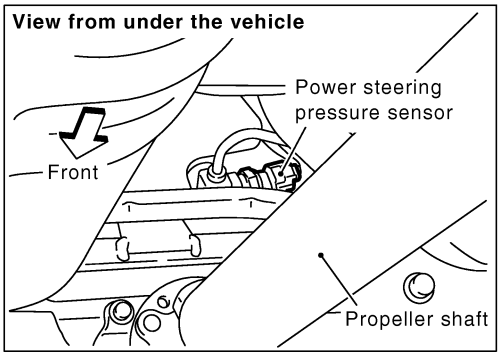
PBIB1979E

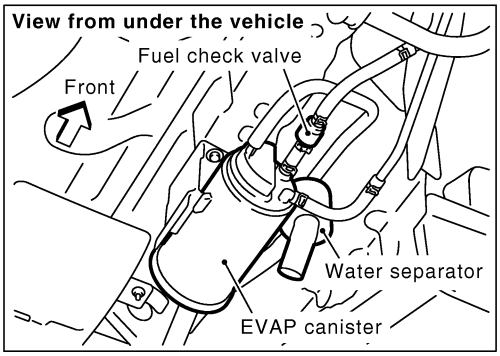

Radiator
Front
Cooling fan motor-1
harness connector
Cooling fan motor-2
harness connector


Cooling fan relay-1
Throttle control
motor relay
Front
Cooling fan relay-3

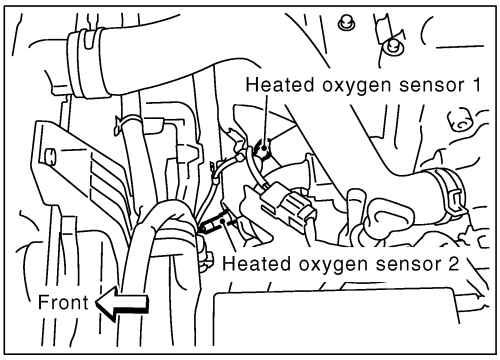

Intake valve timing
control solenoid valve
harness connector
Strut tower RH
Front
View with engine removed
Intake valve timing
control solenoid valve

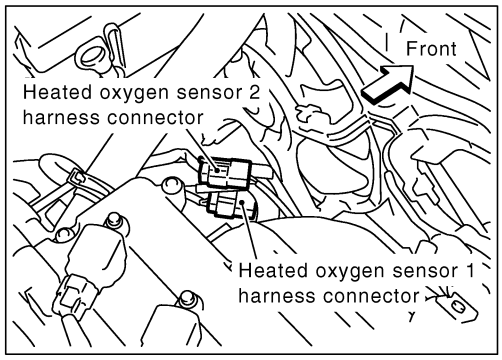

View from between intake manifold collector and
rocker cover
Knock sensor
harness connector
Front
Crankshaft position
sensor (POS)
harness connector
View with engine removed
Knock sensor
Engine
front
Crankshaft position sensor
(POS)

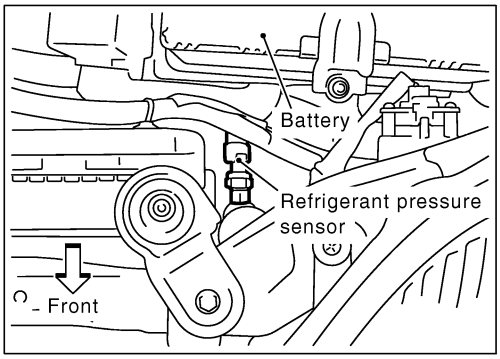

View from under the vehicle
Power steering
pressure sensor
Front
Propeller shaft

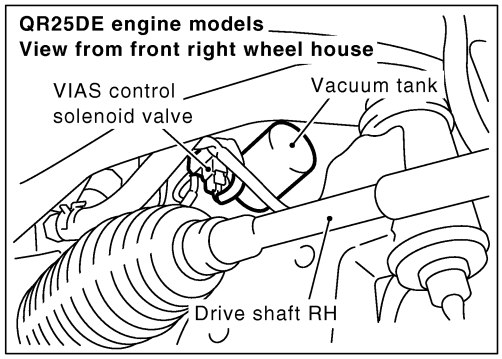

View from under the vehicle
Fuel check valve
Front
Water separator
EVAP canister

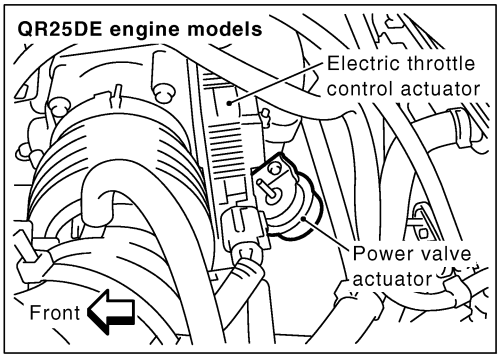
PBIB1980E


Heated oxygen sensor 1
Heated oxygen sensor 2
Front

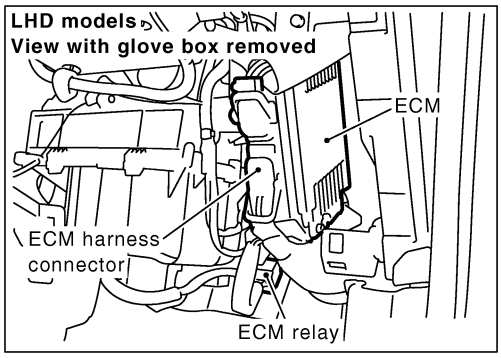

Front
Heated oxygen sensor 2
harness connector
Heated oxygen sensor 1
harness connector

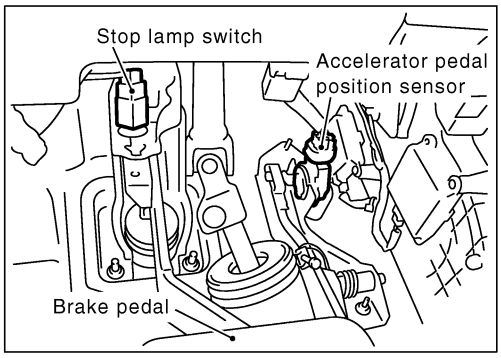

Battery
Refrigerant pressure
sensor
Front

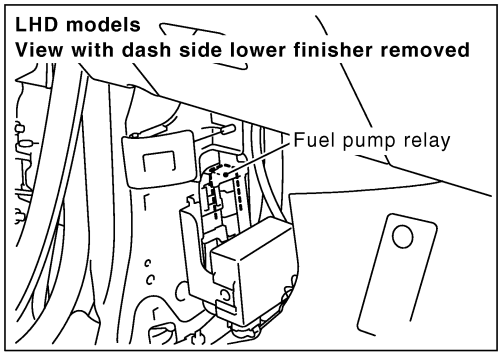

QR25DE engine models
View from front right wheel house
VIAS control
solenoid valve
Vacuum tank
Drive shaft RH

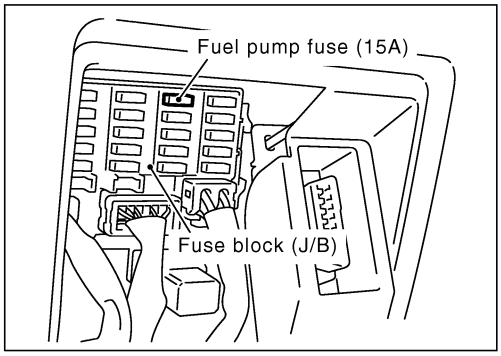

QR25DE engine models
Electric throttle
control actuator
Power valve
actuator
Front

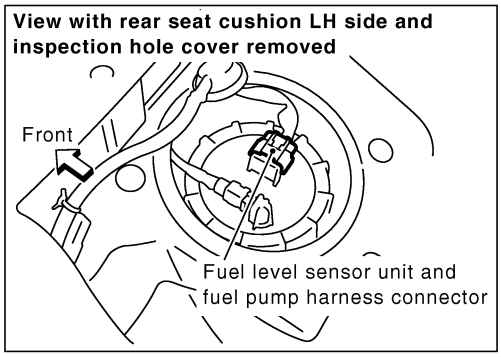
PBIB1997E

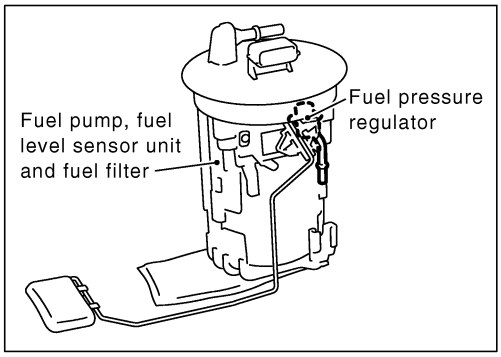

LHD models
View with glove box removed
ECM
ECM harness connector
ECM relay

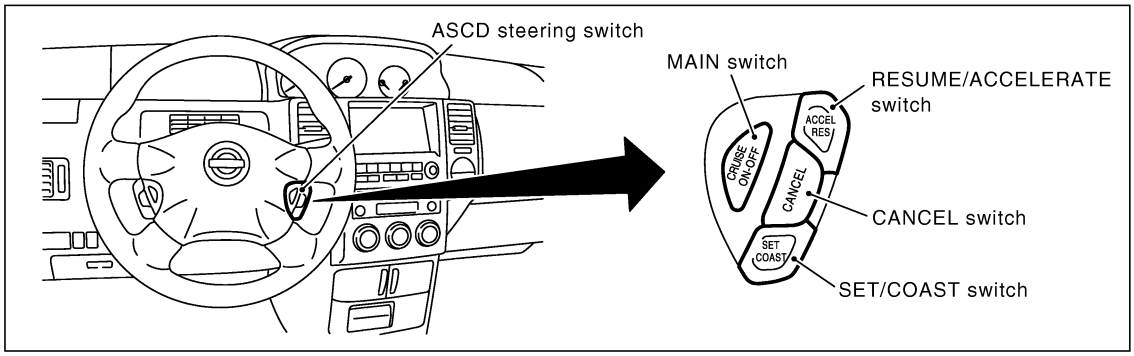

Stop lamp switch
Accelerator pedal position sensor
Brake pedal


LHD models
View with dash side lower finisher removed
Fuel pump relay


Fuel pump fuse (15A)
Fuse block (J/B)


View with rear seat cushion LH side and inspection hole cover removed
Front
Fuel level sensor unit and fuel pump harness connector

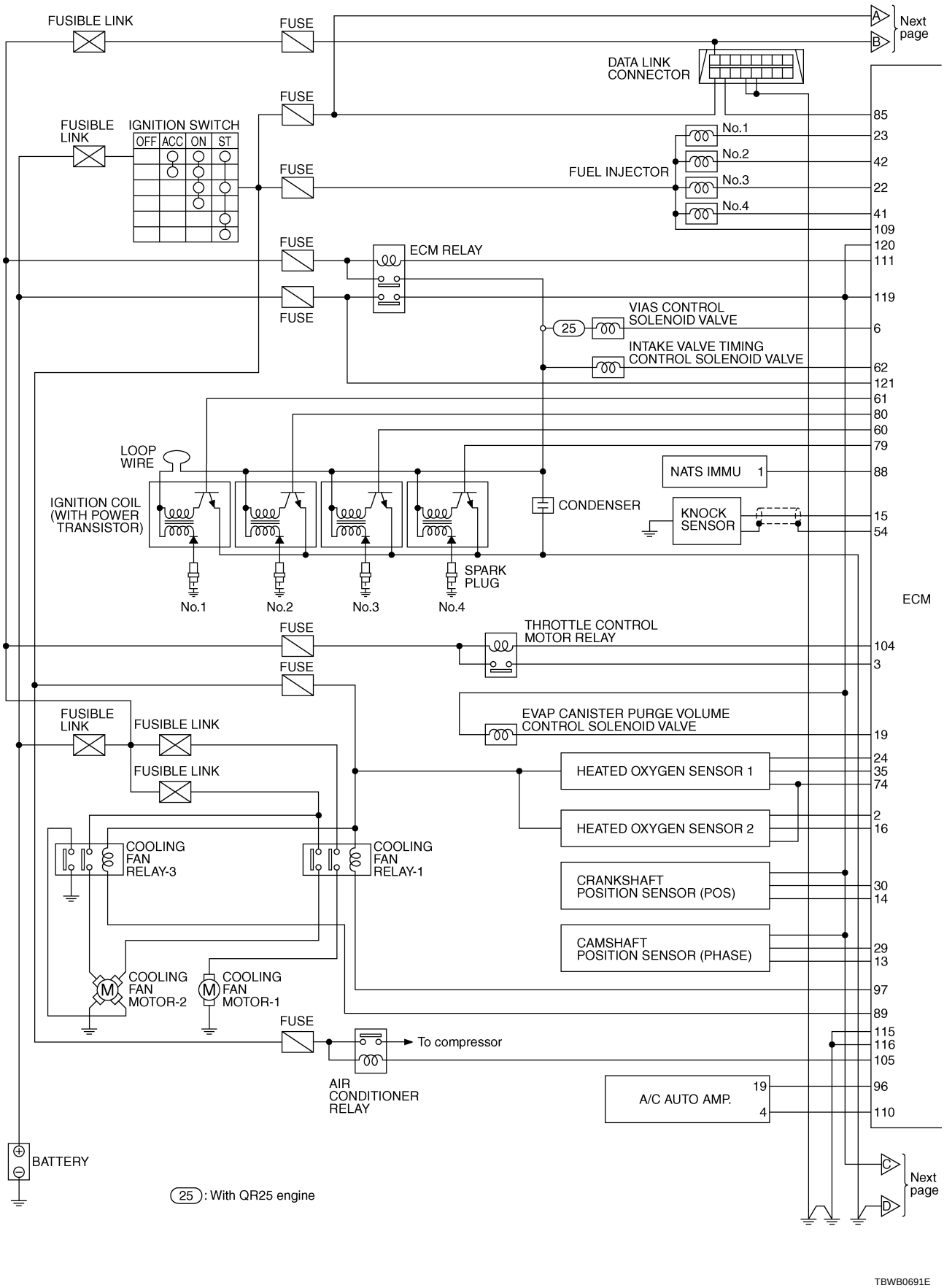

Fuel pump, fuel level sensor unit and fuel filter
Fuel pressure regulator


ASCD steering switch
MAIN switch
RESUME/ACCELERATE switch
ACCEL RES
CRUISE ON-OFF
CANCEL
SET COAST
CANCEL switch
SET/COAST switch

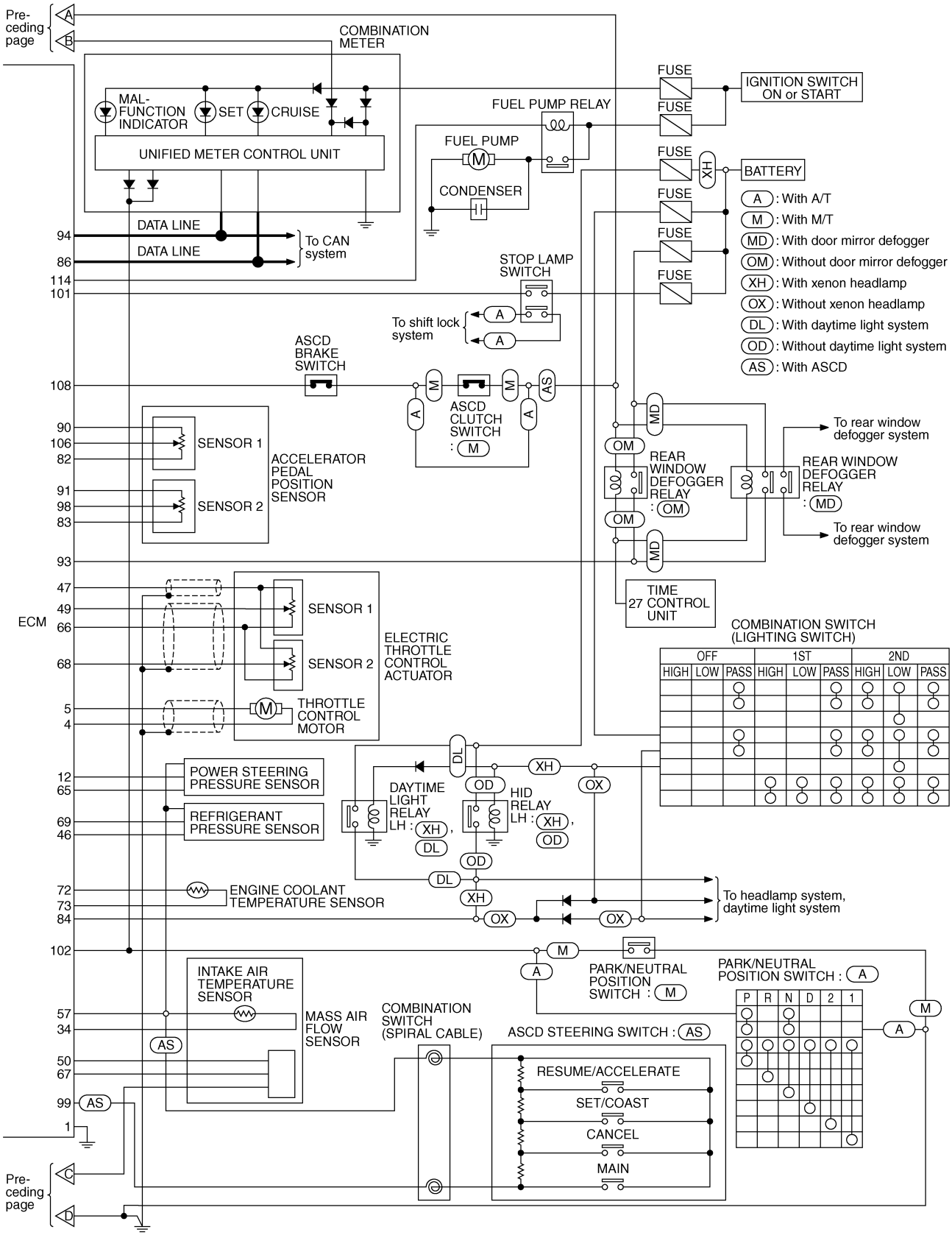
PBIB2887E

Circuit Diagram

BBS001ME



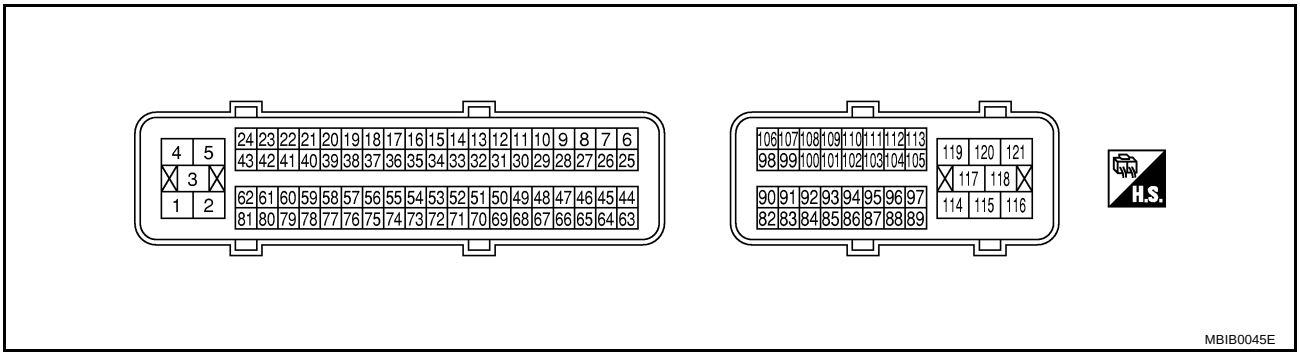
TBWB0691E


Pre-ceding page
A
B
COMBINATION METER
MAL-FUNCTION INDICATOR
SET
CRUISE
UNIFIED METER CONTROL UNIT
DATA LINE
DATA LINE
94
86
To CAN system
114
101
FUEL PUMP RELAY
FUEL PUMP
CONDENSER
FUSE
IGNITION SWITCH ON or START
BATTERY
XH
A : With A/T
M : With M/T
MD : With door mirror defogger
OM : Without door mirror defogger
XH : With xenon headlamp
OX : Without xenon headlamp
DL : With daytime light system
OD : Without daytime light system
AS : With ASCD
STOP LAMP SWITCH
To shift lock system
ASCD BRAKE SWITCH
108
ASCD CLUTCH SWITCH : M
90
106
82
SENSOR 1
SENSOR 2
ACCELERATOR PEDAL POSITION SENSOR
91
98
83
93
REAR WINDOW DEFOGGER RELAY : OM
REAR WINDOW DEFOGGER RELAY : MD
To rear window defogger system
TIME 27 CONTROL UNIT
ECM
47
49
66
68
5
4
ELECTRIC THROTTLE CONTROL ACTUATOR
THROTTLE CONTROL MOTOR
COMBINATION SWITCH (LIGHTING SWITCH)
OFF
1ST
2ND
HIGH
LOW
PASS
12
65
POWER STEERING PRESSURE SENSOR
69
46
REFRIGERANT PRESSURE SENSOR
DAYTIME LIGHT RELAY LH : XH, DL
HID RELAY LH : XH, OD
72
73
84
ENGINE COOLANT TEMPERATURE SENSOR
To headlamp system, daytime light system
102
PARK/NEUTRAL POSITION SWITCH : M
PARK/NEUTRAL POSITION SWITCH : A
P
R
N
D
2
1
INTAKE AIR TEMPERATURE SENSOR
57
34
MASS AIR FLOW SENSOR
COMBINATION SWITCH (SPIRAL CABLE)
ASCD STEERING SWITCH : AS
50
67
99
1
RESUME/ACCELERATE
SET/COAST
CANCEL
MAIN
Pre-ceding page
C
D

TBWB0898E

ECM Harness Connector Terminal Layout

BBS001MF

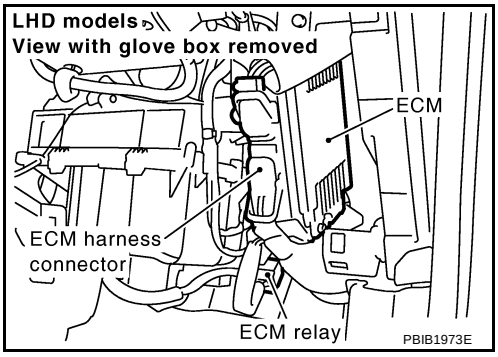


ECM Terminals and Reference Value

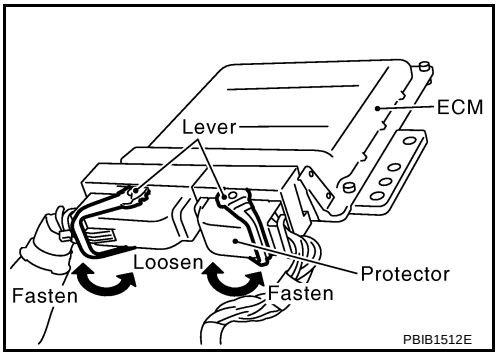
BBS001MG

PREPARATION

1. ECM is located behind the glove box. For this inspection, remove glove box.
2. Remove ECM harness protector.



3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown at right.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.



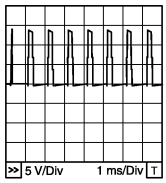
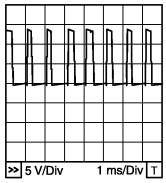
ECM INSPECTION TABLE

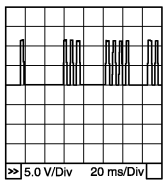
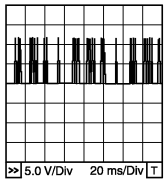
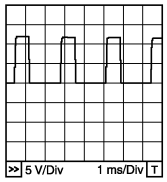
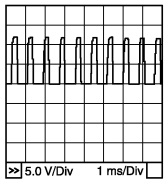
Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

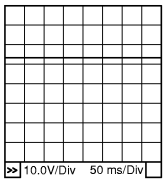
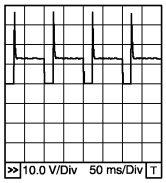
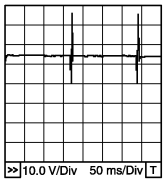
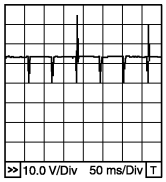
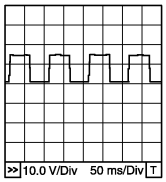
CAUTION:

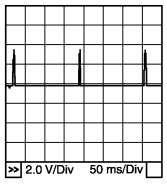
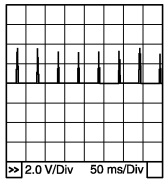
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

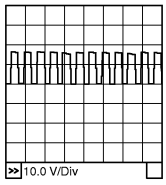
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	PU/R	Heated oxygen sensor 2 heater	**[Engine is running]** ● Engine speed is below 3,600 rpm after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
3	W/B	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	G	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	R	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
6*1	Y	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V
12	P	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned	0.4 - 0.8V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	L/W	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm	1.0 - 4.0V★  PBIB0526E
14	PU/R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 3.0V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3.0V★  PBIB0528E
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
16	OR/B	Heated oxygen sensor 2	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
19	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E
24	G/W	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition** ● Engine speed is below 3,600 rpm	Approximately 7.0V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)
29	B	Sensor ground (Camshaft position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
30	B	Sensor ground (Crankshaft position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
34	Y/G	Intake air temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with intake air temperature.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	P/L	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)
46	R	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
47	R	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
50	OR	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.4V
			[Engine is running] ● **Warm-up condition** ● Idle speed	0.7 - 1.1V (QR20DE) 0.8 - 1.2V (QR25DE)
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm	0.7 - 1.1 to approximately 4.0V (QR20DE) 0.8 - 1.2 to approximately 4.0V (QR25DE) (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
54	—	Sensor ground (Knock sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
57	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
60 61 79 80	L/R BR GY/R PU	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 0.2V★  PBIB0522E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	Y	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	Approximately 4V - BATTERY VOLTAGE (11 - 14V)★  PBIB1790E
65	R	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	B/P	Sensor ground (Mass air flow sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
69	Y	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch ON (Compressor operates)	1.0 - 4.0V
72	BR/Y	Engine coolant temperature sensor	**[Engine is running]**	Approximately 0 - 4.8V Output voltage varies with engine coolant temperature.
73	B	Sensor ground (Engine coolant temperature sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
82	R/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	L	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	L/Y	Electrical load signal (Headlamp signal)	**[Ignition switch: ON]** ● Lighting switch: 2ND position (placed in LOW position for models with Xenon headlamp)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Lighting switch: OFF	Approximately 0V
85	LG	DATA link connector	**[Ignition switch: ON]** ● CONSULT-II is disconnected	BATTERY VOLTAGE (11 - 14V)
86	GY/R	CAN communication line	**[Ignition switch: ON]**	1.0 - 2.5V
89	G	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is high speed operating	0 - 1.0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
93	BR	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V
94	G/R	CAN communication line	**[Ignition switch: ON]**	2.5 - 4.0V
96	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	BATTERY VOLTAGE (11 - 14V)
97	PU	Cooling fan relay (Low)	**[Ignition switch: ON]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Cooling fan is operating	0 - 1.0V
98	B/W	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.15 - 0.6V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	1.95 - 2.4V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
99*1	W/R	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch: OFF	Approximately 4V
			[Ignition switch: ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch: Pressed	Approximately 2V
101	P	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
102	G/OR	PNP switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	**A/T models** BATTERY VOLTAGE (11 - 14V) **M/T models** Approximately 5V
104	W/B	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	3.9 - 4.7V
108*1	GY/L	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal: Slightly depressed ● Clutch pedal: Slightly depressed (M/T)	Approximately 0V
			[Ignition switch: ON] ● Brake pedal: Fully released ● Clutch pedal: Fully released (M/T)	BATTERY VOLTAGE (11 - 14V)
109	B/R	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	G/W	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
114	B/OR	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)
115 116	B B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
119 120	SB GY	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: For QR25DE engine models

CONSULT-II Function (ENGINE)

BBS001MH

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st trip DTC, DTCs and 1st trip freeze frame data or freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
Data monitor (SPEC)	Input/Output of the specification for Basic fuel schedule, AFM, A/F feedback control value and the other data monitor items can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECM part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- Freeze frame data
- 1st trip freeze frame data

ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE					
			WORK SUPPORT	SELF-DIAGNOSTIC RESULTS		DATA MONITOR	DATA MONITOR (SPEC)	ACTIVE TEST
				DTC*1	FREEZE FRAME DATA*2			
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor (POS)		×	×	×	×	
		Camshaft position sensor (PHASE)		×		×	×	
		Mass air flow sensor		×		×	×	
		Engine coolant temperature sensor		×	×	×	×	×
		Heated oxygen sensor 1		×		×	×	
		Heated oxygen sensor 2				×	×	
		Vehicle speed signal		×	×	×	×	
		Accelerator pedal position sensor		×		×	×	
		Throttle position sensor		×		×	×	
		Intake air temperature sensor				×	×	
		Knock sensor		×				
		Refrigerant pressure sensor				×	×	
		Closed throttle position switch (accelerator pedal position sensor signal)				×	×	
		Air conditioner switch				×	×	
		Park/neutral position (PNP) switch		×		×	×	
		Stop lamp switch		×		×	×	
		Power steering pressure sensor		×		×	×	
		Battery voltage				×	×	
		Electrical load signal				×	×	
		ASCD steering switch*3		×		×	×	
		ASCD brake switch*3		×		×	×	
		ASCD clutch switch*3		×		×	×	
ENGINE CONTROL COMPONENT PARTS	OUTPUT	Fuel injectors				×	×	×
		Power transistor (Ignition timing)				×	×	×
		Throttle control motor relay		×		×	×	
		Throttle control motor		×				
		EVAP canister purge volume control solenoid valve				×	×	×
		Air conditioner relay				×	×	
		Fuel pump relay	×			×	×	×
		Cooling fan relay		×		×	×	×
		Heated oxygen sensor 1 heater				×	×	
		Heated oxygen sensor 2 heater				×	×	
		Intake valve timing control solenoid valve		×		×	×	×
		VIAS control solenoid valve*3				×	×	×

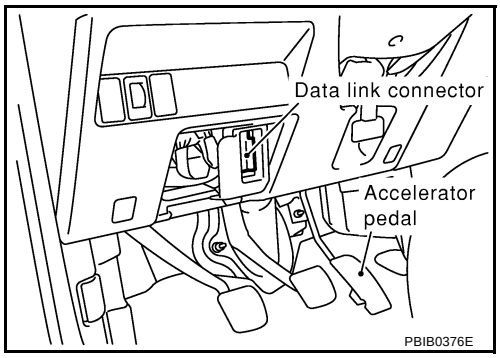
X: Applicable

*1: This item includes 1st trip DTCs.

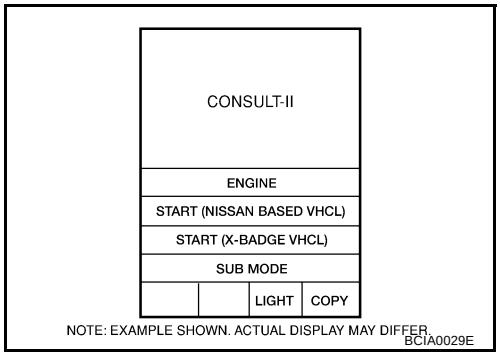
*2: This mode includes 1st trip freeze frame data or freeze frame data. The items appear on CONSULT-II screen in freeze frame data mode only if a 1st trip DTC or DTC is detected. For details, refer to EC-569, "FREEZE FRAME DATA AND 1ST TRIP FREEZE FRAME DATA" .
*3: For QR25DE engine models

INSPECTION PROCEDURE

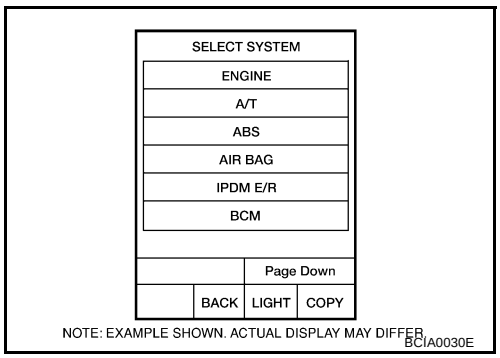
1. Turn ignition switch OFF.
2. Connect CONSULT-II and CONSULT-II CONVERTER to data link connector, which is located under driver side dash panel.
3. Turn ignition switch ON.



4. Touch “START(NISSAN BASED VHCL)”.

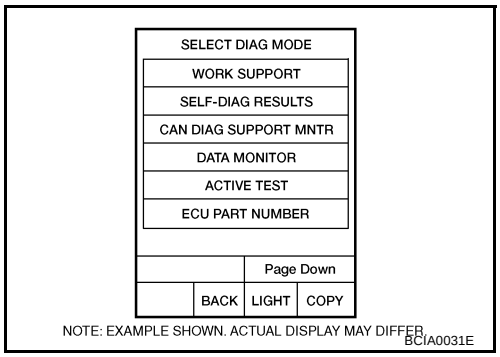


5. Touch “ENGINE”.
   If “ENGINE” is not indicated, go to GI-35, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



WORK SUPPORT MODE

Work Item

WORK ITEM	CONDITION	USAGE
FUEL PRESSURE RELEASE	● FUEL PUMP WILL STOP BY TOUCHING “START” DURING IDLING. CRANK A FEW TIMES AFTER ENGINE STALLS.	When releasing fuel pressure from fuel line
IDLE AIR VOL LEARN	● THE IDLE AIR VOLUME THAT KEEPS THE ENGINE WITHIN THE SPECIFIED RANGE IS MEMORIZED IN ECM.	When learning the idle air volume
SELF-LEARNING CONT	● THE COEFFICIENT OF SELF-LEARNING CONTROL MIXTURE RATIO RETURNS TO THE ORIGINAL COEFFICIENT.	When clearing the coefficient of self-learning control value
TARGET IDLE RPM ADJ*	● IDLE CONDITION	When setting target idle speed
TARGET IGN TIM ADJ*	● IDLE CONDITION	When adjusting target ignition timing

*: This function is not necessary in the usual service procedure.

SELF-DIAG RESULTS MODE

Self Diagnostic Item

Regarding items of DTC and 1st trip DTC, refer to EC-536, "INDEX FOR DTC" .

Freeze Frame Data and 1st Trip Freeze Frame Data

Freeze frame data item*	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as PXXXX. (Refer to EC-536, "INDEX FOR DTC" .)
FUEL SYS-B1	● “Fuel injection system status” at the moment a malfunction is detected is displayed. ● One mode in the following is displayed. Mode2: Open loop due to detected system malfunction Mode3: Open loop due to driving conditions (power enrichment, deceleration enleanment) Mode4: Closed loop - using oxygen sensor(s) as feedback for fuel control Mode5: Open loop - has not yet satisfied condition to go to closed loop
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
L-FUEL TRM-B1 [%]	● “Long-term fuel trim” at the moment a malfunction is detected is displayed. ● The long-term fuel trim indicates much more gradual feedback compensation to the base fuel schedule than short-term fuel trim.
S-FUEL TRM-B1 [%]	● “Short-term fuel trim” at the moment a malfunction is detected is displayed. ● The short-term fuel trim indicates dynamic or instantaneous feedback compensation to the base fuel schedule.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VHCL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
B/FUEL SCHDL [msec]	● The base fuel schedule at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.

*: The items are the same as those of 1st trip freeze frame data.

DATA MONITOR MODE
Monitored Item

×: Applicable

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	×	×	● Indicates the engine speed computed from the signals of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	● Accuracy becomes poor if engine speed drops below the idle rpm. ● If the signal is interrupted while the engine is running, an abnormal value may be indicated.
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	● When the engine is stopped, a certain value is indicated.
B/FUEL SCHDL [msec]		×	● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When the engine is stopped, a certain value is indicated. ● This data also includes the data for the air-fuel ratio learning control.
COOLAN TEMP/S [°C] or [°F]	×	×	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	● When the engine coolant temperature sensor is open or short-circuited, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
HO2S1 (B1) [V]	×	×	● The signal voltage of the heated oxygen sensor 1 is displayed.	
HO2S2 (B1) [V]	×		● The signal voltage of the heated oxygen sensor 2 is displayed.	
HO2S1 MNTR (B1) [RICH/LEAN]	×	×	● Display of heated oxygen sensor 1 signal during air-fuel ratio feedback control: RICH: means the mixture became “rich”, and control is being affected toward a leaner mixture. LEAN: means the mixture became “lean”, and control is being affected toward a rich mixture.	● After turning ON the ignition switch, “RICH” is displayed until air-fuel mixture ratio feedback control begins. ● When the air-fuel ratio feedback is clamped, the value just before the clamping is displayed continuously.
HO2S2 MNTR (B1) [RICH/LEAN]	×		● Display of heated oxygen sensor 2 signal: RICH: means the amount of oxygen after three way catalyst is relatively small. LEAN: means the amount of oxygen after three way catalyst is relatively large.	● When the engine is stopped, a certain value is indicated.
VHCL SPEED SE [km/h] or [mph]	×	×	● The vehicle speed computed from the vehicle speed signal is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
ACCEL SEN 1 [V]	×	×	● The accelerator pedal position sensor signal voltage is displayed.	● ACCEL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
ACCEL SEN 2 [V]	×			
THRTL SEN 1 [V]	×	×	● The throttle position sensor signal voltage is displayed.	● THRTL SEN 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.
THRTL SEN 2 [V]	×			
INT/A TEMP SE [°C] or [°F]	×	×	● The intake air temperature (determined by the signal voltage of the intake air temperature sensor) is indicated.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
START SIGNAL [ON/OFF]	×	×	● Indicates start signal status [ON/OFF] computed by the ECM according to the signals of engine speed and battery voltage.	● After starting the engine, [OFF] is displayed regardless of the starter signal.
CLSD THL POS [ON/OFF]	×	×	● Indicates idle position [ON/OFF] computed by ECM according to the accelerator pedal position sensor signal.	
AIR COND SIG [ON/OFF]	×	×	● Indicates [ON/OFF] condition of the air conditioner switch as determined by the air conditioner signal.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position (PNP) switch signal.	
PW/ST SIGNAL [ON/OFF]	×	×	● [ON/OFF] condition of the power steering system (determined by the signal voltage of the power steering pressure sensor signal) is indicated.	
LOAD SIGNAL [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the electrical load signal. ON: Rear window defogger switch is ON and/or lighting switch is in 2nd position (placed in LOW position for models with Xenon headlamp). OFF: Both rear window defogger switch and lighting switch are OFF.	
IGNITION SW [ON/OFF]	×		● Indicates [ON/OFF] condition from ignition switch.	
HEATER FAN SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the heater fan switch signal.	
BRAKE SW [ON/OFF]	×		● Indicates [ON/OFF] condition from the stop lamp switch signal.	
INJ PULSE-B1 [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	● When the engine is stopped, a certain computed value is indicated.
IGN TIMING [BTDC]		×	● Indicates the ignition timing computed by ECM according to the input signals.	● When the engine is stopped, a certain value is indicated.
PURG VOL C/V [%]			● Indicates the EVAP canister purge volume control solenoid valve control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/V TIM (B1) [°CA]			● Indicates [°CA] of intake camshaft advanced angle.	
INT/V SOL (B1) [%]			● The control value of the intake valve timing control solenoid valve (determined by ECM according to the input signal) is indicated. ● The advance angle becomes larger as the value increases	
VIAS S/V* [ON/OFF]			● The control condition of the VIAS control solenoid valve (determined by ECM according to the input signals) is indicated. ON: VIAS control solenoid valve is operating. OFF: VIAS control solenoid valve is not operating.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIG-NALS	Description	Remarks
AIR COND RLY [ON/OFF]		×	● The air conditioner relay control condition (determined by ECM according to the input signals) is indicated.	
FUEL PUMP RLY [ON/OFF]		×	● Indicates the fuel pump relay control condition determined by ECM according to the input signals.	
THRTL RELAY [ON/OFF]		×	● Indicates the throttle control motor relay control condition determined by the ECM according to the input signals.	
COOLING FAN [HI/LOW/OFF]			● Indicates the condition of the cooling fan (determined by ECM according to the input signals). HI: High speed operation LOW: Low speed operation OFF: Stop	
HO2S1 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 1 heater determined by ECM according to the input signals.	
HO2S2 HTR (B1) [ON/OFF]			● Indicates [ON/OFF] condition of heated oxygen sensor 2 heater determined by ECM according to the input signals.	
IDL A/V LEARN [YET/CMPLT]			● Display the condition of Idle Air Volume Learning YET: Idle Air Volume Learning has not been performed yet. CMPLT: Idle Air Volume Learning has already been performed successfully.	
AC PRESS SEN [V]			● The signal voltage from the refrigerant pressure sensor is displayed.	
VHCL SPEED SE* [km/h] or [mph]			● The vehicle speed computed from the vehicle speed signal sent from TCM is displayed.	
SET VHCL SPD* [km/h] or [mph]			● The preset vehicle speed is displayed.	
MAIN SW* [ON/OFF]			● Indicates [ON/OFF] condition from MAIN switch signal.	
CANCEL SW* [ON/OFF]			● Indicates [ON/OFF] condition from CANCEL switch signal.	
RESUME/ACC SW* [ON/OFF]			● Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
SET SW* [ON/OFF]			● Indicates [ON/OFF] condition from SET/COAST switch signal.	
BRAKE SW1* [ON/OFF]			● Indicates [ON/OFF] condition from ASCD brake switch signal.	
BRAKE SW2* [ON/OFF]			● Indicates [ON/OFF] condition of stop lamp switch signal.	
VHCL SPD CUT* [NON/CUT]			● Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed increased to excessively high compared with the ASCD set speed, and ASCD operation is cut off.	

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
LO SPEED CUT* [NON/CUT]			● Indicates the vehicle cruise condition. NON: Vehicle speed is maintained at the ASCD set speed. CUT: Vehicle speed decreased to excessively low compared with the ASCD set speed, and ASCD operation is cut off.	
AT OD MONITOR* [ON/OFF]			● Indicates [ON/OFF] condition of A/T O/D according to the input signal from the TCM.	● For M/T models, always “OFF” is displayed.
AT OD CANCEL* [ON/OFF]			● Indicates [ON/OFF] condition of A/T O/D cancel signal sent from the TCM.	● For M/T models, always “OFF” is displayed.
CRUISE LAMP* [ON/OFF]			● Indicates [ON/OFF] condition of CRUISE lamp determined by the ECM according to the input signals.	
SET LAMP* [ON/OFF]			● Indicates [ON/OFF] condition of SET lamp determined by the ECM according to the input signals.	
Voltage [V]			● Voltage, frequency, duty cycle or pulse width measured by the probe.	● Only “#” is displayed if item is unable to be measured. ● Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured.
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				

*: For QR25DE engine models

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

DATA MONITOR (SPEC) MODE

Monitored Item

Monitored item [Unit]	ECM INPUT SIGNALS	MAIN SIGNALS	Description	Remarks
ENG SPEED [rpm]	×		● Indicates the engine speed computed from the signals of the crankshaft position sensor (POS) and camshaft position sensor (PHASE).	
MAS A/F SE-B1 [V]	×	×	● The signal voltage of the mass air flow sensor specification is displayed.	● When engine is running specification range is indicated.
B/FUEL SCHDL [msec]			● “Base fuel schedule” indicates the fuel injection pulse width programmed into ECM, prior to any learned on board correction.	● When engine is running specification range is indicated.
A/F ALPHA-B1 [%]		×	● The mean value of the air-fuel ratio feedback correction factor per cycle is indicated.	● When engine is running specification range is indicated. ● This data also includes the data for the air-fuel ratio learning control.

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

Test Item

TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
FUEL INJECTION	● Engine: Return to the original trouble condition ● Change the amount of fuel injection using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Fuel injector ● Heated oxygen sensor 1
IGNITION TIMING	● Engine: Return to the original trouble condition ● Timing light: Set ● Retard the ignition timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Perform Idle Air Volume Learning.
POWER BALANCE	● Engine: After warming up, idle the engine. ● Air conditioner switch OFF ● Shift lever: N (A/T), Neutral (M/T) ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injector ● Power transistor ● Spark plug ● Ignition coil
COOLING FAN*	● Ignition switch: ON ● Turn the cooling fan LOW, HI, OFF with CONSULT-II.	Cooling fan moves and stops.	● Harness and connectors ● Cooling fan relay ● Cooling fan motor
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injector
FUEL PUMP RELAY	● Ignition switch: ON (Engine stopped) ● Turn the fuel pump relay ON and OFF using CONSULT-II and listen to operating sound.	Fuel pump relay makes the operating sound.	● Harness and connectors ● Fuel pump relay
PURG VOL CONT/V	● Engine: After warming up, run engine at 1,500 rpm. ● Change the EVAP canister purge volume control solenoid valve opening percent using CONSULT-II.	Engine speed changes according to the opening percent.	● Harness and connectors ● Solenoid valve
V/T ASSIGN ANGLE	● Engine: Return to the original trouble condition ● Change intake valve timing using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Intake valve timing control solenoid valve

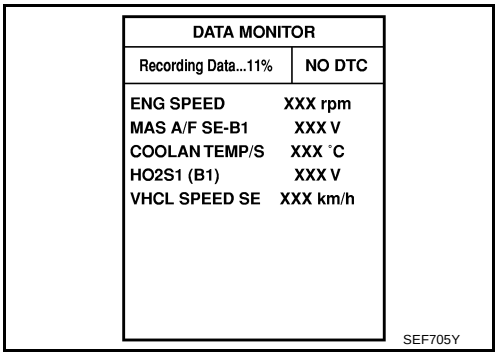
*:Leaving cooling fan OFF with CONSULT-II while engine is running may cause the engine to overheat.

REAL TIME DIAGNOSIS IN DATA MONITOR MODE (RECORDING VEHICLE DATA)

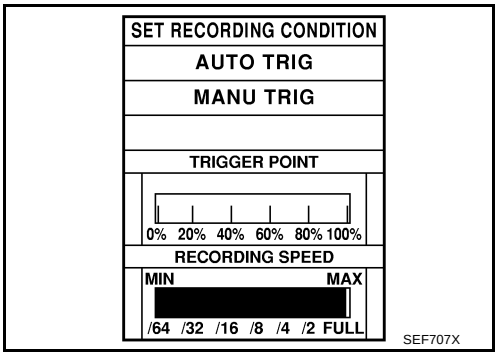
Description

CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

1. “AUTO TRIG” (Automatic trigger):
   - The malfunction will be identified on the CONSULT-II screen in real time.
     In other words, DTC/1st trip DTC and malfunction item will be displayed if the malfunction is detected by ECM.
     At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown at right, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
     The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II Operation Manual.

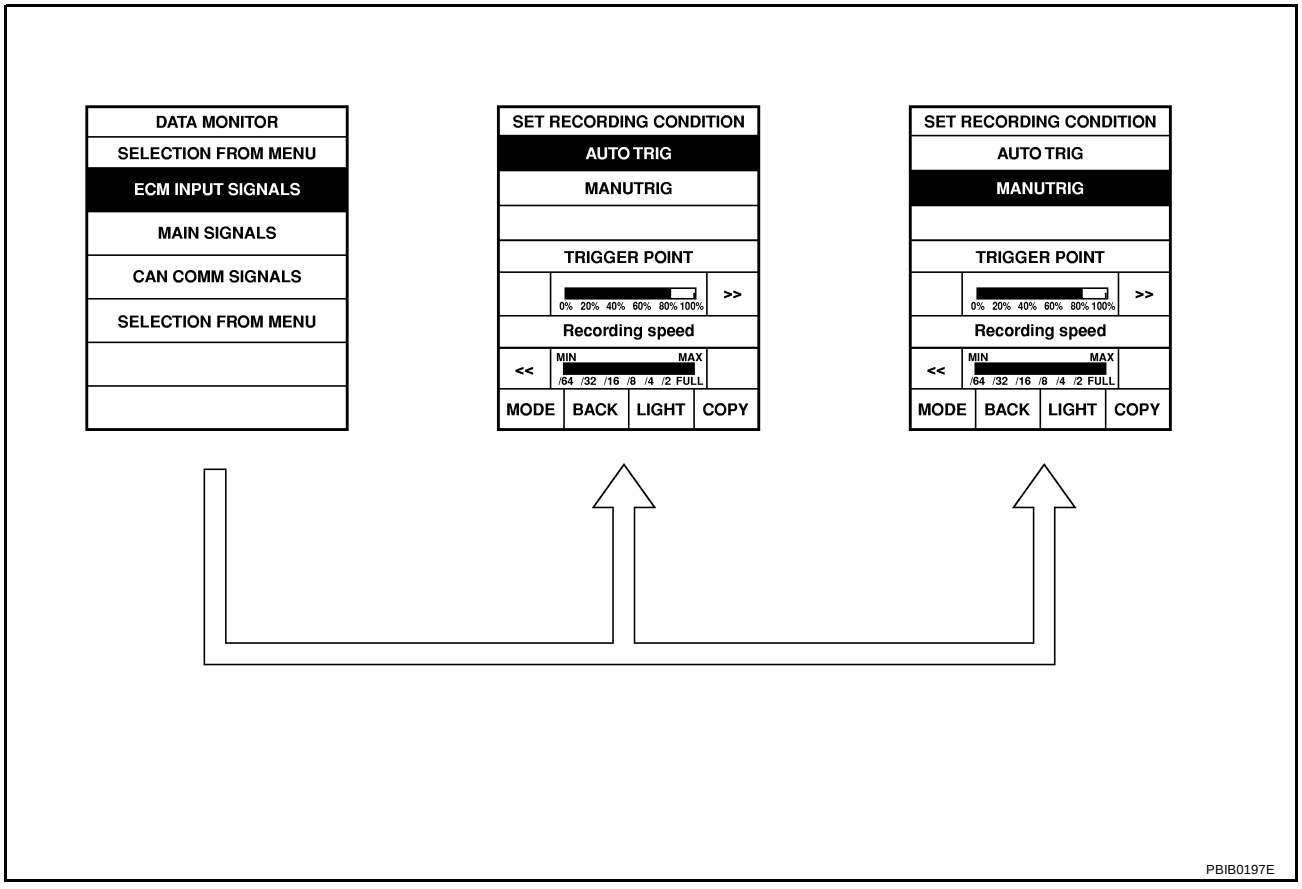


2. “MANU TRIG” (Manual trigger):
   - DTC/1st trip DTC and malfunction item will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
     DATA MONITOR can be performed continuously even though a malfunction is detected.



Operation

1. “AUTO TRIG”
   - While trying to detect the DTC/1st trip DTC by performing the DTC Confirmation Procedure, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
   - While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
     When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the “DTC Confirmation Procedure”, the moment a malfunction is found the DTC/1st trip DTC will be displayed. (Refer to “Incident Simulation Tests” in GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident" .)
2. “MANU TRIG”
   - If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.


DATA MONITOR
SELECTION FROM MENU
ECM INPUT SIGNALS
MAIN SIGNALS
CAN COMM SIGNALS
SELECTION FROM MENU
SET RECORDING CONDITION
AUTO TRIG
MANUTRIG
TRIGGER POINT
0% 20% 40% 60% 80% 100%
>>
Recording speed
<<
MIN MAX
/64 /32 /16 /8 /4 /2 FULL
MODE BACK LIGHT COPY
SET RECORDING CONDITION
AUTO TRIG
MANUTRIG
TRIGGER POINT
0% 20% 40% 60% 80% 100%
>>
Recording speed
<<
MIN MAX
/64 /32 /16 /8 /4 /2 FULL
MODE BACK LIGHT COPY
PBIB0197E

CONSULT-II Reference Value in Data Monitor Mode

BBS001MI

Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.
  * Specification data may not be directly related to their components signals/values/operations.
  i.e. Adjust ignition timing with a timing light before monitoring IGN TIMING, because the monitor may show the specification data in spite of the ignition timing not being adjusted to the specification data. This IGN TIMING monitors the data calculated by the ECM according to the signals input from the camshaft position sensor and other ignition timing related sensors.

MONITOR ITEM	CONDITION		SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication.
MAS A/F SE-B1	See EC-622, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
B/FUEL SCHDL	See EC-622, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
A/F ALPHA-B1	See EC-622, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 (B1)	Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	LEAN ←→ RICH Changes more than 5 times during 10 seconds.
HO2S2 MNTR (B1)	Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load		LEAN ←→ RICH
VEH SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication.		Almost the same speed as the speedometer indication.
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
ACCEL SEN 1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.7V
ACCEL SEN 2*1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
THRTL SEN 1 THRTL SEN 2*1	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75V
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is not being turned	OFF
		Steering wheel is being turned	ON

MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd (placed in LOW position for models with Xenon headlamp).	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
IGNITION SW	● Ignition switch: ON → OFF → ON		ON → OFF → ON
HEATER FAN SW	● Ignition switch: ON	Heater fan is operating.	ON
		Heater fan is not operating	OFF
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
INJ PULSE-B1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec
IGN TIMING	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	13° - 17° BTDC
		2,000 rpm	25° - 45° BTDC
PURG VOL C/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	0%
		2,000 rpm	20 - 30%
INT/V TIM (B1)	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
INT/V SOL (B1)	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: P or N (A/T), Neutral (M/T) ● No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 50%
VIAS S/V*2	● Engine: After warming up	Idle	OFF
		More than 5,000 rpm	ON
AIR COND RLY	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates)	ON
FUEL PUMP RLY	● For 1 second after turning ignition switch ON ● Engine running or cranking		ON
	● Except above conditions		OFF
THRTL RELAY	● Ignition switch: ON		ON

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 99°C (210°F)	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH
HO2S1 HTR (B1)	● Engine: After warming up ● Engine speed: Below 3,600 rpm		ON
	● Engine speed: Above 3,600 rpm		OFF
HO2S2 HTR (B1)	● Engine speed is below 3,600 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load.		ON
	● Engine speed: Above 3,600 rpm		OFF
O2SEN HTR DTY	● Engine coolant temperature when engine started: More than 80°C (176°F) ● Engine speed: below 3,600 rpm		Approx. 50%
AC PRESS SEN	● Engine: Idle ● Both A/C switch and blower fan seitch: ON (Compressor operates)		1.0 - 4.0V
VEH SPEED SE*2	● Turn drive wheels and compare CONSULT-II value with the speedometer indication.		Almost the same speed as the speedometer indication
SET VHCL SPD*2	● Engine: Running	ASCD: Operating.	The preset vehicle speed is displayed.
MAIN SW*2	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW*2	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW*2	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF
BRAKE SW1*2	● Ignition switch: ON	Clutch pedal (M/T) and brake pedal: Fully released	ON
		Clutch pedal (M/T) and/or brake pedal: Slightly depressed	OFF
BRAKE SW2*2	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
CRUISE LAMP*2	● Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP*2	● MAIN switch: ON ● Vehicle speed: Between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

*1: Accelerator pedal position sensor 2 signal and throttle position sensor 2 signal are converted by ECM internally. Thus, they differ from ECM terminals voltage signals.
*2: For QR25DE engine models

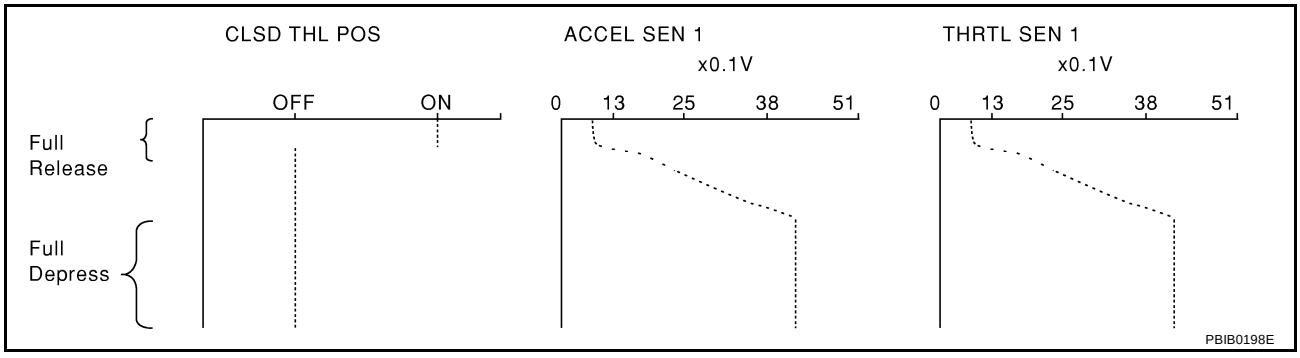
Major Sensor Reference Graph in Data Monitor Mode

BBS001MJ

The following are the major sensor reference graphs in “DATA MONITOR” mode.

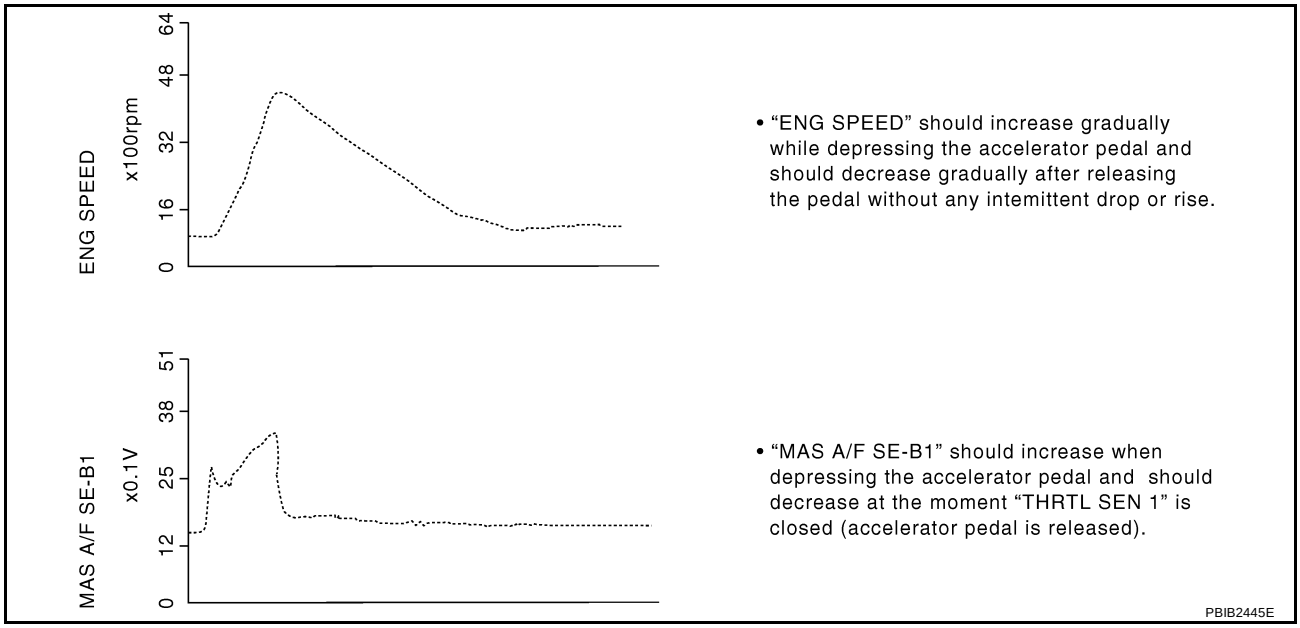
CLSD THL POS, ACCEL SEN 1, THRTL SEN 1

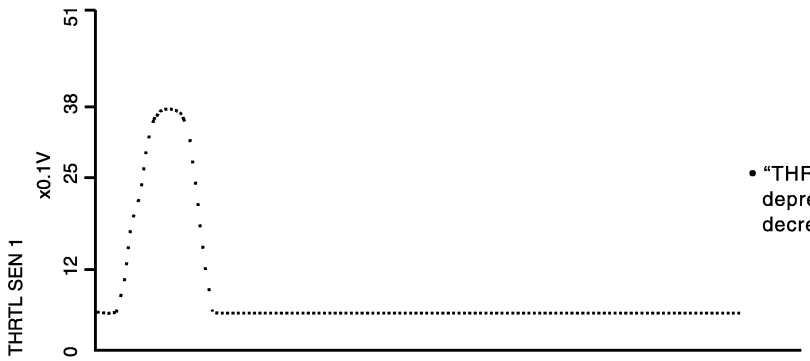
Below is the data for “CLSD THL POS”, “ACCEL SEN 1” and “THRTL SEN 1” when depressing the accelerator pedal with the ignition switch ON and with selector lever in D position (A/T models) or with shift lever in 1st position (M/T models).
The signal of “ACCEL SEN 1” and “THRTL SEN 1” should rise gradually without any intermittent drop or rise after “CLSD THL POS” is changed from “ON” to “OFF”.



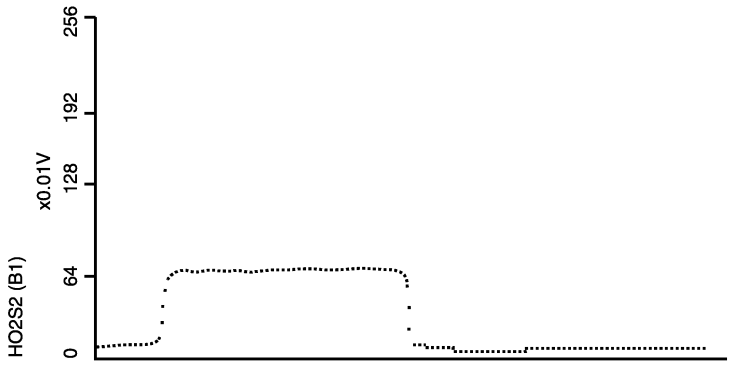
ENG SPEED, MAS A/F SE-B1, THRTL SEN 1, HO2S2 (B1), HO2S1 (B1), INJ PULSE-B1

Below is the data for “ENG SPEED”, “MAS A/F SE-B1”, “THRTL SEN 1”, “HO2S2 (B1)”, “HO2S1 (B1)” and “INJ PULSE-B1” when revving engine quickly up to 4,800 rpm under no load after warming up engine sufficiently.
Each value is for reference, the exact value may vary.

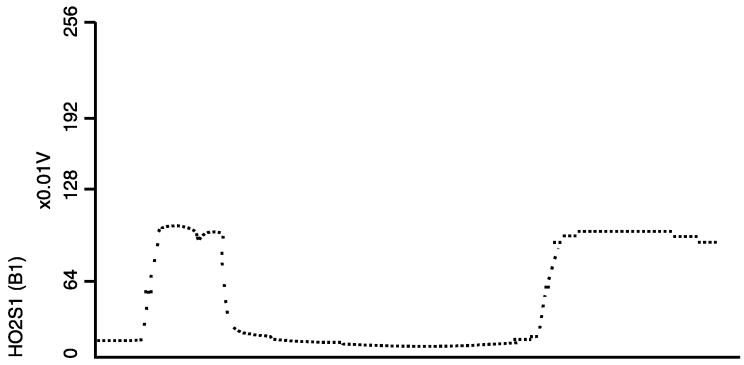




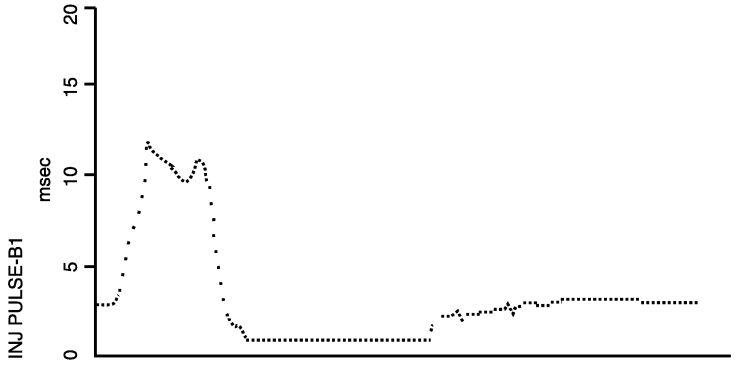
- "THRTL SEN 1" should increase while depressing the accelerator pedal and should decrease while releasing it.



- "HO2S2 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "HO2S1 (B1)" may increase immediately after depressing the accelerator pedal and may decrease after releasing the pedal.



- "INJ PULSE-B1" should increase when depressing the accelerator pedal and should decrease when the pedal is released.

PBIB0668E

TROUBLE DIAGNOSIS - SPECIFICATION VALUE

PFP:00031

Description

BBS001MK

The specification (SP) value indicates the tolerance of the value that is displayed in “DATA MONITOR (SPEC)” mode of CONSULT-II during normal operation of the Engine Control System. When the value in “DATA MONITOR (SPEC)” mode is within the SP value, the Engine Control System is confirmed OK. When the value in “DATA MONITOR (SPEC)” mode is NOT within the SP value, the Engine Control System may have one or more malfunctions.
The SP value is used to detect malfunctions that may affect the Engine Control System, but will not light the MIL.
The SP value will be displayed for the following three items:

- B/FUEL SCHDL (The fuel injection pulse width programmed into ECM prior to any learned on board correction)
- A/F ALPHA-B1 (The mean value of air-fuel ratio feedback correction factor per cycle)
- MAS A/F SE-B1 (The signal voltage of the mass air flow sensor)

Testing Condition

BBS001ML

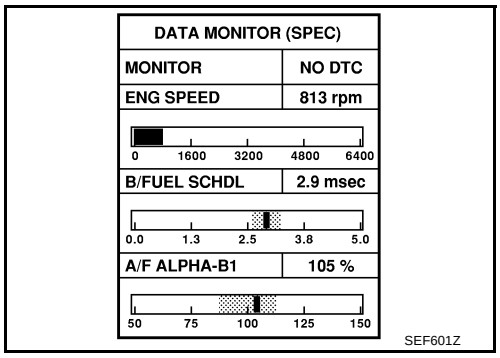
- Vehicle driven distance: More than 5,000 km (3,017 miles)
- Barometric pressure: 98.3 - 104.3 kPa (0.983 - 1.043 bar, 1.003 - 1.064 kg/cm^2 , 14.25 - 15.12 psi)
- Atmospheric temperature: 20 - 30°C (68 - 86°F)
- Engine coolant temperature: 75 - 95°C (167 - 203°F)
- Engine speed: Idle
- Transmission: Warmed-up
  - A/T models: After the engine is warmed up to normal operating temperature, drive vehicle until “FLUID TEMP SE” (A/T fluid temperature sensor signal) indicates more than 60°C (140°F)
  - M/T models: After the engine is warmed up to normal operating temperature, drive vehicle for 5 minutes.
- Electrical load: Not applied
  - Rear window defogger switch, air conditioner switch, lighting switch are OFF. Steering wheel is straight ahead.

Inspection Procedure

BBS001MM

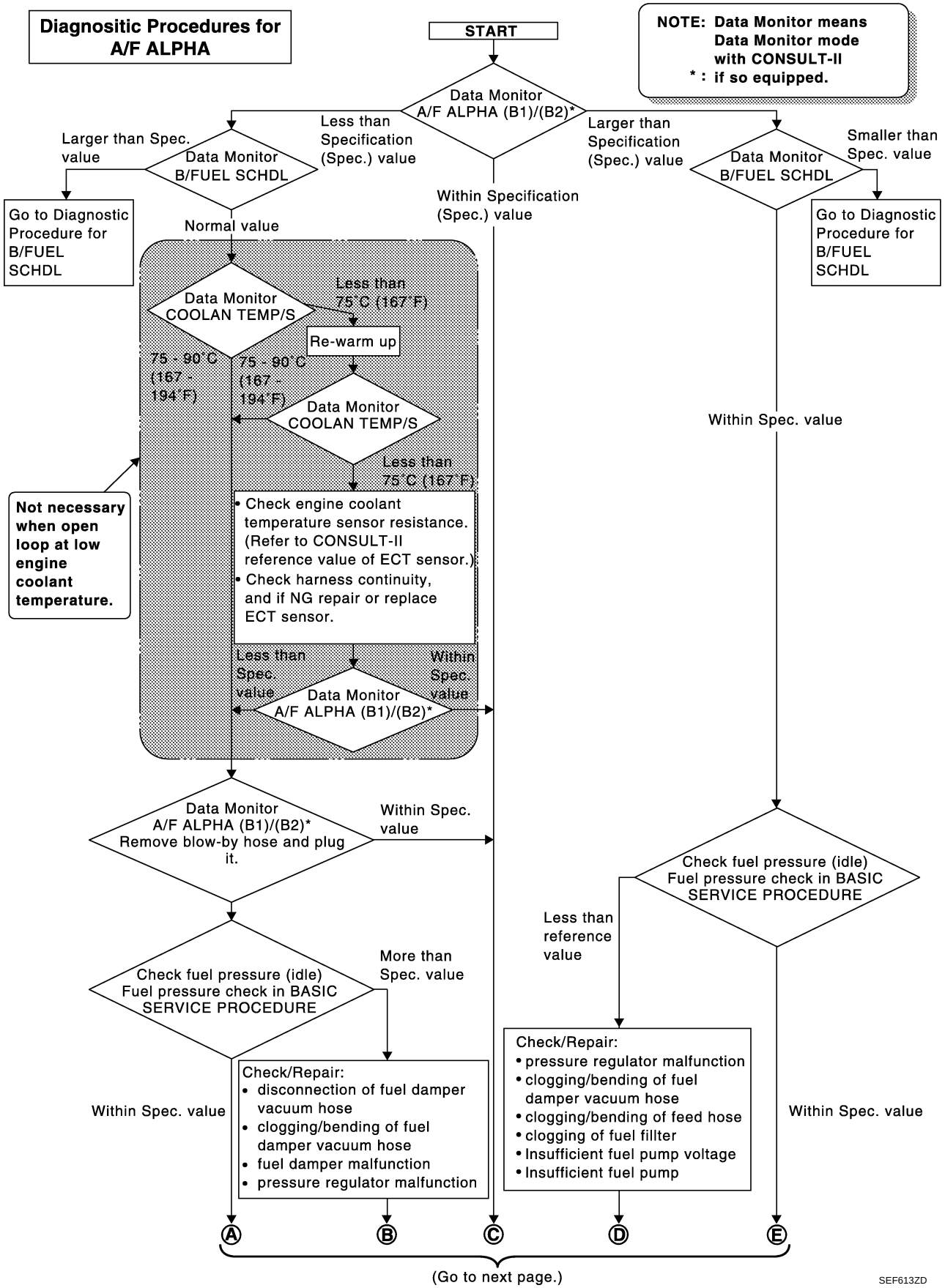
NOTE:
Perform “DATA MONITOR (SPEC)” mode in maximum scale display.

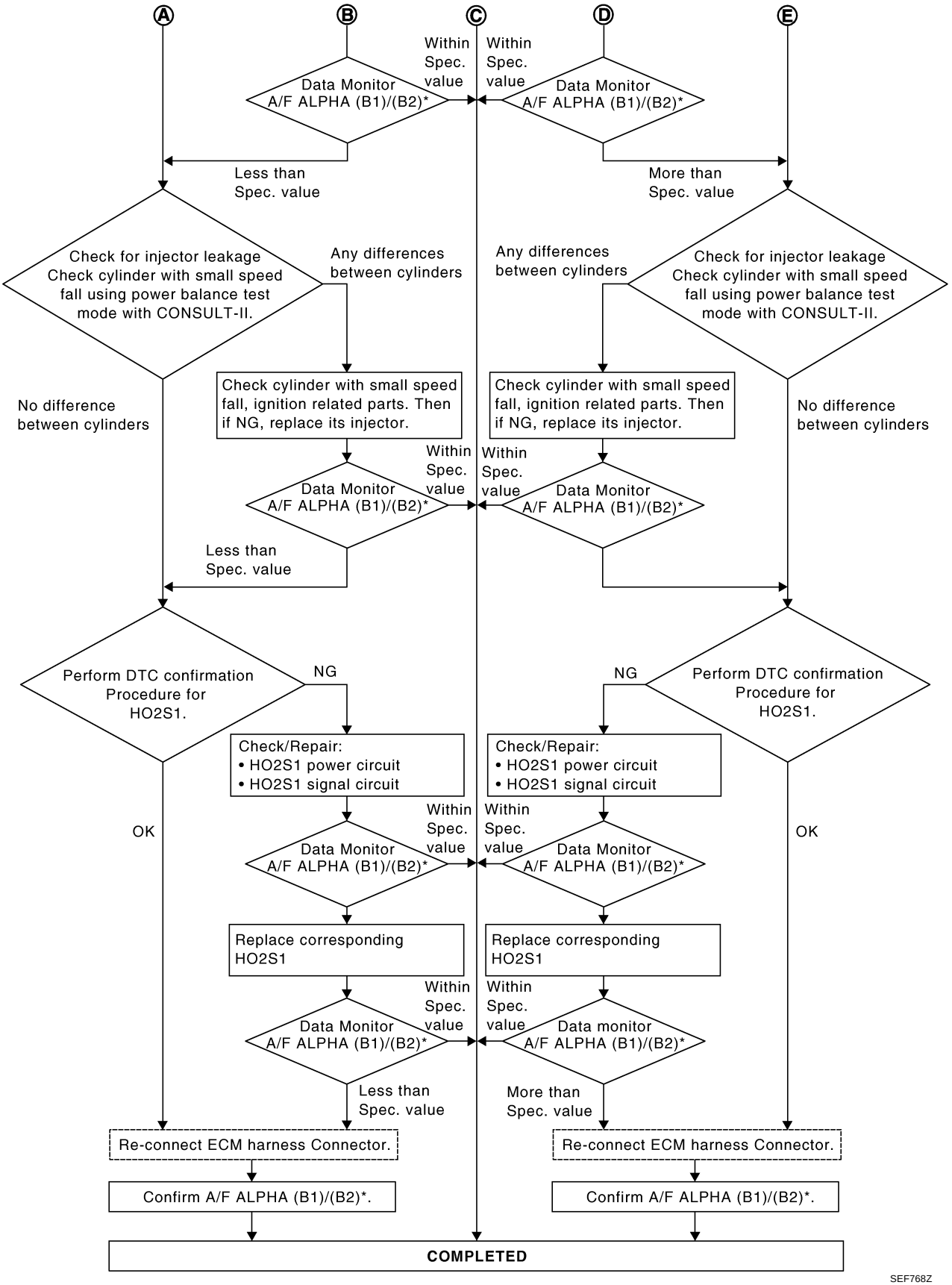
1. Perform EC-580, "Basic Inspection" .
2. Confirm that the testing conditions indicated above are met.
3. Select “B/FUEL SCHDL”, “A/F ALPHA-B1” and “MAS A/F SE-B1” in “DATA MONITOR (SPEC)” mode with CONSULT-II.
4. Make sure that monitor items are within the SP value.
5. If NG, go to EC-623, "Diagnostic Procedure" .



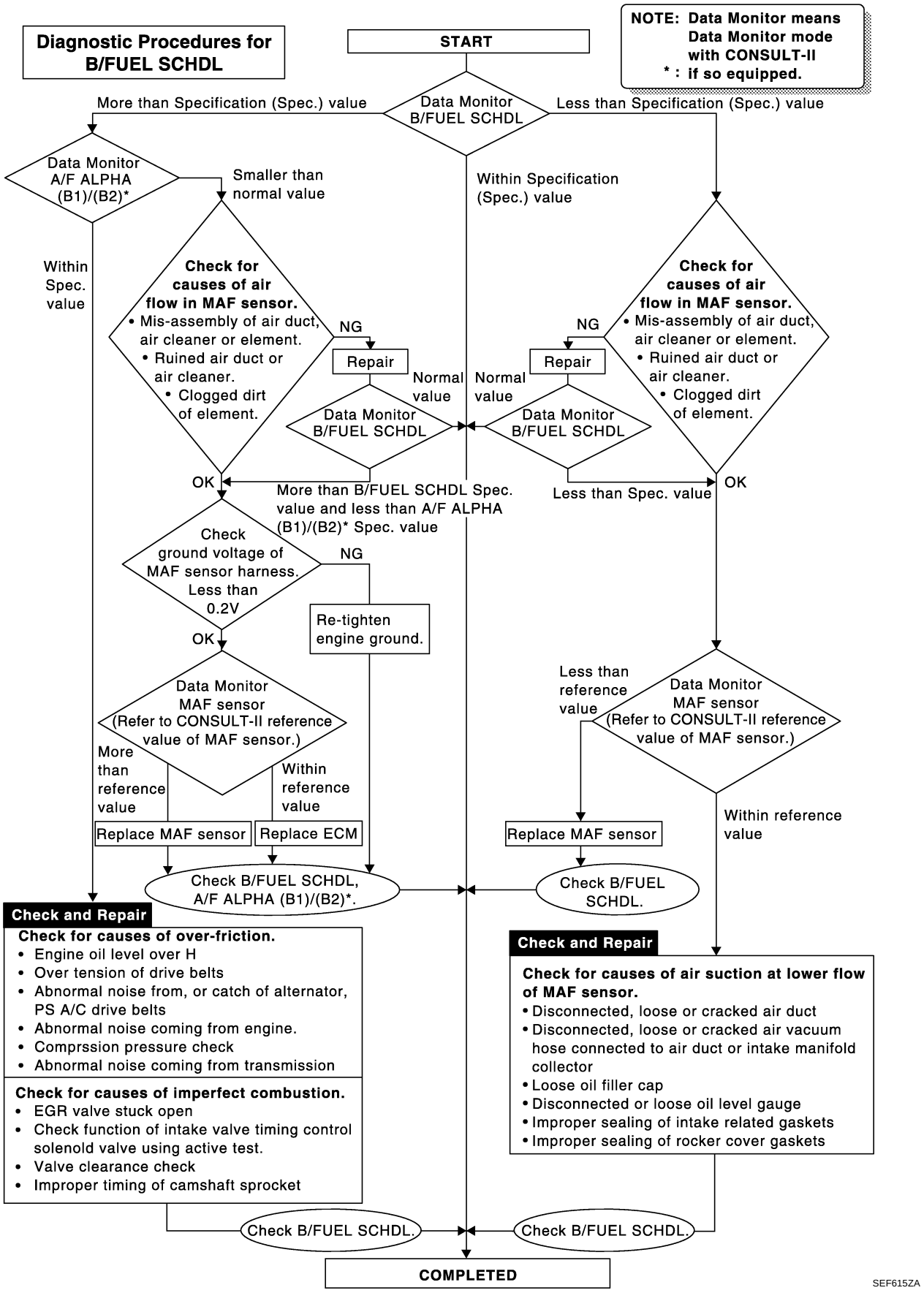
Diagnostic Procedure

BBS001MN




A
B
C
D
E
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
Any differences between cylinders
Any differences between cylinders
Check for injector leakage Check cylinder with small speed fall using power balance test mode with CONSULT-II.
No difference between cylinders
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
Check cylinder with small speed fall, ignition related parts. Then if NG, replace its injector.
No difference between cylinders
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
Perform DTC confirmation Procedure for HO2S1.
NG
NG
Perform DTC confirmation Procedure for HO2S1.
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
Check/Repair:
• HO2S1 power circuit
• HO2S1 signal circuit
OK
Within Spec. value
Within Spec. value
OK
Data Monitor A/F ALPHA (B1)/(B2)*
Data Monitor A/F ALPHA (B1)/(B2)*
Replace corresponding HO2S1
Replace corresponding HO2S1
Within Spec. value
Within Spec. value
Data Monitor A/F ALPHA (B1)/(B2)*
Data monitor A/F ALPHA (B1)/(B2)*
Less than Spec. value
More than Spec. value
Re-connect ECM harness Connector.
Re-connect ECM harness Connector.
Confirm A/F ALPHA (B1)/(B2)*.
Confirm A/F ALPHA (B1)/(B2)*.
COMPLETED

SEF768Z


Diagnostic Procedures for B/FUEL SCHDL
START
NOTE: Data Monitor means Data Monitor mode with CONSULT-II
* : if so equipped.
Data Monitor B/FUEL SCHDL
More than Specification (Spec.) value
Within Specification (Spec.) value
Less than Specification (Spec.) value
Data Monitor A/F ALPHA (B1)/(B2)*
Smaller than normal value
Within Spec. value
Check for causes of air flow in MAF sensor.
• Mis-assembly of air duct, air cleaner or element.
• Ruined air duct or air cleaner.
• Clogged dirt of element.
NG
Repair
Normal value
Data Monitor B/FUEL SCHDL
Check for causes of air flow in MAF sensor.
• Mis-assembly of air duct, air cleaner or element.
• Ruined air duct or air cleaner.
• Clogged dirt of element.
NG
Repair
Normal value
Data Monitor B/FUEL SCHDL
OK
More than B/FUEL SCHDL Spec. value and less than A/F ALPHA (B1)/(B2)* Spec. value
Less than Spec. value
OK
Check ground voltage of MAF sensor harness. Less than 0.2V
NG
Re-tighten engine ground.
OK
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor.)
More than reference value
Within reference value
Replace MAF sensor
Replace ECM
Less than reference value
Data Monitor MAF sensor (Refer to CONSULT-II reference value of MAF sensor.)
Replace MAF sensor
Within reference value
Check B/FUEL SCHDL, A/F ALPHA (B1)/(B2)*.
Check B/FUEL SCHDL.
Check and Repair
Check for causes of over-friction.
• Engine oil level over H
• Over tension of drive belts
• Abnormal noise from, or catch of alternator, PS A/C drive belts
• Abnormal noise coming from engine.
• Comprssion pressure check
• Abnormal noise coming from transmission
Check for causes of imperfect combustion.
• EGR valve stuck open
• Check function of intake valve timing control solenold valve using active test.
• Valve clearance check
• Improper timing of camshaft sprocket
Check and Repair
Check for causes of air suction at lower flow of MAF sensor.
• Disconnected, loose or cracked air duct
• Disconnected, loose or cracked air vacuum hose connected to air duct or intake manifold collector
• Loose oil filler cap
• Disconnected or loose oil level gauge
• Improper sealing of intake related gaskets
• Improper sealing of rocker cover gaskets
Check B/FUEL SCHDL.
Check B/FUEL SCHDL.
COMPLETED
SEF615ZA

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

BBS001MO

Intermittent incidents may occur. In many cases, the malfunction resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st trip) DTC visits. Realize also that the most frequent cause of intermittent incident occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

Common Intermittent Incident Report Situations

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than [0] or [1t].
III	The symptom described by the customer does not recur.
IV	(1st trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for PXXXX does not indicate the malfunctioning area.

Diagnostic Procedure

BBS001MP

1. INSPECTION START

Erase (1st trip) DTCs. Refer to EC-569, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to EC-634, "Ground Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident" , “Incident Simulation Tests”.

OK or NG

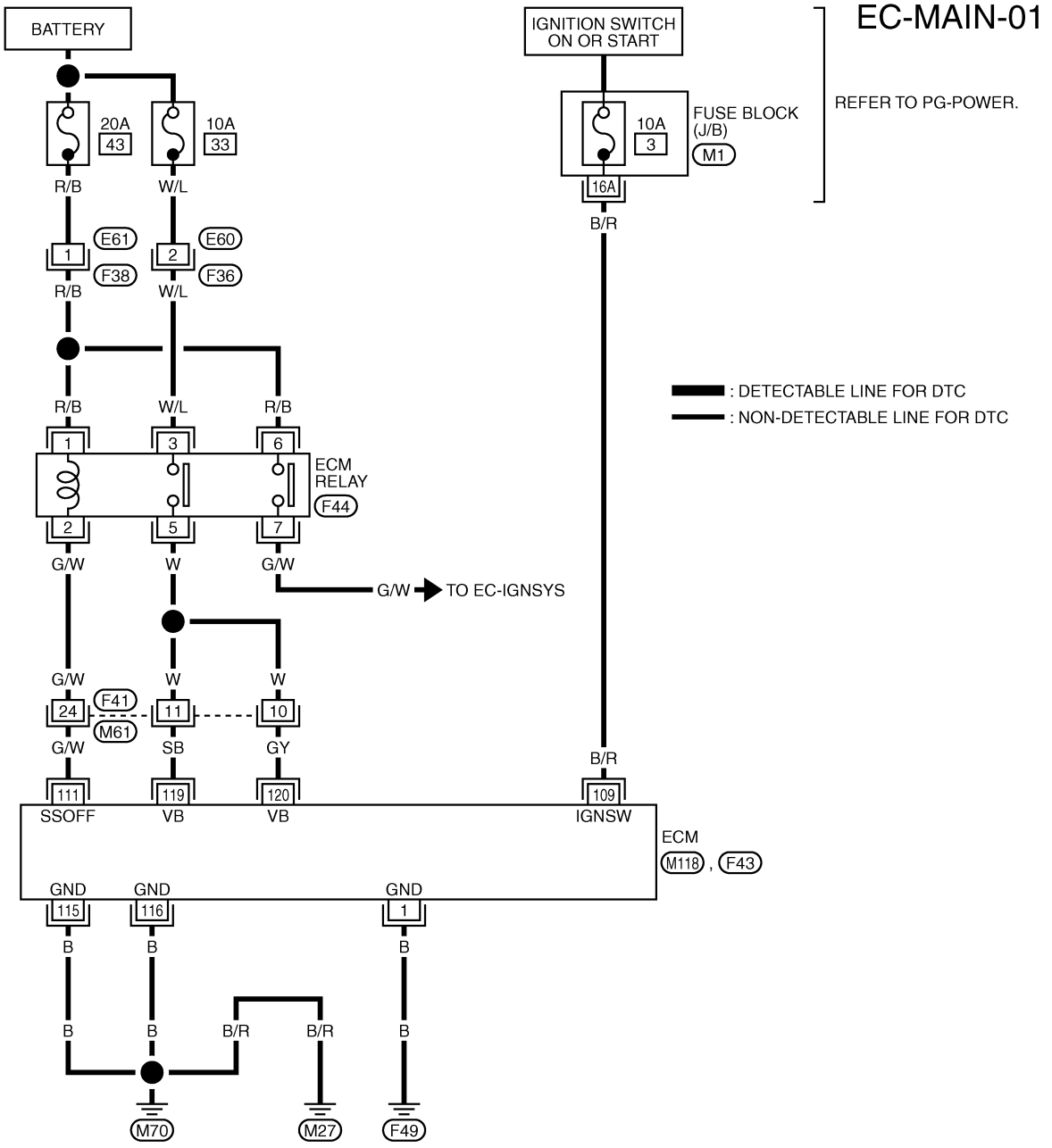
OK >> **INSPECTION END**
NG >> Repair or replace.

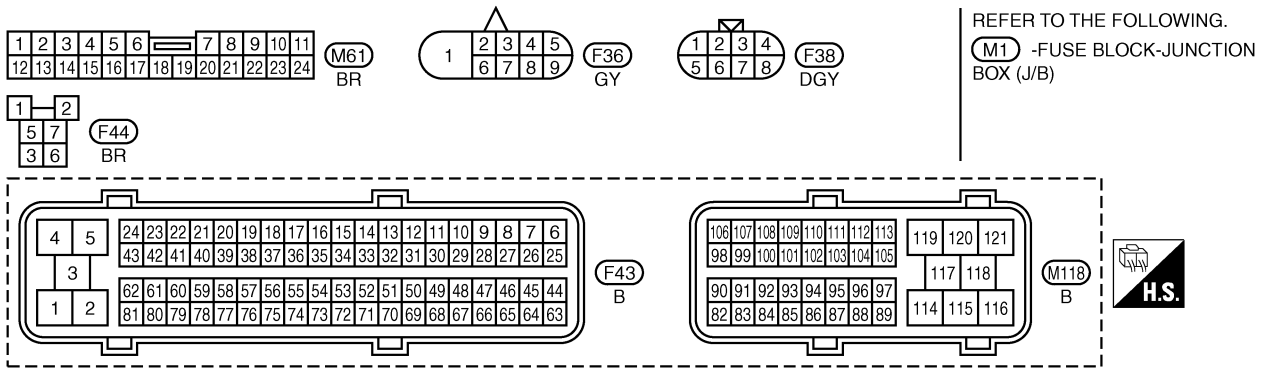
POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

Wiring Diagram

BBS001MQ





TBWA0594E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
1	B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
109	B/R	Ignition switch	**[Ignition switch: OFF]**	0V
			[Ignition switch: ON]	BATTERY VOLTAGE (11 - 14V)
111	G/W	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
115 116	B B	ECM ground	**[Engine is running]** ● Idle speed	Body ground
119 120	SB GY	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS001MR

1. INSPECTION START

Start engine.

Is engine running?

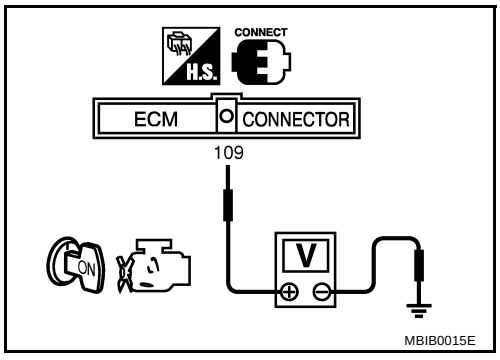
Yes or No

Yes >> GO TO 11.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF and then ON.
2. Check voltage between ECM terminal 109 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

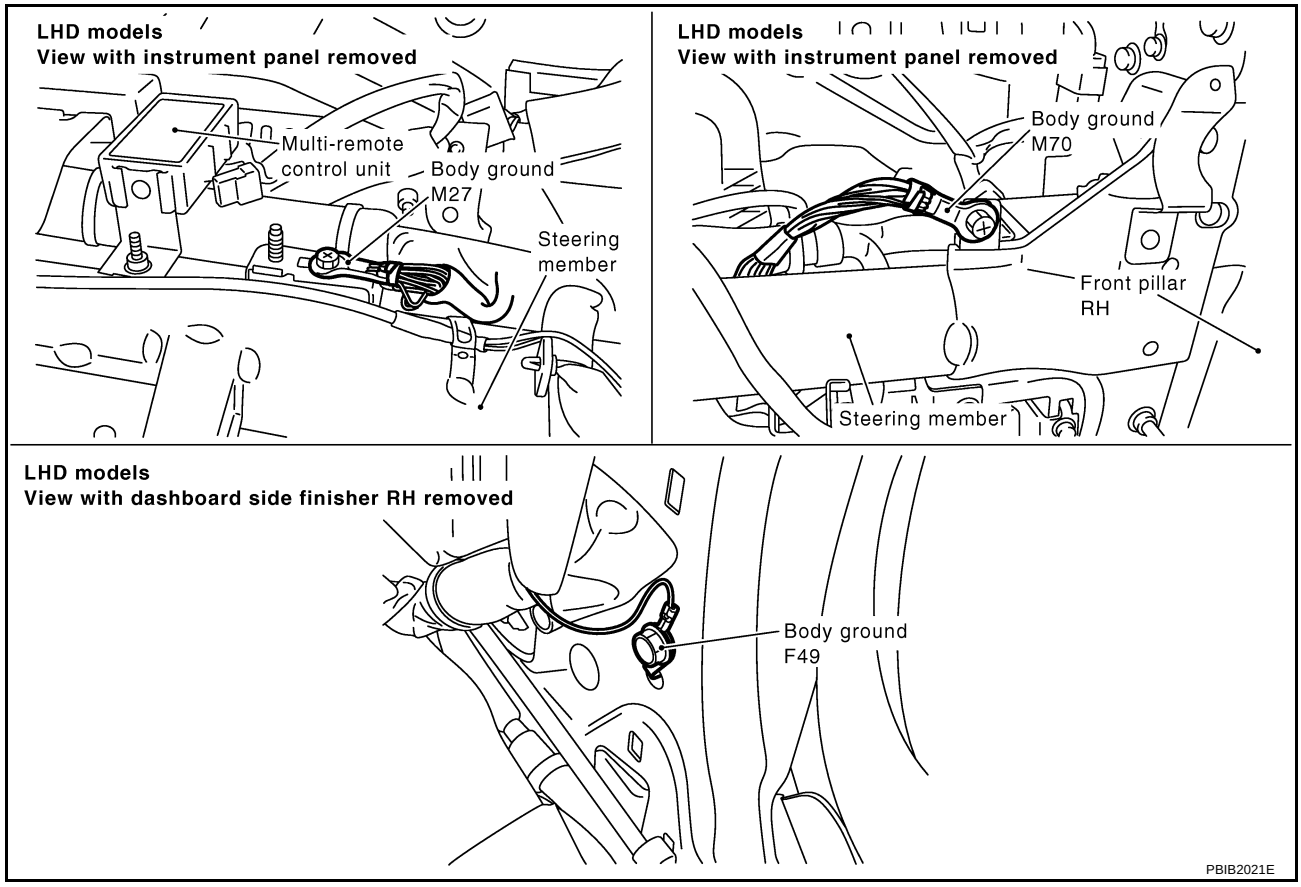
Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .



OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 1, 115, 116 and ground.
   Refer to Wiring Diagram.

Continuity should exist.

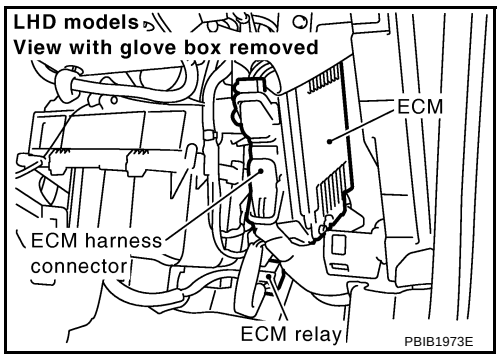
4. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

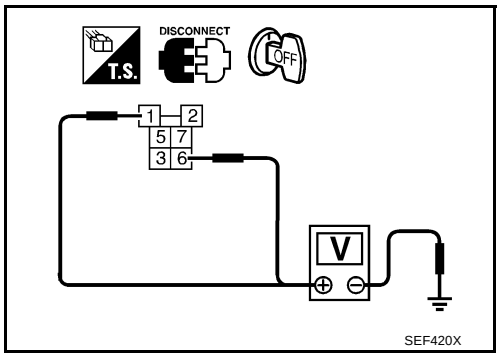
6. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Disconnect ECM relay.



2. Check voltage between ECM relay terminals 1, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- 20A fuse
- Harness for open or short between ECM relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 111 and ECM relay terminal 2.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.

9. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F41, M61
- Harness for open or short between ECM relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ECM RELAY

Refer to EC-634, "Component Inspection" .

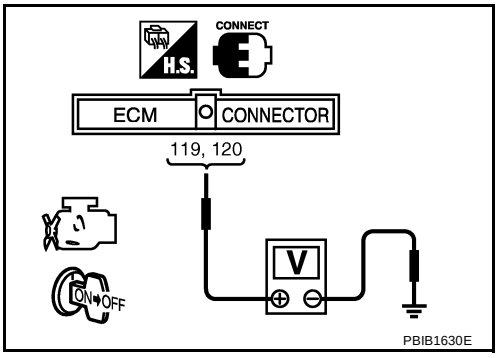
OK or NG

OK >> Go to EC-875, "IGNITION SIGNAL" .
NG >> Replace ECM relay.

11. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Turn ignition switch OFF and wait at least 10 seconds.
2. Turn ignition switch ON and then OFF.
3. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop approximately 0V.

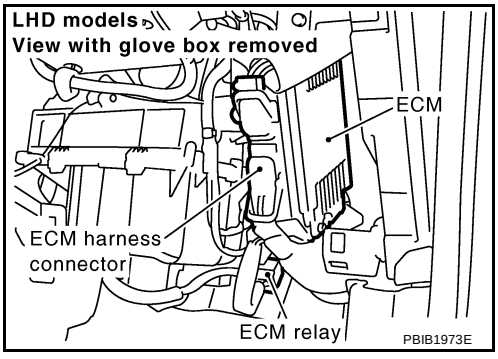


OK or NG

OK >> GO TO 17.
NG (Battery voltage does not exist.)>>GO TO 12.
NG (Battery voltage exists for more than a few seconds.)>>GO TO 14.

12. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Disconnect ECM relay.

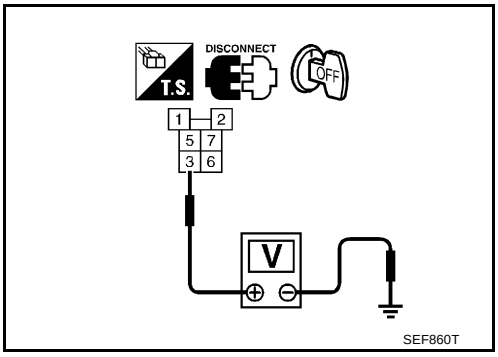


2. Check voltage between ECM relay terminal 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 14.
NG >> GO TO 13.



13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E60, F36
- 10A fuse
- Harness for open or short between ECM relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK ECM POWER SUPPLY CIRCUIT-V

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 119, 120 and ECM relay terminal 5. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F41, M61
- Harness for open or short between ECM relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK ECM RELAY

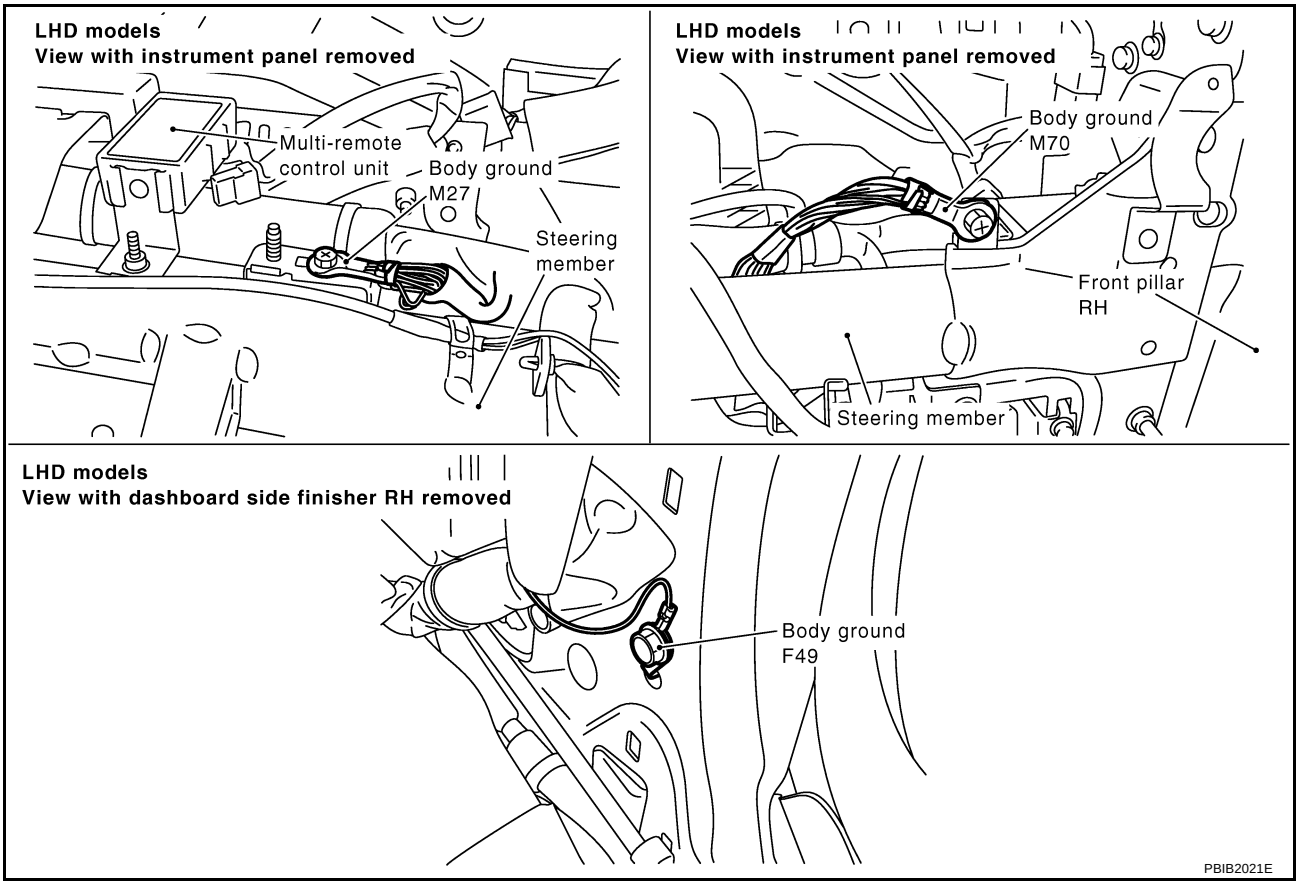
Refer to EC-634, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ECM relay.

17. CHECK GROUND CONNECTIONS

Loosen and retighten three ground screws on the body.
Refer to EC-634, "Ground Inspection" .



OK or NG

OK >> GO TO 18.
NG >> Repair or replace ground connections.

18. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT-II

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 115, 116 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 19.
NG >> Repair open circuit or short to power in harness or connectors.

19. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> **INSPECTION END**

Component Inspection

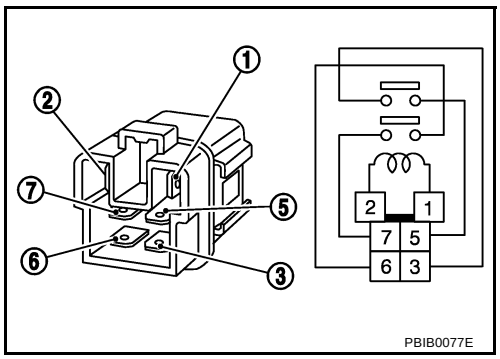
BBS001MS

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.



Ground Inspection

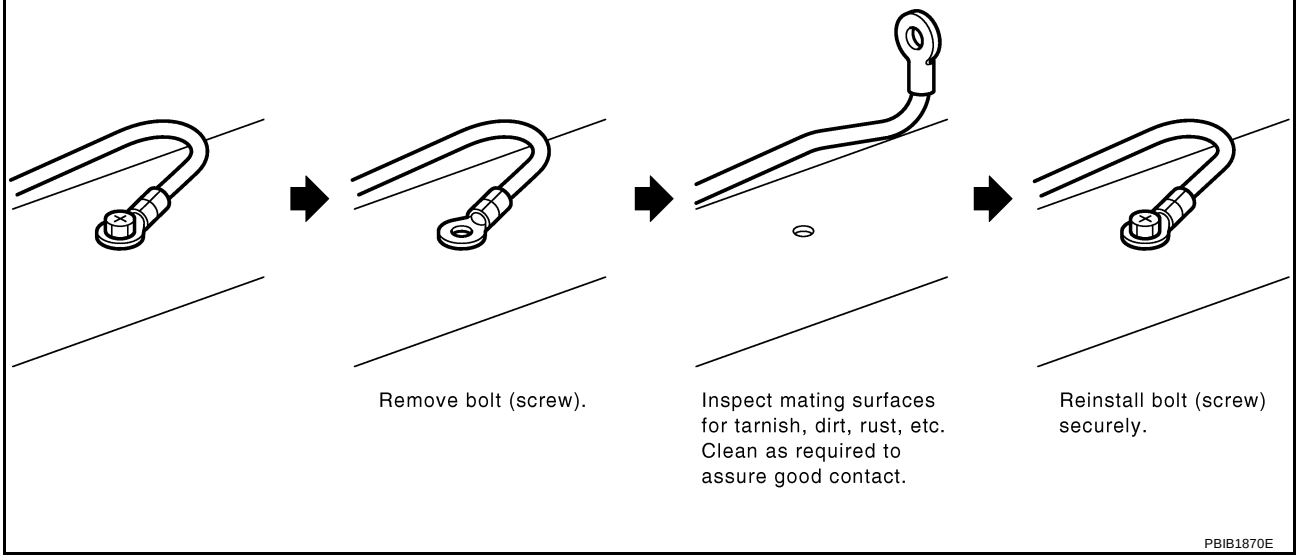
BBS001MT

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to “Ground Distribution” in PG section.

Ground Inspection



DTC U1000, U1001 CAN COMMUNICATION LINE

PFP:23710

Description

BBS001MU

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

BBS001MV

The MI will not light up these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000 1000 U1001 1001	CAN communication line	● ECM cannot communicate to other control units. ● ECM cannot communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted)

DTC Confirmation Procedure

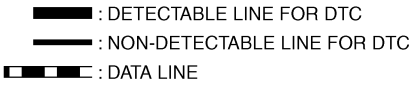
BBS001MW

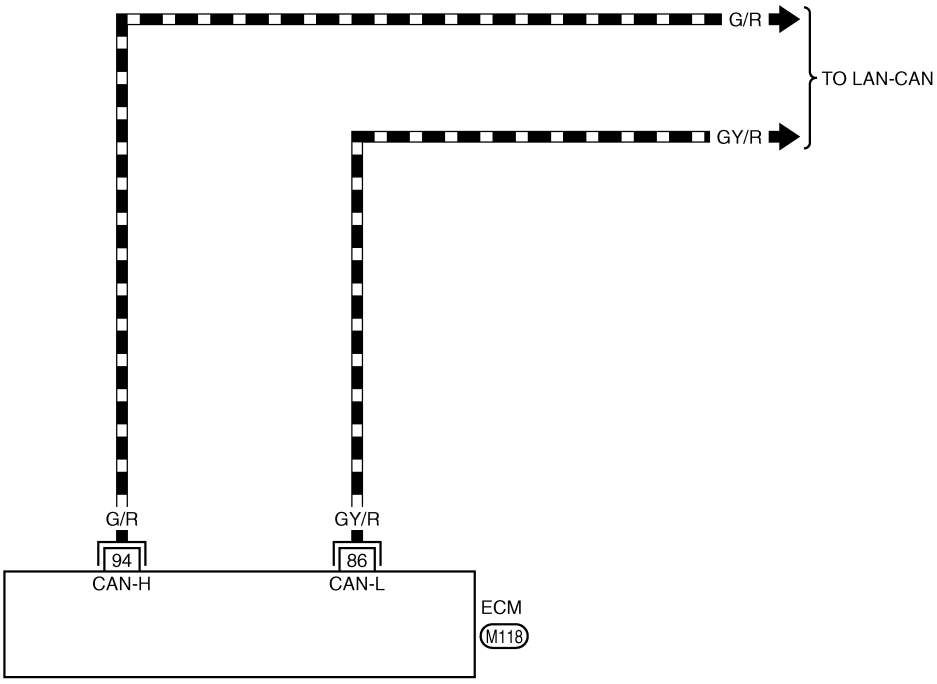
1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-637, "Diagnostic Procedure" .

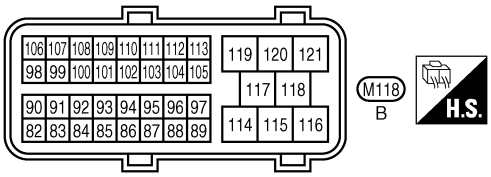
Wiring Diagram

BBS001MX

EC-CAN-01







TBWA0595E

Diagnostic Procedure

BBS001MY

Go to LAN-25, "CAN Communication Unit" .

DTC P0011 IVT CONTROL

PFP:23796

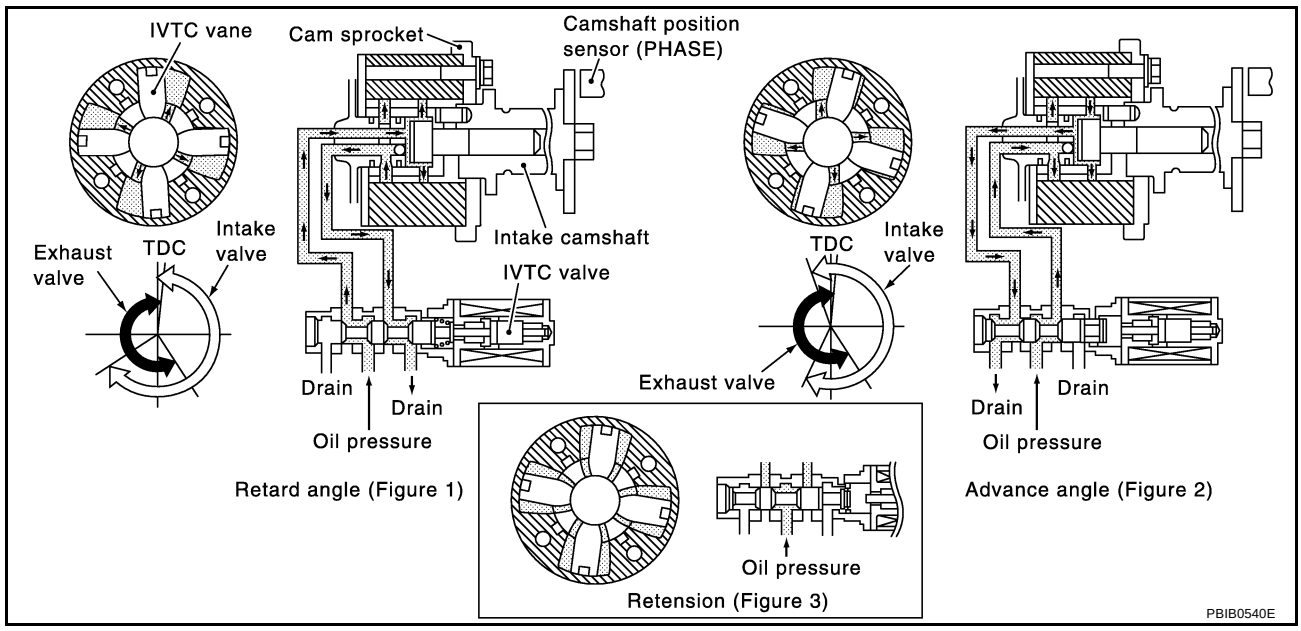
Description

BBS001MZ

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed	Intake valve timing control	Intake valve timing control solenoid valve
Engine coolant temperature sensor	Engine coolant temperature		
Wheel sensor	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line.



This mechanism hydraulically controls cam phases continuously with the fixed operating angle of the intake valve.

The ECM receives signals such as crankshaft position, camshaft position, engine speed, and engine coolant temperature. Then, the ECM sends ON/OFF pulse duty signals to the intake valve timing control solenoid valve depending on driving status. This makes it possible to control the shut/open timing of the intake valve to increase engine torque in low/mid speed range and output in high-speed range.

COMPONENT DISCRIPTION

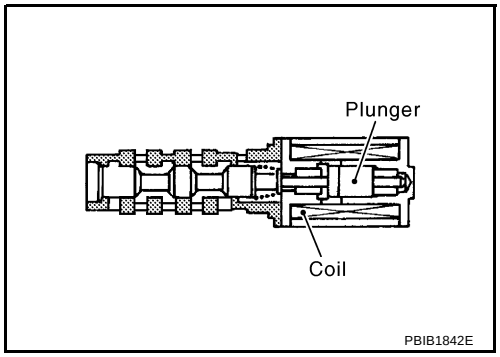
Intake valve timing control solenoid valve is activated by ON/OFF pulse duty (ratio) signals from the ECM.

The intake valve timing control solenoid valve changes the oil amount and direction of flow through intake valve timing control unit or stops oil flow.

The longer pulse width advances valve angle.

The shorter pulse width retards valve angle.

When ON and OFF pulse widths become equal, the solenoid valve stops oil pressure flow to fix the intake valve angle at the control position.



CONSULT-II Reference Value in Data Monitor Mode

BBS001N0

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/V TIM (B1)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	–5° - 5°CA
		2,000 rpm	Approx. 0° - 20°CA
INT/V SOL (B1)	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	0% - 2%
		2,000 rpm	Approx. 0% - 50%

On Board Diagnosis Logic

BBS001N1

The MI will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	Detecting condition	Possible cause
P0011 0011	Intake valve timing control performance	There is a gap between angle of target and phase-control angle degree.	● Harness or connectors (Intake valve timing control solenoid valve circuit is open or shorted.) ● Intake valve timing control solenoid valve ● Crankshaft position sensor (POS) ● Camshaft position sensor (PHASE) ● Accumulation of debris to the signal pick-up portion of the camshaft

FAIL-SAFE MODE

ECM enters in fail-safe mode when the malfunction is detected.

Detected items	Engine operating condition in fail-safe mode
Intake valve timing control	The signal is not energized to the solenoid valve and the valve control does not function

DTC Confirmation Procedure

BBS001N2

CAUTION:
Always drive at a safe speed.

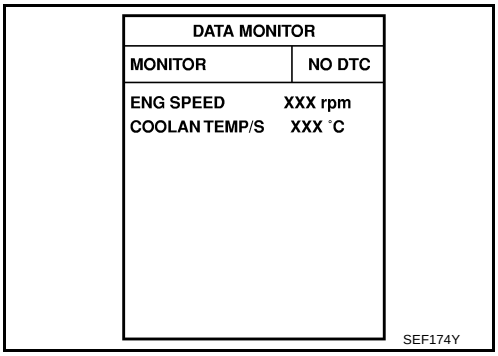
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is between 10V and 16V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and warm it up to the normal operating temperature.
3. Maintain the following conditions for at least 6 consecutive seconds.
   Hold the accelerator pedal as steady as possible.

ENG SPEED	1,200 - 2,000 (A constant rotation is maintained.)



COOLAN TEMP/S	60 - 120°C (140 - 248°F)
Selector lever	M/T: Neutral position A/T: P or N position

4. Stop vehicle with engine running and let engine idle for 10 seconds.
5. If the 1st trip DTC is detected, go to EC-643, "Diagnostic Procedure" .
   If the 1st trip DTC is not detected, go to next step.
6. Maintain the following conditions for at least 20 consecutive seconds.

ENG SPEED	2,000 - 3,175 rpm (A constant rotation is maintained.)
COOLAN TEMP/S	80 - 90°C (176 - 194°F)
Selector lever	1st or 2nd position
Driving location uphill	Driving vehicle uphill (Increased engine load will help maintain the driving conditions required for this test.)

7. If 1st trip DTC is detected, go to EC-643, "Diagnostic Procedure" .

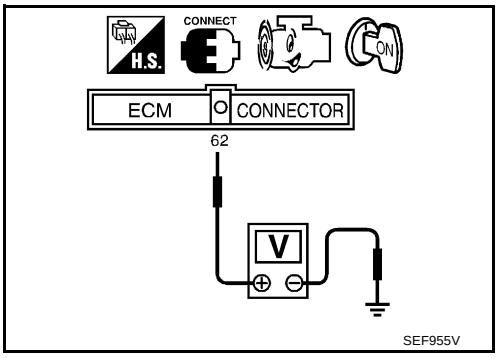
Overall Function Check

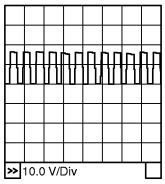
BBS001N3

Use this procedure to check the overall function of the intake valve timing control system. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Set the tester probe between ECM terminal 62 (IVT control solenoid valve signal) and ground.
5. Start engine and let it idle.
6. Check the voltage under the following conditions.
   Verify that the oscilloscope screen shows the signal wave as shown below.



Conditions	Voltage
AT idle	BATTERY VOLTAGE (11 - 14V)
2,000 rpm	Approximately 4V - BATTERY VOLTAGE (11 - 14V)★  PBIB1790E

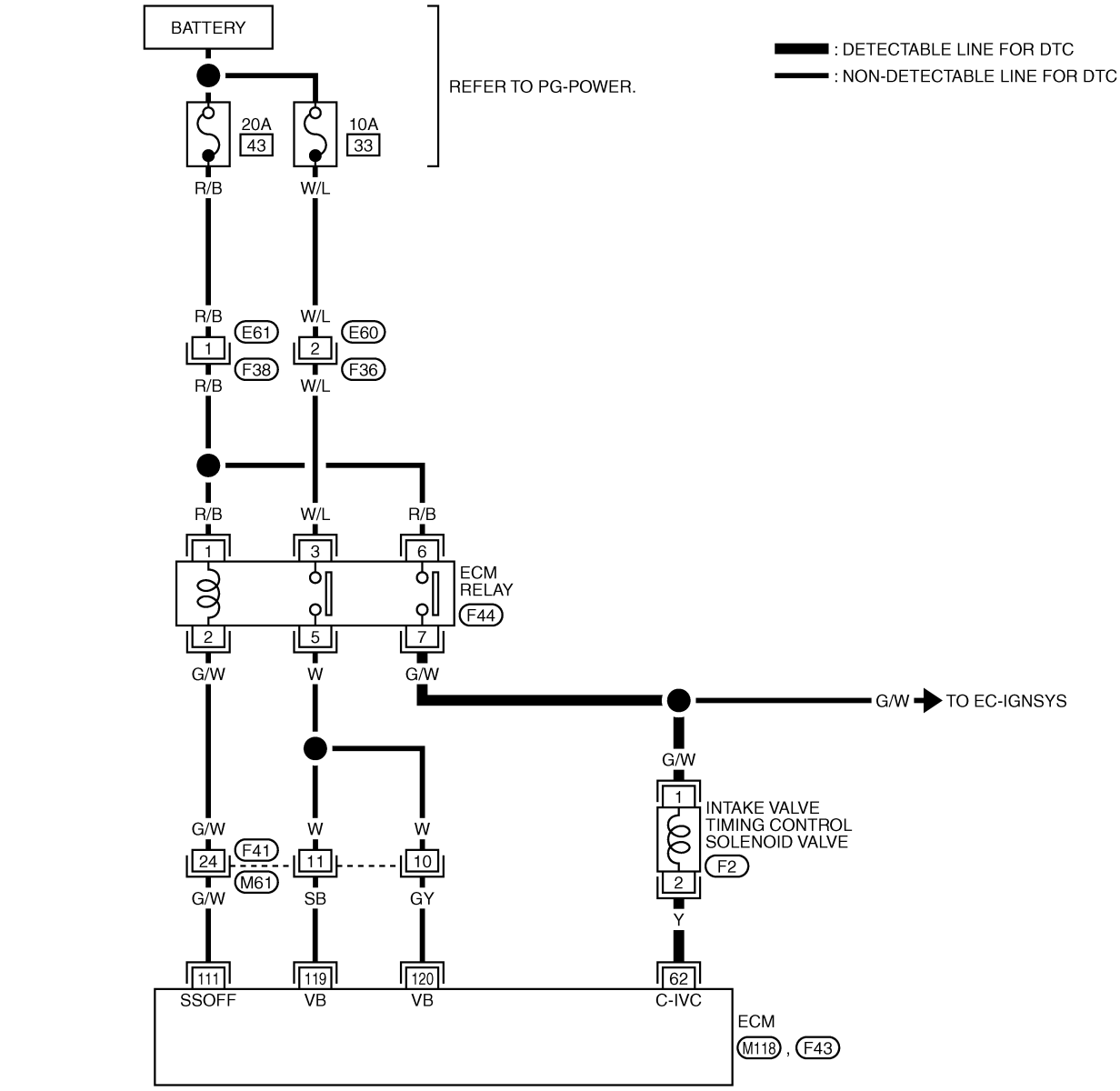
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

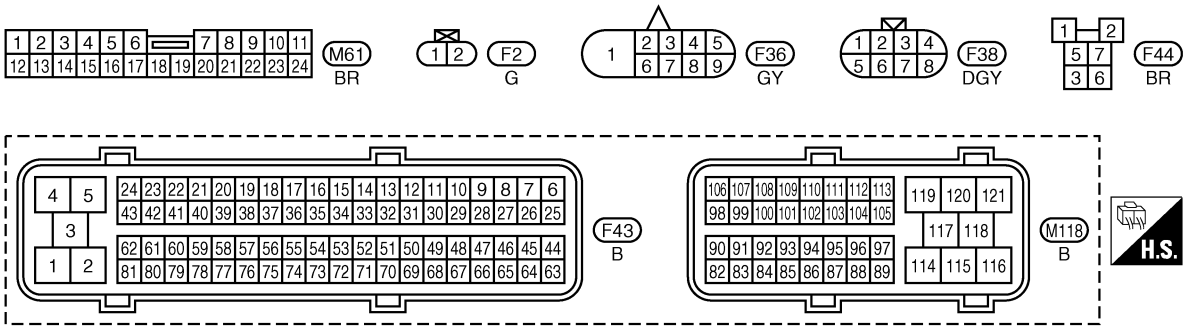
7. If NG, go to EC-643, "Diagnostic Procedure" .

Wiring Diagram

BBS001N4

EC-IVC-01

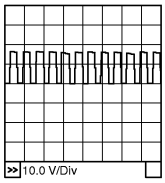




TBWA0612E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
62	Y	Intake valve timing control solenoid valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	Approximately 4V - BATTERY VOLTAGE (11 - 14V)★  PBIB1790E

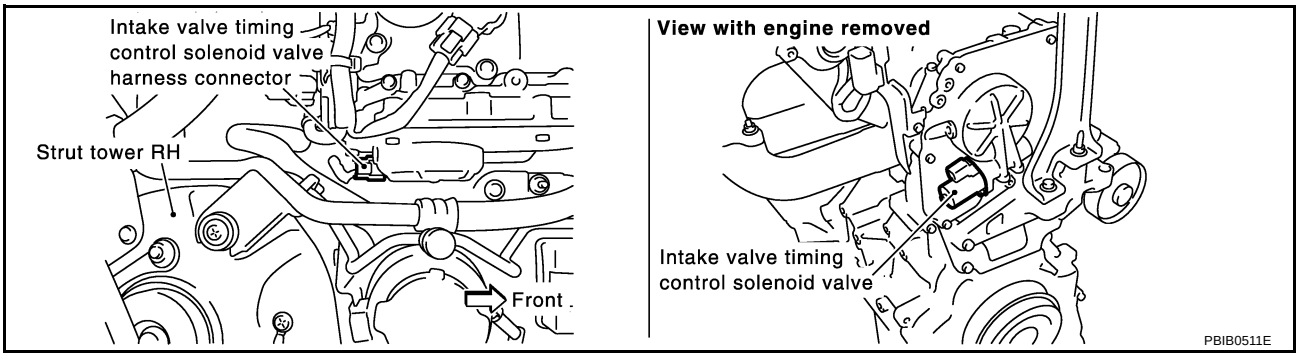
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001N5

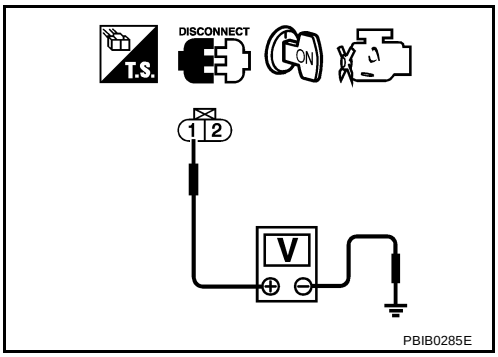
1. CHECK POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect intake valve timing control solenoid valve harness connector.



3. Turn ignition switch ON.
4. Check voltage between intake valve timing control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTION PART

Check harness for open or short between intake valve timing control solenoid valve and ECM relay.

>> Repair or replace harness or connectors.

3. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between intake valve timing control solenoid valve terminal 2 and ECM terminal 62. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EC-645, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace intake valve timing control solenoid valve.

5. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-638, "DTC P0011 IVT CONTROL" .

OK or NG

OK >> GO TO 6.
NG >> Replace crankshaft position sensor (POS).

6. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-710, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace camshaft position sensor (PHASE).

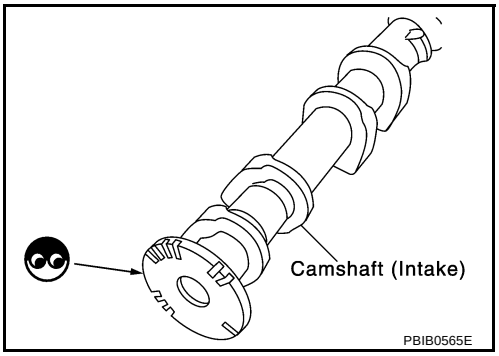
7. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 8.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
For wiring diagram refer to EC-697, "Wiring Diagram" for CKP sensor (POS) and EC-705, "Wiring Diagram" for CMP sensor (PHASE).

>> **INSPECTION END**

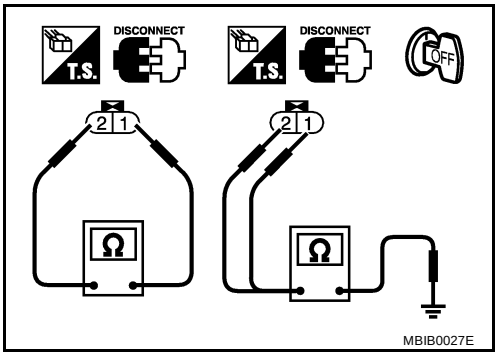
Component Inspection

BBS001N6

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

1. Disconnect intake valve timing control solenoid valve harness connector.
2. Check resistance between intake valve timing control solenoid valve terminals 1 and 2 under the following conditions.

Terminals	Resistance
1 and 2	Approximately 8Ω at 20°C (68°F)
1 or 2 and ground	∞Ω (Continuity should not exist)



Removal and Installation

BBS001N7

INTAKE VALVE TIMING CONTROL SOLENOID VALVE

Refer to EM-46, "TIMING CHAIN" .

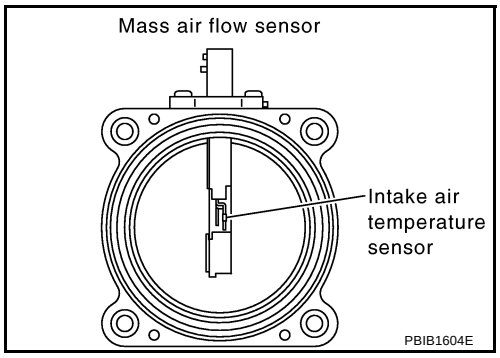
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

BBS001N8

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire is a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

BBS001N9

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
MAS A/F SE-B1	See EC-622, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .	

On Board Diagnosis Logic

BBS001NA

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air leaks ● Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Detected items	Engine operating condition in fail-safe mode
Mass air flow sensor circuit	Engine speed will not rise more than 2,400 rpm due to the fuel cut.

DTC Confirmation Procedure

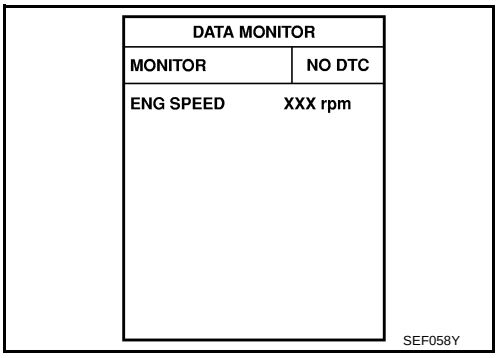
BBS001NB

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P0102

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and wait at least 5 seconds.
4. If DTC is detected, go to EC-649, "Diagnostic Procedure" .



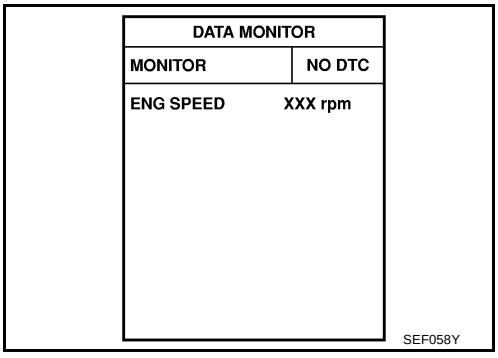
Without CONSULT-II

1. Start engine and wait 5 seconds at most.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-649, "Diagnostic Procedure" .

PROCEDURE FOR DTC P0103

With CONSULT-II

1. Turn ignition switch ON
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-649, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Start engine and wait at least 5 seconds.
6. If DTC is detected, go to EC-649, "Diagnostic Procedure" .



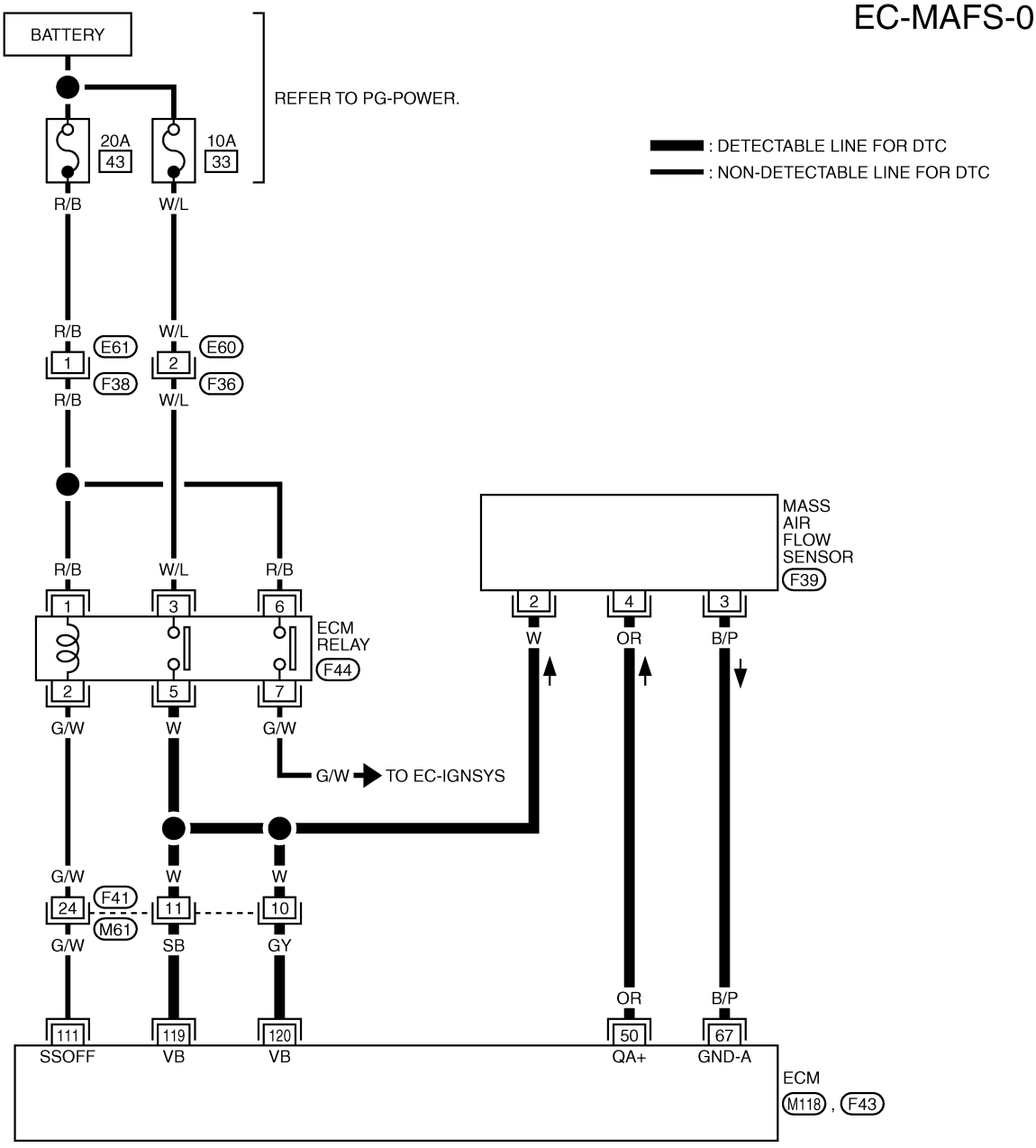
Without CONSULT-II

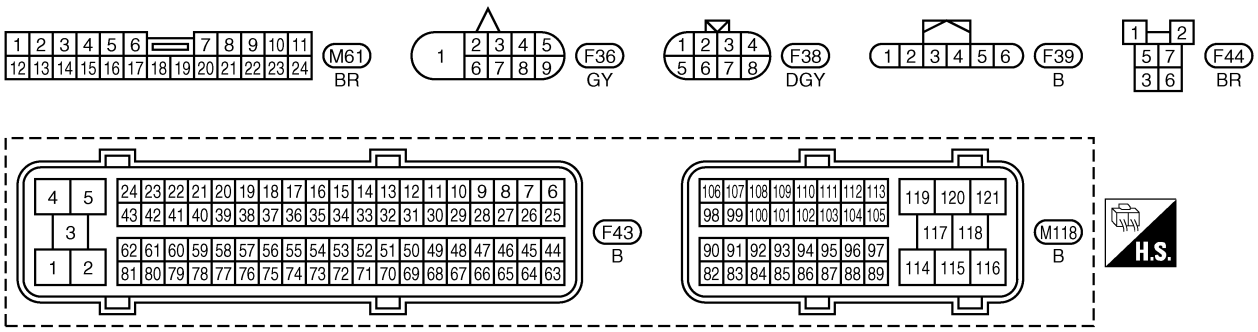
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-649, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and wait at least 5 seconds.
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
9. If DTC is detected, go to EC-649, "Diagnostic Procedure" .

Wiring Diagram

BBS001NC

EC-MAFS-01





TBWA0598E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
50	OR	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.4V
			[Engine is running] ● **Warm-up condition** ● Idle speed	0.7 - 1.1V (QR20DE) 0.8 - 1.2V (QR25DE)
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm	0.7 - 1.1 to Approximately 4.0V (QR20DE) 0.8 - 1.2 to Approximately 4.0V (QR25DE) (Check for liner voltage rise in response to engine being increased to about 4,000 rpm.)
67	B/P	Sensor ground (Mass air flow sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001ND

1. INSPECTION START

Which malfunction (P0102 or P0103) is duplicated?

P0102 or P0103

P0102 >> GO TO 2.
P0103 >> GO TO 3.

2. CHECK INTAKE SYSTEM

Check the following for connection.

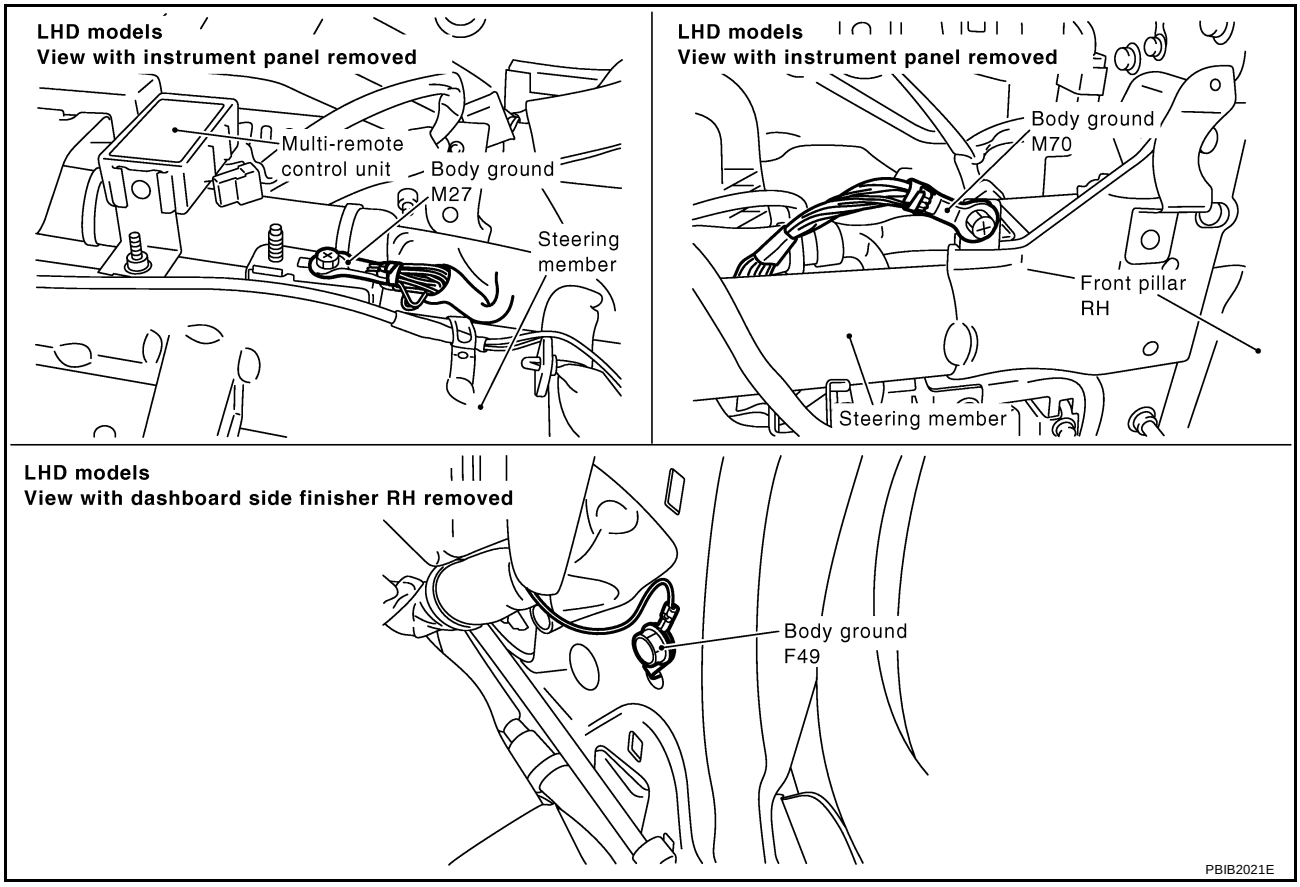
- Air duct
- Vacuum hoses
- Intake air passage between air duct to intake manifold

OK or NG

OK >> GO TO 3.
NG >> Reconnect the parts.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

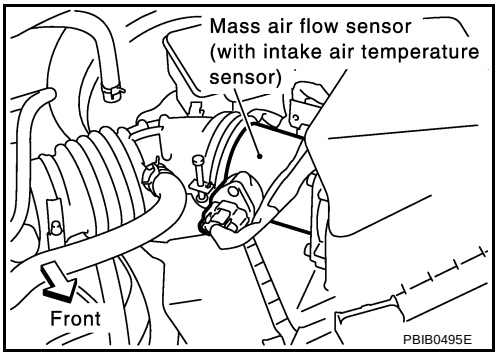


OK or NG

OK >> GO TO 4.
NG >> Repair or replace ground connections.

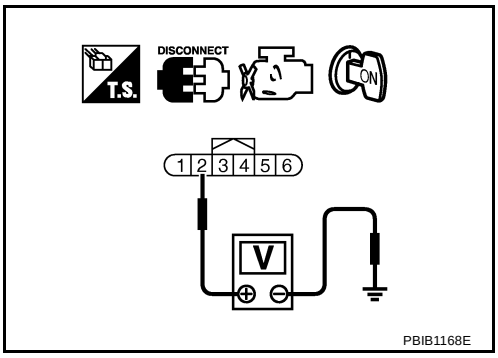
4. CHECK MAF SENSOR POWER SUPPLY CIRCUIT

1. Disconnect MAF sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between MAF sensor terminals 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F41, M61
- Harness for open or short between mass air flow sensor and ECM
- Harness for open or short between mass air flow sensor and ECM relay

>> Repair harness or connectors.

6. CHECK MAF SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 3 and ECM terminal 67. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK MAF SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between MAF sensor terminal 4 and ECM terminal 50.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK MASS AIR FLOW SENSOR

Refer to EC-652, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass air flow sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001NE

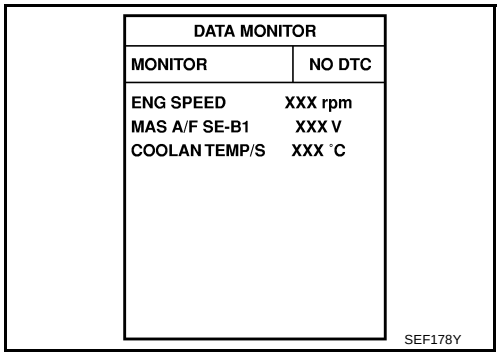
MASS AIR FLOW SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.
4. Select “MAS A/F SE-B1” and check indication under the following conditions.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1V (QR20DE) 0.8 - 1.2V (QR25DE)
Idle to about 4,000 rpm	0.7 - 1.1 to 2.4 (QR20DE)* 0.8 - 1.2 to 2.4 (QR25DE)*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.



5. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

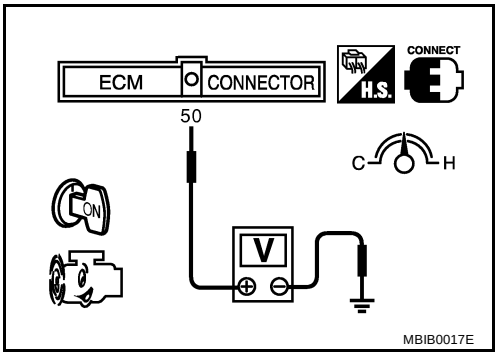
6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 50 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	0.7 - 1.1V (QR20DE) 0.8 - 1.2V (QR25DE)
Idle to about 4,000 rpm	0.7 - 1.1 to 2.4 (QR20DE)* 0.8 - 1.2 to 2.4 (QR25DE)*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.



4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

BBS001NF

MASS AIR FLOW SENSOR

Refer to EM-16, "AIR CLEANER AND AIR DUCT" .

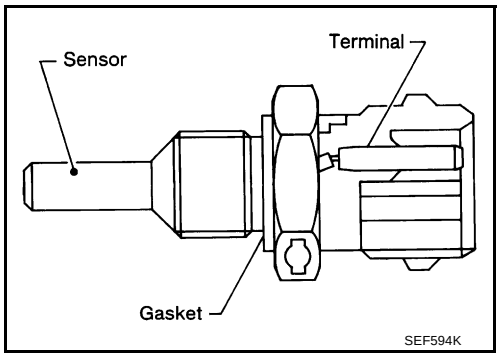
DTC P0117, P0118 ECT SENSOR

PFP:22630

Component Description

BBS001NG

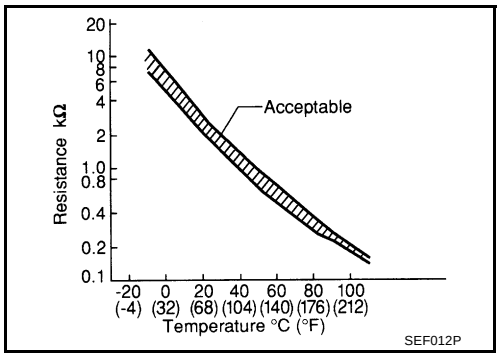
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
–10 (14)	4.4	7.0 - 11.4
20 (68)	3.5	2.1 - 2.9
50 (122)	2.2	0.68 - 1.00
90 (194)	0.9	0.236 - 0.260

*: This data is reference value and is measured between ECM terminal 72 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

BBS001NH

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

FAIL-SAFE MODE

When this malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Detected items	Engine operating condition in fail-safe mode	
Engine coolant temperature sensor circuit	Engine coolant temperature will be determined by ECM based on the time after turning ignition switch ON or START. CONSULT-II displays the engine coolant temperature decided by ECM.	
	Condition	Engine coolant temperature decided (CONSULT-II display)
	Just as ignition switch is turned ON or START	40°C (104°F)
	More than approx. 4 minutes after ignition ON or START	80°C (176°F)
	Except as shown above	40 - 80°C (104 - 176°F) (Depends on the time)
	When the fail-safe system for engine coolant temperature sensor is activated, the cooling fan operates while engine is running.	

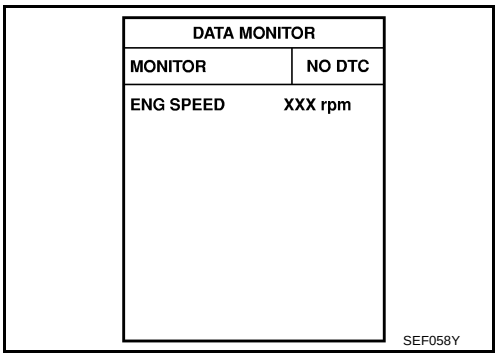
DTC Confirmation Procedure

BBS001NI

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-657, "Diagnostic Procedure" .



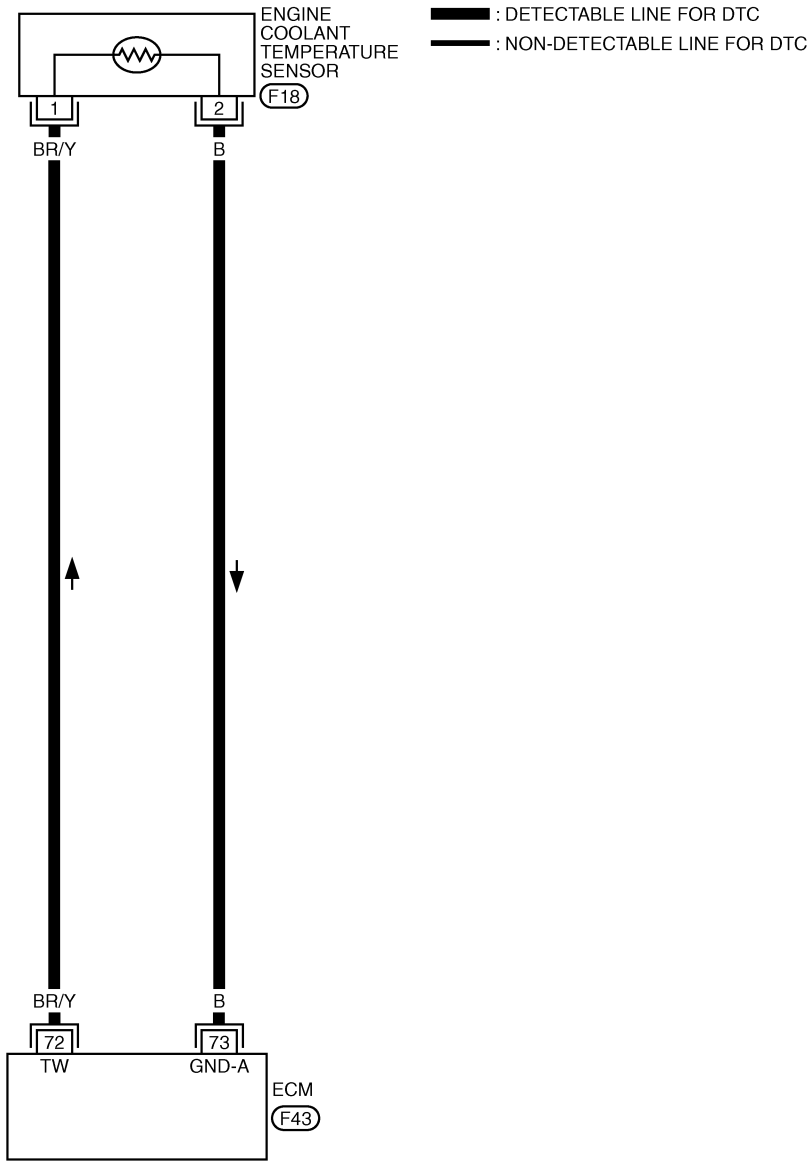
WITHOUT CONSULT-II

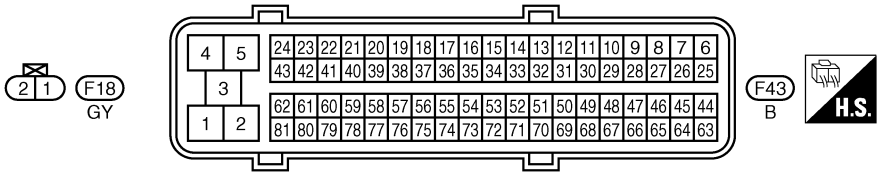
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-657, "Diagnostic Procedure" .

Wiring Diagram

BBS001NJ

EC-ECTS-01





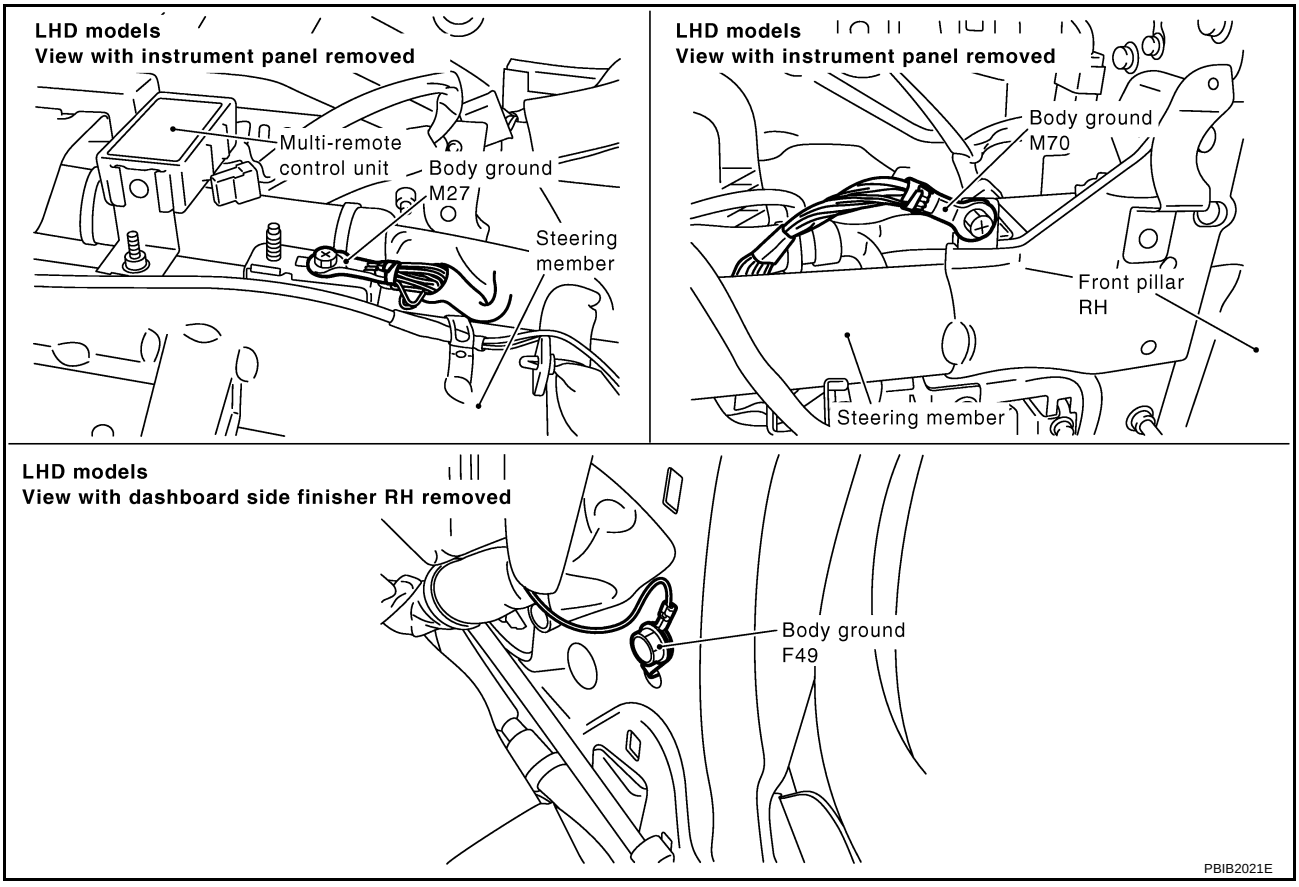
TBWA0600E

Diagnostic Procedure

BBS001NK

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

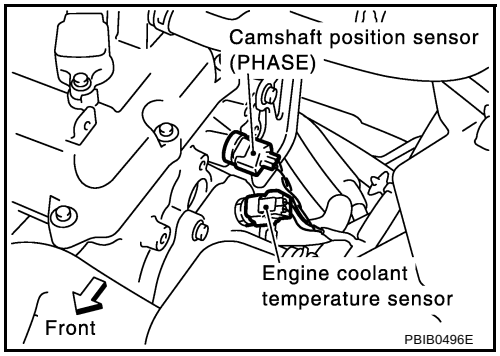


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

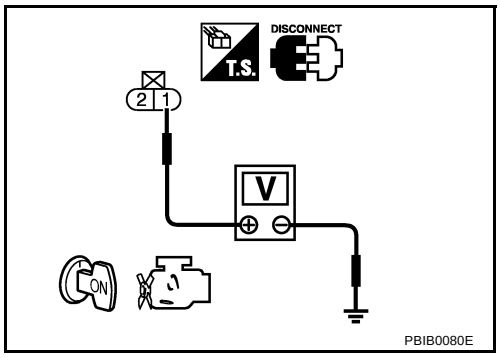
2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature (ECT) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 73. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-659, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

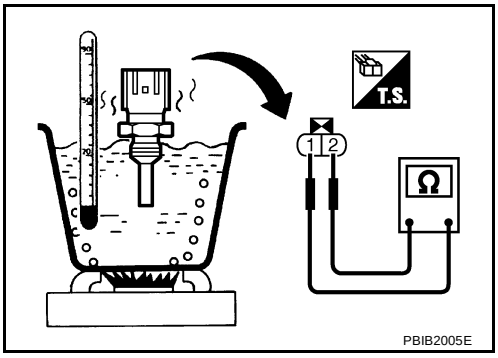
>> **INSPECTION END**

Component Inspection

BBS001NL

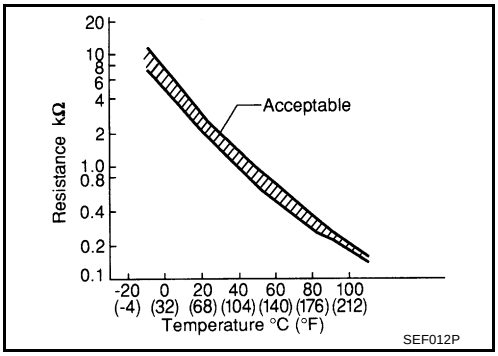
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

BBS001NM

ENGINE COOLANT TEMPERATURE SENSOR

Refer to CO-23, "THERMOSTAT AND WATER CONTROL VALVE" .

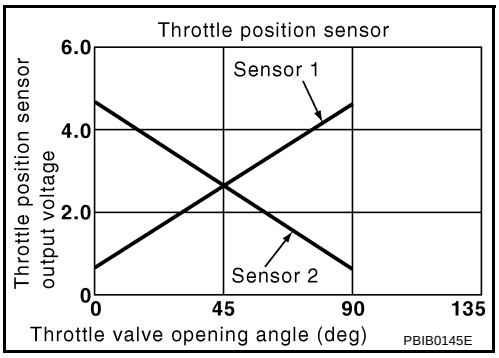
DTC P0122, P0123 TP SENSOR

PFP:16119

Component Description

BBS001NN

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

BBS001NO

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

BBS001NP

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Throttle position sensor 2 circuit low input	An excessively low voltage from the TP sensor 2 is sent to ECM.	● Harness or connectors (TP sensor 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 2) ● Accelerator pedal position sensor (APP sensor 2)
P0123 0123	Throttle position sensor 2 circuit high input	An excessively high voltage from the TP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

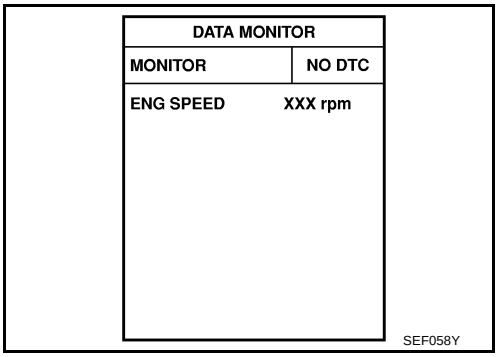
DTC Confirmation Procedure

BBS001NQ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-664, "Diagnostic Procedure" .



WITHOUT CONSULT-II

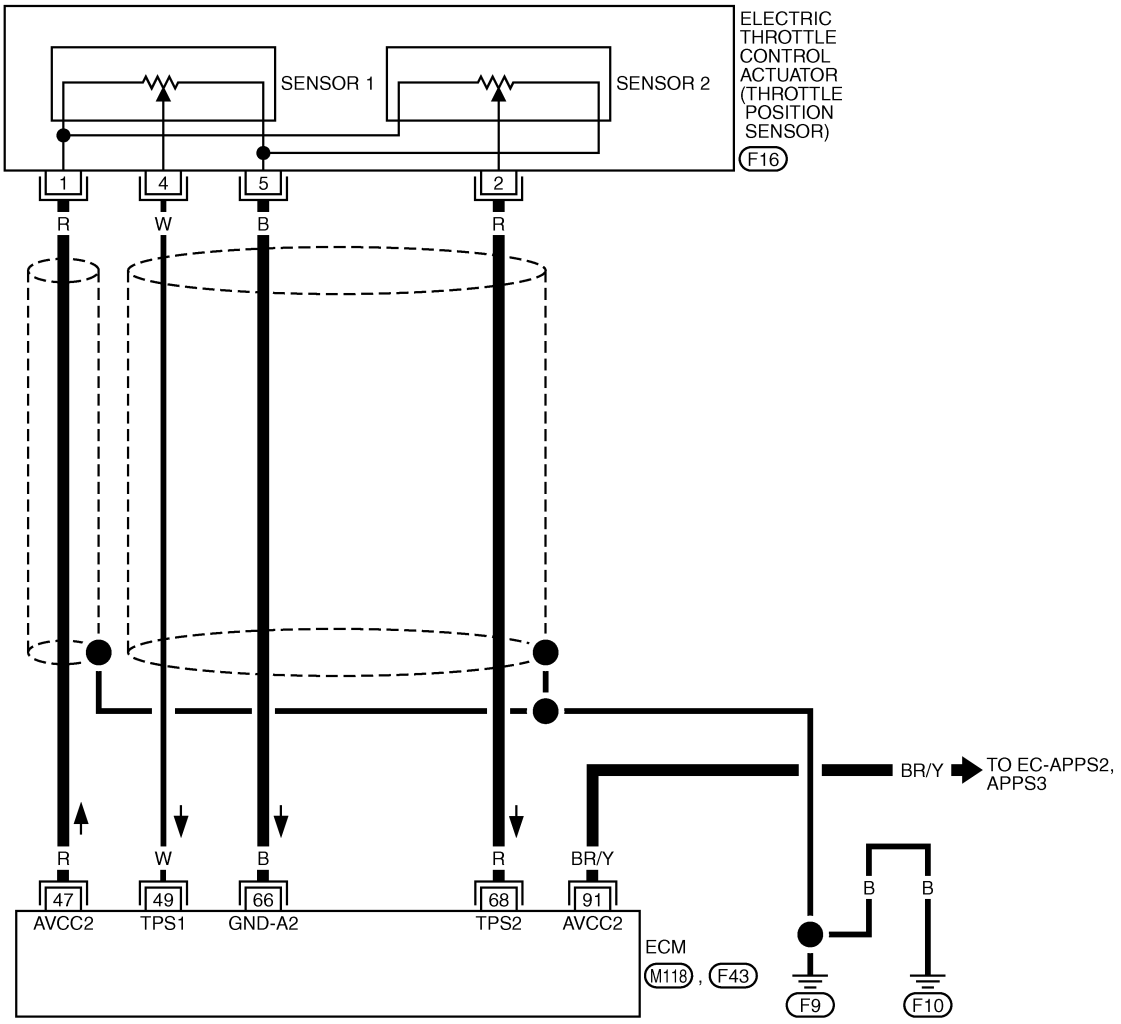
1. Start engine and let it idle for 1 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-664, "Diagnostic Procedure" .

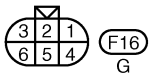
Wiring Diagram

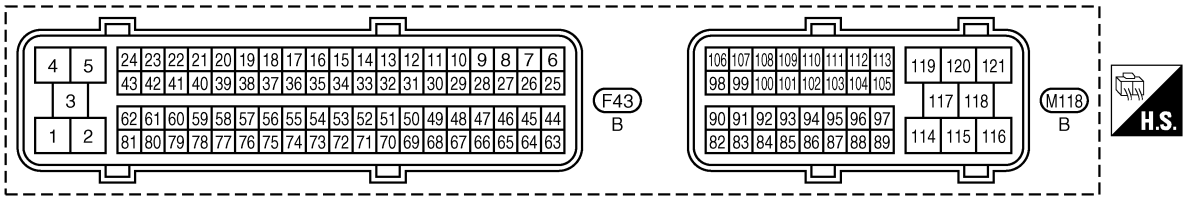
BBS001NR

EC-TPS2-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC







TBWB0260E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

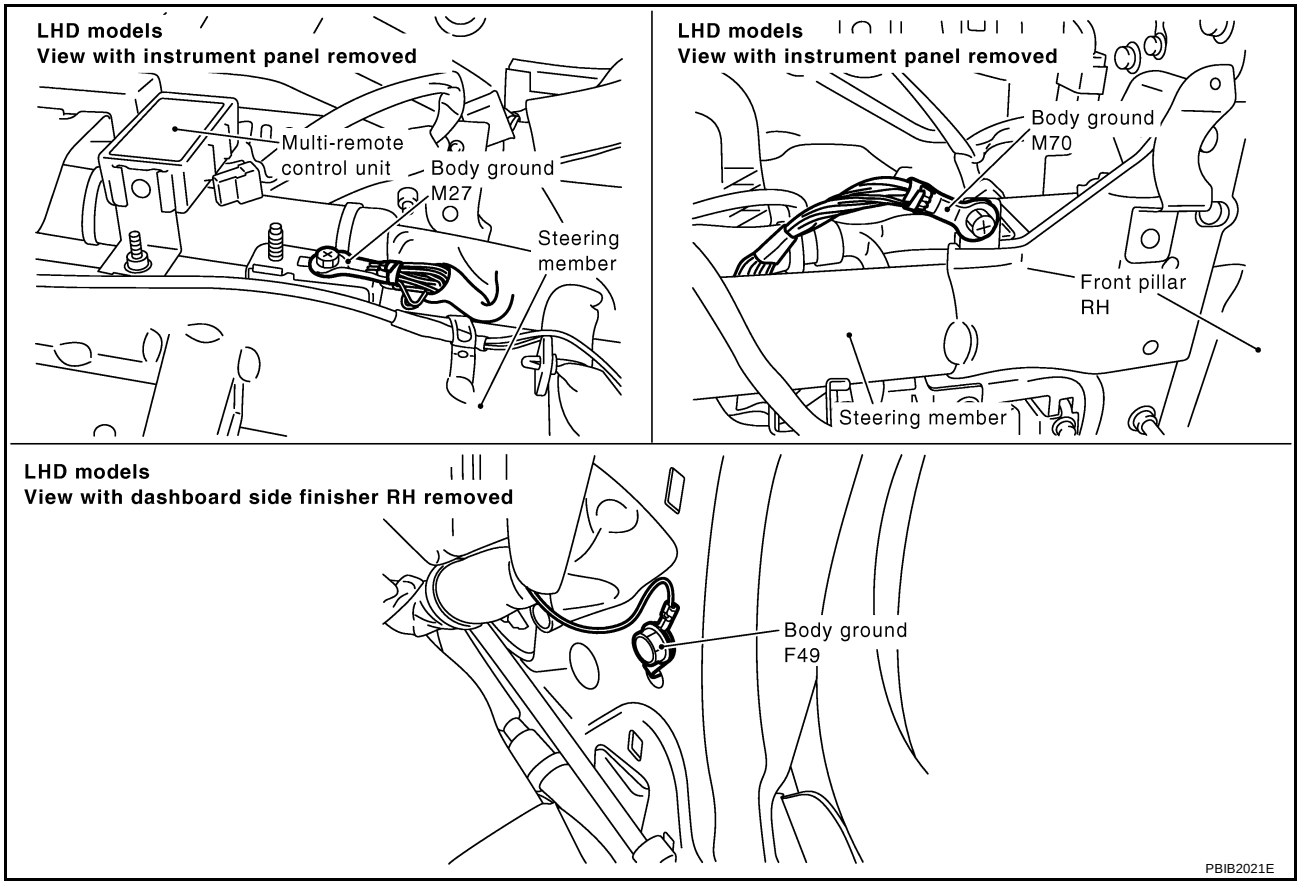
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	R	Throttle position sensor power supply	**[Ignition switch: ON]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

BBS001NS

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

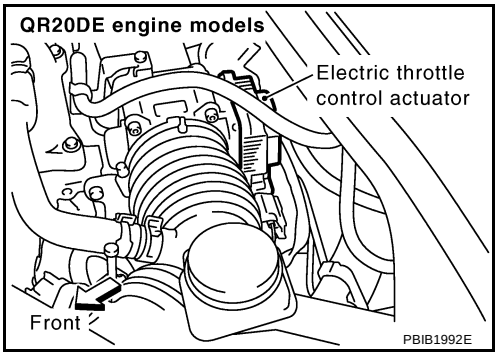


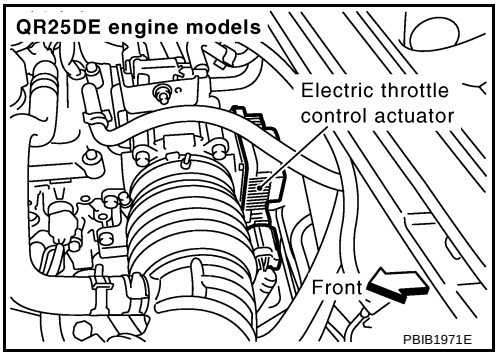
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-I

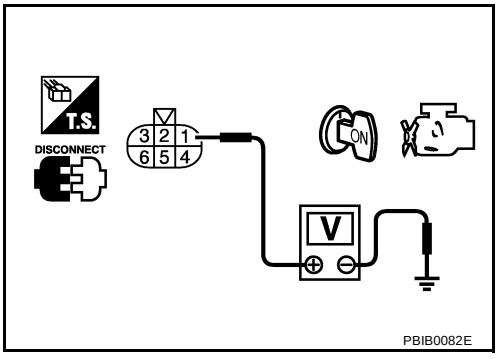
1. Disconnect electric throttle control actuator harness connector.





2. Turn ignition switch ON.
3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK THROTTLE POSITION SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-662
91	APP sensor terminal 4	EC-842

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-847, "Component Inspection" .

OK or NG

OK >> GO TO 11
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-562, "Accelerator Pedal Released Position Learning" .
3. Perform EC-563, "Throttle Valve Closed Position Learning" .
4. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between electric throttle control actuator terminal 2 ECM terminal 68. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-667, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

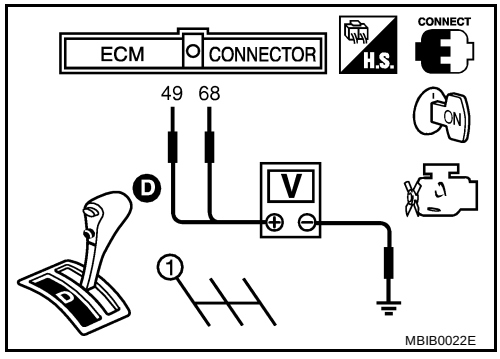
Component Inspection

BBS001NT

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T) or 1st position (M/T).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-563, "Throttle Valve Closed Position Learning" .
8. Perform EC-563, "Idle Air Volume Learning" .

Removal and Installation

BBS001NU

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

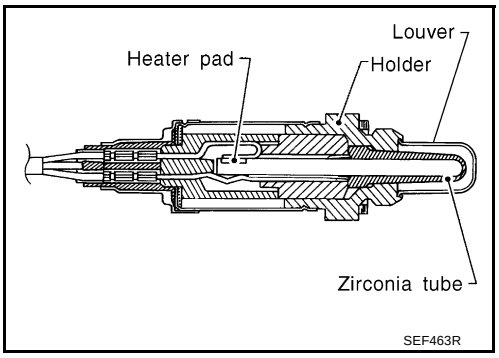
DTC P0132 HO2S1

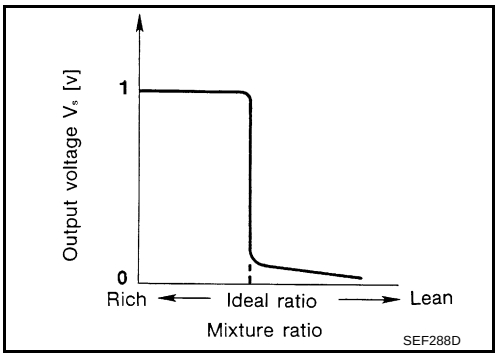
PFP:22690

Component Description

BBS001NV

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

BBS001NW

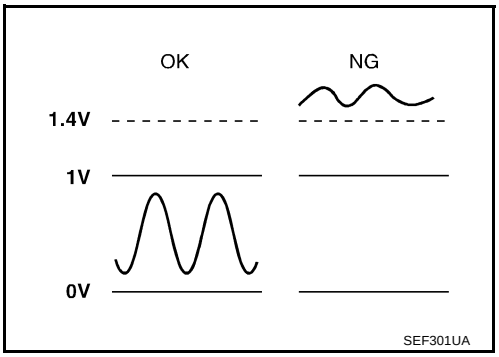
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

BBS001NX

To judge the malfunction, the diagnosis checks that the heated oxygen sensor 1 output is not inordinately high.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0132 0132	Heated oxygen sensor 1 circuit high voltage	An excessively high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1

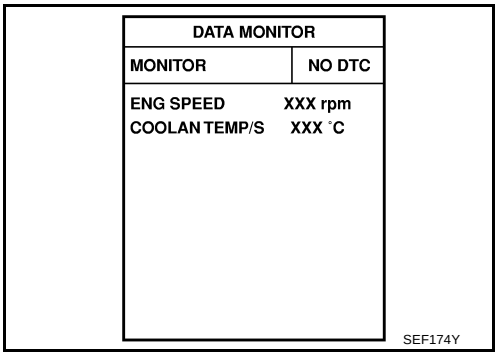
DTC Confirmation Procedure

BBS001NY

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Restart engine and let it idle for 2 minutes.
6. If 1st trip DTC is detected, go to EC-671, "Diagnostic Procedure" .



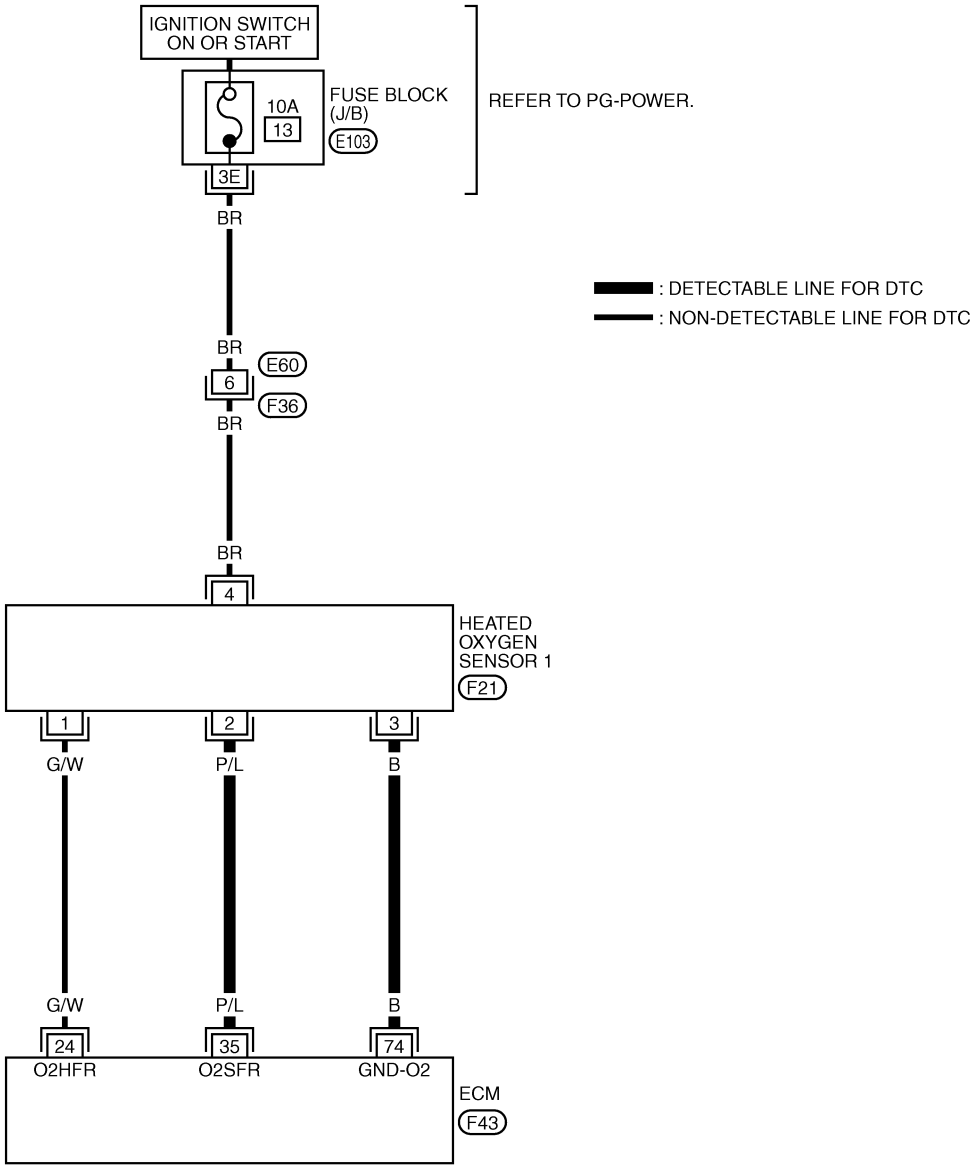
WITHOUT CONSULT-II

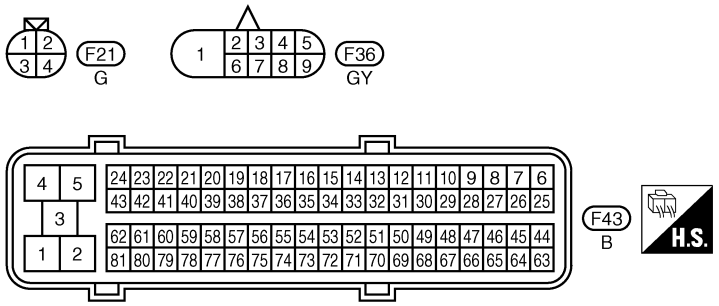
1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Restart engine and let it idle for 2 minutes.
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
6. If 1st trip DTC is detected, go to EC-671, "Diagnostic Procedure" .

Wiring Diagram

BBS001NZ

EC-HO2S1-01





REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0602E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

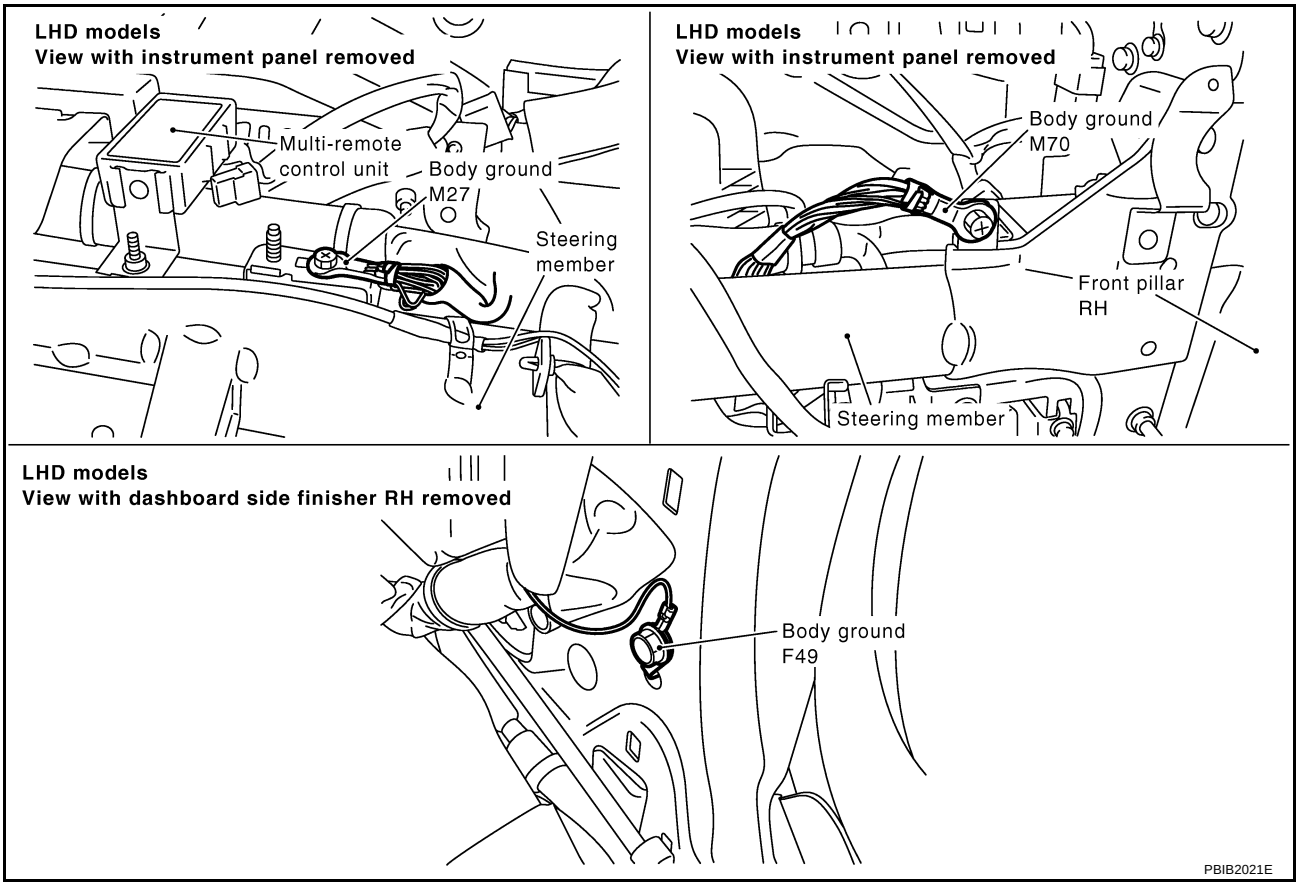
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	P/L	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001O0

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .



OK or NG

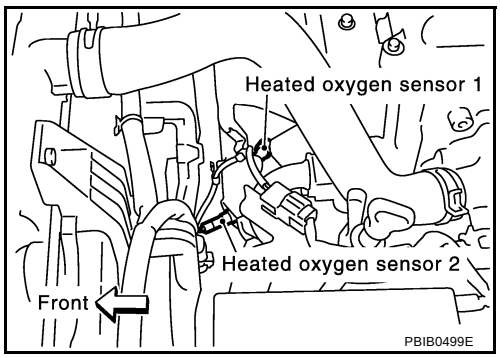
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. RETIGHTEN HEATED OXYGEN SENSOR 1

1. Loosen and retighten heated oxygen sensor 1.

Tightening torque: 40 - 60 N·m (4.1 - 6.2 kg-m, 30 - 44 ft-lb)

>> GO TO 3.



3. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

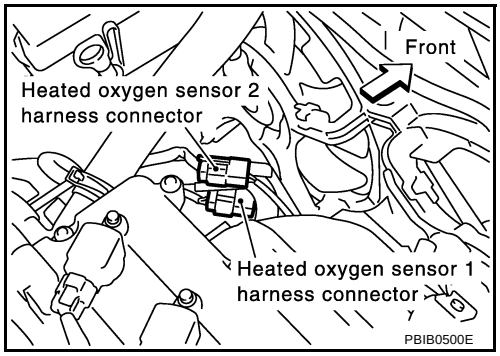
1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground.
   Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HO2S1 CONNECTOR FOR WATER

Check heated oxygen sensor 1 connectors for water.

Water should not exist.

OK or NG

OK >> GO TO 6.
NG >> Repair or replace harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-673, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 1.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001O1

HEATED OXYGEN SENSOR 1

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.

DATA MONITOR	
MONITOR	NO DTC
ENG SPEED	XXX rpm
MAS A/F SE-B1	XXX V
COOLAN TEMP/S	XXX °C
HO2S1 (B1)	XXX V
HO2S1 MNTR (B1)	LEAN

SEF646Y

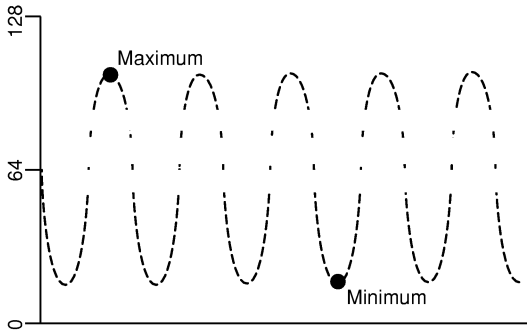
6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.

cycle	1	2	3	4	5
HO2S1 MNTR (B1)	R-L	R-L	R-L	R-L	R-L

R means HO2S1 MNTR (B1) indicates RICH
L means HO2S1 MNTR (B1) indicates LEAN

SEF217YA

Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



SEF648Y

- Maximum voltage should be over 0.6V at least one time.
- Minimum voltage should be below 0.30V at least one time.

CAUTION:

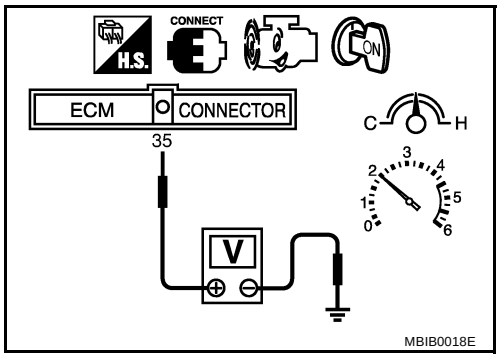
- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001O2

HEATED OXYGEN SENSOR 1

Refer to EM-25, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

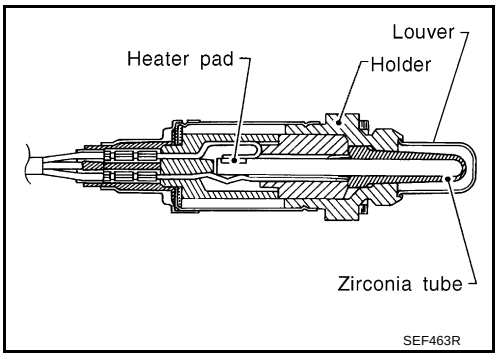
DTC P0134 HO2S1

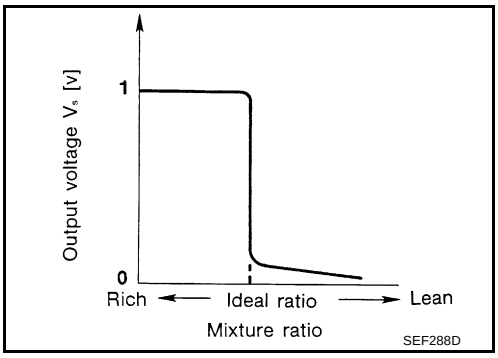
PFP:22690

Component Description

BBS001O3

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

BBS001O4

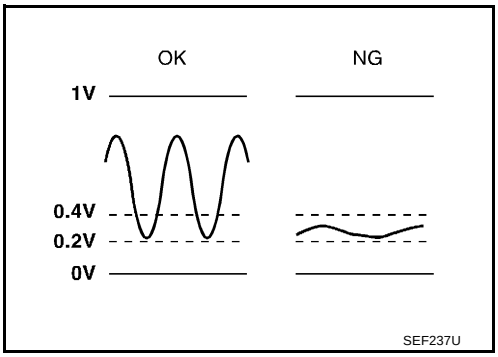
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ⟷ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ⟷ RICH Changes more than 5 times during 10 seconds.

On Board Diagnosis Logic

BBS001O5

Under the condition in which the heated oxygen sensor 1 signal is not input, the ECM circuits will read a continuous approximately 0.3V. Therefore, for this diagnosis, the time that output voltage is within 200 to 400 mV range is monitored, and the diagnosis checks that this time is not inordinately long.



DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0134 0134	Heated oxygen sensor 1 circuit no activity detected	The voltage from the sensor is constantly approx. 0.3V.	● Harness or connectors (The sensor circuit is open or shorted.) ● Heated oxygen sensor 1

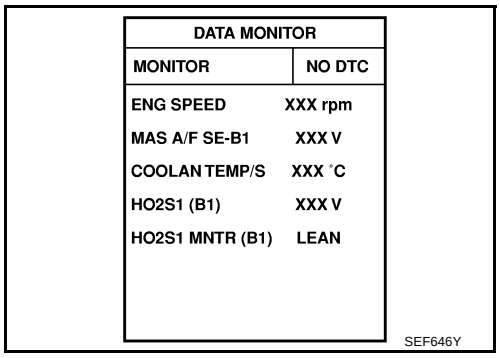
Overall Function Check

BBS001O6

Use this procedure to check the overall function of the heated oxygen sensor 1 circuit. During this check, a 1st trip DTC might not be confirmed.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” in “DATA MONITOR” mode with CONSULT-II, and select “H02S1 (B1)”.
3. Hold engine speed at 2,000 rpm under no load.
4. Make sure that the indications do not remain in the range between 0.2V to 0.4V.
5. If NG, go to EC-678, "Diagnostic Procedure" .

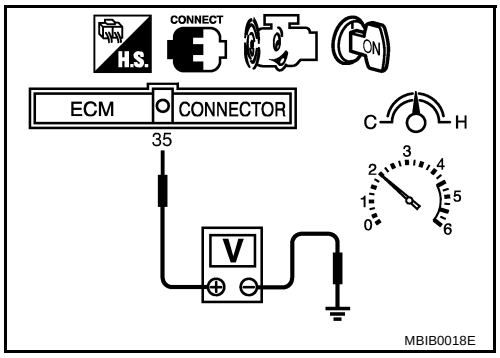


WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.

- The voltage does not remain in the range of 0.2 to 0.4V.

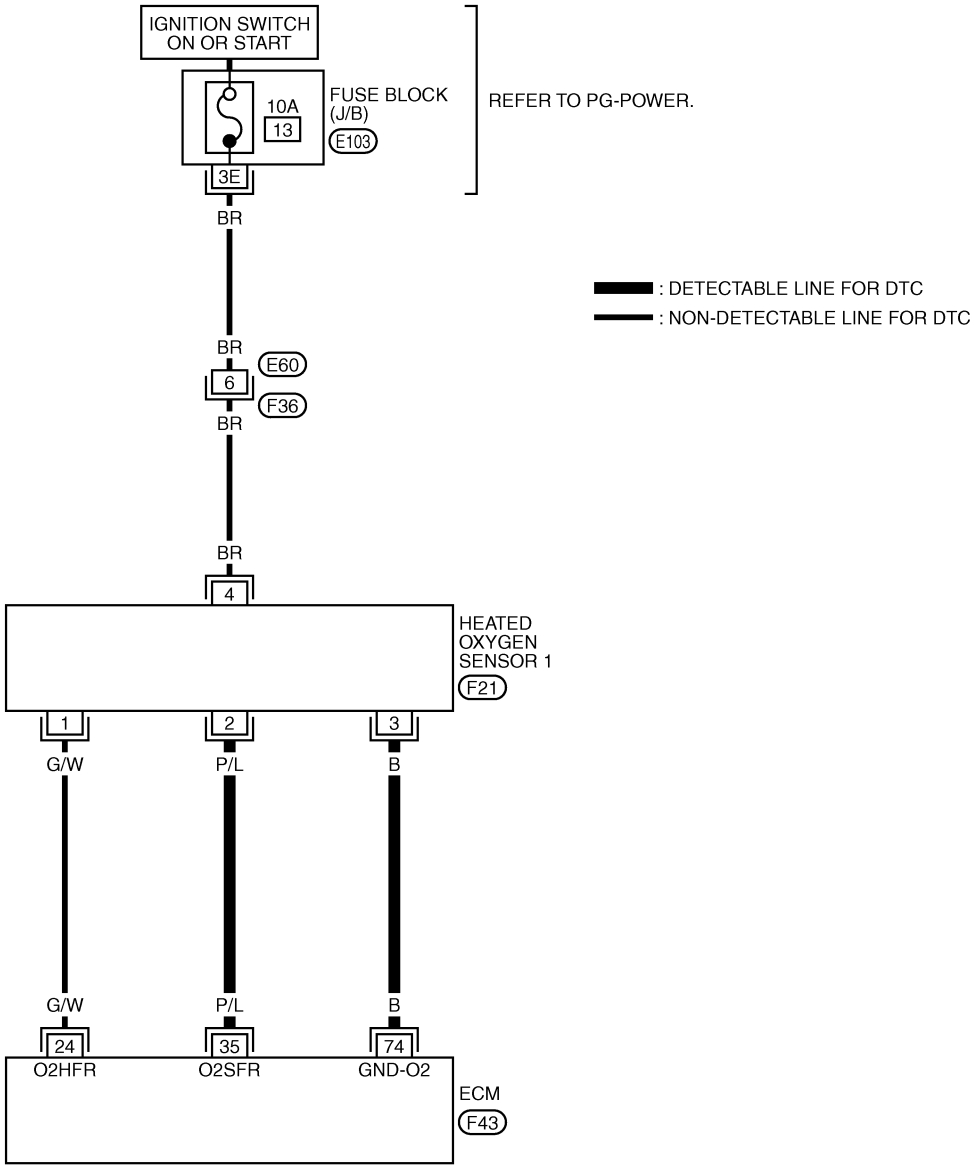
4. If NG, go to EC-678, "Diagnostic Procedure" .

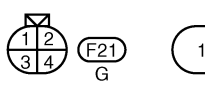


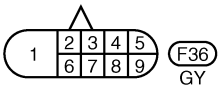
Wiring Diagram

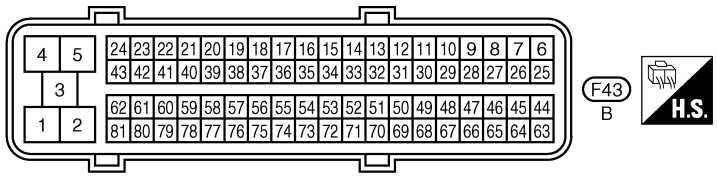
BBS001O7

EC-HO2S1-01









REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0602E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

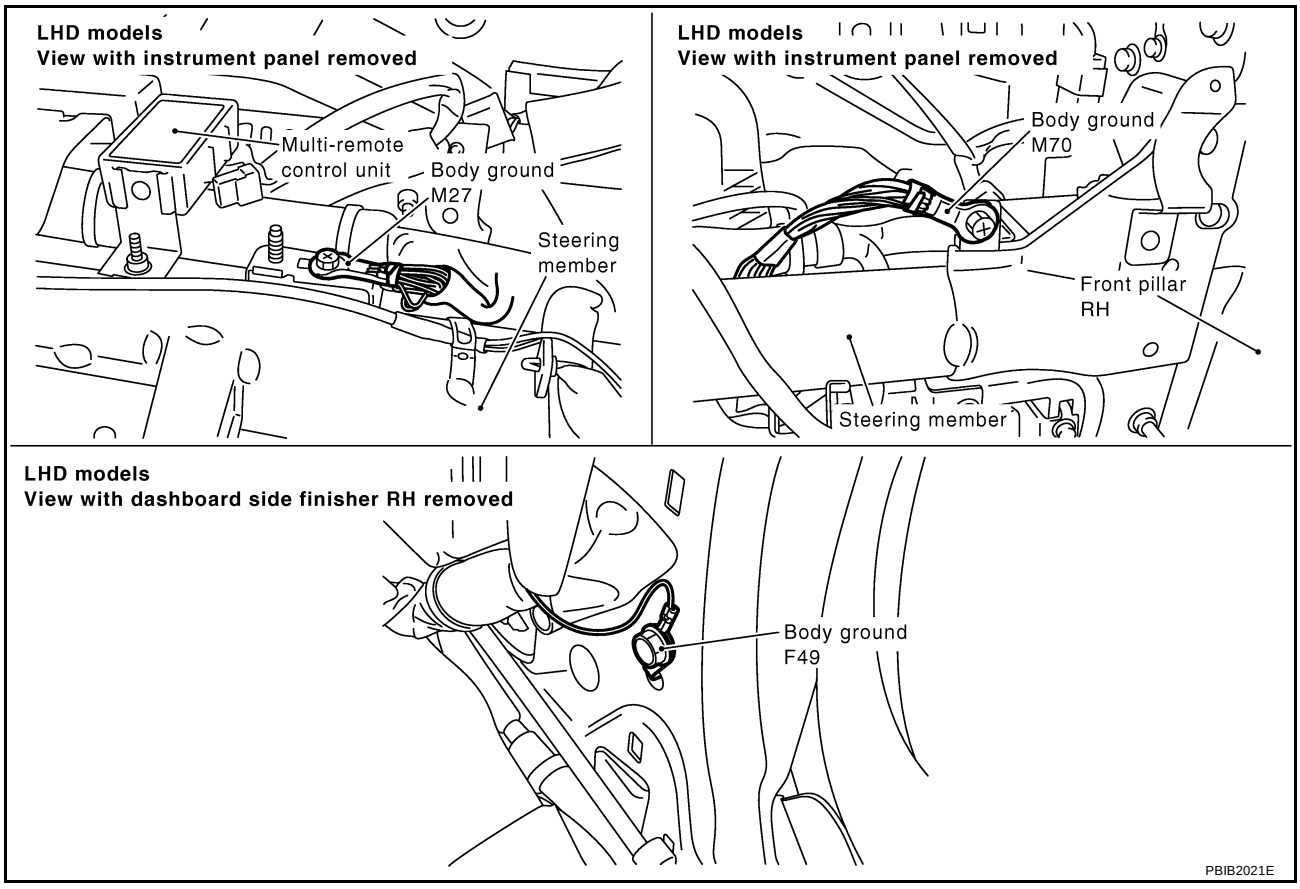
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	P/L	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001O8

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

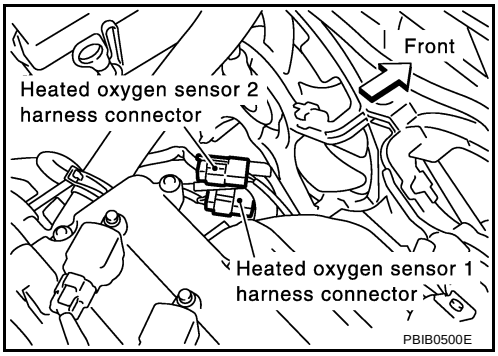
1. Disconnect heated oxygen sensor 1 harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground. Refer to Wiring Diagram.

Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-679, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace heated oxygen sensor 1.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

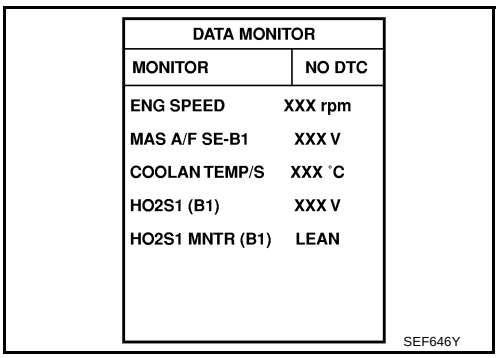
BBS001O9

HEATED OXYGEN SENSOR 1

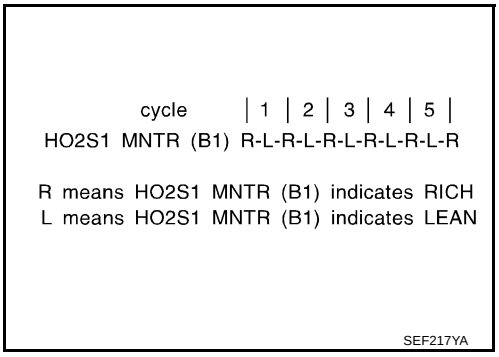
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.

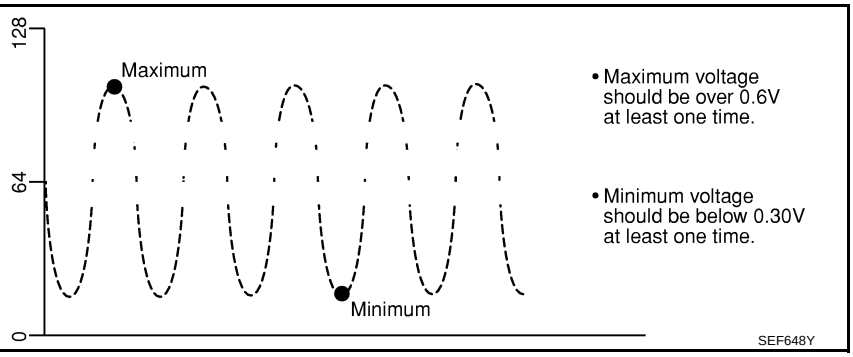
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.



6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown at right.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.



Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



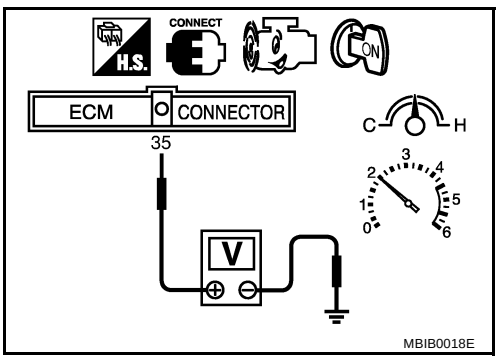
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**

- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001OA

HEATED OXYGEN SENSOR 1

Refer to EM-25, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

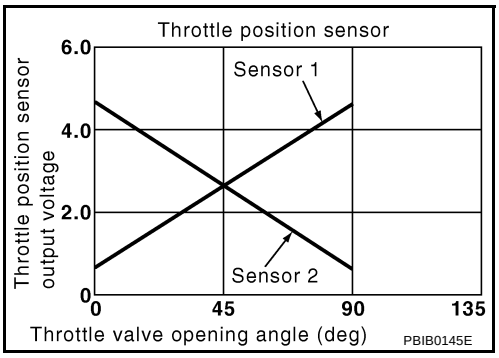
DTC P0222, P0223 TP SENSOR

PFP:16119

Component Description

BBS001OB

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

BBS001OC

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

BBS001OD

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Throttle position sensor 1 circuit low input	An excessively low voltage from the TP sensor 1 is sent to ECM.	● Harness or connectors (TP sensor 1 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1) ● Accelerator pedal position sensor (APP sensor 2)
P0223 0223	Throttle position sensor 1 circuit high input	An excessively high voltage from the TP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

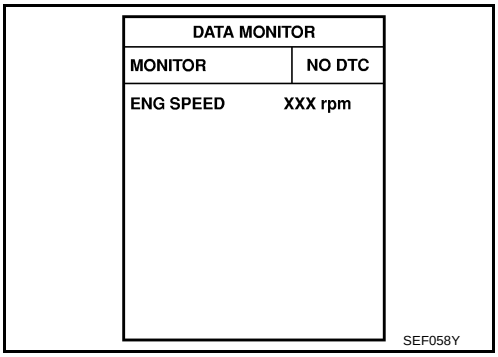
DTC Confirmation Procedure

BBS001OE

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-686, "Diagnostic Procedure" .



WITHOUT CONSULT-II

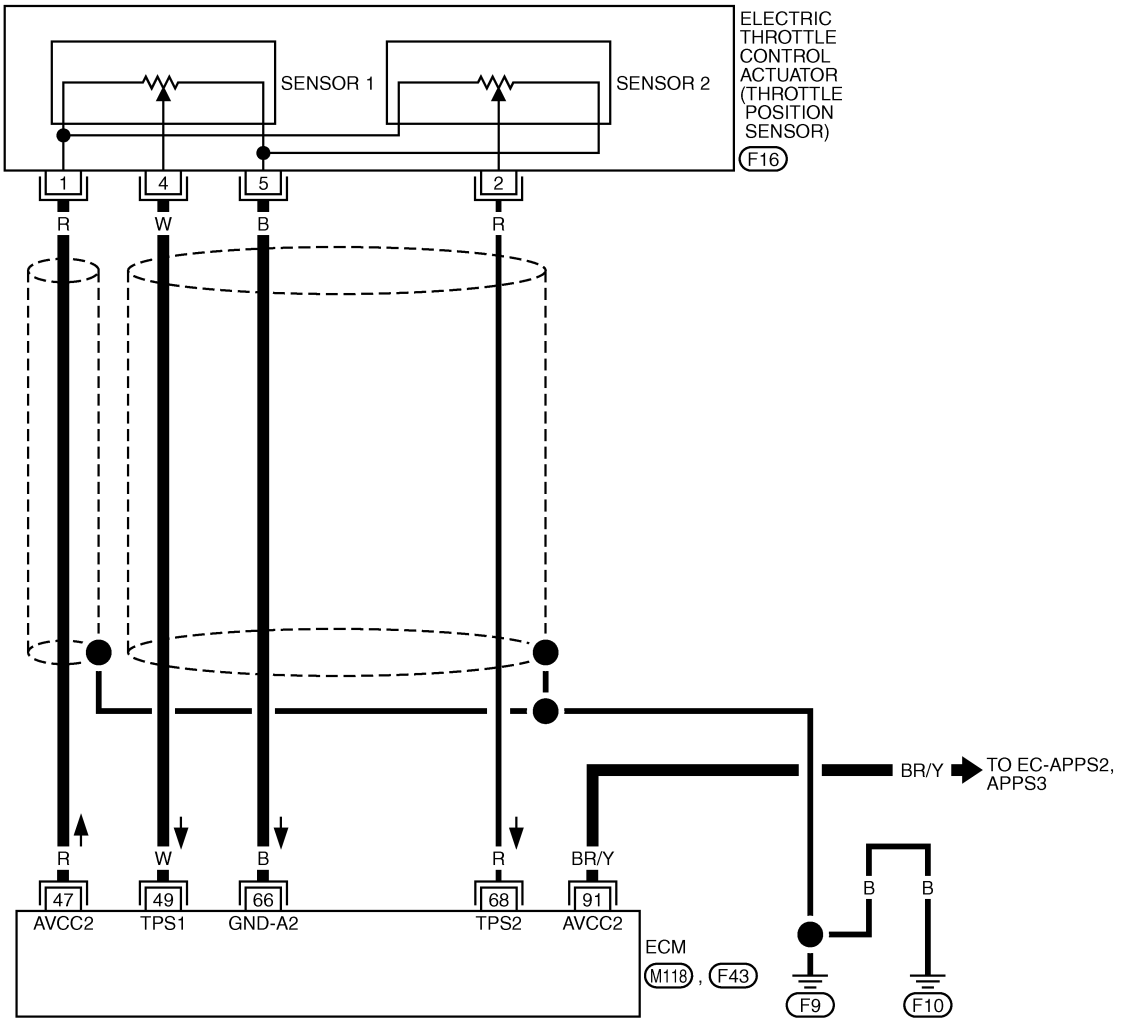
1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-686, "Diagnostic Procedure" .

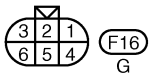
Wiring Diagram

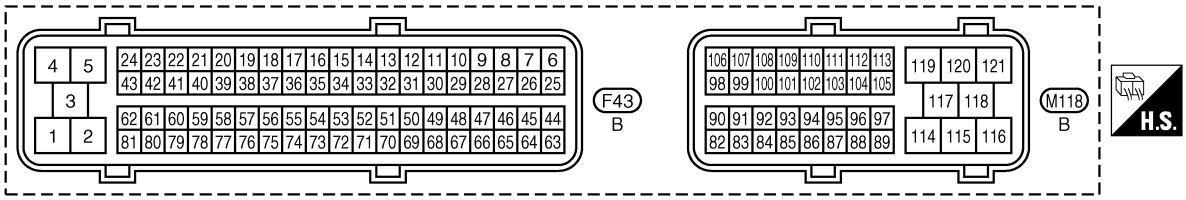
BBS001OF

EC-TPS1-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC







TBWB0261E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

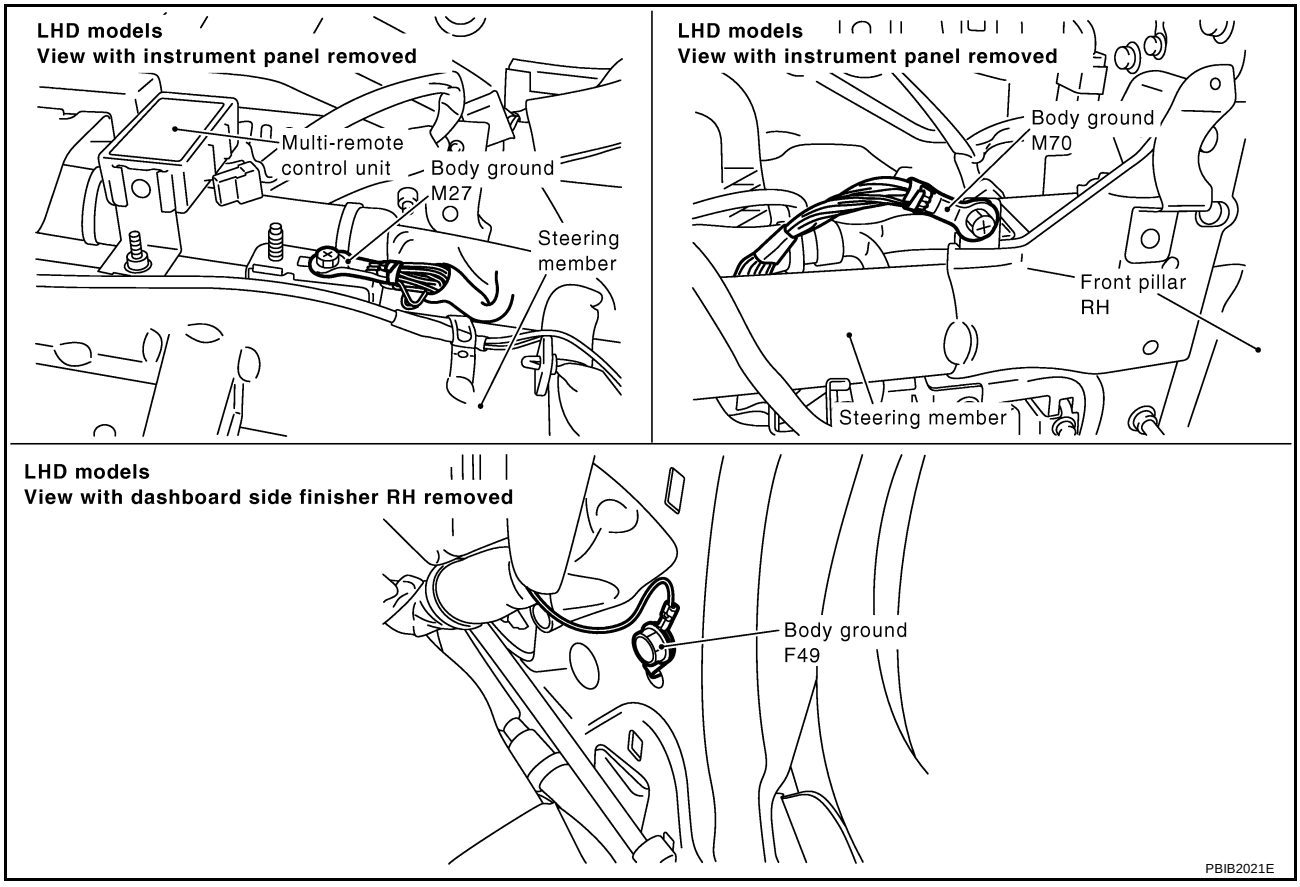
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	R	Throttle position sensor power supply	**[Ignition switch: ON]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

BBS001OG

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

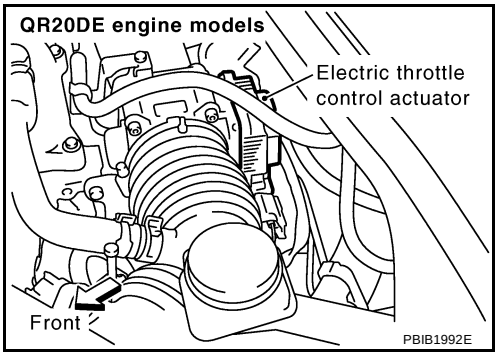


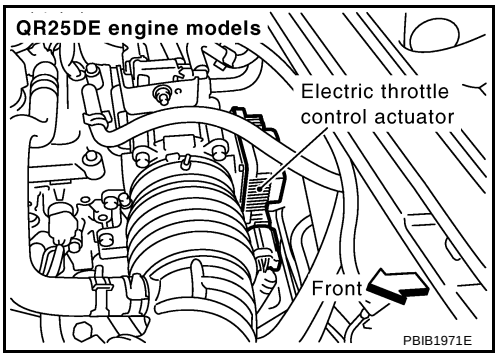
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-I

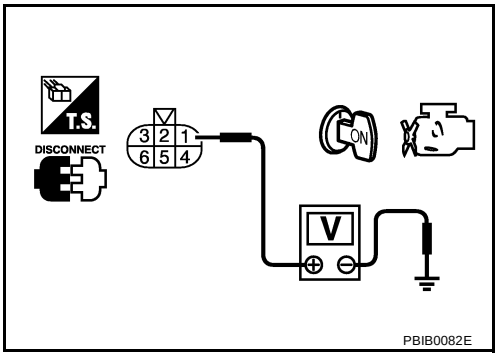
1. Disconnect electric throttle control actuator harness connector.





2. Turn ignition switch ON.
3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK THROTTLE POSITION SENSOR 1 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-684
91	APP sensor terminal 4	EC-842

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-847, "Component Inspection" .

OK or NG

OK >> GO TO 11
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-562, "Accelerator Pedal Released Position Learning" .
3. Perform EC-563, "Throttle Valve Closed Position Learning" .
4. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 49. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-689, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

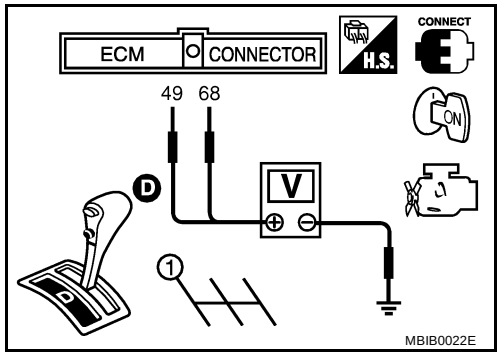
Component Inspection

BBS001OH

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T) or 1st position (M/T).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-563, "Throttle Valve Closed Position Learning" .
8. Perform EC-563, "Idle Air Volume Learning" .

Removal and Installation

BBS001OI

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

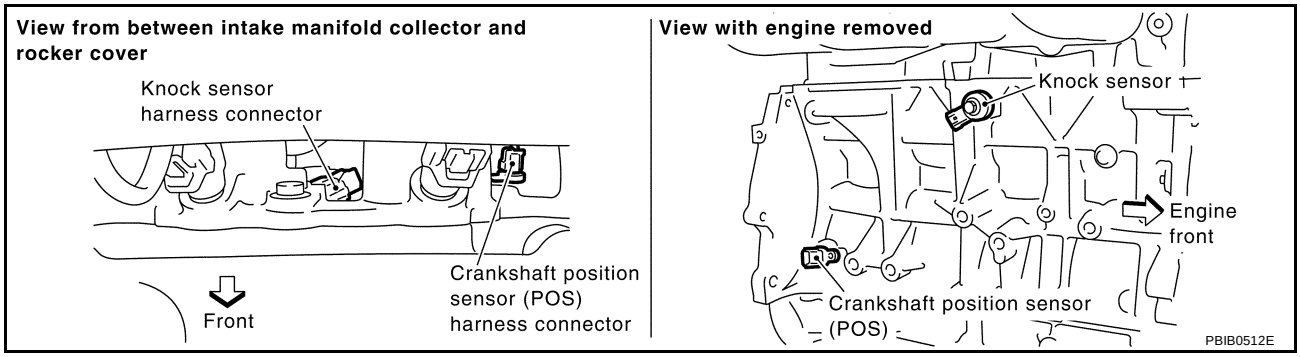
DTC P0327, P0328 KS

PFP:22060

Component Description

BBS001OJ

The knock sensor is attached to the cylinder block. It senses engine knocking using a piezoelectric element. A knocking vibration from the cylinder block is sensed as vibrational pressure. This pressure is converted into a voltage signal and sent to the ECM.



On Board Diagnosis Logic

BBS001OK

The MI will not light up for these self-diagnoses.

DTC No.	Trouble Diagnosis Name	DTC Detected Condition	Possible Cause
P0327 0327	Knock sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Knock sensor
P0328 0328	Knock sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

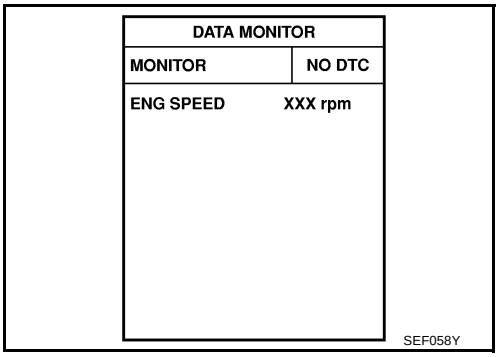
BBS001OL

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-692, "Diagnostic Procedure" .



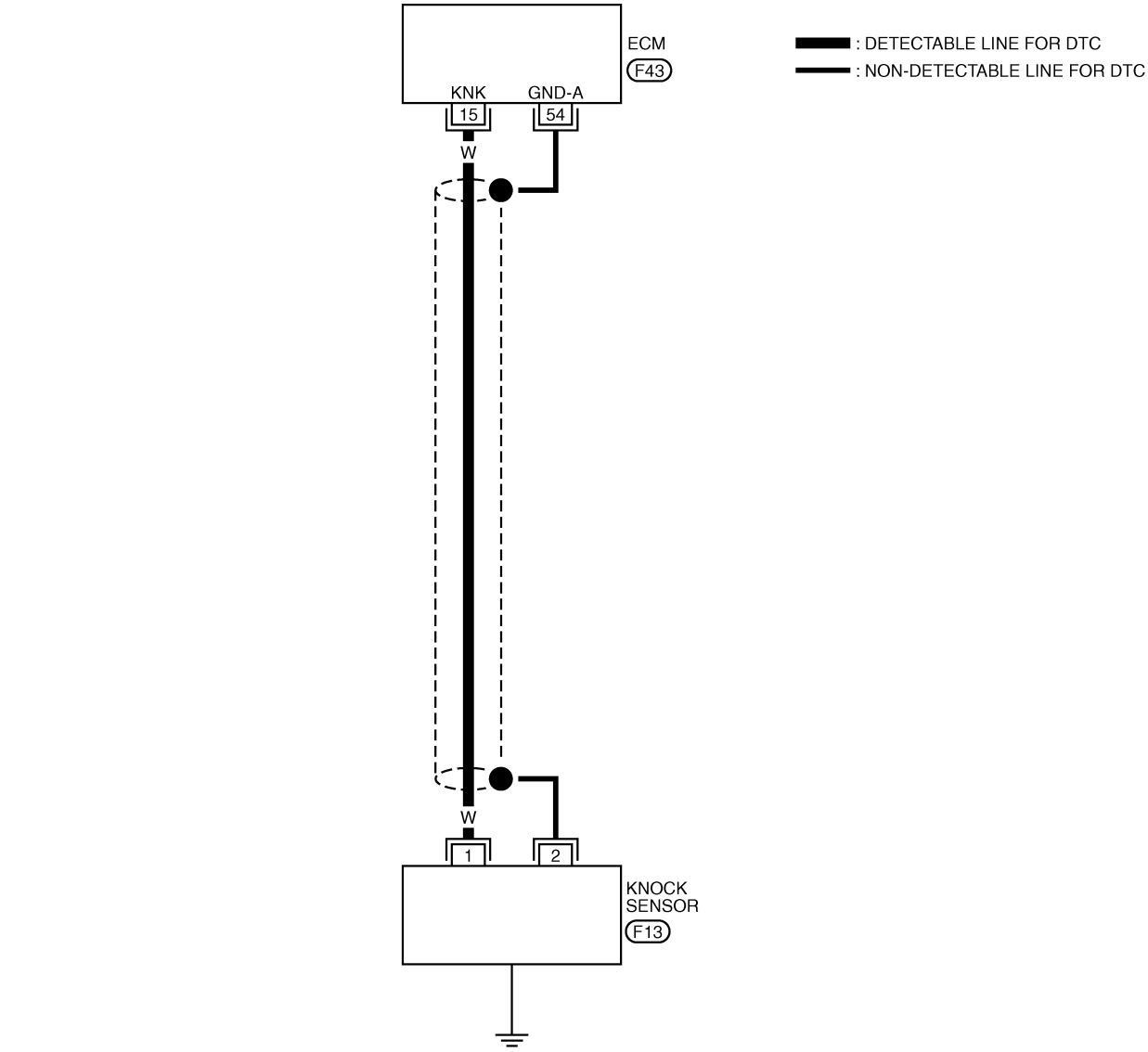
WITHOUT CONSULT-II

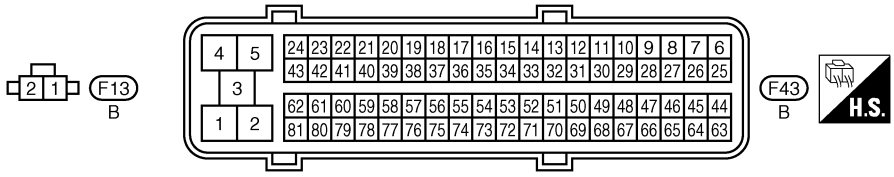
1. Start engine and run it for at least 5 seconds at idle speed.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-692, "Diagnostic Procedure" .

Wiring Diagram

BBS001OM

EC-KS-01





TBWA0606E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
15	W	Knock sensor	**[Engine is running]** ● Idle speed	Approximately 2.5V
54	—	Sensor ground (Knock sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001ON

1. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check resistance between ECM terminal 15 and ground. Refer to Wiring Diagram.

   NOTE:
   It is necessary to use an ohmmeter which can measure more than 10 MΩ.

   Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

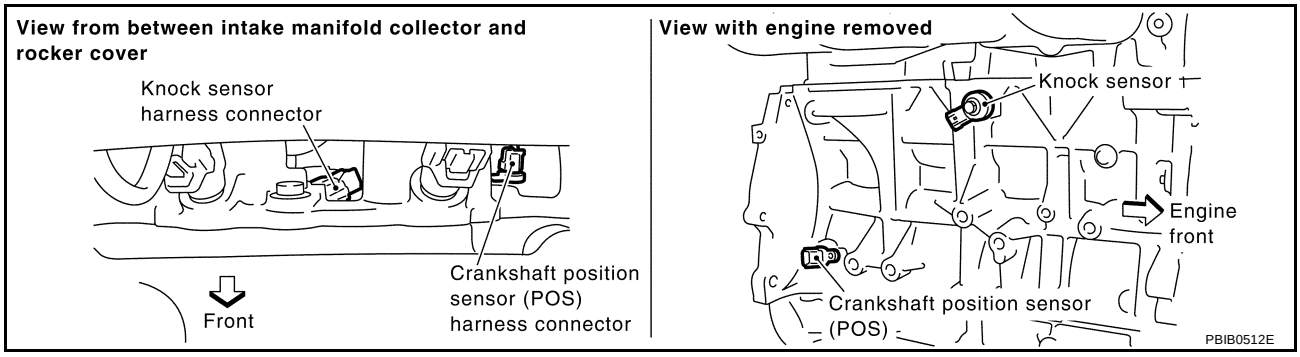
4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK KNOCK SENSOR INPUT SIGNAL CIRCUIT-II

1. Disconnect knock sensor harness connector.



2. Check harness continuity between knock sensor terminal 1 and ECM terminal 15. Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK KNOCK SENSOR

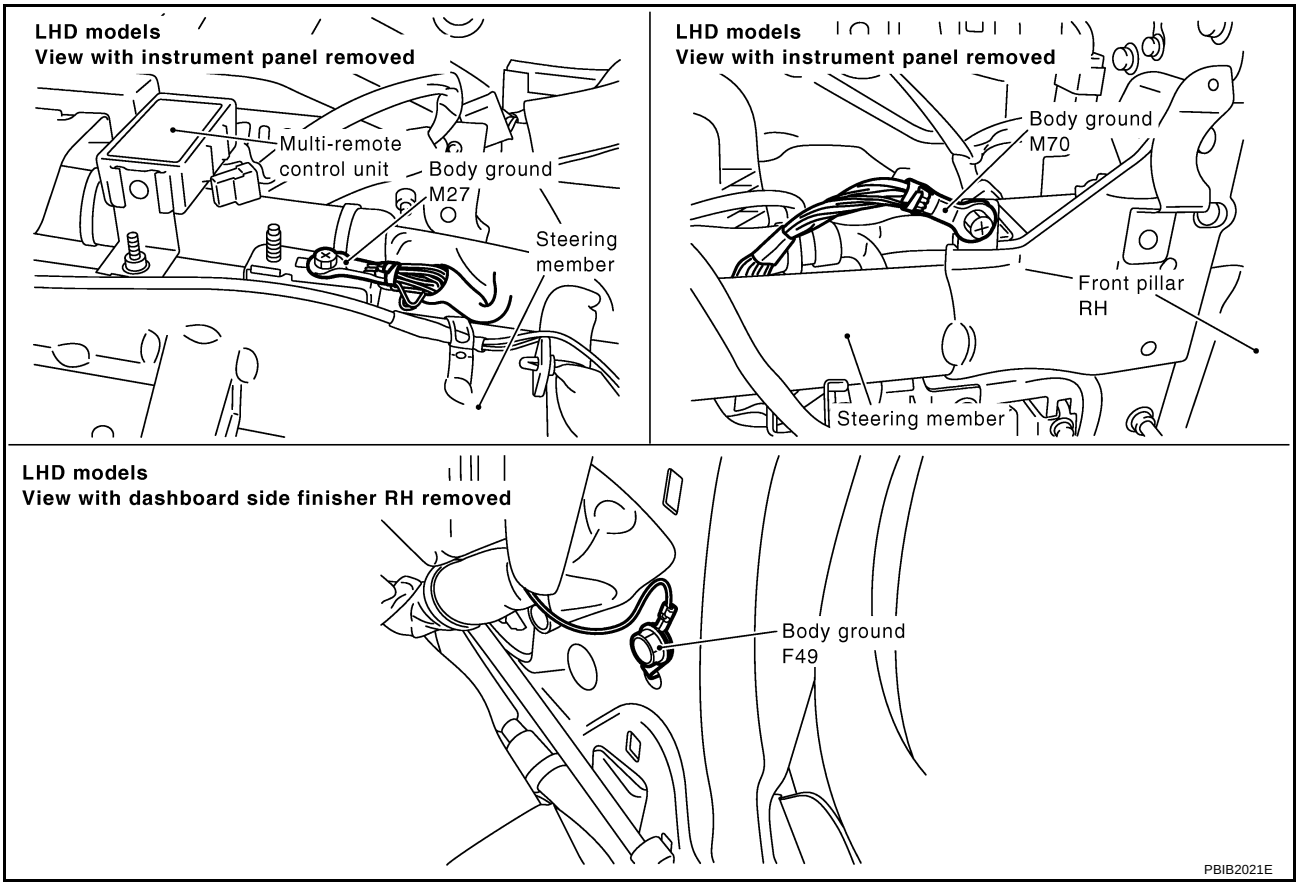
Refer to EC-694, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace knock sensor.

4. CHECK GROUND CONNECTIONS

Loosen and retighten three ground screws on the body.
Refer to EC-634, "Ground Inspection" .



OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK KNOCK SENSOR SHIELD CIRCUIT FOR OPEN AND SHORT

1. Reconnect knock sensor harness connector.
2. Check harness continuity between ECM terminal 54 and ground.

Continuity should exist

3. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001OO

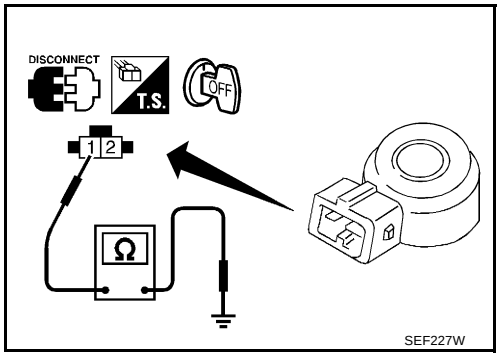
KNOCK SENSOR

Check resistance between knock sensor terminal 1 and ground.

NOTE:
It is necessary to use an ohmmeter which can measure more than 10 MΩ.

Resistance: Approximately 530 - 590kΩ [at 20°C (68°F)]

CAUTION:
Do not use any knock sensors that have been dropped or physically damaged. Use only new ones.



Removal and Installation

BBS001OP

KNOCK SENSOR

Refer to EM-89, "CYLINDER BLOCK" .

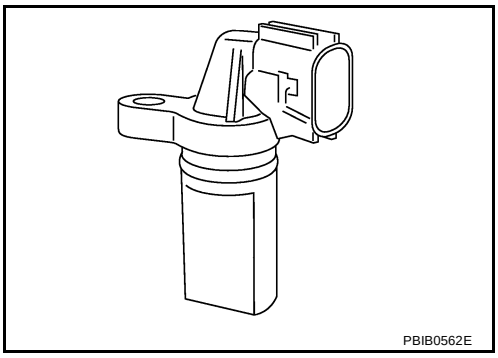
DTC P0335 CKP SENSOR (POS)

PFP:23731

Component Description

BBS001OQ

The crankshaft position sensor (POS) is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running to the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.
The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


PBIB0562E

CONSULT-II Reference Value in Data Monitor Mode

BBS001OR

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ENG SPEED	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

BBS001OS

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor (POS) circuit	● The crankshaft position sensor (POS) signal is not detected by the ECM during the first few seconds of engine cranking. ● The proper pulse signal from the crankshaft position sensor (POS) is not sent to ECM while the engine is running. ● The crankshaft position sensor (POS) signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor (POS) ● Signal plate

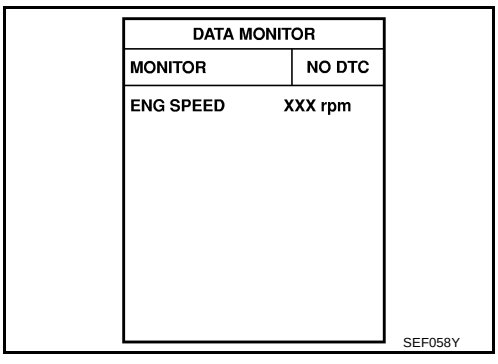
DTC Confirmation Procedure

BBS001OT

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
3. If 1st trip DTC is detected, go to EC-699, "Diagnostic Procedure".
   If 1st trip DTC is not detected, go to next step.
4. Maintain engine speed at more than 800 rpm for at least 5 seconds.
5. If 1st trip DTC is detected, go to EC-699, "Diagnostic Procedure".



SEF058Y

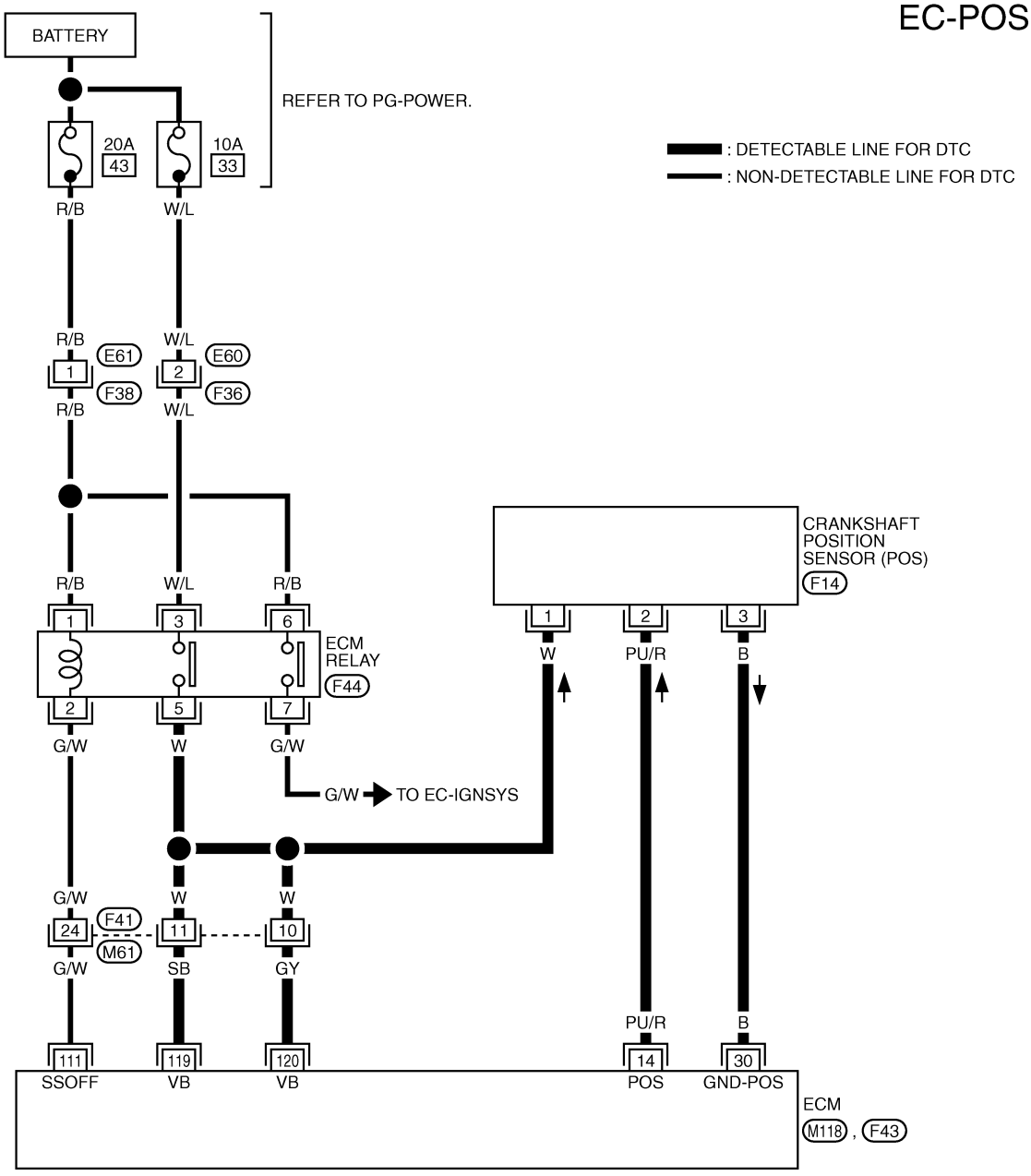
WITHOUT CONSULT-II

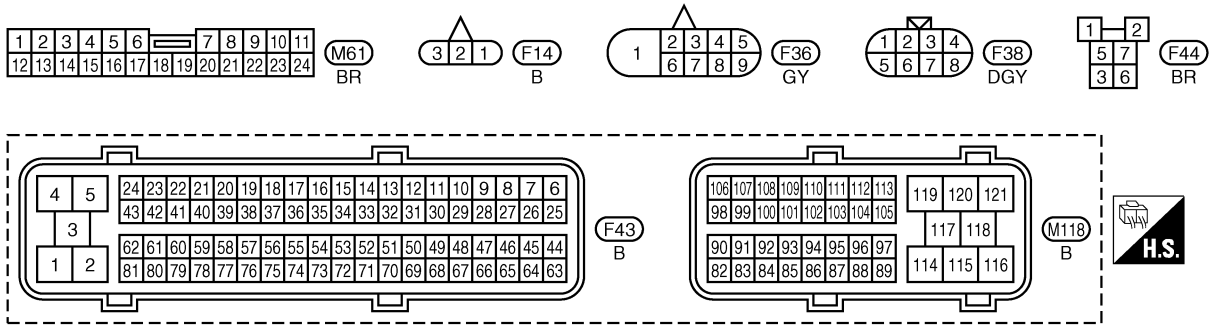
1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-699, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and maintain engine speed at more than 800 rpm for at least 5 seconds.
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
9. If 1st trip DTC is detected, go to EC-699, "Diagnostic Procedure" .

Wiring Diagram

BBS001OU

EC-POS-01



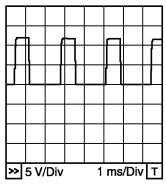
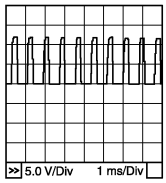


TBWA0607E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	PU/R	Crankshaft position sensor (POS)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	Approximately 3V★  PBIB0527E
			[Engine is running] ● Engine speed is 2,000 rpm	Approximately 3V★  PBIB0528E
30	B	Sensor ground (Crankshaft position sensor)	[Engine is running] ● **Warm-up condition** ● Idle speed	Approximately 0V

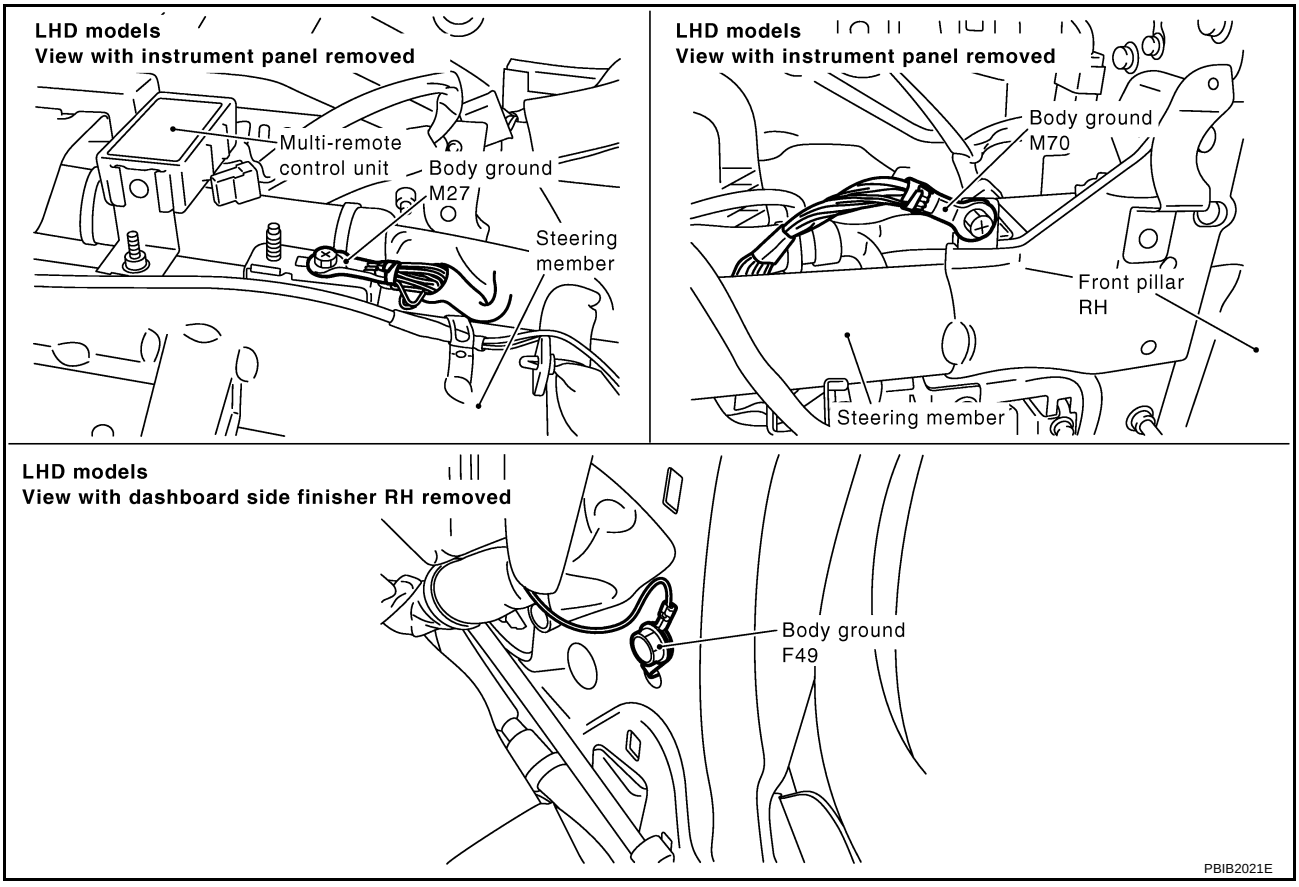
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001OV

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

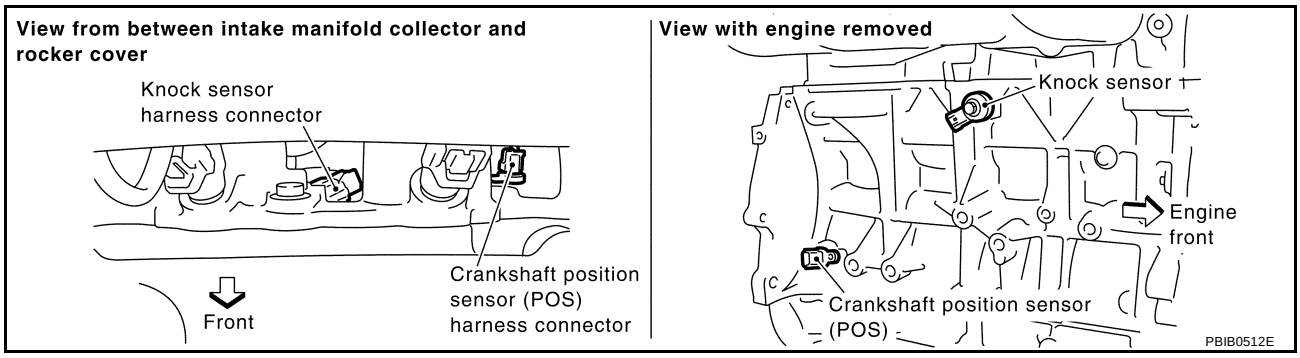


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

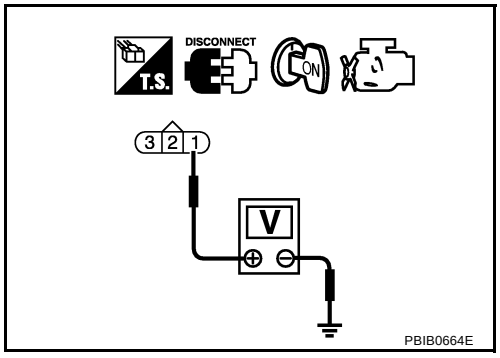
2. CHECK CRANKSHAFT POSITION (CKP) SENSOR (POS) POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor (POS) harness connector.



2. Turn ignition switch ON.
3. Check voltage between CKP sensor (POS) terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F41, M61
- Harness for open or short between crankshaft position sensor (POS) and ECM
- Harness for open or short between crankshaft position sensor (POS) and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR (POS) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CKP sensor (POS) terminal 3 and ECM terminal 30. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CKP SENSOR (POS) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CKP sensor (POS) terminal 2 and ECM terminal 14. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CRANKSHAFT POSITION SENSOR (POS)

Refer to EC-701, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace crankshaft position sensor (POS).

7. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 8.
NG >> Replace the signal plate.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

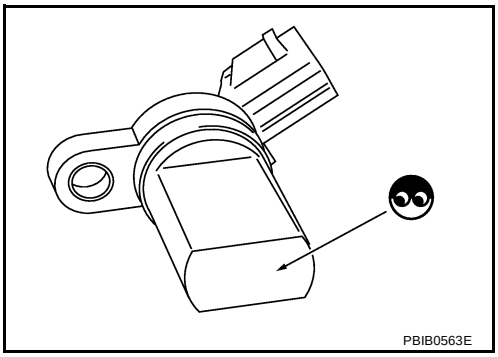
>> **INSPECTION END**

Component Inspection

BBS001OW

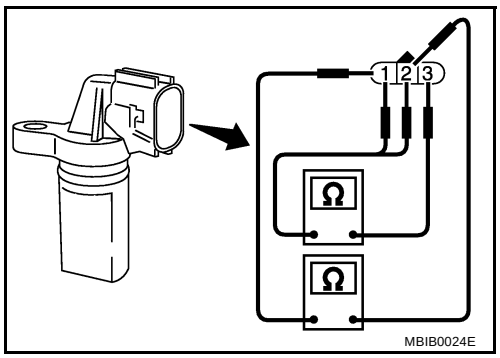
CRANKSHAFT POSITION SENSOR (POS)

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor (POS) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	



6. If NG, replace crankshaft position sensor (POS).

Removal and Installation

BBS001OX

CRANKSHAFT POSITION SENSOR (POS)

Refer to EM-89, "CYLINDER BLOCK" .

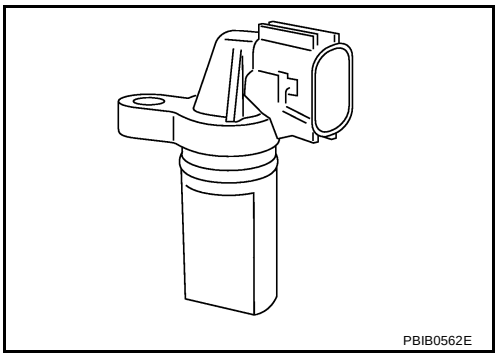
DTC P0340 CMP SENSOR (PHASE)

PFP:23731

Component Description

BBS001OY

The camshaft position sensor (PHASE) senses the retraction of intake valve camshaft to identify a particular cylinder. The camshaft position sensor (PHASE) senses the piston position.
When the crankshaft position sensor (POS) system becomes inoperative, the camshaft position sensor (PHASE) provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.


PBIB0562E

On Board Diagnosis Logic

BBS001OZ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	Camshaft position sensor (PHASE) circuit	● The cylinder No. signal is not sent to ECM for the first few seconds during engine cranking. ● The cylinder No. signal is not set to ECM during engine running. ● The cylinder No. signal is not in the normal pattern during engine running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Camshaft position sensor (PHASE) ● Camshaft (Intake) ● Starter motor (Refer to SC-23, "STARTING SYSTEM" .) ● Starting system circuit (Refer to SC-23, "STARTING SYSTEM" .) ● Dead (Weak) battery

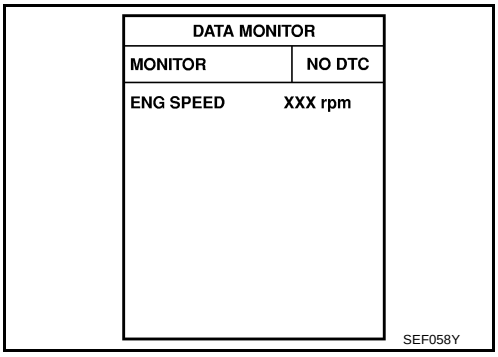
DTC Confirmation Procedure

BBS001P0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V with ignition switch ON.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
4. If 1st trip DTC is detected, go to EC-706, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
5. Maintain engine speed at more than 800 rpm for at least 5 seconds.
6. If 1st trip DTC is detected, go to EC-706, "Diagnostic Procedure" .



SEF058Y

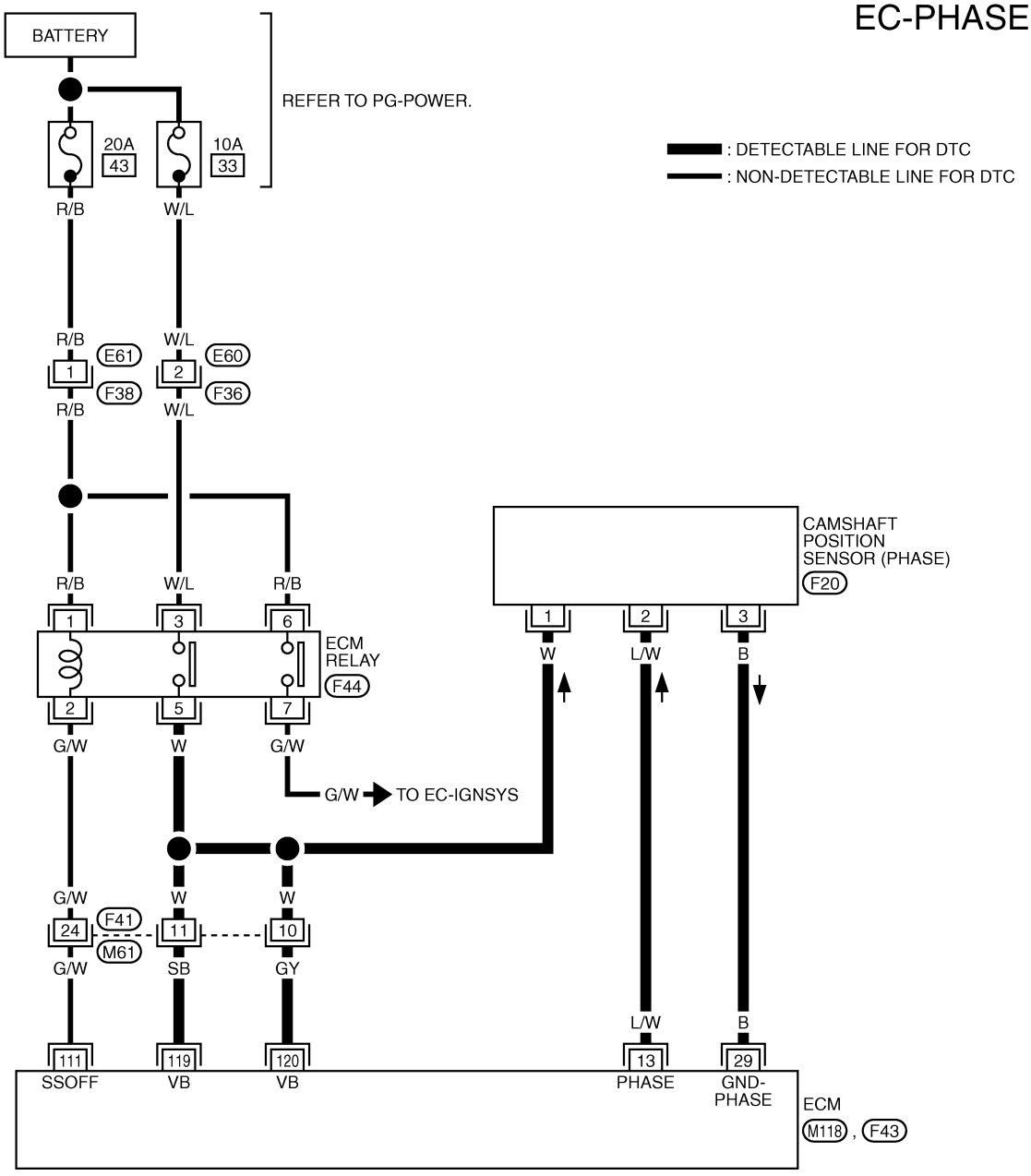
WITHOUT CONSULT-II

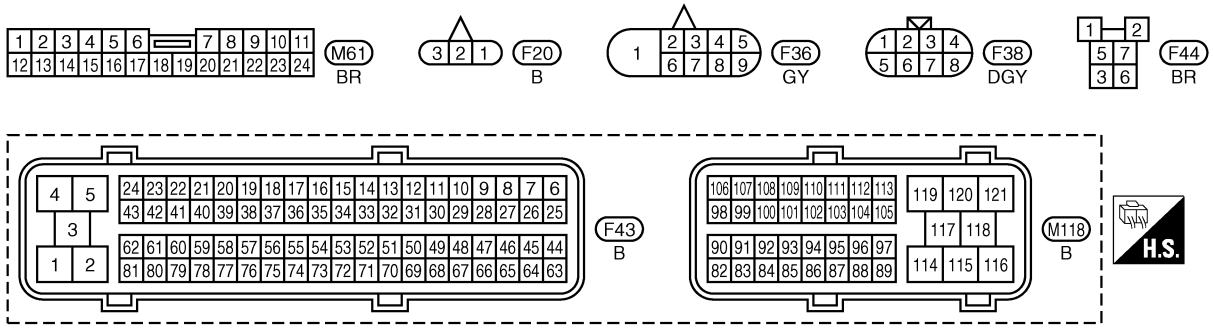
1. Crank engine for at least 2 seconds and run it for at least 5 seconds at idle speed.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-706, "Diagnostic Procedure" .
   If 1st trip DTC is not detected, go to next step.
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Start engine and maintain engine speed at more than 800 rpm for at least 5 seconds.
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
9. If 1st trip DTC is detected, go to EC-706, "Diagnostic Procedure" .

Wiring Diagram

BBS001P1

EC-PHASE-01



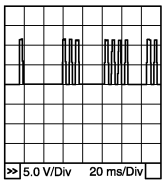
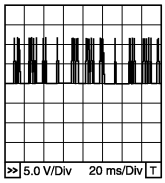


TBWA0608E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
13	L/W	Camshaft position sensor (PHASE)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	1.0 - 4.0V★  PBIB0525E
			[Engine is running] ● Engine speed is 2,000 rpm	1.0 - 4.0V★  PBIB0526E
29	B	Sensor ground (Camshaft position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001P2

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

Does the starter motor operate?

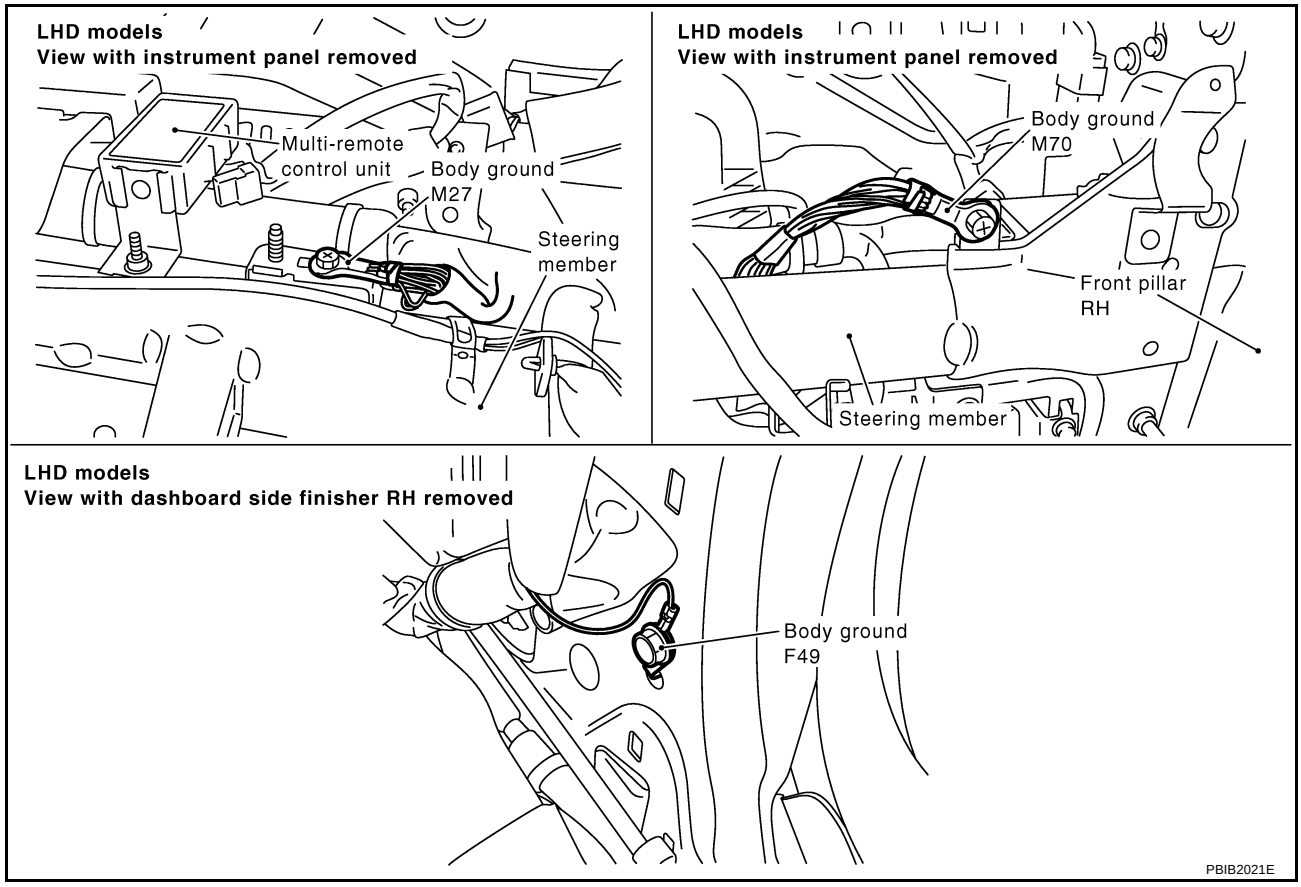
Yes or No

Yes >> GO TO 2.

No >> Check starting system. (Refer to SC-23, "STARTING SYSTEM" .)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

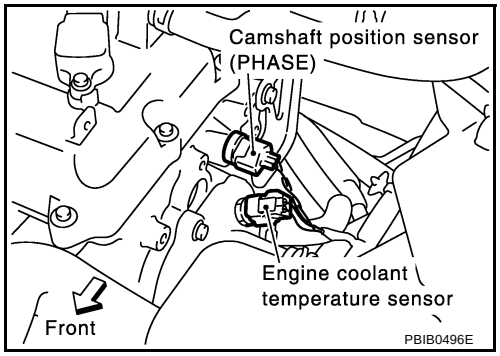


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

3. CHECK CAMSHAFT POSITION (CMP) SENSOR (PHASE) POWER SUPPLY CIRCUIT

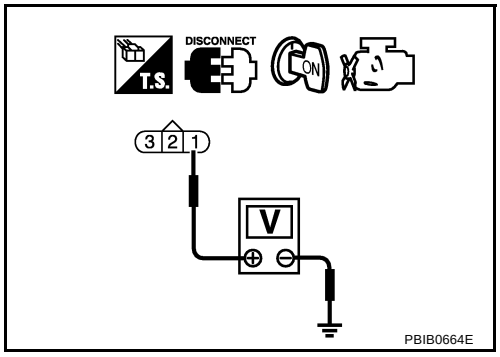
1. Disconnect camshaft position (CMP) sensor (PHASE) harness connector.
2. Turn ignition switch ON.



3. Check voltage between CMP sensor (PHASE) terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F41, M61
- Harness for open or short between camshaft position sensor (PHASE) and ECM
- Harness for open or short between camshaft position sensor (PHASE) and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR (PHASE) GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between CMP sensor (PHASE) terminal 3 and ECM terminal 29. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CMP SENSOR (PHASE) INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between CMP sensor (PHASE) terminal 2 and ECM terminal 13. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK CAMSHAFT POSITION SENSOR (PHASE)

Refer to EC-710, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace camshaft position sensor (PHASE).

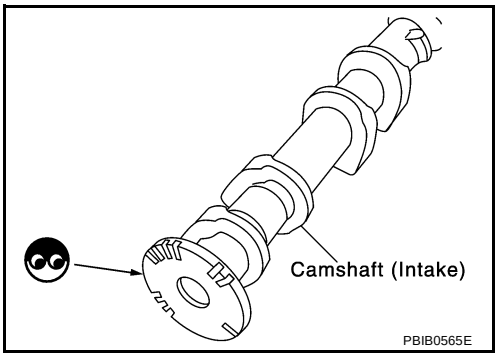
8. CHECK CAMSHAFT (INTAKE)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 9.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



9. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

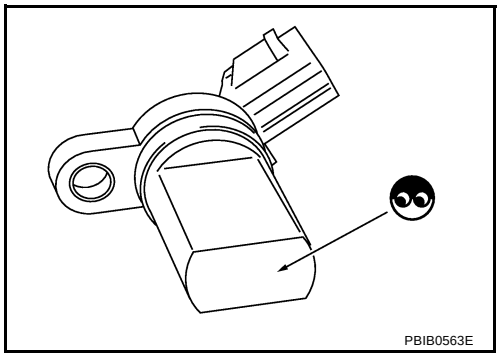
>> **INSPECTION END**

Component Inspection

BBS001P3

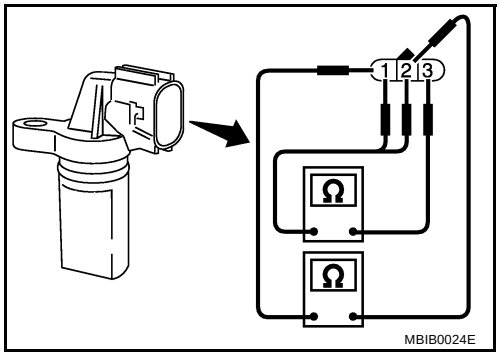
CAMSHAFT POSITION SENSOR (PHASE)

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor (PHASE) harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
3 (+) - 1 (-)	Except 0 or ∞
3 (+) - 2 (-)	
2 (+) - 1 (-)	



Removal and Installation

BBS001P4

CAMSHAFT POSITION SENSOR (PHASE)

Refer to EM-56, "CAMSHAFT" .

DTC P0500 VSS

PFP:32702

Description

BBS001P5

NOTE:
If DTC P0500 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-635, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
The vehicle speed signal is sent to the combination meter from the “ESP/TCS/ABS control unit” (with ESP models) “ABS actuator and electric unit (control unit)” (without ESP models) through CAN communication line. The combination meter then sends a signal to the ECM through CAN communication line.

On Board Diagnosis Logic

BBS001P6

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0500 0500	Vehicle speed sensor	The almost 0 km/h (0 MPH) signal from vehicle speed sensor is sent to ECM even when vehicle is being driven.	● Harness or connectors (The CAN communication line is open or shorted.) ● ESP/TCS/ABS control unit (with ESP models) ● ABS actuator and electric unit (control unit) (without ESP models) ● Wheel sensor ● Combination meter

DTC Confirmation Procedure

BBS001P7

CAUTION:
Always drive vehicle at a safe speed.

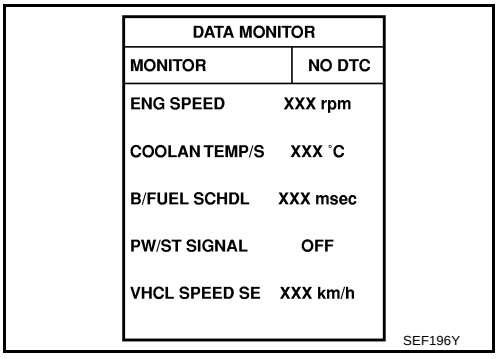
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Steps 1 and 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine.
2. Read “VHCL SPEED SE” in “DATA MONITOR” mode with CONSULT-II. The vehicle speed on CONSULT-II should exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
   If NG, go to EC-712, "Diagnostic Procedure" .
   If OK, go to following step.
3. Select “DATA MONITOR” mode with CONSULT-II.
4. Warm engine up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED		M/T: 2,000 - 6,000 rpm A/T: 1,750 - 6,000 rpm
COOLAN TEMP/S		More than 70°C (158°F)
B/FUEL SCHDL	QR20DE	4.9 - 31.8 msec
	QR25DE	M/T: 5.0 - 31.8 msec A/T: 6.0 - 31.8 msec
Selector lever		Suitable position
PW/ST SIGNAL		OFF



6. If 1st trip DTC is detected, go to EC-712, "Diagnostic Procedure" .

Overall Function Check

BBS001P8

Use this procedure to check the overall function of the vehicle speed signal circuit. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT-II

1. Lift up drive wheels.
2. Start engine.
3. Read vehicle speed with combination meter.
   The vehicle speed indication should be able to exceed 10 km/h (6 MPH) when rotating wheels with suitable gear position.
4. If NG, go to EC-712, "Diagnostic Procedure" .

Diagnostic Procedure

BBS001P9

1. CHECK DTC WITH “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)” (WITHOUT ESP MODELS) OR “ESP/TCS/ABS CONTROL UNIT” (WITH ESP MODELS)

Refer to BRC-9, "TROUBLE DIAGNOSIS" (Models without ESP) or BRC-52, "TROUBLE DIAGNOSIS" (Models with ESP).

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

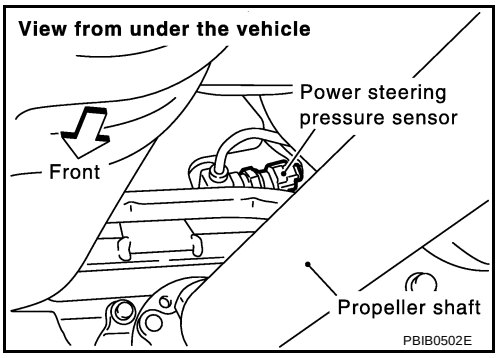
DTC P0550 PSP SENSOR

PFP:49763

Component Description

BBS001PA

Power steering pressure (PSP) sensor is installed to the power steering high-pressure tube and detects a power steering load. This sensor is a potentiometer which transforms the power steering load into output voltage, and emits the voltage signal to the ECM. The ECM controls the electric throttle control actuator and adjusts the throttle valve opening angle to increase the engine speed and adjusts the idle speed for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

BBS001PB

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel is not being turned	OFF
		Steering wheel is being turned	ON

On Board Diagnosis Logic

BBS001PC

The MI will not light up for this self-diagnosis.

NOTE:

If DTC P0550 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-777, "DTC P1229 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0550 0550	Power steering pressure sensor circuit	An excessively low or high voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Power steering pressure sensor

DTC Confirmation Procedure

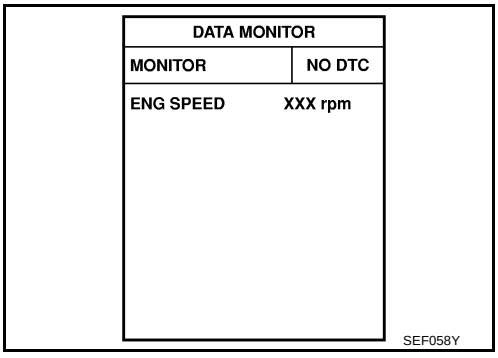
BBS001PD

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-715, "Diagnostic Procedure" .



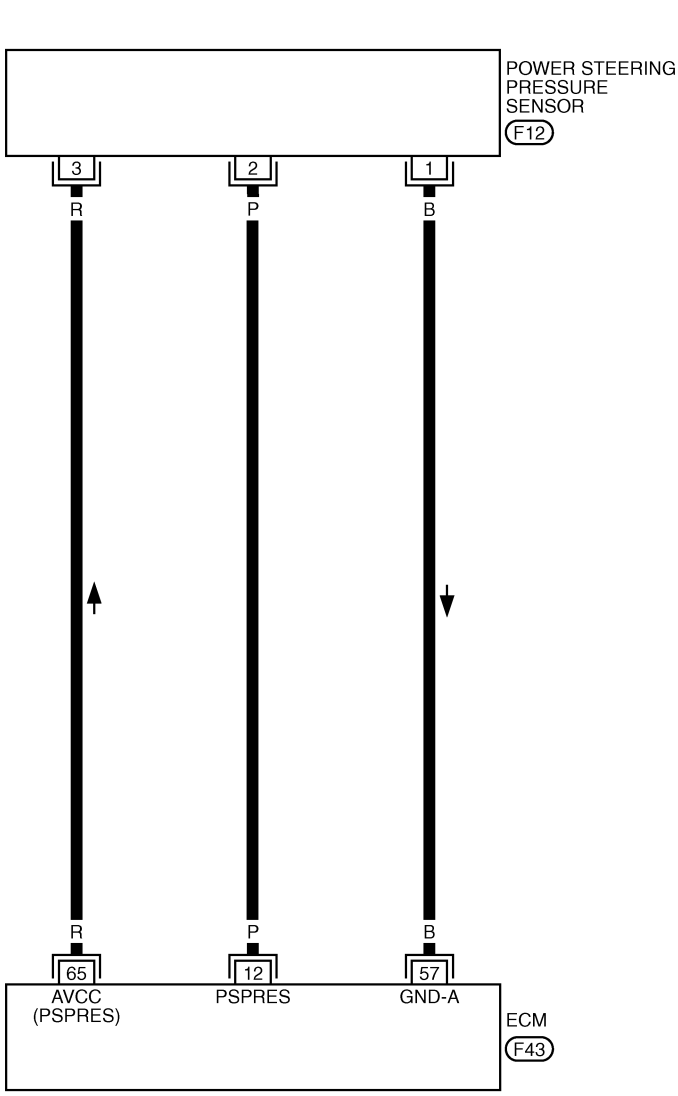
WITHOUT CONSULT-II

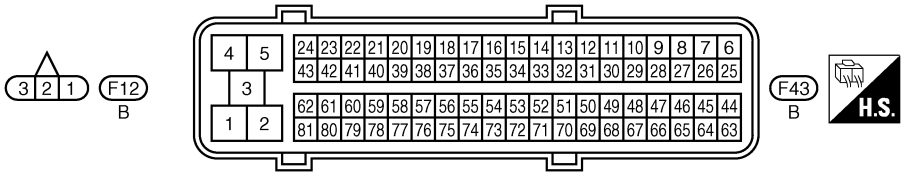
1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-715, "Diagnostic Procedure" .

Wiring Diagram

BBS001PE

EC-PS/SEN-01





TBWA0610E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

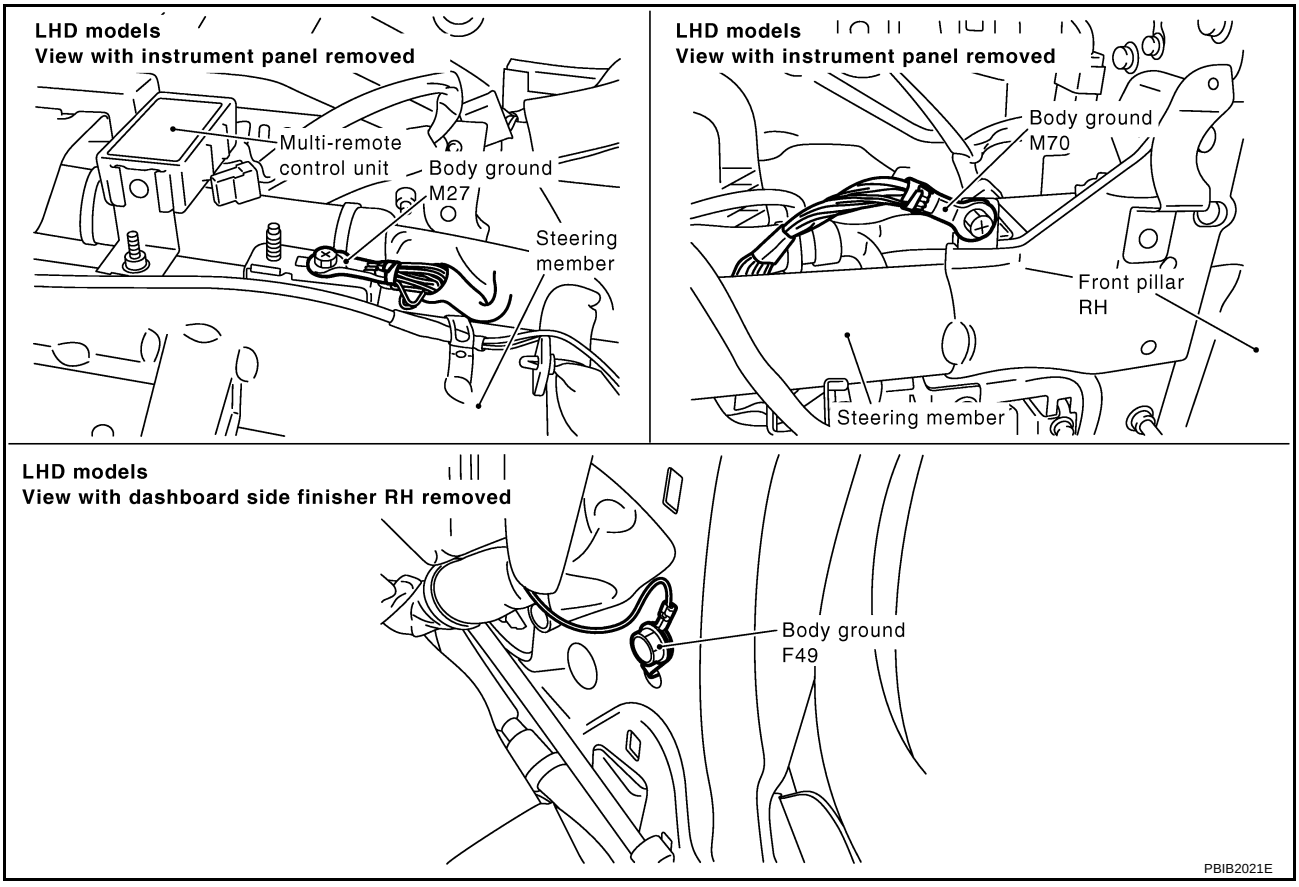
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
12	P	Power steering pressure sensor	**[Engine is running]** ● Steering wheel is being turned	0.5 - 4.0V
			[Engine is running] ● Steering wheel is not being turned	0.4 - 0.8V
57	B	Sensor ground	**[Engine is running]** ● Warm-up condition ● Idle speed	Approximately 0V
65	R	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

BBS001PF

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

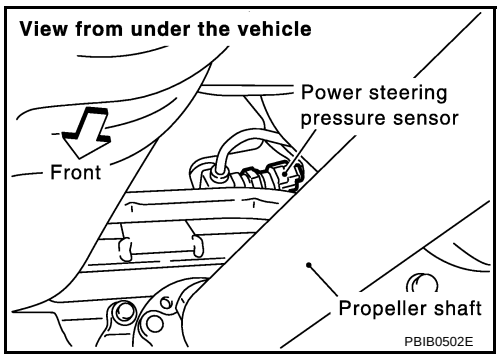


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

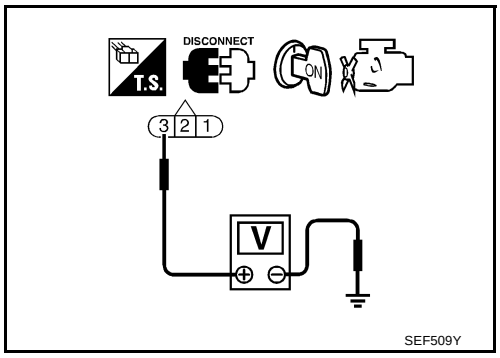
2. CHECK PSP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect PSP sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between PSP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK PSP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between PSP sensor terminal 1 and ECM terminal 57. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK PSP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between PSP sensor terminal 2 and ECM terminal 12.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PSP SENSOR

Refer to EC-717, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace PSP sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

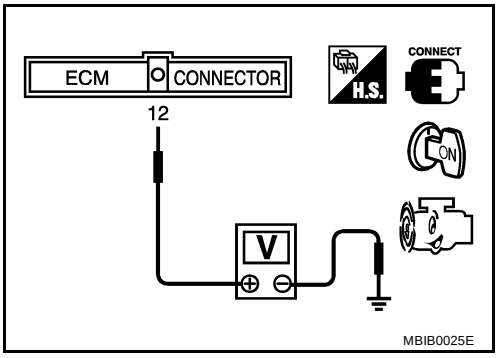
Component Inspection

BBS001PG

POWER STEERING PRESSURE SENSOR

1. Reconnect all harness connectors disconnected.
2. Start engine and let it idle.
3. Check voltage between ECM terminal 12 and ground under the following conditions.

Condition	Voltage
Steering wheel is being turned	0.5 - 4.0V
Steering wheel is not being turned	0.4 - 0.8V



Removal and Installation

BBS001PH

POWER STEERING PRESSURE SENSOR

Refer to PS-37, "HYDRAULIC LINE" .

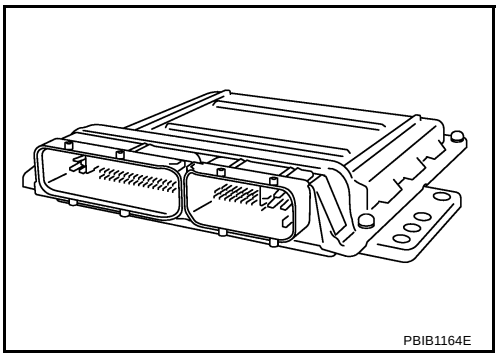
DTC P0605 ECM

PFP:23710

Component Description

BBS001PI

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


PBIB1164E

On Board Diagnosis Logic

BBS001PJ

This self-diagnosis has one or two trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P0605 0605	Engine control module	A)	ECM calculation function is malfunctioning.	● ECM
		B)	ECM EEP-ROM system is malfunctioning.	
		C)	ECM self shut-off function is malfunctioning.	

FAIL-SAFE MODE

ECM enters fail-safe mode when malfunction A is detected.

Detected items	Engine operation condition in fail-safe mode
Malfunction A	● ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring. ● ECM deactivates ASCD operation.

DTC Confirmation Procedure

BBS001PK

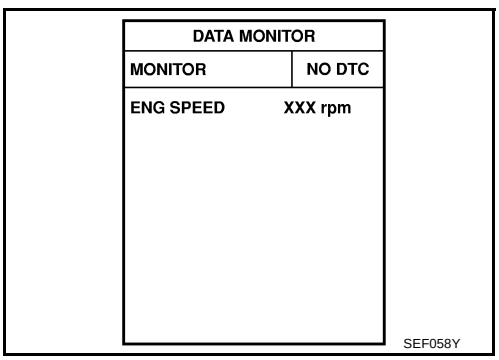
Perform PROCEDURE FOR MALFUNCTION A first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION B. If there is no malfunction on PROCEDURE FOR MALFUNCTION B, perform PROCEDURE FOR MALFUNCTION C.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A

With CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If 1st trip DTC is detected, go to EC-720, "Diagnostic Procedure"
   .



SEF058Y

Without CONSULT-II

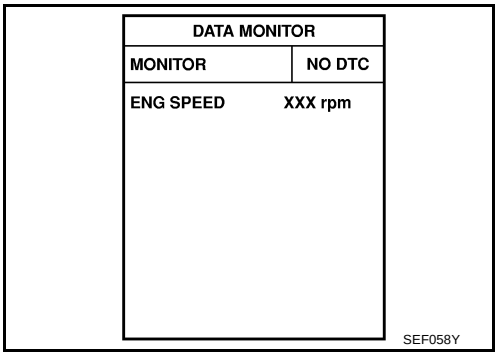
1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.

3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-720, "Diagnostic Procedure" .

PROCEDURE FOR MALFUNCTION B

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. If 1st trip DTC is detected, go to EC-720, "Diagnostic Procedure" .



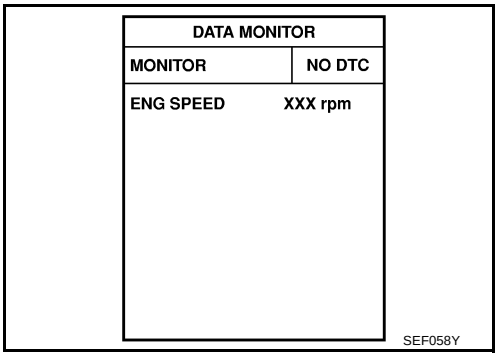
Without CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-720, "Diagnostic Procedure" .

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Repeat step 3 for 32 times.
5. If 1st trip DTC is detected, go to EC-720, "Diagnostic Procedure" .



Without CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Repeat step 2 for 32 times.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If 1st trip DTC is detected, go to EC-720, "Diagnostic Procedure" .

Diagnostic Procedure

BBS001PL

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-718, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P0605 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-569, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
3. **Perform DTC Confirmation Procedure.**
   See EC-718, "DTC Confirmation Procedure" .
4. Is the 1st trip DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-107, "NATS (NISSAN ANTI-THEFT SYSTEM)" .
3. Perform EC-562, "Accelerator Pedal Released Position Learning" .
4. Perform EC-563, "Throttle Valve Closed Position Learning" .
5. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

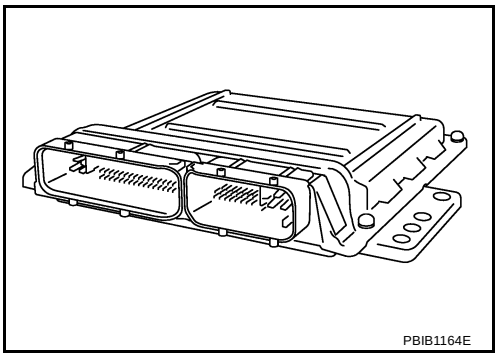
DTC P1065 ECM POWER SUPPLY

PFP:23710

Component Description

BBS001PM

Battery voltage is supplied to the ECM even when the ignition switch is turned OFF for the ECM memory function of the DTC memory, the air fuel ratio feedback compensation value memory, the Idle Air Volume Learning value memory, etc.


PBIB1164E

On Board Diagnosis Logic

BBS001PN

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1065 1065	ECM power supply circuit	ECM back-up RAM system does not function properly.	● Harness or connectors [ECM power supply (back-up) circuit is open or shorted.] ● ECM

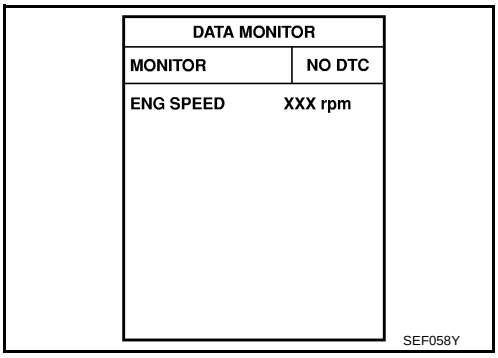
DTC Confirmation Procedure

BBS001PO

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Repeat steps 3 and 4 for 4 times.
6. If 1st trip DTC is detected, go to EC-723, "Diagnostic Procedure" .



SEF058Y

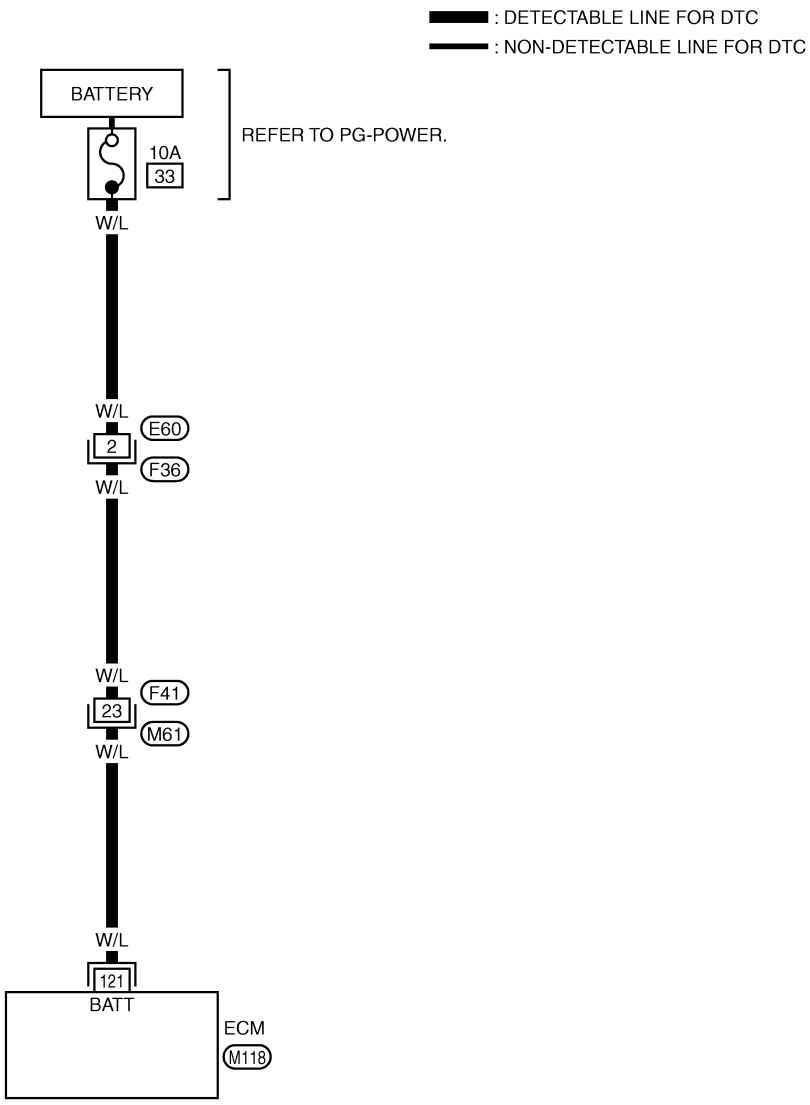
WITHOUT CONSULT-II

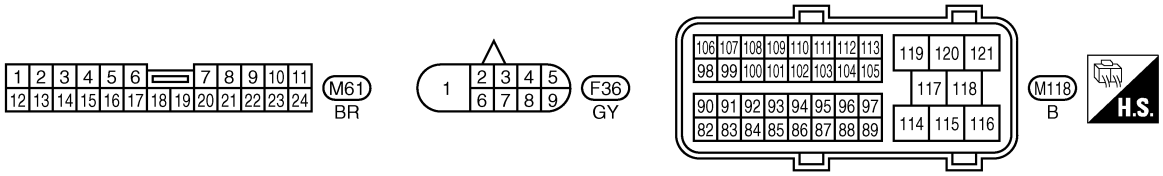
1. Turn ignition switch ON and wait at least 1 second.
2. Start engine and let it idle for 1 second.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Repeat steps 2 and 3 for 4 times.
5. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
6. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
7. If 1st trip DTC is detected, go to EC-723, "Diagnostic Procedure" .

Wiring Diagram

BBS001PP

EC-ECM/PW-01





TBWA0611E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

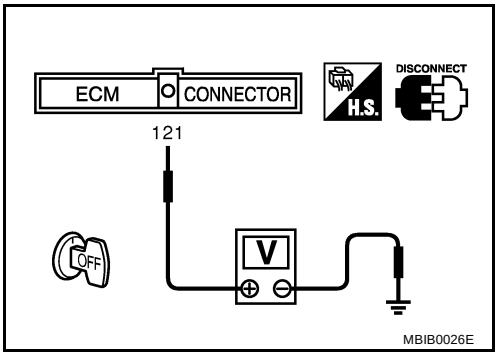
Diagnostic Procedure

BBS001PQ

1. CHECK ECM POWER SUPPLY

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E60, F36
- Harness connectors F41, M61
- 10A fuse
- Harness for open or short between ECM and battery

>> Repair or replace harness or connectors.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 4.
NG >> Repair or replace harness or connectors.

4. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-721, "DTC Confirmation Procedure" .
5. Is the 1st trip DTC P1065 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-569, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
3. **Perform DTC Confirmation Procedure.**
   See EC-721, "DTC Confirmation Procedure" .
4. Is the 1st trip DTC P1065 displayed again?

Yes or No

Yes >> GO TO 5.
No >> **INSPECTION END**

5. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-107, "NATS (NISSAN ANTI-THEFT SYSTEM)" .
3. Perform EC-562, "Accelerator Pedal Released Position Learning" .
4. Perform EC-563, "Throttle Valve Closed Position Learning" .
5. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR

PFP:16119

Component Description

BBS001PR

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The throttle position sensor detects the throttle valve position, and the opening and closing speed of the throttle valve and feeds the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

BBS001PS

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition		Possible cause
P1121 1121	Electric throttle control actuator	A)	Electric throttle control actuator does not function properly due to the return spring malfunction.	● Electric throttle control actuator
		B)	Throttle valve opening angle in fail-safe mode is not in specified range.	
		C)	ECM detect the throttle valve is stuck open.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Detected items	Engine operating condition in fail-safe mode
Malfunction A	The ECM controls the electric throttle actuator by regulating the throttle opening around the idle position. The engine speed will not rise more than 2,000 rpm.
Malfunction B	ECM controls the electric throttle control actuator by regulating the throttle opening to 20 degrees or less.
Malfunction C	While the vehicle is driving, it slows down gradually by fuel cut. After the vehicle stops, the engine stalls. The engine can restart in N or P position, and engine speed will not exceed 1,000 rpm or more.

DTC Confirmation Procedure

BBS001PT

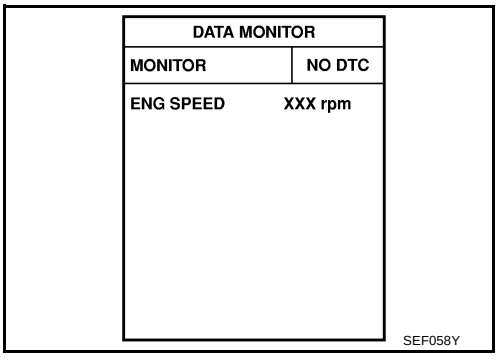
NOTE:

- **Perform PROCEDURE FOR MALFUNCTION A AND B first. If the DTC cannot be confirmed, perform PROCEDURE FOR MALFUNCTION C.**
- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR MALFUNCTION A AND B

With CONSULT-II

1. Turn ignition witch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to D position (A/T), 1st position (M/T) and wait at least 3 seconds.
4. Shift selector lever to P position (A/T), Neutral position (M/T).
5. Turn ignition switch OFF and wait at least 10 seconds.
6. Turn ignition switch ON and wait at least 1 second.
7. Shift selector lever to D position (A/T), 1st position (M/T) and wait at least 3 seconds.
8. Shift selector lever to P position (A/T), Neutral position (M/T).
9. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
10. If DTC is detected, go to EC-726, "Diagnostic Procedure" .



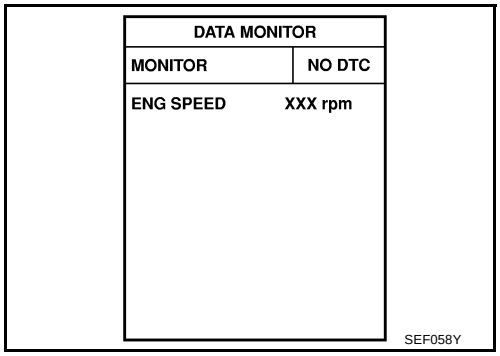
Without CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Shift selector lever to D position (A/T), 1st position (M/T) and wait at least 3 seconds.
3. Shift selector lever to P position (A/T), Neutral position (M/T).
4. Turn ignition switch OFF and wait at least 10 seconds.
5. Turn ignition switch ON and wait at least 1 second.
6. Shift selector lever to D position (A/T), 1st position (M/T) and wait at least 3 seconds.
7. Shift selector lever to P position (A/T), Neutral position (M/T).
8. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
9. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
10. If DTC is detected, go to EC-726, "Diagnostic Procedure" .

PROCEDURE FOR MALFUNCTION C

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Shift selector lever to D position (A/T), 1st position (M/T) and wait at least 3 seconds.
4. Shift selector lever to P position (A/T), Neutral position (M/T).
5. Start engine and let it idle for 3 seconds.
6. If DTC is detected, go to EC-726, "Diagnostic Procedure" .



Without CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Shift selector lever to D position (A/T), 1st position (M/T) and wait at least 3 seconds.
3. Shift selector lever to P position (A/T), Neutral position (M/T).
4. Start engine and let it idle for the 3 seconds.
5. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
6. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
7. If DTC is detected, go to EC-726, "Diagnostic Procedure" .

Diagnostic Procedure

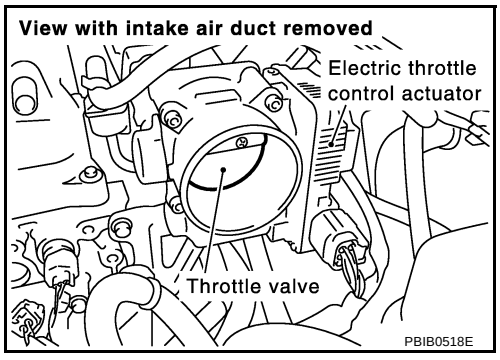
BBS001PU

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

Removal and Installation

BBS001PV

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P1122 ELECTRIC THROTTLE CONTROL FUNCTION

PFP:16119

Description

BBS001PW

NOTE:
If DTC P1122 is displayed with DTC P1121 or 1126, first perform the trouble diagnosis for DTC P1121 or P1126. Refer to EC-725, "DTC P1121 ELECTRIC THROTTLE CONTROL ACTUATOR" or EC-739, "DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY" .

Electric Throttle Control Actuator consists of throttle control motor, throttle position sensor, etc.
The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

BBS001PX

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1122 1122	Electric throttle control performance problem	Electric throttle control function does not operate properly.	● Harness or connectors (Throttle control motor circuit is open or shorted.) ● Harness or connectors (Throttle control motor relay circuit is open or shorted.) ● Electric throttle control actuator ● Throttle control motor relay

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

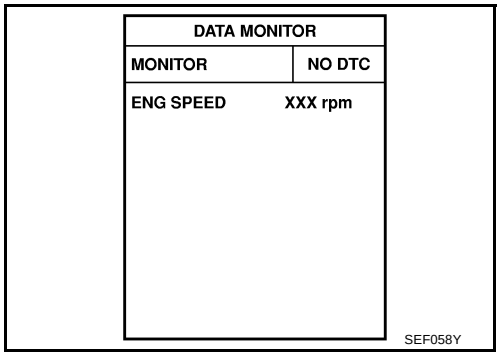
DTC Confirmation Procedure

BBS001PY

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 11V when engine is running.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-734, "Diagnostic Procedure" .



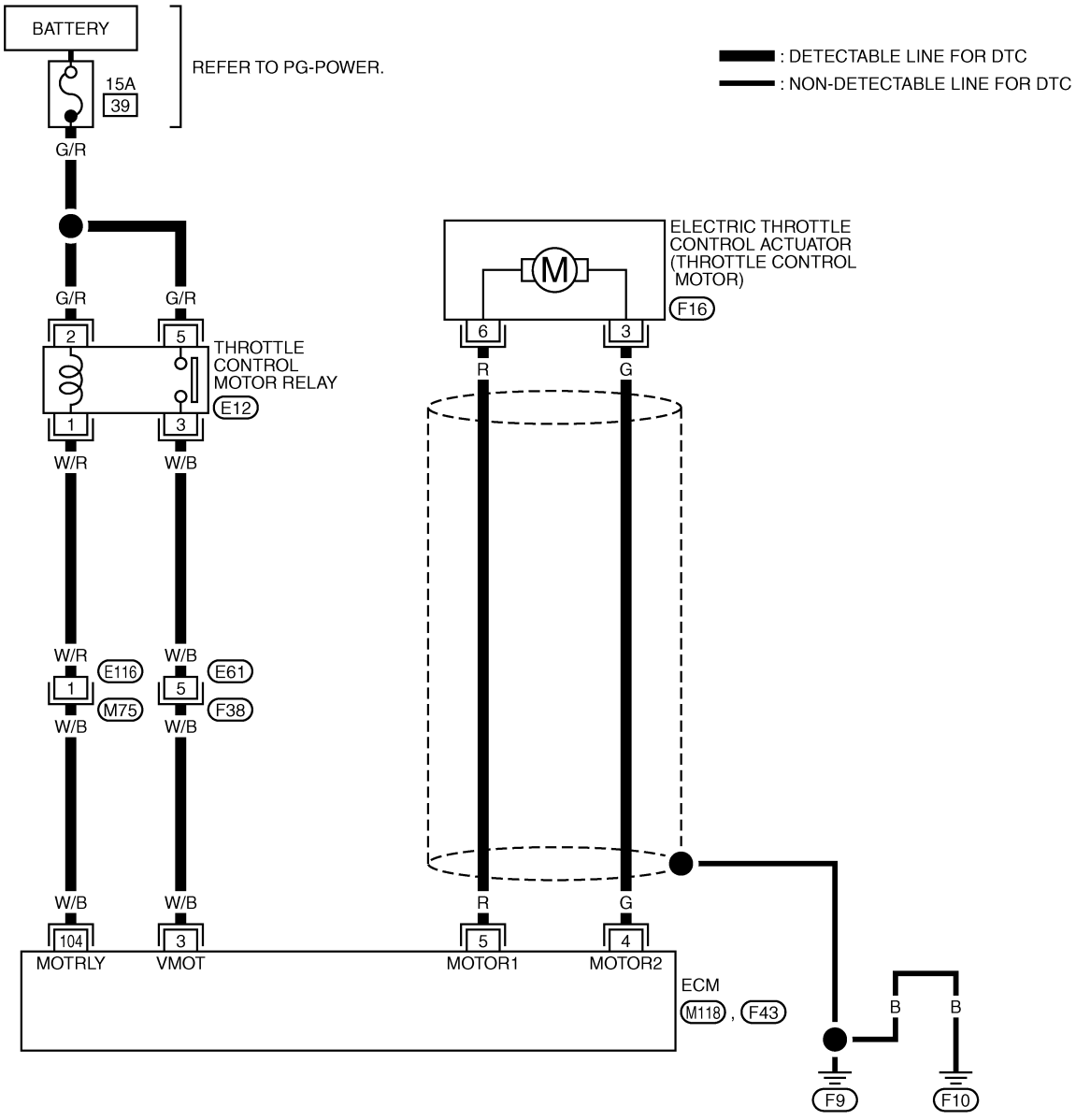
WITHOUT CONSULT-II

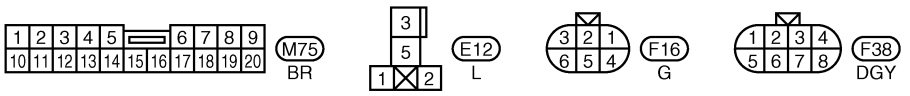
1. Turn ignition switch ON and wait at least 2 seconds.
2. Start engine and let it idle for 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-734, "Diagnostic Procedure" .

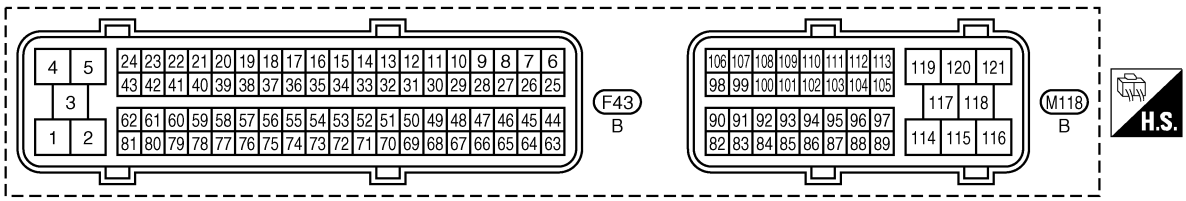
Wiring Diagram
LHD MODELS

BBS001PZ

EC-ETC1-01



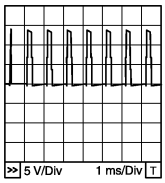
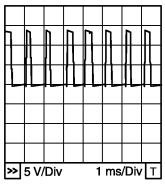




TBWA0613E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

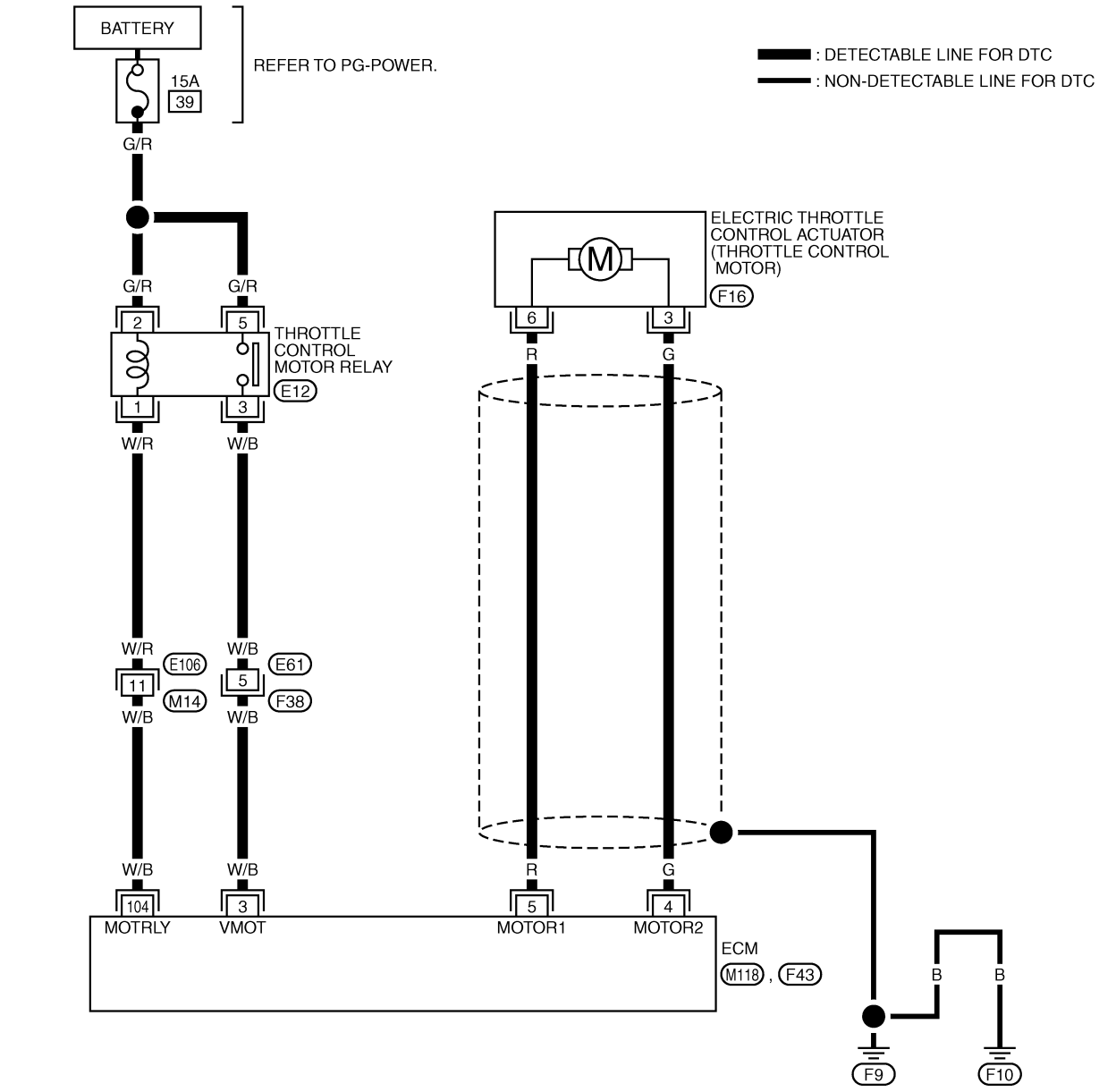
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

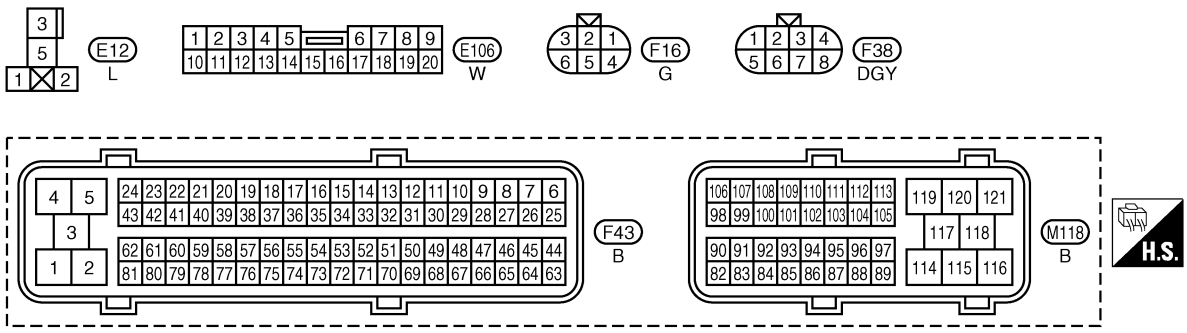
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	W/B	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	G	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	R	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	W/B	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

RHD MODELS

EC-ETC1-02

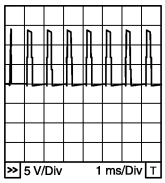
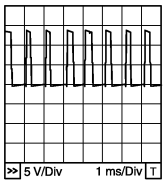




TBWA0614E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	W/B	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
4	G	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	R	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E
104	W/B	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

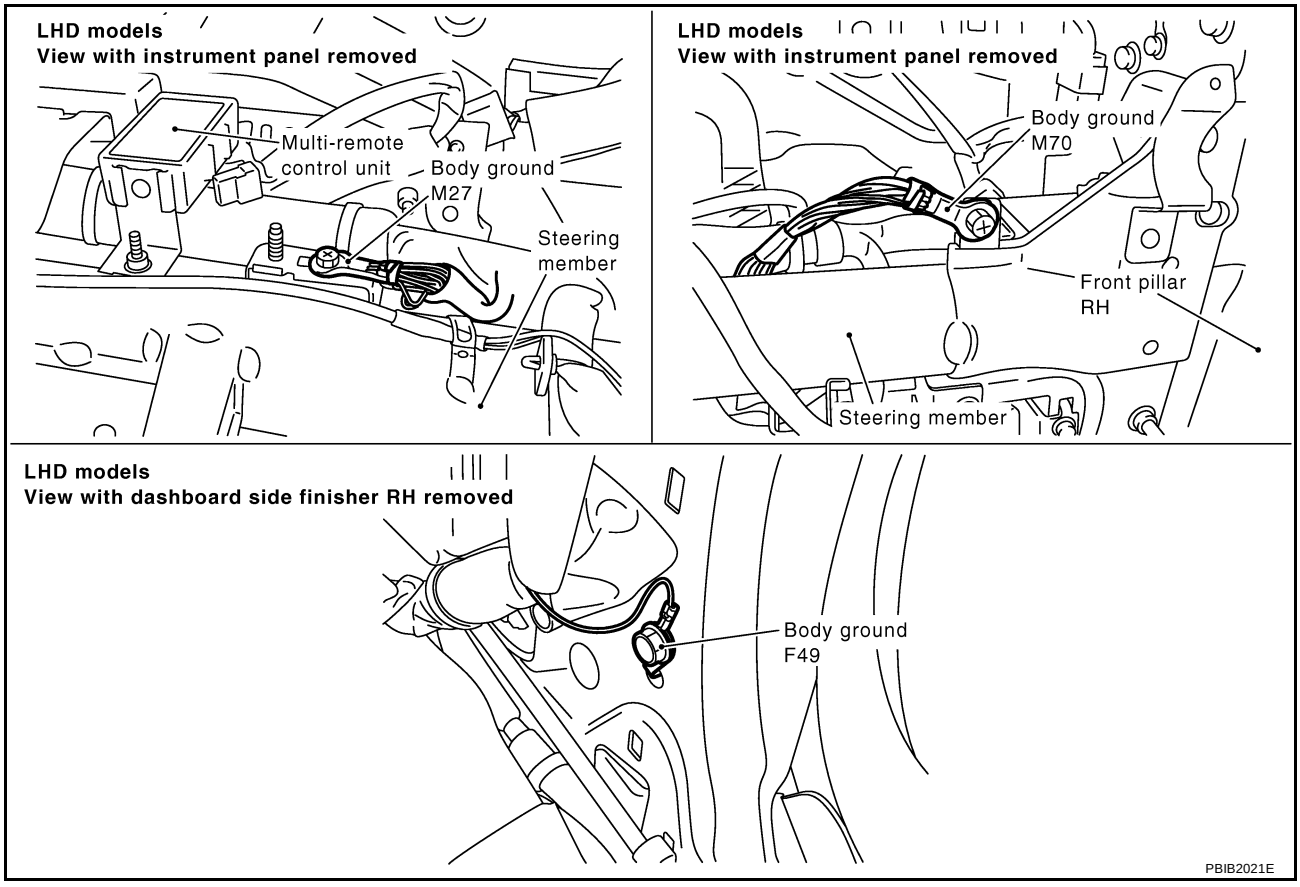
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001Q0

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .



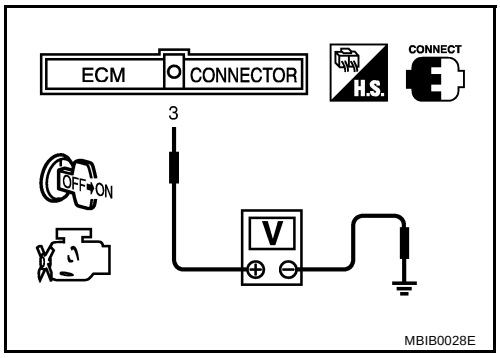
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE CONTROL MOTOR RELAY SIGNAL CIRCUIT

Check voltage between ECM terminal 3 and ground under the following conditions with CONSULT-II or tester.

Ignition switch	Voltage
OFF	Approximately 0V
ON	Battery voltage (11 - 14V)

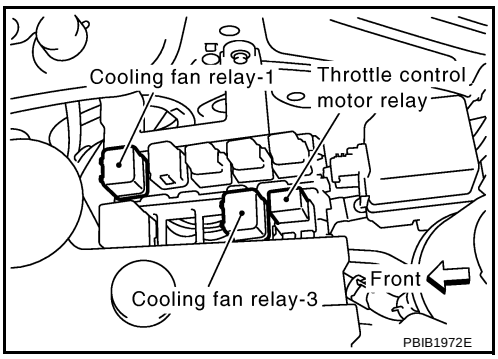


OK or NG

OK >> GO TO 10.
NG >> GO TO 3.

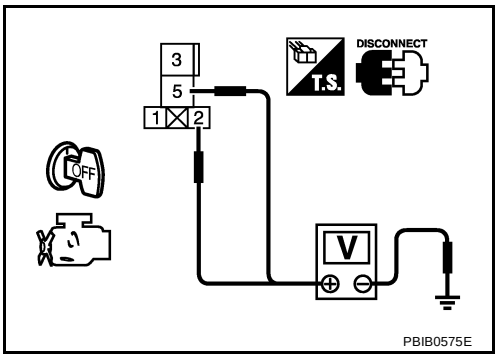
3. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle control motor relay.



3. Check voltage between throttle control motor relay terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Harness for open or short between throttle control motor relay and battery

>> Repair or replace harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between throttle control motor relay terminal 3 and ECM terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- Harness for open or short between throttle control motor relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT

1. Check continuity between throttle control motor relay terminal 1 and ECM terminal 104. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E116, M75 (LHD models)
- Harness connectors E106, M14 (RHD models)
- Harness for open or short between throttle control motor relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE CONTROL MOTOR RELAY

Refer to EC-737, "Component Inspection" .

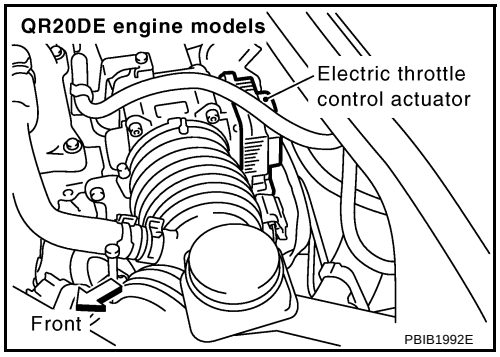
OK or NG

OK >> GO TO 13.
NG >> Replace throttle control motor relay.

10. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Turn ignition switch OFF.
2. Disconnect electric throttle control actuator harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between the following terminals. Refer to Wiring Diagram.

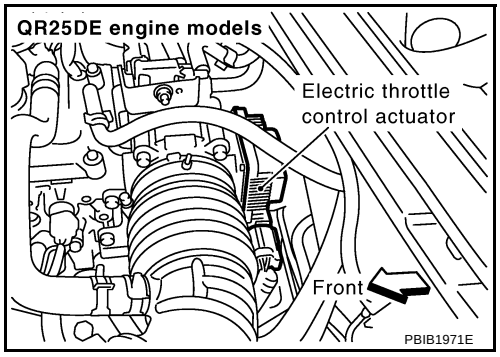
Electric throttle control actuator terminal	ECM terminal	Continuity
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist



5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair or replace.

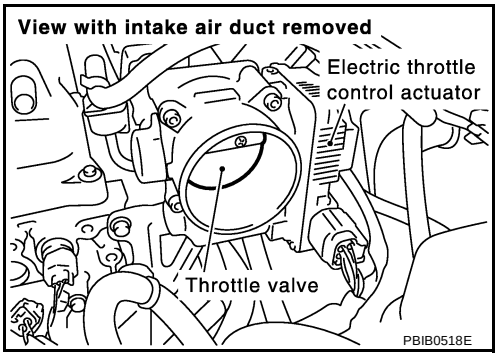


11. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if foreign matter is caught between the throttle valve and the housing.

OK or NG

OK >> GO TO 12.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



12. CHECK THROTTLE CONTROL MOTOR

Refer to EC-737, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> GO TO 14.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 14.
NG >> Repair or replace harness or connectors.

14. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

Component Inspection

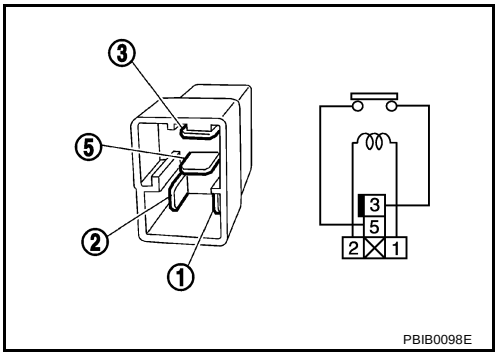
BBS001Q1

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



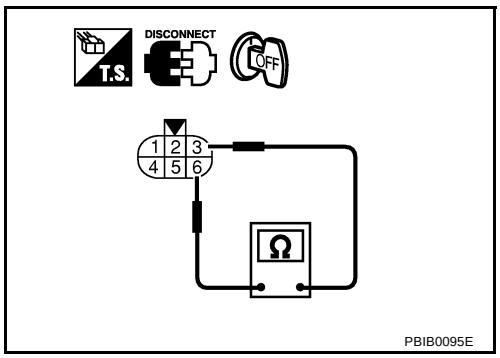
THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.

2. Check resistance between terminals 3 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-563, "Throttle Valve Closed Position Learning" .
5. Perform EC-563, "Idle Air Volume Learning" .



Removal and Installation

BBS001Q2

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P1124, P1126 THROTTLE CONTROL MOTOR RELAY

PFP:16119

Component Description

BBS001Q3

Power supply for the Throttle Control motor is provided to the ECM via throttle control motor relay. The throttle control motor relay is ON/OFF controlled by the ECM. When the ignition switch is turned ON, the ECM sends an ON signal to throttle control motor relay and battery voltage is provided to the ECM. When the ignition switch is turned OFF, the ECM sends an OFF signal to throttle control motor relay and battery voltage is not provided to the ECM.

CONSULT-II Reference Value in Data Monitor Mode

BBS001Q4

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL RELAY	● Ignition switch: ON	ON

On Board Diagnosis Logic

BBS001Q5

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1124 1124	Throttle control motor relay circuit short	ECM detect the throttle control motor relay is stuck ON.	● Harness or connectors (Throttle control motor relay circuit is shorted.) ● Throttle control motor relay
P1126 1126	Throttle control motor relay circuit open	ECM detects a voltage of power source for throttle control motor is excessively low.	● Harness or connectors (Throttle control motor relay circuit is open.) ● Throttle control motor relay

FAIL-SAFE MODE

When the DTC detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

DTC Confirmation Procedure

BBS001Q6

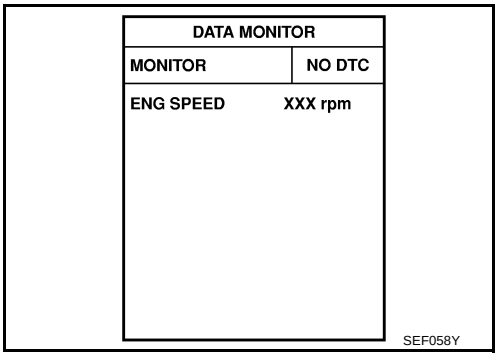
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

PROCEDURE FOR DTC P1124

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 8V.

With CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-744, "Diagnostic Procedure" .



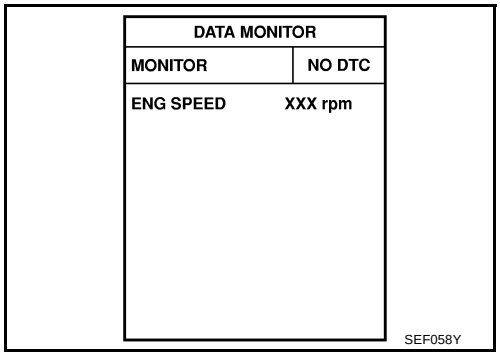
Without CONSULT-II

1. Turn ignition switch ON and wait at least 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-744, "Diagnostic Procedure" .

PROCEDURE FOR DTC P1126

With CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-744, "Diagnostic Procedure" .



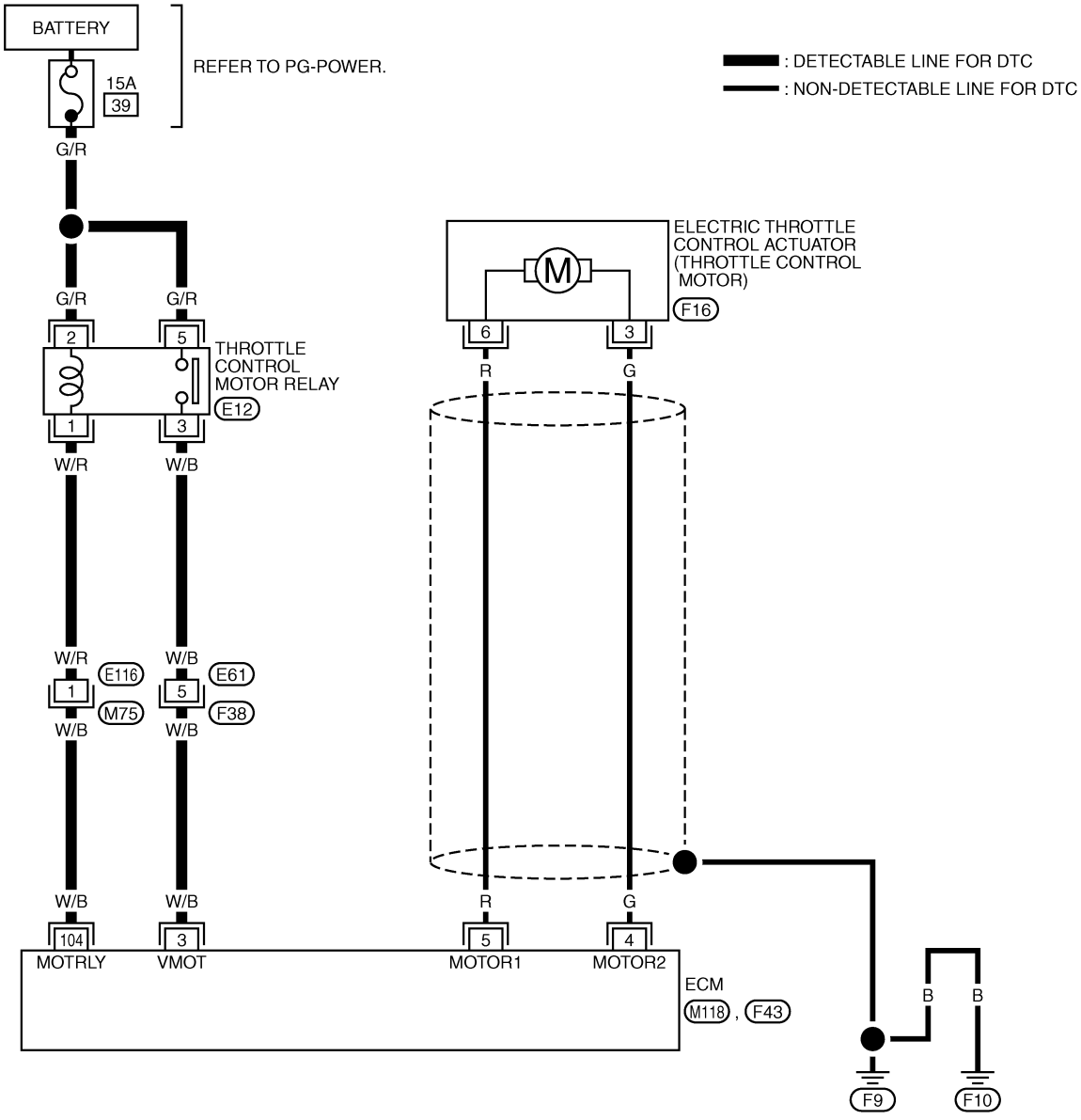
Without CONSULT-II

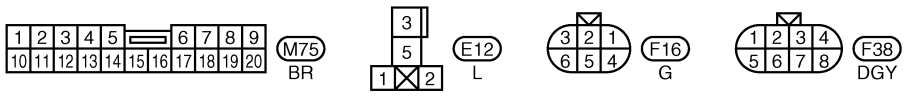
1. Turn ignition switch ON and wait at least 2 second.
2. Start engine and let it idle for 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-744, "Diagnostic Procedure" .

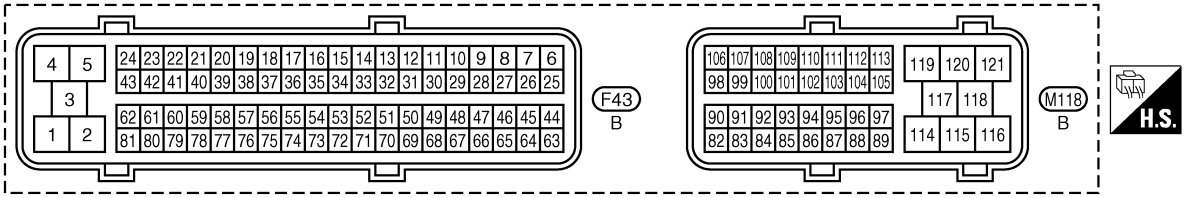
Wiring Diagram
LHD MODELS

BBS001Q7

EC-ETC2-01







TBWA0615E

Specification data are reference values and are measured between each terminal and ground.

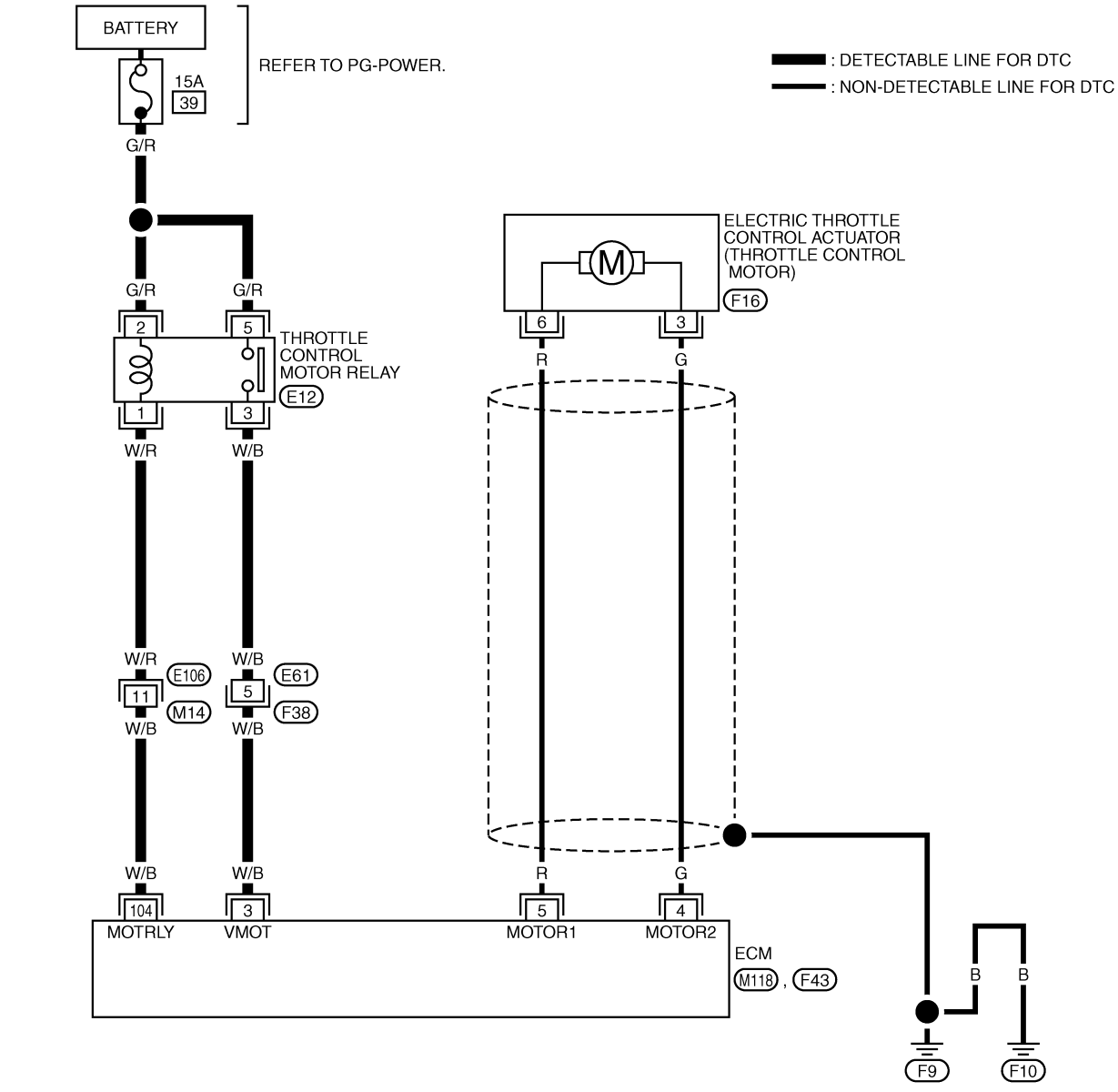
CAUTION:

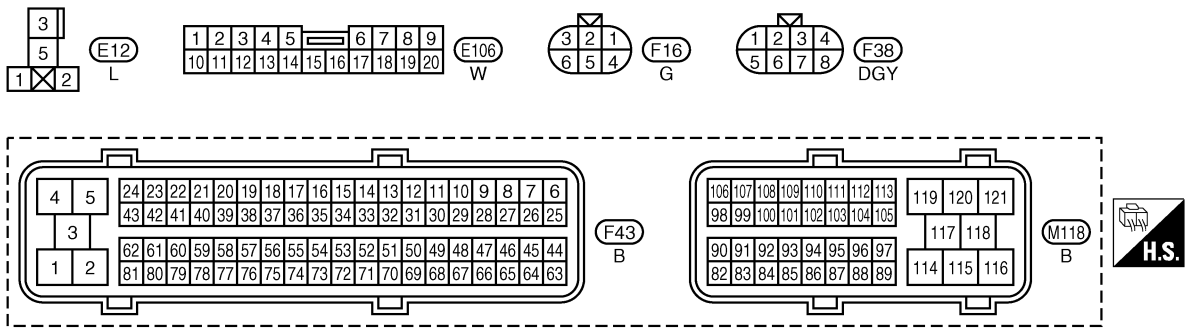
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	W/B	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
104	W/B	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

RHD MODELS

EC-ETC2-02





TBWA0616E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

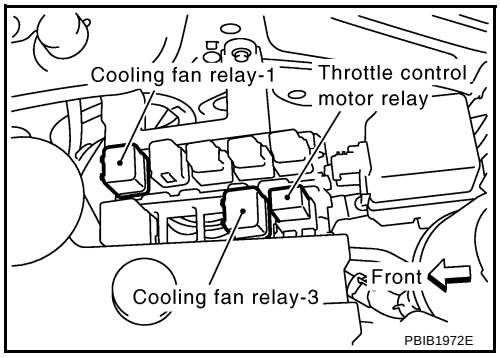
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
3	W/B	Throttle control motor relay power supply	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
104	W/B	Throttle control motor relay	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON]	0 - 1.0V

Diagnostic Procedure

BBS001Q8

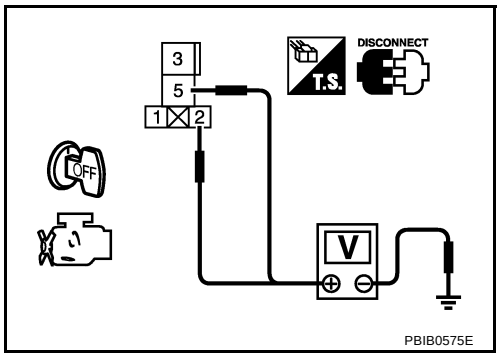
1. CHECK THROTTLE CONTROL MOTOR RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect throttle control motor relay.



3. Check voltage between throttle control motor relay terminals 2, 5 and ground.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Harness for open or short between throttle control motor relay and battery

>> Repair or replace harness or connectors.

3. CHECK THROTTLE CONTROL MOTOR RELAY INPUT SIGNAL CIRCUIT

1. Disconnect ECM harness connector.
2. Check harness continuity between throttle control motor relay terminal 3 and ECM terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- Harness for open or short between throttle control motor relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK THROTTLE CONTROL MOTOR RELAY OUTPUT SIGNAL CIRCUIT

1. Check continuity between throttle control motor relay terminal 1 and ECM terminal 104. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E116, M75 (LHD models)
- Harness connectors E106, M14 (RHD models)
- Harness for open or short between throttle control motor relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK THROTTLE CONTROL MOTOR RELAY

Refer to EC-746, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace throttle control motor relay.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

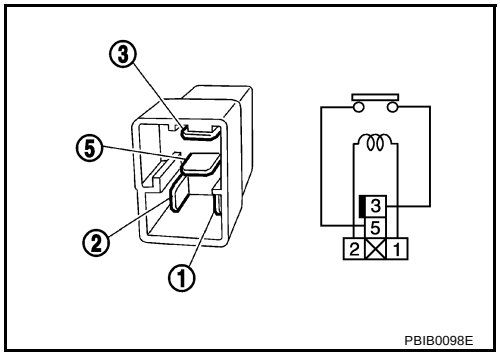
BBS001Q9

THROTTLE CONTROL MOTOR RELAY

1. Apply 12V direct current between relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

3. If NG, replace throttle control motor relay.



DTC P1128 THROTTLE CONTROL MOTOR

PFP:16119

Component Description

BBS001QA

The throttle control motor is operated by the ECM and it opens and closes the throttle valve.
The current opening angle of the throttle valve is detected by the throttle position sensor and it provides feedback to the ECM to control the throttle control motor to make the throttle valve opening angle properly in response to driving condition.

On Board Diagnosis Logic

BBS001QB

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1128 1128	Throttle control motor circuit short	ECM detects short both circuits between ECM and throttle control motor.	● Harness or connectors (Throttle control motor circuit is shorted.) ● Electric throttle control actuator (Throttle control motor)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

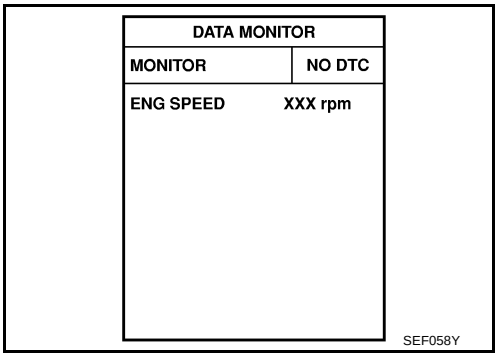
DTC Confirmation Procedure

BBS001QC

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and wait at least 2 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If DTC is detected, go to EC-752, "Diagnostic Procedure" .



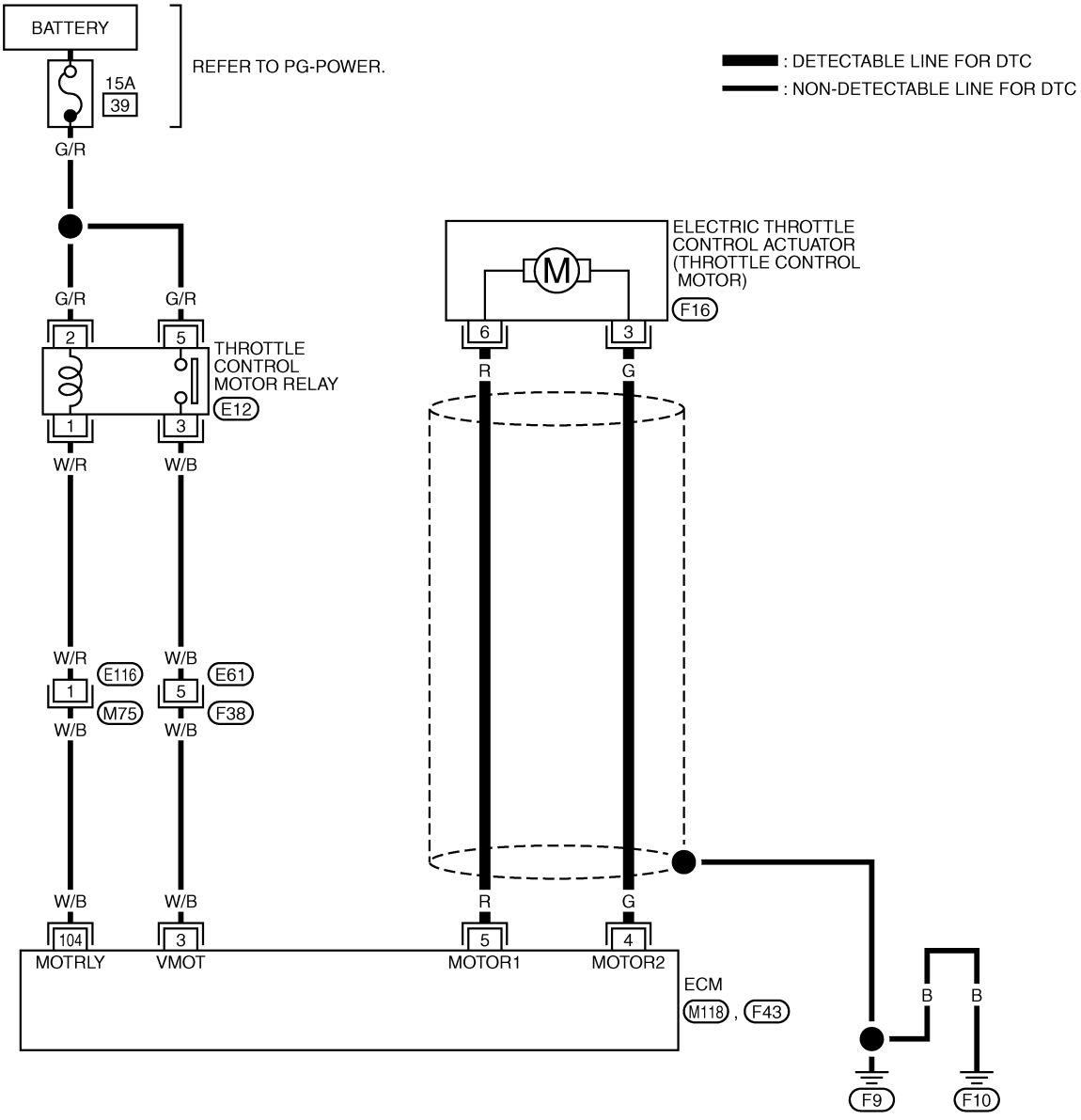
WITHOUT CONSULT-II

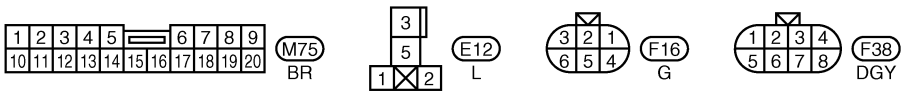
1. Turn ignition switch ON and wait at least 2 second.
2. Start engine and let it idle for 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-752, "Diagnostic Procedure" .

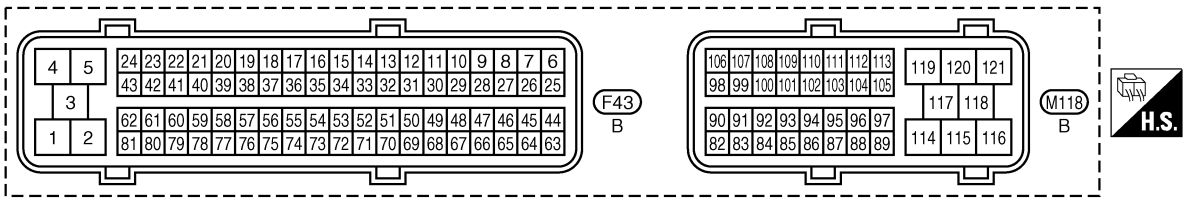
Wiring Diagram
LHD MODELS

BBS001QD

EC-ETC3-01



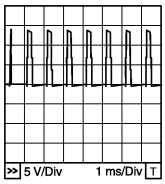
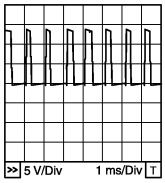




TBWA0617E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

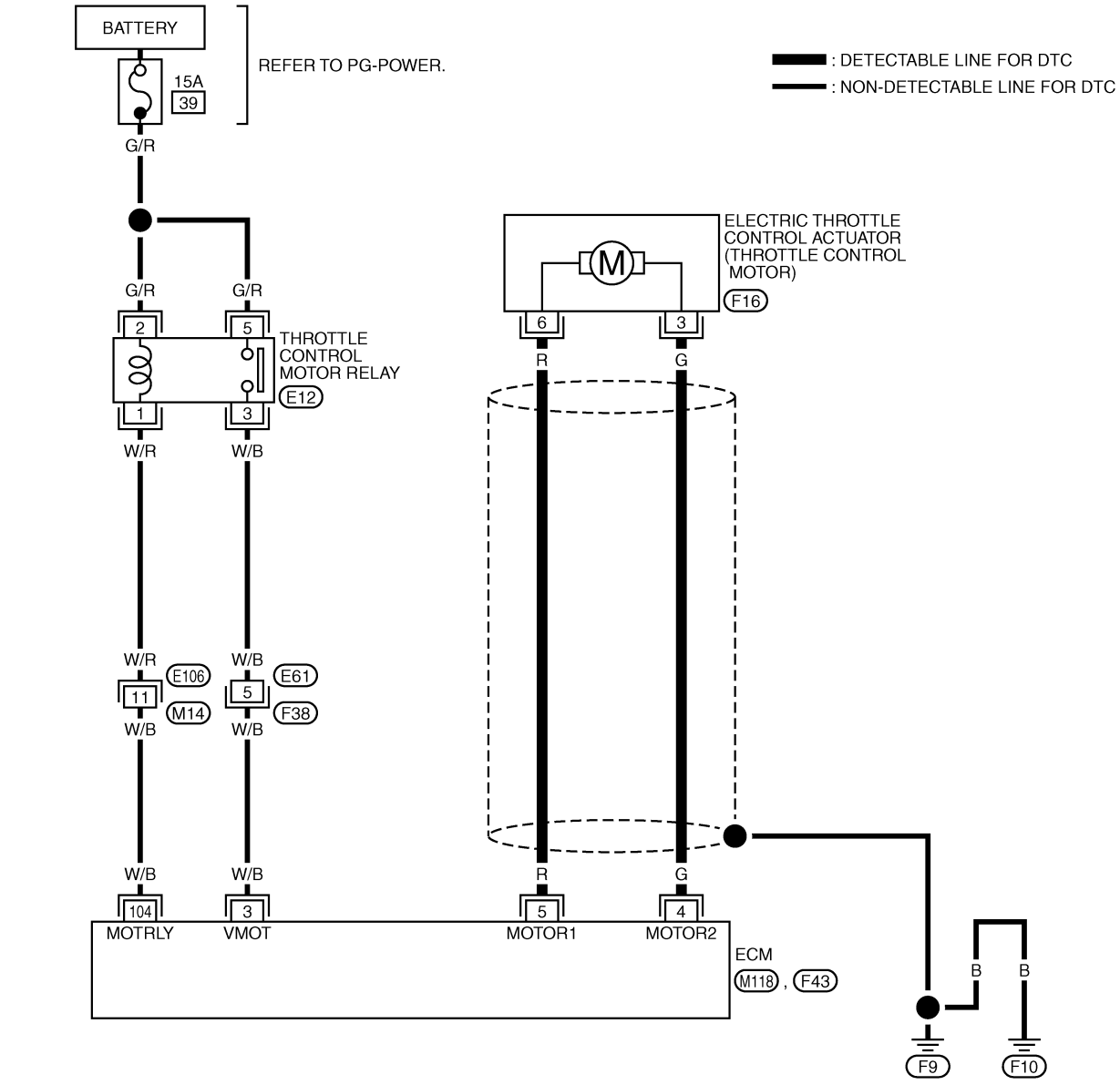
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

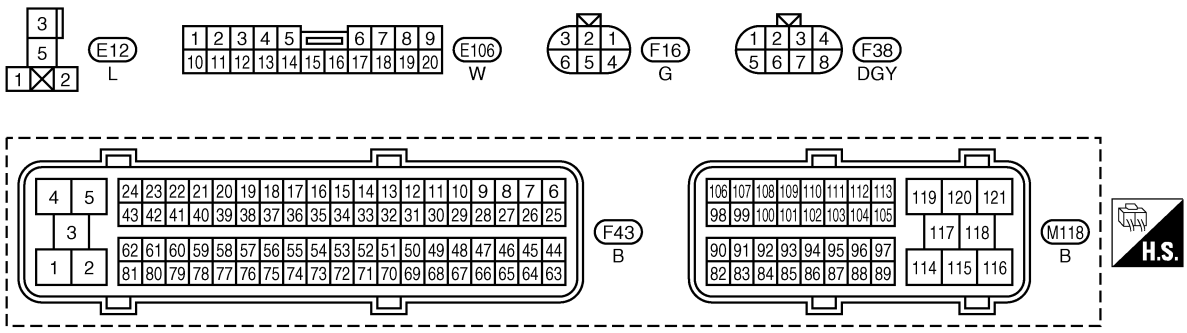
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	G	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	R	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

RHD MODELS

EC-ETC3-02

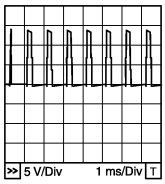
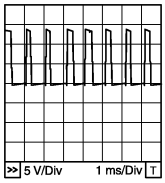




TBWA0618E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
4	G	Throttle control motor (Close)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	0 - 14V★  PBIB1104E
5	R	Throttle control motor (Open)	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	0 - 14V★  PBIB1105E

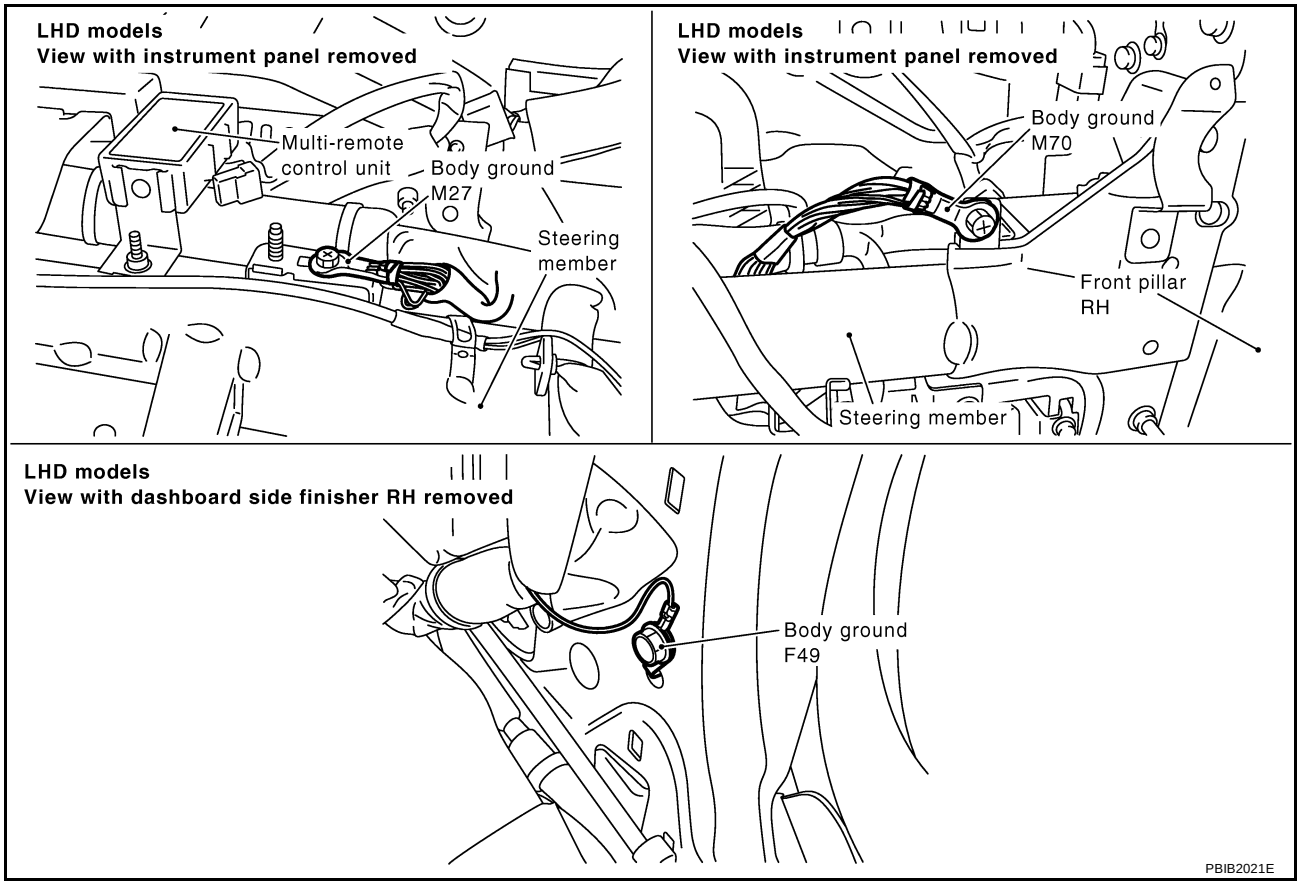
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001QE

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

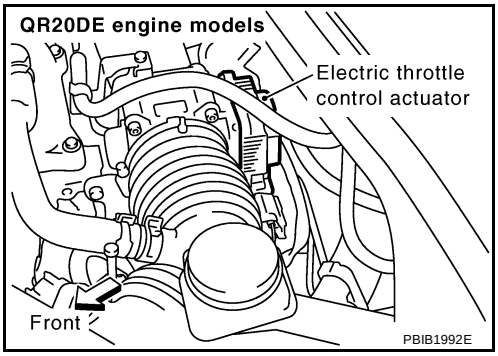
1. Disconnect electric throttle control actuator harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.

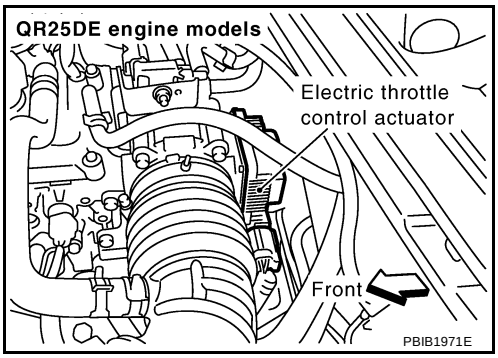
Electric throttle control actuator terminal	ECM terminal	Continuity
3	4	Should exist
	5	Should not exist
6	4	Should not exist
	5	Should exist

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.





3. CHECK THROTTLE CONTROL MOTOR

Refer to EC-753, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace harness or connectors.

5. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

Component Inspection

BBS001QF

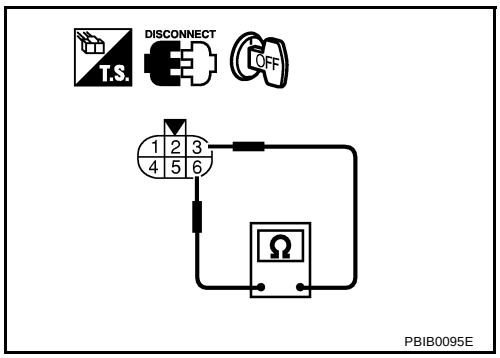
THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.

2. Check resistance between terminals 3 and 6.

Resistance: Approximately 1 - 15 Ω [at 25 °C (77°F)]

3. If NG, replace electric throttle control actuator and go to next step.
4. Perform EC-563, "Throttle Valve Closed Position Learning" .
5. Perform EC-563, "Idle Air Volume Learning" .



Removal and Installation

BBS001QG

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P1211 TCS CONTROL UNIT

PFP:47850

Description

BBS001QH

The malfunction information related to TCS is transferred through the CAN communication line from ESP/TCS/ABS control unit to ECM.

Be sure to erase the malfunction information such as DTC not only for ESP/TCS/ABS control unit but also for ECM after TCS related repair.

On Board Diagnosis Logic

BBS001QI

Freeze frame data is not stored in the ECM for this self-diagnosis.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211 1211	TCS control unit	ECM receives a malfunction information from ESP/TCS/ABS control unit.	● ESP/TCS/ABS control unit ● TCS related parts

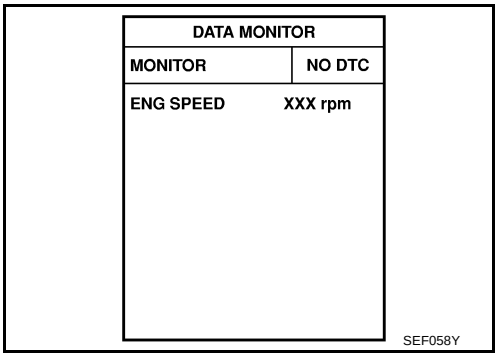
DTC Confirmation Procedure

BBS001QJ

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 60 seconds.
4. If 1st trip DTC is detected, go to EC-755, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and let it idle for at least 60 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-755, "Diagnostic Procedure" .

Diagnostic Procedure

BBS001QK

Go to BRC-52, "TROUBLE DIAGNOSIS" .

DTC P1212 TCS COMMUNICATION LINE

PFP:47850

Description

BBS001QL

NOTE:
If DTC P1212 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-635, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and ESP/TCS/ABS control unit.
Be sure to erase the malfunction information such as DTC not only for ESP/TCS/ABS control unit but also for ECM after TCS related repair.

On Board Diagnosis Logic

BBS001QM

Freeze frame data is not stored in the ECM for this self-diagnosis.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212 1212	TCS communication line	ECM can not receive the information from ESP/TCS/ABS control unit continuously.	● Harness or connectors (The CAN communication line is open or shorted.) ● ESP/TCS/ABS control unit ● Dead (Weak) battery

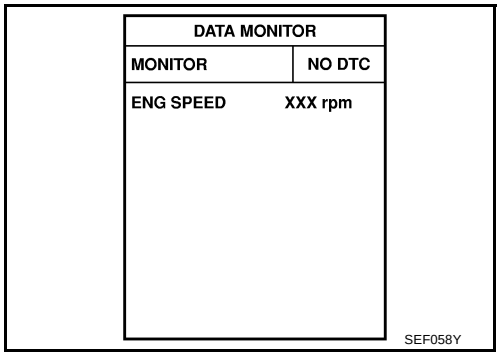
DTC Confirmation Procedure

BBS001QN

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10.5V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 10 seconds.
4. If a 1st trip DTC is detected, go to EC-756, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and let it idle for at least 60 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-756, "Diagnostic Procedure" .

Diagnostic Procedure

BBS001QO

Go to BRC-52, "TROUBLE DIAGNOSIS" .

DTC P1217 ENGINE OVER TEMPERATURE

PFP:00000

System Description

BBS001QP

NOTE:
If DTC P1217 is displayed with DTC U1000, U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-635, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

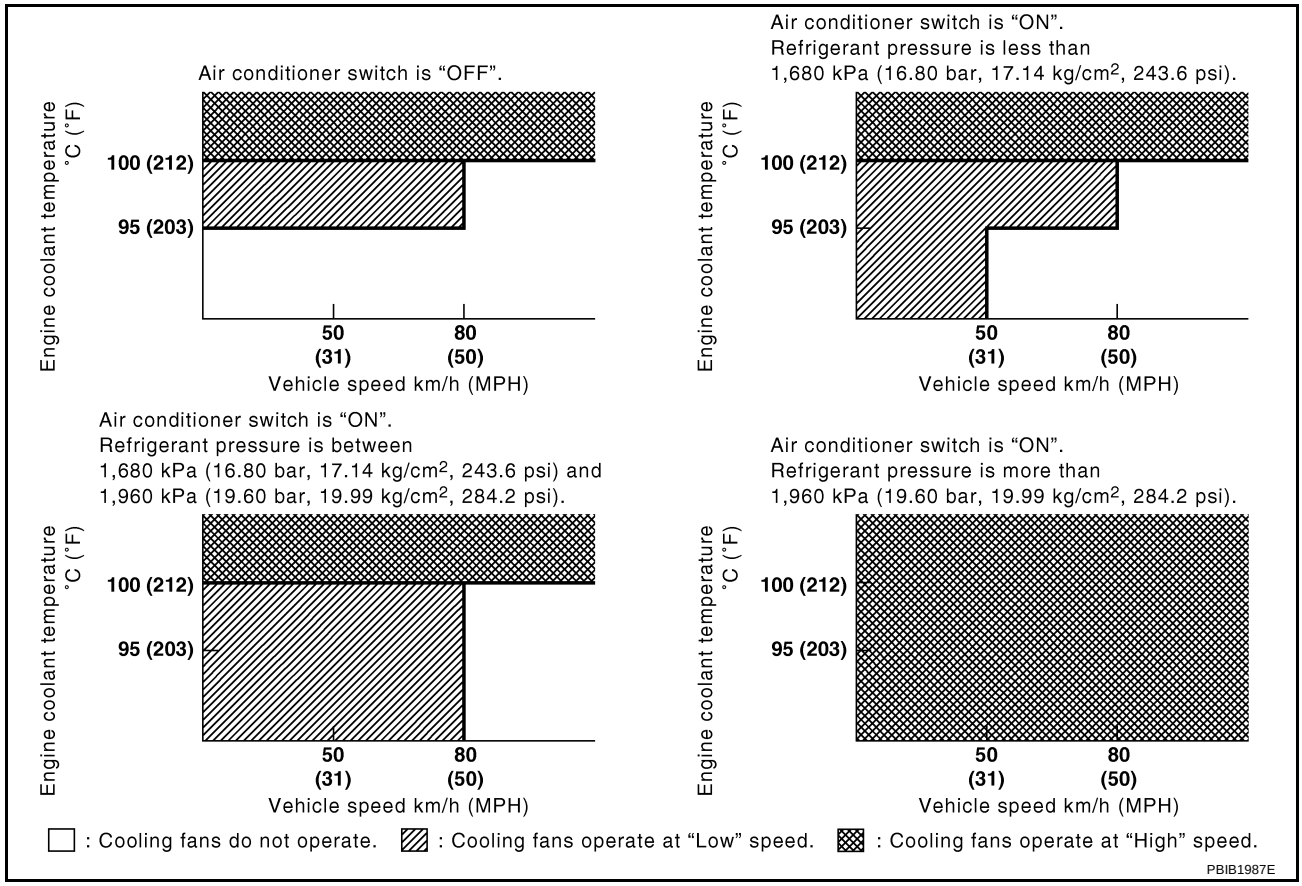
COOLING FAN CONTROL

Sensor	Input Signal to ECM	ECM function	Actuator
Wheel sensor	Vehicle speed*1	Cooling fan control	Cooling fan relay
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal		
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*2		
Battery	Battery voltage*2		
Refrigerant pressure sensor	Refrigerant pressure		

*1: This signal is sent to ECM through CAN communication line.
*2: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure, and air conditioner ON signal. The control system has 3-step control [HIGH/LOW/OFF].

OPERATION



CONSULT-II Reference Value in Data Monitor Mode

BBS001QQ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
AIR COND SIG	● Engine: After warming up, idle the engine	Air conditioner switch: OFF	OFF
		Air conditioner switch: ON (Compressor operates.)	ON
COOLING FAN	● Engine: After warming up, idle the engine ● Air conditioner switch: OFF	Engine coolant temperature is 94°C (201°F) or less	OFF
		Engine coolant temperature is between 95°C (203°F) and 99°C (210°F) or more	LOW
		Engine coolant temperature is 100°C (212°F) or more	HIGH

On Board Diagnosis Logic

BBS001QR

If the cooling fan or another component in the cooling system malfunctions, engine coolant temperature will rise. When the engine coolant temperature reaches an abnormally high temperature condition, a malfunction is indicated.

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1217 1217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method. ● Engine coolant is not within the specified range.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● Cooling fan ● Cooling fan relays ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-771, "Main 12 Causes of Overheating" .

CAUTION:

When a malfunction is indicated, be sure to replace the coolant. Refer to CO-9, "Changing Engine Coolant" . Also, replace the engine oil. Refer to LU-8, "Changing Engine Oil" .

1. **Fill radiator with coolant up to specified level with a filling speed of 2 liters per minute. Be sure to use coolant with the proper mixture ratio. Refer to MA-19, "Engine Coolant Mixture Ratio" .**
2. **After refilling coolant, run engine to ensure that no water-flow noise is emitted.**

Overall Function Check

BBS001QS

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

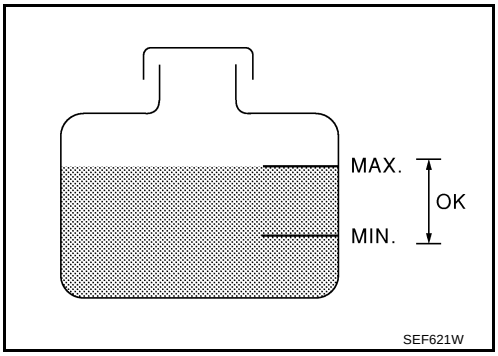
WARNING:

Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.

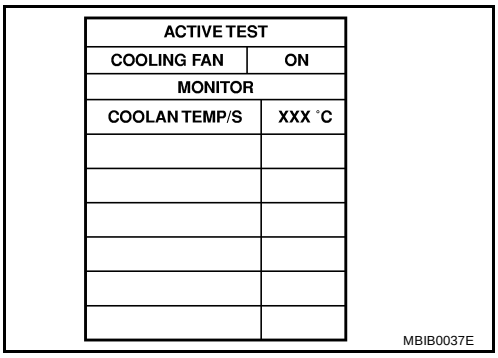
Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.

WITH CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-764, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-764, "Diagnostic Procedure" .
3. Turn ignition switch ON.



4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-764, "Diagnostic Procedure" .

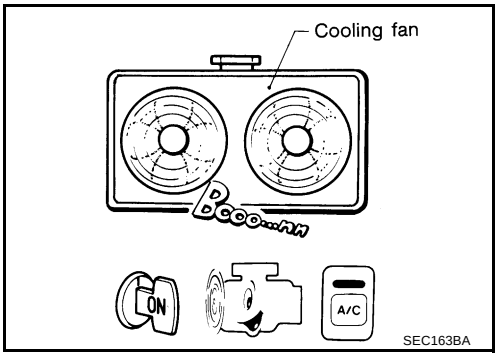


WITHOUT CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-764, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-764, "Diagnostic Procedure" .
3. Start engine.

   CAUTION:
   Be careful not to overheat engine.
4. Set temperature control dial to full cold position.
5. Turn air conditioner switch ON.
6. Turn blower fan switch ON.
7. Run engine at idle for a few minutes with air conditioner operating.

   CAUTION:
   Be careful not to overheat engine.
8. Make sure that cooling fans operates at low speed.
   If NG, go to EC-764, "Diagnostic Procedure" .
   If OK, go to the following step.
9. Turn ignition switch OFF.
10. Turn air conditioner switch and blower fan switch OFF.
11. Disconnect engine coolant temperature sensor harness connector.
12. Connect 150Ω resistor to engine coolant temperature sensor harness connector.

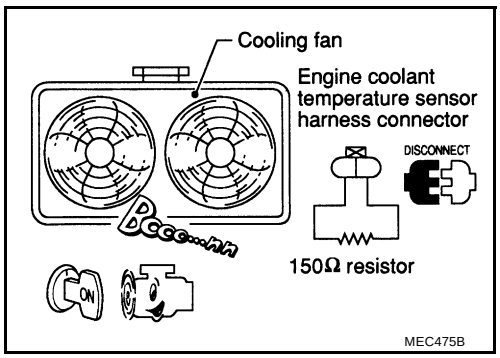


13. Restart engine and make sure that cooling fan operates at higher speed than low speed.

    CAUTION:

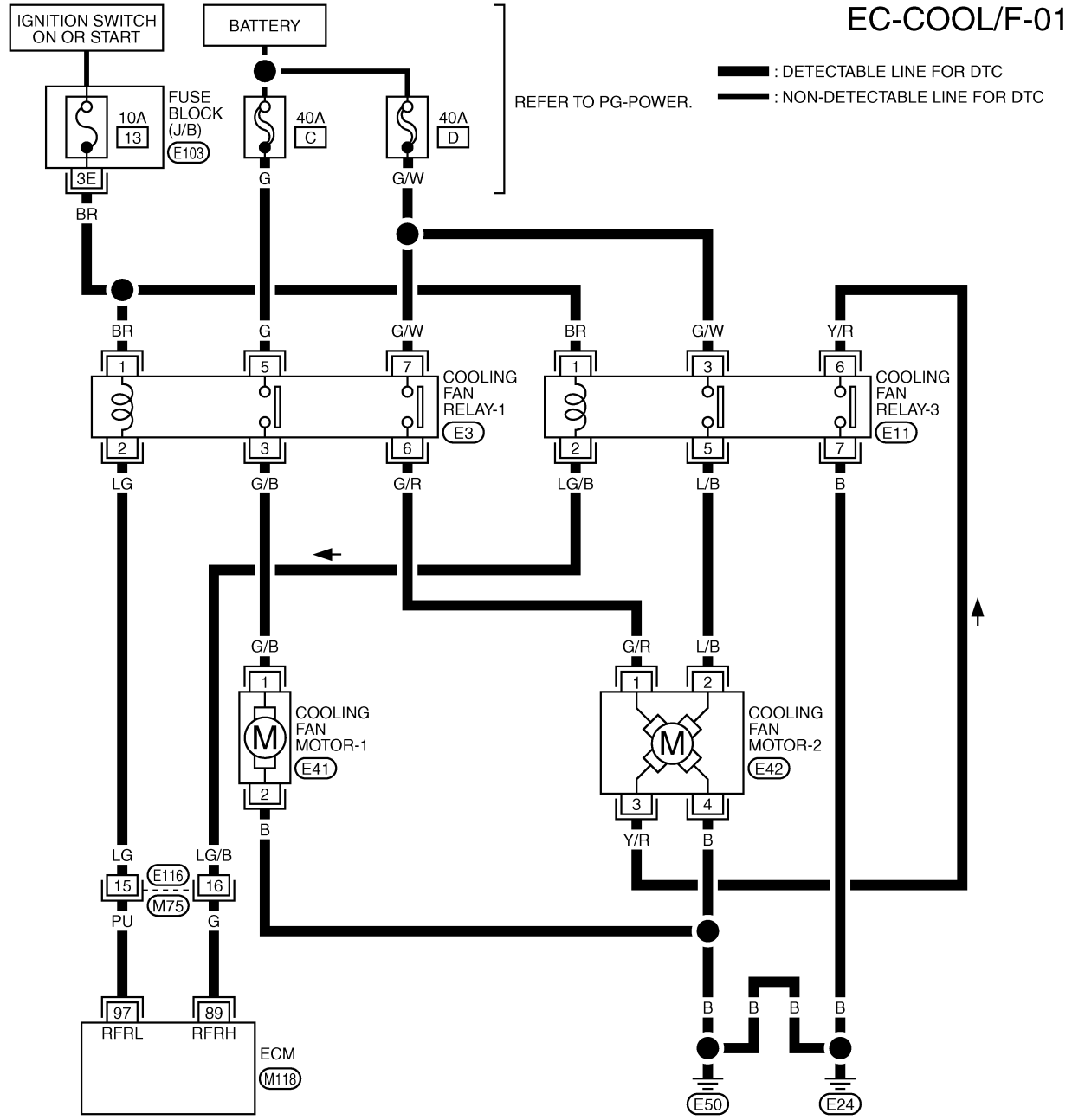
    Be careful not to overheat engine.

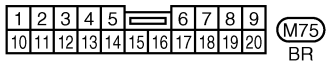
14. If NG, go to EC-764, "Diagnostic Procedure" .

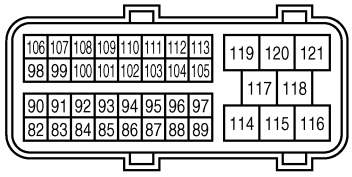


Wiring Diagram
LHD MODELS

BBS001QT







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0619E

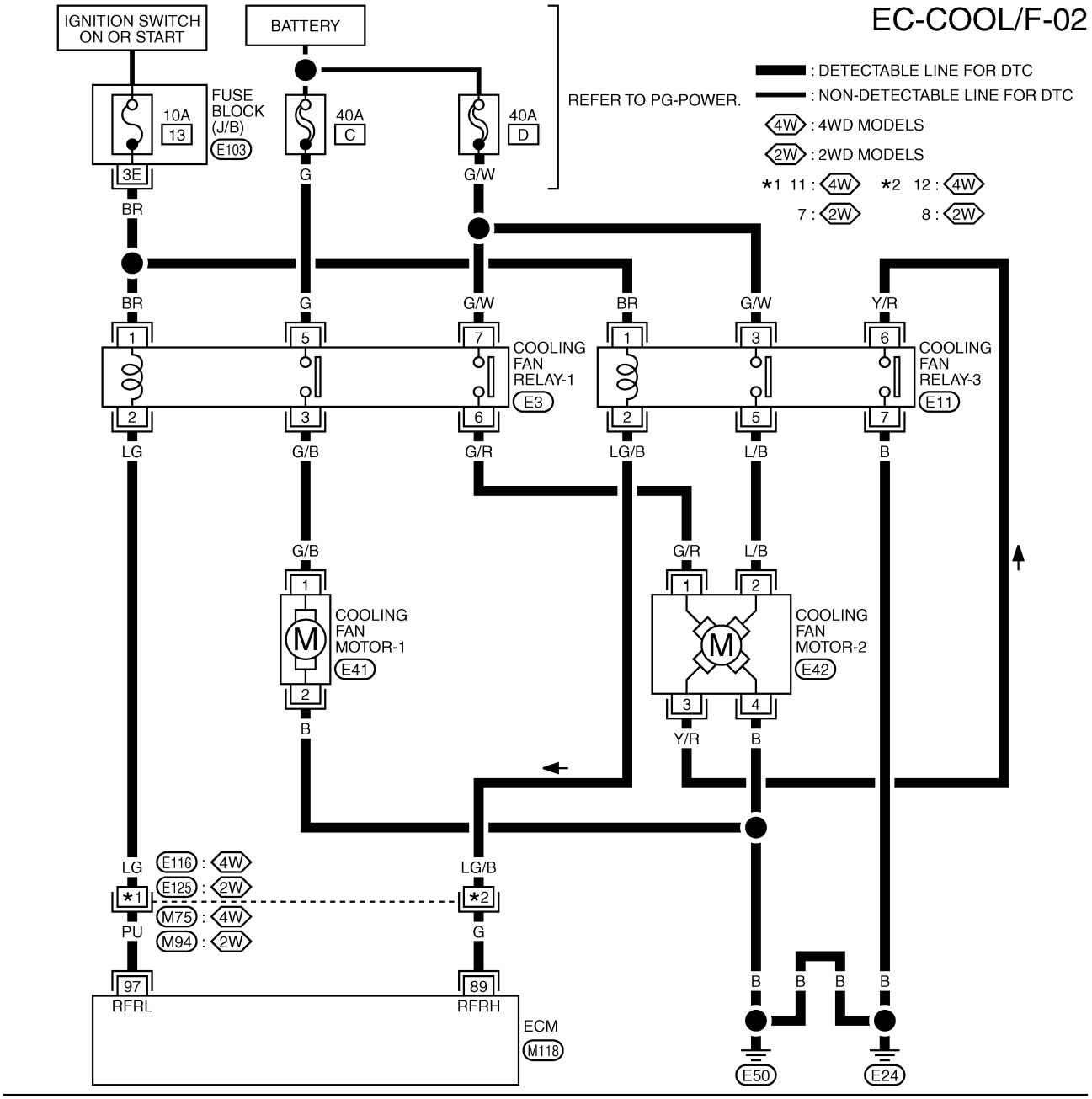
Specification data are reference values and are measured between each terminal and ground.

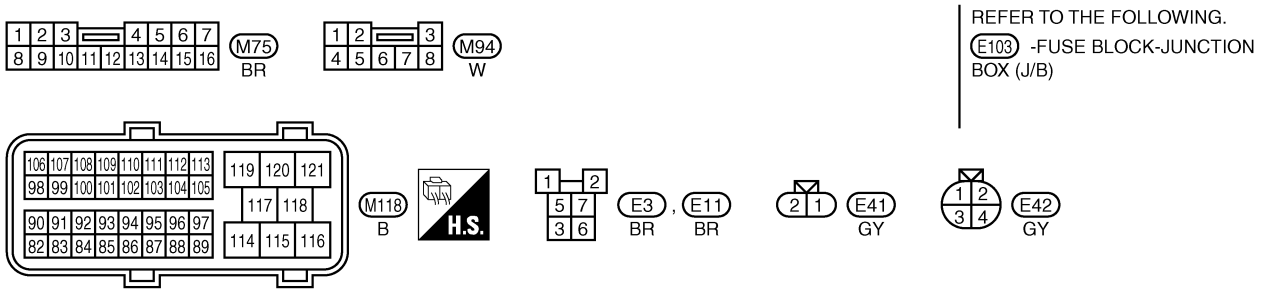
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	G	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is high speed operating	0 - 1.0V
97	PU	Cooling fan relay (Low)	**[Ignition switch: ON]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Cooling fan is operating	0 - 1.0V

RHD MODELS





TBWB0690E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
89	G	Cooling fan relay (High)	**[Engine is running]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan is high speed operating	0 - 1.0V
97	PU	Cooling fan relay (Low)	**[Ignition switch: ON]** ● Cooling fan is not operating	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Cooling fan is operating	0 - 1.0V

Diagnostic Procedure

BBS001QU

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 4.

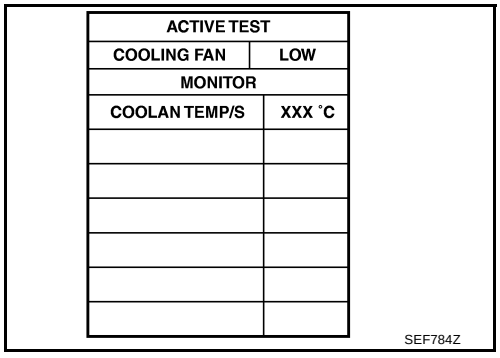
2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “LOW” on the CONSULT-II screen.
3. Make sure that cooling fans-1 and -2 operates at low speed.

OK or NG

OK >> GO TO 3.
NG >> Check cooling fan low speed control circuit. (Go to EC-768, "PROCEDURE A" .)



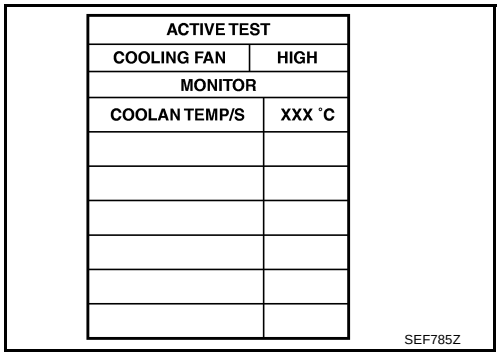
3. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Touch “HIGH”on the CONSULT-II screen.
2. Make sure that cooling fan-2 operate at higher speed than low speed.

OK or NG

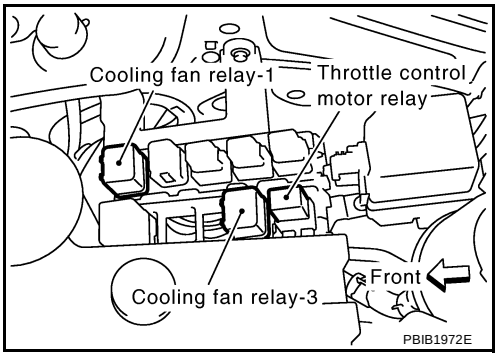
OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-770, "PROCEDURE B" .)



4. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

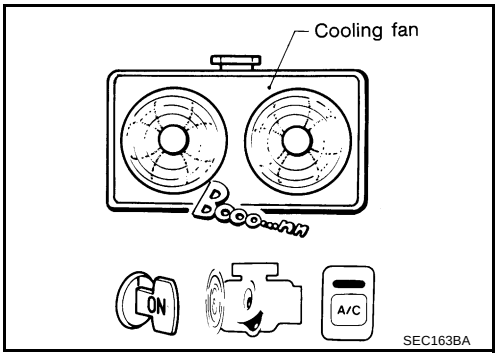
1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-3.
3. Start engine and let it idle.
4. Turn air conditioner switch ON.
5. Turn blower fan switch ON.



6. Make sure that cooling fans-1 and -2 operates at low speed.

OK or NG

OK >> GO TO 5.
NG >> Check cooling fan low speed control circuit. (Go to EC-768, "PROCEDURE A" .)



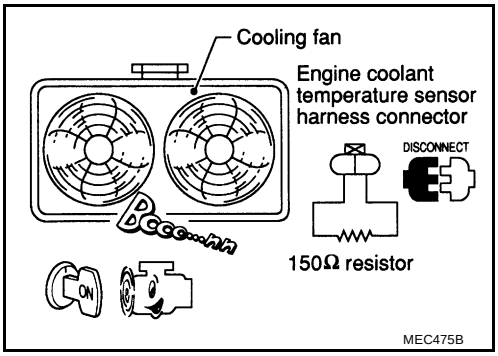
5. CHECK COOLING FAN HIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch OFF.
2. Reconnect cooling fan relay-3.
3. Turn air conditioner switch and blower fan switch OFF.
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.
6. Restart engine and make sure that cooling fan-2 operates at higher speed than low speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan high speed control circuit. (Go to EC-770, "PROCEDURE B" .)



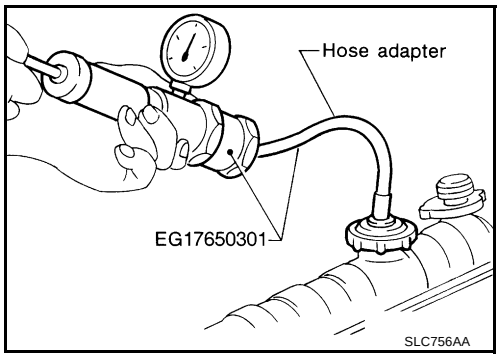
6. CHECK COOLING SYSTEM FOR LEAK

Apply pressure to the cooling system with a tester, and check if the pressure drops.

Testing pressure: 157 kPa (1.57 bar, 1.6 kg/cm^2 , 23psi)

CAUTION:
Higher than the specified pressure may cause radiator damage.

Pressure should not drop.



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check the following for leak.

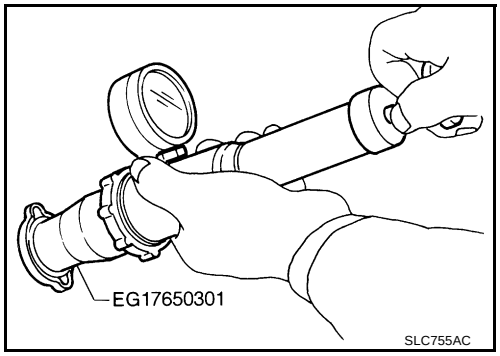
- Hose
- Radiator
- Water pump (Refer to CO-21, "WATER PUMP" .)

>> Repair or replace.

8. CHECK RADIATOR CAP

Apply pressure to cap with a tester and check radiator cap relief pressure.

Radiator cap relief pressure: **59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm^2 , 9 - 14 psi)**



OK or NG

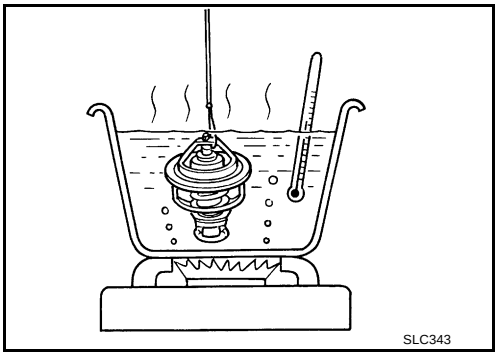
OK >> GO TO 9.
NG >> Replace radiator cap.

9. CHECK THERMOSTAT

1. Remove thermostat.
2. Check valve seating condition at normal room temperatures.
   It should seat tightly.
3. Check valve opening temperature and valve lift.

   Valve opening temperature: **82 °C (180 °F) [standard]**

   Valve lift: **More than 8 mm/95 °C (0.31 in/203 °F)**



4. Check if valve is closed at 5°C (9°F) below valve opening temperature.
   For details, refer to CO-23, "THERMOSTAT AND WATER CONTROL VALVE" .

OK or NG

OK >> GO TO 10.
NG >> Replace thermostat.

10. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-659, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace engine coolant temperature sensor.

11. CHECK MAIN 12 CAUSES

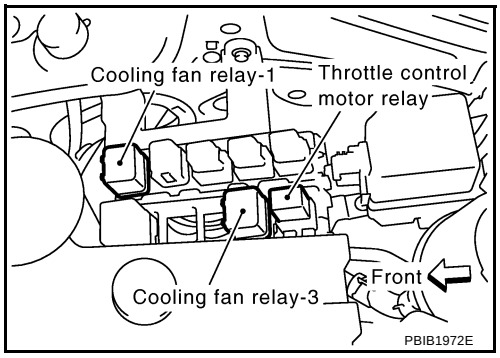
If the cause cannot be isolated, go to EC-771, "Main 12 Causes of Overheating" .

>> **INSPECTION END**

PROCEDURE A

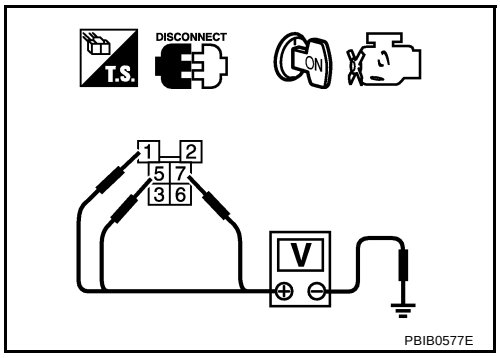
1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch ON.



4. Check voltage between cooling fan relay-1 terminals 1, 5, 7 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

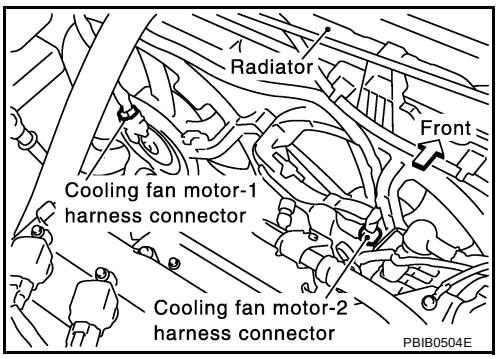
- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN MOTORS CONTROL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-1 terminal 3 and cooling fan motor-1 terminal 1, cooling fan motor-1 terminal 2 and ground.

Continuity should exist.



4. Also check harness for short to ground and short to power.
5. Check harness continuity between cooling fan relay-1 terminal 6 and cooling fan motor-2 terminal 1, cooling fan motor-2 terminal 4 and ground.

Continuity should exist.

6. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between cooling fan relay-1 terminal 2 and ECM terminal 97. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E116, M75
- Harness for open or short between cooling fan relay-1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-1

Refer to EC-772, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-772, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

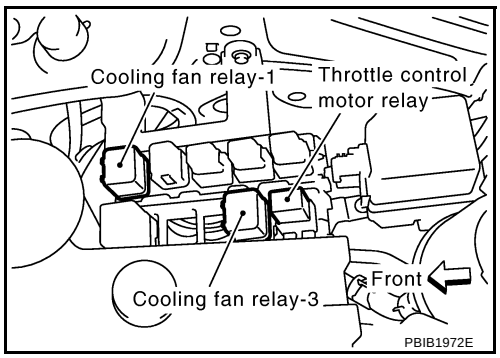
Perform EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

PROCEDURE B

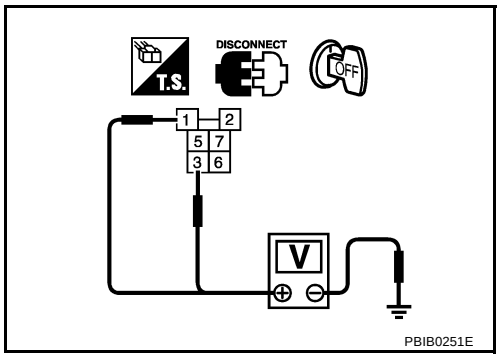
1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-3.
3. Turn ignition switch ON.



4. Check voltage between cooling fan relay-3 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

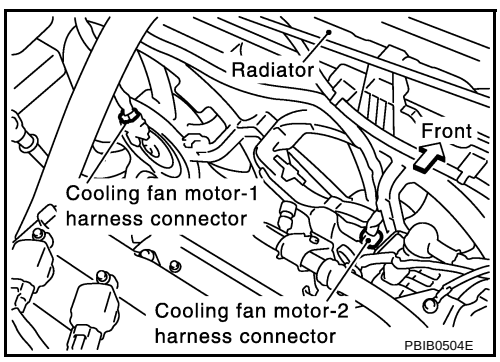
- Harness for open or short between cooling fan relay-3 and fuse
- Harness for open or short between cooling fan relay-3 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN MOTORS CONTROL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-2 harness connector.
3. Check harness continuity between cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 2, cooling fan motor-2 terminal 3 and cooling fan relay-3 terminal 6, cooling fan relay-3 terminal 7 and ground.
   Refer to Wiring Diagram.

Continuity should exist.



4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between cooling fan relay-3 terminal 2 and ECM terminal 89. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E116, M75
- Harness for open or short between cooling fan relay-2 and ECM
- Harness for open or short between cooling fan relay-3 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAYS-3

Refer to EC-772, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay.

7. CHECK INTERMITTENT INCIDENT

Perform EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

BBS001QV

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-19 .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See CO-9 .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See CO-13 .
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-9 .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-23 , and CO-12 .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P1217 (EC-757).
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See CO-9 .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-9 .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	See EM-70 .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-89 .

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-5, "OVERHEATING CAUSE ANALYSIS" .

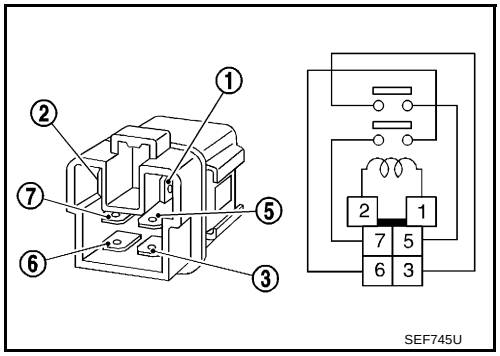
Component Inspection

BBS001QW

COOLING FAN RELAYS-1 AND -3

Check continuity between terminals 3 and 5, 6 and 7.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

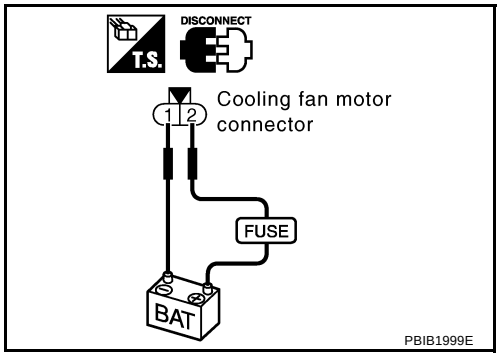


SEF745U

COOLING FAN MOTOR-1

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Terminals	
	(+)	(-)
Cooling fan motor	1	2

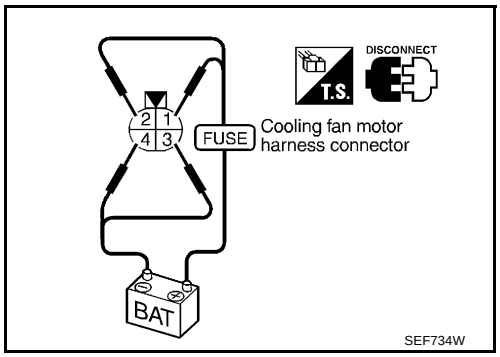


PBIB1999E

COOLING FAN MOTOR-2

1. Disconnect cooling fan motor harness connector.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(+)	(-)
Cooling fan motor	Low	1	4
	High	1, 2	3, 4



SEF734W

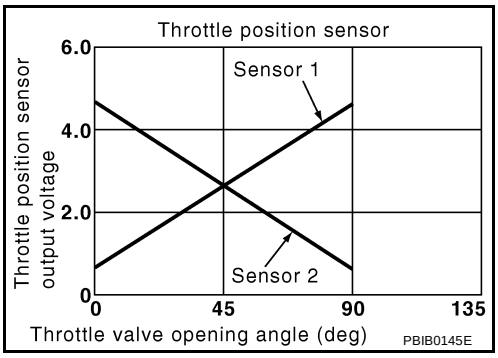
DTC P1225 TP SENSOR

PFP:16119

Component Description

BBS001QX

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

BBS001QY

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1225 1225	Closed throttle position learning performance problem	Closed throttle position learning value is excessively low.	● Electric throttle control actuator (TP sensor 1 and 2)

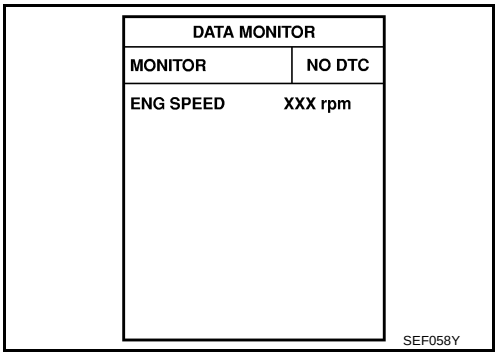
DTC Confirmation Procedure

BBS001QZ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. If 1st trip DTC is detected, go to EC-774, "Diagnostic Procedure" .



WITHOUT CONSULT-II

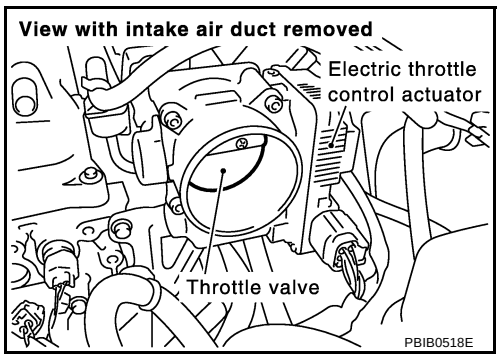
1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If 1st trip DTC is detected, go to EC-774, "Diagnostic Procedure" .

Diagnostic Procedure

BBS001R0

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

Removal and Installation

BBS001R1

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

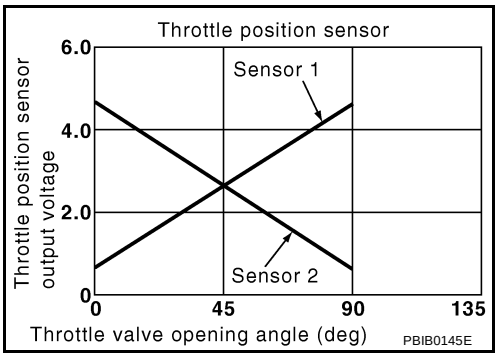
DTC P1226 TP SENSOR

PFP:16119

Component Description

BBS001R2

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



On Board Diagnosis Logic

BBS001R3

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1226 1226	Closed throttle position learning performance problem	Closed throttle position learning is not performed successfully, repeatedly.	● Electric throttle control actuator (TP sensor 1 and 2)

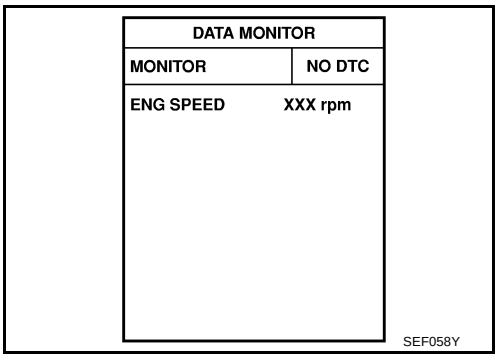
DTC Confirmation Procedure

BBS001R4

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF and wait at least 10 seconds.
4. Turn ignition switch ON.
5. Repeat steps 3 and 4 for 32 times.
6. If 1st trip DTC is detected, go to EC-776, "Diagnostic Procedure" .



WITHOUT CONSULT-II

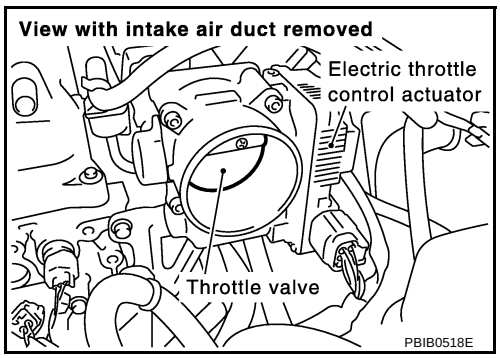
1. Turn ignition switch ON.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Repeat step 2 for 32 times.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If 1st trip DTC is detected, go to EC-776, "Diagnostic Procedure" .

Diagnostic Procedure

BBS001R5

1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Turn ignition switch OFF.
2. Remove the intake air duct.
3. Check if foreign matter is caught between the throttle valve and the housing.



OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.

2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

Removal and Installation

BBS001R6

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

DTC P1229 SENSOR POWER SUPPLY

PFP:16119

On Board Diagnosis Logic

BBS001R7

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1229 1229	Sensor power supply circuit short	ECM detects a voltage of power source for sensor is excessively low or high.	● Harness or connectors (APP sensor 1 circuit is shorted.) (PSP sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) ● Accelerator pedal position sensor (APP sensor 1) ● Power steering pressure sensor ● Refrigerant pressure sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
ECM stops the electric throttle control actuator control, throttle valve is maintained at a fixed opening (approx. 5 degrees) by the return spring.

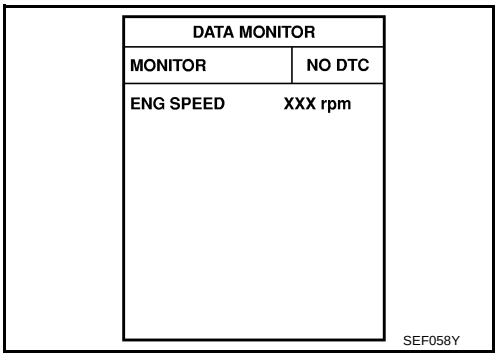
DTC Confirmation Procedure

BBS001R8

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-779, "Diagnostic Procedure" .



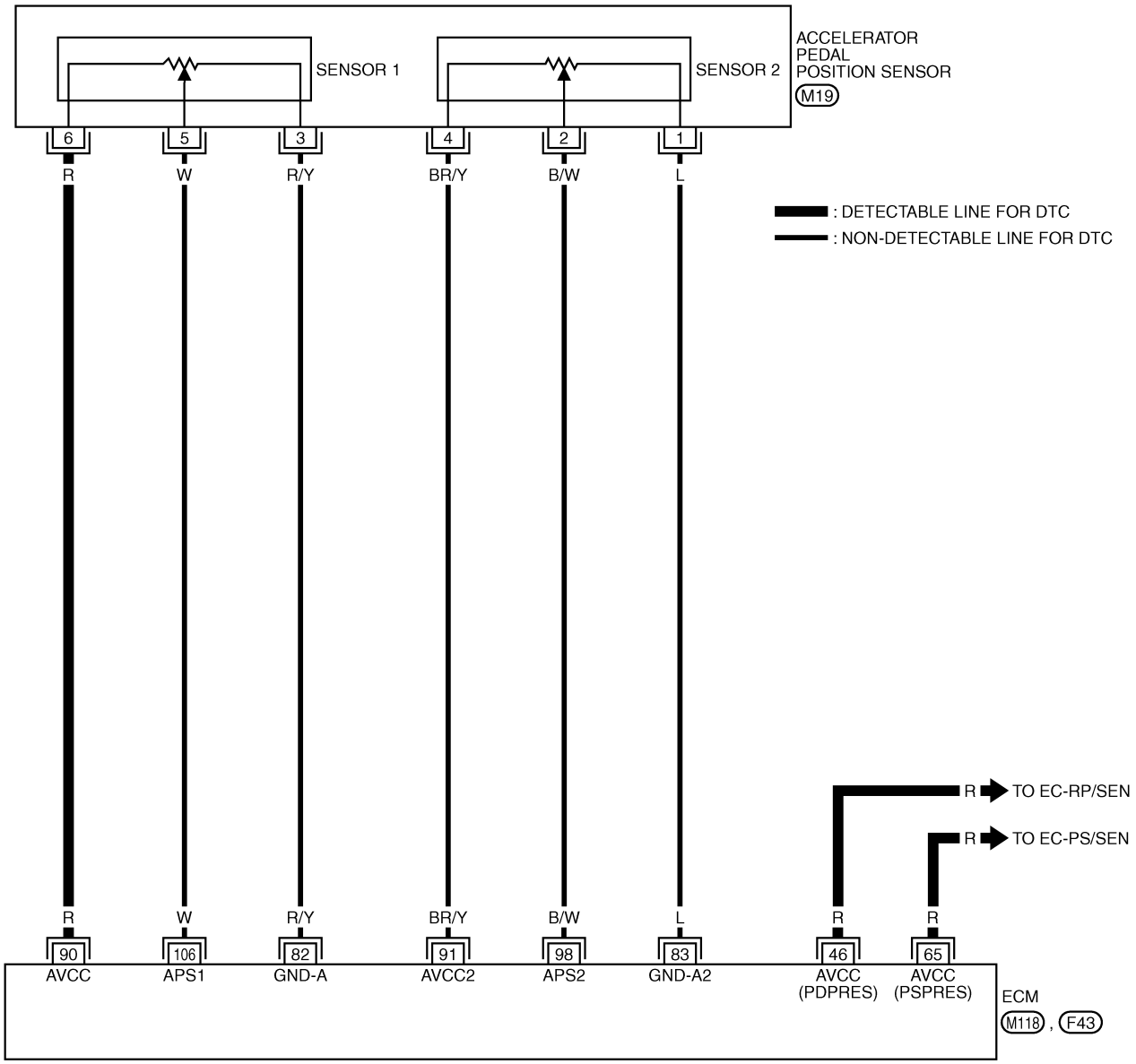
WITHOUT CONSULT-II

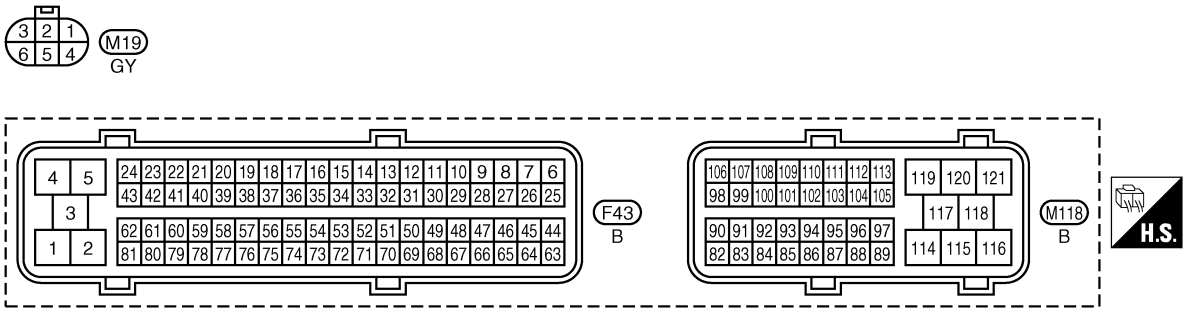
1. Start engine and let it idle for 1 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-779, "Diagnostic Procedure" .

Wiring Diagram

BBS001R9

EC-SEN/PW-01





TBWB0262E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

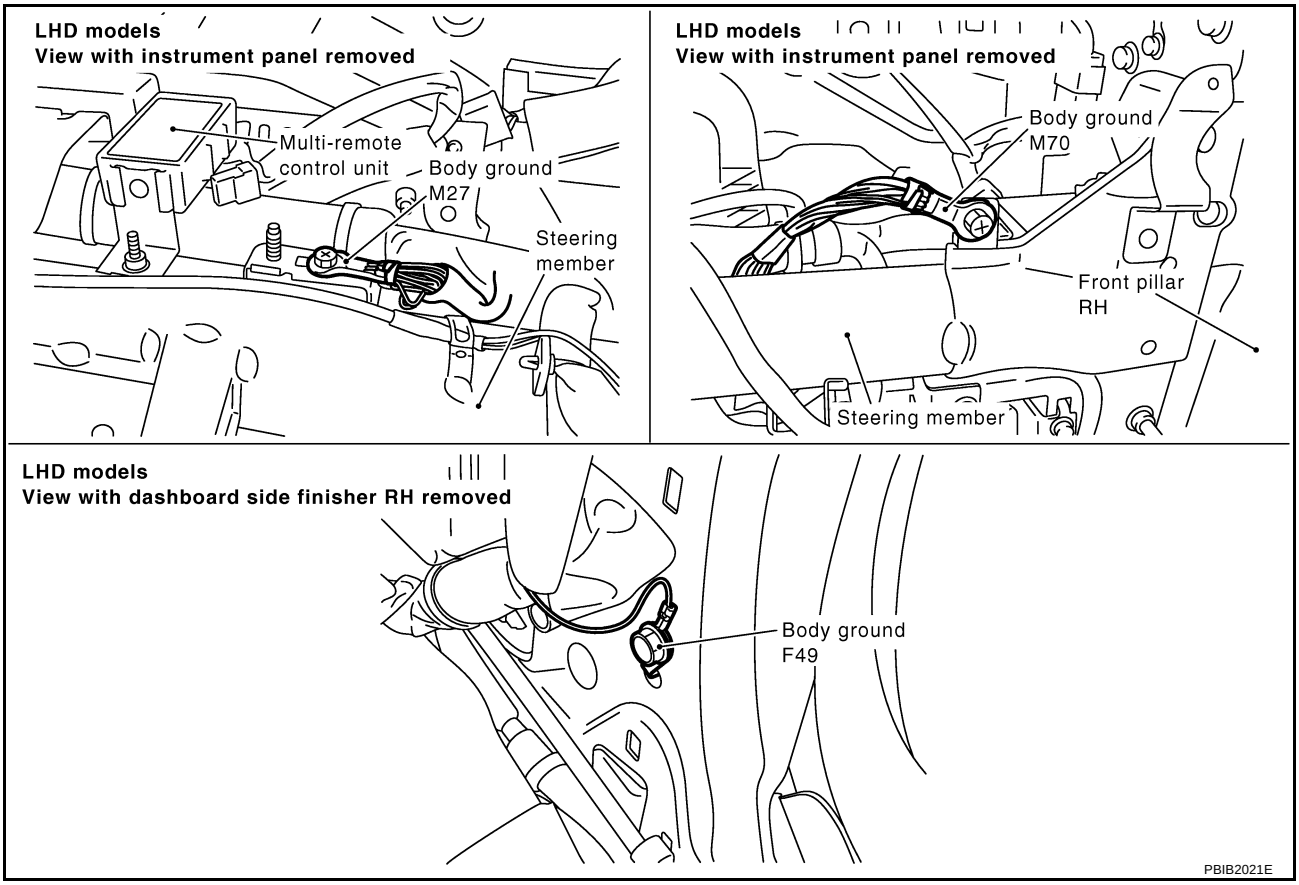
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	R	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
65	R	Sensor power supply (Power steering pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

BBS001RA

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

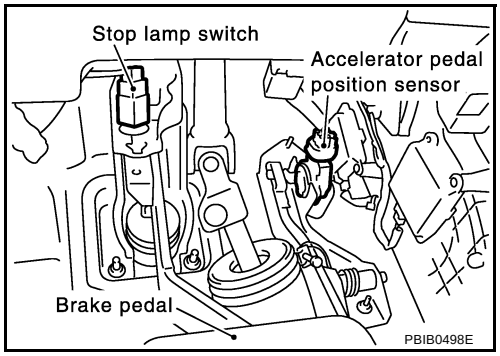


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

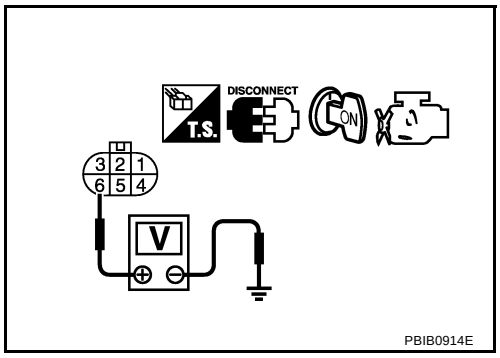
2. CHECK ACCELERATOR PEDAL POSITION SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position sensor (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY CIRCUIT

Check harness for short to power and short to ground, between the following terminals

ECM terminal	Sensor terminal	Reference Wiring Diagram
90	APP sensor terminal 6	EC-842
46	Refrigerant pressure sensor terminal 3	EC-917
65	PSP sensor terminal 3	EC-714

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

- Refrigerant pressure sensor (Refer to ATC-90, "COMPONENT INSPECTION" .)
- Power steering pressure sensor (Refer to EC-717, "Component Inspection" .)

OK or NG

OK >> GO TO 7.
NG >> Replace malfunctioning component.

5. CHECK APP SENSOR

Refer to EC-847, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-562, "Accelerator Pedal Released Position Learning" .
3. Perform EC-563, "Throttle Valve Closed Position Learning" .
4. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

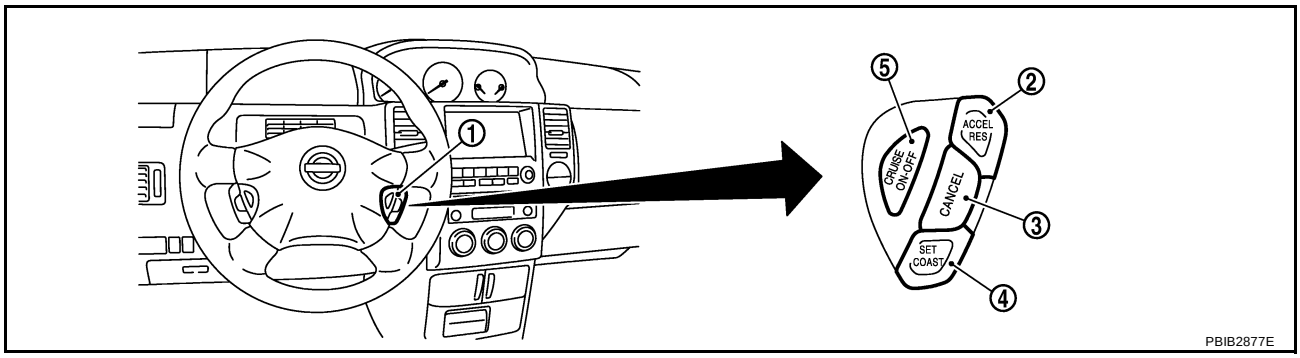
DTC P1564 ASCD STEERING SWITCH

PFP:25551

Component Description

BBS001RB

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. CANCEL switch
4. SET/COAST switch
5. MAIN switch

Refer to EC-971, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

BBS001RC

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	● Ignition switch: ON	MAIN switch: Pressed	ON
		MAIN switch: Released	OFF
CANCEL SW	● Ignition switch: ON	CANCEL switch: Pressed	ON
		CANCEL switch: Released	OFF
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Pressed	ON
		RESUME/ACCELERATE switch: Released	OFF
SET SW	● Ignition switch: ON	SET/COAST switch: Pressed	ON
		SET/COAST switch: Released	OFF

On Board Diagnosis Logic

BBS001RD

This self-diagnosis has the one trip detection logic.
The MI will not light up for this diagnosis.

NOTE:
If DTC P1564 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605.
Refer to EC-718, "DTC P0605 ECM".

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1564 1564	ASCD steering switch	● An excessively high voltage signal from the ASCD steering switch is sent to ECM. ● ECM detects that input signal from the ASCD steering switch is out of the specified range. ● ECM detects that the ASCD steering switch is stuck ON.	● Harness or connectors (The switch circuit is open or shorted.) ● ASCD steering switch ● ECM

DTC Confirmation Procedure

BBS001RE

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If DTC is detected, go to EC-788, "Diagnostic Procedure" .

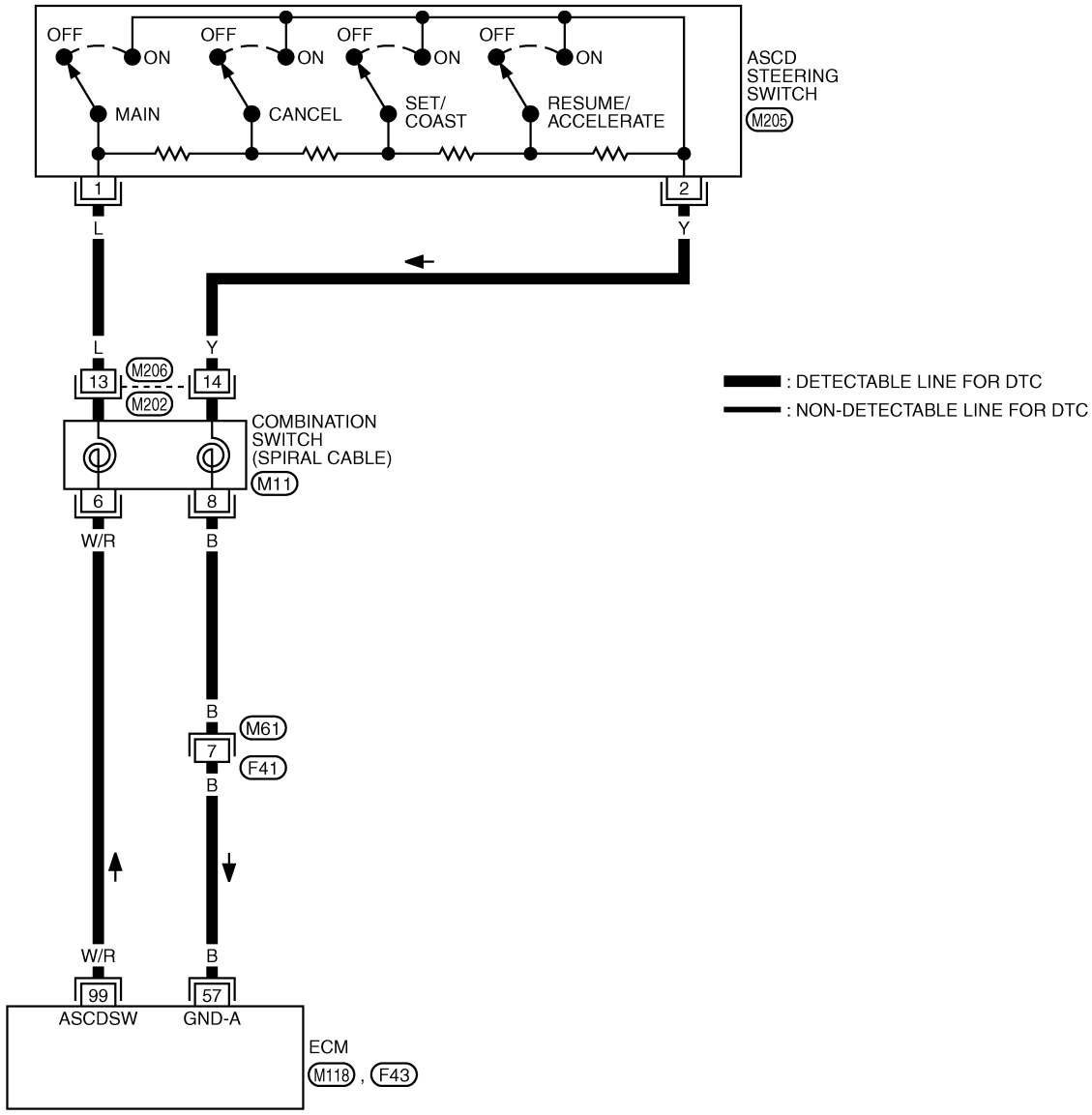
WITHOUT CONSULT-II

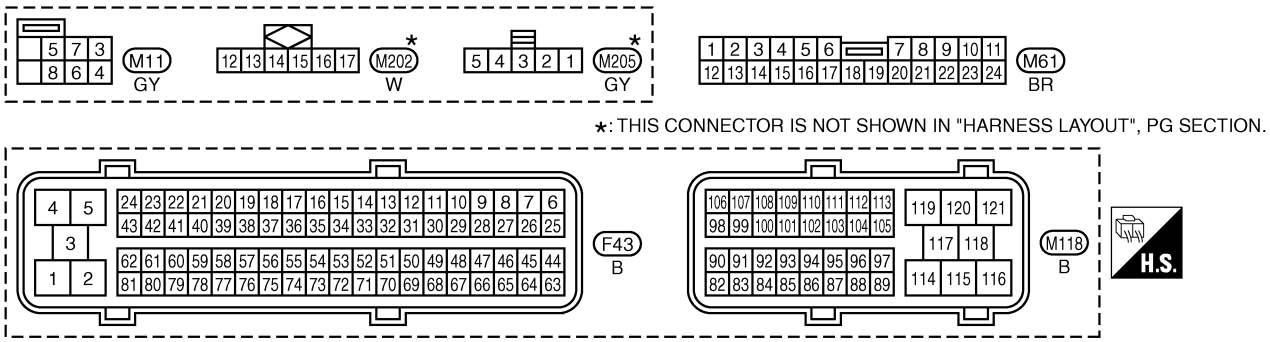
1. Turn ignition switch ON.
2. Wait at least 10 seconds.
3. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
9. If DTC is detected, go to EC-788, "Diagnostic Procedure" .

Wiring Diagram
LHD MODELS

BBS001RF

EC-ASC/SW-01





TBWB0463E

Specification data are reference values and are measured between each terminal and ground.

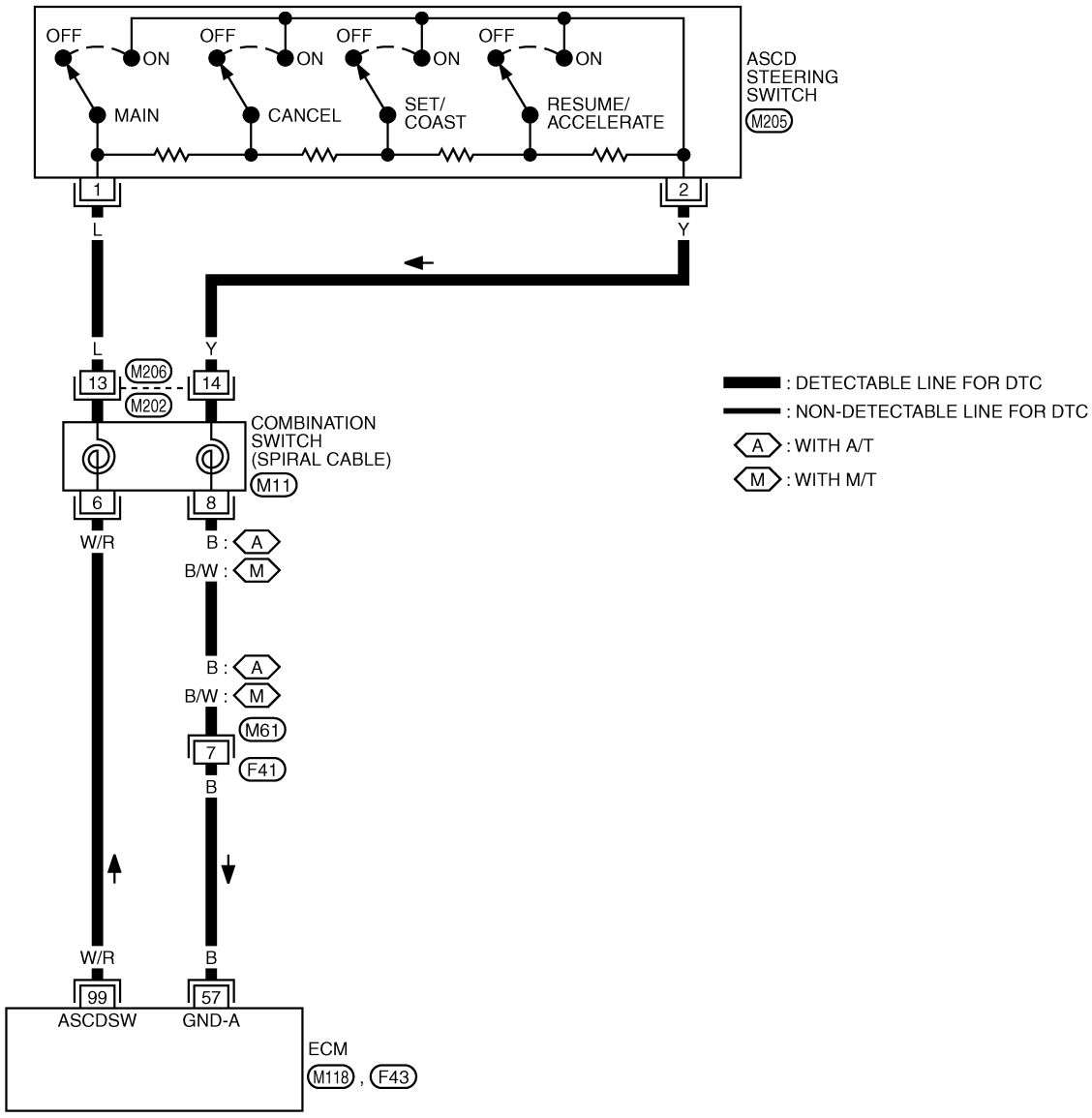
CAUTION:

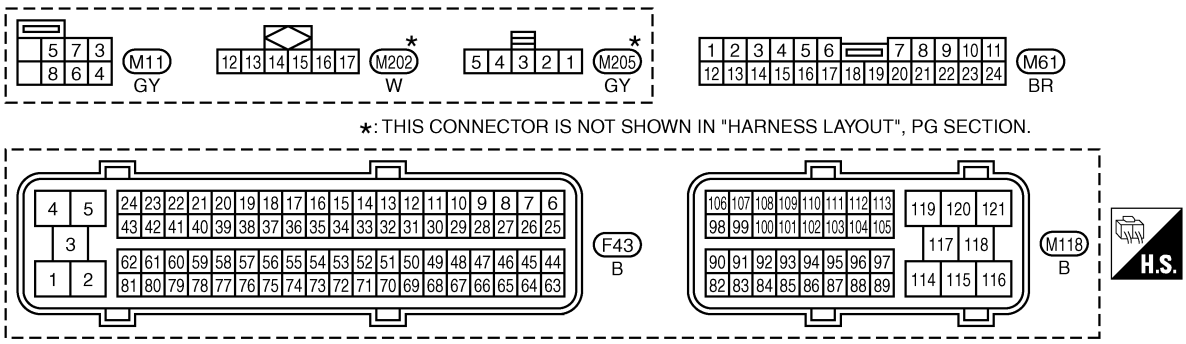
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
99	W/R	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch: OFF	Approximately 4V
			[Ignition switch: ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch: Pressed	Approximately 2V

RHD MODELS

EC-ASC/SW-02





TBWB0464E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

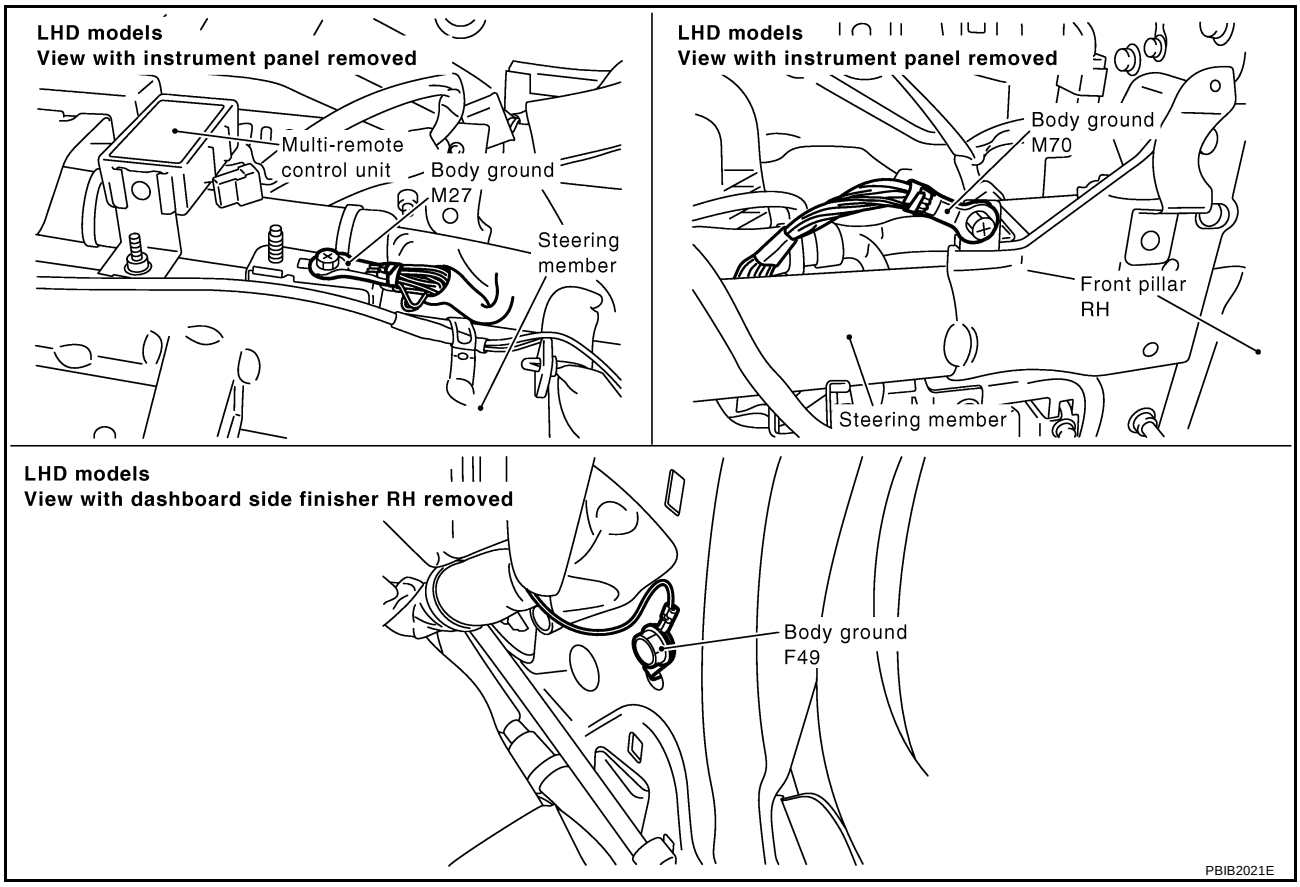
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
57	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
99	W/R	ASCD steering switch	**[Ignition switch: ON]** ● ASCD steering switch: OFF	Approximately 4V
			[Ignition switch: ON] ● MAIN switch: Pressed	Approximately 0V
			[Ignition switch: ON] ● CANCEL switch: Pressed	Approximately 1V
			[Ignition switch: ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3V
			[Ignition switch: ON] ● SET/COAST switch: Pressed	Approximately 2V

Diagnostic Procedure

BBS001RG

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-634, "Ground Inspection" .



OK or NG

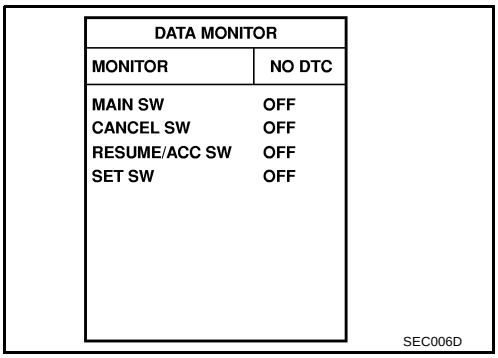
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-II

1. Turn ignition switch ON.
2. Select “MAIN SW”, “RESUME/ACC SW”, “SET SW” and “CANCEL SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check each item indication under the following conditions.

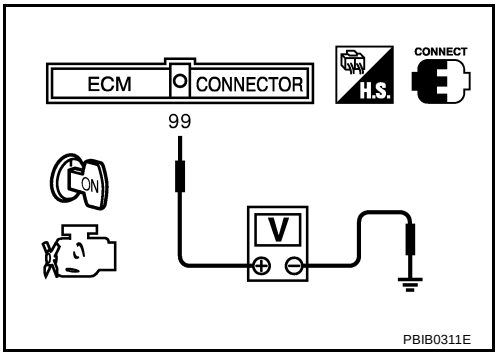
Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF
RESUME/ACCEL-ERARE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 99 and ground with pressing each button.

Switch	Condition	Voltage [V]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4
CANCEL switch	Pressed	Approx. 1
	Released	Approx. 4
RESUME/ACCELERATE switch	Pressed	Approx. 3
	Released	Approx. 4
SET/COAST switch	Pressed	Approx. 2
	Released	Approx. 4



OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

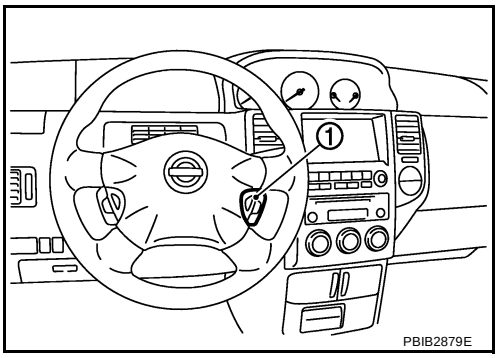
1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect ASCD steering switch (1) harness connector M205.
4. Check harness continuity between ASCD steering switch terminal 2 and ECM terminal 57. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M202, M206
- Harness connectors M61, F41
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 99 and ASCD steering switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M202, M206
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-791, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

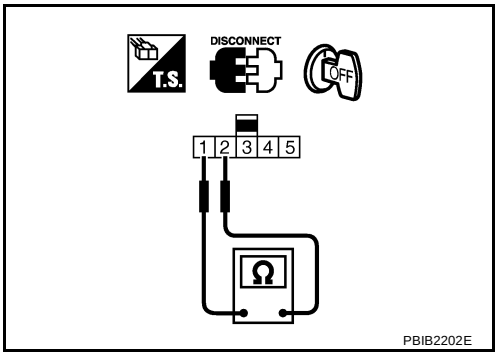
>> **INSPECTION END**

Component Inspection

BBS001RH

ASCD STEERING SWITCH

1. Disconnect ASCD steering switch harness connector M205.
2. Check continuity between ASCD steering switch terminals 1 and 2 with pushing each switch.



Switch	Condition	Resistance [Ω]
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000

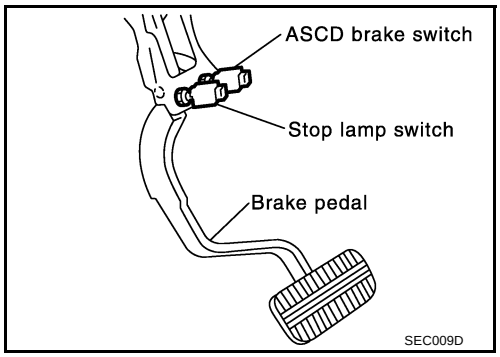
DTC P1572 ASCD BRAKE SWITCH

PFP:25320

Component Description

BBS001RI

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-971, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

BBS001RJ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	● Ignition switch: ON	Clutch pedal (M/T) and brake pedal: Fully released	ON
		Clutch pedal (M/T) and/or brake pedal: Slightly depressed	OFF
BRAKE SW2 (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

BBS001RK

This self-diagnosis has the one trip detection logic.
The MI will not light up for this diagnosis.

NOTE:

- **If DTC P1572 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-718, "DTC P0605 ECM".**
- **This self-diagnosis has the one trip detection logic. When malfunction A is detected, DTC is not stored in ECM memory. And in that case, 1st trip DTC and 1st trip freeze frame data are displayed. 1st trip DTC is erased when ignition switch OFF. And even when malfunction A is detected in two consecutive trips, DTC is not stored in ECM memory.**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition		Possible Cause
P1572 1572	ASCD brake switch	A)	When the vehicle speed is above 30km/h (19 MPH), ON signals from the stop lamp switch and the ASCD brake switch are sent to ECM at the same time.	● Harness or connectors (The stop lamp switch circuit is shorted.) ● Harness or connectors (The ASCD brake switch circuit is shorted.)
		B)	ASCD brake switch signal is not sent to ECM for extremely long time while the vehicle is driving	● Harness or connectors (The ASCD clutch switch circuit is shorted.) (M/T models) ● Stop lamp switch ● ASCD brake switch ● ASCD clutch switch (M/T models) ● Incorrect stop lamp switch installation ● Incorrect ASCD brake switch installation ● Incorrect ASCD clutch switch installation (M/T models) ● ECM

DTC Confirmation Procedure

BBS001RL

CAUTION:
Always drive vehicle at a safe speed.

NOTE:

- If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
- Procedure for malfunction B is not described here. It takes extremely long time to complete procedure for malfunction B. By performing procedure for malfunction A, the incident that causes malfunction B can be detected.

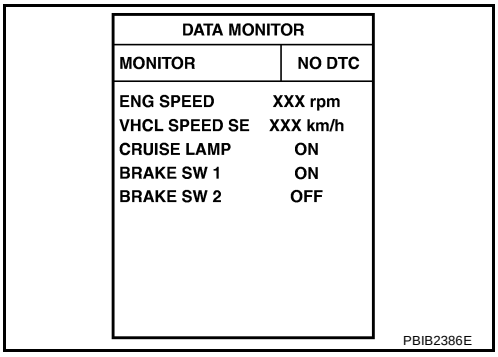
TESTING CONDITION:
Steps 4 and 5 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine (EPS switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Press MAIN switch and make sure that CRUISE indicator lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Shift lever	Suitable position

If 1st trip DTC is detected, go to EC-796, "Diagnostic Procedure" .
If 1st trip DTC is not detected, go to the following step.



5. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 30 km/h (19 MPH)
Shift lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned vehicle speed.

6. If 1st trip DTC is detected, go to EC-796, "Diagnostic Procedure" .

Overall Function Check

BBS001RM

Use this procedure to check the overall function of the ASCD brake switch circuit. During this check, a 1st trip DTC might not be confirmed.

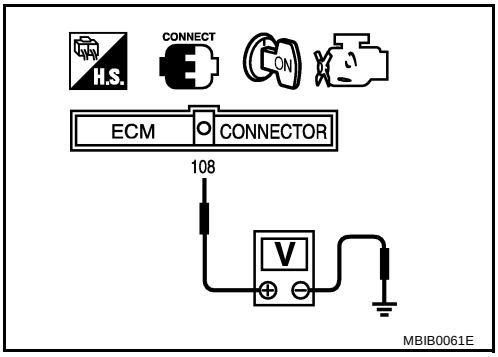
WITHOUT CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 (ASCD brake switch signal) and ground under the following conditions.
   A/T models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully relased	Battery voltege

M/T models

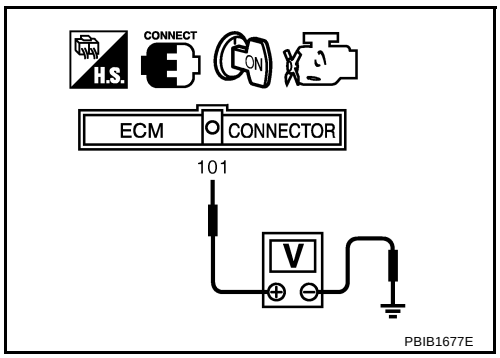
CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



3. If NG, go to EC-796, "Diagnostic Procedure" .
   If OK, go to next step.

4. Check voltage between ECM terminal 101 (Stop lamp switch signal) and ground under the following conditions.

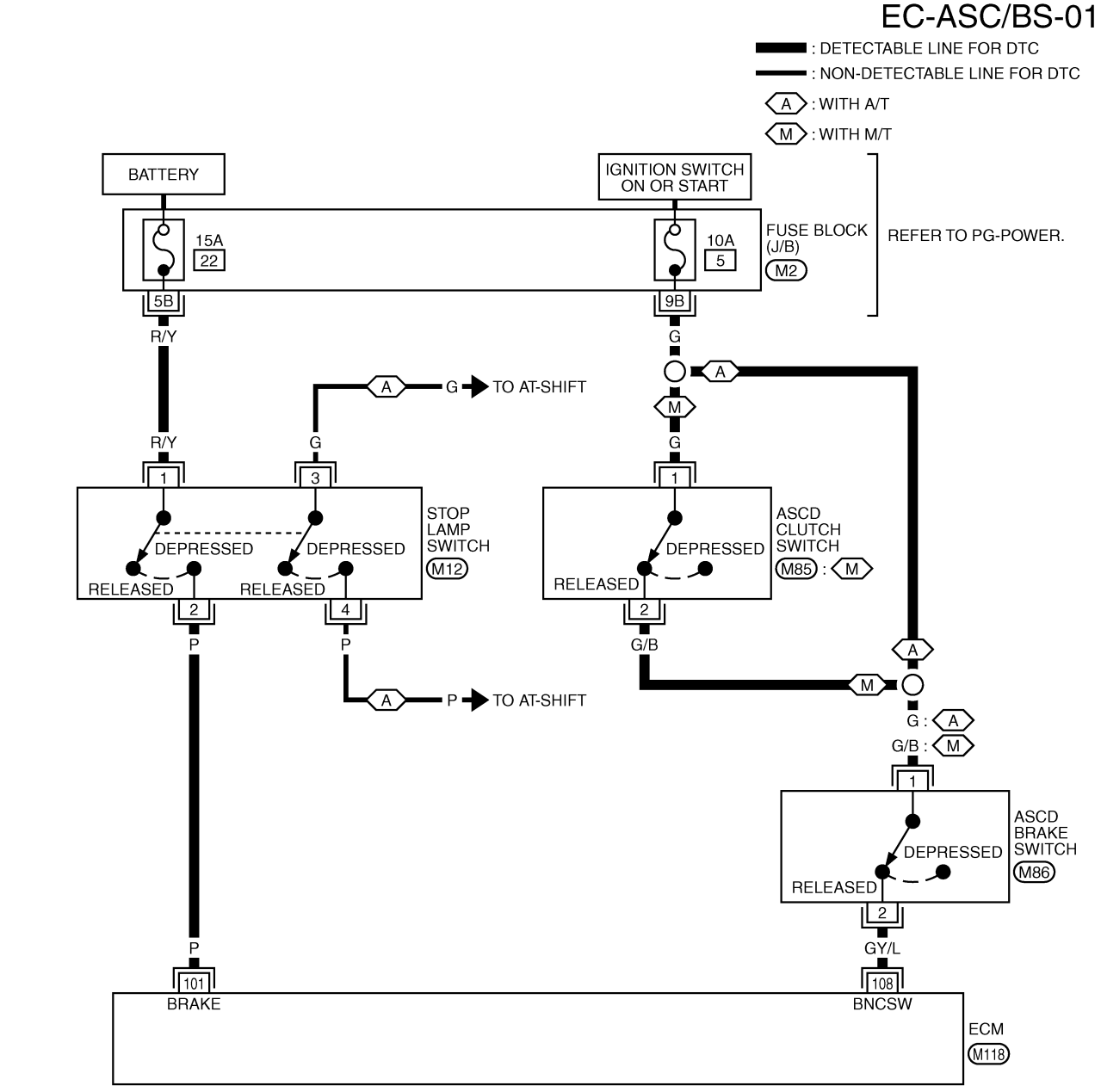
CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly deprassed	Battery voltage

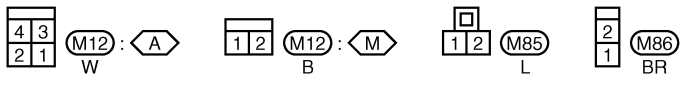


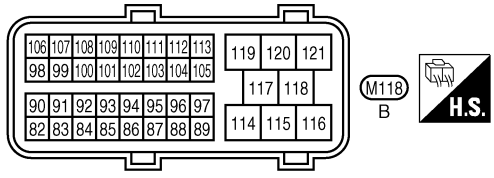
5. If NG, go to EC-796, "Diagnostic Procedure" .

Wiring Diagram

BBS001RN







REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0756E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	P	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	GY/L	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal and/or clutch pedal (M/T): Slightly depressed	Approximately 0V
			[Ignition switch: ON] ● Brake pedal and clutch pedal (M/T): Fully released	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS001RO

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

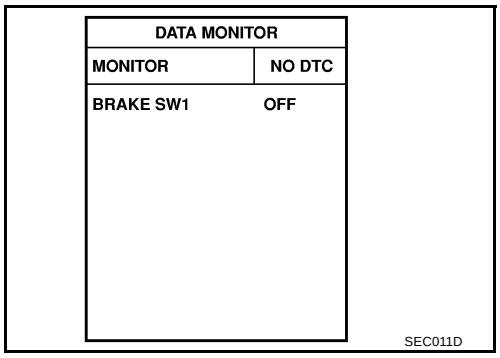
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

A/T models

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

M/T models

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON



Without CONSULT-II

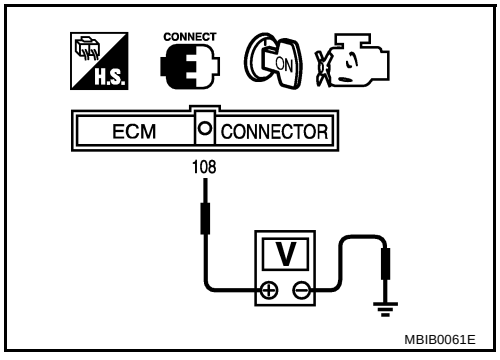
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

A/T models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

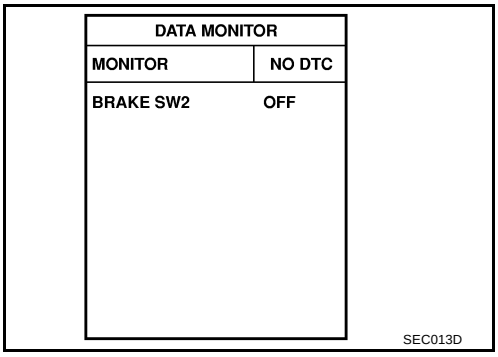
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

1. Select “BRAKE SW2” in “DATA MONITOR” mode with CONSULT-II.
2. Check “BRAKE SW2” indication under the following conditions.

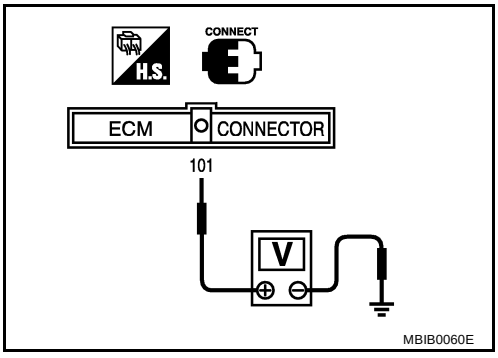
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

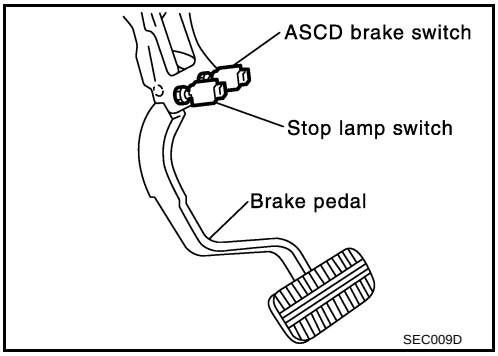


OK or NG

OK >> GO TO 15.
NG >> GO TO 11.

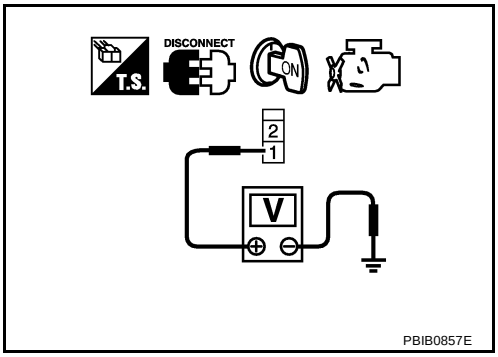
3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG (A/T models)>>GO TO 4.
NG (M/T models)>>GO TO 5.

4. DETECT MALFUNCTIONING PART

Check the following.

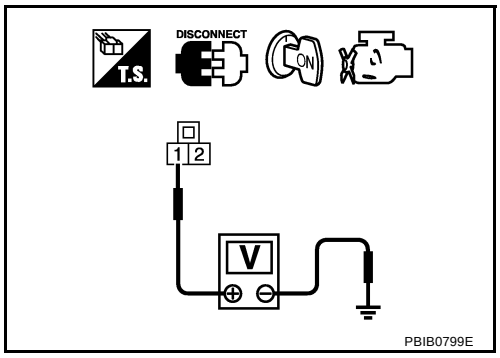
- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between ASCD clutch switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD clutch switch terminal 2 and ASCD brake switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK ASCD CLUTCH SWITCH

Refer to EC-801, "Component Inspection"

OK or NG

OK >> GO TO 15.
NG >> Replace ASCD clutch switch.

9. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ASCD brake switch terminal 2 and ECM terminal 108. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH

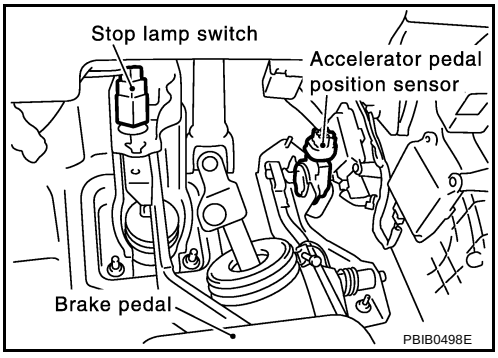
Refer to EC-801, "Component Inspection" .

OK or NG

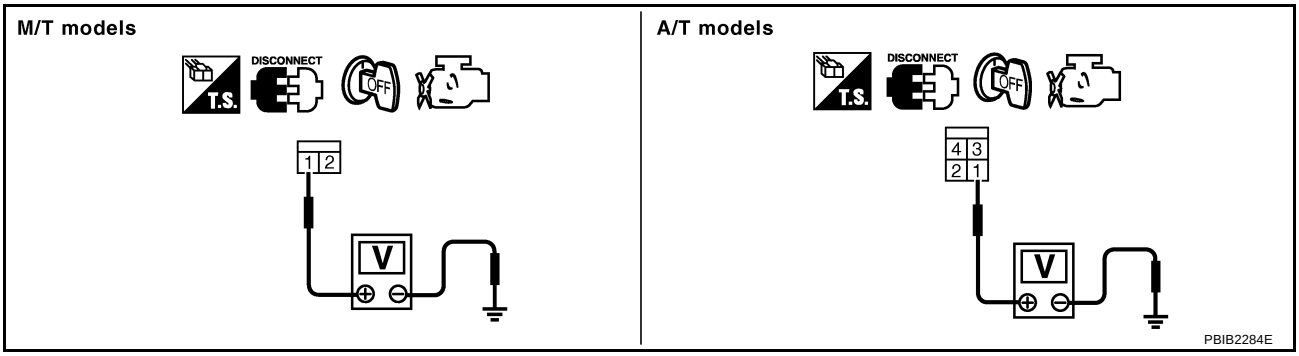
OK >> GO TO 15.
NG >> Replace ASCD brake switch.

11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 15A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK STOP LAMP SWITCH

Refer to EC-801, "Component Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Replace stop lamp switch.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

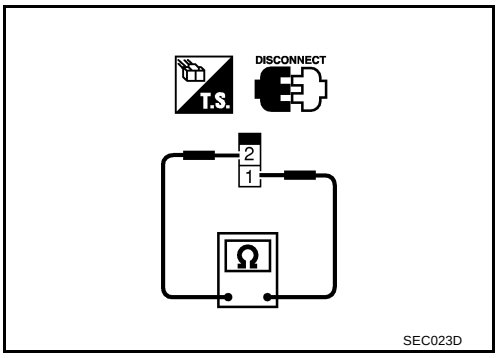
Component Inspection

BBS001RP

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

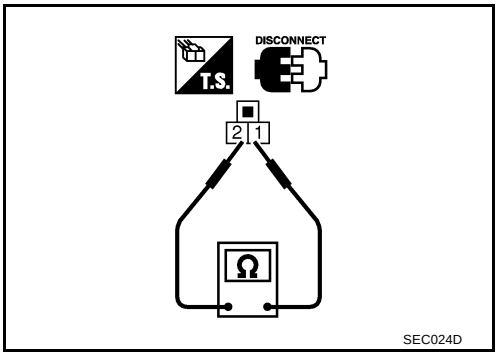


If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

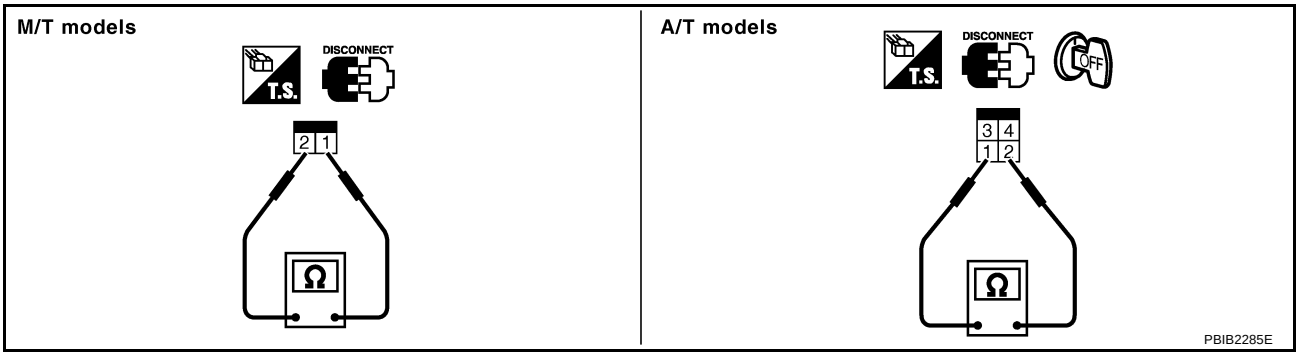
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist



If NG, adjust ASCD clutch switch installation, refer to CL-5, "CLUTCH PEDAL" , and perform step 3 again.

STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

DTC P1574 ASCD VEHICLE SPEED SENSOR

PFP:31036

Component Description

BBS001RQ

ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from ESP/TCS/ABS control unit (models with ESP) or “ABS actuator and electric unit (control unit)”(models without ESP), and the other is from TCM (Transmission control module).

The ECM uses these signals for ASCD control. Refer to EC-971, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

BBS001RR

This self-diagnosis has the one trip detection logic.
The MI will not light up for this diagnosis.

NOTE:

- **If DTC P1574 is displayed with DTC U1000 or U1001, first perform the trouble diagnosis for DTC U1000, U1001. Refer to EC-635, "DTC U1000, U1001 CAN COMMUNICATION LINE" .**
- **If DTC P1574 is displayed with DTC P0500, first perform the trouble diagnosis for DTC P0500. Refer to EC-711, "DTC P0500 VSS" .**
- **If DTC P1574 is displayed with DTC P0605, first perform the trouble diagnosis for DTC P0605. Refer to EC-718, "DTC P0605 ECM" .**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P1574 1574	ASCD vehicle speed sensor	ECM detects a difference between two vehicle speed signals is out of the specified range.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (Revolution sensor circuit is open or shorted) ● Harness or connectors (Wheel sensor circuit is open or shorted.) ● TCM ● ESP/TCS/ABS control unit (models with ESP) ● “ABS actuator and electric unit (control unit)” (models without ESP) ● Combination meter ● Wheel sensor ● Revolution sensor ● ECM

DTC Confirmation Procedure

BBS001RS

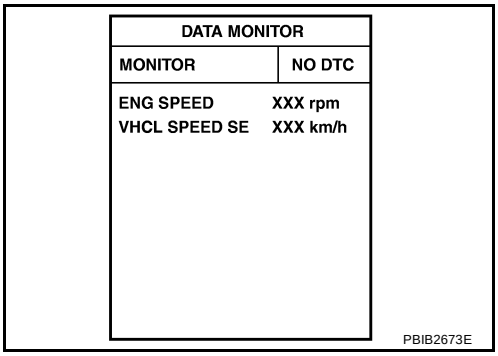
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine (ESP switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 40 km/h (25 MPH).
4. If DTC is detected, go to EC-803, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine.
2. Drive the vehicle at more than 40 km/h (25MPH) for at least 5 seconds.
3. Stop vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
6. If DTC is detected, go to EC-803, "Diagnostic Procedure" .

Diagnostic Procedure

BBS001RT

1. CHECK DTC WITH TCM

Check DTC with TCM.
Refer to AT-235, "ON BOARD DIAGNOSTIC SYSTEM DESCRIPTION" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. CHECK DTC WITH ESP/TCS/ABS CONTROL UNIT (MODELS WITH ESP), “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)” (MODELS WITHOUT ESP)

Check DTC with ESP/TCS/ABS control unit (models with ESP), “ABS actuator and electric unit (control unit)” (models without ESP). Refer to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP), BRC-9, "TROUBLE DIAGNOSIS" (models without ESP).

OK or NG

OK >> GO TO 3.
NG >> Perform trouble shooting relevant to DTC indicated.

3. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

DTC P1706 PNP SWITCH

PFP:32006

Component Description

BBS001RU

When the shift lever position is P or N (A/T), Neutral (M/T), park/neutral position (PNP) switch is ON.
ECM detects the position because the continuity of the line (the ON signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

BBS001RV

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: P or N (A/T), Neutral (M/T)	ON
		Shift lever: Except above	OFF

On Board Diagnosis Logic

BBS001RW

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1706 1706	Park/neutral position switch	The signal of the park/neutral position (PNP) switch is not changed in the process of engine starting and driving.	● Harness or connectors (PNP switch circuit is open or shorted.) ● Park/neutral position (PNP) switch

DTC Confirmation Procedure

BBS001RX

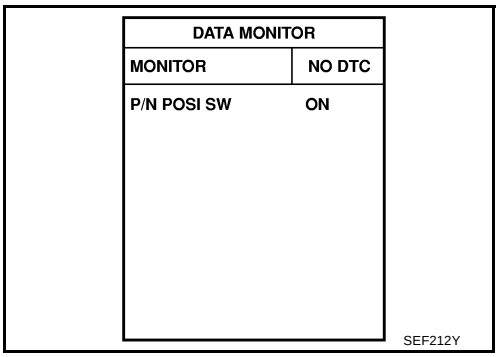
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II. Then check the “P/N POSI SW” signal under the following conditions.

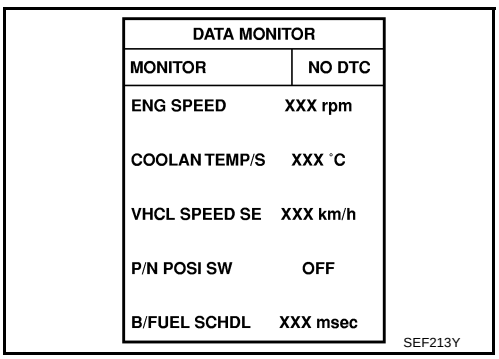
Position (Selector lever)	Known-good signal
N or P position (A/T) Neutral position (M/T)	ON
Except above position	OFF



If NG, go to EC-807, "Diagnostic Procedure" .
If OK, go to following step.

3. Select “DATA MONITOR” mode with CONSULT-II.
4. Start engine and warm it up to normal operating temperature.
5. Maintain the following conditions for at least 60 consecutive seconds.

ENG SPEED	1,500 - 6,375 rpm
COOLAN TEMP/S	More than 70°C (158°F)
B/FUEL SCHDL	3.0 - 31.8 msec
VHCL SPEED SE	More than 64 km/h (40 MPH)
Selector lever	Suitable position



6. If 1st trip DTC is detected, go to EC-807, "Diagnostic Procedure" .

Overall Function Check

BBS001RY

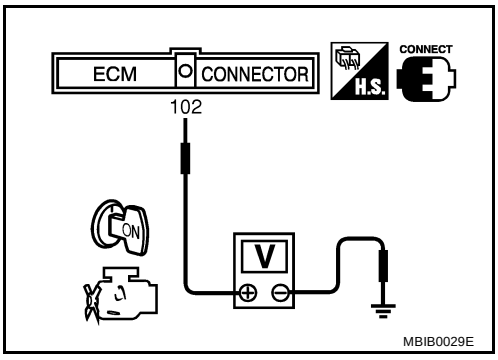
Use this procedure to check the overall function of the park/neutral position (PNP) switch circuit. During this check, a 1st trip DTC might not be confirmed.

WITHOUT CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 (PNP switch signal) and body ground under the following conditions.

Condition (Gear position)	Voltage V (Known-good data)
P or N position (A/T) Neutral position (M/T)	Approx. 0
Except above position	A/T: Battery voltage M/T: Approximately 5V

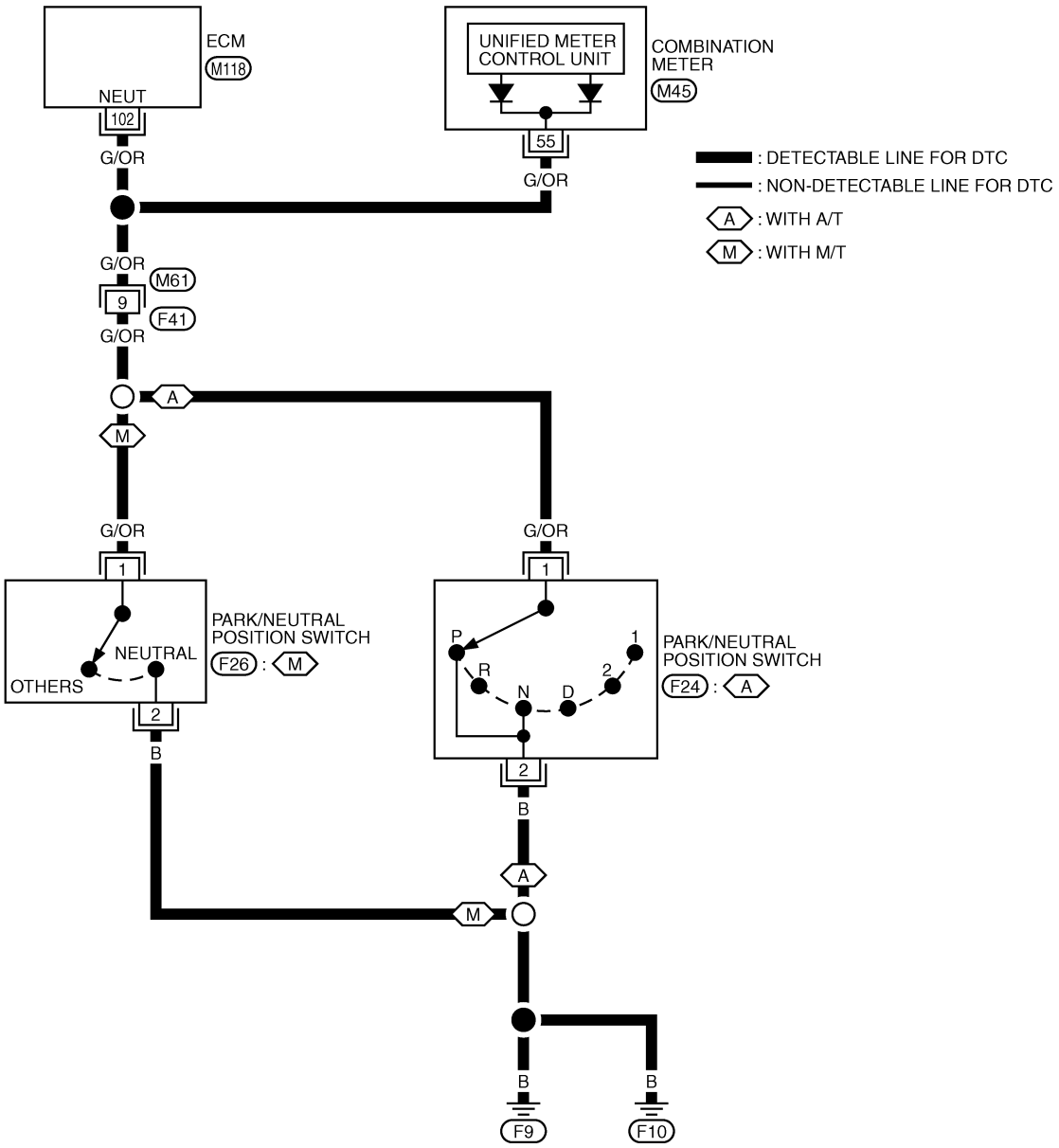
3. If NG, go to EC-807, "Diagnostic Procedure" .

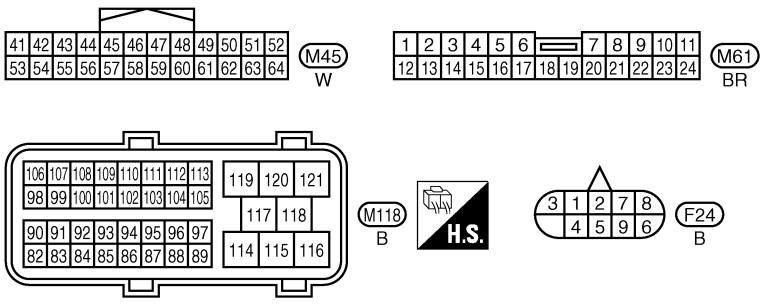


Wiring Diagram

BBS001RZ

EC-PNP/SW-01





TBWA0622E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	G/OR	PNP switch	**[Ignition switch: ON]** ● Shift lever: P or N (A/T), Neutral (M/T)	Approximately 0V
			[Ignition switch: ON] ● Except above position	**A/T models** BATTERY VOLTAGE (11 - 14V) **M/T models** Approximately 5V

Diagnostic Procedure

BBS001S0

1. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect PNP switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to power in harness or connectors.

2. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Disconnect combination meter harness connector.
3. Check harness continuity between PNP switch terminal 1 and ECM terminal 102, combination meter terminal 55. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M61, F41
- Harness for open or short between PNP switch and ECM
- Harness for open or short between PNP switch and combination meter

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK PNP SWITCH

Refer to AT-400, "Park/Neutral Position (PNP) Switch" (A/T) or MT-15, "PARK/NEUTRAL POSITION (PNP) SWITCH" (M/T).

OK or NG

OK >> GO TO 5.
NG >> Replace PNP switch.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P1720 VSS

PFP:31036

Description

BBS001S1

NOTE:
If DTC P1720 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-635, "DTC U1000, U1001 CAN COMMUNICATION LINE" .
ECM receives two vehicle speed sensor signals via CAN communication line. One is sent from ESP/TCS/ABS control unit (models with ESP) or “ABS actuator and electric unit (control unit)”(models without ESP), and the other is from TCM (Transmission control module). ECM uses these two signals for engine control.

CONSULT-II Reference Value in Data Monitor Mode

BBS001S2

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
VEH SPEED SE	● Turn drive wheels and compare the CONSULT-II value with speedometer indication	Almost the same speed as the speedometer indication

On Board Diagnosis Logic

BBS001S3

The MI will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1720 1720	Vehicle speed sensor (A/T output)	ECM detects a difference between two vehicle speed sensor signals is out of the specified range.	● Harness or connectors (The CAN communication line is open or shorted) ● Harness or connectors (Revolution sensor circuit is open or shorted) ● Harness or connectors (Wheel sensor circuit is open or shorted.) ● TCM ● ESP/TCS/ABS control unit (models with ESP) ● “ABS actuator and electric unit (control unit)” (models without ESP) ● Combination meter ● Wheel sensor ● Revolution sensor

DTC Confirmation Procedure

BBS001S4

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine.
4. Drive vehicle at a speed of 20 km/h (12 MPH) or more for at least 5 seconds without brake pedal depressing.
5. If 1st trip DTC is detected, go to EC-810, "Diagnostic Procedure" .

WITHOUT CONSULT-II

1. Start engine.
2. Drive vehicle at a speed of 20 km/h (12 MPH) or more for at least 5 seconds without brake pedal depressing.
3. Stop the vehicle.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.

5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
6. If 1st trip DTC is detected, go to EC-810, "Diagnostic Procedure" .

Diagnostic Procedure

BBS001S5

1. CHECK DTC WITH TCM

Check DTC with TCM. Refer to AT-6, "TROUBLE DIAGNOSIS — INDEX" .

OK or NG

OK >> GO TO 2.
NG >> Perform trouble shooting relevant to DTC indicated.

2. CHECK DTC WITH ESP/TCS/ABS CONTROL UNIT (MODELS WITH ESP), “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)” (MODELS WITHOUT ESP)

Check DTC with ESP/TCS/ABS control unit (models with ESP), “ABS actuator and electric unit (control unit)” (models without ESP). Refer to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP), BRC-9, "TROUBLE DIAGNOSIS" (models without ESP).

OK or NG

OK >> GO TO 3.
NG >> Perform trouble shooting relevant to DTC indicated.

3. CHECK COMBINATION METER

Check combination meter function. Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

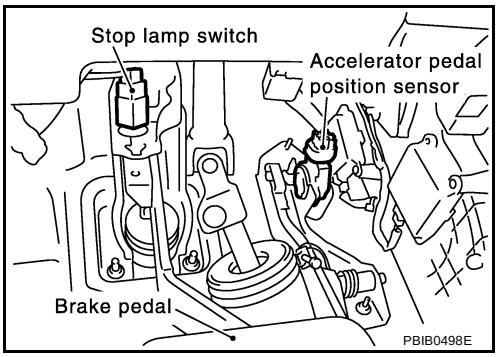
DTC P1805 BRAKE SWITCH

PFP:25320

Description

BBS001S6

Brake switch signal is applied to the ECM through the stop lamp switch when the brake pedal is depressed. This signal is used mainly to decrease the engine speed when the vehicle is driving.



CONSULT-II Reference Value in Data Monitor Mode

BBS001S7

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

On Board Diagnosis Logic

BBS001S8

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1805 1805	Brake switch	A brake switch signal is not sent to ECM for extremely long time while the vehicle is driving.	● Harness or connectors (Stop lamp switch circuit is open or shorted.) ● Stop lamp switch

FALI-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and MI lights up.

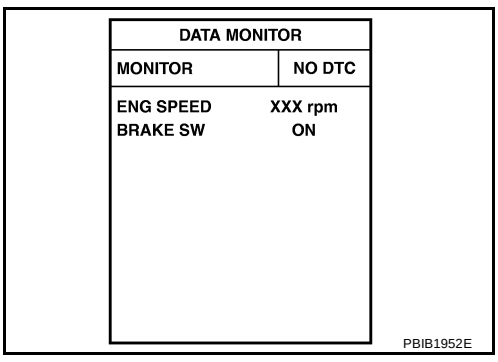
Engine operating condition in fail-safe mode	
ECM controls the electric throttle control actuator by regulating the throttle opening to a small range. Therefore, acceleration will be poor.	
Vehicle condition	Driving condition
When engine is idling	Normal
When accelerating	Poor acceleration

DTC Confirmation Procedure

BBS001S9

WITH CONSULT-II

1. Turn ignition switch ON.
2. Fully depress the brake pedal for at least 5 seconds.
3. Erase the DTC with CONSULT-II.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If DTC is detected, go to EC-814, "Diagnostic Procedure" .



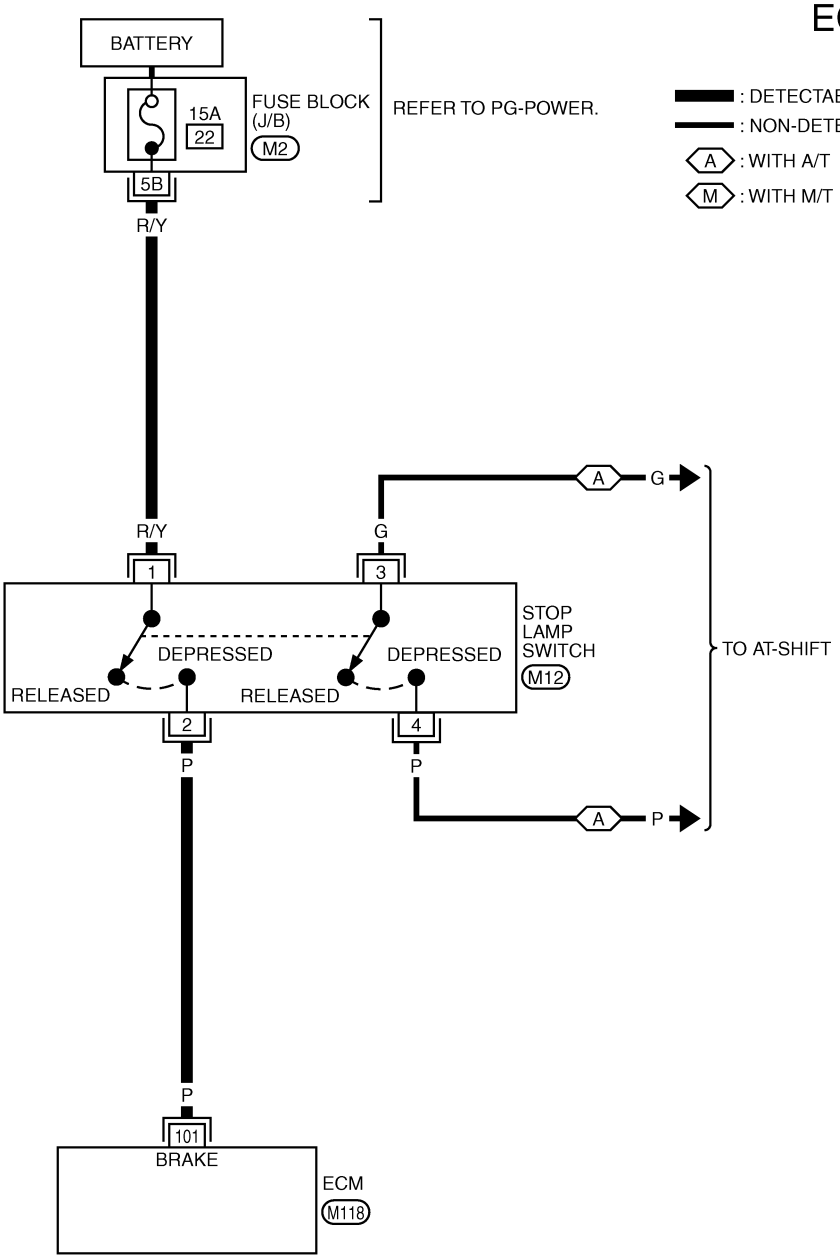
WITHOUT CONSULT-II

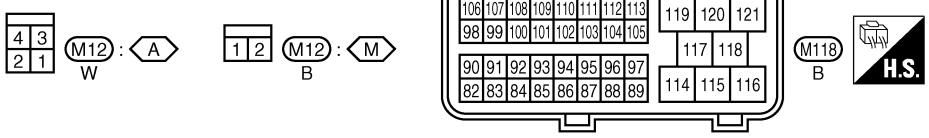
1. Turn ignition switch ON.
2. Fully depress the brake pedal at least 5 seconds.
3. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-573, "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)" .
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
6. If DTC is detected, go to EC-814, "Diagnostic Procedure" .

Wiring Diagram

BBS001SA

EC-BRK/SW-01





REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0623E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	P	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly fully depressed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS001SB

1. CHECK STOP LAMP SWITCH CIRCUIT

1. Turn ignition switch OFF.
2. Check the stop lamp when depressing and releasing the brake pedal.

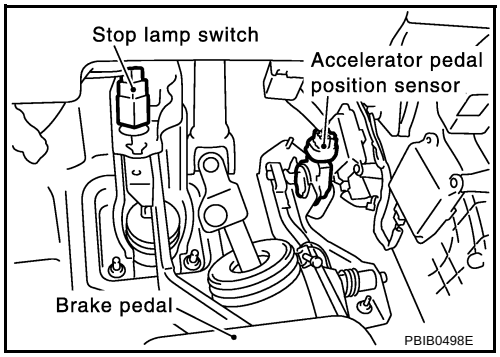
Brake pedal	Stop lamp
Fully released	Not illuminated
Slightly depressed	Illuminated

OK or NG

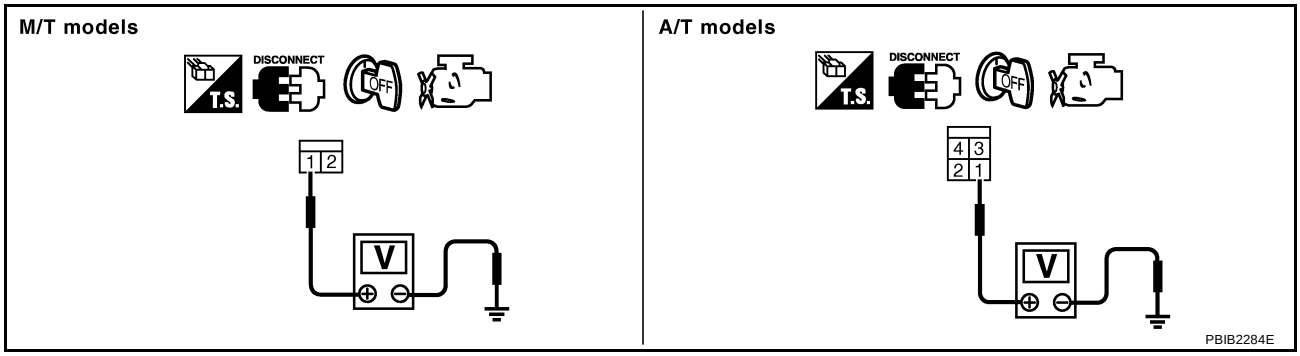
OK >> GO TO 4.
NG >> GO TO 2.

2. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Disconnect stop lamp switch harness connector.



2. Check voltage between stop lamp switch terminal 1 and ground with CONSULT-II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 15A fuse
- Fuse block (J/B) connector M2
- Harness for open and short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between stop lamp switch terminal 2 and ECM terminal 101. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH

Refer to EC-815, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace stop lamp switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

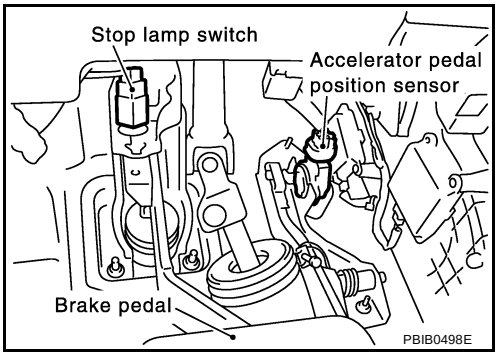
>> **INSPECTION END**

Component Inspection

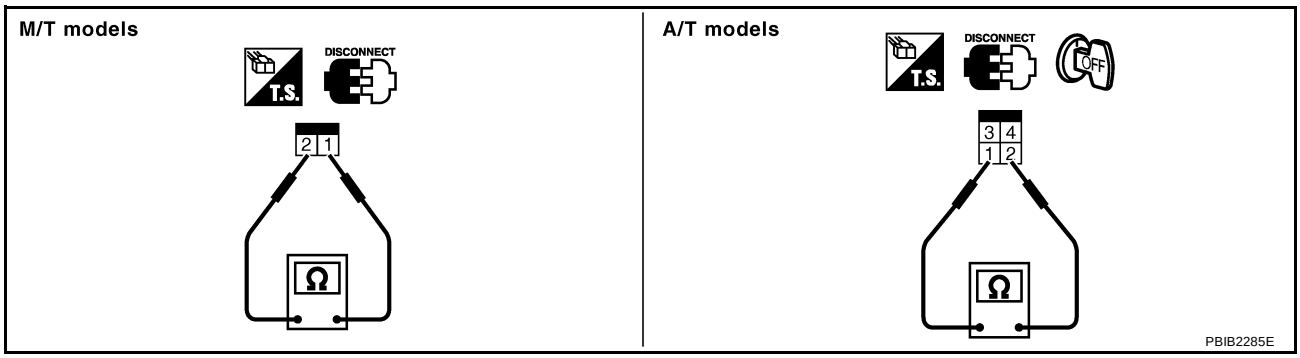
BBS001SC

STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

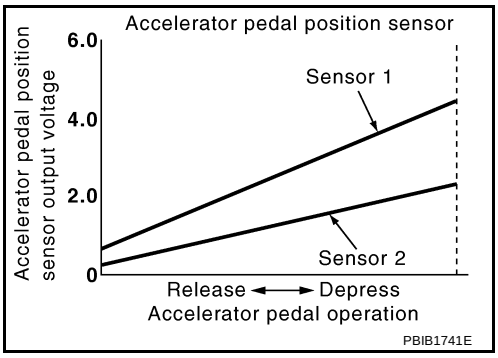
DTC P2122, P2123 APP SENSOR

PFP:18002

Component Description

BBS001SD

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

BBS001SE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.7V
ACCEL SEN 2*	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

BBS001SF

These self-diagnoses have the one trip detection logic.

NOTE:
If DTC P2122 or P2123 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-777, "DTC P1229 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2122 2122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (APP sensor 1)
P2123 2123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

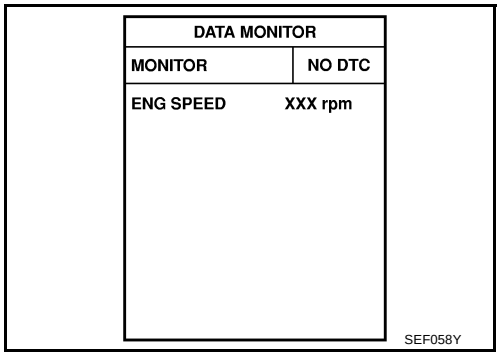
BBS001SG

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-821, "Diagnostic Procedure" .



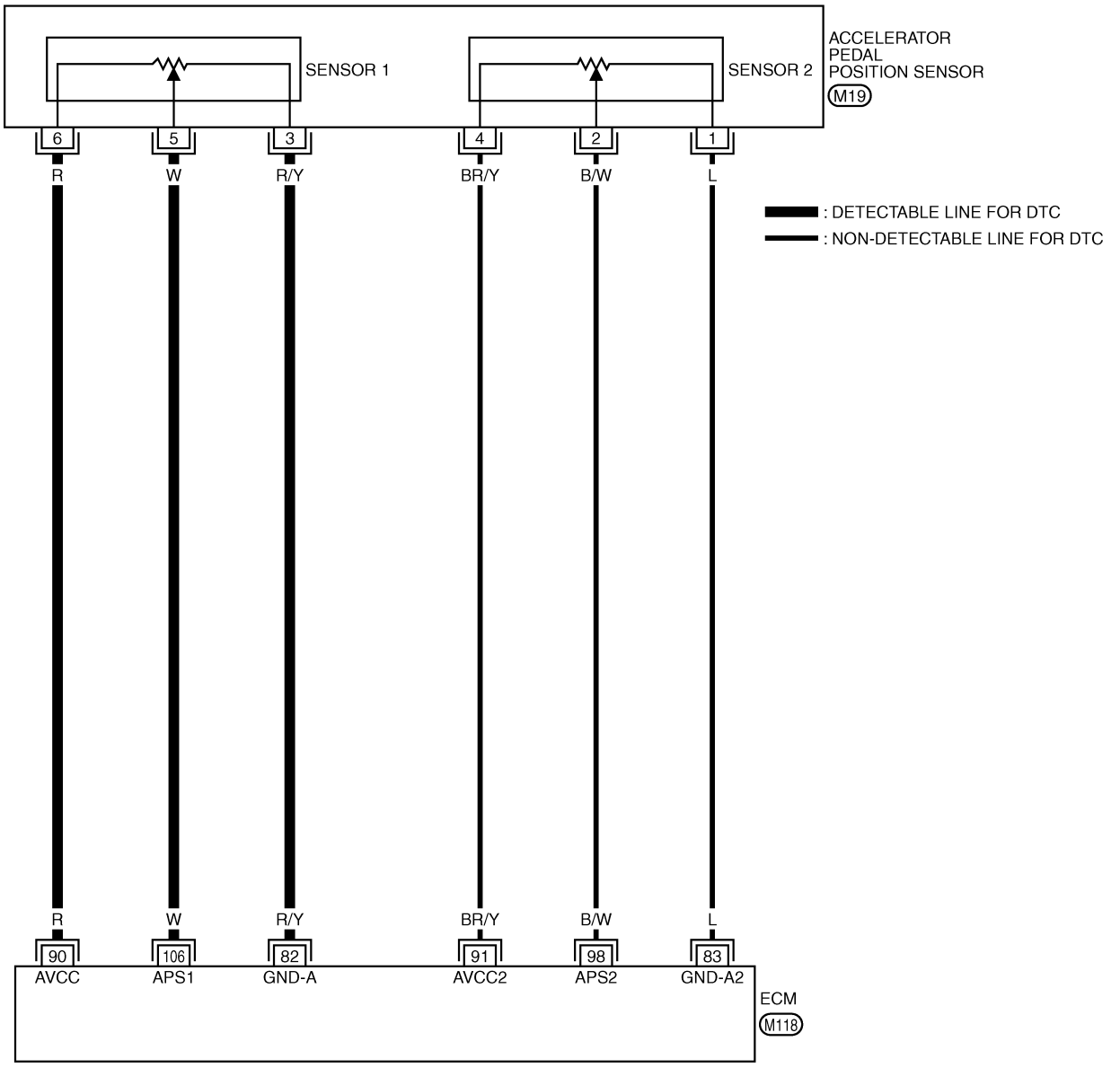
WITHOUT CONSULT-II

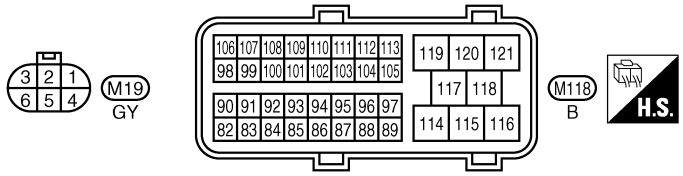
1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-821, "Diagnostic Procedure" .

Wiring Diagram

BBS001SH

EC-APPS1-01





TBWA0624E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

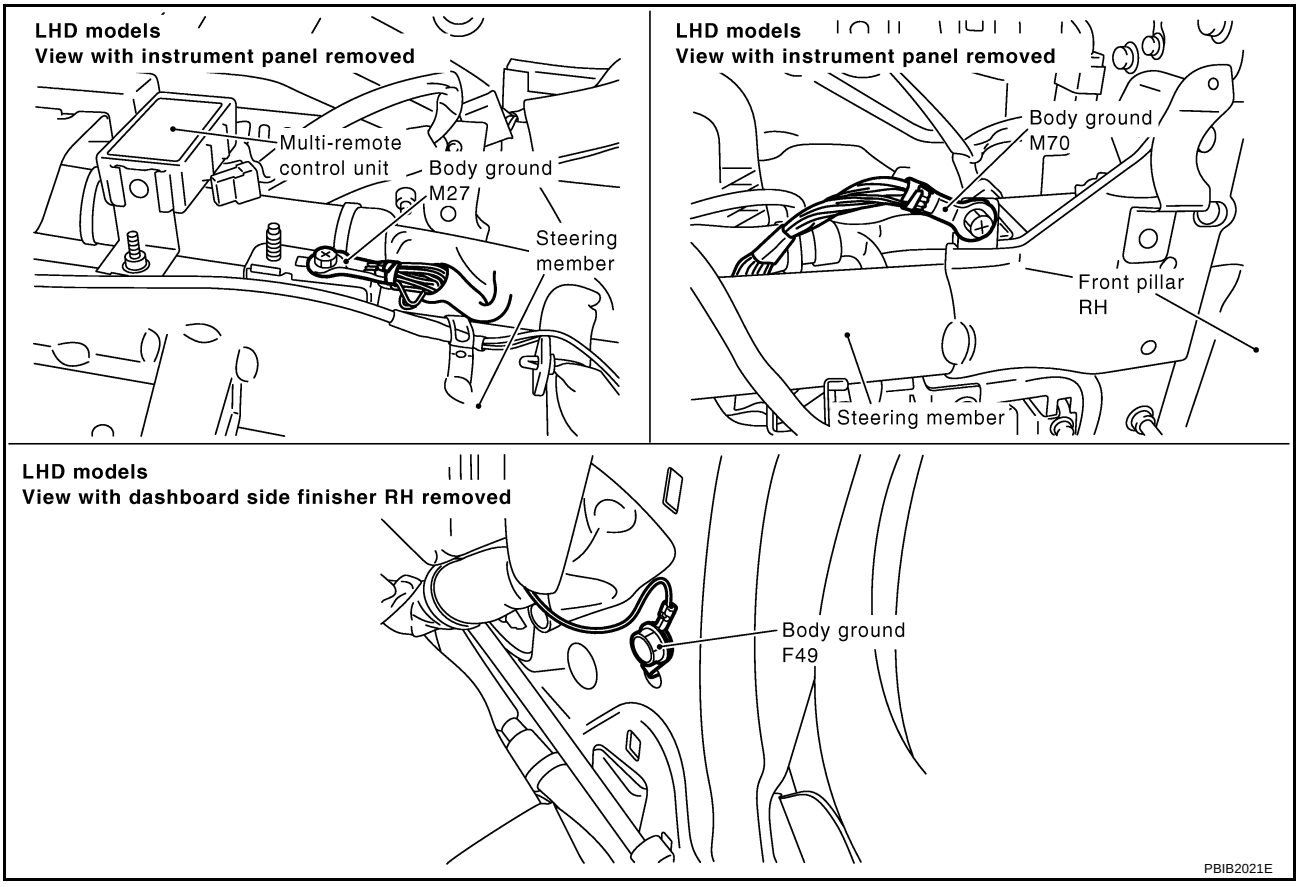
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
82	R/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	L	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	B/W	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.15 - 0.6V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	3.9 - 4.7V

Diagnostic Procedure

BBS001SI

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

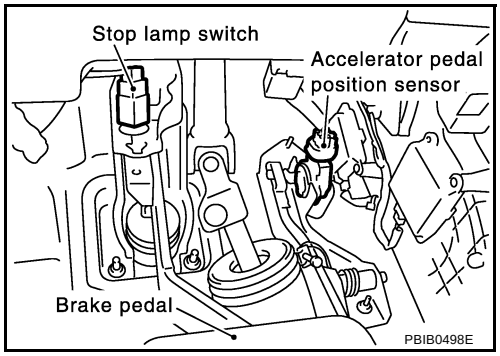


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

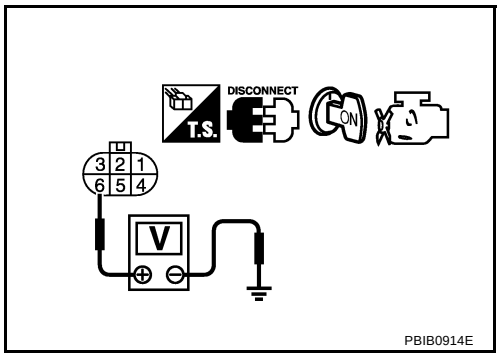
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 3 and ECM terminal 82. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between APP sensor terminal 5 and ECM terminal 106. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-823, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace the accelerator pedal assembly.
2. Perform EC-562, "Accelerator Pedal Released Position Learning" .
3. Perform EC-563, "Throttle Valve Closed Position Learning" .
4. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

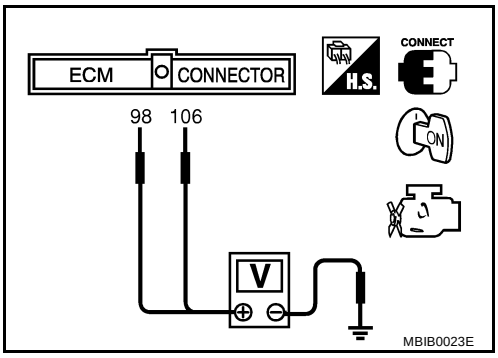
Component Inspection

BBS001SJ

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.15 - 0.6V
	Fully depressed	1.95 - 2.4V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-562, "Accelerator Pedal Released Position Learning" .
6. Perform EC-563, "Throttle Valve Closed Position Learning" .
7. Perform EC-563, "Idle Air Volume Learning" .

Removal and Installation

BBS001SK

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

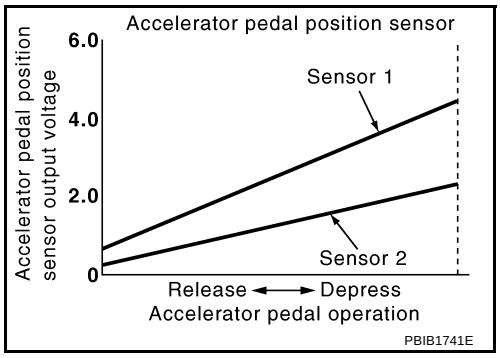
DTC P2127, P2128 APP SENSOR

PFP:18002

Component Description

BBS001SL

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

BBS001SM

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.7V
ACCEL SEN 2*	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

BBS001SN

These self-diagnoses have the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2127 2127	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (APP sensor 2 circuit is open or shorted.) (TP sensor circuit is shorted.) ● Accelerator pedal position sensor (APP sensor 2) ● Electric throttle control actuator (TP sensor 1 and 2)
P2128 2128	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of throttle valve to be shower than the normal condition. So, the acceleration will be poor.

DTC Confirmation Procedure

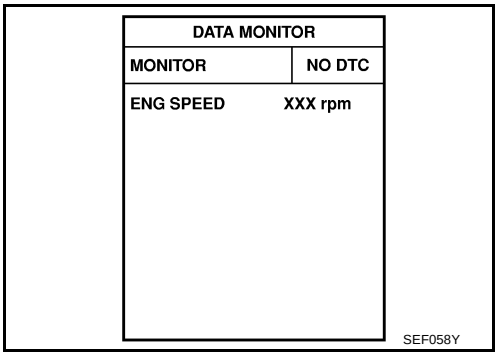
BBS001SO

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-828, "Diagnostic Procedure" .



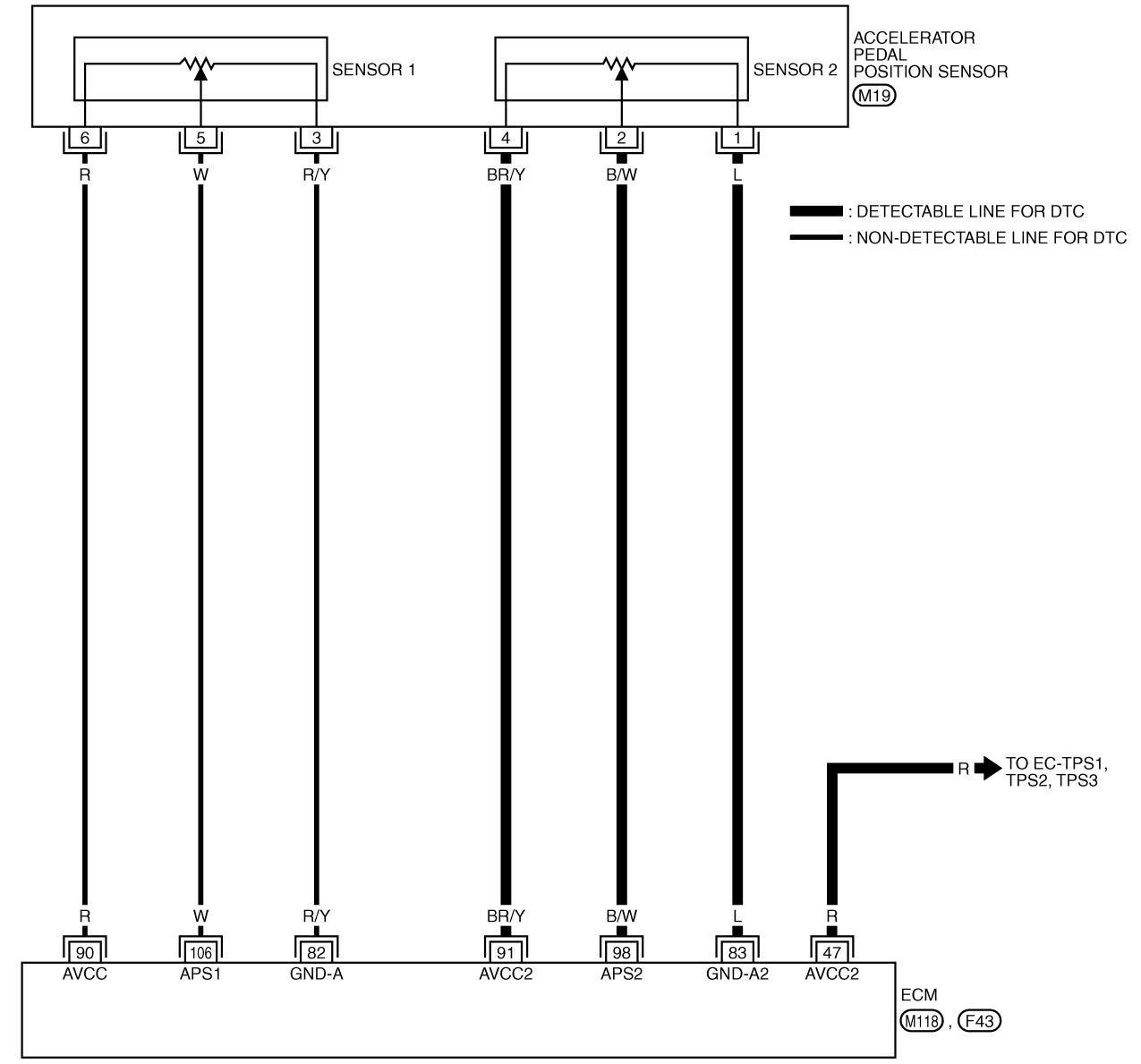
WITHOUT CONSULT-II

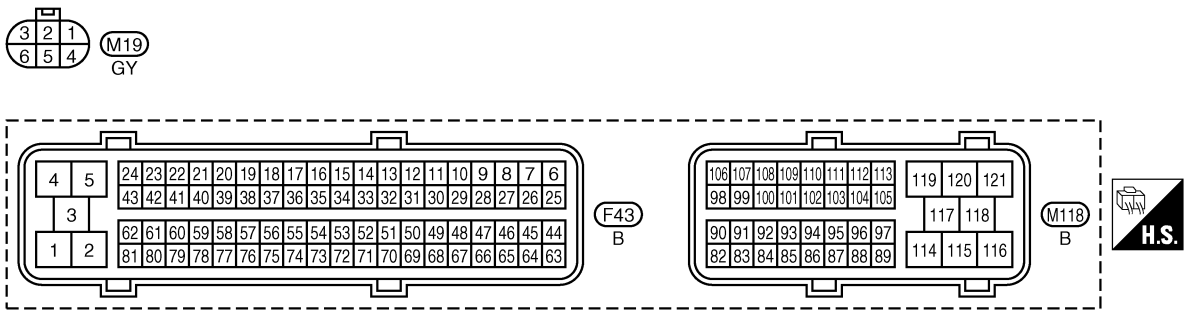
1. Start engine and let it idle for 1 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-828, "Diagnostic Procedure" .

Wiring Diagram

BBS001SP

EC-APPS2-01





TBWB0263E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

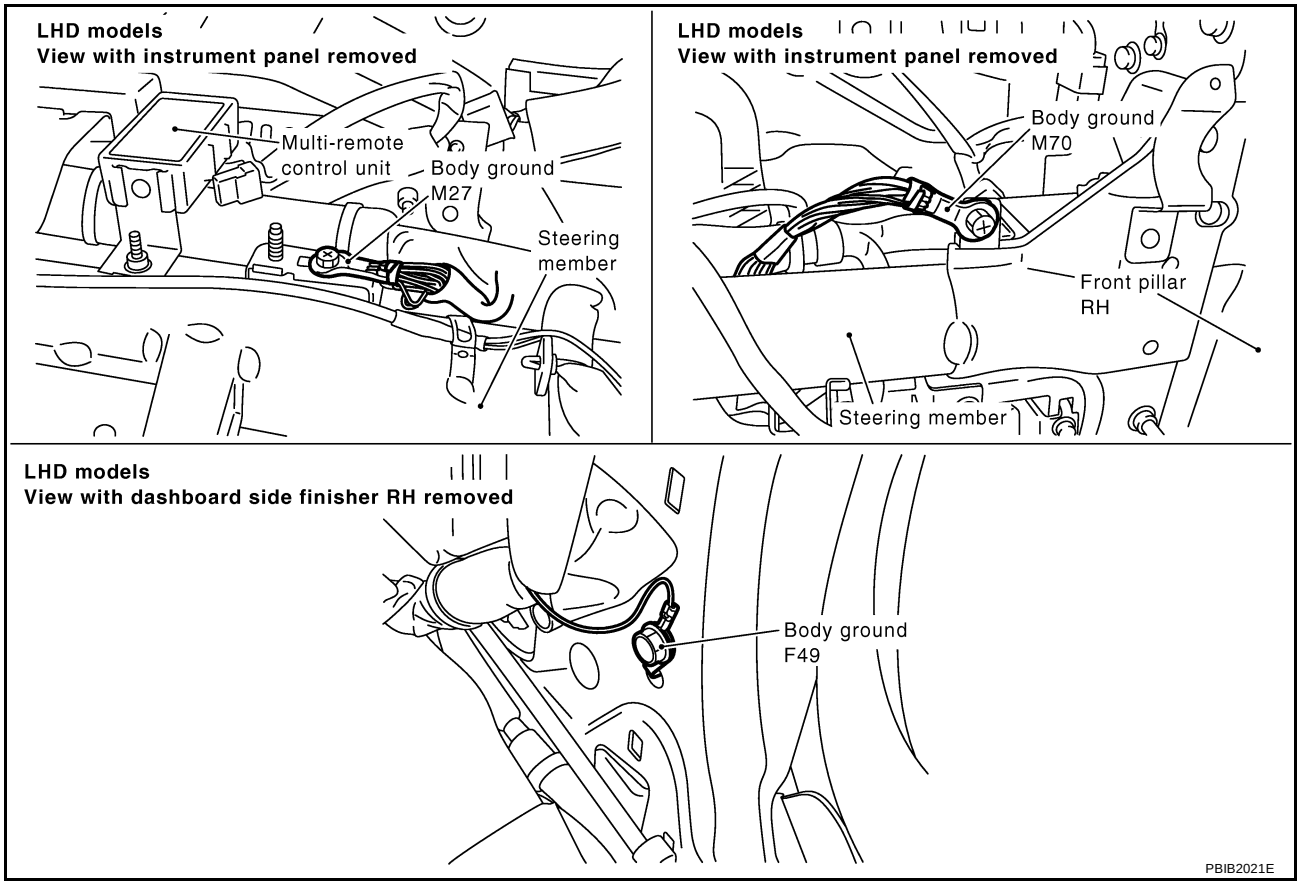
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	R	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
82	R/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	L	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	B/W	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.15 - 0.6V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	3.9 - 4.7V

Diagnostic Procedure

BBS001SQ

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

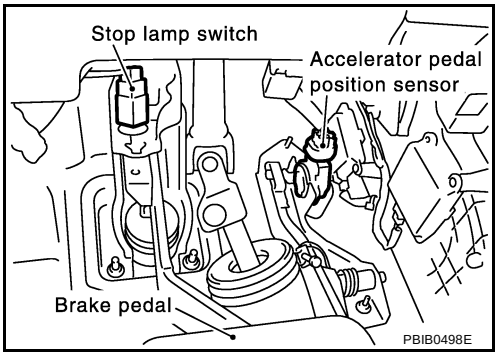


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

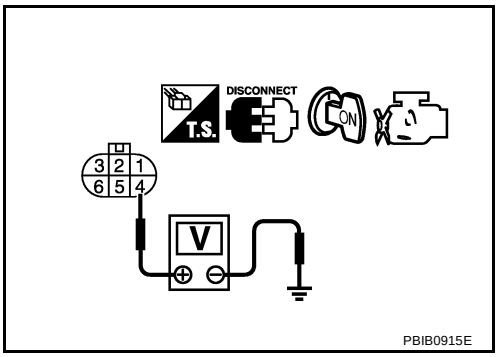
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 91. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 4	EC-826
47	Electric throttle control actuator terminal 1	EC-834

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK THROTTLE POSITION SENSOR

Refer to EC-839, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 6.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 83.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between APP sensor terminal 2 and ECM terminal 98.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK APP SENSOR

Refer to EC-831, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace the accelerator pedal assembly.
2. Perform EC-562, "Accelerator Pedal Released Position Learning" .
3. Perform EC-563, "Throttle Valve Closed Position Learning" .
4. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

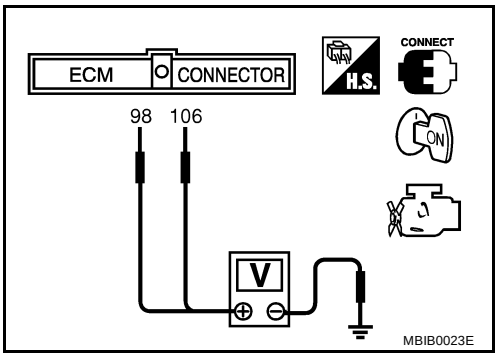
Component Inspection

BBS001SR

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.15 - 0.6V
	Fully depressed	1.95 - 2.4V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-562, "Accelerator Pedal Released Position Learning" .
6. Perform EC-563, "Throttle Valve Closed Position Learning" .
7. Perform EC-563, "Idle Air Volume Learning" .

Removal and Installation

BBS001SS

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

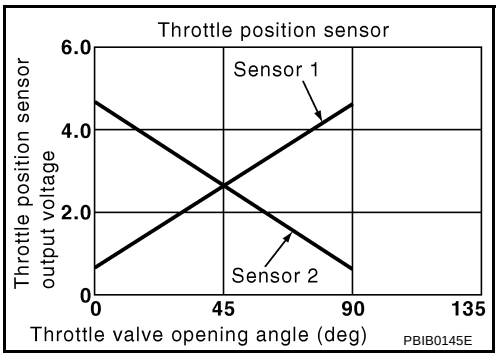
DTC P2135 TP SENSOR

PFP:16119

Component Description

BBS001ST

Electric throttle control actuator consists of throttle control motor, throttle position sensor, etc. The throttle position sensor responds to the throttle valve movement.
The throttle position sensor has the two sensors. These sensors are a kind of potentiometers which transform the throttle valve position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the throttle valve and feed the voltage signals to the ECM. The ECM judges the current opening angle of the throttle valve from these signals and the ECM controls the throttle control motor to make the throttle valve opening angle properly in response to driving condition.



CONSULT-II Reference Value in Data Monitor Mode

BBS001SU

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
THRTL SEN 1 THRTL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	More than 0.36V
	● Shift lever: D (A/T), 1st (M/T)	Accelerator pedal: Fully depressed	Less than 4.75V

*: Throttle position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage signal.

On Board Diagnosis Logic

BBS001SV

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Throttle position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from TP sensor 1 and TP sensor 2.	● Harness or connector (TP sensor 1 and 2 circuit is open or shorted.) (APP sensor 2 circuit is shorted.) ● Electric throttle control actuator (TP sensor 1 and 2) ● Accelerator pedal position sensor (APP sensor 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operation condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

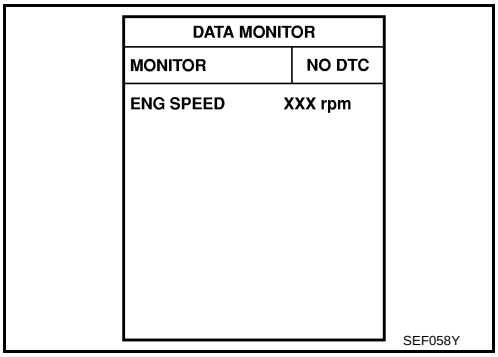
DTC Confirmation Procedure

BBS001SW

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-836, "Diagnostic Procedure" .



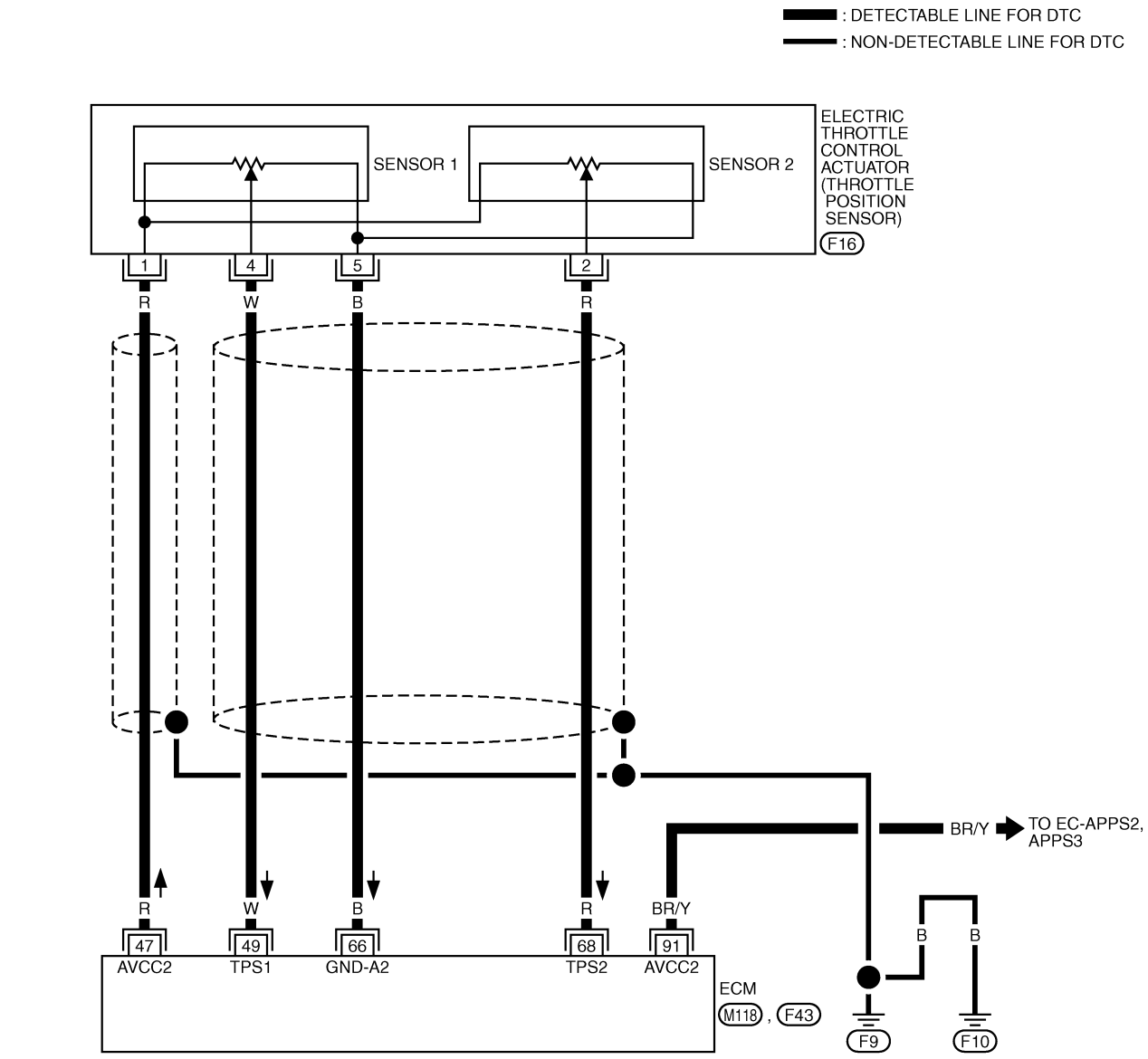
WITHOUT CONSULT-II

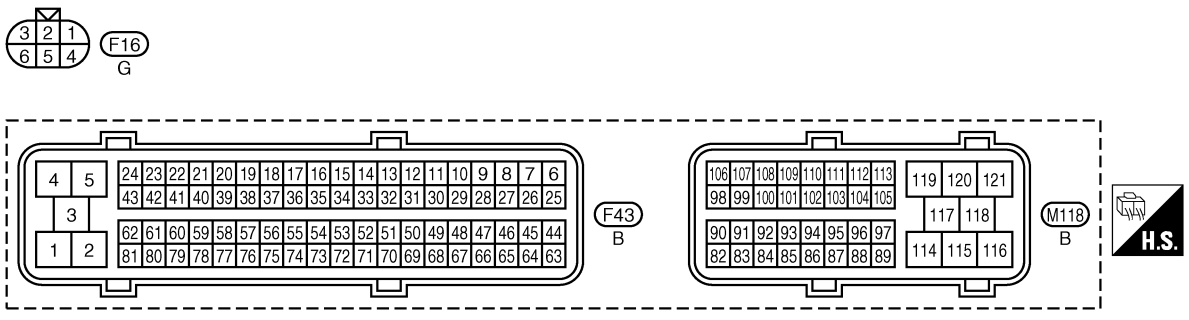
1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-836, "Diagnostic Procedure" .

Wiring Diagram

BBS001SX

EC-TPS3-01





TBWB0264E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

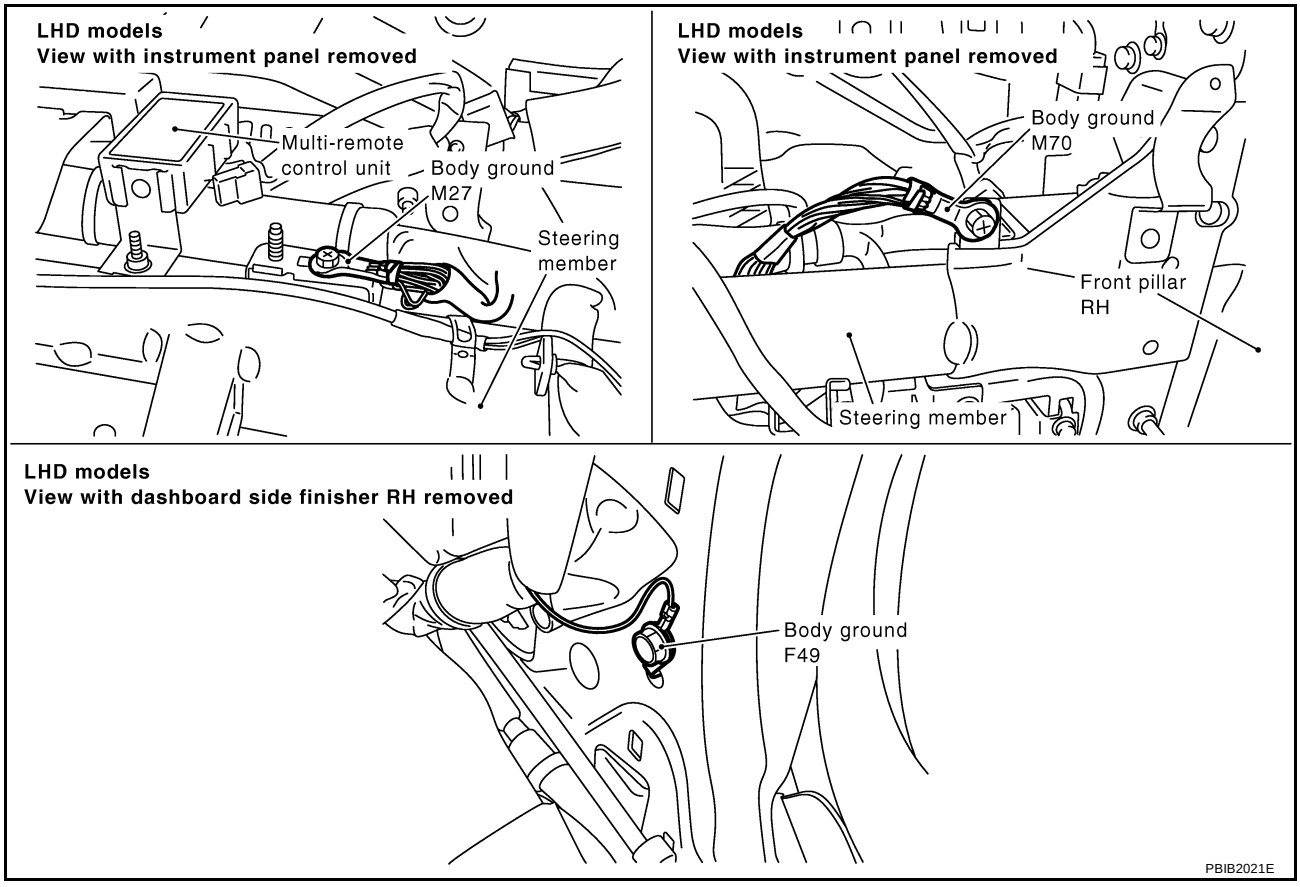
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	R	Throttle position sensor power supply	**[Ignition switch: ON]**	Approximately 5V
49	W	Throttle position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	More than 0.36V
			[Ignition switch: ON] ● Engine stopped ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	Less than 4.75V
66	B	Sensor ground (Throttle position sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
68	R	Throttle position sensor 2	**[Ignition switch: ON]** ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully released	Less than 4.75V
			[Ignition switch: ON] ● Shift lever: D (A/T), 1st (M/T) ● Accelerator pedal: Fully depressed	More than 0.36V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V

Diagnostic Procedure

BBS001SY

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

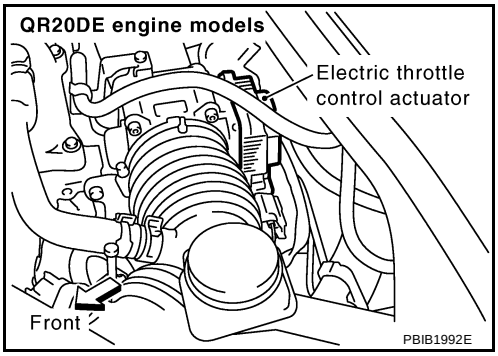


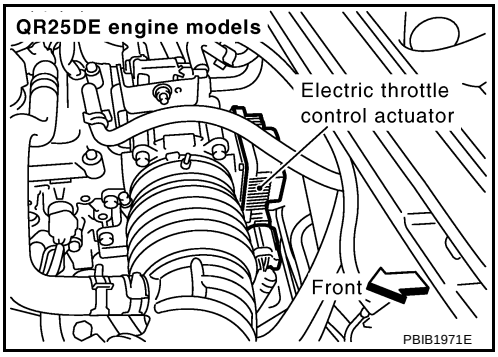
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-I

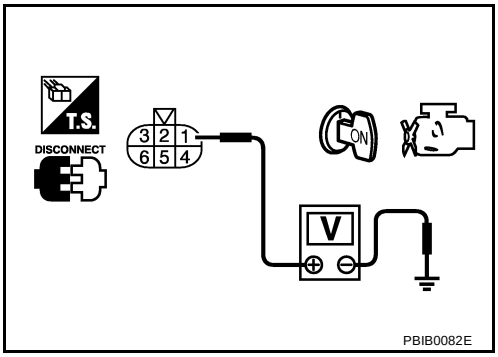
1. Disconnect electric throttle control actuator harness connector.
2. Turn ignition switch ON.





3. Check voltage between electric throttle control actuator terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 7.
NG >> GO TO 3.

3. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 47. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 4.
NG >> Repair or replace open circuit.

4. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
47	Electric throttle control actuator terminal 1	EC-834
91	APP sensor terminal 4	EC-842

OK or NG

OK >> GO TO 5.
NG >> Repair short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-847, "Component Inspection" .

OK or NG

OK >> GO TO 11
NG >> GO TO 6.

6. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace accelerator pedal assembly.
2. Perform EC-562, "Accelerator Pedal Released Position Learning" .
3. Perform EC-563, "Throttle Valve Closed Position Learning" .
4. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

7. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 5 and ECM terminal 66. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 49, electric throttle control actuator terminal 2 and ECM terminal 68. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK THROTTLE POSITION SENSOR

Refer to EC-839, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

11. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

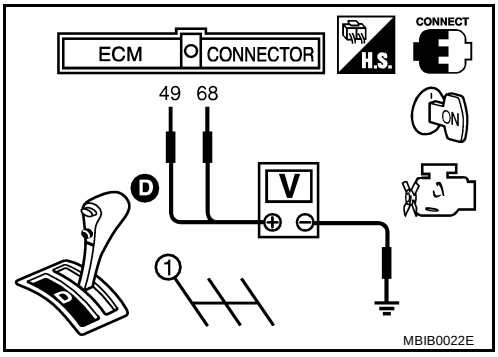
Component Inspection

BBS001SZ

THROTTLE POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Turn ignition switch ON.
4. Set selector lever to D position (A/T) or 1st position (M/T).
5. Check voltage between ECM terminals 49 (TP sensor 1 signal), 68 (TP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
49 (Throttle position sensor 1)	Fully released	More than 0.36V
	Fully depressed	Less than 4.75V
68 (Throttle position sensor 2)	Fully released	Less than 4.75V
	Fully depressed	More than 0.36V



6. If NG, replace electric throttle control actuator and go to the next step.
7. Perform EC-563, "Throttle Valve Closed Position Learning" .
8. Perform EC-563, "Idle Air Volume Learning" .

Removal and Installation

BBS001T0

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-18, "INTAKE MANIFOLD" .

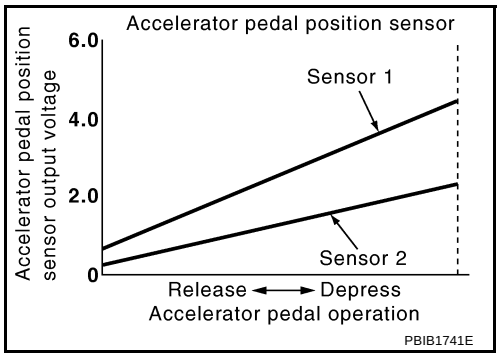
DTC P2138 APP SENSOR

PFP:18002

Component Description

BBS001T1

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensor detects the accelerator position and sends a signal to the ECM.
Accelerator pedal position sensor has two sensors. These sensors are a kind of potentiometers which transform the accelerator pedal position into output voltage, and emit the voltage signal to the ECM. In addition, these sensors detect the opening and closing speed of the accelerator pedal and feed the voltage signals to the ECM. The ECM judges the current opening angle of the accelerator pedal from these signals and controls the throttle control motor based on these signals.
Idle position of the accelerator pedal is determined by the ECM receiving the signal from the accelerator pedal position sensor. The ECM uses this signal for the engine operation such as fuel cut.



CONSULT-II Reference Value in Data Monitor Mode

BBS001T2

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL SEN 1	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.7V
ACCEL SEN 2*	● Ignition switch: ON (engine stopped)	Accelerator pedal: Fully released	0.3 - 1.2V
		Accelerator pedal: Fully depressed	3.9 - 4.8V
CLSD THL POS	● Ignition switch: ON	Accelerator pedal: Fully released	ON
		Accelerator pedal: Slightly depressed	OFF

*: Accelerator pedal position sensor 2 signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

BBS001T3

This self-diagnosis has the one trip detection logic.

NOTE:
If DTC P2138 is displayed with DTC P1229, first perform the trouble diagnosis for DTC P1229. Refer to EC-777, "DTC P1229 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2138 2138	Accelerator pedal position sensor circuit range/performance problem	Rationally incorrect voltage is sent to ECM compared with the signals from APP sensor 1 and APP sensor 2.	● Harness or connector (APP sensor 1 and 2 circuit is open or shorted.) (TP sensor circuit is shorted.) ● Accelerator pedal position sensor (APP sensor 1 and 2) ● Electric throttle control actuator (TP sensor 1 and 2)

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe mode and the MI lights up.

Engine operating condition in fail-safe mode
The ECM controls the electric throttle control actuator in regulating the throttle opening in order for the idle position to be within +10 degrees. The ECM regulates the opening speed of the throttle valve to be slower than the normal condition. So, the acceleration will be poor.

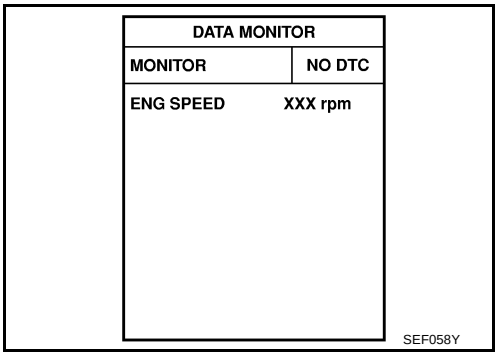
DTC Confirmation Procedure

BBS001T4

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.
TESTING CONDITION:
Before performing the following procedure, confirm that battery voltage is more than 10V at idle.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-844, "Diagnostic Procedure" .



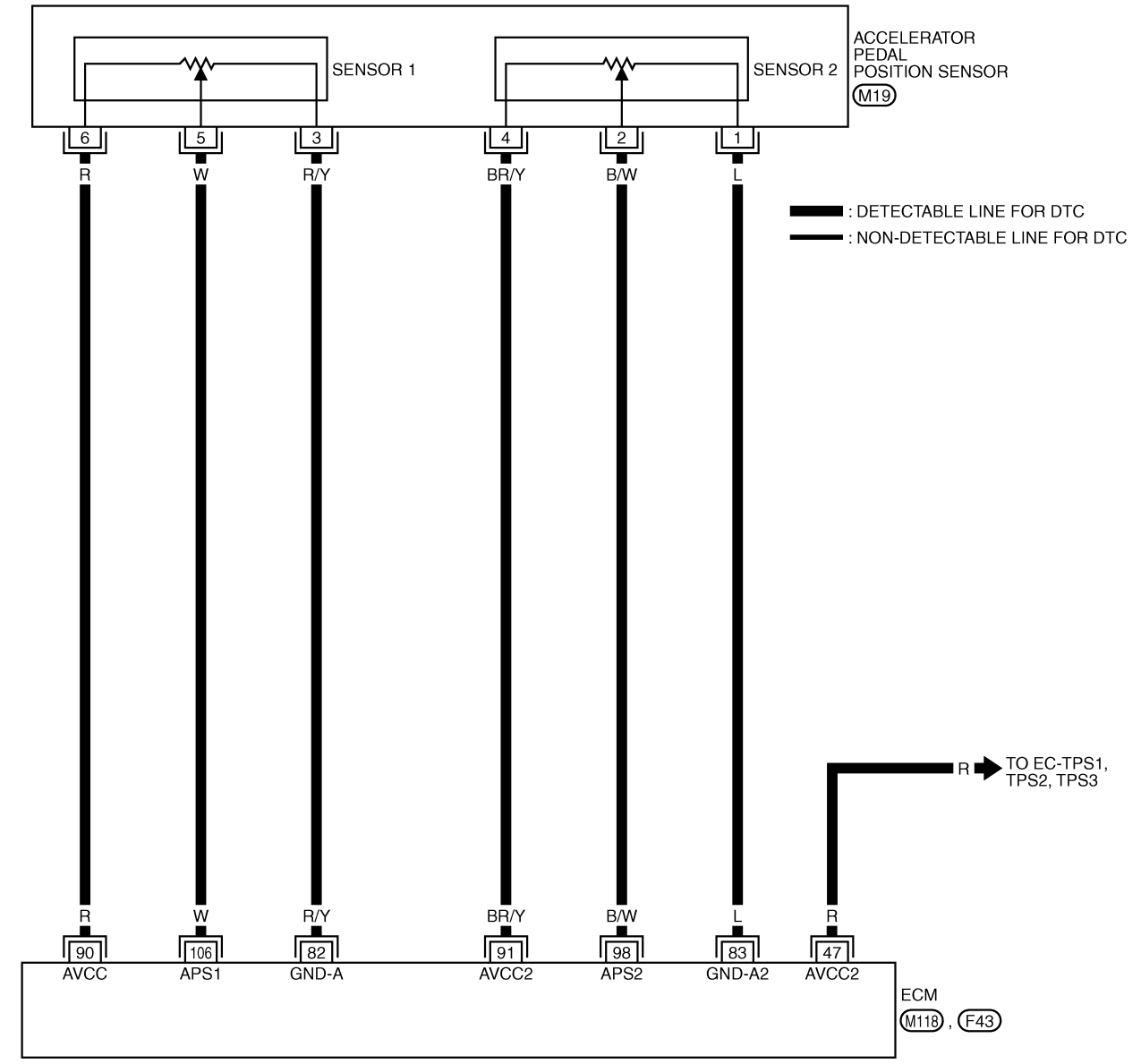
WITHOUT CONSULT-II

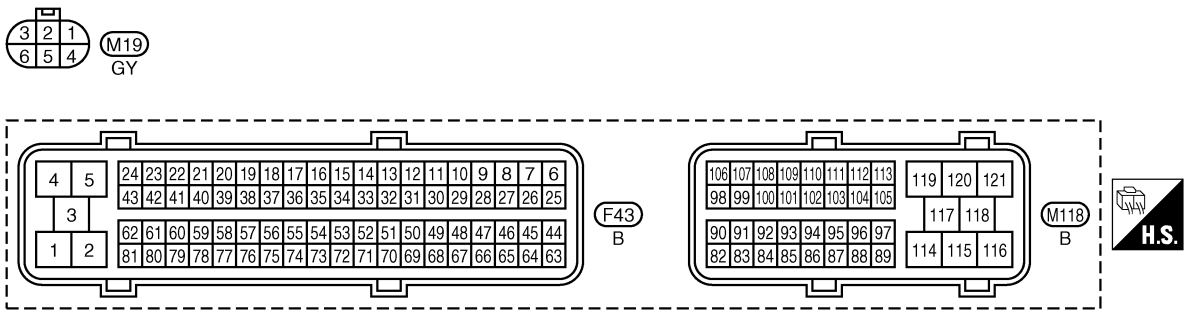
1. Start engine and let it idle for 1 second.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-844, "Diagnostic Procedure" .

Wiring Diagram

BBS001T5

EC-APPS3-01





TBWB0265E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

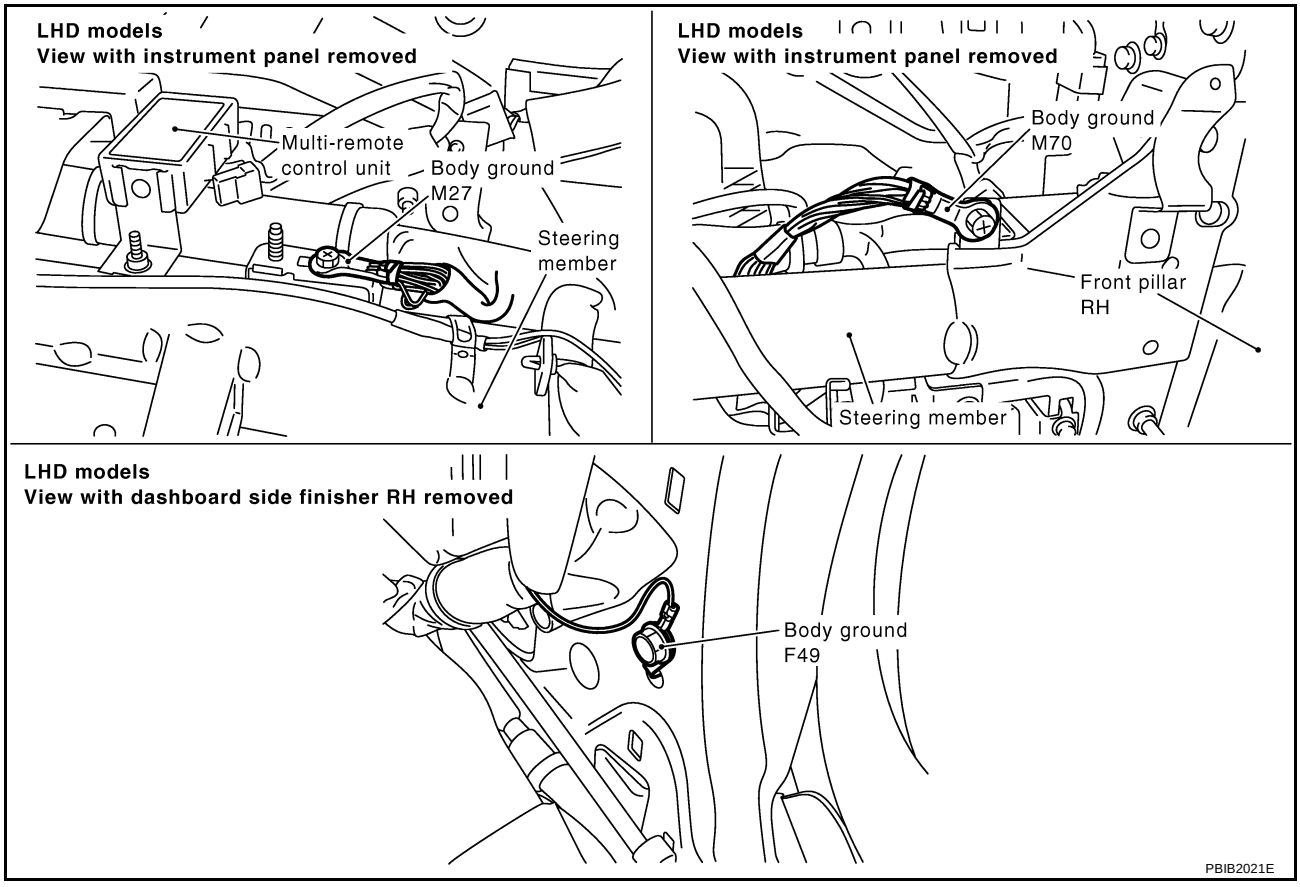
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
47	R	Sensor power supply (Throttle position sensor)	**[Ignition switch: ON]**	Approximately 5V
82	R/Y	Sensor ground (Accelerator pedal position sensor 1)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
83	L	Sensor ground (Accelerator pedal position sensor 2)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
90	R	Sensor power supply (Accelerator pedal position sensor 1)	**[Ignition switch: ON]**	Approximately 5V
91	BR/Y	Sensor power supply (Accelerator pedal position sensor 2)	**[Ignition switch: ON]**	Approximately 5V
98	B/W	Accelerator pedal position sensor 2	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.15 - 0.6V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	1.95 - 2.4V
106	W	Accelerator pedal position sensor 1	**[Ignition switch: ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.5 - 1.0V
			[Ignition switch: ON] ● Engine stopped ● Accelerator pedal: Fully depressed	3.9 - 4.7V

Diagnostic Procedure

BBS001T6

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

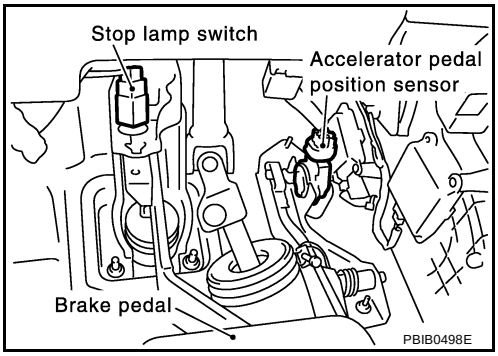


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

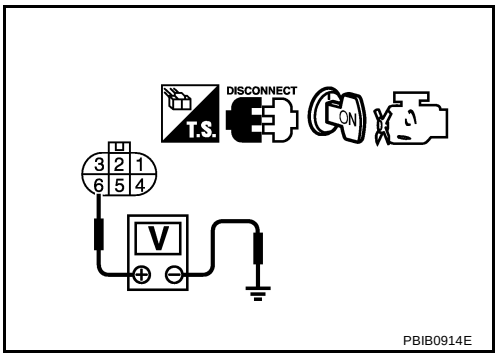
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



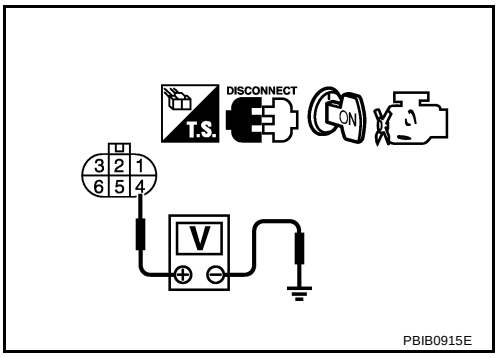
OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-I

Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 8.
NG >> GO TO 4.

4. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 4 and ECM terminal 91. Refer to Wiring Diagram.

Continuity should exist.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace open circuit.

5. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT-III

Check harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
91	APP sensor terminal 4	EC-842
47	Electric throttle control actuator terminal 1	EC-834

OK or NG

OK >> GO TO 6.
NG >> Repair short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-839, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

1. Replace the electric throttle control actuator.
2. Perform EC-563, "Throttle Valve Closed Position Learning" .
3. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

8. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 3 and ECM terminal 82, APP sensor terminal 1 and ECM terminal 83.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between APP sensor terminal 5 and ECM terminal 106, APP sensor terminal 2 and ECM terminal 98.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK APP SENSOR

Refer to EC-847, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. REPLACE ACCELERATOR PEDAL ASSEMBLY

1. Replace the accelerator pedal assembly.
2. Perform EC-562, "Accelerator Pedal Released Position Learning" .
3. Perform EC-563, "Throttle Valve Closed Position Learning" .
4. Perform EC-563, "Idle Air Volume Learning" .

>> **INSPECTION END**

12. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

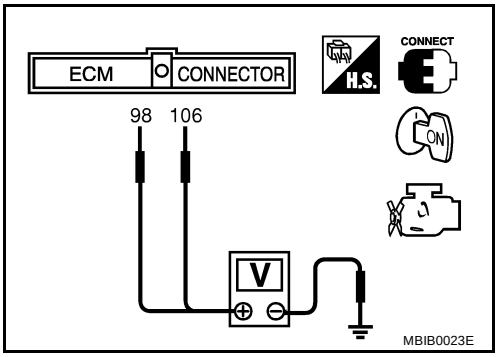
Component Inspection

BBS001T7

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 106 (APP sensor 1 signal), 98 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
106 (Accelerator pedal position sensor 1)	Fully released	0.5 - 1.0V
	Fully depressed	3.9 - 4.7V
98 (Accelerator pedal position sensor 2)	Fully released	0.15 - 0.6V
	Fully depressed	1.95 - 2.4V



4. If NG, replace accelerator pedal assembly and go to the next step.
5. Perform EC-562, "Accelerator Pedal Released Position Learning" .
6. Perform EC-563, "Throttle Valve Closed Position Learning" .
7. Perform EC-563, "Idle Air Volume Learning" .

Removal and Installation

BBS001T8

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

HO2S1 HEATER

PFP:22690

Description

BBS001T9

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 1 heater control	Heated oxygen sensor 1 heater
Engine coolant temperature sensor	Engine coolant temperature		

The ECM performs ON/OFF duty control of the heated oxygen sensor 1 heater corresponding to the engine speed and engine coolant temperature. The duty percent varies with engine coolant temperature when engine is started.

OPERATION

Engine speed rpm	Heated oxygen sensor 1 heater
Above 3,600	OFF
Below 3,600	ON

CONSULT-II Reference Value in Data Monitor Mode

BBS001TA

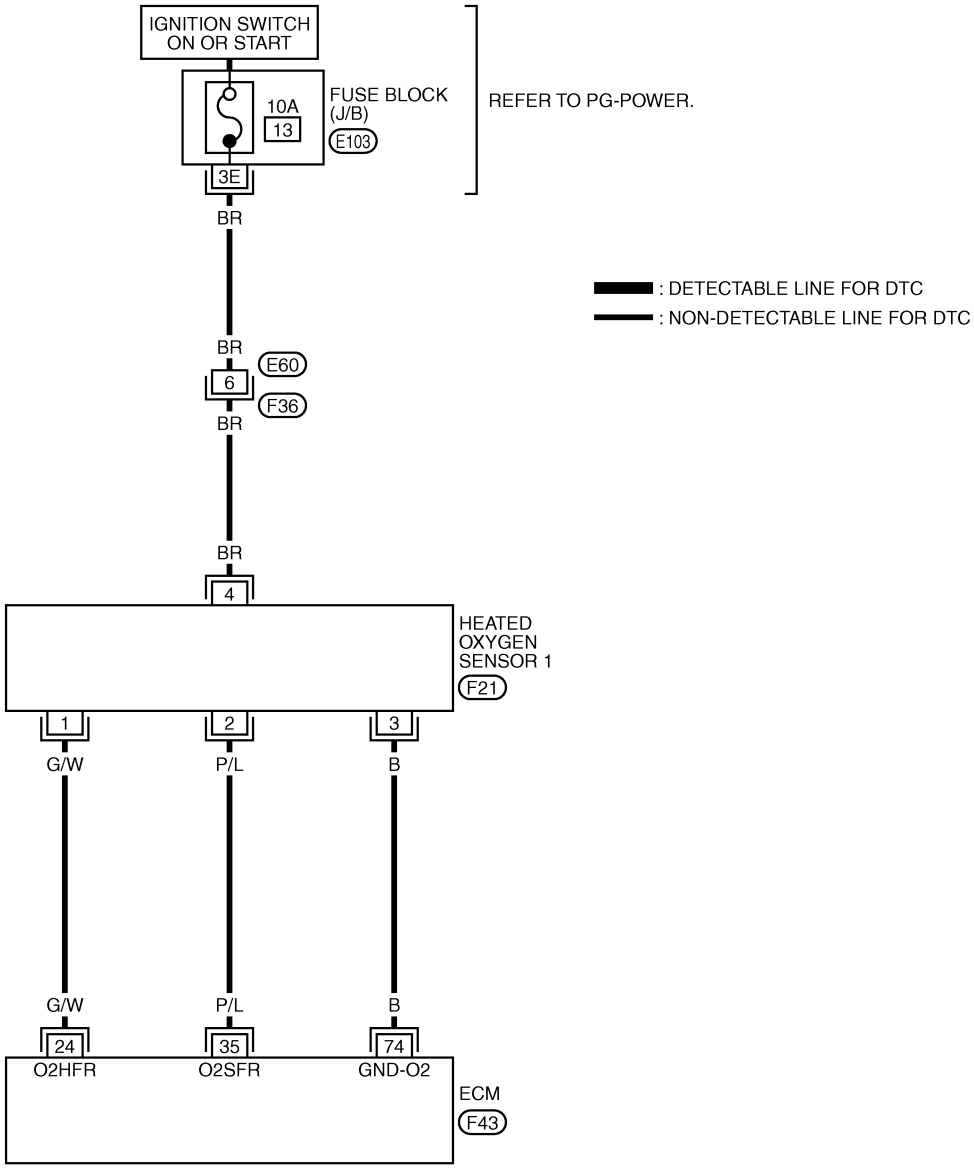
Specification data are reference values.

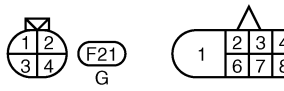
MONITOR ITEM	CONDITION	SPECIFICATION
HO2S1 HTR (B1)	● Engine: After warming up ● Engine speed: Below 3,600 rpm	ON
	● Engine speed: Above 3,600 rpm	OFF

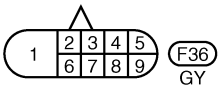
Wiring Diagram

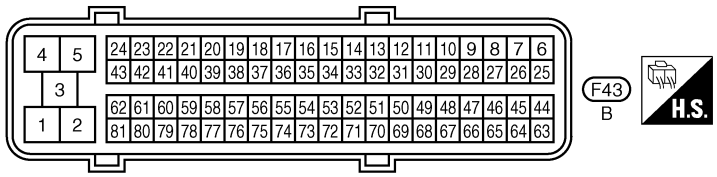
BBS001TB

EC-FRO2/H-01







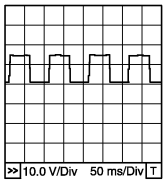


REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0643E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
24	G/W	Heated oxygen sensor 1 heater	**[Engine is running]** ● **Warm-up condition.** ● Engine speed is below 3,600 rpm	Approximately 7.0V★  PBIB0519E
			[Engine is running] ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

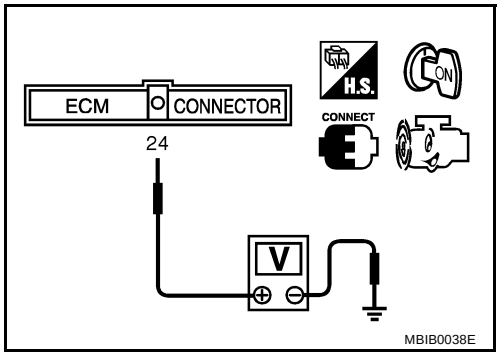
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

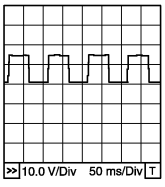
BBS001TC

1. CHECK OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Turn ignition switch ON.
4. Set tester prove between ECM terminal 24 (HO2S1 heater signal) and ground.
5. Start engine and let it idle.
6. Check the voltage under the following conditions.
   Verify that the oscilloscope screen shows the signal waves as shown below.



MBIB0038E

Conditions	Voltage
At idle	Approximately 7.0V★  PBIB0519E
Engine speed is above 3,600 rpm.	BATTERY VOLTAGE (11 - 14V)

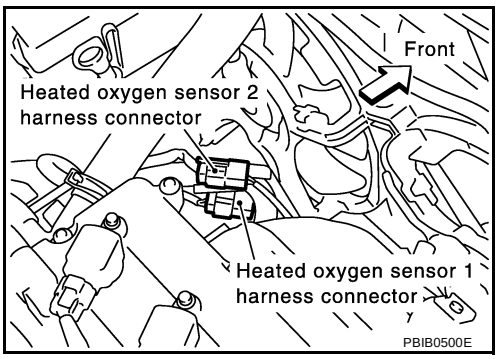
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK HO2S1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Turn ignition switch ON.

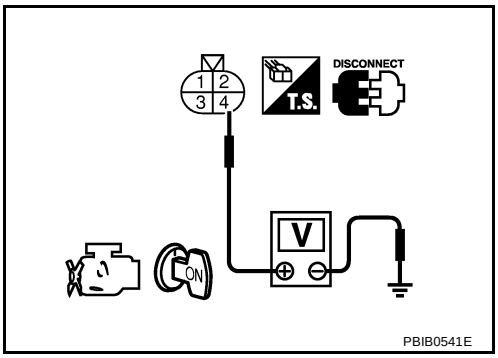


4. Check voltage between HO2S1 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E60, F36
- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between heated oxygen sensor 1 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S1 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S1 terminal 1 and ECM terminal 24. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1 HEATER

Refer to EC-852, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

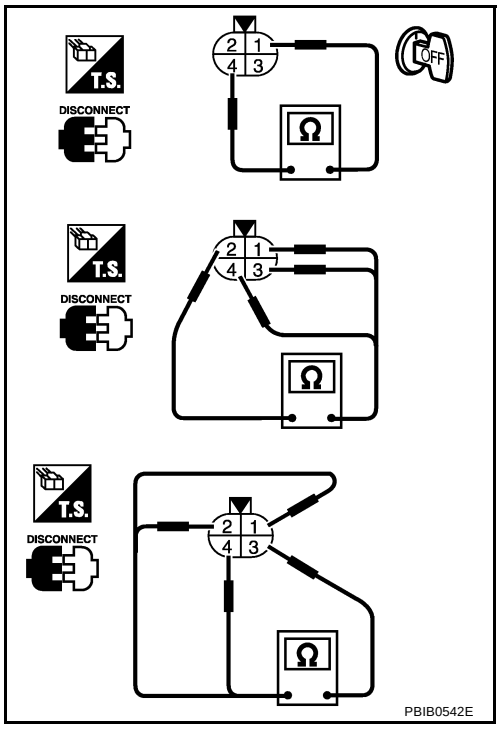
BBS001TD

HEATED OXYGEN SENSOR 1 HEATER

1. Check resistance between HO2S1 terminals as follows.

Terminal No.	Resistance
1 and 4	3.3 - 4.0 Ω at 25°C (77°F)
2 and 1, 3, 4	∞ Ω (Continuity should not exist)
3 and 1, 2, 4	

2. If NG, replace heated oxygen sensor 1.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001TE

HEATED OXYGEN SENSOR 1

Refer to EM-25, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

HO2S2 HEATER

PFP:226A0

Description

BBS001TF

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Camshaft position sensor (PHASE) Crankshaft position sensor (POS)	Engine speed	Heated oxygen sensor 2 heater control	Heated oxygen sensor 2 heater
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		

The ECM performs ON/OFF control of the heated oxygen sensor 2 heater corresponding to the engine speed, amount of intake air and engine coolant temperature.

OPERATION

Engine speed rpm	Heated oxygen sensor 2 heater
Above 3,600	OFF
Below 3,600 rpm after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON

CONSULT-II Reference Value in Data Monitor Mode

BBS001TG

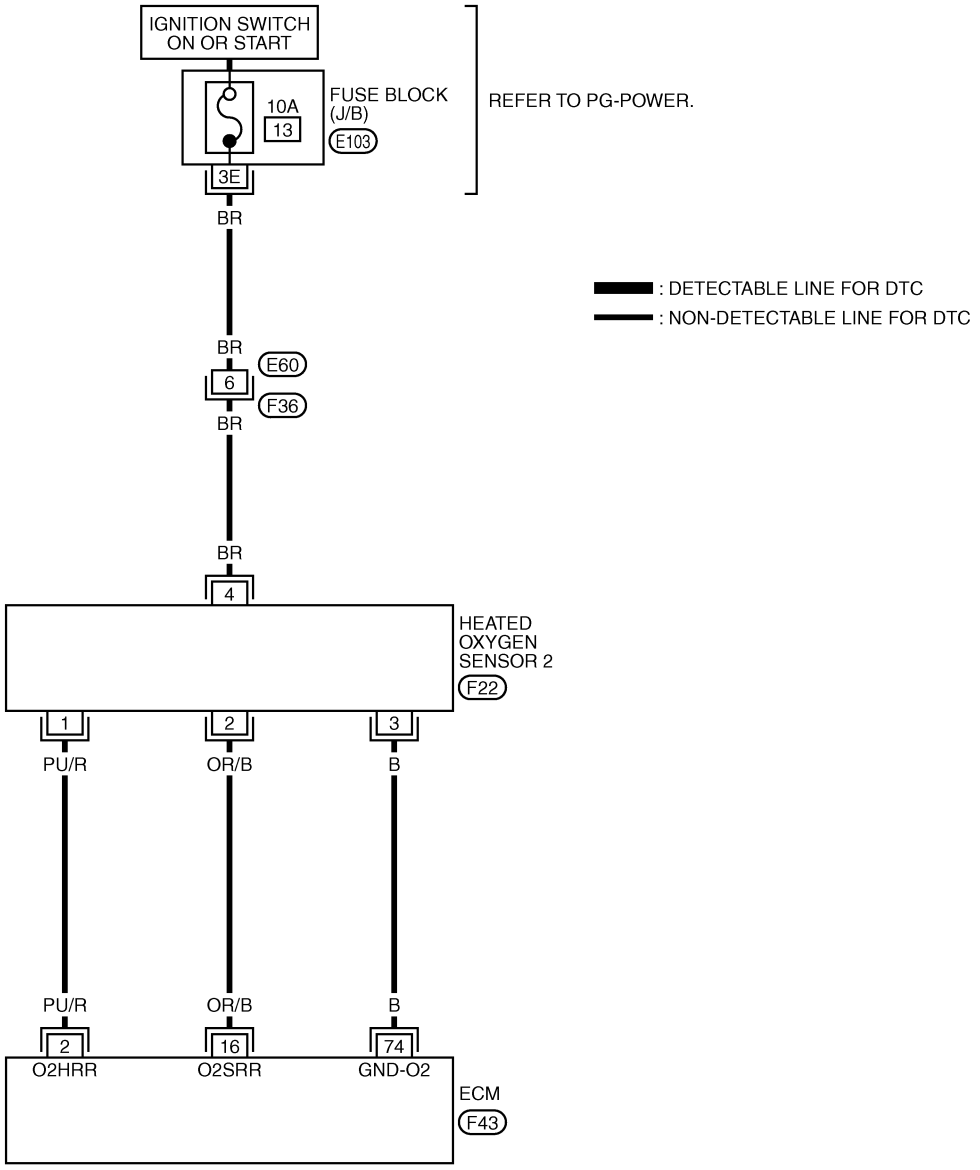
Specification data are reference values.

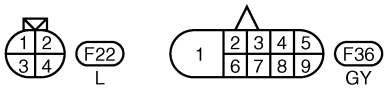
MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 HTR (B1)	● Engine speed: Below 3,600 rpm after the following conditions are met. – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	ON
	● Engine speed: Above 3,600 rpm	OFF

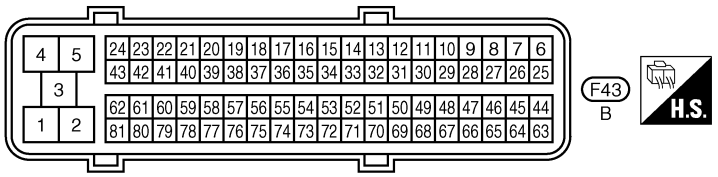
Wiring Diagram

BBS001TH

EC-RRO2/H-01







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0644E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
2	PU/R	Heated oxygen sensor 2 heater	**[Engine is running]** ● Engine speed: Below 3,600 rpm after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 1.0V
			[Ignition switch: ON] ● Engine stopped **[Engine is running]** ● Engine speed is above 3,600 rpm	BATTERY VOLTAGE (11 - 14V)

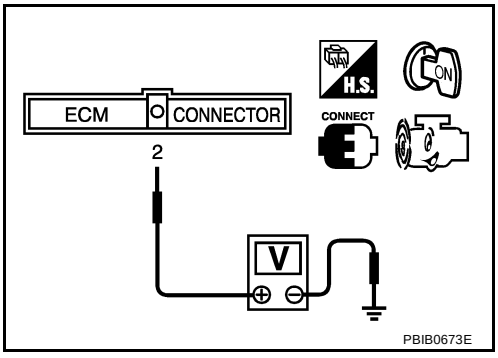
Diagnostic Procedure

BBS001TI

1. CHECK OVERALL FUNCTION

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter proves between ECM terminal 2 (HO2S2 heater signal) and ground.
6. Check the voltage under the following conditions.

Conditions	Voltage
At idle	0 - 1V
Engine speed is above 3,600 rpm	Battery voltage

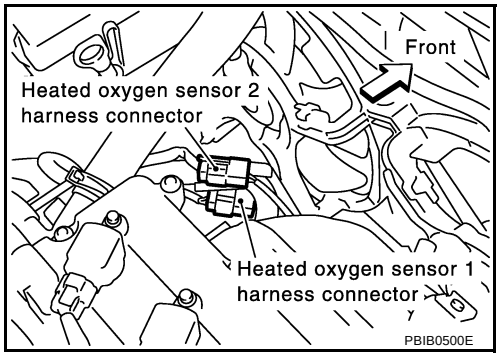


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

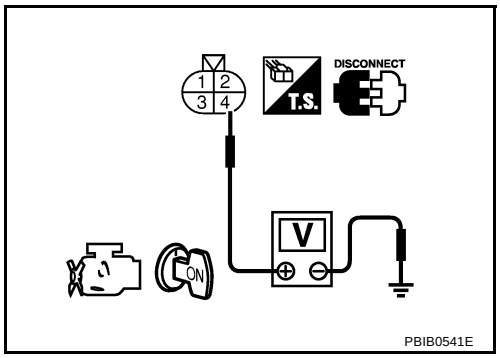
2. CHECK HO2S2 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Turn ignition switch ON.



4. Check voltage between HO2S2 terminal 4 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E60, F36
- Fuse block (J/B) connector E103
- 10A fuse
- Harness for open or short between heated oxygen sensor 2 and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK HO2S2 OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between HO2S2 terminal 1 and ECM terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 2 HEATER

Refer to EC-857, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 2.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

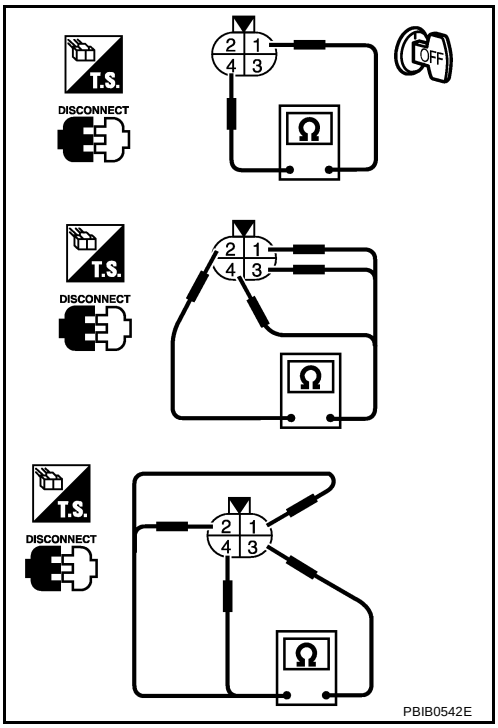
Component Inspection

BBS001TJ

HEATED OXYGEN SENSOR 2 HEATER

1. Check resistance between HO2S2 terminals as follows.

Terminal No.	Resistance
1 and 4	5.0 - 7.0 Ω at 25°C (77°F)
2 and 1, 3, 4	∞ Ω (Continuity should not exist)
3 and 1, 2, 4	



2. If NG, replace heated oxygen sensor 2.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001TK

HEATED OXYGEN SENSOR 2

Refer to EX-2, "EXHAUST SYSTEM" .

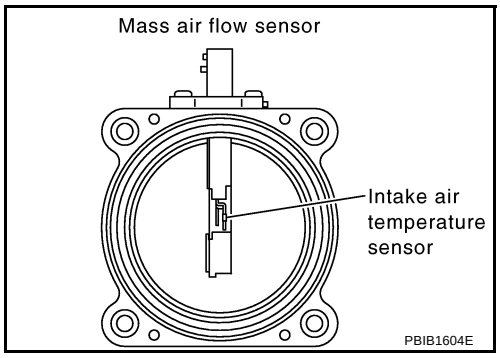
IAT SENSOR

PFP:22630

Component Description

BBS001TL

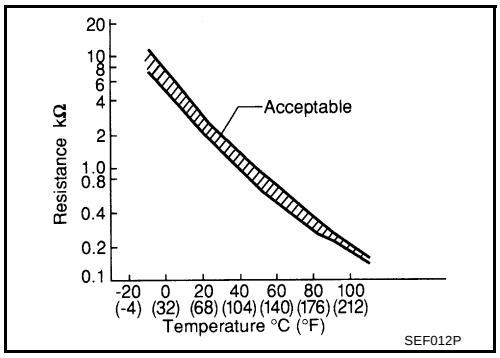
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	3.32	1.800 - 2.200
80 (176)	1.23	0.283 - 0.359

*: This data is reference value and is measured between ECM terminal 34 (Intake air temperature sensor) and ground.

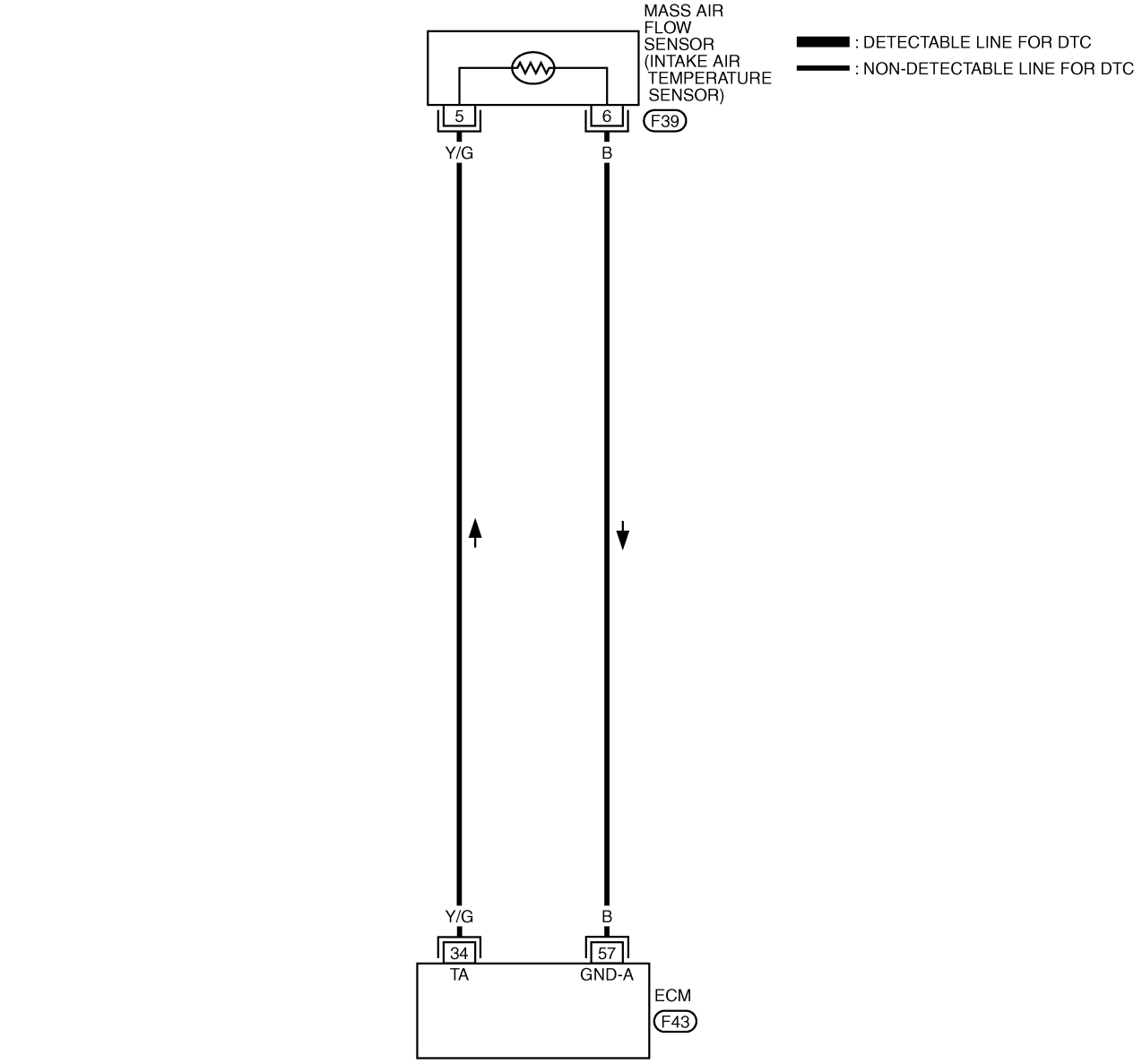


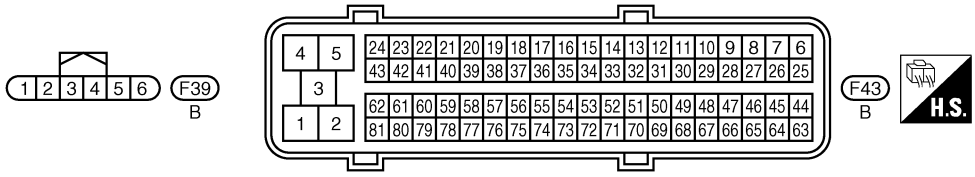
CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

Wiring Diagram

BBS001TM

EC-IATSEN-01





TBWA0645E

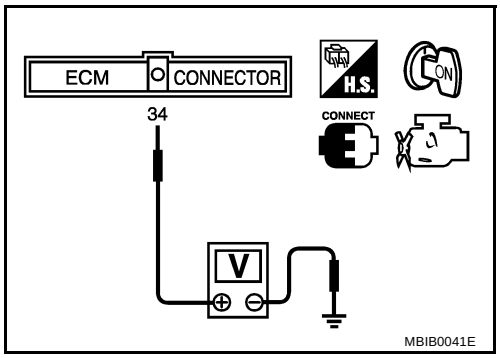
Diagnostic Procedure

BBS001TN

1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 34 and ground with CONSULT-II or tester.

Voltage : Approximately 0 - 4.8V

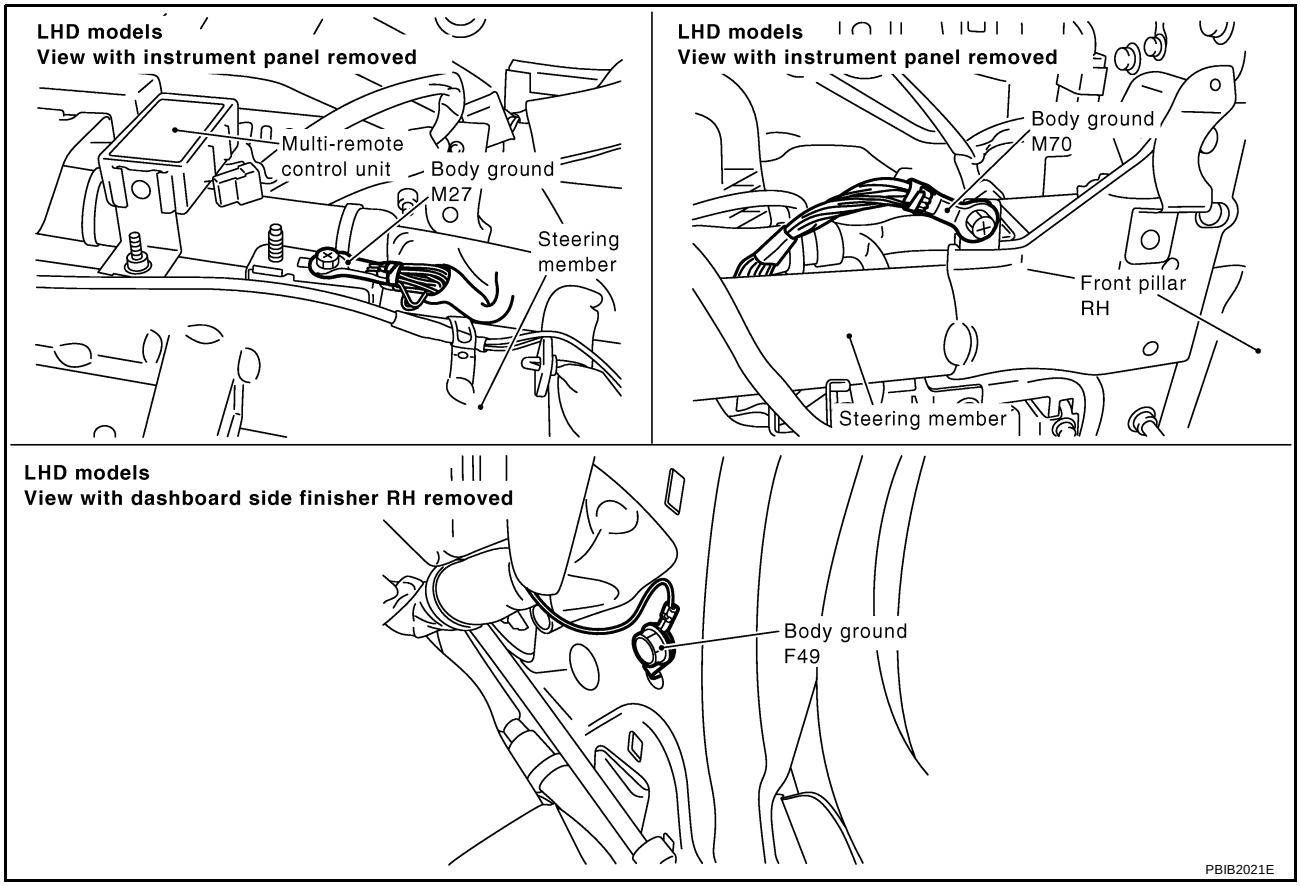


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
Refer to EC-634, "Ground Inspection" .

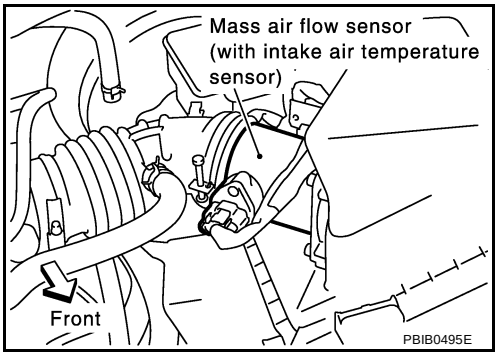


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

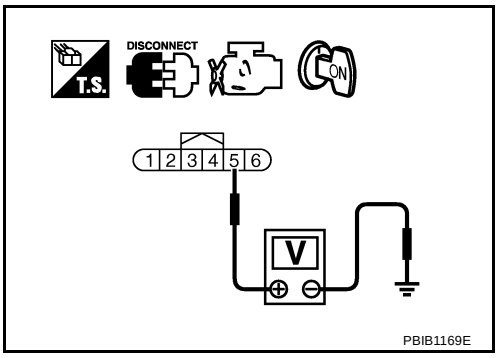
3. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
2. Turn ignition switch ON.



3. Check voltage between mass air flow sensor terminal 5 and ground.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 6 and ECM terminal 57. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-862, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

6. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

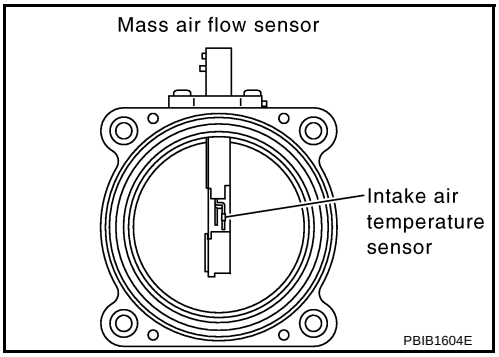
BBS001TO

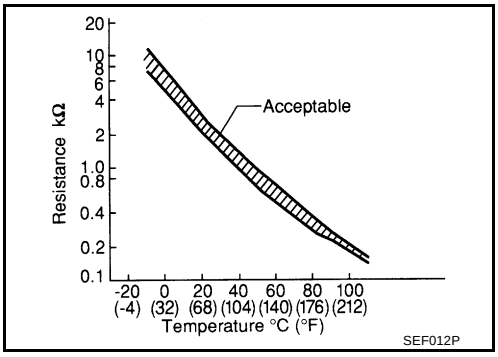
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

BBS001TP

MASS AIR FLOW SENSOR

Refer to EM-16, "AIR CLEANER AND AIR DUCT" .

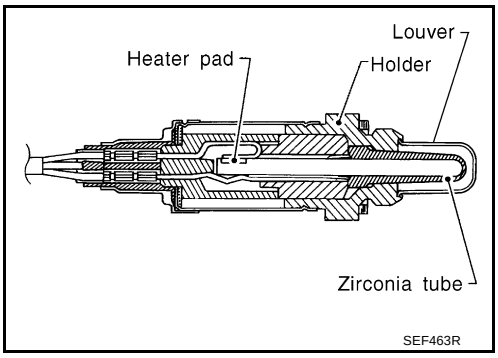
HO2S1

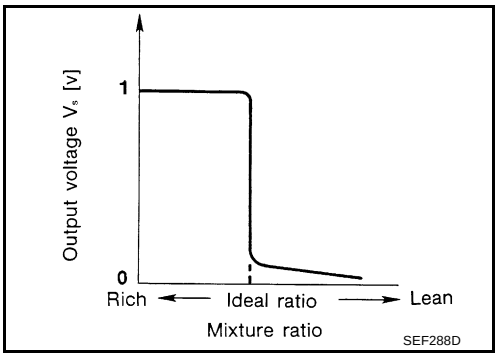
PFP:22690

Component Description

BBS001TQ

The heated oxygen sensor 1 is placed into the exhaust manifold. It detects the amount of oxygen in the exhaust gas compared to the outside air. The heated oxygen sensor 1 has a closed-end tube made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions. The heated oxygen sensor 1 signal is sent to the ECM. The ECM adjusts the injection pulse duration to achieve the ideal air-fuel ratio. The ideal air-fuel ratio occurs near the radical change from 1V to 0V.





CONSULT-II Reference Value in Data Monitor Mode

BBS001TR

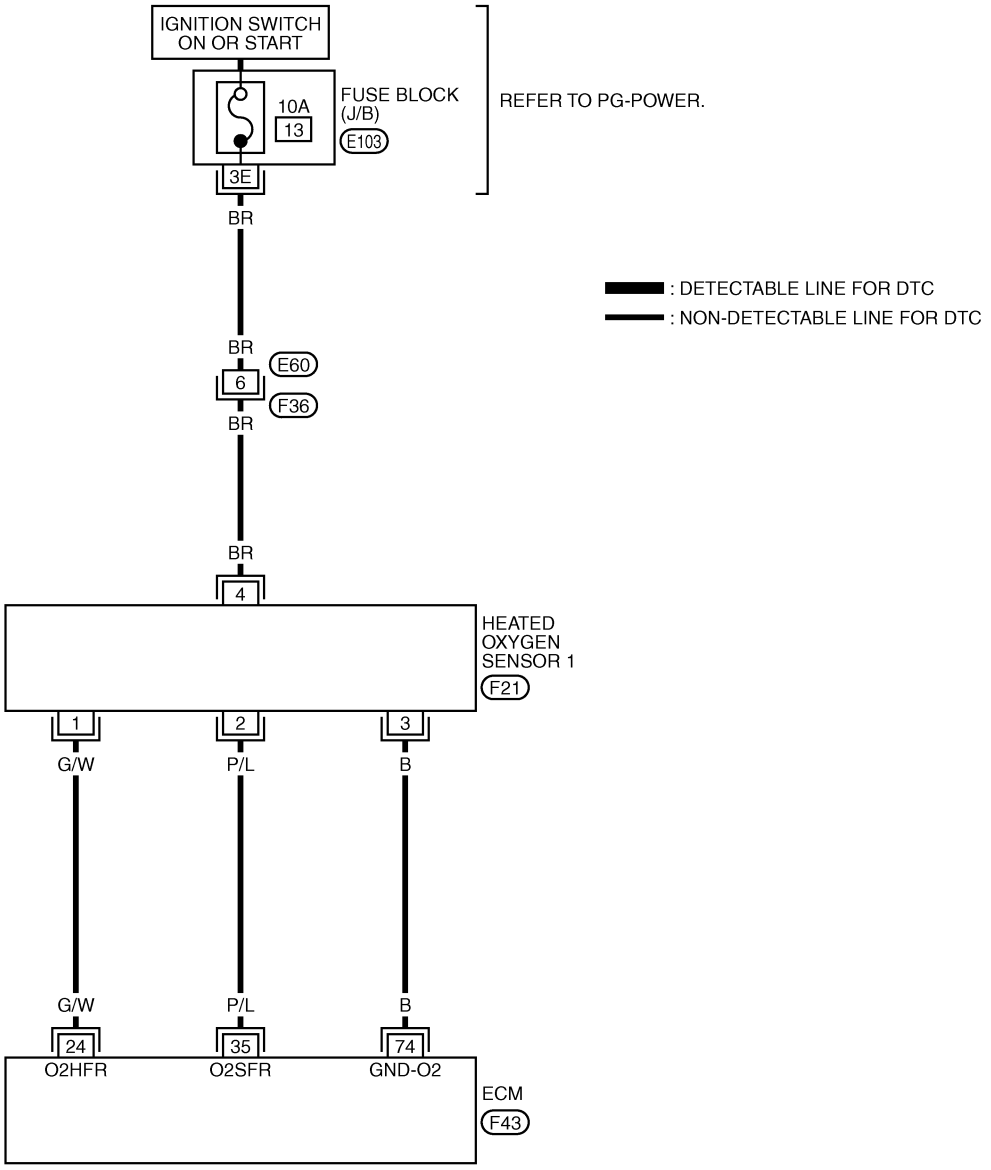
Specification data are reference values.

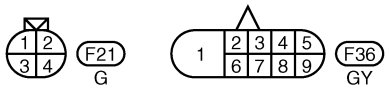
MONITOR ITEM	CONDITION		SPECIFICATION
HO2S1 (B1)	● Engine: After warming up	Maintaining engine speed at 2,000 rpm	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S1 MNTR (B1)			LEAN ←→ RICH Changes more than 5 times during 10 seconds.

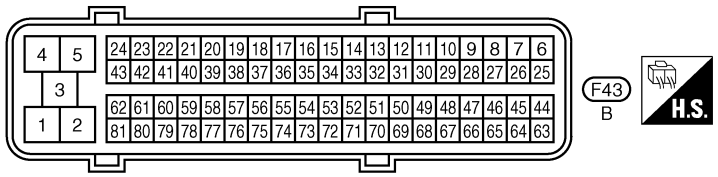
Wiring Diagram

BBS001TS

EC-FRO2-01







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0646E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

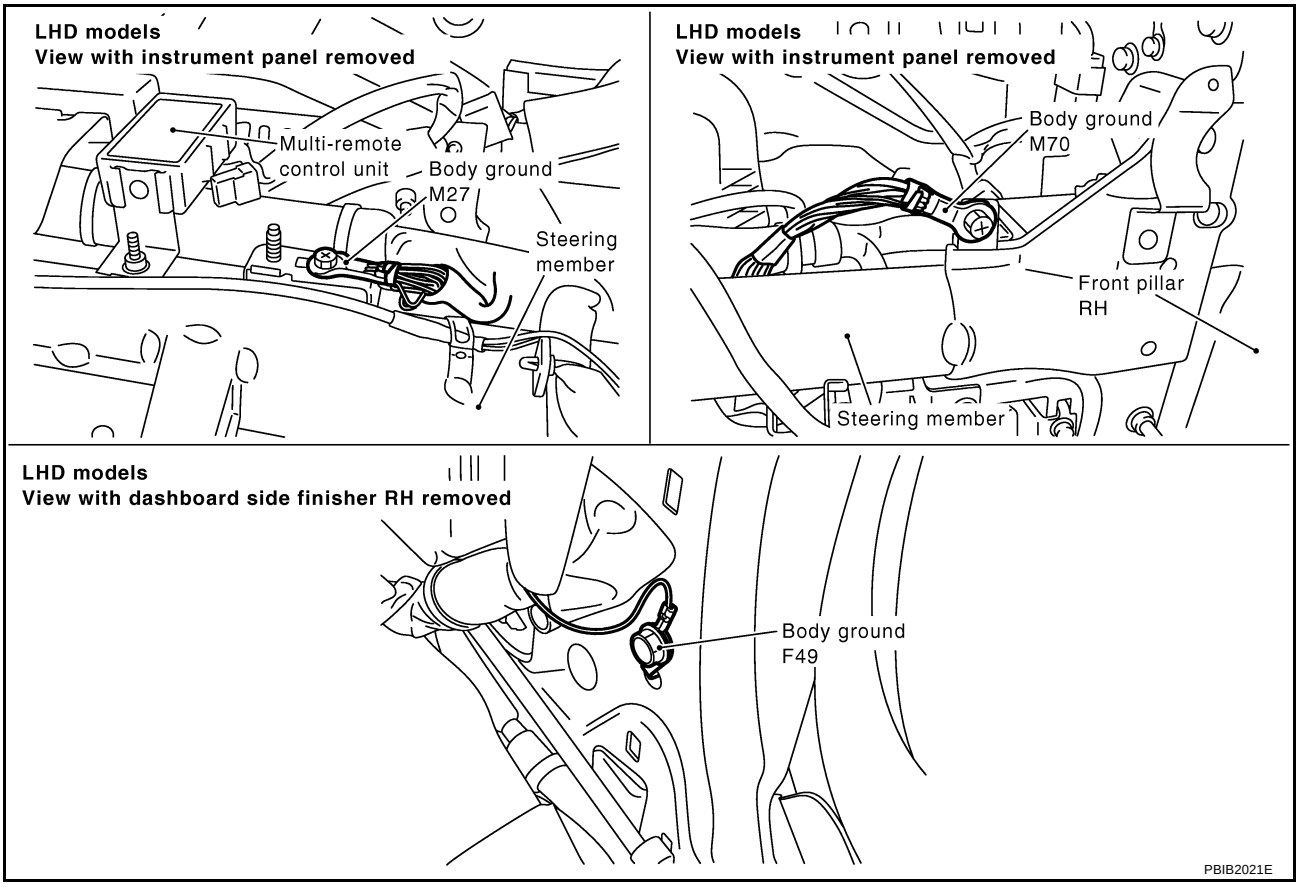
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
35	P/L	Heated oxygen sensor 1	**[Engine is running]** ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - Approximately 1.0V (Periodically change)
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● Idle speed	Approximately 0V

Diagnostic Procedure

BBS001TT

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .



OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

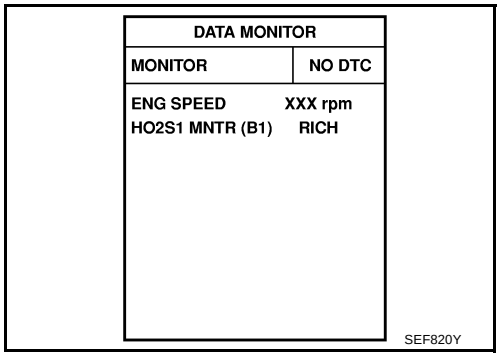
2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “HO2S1 MNTR (B1)” in “DATA MONITOR” mode with CONSULT-II.
3. Keep the engine speed at 2,000 rpm under no load, and make sure that the monitors fluctuates between LEAN and RICH more than five times in 10 seconds.

   1 time: RICH → LEAN → RICH

   2 times: RICH → LEAN → RICH → LEAN →RICH

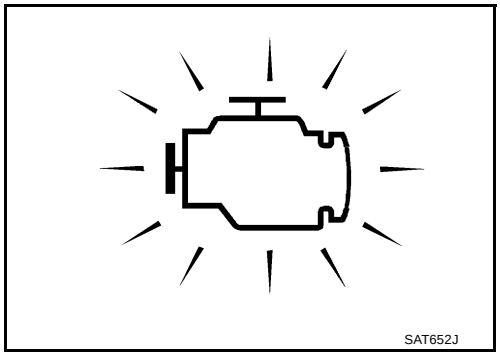


Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Stop engine and wait at least 10 seconds.
3. Set ECM in Diagnostic test mode - II (Heated oxygen sensor 1 monitor).
   Refer to EC-572, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .
4. Keep the engine speed at 2,000 rpm under no load, and make sure that the MI comes ON more than five times in 10 seconds.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.



3. CHECK HO2S1 GROUND CIRCUIT FOR OPEN AND SHORT

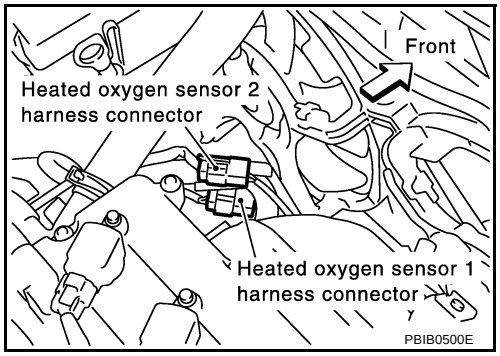
1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 1 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S1 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



4. CHECK HO2S1 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 35 and HO2S1 terminal 2. Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 35 or HO2S1 terminal 2 and ground. Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HEATED OXYGEN SENSOR 1

Refer to EC-867, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace heated oxygen sensor 1.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

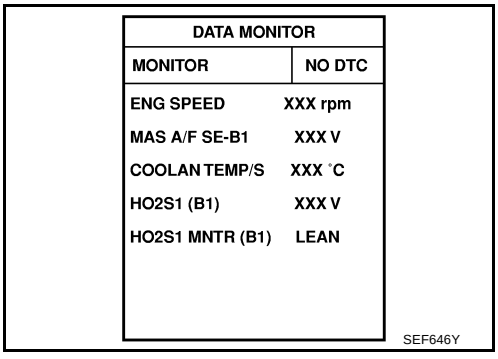
Component Inspection

BBS001TU

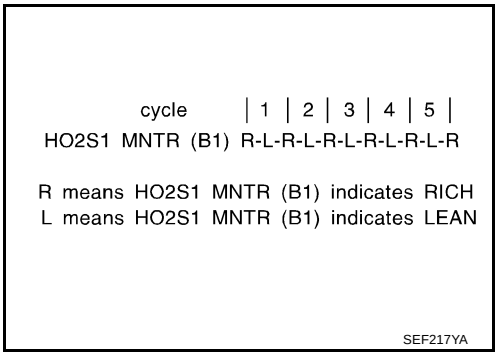
HEATED OXYGEN SENSOR 1

With CONSULT-II

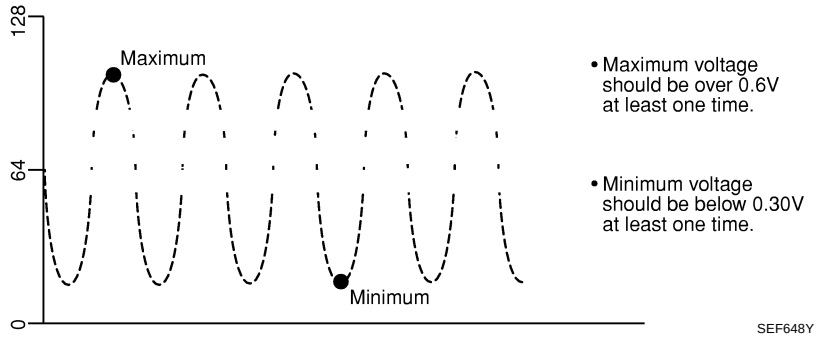
1. Start engine and warm it up to normal operating temperature.
2. Select “MANU TRIG” and adjust “TRIGGER POINT” to 100% in “DATA MONITOR” mode with CONSULT-II.
3. Select “HO2S1 (B1)” and “HO2S1 MNTR (B1)”.
4. Hold engine speed at 2,000 rpm under no load during the following steps.
5. Touch “RECORD” on CONSULT-II screen.



6. Check the following.
   - “HO2S1 MNTR (B1)” in “DATA MONITOR” mode changes from “RICH” to “LEAN” to “RICH” more than 5 times in 10 seconds.
     5 times (cycles) are counted as shown in the figure.
   - “HO2S1 (B1)” voltage goes above 0.6V at least once.
   - “HO2S1 (B1)” voltage goes below 0.3V at least once.
   - “HO2S1 (B1)” voltage never exceeds 1.0V.



Trigger	ENG SPEED	HO2S1 (B1)
	rpm	V
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX
XXX	XXX	XXX



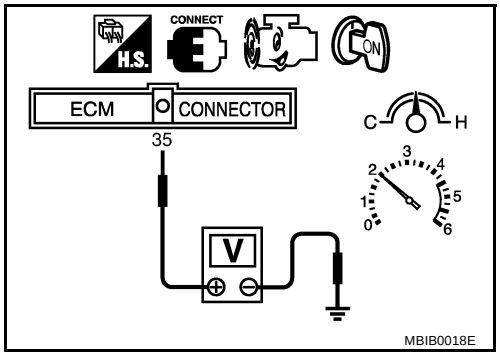
CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Set voltmeter probes between ECM terminal 35 (HO2S1 signal) and ground.
3. Check the following with engine speed held at 2,000 rpm constant under no load.
   - The voltage fluctuates between 0 to 0.3V and 0.6 to 1.0V more than 5 times within 10 seconds.
   - The maximum voltage is over 0.6V at least 1 time.
   - The minimum voltage is below 0.3V at least 1 time.
   - The voltage never exceeds 1.0V.

   1 time: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V
   2 times: 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V → 0.6 - 1.0V → 0 - 0.3V



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001TV

HEATED OXYGEN SENSOR 1

Refer to EM-25, "EXHAUST MANIFOLD AND THREE WAY CATALYST" .

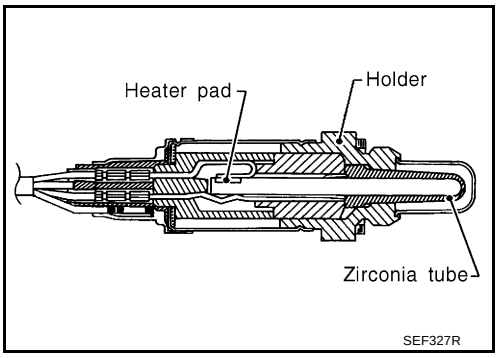
HO2S2

PFP:226A0

Component Description

BBS001TW

The heated oxygen sensor 2, after three way catalyst (manifold), monitors the oxygen level in the exhaust gas.
Even if switching characteristics of the heated oxygen sensor 1 are shifted, the air-fuel ratio is controlled to stoichiometric, by the signal from the heated oxygen sensor 2.
This sensor is made of ceramic zirconia. The zirconia generates voltage from approximately 1V in richer conditions to 0V in leaner conditions.
Under normal conditions the heated oxygen sensor 2 is not used for engine control operation.



CONSULT-II Reference Value in Data Monitor Mode

BBS001TX

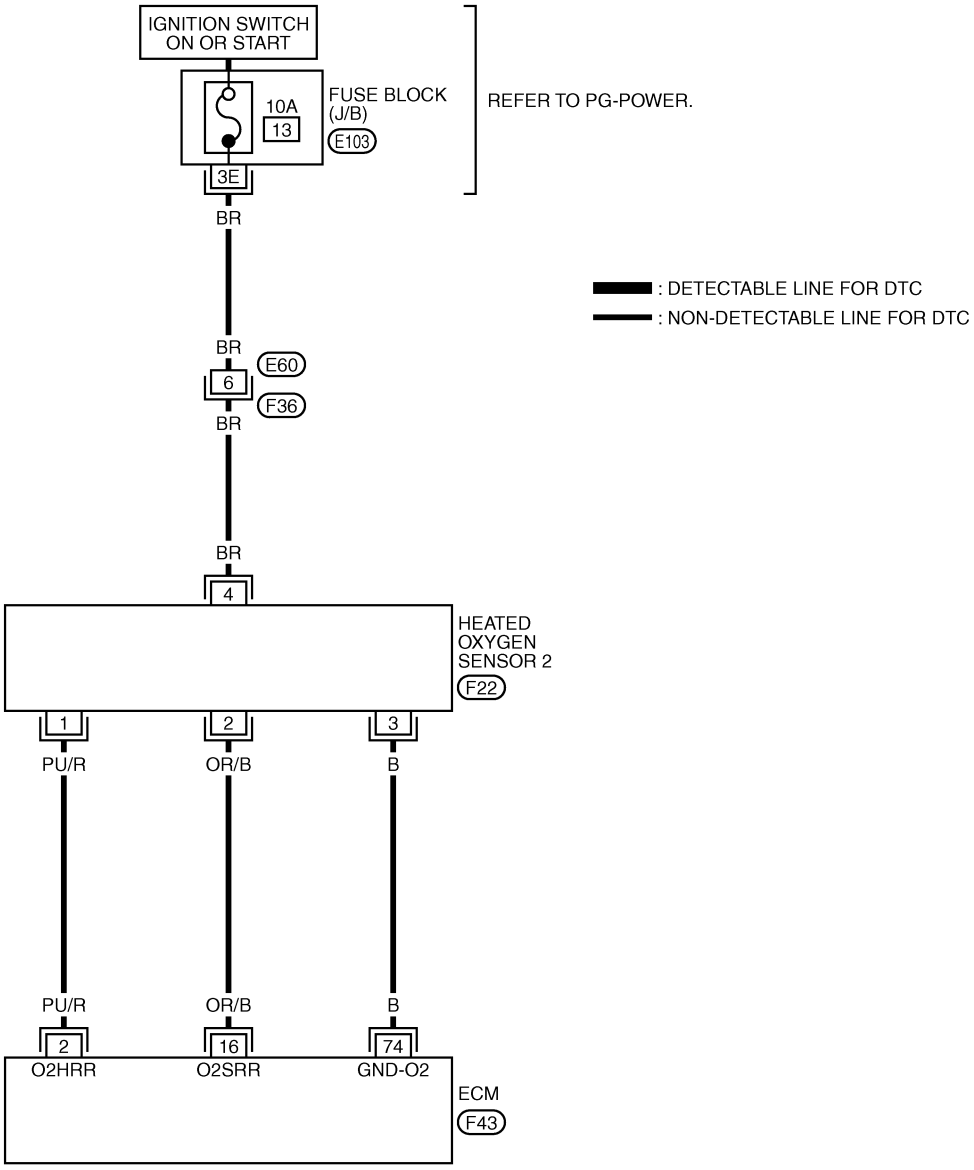
Specification data are reference values.

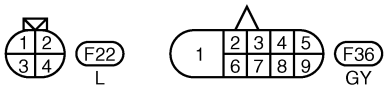
MONITOR ITEM	CONDITION	SPECIFICATION
HO2S2 (B1)	Revving engine from idle to 3,000 rpm quickly after the following conditions are met. ● Engine: After warming up ● Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - 0.3V ←→ Approx. 0.6 - 1.0V
HO2S2 MNTR (B1)		LEAN ←→ RICH

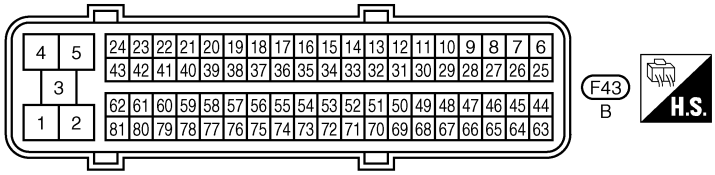
Wiring Diagram

BBS001TY

EC-RRO2-01







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0647E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
16	OR/B	Heated oxygen sensor 2	**[Engine is running]** ● Revving engine from idle to 3,000 rpm quickly after the following conditions are met – Engine: After warming up – Keeping the engine speed between 3,500 and 4,000 rpm for 1 minute and at idle for 1 minute under no load	0 - Approximately 1.0V
74	B	Sensor ground (Heated oxygen sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V

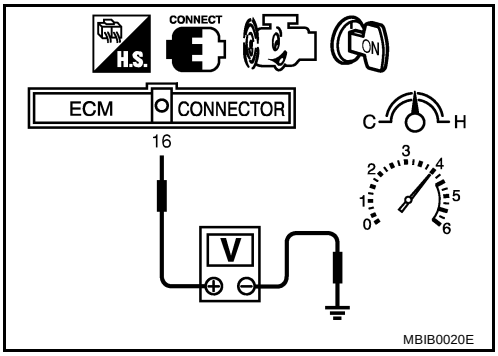
Diagnostic Procedure

BBS001TZ

1. CHECK OVERALL FUNCTION-I

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and ground.
6. Check the voltage while revving up to 4,000 rpm under no load at least 10 times. (Depress and release the accelerator pedal as quickly as possible.)

The voltage does not remain in the range of 0.2 - 0.4V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK OVERALL FUNCTION-II

Keep engine at idle for 10 minutes, then check the voltage between ECM terminal 16 (HO2S2 signal) and ground, or check voltage when coasting 80 km/h (50 MPH) in 3rd gear (M/T) or D position (A/T) with “OD” OFF.

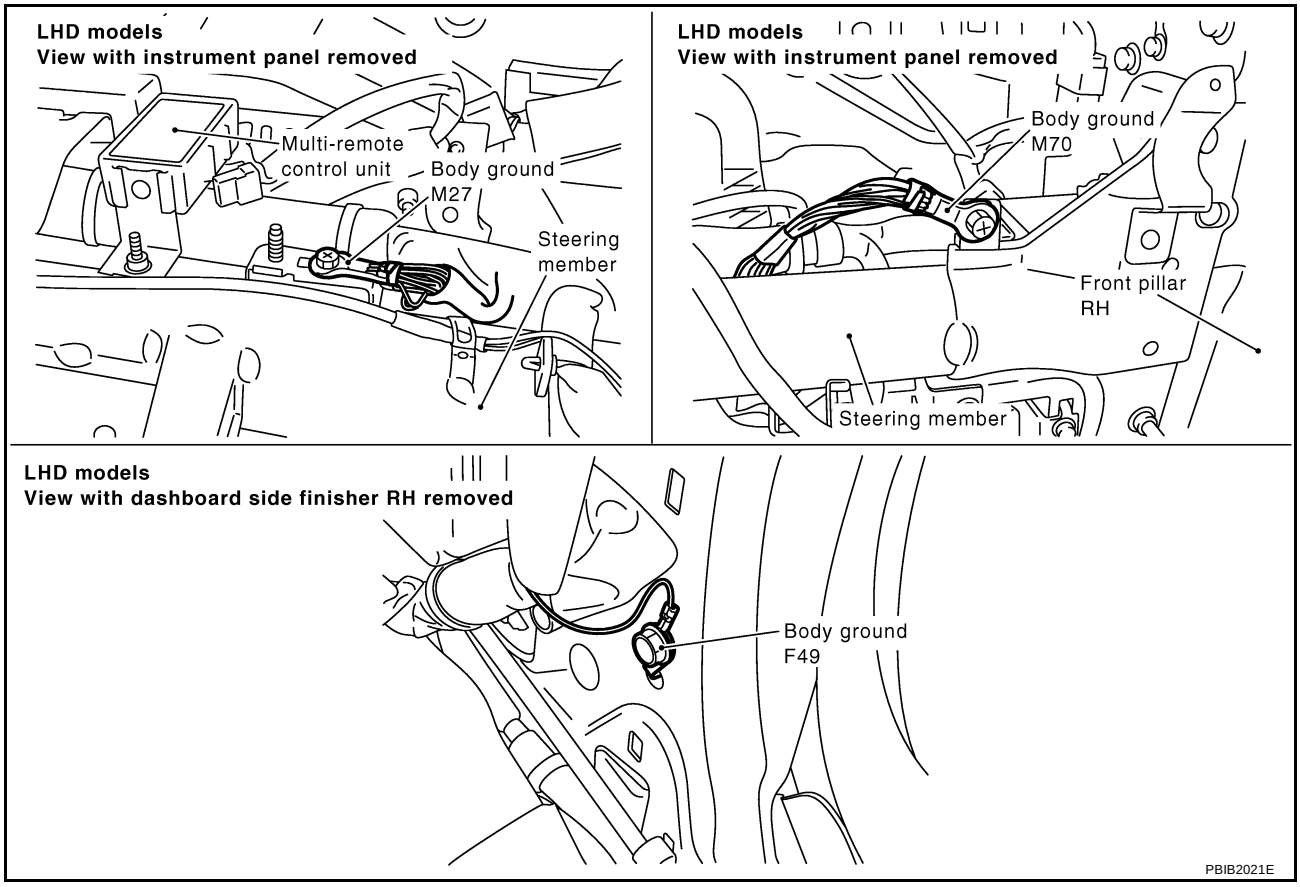
The voltage does not remain in the range of 0.2 - 0.4V

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.

3. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .



OK or NG

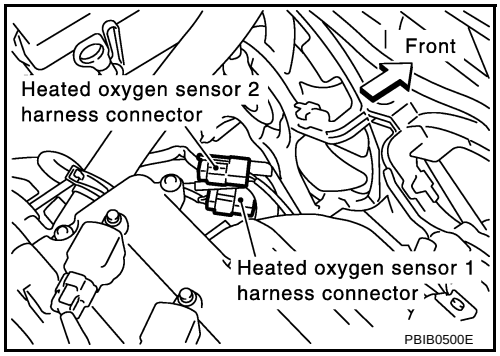
OK >> GO TO 4.
NG >> Repair or replace ground connections.

4. CHECK HO2S2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect heated oxygen sensor 2 harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ECM terminal 74 and HO2S2 terminal 3.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK HO2S2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 16 and HO2S2 terminal 2. Refer to Wiring Diagram.

   Continuity should exist.

2. Check harness continuity between ECM terminal 16 or HO2S2 terminal 2 and ground. Refer to Wiring Diagram.

   Continuity should not exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK HEATED OXYGEN SENSOR 2

Refer to EC-873, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace heated oxygen sensor 2.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001U0

HEATED OXYGEN SENSOR 2

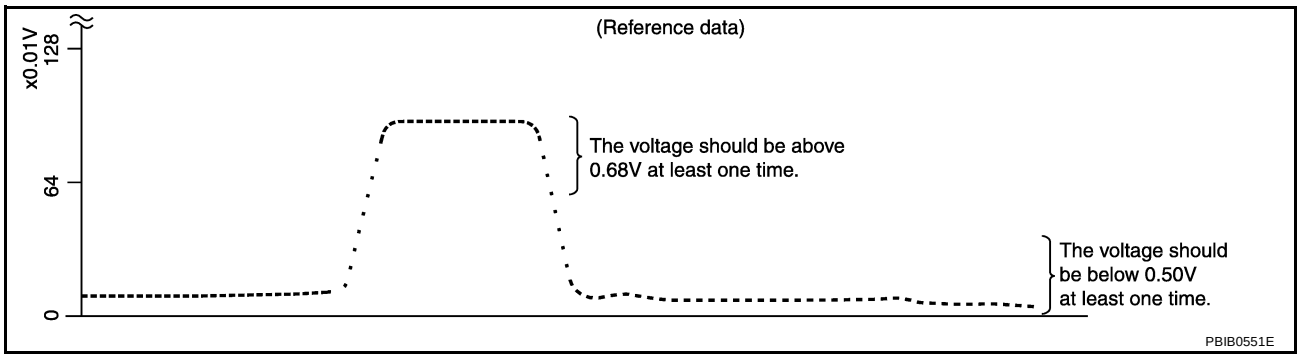
With CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Select “FUEL INJECTION” in “ACTIVE TEST” mode, and select “HO2S2 (B1)” as the monitor item with CONSULT-II.

ACTIVE TEST	
FUEL INJECTION	25 %
MONITOR	
ENG SPEED	XXX rpm
HO2S1 (B1)	XXX V
HO2S2 (B1)	XXX V
HO2S1 MNTR (B1)	RICH
HO2S2 MNTR (B1)	RICH

SEF662Y

6. Check “HO2S2 (B1)” at idle speed when adjusting “FUEL INJECTION” to ±25%.



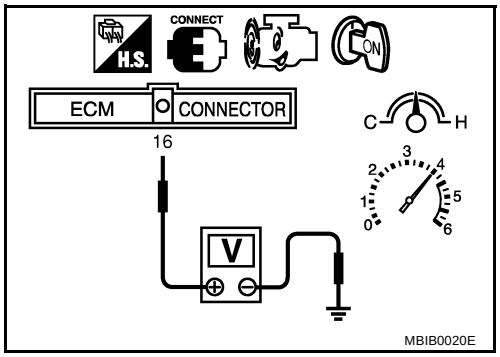
“HO2S2 (B1)” should be above 0.68V at least once when the “FUEL INJECTION” is +25%.
“HO2S2 (B1)” should be below 0.50V at least once when the “FUEL INJECTION” is −25%.

CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Without CONSULT-II

1. Start engine and warm it up to the normal operating temperature.
2. Turn ignition switch OFF and wait at least 10 seconds.
3. Start engine and keep the engine speed at between 3,500 and 4,000 rpm for at least 1 minute under no load.
4. Let engine idle for 1 minute.
5. Set voltmeter probes between ECM terminal 16 (HO2S2 signal) and ground.
6. Check the voltage when revving up to 4,000 rpm under no load at least 10 times.
   (Depress and release accelerator pedal as soon as possible.)
   The voltage should be above 0.68V at least once during this procedure.
   If the voltage is above 0.68V at step 6, step 7 is not necessary.
7. Keep vehicle idling for 10 minutes, then check voltage. Or check the voltage when coasting from 80 km/h (50 MPH) in D position with “OD” OFF (A/T). 3rd gear position (M/T).
   The voltage should be below 0.50V at least once during this procedure.
8. If NG, replace heated oxygen sensor 2.



CAUTION:

- **Discard any heated oxygen sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new oxygen sensor, clean exhaust system threads using Oxygen Sensor Thread Cleaner tool and approved anti-seize lubricant.**

Removal and Installation

BBS001U1

HEATED OXYGEN SENSOR 2

Refer to EX-2, "EXHAUST SYSTEM" .

IGNITION SIGNAL

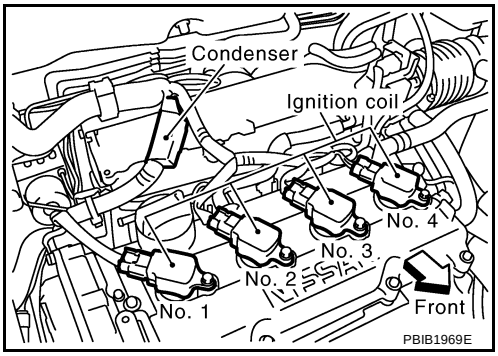
PFP:22448

Component Description

BBS001U2

IGNITION COIL & POWER TRANSISTOR

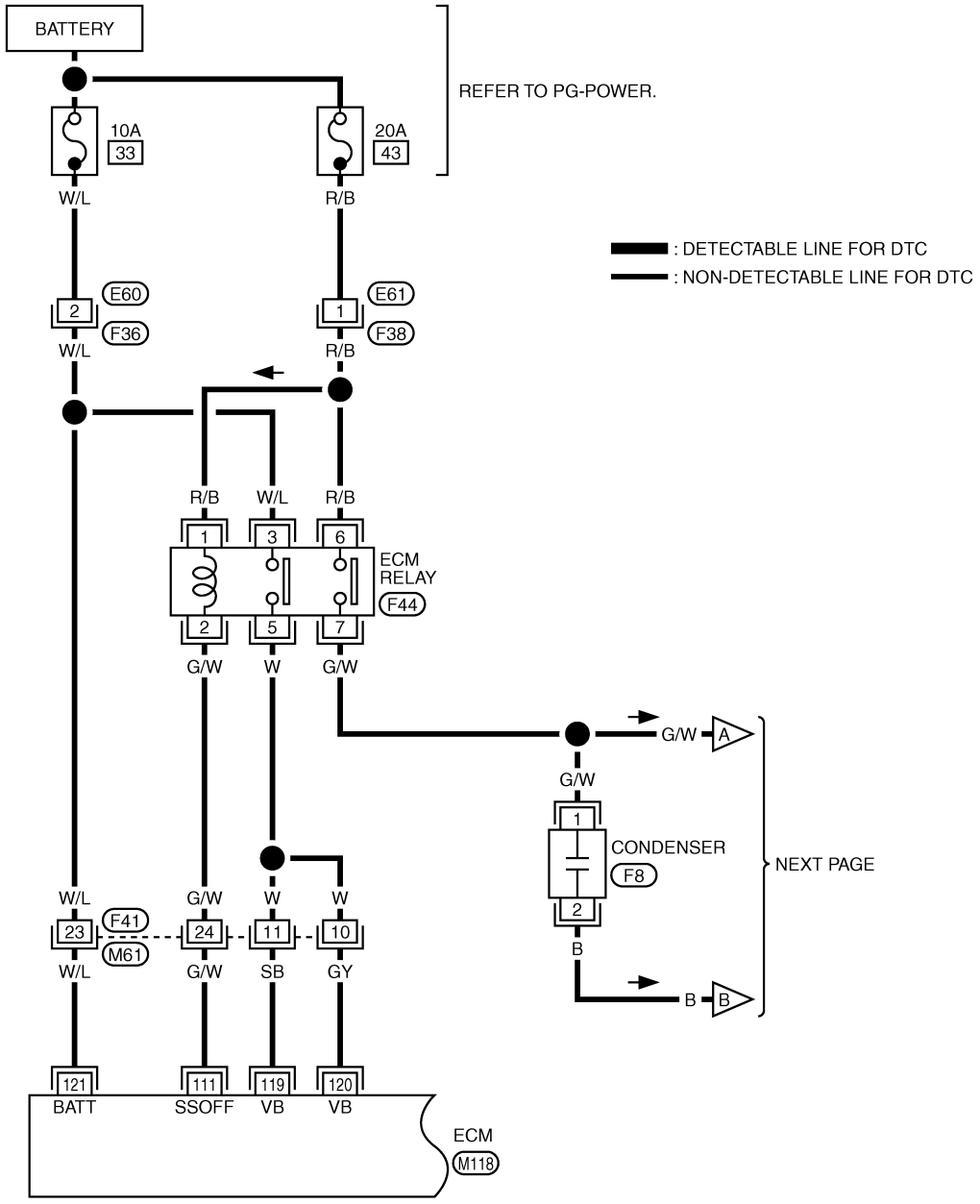
The ignition signal from the ECM is sent to and amplified by the power transistor. The power transistor turns ON and OFF the ignition coil primary circuit. This ON/OFF operation induces the proper high voltage in the coil secondary circuit.

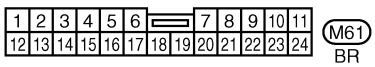


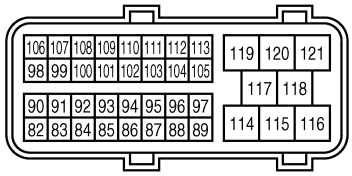
Wiring Diagram

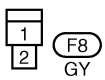
BBS001U3

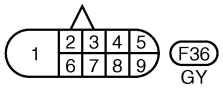
EC-IGNSYS-01

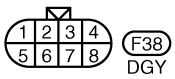


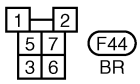












TBWA0628E

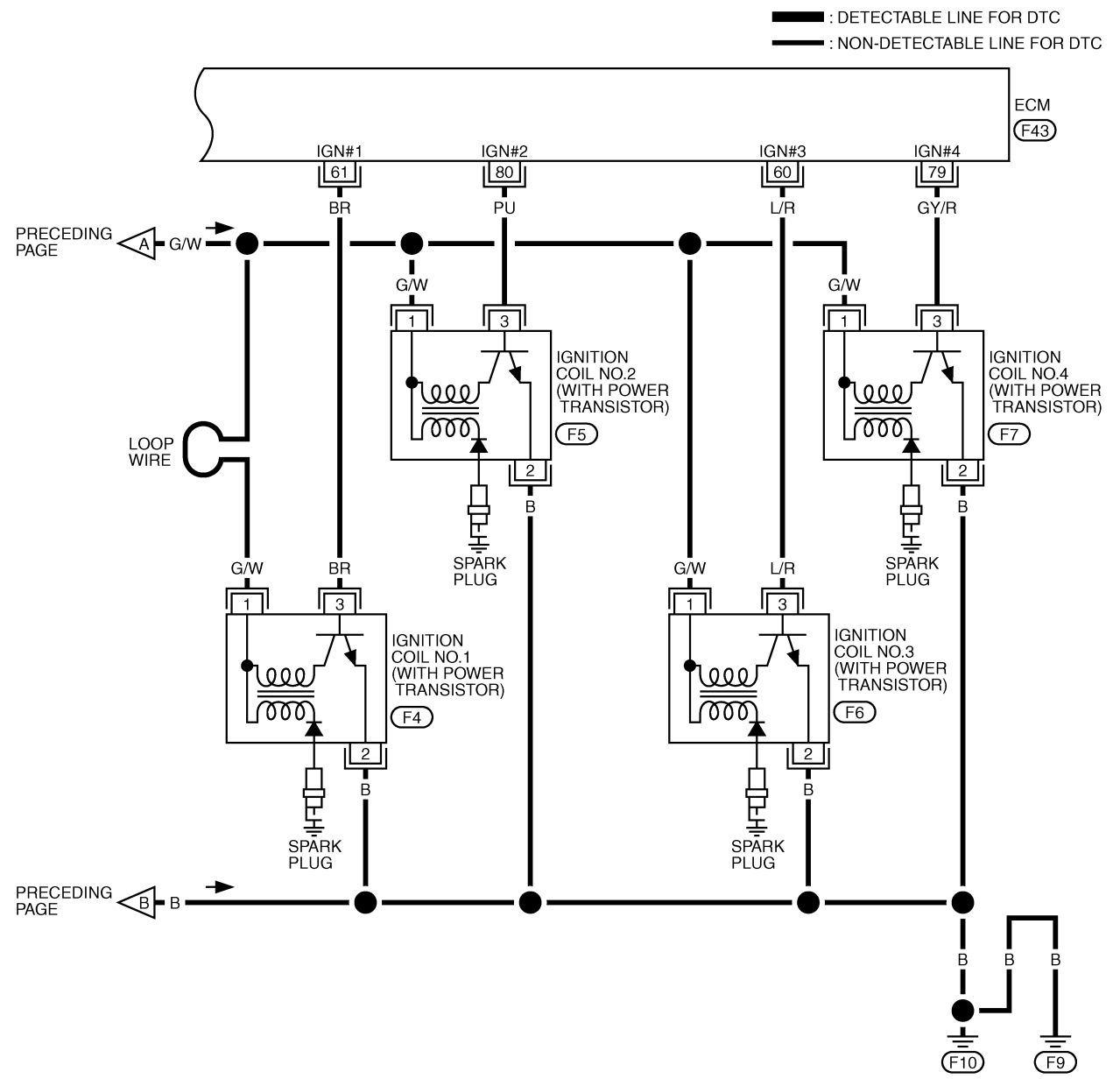
Specification data are reference values and are measured between each terminal and ground.

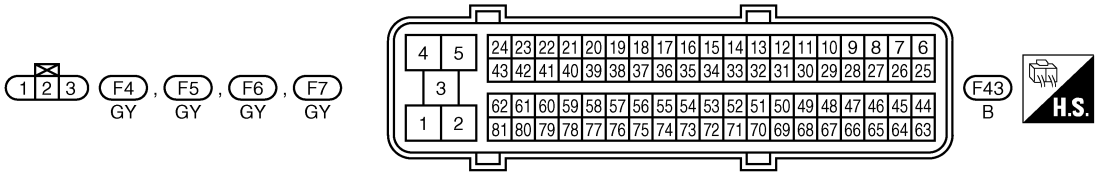
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	G/W	ECM relay (Self shut-off)	**[Engine is running]** **[Ignition switch: OFF]** ● For a few seconds after turning ignition switch OFF	0 - 1.0V
			[Ignition switch: OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	SB GY	Power supply for ECM	**[Ignition switch: ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch: OFF]**	BATTERY VOLTAGE (11 - 14V)

EC-IGNSYS-02

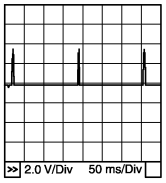
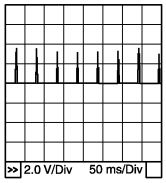




TBWA0629E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
60 61 79 80	L/R B/R GY/R PU	Ignition signal No. 3 Ignition signal No. 1 Ignition signal No. 4 Ignition signal No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	0 - 0.1V★  PBIB0521E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 0.2V★  PBIB0522E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001U4

1. CHECK ENGINE START

Turn ignition switch OFF, and restart engine.
Is engine running?

Yes or No

Yes (With CONSULT-II)>>GO TO 2.
Yes (Without CONSULT-II)>>GO TO 3.
No >> GO TO 4.

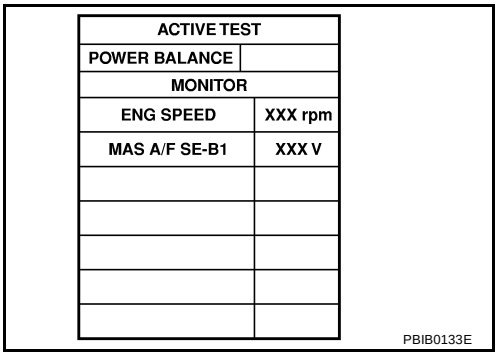
2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
2. Make sure that each circuit produces a momentary engine speed drop.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.



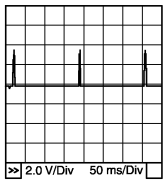
PBIB0133E

3. CHECK OVERALL FUNCTION

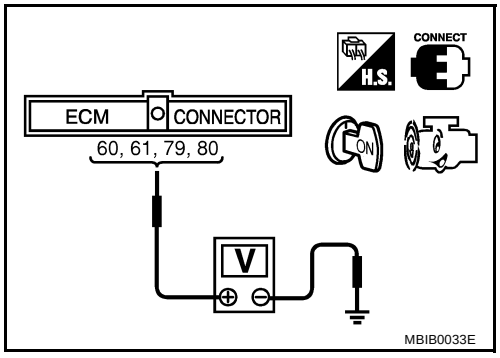
Without CONSULT-II

1. Let engine idle.
2. Read the voltage signal between ECM terminals 60, 61, 79, 80 and ground with an oscilloscope.
3. Verify that the oscilloscope screen shows the signal wave as shown below.

NOTE:
The pulse cycle changes depending on rpm at idle.



PBIB0521E



MBIB0033E

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 12.

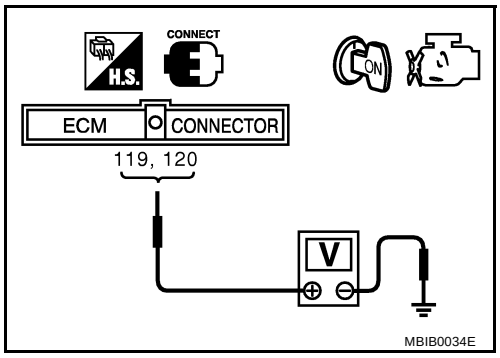
4. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

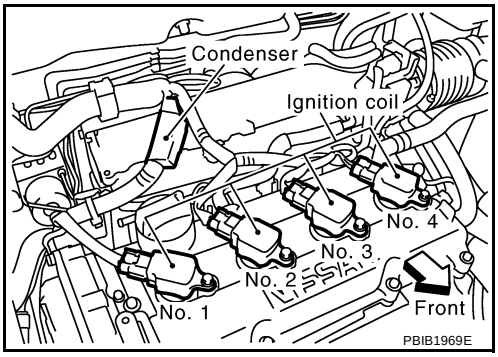
OK >> GO TO 5.
NG >> Go to EC-627, "POWER SUPPLY AND GROUND CIRCUIT" .



MBIB0034E

5. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Turn ignition switch ON.

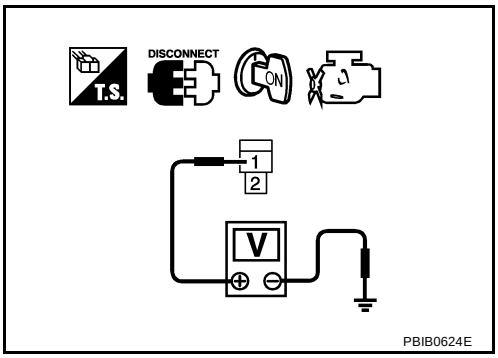


4. Check voltage between condenser terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 6.



6. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-III

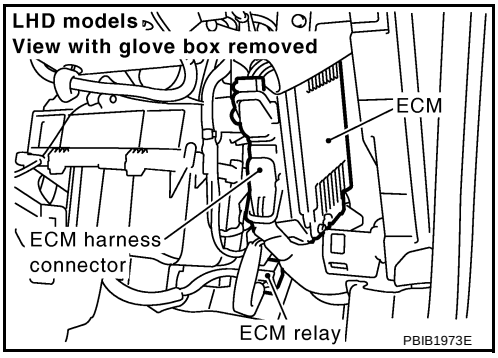
1. Turn ignition switch OFF.
2. Disconnect ECM relay.
3. Check harness continuity between ECM relay terminal 7 and condenser terminal 1.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



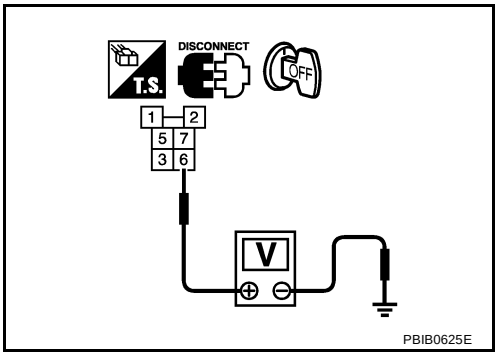
7. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-IV

Check voltage between ECM relay terminal 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- 20A fuse
- Harness for open or short between ECM relay and battery

>> Repair or replace harness or connectors.

9. CHECK ECM RELAY

Refer to EC-884, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ECM relay.

10. CHECK CONDENSER GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between condenser terminal 2 and ground.
   Refer to Wiring diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to power in harness or connector.

11. CHECK CONDENSER

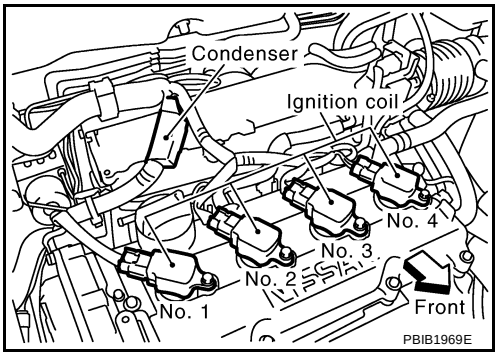
Refer to EC-884, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace condenser.

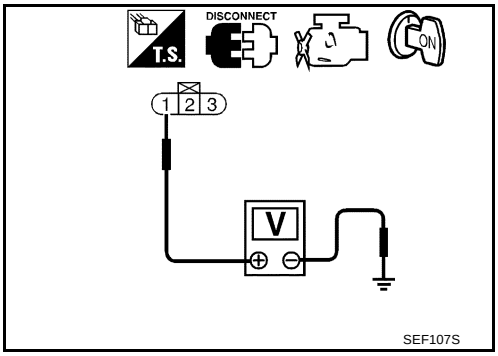
12. CHECK IGNITION COIL POWER SUPPLY CIRCUIT-V

1. Turn ignition switch OFF.
2. Reconnect all harness connectors disconnected.
3. Disconnect ignition coil harness connector.
4. Turn ignition switch ON.



5. Check voltage between ignition coil terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 14.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check harness for open or short between ignition coil and ECM relay.

>> Repair open circuit or short to ground or short to power in harness or conectors.

14. CHECK IGNITION COIL GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ignition coil terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

OK or NG

OK >> GO TO 15.
NG >> Repair open circuit or short to power in harness or connectors.

15. CHECK IGNITION COIL OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 60, 61, 79, 80 and ignition coil terminal 3. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK IGNITION COIL WITH POWER TRANSISTOR

Refer to EC-884, "Component Inspection" .

OK or NG

OK >> GO TO 17.
NG >> Replace ignition coil with power transistor.

17. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

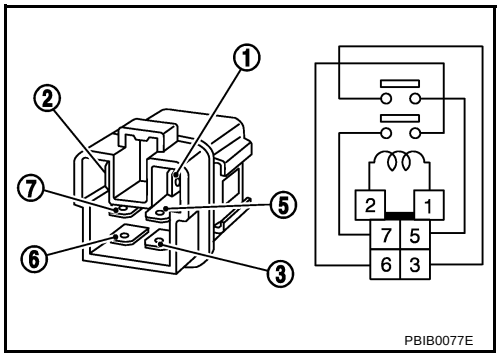
BBS001U5

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals 3 and 5, 6 and 7.

Condition	Continuity
12V direct current supply between terminals 1 and 2	Yes
OFF	No

3. If NG, replace ECM relay.

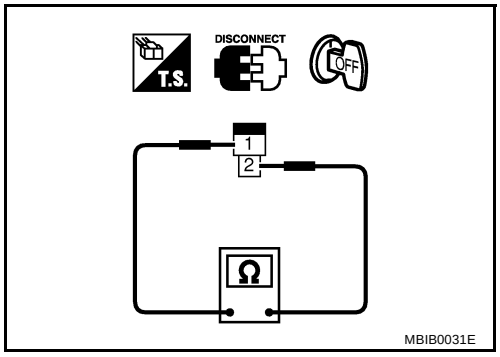


PBIB0077E

CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminals 1 and 2.

Resistance: Above 1 MΩ at 25°C (77°F)

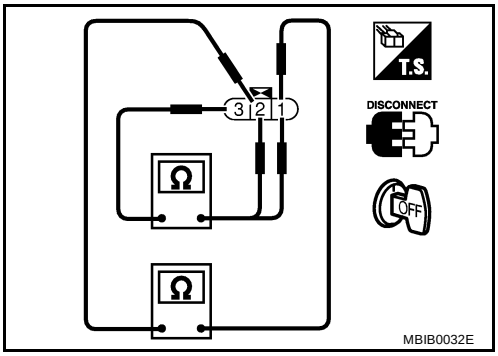


MBIB0031E

IGNITION COIL WITH POWER TRANSISTOR

1. Turn ignition switch OFF.
2. Disconnect ignition coil harness connector.
3. Check resistance between ignition coil terminals as follows.

Terminal No.	Resistance Ω [at 25°C (77°F)]
2 and 3	Except 0 or ∞
1 and 2	Except 0
1 and 3	



BBS001U6

Removal and Installation

IGNITION COIL WITH POWER TRANSISTOR

Refer to EM-31, "IGNITION COIL" .

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

PFP:14920

Description

BBS001U7

SYSTEM DESCRIPTION

Sensor	Input signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*1	EVAP canister purge flow control	EVAP canister purge volume control solenoid valve
Mass air flow sensor	Amount of intake air		
Engine coolant temperature sensor	Engine coolant temperature		
Battery	Battery voltage*1		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Closed throttle position		
Heated oxygen sensor 1	Density of oxygen in exhaust gas (Mixture ratio feedback signal)		
Wheel sensor	Vehicle speed*2		

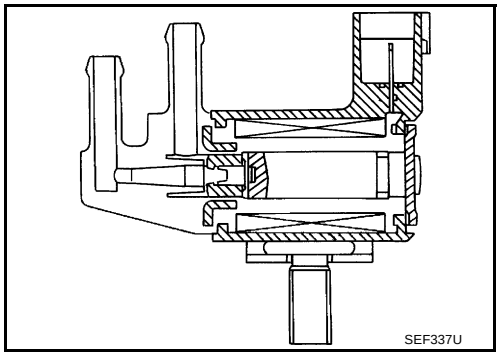
*1: ECM determines the start signal status by the signals of engine speed and battery voltage.

*2: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of fuel vapor from the EVAP canister. The opening of the vapor by-pass passage in the EVAP canister purge volume control solenoid valve changes to control the flow rate. The EVAP canister purge volume control solenoid valve repeats ON/OFF operation according to the signal sent from the ECM. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions. When the engine is operating, the flow rate of fuel vapor from the EVAP canister is regulated as the air flow changes.

COMPONENT DESCRIPTION

The EVAP canister purge volume control solenoid valve uses a ON/OFF duty to control the flow rate of fuel vapor from the EVAP canister. The EVAP canister purge volume control solenoid valve is moved by ON/OFF pulses from the ECM. The longer the ON pulse, the greater the amount of fuel vapor that will flow through the valve.



CONSULT-II Reference Value in Data Monitor Mode

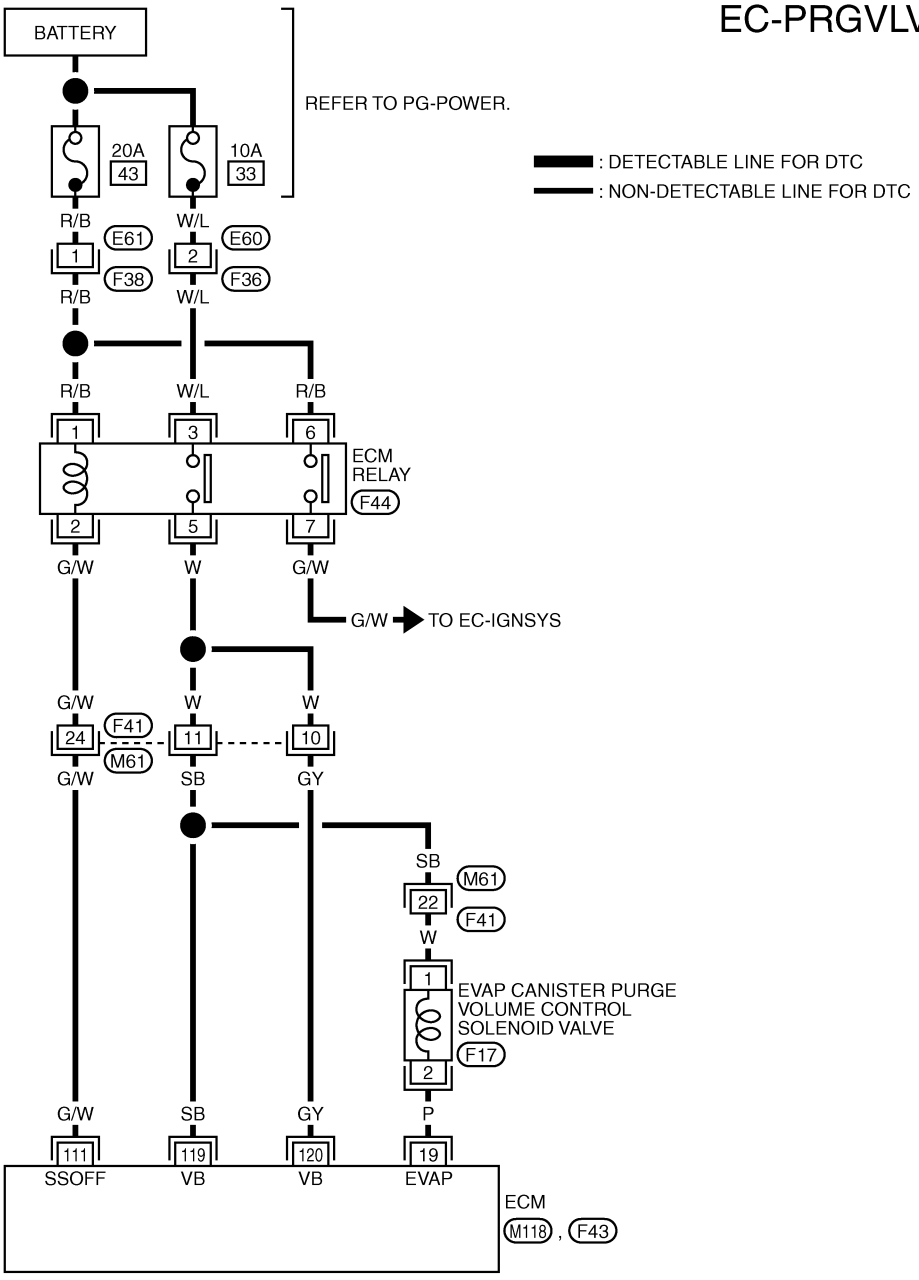
BBS001U8

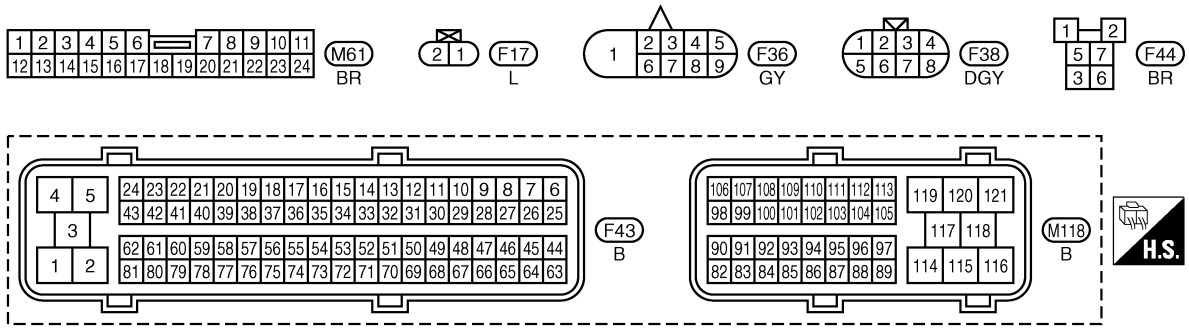
Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PURG VOL C/V	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	0%
		2,000 rpm	20 - 30%

Wiring Diagram

BBS001U9



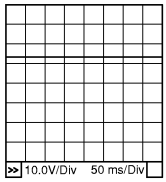
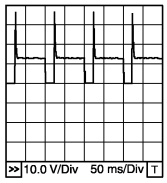


TBWA0648E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
19	P	EVAP canister purge volume control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)★  PBIB0050E
			[Engine is running] ● Engine speed is about 2,000 rpm (More than 100 seconds after starting engine)	Approximately 10V★  PBIB0520E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001UA

1. CHECK OVERALL FUNCTION

With CONSULT-II

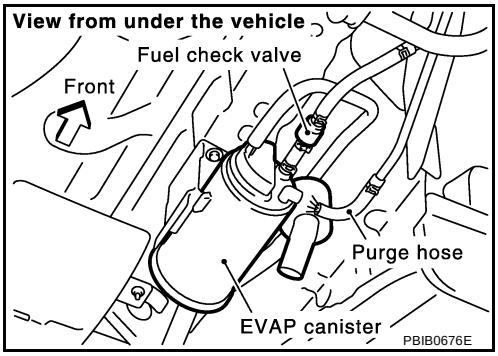
1. Turn ignition switch OFF.
2. Disconnect the EVAP purge hose connected to the EVAP canister.
3. Turn ignition switch ON, and select “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II.
4. Start engine and let it idle.

ACTIVE TEST	
PURG VOL CONT/V	XXX %
MONITOR	
ENG SPEED	XXX rpm
A/F ALPHA-B1	XXX %
HO2S1 MNTR (B1)	LEAN

PBIB0569E

5. Change the valve opening percentage with touching “Qu” or “Qd” on CONSULT-II screen, and check for vacuum existence at the EVAP purge hose under the following conditions.

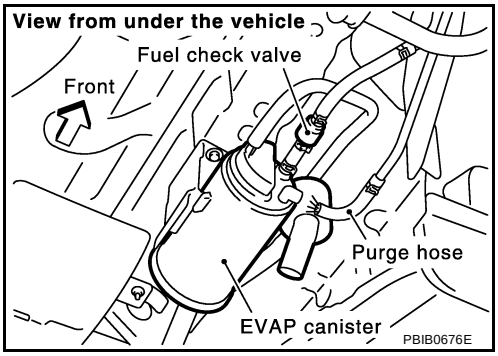
Conditions (PURG VOL CONT/V)	Vacuum
0%	Should not exist.
100%	Should exist.



Without CONSULT-II

1. Turn ignition switch OFF.
2. Disconnect the EVAP purge hose connected to the EVAP canister.
3. Start engine and let it idle for at least 80 seconds.
4. Check for vacuum existence at the EVAP purge hose under the following conditions.

Conditions	Vacuum
At idle	Should not exist.
Engine speed is about 2,000 rpm.	Should exist.



OK or NG

OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK EVAP CANISTER

Refer to EC-967, "Component Inspection" .

OK or NG

OK >> **INSPECTION END**
NG >> Replace EVAP canister.

3. CHECK EVAP PURGE LINE

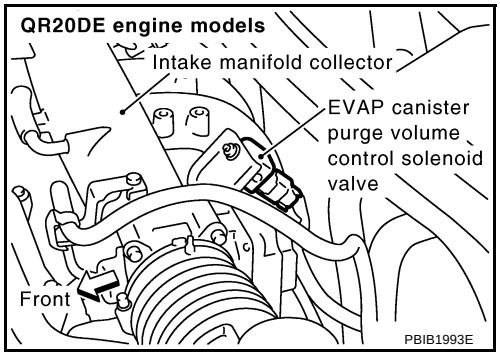
Check EVAP purge line (pipe, rubber tube, fuel tank and EVAP canister) for cracks or improper connection. Refer to EC-965, "EVAPORATIVE EMISSION LINE DRAWING" .

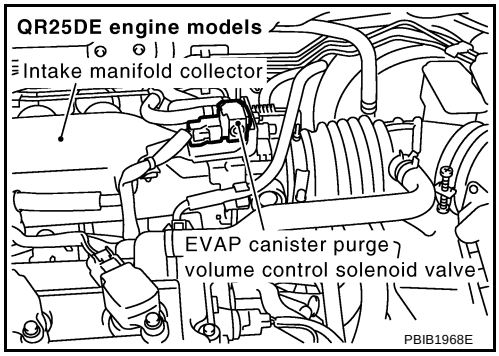
OK or NG

OK >> GO TO 4.
NG >> Repair or reconnect the hose.

4. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

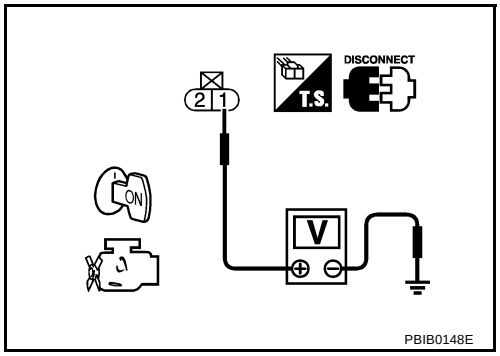
1. Turn ignition switch OFF.
2. Disconnect EVAP canister purge volume control solenoid valve harness connector.
3. Turn ignition switch ON.





4. Check voltage between EVAP canister purge volume control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F41, M61
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM relay
- Harness for open or short between EVAP canister purge volume control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between EVAP canister purge volume control solenoid valve terminal 2 and ECM terminal 19. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

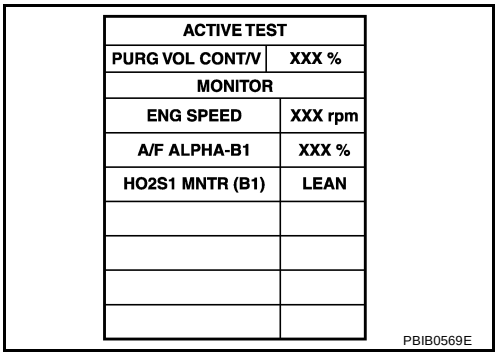
OK or NG

OK (With CONSULT-II)>>GO TO 7.
OK (Without CONSULT-II)>>GO TO 8.
NG >> Repair open circuit or short to ground and short to power in harness or connectors.

7. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE OPERATION

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine.
3. Perform “PURG VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that engine speed varies according to the valve opening.



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. CHECK EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-892, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace EVAP canister purge volume control solenoid valve.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

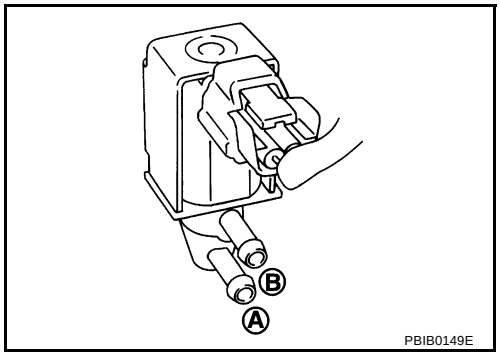
BBS001UB

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

With CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

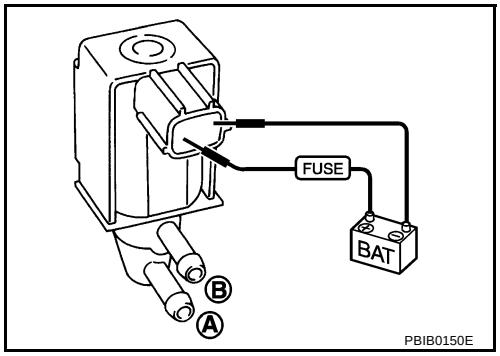
Condition (PURG VOL CONT/V)	Air passage continuity between A and B
100%	Yes
0%	No



Without CONSULT-II

Check air passage continuity of EVAP canister purge volume control solenoid valve under the following conditions.

Condition	Air passage continuity between A and B
12V direct current supply between terminals 1 and 2	Yes
No supply	No



Removal and Installation

BBS001UC

EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EM-18, "INTAKE MANIFOLD" .

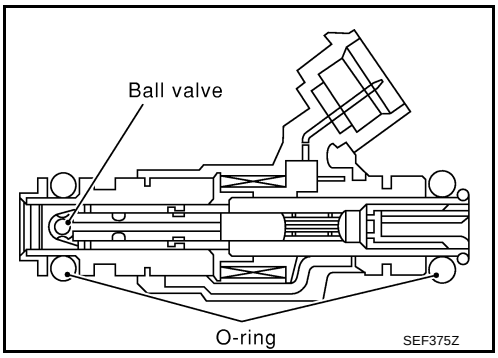
INJECTOR CIRCUIT

PFP:16600

Component Description

BBS001UD

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the injector circuit, the coil in the injector is energized. The energized coil pulls the ball valve back and allows fuel to flow through the injector into the intake manifold. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

BBS001UE

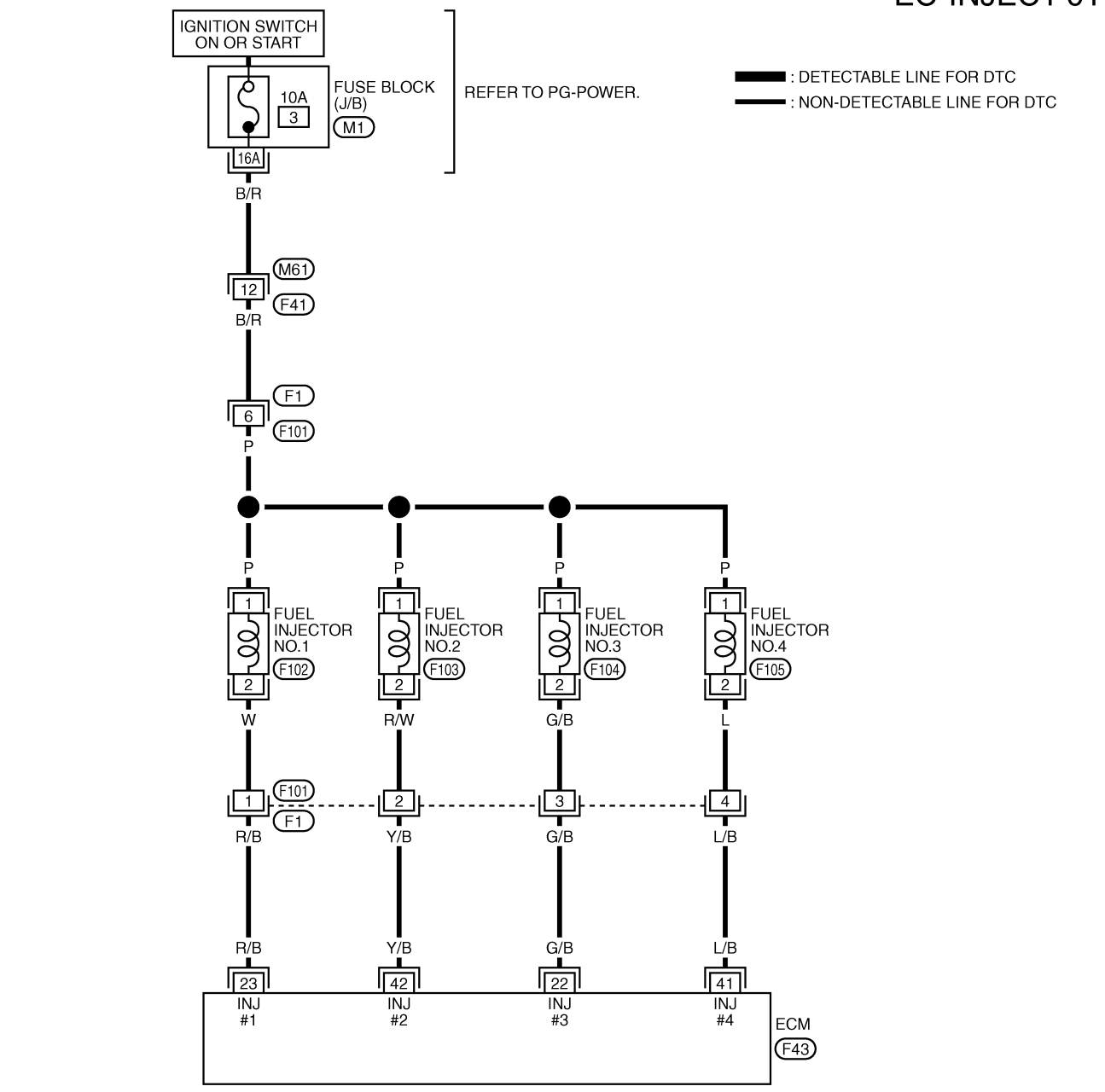
Specification data are reference values.

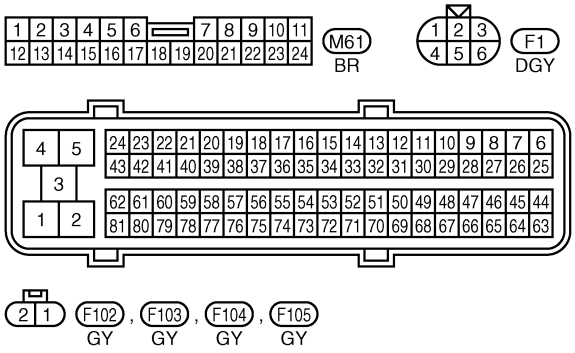
MONITOR ITEM	CONDITION		SPECIFICATION
B/FUEL SCHDL	See EC-622, "TROUBLE DIAGNOSIS - SPECIFICATION VALUE" .		
INJ PULSE-B1	● Engine: After warming up ● Shift lever: P or N (A/T), Neutral (M/T) ● Air conditioner switch: OFF ● No load	Idle	2.0 - 3.0 msec
		2,000 rpm	1.9 - 2.9 msec

Wiring Diagram

BBS001UF

EC-INJECT-01



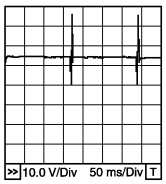
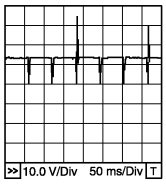


REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0697E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
22 23 41 42	G/B R/B L/B Y/B	Injector No. 3 Injector No. 1 Injector No. 4 Injector No. 2	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle	BATTERY VOLTAGE (11 - 14V)★  PBIB0529E
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	BATTERY VOLTAGE (11 - 14V)★  PBIB0530E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001UG

1. INSPECTION START

Turn ignition switch to START.
Is any cylinder ignited?

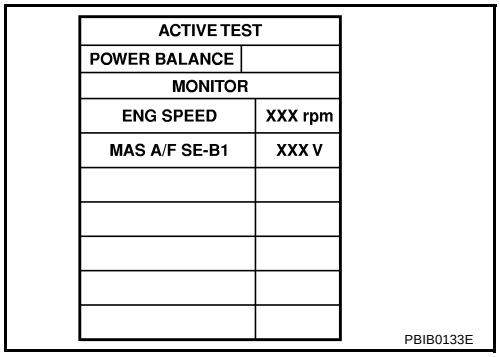
Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Perform “POWER BALANCE” in “ACTIVE TEST” mode with CONSULT-II.
3. Make sure that each circuit produces a momentary engine speed drop.



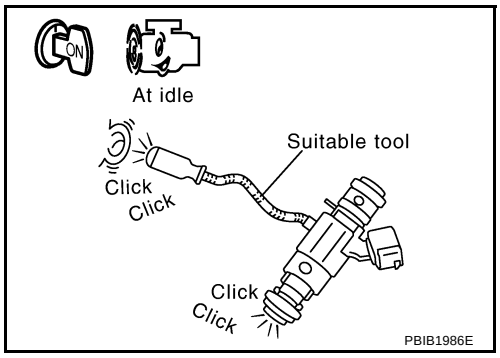
Without CONSULT-II

1. Start engine.
2. Listen to each injector operating sound.

Clicking noise should be heard.

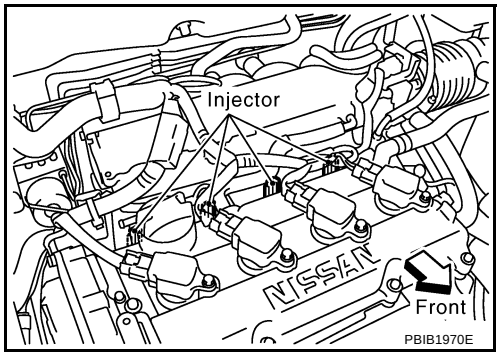
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 3.



3. CHECK INJECTOR POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect injector harness connector.
3. Turn ignition switch ON.

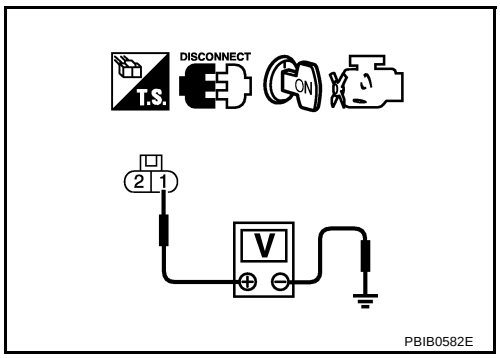


4. Check voltage between injector terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M61, F41
- Harness connectors F1, F101
- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between injector and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INJECTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between injector terminal 2 and ECM terminals 22, 23, 41, 42.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFONCTIONING PART

Check the following.

- Harness connectors F101, F1
- Harness for open or short between injector and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK INJECTOR

Refer to EC-898, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace injector.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

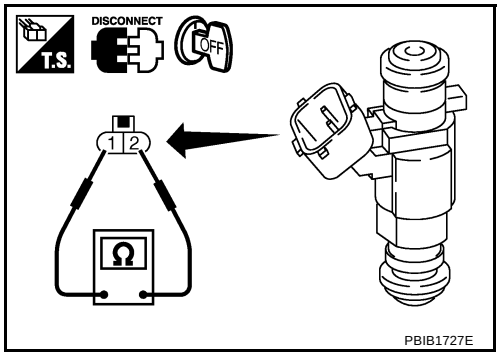
Component Inspection

BBS001UH

INJECTOR

1. Disconnect injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 13.5 - 17.5Ω [at 10 - 60°C (50 - 140°F)]



Removal and Installation

BBS001UI

INJECTOR

Refer to EM-34, "FUEL INJECTOR AND FUEL TUBE" .

VIAS

PFP:14956

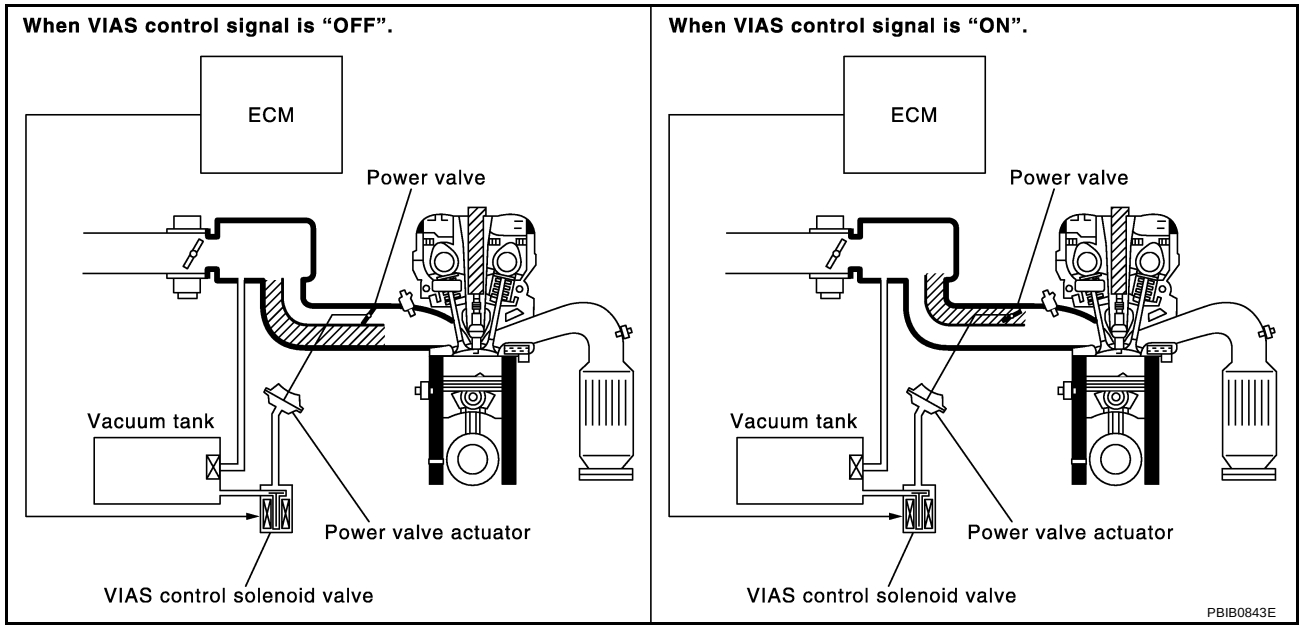
Description

BBS001UJ

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	VIAS control	VIAS control solenoid valve
Mass air flow sensor	Amount of intake air		
Throttle position sensor	Throttle position		
Accelerator pedal position sensor	Accelerator pedal position		
Battery	Battery voltage*		
Engine coolant temperature sensor	Engine coolant temperature		

*: The ECM determines the start signal status by the signals of engine speed and battery voltage.



When the engine is running at low or medium speed, the power valve is fully closed. Under this condition, the effective suction port length is equivalent to the total length of the intake manifold collector's suction port including the intake valve. This long suction port provides increased air intake which results in improved suction efficiency and higher torque generation.

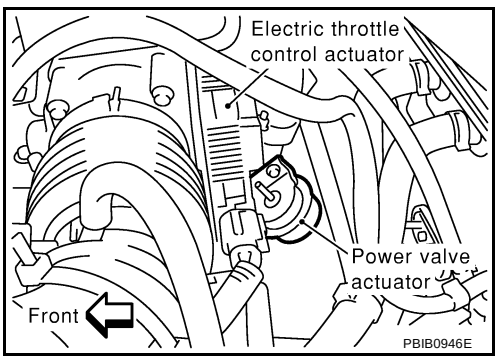
The surge tank and one-way valve are provided. When engine is running at high speed, the ECM sends the signal to the VIAS control solenoid valve. This signal introduces the intake manifold vacuum into the power valve actuator and therefore opens the power valve to two suction passages together in the collector.

Under this condition, the effective port length is equivalent to the length of the suction port provided independently for each cylinder. This shortened port length results in enhanced engine output with reduced suction resistance under high speeds.

COMPONENT DESCRIPTION

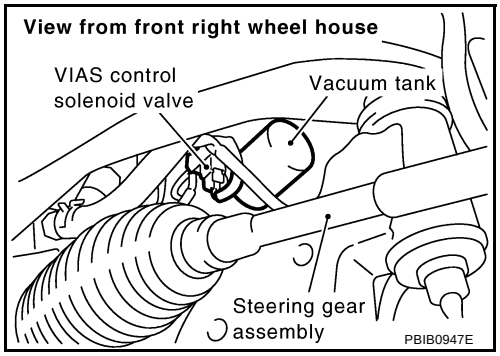
Power Valve

The power valve is installed in intake manifold collector and used to control the suction passage of the variable induction air control system. It is set in the fully closed or fully opened position by the power valve actuator operated by the vacuum stored in the surge tank. The vacuum in the surge tank is controlled by the VIAS control solenoid valve.



VIAS Control Solenoid Valve

The VIAS control solenoid valve cuts the intake manifold vacuum signal for power valve control. It responds to ON/OFF signals from the ECM. When the solenoid is off, the vacuum signal from the intake manifold is cut. When the ECM sends an ON signal the coil pulls the plunger downward and feeds the vacuum signal to the power valve actuator.



CONSULT-II Reference Value in Data Monitor Mode

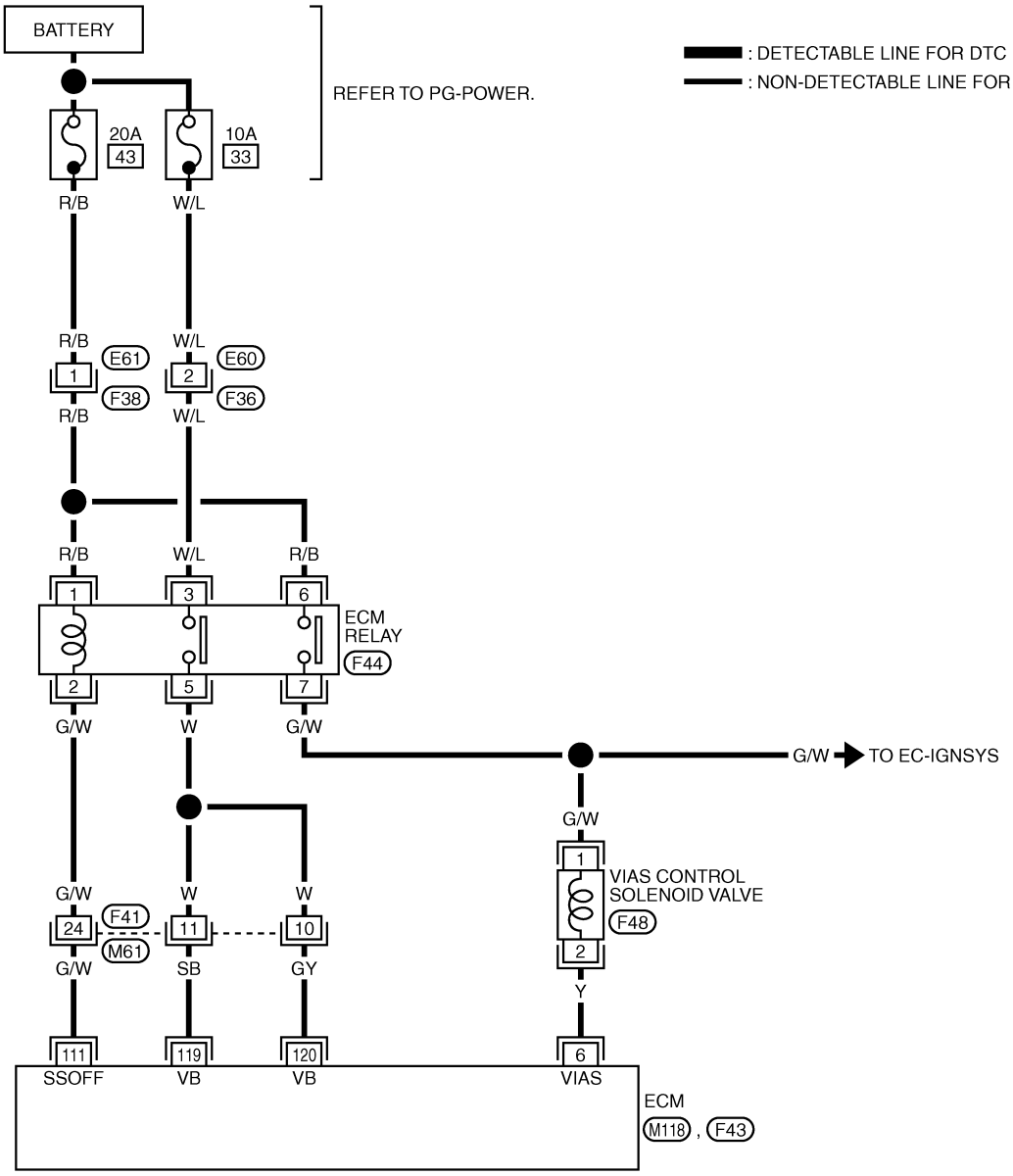
BBS001UK

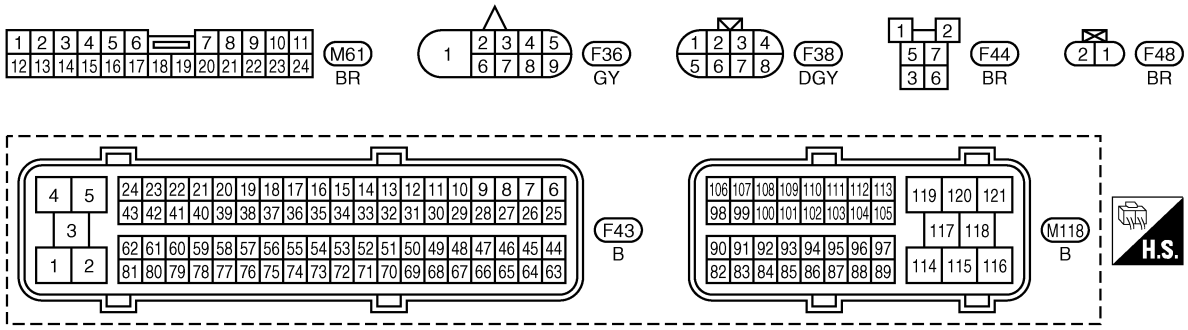
MONITOR ITEM	CONDITION		SPECIFICATION
VIAS S/V	● Engine: After warming up	Idle	OFF
		More than 5,000 rpm	ON

Wiring Diagram

BBS001UL

EC-VIAS-01





TBWA0651E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
6	Y	VIAS control solenoid valve	**[Engine is running]** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Engine speed is above 5,000 rpm	0 - 1.0V

Diagnostic Procedure

BBS001UM

1. CHECK OVERALL FUNCTION

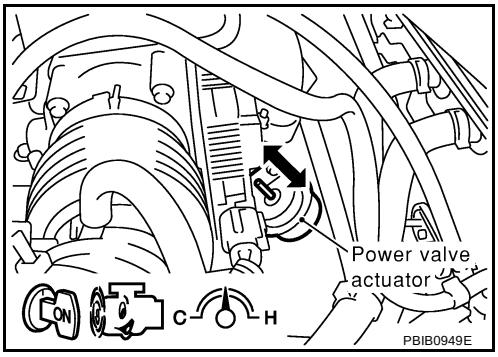
With CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.

ACTIVE TEST	
VIAS SOL VALVE	OFF
MONITOR	
ENG SPEED	XXX rpm

PBIB0844E

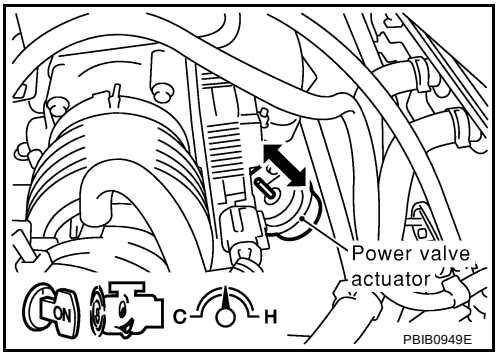
3. Turn VIAS control solenoid valve ON and OFF, and make sure that power valve actuator rod moves.



PBIB0949E

Without CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Rev engine quickly up to above 5,000 rpm and make sure that power valve actuator rod moves.



PBIB0949E

OK or NG

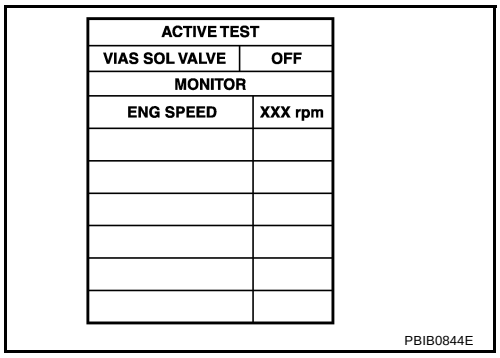
OK >> **INSPECTION END**
NG (With CONSULT-II) >>GO TO 2.
NG (Without CONSULT-II) >>GO TO 3.

2. CHECK VACUUM EXISTENCE

With CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Start engine and let it idle.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode with CONSULT-II.
4. Turn VIAS control solenoid valve ON and OFF, and check vacuum existence under the following conditions.

VIAS SOL VALVE	Vacuum
ON	Should exist
OFF	Should not exist



OK or NG

OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

3. CHECK VACUUM EXISTENCE

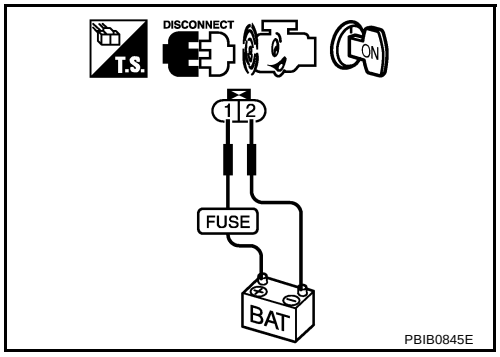
Without CONSULT-II

1. Stop engine and disconnect vacuum hose connected to power valve actuator.
2. Disconnect VIAS control solenoid valve harness connector.
3. Start engine and let it idle.
4. Apply 12V of direct current between VIAS control solenoid valve terminals 1 and 2.
5. Check vacuum existence under the following conditions.

Condition	Vacuum
12V direct current supply	Should exist
No supply	Should not exist

OK or NG

OK >> Repair or replace power valve actuator.
NG >> GO TO 4.

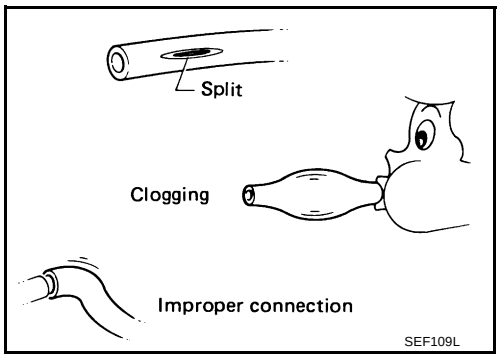


4. CHECK VACUUM HOSE

1. Stop engine.
2. Check hoses and tubes between intake manifold and power valve actuator for crack, clogging, improper connection or disconnection. Refer to EC-548, "Vacuum Hose Drawing" .

OK or NG

OK >> GO TO 5.
NG >> Repair hoses or tubes.



5. CHECK VACUUM TANK

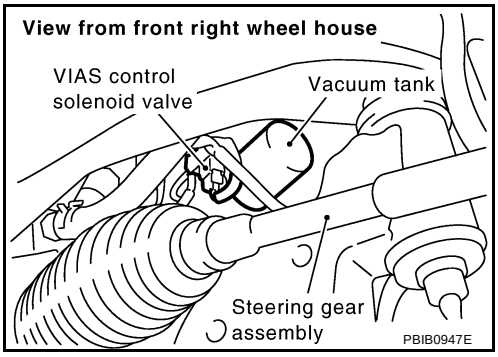
Refer to EC-906, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace vacuum tank.

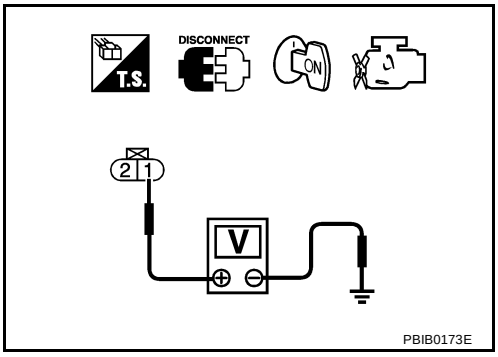
6. CHECK VIAS CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect VIAS control solenoid valve harness connector.
2. Turn ignition switch ON.



3. Check voltage between VIAS control solenoid valve terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECT MALFUNCTIONING PART

Check harness for open or short between VIAS control solenoid valve and ECM relay.

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK VIAS CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between VIAS control solenoid valve terminal 2 and ECM terminal 6. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK VIAS CONTROL SOLENOID VALVE

Refer to EC-906, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace VIAS control solenoid valve.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001UN

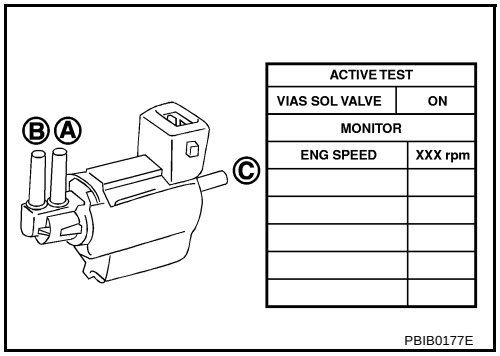
VIAS CONTROL SOLENOID VALVE

With CONSULT-II

1. Reconnect harness connectors disconnected.
2. Turn ignition switch ON.
3. Perform “VIAS SOL VALVE” in “ACTIVE TEST” mode.
4. Check air passage continuity and operation delay time under the following conditions.

Condition VIAS SOL VALVE	Air passage continuity between A and B	Air passage continuity between A and C
ON	Yes	No
OFF	No	Yes

Operation takes less than 1 second.

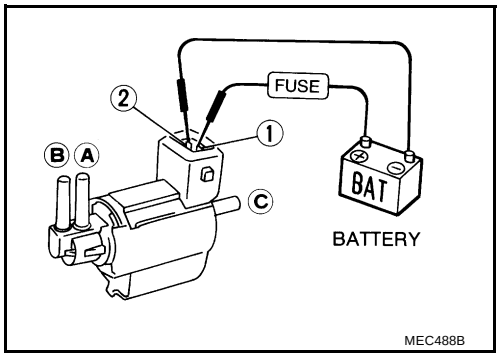


Without CONSULT-II

Check air passage continuity and operation delay time under the following conditions.

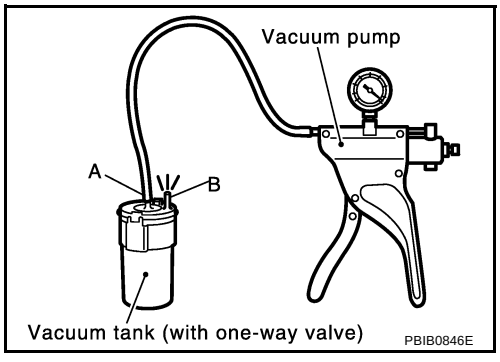
Condition	Air passage continuity between A and B	Air passage continuity between A and C
12V direct current supply between terminals 1 and 2	Yes	No
No supply	No	Yes

Operation takes less than 1 second.



VACUUM TANK

1. Disconnect vacuum hose connected to vacuum tank.
2. Connect a vacuum pump to the port **A** of vacuum pump.
3. Apply vacuum and make sure that vacuum exists at the port **B** .



Removal and Installation

BBS001UO

VIAS CONTROL SOLENOID VALVE

Refer to EM-18, "INTAKE MANIFOLD" .

FUEL PUMP CIRCUIT

PFP:17042

Description

BBS001UP

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor (POS) Camshaft position sensor (PHASE)	Engine speed*	Fuel pump control	Fuel pump relay
Battery	Battery voltage*		

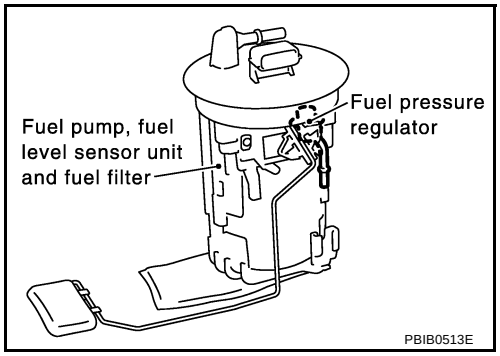
*: ECM determines the start signal status by the signals of engine speed and battery voltage.

The ECM activates the fuel pump for several seconds after the ignition switch is turned ON to improve engine startability. If the ECM receives a engine speed signal from the crankshaft position sensor (POS) and camshaft position sensor (PHASE), it knows that the engine is rotating, and causes the pump to operate. If the engine speed signal is not received when the ignition switch is ON, the engine stalls. The ECM stops pump operation and prevents battery discharging, thereby improving safety. The ECM does not directly drive the fuel pump. It controls the ON/OFF fuel pump relay, which in turn controls the fuel pump.

Condition	Fuel pump operation
Ignition switch is turned to ON	Operates for 1 second
Engine running and cranking	Operates
When engine is stopped	Stops in 1.5 seconds
Except as shown above	Stops

COMPONENT DESCRIPTION

A turbine type design fuel pump is used in the fuel tank.



CONSULT-II Reference Value in Data Monitor Mode

BBS001UQ

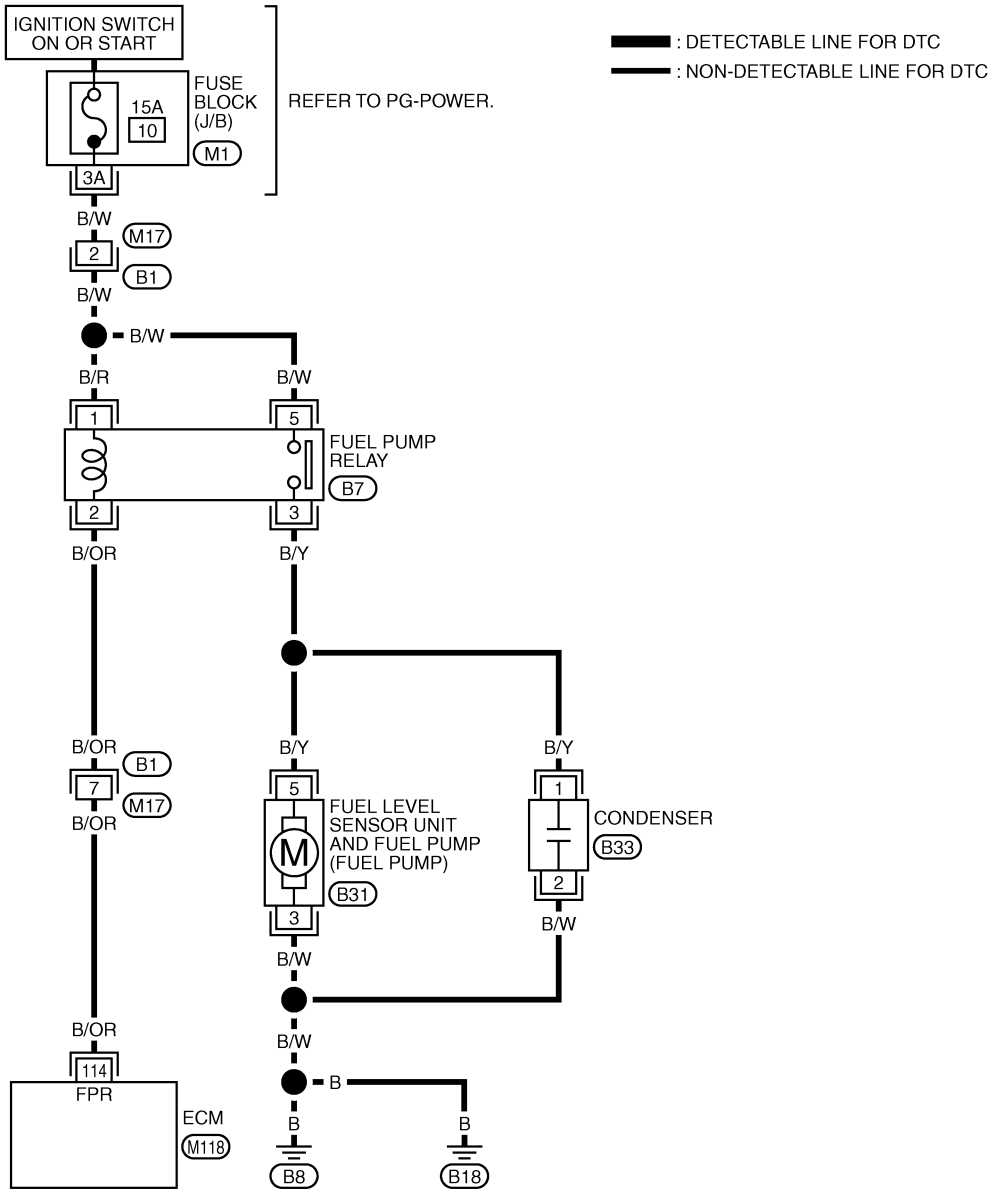
Specification data are reference values.

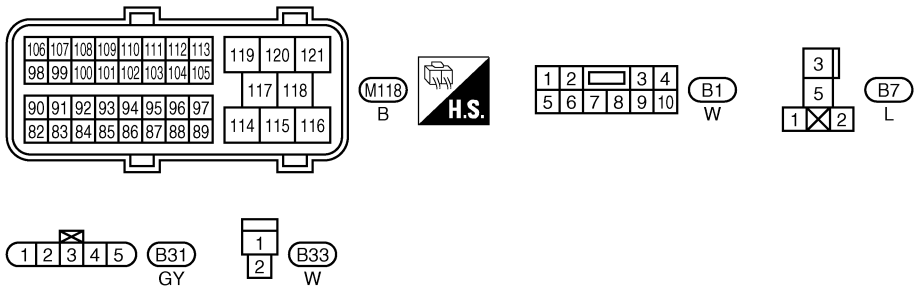
MONITOR ITEM	CONDITION	SPECIFICATION
FUEL PUMP RLY	● For 1 second after turning ignition switch ON ● Engine running or cranking	ON
	● Except above conditions	OFF

Wiring Diagram
LHD MODELS

BBS001UR

EC-F/PUMP-01





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0632E

Specification data are reference values and are measured between each terminal and ground.

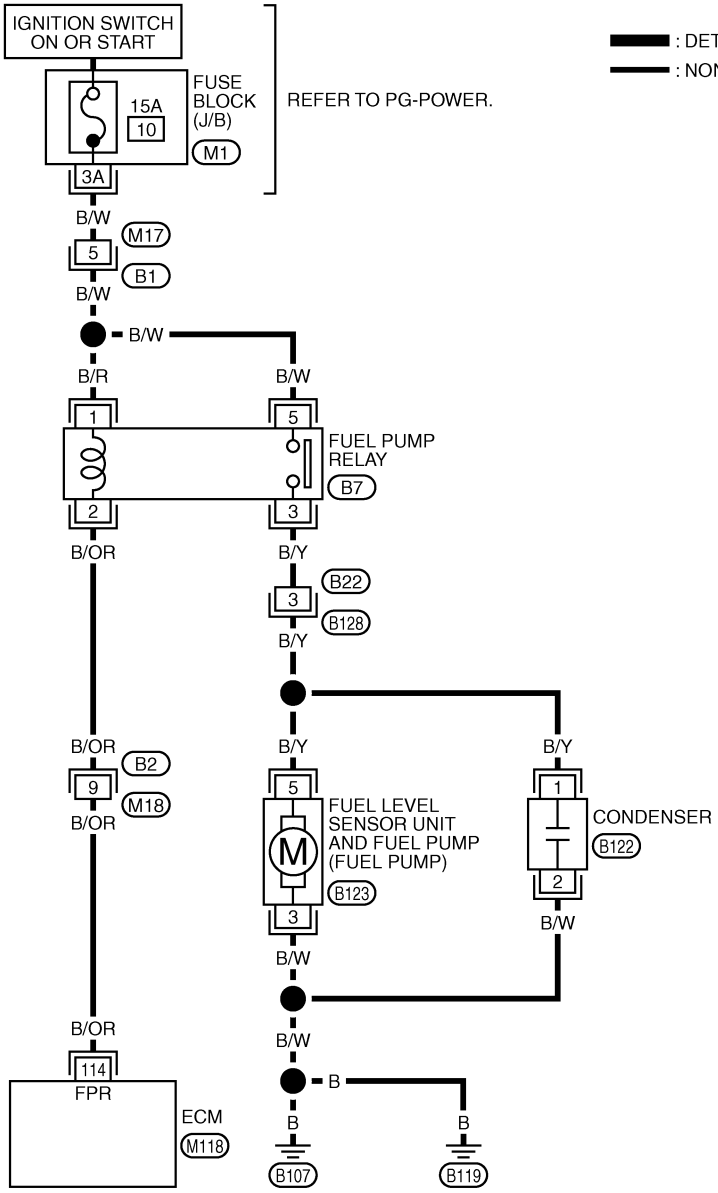
CAUTION:

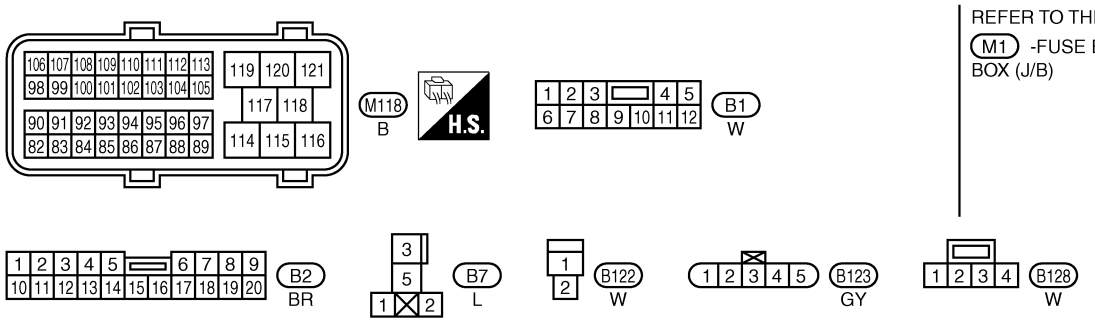
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
114	B/OR	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

RHD MODELS

EC-F/PUMP-02





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0633E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
114	B/OR	Fuel pump relay	**[Ignition switch: ON]** ● For 1 second after turning ignition switch ON **[Engine is running]**	0 - 1.0V
			[Ignition switch: ON] ● More than 1 second after turning ignition switch ON	BATTERY VOLTAGE (11 - 14V)

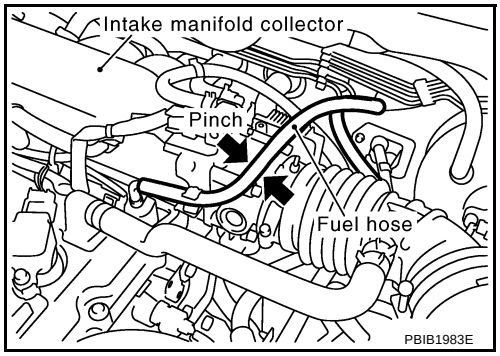
Diagnostic Procedure

BBS001US

1. CHECK OVERALL FUNCTION

1. Turn ignition switch ON.
2. Pinch fuel feed hose with two fingers.

Fuel pressure pulsation should be felt on the fuel hose for 1 second after ignition switch is turned ON.

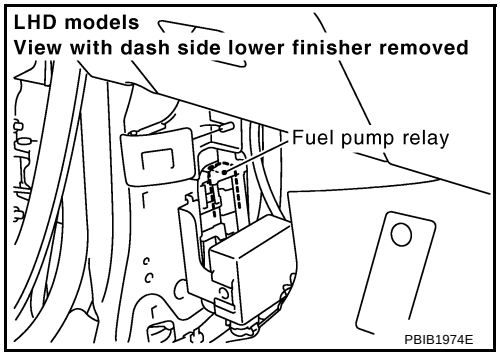


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

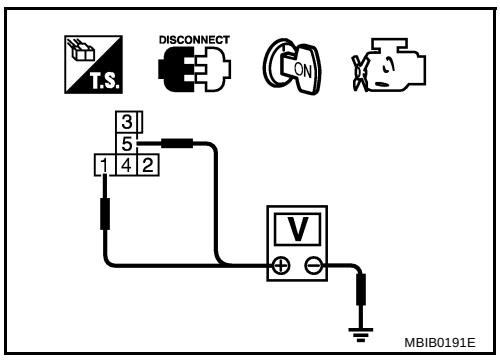
2. CHECK FUEL PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect fuel pump relay.
3. Turn ignition switch ON.



4. Check voltage between fuel pump relay terminals 1, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M17, B1
- Fuse block (J/B) connector M1
- 15A fuse
- Harness for open or short between fuel pump relay and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CONDENSER CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check harness continuity between fuel pump relay terminal 3 and condenser terminal 1, condenser terminal 2 and ground.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B22, B128 (RHD models)
- Harness for open or short between fuel pump relay and condenser
- Harness for open or short between condenser and ground

>> Repair open circuit or short to ground or short to power in harness connectors.

6. CHECK CONDENSER

Refer to EC-915, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace condenser.

7. CHECK FUEL PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

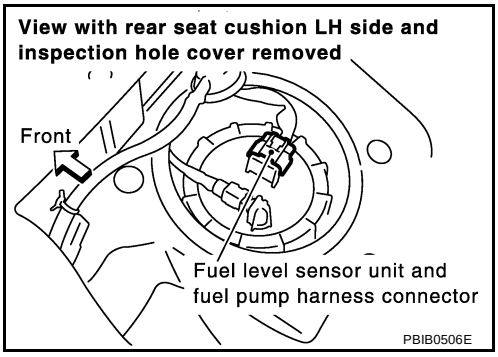
1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check harness continuity between fuel pump relay terminal 3 and “fuel level sensor unit and fuel pump” terminal 5, “fuel level sensor unit and fuel pump” terminal 3 and ground.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.



8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B22, B128 (RHD models)
- Harness for open or short between fuel pump relay and “fuel level sensor unit and fuel pump”
- Harness for open or short between “fuel level sensor unit and fuel pump” and ground

>> Repair open circuit or short to ground or short to power in harness connectors.

9. CHECK FUEL PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between fuel pump relay terminal 2 and ECM terminal 114.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M17 (LHD models)
- Harness connectors B2, M18 (RHD models)
- Harness for open or short between fuel pump relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK FUEL PUMP RELAY

Refer to EC-915, "Component Inspection" .

OK or NG

OK >> GO TO 12.
NG >> Replace fuel pump relay.

12. CHECK FUEL PUMP

Refer to EC-915, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace fuel pump.

13. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

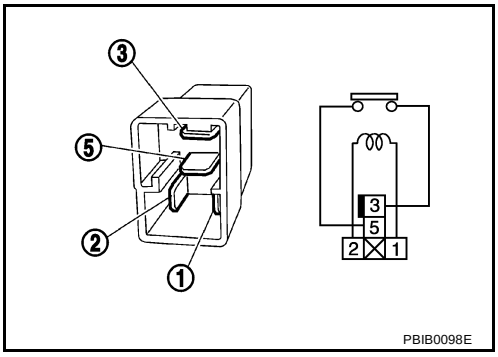
Component Inspection

BBS001UT

FUEL PUMP RELAY

Check continuity between terminals 3 and 5 under the following conditions.

Conditions	Continuity
12V direct current supply between terminals 1 and 2	Yes
No current supply	No

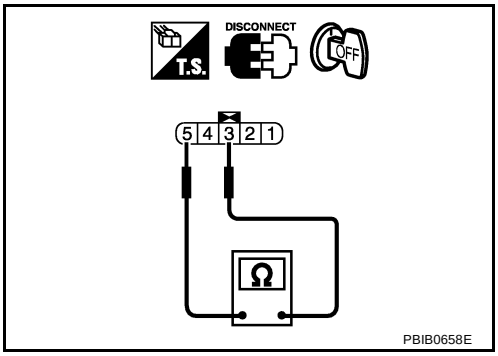


PBIB0098E

FUEL PUMP

1. Disconnect “fuel level sensor unit and fuel pump” harness connector.
2. Check resistance between “fuel level sensor unit and fuel pump” terminals 3 and 5.

Resistance: Approximately 0.2 - 5.0Ω [at 25°C (77°F)]

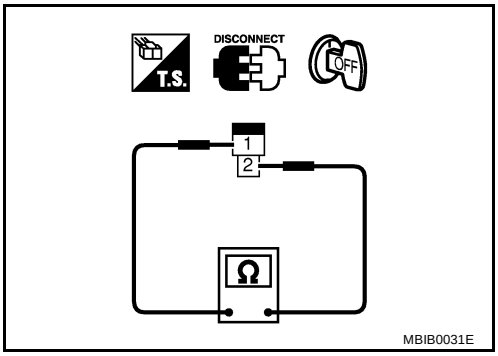


PBIB0658E

CONDENSER

1. Turn ignition switch OFF.
2. Disconnect condenser harness connector.
3. Check resistance between condenser terminal 1 and 2.

Resistance: Above 1MΩ [at 25°C (77°F)]



MBIB0031E

Removal and Installation

BBS001UU

FUEL PUMP

Refer to FL-4, "FUEL LEVEL SENSOR UNIT, FUEL FILTER AND FUEL PUMP ASSEMBLY" .

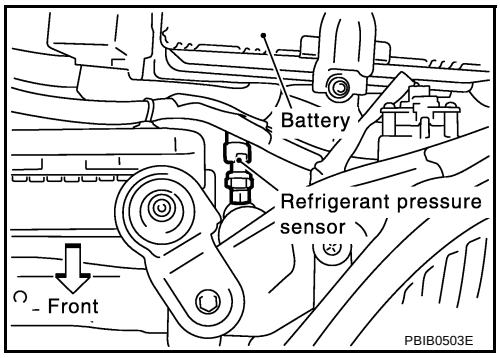
REFRIGERANT PRESSURE SENSOR

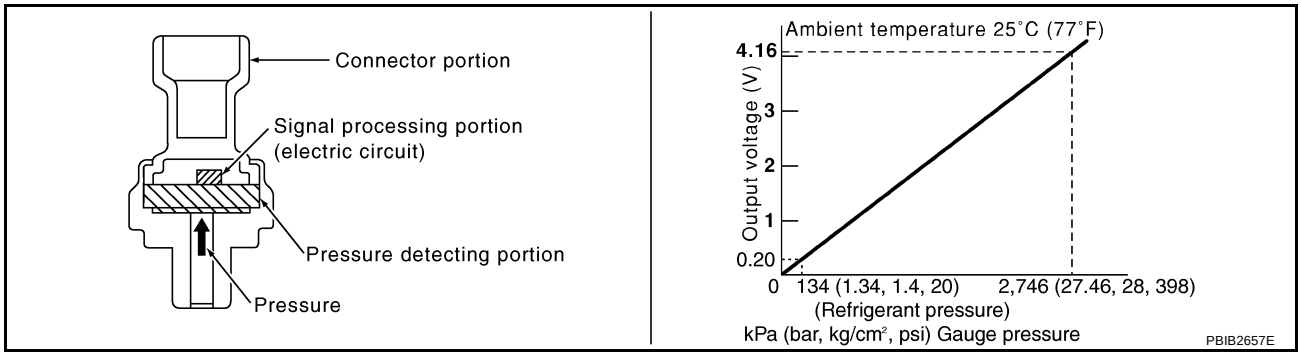
PFP:92136

Component Description

BBS001UV

The refrigerant pressure sensor is installed at the condenser of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.



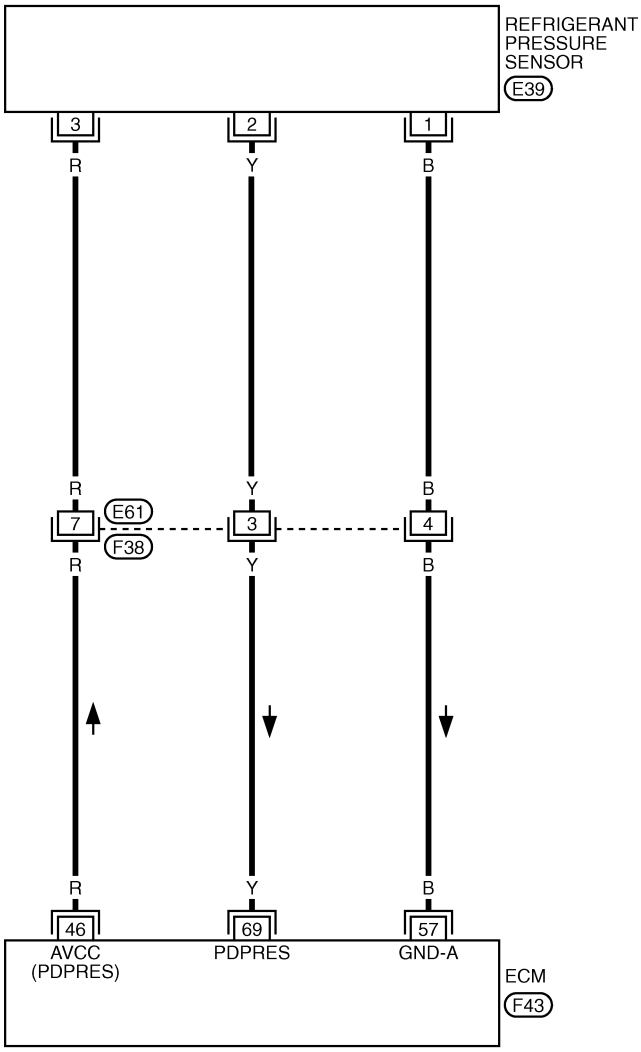


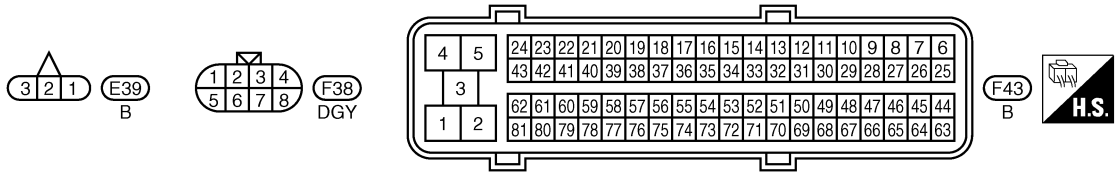
Wiring Diagram

BBS001UW

EC-RP/SEN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWA0634E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
46	R	Sensor power supply (Refrigerant pressure sensor)	**[Ignition switch: ON]**	Approximately 5V
57	B	Sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
69	L	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower switch are ON (Compressor operates.)	1.0 - 4.0V

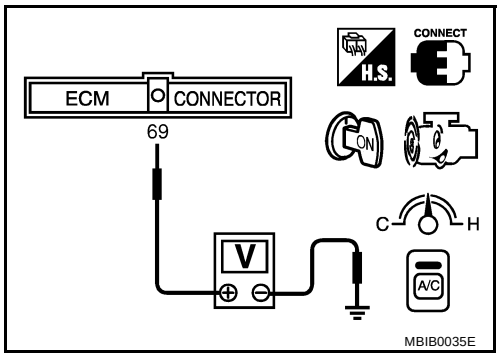
Diagnostic Procedure

BBS001UX

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 69 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

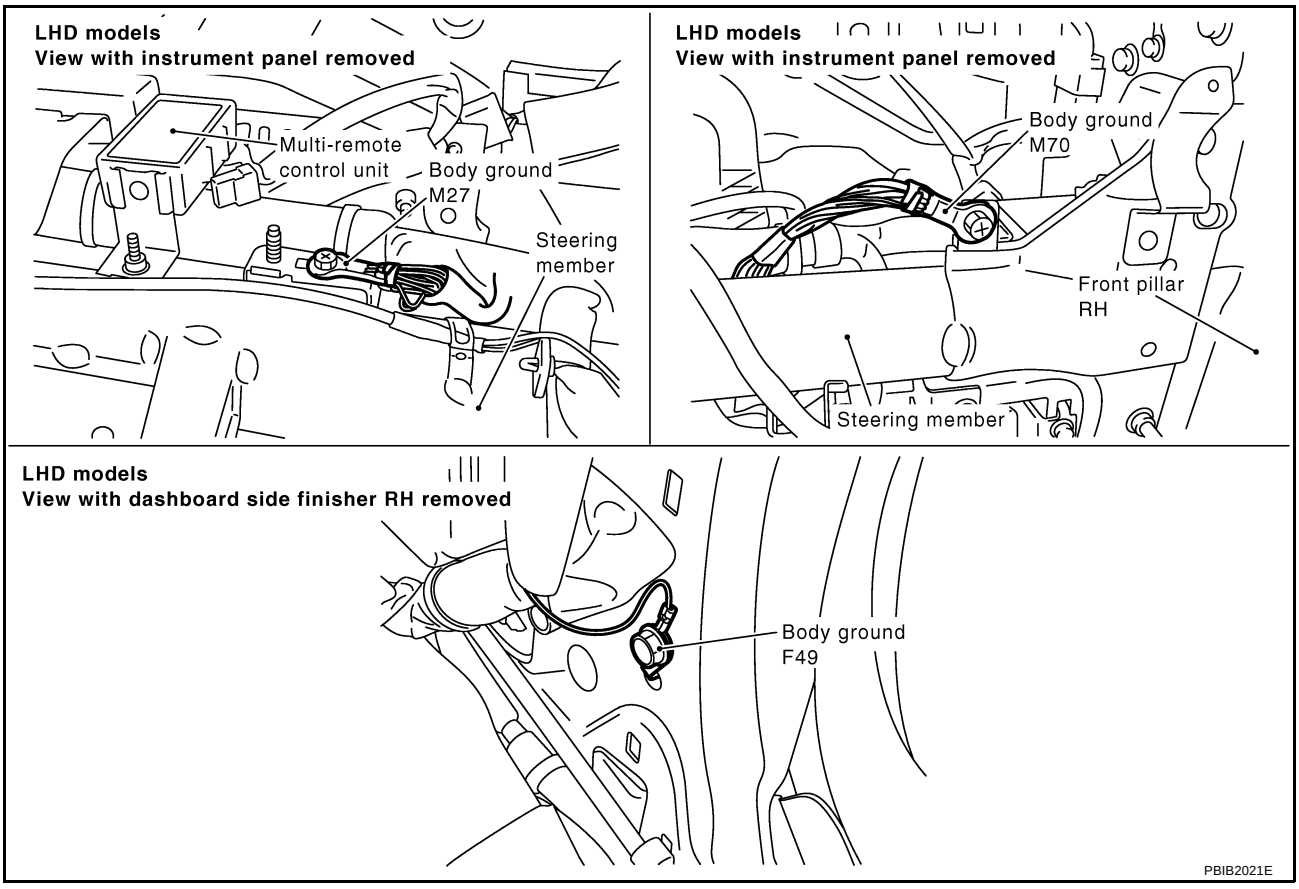


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower switch OFF.
2. Stop engine.
3. Loosen and retighten three ground screws on the body.
   Refer to EC-634, "Ground Inspection" .

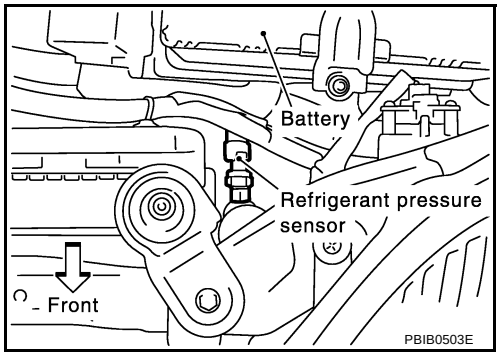


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

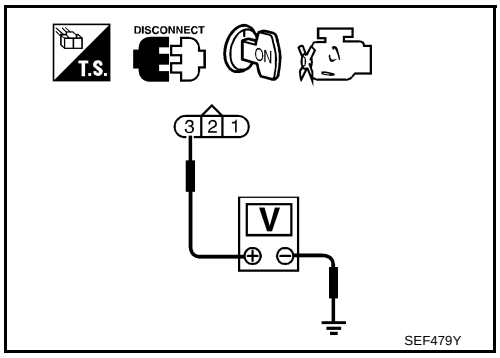
3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 57. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between refrigerant pressure sensor terminal 2 and ECM terminal 69. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E61, F38
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

BBS001UY

REFRIGERANT PRESSURE SENSOR

Refer to ATC-139, "REFRIGERANT LINES" .

ELECTRICAL LOAD SIGNAL

PFP:25350

CONSULT-II Reference Value in Data Monitor Mode

BBS001UZ

Specification data are reference values.

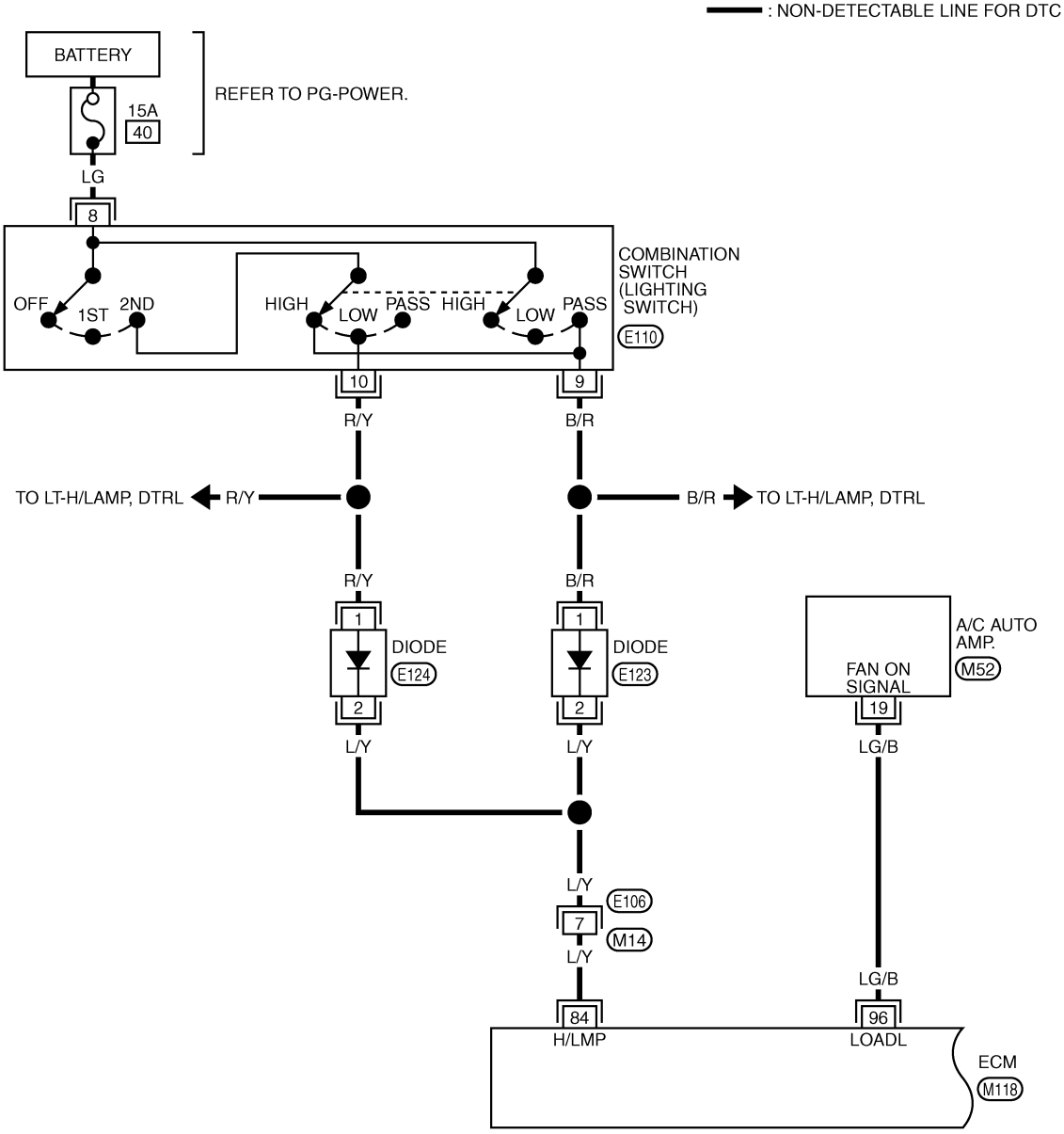
MONITOR ITEM	CONDITION		SPECIFICATION
LOAD SIGNAL	● Ignition switch: ON	Rear window defogger switch is ON and/or lighting switch is in 2nd position (placed in LOW position for models with Xenon headlamp).	ON
		Rear window defogger switch is OFF and lighting switch is OFF.	OFF
HEATER FAN SW	● Ignition switch: ON	Heater fan is operating	ON
		Heater fan is not operating	OFF

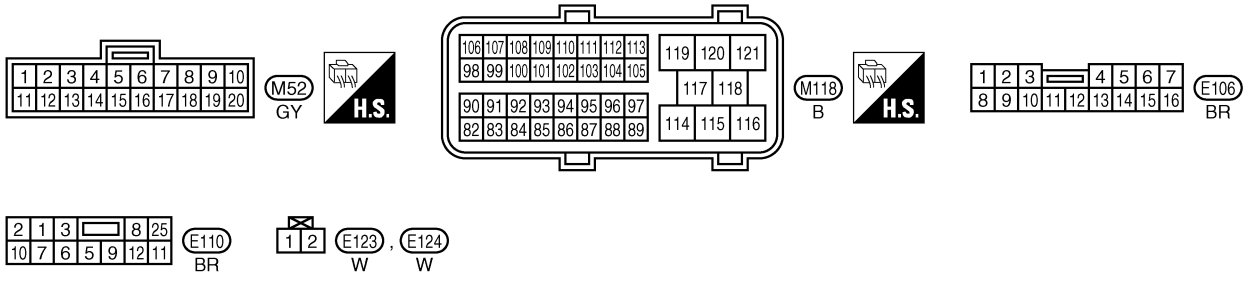
Wiring Diagram

BBS001V0

LHD MODELS WITHOUT XENON HEADLAMP

EC-LOAD-01





TBWB0468E

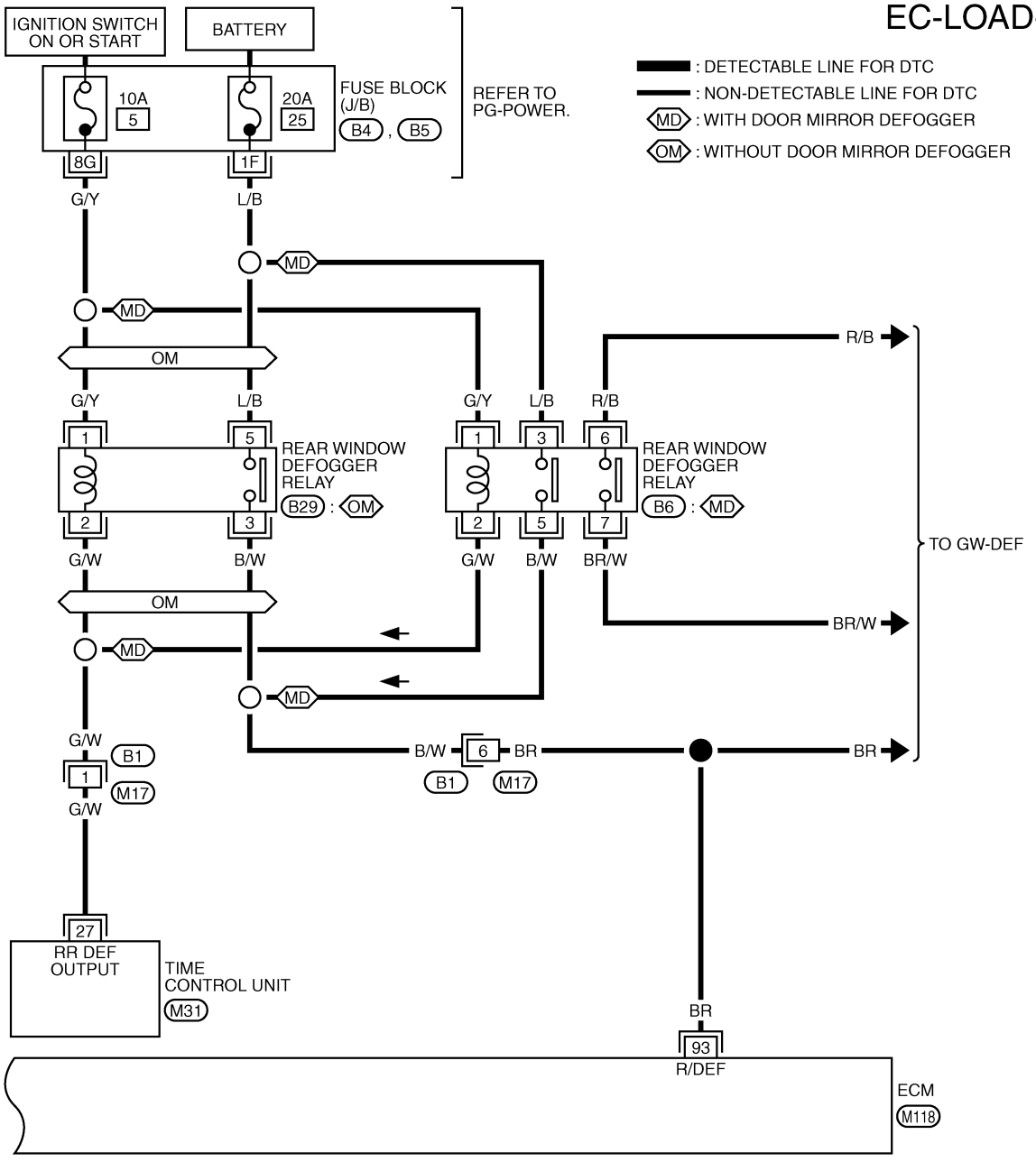
Specification data are reference values and are measured between each terminal and ground.

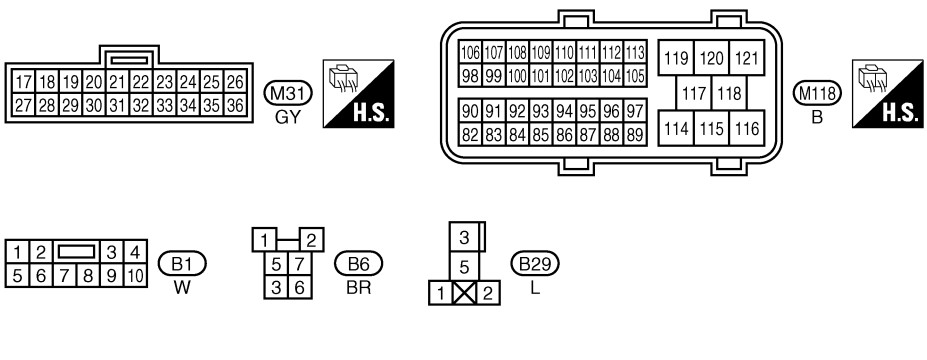
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	L/Y	Electrical load signal (Headlamp signal)	**[Ignition switch: ON]** ● Lighting switch: 2nd position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Lighting switch: OFF	Approximately 0V
96	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	BATTERY VOLTAGE (11 - 14V)

EC-LOAD-02





REFER TO THE FOLLOWING.
B4 , B5 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0636E

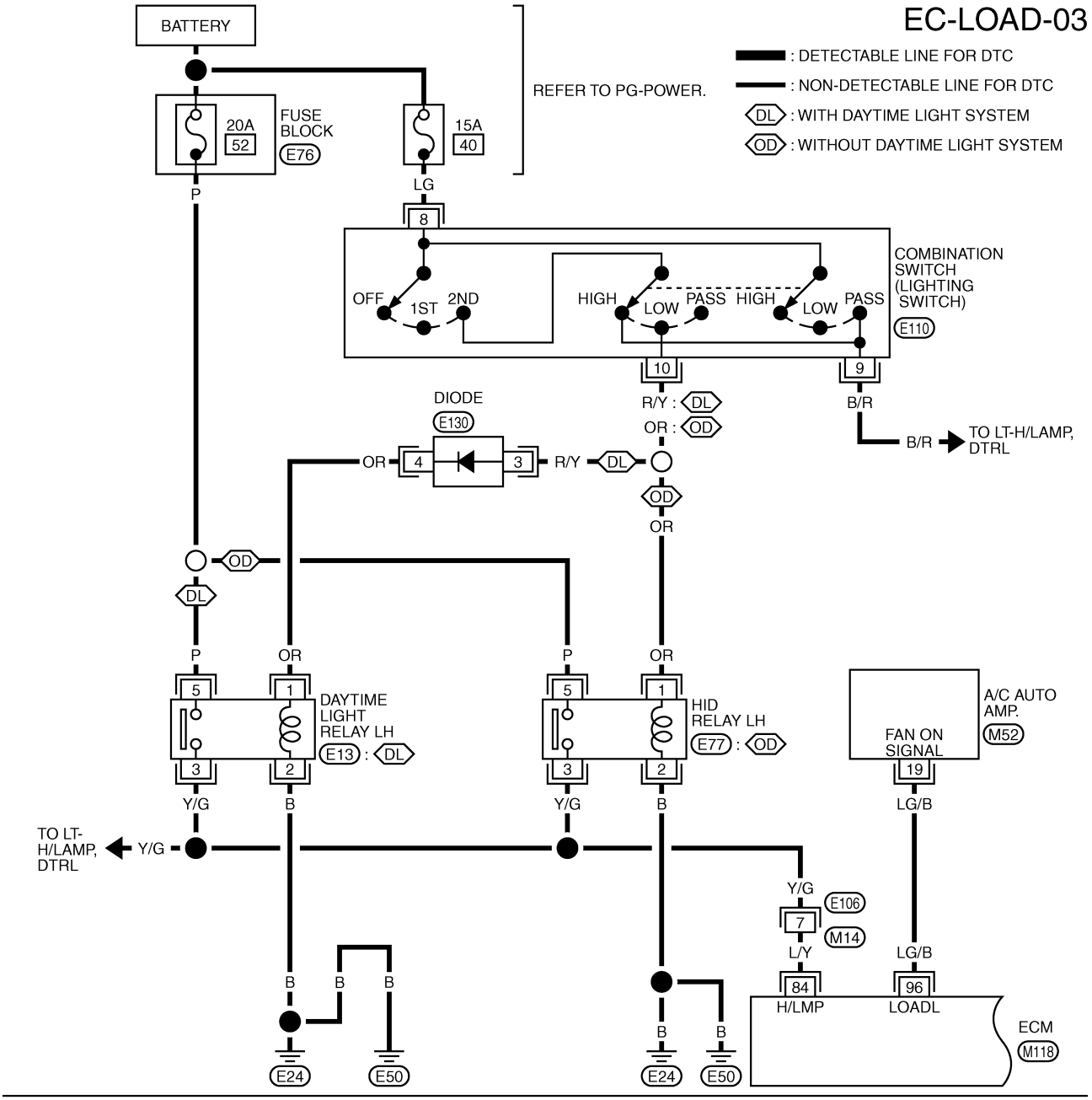
Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
93	BR	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V

LHD MODELS WITH XENON HEADLAMP



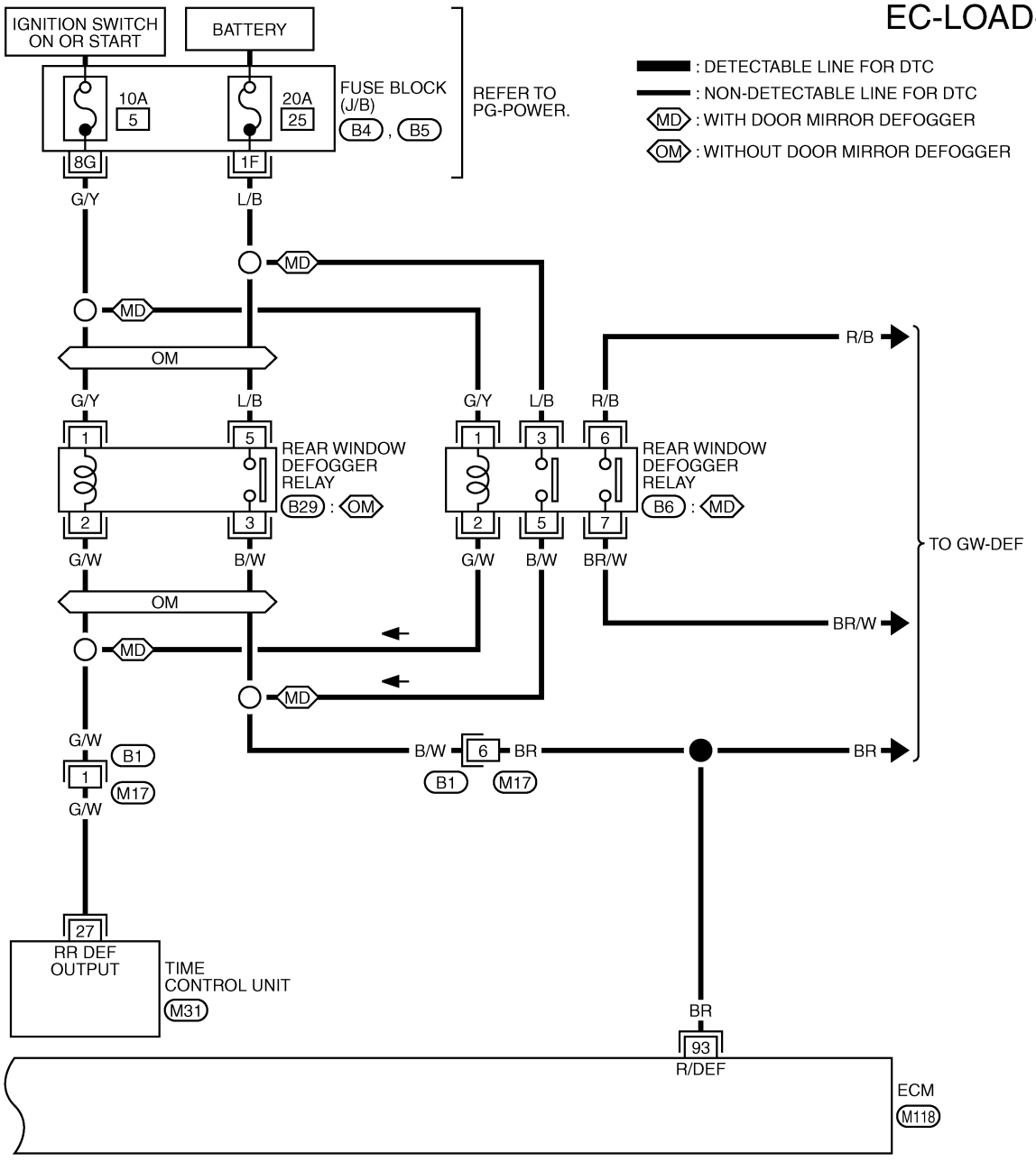
Specification data are reference values and are measured between each terminal and ground.

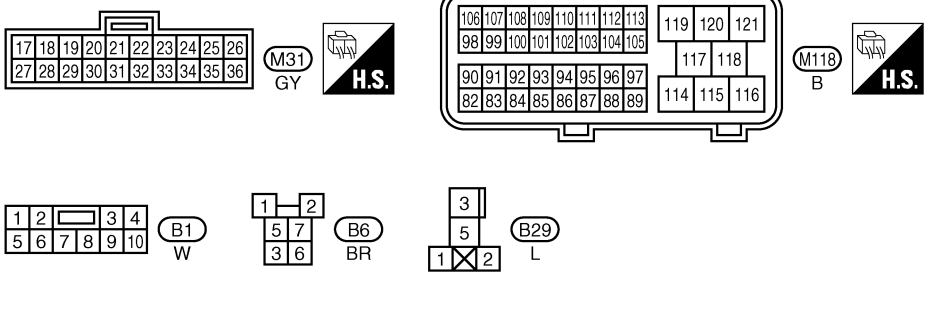
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	L/Y	Electrical load signal (Headlamp signal)	**[Ignition switch: ON]** ● Lighting switch: 2nd position and placed in LOW position	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Lighting switch: OFF	Approximately 0V
96	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	BATTERY VOLTAGE (11 - 14V)

EC-LOAD-04





REFER TO THE FOLLOWING.
B4 , B5 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0470E

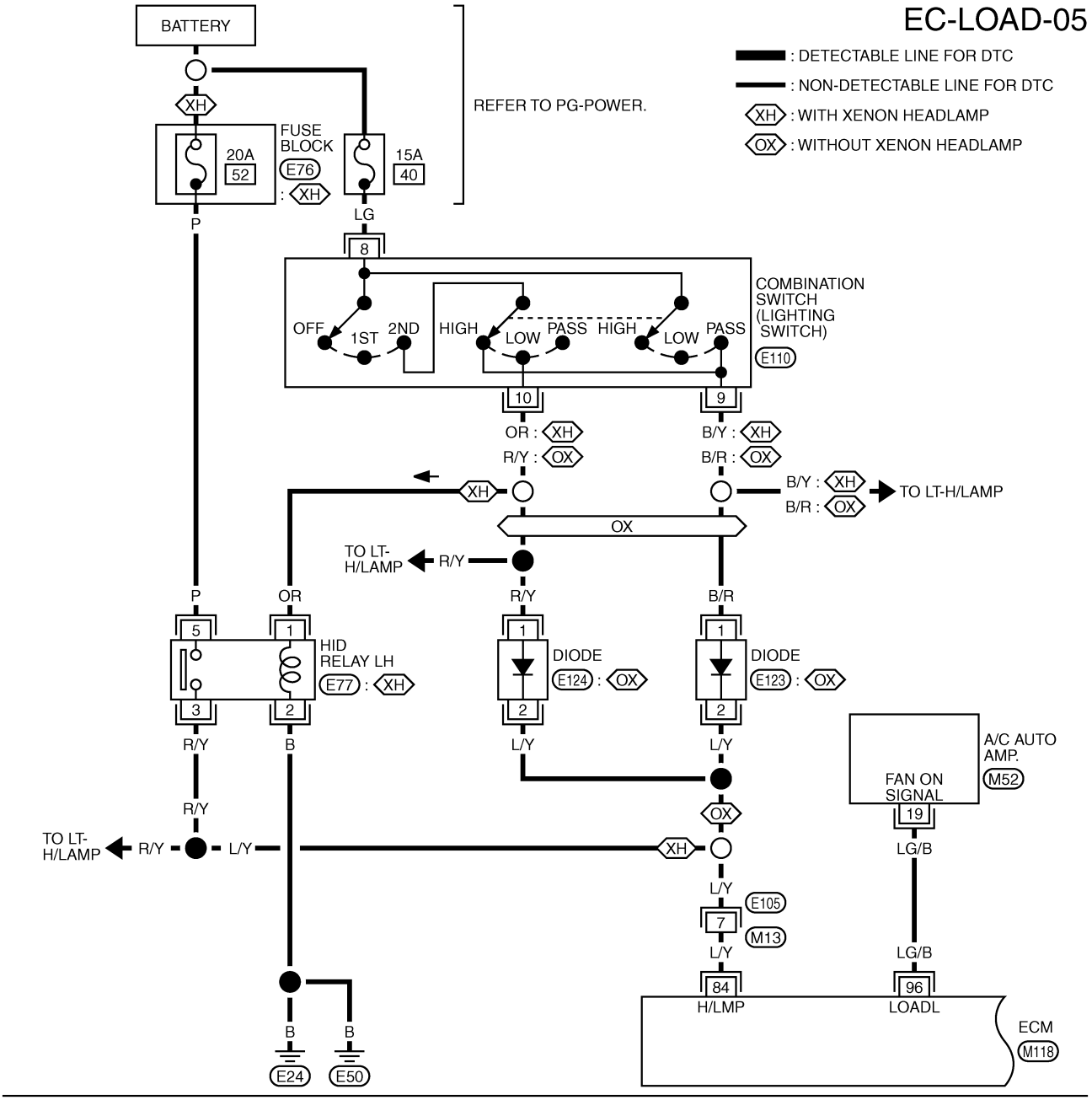
Specification data are reference values and are measured between each terminal and ground.

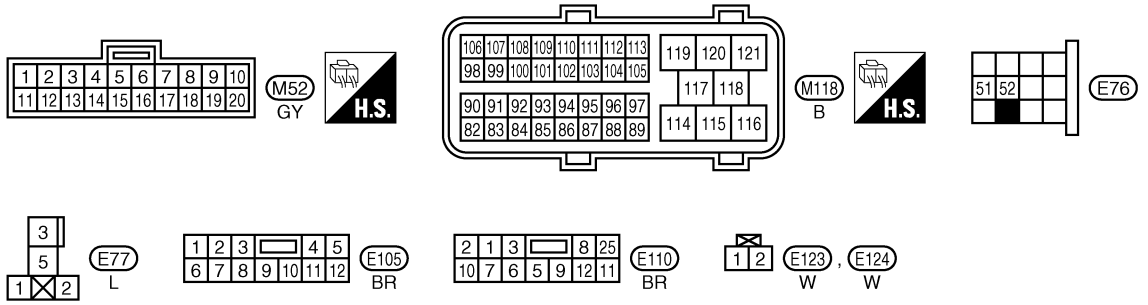
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
93	BR	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V

RHD MODELS





TBWB0471E

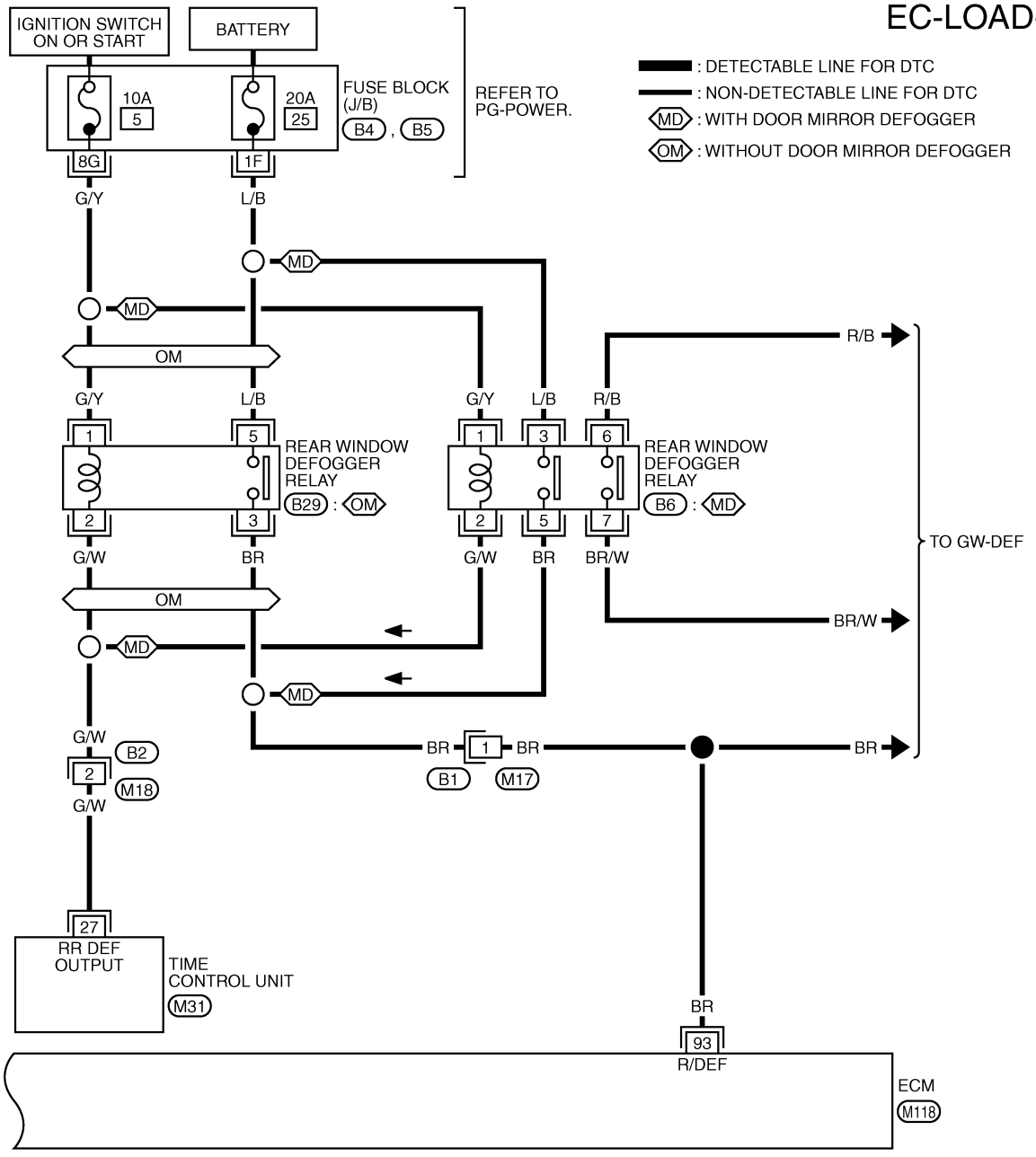
Specification data are reference values and are measured between each terminal and ground.

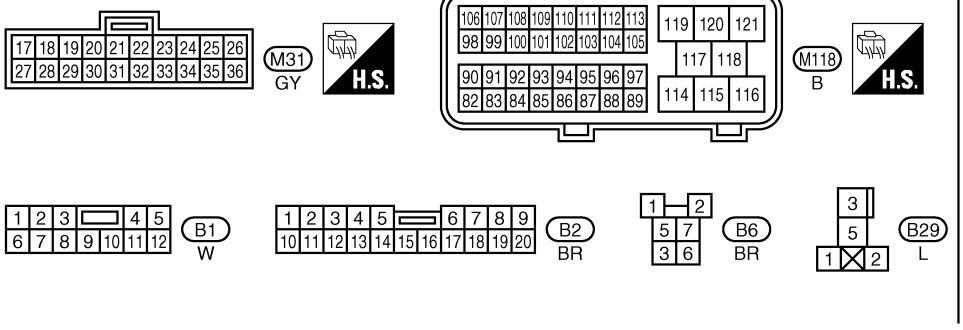
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
84	L/Y	Electrical load signal (Headlamp signal)	**[Ignition switch: ON]** ● Lighting switch: 2nd position (placed in LOW position for models with Xenon headlamp)	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Lighting switch: OFF	Approximately 0V
96	LG/B	Heater fan switch	**[Engine is running]** ● Heater fan switch: ON	Approximately 0V
			[Engine is running] ● Heater fan switch: OFF	BATTERY VOLTAGE (11 - 14V)

EC-LOAD-06





REFER TO THE FOLLOWING.
B4 , B5 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0472E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
93	BR	Electrical load signal (Rear window defogger signal)	**[Ignition switch: ON]** ● Rear window defogger switch: ON	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch: ON] ● Rear window defogger switch: OFF	Approximately 0V

Diagnostic Procedure

BBS001V1

LHD MODELS WITHOUT XENON HEADLAMP

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

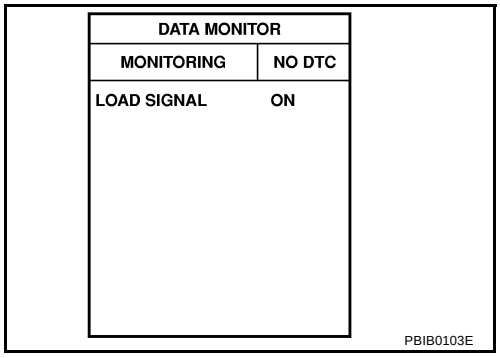
Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCITION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Lighting switch: ON at 2nd position	ON
Lighting switch: OFF	OFF



OK or NG

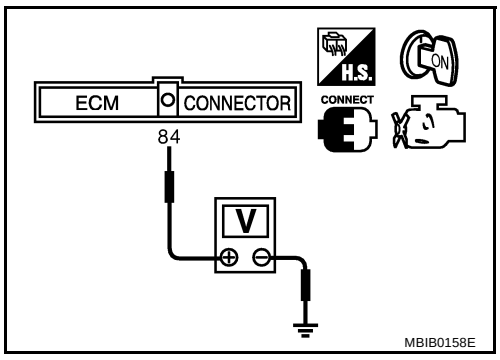
OK >> GO TO 4.
NG >> GO TO 8.

3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 84 and ground under the following conditions.

Condition	Voltage
Lighting switch: ON at 2nd position	BATTERY VOLTAGE
Lighting switch: OFF	0V



OK or NG

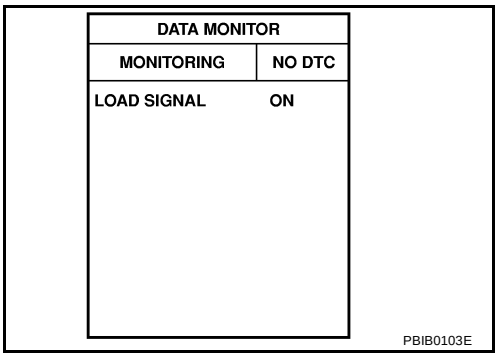
OK >> GO TO 5.
NG >> GO TO 8.

4. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

With CONSULT-II

Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF



OK or NG

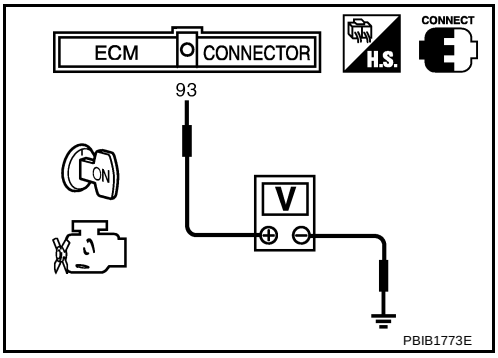
OK >> GO TO 6.
NG >> GO TO 11.

5. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Without CONSULT-II

Check voltage between ECM terminal 93 and ground under the following conditions.

Condition	Voltage
Rear window defogger switch: ON	BATTERY VOLTAGE
Rear window defogger switch: OFF	0V



OK or NG

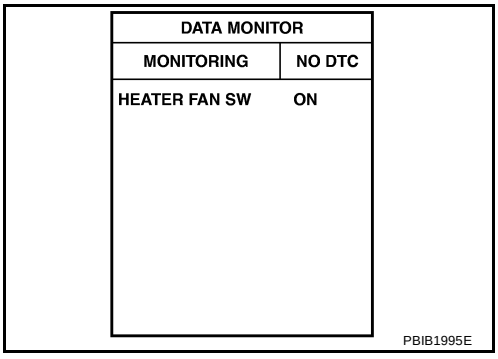
OK >> GO TO 7.
NG >> GO TO 11.

6. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

With CONSULT-II

Check “HEATER FAN SW” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF



OK or NG

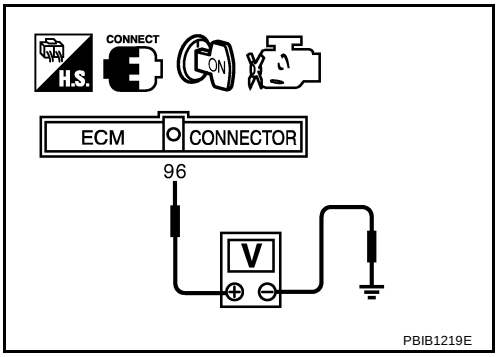
OK >> **INSPECTION END**.
NG >> GO TO 14.

7. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 96 and ground under the following conditions.

Condition	Voltage
Heater fan control switch: ON	0V
Heater fan control switch: OFF	BATTERY VOLTAGE



OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 14.

8. CHECK HEADLAMP FUNCTION

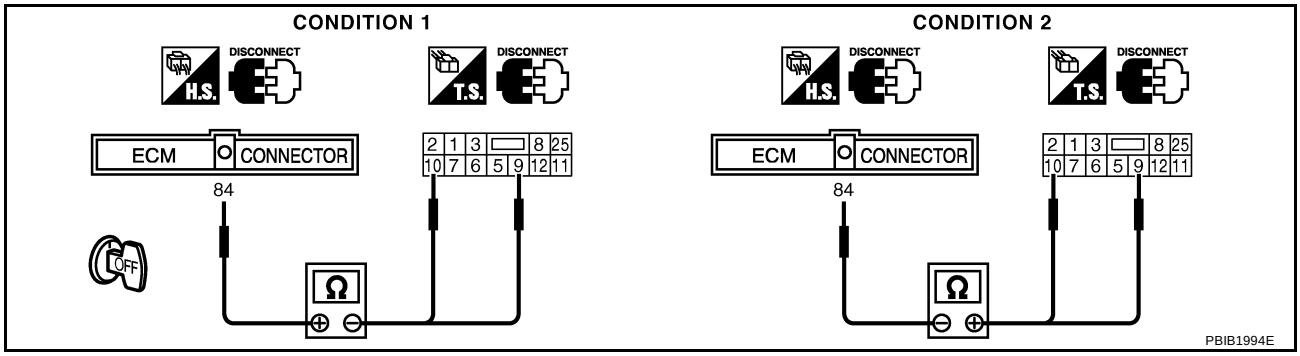
1. Start engine.
2. Turn the lighting switch ON at 2nd position.
3. Check that headlamps are illuminated.

OK or NG

OK >> GO TO 9.
NG >> Refer to LT-27, "HEADLAMP - CONVENTIONAL TYPE -" or LT-53, "HEADLAMP (WITH DAY-TIME) - CONVENTIONAL TYPE -" .

9. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connectors.
4. Check harness continuity between lighting switch terminal 9, 10 and ECM terminal 84 under the following conditions.



Condition	Continuity
1	Should exist
2	Should not exist

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M14
- Diode E123
- Diode E124
- Harness for open and short between lighting switch and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK REAR WINDOW DEFOGGER FUNCTION

1. Start engine.
2. Turn ON the rear window defogger switch.
3. Check the rear windshield.
   Is the rear windshield heated up?

Yes or No

Yes >> GO TO 12.
No >> Refer to GW-17, "REAR WINDOW DEFOGGER" .

12. CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between rear window defogger relay 3 (models without door mirror defogger), 5 (models with door mirror defogger) and ECM terminal 93.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M17
- Harness for open and short between rear window defogger relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK HEATER FAN CONTROL FUNCTION

1. Start engine.
2. Turn ON the fan control switch.
3. Check the blower fan motor.
   Does the blower fan motor activate?

Yes or No

Yes >> GO TO 15.
No >> Refer to ATC-33, "TROUBLE DIAGNOSIS" .

15. CHECK HEATER FAN SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect A/C AUTO AMP. harness connector.
4. Check harness continuity between A/C AUTO AMP. terminal 19 and ECM terminal 96. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK INTERMITTENT INCIDENT

Perform EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

LHD MODELS WITH XENON HEADLAMP

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCITION-I

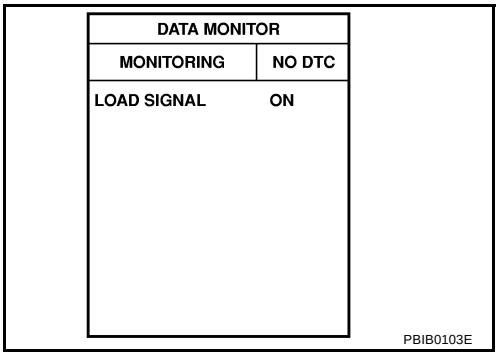
With CONSULT-II

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Lighting switch: ON at 2nd position and placed in LOW position	ON
Lighting switch: OFF	OFF

OK or NG

OK >> GO TO 4.
NG >> GO TO 8.

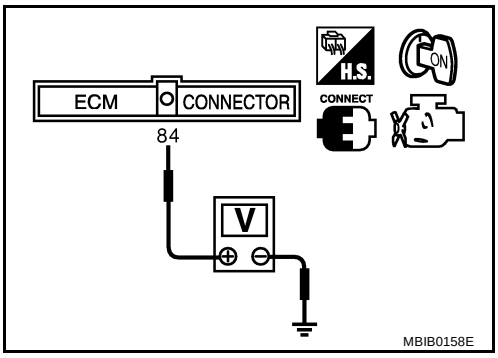


3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 84 and ground under the following conditions.

Condition	Voltage
Lighting switch: ON at 2nd position and placed in LOW position	BATTERY VOLTAGE
Lighting switch: OFF	0V



OK or NG

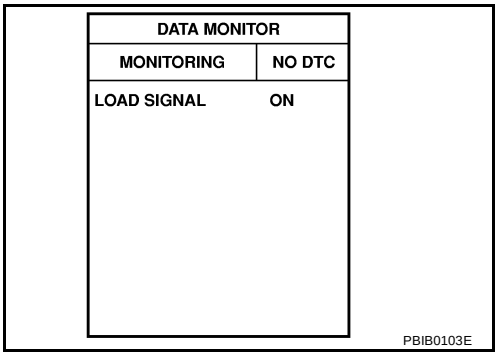
OK >> GO TO 5.
NG >> GO TO 8.

4. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

With CONSULT-II

Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF



OK or NG

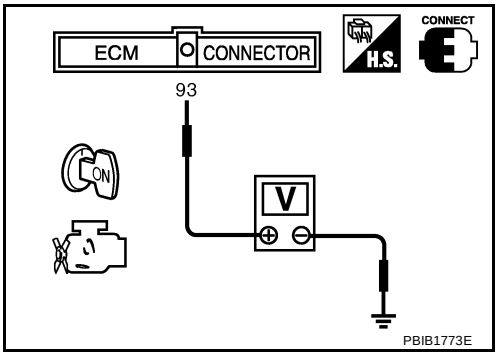
OK >> GO TO 6.
NG >> GO TO 11.

5. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Without CONSULT-II

Check voltage between ECM terminal 93 and ground under the following conditions.

Condition	Voltage
Rear window defogger switch: ON	BATTERY VOLTAGE
Rear window defogger switch: OFF	0V



OK or NG

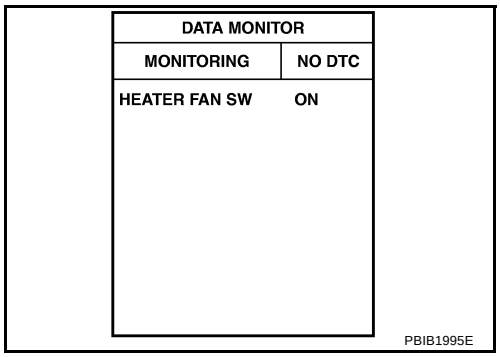
OK >> GO TO 7.
NG >> GO TO 11.

6. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

With CONSULT-II

Check “HEATER FAN SW” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF



OK or NG

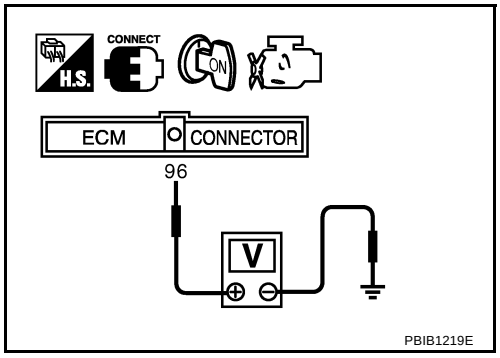
OK >> **INSPECTION END**.
NG >> GO TO 14.

7. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 96 and ground under the following conditions.

Condition	Voltage
Heater fan control switch: ON	0V
Heater fan control switch: OFF	BATTERY VOLTAGE



OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 14.

8. CHECK HEADLAMP FUNCTION

1. Start engine.
2. Turn the lighting switch ON at 2nd position and placed in LOW position.
3. Check that headlamps are illuminated.

OK or NG

OK >> GO TO 9.
NG >> Refer to LT-5, "HEADLAMP - XENON TYPE -" or LT-43, "HEADLAMP (WITH DAYTIME) - XENON TYPE -" .

9. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect daytime light relay LH or HID relay LH.
4. Check harness continuity between ECM terminal 84 and daytime light relay LH terminal 3 or HID relay LH terminal 3.
   Refer to Wiring Diagram.
5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E106, M14
- Harness for open and short between ECM and daytime light relay LH or HID relay LH

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK REAR WINDOW DEFOGGER FUNCTION

1. Start engine.
2. Turn ON the rear window defogger switch.
3. Check the rear windshield.
   Is the rear windshield heated up?

Yes or No

Yes >> GO TO 12.
No >> Refer to GW-17, "REAR WINDOW DEFOGGER" .

12. CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between rear window defogger relay 3 (models without door mirror defogger), 5 (models with door mirror defogger) and ECM terminal 93.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> GO TO 13.

13. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M17
- Harness for open and short between rear window defogger relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK HEATER FAN CONTROL FUNCTION

1. Start engine.
2. Turn ON the fan control switch.
3. Check the blower fan motor.
   Does the blower fan motor activate?

Yes or No

Yes >> GO TO 15.
No >> Refer to ATC-33, "TROUBLE DIAGNOSIS" .

15. CHECK HEATER FAN SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect A/C AUTO AMP. harness connector.
4. Check harness continuity between A/C AUTO AMP. terminal 19 and ECM terminal 96. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 16.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK INTERMITTENT INCIDENT

Perform EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

RHD MODELS

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 3.

2. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCITION-I

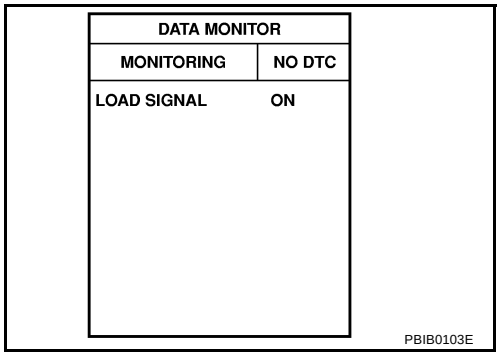
With CONSULT-II

1. Turn ignition switch ON.
2. Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Lighting switch: ON at 2nd position (placed in LOW position for models with Xenon headlamp)	ON
Lighting switch: OFF	OFF

OK or NG

OK >> GO TO 4.
NG >> GO TO 8.

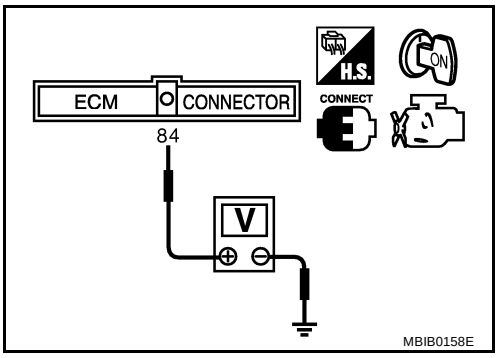


3. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-I

Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 84 and ground under the following conditions.

Condition	Voltage
Lighting switch: ON at 2nd position (placed in LOW position for models with Xenon headlamp)	BATTERY VOLTAGE
Lighting switch: OFF	0V



OK or NG

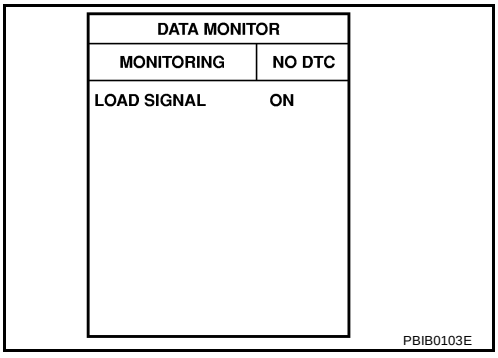
OK >> GO TO 5.
NG >> GO TO 8.

4. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

With CONSULT-II

Check “LOAD SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Rear window defogger switch: ON	ON
Rear window defogger switch: OFF	OFF



OK or NG

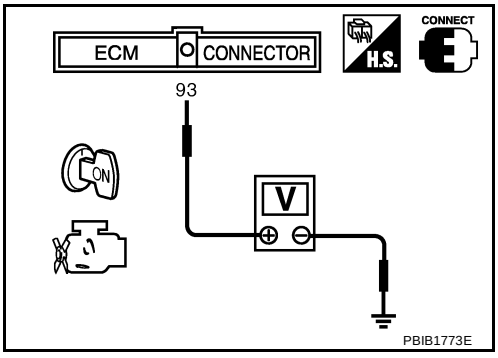
OK >> GO TO 6.
NG >> GO TO 13.

5. CHECK LOAD SIGNAL CIRCUIT OVERALL FUNCTION-II

Without CONSULT-II

Check voltage between ECM terminal 93 and ground under the following conditions.

Condition	Voltage
Rear window defogger switch: ON	BATTERY VOLTAGE
Rear window defogger switch: OFF	0V



OK or NG

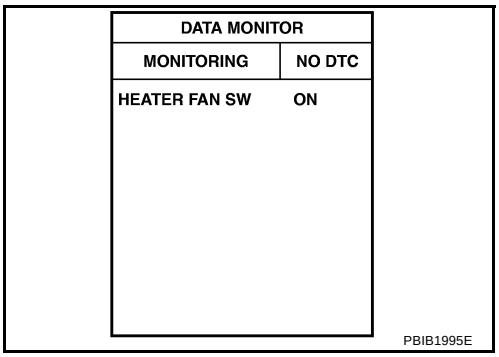
OK >> GO TO 7.
NG >> GO TO 13.

6. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

With CONSULT-II

Check “HEATER FAN SW” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

Condition	LOAD SIGNAL
Heater fan control switch: ON	ON
Heater fan control switch: OFF	OFF



OK or NG

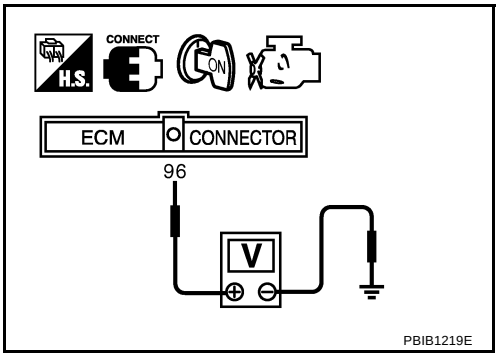
OK >> **INSPECTION END**.
NG >> GO TO 16.

7. CHECK HEATER FAN SIGNAL CIRCUIT OVERALL FUNCTION

Without CONSULT-II

Check voltage between ECM terminal 96 and ground under the following conditions.

Condition	Voltage
Heater fan control switch: ON	0V
Heater fan control switch: OFF	BATTERY VOLTAGE



OK or NG

OK >> **INSPECTION END**.
NG >> GO TO 16.

8. CHECK HEADLAMP FUNCTION

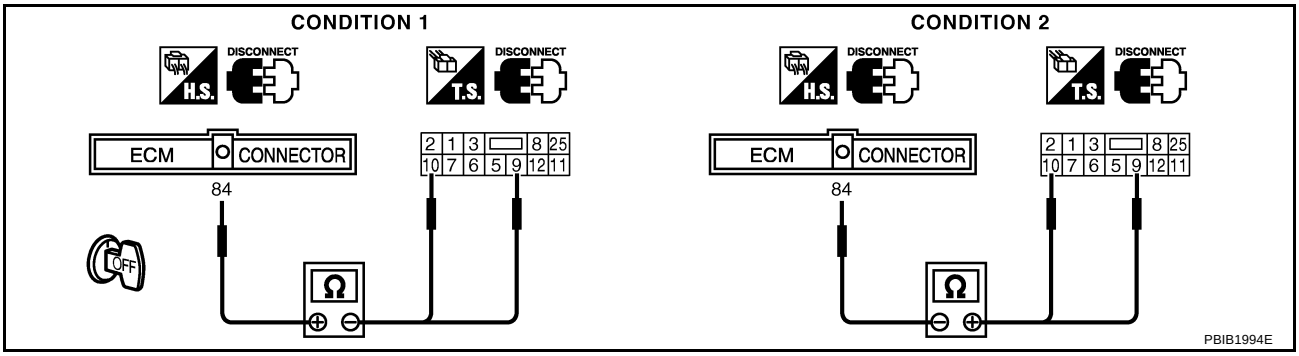
1. Start engine.
2. Turn the lighting switch ON at 2nd position (placed in LOW position for models with Xenon headlamp).
3. Check that headlamps are illuminated.

OK or NG

OK (Models without Xenon headlamp)>>GO TO 9.
OK (Models with Xenon headlamp)>>GO TO 11.
NG >> Refer to LT-5, "HEADLAMP - XENON TYPE -" , LT-27, "HEADLAMP - CONVENTIONAL TYPE -" , LT-43, "HEADLAMP (WITH DAYTIME) - XENON TYPE -" or LT-53, "HEADLAMP (WITH DAYTIME) - CONVENTIONAL TYPE -" .

9. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect lighting switch harness connectors.
4. Check harness continuity between lighting switch terminal 9, 10 and ECM terminal 84 under the following conditions.



Condition	Continuity
1	Should exist
2	Should not exist

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 18.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M13
- Diode E123
- Diode E124
- Harness for open and short between ECM and combination switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK HEADLAMP INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect HID relay LH.
4. Check harness continuity between ECM terminal 84 and HID relay LH terminal 3. Refer to Wiring Diagram.
5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 18.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E105, M13
- Harness for open and short between ECM and HID relay LH

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK REAR WINDOW DEFOGGER FUNCTION

1. Start engine.
2. Turn ON the rear window defogger switch.
3. Check the rear windshield.
   Is the rear windshield heated up?

Yes or No

Yes >> GO TO 14.
No >> Refer to GW-17, "REAR WINDOW DEFOGGER" .

14. CHECK REAR WINDOW DEFOGGER INPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect rear window defogger relay.
4. Check harness continuity between rear window defogger relay 3 (models without door mirror defogger), 5 (models with door mirror defogger) and ECM terminal 93.
   Refer to Wiring Diagram.

   Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 18.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors B1, M17
- Harness for open and short between rear window defogger relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK HEATER FAN CONTROL FUNCTION

1. Start engine.
2. Turn ON the fan control switch.
3. Check the blower fan motor.
   Does the blower fan motor activate?

Yes or No

Yes >> GO TO 17.
No >> Refer to ATC-33, "TROUBLE DIAGNOSIS" .

17. CHECK HEATER FAN SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Stop engine.
2. Disconnect ECM harness connector.
3. Disconnect A/C AUTO AMP. harness connector.
4. Check harness continuity between A/C AUTO AMP. terminal 19 and ECM terminal 96. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 18.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

18. CHECK INTERMITTENT INCIDENT

Perform EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

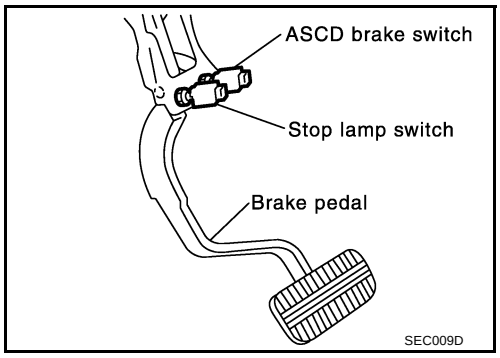
ASCD BRAKE SWITCH

PFP:25320

Component Description

BBS001V2

When the brake pedal is depressed, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-971, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

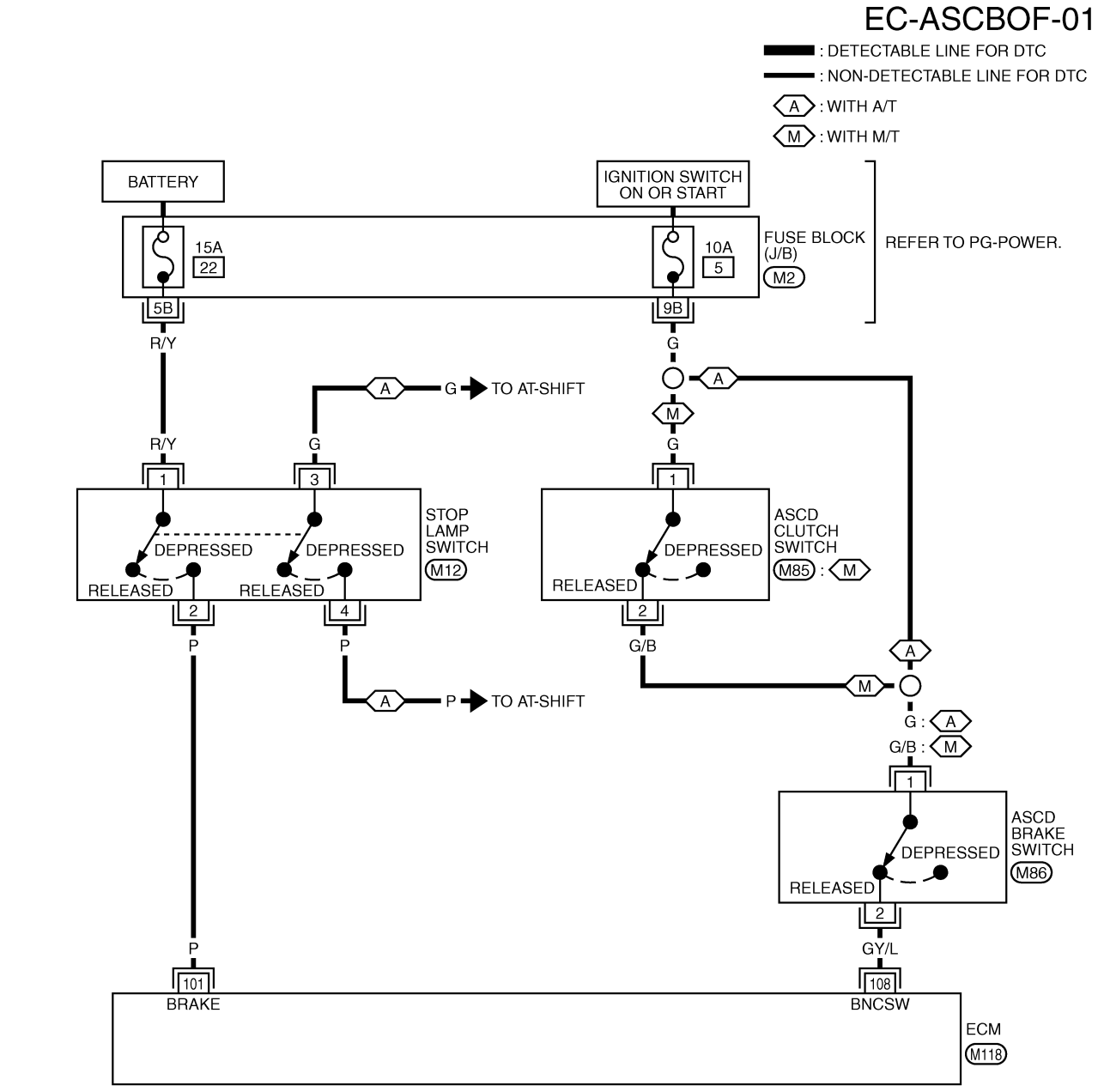
BBS001V3

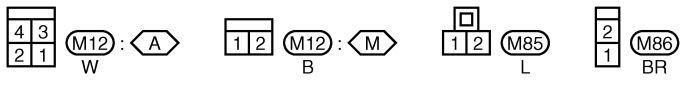
Specification data are reference values.

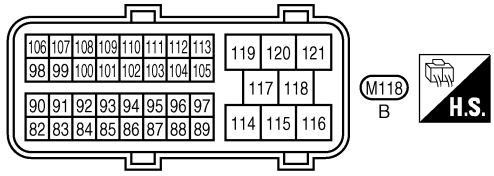
MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW1 (ASCD brake switch)	● Ignition switch: ON	Clutch pedal (M/T) and brake pedal: Fully released	ON
		Clutch pedal (M/T) and/or brake pedal: Slightly depressed	OFF
BRAKE SW2 (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON

Wiring Diagram

BBS001V4







REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0763E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
101	P	Stop lamp switch	**[Ignition switch: OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch: OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
108	GY/L	ASCD brake switch	**[Ignition switch: ON]** ● Brake pedal and/or clutch pedal (M/T): Slightly depressed	Approximately 0V
			[Ignition switch: ON] ● Brake pedal and clutch pedal (M/T): Fully released	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS001V5

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

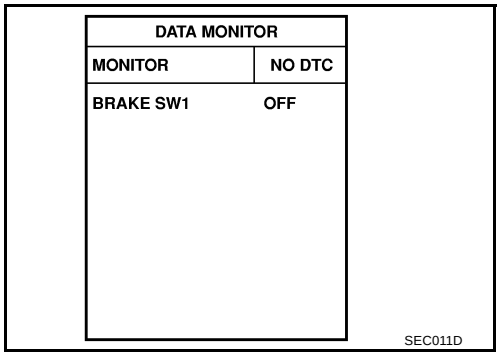
1. Turn ignition switch ON.
2. Select “BRAKE SW1” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW1” indication under the following conditions.

A/T models

CONDITION	INDICATION
Brake pedal: Slightly depressed	OFF
Brake pedal: Fully released	ON

M/T models

CONDITION	INDICATION
Clutch pedal and/or brake pedal: Slightly depressed	OFF
Clutch pedal and brake pedal: Fully released	ON



Without CONSULT-II

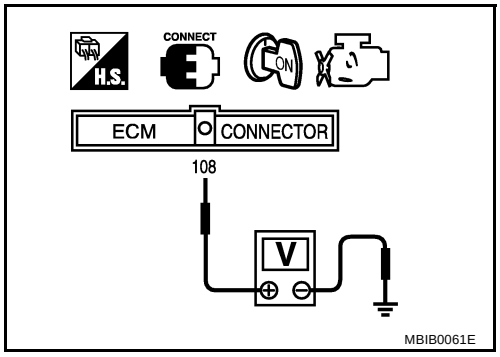
1. Turn ignition switch ON.
2. Check voltage between ECM terminal 108 and ground under the following conditions.

A/T models

CONDITION	VOLTAGE
Brake pedal: Slightly depressed	Approximately 0V
Brake pedal: Fully released	Battery voltage

M/T models

CONDITION	VOLTAGE
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V
Clutch pedal and brake pedal: Fully released	Battery voltage



OK or NG

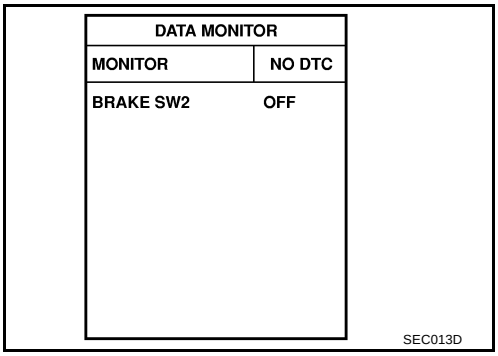
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

1. Select “BRAKE SW2” in “DATA MONITOR” mode with CONSULT-II.
2. Check “BRAKE SW2” indication under the following conditions.

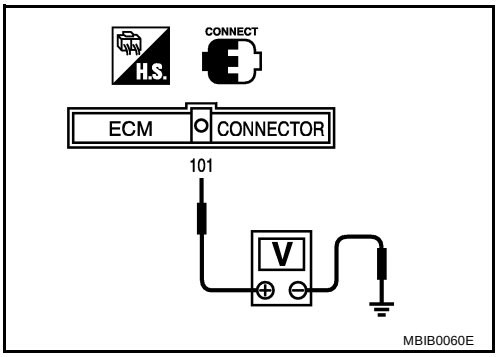
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage

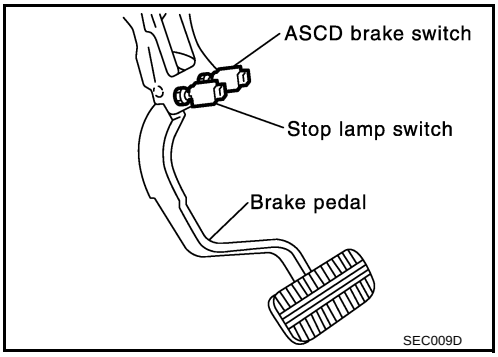


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 11.

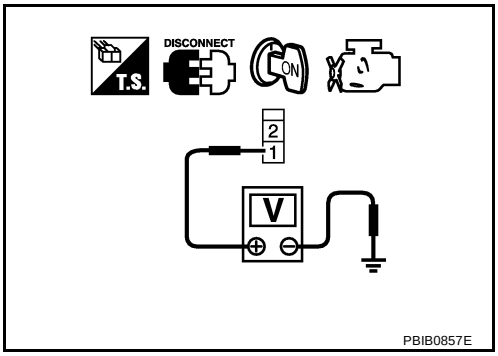
3. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Turn ignition switch ON.



4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG (A/T models)>>GO TO 4.
NG (M/T models)>>GO TO 5.

4. DETECT MALFUNCTIONING PART

Check the following.

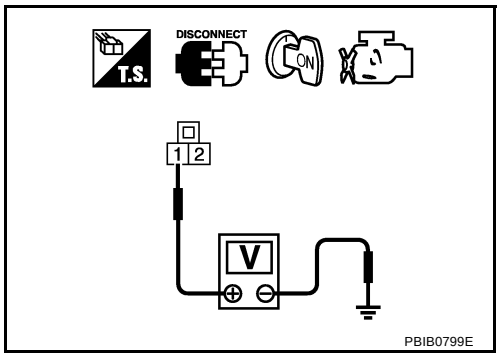
- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between ASCD brake switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Turn ignition switch ON.
4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between ASCD clutch switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD clutch switch terminal 2 and ASCD brake switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK ASCD CLUTCH SWITCH

Refer to EC-955, "Component Inspection" .

OK or NG

OK >> GO TO 15.
NG >> Replace ASCD clutch switch.

9. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ASCD brake switch terminal 2 and ECM terminal 108. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 10.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH

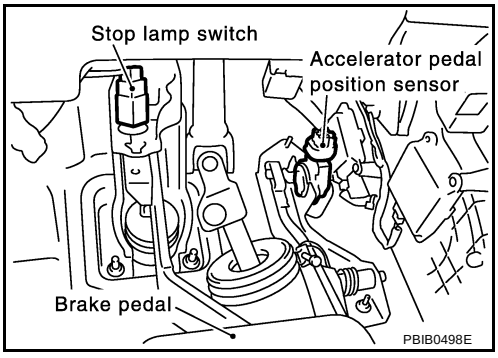
Refer toEC-955, "Component Inspection" .

OK or NG

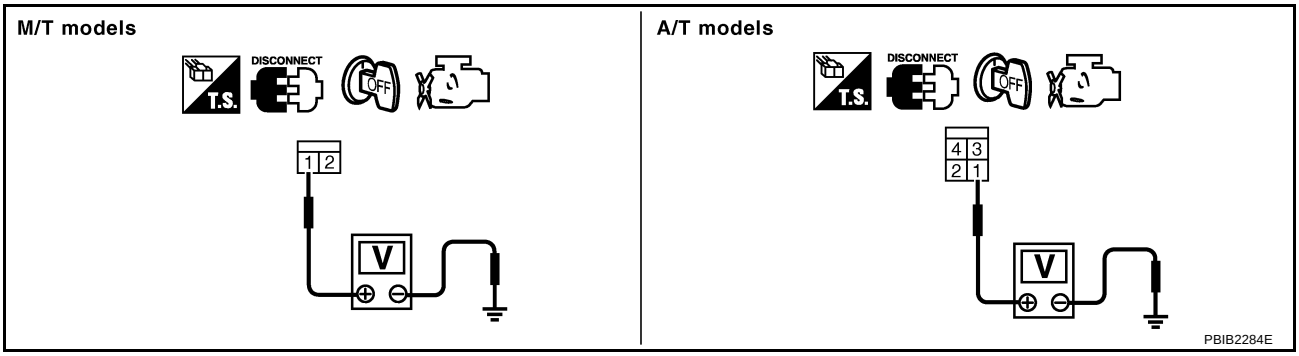
OK >> GO TO 15.
NG >> Replace ASCD brake switch.

11. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.



Voltage: Battery voltage

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 15A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 101 and stop lamp switch terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 14.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

14. CHECK STOP LAMP SWITCH

Refer to EC-955, "Component Inspection"

OK or NG

OK >> GO TO 15.
NG >> Replace stop lamp switch.

15. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

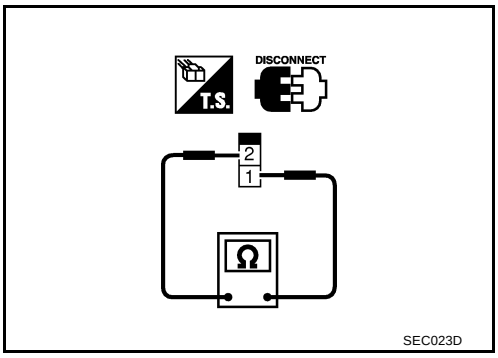
Component Inspection

BBS001V6

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

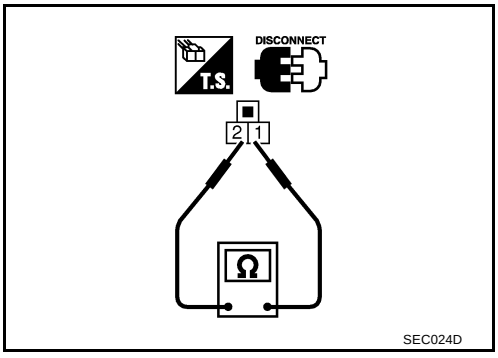


If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

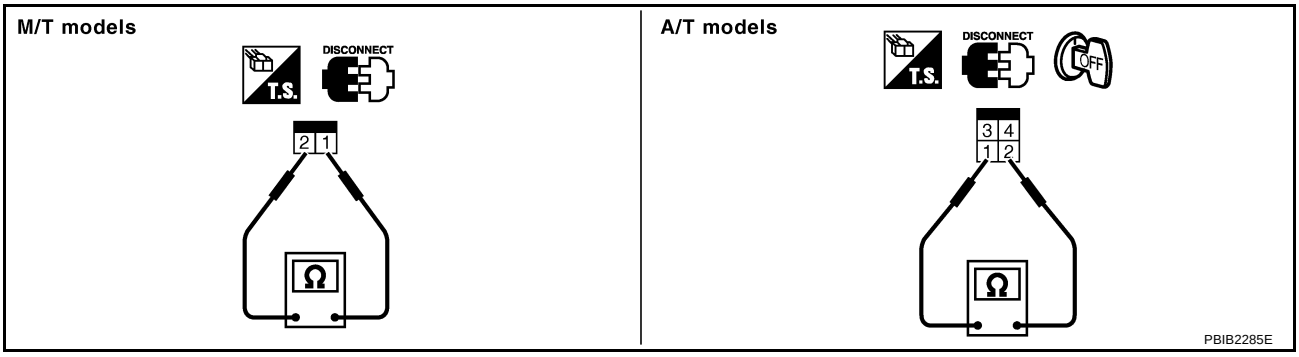
Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist



If NG, adjust ASCD clutch switch installation, refer to CL-5, "CLUTCH PEDAL" , and perform step 3 again.

STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.



Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

ASCD INDICATOR

PFP:24814

Component Description

BBS001V7

ASCD indicator lamp illuminates to indicate ASCD operation status. Lamp has two indicators, CRUISE, SET, and is integrated in combination meter.
CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET indicator illuminates when following conditions are met.

- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

SET indicator remains lit during ASCD control.
Refer to EC-971, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

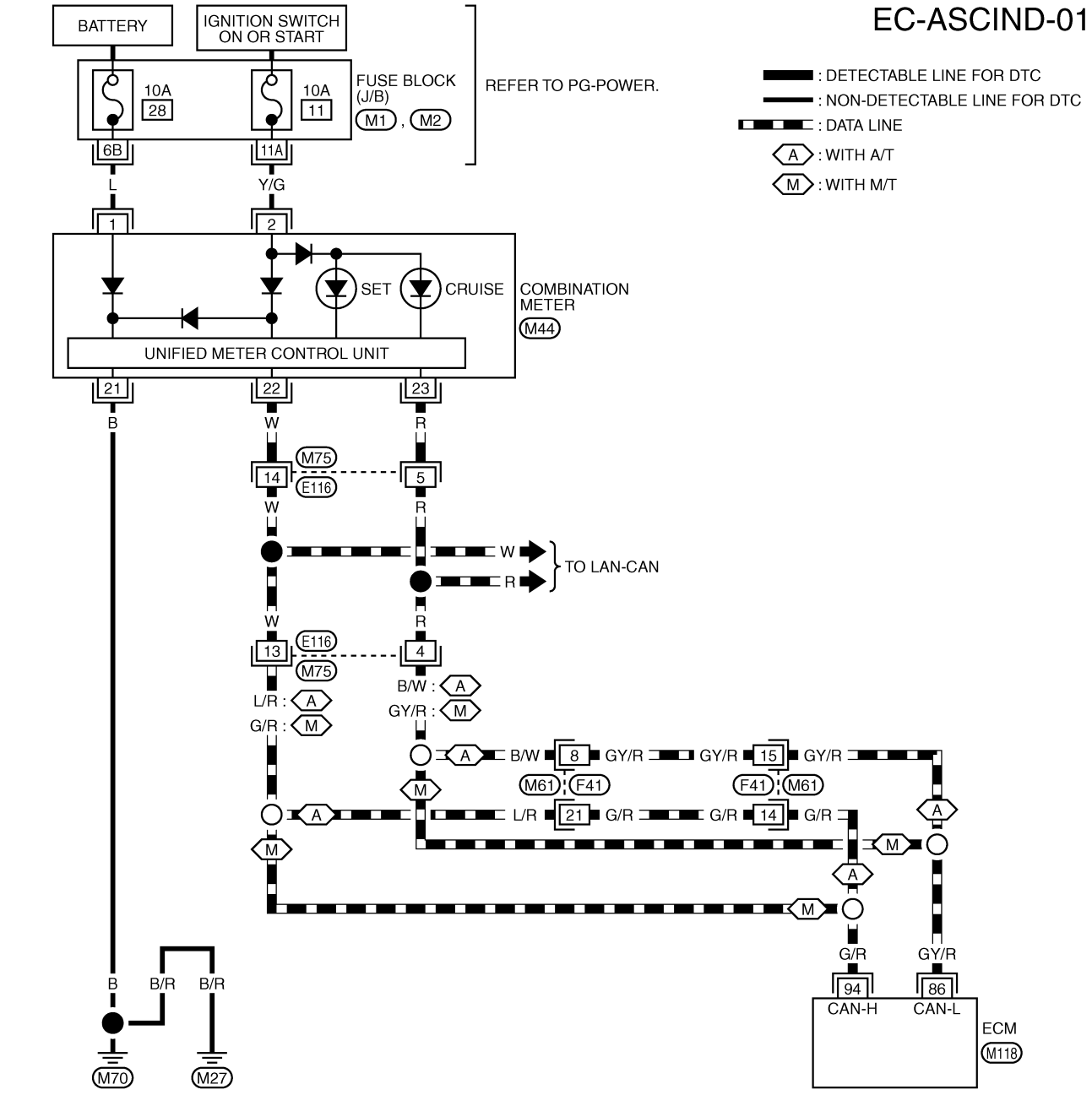
BBS001V8

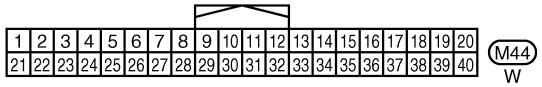
Specification data are reference value.

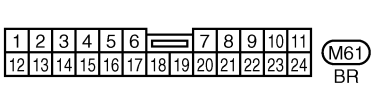
MONITOR ITEM	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● Vehicle speed is between40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

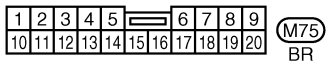
Wiring Diagram
LHD MODELS

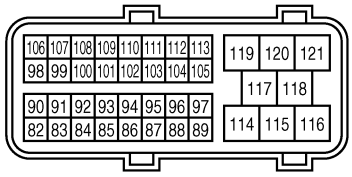
BBS001V9









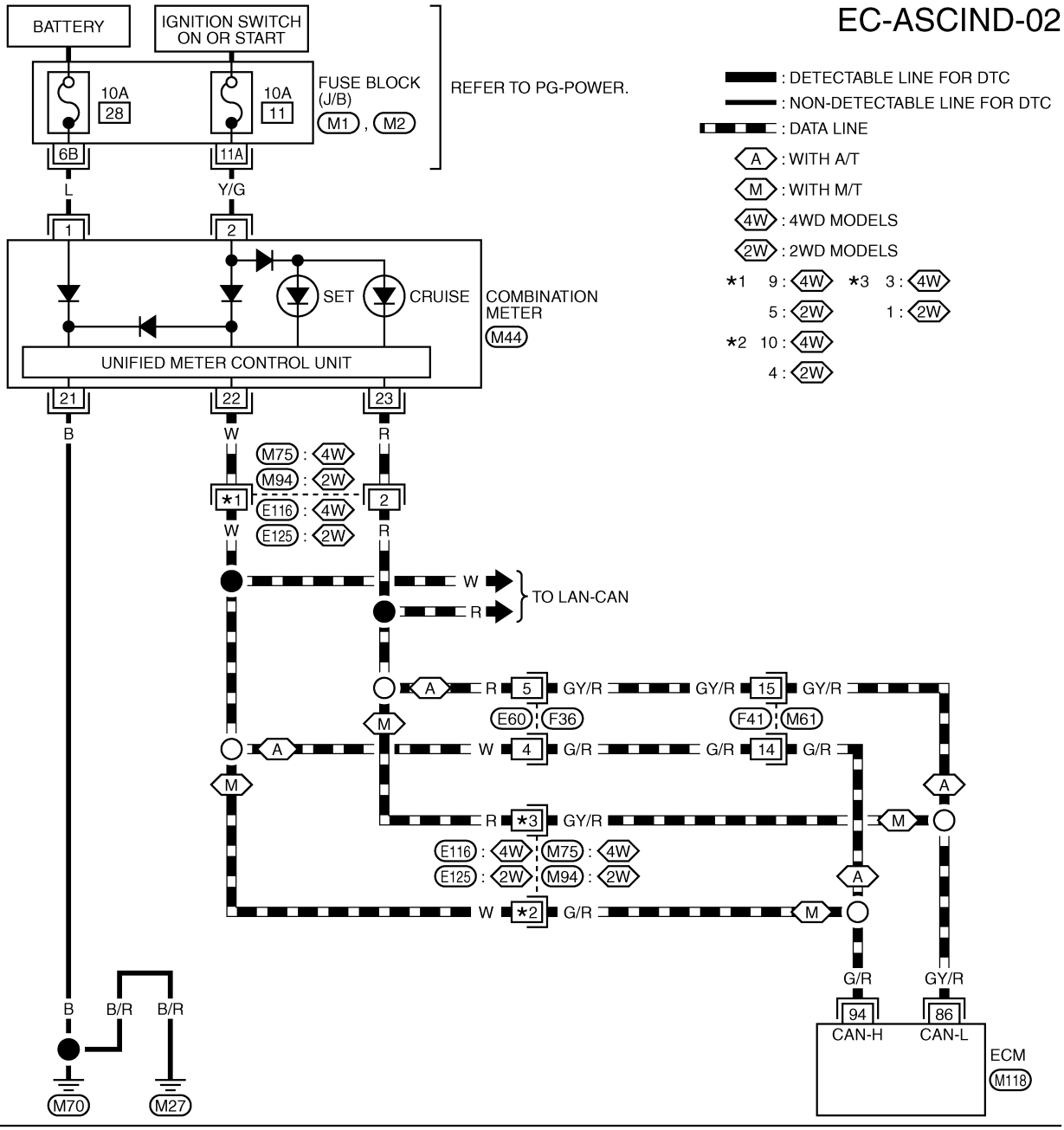


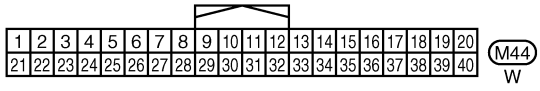
REFER TO THE FOLLOWING.
M1, M2 -FUSE BLOCK-JUNCTION BOX (J/B)

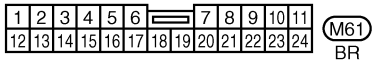
TBWA0764E

RHD MODELS

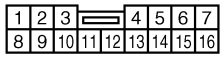
EC-ASCIND-02

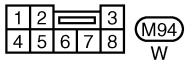


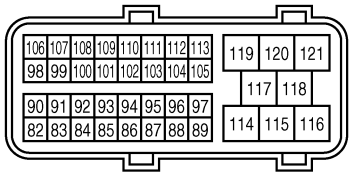


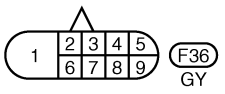


REFER TO THE FOLLOWING.
M1 , M2 -FUSE BLOCK-JUNCTION BOX (J/B)









TBWB0687E

Diagnostic Procedure

BBS001VA

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 144 km/h (89 MPH)	ASCD: Operating	ON
		ASCD: Not operating	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK DTC

Check that DTC U1000 or U1001 is not displayed.

OK or NG

OK >> GO TO 3.
NG >> Perform trouble diagnoses for DTC U1000, U1001. Refer to EC-635, "DTC U1000, U1001 CAN COMMUNICATION LINE" .

3. CHECK COMBINATION METER FUNCTION

Refer to DI-4, "COMBINATION METERS" .

OK or NG

OK >> GO TO 4.
NG >> Replace combination meter.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-626, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

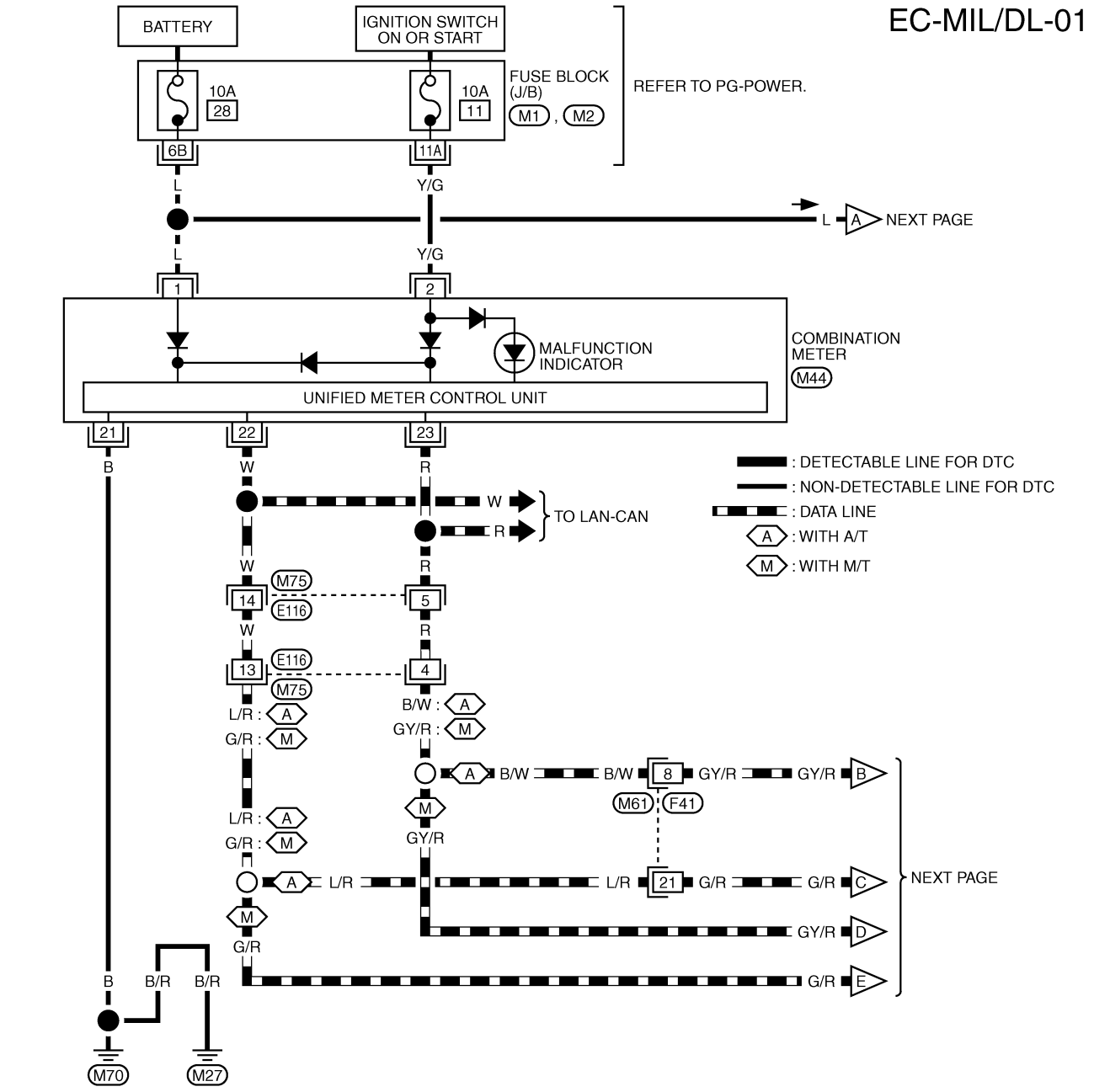
MI & DATA LINK CONNECTORS

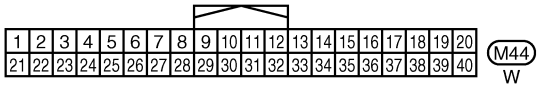
PFP:24814

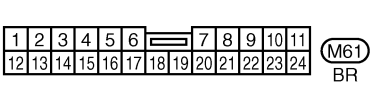
Wiring Diagram

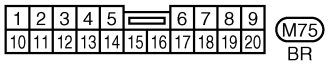
BBS001VB

LHD MODELS





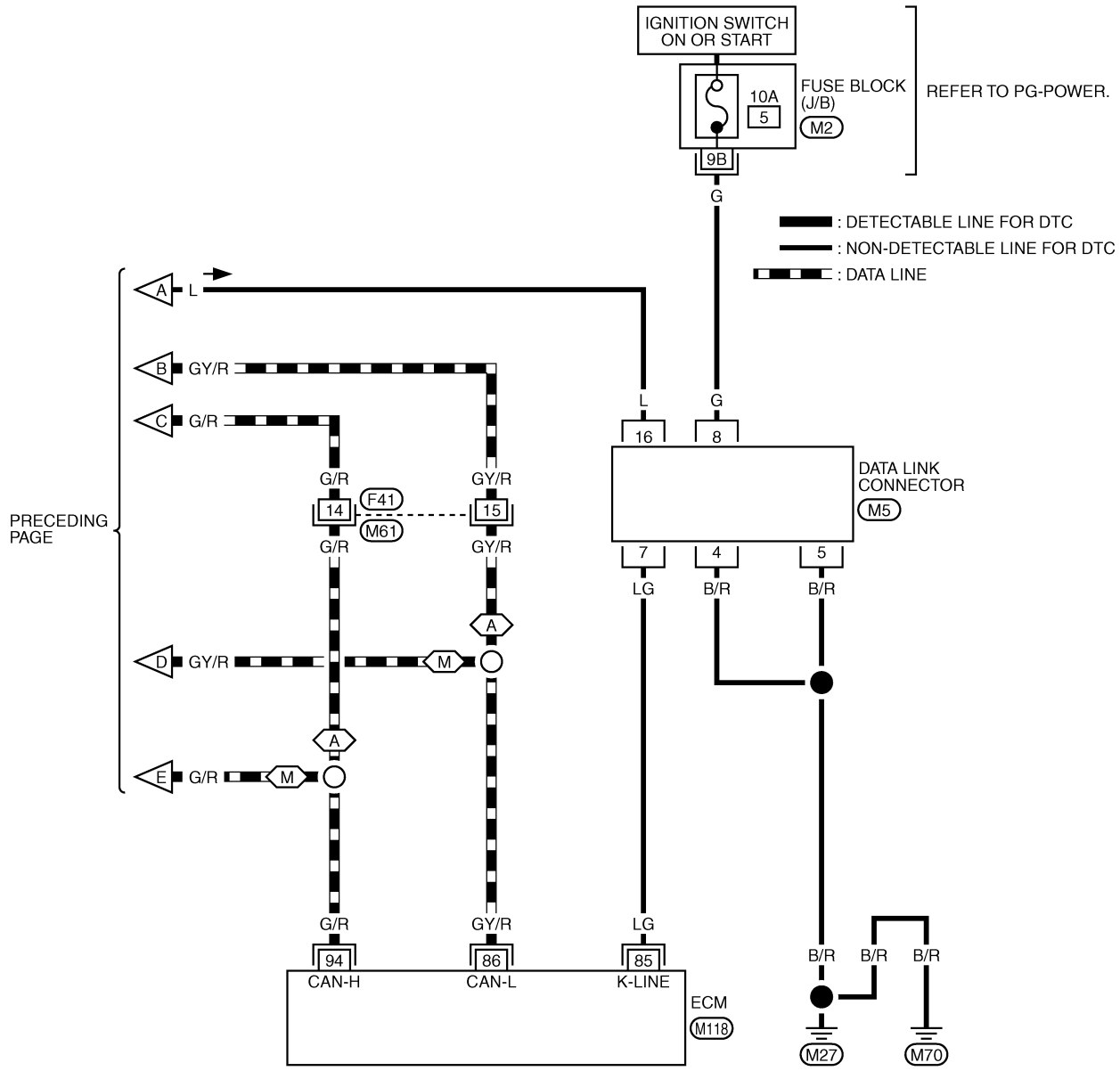


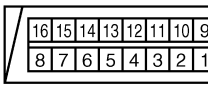


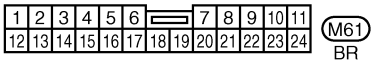
REFER TO THE FOLLOWING.
M1 , M2 -FUSE BLOCK-JUNCTION BOX (J/B)

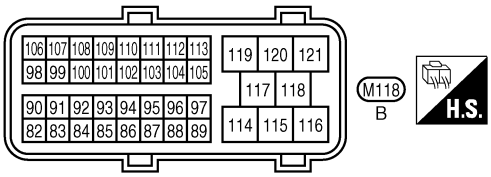
TBWA0639E

EC-MIL/DL-02







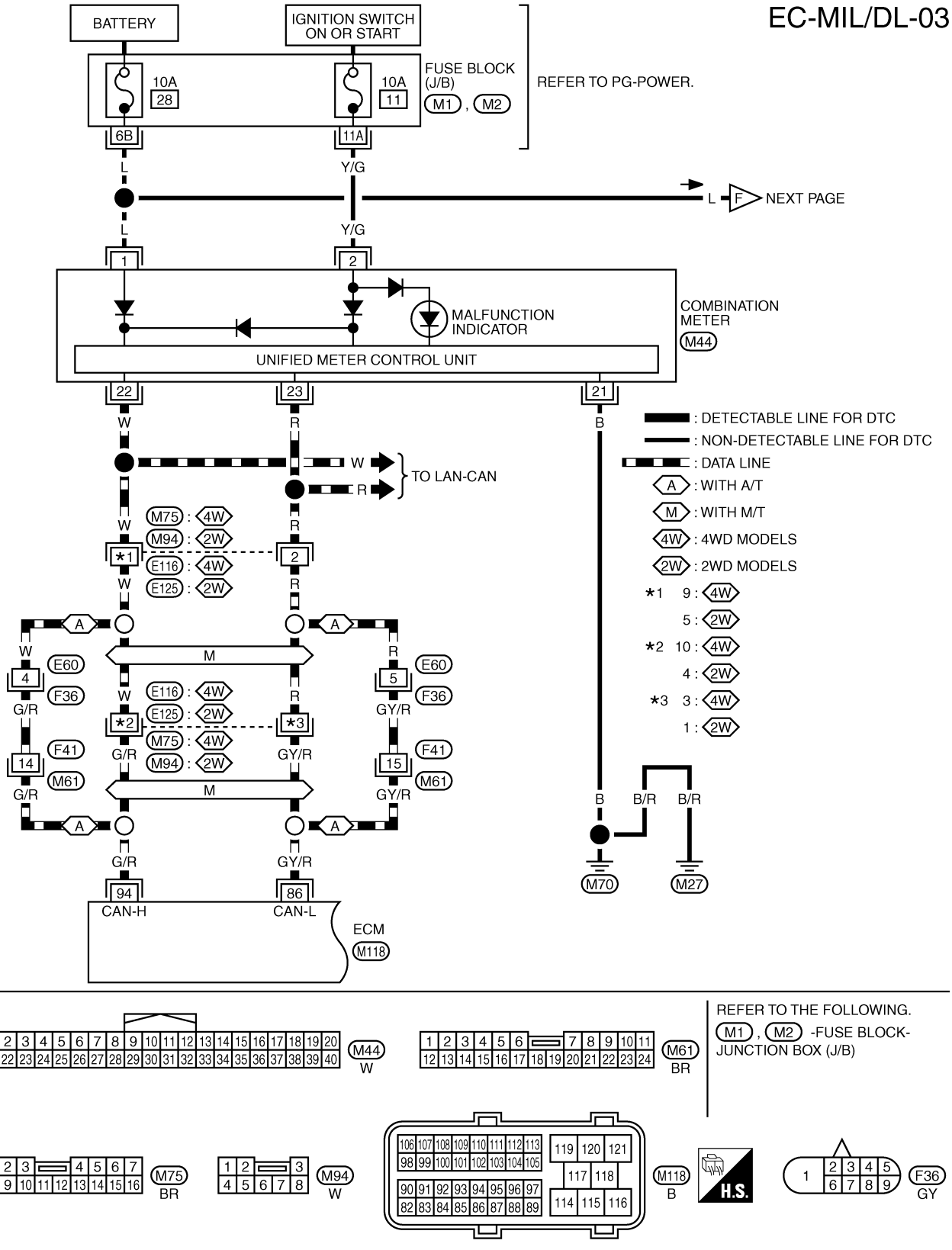


REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0640E

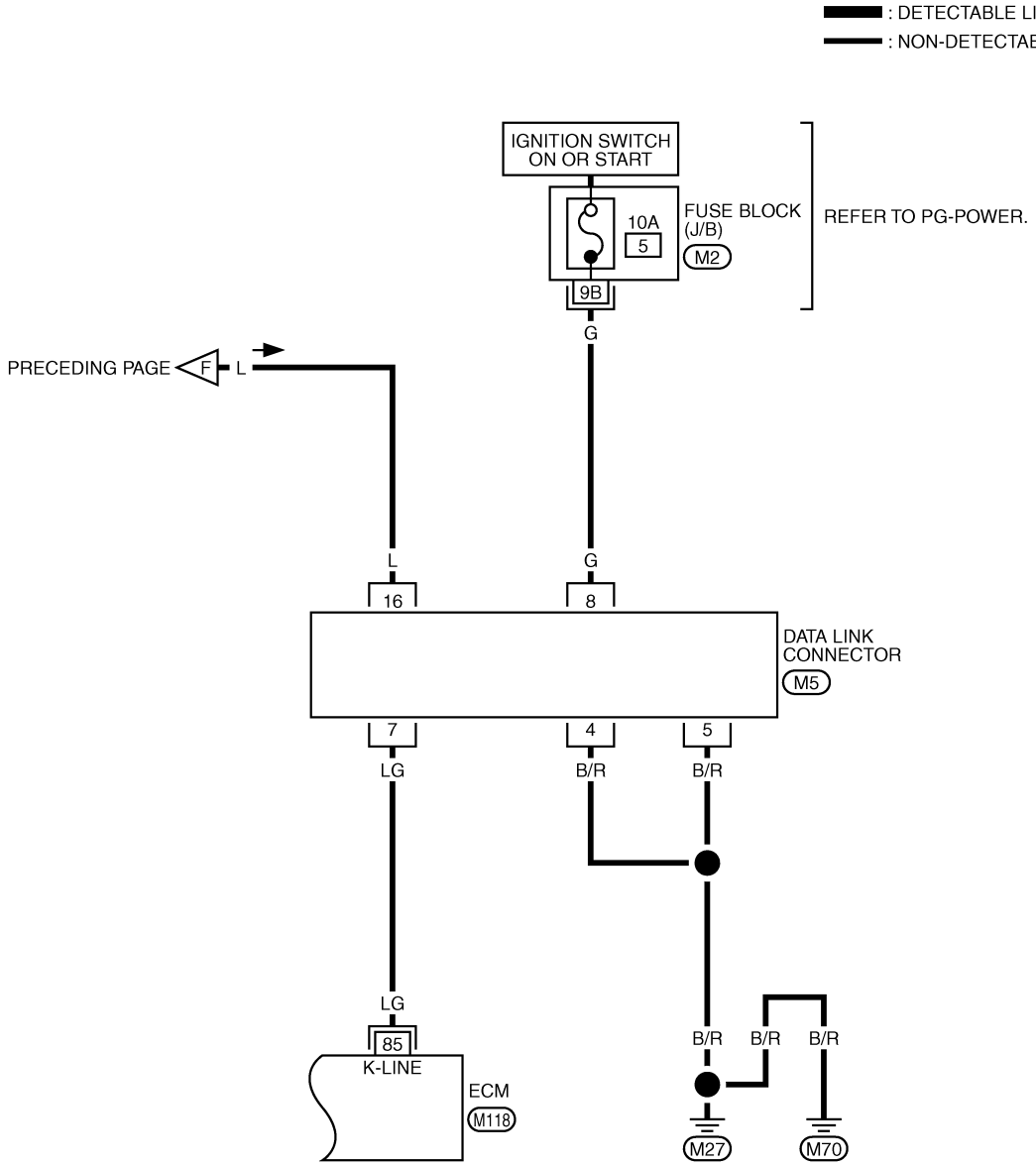
RHD MODELS

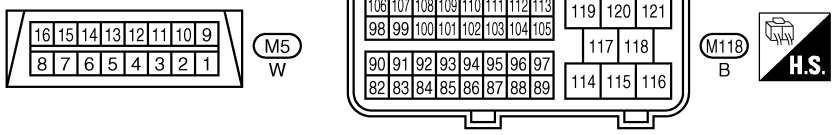
EC-MIL/DL-03



TBWB0688E

EC-MIL/DL-04





REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0642E

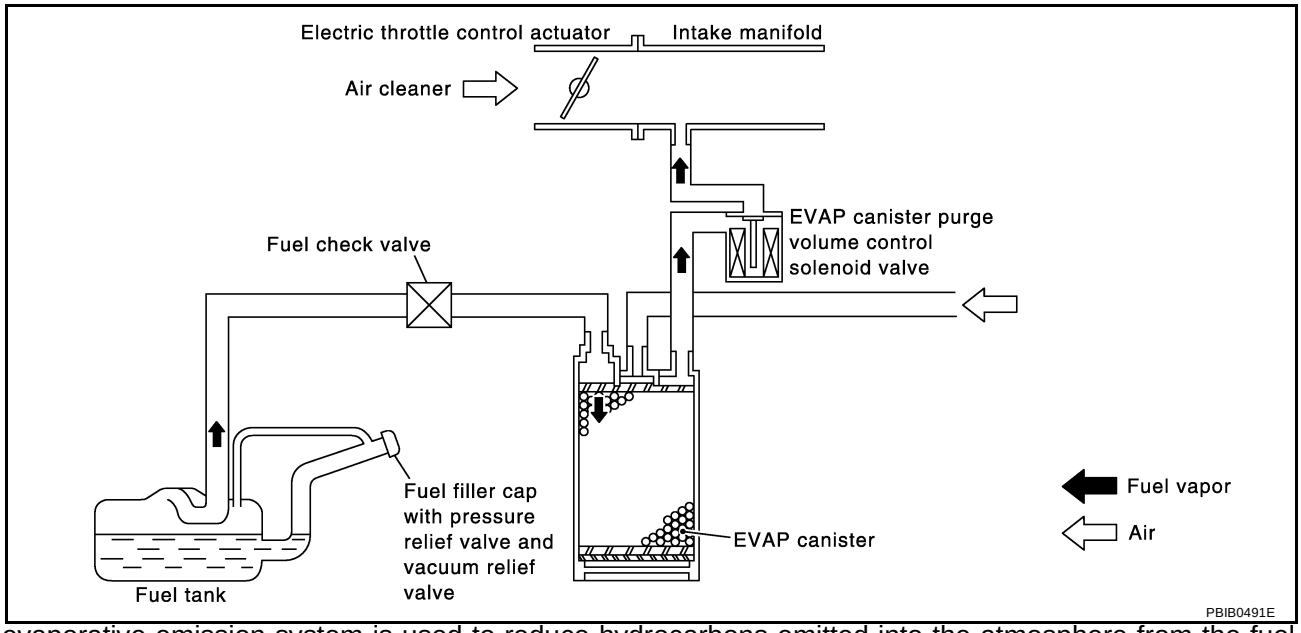
EVAPORATIVE EMISSION SYSTEM

PFP:14950

Description

BBS001VC

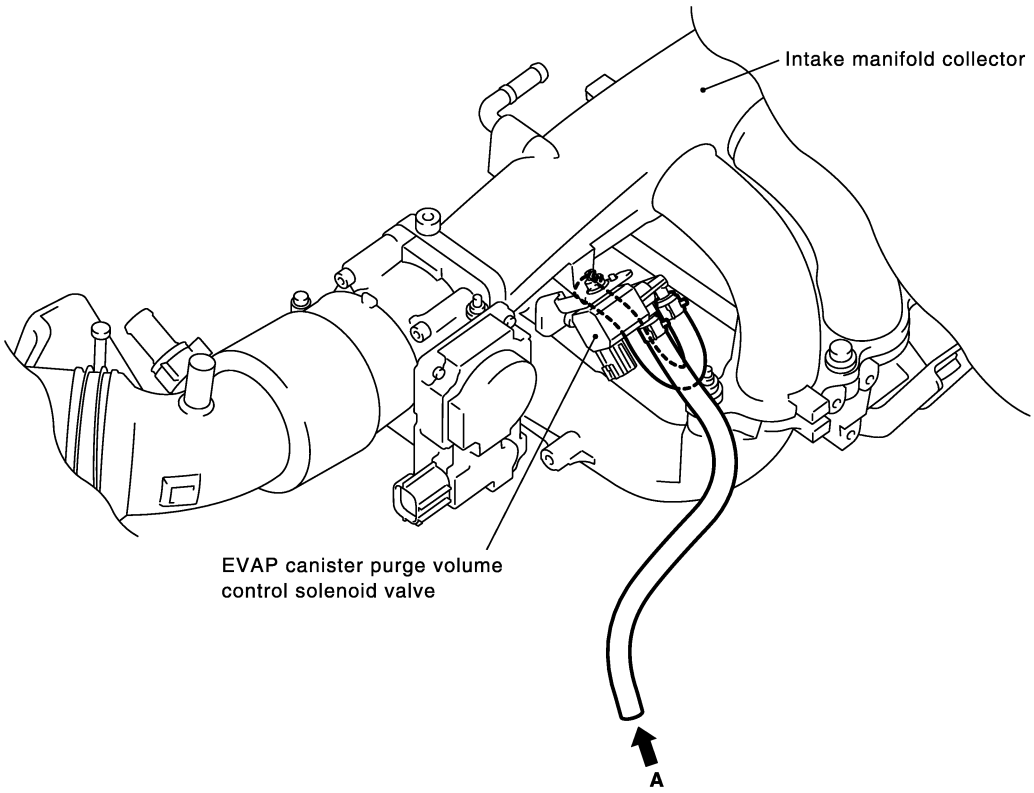
SYSTEM DESCRIPTION

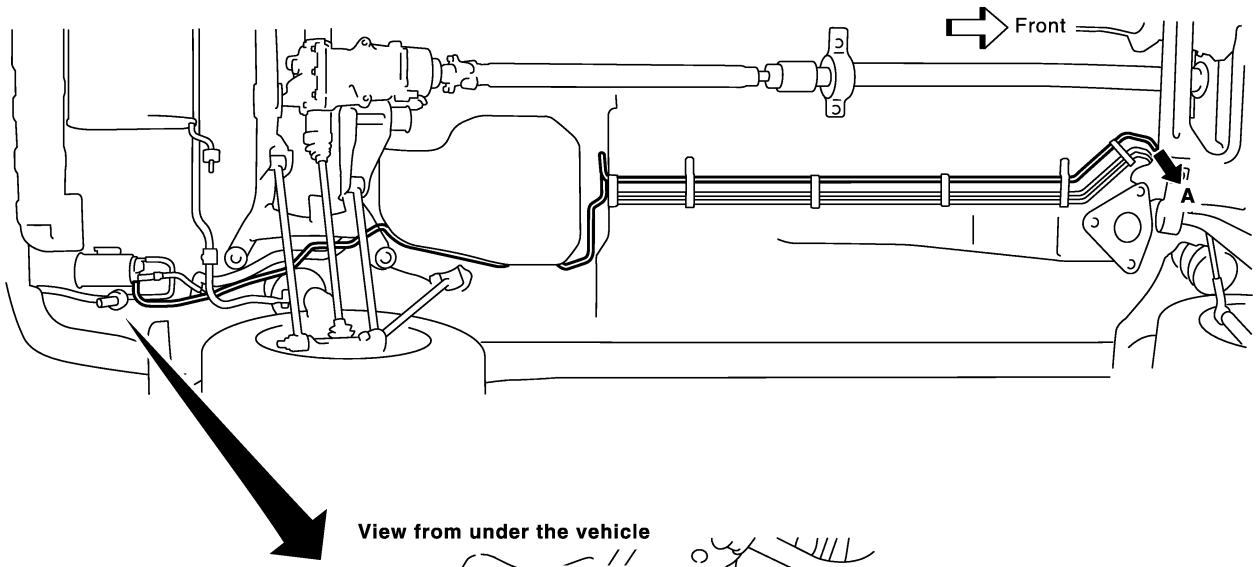


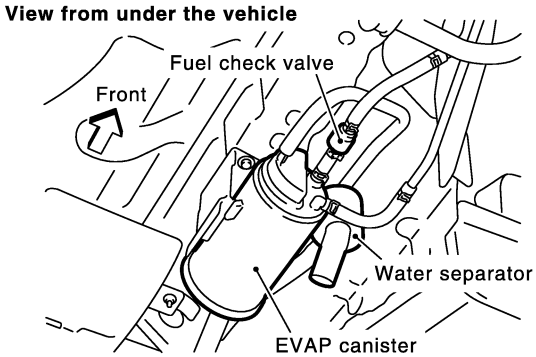
The evaporative emission system is used to reduce hydrocarbons emitted into the atmosphere from the fuel system. This reduction of hydrocarbons is accomplished by activated charcoals in the EVAP canister.
The fuel vapor in the sealed fuel tank is led into the EVAP canister which contains activated carbon and the vapor is stored there when the engine is not operating or when refueling to the fuel tank.
The vapor in the EVAP canister is purged by the air through the purge line to the intake manifold when the engine is operating. EVAP canister purge volume control solenoid valve is controlled by ECM. When the engine operates, the flow rate of vapor controlled by EVAP canister purge volume control solenoid valve is proportionally regulated as the air flow increases.
EVAP canister purge volume control solenoid valve also shuts off the vapor purge line during decelerating and idling.

EVAPORATIVE EMISSION LINE DRAWING

QR20DE Engine Models



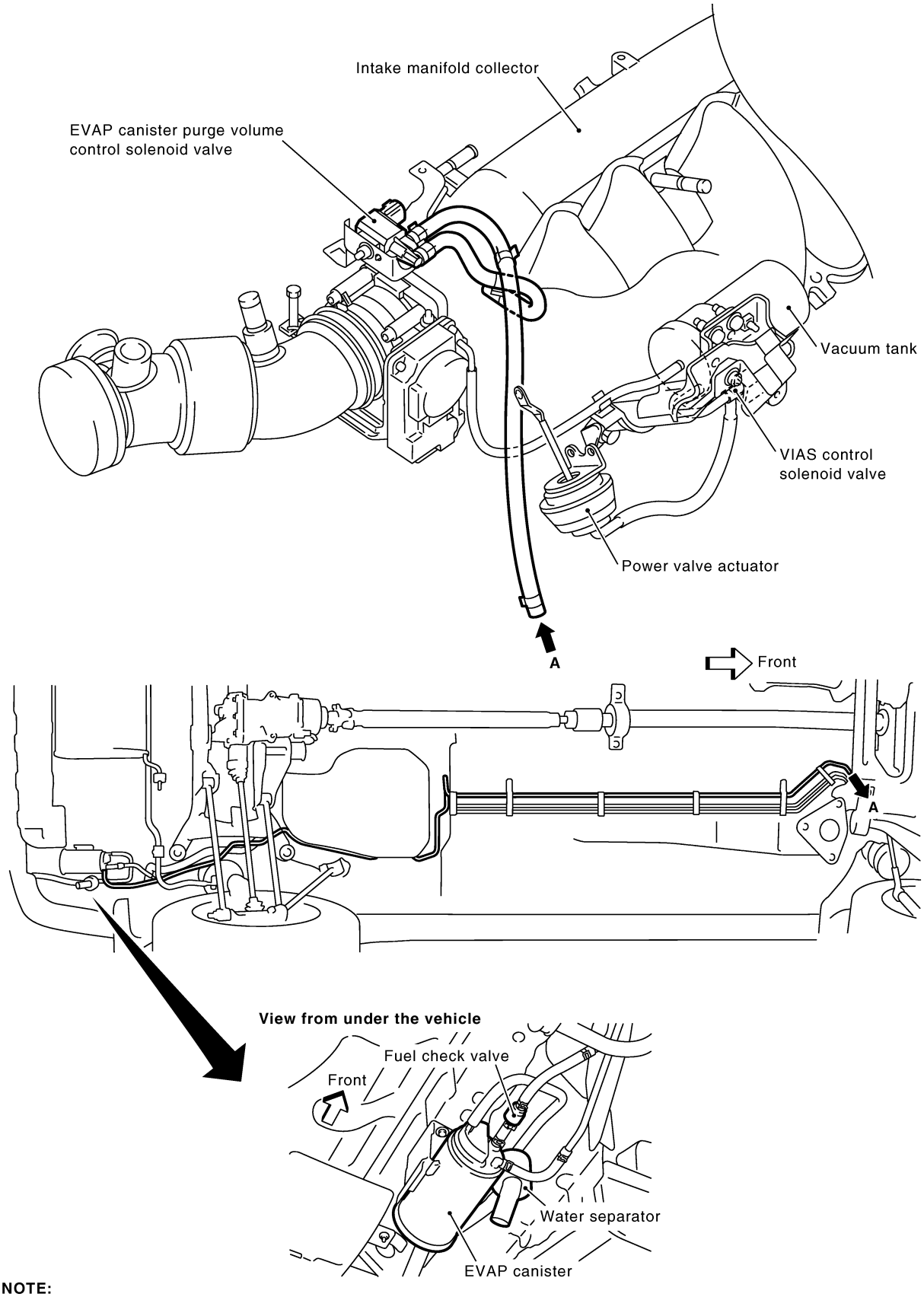




NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB0490E

QR25DE Engine Models



NOTE:
Do not use soapy water or any type of solvent while installing vacuum hose or purge hoses.

PBIB1998E

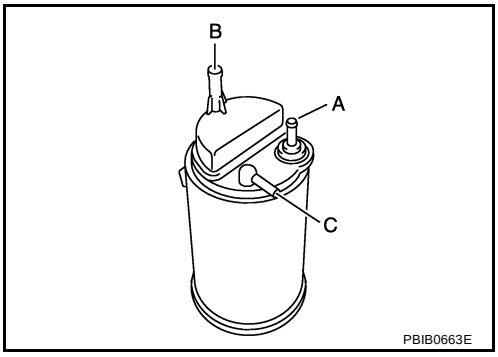
Component Inspection

BBS001VD

EVAP CANISTER

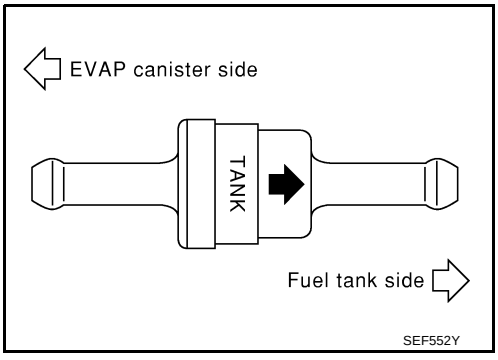
Check EVAP canister as follows:

1. Block port **B** . Orally blow air through port **A** . Check that air flows freely through port **C** .
2. Block port **A** . Orally blow air through port **B** . Check that air flows freely through port **C** .



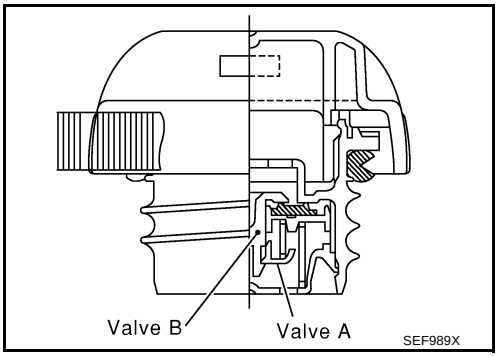
FUEL CHECK VALVE

1. Blow air through connector on fuel tank side.
   A considerable resistance should be felt and a portion of air flow should be directed toward the EVAP canister side.
2. Blow air through connector on EVAP canister side.
   Air flow should be smoothly directed toward fuel tank side.
3. If fuel check valve is suspected of not properly functioning in steps 1 and 2 above, replace it.



FUEL TANK VACUUM RELIEF VALVE (BUILT INTO FUEL FILLER CAP)

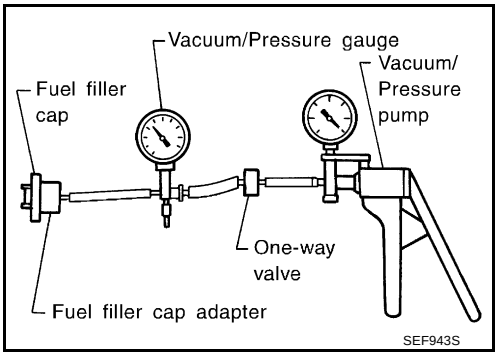
1. Wipe clean valve housing.



2. Check valve opening pressure and vacuum.

Pressure:	**15.3 - 20.0 kPa (0.153 - 0.200 bar, 0.156 - 0.204 kg/cm^2 , 2.22 - 2.90 psi)**
Vacuum:	**–6.0 to –3.4 kPa (–0.060 to –0.034 bar, –0.061 to –0.035 kg/cm^2 , –0.87 to –0.49 psi)**

3. If out of specification, replace fuel filler cap as an assembly.

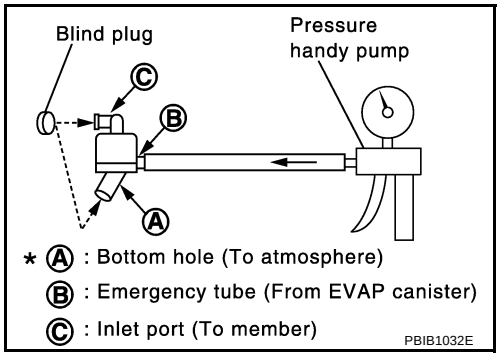


WATER SEPARATOR

1. Check visually for insect nests in the water separator air inlet.
2. Check visually for cracks or flaws in the appearance.
3. Check visually for cracks or flaws in the hose.
4. Check that **A** and **C** are not clogged by blowing air into **B** with **A** , and then **C** plugged.
5. In case of NG in items 2 - 4, replace the parts.

NOTE:

- Do not disassemble water separator.



EVAP CANISTER PURGE VOLUME CONTROL SOLENOID VALVE

Refer to EC-892, "Component Inspection" .

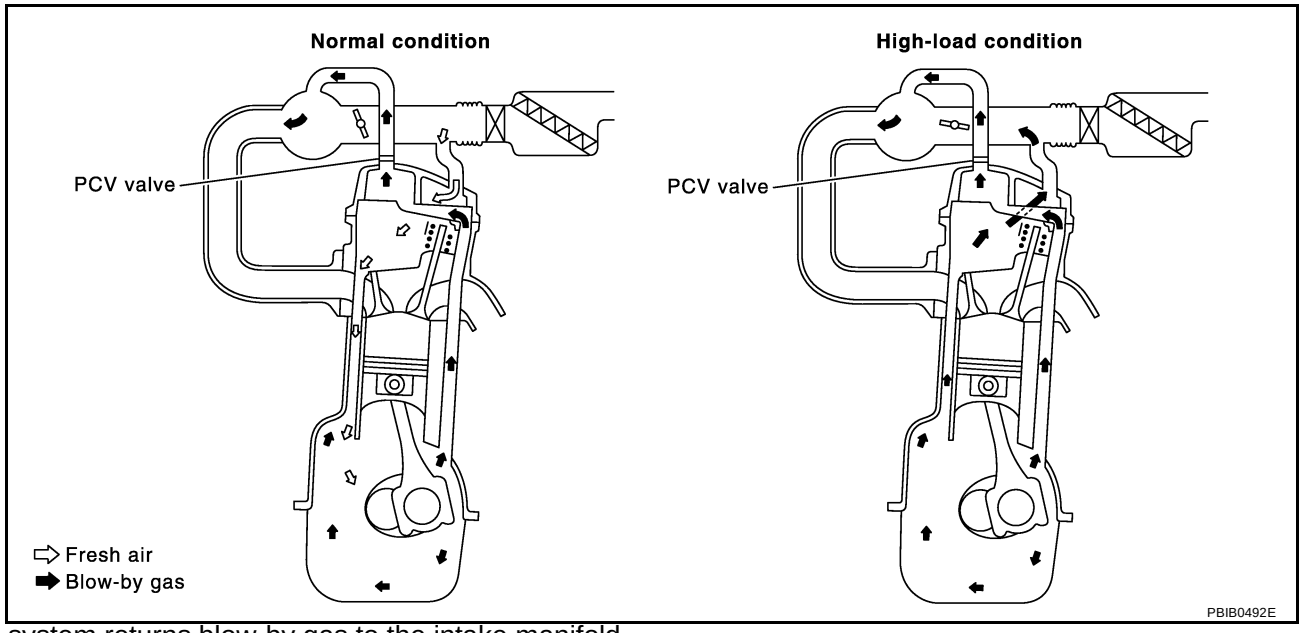
POSITIVE CRANKCASE VENTILATION

PFP:11810

Description

BBS001VE

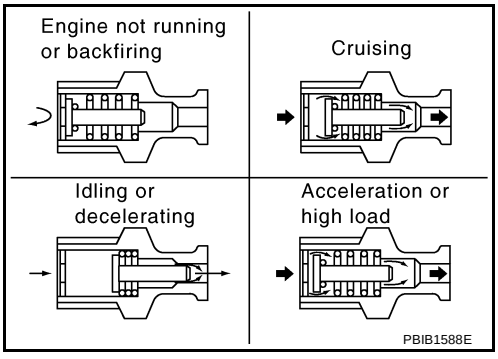
SYSTEM DESCRIPTION



This system returns blow-by gas to the intake manifold.

The positive crankcase ventilation (PCV) valve is provided to conduct crankcase blow-by gas to the intake manifold. During partial throttle operation of the engine, the intake manifold sucks the blow-by gas through the PCV valve. Normally, the capacity of the valve is sufficient to handle any blow-by and a small amount of ventilating air. The ventilating air is then drawn from the air inlet tubes into the crankcase. In this process the air passes through the hose connecting air inlet tubes to rocker cover. Under full-throttle condition, the manifold vacuum is insufficient to draw the blow-by flow through the valve. The flow goes through the hose connection in the reverse direction.

On vehicles with an excessively high blow-by, the valve does not meet the requirement. This is because some of the flow will go through the hose connection to the air inlet tubes under all conditions.

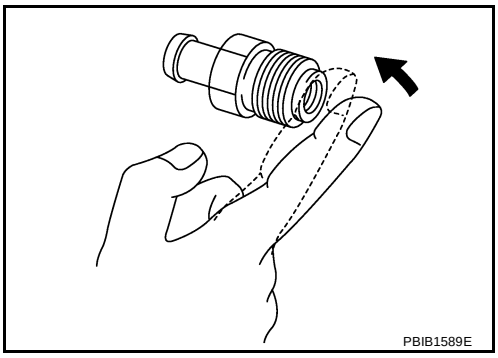


Component Inspection

BBS001VF

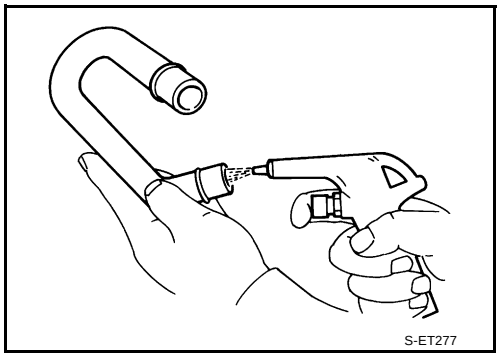
PCV (POSITIVE CRANKCASE VENTILATION) VALVE

With engine running at idle, remove PCV valve from rocker cover. A properly working valve makes a hissing noise as air passes through it. A strong vacuum should be felt immediately when a finger is placed over valve inlet.



PCV VALVE VENTILATION HOSE

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



AUTOMATIC SPEED CONTROL DEVICE (ASCD)

PFP:18930

System Description

BBS001VG

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Electric throttle control actuator
Stop lamp switch	Brake pedal operation		
ASCD clutch switch (M/T models)	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Park/Neutral position (PNP) switch	Gear position		
Wheel sensor*	Vehicle speed		

*: This signal is sent to the ECM through CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH).
ECM controls throttle angle of electric throttle control actuator to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

NOTE:
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws.

SET OPERATION

Press ASCD MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 144 km/h (89 MPH), press SET/COAST switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is pressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is pressed
- More than 2 switches at ASCD steering switch are pressed at the same time (Set speed will be cleared)
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to the neutral position
- Vehicle speed decreased to 13 km/h (8 MPH) lower than the set speed
- ESP/TCS system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Engine coolant temperature is slightly higher than the normal operating temperature, CRUISE lamp may blink slowly.
  When the engine coolant temperature decreases to the normal operating temperature, CRUISE lamp will stop blinking and the cruise operation will be able to work by pressing SET/COAST switch or RESUME/ACCELERATE switch.
- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is pressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is pressed after cancel operation other than pressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is fully released
- Clutch pedal is fully released (M/T models)
- A/T selector lever is in other than P and N position (A/T models)
- Vehicle speed is greater than 40 km/h (25 MPH) and less than 144 km/h (89 MPH)

Component Description

BBS001VH

ASCD STEERING SWITCH

Refer to EC-782 .

ASCD BRAKE SWITCH

Refer to EC-792 and EC-948 .

ASCD CLUTCH SWITCH

Refer to EC-792 and EC-948

STOP LAMP SWITCH

Refer to EC-792 , EC-811 and EC-948 .

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EC-725 , EC-728 , EC-739 and EC-747 .

ASCD INDICATOR

Refer to EC-956 .

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00030

Fuel Pressure

BBS001VI

Fuel pressure at idle	Approximately 350 kPa (3.5bar, 3.57kg/cm^2 , 51psi)

Idle Speed and Ignition Timing

BBS001VJ

Target idle speed	QR20DE	M/T	No load* (in Neutral position)	650±50 rpm
		A/T	No load* (in P or N position)	700±50 rpm
	QR25DE	M/T	No load* (in Neutral position)	
		A/T	No load* (in P or N position)	
Air conditioner: ON	QR20DE	M/T	In Neutral position	725 rpm or more
		A/T	In P or N position	
	QR25DE	M/T	In Neutral position	750 rpm or more
		A/T	In P or N position	700 rpm or more
Ignition timing	QR20DE	M/T	In Neutral position	15°±5° BTDC
		A/T	In P or N position	
	QR25DE	M/T	In Neutral position	
		A/T	In P or N position	

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

BBS001VK

Supply voltage	Battery voltage (11 - 14V)
Output voltage at idle	0.7 - 1.1*V (QR20DE) 0.8 - 1.2*V (QR25DE)

*: Engine is warmed up to normal operating temperature and running under no-load.

Intake Air Temperature Sensor

BBS001VL

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200
80 (176)	0.283 - 0.359

Engine Coolant Temperature Sensor

BBS001VM

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Heated Oxygen Sensor 1 Heater

BBS001VN

Resistance [at 25°C (77°F)]	3.3 - 4.0Ω

Heated Oxygen sensor 2 Heater

BBS001VO

Resistance [at 25°C (77°F)]	5.0 - 7.0Ω

Crankshaft Position Sensor (POS)

BBS001VP

Refer to EC-701, "Component Inspection" .

Camshaft Position Sensor (PHASE)

BBS001VQ

Refer to EC-710, "Component Inspection" .

Throttle Control Motor

BBS001VR

Resistance [at 25°C (77°F)]	Approximately 1 - 15Ω

Injector

BBS001VS

Resistance [at 10 - 60°C (50 - 140°F)]	13.5 - 17.5Ω

Fuel Pump

BBS001VT

Resistance [at 25°C (77°F)]	Approximately 0.2 - 5.0Ω

INDEX FOR DTC

PFP:00024

Alphabetical Index

BBS001VU

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to GI-46, "IDENTIFICATION PLATE" .

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1068, "DTC U1000 CAN COMMUNICATION LINE" .

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
A/F SEN1 HTR*5	P0135	0135	3	×	EC-1135
A/F SENSOR1*5	P0130	0130	3	×	EC-1120
A/F SENSOR1*5	P0131	0131	3	×	EC-1125
A/F SENSOR1*5	P0132	0132	3	×	EC-1125
A/F SENSOR1*5	P0134	0134	3	×	EC-1130
A/F SENSOR1*5	P2297	2297	3	×	EC-1395
APP SEN 1/CIRCUIT	P0122	0122	1	—	EC-1113
APP SEN 1/CIRCUIT	P0123	0123	1	—	EC-1113
APP SEN 2/CIRCUIT	P0222	0222	1	—	EC-1176
APP SEN 2/CIRCUIT	P0223	0223	1	—	EC-1176
APP SENSOR	P2135	2135	1	—	EC-1376
BARO SEN/CIRC	P2228	2228	3	×	EC-1393
BARO SEN/CIRC	P2229	2229	3	×	EC-1393
BATTERY VOLTAGE	P0563	0563	1	—	EC-1284
BRAKE SW/CIRCUIT	P0504	0504	1	—	EC-1275
CAN COMM CIRCUIT	U1000	1000*4	1	—	EC-1068
CKP SEN/CIRCUIT	P0335	0335	3	×	EC-1196
CKP SENSOR	P0336	0336	3	×	EC-1202
CMP SEN/CIRCUIT	P0340	0340	3	×	EC-1208
CMP SENSOR	P0341	0341	3	×	EC-1214
CMP/CKP RELATION	P0016	0016	3	×	EC-1071
CYL1 INJECTOR	P0201	0201	3	×	EC-1153
CYL2 INJECTOR	P0202	0202	3	×	EC-1153
CYL3 INJECTOR	P0203	0203	3	×	EC-1153
CYL4 INJECTOR	P0204	0204	3	×	EC-1153
DFF PRESS SEN/CIRC*5	P0472	0472	3	×	EC-1258
DFF PRESS SEN/CIRC*5	P0473	0473	3	×	EC-1258
DIFF EX PRESS SEN*5	P0471	0471	1	—	EC-1250
DIFF EX PRESS SEN*5	P0478	0478	1	—	EC-1266
E/R AIR TMP S/CIRC*5	P1472	1472	3	×	EC-1354
E/R AIR TMP S/CIRC*5	P1473	1473	3	×	EC-1354
ECM	P0605	0605	3	×	EC-1296
ECM	P0606	0606	3	×	EC-1298

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
ECM	P1616	1616	1	—	EC-1360
ECM RELAY	P0686	0686	1	—	EC-1318
ECT SEN/CIRCUIT	P0117	0117	3	×	EC-1107
ECT SEN/CIRCUIT	P0118	0118	3	×	EC-1107
EGR SYSTEM	P0401	0401	3	×	EC-1224
EGR VALVE	P0404	0404	3	×	EC-1231
ENG OVER TEMP	P0217	0217	1	×	EC-1160
ETC ACTR*5	P0638	0638	1	—	EC-1305
ETC ACTR*5	P2119	2119	1	—	EC-1374
ETC MOT*5	P2118	2118	3	×	EC-1369
FR EX TMP SEN/CIRC*5	P0427	0427	3	×	EC-1238
FR EX TMP SEN/CIRC*5	P0428	0428	3	×	EC-1238
FRP RELIEF VALVE	P1272	1272	3	×	EC-1332
FRP SEN/CIRC	P0192	0192	3	×	EC-1145
FRP SEN/CIRC	P0193	0193	3	×	EC-1145
FUEL LEAK	P0093	0093	3	×	EC-1082
FUEL PUMP	P0089	0089	3	×	EC-1080
FUEL PUMP	P1273	1273	3	×	EC-1338
FUEL PUMP	P1274	1274	1	×	EC-1344
FUEL PUMP	P1275	1275	1	×	EC-1349
FUEL PUMP/CIRC	P0628	0628	3	×	EC-1300
FUEL PUMP/CIRC	P0629	0629	3	×	EC-1300
FUEL TEMP SEN/CIRC	P0182	0182	3	×	EC-1141
FUEL TEMP SEN/CIRC	P0183	0183	3	×	EC-1141
GLOW RELAY	P0380	0380	3	×	EC-1220
HIGH FUEL PRESS	P0088	0088	3	×	EC-1078
IAT SEN/CIRCUIT	P0112	0112	3	×	EC-1102
IAT SEN/CIRCUIT	P0113	0113	3	×	EC-1102
INJ ADJ VAL ERROR	P1623	1623	1	—	EC-1364
INJ ADJ VAL UNRGST	P1622	1622	1	—	EC-1362
INJ PWR/CIRC	P2146	2146	3	×	EC-1383
INJ PWR/CIRC	P2149	2149	3	×	EC-1383
INJECTOR	P0200	0200	3	×	EC-1151
INJECTOR/CIRC	P2147	2147	3	×	EC-1387
INJECTOR/CIRC	P2148	2148	3	×	EC-1387
INJECTOR 1	P1268	1268	1	—	EC-1324
INJECTOR 2	P1269	1269	1	—	EC-1324
INJECTOR 3	P1270	1270	1	—	EC-1324
INJECTOR 4	P1271	1271	1	—	EC-1324
MAF SEN/CIRCUIT	P0102	0102	3	×	EC-1095
MAF SEN/CIRCUIT	P0103	0103	3	×	EC-1095
MAF SENSOR	P0101	0101	3	×	EC-1086

Items (CONSULT-II screen terms)	DTC*1		Trip	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	1	—	BL-107
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—
PM OVER ACCMLT*5	P2002	2002	1	—	EC-1366
RR EX TMP SEN/CIRC*5	P0437	0437	3	×	EC-1244
RR EX TMP SEN/CIRC*5	P0438	0438	3	×	EC-1244
SENSOR PWR/CIRC1	P0642	0642	3	×	EC-1307
SENSOR PWR/CIRC1	P0643	0643	3	×	EC-1307
SENSOR PWR/CIRC2	P0652	0652	3	×	EC-1312
SENSOR PWR/CIRC2	P0653	0653	3	×	EC-1312
STRG SW/CIRC	P0580	0580	1	—	EC-1287
STRG SW/CIRC	P0581	0581	1	—	EC-1287
TC BOOST SEN/CIRC	P0237	0237	3	×	EC-1189
TC BOOST SEN/CIRC	P0238	0238	3	×	EC-1189
TC BOOST SOL/CIRC	P0045	0045	3	×	EC-1073
TC SYSTEM	P0234	0234	1	—	EC-1183
TCS/CIRC	P1212	1212	1	—	EC-1323
TCS C/U FUNCTN	P1211	1211	1	—	EC-1322
TP SEN/CIRCUIT*5	P2621	2621	3	×	EC-1398
TP SEN/CIRCUIT*5	P2622	2622	3	×	EC-1398
VEHICLE SPEED	P0501	0501	1	—	EC-1269
VEHICLE SPEED	P0502	0502	1	—	EC-1271
VEHICLE SPEED	P0503	0503	1	—	EC-1273

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.
*2: This number is prescribed by ISO 15031-6.
*3: In Diagnostic Test Mode II (Self-diagnostic results).
*4: The troubleshooting for this DTC needs CONSULT-II.
*5: Models with DPF.

DTC No. Index

BBS001VV

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to GI-46, "IDENTIFICATION PLATE" .

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1068, "DTC U1000 CAN COMMUNICATION LINE" .

X: Applicable —: Not applicable

DTC*1		Items (CONSULT-II screen item)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
U1000	1000*4	CAN COMM CIRCUIT	1	—	EC-1068
P0000	**0000**	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—	—
P0016	0016	CMP/CKP RELATION	3	×	EC-1071
P0045	0045	TC BOOST SOL/CIRC	3	×	EC-1073
P0088	0088	HIGH FUEL PRESS	3	×	EC-1078
P0089	0089	FUEL PUMP	3	×	EC-1080
P0093	0093	FUEL LEAK	3	×	EC-1082
P0101	0101	MAF SENSOR	3	×	EC-1086
P0102	0102	MAF SEN/CIRCUIT	3	×	EC-1095
P0103	0103	MAF SEN/CIRCUIT	3	×	EC-1095
P0112	0112	IAT SEN/CIRCUIT	3	×	EC-1102
P0113	0113	IAT SEN/CIRCUIT	3	×	EC-1102
P0117	0117	ECT SEN/CIRCUIT	3	×	EC-1107
P0118	0118	ECT SEN/CIRCUIT	3	×	EC-1107
P0122	0122	APP SEN 1/CIRCUIT	1	—	EC-1113
P0123	0123	APP SEN 1/CIRCUIT	1	—	EC-1113
P0130	0130	A/F SENSOR1*5	3	×	EC-1120
P0131	0131	A/F SENSOR1*5	3	×	EC-1125
P0132	0132	A/F SENSOR1*5	3	×	EC-1125
P0134	0134	A/F SENSOR1*5	3	×	EC-1130
P0135	0135	A/F SEN1 HTR*5	3	×	EC-1135
P0182	0182	FUEL TEMP SEN/CIRC	3	×	EC-1141
P0183	0183	FUEL TEMP SEN/CIRC	3	×	EC-1141
P0192	0192	FRP SEN/CIRC	3	×	EC-1145
P0193	0193	FRP SEN/CIRC	3	×	EC-1145
P0200	0200	INJECTOR	3	×	EC-1151
P0201	0201	CYL1 INJECTOR	3	×	EC-1153
P0202	0202	CYL2 INJECTOR	3	×	EC-1153
P0203	0203	CYL3 INJECTOR	3	×	EC-1153
P0204	0204	CYL4 INJECTOR	3	×	EC-1153
P0217	0217	ENG OVER TEMP	1	×	EC-1160
P0222	0222	APP SEN 2/CIRCUIT	1	—	EC-1176
P0223	0223	APP SEN 2/CIRCUIT	1	—	EC-1176
P0234	0234	TC SYSTEM	1	—	EC-1183

DTC*1		Items (CONSULT-II screen item)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P0237	0237	TC BOOST SEN/CIRC	3	×	EC-1189
P0238	0238	TC BOOST SEN/CIRC	3	×	EC-1189
P0335	0335	CKP SEN/CIRCUIT	3	×	EC-1196
P0336	0336	CKP SENSOR	3	×	EC-1202
P0340	0340	CMP SEN/CIRCUIT	3	×	EC-1208
P0341	0341	CMP SENSOR	3	×	EC-1214
P0380	0380	GLOW RELAY	3	×	EC-1220
P0401	0401	EGR SYSTEM	3	×	EC-1224
P0404	0404	EGR VALVE	3	×	EC-1231
P0427	0427	FR EX TMP SEN/CIRC*5	3	×	EC-1238
P0428	0428	FR EX TMP SEN/CIRC*5	3	×	EC-1238
P0437	0437	RR EX TMP SEN/CIRC*5	3	×	EC-1244
P0438	0438	RR EX TMP SEN/CIRC*5	3	×	EC-1244
P0471	0471	DIFF EX PRESS SEN*5	1	—	EC-1250
P0472	0472	DFF PRESS SEN/CIRC*5	3	×	EC-1258
P0473	0473	DFF PRESS SEN/CIRC*5	3	×	EC-1258
P0478	0478	DIFF EX PRESS SEN*5	1	—	EC-1266
P0501	0501	VEHICLE SPEED	1	—	EC-1269
P0502	0502	VEHICLE SPEED	1	—	EC-1271
P0503	0503	VEHICLE SPEED	1	—	EC-1273
P0504	0504	BRAKE SW/CIRCUIT	1	—	EC-1275
P0563	0563	BATTERY VOLTAGE	1	—	EC-1284
P0580	0580	STRG SW/CIRC	1	—	EC-1287
P0581	0581	STRG SW/CIRC	1	—	EC-1287
P0605	0605	ECM	3	×	EC-1296
P0606	0606	ECM	3	×	EC-1298
P0628	0628	FUEL PUMP/CIRC	3	×	EC-1300
P0629	0629	FUEL PUMP/CIRC	3	×	EC-1300
P0638	0638	ETC ACTR*5	1	—	EC-1305
P0642	0642	SENSOR PWR/CIRC1	3	×	EC-1307
P0643	0643	SENSOR PWR/CIRC1	3	×	EC-1307
P0652	0652	SENSOR PWR/CIRC2	3	×	EC-1312
P0653	0653	SENSOR PWR/CIRC2	3	×	EC-1312
P0686	0686	ECM RELAY	1	—	EC-1318
P1211	1211	TCS C/U FUNCTN	1	—	EC-1322
P1212	1212	TCS/CIRC	1	—	EC-1323
P1268	1268	INJECTOR 1	1	—	EC-1324
P1269	1269	INJECTOR 2	1	—	EC-1324
P1270	1270	INJECTOR 3	1	—	EC-1324
P1271	1271	INJECTOR 4	1	—	EC-1324
P1272	1272	FRP RELIEF VALVE	3	×	EC-1332

DTC*1		Items (CONSULT-II screen item)	Trip	MI lighting up	Reference page
CONSULT-II GST*2	ECM*3				
P1273	1273	FUEL PUMP	3	×	EC-1338
P1274	1274	FUEL PUMP	1	×	EC-1344
P1275	1275	FUEL PUMP	1	×	EC-1349
P1472	1472	E/R AIR TMP S/CIRC*5	3	×	EC-1354
P1473	1473	E/R AIR TMP S/CIRC*5	3	×	EC-1354
P1610 - P1615	1610 - 1615	NATS MALFUNTION	1	—	BL-107
P1616	1616	ECM	1	—	EC-1360
P1622	1622	INJ ADJ VAL UNRGST	1	—	EC-1362
P1623	1623	INJ ADJ VAL ERROR	1	—	EC-1364
P2002	2002	PM OVER ACCMLT*5	1	—	EC-1366
P2118	2118	ETC MOT*5	3	×	EC-1369
P2119	2119	ETC ACTR*5	1	—	EC-1374
P2135	2135	APP SENSOR	1	—	EC-1376
P2146	2146	INJ PWR/CIRC	3	×	EC-1383
P2147	2147	INJECTOR/CIRC	3	×	EC-1387
P2148	2148	INJECTOR/CIRC	3	×	EC-1387
P2149	2149	INJ PWR/CIRC	3	×	EC-1383
P2228	2228	BARO SEN/CIRC	3	×	EC-1393
P2229	2229	BARO SEN/CIRC	3	×	EC-1393
P2297	2297	A/F SENSOR1*5	3	×	EC-1395
P2621	2621	TP SEN/CIRCUIT*5	3	×	EC-1398
P2622	2622	TP SEN/CIRCUIT*5	3	×	EC-1398

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.
*2: This number is prescribed by ISO 15031-6.
*3: In Diagnostic Test Mode II (Self-diagnostic results).
*4: The troubleshooting for this DTC needs CONSULT-II.
*5: Models with DPF.

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

BBS001VW

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

On Board Diagnostic (OBD) System of Engine

BBS001VX

The ECM has an on board diagnostic system. It will light up the malfunction indicator (MI) to warn the driver of a malfunction causing emission deterioration.

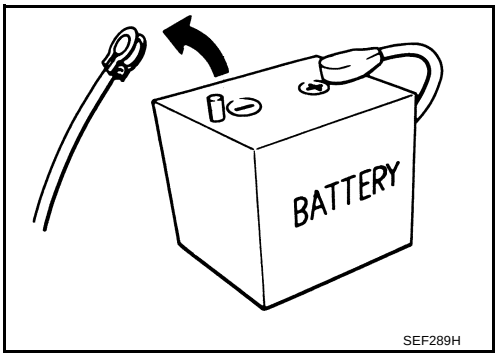
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery negative cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-74, "HARNESS CONNECTOR" .**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the fuel system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

Precautions

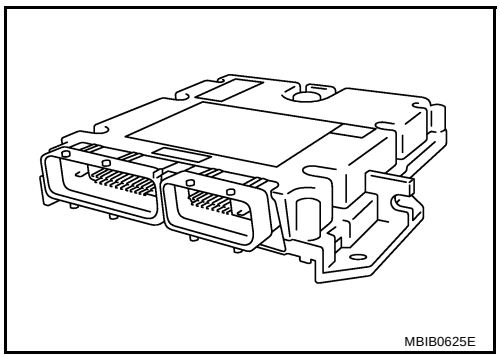
BBS001VY

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery negative cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned OFF.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery negative cable.**

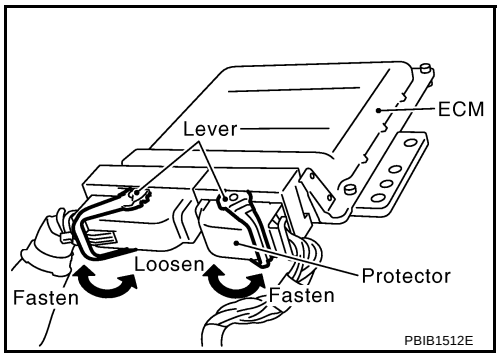


SEF289H

- **Do not disassemble ECM.**

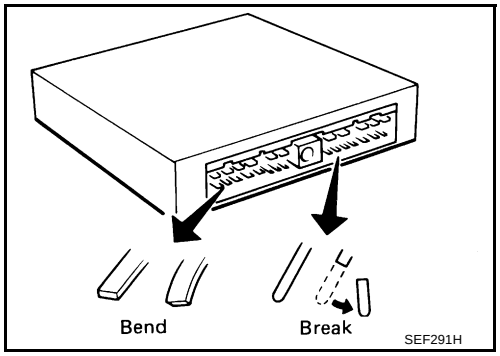

MBIB0625E

- **When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.**



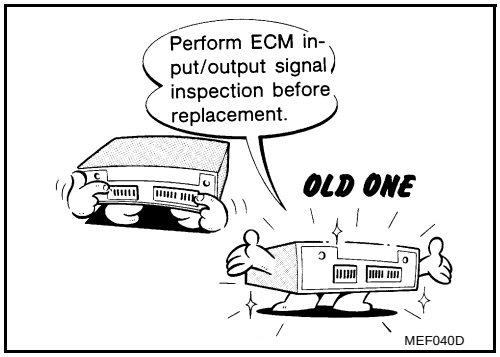
PBIB1512E

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC's.
- **Keep engine control system harness at least 10cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of IC's, etc.**
- **Keep engine control system parts and harness dry.**



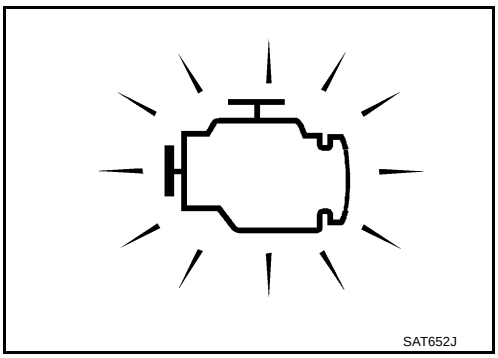
SEF291H

- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-1035, "ECM Terminals And Reference Value" .**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor, crankshaft position sensor.**

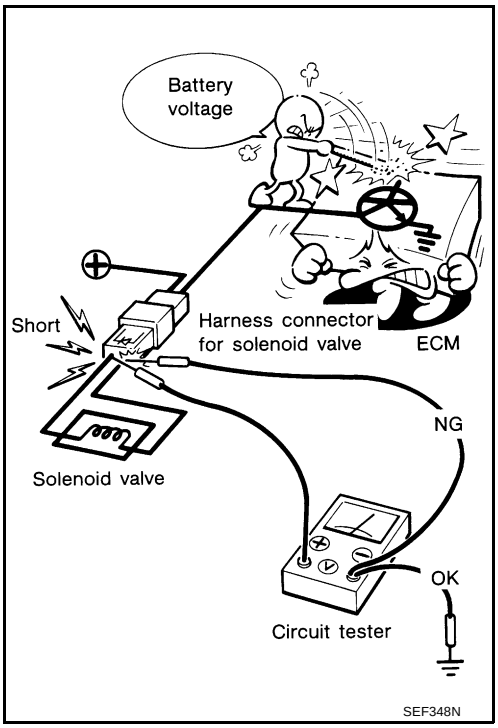


MEF040D

- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.

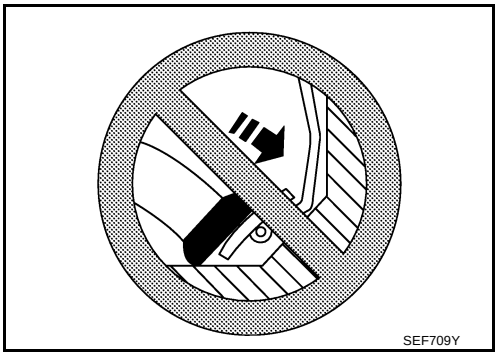

SAT652J

- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**
- **Do not disassemble fuel pump.**
  If NG, take proper action.
- **Do not disassemble fuel injector.**
  If NG, replace fuel injector.

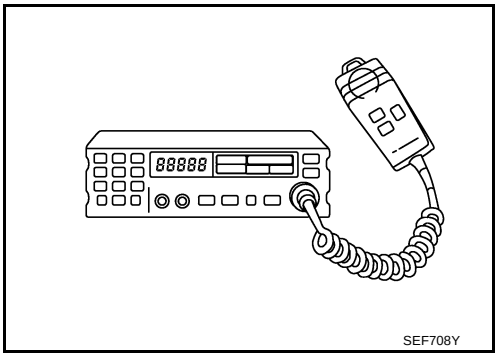


SEF348N

- **Do not depress accelerator pedal when staring.**
- **Immediately after staring, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**


SEF709Y

- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
  - **Keep the antenna as far as possible from the electronic control units.**
  - **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
    Do not let them run parallel for a long distance.
  - **Adjust the antenna and feeder line so that the standingwave radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**

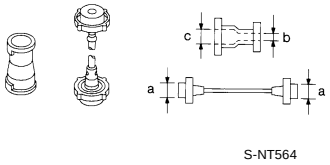
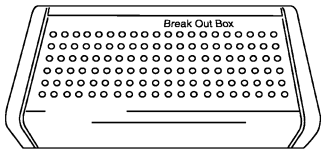
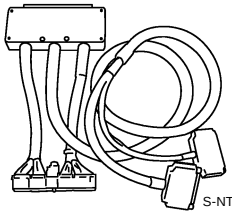
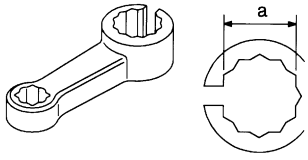

SEF708Y

PREPARATION

PFP:00002

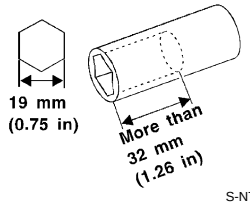
Special Service Tools

BBS001W0

Tool number Tool name	Description
EG17650301 Radiator cap tester adapter  S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV109E0010 Break-out box  S-NT825	Measuring the ECM signals with a circuit tester
KV109E0080 Y-cable adapter  S-NT826	Measuring the ECM signals with a circuit tester
KV10114400 Heated oxygen sensor wrench  NT636	Loosening or tightening air fuel ratio sensor 1 **a: 22 mm (0.87 in)**

Commercial Service Tools

BBS001W1

Tool name	Description
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor

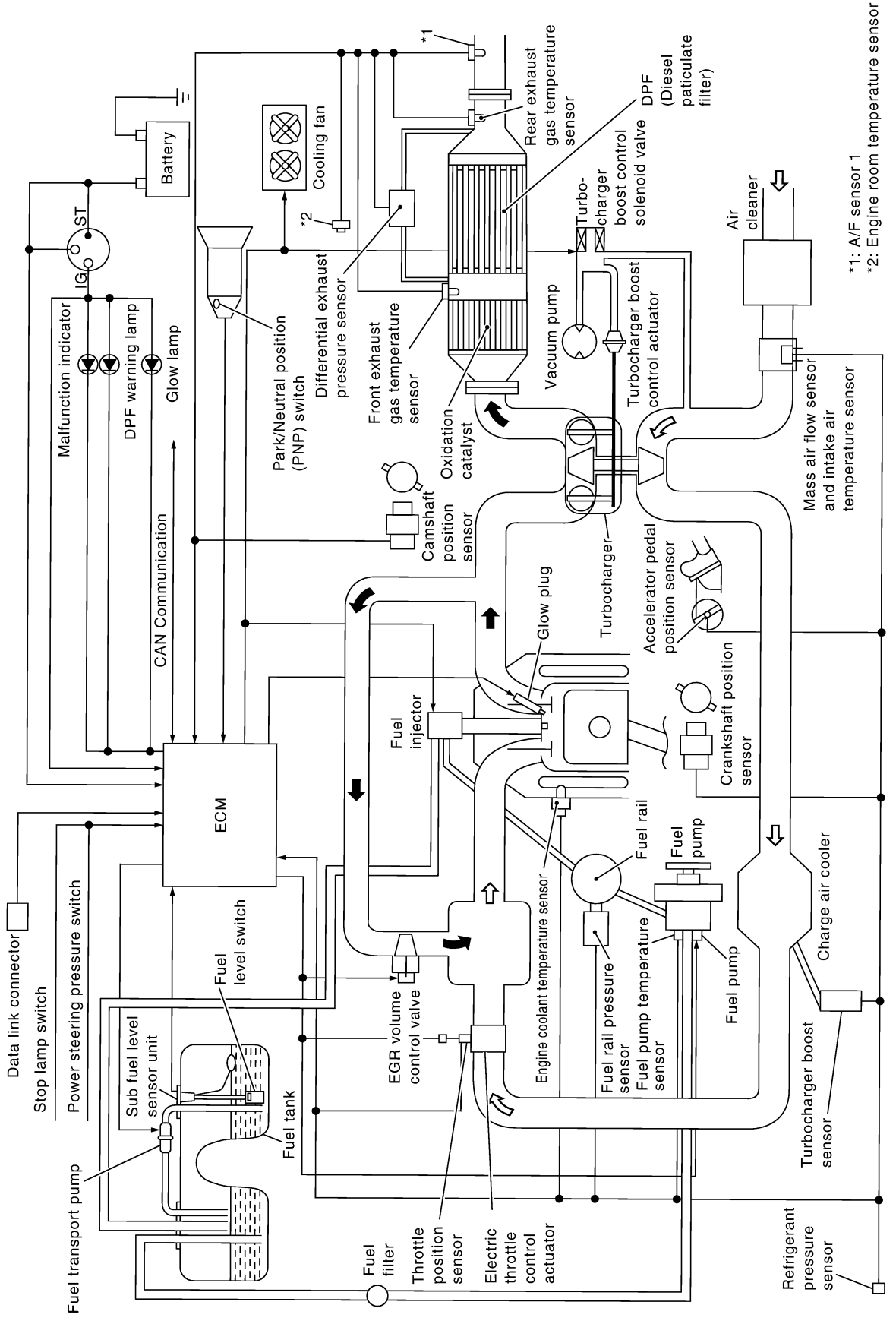
ENGINE CONTROL SYSTEM

PFP:23710

System Diagram

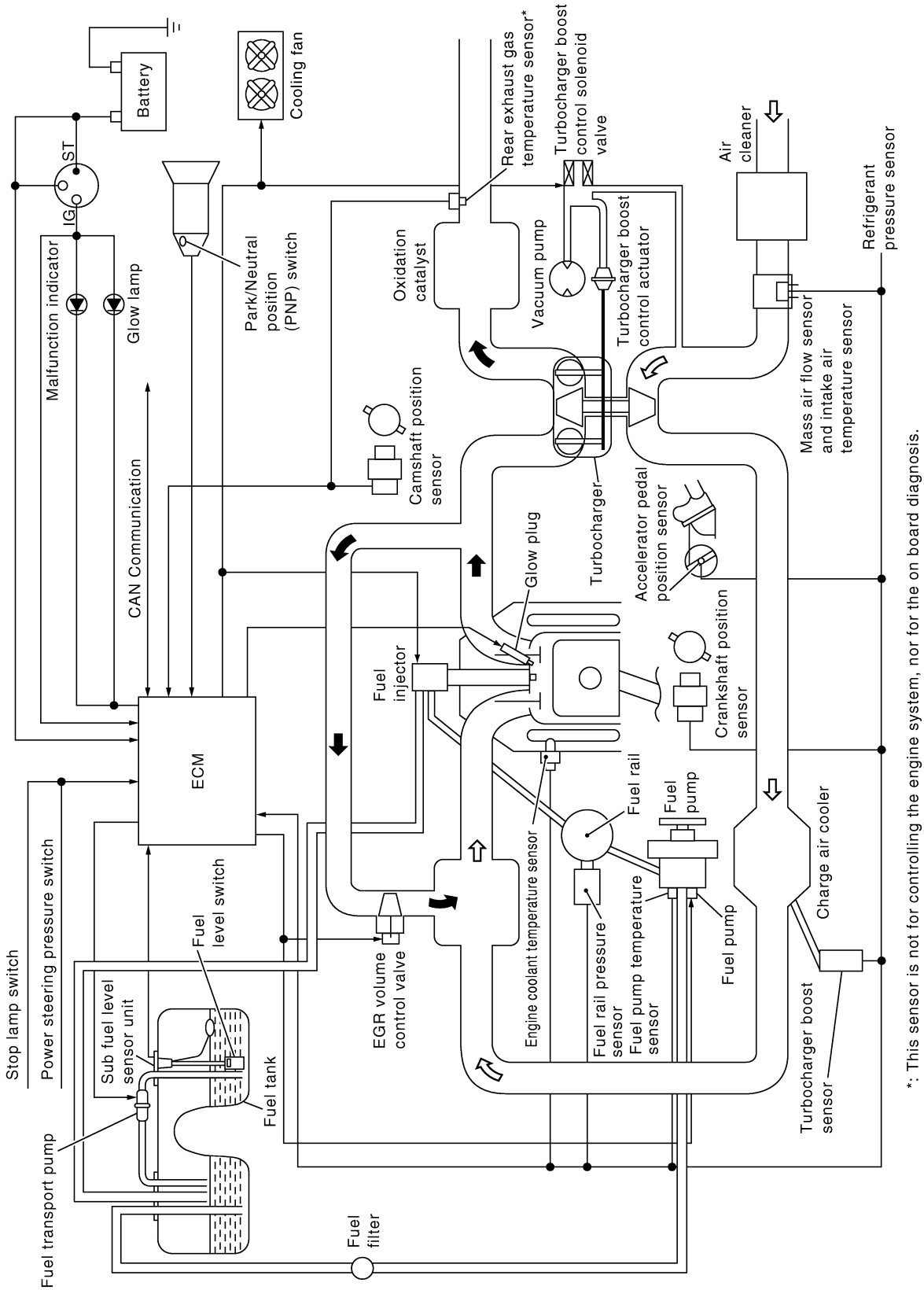
BBS001W2

MODELS WITH DPF



PBIB3151E

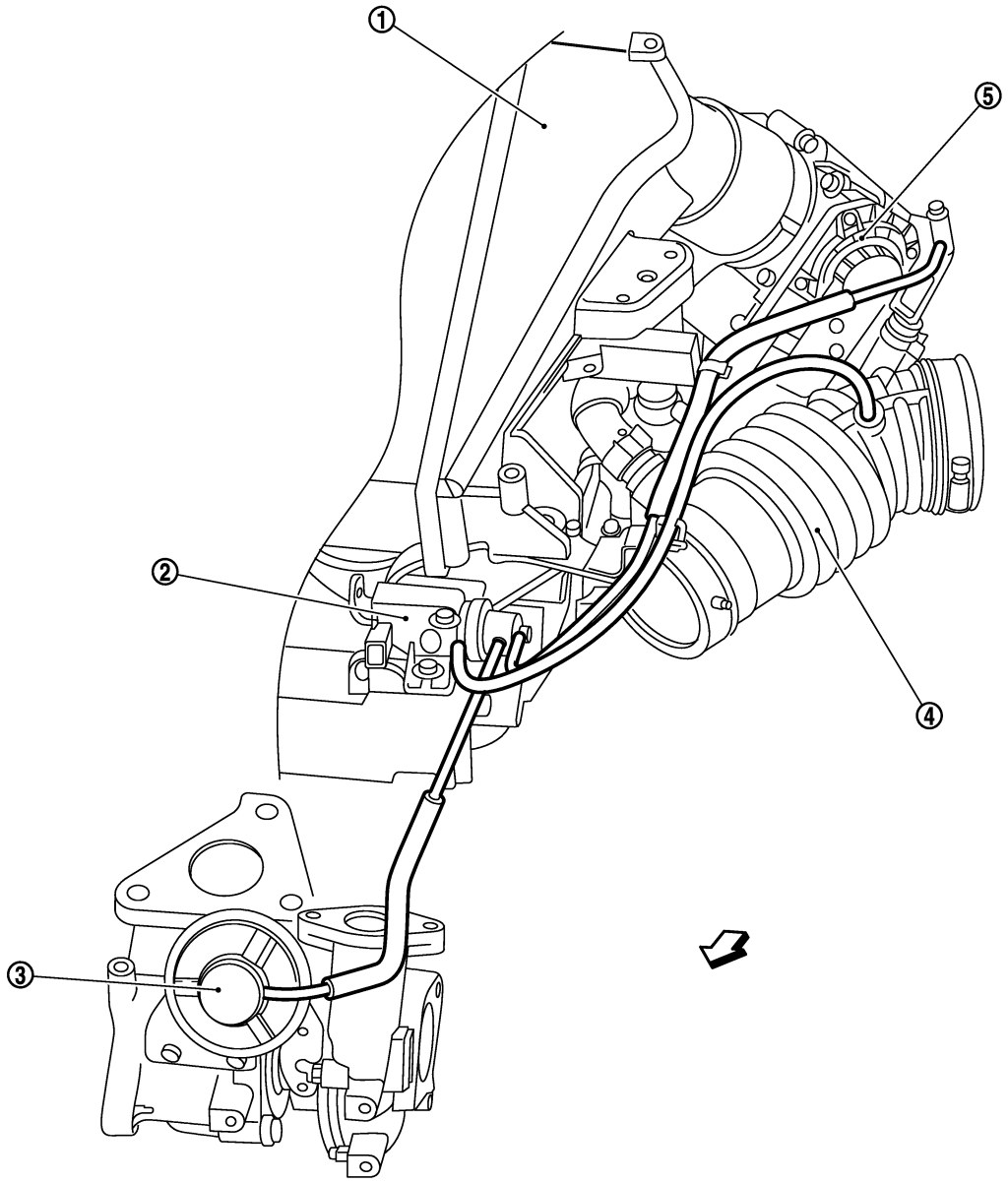
MODELS WITHOUT DPF



Vacuum Hose Drawing

BBS001W3

MODELS WITH DPF



PBIB3152E

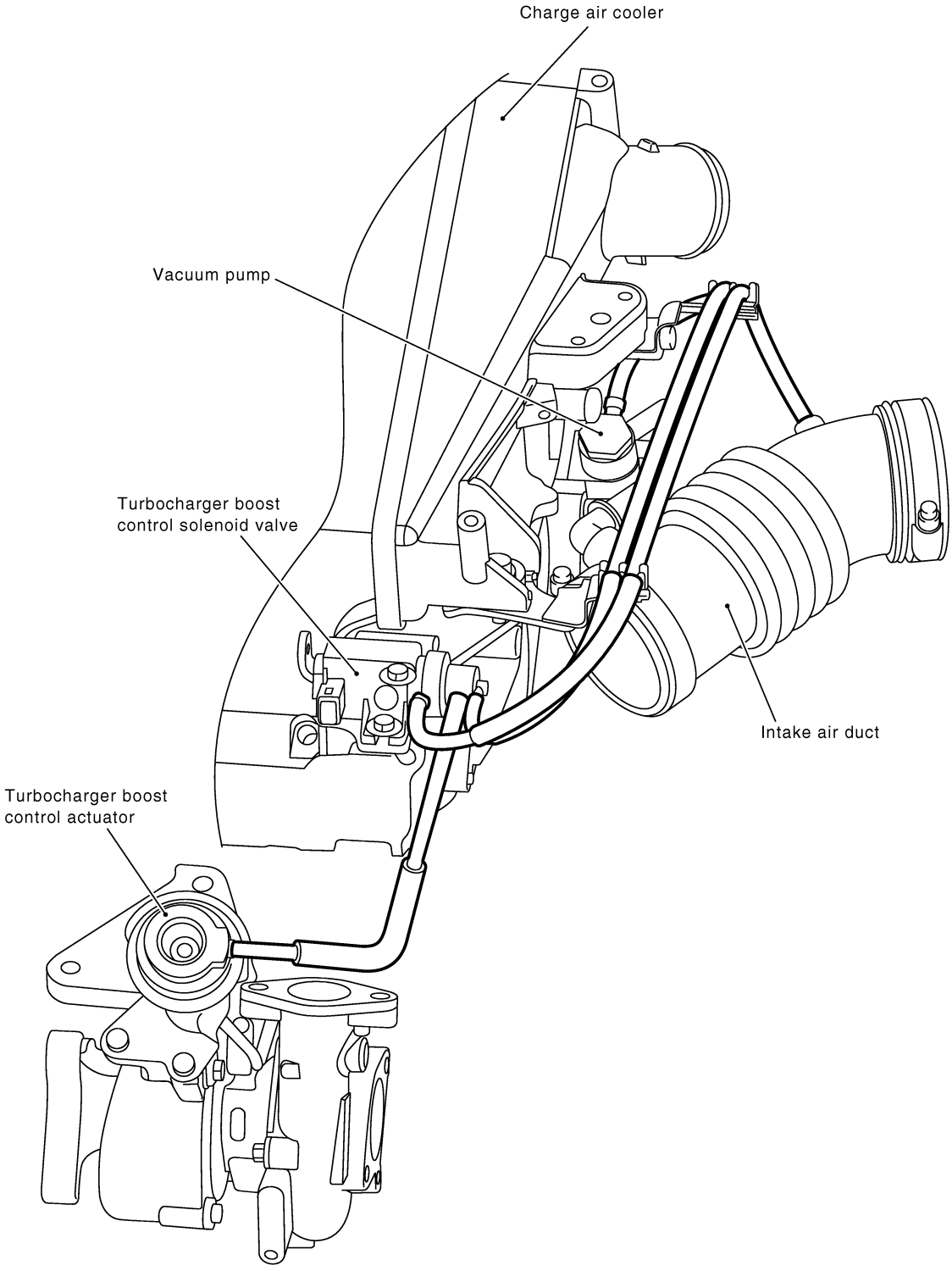
⇦ : Vehicle front

1. Charge air cooler
2. Turbocharger boost control solenoid valve
3. Turbocharger boost control actuator
4. Intake air duct
5. Electric throttle control actuator

NOTE: Do not use soapy water or any type of solvent while installing vacuum hose.

Refer to EC-985, "System Diagram" for Vacuum Control System.

MODELS WITHOUT DPF



NOTE: Do not use soapy water or any type of solvent while installing vacuum horses.

PBIB2019E

Refer to EC-985, "System Diagram" for Vacuum Control System.

System Chart

BBS001W4

Input (Sensor)	ECM Function	Output (Actuator)
● Accelerator pedal position sensor ● Fuel rail pressure sensor ● Fuel pump temperature sensor ● Engine coolant temperature sensor ● Mass air flow sensor ● Intake air temperature sensor ● Crankshaft position sensor ● Camshaft position sensor ● Turbocharger boost sensor ● Vehicle speed sensor*1 ● ESP/TCS/ABS control unit*1 ● Ignition switch ● Stop lamp switch ● Air conditioner switch*1 ● Park/neutral position switch ● Battery voltage ● Fuel level switch ● Refrigerant pressure sensor ● Power steering pressure switch ● Differential exhaust pressure sensor ● Engine room air temperature sensor ● Front exhaust gas temperature sensor ● Rear exhaust gas temperature sensor ● A/F sensor 1	Fuel injection control	● Fuel injector ● Fuel pump
	Fuel injection timing control	● Fuel injector ● Fuel pump
	Fuel cut control	● Fuel injector ● Fuel pump
	ASCD vehicle speed control	● Fuel injector ● Fuel pump
	Glow control system	● Glow relay ● Glow indicator lamp*2
	On board diagnostic system	Malfunction indicator (MI)*2
	EGR volume control	EGR volume control valve
	Cooling fan control	Cooling fan relay
	Turbocharger boost control	Turbocharger boost control solenoid valve
	Fuel transport pump control	Fuel transport pump relay
	DPF regeneration control	● Fuel injector ● Electric throttle control actuator ● EGR volume control valve
	A/F sensor 1 heater control	A/F sensor 1 heater
	Air conditioning cut control	Air conditioner relay

*1: The input signal is sent to the ECM through CAN communication line.
*2: The output signal is sent from the ECM through CAN communication line.

Fuel Injection Control System

BBS001W5

SYSTEM DESCRIPTION

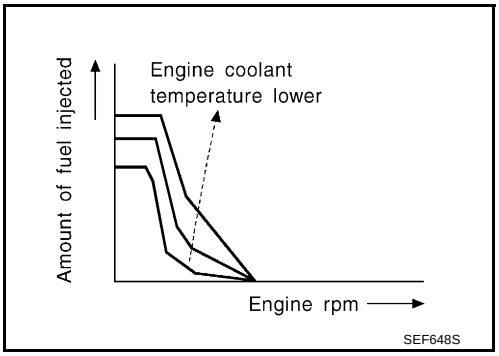
Three types of fuel injection control are provided to accommodate engine operating conditions; normal control, idle control and start control. The ECM determines the appropriate fuel injection control. Under each control, the amount of fuel injected is adjusted to improve engine performance.
Pulse signals are sent to fuel injectors according to the input signals to adjust the amount of fuel injected to preset value.

START CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Fuel injection control (start control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		
Camshaft position sensor	Piston position		
Ignition switch	Start signal		
Fuel rail pressure sensor	Fuel rail pressure		

When the ECM receives a start signal from the ignition switch, the ECM adapts the fuel injection system for the start control. The amount of fuel injected at engine starting is a preset program value in the ECM. The program is determined by the engine speed, engine coolant temperature and fuel rail pressure.
For better startability under cool engine conditions, the lower the coolant temperature becomes, the greater the amount of fuel injected. The ECM ends the start control when the engine speed reaches the specific value, and shifts the control to the normal or idle control.



IDLE CONTROL
Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Fuel injection control (Idle control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		
Battery	Battery voltage		
Accelerator pedal position sensor	Accelerator pedal position		
Fuel rail pressure sensor	Fuel rail pressure		
Vehicle speed sensor	Vehicle speed*		
Air conditioner switch	Air conditioner signal*		

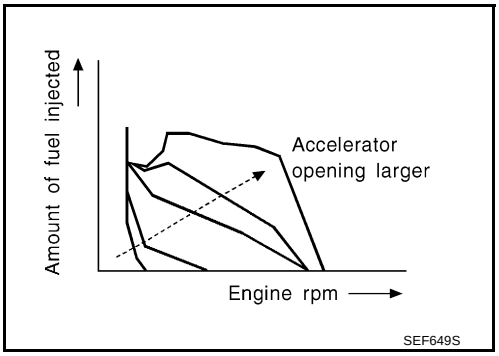
*: The input signal is sent to the ECM through CAN communication line.

When the ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control. The ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. The ECM also provides the system with a fast idle control in response to the engine coolant temperature signal.

NORMAL CONTROL
Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Normal control)	Fuel injector Fuel pump
Accelerator pedal position sensor	Accelerator position		
Fuel rail pressure sensor	Fuel rail pressure		

The amount of fuel injected under normal driving conditions is determined according to sensor signals. The crankshaft position sensor detects engine speed, the accelerator pedal position sensor detects accelerator pedal position and fuel rail pressure sensor detects fuel rail pressure. These sensors send signals to the ECM.
The fuel injection data, predetermined by correlation between various engine speeds, accelerator pedal positions and fuel rail pressure are stored in the ECM memory, forming a map. The ECM determines the optimal amount of fuel to be injected using the sensor signals in comparison with the map.



MAXIMUM AMOUNT CONTROL
Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Mass air flow sensor	Amount of intake air	Fuel injection control (Maximum amount control)	Fuel Injector
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor	Engine speed		
Accelerator pedal position sensor	Accelerator pedal position		

The maximum injection amount is controlled to an optimum by the engine speed, intake air amount, engine coolant temperature, and accelerator opening in accordance with the driving conditions.
This prevents the oversupply of the injection amount caused by decreased air density at a high altitude or during a system failure.

DECELERATION CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Accelerator pedal position sensor	Accelerator pedal position	Fuel injection control (Deceleration control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		

The ECM sends a fuel cut signal to the fuel injectors and fuel pump during deceleration for better fuel efficiency. The ECM determines the time of deceleration according to signals from the accelerator pedal position sensor and crankshaft position sensor.

Fuel Injection Timing Control System

BBS001W6

DESCRIPTION

The target fuel injection timing in accordance with the engine speed and the fuel injection amount are recorded as a map in the ECM beforehand. The ECM determines the optimum injection timing using sensor signals accordance with the map.

Air Conditioning Cut Control

BBS001W7

INPUT / OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Air conditioner switch	Air conditioner ON signal*	Air conditioner cut control	Air conditioner relay
Accelerator pedal position sensor	Accelerator pedal opening angle		
Vehicle speed sensor	Vehicle speed*		
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		

*: The input signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

This system improves acceleration when the air conditioner is used.
When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds.
When engine coolant temperature becomes excessively high, the air conditioner is turned off. This continues until the engine coolant temperature returns to normal.

Fuel Cut Control (At No Load & High Engine Speed)

BBS001W8

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Vehicle speed sensor	Vehicle speed*	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor	Engine speed		

*: The input signal is sent to the ECM through CAN communication line.

If the engine speed is above 2,800 rpm under no load (for example, the shift position is neutral and engine speed is over 2,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

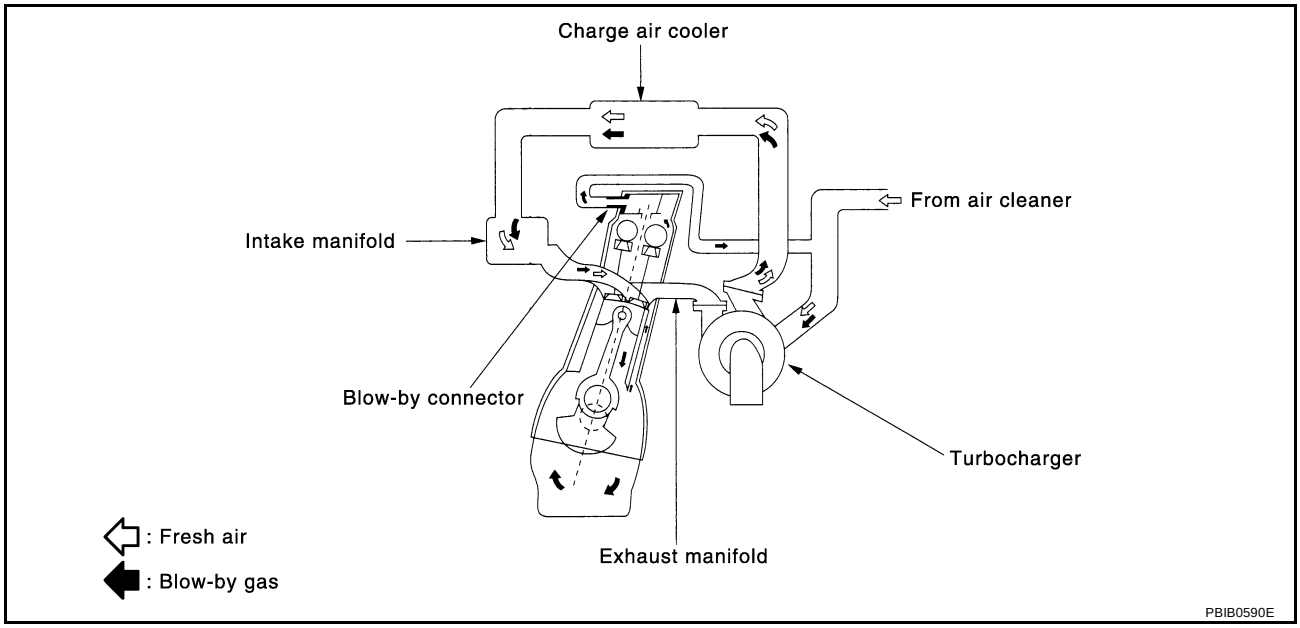
NOTE:
This function is different from deceleration control listed under EC-989, "Fuel Injection Control System" .

Crankcase Ventilation System

BBS001W9

DESCRIPTION

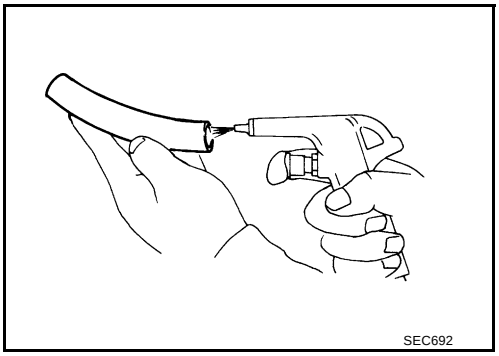
In this system, blow-by gas is sucked into the air duct after oil separation by oil separator in the rocker cover.



INSPECTION

Ventilation Hose

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



CAN Communication

BBS001WA

SYSTEM DESCRIPTION

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-25, "CAN Communication Unit" , about CAN communication for detail.

BASIC SERVICE PROCEDURE

PFP:00018

Fuel Filter

BBS001WB

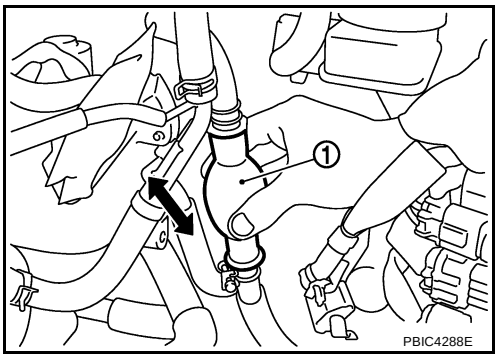
DESCRIPTION

A water draining cock is on the lower side and a priming pump for bleeding air is on the upper side.

AIR BLEEDING

After fuel filter is replaced and after fuel system components are removed/installed, bleed air from fuel line as follows:

1. Prime the circuit using the priming pump (1).
2. Perform engine cranking with repeating several times until engine starting.



CAUTION:

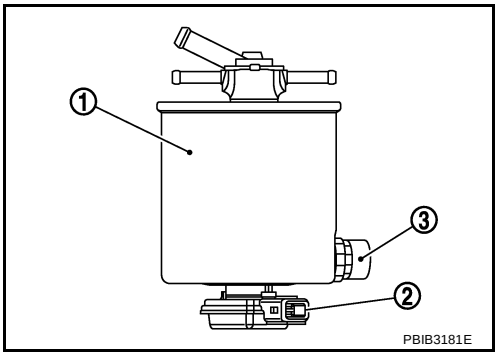
- **Crank engine until it starts. Do not crank engine for more than 30 seconds.**
- **Prepare a tray to collect fuel. Prevent fuel from adhering to rubber parts, especially the engine mounting insulator.**

WATER DRAINING

1. Prepare a tray at the drain plug open end.
2. Loosen drain plug (3), and operate priming pump to drain water from fuel filter (1).
   - Fuel filter sensor (2)

   CAUTION:
   - **Water in filter is drained with fuel. Prepare larger capacity pan than fuel filter volume.**
   - **Drained water is mixed with fuel. Prevent fuel from adhering to rubber parts such as engine mounting insulator.**
3. After draining, close drain plug by hand.

   CAUTION:
   If drain plug is tightened excessively, it may be damaged and fuel will leak. Do not use tools to tighten drain cock.
4. Bleed air in fuel piping. Refer to EC-993, "AIR BLEEDING" .
5. Start engine and make sure there is no fuel leakage.



Fuel Pump Learning Value Clearing

BBS001WC

DESCRIPTION

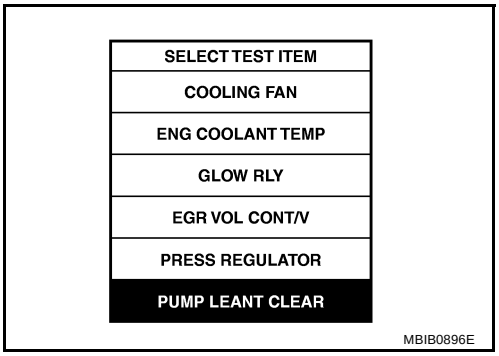
In order to always keep optimum fuel pressure in fuel rail, the ECM controls fuel pump in high precision with monitoring the signal of fuel rail pressure sensor.
Accordingly, the ECM always learns characteristic value of fuel pump. Fuel Pump Learning Value Clearing is an operation to clear the value of the fuel pump learning.
Fuel Pump Learning Value Clearing should be performed under the following conditions.

- Fuel pump is changed.
- ECM is replaced with used one which stores the fuel pump learning value of other fuel pump.

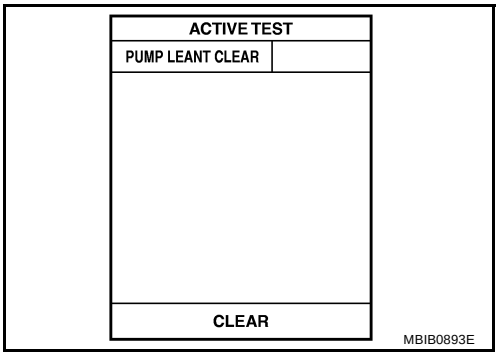
OPERATION PROCEDURE

NOTE:
When removing fuel pump, perform Fuel Pump Learning Value Clearing before starting engine.

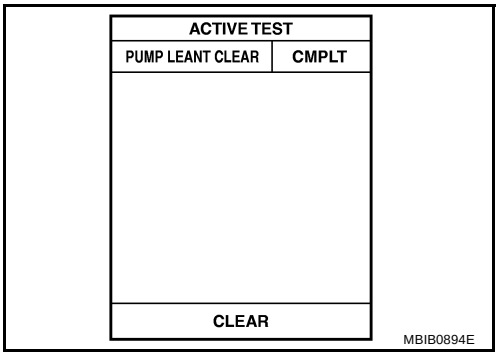
1. Turn ignition switch ON.
2. Select “PUMP LEARNT CLEAR” in “ACTIVE TEST” mode with CONSULT-II.



3. Touch “CLEAR” and wait a few seconds.



4. Make sure that “CMPLT” is displayed on CONSULT-II screen.



Injector Adjustment Value Registration

BBS002HV

DESCRIPTION

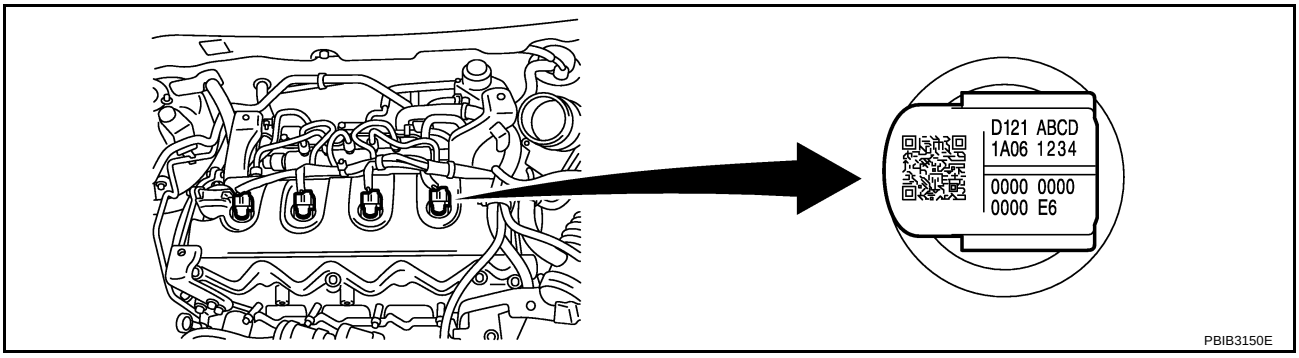
Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector. The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control.
A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the injector which is installed on the vehicle

Injector Adjustment Value Registration must be performed after the following cases.

- Injector(s) are replaced.
- ECM is replaced.

For the first case, Injector Adjustment Value Registration for the replaced fuel injector must be performed. And for the second case, Injector Adjustment Value Registration for all the fuel injectors must be performed.



Example: Injector adjustment value = D121ABCD1A06123400000000000E6

OPERATION PROCEDURE

NOTE:

- **Before performing this procedure, record injector adjustment value printed on a fuel injector.**
- **When all fuel injectors are replaced or ECM is replaced, it is recommended to perform "INJ ADJ VAL CLR" in "WORK SUPPORT" mode before performing this procedure. By performing "INJ ADJ VAL CLR" in "WORK SUPPORT" mode, injector adjustment value stored in ECM is initialized.**

1. Turn ignition switch ON (engine stopped).
2. Select "ENTER INJECTOR CALIB DATA" in "WORK SUPPORT" mode with CONSULT-II.
3. Touch "START".

   NOTE:
   When touching "START", CONSULT-II reads injector adjustment values stored in ECM.
4. Select the number of the cylinder which needs Injector Adjustment Value Registration.
5. Input injector adjustment value, and touch "ENTER".

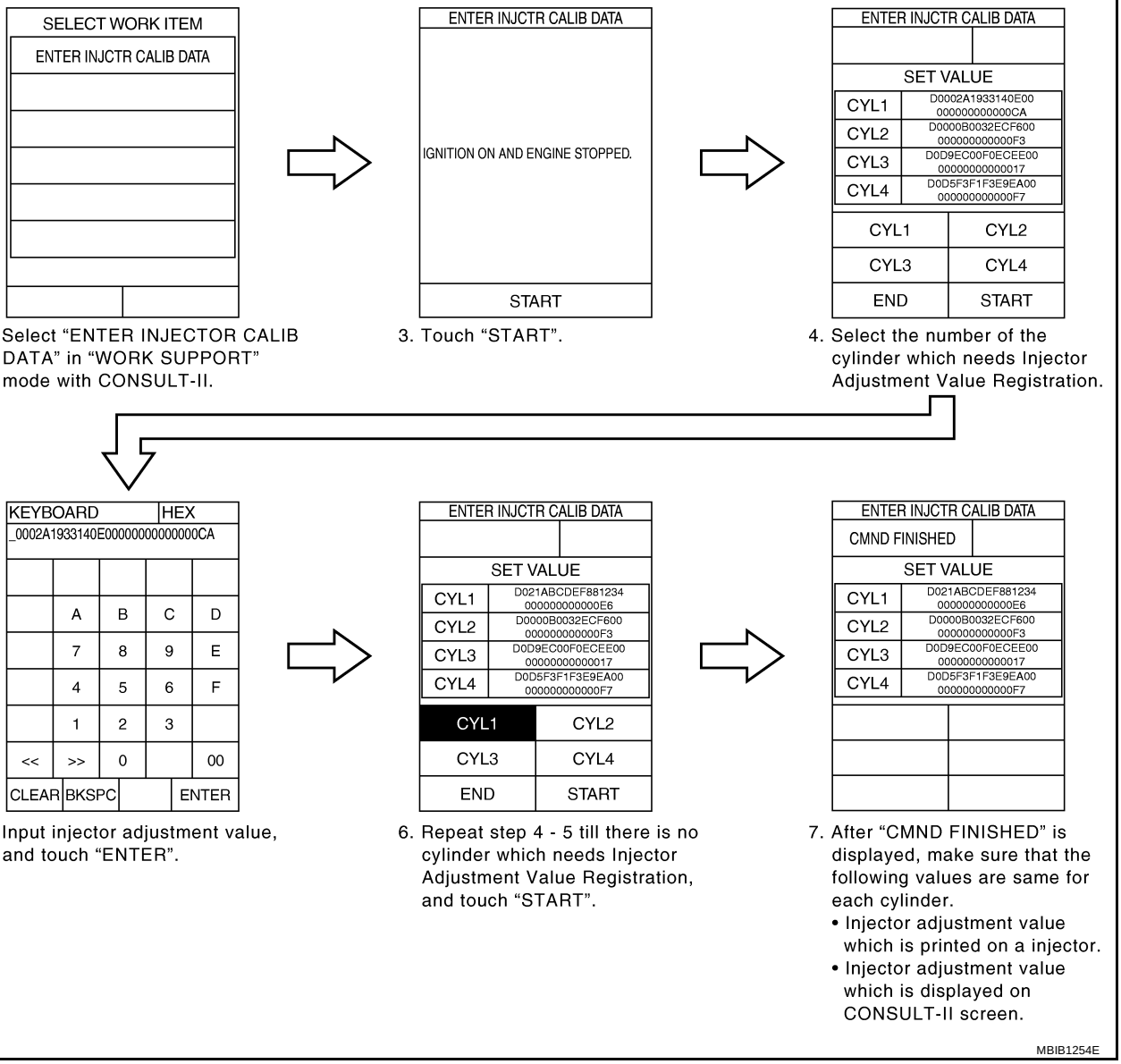
   NOTE:
   Input injector adjustment value is stored in CONSULT-II.
6. Repeat step 4 - 5 till there is no cylinder which needs Injector Adjustment Value Registration, and touch "START".

   NOTE:
   When touching "START", injector adjustment values stored in CONSULT-II are written onto ECM memory.
7. After "CMND FINISHED" is displayed, make sure that the following values are same for each cylinder.
   - Injector adjustment value which is printed on a fuel injector.
   - Injector adjustment value which is displayed on CONSULT-II screen.

   NOTE:
   - In this step, CONSULT-II reads injector adjustment values stored in ECM and displays the values on the CONSULT-II screen. This is for checking if injector adjustment values are written onto ECM memory correctly.

- If DTC is detected, perform DTC Confirmation Procedure for the DTC, and check if the same DTC is detected again.

1. Turn ignition switch ON (engine stopped).



2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START”.
4. Select the number of the cylinder which needs Injector Adjustment Value Registration.
5. Input injector adjustment value, and touch “ENTER”.
6. Repeat step 4 - 5 till there is no cylinder which needs Injector Adjustment Value Registration, and touch “START”.
7. After “CMND FINISHED” is displayed, make sure that the following values are same for each cylinder.
   - Injector adjustment value which is printed on a injector.
   - Injector adjustment value which is displayed on CONSULT-II screen.

MBIB1254E

Service Regeneration

BBS002LY

DESCRIPTION

Service Regeneration is performed with CONSULT-II to reduce particulate matter in DPF. Service Regeneration should be performed in the following cases.

- ECM enters fail-safe mode because the amount of particulate matter in DPF reaches the specified level.

  NOTE:
  When ECM enters fail-safe mode because the amount of particulate matter in DPF reaches the specified level, check whether or not DTC is stored in ECM. In the case of DTC stored, perform the Diagnostic Procedure for the DTC.

- ECM is replaced.

  NOTE:
  Based on the signal from sensors ECM measures the amount of particulate matter in DPF and stores the value in EEPROM (Electrically Erasable Programmable Read Only Memory). When ECM is replaced as new one, there is a difference between the actual amount of particulate matter and the value stored in new ECM, because the value stored in new ECM is initialized one. In the case above, ECM can not perform regeneration control correctly. So, perform service regeneration to make the amount of particulate matter in DPF zero.

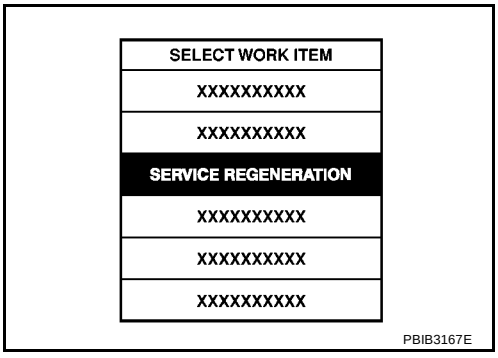
- Component Inspection for DPF is performed.

CAUTION:

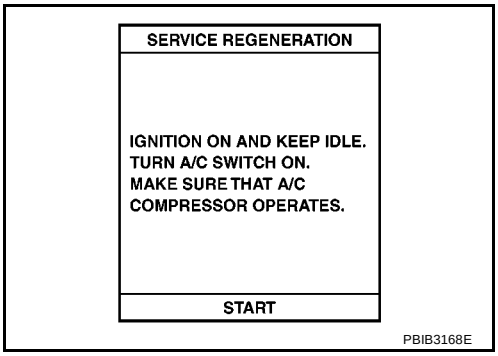
Always replace engine oil and engine oil filter after service regeneration. Fuel mixes with engine oil during service regeneration. The mixture does not occur during the regeneration which is automatically performed under normal operation.

OPERATION PROCEDURE

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch ON and make sure that A/C compressor operates.
3. Select “SERVICE REGENERATION” in “WORK SUPPORT” mode with CONSULT-II.



4. Touch “START”.



5. Wait until “CMPT” is displayed.

SERVICE REGENERATION	
SERVICE REGENE	REGENERTNG
MONITOR	
CKPS-RPM (TDC)	XXX rpm
REG TIME RMN	XX min
END	

SERVICE REGENERATION	
SERVICE REGENE	CMPLT
MONITOR	
END	

PBIB3169E

NOTE:

- Make sure that accelerator pedal is fully released during service regeneration, or service regeneration is canceled. When service regeneration is canceled, retry from step1.
- It will take approximately 30 minutes until “CMPLT” is displayed.

6. Turn A/C switch OFF.
7. Turn ignition switch OFF.
8. Replace engine oil and engine oil filter.

DPF Data Clear

BBS002LZ

DESCRIPTION

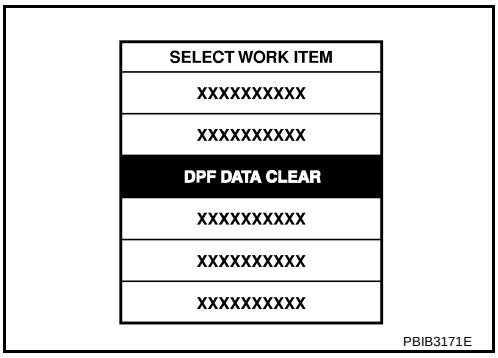
Perform “DPF DATA CLEAR” in “WORK SUPPORT” mode with CONSULT-II when oxidation catalyst with DPF is replaced as new one. Based on the signal from sensors ECM estimates the amount of particulate matter in DPF and stores the value in EEPROM as DPF data. When oxidation catalyst with DPF is replaced as new one, there is a difference between DPF data stored in ECM and the actual amount of particulate matter in DPF, because no particulate matter is trapped in new DPF. In this case, ECM can not perform regeneration control correctly. So perform “DPF DATA CLEAR” in “WORK SUPPORT” mode with CONSULT-II to clear DPF data stored in ECM.

CAUTION:

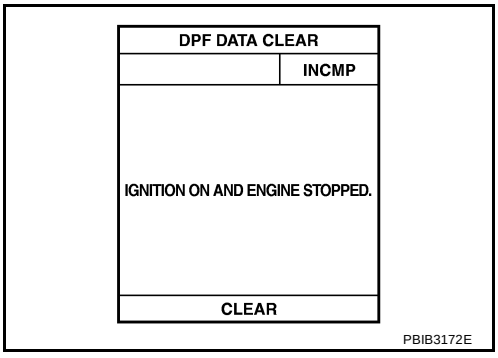
Never perform “DPF DATA CLEAR” in “WORK SUPPORT” mode with CONSULT-II when oxidation catalyst with DPF is not replaced as new one. DPF may be damaged because regeneration is not performed at appropriate timing.

OPERATION PROCEDURE

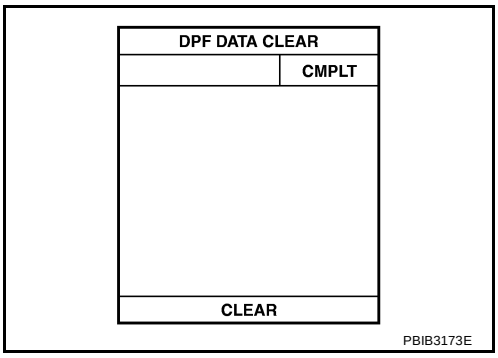
1. Turn ignition switch ON.
2. Select “DPF DATA CLEAR” in “WORK SUPPORT” mode with CONSULT-II.



3. Touch “CLEAR” and wait a few seconds.



4. Make sure that “CMPLT” is displayed on CONSULT-II screen.



A/F Sensor Learning Value Clear

BBS002M0

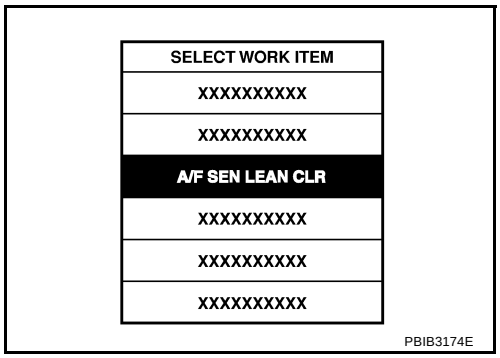
DESCRIPTION

ECM learns the output characteristic of A/F sensor 1 to perform the control of DPF regeneration precisely. A/F sensor learning value should be cleared under the following conditions.

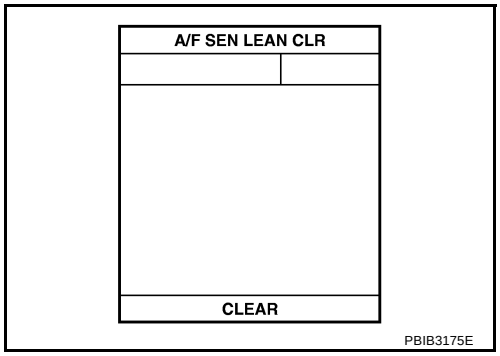
- A/F sensor 1 is changed.
- ECM is replaced with used one which stores the A/F Sensor Learning Value of another A/F sensor 1.

OPERATION PROCEDURE

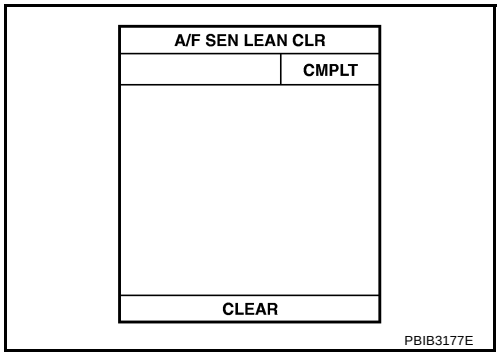
1. Turn ignition switch ON.
2. Select “A/F SEN LEAN CLR” in “WORK SUPPORT” mode with CONSULT-II.



3. Touch “CLEAR” and wait a few seconds.



4. Make sure that “CMPLT” is displayed on CONSULT-II screen.



ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

Introduction

BBS001WD

The ECM has an on board diagnostic system, which detects malfunctions related to engine sensors or actuators. The ECM also records various emission-related diagnostic information including:

Emission-related diagnostic information	ISO Standard
Diagnostic Trouble Code (DTC)	Service $03 of ISO 15031-5
Freeze Frame data	Service $02 of ISO 15031-5
1st/2nd Trip Diagnostic Trouble Code (1st/2nd Trip DTC)	Service $07 of ISO 15031-5
Calibration ID	Service $09 of ISO 15031-5

The above information can be checked using procedures listed in the table below.

×: Applicable —: Not applicable

	DTC	1st trip DTC	2nd trip DTC	Freeze Frame data
CONSULT-II	×	×	×	×
GST	×	×	×	×
ECM	×	×*	×*	—

*: When DTC and 1st/2nd trip DTC simultaneously appear on the display, they cannot be clearly distinguished from each other.

The malfunction indicator (MI) on the instrument panel lights up when the same malfunction is detected in three consecutive trips (Three trip detection logic).

Three Trip Detection Logic and One Trip Detection Logic

BBS001WE

On board diagnosis (OBD) system of this vehicle has “Three Trip Detection Logic” and “One Trip Detection Logic”. For which logic each self-diagnosis corresponds with, refer to EC-975, "INDEX FOR DTC" .
“Trip” of “Three Trip Detection Logic” means a driving mode in which the self-diagnosis is performed while driving.

THREE TRIP DETECTION LOGIC

When a malfunction is detected for the first time, 1st trip DTC is stored in the ECM memory. MI does not illuminate at this stage. <1st trip>
When the same malfunction is detected again during the next driving, 2nd trip DTC is stored in the ECM memory and 1st trip DTC is cleared from the ECM memory. MI does not illuminate at this stage. <2nd trip>
When the same malfunction is detected again at the third driving, DTC and Freeze Frame Data are stored in the ECM memory and 2nd trip DTC is cleared from the ECM memory. MI illuminates at the same time when DTC is stored. <3rd trip>
In other words, DTC and Freeze Frame Data are stored and MI illuminates when the same malfunction occurs in 3 consecutive trips.
This is called “Three Trip Detection Logic”.

ONE TRIP DETECTION LOGIC

When a malfunction is detected for the first time, DTC and Freeze Frame Data are stored in the ECM memory and MI lights up. This is called “One Trip Detection Logic”. Some self-diagnoses will not illuminate MI when DTC is stored. (Refer to EC-1001, "Emission-Related Diagnostic Information" .) 1st/2nd trip DTC is not stored for one trip detection logic.

Emission-Related Diagnostic Information

BBS001WF

EMISSION-RELATED DIAGNOSTIC INFORMATION ITEMS

X: Applicable —: Not applicable

Items (CONSULT-II screen item)	DTC*1		1st/2nd trip DTC	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
CAN COMM CIRCUIT	U1000	1000*4	—	—	EC-1068
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	**0000**	—	—	—

Items (CONSULT-II screen item)	DTC*1		1st/2nd trip DTC	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
CMP/CKP RELATION	P0016	0016	×	×	EC-1071
TC BOOST SOL/CIRC	P0045	0045	×	×	EC-1073
HIGH FUEL PRESS	P0088	0088	×	×	EC-1078
FUEL PUMP	P0089	0089	×	×	EC-1080
FUEL LEAK	P0093	0093	×	×	EC-1082
MAF SENSOR	P0101	0101	×	×	EC-1086
MAF SEN/CIRCUIT	P0102	0102	×	×	EC-1095
MAF SEN/CIRCUIT	P0103	0103	×	×	EC-1095
IAT SEN/CIRCUIT	P0112	0112	×	×	EC-1102
IAT SEN/CIRCUIT	P0113	0113	×	×	EC-1102
ECT SEN/CIRCUIT	P0117	0117	×	×	EC-1107
ECT SEN/CIRCUIT	P0118	0118	×	×	EC-1107
APP SEN 1/CIRCUIT	P0122	0122	—	—	EC-1113
APP SEN 1/CIRCUIT	P0123	0123	—	—	EC-1113
A/F SENSOR1*5	P0130	0130	×	×	EC-1120
A/F SENSOR1*5	P0131	0131	×	×	EC-1125
A/F SENSOR1*5	P0132	0132	×	×	EC-1125
A/F SENSOR1*5	P0134	0134	×	×	EC-1130
A/F SEN1 HTR*5	P0135	0135	×	×	EC-1135
FUEL TEMP SEN/CIRC	P0182	0182	×	×	EC-1141
FUEL TEMP SEN/CIRC	P0183	0183	×	×	EC-1141
FRP SEN/CIRC	P0192	0192	×	×	EC-1145
FRP SEN/CIRC	P0193	0193	×	×	EC-1145
INJECTOR	P0200	0200	×	×	EC-1151
CYL1 INJECTOR	P0201	0201	×	×	EC-1153
CYL2 INJECTOR	P0202	0202	×	×	EC-1153
CYL3 INJECTOR	P0203	0203	×	×	EC-1153
CYL4 INJECTOR	P0204	0204	×	×	EC-1153
ENG OVER TEMP	P0217	0217	—	×	EC-1160
APP SEN 2/CIRCUIT	P0222	0222	—	—	EC-1176
APP SEN 2/CIRCUIT	P0223	0223	—	—	EC-1176
TC SYSTEM	P0234	0234	—	—	EC-1183
TC BOOST SEN/CIRC	P0237	0237	×	×	EC-1189
TC BOOST SEN/CIRC	P0238	0238	×	×	EC-1189
CKP SEN/CIRCUIT	P0335	0335	×	×	EC-1196
CKP SENSOR	P0336	0336	×	×	EC-1202
CMP SEN/CIRCUIT	P0340	0340	×	×	EC-1208
CMP SENSOR	P0341	0341	×	×	EC-1214
GLOW RELAY	P0380	0380	×	×	EC-1220
EGR SYSTEM	P0401	0401	×	×	EC-1224
EGR VALVE	P0404	0404	×	×	EC-1231

Items (CONSULT-II screen item)	DTC*1		1st/2nd trip DTC	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
FR EX TMP SEN/CIRC*5	P0427	0427	×	×	EC-1238
FR EX TMP SEN/CIRC*5	P0428	0428	×	×	EC-1238
RR EX TMP SEN/CIRC*5	P0437	0437	×	×	EC-1244
RR EX TMP SEN/CIRC*5	P0438	0438	×	×	EC-1244
DIFF EX PRESS SEN*5	P0471	0471	—	—	EC-1250
DFF PRESS SEN/CIRC*5	P0472	0472	×	×	EC-1258
DFF PRESS SEN/CIRC*5	P0473	0473	×	×	EC-1258
DIFF EX PRESS SEN*5	P0478	0478	—	—	EC-1266
VEHICLE SPEED	P0501	0501	—	—	EC-1269
VEHICLE SPEED	P0502	0502	—	—	EC-1271
VEHICLE SPEED	P0503	0503	—	—	EC-1273
BRAKE SW/CIRCUIT	P0504	0504	—	—	EC-1275
BATTERY VOLTAGE	P0563	0563	—	—	EC-1284
STRG SW/CIRC	P0580	0580	—	—	EC-1287
STRG SW/CIRC	P0581	0581	—	—	EC-1287
ECM	P0605	0605	×	×	EC-1296
ECM	P0606	0606	×	×	EC-1298
FUEL PUMP/CIRC	P0628	0628	×	×	EC-1300
FUEL PUMP/CIRC	P0629	0629	×	×	EC-1300
ETC ACTR*5	P0638	0638	—	—	EC-1305
SENSOR PWR/CIRC1	P0642	0642	×	×	EC-1307
SENSOR PWR/CIRC1	P0643	0643	×	×	EC-1307
SENSOR PWR/CIRC2	P0652	0652	×	×	EC-1312
SENSOR PWR/CIRC2	P0653	0653	×	×	EC-1312
ECM RELAY	P0686	0686	—	—	EC-1318
TCS C/U FUNCTN	P1211	1211	—	—	EC-1322
TCS/CIRC	P1212	1212	—	—	EC-1323
INJECTOR 1	P1268	1268	—	—	EC-1324
INJECTOR 2	P1269	1269	—	—	EC-1324
INJECTOR 3	P1270	1270	—	—	EC-1324
INJECTOR 4	P1271	1271	—	—	EC-1324
FRP RELIEF VALVE	P1272	1272	×	×	EC-1332
FUEL PUMP	P1273	1273	×	×	EC-1338
FUEL PUMP	P1274	1274	—	×	EC-1344
FUEL PUMP	P1275	1275	—	×	EC-1349
E/R AIR TMP S/CIRC*5	P1472	1472	×	×	EC-1354
E/R AIR TMP S/CIRC*5	P1473	1473	×	×	EC-1354
NATS MALFUNTION	P1610 - P1615	1610 - 1615	—	—	BL-107
ECM	P1616	1616	—	—	EC-1360
INJ ADJ VAL UNRGST	P1622	1622	—	—	EC-1362
INJ ADJ VAL ERROR	P1623	1623	—	—	EC-1364

Items (CONSULT-II screen item)	DTC*1		1st/2nd trip DTC	MI lighting up	Reference page
	CONSULT-II GST*2	ECM*3			
PM OVER ACCMLT*5	P2002	2002	—	—	EC-1366
ETC MOT*5	P2118	2118	×	×	EC-1369
ETC ACTR*5	P2119	2119	—	—	EC-1374
APP SENSOR	P2135	2135	—	—	EC-1376
INJ PWR/CIRC	P2146	2146	×	×	EC-1383
INJECTOR/CIRC	P2147	2147	×	×	EC-1387
INJECTOR/CIRC	P2148	2148	×	×	EC-1387
INJ PWR/CIRC	P2149	2149	×	×	EC-1383
BARO SEN/CIRC	P2228	2228	×	×	EC-1393
BARO SEN/CIRC	P2229	2229	×	×	EC-1393
A/F SENSOR1*5	P2297	2297	×	×	EC-1395
TP SEN/CIRCUIT*5	P2622	2622	×	×	EC-1398
TP SEN/CIRCUIT*5	P2623	2623	×	×	EC-1398

*1: 1st trip DTC No. and 2nd trip DTC No. are the same as DTC No.
*2: This number is prescribed by ISO 15031-6.
*3: In Diagnostic Test Mode II (Self diagnostic results), this number is controlled by NISSAN.
*4: The troubleshooting for this DTC needs CONSULT-II.
*5: Models with DPF.

DTC AND 1ST/2ND TRIP DTC

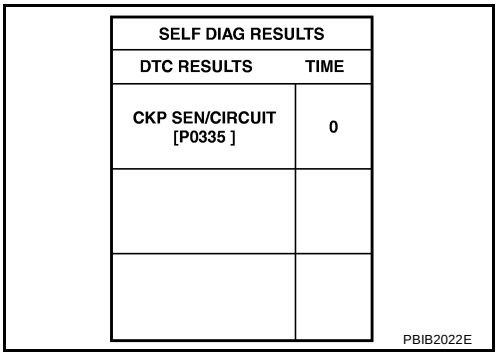
The number of 1st/2nd trip DTC is the same as the number of DTC.
When a malfunction is detected during 1st trip, 1st trip DTC is stored in the ECM memory. MI does not illuminate at this time. When the same malfunction is detected in the next trip (2nd trip), 2nd trip DTC is stored in the ECM memory and 1st trip DTC is cleared from the ECM memory. MI does not illuminate at this time. In addition, DTC is stored in the ECM memory and MI lights up when the same malfunction is detected during the following consecutive trip (3rd trip).
The procedure for erasing DTC, 1st trip DTC, and 2nd trip DTC from the ECM memory is described in EC-1005, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .
For malfunctions in which 1st/2nd trip DTC are displayed, Refer to EC-1001, "Emission-Related Diagnostic Information" .
1st/2nd trip DTC is specified in Service $07 of ISO15031-5. 1st/2nd trip DTC detection occurs without lighting up MI and therefore does not warn the driver of a malfunction.
When 1st/2nd trip DTC is detected, check, print out or write down, and erase 1st/2nd trip DTC as specified with step II of Work Flow, refer to EC-1014, "WORK FLOW" . Then perform DTC Confirmation Procedure or Overall Function Check to try to duplicate the malfunction. If the malfunction is duplicated, it is necessary to investigate the cause again.

How to Read DTC and 1st/2nd Trip DTC

DTC and 1st/2nd trip DTC can be read by the following procedures.

With CONSULT-II
With GST
CONSULT-II or GST (Generic Scan Tool): Examples: P0117, P0335, P1268, etc.
These numbers are prescribed by ISO 15031-6.
(CONSULT-II also displays the malfunctioning parts and systems.)

A sample of CONSULT-II display for DTC and 1st/2nd trip DTC is shown in the figure. DTC and 1st/2nd trip DTC are displayed in the “SELF-DIAG RESULTS” mode of CONSULT-II.
“TIME” data shows how many times the vehicle was driven after the last detection of DTC or 1st/2nd trip DTC. When DTC or 1st/2nd trip DTC has been detected currently, “TIME” becomes “0”.



- CONSULT-II displays for DTC and 1st/2nd trip DTC become the same.
- The output of a DTC indicates a malfunction. However, GST does not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify the malfunction status. Therefore the use of CONSULT-II (If available) is recommended.

FREEZE FRAME DATA

ECM records driving conditions such as calculated load value, engine coolant temperature, engine speed, vehicle speed, and intake manifold pressure at the moment a malfunction is detected.
The data stored together with DTC is called Freeze Frame Data, and is displayed on CONSULT-II or GST.
When 1st/2nd trip DTC is detected, Freeze Frame Data is not recorded.
Only a set of Freeze Frame Data can be stored in the ECM memory. When ECM records Freeze Frame Data, and another Freeze Frame Data is generated after that, the first (original) Freeze Frame Data is not updated in ECM and it remains.
When the DTC is erased from ECM memory, Freeze Frame Data is erased with DTC. The procedure for erasing DTC is described in EC-1005, "How to Erase DTC" .

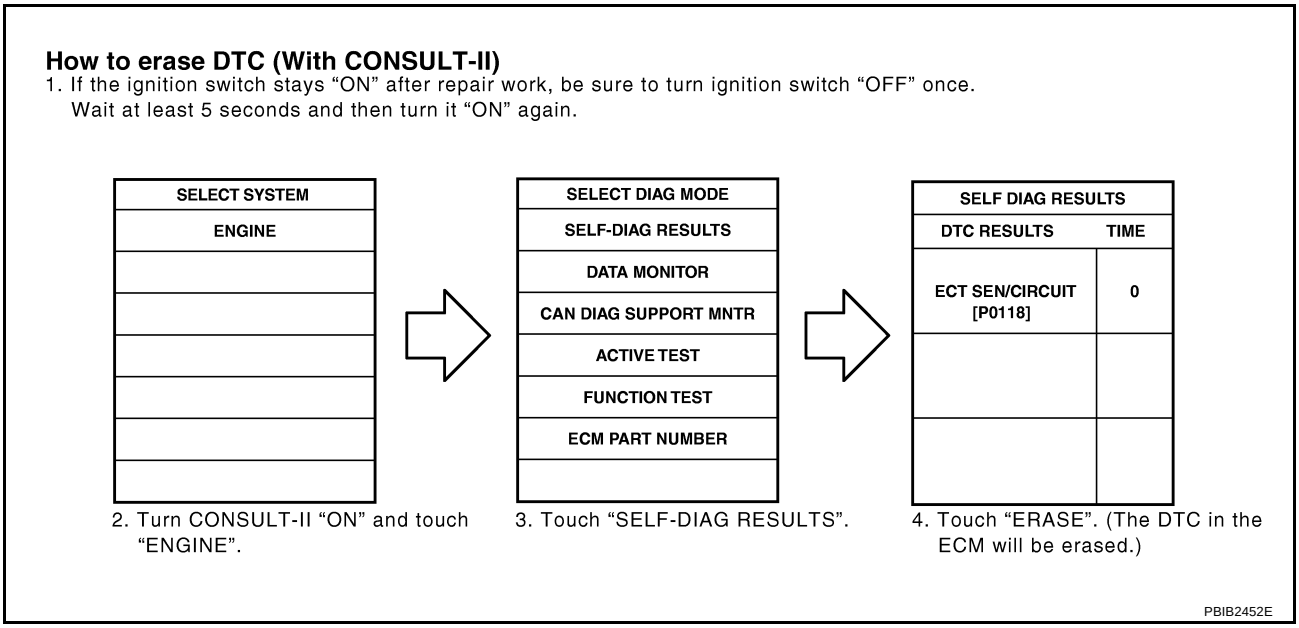
HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION

How to Erase DTC

With CONSULT-II

The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (The DTC in the ECM will be erased.)



- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**

- Diagnostic trouble codes
- 1st trip diagnostic trouble codes
- 2nd trip diagnostic trouble codes
- Freeze frame data

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

With GST

The emission related diagnostic information in the ECM can be erased by selecting Service $04 with GST.

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Select Service $04 with GST (Generic Scan Tool).

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**
  - Diagnostic trouble codes
  - 1st trip diagnostic trouble codes
  - 2nd trip diagnostic trouble codes
  - Freeze frame data

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

No Tools

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once.
2. Wait at least 10 seconds and then turn it ON (engine stopped) again.
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-1007, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

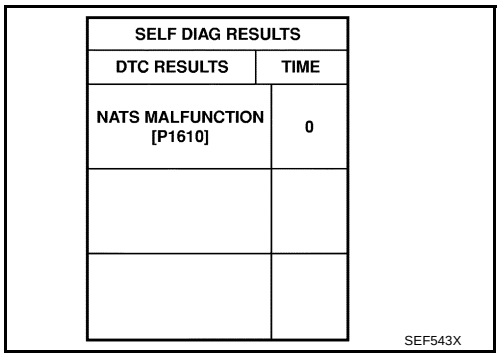
- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**
  - Diagnostic trouble codes
  - Freeze frame data
  - Fuel pump learning value

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

NATS (Nissan Anti-Theft System)

BBS001WG

- **If the security indicator lights up with the ignition switch in the ON position or "NATS MALFUNCTION" is displayed on "SELF-DIAG RESULTS" screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to BL-107, "NATS (NISSAN ANTI-THEFT SYSTEM)" .**
- **Confirm no self-diagnostic results of NATS is displayed before touching "ERASE" in "SELF-DAIG RESULTS" mode with CONSULT-II.**
- **When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner.
  Regarding the procedure of NATS initialization and all NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS.



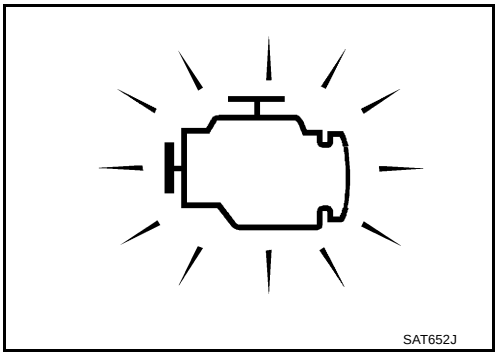
Malfunction Indicator (MI)

BBS001WH

DESCRIPTION

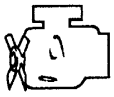
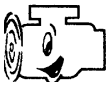
The MI is located on the instrument panel.

1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   If the MI does not light up, refer to EC-1817, "MI & DATA LINK CONNECTORS" .
2. When the engine is started, the MI should go off.
   If the MI remains on, the on board diagnostic system has detected an engine system malfunction.


SAT652J

ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position Engine stopped 	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit. (See EC-1817, "MI & DATA LINK CONNECTORS" .)
	Engine running 	MALFUNCTION WARNING	This is a usual driving condition. When ECM detects a malfunction, the MI will light up to inform the driver that a malfunction has been detected.
Mode II	Ignition switch in ON position Engine stopped	SELF-DIAGNOSTIC RESULTS	This function allows DTCs to be read.

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

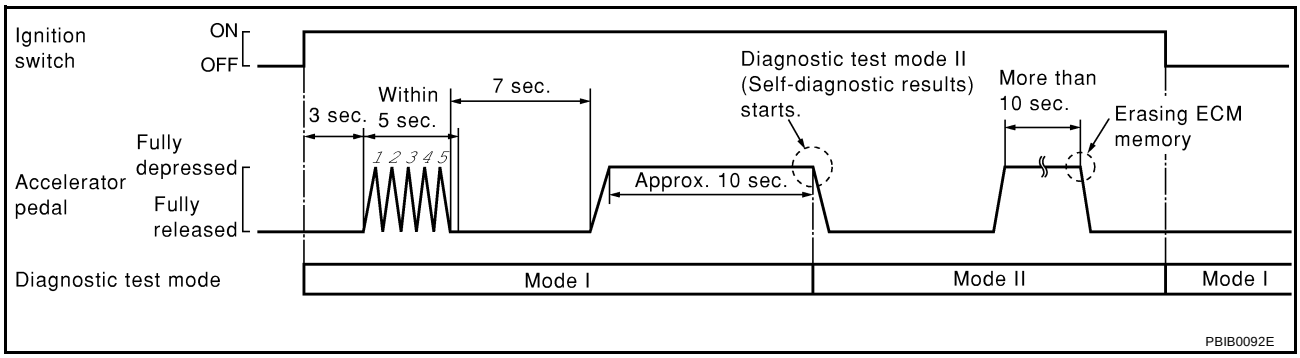
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.
b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.
4. Fully release the accelerator pedal.

ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-1007, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EC-1452, "MI & DATA LINK CONNECTORS" .

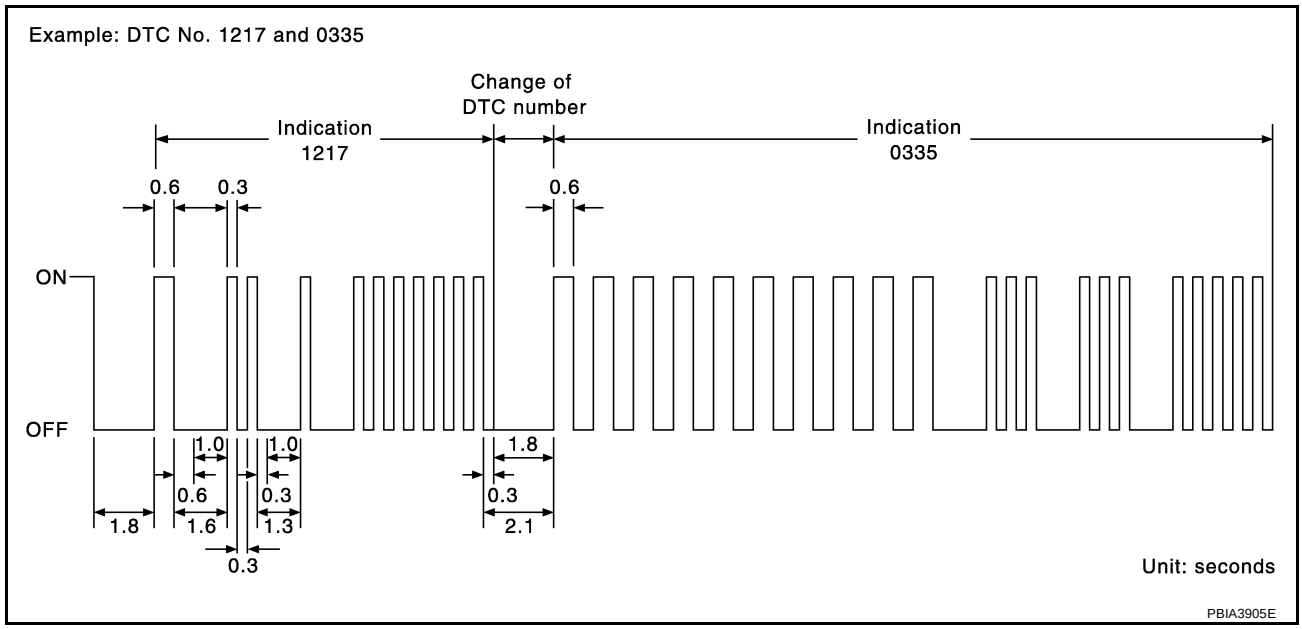
DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MI	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC is indicated by the number of blinks of the MI as shown below. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-975, "INDEX FOR DTC")

How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to EC-1009, "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)" .

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

OBD System Operation Chart

BBS001WI

RELATIONSHIP BETWEEN MI, 1ST/2ND TRIP DTC, DTC, AND DETECTABLE ITEMS

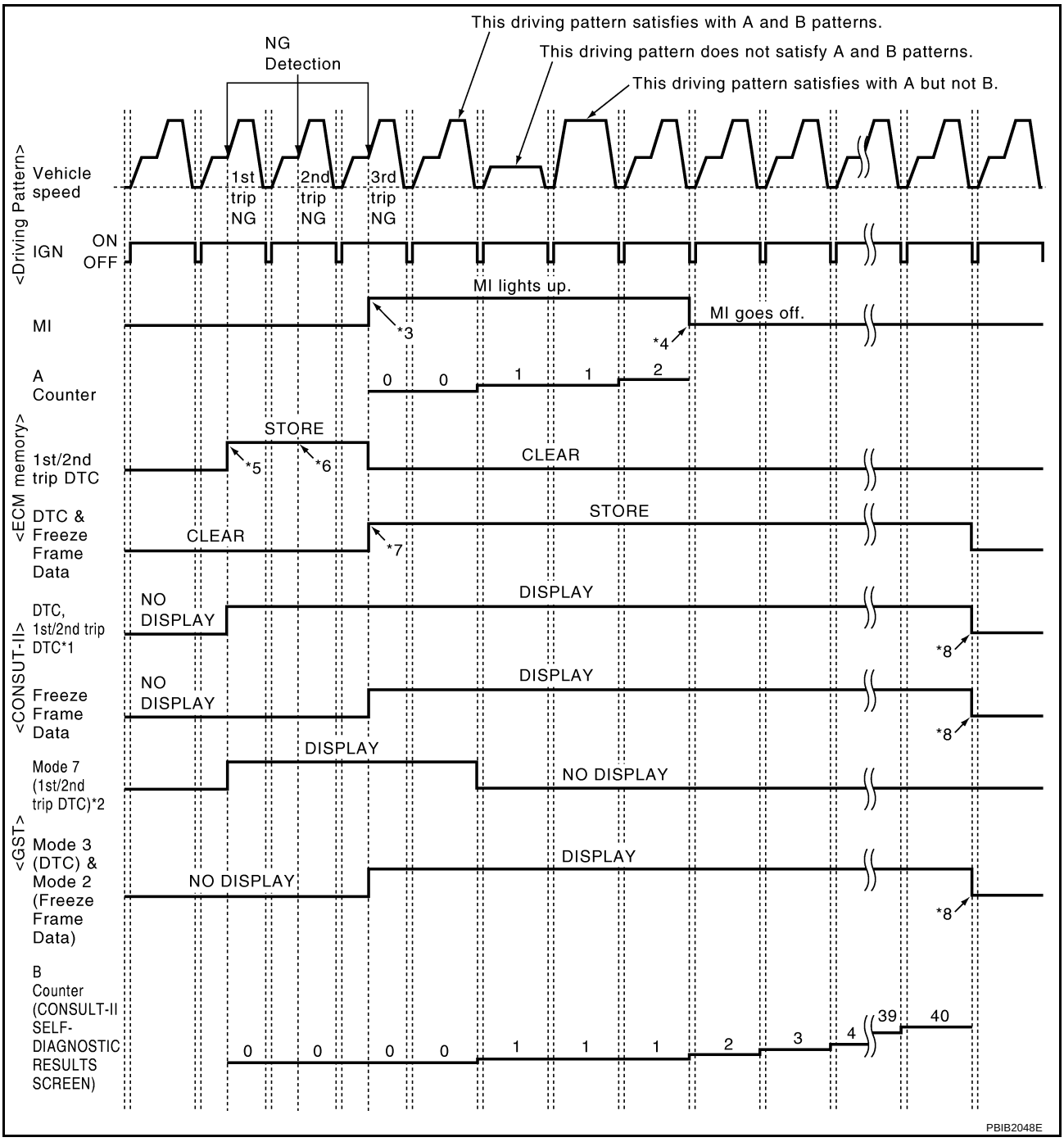
- When the malfunction is detected for the first time, 1st trip DTC is stored in the ECM memory.
- When the same malfunction is detected during 2nd consecutive trip, 2nd trip DTC is stored and 1st trip DTC is cleared.
- When the same malfunction is detected during 3rd consecutive trip, DTC and Freeze Frame Data are stored and MI illuminates. Refer to EC-1001, "Three Trip Detection Logic and One Trip Detection Logic" for details.1st/2nd trip DTC are cleared from the ECM memory.
- MI will go off after the vehicle is driven 3 consecutive times with no malfunction (driving pattern A).
- 1st/2nd trip DTC, DTC, and Freeze Frame Data will be stored until the vehicle is driven 41 times (driving pattern B) without the same malfunction recurring. “TIME” data displayed in the “SELF-DIAG RESULTS” mode of CONSULT-II shows the number of times the vehicle is driven without the same malfunction recurring.

SUMMARY CHART

Items	Trip	Counter	Driving Pattern
MI (goes off)	3	2	A
DTC, Freeze Frame Data (clear)	41	40	B
1st/2nd Trip DTC (clear)	41	40	B

Refer to EC-1012 for details of pattern A and B.

RELATIONSHIP BETWEEN MI, DTC, 1ST/ 2NDTRIP DTC AND DRIVING PATTERNS



*1: CONSULT-II displays for DTC and 1st/2nd trip DTC become the same.

*2: 1st/2nd trip DTC becomes the same display in mode7 of GST.

*3: When the same malfunction is detected in three consecutive trips, MI will light up.

*4: MI will go off after vehicle is driven 3 times (pattern A) without any malfunctions.

*5: When the malfunction is detected for the first time, 1st trip DTC is stored in the ECM memory.

*6: When the same malfunction is detected during 2nd consecutive trip, 2nd trip DTC is stored and 1st trip DTC is cleared.

*7: When the same malfunction is detected during 3rd consecutive trip, DTC and Freeze Frame Data are stored.

*8: The DTC and the freeze frame data will not be displayed any longer after vehicle is driven 41 times (pattern B) without the same malfunction.

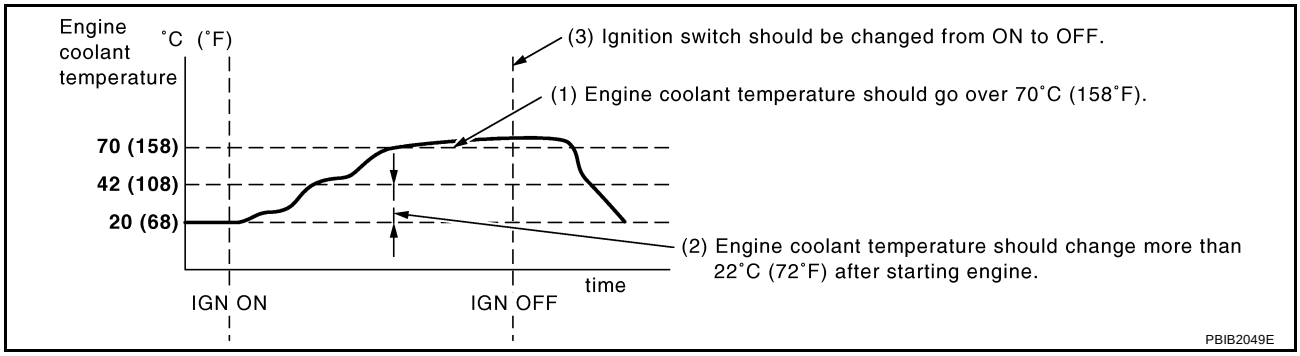
<Driving Pattern A>

Driving pattern A means the vehicle operation as follows:
Engine speed should go over 500 rpm at least 5 seconds and the DTC Confirmation Procedure is performed.

- The A counter will be cleared when the same malfunction is detected.
- The A counter will be counted up when the same malfunction is not detected.
- The MI will go off when the A counter reaches 3.

<Driving Pattern B>

Driving pattern B means the vehicle operation as follows:
Driving pattern A and (1)-(3) are satisfied.



- The B counter will be cleared when the same malfunction is detected.
- The B counter will be counted up when the same malfunction is not detected.
- The DTC will not be displayed after the B counter reaches 40.

TROUBLE DIAGNOSIS

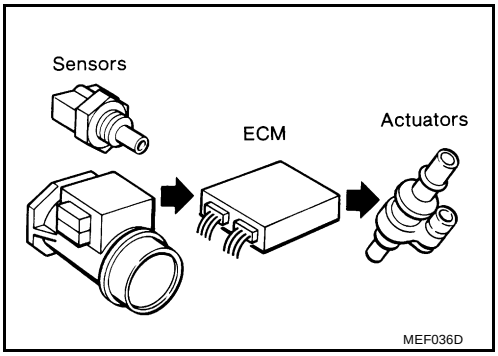
PFP:00004

Trouble Diagnosis Introduction

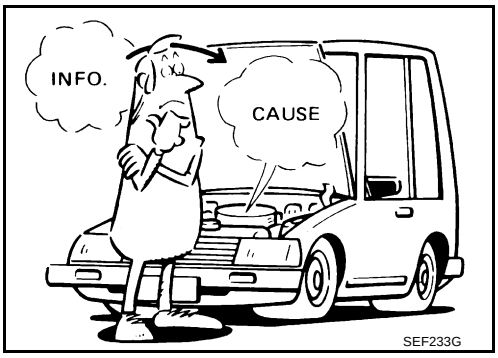
BBS001WJ

INTRODUCTION

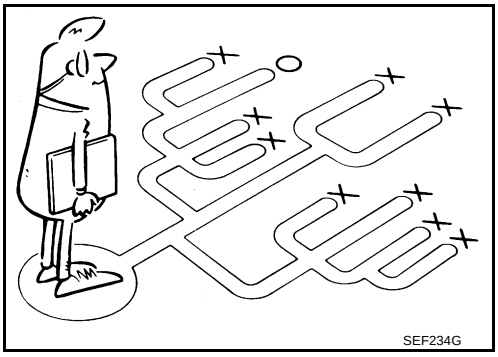
The engine has an ECM to control major systems such as fuel injection control, fuel injection timing control, glow control system, etc. The ECM accepts input signals from sensors and instantly actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, or other malfunctions with the engine.



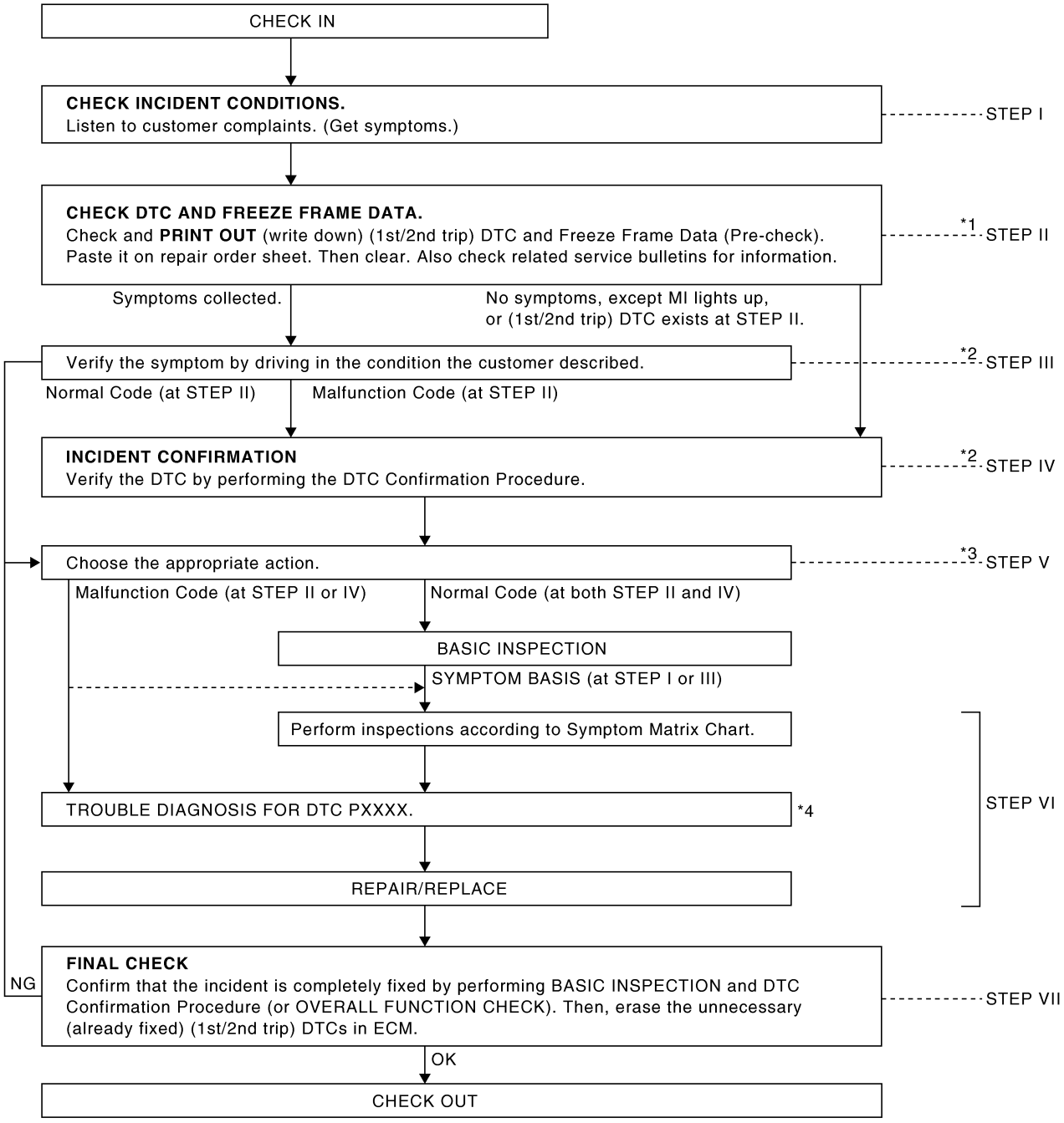
It is much more difficult to diagnose a malfunction that occurs intermittently rather than continuously. Most intermittent malfunctions are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT-II (or GST) or a circuit tester connected should be performed. Follow the EC-1014, "WORK FLOW" .
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on next page should be used.
Start your diagnosis by looking for conventional incidents first. This will help troubleshoot driveability incidents on an electronically controlled engine vehicle.



WORK FLOW



PBIB2047E

*1 If time data of “SELF-DIAG RESULTS” is other than “0”, perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*2 If the incident cannot be verified, perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-1059, "POWER SUPPLY AND GROUND CIRCUIT" .

*4 If malfunctioning part cannot be detected, perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the EC-1015, "DIAGNOSTIC WORK SHEET" .
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II or GST) the (1st/2nd trip) DTC and the freeze frame data (When 1st/2nd trip DTC is detected, Freeze Frame Data is not recorded.), then erase the DTC and the data. (Refer to EC-1005 .) The (1st/2nd trip) DTC and the freeze frame data can be used when duplicating the incident at STEP III & IV. If the incident cannot be verified, perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . Study the relationship between the cause, specified by (1st/2nd trip) DTC, and the symptom described by the customer. (The Symptom Matrix Chart will be useful. See EC-1022 .) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The DIAGNOSTIC WORK SHEET and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results. If the incident cannot be verified, perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the (1st/2nd trip) DTC by driving in (or performing) the DTC Confirmation Procedure. Check and read the (1st/2nd trip) DTC and freeze frame data by using CONSULT-II or GST. During the (1st/2nd trip) DTC verification, be sure to connect CONSULT-II to the vehicle in “DATA MONITOR (AUTO TRIG)” mode and check real time diagnosis results. If the incident cannot be verified, perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . In case the DTC Confirmation Procedure is not available, perform the Overall Function Check instead. The (1st/2nd trip) DTC cannot be displayed by this check, however, this simplified check is an effective alternative. The NG result of the Overall Function Check is the same as the (1st/2nd trip) DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to TROUBLE DIAGNOSIS FOR DTC PXXXX. If the normal code is indicated, proceed to the BASIC INSPECTION. (Refer to EC-1018 .) Then perform inspections according to the Symptom Matrix Chart. (Refer to EC-1022 .)
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) Harness Layouts. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-1035 , EC-1054 . The Diagnostic Procedure in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to Circuit Inspection in GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident" . Repair or replace the malfunction parts. If malfunctioning part cannot be detected, perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the DTC Confirmation Procedure and confirm the normal code [DTC No. P0000] is detected. If the incident is still detected in the final check, perform STEP VI by using a method different from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) (1st/2nd trip) DTC in ECM. (Refer to EC-1005, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .)

DIAGNOSTIC WORK SHEET

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one shown below in order to organize all the information for troubleshooting.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion when engine is cool ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator		☐ Turned on ☐ Not turned on	

MTBL0533

DTC Inspection Priority Chart

BBS001WK

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1068, "DTC U1000 CAN COMMUNICATION LINE" .

Priority	Detected items (DTC)
1	● U1000 CAN communication line ● P0016 Crankshaft position - camshaft position correlation ● P0101 P0102 P0103 Mass air flow sensor ● P0112 P0113 Intake air temperature sensor ● P0117 P0118 Engine coolant temperature sensor ● P0122 P0123 P0222 P0223 P2135 Accelerator pedal position sensor ● P0130 P0131 P0132 P0134 A/F sensor 1 ● P0135 A/F sensor 1 heater ● P0182 P0183 Fuel pump temperature sensor ● P0192 P0193 Fuel rail pressure sensor ● P0237 P0238 Turbocharger boost sensor ● P0335 P0336 Crankshaft position sensor ● P0340 P0341 Camshaft position sensor ● P0427 P0428 Front exhaust gas temperature sensor ● P0437 P0438 Rear exhaust gas temperature sensor ● P0471 P0472 P0473 P0478 Differential exhaust pressure sensor ● P0563 Battery voltage ● P0605 P0606 P1616 ECM ● P0642 P0643 P0652 P0653 Sensor power supply ● P1472 P1473 Engine room air temperature sensor ● P1610 - P1615 NATS ● P1622 P1623 Injector adjustment value ● P2228 P2229 Barometric pressure sensor ● P2621 P2622 Throttle position sensor
2	● P0045 Turbocharger boost control solenoid valve ● P0089 P0628 P0629 P1272 - P1275 Fuel pump ● P0200 - P0204 P1268 - P1271 P2146 - P2149 Fuel injector ● P0380 Glow relay ● P0404 EGR volume control valve ● P0686 ECM relay ● P1212 TCS communication line ● P21118 P2119 Electric throttle control actuator
3	● P0088 P0093 Fuel system ● P0217 Engine over temperature (OVERHEAT) ● P0234 Turbocharger system ● P0401 EGR function ● P0501 P0502 P0503 ASCD vehicle speed sensor ● P0504 ASCD brake switch ● P0580 P0581 ASCD steering switch ● P0638 Electric throttle control actuator function ● P1211 TCS control unit ● P2002 DPF ● P2297 A/F sensor 1

Fail-safe Chart

BBS003ZB

When the DTC listed below is detected, the ECM enters fail-safe mode.

DTC No.	Detected items	Engine operating condition in fail-safe mode
P2002	Particulate matter over accumulation	Engine speed will not rise more than 2,000 rpm due to the fuel cut.

Basic Inspection

BBS001WL

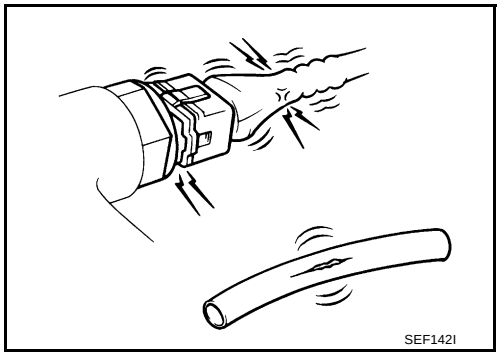
Precaution:
Perform Basic Inspection without electrical or mechanical loads applied;

- **Headlamp switch is OFF.**
- **On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.**
- **Air conditioner switch is OFF.**
- **Rear defogger switch is OFF.**
- **Steering wheel is in the straight-ahead position, etc.**

1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction.
2. Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to MA-7, "PERIODIC MAINTENANCE" .
3. Open engine hood and check the following:
   - Harness connectors for improper connections
   - Vacuum hoses for splits, kinks, or improper connections
   - Wiring for improper connections, pinches, or cuts
4. Start engine and warm it up to the normal operating temperature.

>> GO TO 2.


SEF142I

2. PREPARATION FOR CHECKING IDLE SPEED

With CONSULT-II
Connect CONSULT-II to the data link connector.
Without CONSULT-II
Install diesel tacho tester to the vehicle.

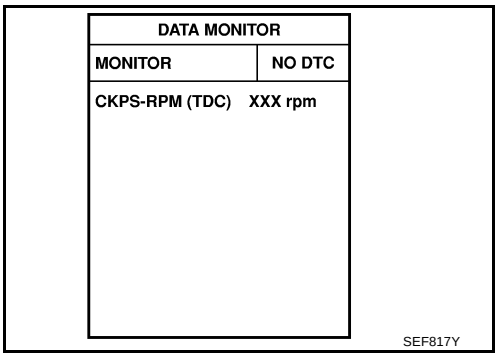
>> GO TO 3.

3. CHECK IDLE SPEED

With CONSULT-II

1. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
2. Read idle speed.

725±25 rpm



Without CONSULT-II

Read idle speed.

725±25 rpm

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. BLEED AIR FROM FUEL SYSTEM

1. Stop engine.
2. Use priming pump to bleed air from fuel system. Refer to EC-993, "AIR BLEEDING" .

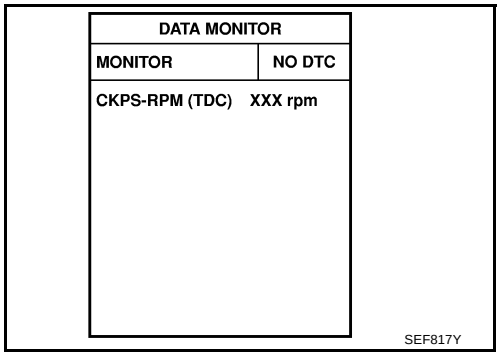
>> GO TO 6.

6. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

725±25 rpm



Without CONSULT-II

Read idle speed.

725±25 rpm

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. DRAIN WATER FROM FUEL FILTER

Drain water from fuel filter. Refer to EC-993, "WATER DRAINING" .

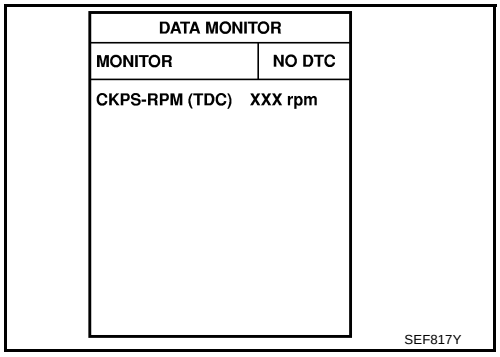
>> GO TO 8.

8. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

725±25 rpm



Without CONSULT-II

Read idle speed.

725±25 rpm

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. CHECK AIR CLEANER FILTER

Check air cleaner filter for clogging or breaks.

OK or NG

OK >> GO TO 10.
NG >> Replace air cleaner filter.

10. CHECK BATTERY VOLTAGE

Check battery voltage.

Voltage: More than 12.13V

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. CHECK BATTERY

Refer to SC-4, "BATTERY" .

OK or NG

OK >> Check charging system. Refer to SC-13, "CHARGING SYSTEM" .
NG >> Repair or replace.

12. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-214, "CHECKING COMPRESSION PRESSURE" .

OK or NG

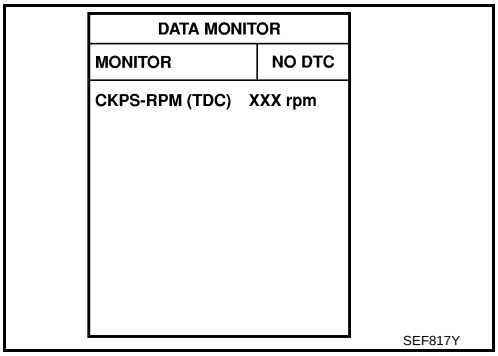
OK >> GO TO 13.
NG >> Follow the instruction of “CHECKING COMPRESSION PRESSURE”.

13. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

725±25 rpm



Without CONSULT-II

Read idle speed.

725±25 rpm

OK or NG

OK >> **INSPECTION END**
NG >> 1. Replace fuel injector.
2. GO TO 3.

Symptom Matrix Chart

BBS001WM

SYSTEM — Basic engine control system	SYMPTOM													Reference page
	HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL			HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	
	NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING							
Warranty symptom code	AA				AB			AC	AD	AE		AF		
Fuel pump	5	5	5	5	5	5	5	5		5	5		5	—
Fuel injector	3	3	3	3	3	3	3	3	3	4	4	3	3	EC-1153
Glow control system	1	1	1	1					1					EC-1403
Engine body	3	3	3	3	3	3	3		3	4	4		3	EM-227
Fuel transport pump					2	2	2							EC-1428
EGR system										3	3			EC-1224
Air cleaner and duct										3	3			EM-141
Electric throttle control actuator	2	2	2	2	1	1	1			1	1			EC-1369, EC-1374
Fuel rail pressure relief valve	3	3	3	3	3	3	3	3		3	3		3	EC-1082

SYSTEM — Basic engine control system		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL			HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	
		NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING							
Warranty symptom code		AA				AB			AC	AD	AE		AF		
ENGINE CONTROL	Fuel pump circuit	4	4	4	4	4	4	4	4		4	4		4	EC-1300
	Fuel injector circuit	1	1	1	1	1	1	1	1	1	1	1	1	1	EC-1153
	Fuel injector adjustment value								1	1	1	1			EC-995
	Mass air flow sensor circuit								1		1	1			EC-1095
	Engine coolant temperature circuit			1		1		1						1	EC-1107
	Vehicle speed signal circuit											1			LAN-25
	A/F sensor 1 circuit														EC-1120, EC-1125, EC-1130
	Accelerator pedal position sensor circuit								1		1	1			EC-1113
	Fuel rail pressure sensor circuit														EC-1145
	Crankshaft position sensor circuit		1	1	1	1	1	1	1	1	1	1			EC-1196
	Camshaft position sensor circuit			3	3										EC-1208
	Turbocharger boost sensor circuit								1		1	1			EC-1189
	Turbocharger boost control solenoid valve circuit								1		1	1			EC-1073
	Start signal circuit	1	1	1	1	1		1	1		1	1			EC-1446
	Ignition switch circuit		1			1	1	1							EC-1059
	Power supply for ECM circuit		1			1	1	1							EC-1059

SYSTEM — Basic engine control system		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL			HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	
		NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING							
Warranty symptom code		AA				AB			AC	AD	AE		AF		
ENGINE CONTROL	Cooling fan relay circuit														EC-1160
	EGR volume control valve circuit								1		1	1			EC-1231
	Glow relay circuit	1	1	1	1										EC-1220
	Differential exhaust pressure sensor circuit										3	3	3		EC-1258
	Engine room air temperature sensor circuit														EC-1354
	Front exhaust gas temperature sensor circuit														EC-1238
	Rear exhaust gas temperature sensor circuit														EC-1244
	Throttle position sensor circuit														EC-1398
	Refrigerant pressure sensor circuit					2	2	2					3	3	EC-1436
	ECM relay (Self-shutoff) circuit		1				1	1	1						EC-1318
	ECM	2	2	2	2	2	2	2	2	2	2	2	2	2	EC-1296, EC-1298, EC-1360, EC-1393
NATS (Nissan Anti-theft System)			1												EC-1006

1 - 5: The numbers refer to the order of inspection.
(continued on next page)

SYSTEM — Basic engine control system		SYMPTOM												Reference page
		ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	DPF warning light illuminates.*	Malfunction indicator illuminates.	Can be detected by CONSULT-II?	
								BLACK SMOKE	WHITE SMOKE					
Warranty symptom code		AG	AH	AJ	AK	AL	AM	AP		HA				
Fuel pump		5	5	5		5					3	1	1	—
Fuel injector		3	3	3		4		4	4		1	1	1	EC-1153
Glow control system									1					EC-1403
Engine body			3	3	3	3	1		3					EM-227
Fuel transport pump														EC-1428
EGR system								3			1			EC-1224
Air cleaner and duct								3						EM-141
Electric throttle control actuator											1	1	1	EC-1369, EC-1374
Fuel rail pressure relief valve		3	3	3		3						1	1	EC-1082
ENGINE CONTROL	Fuel pump circuit	4	4	4		4					1	1	1	EC-1338
	Fuel injector circuit	1	1	1		1		1	1		1	1	1	EC-1153
	Fuel injector adjustment value	1	1			1		1	1		1		1	EC-995
	Mass air flow sensor circuit							1			1	1	1	EC-1095
	Engine coolant temperature circuit	1	1		1							1	1	EC-1107
	A/F sensor 1 circuit										2	1	1	EC-1120, EC-1125, EC-1130
	Vehicle speed signal circuit											1	1	LAN-25
	Accelerator pedal position sensor circuit			1								1	1	EC-1113
	Fuel rail pressure sensor circuit										1	1	1	EC-1145

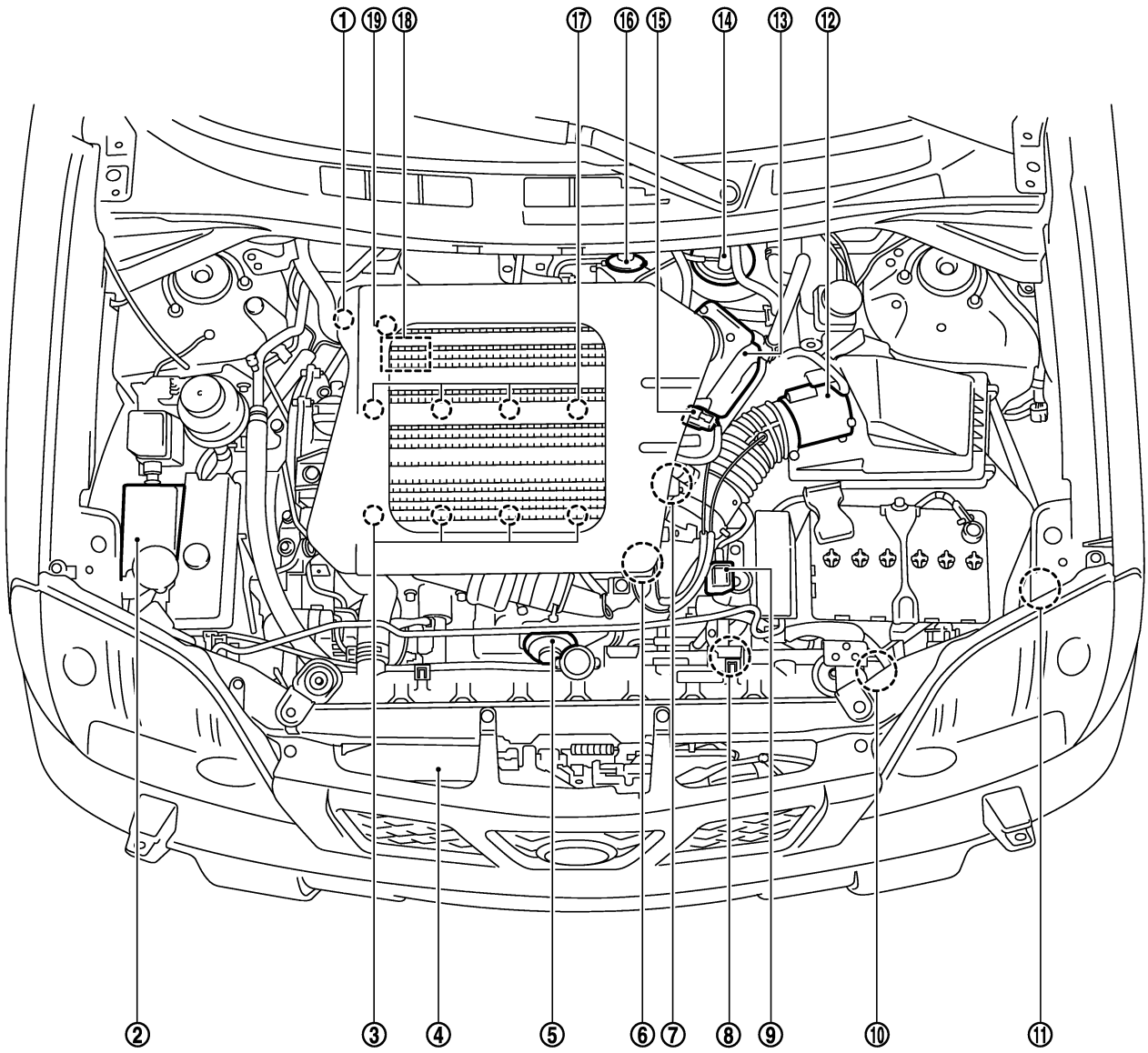
SYSTEM — Basic engine control system		SYMPTOM												Reference page
		ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	DPF warning light illuminates.*	Malfunction indicator illuminates.	Can be detected by CONSULT-II?	
								BLACK SMOKE	WHITE SMOKE					
Warranty symptom code		AG	AH	AJ	AK	AL	AM	AP		HA				
ENGINE CONTROL	Crankshaft position sensor circuit	1	1								3	1	1	EC-1196
	Camshaft position sensor circuit										3	1	1	EC-1208
	Turbocharger boost sensor circuit										2	1	1	EC-1189
	Turbocharger boost control solenoid valve circuit							1	1		1			EC-1073
	Start signal circuit													EC-1446
	Ignition switch circuit													EC-1059
	Power supply for ECM circuit											1	1	EC-1059
	Cooling fan relay circuit				2									EC-1160
	EGR volume control valve circuit							1			1			EC-1231
	Glow relay circuit								1					EC-1220
	Differential exhaust pressure sensor circuit										2	1	1	EC-1258
	Engine room air temperature sensor circuit											1	1	EC-1354
	Front exhaust gas temperature sensor circuit										2	1	1	EC-1238
	Rear exhaust gas temperature sensor circuit										2	1	1	EC-1238
	Throttle position sensor circuit										1	1	1	EC-1398
	Refrigerant pressure sensor circuit			3		4								EC-1436
	ECM relay (Self-shutoff) circuit												1	EC-1318
	ECM	2	2	2	2	2	2	2	2	2	2	2	2	EC-1296, EC-1298, EC-1360, EC-1393
NATS (Nissan Anti-theft System)													1	EC-1006

1 - 5: The numbers refer to the order of inspection.

*: Although there is no malfunction in the engine control system, DPF warning light may light up because the vehicle is driven in the specified driving pattern. For the detail, EC-1449, "DPF" .

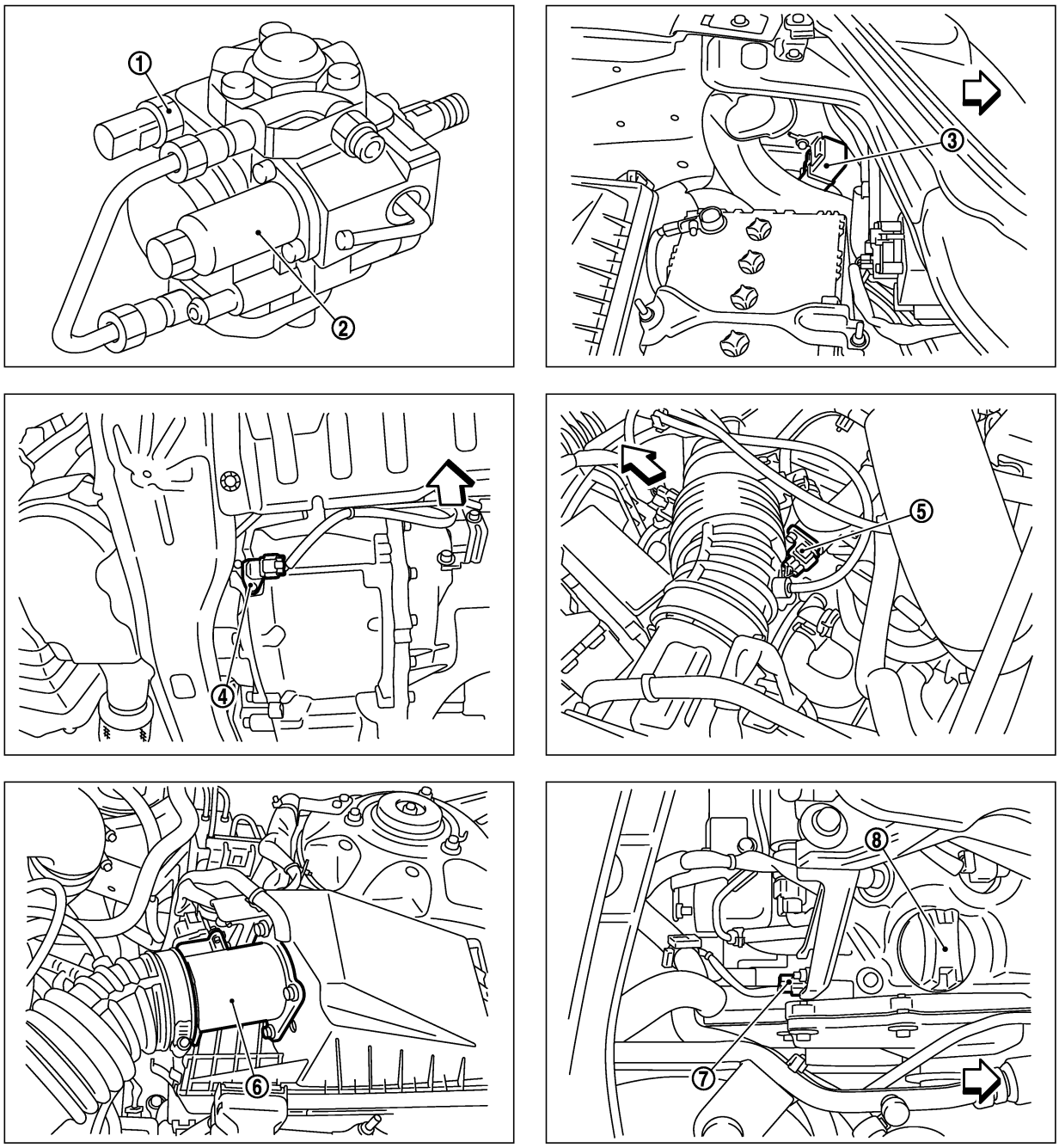
Engine Control Component Parts Location

BBS001WN



PBIB3146E

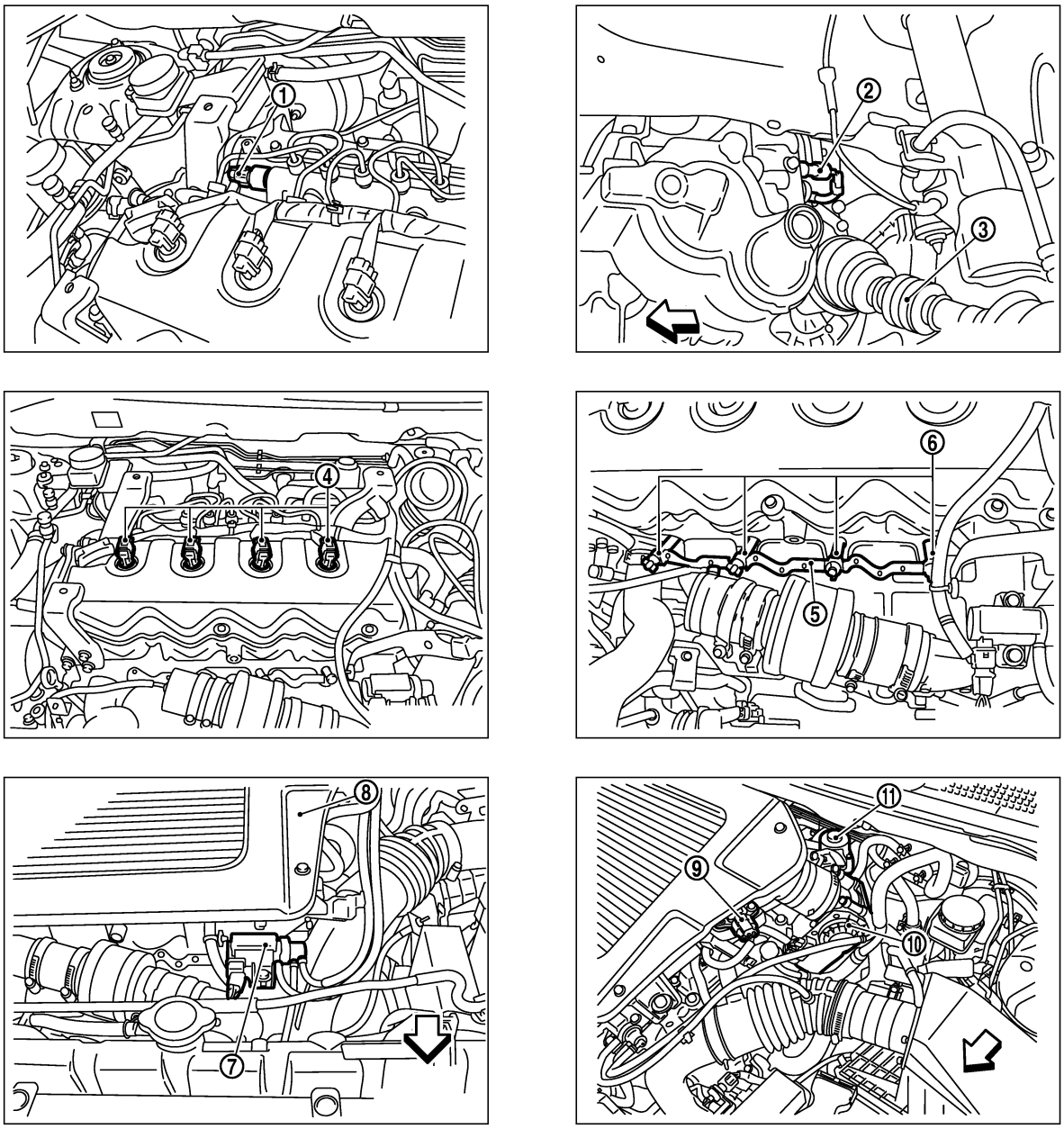
1. Engine coolant temperature sensor
2. Relay box
3. Glow plug
4. Cooling fan motor-2
5. Turbocharger boost control actuator
6. Turbocharger boost control solenoid valve
7. Camshaft position sensor
8. Cooling fan motor-1
9. Intake air control valve actuator
10. Refrigerant pressure sensor
11. Glow relay
12. Mass air flow sensor
13. Electric throttle control actuator
14. Fuel filter
15. Turbocharger boost sensor
16. EGR volume control valve
17. Fuel injector
18. Fuel pump
19. Fuel rail pressure sensor



PBIB3147E

⇦ : Vehicle front

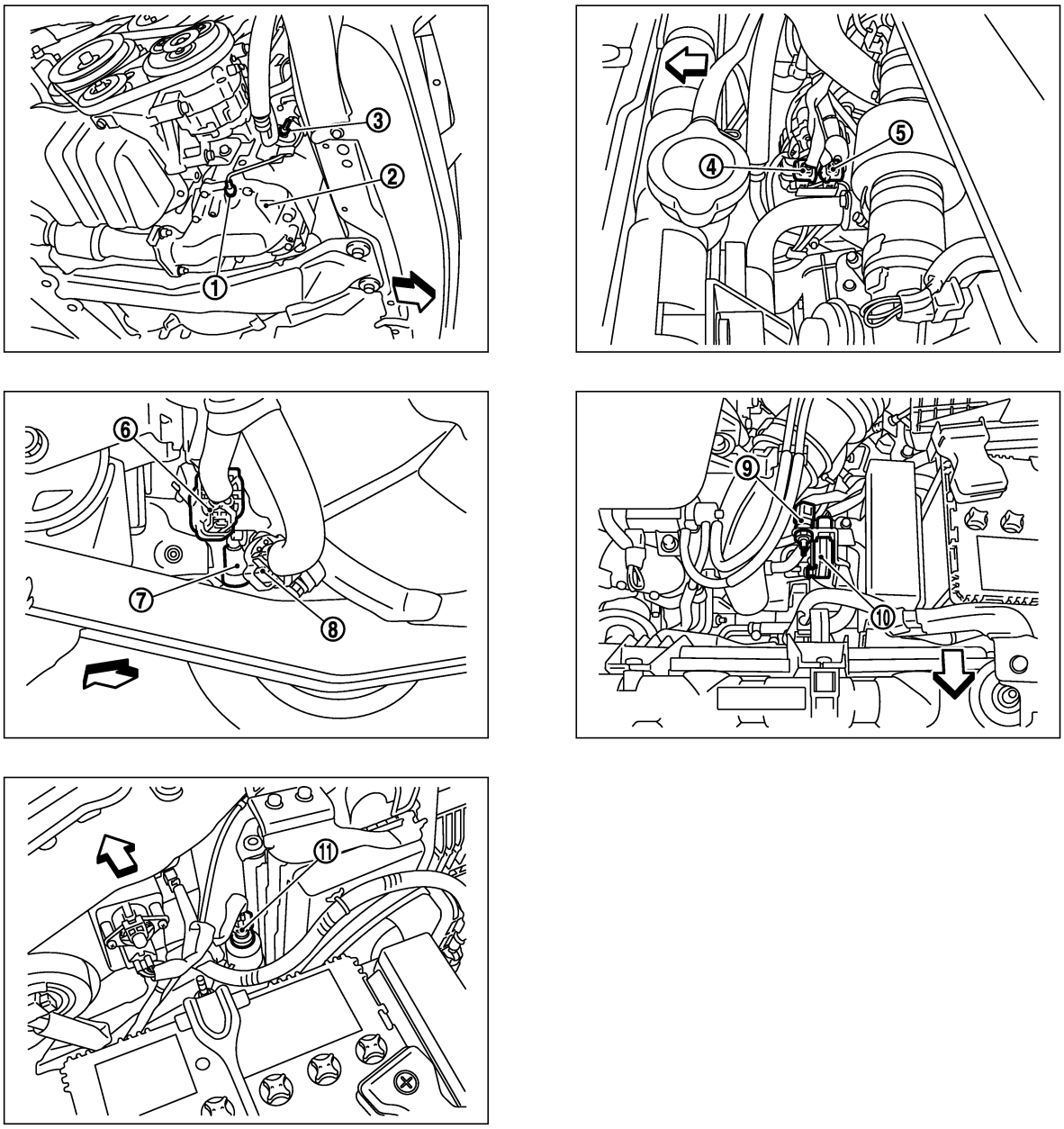
1. Fuel pump temperature sensor
2. Fuel pump
3. Glow relay
4. Crankshaft position sensor (View from under the vehicle)
5. Camshaft position sensor
6. Mass air flow sensor
7. Fuel rail pressure sensor
8. Oil filler cap



PBIB3148E

⇦ : Vehicle front

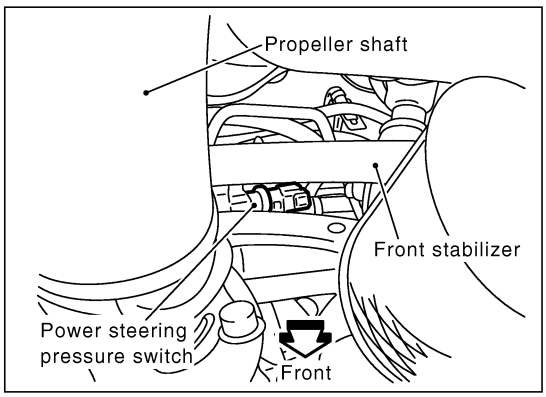
1. Fuel rail pressure sensor
2. PNP switch (View from under the vehicle)
3. Front drive shaft (LH)
4. Fuel injector
5. Connecting plate
6. Glow plug
7. Turbocharger boost control solenoid valve
8. Charge air cooler
9. Turbocharger boost sensor
10. Electric throttle control actuator
11. EGR volume control valve

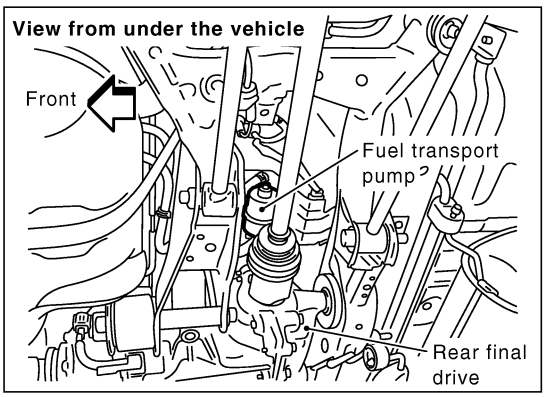


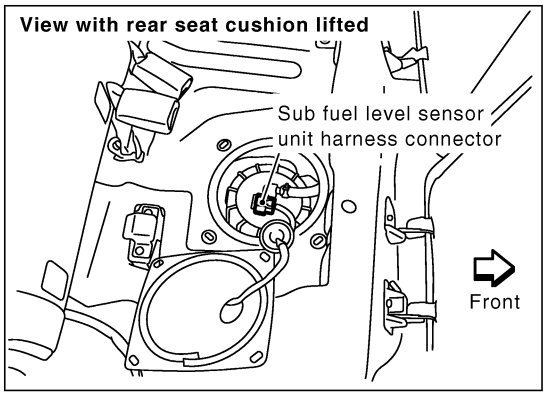
PBIB3149E

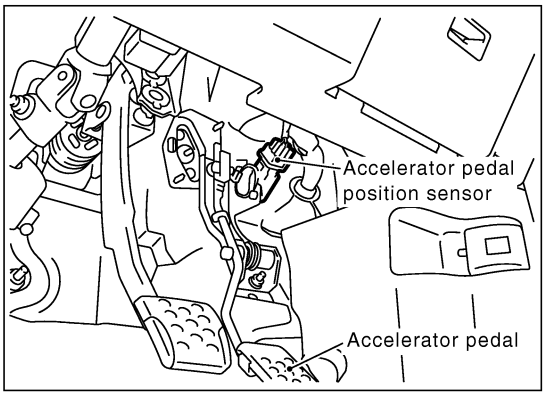
⇦ : Vehicle front

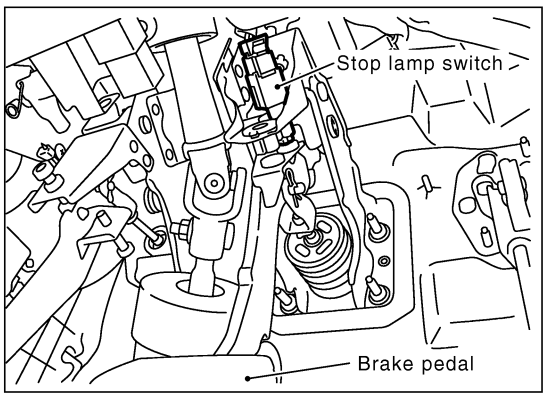
1. Rear exhaust gas temperature sensor (View from under the vehicle)
2. Oxidation Catalyst with DPF
3. Front exhaust gas temperature sensor
4. Rear exhaust gas temperature sensor harness connector (black)
5. Front exhaust gas temperature sensor harness connector (white)
6. A/F sensor 1 harness connector (View from under the vehicle)
7. A/F sensor 1
8. Crankshaft position sensor
9. Engine room air temperature sensor
10. Differential exhaust pressure sensor
11. Refrigerant pressure sensor

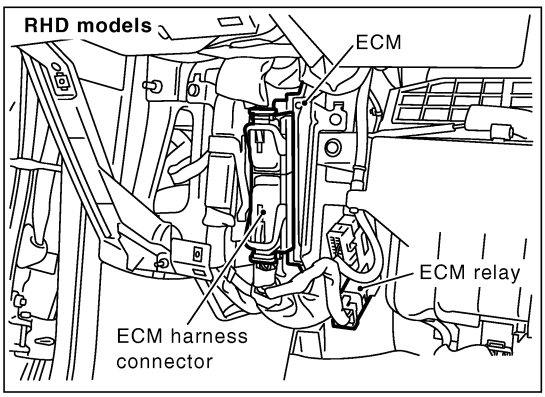

Propeller shaft
Front stabilizer
Power steering
pressure switch
Front


View from under the vehicle
Front
Fuel transport
pump
Rear final
drive

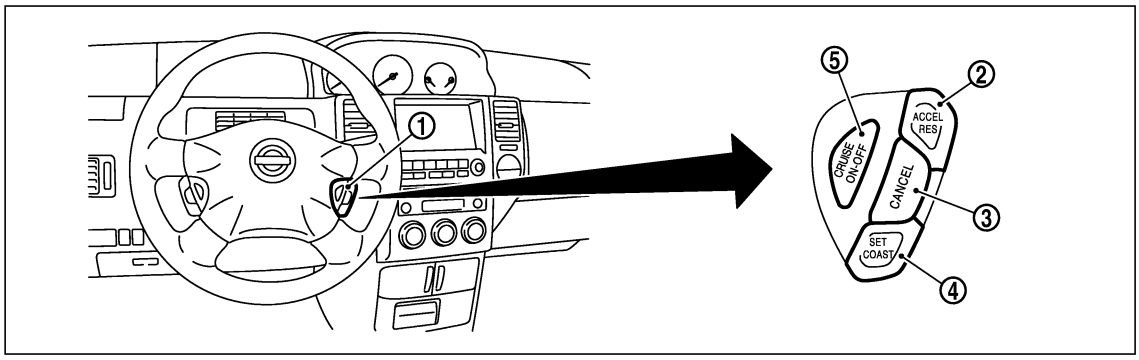

View with rear seat cushion lifted
Sub fuel level sensor
unit harness connector
Front

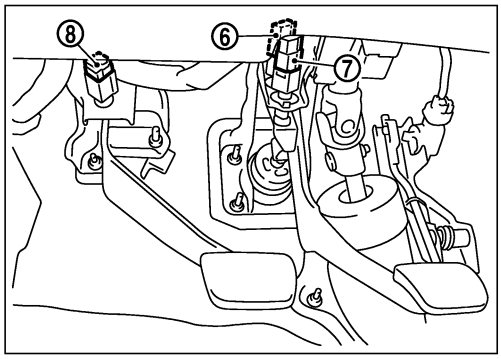

Accelerator pedal
position sensor
Accelerator pedal


Stop lamp switch
Brake pedal


RHD models
ECM
ECM relay
ECM harness
connector

PBIB1940E



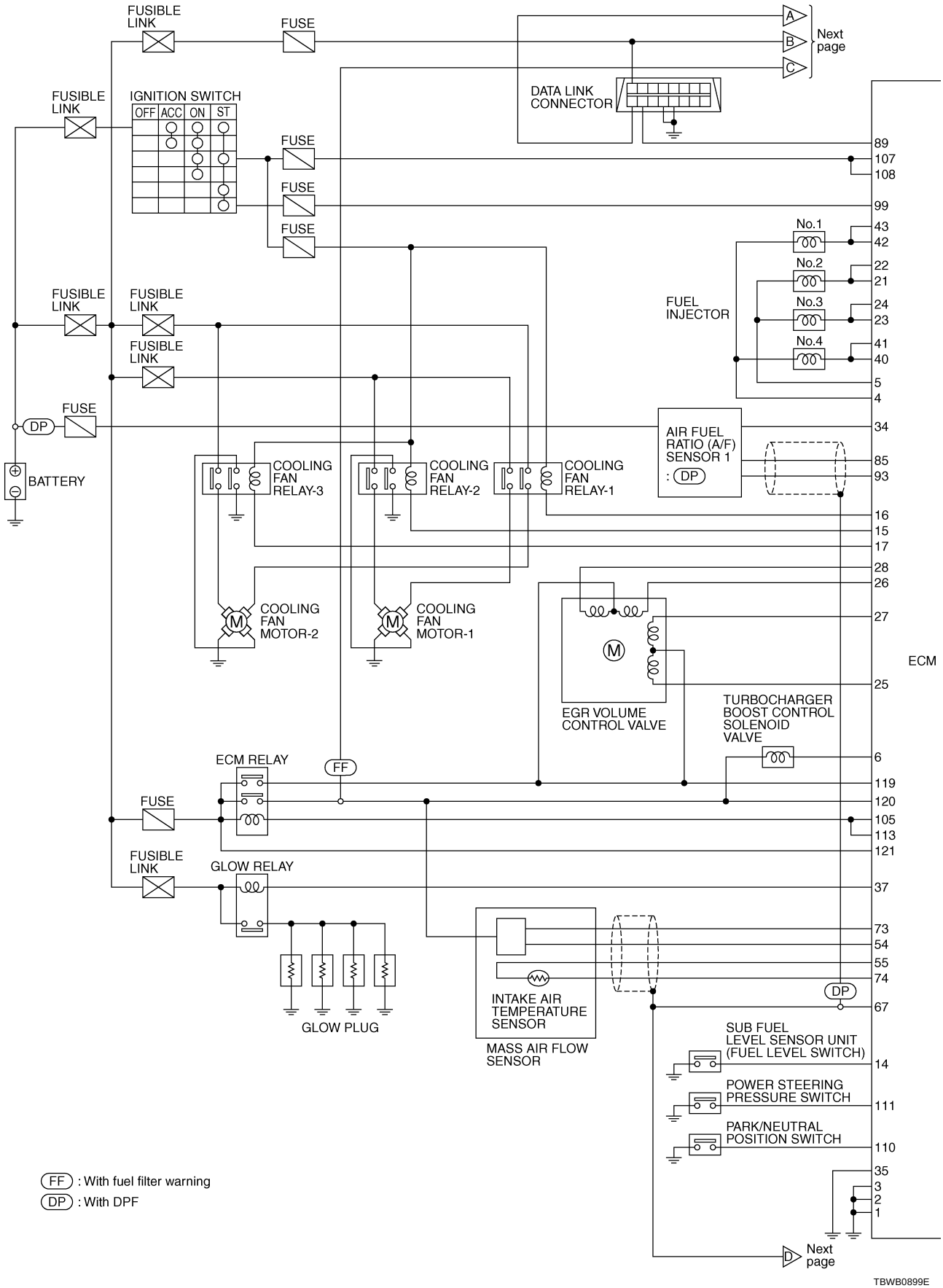


PBIB2881E

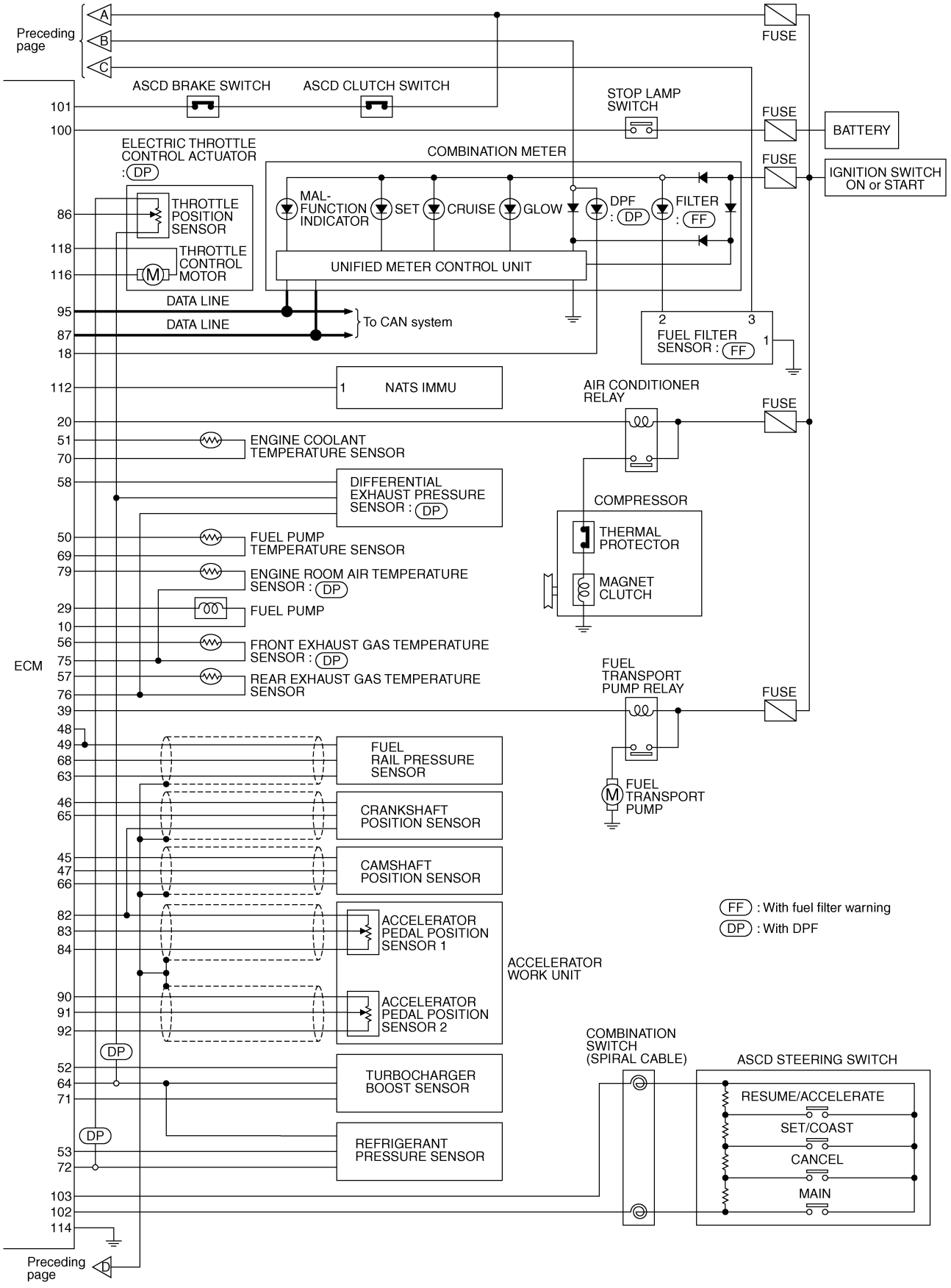
1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. CANSEL switch
4. SET/COAST switch
5. MAIN switch
6. Stop lamp switch harness connector
7. ASCD brake switch harness connector
8. ASCD clutch switch harness connector

Circuit Diagram

BBS001WO



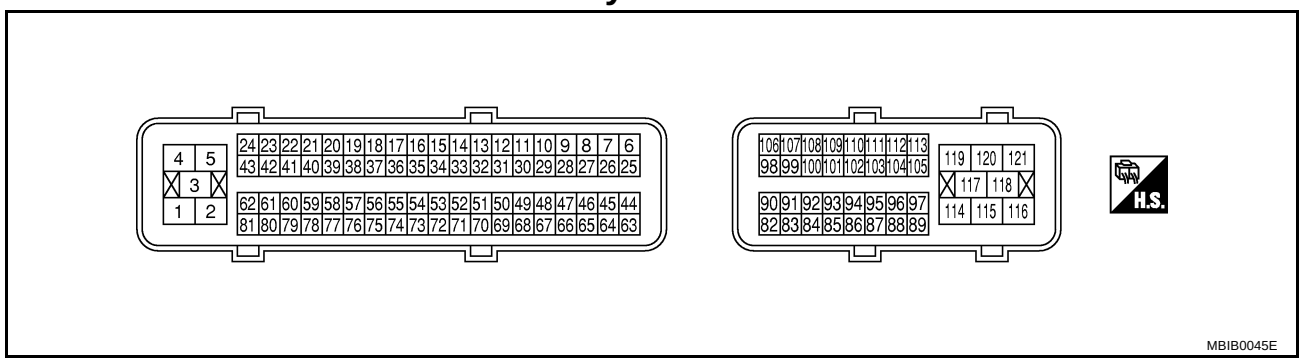
TBWB0899E


Preceding page
A
B
C
FUSE
ASCD BRAKE SWITCH
ASCD CLUTCH SWITCH
STOP LAMP SWITCH
101
100
FUSE
BATTERY
ELECTRIC THROTTLE CONTROL ACTUATOR : DP
COMBINATION METER
FUSE
IGNITION SWITCH ON or START
THROTTLE POSITION SENSOR
86
118
116
THROTTLE CONTROL MOTOR
MAL-FUNCTION INDICATOR
SET
CRUISE
GLOW
DPF : DP
FILTER : FF
UNIFIED METER CONTROL UNIT
DATA LINE
95
87
DATA LINE
To CAN system
18
2
3
FUEL FILTER SENSOR : FF
1
112
1
NATS IMMU
AIR CONDITIONER RELAY
FUSE
20
51
70
ENGINE COOLANT TEMPERATURE SENSOR
58
DIFFERENTIAL EXHAUST PRESSURE SENSOR : DP
COMPRESSOR
50
69
FUEL PUMP TEMPERATURE SENSOR
THERMAL PROTECTOR
79
ENGINE ROOM AIR TEMPERATURE SENSOR : DP
MAGNET CLUTCH
29
FUEL PUMP
10
56
75
FRONT EXHAUST GAS TEMPERATURE SENSOR : DP
ECM
57
76
REAR EXHAUST GAS TEMPERATURE SENSOR
FUEL TRANSPORT PUMP RELAY
39
FUSE
48
49
68
63
FUEL RAIL PRESSURE SENSOR
FUEL TRANSPORT PUMP
46
65
CRANKSHAFT POSITION SENSOR
45
47
66
CAMSHAFT POSITION SENSOR
FF : With fuel filter warning
DP : With DPF
82
83
84
ACCELERATOR PEDAL POSITION SENSOR 1
ACCELERATOR WORK UNIT
90
91
92
ACCELERATOR PEDAL POSITION SENSOR 2
COMBINATION SWITCH (SPIRAL CABLE)
ASCD STEERING SWITCH
DP
52
64
71
TURBOCHARGER BOOST SENSOR
RESUME/ACCELERATE
SET/COAST
CANCEL
MAIN
DP
53
72
REFRIGERANT PRESSURE SENSOR
103
102
114
Preceding page
D

TBWB0900E

ECM Harness Connector Terminal Layout

BBS001WP

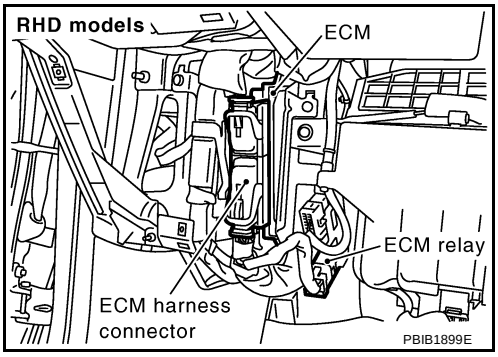


ECM Terminals And Reference Value

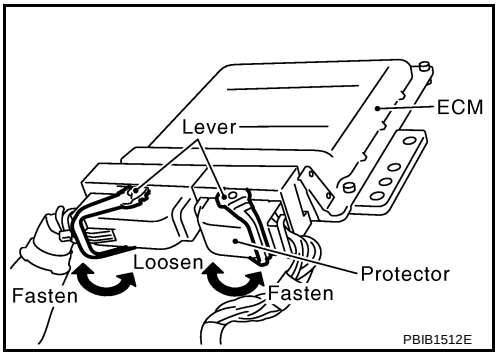
BBS001WQ

PREPARATION

1. ECM is located behind the glove box. For this inspection, remove glove box.
2. Remove ECM harness protector.



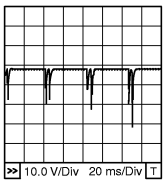
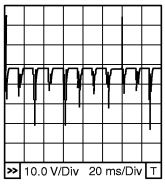
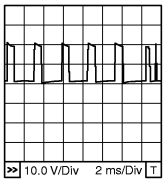
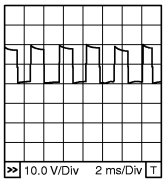
3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown in the figure.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

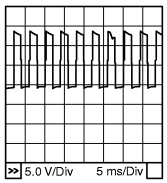
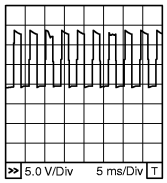


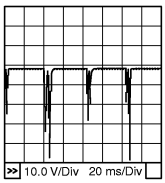
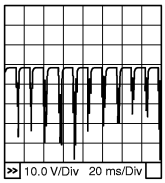
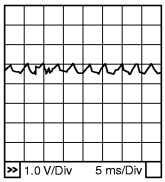
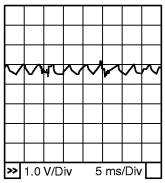
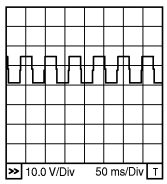
ECM INSPECTION TABLE

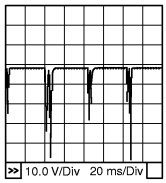
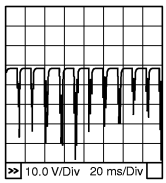
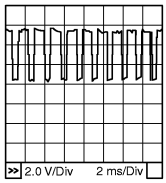
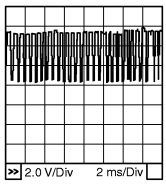
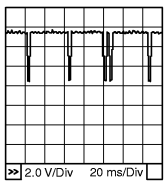
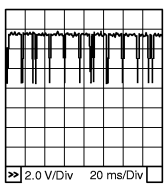
Remarks: Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
1 2 3	B B B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
4	W/B	Fuel injector power supply (For cylinder No. 1 and 4) Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	5 - 10V ★  MBIB0883E
5	G/B		**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	5 - 10V ★  MBIB0884E
6	L	Turbocharger boost control solenoid valve	**[Ignition switch ON]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0889E
			[Ignition switch ON] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0890E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0886E
14	W/PU	Fuel level switch	**[Ignition switch ON]** ● Some fuel is in the fuel tank	Approximately 0V
			[Ignition switch ON] ● No fuel is in the fuel tank	BATTERY VOLTAGE (11 - 14V)
15	LG/B	Cooling fan relay-2	**[Engine is running]** ● Cooling fan: Not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan: Operating	Approximately 0.1V
16	LG	Cooling fan relay-1	**[Engine is running]** ● Cooling fan: Not operating ● Cooling fan: Operating at low speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan: Operating at middle speed ● Cooling fan: Operating at high speed	Approximately 0.1V
17	SB	Cooling fan relay-3	**[Engine is running]** ● Cooling fan: Not operating ● Cooling fan: Operating at low speed ● Cooling fan: Operating at middle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan: Operating at high speed	Approximately 0.1V
18	BR	DPF warning lamp	**[Ignition switch ON]** ● DPF warning light: OFF	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● DPF warning light: ON	Approximately 0.3V
20	L	Air conditioner relay	**[Engine is running]** ● Air conditioner switch: OFF	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Both air conditioner switch and blower fan switch: ON (Compressor is operating)	Approximately 0.1V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
21 22 23 24	G/R GY/L G/R GY/L	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 9V ★  MBIB0882E
25 26 27 28	GY W/L OR/B GY/B	EGR volume control valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.1 - 14V (Voltage signals of each ECM terminals differ according to the control position of EGR volume control valve.)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E
34	L	A/F sensor 1 heater	**[Engine is running]** ● After the vehicle is driven for 6 minutes under the following conditions. – Warm-up condition – Vehicle speed: 80km/h (50MPH) – Shift lever: Suitable gear position	Approximately 5V★  PBIB3207E
			[Ignition switch: ON] ● Engine: Stopped	BATTERY VOLTAGE (11 - 14V)
35	B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
37	W/R	Glow relay	Refer to EC-1403, "GLOW CONTROL SYSTEM" .	

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
39	B/OR	Fuel transport pump relay	**[Engine is running]** ● Some fuel is in the fuel tank	Approximately 0V
			[Engine is running] ● No fuel is in the fuel tank	BATTERY VOLTAGE (11 - 14V)
40 41 42 43	G/R GY/L G/R GY/L	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 9V ★  MBIB0882E
45	G/OR	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
46	L	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 6V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 6V ★  MBIB0880E
47	G/R	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 6V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 6V ★  MBIB0878E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
48 49	Y/R R	Fuel rail pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.7 - 2.0V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	2.0 - 2.3V
50	PU	Fuel pump temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with fuel pump temperature
51	L/OR	Engine coolant temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with engine coolant temperature
52	Y	Turbocharger boost sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	2.3 - 2.6V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	2.5 - 2.8V
53	Y	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower fan switch: ON (Compressor operates)	1.0 - 4.0V
54	W	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.7V
			[Engine is running] ● **Warm-up condition** ● Idle speed	1.6 - 1.9V
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm.	1.6 - 1.9V to Approximately 4.3V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
55	G	Intake air temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.2V Output voltage varies with intake air temperature
56	P	Front exhaust gas temperature sensor	**[Engine is running]**	Approximately 0.3 - 5.3V Output voltage varies with front exhaust gas temperature
57	SB	Rear exhaust gas temperature sensor	**[Engine is running]**	Approximately 0.3 - 5.3V Output voltage varies with rear exhaust gas temperature
58	PU	Differential exhaust pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 1.3V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 1.5V
63	W	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
64	W	Sensor power supply (Turbocharger boost sensor / Differential exhaust pressure sensor / Throttle position sensor / Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
65	L/R	Crankshaft position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
66	G/Y	Camshaft position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
68	B	Fuel rail pressure sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
69	B	Fuel pump temperature sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
70	B	Engine coolant temperature sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
71	B	Turbocharger boost sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
72	B	Sensor ground (Throttle position sensor / Refrigerant pressure sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
73	B	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
74	R	Intake air temperature sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
75	Y	Sensor ground (Engine room air temperature sensor / Front exhaust gas temperature sensor)	**[Engine is running]**	Approximately 0.3V
76	BR	Sensor ground (Differential exhaust pressure sensor / Rear exhaust gas temperature sensor)	**[Ignition switch: ON]**	Approximately 0.3V
79	BR	Engine room air temperature sensor	**[Engine is running]**	Approximately 0.3 - 5.3V Output voltage varies with engine room air temperature

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V
83	W	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.8 - 1.3V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.0V
84	R	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
85	W	A/F sensor 1 (-)	**[Engine is running]** ● Idle speed	1.8 - 2.1V
86	PU	Throttle position sensor	**[Ignition switch ON]**	3.65 - 4.85V
87	GY/R	CAN communication line	**[Ignition switch ON]**	Approximately 2.0 - 2.6V Output voltage varies with the communication status.
89	LG	Data link connector	**[Ignition switch ON]** ● CONSULT-II or GST is disconnected.	Approximately 0V - Battery voltage (11 - 14V)
90	L	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	G	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.45 - 0.9V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.25 - 2.7V
92	Y	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
93	OR	A/F sensor 1 (+)	**[Engine is running]** ● Idle speed	2.2 - 2.5V
95	G/R	CAN communication line	**[Ignition switch ON]**	Approximately 2.6 - 3.2V Output voltage varies with the communication status.
99	B/Y	Start signal	**[Ignition switch ON]**	Approximately 0.3V
			[Ignition switch START]	BATTERY VOLTAGE (11 - 14V)
100	P	Stop lamp switch	**[Ignition switch OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
101	GY/L	ASCD brake switch	**[Ignition switch ON]** ● Brake pedal and clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch OFF] ● Brake pedal and/or clutch pedal: Slightly depressed	Approximately 0V
102	PU*1 W/R*2	ASCD steering switch	**[Ignition switch ON]** ● ASCD steering switch: OFF	Approximately 4.3V
			[Ignition switch ON] ● MAIN switch: Pressed	Approximately 0.3V
			[Ignition switch ON] ● CANCEL switch: Pressed	Approximately 1.3V
			[Ignition switch ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3.3V
			[Ignition switch ON] ● SET/COAST switch: Pressed	Approximately 2.3V
103	B/OR	ASCD steering switch ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
105	G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	W/R W/R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
110	G/OR	Park/Neutral position switch	**[Ignition switch ON]** ● Shift lever: Neutral	Approximately 0V
			[Ignition switch ON] ● Shift lever: Except above	BATTERY VOLTAGE (11 - 14V)
111	P/B	Power steering pressure switch	**[Engine is running]** ● Steering wheel: Being turned	Approximately 0V
			[Engine is running] ● Steering wheel: Not being turned	BATTERY VOLTAGE (11 - 14V)
113	G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
114	B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
116	OR	Throttle control motor (Open)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
118	G	Throttle control motor (Close)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: LHD models
*2: RHD models

CONSULT-II Function (ENGINE)

BBS001WR

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as 1st/2nd trip DTC, DTC and freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECM part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- 1st/2nd trip diagnostic trouble codes
- Freeze frame data

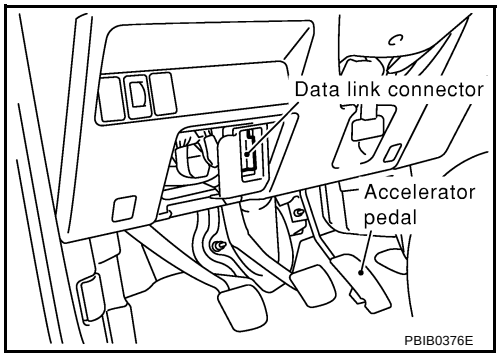
ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

		Item	DIAGNOSTIC TEST MODE			
			SELF-DIAG RESULTS		DATA MONITOR	ACTIVE TEST
			DTC*	FREEZE FRAME DATA		
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor	×	×	×	
		Camshaft position sensor	×			
		Engine coolant temperature sensor	×	×	×	×
		Vehicle speed sensor	×	×	×	
		Fuel pump temperature sensor	×		×	
		Accelerator pedal position sensor 1	×		×	
		Accelerator pedal position sensor 2	×		×	
		Fuel rail pressure sensor	×		×	
		Mass air flow sensor	×	×	×	
		Intake air temperature sensor	×	×		
		Turbocharger boost sensor	×	×	×	
		Air fuel ratio (A/F) sensor 1	×		×	
		Throttle position sensor	×		×	
		Differential exhaust pressure sensor	×		×	
		Engine room air temperature sensor	×		×	
		Front exhaust gas temperature sensor	×		×	
		Rear exhaust gas temperature sensor	×		×	
		Refrigerant pressure sensor			×	
		Battery voltage	×		×	
		Park/neutral position (PNP) switch			×	
		Power steering pressure switch			×	
		Stop lamp switch			×	
		Barometric pressure sensor (built-into ECM)	×		×	
		ASCD steering switch	×		×	
		ASCD brake switch	×		×	
		ASCD clutch switch	×		×	
	OUTPUT	Fuel pump	×		×	×
		Fuel injector	×		×	×
		Glow relay	×		×	×
		Cooling fan relay	×		×	×
		EGR volume control valve	×		×	×
		Throttle control motor	×		×	×
		Air fuel ratio (A/F) sensor 1 heater	×		×	

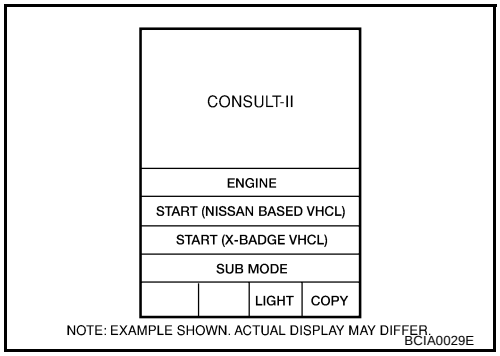
X: Applicable
*: This item includes 1st/2nd trip DTCs.

INSPECTION PROCEDURE

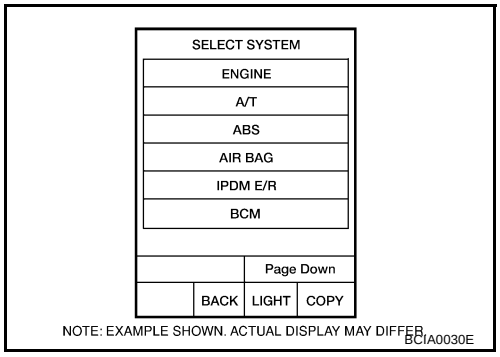
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector, which is located under the driver side dash panel.
3. Turn ignition switch ON.



4. Touch “START (NISSAN BASED VHCL)”.

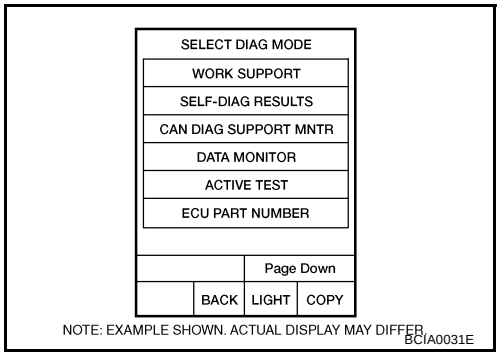


5. Touch “ENGINE”.
   If “ENGINE” is not indicated, go to GI-35, "CONSULT-II Data Link Connector (DLC) Circuit" .



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



WORK SUPPORT MODE

Work Item

WORK ITEM	DESCRIPTION	USAGE
ENTER INJCTR CALIB DATA	● Injector adjustment value is written onto ECM memory.	When performing Injector Adjustment Value Registration.
INJ ADJ VAL CLR	● Injector adjustment value stored in ECM is initialized.	Before changing injector adjustment value stored in ECM, it is recommended to perform this work item.

WORK ITEM	DESCRIPTION	USAGE
SERVICE REGENERATION	● This Regeneration is performed with CONSULT-II to make particulate matter burn to reduce. **NOTE:** Always replace engine oil and oil filter after service regeneration.	Service Regeneration should be performed in the following cases. ● ECM enters fail-safe mode because the amount of particulate matter in DPF reaches the specified level. ● ECM is replaced. ● Component Inspection for DPF is performed.
DPF DATA CLR	● DPF data stored in ECM memory is cleared.	Always perform after oxidation catalyst with DPF is replaced as new one. **CAUTION:** **Never perform when oxidation catalyst with DPF is not replaced as new one. Oxidation catalyst with DPF may be damaged because regeneration is not performed at appropriate timing.**
A/F LARN CLR	● A/F Sensor Learning Value stored in ECM is cleared.	This work support item should be performed under the following conditions. ● A/F sensor 1 is changed. ● ECM is replaced with used one which stores the A/F Sensor Learning Value of another A/F sensor 1.

SELF-DIAGNOSTIC MODE

Self Diagnostic Item

Regarding items of DTC and 1st/2nd trip DTC, refer to — EC-975, "INDEX FOR DTC" .

Freeze Frame Data

Freeze frame data item	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-975, "INDEX FOR DTC" .)
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
INT MANI PRES [kPa]	● The intake manifold pressure at the moment a malfunction is detected is displayed.
INT/A TEMP SE [°C] or [°F]	● The intake air temperature at the moment a malfunction is detected is displayed.
FUEL/R PRESS [kPa]	● The fuel rail pressure at the moment a malfunction is detected is displayed.
MASS AIRFLOW [g/s]	● The mass air flow at the moment a malfunction is detected is displayed.

DATA MONITOR MODE

MONITOR ITEM	ECM INPUT SIGNAL	MAIN SIGNALS	CONDITION	SPECIFICATION
CKPS·RPM (TDC) [rpm]	×	×	● The engine speed computed from the crankshaft position sensor signal is displayed.	
COOLAN TEMP/S [°C] or [°F]	×	×	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature circuit is open or short, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
VHCL SPEED SE [km/h] or [mph]	×	×	● The vehicle speed computed form the vehicle speed sensor signal is displayed.	
FUEL TEMP SEN [°C] or [°F]	×	×	● The fuel temperature (determined by the signal voltage of the fuel pump temperature sensor) is displayed.	
ACCEL POS SEN [V]	×	×	● The accelerator pedal position sensor 1 signal voltage is displayed.	
ACCEL SEN 2 [V]	×	×	● The accelerator pedal position sensor 2 signal voltage is displayed.	
ACT CR PRESS [MPa]	×	×	● The Fuel rail pressure (determined by the signal voltage of the fuel rail pressure sensor) is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position switch signal.	
START SIGNAL [ON/OFF]	×	×	● indicates [ON/OFF] condition from the starter signal.	
PW/ST SIGNAL [ON/OFF]	×		● indicates [ON/OFF] condition from the power steering pressure switch signal.	
BRAKE SW [ON/OFF]	×	×	● indicates [ON/OFF] condition from the stop lamp switch signal.	
BRAKE SW2 [ON/OFF]	×	×	● indicates [ON/OFF] condition from the ASCD brake switch and ASCD clutch switch signal.	
IGN SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from ignition switch signal.	
MAS AIR/FL SE [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	
MAIN INJ WID [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	
PUMP CURRENT [mA]		×	● Indicates the fuel pump power supply current from the ECM.	
GLOW RLY [ON/OFF]		×	● The glow relay control condition (determined by ECM according to the input signal) is displayed.	
COOLING FAN [LOW/MID/HI/OFF]		×	● Indicates the control condition of the cooling fans (determined by ECM according to the input signal). LOW ... Operates at low speed. MID ... Operates at middle speed. HI ... Operates at high speed. OFF ... Stopped	

MONITOR ITEM	ECM INPUT SIGNAL	MAIN SIG-NALS	CONDITION	SPECIFICATION
EGR VOL CON/V [step]		×	● Indicates the EGR volume control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/A VOLUME [mg/]			● The intake air volume computed from the mass air flow sensor signal is displayed.	
BARO SEN [kPa]	×	×	● The barometric pressure (determined by the signal voltage from the absolute pressure sensor built into the ECM) is displayed.	
INT/M PRES SE [kPa]			● Turbocharger boost (determined by the signal voltage from the turbocharger boost sensor) is displayed.	
CYL COUNT [1/2/3/4]			● The cylinder being injected is displayed. 1 ... Cylinder No.1 is injected. 2 ... Cylinder No.2 is injected. 3 ... Cylinder No.3 is injected. 4 ... Cylinder No.4 is injected.	
SET SW [ON/OFF]	×		● Indicates [ON/OFF] condition from SET/ COAST switch signal.	
RESUME/ACC SW [ON/OFF]	×		● Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
CANCEL SW [ON/OFF]	×		● Indicates [ON/OFF] condition from CAN-CEL switch signal.	
MAIN SW [ON/OFF]	×		● Indicates [ON/OFF] condition from MAIN switch signal.	
AC PRESS SEN [V]			● The signal voltage from the refrigerant pressure sensor is displayed.	
DF EX PRES SE [kPa]	×		● The differential exhaust pressure (deter-mined by the signal voltage of the differ-ential exhaust pressure sensor) is displayed.	
E/R AIR TMP/S [°C] or [°F]	×		● The engine room air temperature (deter-mined by the signal voltage of the engine room air temperature sensor) is dis-played.	
REG TIME RMN [min]			● The time remaining for Regeneration is displayed.	“0 min” is displayed when Regen-eration is not performed.
A/F SEN1 [mV]	×		● The air fuel ratio (A/F) sensor 1 signal voltage is displayed.	
ETC OPEN ANGL [deg]			● The opening angle of Electric throttle control actuator is displayed.	
THRTL SEN [V]	×		● The throttle position sensor signal volt-age is displayed.	
FR EX TMP SEN [°C] or [°F]	×		● The front exhaust gas temperature (determined by the signal voltage of the front exhaust gas temperature sensor) is displayed.	
RR EX TMP SEN [°C] or [°F]	×		● The rear exhaust gas temperature (determined by the signal voltage of the rear exhaust gas temperature sensor) is displayed.	

MONITOR ITEM	ECM INPUT SIGNAL	MAIN SIG-NALS	CONDITION	SPECIFICATION
Voltage [V]			Voltage, frequency, duty cycle or pulse width measured by the probe.	Only "#" is displayed if item is unable to be measured. Figures with "#"s are temporary ones. They are the same figures as an actual piece of data which was just previously measured. [Hz] or [%]
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

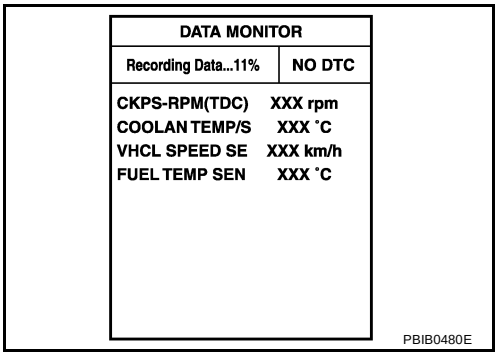
TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BAL-ANCE	● Engine: After warming up, idle the engine. ● A/C switch: OFF ● Shift lever: Neutral position ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injector
COOLING FAN *	● Ignition switch: ON ● Operate the cooling fan at LOW, MID, HI speed and turn OFF using CONSULT-II.	Cooling fan moves at LOW, MID, HI speed and stops.	● Harness and connectors ● Cooling fan motor ● Cooling fan relay
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injector
GLOW RLY	● Ignition switch: ON (Engine stopped) ● Turn the glow relay ON and OFF using CONSULT-II and listen to operating sound.	Glow relay makes the operating sound.	● Harness and connectors ● Glow relay
EGR VOL CONT/V	● Ignition switch: ON ● Change EGR volume control valve opening step using CONSULT-II.	EGR volume control valve makes an operating sound.	● Harness and connectors ● EGR volume control valve
PRES REGULA-TOR	● Ignition switch: ON ● Change fuel rail pressure using CONSULT-II.	Fuel leaks.	● Fuel line ● Fuel pressure relief valve
PUMP LEANT CLEAR	● This mode is used for performing Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .		
TEARGET ETC ANGLE	● Ignition switch: ON ● Change electric throttle control actuator opening angle using CONSULT-II.	The opening angle of throttle valve is changed properly.	● Harness and connectors ● Electric throttle control actuator

*:Leaving cooling fan OFF with CONSULT-II while engine is running may cause the engine to overheat.

REAL TIME DIAGNOSIS IN DATA MONITOR MODE

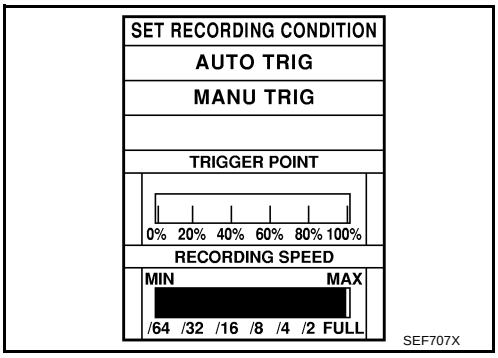
CONSULT-II has two kinds of triggers and they can be selected by touching "SETTING" in "DATA MONITOR" mode.

1. “AUTO TRIG” (Automatic trigger):



- The malfunction will be identified on the CONSULT-II screen in real time.
  In other words, DTC/1st trip DTC/2nd trip DTC will be displayed if the malfunction is detected by ECM.
  At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown in the figure, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “ Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
  The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL.

2. “MANU TRIG” (Manual trigger):



- DTC/1st trip DTC/2nd trip DTC will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
  DATA MONITOR can be performed continuously even though a malfunction is detected.

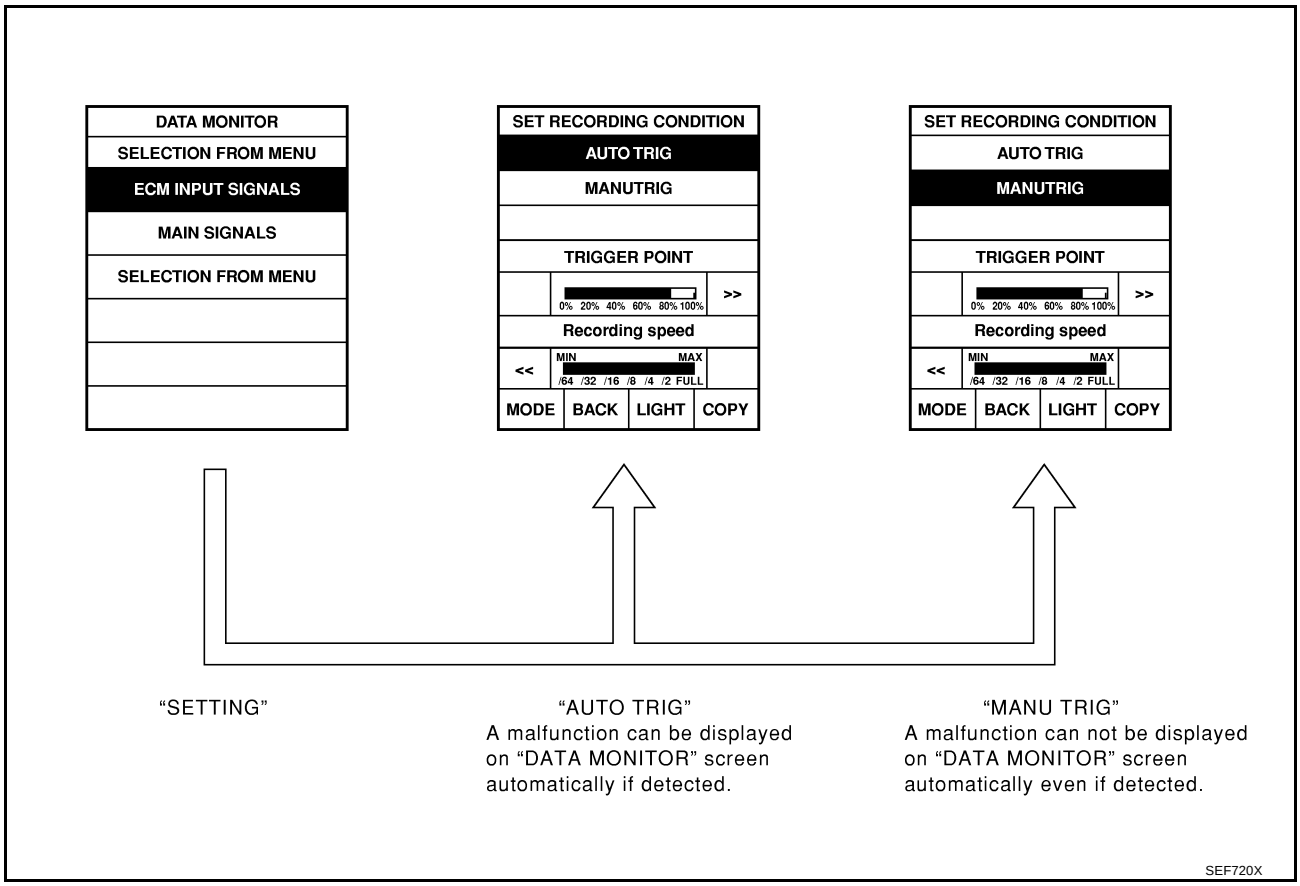
Use these triggers as follows:

1. “AUTO TRIG”

- While trying to detect the DTC/1st trip DTC/2nd trip DTC by performing the “DTC Confirmation Procedure”, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
  When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the DTC Confirmation Procedure, the moment a malfunction is found the DTC/1st trip DTC/2nd trip DTC will be displayed. Refer to GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident" , “INCIDENT SIMULATION TESTS”.

2. “MANU TRIG”

– If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



FUNCTION TEST

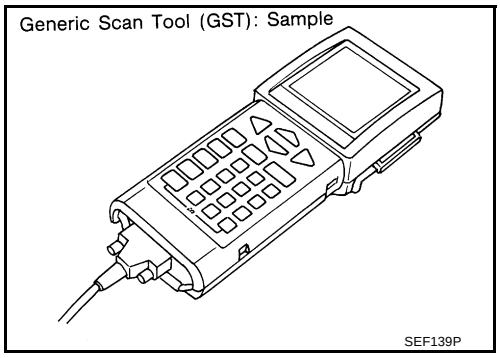
This mode is used to inform customers of their vehicle condition of periodic maintenance.

Generic Scan Tool (GST) Function

BBS001WS

DESCRIPTION

Generic Scan Tool (OBDII scan tool) complying with ISO 15031-4 has 7 different functions explained below.
ISO9141 is used as the protocol.
The name “GST” or “Generic Scan Tool” is used in this service manual.



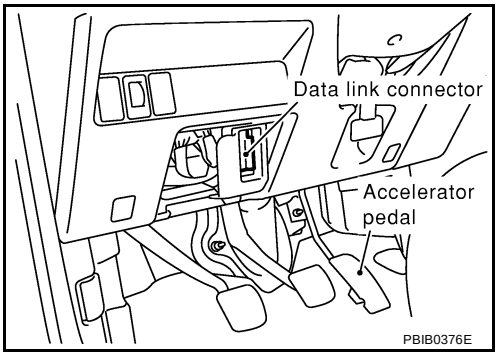
FUNCTION

Diagnostic test mode		Function
Service $01	READINESS TESTS	This diagnostic service gains access to current emission-related data values, including analog inputs and outputs, digital inputs and outputs, and system status information.
Service $02	(FREEZE DATA)	This diagnostic service gains access to emission-related data value which were stored by ECM during the freeze frame. For details, refer to EC-1005, "FREEZE FRAME DATA" .
Service $03	DTCs	This diagnostic service gains access to emission-related power train trouble codes which were stored by ECM.

Diagnostic test mode		Function
Service $04	CLEAR DIAG INFO	This diagnostic service can clear all emission-related diagnostic information. This includes: ● Clear number of diagnostic trouble codes (Service $01) ● Clear diagnostic trouble codes (Service $03) ● Clear trouble code for freeze frame data (Service $01) ● Clear freeze frame data (Service $02) ● Reset status of system monitoring test (Service $01) ● Clear on board monitoring test results (Service $07)
Service $06	(ON BOARD TESTS)	This diagnostic service is not applicable on this vehicle.
Service $07	(ON BOARD TESTS)	This diagnostic service enables the off board test drive to obtain test results for emission-related powertrain components/systems that are continuously monitored during normal driving conditions.
Service $09	(CALIBRATION ID)	This diagnostic service enables the off-board test device to request specific vehicle information such as Vehicle Identification Number (VIN) and Calibration IDs.

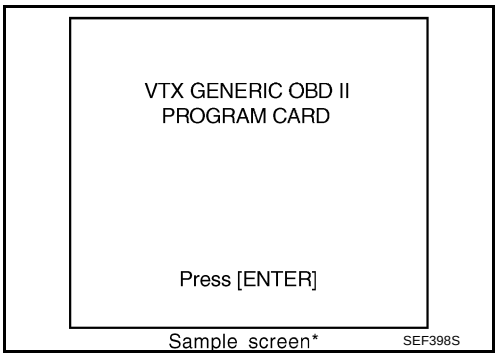
INSPECTION PROCEDURE

1. Turn ignition switch OFF.
2. Connect “GST” to data link connector, which is located under drivers side dash panel near the fuse box cover.
3. Turn ignition switch ON.



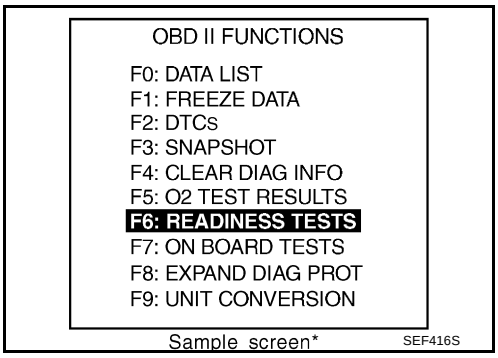
4. Enter the program according to instruction on the screen or in the operation manual.

(*: Regarding GST screens in this section, sample screens are shown.)



5. Perform each diagnostic mode according to each service procedure.

For further information, see the GST Operation Manual of the tool maker.



CONSULT-II Reference Value in Data Monitor Mode

BBS001WT

Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

MONITOR ITEM	CONDITION		SPECIFICATION
CKPS-RPM (TDC)	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
VHCL SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication		Almost the same speed as the speedometer indication
FUEL TEMP SEN	● Engine: After warming up		More than 40°C (104°F)
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.15 - 0.6V
		Accelerator pedal: Fully depressed	1.95 - 2.4V
MAS AIR/FL SE*	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Ignition switch: ON (Engine stopped)	Approximately 0.4V
		Idle	1.3 - 1.6V
		Engine is revving from idle to about 4,000 rpm.	1.3 - 1.6V to Approximately 4.0V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
P/N POSI SW	● Ignition switch: ON	Shift lever: Neutral position	ON
		Except above	OFF
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
BRAKE SW2	● Ignition switch: ON	Brake pedal and clutch pedal: Fully released	OFF
		Brake pedal and/or clutch pedal: Slightly depressed	ON
IGN SW	● Ignition switch: ON → OFF		ON → OFF
ACT CR PRESS	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	20 - 30 MPa
		2,000 rpm	45 - 55 MPa
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec
GLOW RLY	Refer to EC-1403, "GLOW CONTROL SYSTEM" .		
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

MONITOR ITEM	CONDITION		SPECIFICATION
COOLING FAN	● When cooling fan is stopped.		OFF
	● When cooling fans operate at low speed.		LOW
	● When cooling fans operate at middle speed.		MID
	● When cooling fans operate at high speed.		HI
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	After 1 minute at idle	More than 10 steps
		Revving engine from idle to 3,600 rpm	0 step
INT/A VOLUME	● Engine: After warming up, idle the engine		150 - 450 mg/st
INT/M PRES SE [kPa]	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	Approx. 100 kPa
		2,800 rpm	Approx. 126 kPa
		4,000 rpm	Approx. 106 kPa
BARO SEN	● Ignition switch: ON		Altitude Approx. 0m: Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm^2 , 14.59 psi) Approx. 1,000 m: Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm^2 , 12.90 psi) Approx. 1,500 m: Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm^2 , 12.06 psi) Approx. 2,000 m: Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm^2 , 11.36 psi)
CYL COUNT	● Engine is running		1 → 3 → 4 → 2
SET SW	● Ignition switch: ON	SET/COAST switch: Released	OFF
		SET/COAST switch: Pressed	ON
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Released	OFF
		RESUME/ACCELERATE switch: Pressed	ON
CANCEL SW	● Ignition switch: ON	CANCEL switch: Released	OFF
		CANCEL switch: Pressed	ON
AC PRESS SEN	● Engine: Idle ● Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0V
MAIN SW	● Ignition switch: ON	MAIN switch: Released	OFF
		MAIN switch: Pressed	ON
DF EX PRES SE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	Approx. 2.5 kPa
		2,000 rpm	Approx. 3.5 kPa
E/R AIR TMP/S	● Engine: After warming up		More than 40°C (104°F)
A/F SEN1	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	Approx. 2200 mV
ETC OPEN ANGL	● Ignition switch: ON		84.0 °

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL SEN	● Ignition switch: ON	3.35 - 4.55 V
FR EX TMP SEN	● Engine: After warming up	More than 120°C (248°F)
RR EX TMP SEN	● Engine: After warming up	More than 100°C (212°F)

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
*: This signal is converted by ECM internally. Thus, this differs from ECM terminals voltage.

Major Sensor Reference Graph in Data Monitor Mode

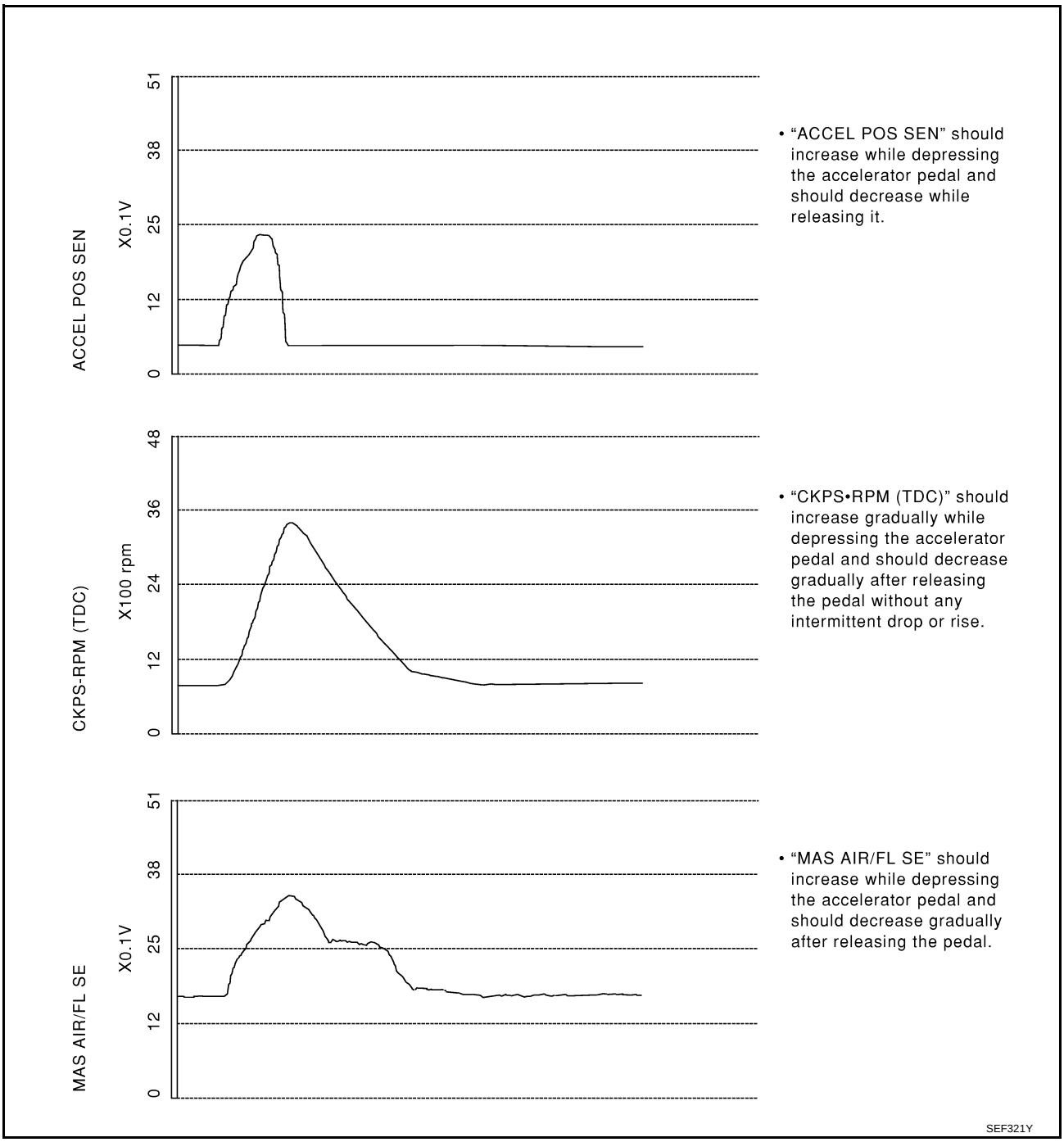
BBS001WU

The following are the major sensor reference graphs in “DATA MONITOR” mode.

ACCEL POS SEN, “CKPS·RPM (TDC)”, “MAS AIR/FL SE”

Below is the data for “ACCEL POS SEN”, “CKPS·RPM (TDC)” and “MAS AIR/FL SE” when revving engine quickly up to 3,000 rpm under no load after warming up engine to the normal operating temperature.

Each value is for reference, the exact value may vary.



- "ACCEL POS SEN" should increase while depressing the accelerator pedal and should decrease while releasing it.
- "CKPS•RPM (TDC)" should increase gradually while depressing the accelerator pedal and should decrease gradually after releasing the pedal without any intermittent drop or rise.
- "MAS AIR/FL SE" should increase while depressing the accelerator pedal and should decrease gradually after releasing the pedal.

TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

BBS001WV

Intermittent incidents may occur. In many cases, the incident resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on (1st/2nd trip) DTC visits. Realize also that the most frequent cause of intermittent incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

COMMON INTERMITTENT INCIDENTS REPORT SITUATIONS

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than “0”.
III	The symptom described by the customer does not recur.
IV	(1st/2nd trip) DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for XXXX does not indicate the malfunctioning area.

Diagnostic Procedure

BBS001WW

1. INSPECTION START

Erase (1st/2nd trip) DTCs. Refer to EC-1005, "HOW TO ERASE EMISSION-RELATED DIAGNOSTIC INFORMATION" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to EC-1067, "Ground Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident" , “INCIDENT SIMULATION TESTS”.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace.

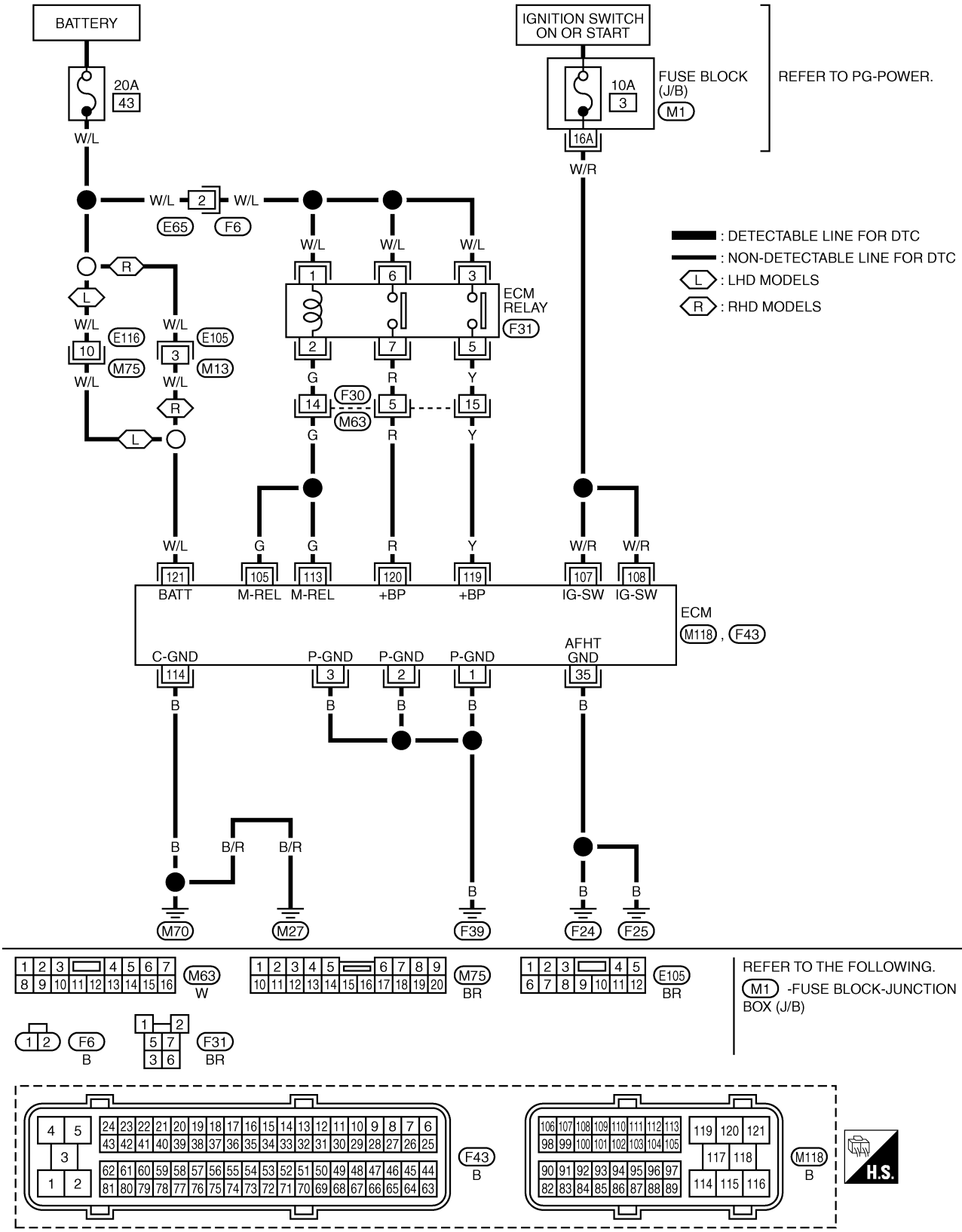
POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

Wiring Diagram

BBS001WX

EC-MAIN-01



TBWB0901E

Remarks: Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
1 2 3	B B B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
35	B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
105	G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	W/R W/R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
113	G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
114	B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS001WY

1. INSPECTION START

Start engine.
Is engine running?

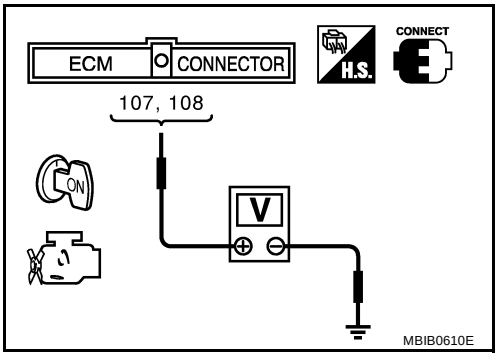
Yes or No

Yes >> GO TO 6.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 107, 108 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

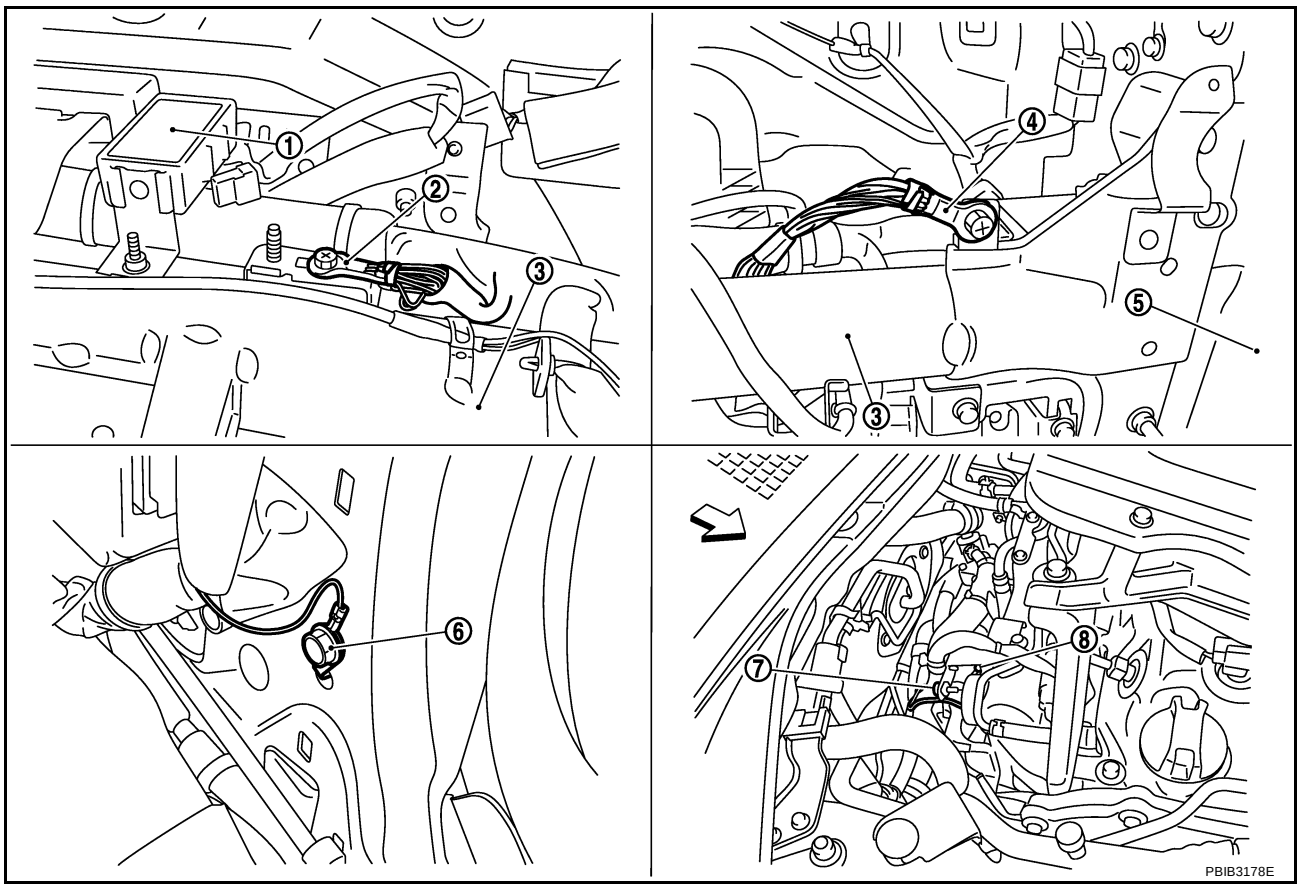
Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws. Refer to EC-1067, "Ground Inspection" .



⇦ : Vehicle front

1. Multi-remote control unit	2. Body ground M27	3. Steering member
4. Body ground M70	5. Front pillar (RH)	6. Body ground F39
7. Engine ground F25	8. Engine ground F24	

OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 2, 3, 35, 114 and ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

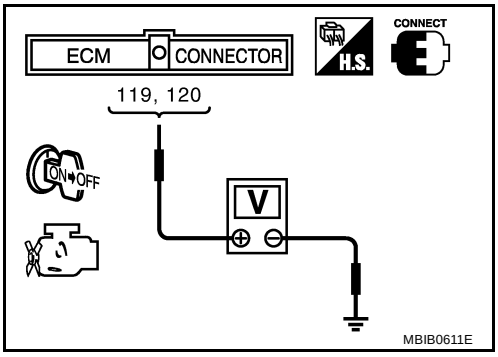
OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

6. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Reconnect ECM harness connector.
3. Turn ignition switch ON and then OFF.
4. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.

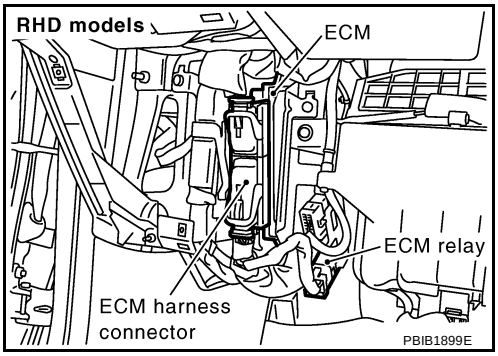


OK or NG

OK >> GO TO 14.
NG (Battery voltage does not exist)>>GO TO 7.
NG (Battery voltage exists for more then a few seconds)>>GO TO 9.

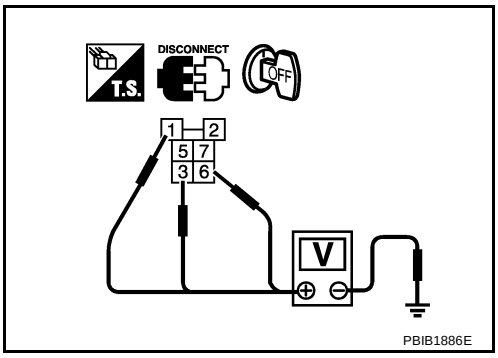
7. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Disconnect ECM relay.



2. Check voltage between relay terminals 1, 3, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E65, F6
- 20A fuse
- Harness for open or short between ECM relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 105, 113 and ECM relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between ECM and ECM relay.

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Check harness continuity between ECM terminal 119 and ECM relay terminal 5, ECM terminal 120 and ECM relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between ECM and ECM relay.

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ECM RELAY

Refer to EC-1067, "Component Inspection" .

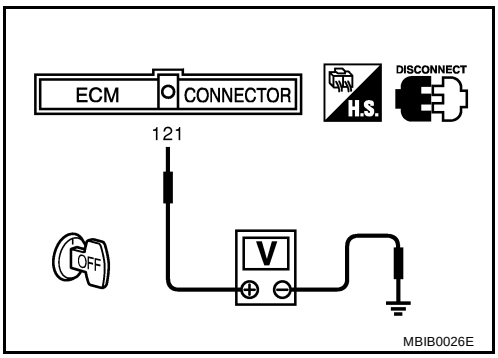
OK or NG

OK >> GO TO 14.
NG >> Replace ECM relay.

14. CHECK ECM POWER SUPPLY CIRCUIT-V

Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

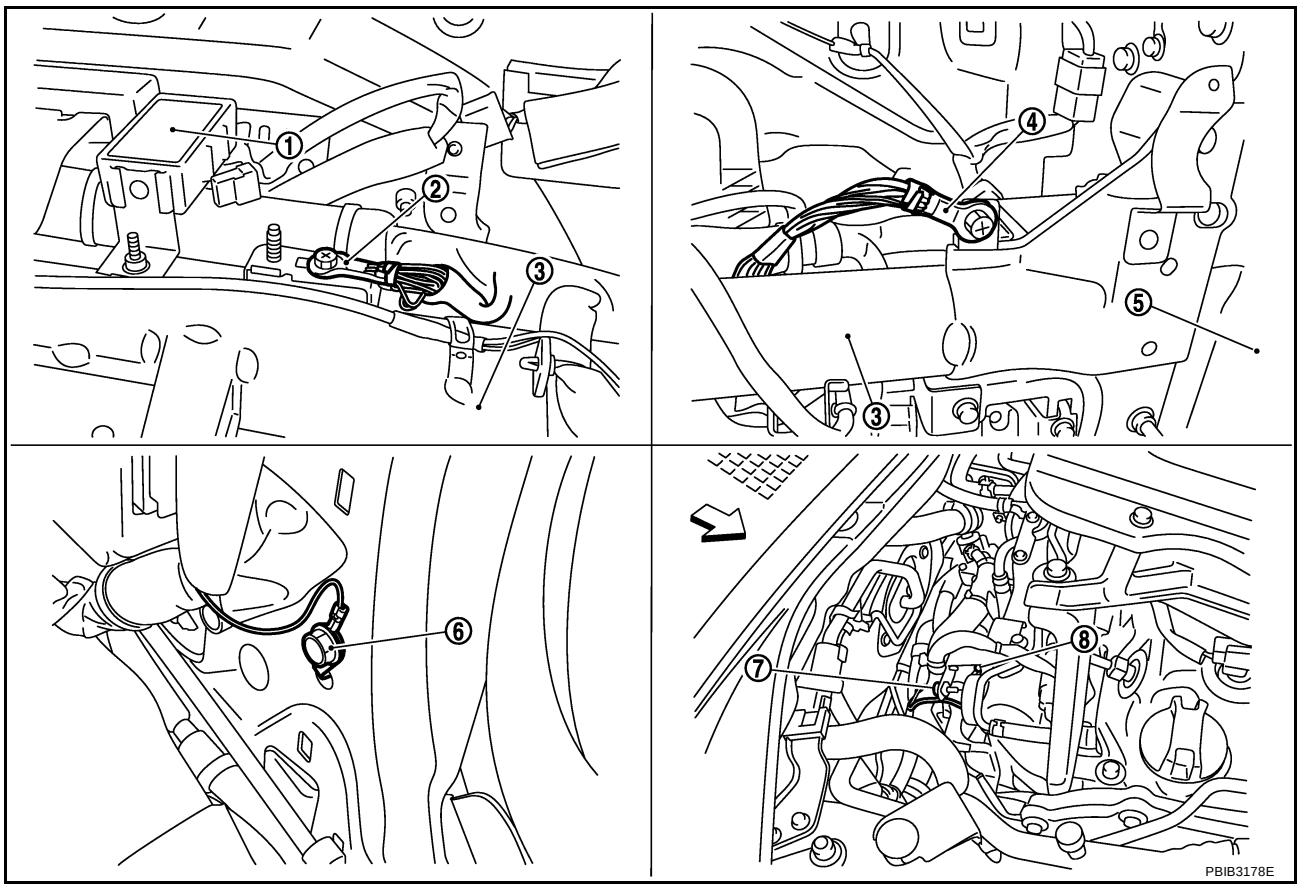
Check the following.

- 20A fuse
- Harness connectors E116, M75 (LHD models)
- Harness connectors E105, M13 (RHD models)
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws. Refer to EC-1067, "Ground Inspection" .



⇦ : Vehicle front

1.	Multi-remote control unit	2.	Body ground M27	3.	Steering member
4.	Body ground M70	5.	Front pillar (RH)	6.	Body ground F39
7.	Engine ground F25	8.	Engine ground F24		

OK or NG

OK >> GO TO 17.
NG >> Repair or replace ground connections.

17. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 1, 2, 3, 35, 114 and ground. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 18.
NG >> Repair open circuit or short to power in harness or connectors.

18. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

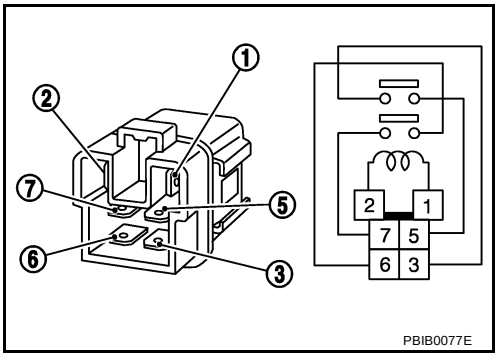
BBS001WZ

ECM RELAY

1. Apply 12V direct current between ECM relay terminals (1) and (2).
2. Check continuity between relay terminals (3) and (5), (6) and (7).

Condition	Continuity
12V direct current supply between terminals (1) and (2)	Yes
OFF	No

3. If NG, replace ECM relay.



PBIB0077E

Ground Inspection

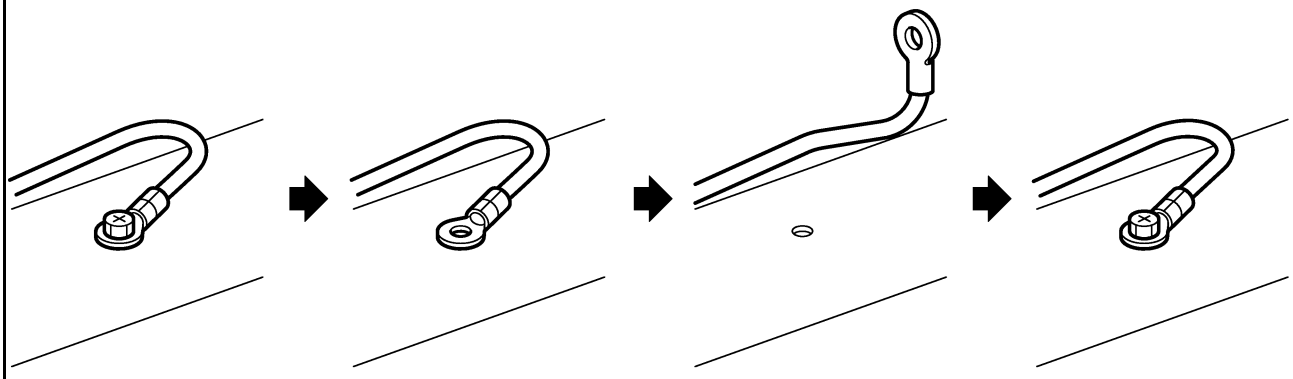
BBS001X0

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to PG-13, "Ground Distribution" .

Ground Inspection



PBIB1870E

DTC U1000 CAN COMMUNICATION LINE

PFP:23710

Description

BBS001X1

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

BBS001X2

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000 1000	CAN communication line	● ECM can not communicate to other control unit. ● ECM can not communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted)

DTC Confirmation Procedure

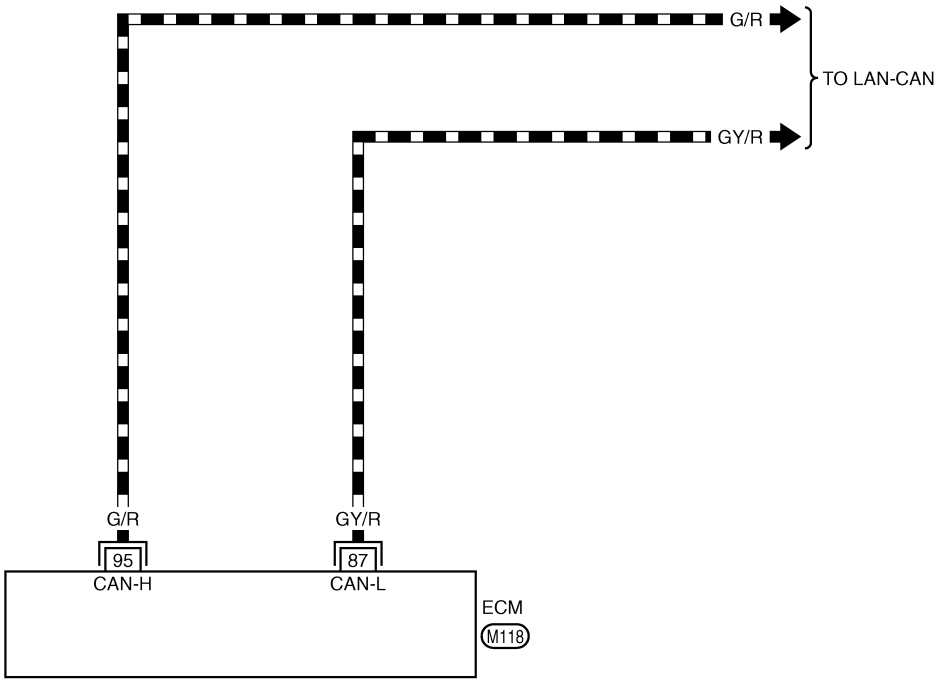
BBS001X3

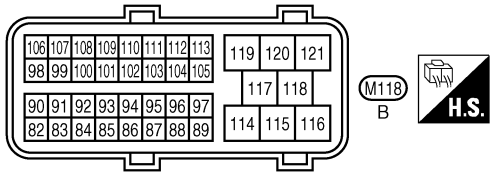
1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-1070, "Diagnostic Procedure" .

Wiring Diagram

BBS001X4

EC-CAN-01





TBWA0564E

Diagnostic Procedure

BBS001X5

Go to LAN-25, "CAN Communication Unit" .

DTC P0016 CKP - CMP CORRELATION

PFP:10328

On Board Diagnosis Logic

BBS001X6

NOTE:
If DTC P0016 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0016 0016	Crankshaft position - camshaft position correlation	The correlation between crankshaft position sensor signal and camshaft position sensor signal is out of the normal range.	● Camshaft position sensor ● Crankshaft position sensor ● Timing chain ● Signal plate

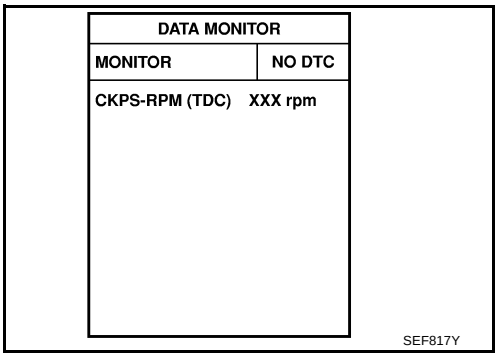
DTC Confirmation Procedure

BBS001X7

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1071, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001X8

1. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1213, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace camshaft position sensor.

2. CHECK SPROCKET

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 3.
NG >> Remove debris and clean the signal plate or replace sprocket.

3. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1201, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace crankshaft position sensor.

4. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 5.
NG >> Replace the signal plate.

5. CHECK TIMING CHAIN

Refer to EM-198, "SECONDARY TIMING CHAIN" , EM-203, "PRIMARY TIMING CHAIN" and EM-167, "VACUUM PUMP" .

OK or NG

OK >> GO TO 6.
NG >> Replace timing chain.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

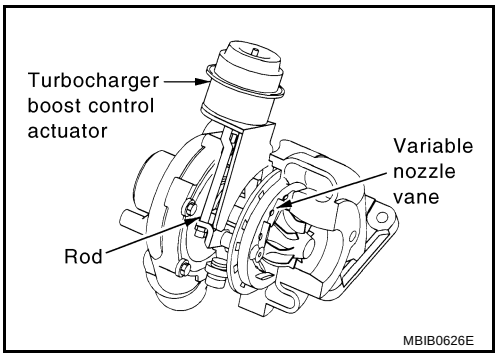
DTC P0045 TC BOOST CONTROL SOLENOID VALVE

PFP:14956

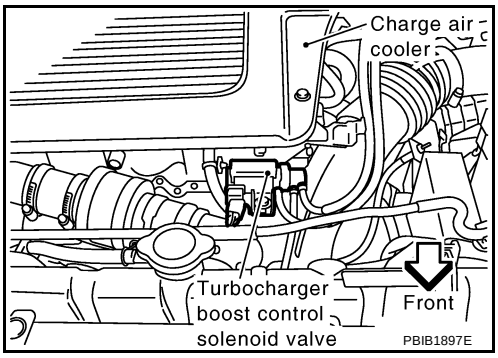
Description

BBS001X9

The turbocharger boost control solenoid valve controls vacuum signal to the turbocharger boost control actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted.



The turbocharger boost control solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.



On Board Diagnosis Logic

BBS001XA

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0045 0045	Turbocharger boost control solenoid valve circuit / open	An improper voltage is sent to ECM through turbocharger boost control solenoid valve.	● Harness or connectors (The solenoid valve circuit is open or shorted.) ● Turbocharger boost control solenoid valve

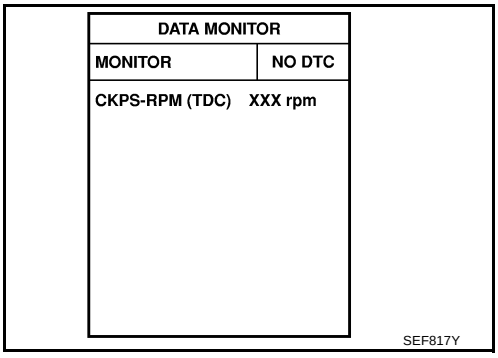
DTC Confirmation Procedure

BBS001XB

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1076, "Diagnostic Procedure" .



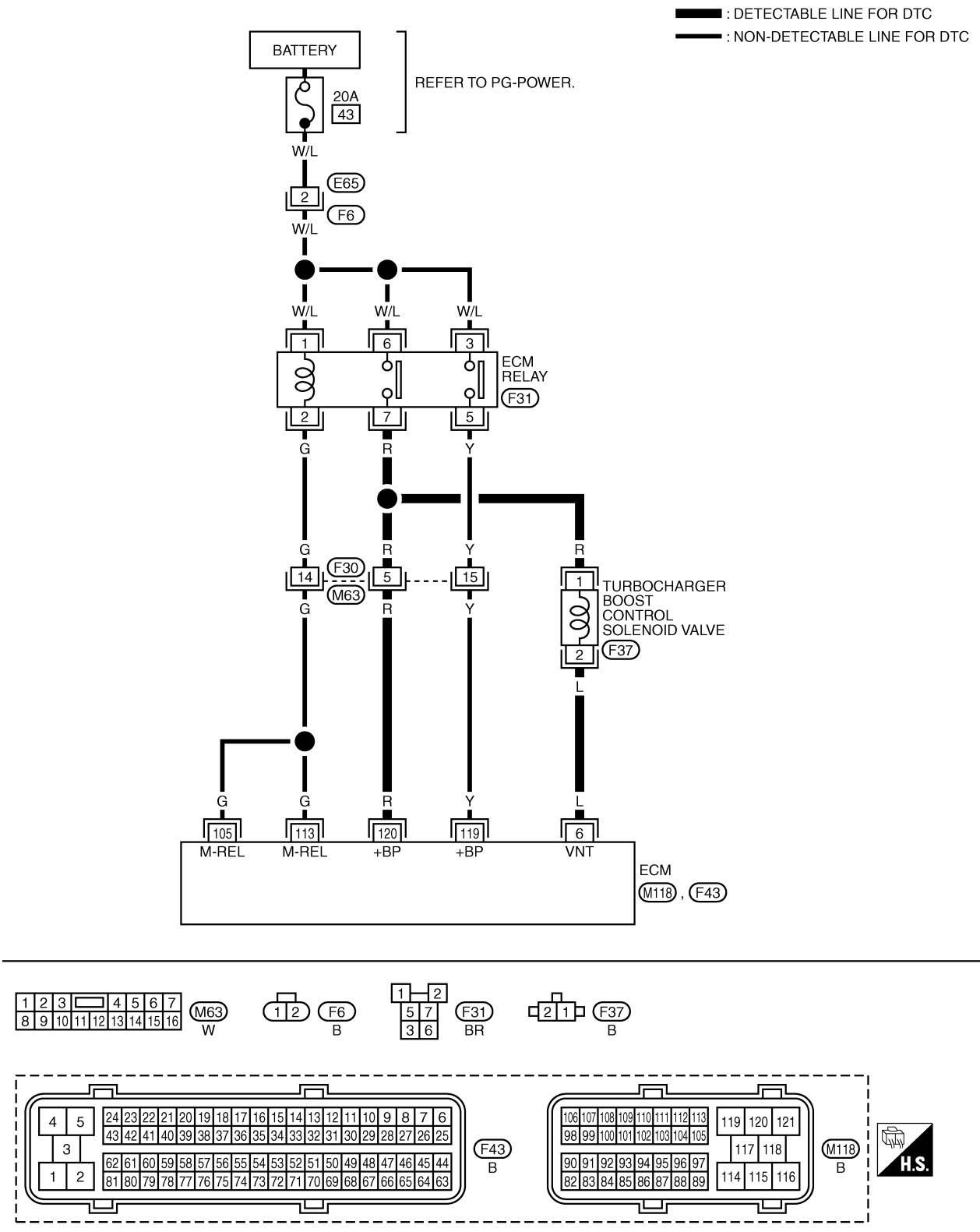
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001XC

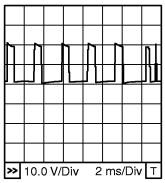
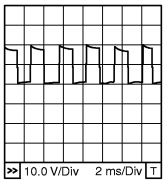
EC-TCC/V-01



TBWA0588E

Specification data are reference valves, and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
6	L	Turbocharger boost control solenoid valve	**[Ignition switch ON]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0889E
			[Ignition switch ON] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0890E
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

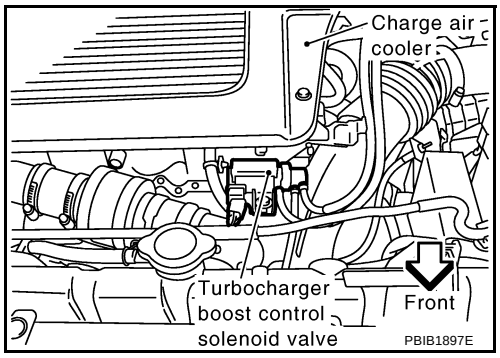
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001XD

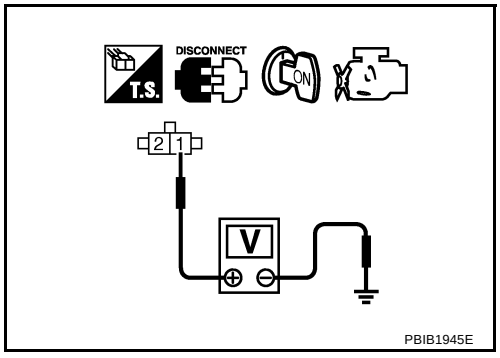
1. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Turn ignition switch ON.



3. Check voltage between turbocharger boost control solenoid valve terminals 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open and short between turbocharger boost control solenoid valve and ECM relay
- Harness for open and short between turbocharger boost control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 6 and turbocharger boost control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EC-1077, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace turbocharger boost control solenoid valve.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

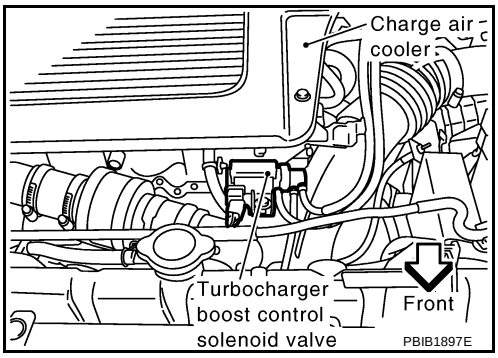
>> **INSPECTION END**

Component Inspection

BBS001XE

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

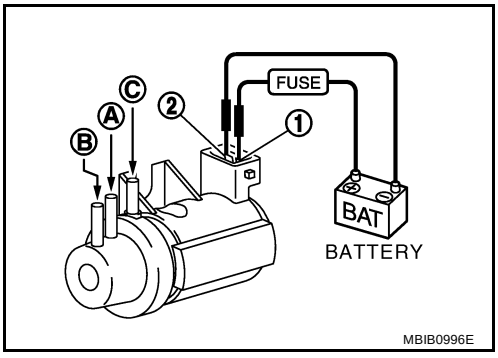
1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Apply 12V direct current between turbocharger boost control solenoid valve terminals.



3. Check air passage continuity of turbocharger boost control solenoid valve under the following conditions.

CONDITIONS	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals (1) and (2)	Yes	No
No supply	No	Yes

Operation takes less than 1 second.



If NG, replace turbocharger boost control solenoid valve.

DTC P0088 FUEL SYSTEM

PFP:17520

On Board Diagnosis Logic

BBS001XF

NOTE:
If DTC P0088 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0088 0088	Fuel rail pressure too high	Fuel pressure is too much higher than the specified value.	● Fuel pump ● Fuel injector ● Fuel rail pressure sensor

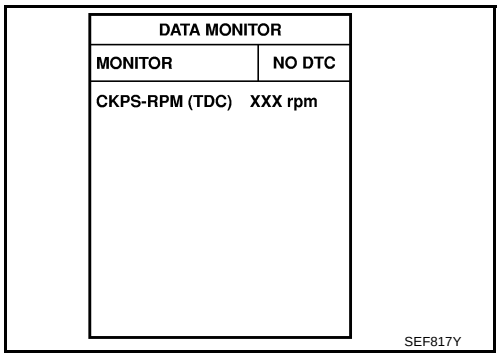
DTC Confirmation Procedure

BBS001XG

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 20 seconds.
4. If 1st trip DTC is detected, go to EC-1078, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001XH

1. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1150, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace fuel rail.

2. CHECK FUEL INJECTOR

Refer to EC-1159, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. REPLACE FUEL INJECOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

4. CHECK FUEL PUMP

Refer to EC-1304, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

BBS001XI

FUEL INJECTOR

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P0089 FUEL PUMP

PFP:16700

On Board Diagnosis Logic

BBS001XJ

NOTE:
If DTC P0089 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0089 0089	Fuel pump performance	Fuel pressure is too much higher than the target value.	● Fuel pump ● Air mixed with fuel ● Lack of fuel ● Fuel rail pressure sensor ● Fuel transport pump operation

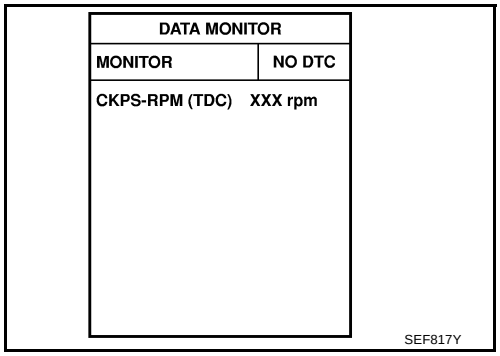
DTC Confirmation Procedure

BBS001XK

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Let engine idle for at least 30 seconds.
4. If 1st trip DTC is detected, go to EC-1080, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001XL

1. CHECK FUEL TRANSPORT PUMP OPERATION

Perform Diagnostic Procedure for fuel transport pump. Refer to EC-1431 .

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of Diagnostic Procedure for fuel transport pump.

2. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1080, "DTC Confirmation Procedure" , again.
7. Is 1st trip DTC detected again?

With GST

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select Service $04 with GST.
5. Perform EC-1080, "DTC Confirmation Procedure" , again.
6. Is 1st trip DTC detected again?

Yes or No

Yes >> GO TO 3.
No >> **INSPECTION END**

3. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1150, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK FUEL PUMP

Perform EC-1300, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace Fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

BBS001XM

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P0093 FUEL SYSTEM

PFP:17520

On Board Diagnosis Logic

BBS001XN

NOTE:
If DTC P0093 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0093 0093	Fuel system leak	ECM detects a fuel system leak. (The relation between the output voltage to the fuel pump and input voltage from the fuel rail pressure sensor is out of the normal range.)	● Fuel pump ● Fuel rail ● Fuel pipe ● Fuel rail pressure relief valve ● Air mixed with fuel ● Lack of fuel ● Fuel transport pump operation

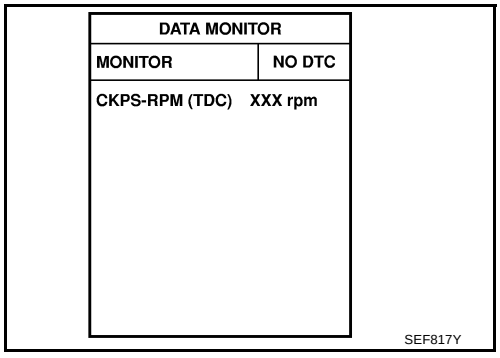
DTC Confirmation Procedure

BBS001XO

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1082, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001XP

1. CHECK FUEL TRANSPORT PUMP OPERATION

Perform Diagnostic Procedure for fuel transport pump. Refer to EC-1431 .

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of Diagnostic Procedure for fuel transport pump.

2. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1082, "DTC Confirmation Procedure" , again.
7. Is 1st trip DTC detected again?

With GST

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select Service $04 with GST.
5. Perform EC-1082, "DTC Confirmation Procedure" , again.
6. Is 1st trip DTC detected again?

Yes or No

Yes >> GO TO 3.
No >> **INSPECTION END**

3. CHECK FUEL LINE FOR LEAK

1. Start engine.
2. Visually check the following for fuel leak.

- Fuel tube from fuel pump to fuel rail
- Fuel rail
- Fuel tube from fuel rail to fuel injector

3. Also check for improper connection or pinches.

OK or NG

OK >> GO TO 4.
NG >> Repair malfunctioning part.

4. CHECK FUEL RAIL PRESSURE RELIEF VALVE

Refer to EC-1084, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel rail.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Component Inspection

BBS001XQ

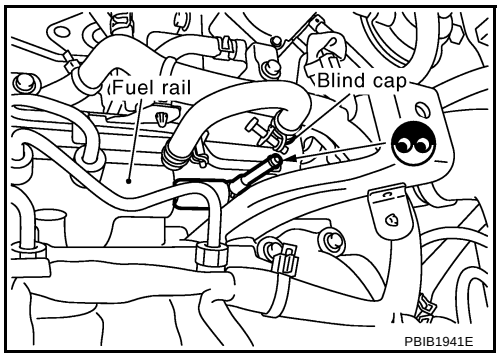
FUEL RAIL PRESSURE RELIEF VALVE

With CONSULT-II

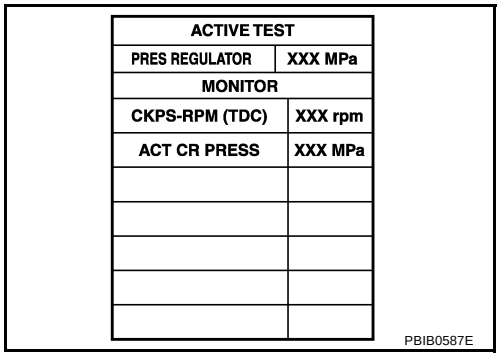
WARNING:

- **Confirm that the engine is cooled down and there are no fire hazards near the vehicle.**
- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.**

1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Turn ignition switch ON.



5. Select “PRES REGULATOR” in “ACTIVE TEST MODE” with CONSULT-II.
6. Start engine and keep engine speed 2,000 rpm.
7. Raise fuel pressure to 180 MPa with touching “UP” or “Qu” on the CONSULT-II screen.
8. Confirm that the fuel does not come out from the fuel rail pressure relief valve.



WARNING:

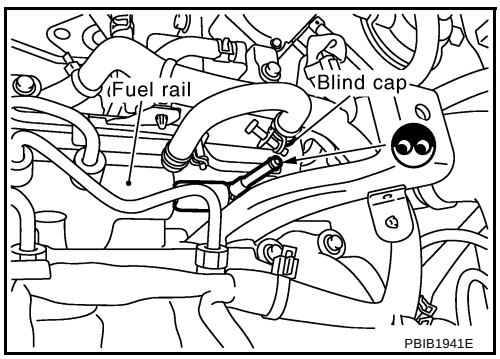
- **Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.**
- **If the fuel comes out, stop the engine immediately.**

Without CONSULT-II

WARNING:

- **Confirm that the engine is cooled down and there are no fire hazards near the vehicle.**
- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.**

1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
5. Confirm that the fuel does not come out from the fuel rail pressure relief valve.



WARNING:

- **Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.**
- **If the fuel comes out, stop the engine immediately.**

Removal and Installation

BBS001XR

FUEL RAIL

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

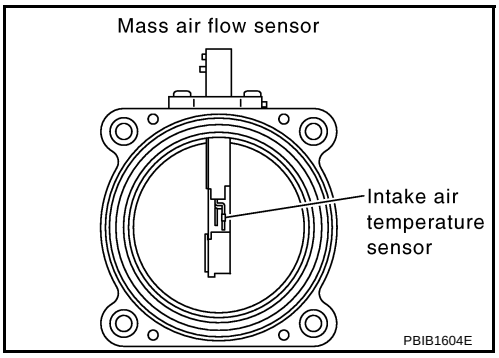
DTC P0101 MAF SENSOR

PFP:22680

Component Description

BBS001XS

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

BBS001XT

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE*	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Ignition switch: ON (Engine stopped)	Approximately 0.4V
		Idle	1.3 - 1.6V
		Engine is revving from idle to about 4,000 rpm.	1.3 - 1.6V to Approximately 4.0V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)

*: This signal is converted by ECM internally. Thus this differs from ECM terminal voltage.

On Board Diagnosis Logic

BBS001XU

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0101 0101	Mass air flow sensor circuit range/performance	Improper voltage from the sensor is sent to ECM compared with the driving condition.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor ● Intake air leaks ● Air cleaner ● Intake air temperature sensor ● EGR volume control valve ● Turbocharger boost sensor

DTC Confirmation Procedure

BBS001XV

CAUTION:
Always drive vehicle at a safe speed.

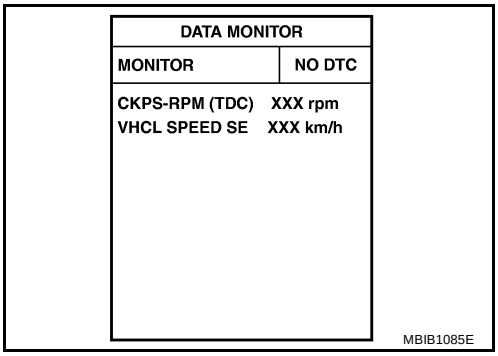
NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 40 seconds.
4. Drive vehicle under the following condition.

CKPS·RPM	Approx. 2800 rpm
VHCL SPEED SE	70 - 100 km/h
Shift lever	4th position

5. Release accelerator pedal for at least 10 seconds.
   Do not depress brake pedal during this procedure.
6. If 1st trip DTC is detected, go to EC-1089, "Diagnostic Procedure" .



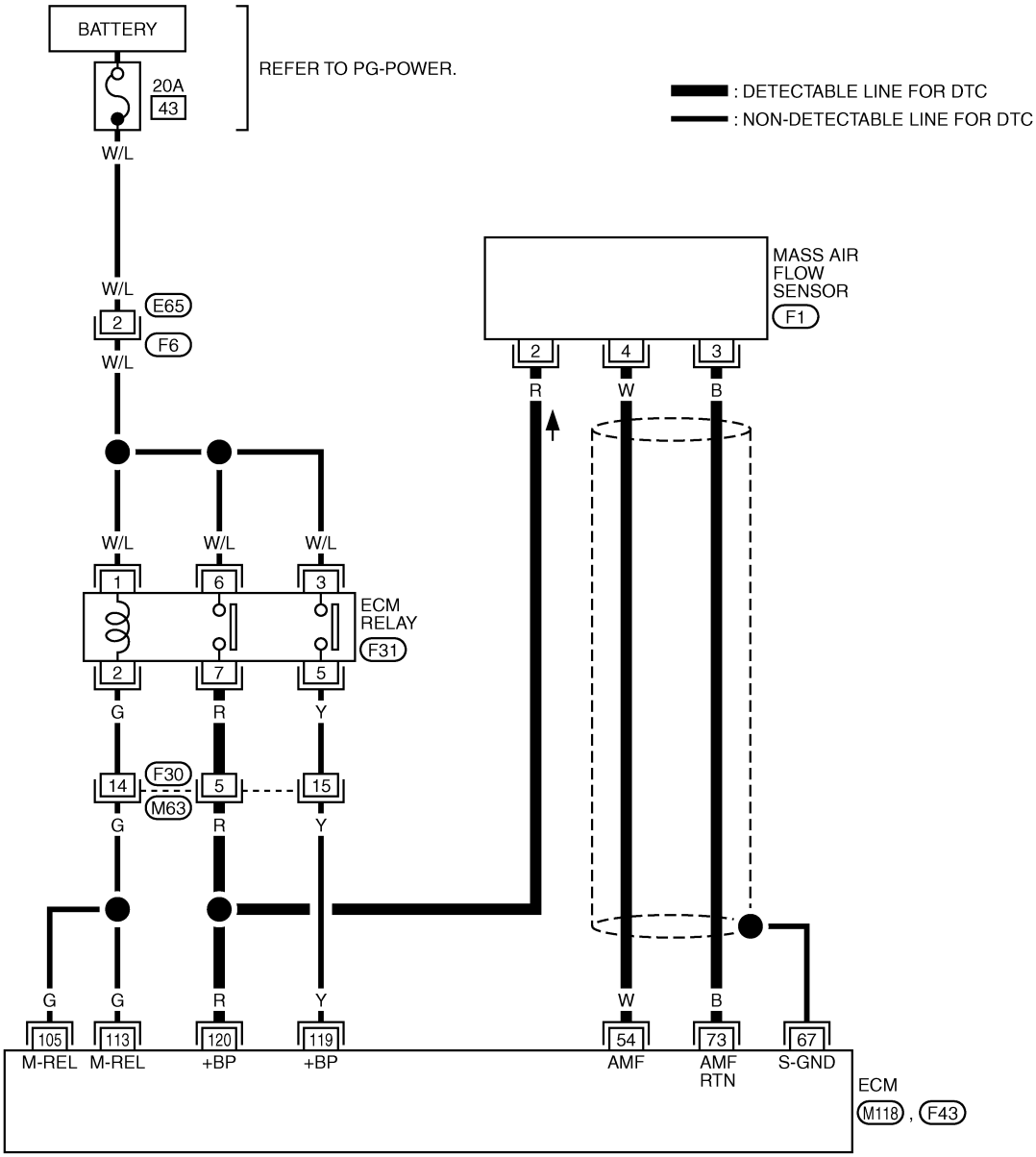
WITH GST

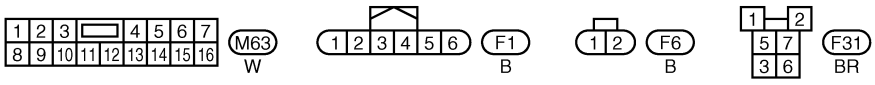
Follow the procedure “WITH CONSULT-II” above.

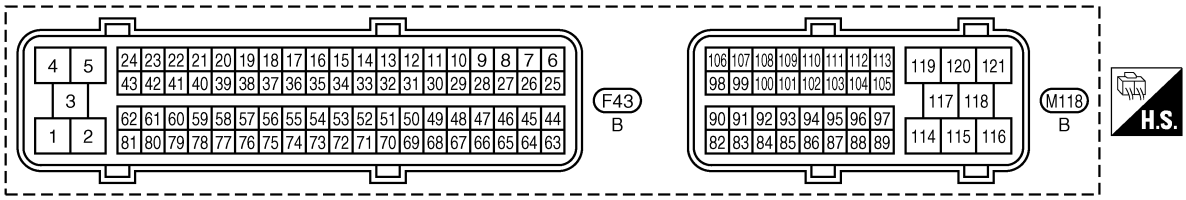
Wiring Diagram

BBS001XW

EC-MAFS-01







TBWA0565E

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	W	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.7V
			[Engine is running] ● **Warm-up condition** ● Idle speed	1.6 - 1.9V
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm.	1.6 - 1.9V to Approximately 4.3V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
73	B	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS001XX

1. CHECK INTAKE SYSTEM

1. Check air cleaner for clogging.
2. Check the following for connection and cracks.

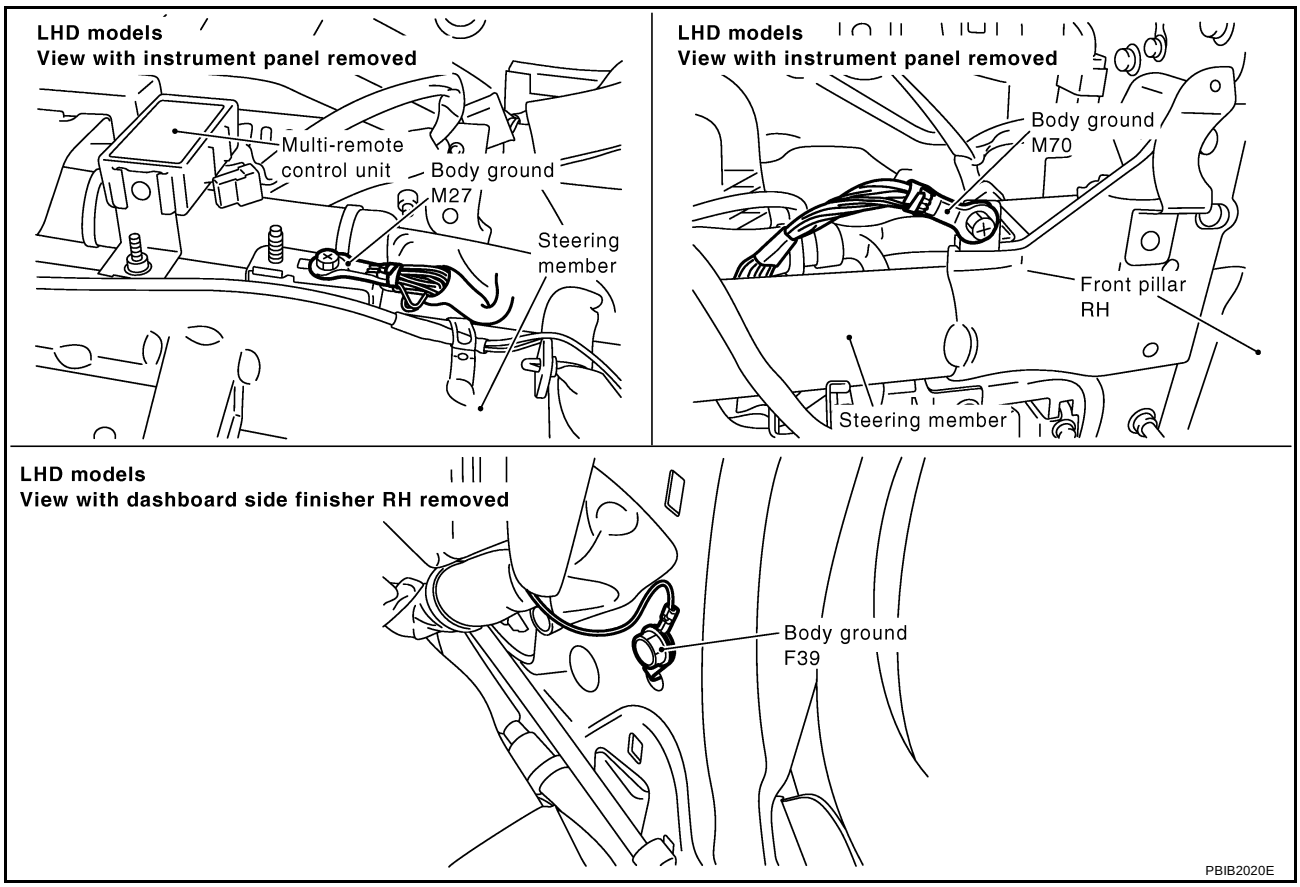
– Air duct
– Vacuum hoses
– Intake air passage between air duct and intake manifold

OK or NG

OK >> GO TO 2.
NG >> Reconnect or repair the parts.

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

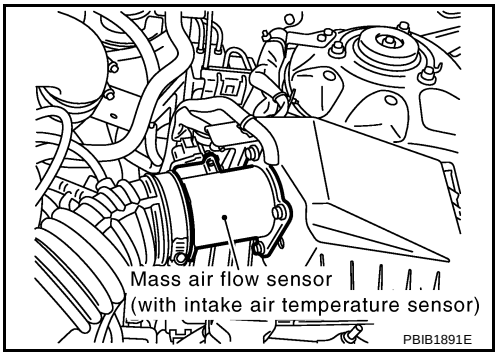


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

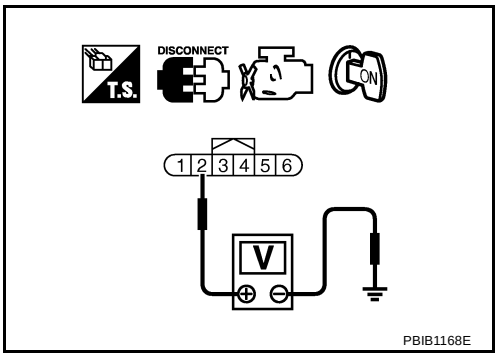
3. CHECK MAFS POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between mass air flow sensor terminals 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 3 and ECM terminal 73. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between mass air flow sensor terminal 4 and ECM terminal 54. Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

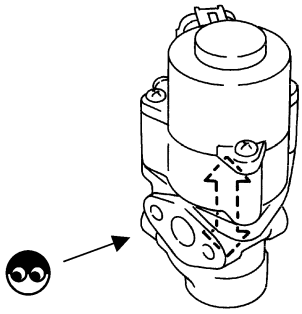
OK >> GO TO 7.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK EGR VOLUME CONTROL VALVE FUNCTION

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Remove EGR volume control valve from cylinder head.
3. Turn ignition switch ON.
4. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
CKPS-RPM (TDC)	XXX rpm

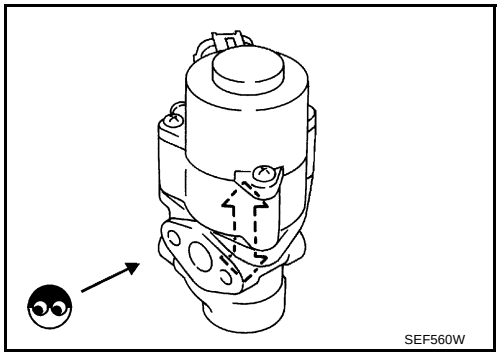


NOTE:
When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Remove EGR volume control valve from cylinder head.
3. Turn ignition switch ON and OFF.
4. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.

   NOTE:
   When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.



OK or NG

OK >> GO TO 8.
NG >> Check EGR volume control valve and its circuit. Refer to EC-1234, "Diagnostic Procedure" .

8. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1106, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace mass sir flow sensor (with intake air temperature sensor).

9. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1195, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace turbocharger boost sensor.

10. CHECK MASS AIR FLOW SENSOR

Refer to EC-1093, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace mass air flow sensor.

11. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001XY

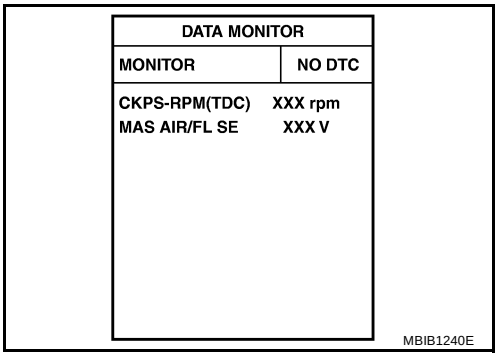
MASS AIR FLOW SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.
4. Select “MAS AIR/FL SE” and check indication under the following conditions.

Condition	MAS AIR/FL SE (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.6
Idle to about 4,000 rpm	1.3 - 1.6 to Approx. 4.0*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.



5. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

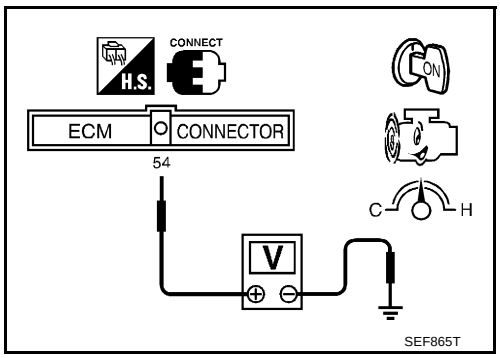
b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
   If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.

3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.7
Idle (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
Idle to about 4,000 rpm	1.6 - 1.9 to Approx. 4.3*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 3 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

BBS001XZ

MASS AIR FLOW SENSOR

Refer to EM-141, "AIR CLEANER AND AIR DUCT" .

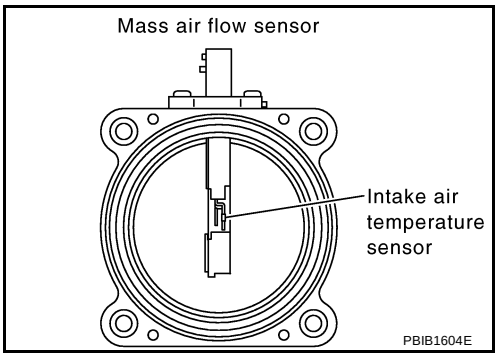
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

BBS001Y0

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

BBS001Y1

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE*	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Ignition switch: ON (Engine stopped)	Approximately 0.4V
		Idle	1.3 - 1.6V
		Engine is revving from idle to about 4,000 rpm.	1.3 - 1.6V to Approximately 4.0V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)

*: This signal is converted by ECM internally. Thus this differs from ECM terminal voltage.

On Board Diagnosis Logic

BBS001Y2

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

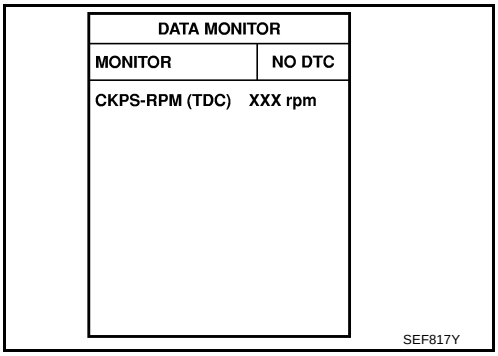
DTC Confirmation Procedure

BBS001Y3

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1098, "Diagnostic Procedure" .



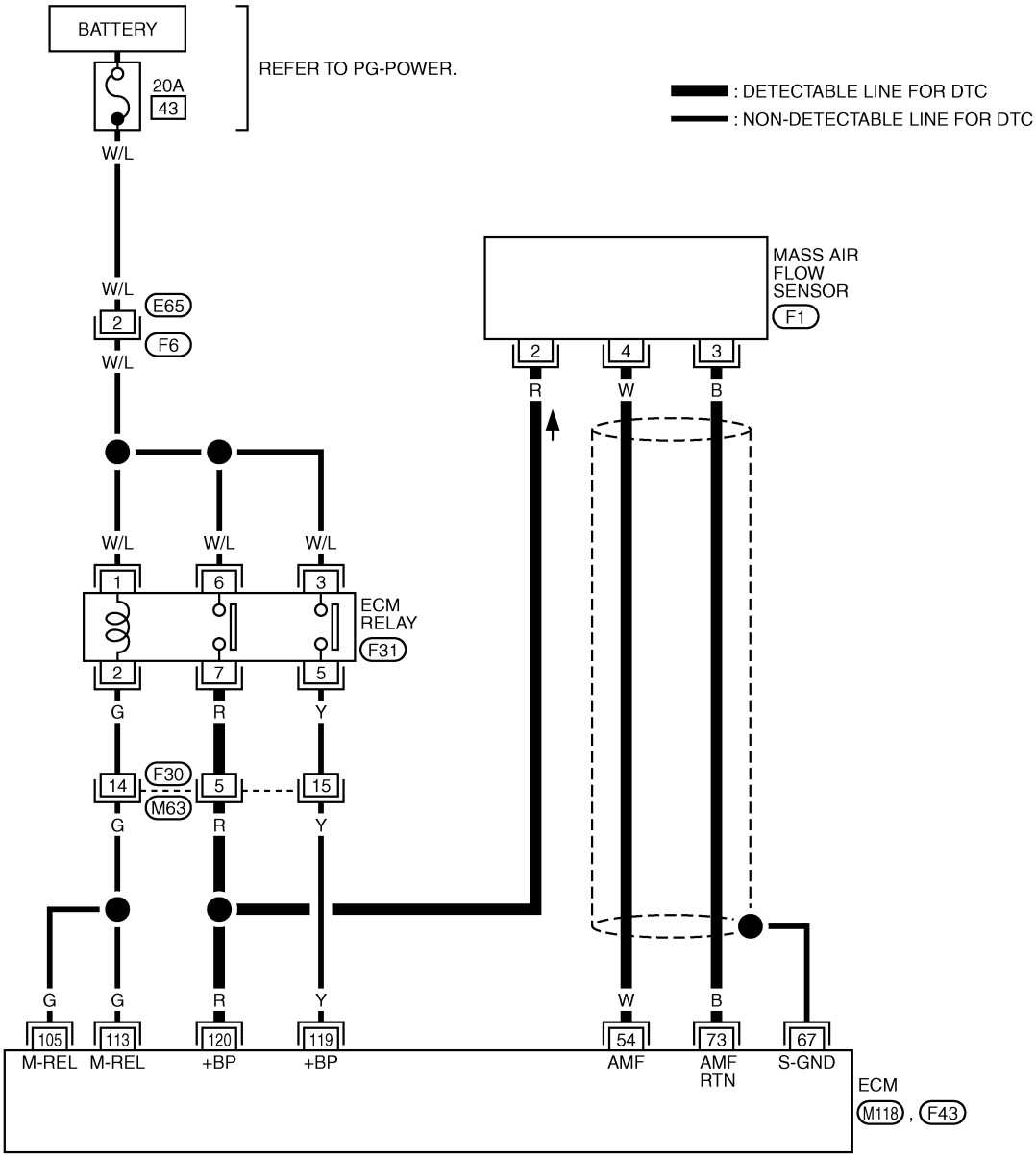
WITH GST

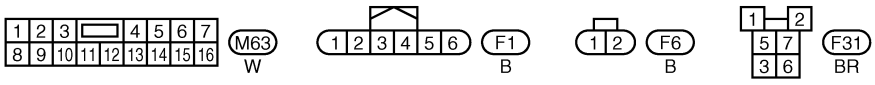
Follow the procedure “WITH CONSULT-II” above.

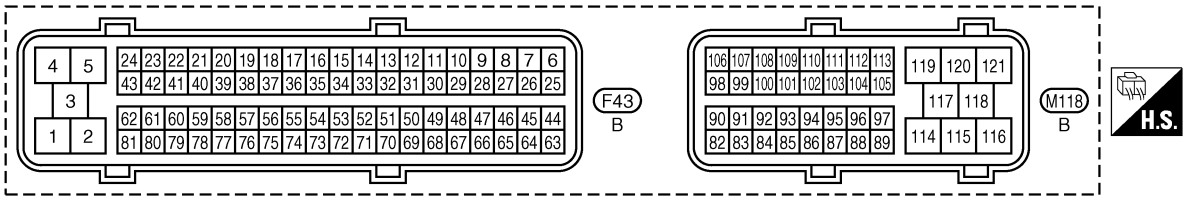
Wiring Diagram

BBS001Y4

EC-MAFS-01







TBWA0565E

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

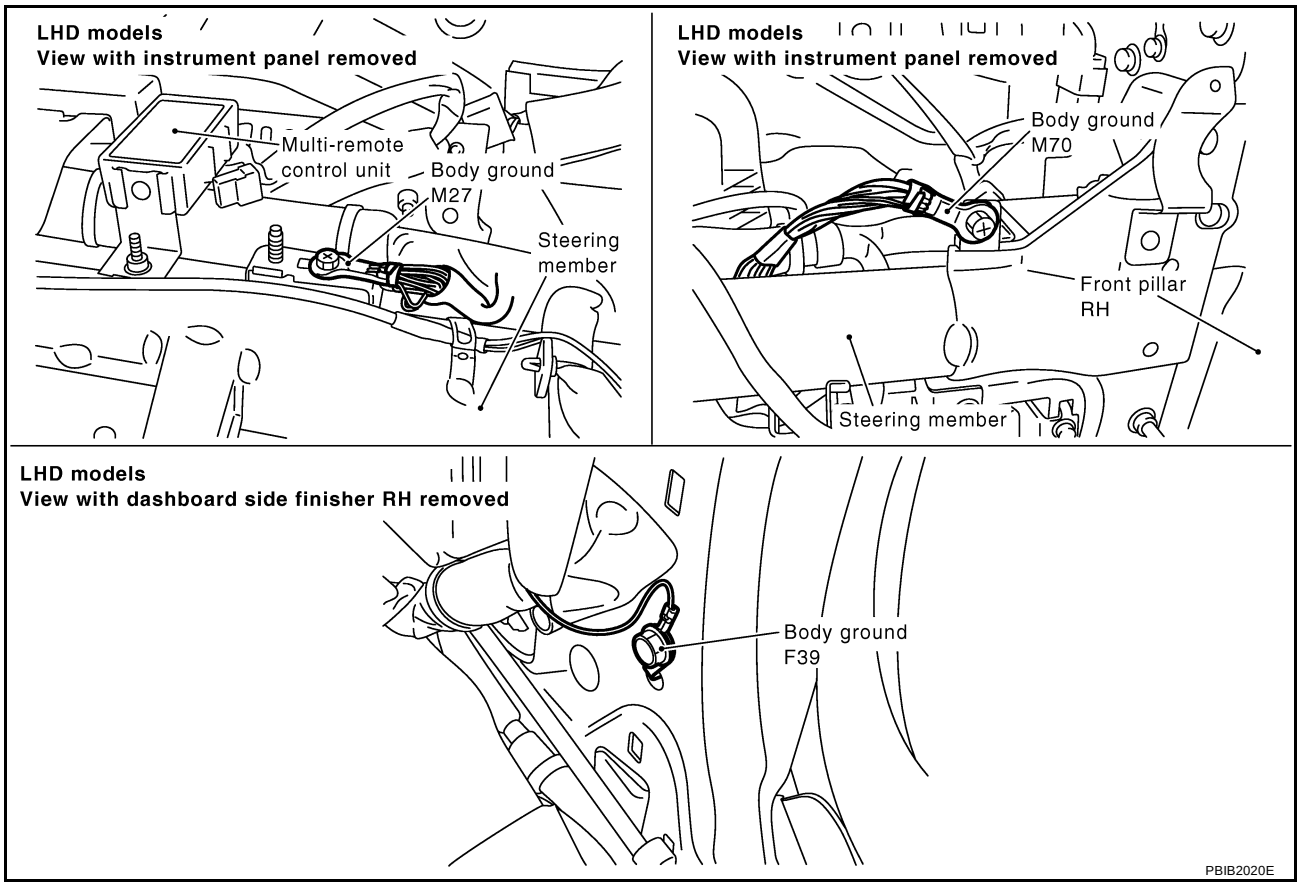
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	W	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.7V
			[Engine is running] ● **Warm-up condition** ● Idle speed	1.6 - 1.9V
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm.	1.6 - 1.9V to Approximately 4.3V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
73	B	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS001Y5

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

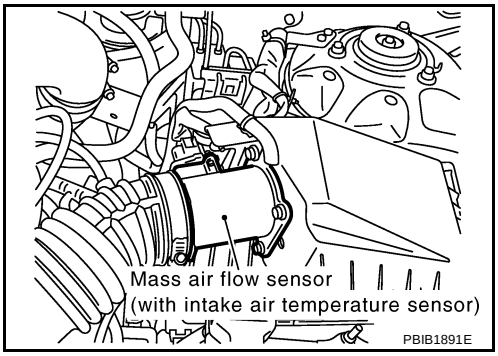


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

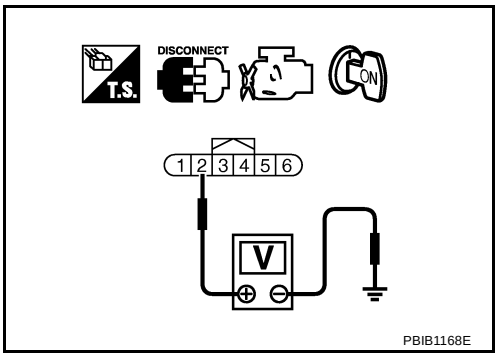
2. CHECK MAFS POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between mass air flow sensor terminals 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 3 and ECM terminal 73. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between mass air flow sensor terminal 4 and ECM terminal 54. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MASS AIR FLOW SENSOR

Refer to EC-1100, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace mass air flow sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS001Y6

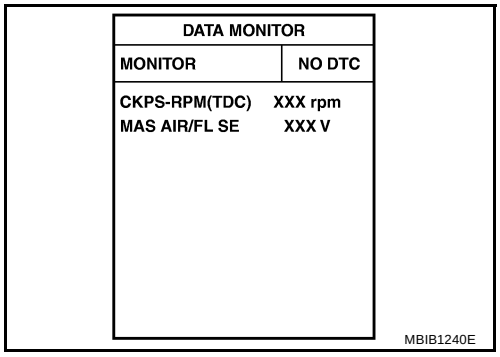
MASS AIR FLOW SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.
4. Select “MAS AIR/FL SE” and check indication under the following conditions.

Condition	MAS AIR/FL SE (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.6
Idle to about 4,000 rpm	1.3 - 1.6 to Approx. 4.0*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.



5. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

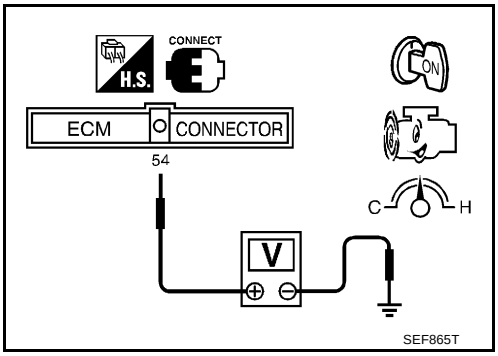
Without CONSULT-II

1. Reconnect all harness connectors disconnected.

2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.

Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.7
Idle (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
Idle to about 4,000 rpm	1.6 - 1.9 to Approx. 4.3*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.



4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 3 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

BBS001Y7

MASS AIR FLOW SENSOR

Refer to EM-141, "AIR CLEANER AND AIR DUCT" .

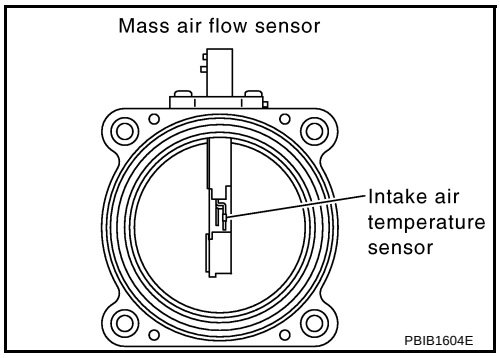
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

BBS001Y8

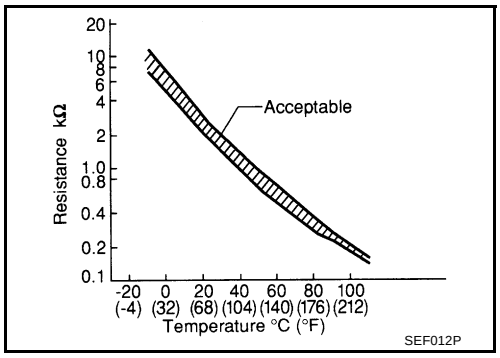
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	2.4	1.800 - 2.200
80 (176)	0.8	0.283 - 0.359

*: This data is reference values and is measured between ECM terminal 55 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

BBS001Y9

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

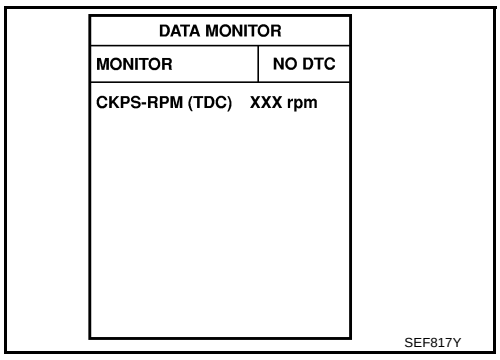
DTC Confirmation Procedure

BBS001YA

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1104, "Diagnostic Procedure" .



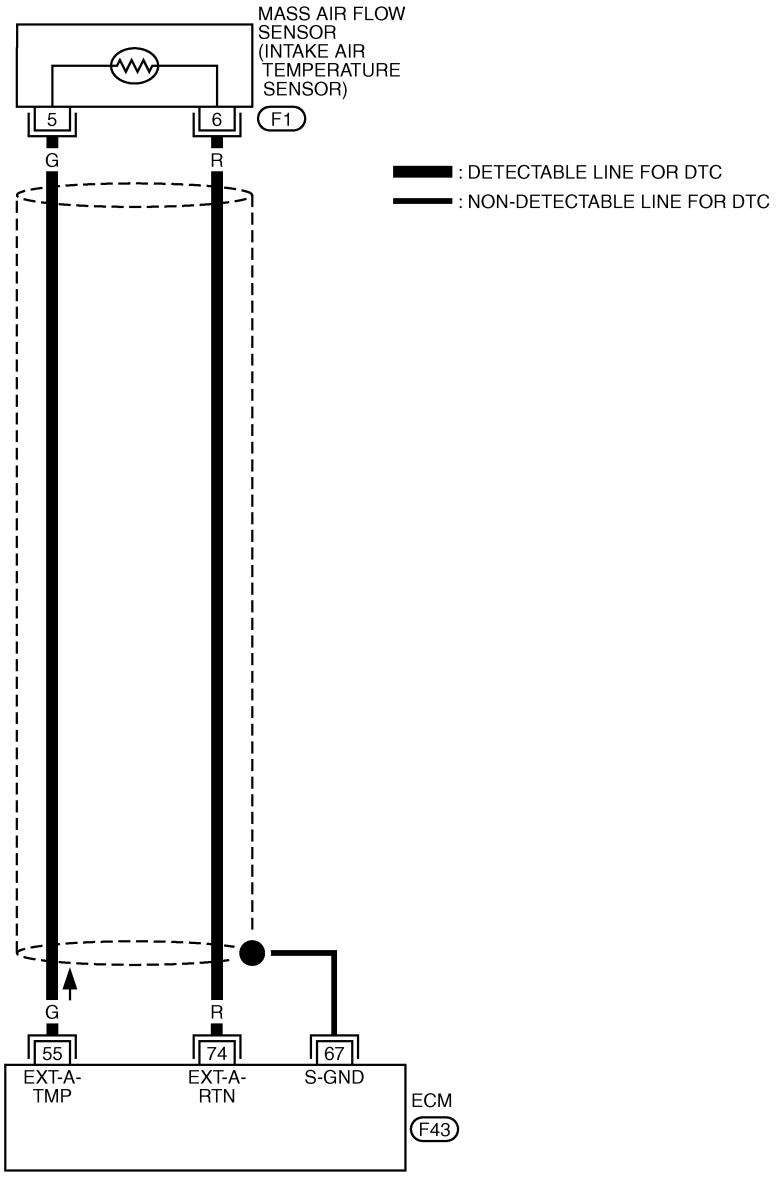
WITH GST

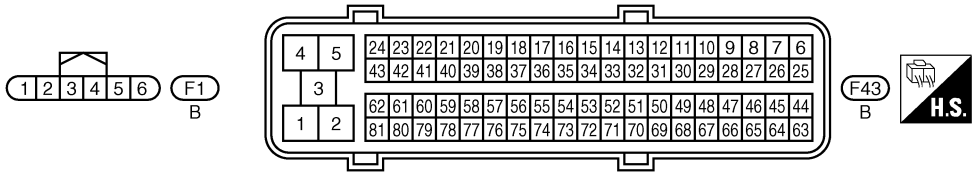
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001YB

EC-IATS-01





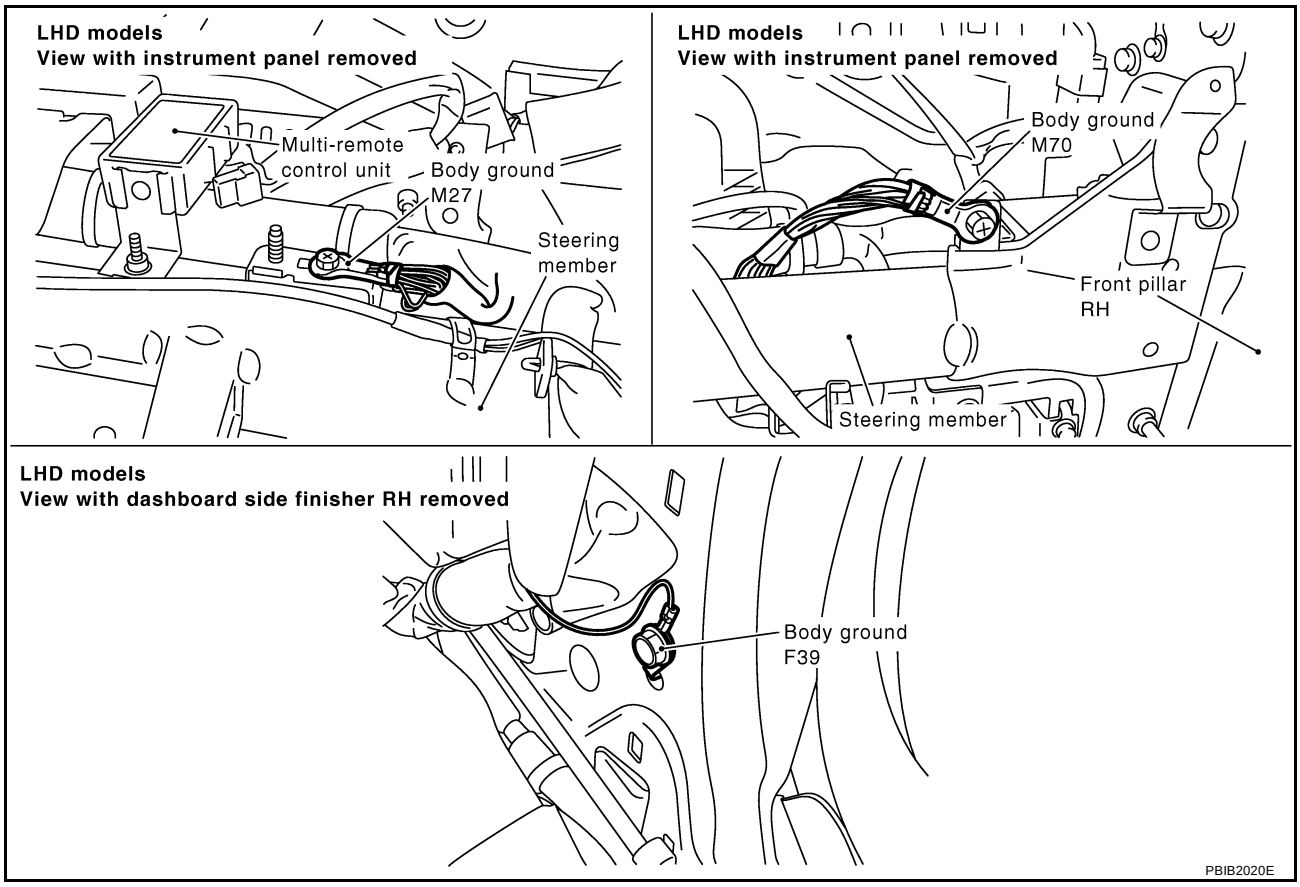
TBWA0587E

Diagnostic Procedure

BBS001YC

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

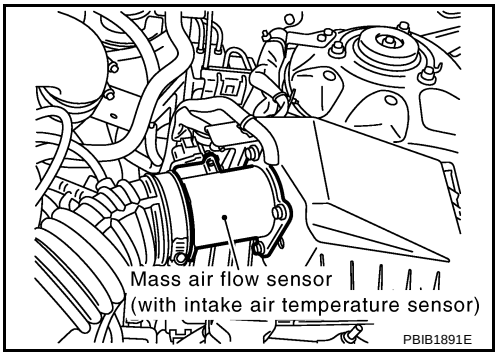


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
2. Turn ignition switch ON.

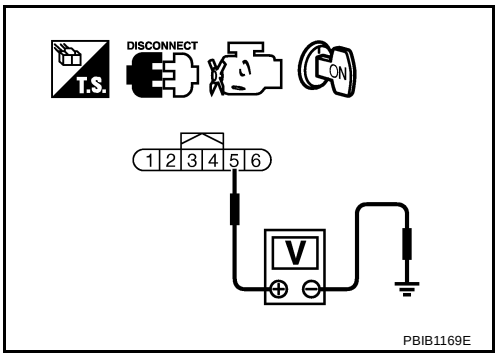


3. Check voltage between MAF sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair harness or connectors.



3. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 6 and ECM terminal 74. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1106, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

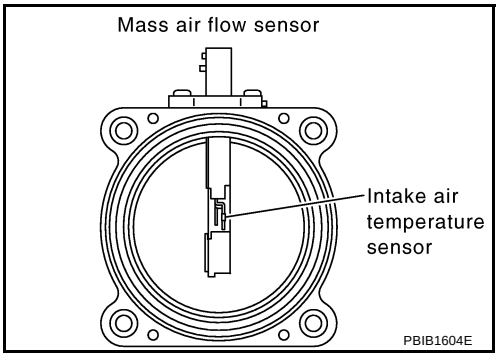
BBS001YD

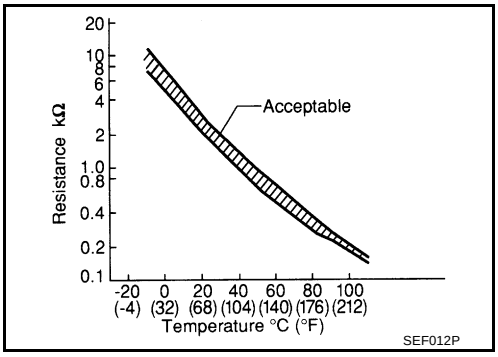
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

BBS001YE

MASS AIR FLOW SENSOR

Refer to EM-141, "AIR CLEANER AND AIR DUCT" .

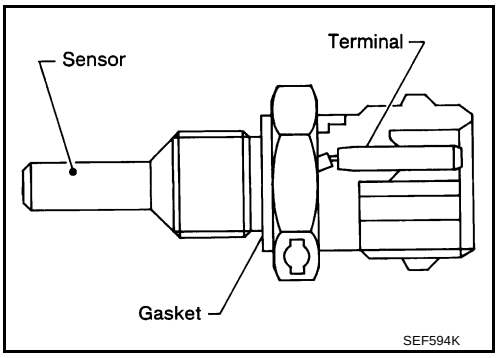
DTC P0117, P0118 ECT SENSOR

PFP:22630

Description

BBS001YF

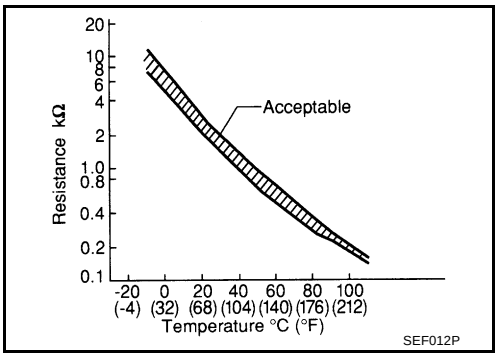
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.7	7.0 - 11.4
20 (68)	3.8	2.1 - 2.9
50 (122)	2.6	0.68 - 1.00
90 (194)	1.3	0.236 - 0.260

*: This data is reference values and is measured between ECM terminal 51 (Engine coolant temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

BBS001YG

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

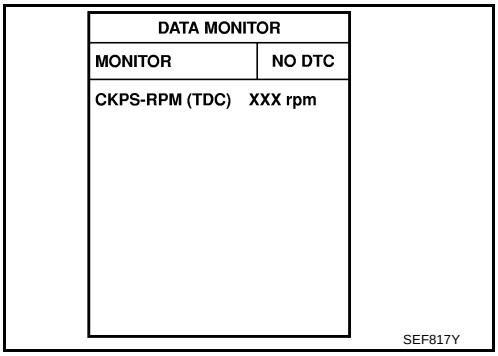
DTC Confirmation Procedure

BBS001YH

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1110, "Diagnostic Procedure" .



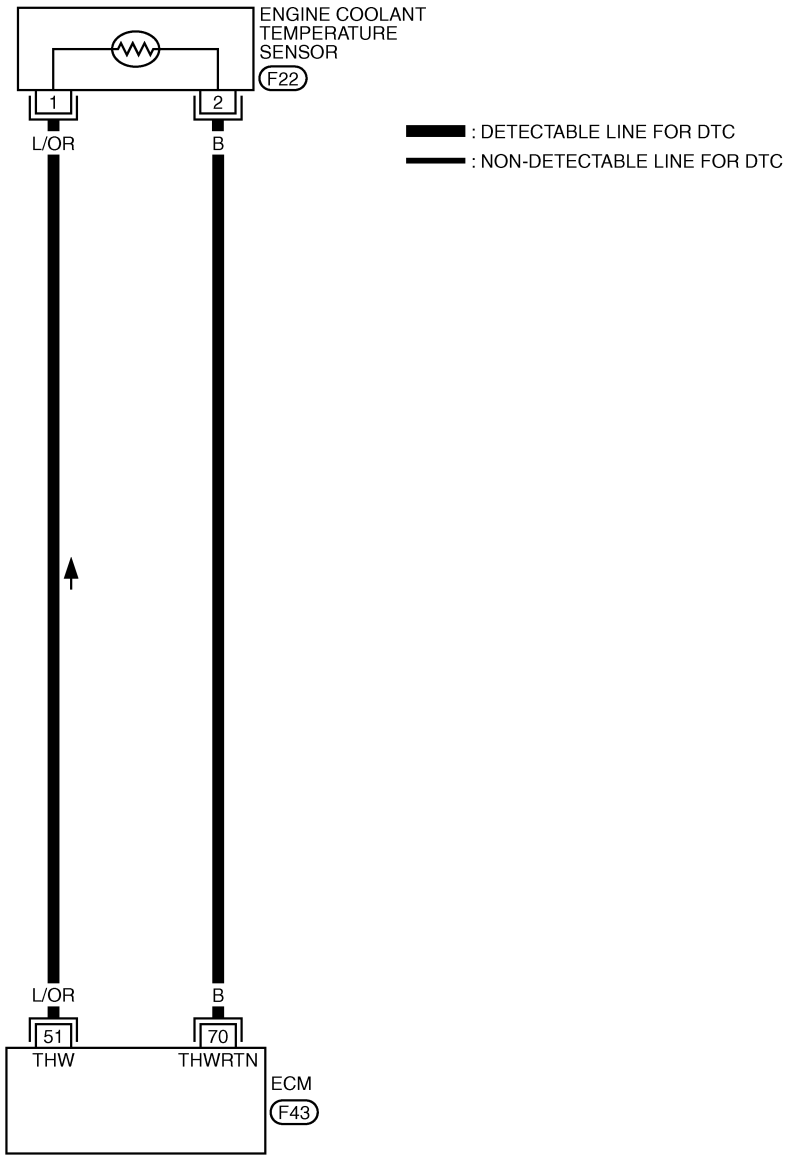
WITH GST

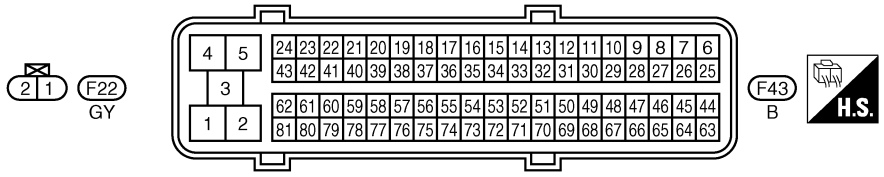
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001YI

EC-ECTS-01





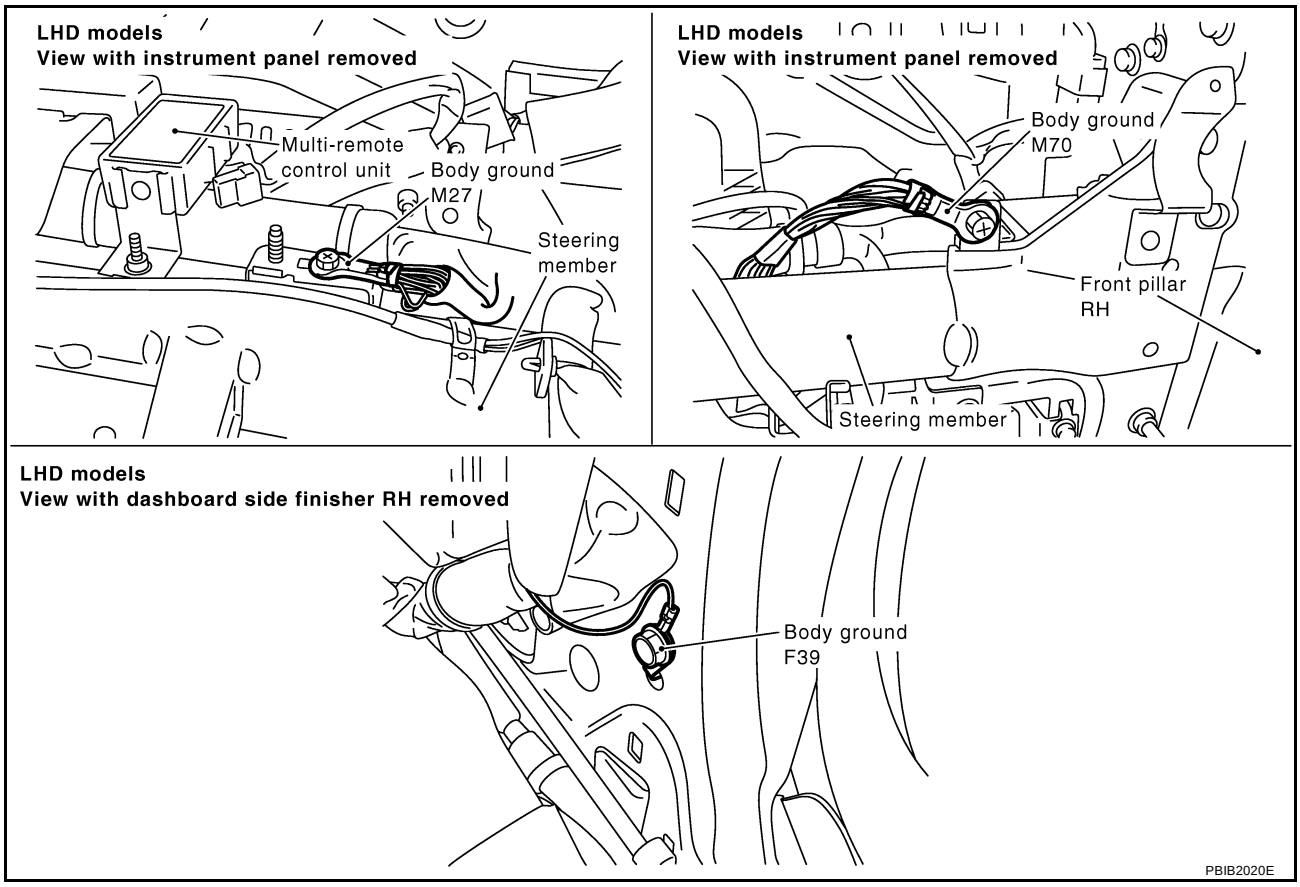
TBWA0566E

Diagnostic Procedure

BBS001YJ

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

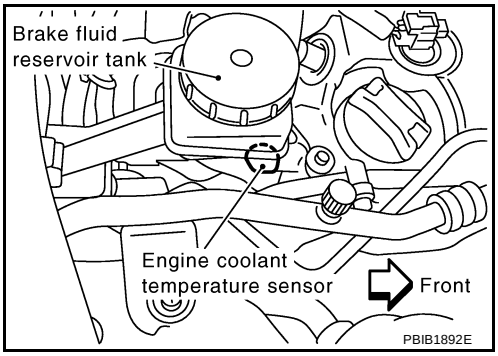


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

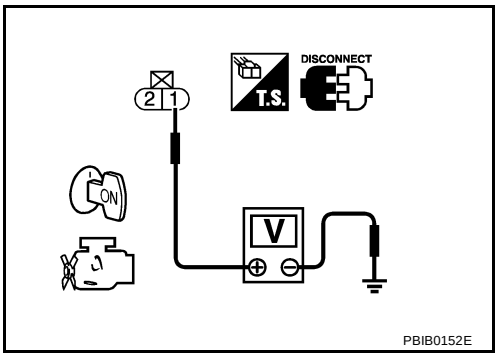
2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair harness or connectors.

3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 70. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1112, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

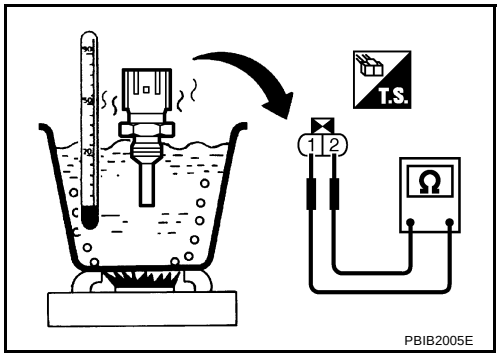
>> **INSPECTION END**

Component Inspection

BBS001YK

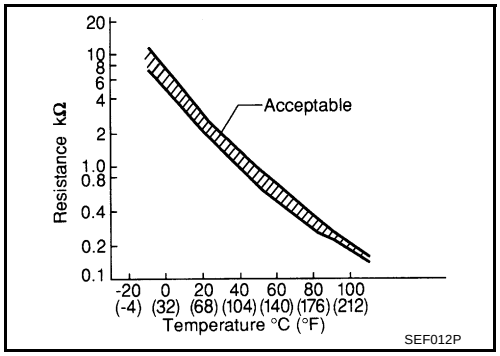
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

BBS001YL

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-214, "CYLINDER HEAD" .

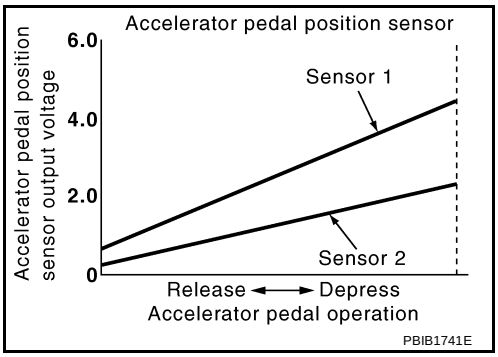
DTC P0122, P0123 APP SENSOR

PFP:18002

Description

BBS001YM

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



CONSULT-II Reference Value in Data Monitor Mode

BBS001YN

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.15 - 0.6V
		Accelerator pedal: Fully depressed	1.95 - 2.4V

*: This signal is converted by ECM internally. Thus, this differs from ECM terminals voltage.

On Board Diagnosis Logic

BBS001YO

These self-diagnoses have the one trip detection logic.
MI will not light up for these self-diagnoses.

NOTE:
If DTC P0122 or P0123 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-1307, "DTC P0642, P0643 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0123 0123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

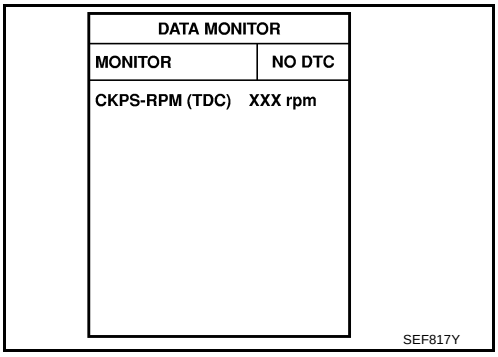
DTC Confirmation Procedure

BBS001YP

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1117, "Diagnostic Procedure" .



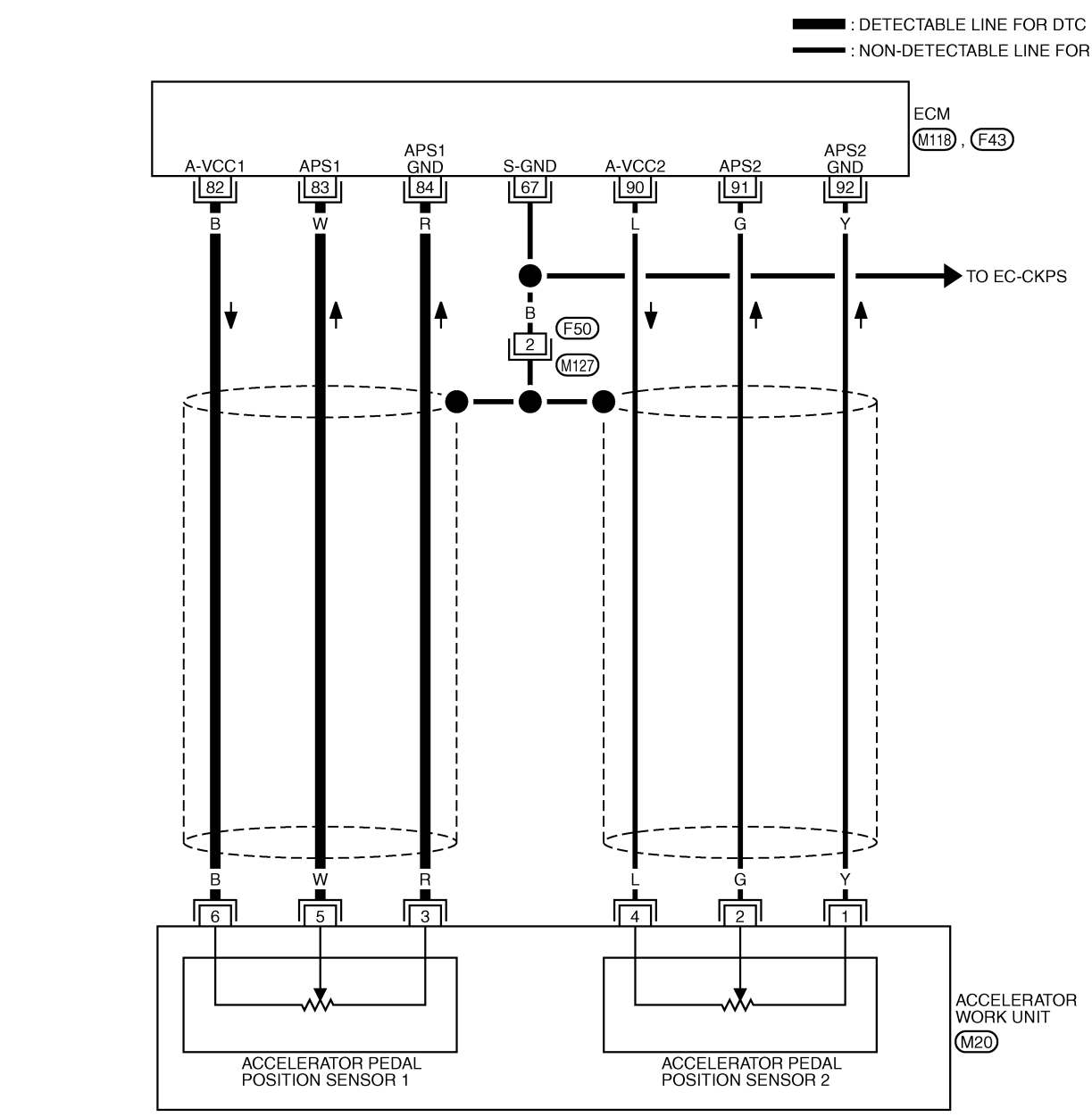
WITH GST

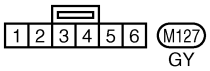
Follow the procedure “WITH CONSULT-II” above.

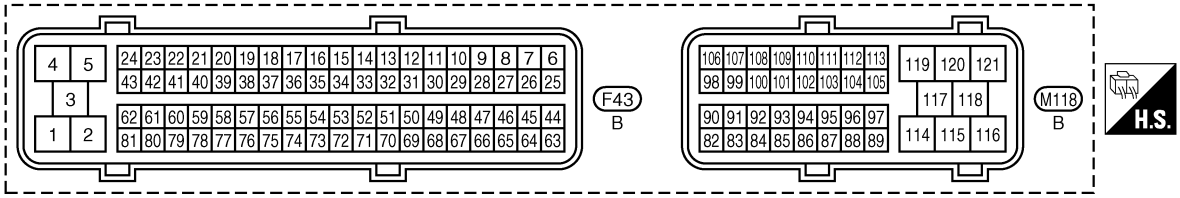
Wiring Diagram

BBS001YQ

EC-APPS1-01







TBWB0902E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

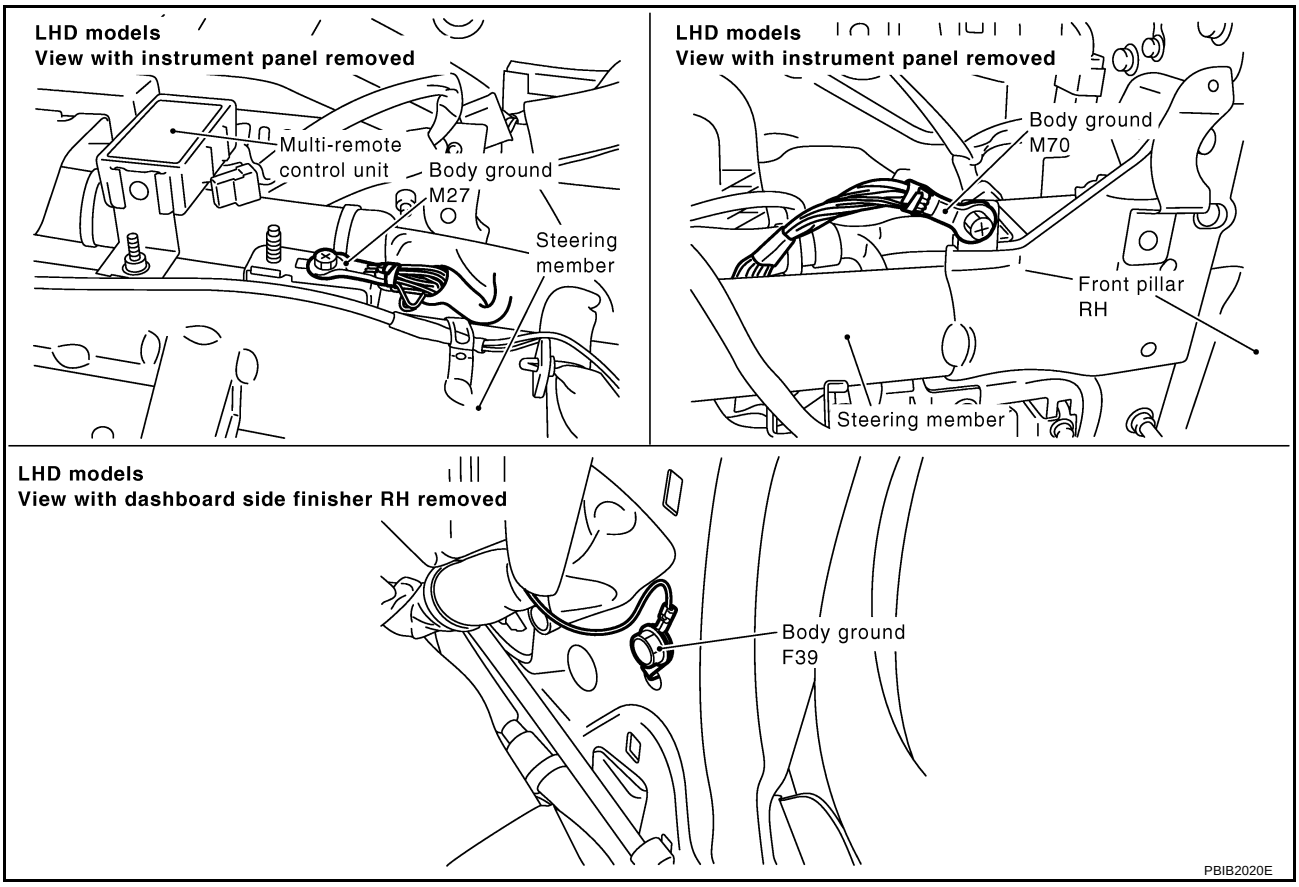
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V
83	W	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.8 - 1.3V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.0V
84	R	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
90	L	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	G	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.45 - 0.9V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.25 - 2.7V
92	Y	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS001YR

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

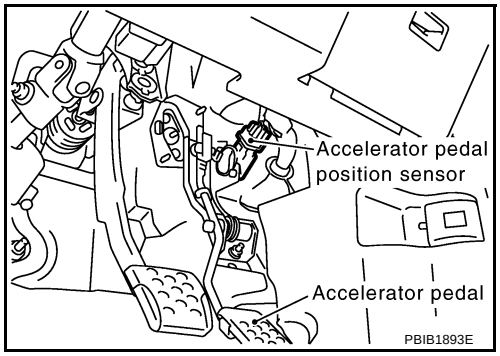


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

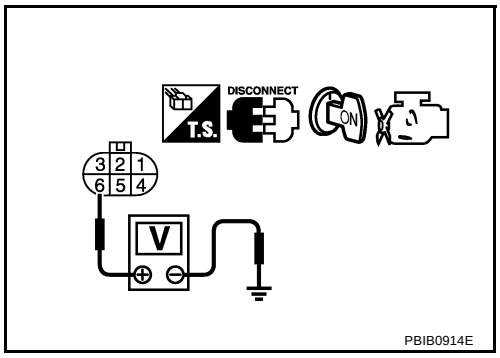
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 3 and ECM terminal 84. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 83 and APP sensor terminal 5. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1119, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

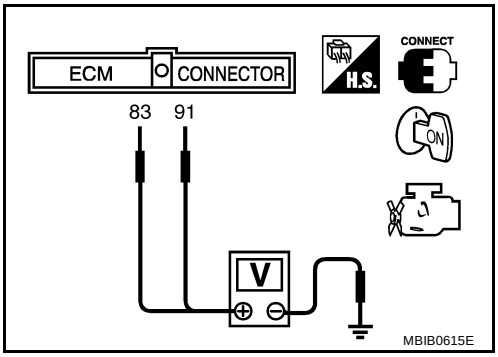
Component Inspection

BBS001YS

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.8 - 1.3V
	Fully depressed	4.2 - 5.0V
91 (Accelerator pedal position sensor 2)	Fully released	0.45 - 0.9V
	Fully depressed	2.25 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

BBS001YT

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

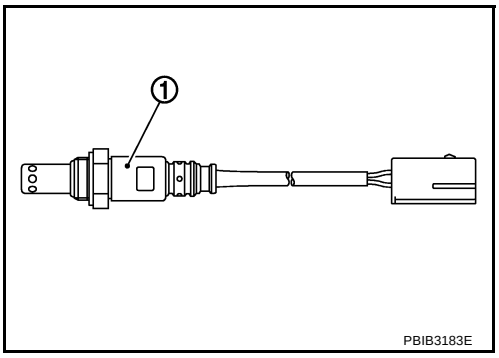
DTC P0130 A/F SENSOR 1

PFP:22693

Component Description

BBS002J8

Air fuel ratio (A/F) sensor 1(1) is installed on the downstream of Oxidation Catalyst with DPF. A/F sensor 1 measures the oxygen level in the exhaust gas and converts it into a voltage signal. A/F sensor 1 sends the signal to ECM. Based on the signal from A/F sensor 1 ECM calculates the air fuel mixture ratio. ECM uses the calculated ratio for the DPF regeneration control.
A heater is integrated in A/F sensor 1 to ensure the required operating temperature.



CONSULT-II Reference Value in Data Monitor Mode

BBS002MA

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1	● Engine: After warming up	Idle	Approx. 2200 [mV]

On Board Diagnosis Logic

BBS002J9

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0130 0130	Air fuel ratio (A/F) sensor 1 circuit	● The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 5V.	● Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is shorted.) ● Air fuel ratio (A/F) sensor 1

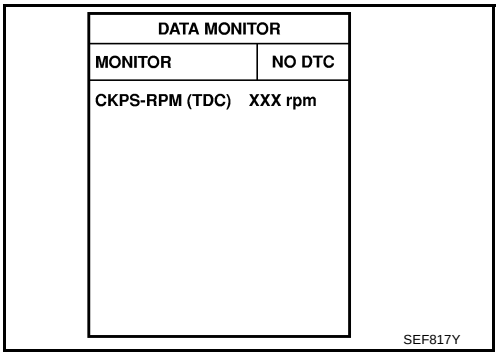
DTC Confirmation Procedure

BBS002JA

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 5 seconds.
4. If 1st trip DTC is detected, go to EC-1123, "Diagnostic Procedure" .

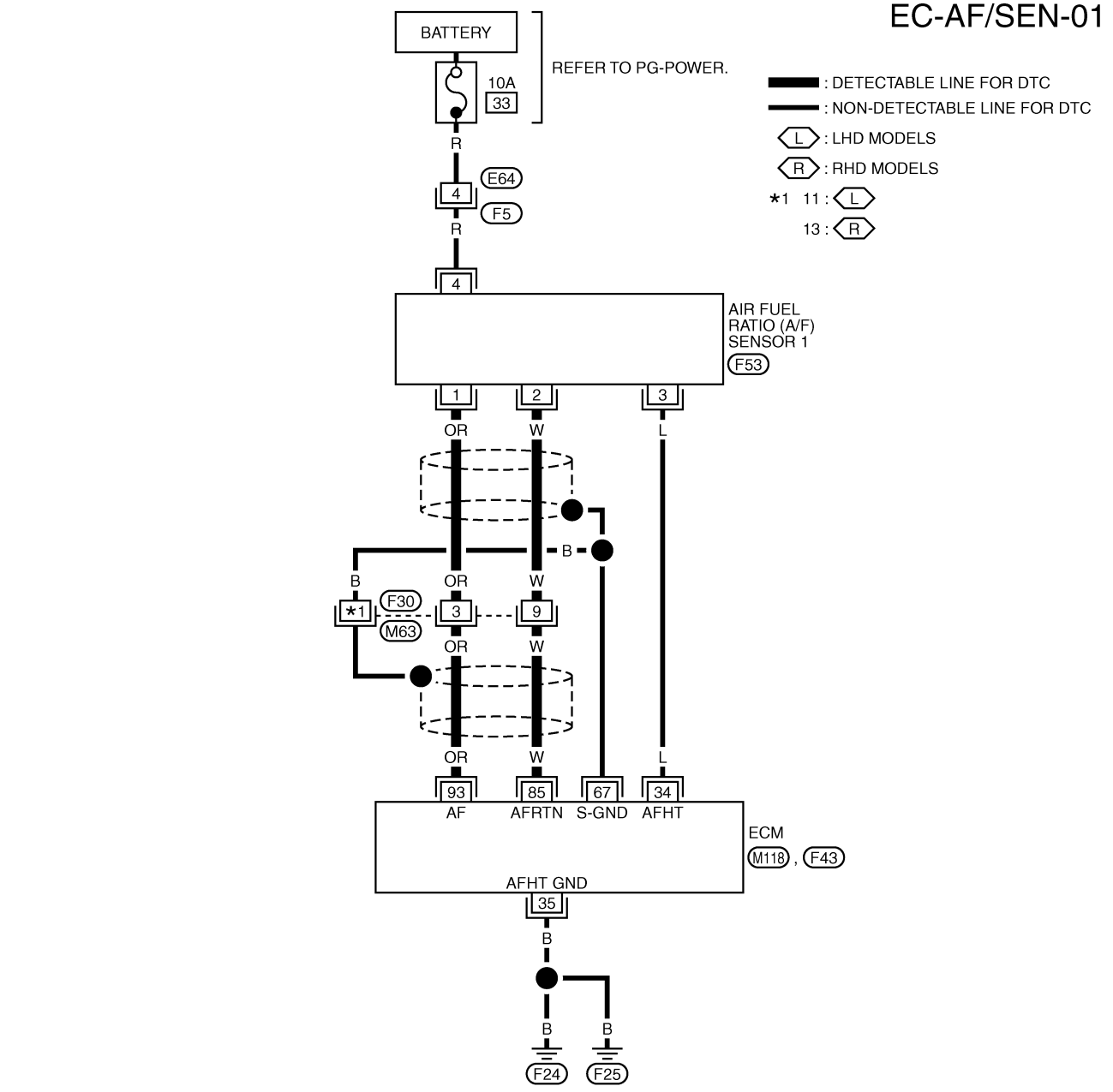


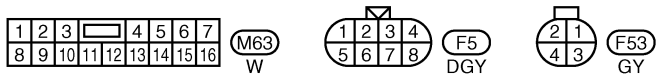
WITH GST

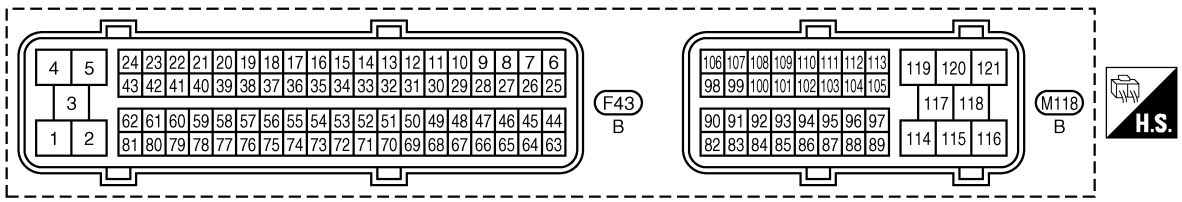
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS002JB





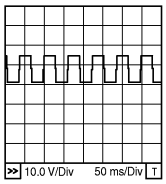


TBWB0921E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
34	L	A/F sensor 1 heater	**[Engine is running]** ● After the vehicle is driven for 6 minutes under the following conditions. – Warm-up condition – Vehicle speed: 80km/h (50MPH) – Shift lever: Suitable gear position	Approximately 5V★  PBIB3207E
			[Ignition switch: ON] ● Engine: Stopped	BATTERY VOLTAGE (11 - 14V)
35	B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	—	Sensor ground (Sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
85	W	A/F sensor 1 (-)	**[Engine is running]** ● Idle speed	1.8 - 2.1V
93	OR	A/F sensor 1 (+)	**[Engine is running]** ● Idle speed	2.2 - 2.5V

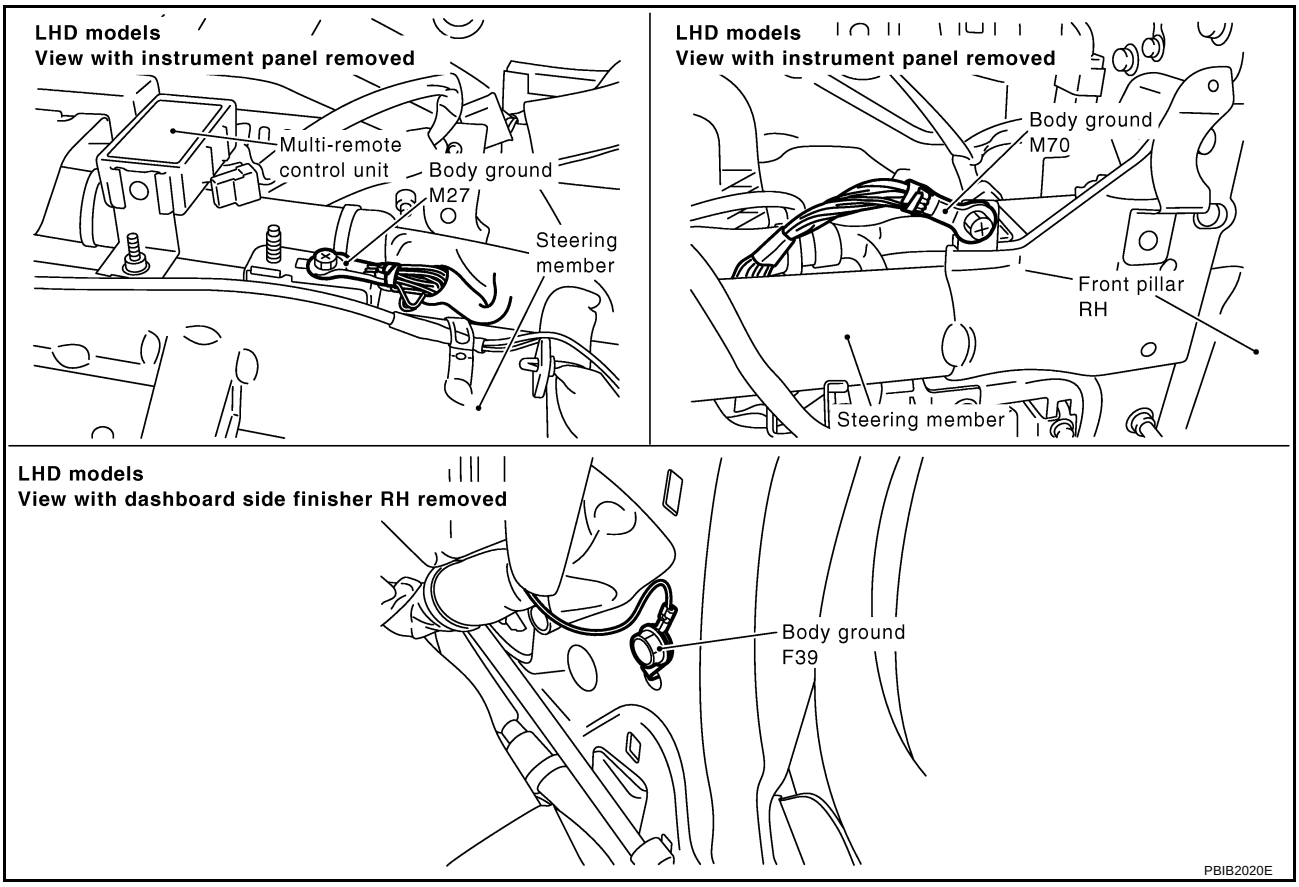
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS002JC

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-1067, "Ground Inspection" .



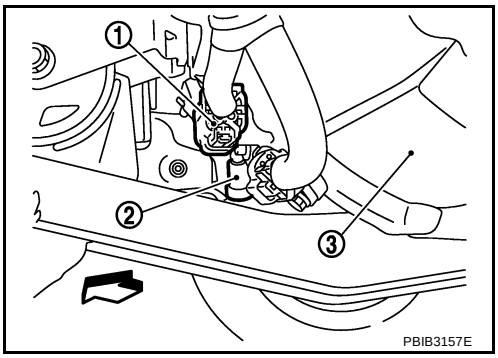
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK HARNESS CONNECTOR

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
   - ⇦: Vehicle front
   - A/F sensor 1 (2)
   - Transaxle case (3)
2. Check harness connector for water.

Water should not exit.



OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT FOR SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	85
2	93

Continuity should not exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between air fuel ratio sensor 1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

1. Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

2. Perform A/F Sensor Learning Value Clear. Refer to EC-1000, "A/F Sensor Learning Value Clear" .

>> **INSPECTION END**

Removal and Installation

BBS002JD

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-150, "CATALYST" .

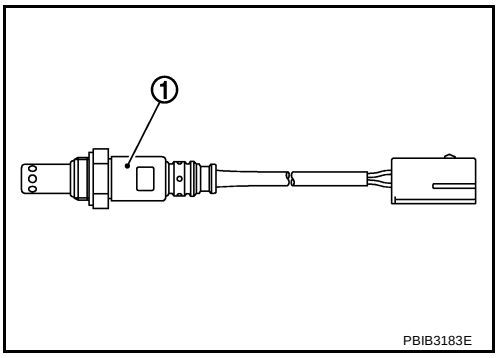
DTC P0131, P0132 A/F SENSOR 1

PFP:226A3

Component Description

BBS002M5

Air fuel ratio (A/F) sensor 1(1) is installed on the downstream of Oxidation Catalyst with DPF. A/F sensor 1 measures the oxygen level in the exhaust gas and converts it into a voltage signal. A/F sensor 1 sends the signal to ECM. Based on the signal from A/F sensor 1 ECM calculates the air fuel mixture ratio. ECM uses the calculated ratio for the DPF regeneration control.
A heater is integrated in A/F sensor 1 to ensure the required operating temperature.



CONSULT-II Reference Value in Data Monitor Mode

BBS002M6

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1	● Engine: After warming up	Idle	Approx. 2200 [mV]

On Board Diagnosis Logic

BBS002JF

To judge the malfunction, the diagnosis checks that the A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is not inordinately low or high.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0131 0131	Air fuel ratio (A/F) sensor 1 circuit low voltage	● An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is shorted.) ● Air fuel ratio (A/F) sensor 1
P0132 0132	Air fuel ratio (A/F) sensor 1 circuit high voltage	● An excessively high voltage from the sensor is sent to ECM.	

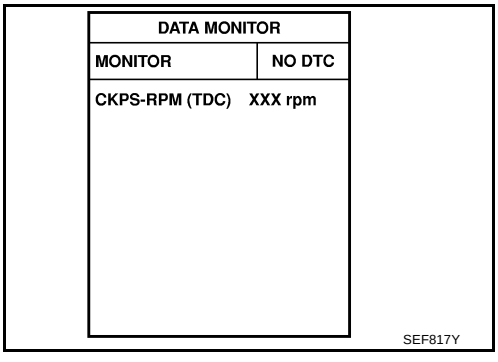
DTC Confirmation Procedure

BBS002JG

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 2 seconds
4. If 1t trip DTC is displayed, go to EC-1128, "Diagnostic Procedure" .

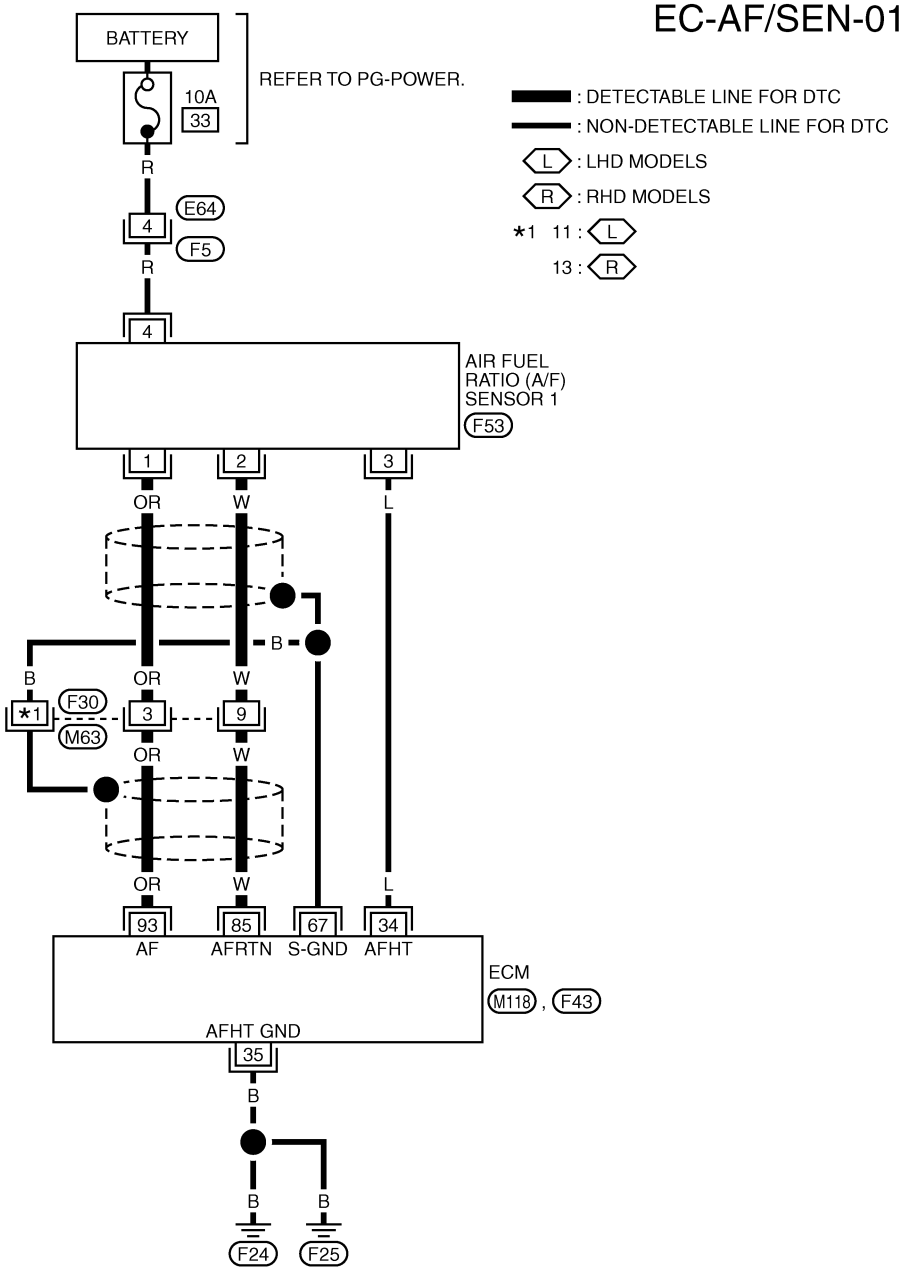


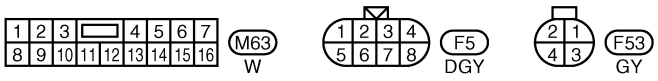
WITH GST

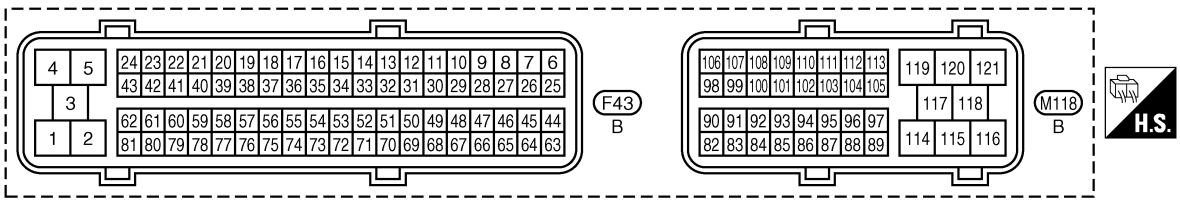
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS002JH



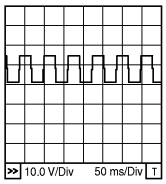




TBWB0921E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
34	L	A/F sensor 1 heater	**[Engine is running]** ● After the vehicle is driven for 6 minutes under the following conditions. – Warm-up condition – Vehicle speed: 80km/h (50MPH) – Shift lever: Suitable gear position	Approximately 5V★  PBIB3207E
			[Ignition switch: ON] ● Engine: Stopped	BATTERY VOLTAGE (11 - 14V)
35	B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	—	Sensor ground (Sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
85	W	A/F sensor 1 (-)	**[Engine is running]** ● Idle speed	1.8 - 2.1V
93	OR	A/F sensor 1 (+)	**[Engine is running]** ● Idle speed	2.2 - 2.5V

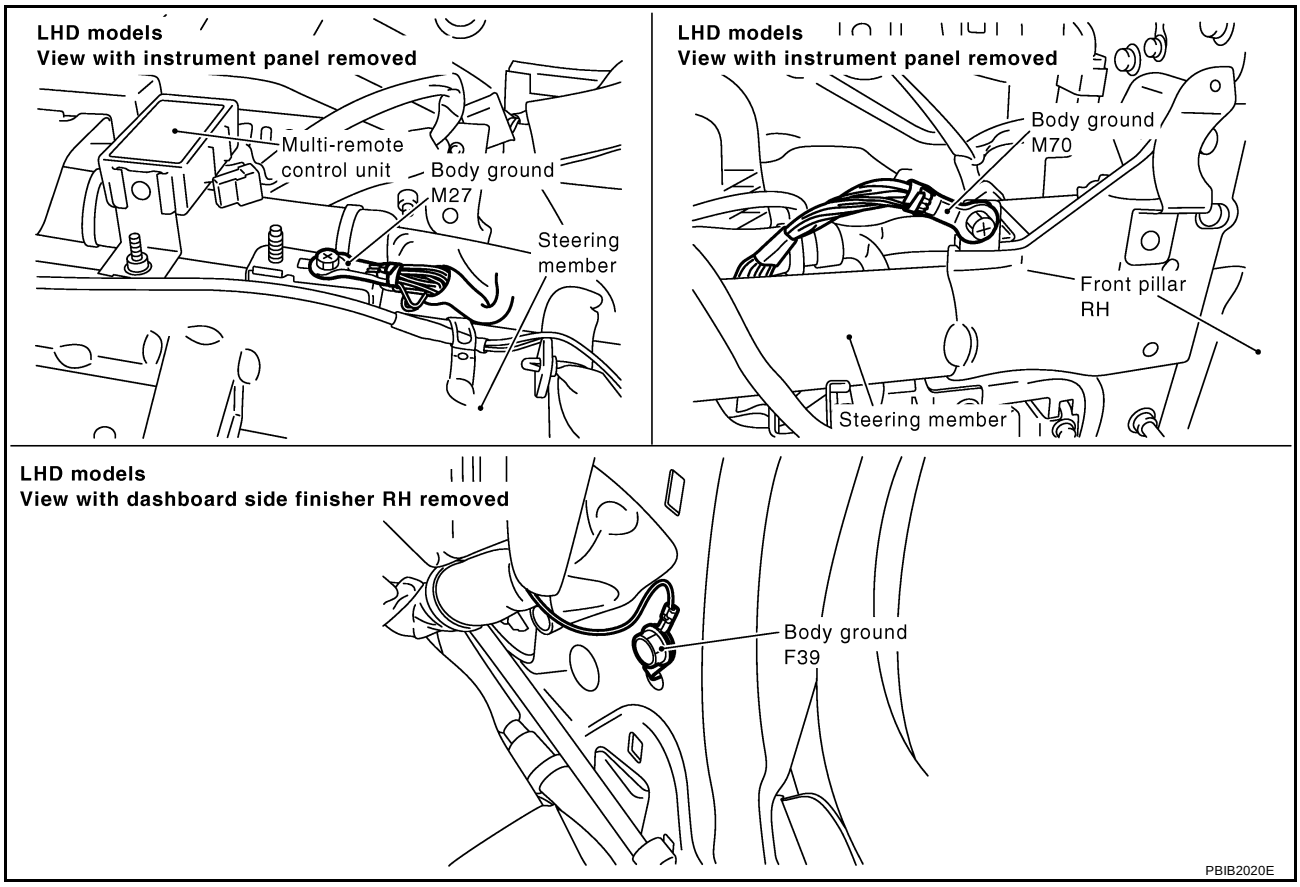
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS002JI

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-1067, "Ground Inspection" .



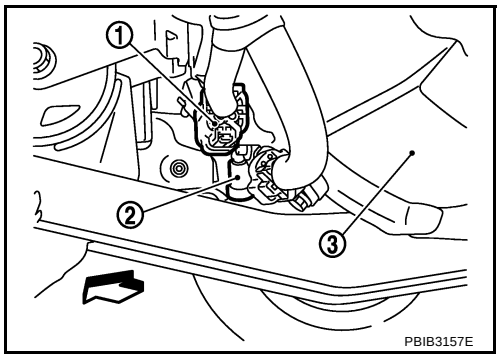
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK HARNESS CONNECTOR

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
   - ⇦: Vehicle front
   - A/F sensor 1 (2)
   - Transaxle case (3)
2. Check harness connector for water.

Water should not exit.



OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between A/F sensor terminal and ECM terminal as follows. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal	Continuity
1	34	Should not exist
	85	Should not exist
	93	Should exist
2	34	Should not exist
	85	Should exist
	93	Should not exist
3	34	Should exist
	85	Should not exist
	93	Should not exist

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between air fuel ratio sensor 1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

1. Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

2. Perform A/F Sensor Learning Value Clear. Refer to EC-1000, "A/F Sensor Learning Value Clear" .

>> **INSPECTION END**

Removal and Installation

BBS002JJ

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-150, "CATALYST" .

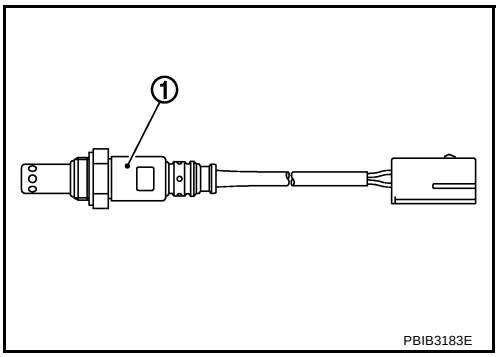
DTC P0134 A/F SENSOR 1

PFP:226A3

Component Description

BBS002M7

Air fuel ratio (A/F) sensor 1(1) is installed on the downstream of Oxidation Catalyst with DPF. A/F sensor 1 measures the oxygen level in the exhaust gas and converts it into a voltage signal. A/F sensor 1 sends the signal to ECM. Based on the signal from A/F sensor 1 ECM calculates the air fuel mixture ratio. ECM uses the calculated ratio for the DPF regeneration control.
A heater is integrated in A/F sensor 1 to ensure the required operating temperature.



CONSULT-II Reference Value in Data Monitor Mode

BBS002M8

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1	● Engine: After warming up	Idle	Approx. 2200 [mV]

On Board Diagnosis Logic

BBS002JL

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P0134 0134	Air fuel ratio (A/F) sensor 1 circuit no activity detected	● The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is constantly approx. 2.2V.	● Harness or connectors (The air fuel ratio (A/F) sensor 1 circuit is open.) ● Air fuel ratio (A/F) sensor 1

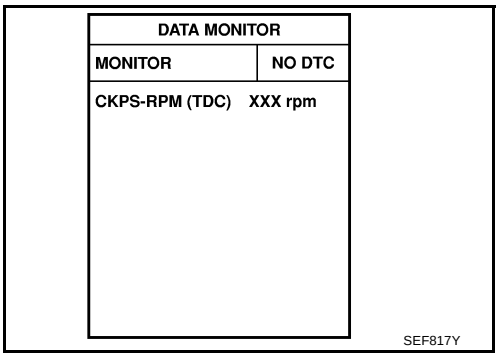
DTC Confirmation Procedure

BBS002JM

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a 10 minutes in the suitable gear position
4. Stop vehicle and let engine idle for 5 seconds.
5. If 1st trip DTC is detected, go to EC-1133, "Diagnostic Procedure" .

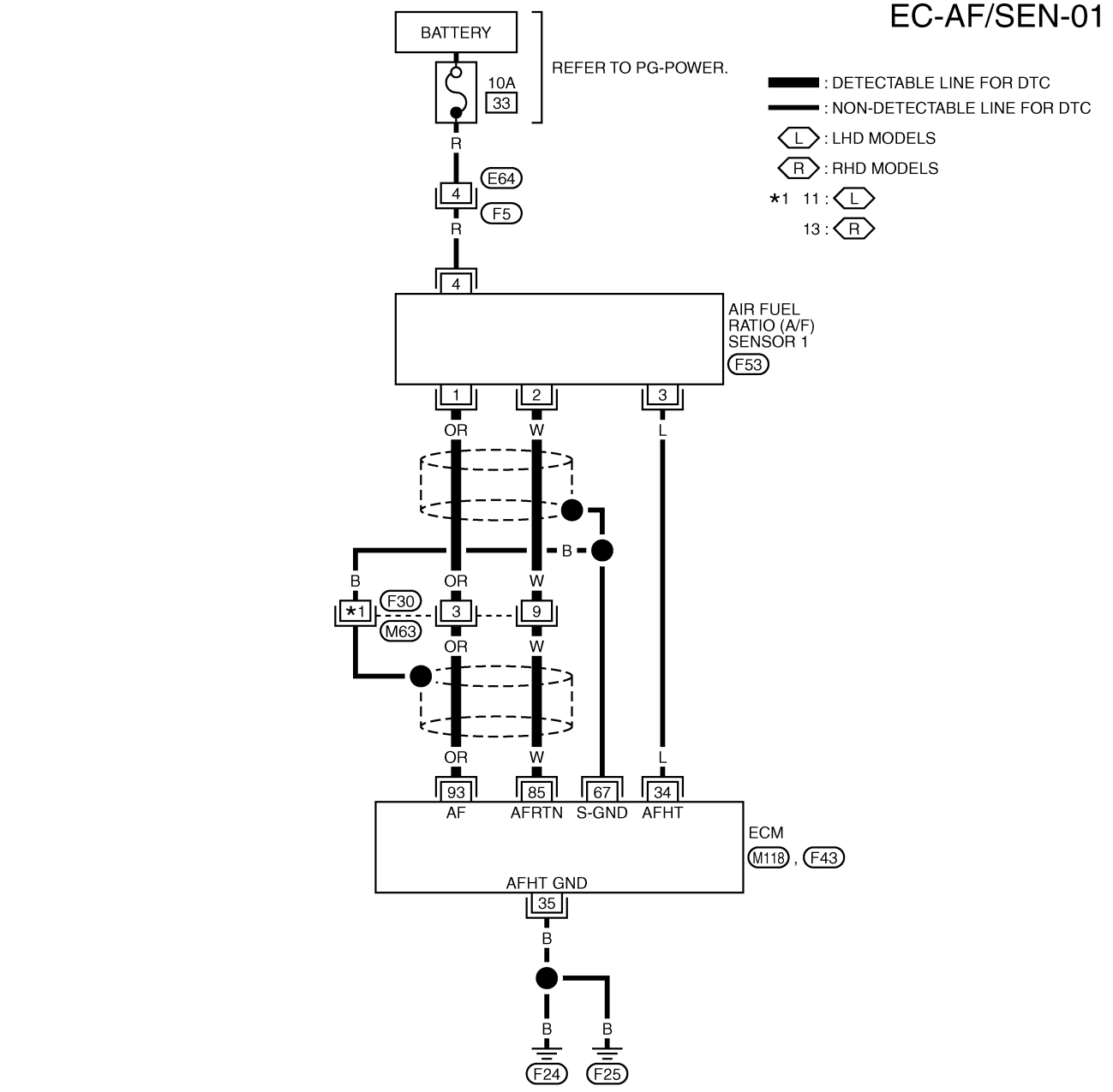


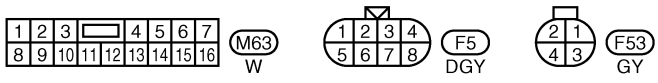
WITH GST

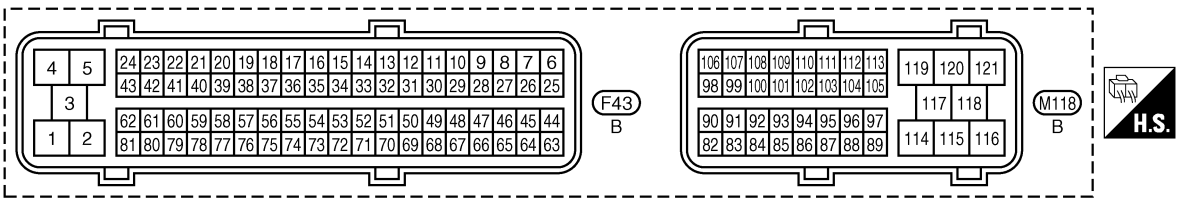
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS002JN





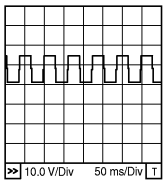


TBWB0921E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
34	L	A/F sensor 1 heater	**[Engine is running]** ● After the vehicle is driven for 6 minutes under the following conditions. – Warm-up condition – Vehicle speed: 80km/h (50MPH) – Shift lever: Suitable gear position	Approximately 5V★  PBIB3207E
			[Ignition switch: ON] ● Engine: Stopped	BATTERY VOLTAGE (11 - 14V)
35	B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	—	Sensor ground (Sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
85	W	A/F sensor 1 (-)	**[Engine is running]** ● Idle speed	1.8 -2.1V
93	OR	A/F sensor 1 (+)	**[Engine is running]** ● Idle speed	2.2 - 2.5V

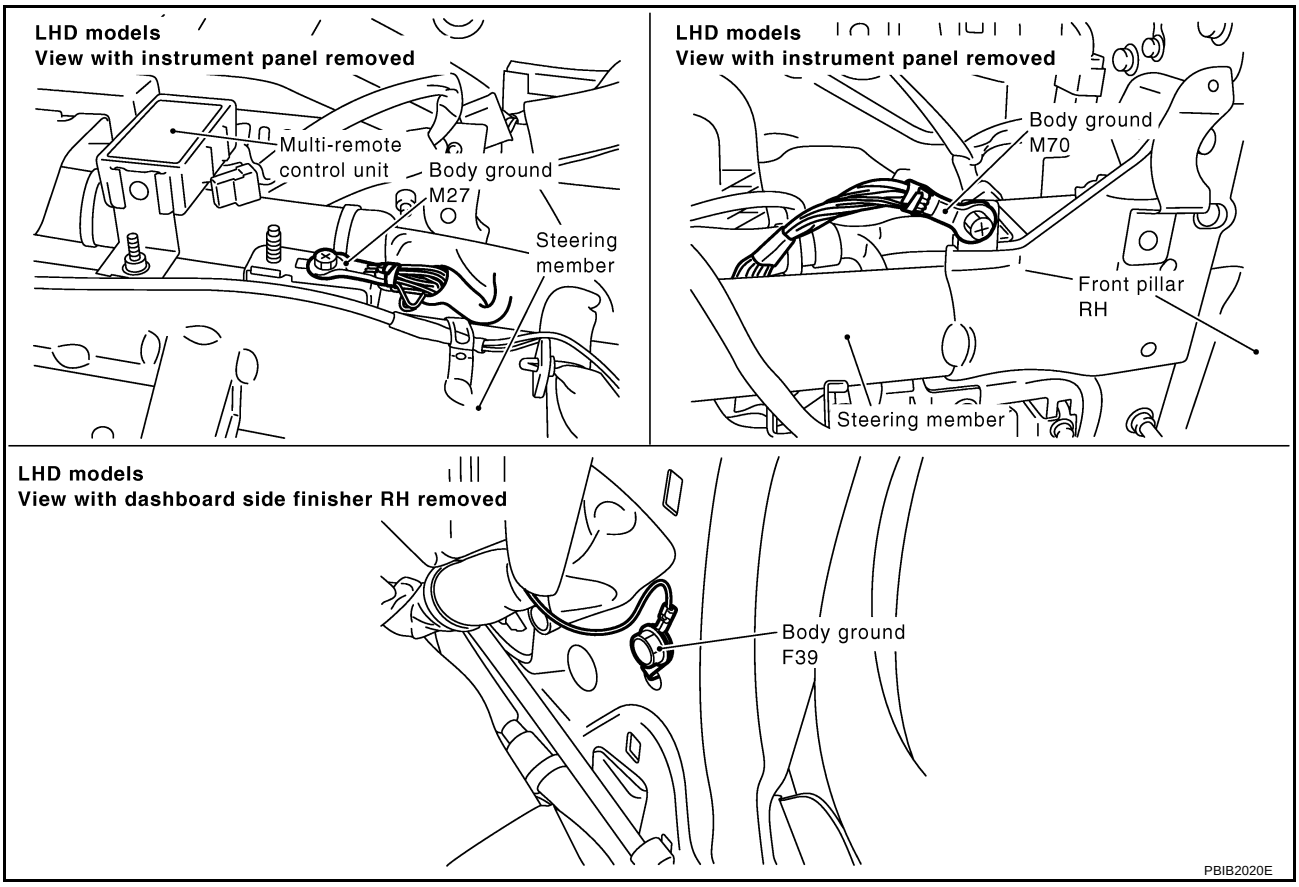
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS002JO

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-1067, "Ground Inspection" .



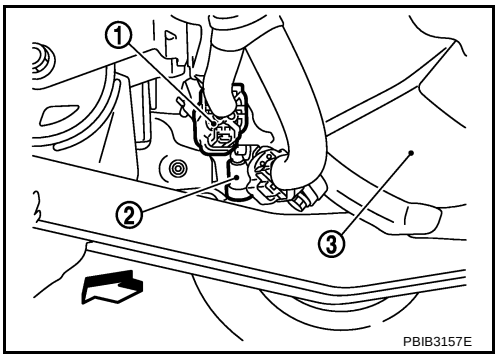
OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK HARNESS CONNECTOR

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
   - ⇦: Vehicle front
   - A/F sensor 1 (2)
   - Transaxle case (3)
2. Check harness connector for water.

Water should not exit.



OK or NG

OK >> GO TO 3.
NG >> Repair or replace harness connector.

3. CHECK AIR FUEL RATIO (A/F) SENSOR 1 INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between A/F sensor 1 terminal and ECM terminal as follows. Refer to Wiring Diagram.

A/F sensor 1 terminal	ECM terminal
1	93
2	85

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between air fuel ratio sensor 1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK INTERMITTENT INCIDENT

Perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

1. Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

2. Perform A/F Sensor Learning Value Clear. Refer to EC-1000, "A/F Sensor Learning Value Clear" .

>> **INSPECTION END**

Removal and Installation

BBS002JP

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-150, "CATALYST" .

DTC P0135 A/F SENSOR 1 HEATER

PFP:226A3

Description

BBS002JQ

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Camshaft position sensor Crankshaft position sensor	Engine speed	Air fuel ratio (A/F) sensor 1 heater control	Air fuel ratio (A/F) sensor 1 heater
Engine coolant temperature sensor	Engine coolant temperature		
Rear exhaust gas temperature sensor	Rear exhaust gas temperature		
Intake air temperature sensor	Intake air temperature		

Based on intake air temperature, engine coolant temperature and rear exhaust gas temperature, ECM switches the mode of A/F sensor heater from OFF to ON (or from ON to OFF).
During A/F sensor heater is ON, ECM controls A/F sensor heater with ON/OFF pulse duty signals according to driving conditions.

OPERATION

Condition	Air fuel ratio (A/F) sensor 1 heater
Ignition switch: ON (Engine stopped)	OFF
After the vehicle is driven for 6 minutes under the following conditions. ● Warm-up condition ● Vehicle speed: 80km/h (50MPH) ● Shift lever: Suitable gear position	ON

On Board Diagnosis Logic

BBS002JR

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0135 0135	Air fuel ratio (A/F) sensor 1 heater circuit	The current amperage in the A/F sensor 1 heater circuit is out of the normal range. (An excessively low or high voltage signal is sent to ECM through the A/F sensor 1 heater)	● Harness or connectors (The air fuel ratio (A/F) sensor 1 heater circuit is open or shorted.) ● Air fuel ratio (A/F) sensor 1 heater

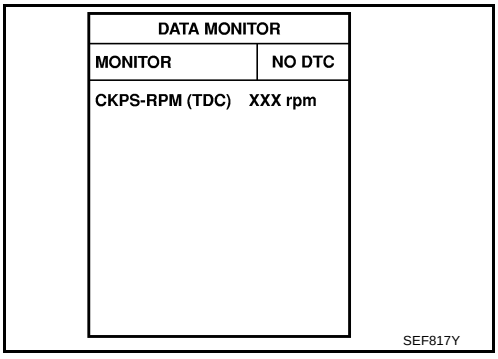
DTC Confirmation Procedure

BBS002JS

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a 6 minutes in the suitable gear position.
4. Release accelerator pedal for at least 3 seconds.
   Do not depress brake pedal during this procedure.
5. If 1st trip DTC is detected, go to EC-1137, "Diagnostic Procedure" .

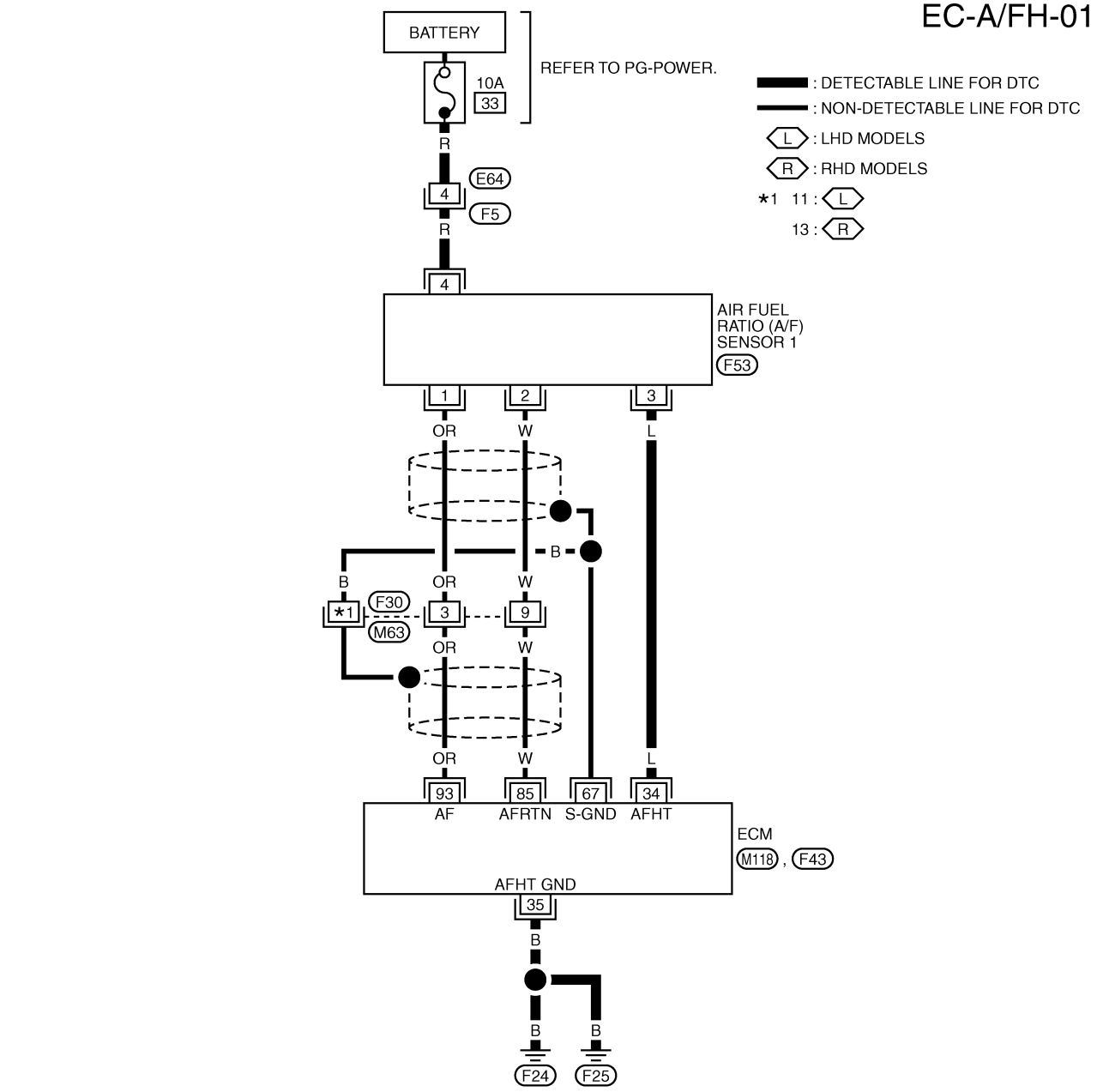


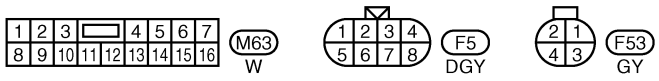
WITH GST

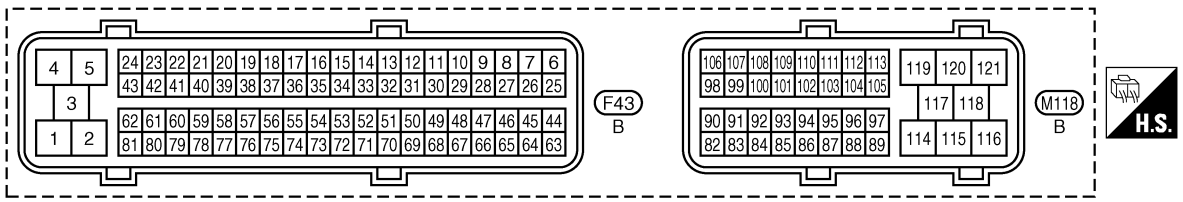
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS002JT



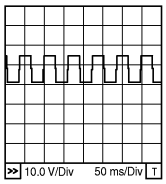




TBWB1031E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
34	L	A/F sensor 1 heater	**[Engine is running]** ● After the vehicle is driven for 6 minutes under the following conditions. – Warm-up condition – Vehicle speed: 80km/h (50MPH) – Shift lever: Suitable gear position	Approximately 5V★  PBIB3207E
			[Ignition switch: ON] ● Engine: Stopped	BATTERY VOLTAGE (11 - 14V)
35	B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
67	—	Sensor ground (Sensor shield circuit)	**[Ignition switch ON]**	Approximately 0.3V
85	W	A/F sensor 1 (-)	**[Engine is running]** ● Idle speed	1.8 - 2.1V
93	OR	A/F sensor 1 (+)	**[Engine is running]** ● Idle speed	2.2 - 2.5V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

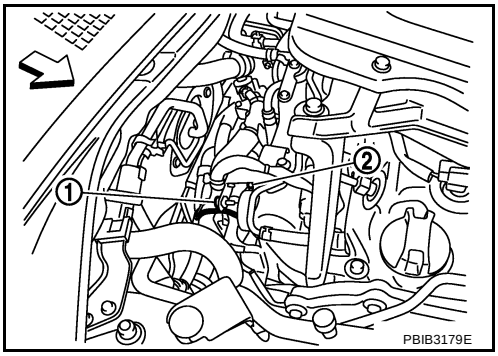
Diagnostic Procedure

BBS002JU

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws. Refer to EC-1067, "Ground Inspection" .

– ⇦: Vehicle front
– Engine ground E25 (1)
– Engine ground E24 (2)



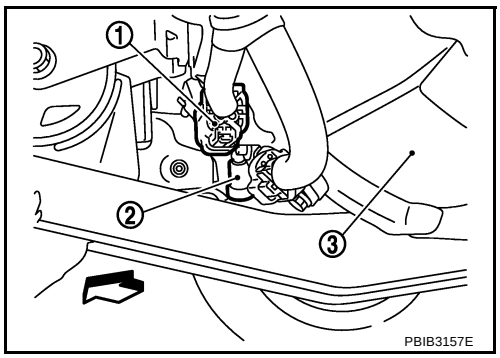
PBIB3179E

OK or NG

OK >> GO TO 2.
NG >> Repair or Replace ground connections.

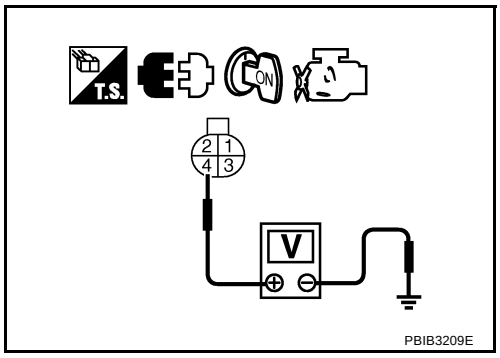
2. CHECK AIR FUEL RATIO (A/F) SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect air fuel ratio (A/F) sensor 1 harness connector (1).
   - ⇦: Vehicle front
   - A/F sensor 1 (2)
   - Transaxle case (3)
2. Turn ignition switch ON.



3. Check voltage between air fuel ratio sensor 1 terminal 4 and ground with CONSULT-II or tester.

   Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E64, F5
- 10A fuse
- Harness for open or short between air fuel ratio sensor 1 and battery

>> Repair or replace harness or connectors.

4. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between air fuel ratio (A/F) sensor 1 terminal 3 and ECM terminal 34. Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 35 and ground. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

6. CHECK AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Refer to EC-1140, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> GO TO 8.

7. CHECK INTERMITTENT INCIDENT

Perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. REPLACE AIR FUEL RATIO (A/F) SENSOR 1

1. Replace air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**

2. Perform A/F Sensor Learning Value Clear. Refer to EC-1000, "A/F Sensor Learning Value Clear" .

>> **INSPECTION END**

Component Inspection

BBS002JV

AIR FUEL RATIO (A/F) SENSOR 1 HEATER

Check resistance between terminals 3 and 4.

Resistance: 1.8 - 2.44Ω at 25°C (77°F)

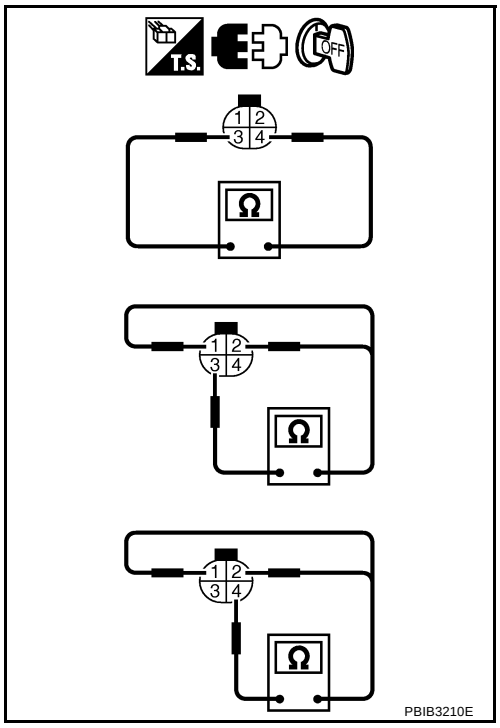
Check continuity between terminals 3 and 1, 2, terminals 4 and 1, 2.

Continuity should not exist.

If NG, replace the air fuel ratio (A/F) sensor 1.

CAUTION:

- **Discard any air fuel ratio (A/F) sensor which has been dropped from a height of more than 0.5 m (19.7 in) onto a hard surface such as a concrete floor; use a new one.**
- **Before installing new air fuel ratio (A/F) sensor, clean exhaust system threads using Heated Oxygen Sensor Thread Cleaner and approved anti-seize lubricant.**



Removal and Installation

BBS002JW

AIR FUEL RATIO (A/F) SENSOR 1

Refer to EM-150, "CATALYST" .

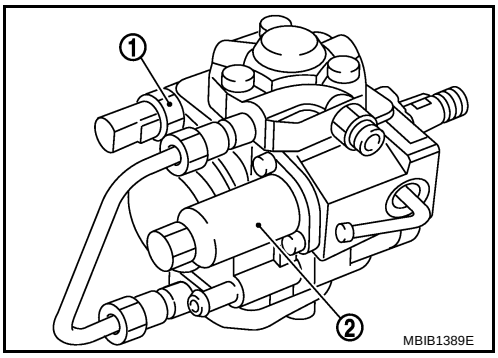
DTC P0182, P0183 FUEL PUMP TEMPERATURE SENSOR

PFP:16700

Description

BBS001YU

Fuel pump temperature sensor (1) is built in the fuel pump (2). The sensor detects the fuel temperature in the fuel pump and calibrates the fuel injection amount change by fuel temperature.



CONSULT-II Reference Value in Data Monitor Mode

BBS001YV

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL TEMP SEN	● Engine: After warming up	More than 40°C (104°F)

On Board Diagnosis Logic

BBS001YW

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182 0182	Fuel pump temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel pump temperature sensor
P0183 0183	Fuel pump temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

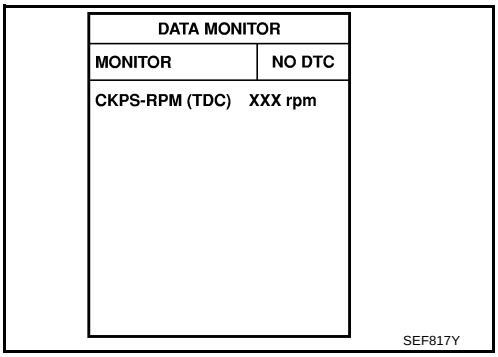
DTC Confirmation Procedure

BBS001YX

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1143, "Diagnostic Procedure" .



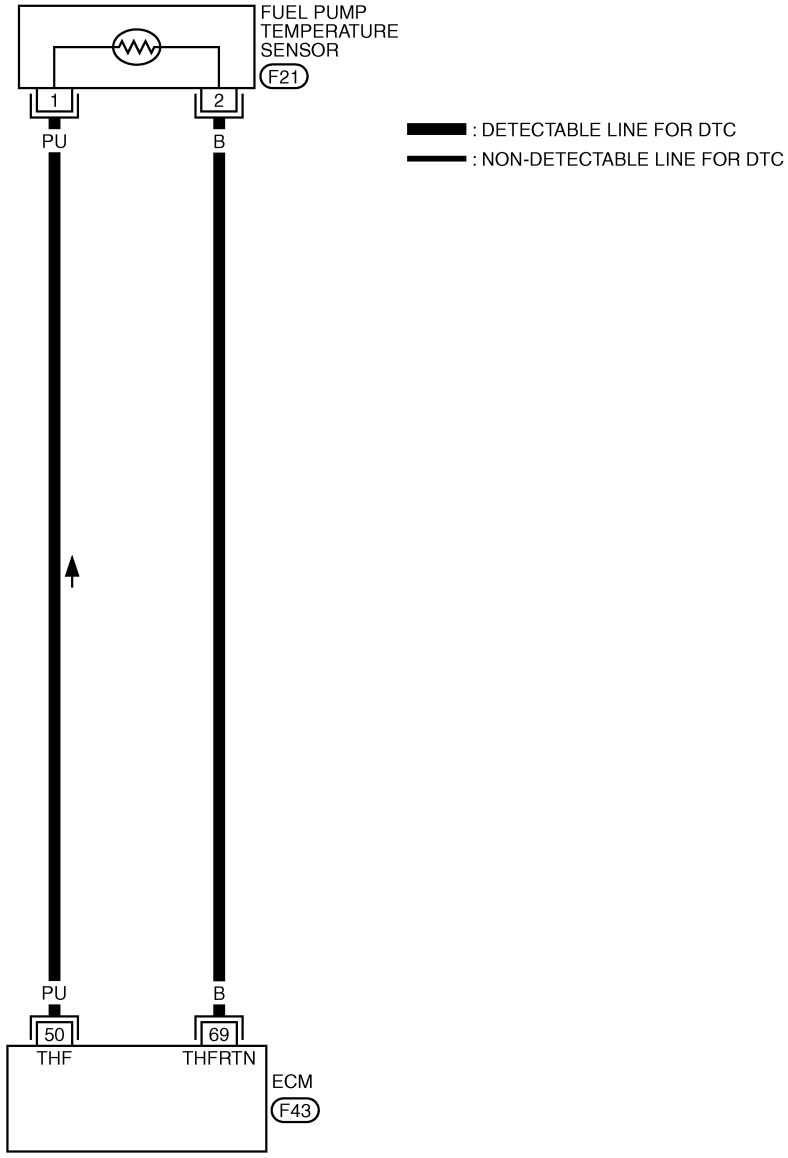
WITH GST

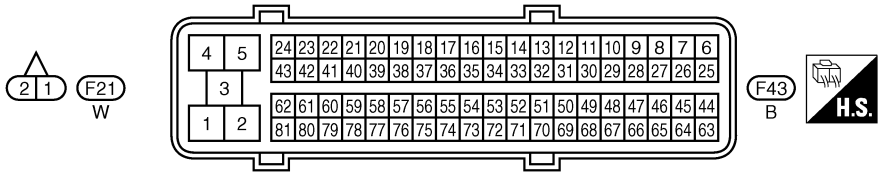
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001YY

EC-FTS-01





TBWA0572E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

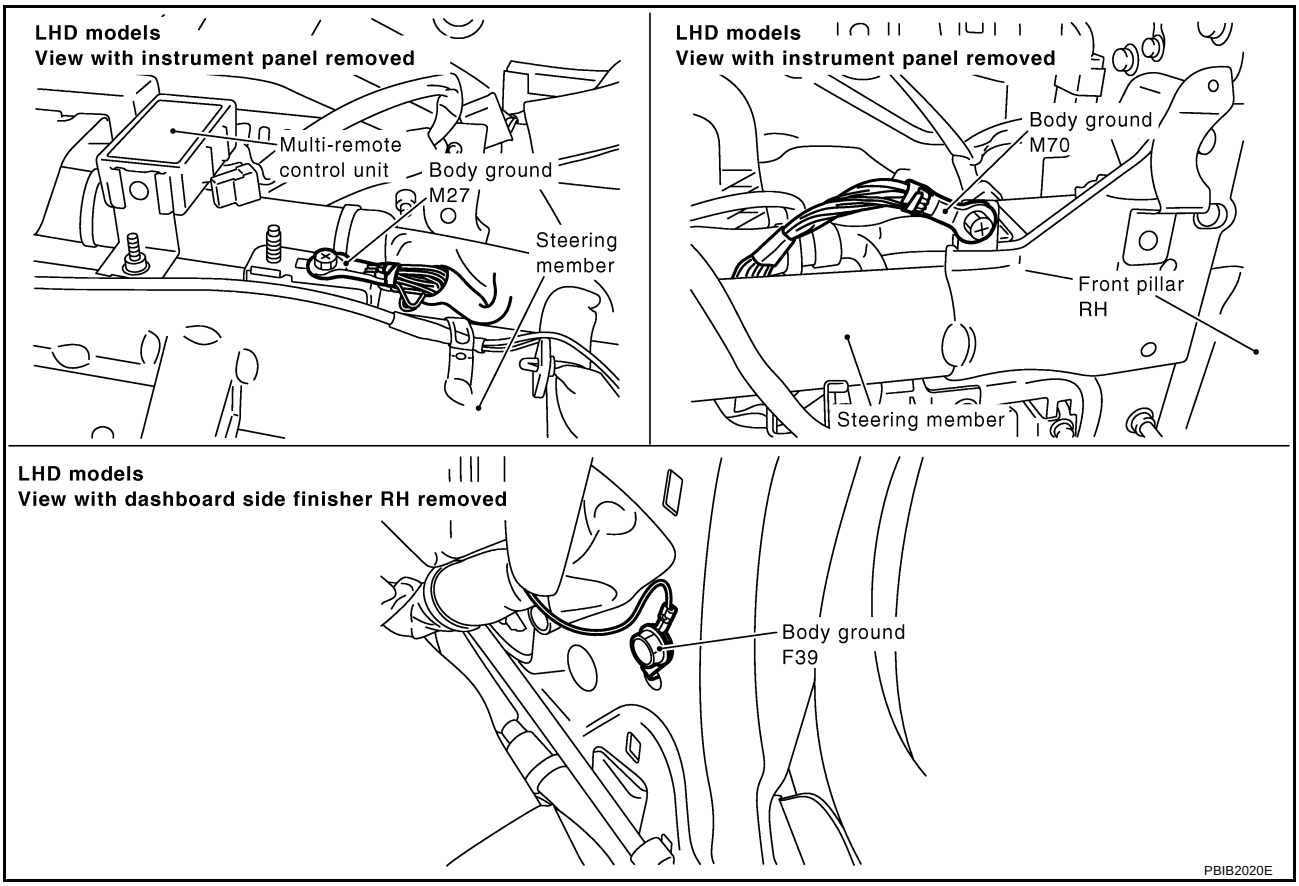
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
50	PU	Fuel pump temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with fuel pump temperature
69	B	Fuel pump temperature sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS001YZ

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

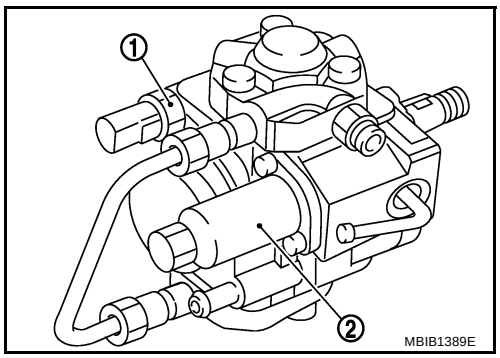


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

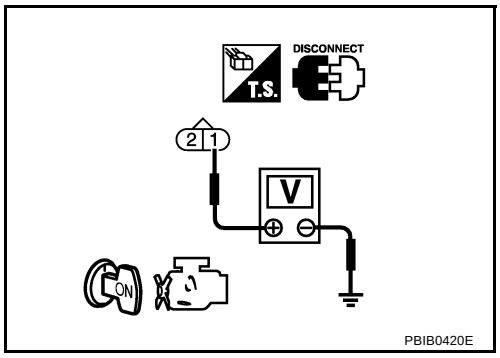
2. CHECK FUEL PUMP TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel pump temperature sensor (1) harness connector.
– Fuel pump (2)
2. Turn ignition switch ON.



3. Check voltage between fuel pump temperature sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair harness or connectors.

3. CHECK FUEL PUMP TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel pump temperature sensor terminal 2 and ECM terminal 69. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Removal and Installation

BBS001Z0

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P0192, P0193 FRP SENSOR

PFP:16638

Description

BBS001Z1

The fuel rail pressure (FRP) sensor is placed to the fuel rail. It measures the fuel pressure in the fuel rail. The sensor sends voltage signal to the ECM. As the pressure increases, the voltage rises.
The ECM controls the fuel pressure in the fuel rail by the inlet throttling device. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

CONSULT-II Reference Value in Data Monitor Mode

BBS001Z2

Specification data are reference values.

MONITOR	CONDITION		SPECIFICATOIN
ACT CR PRESS	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	20 - 30 MPa
		2,000 rpm	45 - 55 MPa

On Board Diagnosis Logic

BBS001Z3

NOTE:
If DTC P0192 or P0193 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0192 0192	Fuel rail pressure sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel rail temperature sensor
P0193 0193	Fuel rail temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

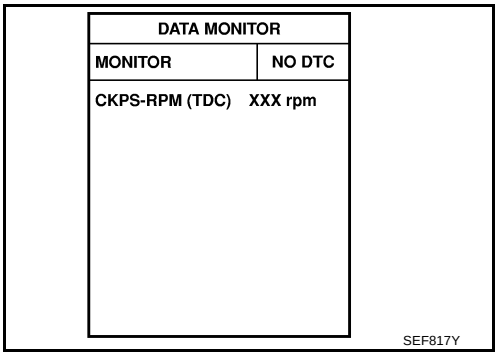
DTC Confirmation Procedure

BBS001Z4

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1148, "Diagnostic Procedure" .



WITH GST

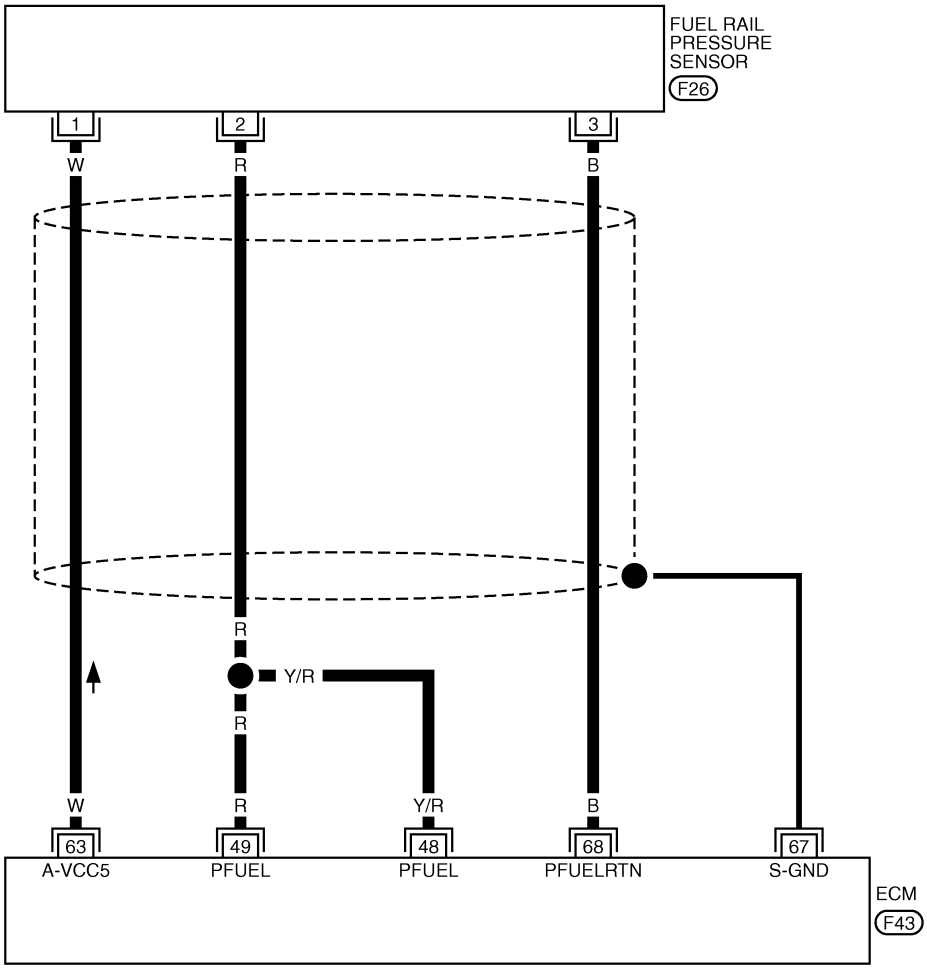
Follow the procedure “WITH CONSULT-II” above.

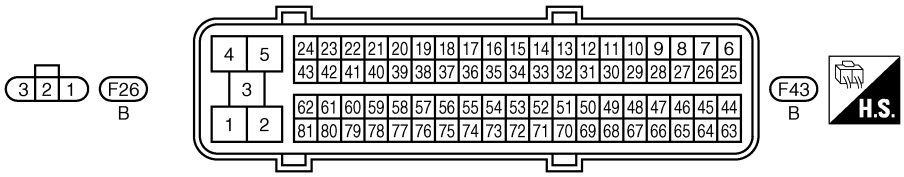
Wiring Diagram

BBS001Z5

EC-FRPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWA0568E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

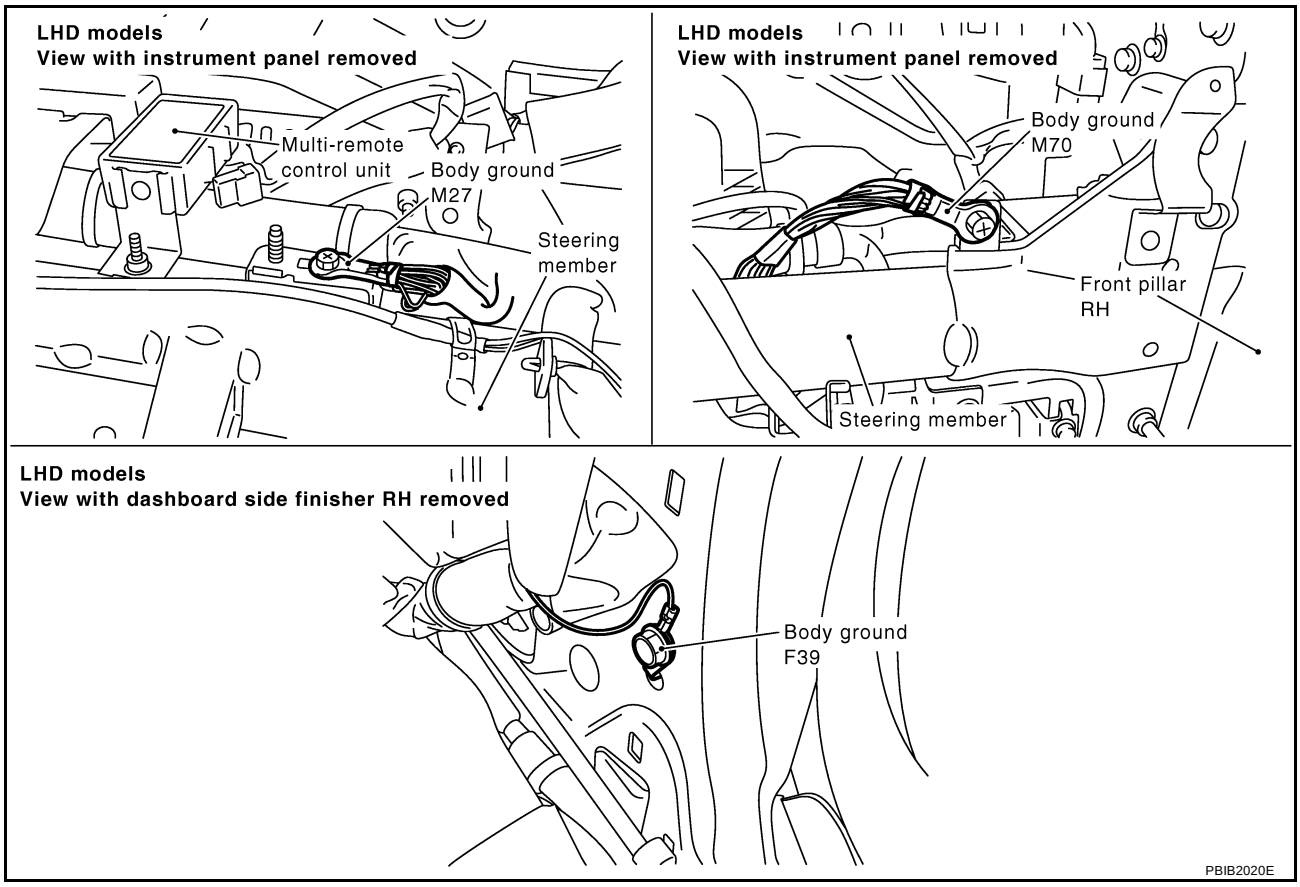
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
48 49	Y/R R	Fuel rail pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.7 - 2.0V
			[Engine is running] ● **Warm-up condition** ● Engine speed is 2,000 rpm	2.0 - 2.3V
63	W	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
68	B	Fuel rail pressure sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS001Z6

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

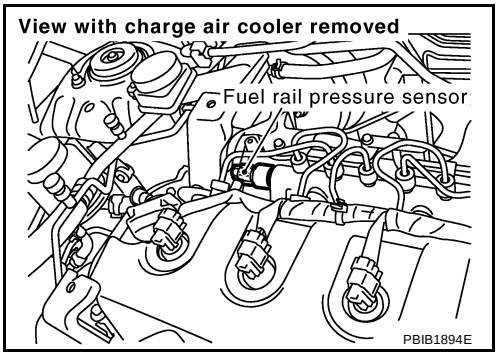


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

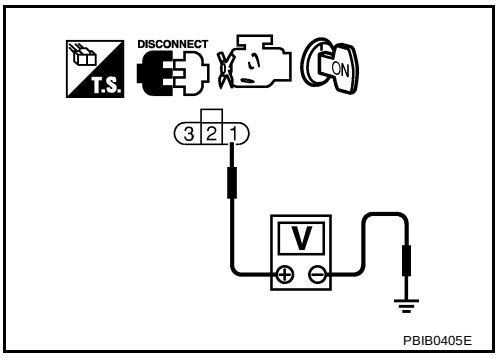
2. CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel rail pressure sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between fuel rail pressure sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel rail pressure sensor terminal 3 and ECM terminal 68. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 48, 49 and fuel rail pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1150, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel rail.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

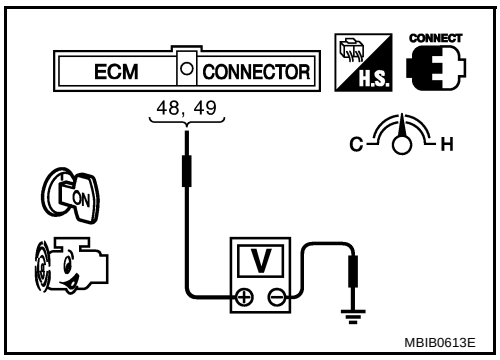
Component Inspection

BBS001Z7

FUEL RAIL PRESSURE SENSOR

1. Reconnect harness connector disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminals 48, 49 (Fuel rail pressure sensor signal) and ground under the following conditions.

Condition	Voltage V
Idle	1.7 - 2.0
2,000 rpm	2.0 - 2.3



4. If the voltage is out of specification, disconnect fuel rail pressure sensor harness connector and connect it again. Then repeat above check.
5. If NG, replace fuel rail.

Removal and Installation

BBS001Z8

FUEL RAIL

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

DTC P0200 FUEL INJECTOR

PFP:16600

On Board Diagnosis Logic

BBS001Z9

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0200 0200	Fuel injector power supply circuit	ECM detects a voltage of power source for the fuel injector is excessively high or low.	● ECM

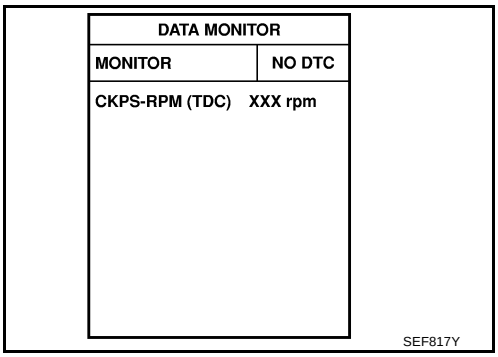
DTC Confirmation Procedure

BBS001ZA

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1151, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS001ZB

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1151, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P0200 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. Perform EC-1151, "DTC Confirmation Procedure" , again.
4. Is 1st trip DTC P0200 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .
5. Perform Service Regeneration (models with DPF). Refer to EC-997, "Service Regeneration" .

>> **INSPECTION END**

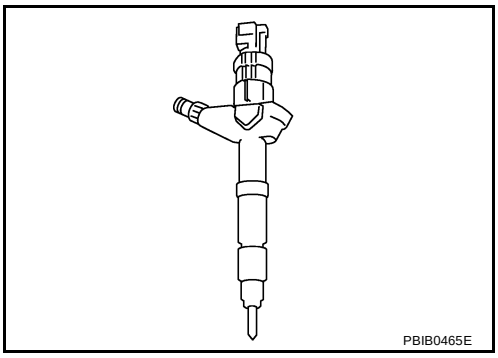
DTC P0201 - P0204 FUEL INJECTOR

PFP:16600

Component Description

BBS001ZC

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

BBS001ZD

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

On Board Diagnosis Logic

BBS001ZE

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0201 0201	No. 1 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 1 cylinder fuel injector.	● Harness or connectors (The fuel injector circuit is open.) ● Fuel injector
P0202 0202	No. 2 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 2 cylinder fuel injector.	
P0203 0203	No. 3 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 3 cylinder fuel injector.	
P0204 0204	No. 4 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 4 cylinder fuel injector.	

DTC Confirmation Procedure

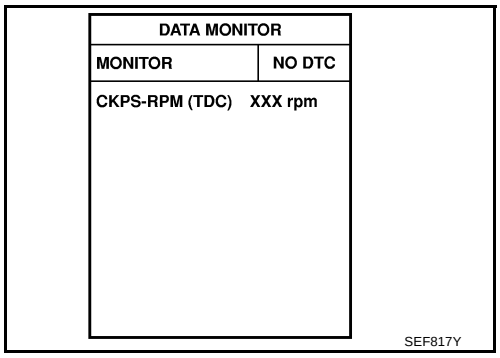
BBS001ZF

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION
Before performing the following procedure, confirm the ambient temperature is more than -20°C (-4°F).

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1157, "Diagnostic Procedure" .



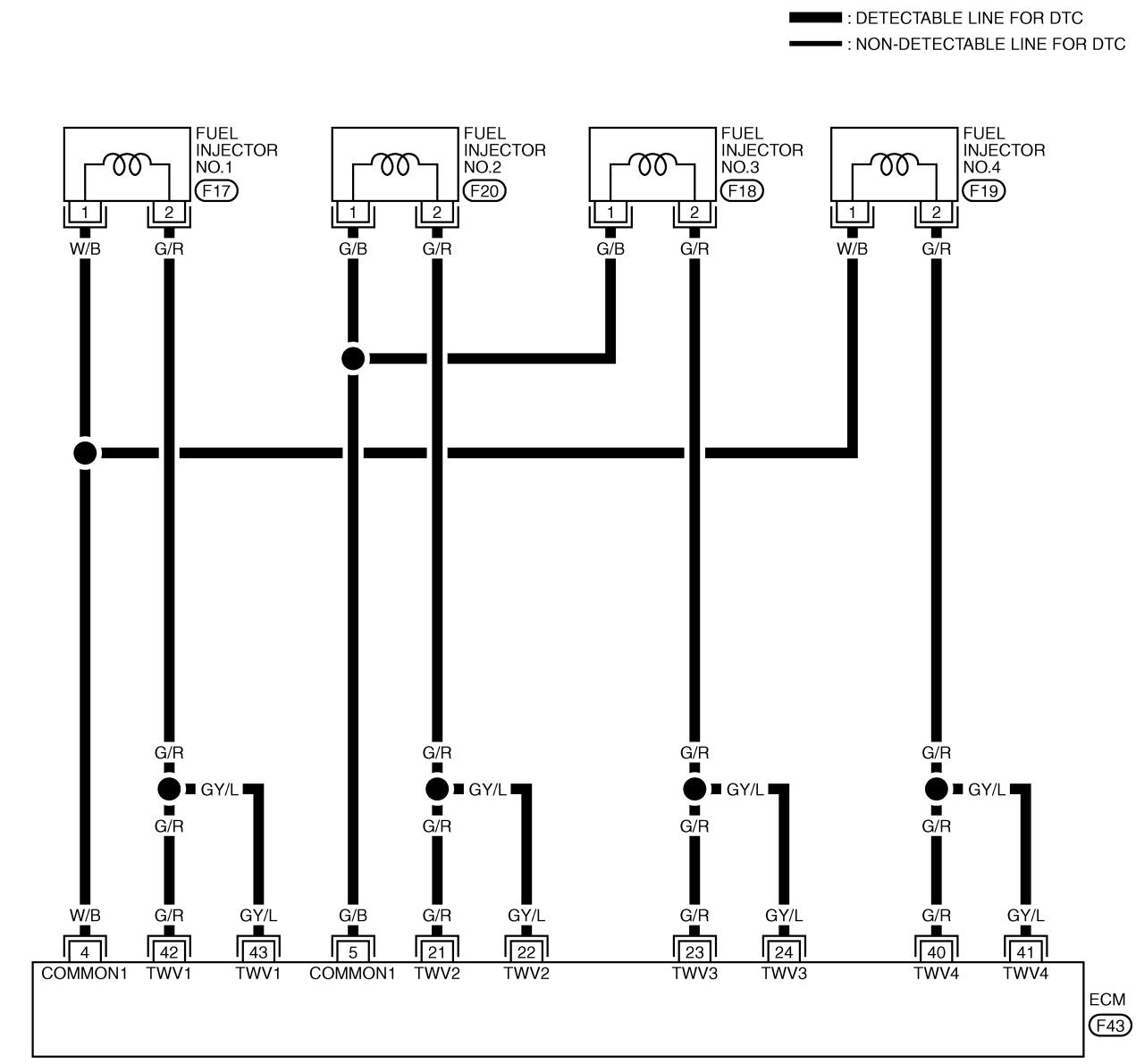
WITH GST

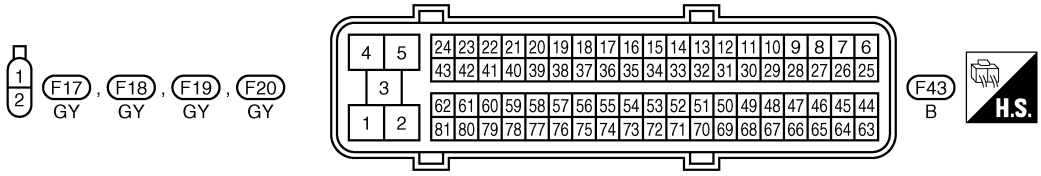
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001ZG

EC-INJECT-01



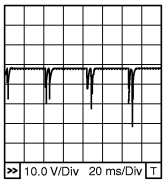
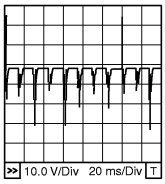
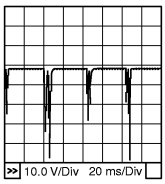
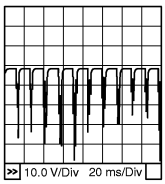


TBWB0903E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	W/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	5 - 10V ★  MBIB0883E
5	G/B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	5 - 10V ★  MBIB0884E
21 22 23 24 40 41 42 43	G/R GY/L G/R GY/L G/R GY/L G/R GY/L	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3 Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 9V ★  MBIB0882E

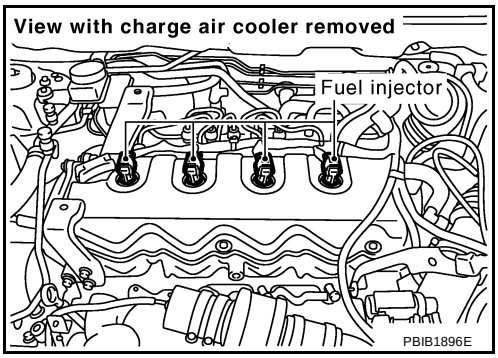
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS001ZH

1. CHECK FUEL INJECTOR POWER SUPPLY FOR OPEN AND SHORT CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.



DTC	Terminal		Cylinder
	ECM	Fuel injector	
P0201	4	1	No.1
P0202	5	1	No.2
P0203	5	1	No.3
P0204	4	1	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL INJECOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

DTC	Terminal		Cylinder
	ECM	Fuel injector	
P0201	42, 43	2	No.1
P0202	21, 22	2	No.2
P0203	23, 24	2	No.3
P0204	40, 41	2	No.4

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL INJECTOR-I

Refer to EC-1159, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK FUEL INJECTOR-II

With CONSULT-II

1. Remove two fuel injectors.
   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connectors.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .
6. Select “SELF DIAG RESULTS” mode with CONSULT-II.
7. Touch “ERASE”.
8. Perform EC-1154, "DTC Confirmation Procedure" .
9. Is DTC displayed for the other cylinder?

With GST

1. Remove two fuel injectors.
   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .
6. Select Service $04 with GST.
7. Perform EC-1154, "DTC Confirmation Procedure" .
8. Is DTC displayed for the other cylinder?

Yes or No

Yes >> GO TO 5.
No >> GO TO 6.

5. REPLACE FUEL INJECOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

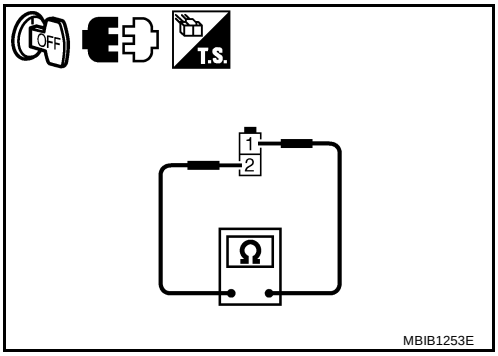
BBS001ZI

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 0.2 - 0.8Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel injector.



Removal and Installation

BBS001ZJ

FUEL INJECTOR

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

DTC P0217 ENGINE OVER TEMPERATURE

PFP:21481

System Description

BBS001ZK

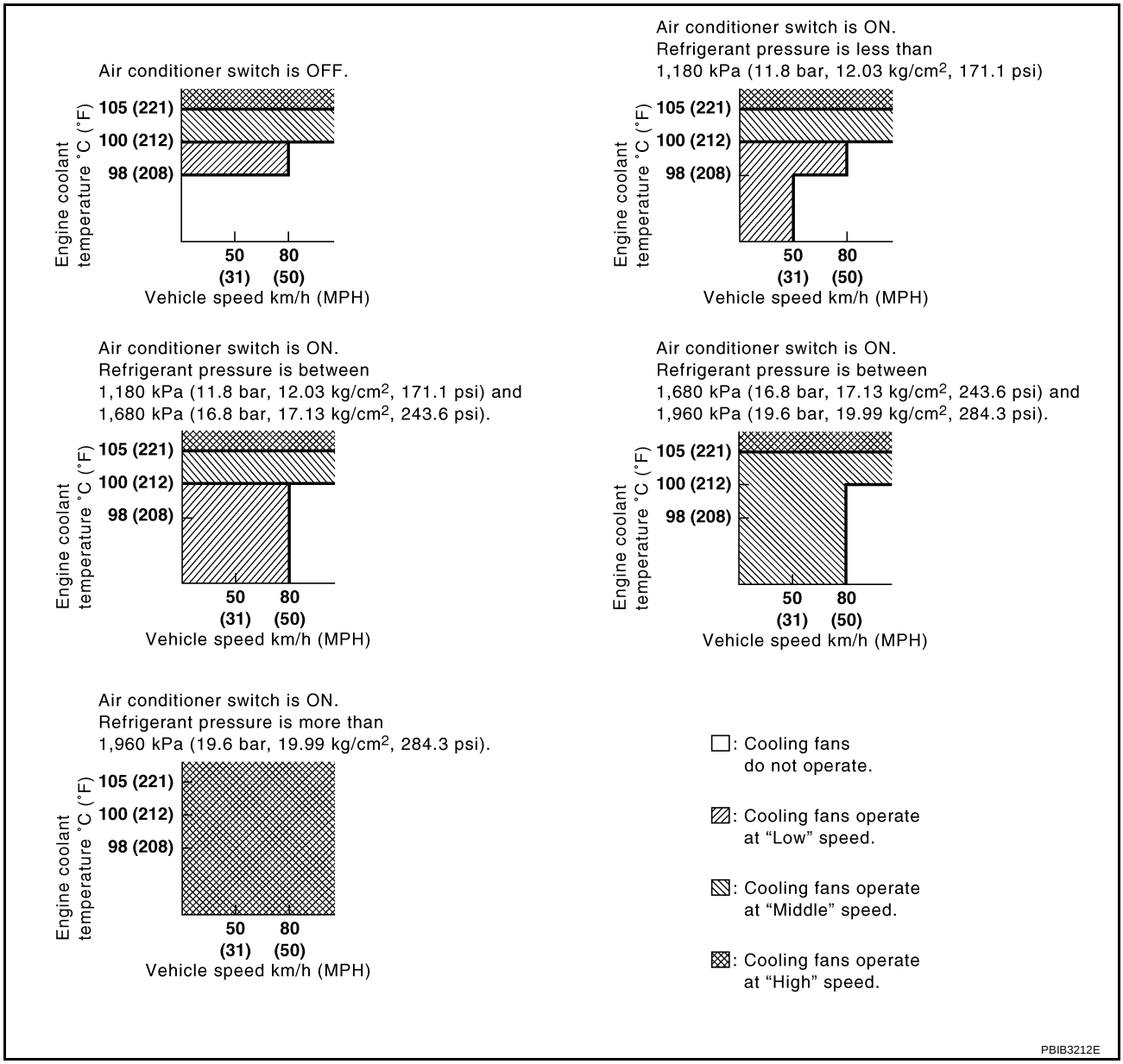
COOLING FAN CONTROL

Sensor	Input signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed *	Cooling fan control	Cooling fan relay
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal *		
Refrigerant pressure sensor	Refrigerant pressure		

*: This signal is sent to the ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure sensor, and air conditioner ON signal. The control system has 4-step control [HIGH/MID/LOW/OFF].

OPERATION



Cooling fan speed	Cooling fan motor	
	1	2
Low (LOW)	Operating (low speed)	Not operating
Middle (MID)	Operating (high speed)	Operating (low speed)
High (HI)	Operating (high speed)	Operating (high speed)

CONSULT-II Reference Value in Data Monitor Mode

BBS001ZL

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
COOLING FAN	● When cooling fan is stopped.	OFF
	● When cooling fans operate at low speed.	LOW
	● When cooling fans operate at middle speed.	MID
	● When cooling fans operate at high speed.	HI

On Board Diagnosis Logic

BBS001ZM

This self-diagnosis has the one trip detection logic.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0217 0217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method. ● Engine coolant is not within the specified range.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● Cooling fan ● Cooling fan relays ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-1174, "Main 12 Causes of Overheating" .

Overall Function Check

BBS001ZN

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

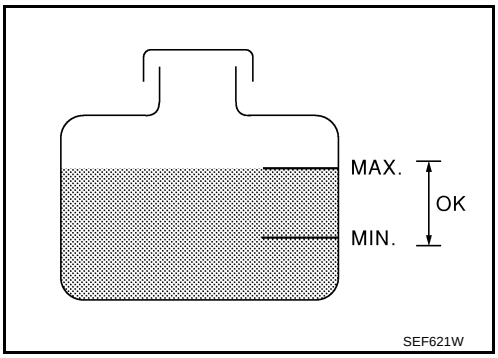
WARNING:

- **Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.**
- **Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.**

WITH CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.

   NOTE:
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-1165, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1165, "Diagnostic Procedure" .
3. Turn ignition switch ON.



4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-1165, "Diagnostic Procedure" .

ACTIVE TEST	
COOLING FAN	OFF
MONITOR	
COOLAN TEMP/S	XXX °C

SEF111X

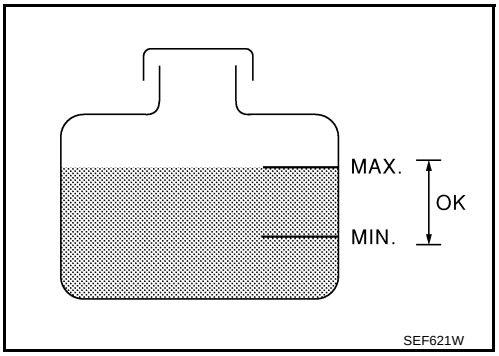
WITHOUT CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.

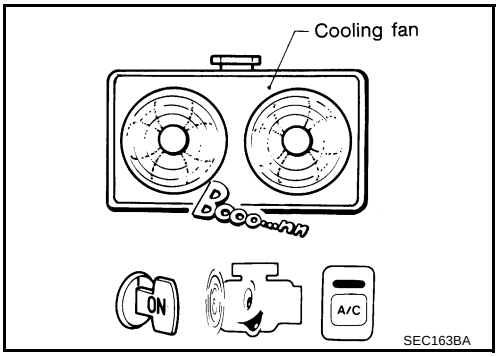
   NOTE:
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-764, "Diagnostic Procedure" .
2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-764, "Diagnostic Procedure" .
3. Start engine.

   CAUTION:
   Be careful not to overheat engine.
4. Set temperature control dial to full cold position.
5. Turn air conditioner switch ON.
6. Turn blower fan switch ON.
7. Run engine at idle for a few minutes with air conditioner operating.

   CAUTION:
   Be careful not to overheat engine.
8. Make sure that cooling fans operates at low speed.
   If NG, go to EC-764, "Diagnostic Procedure" .
   If OK, go to the following step.
9. Turn ignition switch OFF.
10. Turn air conditioner switch and blower fan switch OFF.

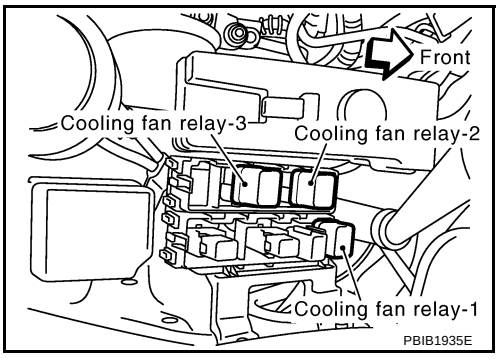


SEF621W



SEC163BA

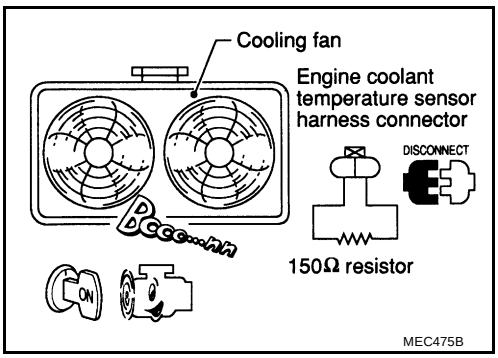
11. Disconnect cooling fan relay-3.
12. Disconnect engine coolant temperature sensor harness connector.
13. Connect 150Ω resistor to engine coolant temperature sensor harness connector.



PBIB1935E

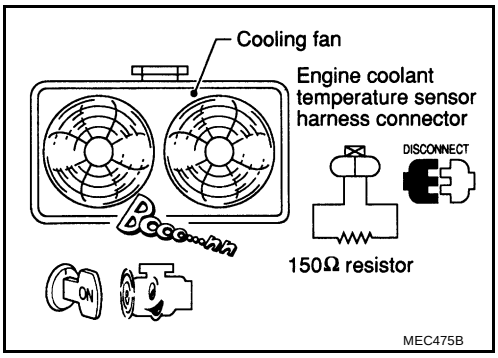
14. Restart engine and make sure that cooling fan operates at higher speed than low speed (middle speed).

    CAUTION:
    Be careful not to overheat engine.
    If NG, go to EC-764, "Diagnostic Procedure" .
    If OK, go to the following step.
15. Turn ignition switch OFF.
16. Reconnect cooling fan relay-3.



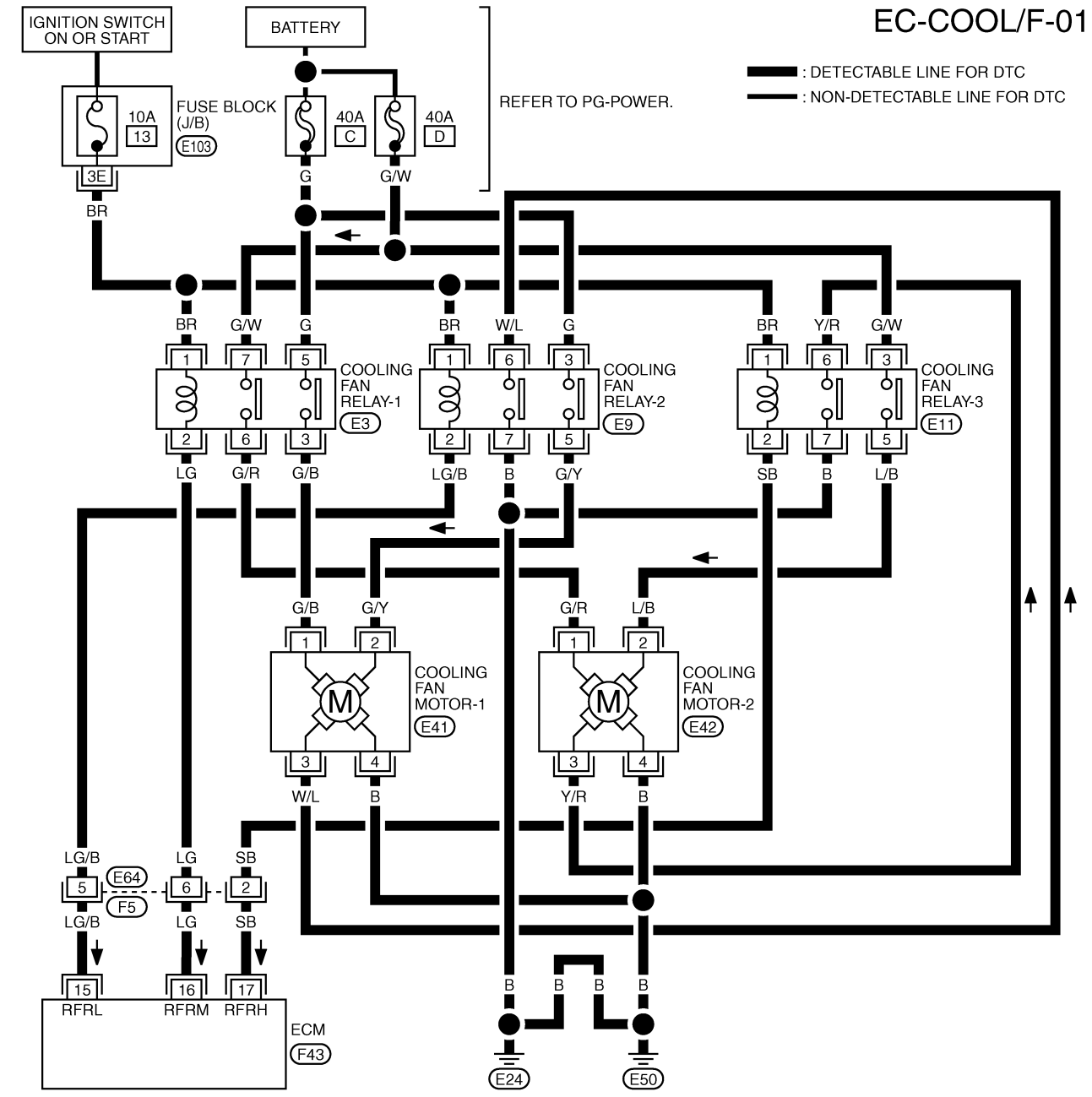
17. Restart engine and make sure that cooling fan operates at higher speed than middle speed.

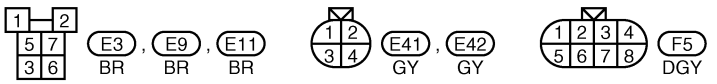
    CAUTION:
    Be careful not to overheat engine.
18. If NG, go to EC-764, "Diagnostic Procedure" .

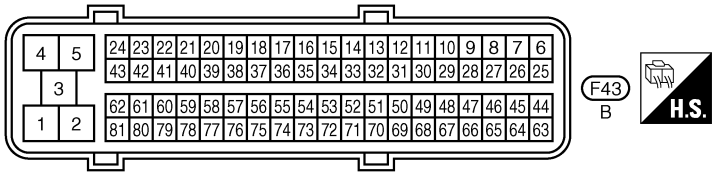


Wiring Diagram

BBS001ZO







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0904E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
15	LG/B	Cooling fan relay-2	**[Engine is running]** ● Cooling fan: Not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan: Operating	Approximately 0.1V
16	LG	Cooling fan relay-1	**[Engine is running]** ● Cooling fan: Not operating ● Cooling fan: Operating at low speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan: Operating at middle speed ● Cooling fan: Operating at high speed	Approximately 0.1V
17	SB	Cooling fan relay-3	**[Engine is running]** ● Cooling fan: Not operating ● Cooling fan: Operating at low speed ● Cooling fan: Operating at middle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan: Operating at high speed	Approximately 0.1V

Diagnostic Procedure

BBS001ZP

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 5.

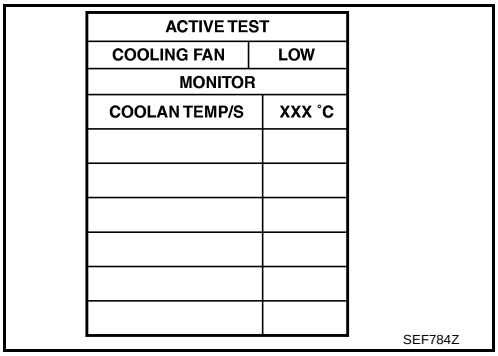
2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “LOW” on the CONSULT-II screen.
3. Make sure that cooling fan-1 operate at low speed.

OK or NG

OK >> GO TO 3.
NG >> Check cooling fan low speed control circuit. (Go to EC-1168, "PROCEDURE A" .)



3. CHECK COOLING FAN MIDDLE SPEED OPERATION

With CONSULT-II

1. Touch “MID”on the CONSULT-II screen.
2. Make sure that cooling fans operate as described below.

– Cooling fan-1 operate at higher speed than low speed.
– Cooling fan-2 operate at low speed.

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan high speed control circuit. (Go to EC-1170, "PROCEDURE B" .)

ACTIVE TEST	
COOLING FAN	MID
MONITOR	
COOLAN TEMP/S	XXX °C

PBIB1668E

4. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Touch “HIGH”on the CONSULT-II screen.
2. Make sure that cooling fan-2 operate at higher speed than low speed.

OK or NG

OK >> GO TO 8.
NG >> Check cooling fan high speed control circuit. (Go toEC-1172, "PROCEDURE C" .)

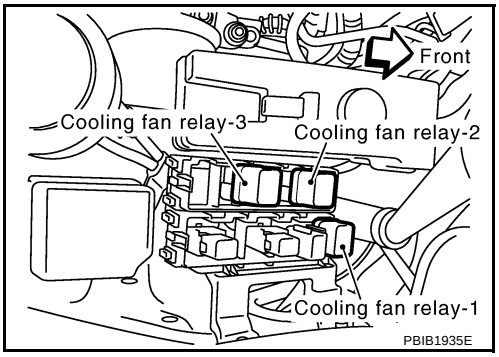
ACTIVE TEST	
COOLING FAN	HIGH
MONITOR	
COOLAN TEMP/S	XXX °C

SEF785Z

5. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

1. Disconnect cooling fan relays-1 and -3.
2. Start engine and let it idle.
3. Set temperature dial at full cold position.
4. Turn air conditioner switch ON.
5. Turn blower fan switch ON.

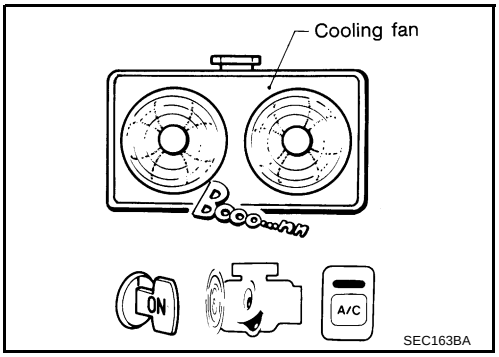


PBIB1935E

6. Make sure that cooling fan-1 operate at low speed.

OK or NG

OK >> GO TO 6.
NG >> Check cooling fan low speed control circuit. (Go to EC-1168, "PROCEDURE A" .)

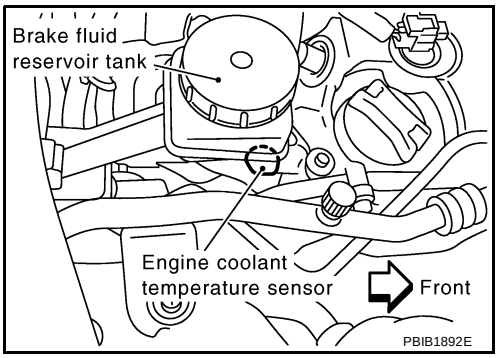


SEC163BA

6. CHECK COOLING FAN MIDDLE SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch OFF.
2. Reconnect cooling fan relay-1.
3. Turn air conditioner switch and blower fan switch OFF.
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.

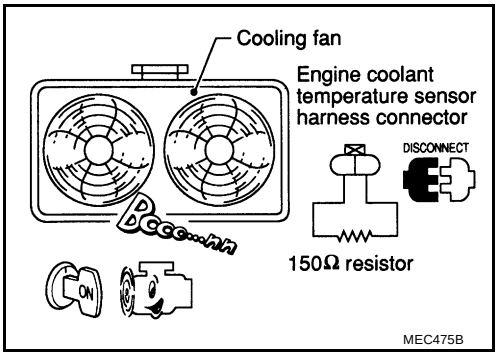


6. Restart engine and make sure that cooling fans operate as described below.

– Cooling fan-1 operate at higher speed than low speed.
– Cooling fan-2 operate at low speed.

OK or NG

OK >> GO TO 7.
NG >> Check cooling fan high speed control circuit. (Go to EC-1170, "PROCEDURE B" .)



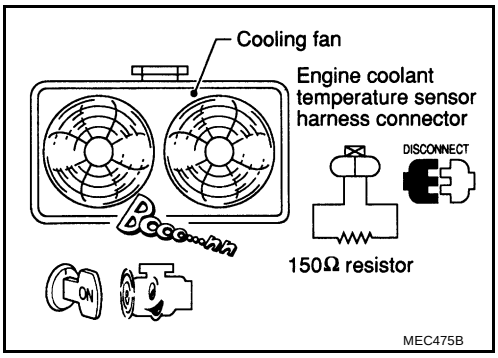
7. CHECK COOLING FAN MIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch OFF.
2. Reconnect cooling fan relay-3.
3. Restart engine and make sure that cooling fan-2 operate at higher speed than low speed.

OK or NG

OK >> GO TO 8.
NG >> Check cooling fan high speed control circuit. (Go to EC-1172, "PROCEDURE C" .)



8. CHECK COOLING SYSTEM FOR LEAK

Refer to CO-32, "CHECKING RADIATOR SYSTEM FOR LEAKS" .

OK or NG

OK >> GO TO 9.
NG >> Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to CO-44, "WATER PUMP" .)

9. CHECK RADIATOR CAP

Refer to CO-36, "Checking Radiator Cap" .

OK or NG

OK >> GO TO 10.
NG >> Replace radiator cap.

10. CHECK COMPONENT PARTS

Check the following.

- Thermostat. Refer to CO-46, "THERMOSTAT AND WATER PIPING" .
- Engine coolant temperature sensor. Refer to EC-1175, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace malfunctioning component.

11. CHECK MAIN 12 CAUSES

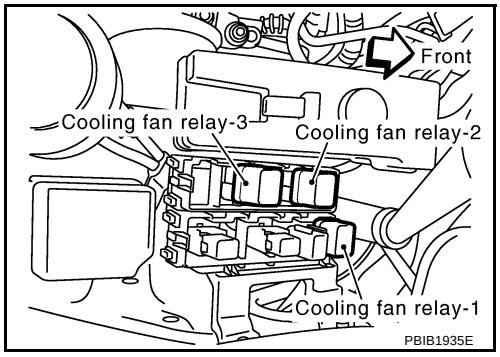
If the cause cannot be isolated, go to EC-1174, "Main 12 Causes of Overheating" .

>> **INSPECTION END**

PROCEDURE A

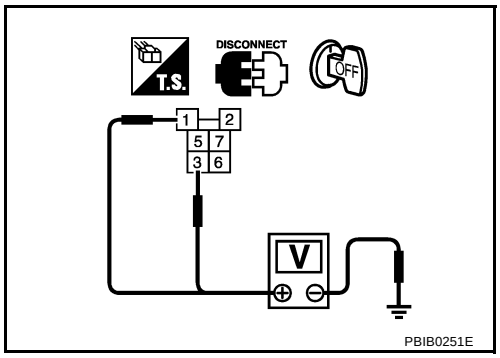
1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-2.
3. Turn ignition switch ON.



4. Check voltage between cooling fan relay-2 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

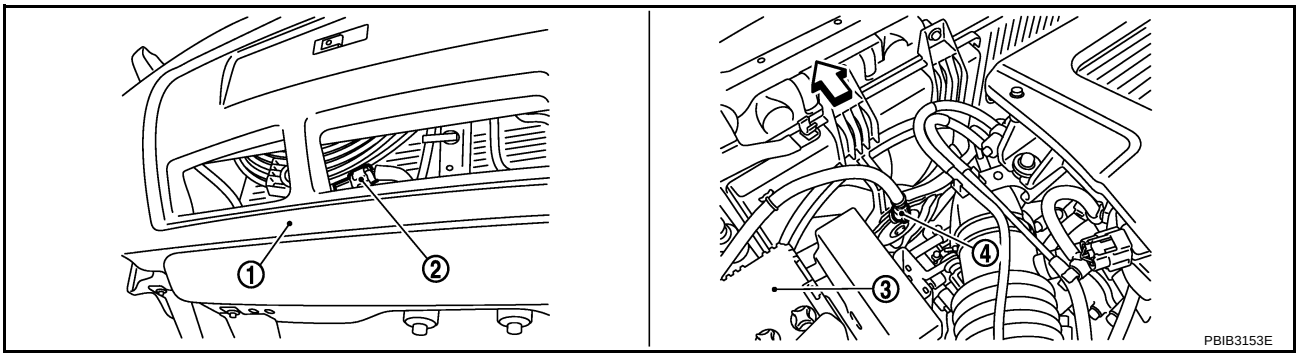
Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector.



⇦ : Vehicle front

1. Front bumper
2. Cooling fan motor-2 harness connector
3. Battery
4. Cooling fan motor-1 harness connector

3. Check harness continuity between the following.

- Cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2
- Cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3
- Cooling fan relay-2 terminal 7 and ground
- Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between cooling fan relay-2 terminal 2 and ECM terminal 15. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E64, F5
- Harness for open or short between cooling fan relay-2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-2

Refer to EC-1175, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay-2.

7. CHECK COOLING FAN MOTOR-1

Refer to EC-1175, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motor-1.

8. CHECK INTERMITTENT INCIDENT

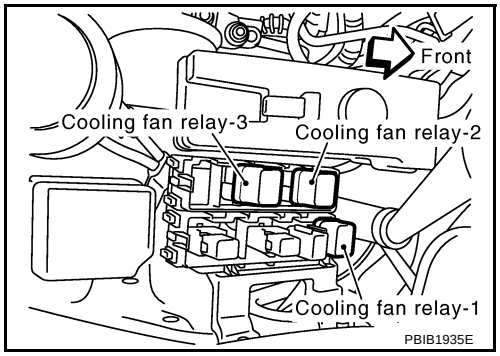
Perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

PROCEDURE B

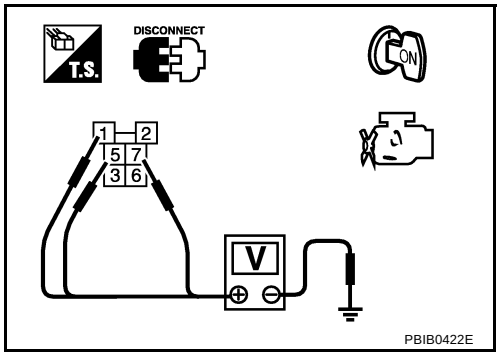
1. CHECK COOLING FAN RELAY-1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch ON.



4. Check voltage between cooling fan relay-1 terminals 1, 5, 7 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

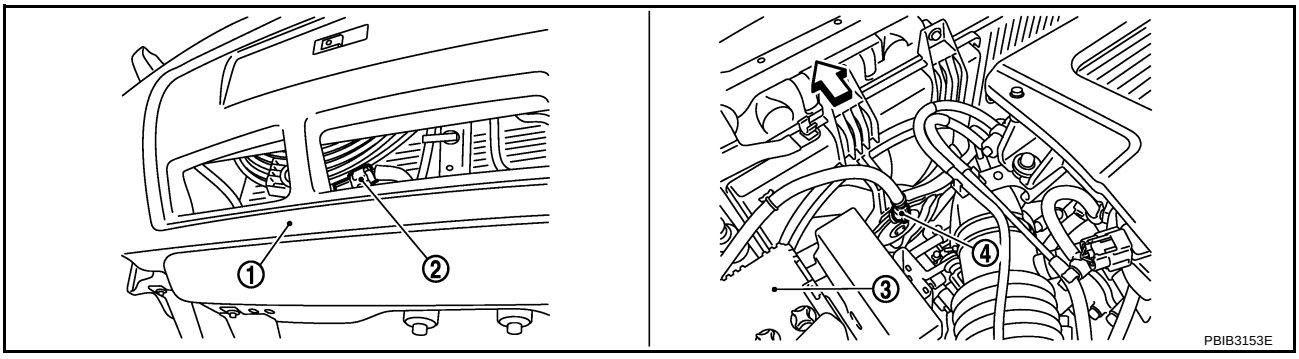
Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN RELAY GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.



⇦ : Vehicle front

1. Front bumper
2. Cooling fan motor-2 harness connector
3. Battery
4. Cooling fan motor-1 harness connector

3. Check harness continuity between the following.

- Cooling fan relay-1 terminal 3 and cooling fan motor-1 terminal 1
- Cooling fan relay-1 terminal 6 and cooling fan motor-2 terminal 1
- Cooling fan motor-1 terminal 4 and ground.
- Cooling fan motor-2 terminal 4 and ground.

Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between cooling fan relay-1 terminal 2 and ECM terminal 16.
Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E64, F5
- Harness for open or short between cooling fan relay-1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-1

Refer to EC-1175, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay-1.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-1175, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

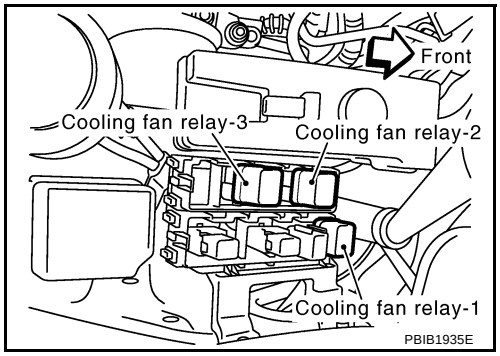
Perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

PROCEDURE C

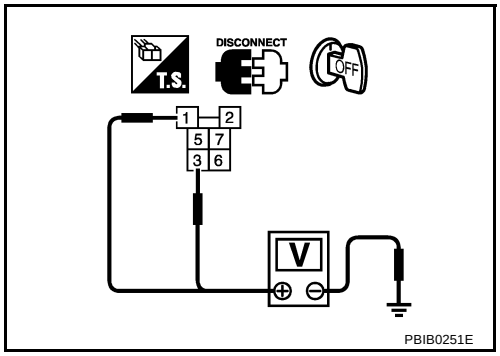
1. CHECK COOLING FAN RELAY-3 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-3.
3. Turn ignition switch ON.



4. Check voltage between cooling fan relay-3 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

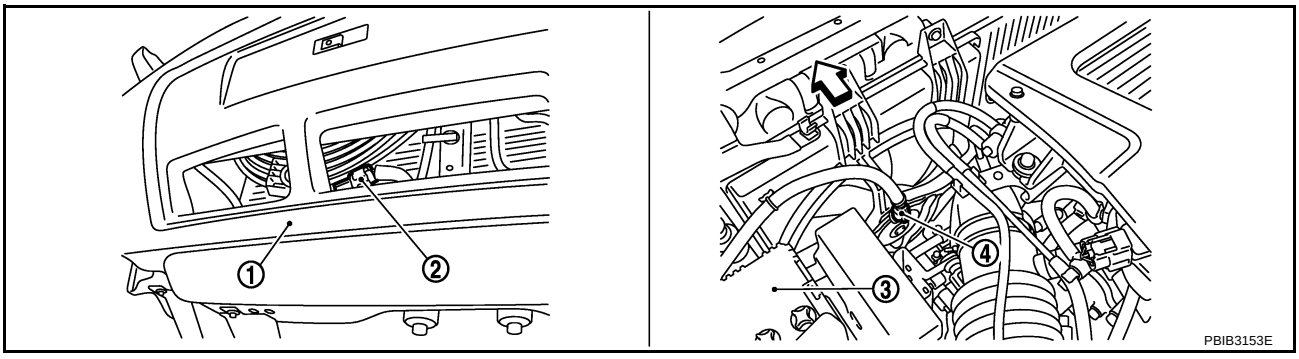
Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-3 and fuse
- Harness for open or short between cooling fan relay-3 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN RELAY GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-2 harness connector.



⇦ : Vehicle front

1. Front bumper
2. Cooling fan motor-2 harness connector
3. Battery
4. Cooling fan motor-1 harness connector

3. Check harness continuity between the following.

- Cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 2
- Cooling fan relay-3 terminal 6 and cooling fan motor-2 terminal 3
- Cooling fan relay-3 terminal 7 and ground
  Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between cooling fan relay-3 terminal 2 and ECM terminal 17.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E64, F5
- Harness for open or short between cooling fan relay-3 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-3

Refer to EC-1175, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay-3.

7. CHECK COOLING FAN MOTOR-2

Refer to EC-1175, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan motor-2.

8. CHECK INTERMITTENT INCIDENT

Perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

BBS001ZQ

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-19, "Engine Coolant Mixture Ratio" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See CO-32, "LEVEL CHECK" .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See MA-33, "CHECKING RADIATOR CAP" .
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-32, "CHECKING RADIATOR SYSTEM FOR LEAKS" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-46, "THERMOSTAT AND WATER PIPING" , and CO-35, "RADIATOR" .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-1160).
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See MA-30, "Changing Engine Coolant" .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-32, "LEVEL CHECK" .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	SeeEM-214, "CYLINDER HEAD" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-235, "CYLINDER BLOCK" .

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-28, "OVERHEATING CAUSE ANALYSIS" .

Component Inspection

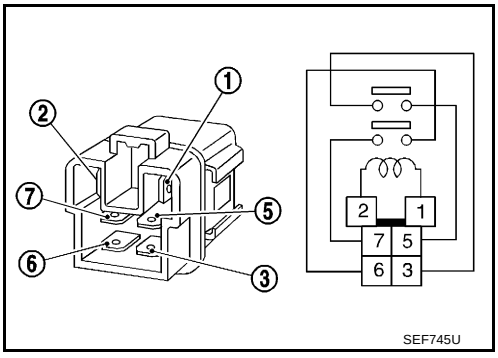
BBS001ZR

COOLING FAN RELAY-1, -2 AND -3

Check continuity between terminals (3) and (5), (6) and (7).

Conditions	Continuity
12V direct current supply between terminals (1) and (2)	Yes
No current supply	No

If NG, replace relay.

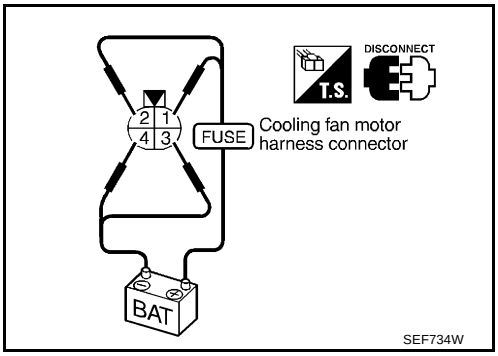


COOLING FAN MOTORS-1 AND -2

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(+)	(-)
Cooling fan motor	Low	1	4
	High	1, 2	3, 4

Cooling fan motor should operate.
If NG, replace cooling fan motor.



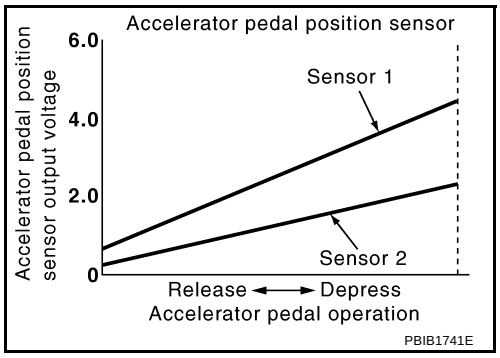
DTC P0222, P0223 APP SENSOR

PFP:18002

Description

BBS001ZS

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



CONSULT-II Reference Value in Data Monitor Mode

BBS001ZT

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.15 - 0.6V
		Accelerator pedal: Fully depressed	1.95 - 2.4V

*: This signal is converted by ECM internally. Thus, this differs from ECM terminals voltage.

On Board Diagnosis Logic

BBS001ZU

These self-diagnoses have the one trip detection logic.
MI will not light up for these self-diagnoses.

NOTE:
If DTC P0222 or P0223 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (The APP sensor 2 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2)
P0223 0223	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

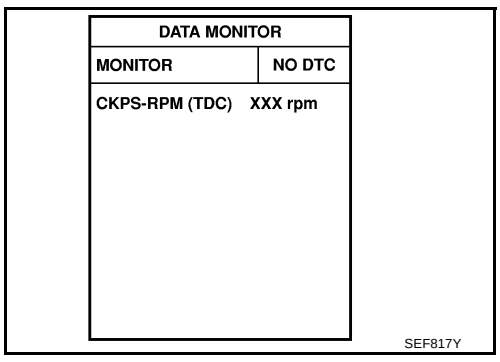
DTC Confirmation Procedure

BBS001ZV

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1180, "Diagnostic Procedure" .



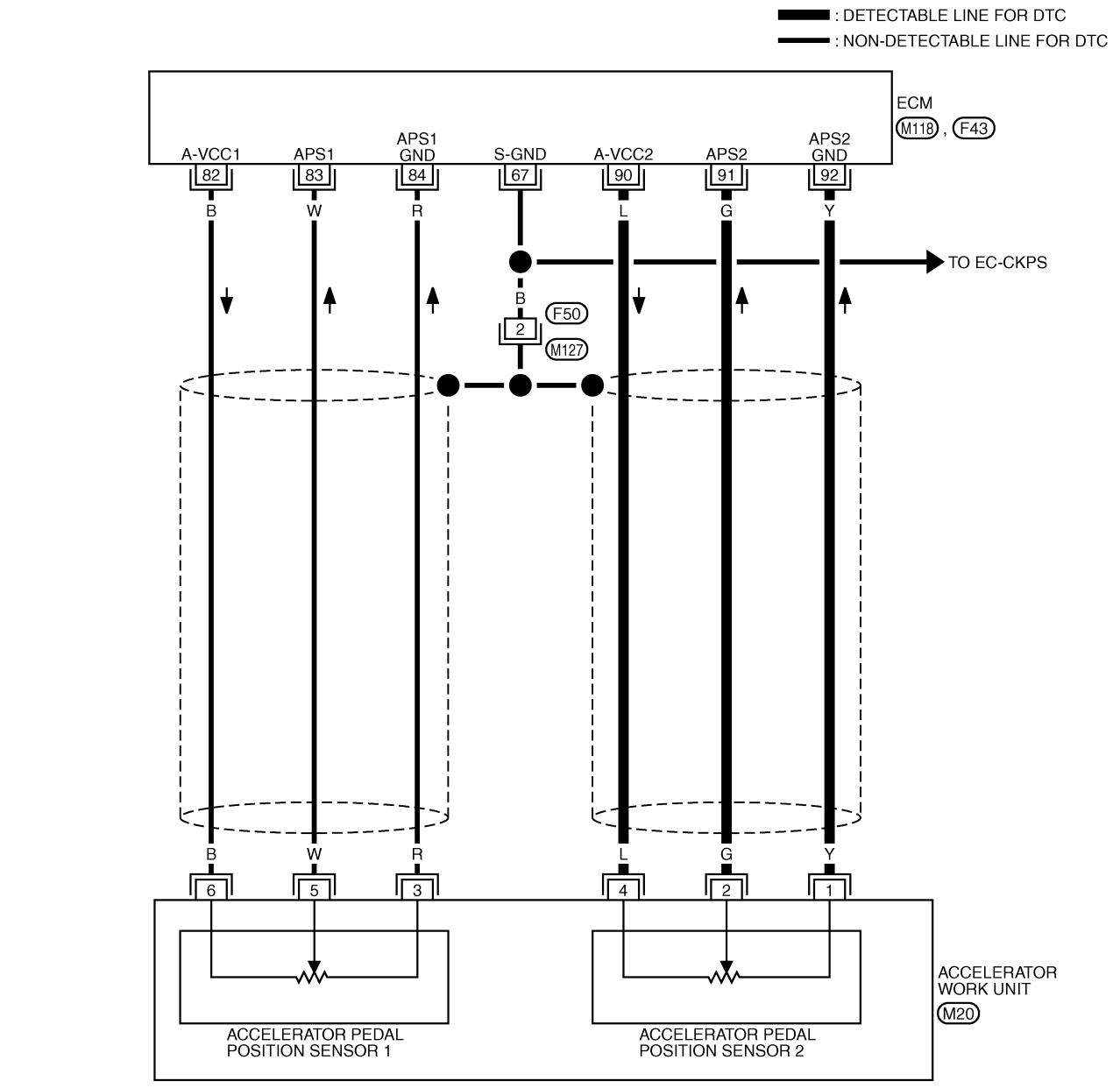
WITH GST

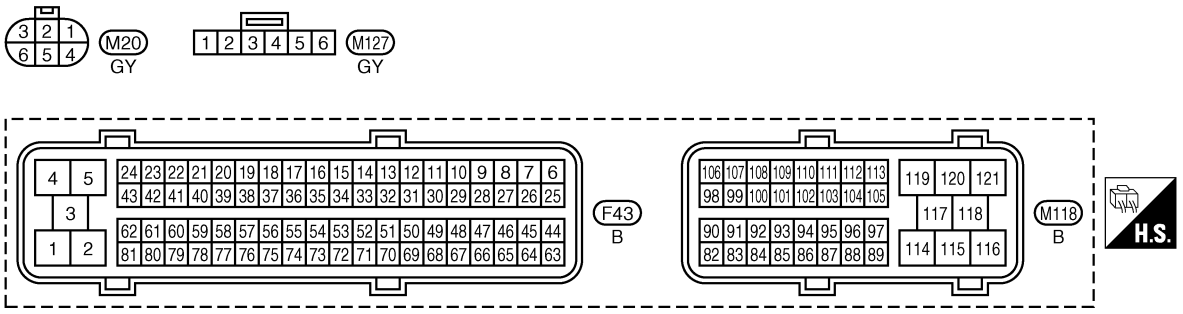
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS001ZW

EC-APPS2-01





TBWB0906E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

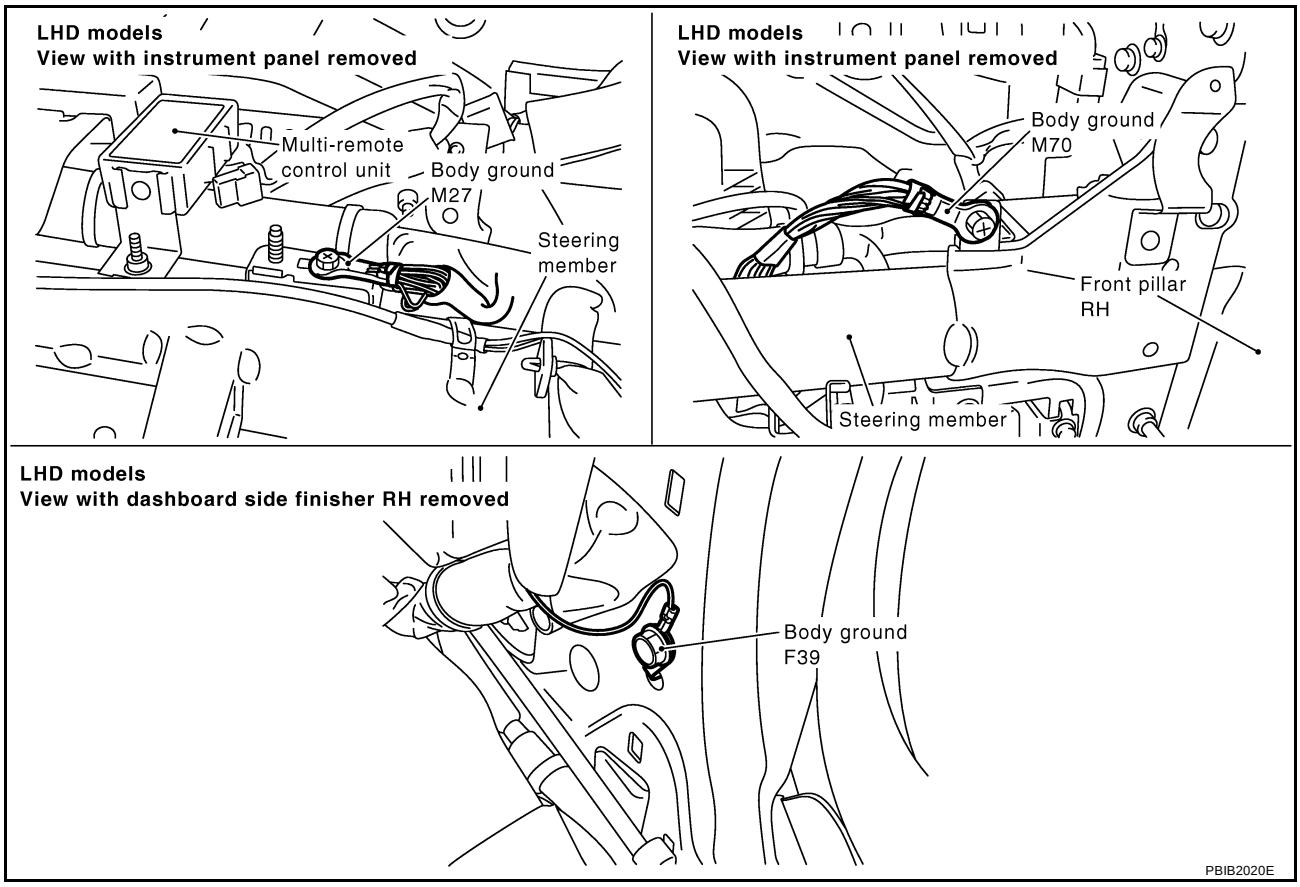
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V
83	W	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.8 - 1.3V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.0V
84	R	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
90	L	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	G	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.45 - 0.9V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.25 - 2.7V
92	Y	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS001ZX

1. CHCEK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

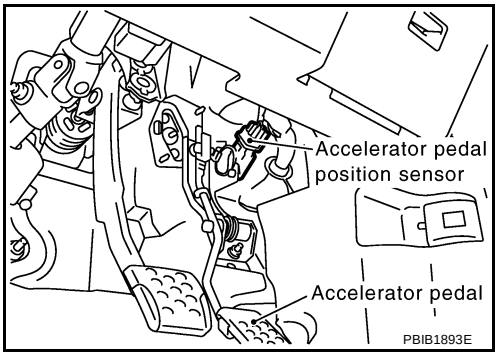


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

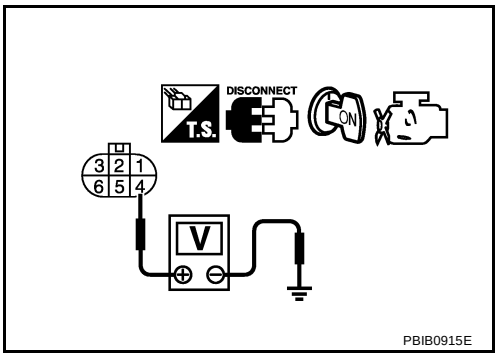
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 92. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 91 and APP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1182, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

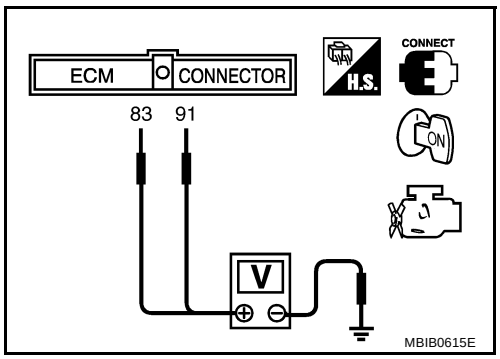
>> **INSPECTION END**

Component Inspection

BBS001ZY

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.8 - 1.3V
	Fully depressed	4.2 - 5.0V
91 (Accelerator pedal position sensor 2)	Fully released	0.45 - 0.9V
	Fully depressed	2.25 - 2.7V

4. If NG, replace accelerator pedal assembly.

Removal and Installation

BBS001ZZ

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

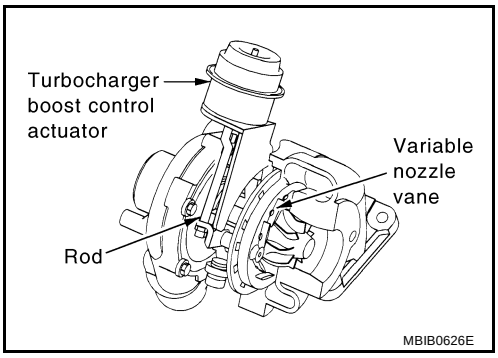
DTC P0234 TC SYSTEM

PFP:14411

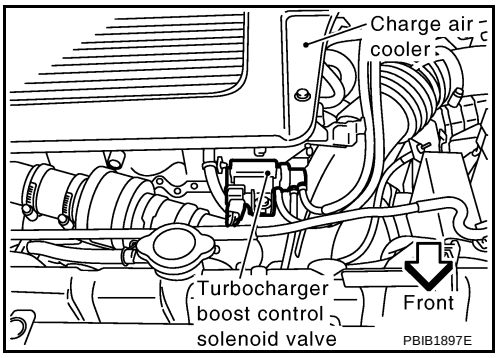
Description

BBS00200

The load from the turbocharger boost control solenoid valve controls the actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted.



The turbocharger boost control solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.



On Board Diagnosis Logic

BBS00201

These self-diagnoses have the one trip detection logic.
The MI will not light up for these self-diagnoses.

NOTE:
If DTC P0234 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

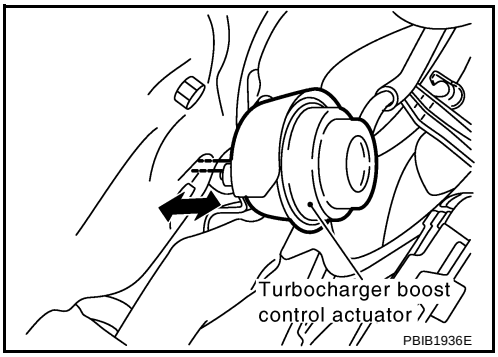
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0234 0234	Turbocharger overboost condition	ECM detects turbocharger boost pressure is excessively high.	● Turbocharger ● Vacuum pump ● Turbocharger boost sensor ● Turbocharger boost control solenoid valve

Overall Function Check

BBS00202

Use this procedure to check the overall function of the turbocharger. During this check, a DTC might not be confirmed.

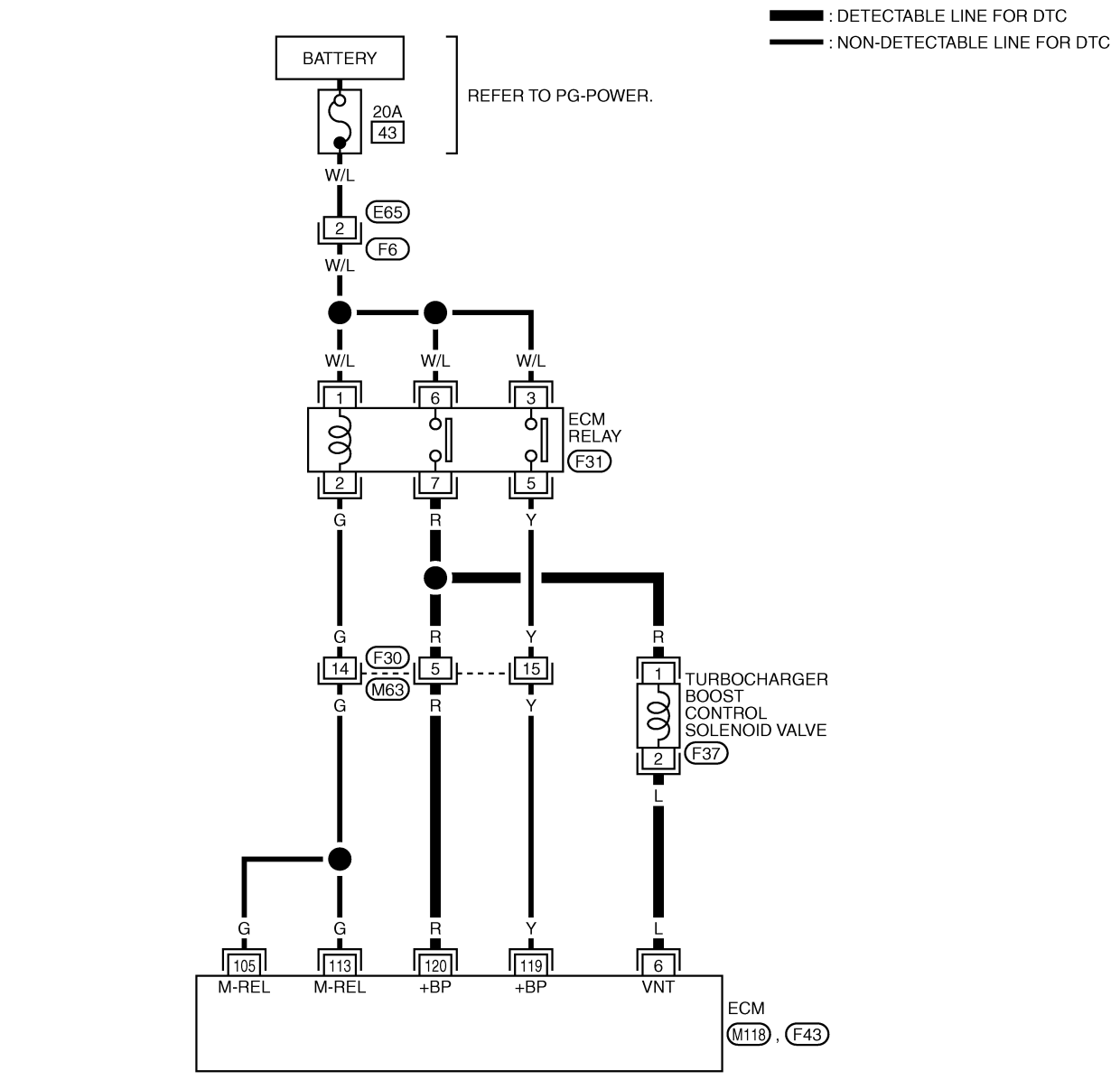
1. Start engine and let it idle.
2. Make sure that turbocharger control actuator rod moves slightly when engine is started.
3. If NG, go to EC-1185, "Diagnostic Procedure" .

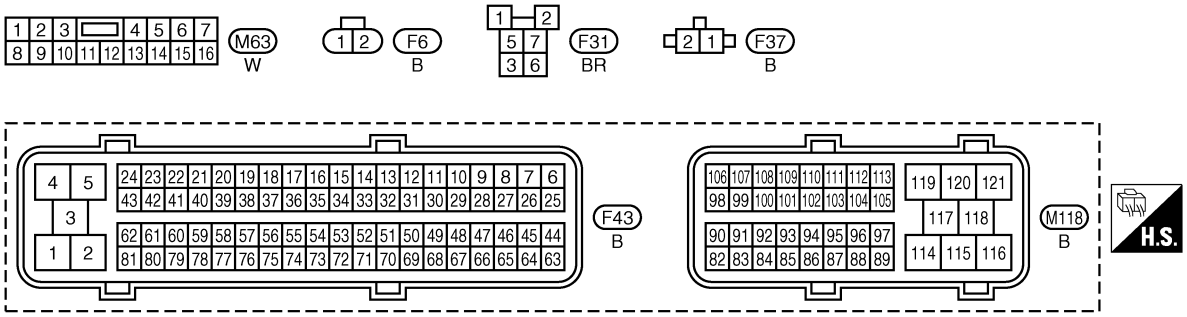


Wiring Diagram

BBS00203

EC-TCC/V-01

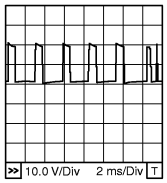
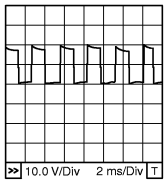




TBWA0588E

Specification data are reference valves, and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
6	L	Turbocharger boost control solenoid valve	**[Ignition switch ON]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0889E
			[Ignition switch ON] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0890E
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS00204

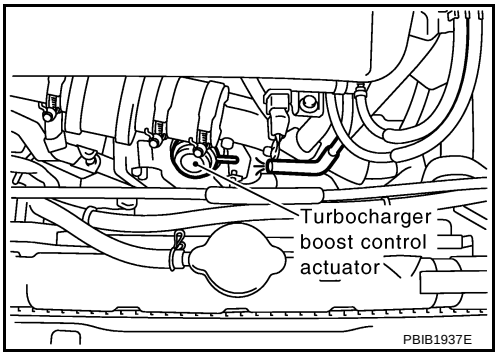
1. CHECK VACUUM SOURCE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose connected to turbocharger control actuator.
3. Start engine and let it idle.
4. Check vacuum hose for vacuum existence.

Vacuum should exist.

OK or NG

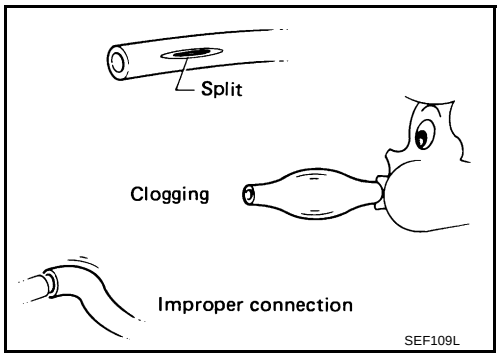
OK >> GO TO 8.
NG >> GO TO 2.



PBIB1937E

2. CHECK VACUUM HOSES AND VACUUM GALLERY

1. Turn ignition switch OFF.
2. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection. Refer to EC-987, "Vacuum Hose Drawing" .

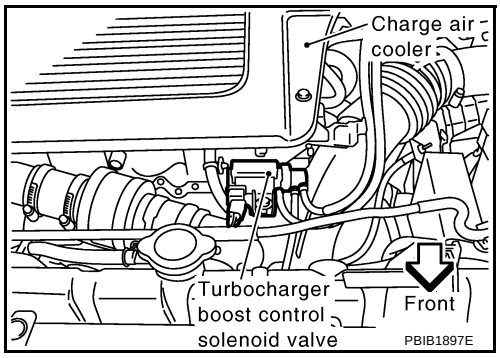


OK or NG

OK >> GO TO 3.
NG >> Repair or replace vacuum hoses and vacuum gallery.

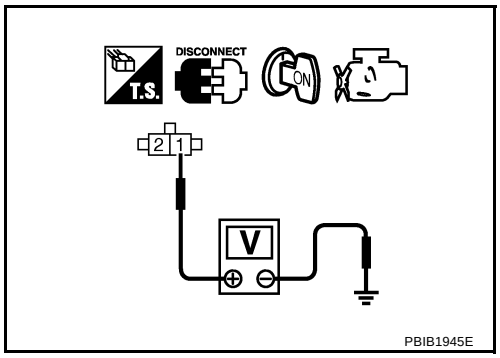
3. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Turn ignition switch ON.



3. Check voltage between turbocharger boost control solenoid valve terminals 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between turbocharger boost control solenoid valve and ECM relay
- Harness for open or short between turbocharger boost control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 6 and turbocharger boost control solenoid valve terminals 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK TURBOCHARGE BOOST CONTROL SOLENOID VALVE

Refer to EC-1188, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace turbocharger boost control solenoid valve.

7. CHECK VACUUM PUMP

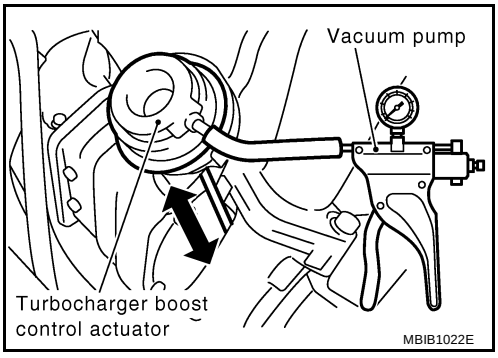
Refer to EM-167, "VACUUM PUMP" .

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum pump assembly.

8. CHECK TURBOCHARGER BOOST CONTROL ACTUATOR

1. Turn ignition switch OFF.
2. Install a vacuum pump to turbocharger boost control actuator.
3. Make sure that the turbocharger boost control actuator rod moves smoothly when applying vacuum of –53.3kPa (–533mbar, –400mmHg, –15.75inHg) and releasing it.



OK or NG

OK >> GO TO 9.
NG >> Replace turbocharger assembly.

9. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1195, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace turbocharger boost sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

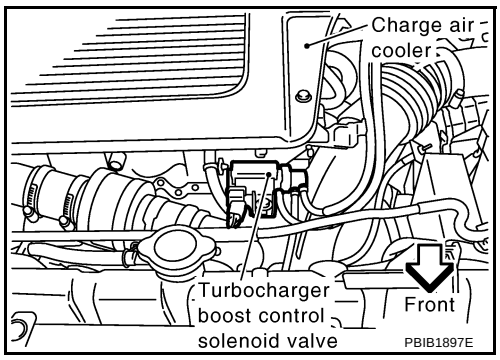
>> **INSPECTION END**

Component Inspection

BBS00205

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Apply 12V direct current between turbocharger boost control solenoid valve terminals.

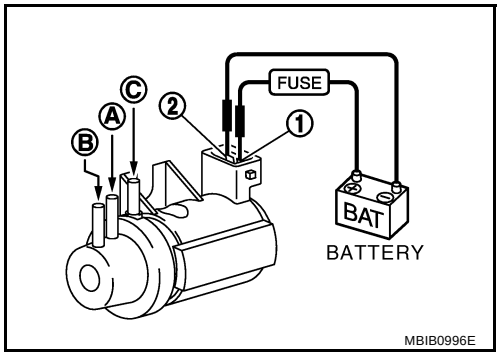


3. Check air passage continuity of turbocharger boost control solenoid valve under the following conditions.

CONDITIONS	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals (1) and (2)	Yes	No
No supply	No	Yes

Operation takes less than 1 second.

If NG, replace turbocharger boost control solenoid valve.



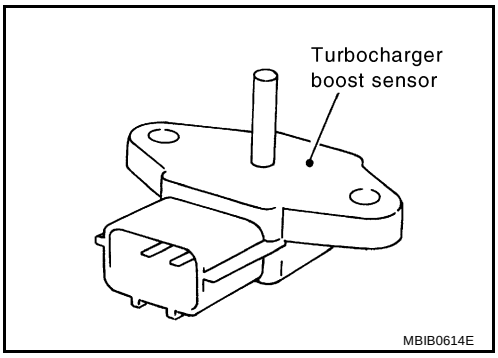
DTC P0237, P0238 TC BOOST SENSOR

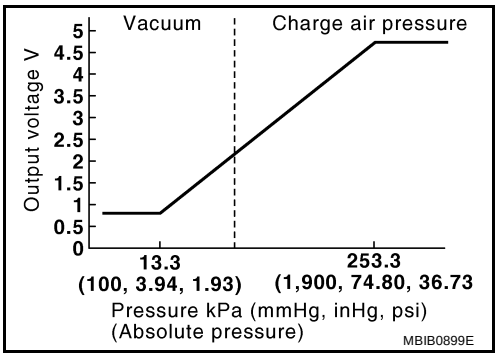
PFP:22365

Component Description

BBS00207

The turbocharger boost sensor detects pressure in the exit side of the charge air cooler. The sensor output voltage to the ECM increases as pressure increases.





CONSULT-II Reference Value in Data Monitor Mode

BBS00208

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/M PRES SE [kPa]	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	Approx. 100 kPa
		2,800 rpm	Approx. 126 kPa
		4,000 rpm	Approx. 106 kPa

On Board Diagnosis Logic

BBS00209

NOTE:
If DTC P0237 or P0238 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0237 0237	Turbocharger boost sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Turbocharger boost sensor
P0238 0238	Turbocharger boost sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

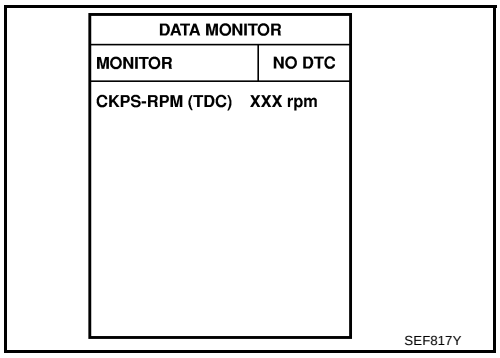
DTC Confirmation Procedure

BBS0020A

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1193, "Diagnostic Procedure" .



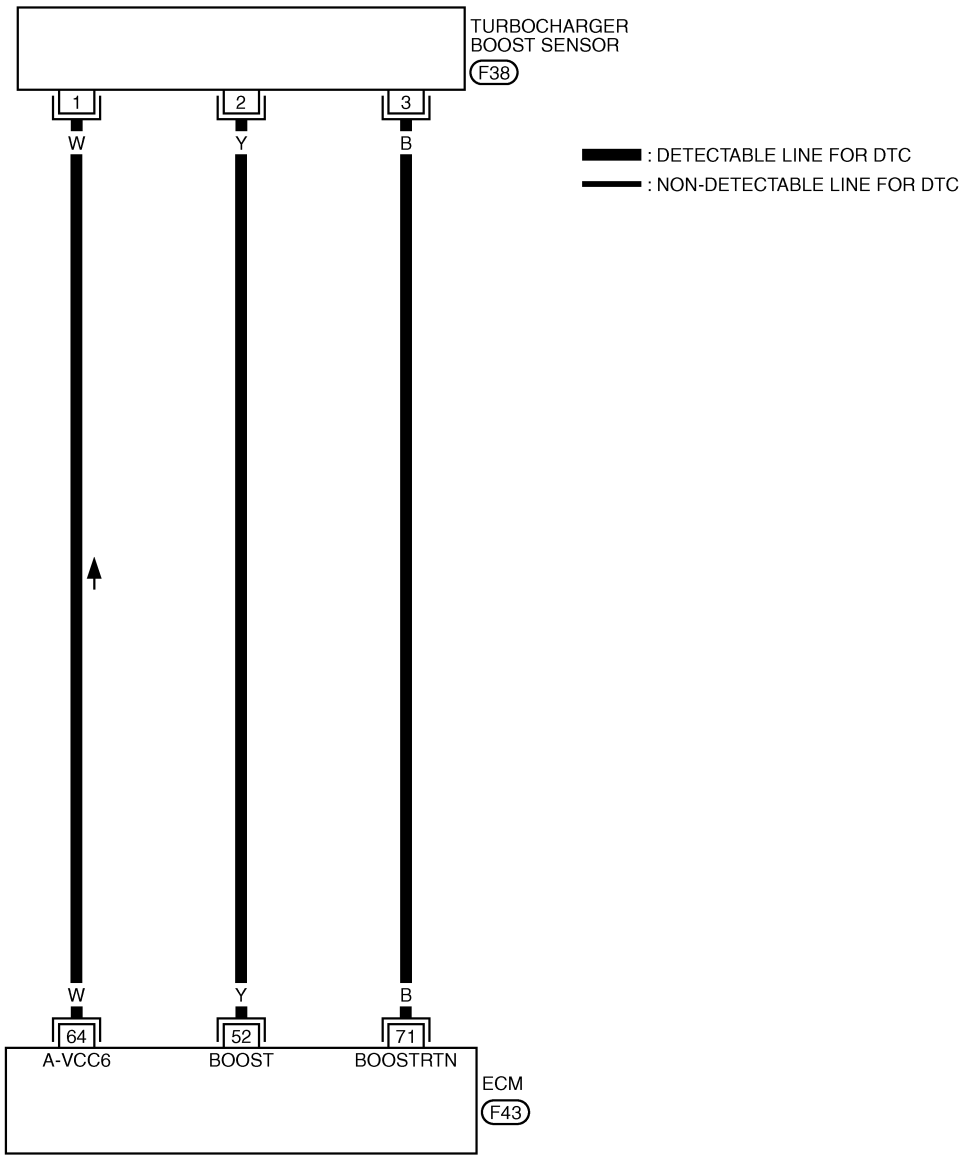
WITH GST

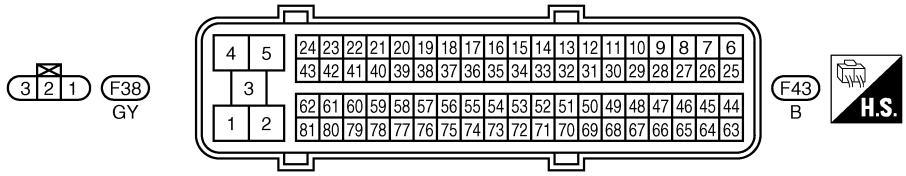
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS0020B

EC-BOOST-01





TBWA0589E

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

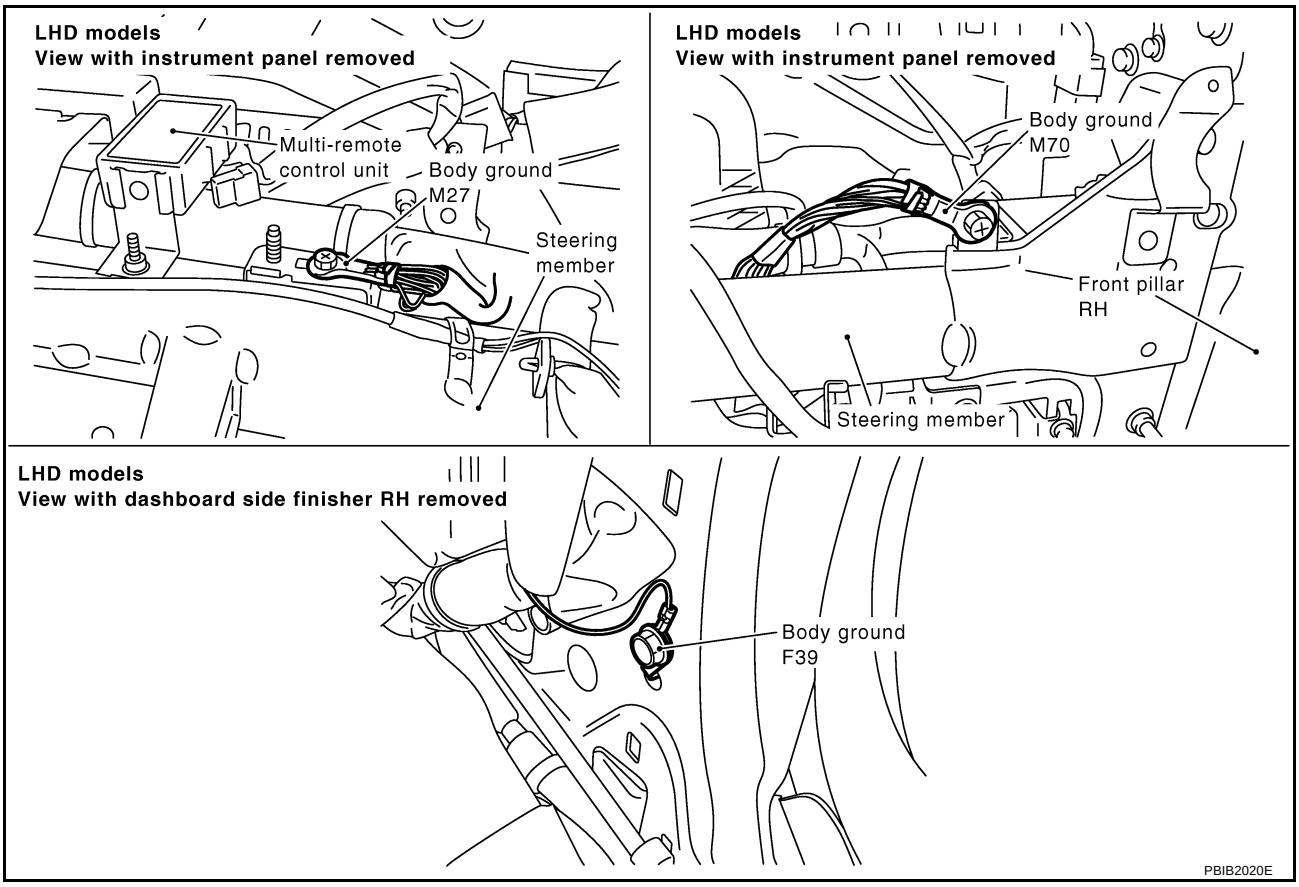
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
52	Y	Turbocharger boost sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	2.3 - 2.6V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	2.5 - 2.8V
64	W	Sensor power supply (Turbocharger boost sensor / Differential exhaust pressure sensor / Throttle position sensor / Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
71	B	Turbocharger boost sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS0020C

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

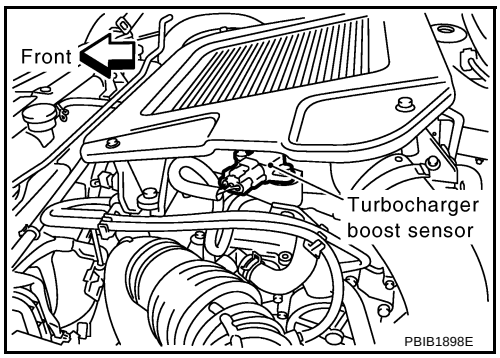


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

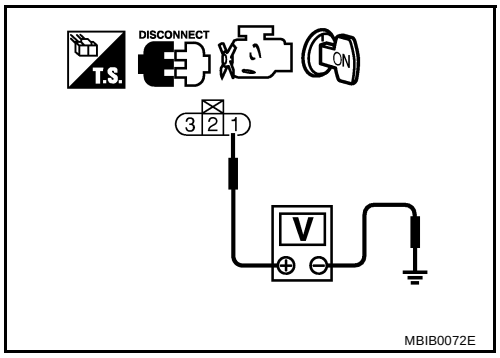
2. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Disconnect turbocharge boost sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between turbocharge boost sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK TURBOCHAGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between turbocharger boost sensor terminal 3 and ECM terminal 71. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK TURBOCHAGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 52 and turbocharger boost sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1195, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace turbocharger boost sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

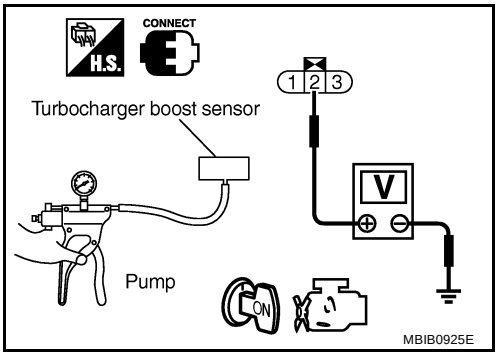
BBS0020D

CHECK TURBOCHARGER BOOST SENSOR

1. Remove turbocharger boost sensor with its harness connected.
2. Turn ignition switch ON.
3. Use pump to apply pressure sensor as shown in the figure.

   CAUTION:
   - **Always calibrate the pressure pump gauge when using it.**
   - **Inspection should be done at room temperature [10 - 30°C (50 - 86°F)].**
4. Check the output voltage between turbocharger boost sensor terminal 2 and ground.

Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mbar, 0 mmHg, 0 inHg)	Approximately 2.3V
+40 kPa (400 mbar, 300mmHg, 11.81 inHg)	Approximately 2.9V



Removal and Installation

BBS0020E

TURBOCHARGER BOOST SENSOR

Refer to EM-143, "CHARGE AIR COOLER" .

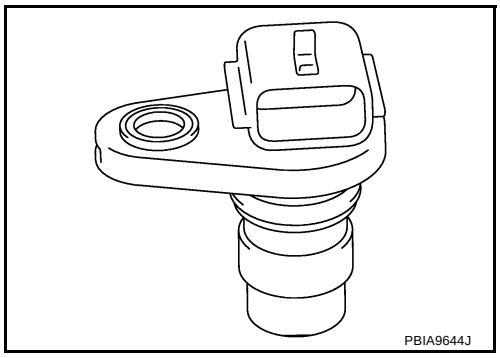
DTC P0335 CKP SENSOR

PFP:23731

Description

BBS0020F

The crankshaft position (CKP) sensor is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


PBIA9644J

CONSULT-II Reference Value in Data Monitor Mode

BBS0020G

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS-RPM (TDC)	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication

On Board Diagnosis Logic

BBS0020H

NOTE:
If DTC P0335 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-1307, "DTC P0642, P0643 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor circuit	Crankshaft position sensor signal is not detect by the ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor

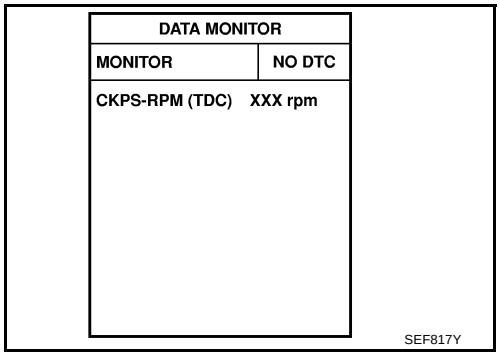
DTC Confirmation Procedure

BBS0020I

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If 1st trip DTC is detected, go to EC-1199, "Diagnostic Procedure" .



SEF817Y

WITH GST

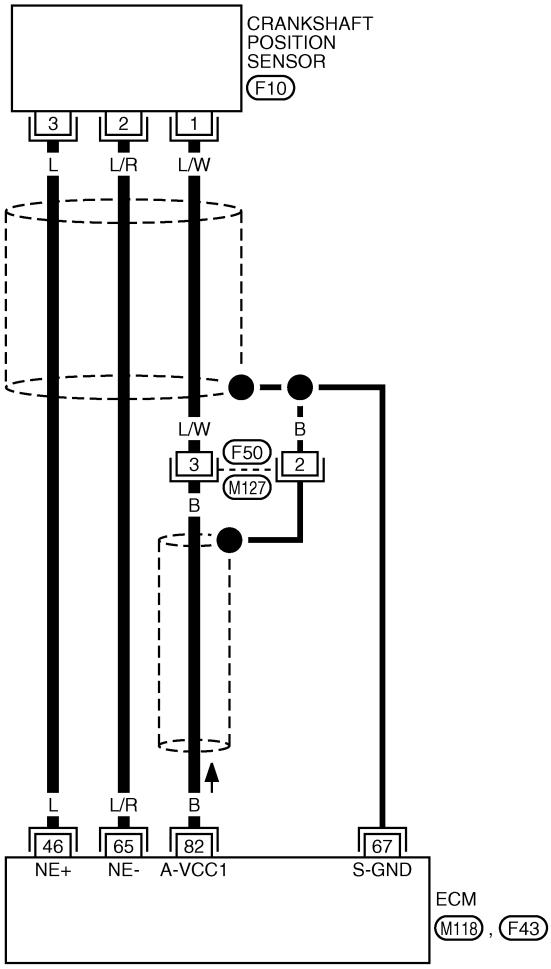
Follow the procedure “WITH CONSULT-II” above.

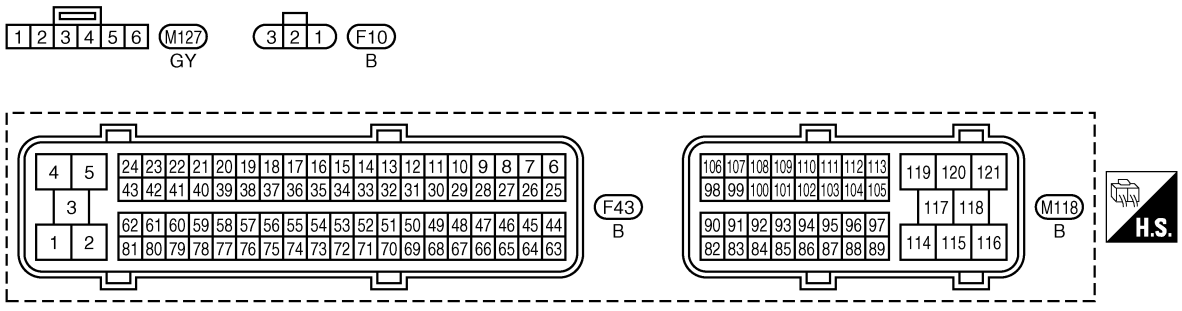
Wiring Diagram

BBS0020J

EC-CKPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



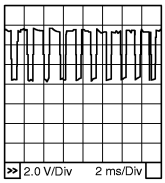
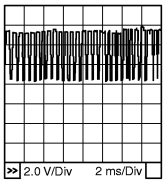


TBWB0907E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
46	L	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 6V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 6V ★  MBIB0880E
65	L/R	Crankshaft position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V

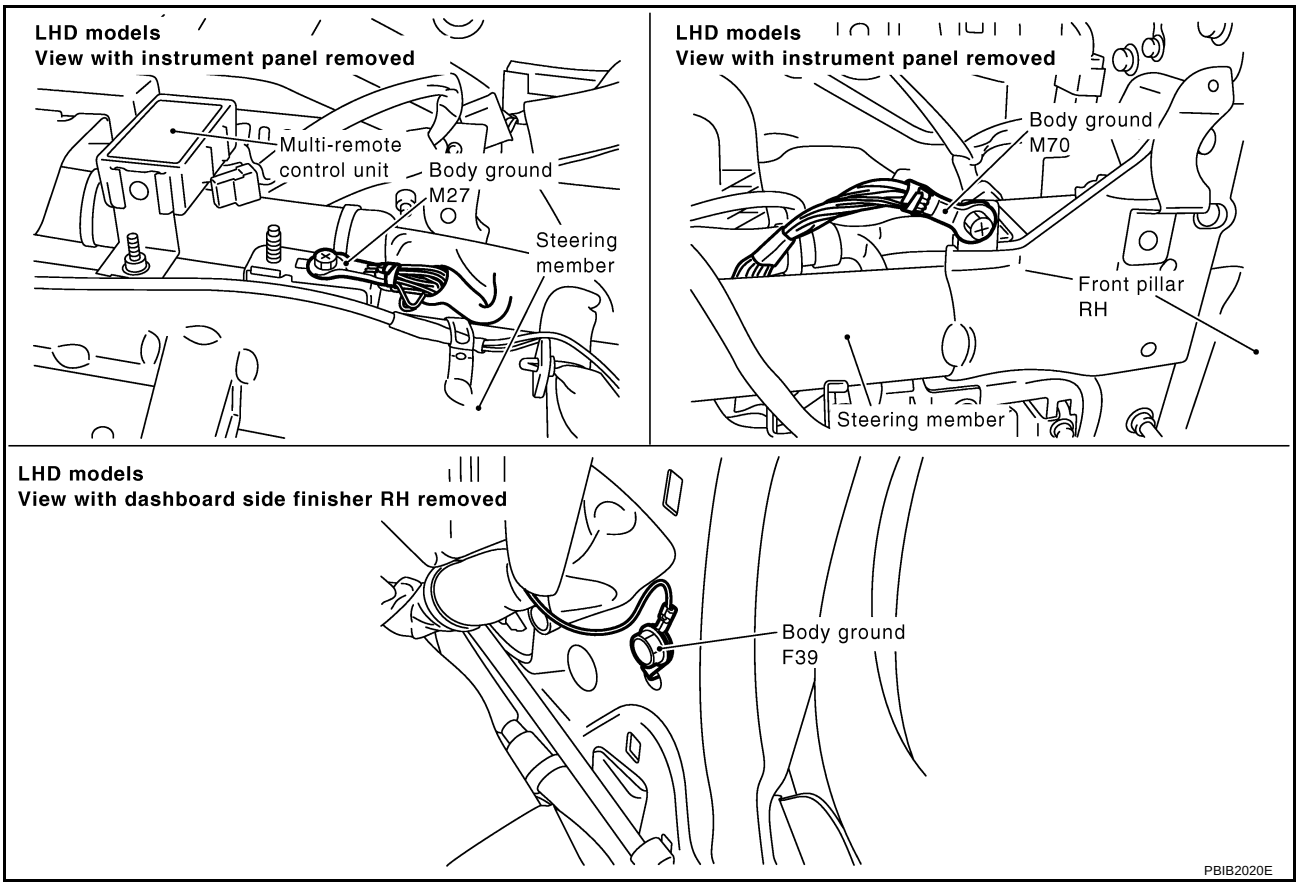
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS0020K

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

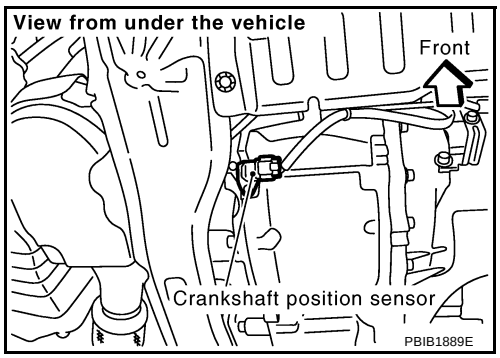


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

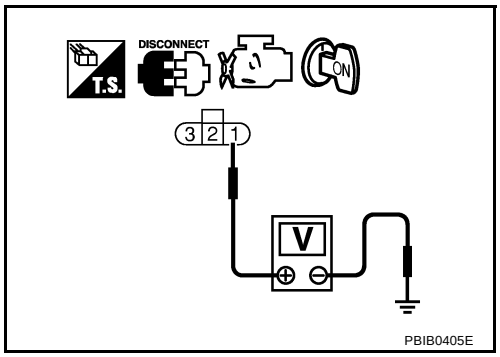
2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between CKP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F50, M127
- Harness for open or short between CKP sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 65 and CKP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for and short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 46 and CKP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1201, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace crankshaft position sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

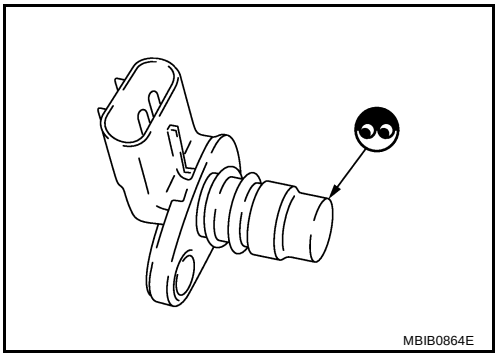
>> **INSPECTION END**

Component Inspection

BBS0020L

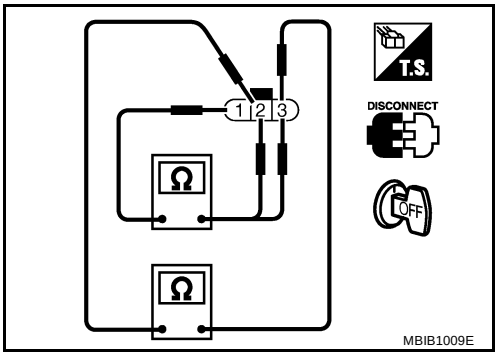
CRANKSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.


MBIB0864E

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	Except 0
2 (+) - 3 (-)	



MBIB1009E

6. If NG, replace crankshaft position sensor.

Removal and Installation

BBS0020M

CRANKSHAFT POSITION SENSOR

Refer to EM-161, "OIL PAN AND OIL STRAINER" .

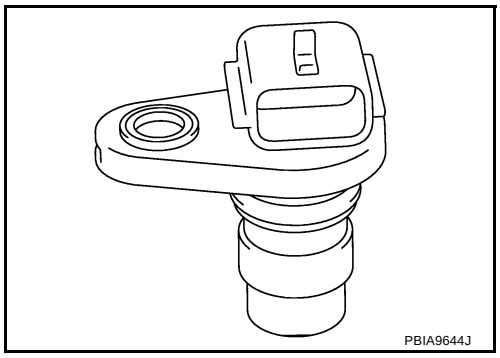
DTC P0336 CKP SENSOR

PFP:23731

Description

BBS0020N

The crankshaft position (CKP) sensor is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


PBIA9644J

CONSULT-II Reference Value in Data Monitor Mode

BBS0020O

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (TDC)	● Tachometer: Connect ● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

BBS0020P

NOTE:
If DTC P0336 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-1307, "DTC P0642, P0643 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0336 0336	Crankshaft position sensor circuit range/performance	Crankshaft position sensor signal is not in the normal pattern when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor ● Signal plate

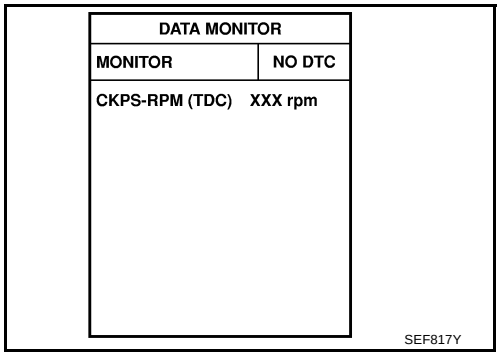
DTC Confirmation Procedure

BBS0020Q

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If 1st trip DTC is detected, go to EC-1205, "Diagnostic Procedure" .



SEF817Y

WITH GST

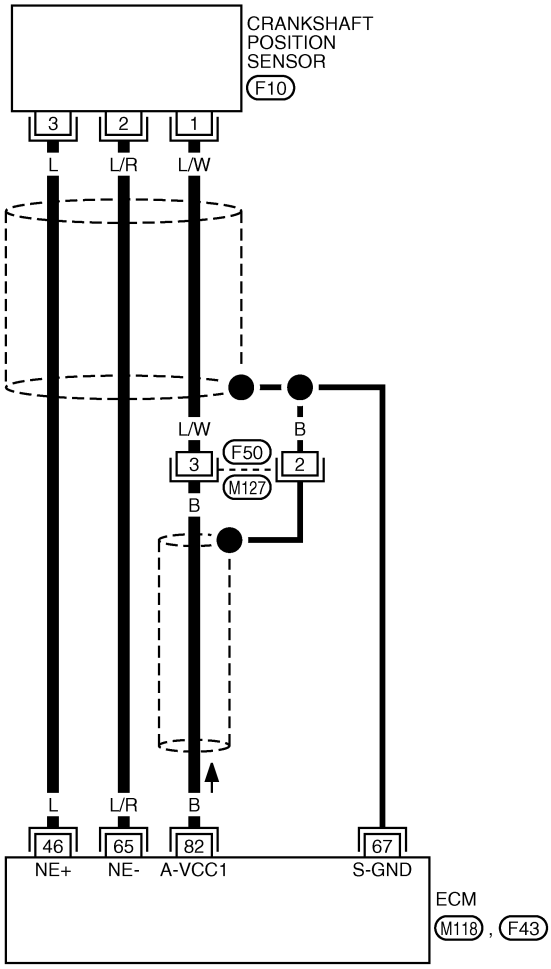
Follow the procedure “WITH CONSULT-II” above.

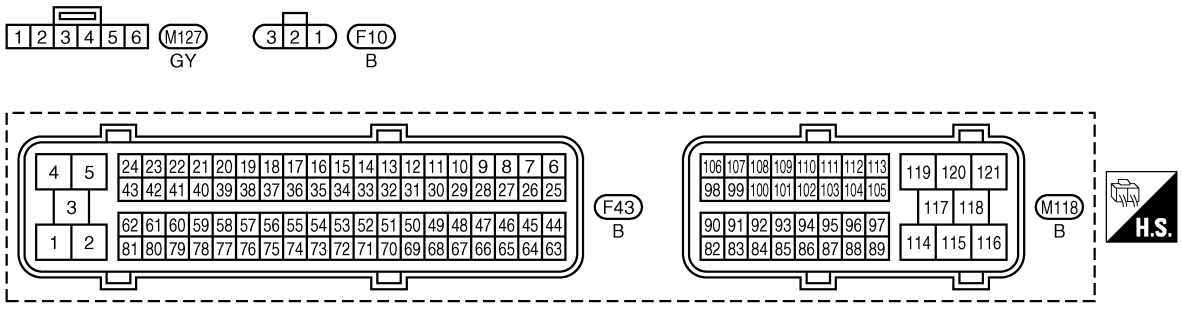
Wiring Diagram

BBS0020R

EC-CKPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



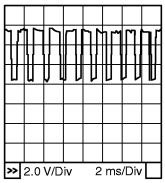
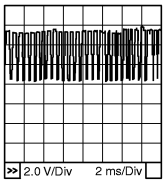


TBWB0907E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
46	L	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 6V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 6V ★  MBIB0880E
65	L/R	Crankshaft position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V

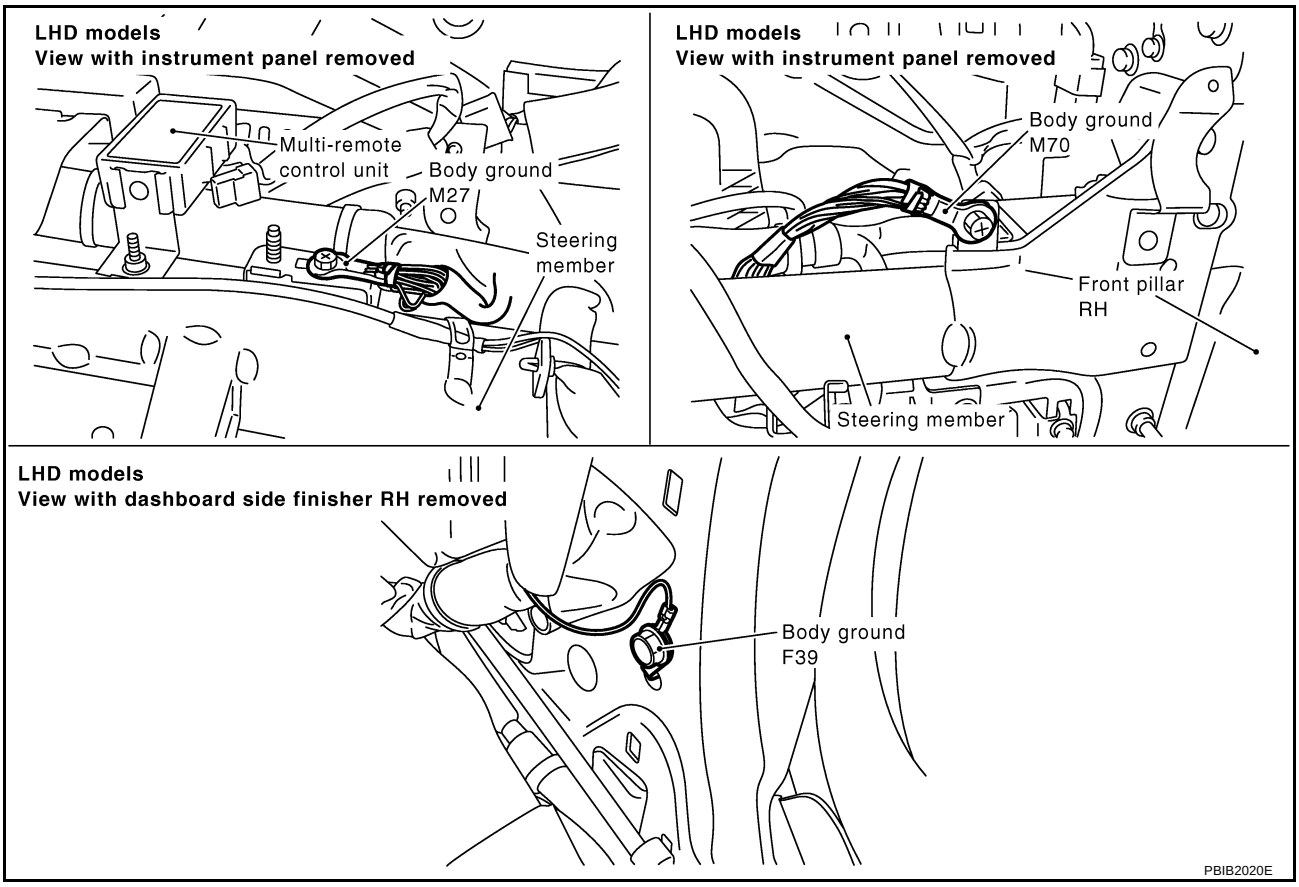
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS0020S

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

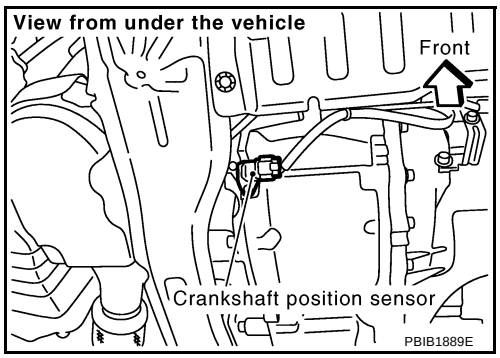


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

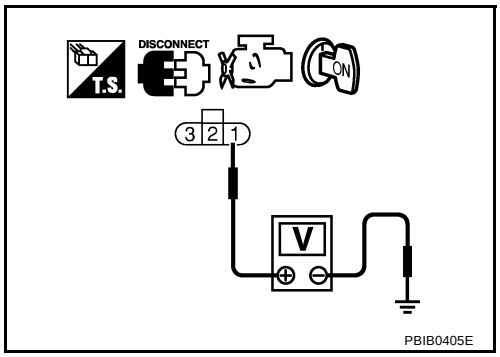
1. Disconnect crankshaft position (CKP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between CKP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F50, M127
- Harness for open or short between CKP sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 65 and CKP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for and short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 46 and CKP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1207, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace crankshaft position sensor.

7. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 8.
NG >> Replace the signal plate.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

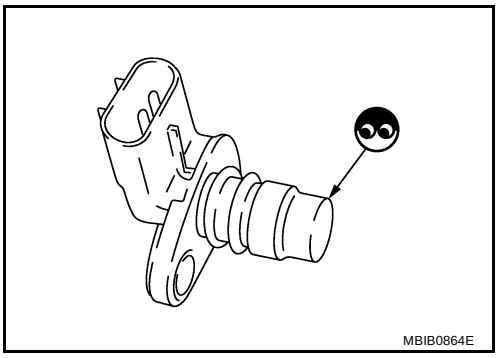
>> **INSPECTION END**

Component Inspection

BBS0020T

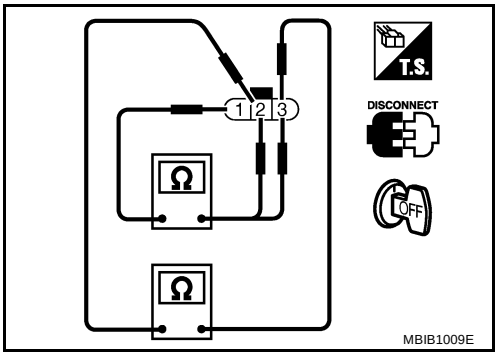
CRANKSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.


MBIB0864E

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	Except 0
2 (+) - 3 (-)	



MBIB1009E

6. If NG, replace crankshaft position sensor.

Removal and Installation

BBS0020U

CRANKSHAFT POSITION SENSOR

Refer to EM-161, "OIL PAN AND OIL STRAINER" .

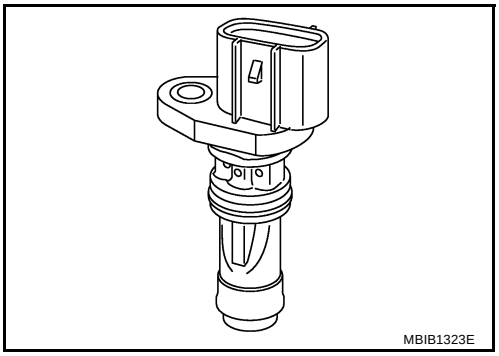
DTC P0340 CMP SENSOR

PFP:23731

Description

BBS0020V

The camshaft position (CMP) sensor senses the retraction with camshaft (left side) to identify a particular cylinder. The camshaft position (CMP) sensor senses the piston position.
When the crankshaft position (CKP) sensor system becomes inoperative, the camshaft position (CMP) sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.


MBIB1323E

On Board Diagnosis Logic

BBS0020W

NOTE:
If DTC P0340 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	Camshaft position sensor circuit	Camshaft position sensor signal is not detect by the ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Camshaft position sensor

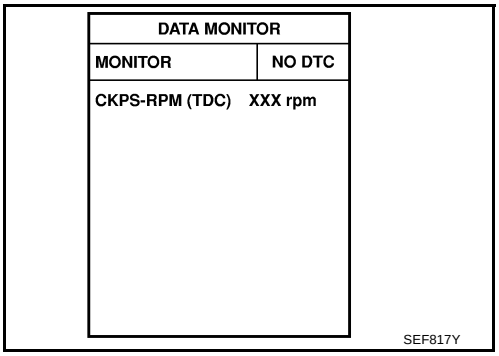
DTC Confirmation Procedure

BBS0020X

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If 1st trip DTC is detected, go to EC-1211, "Diagnostic Procedure" .



SEF817Y

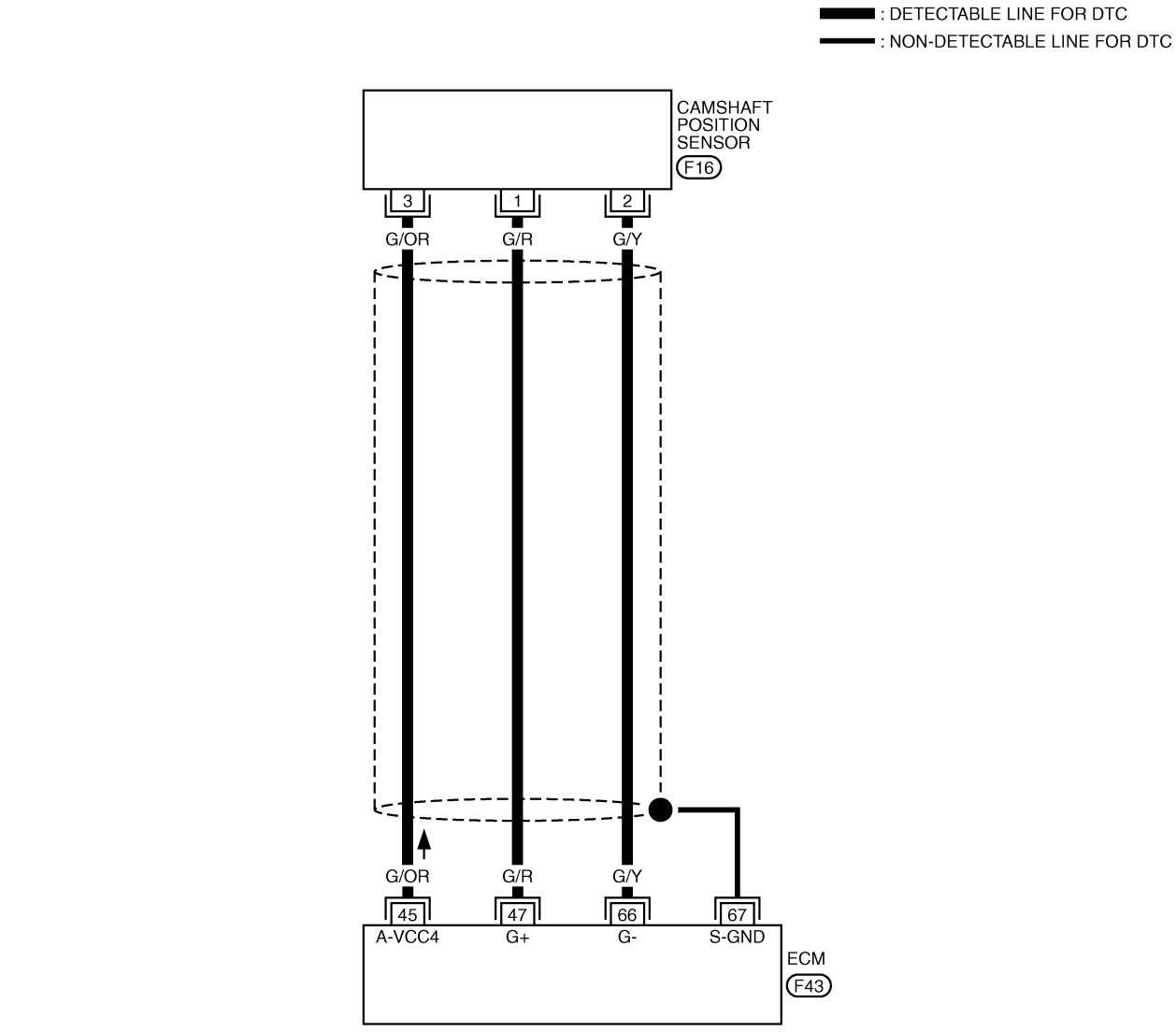
WITH GST

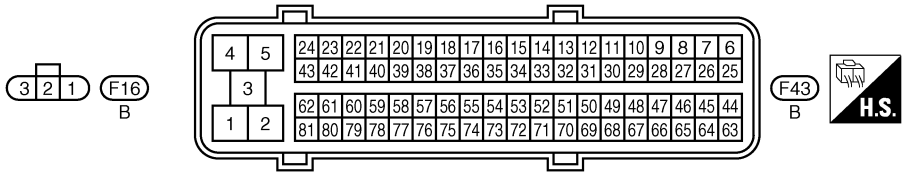
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS0020Y

EC-CMPS-01

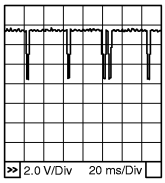
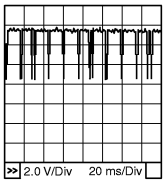




TBWA0571E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
45	G/OR	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
47	G/R	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 6V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 6V ★  MBIB0878E
66	G/Y	Camshaft position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

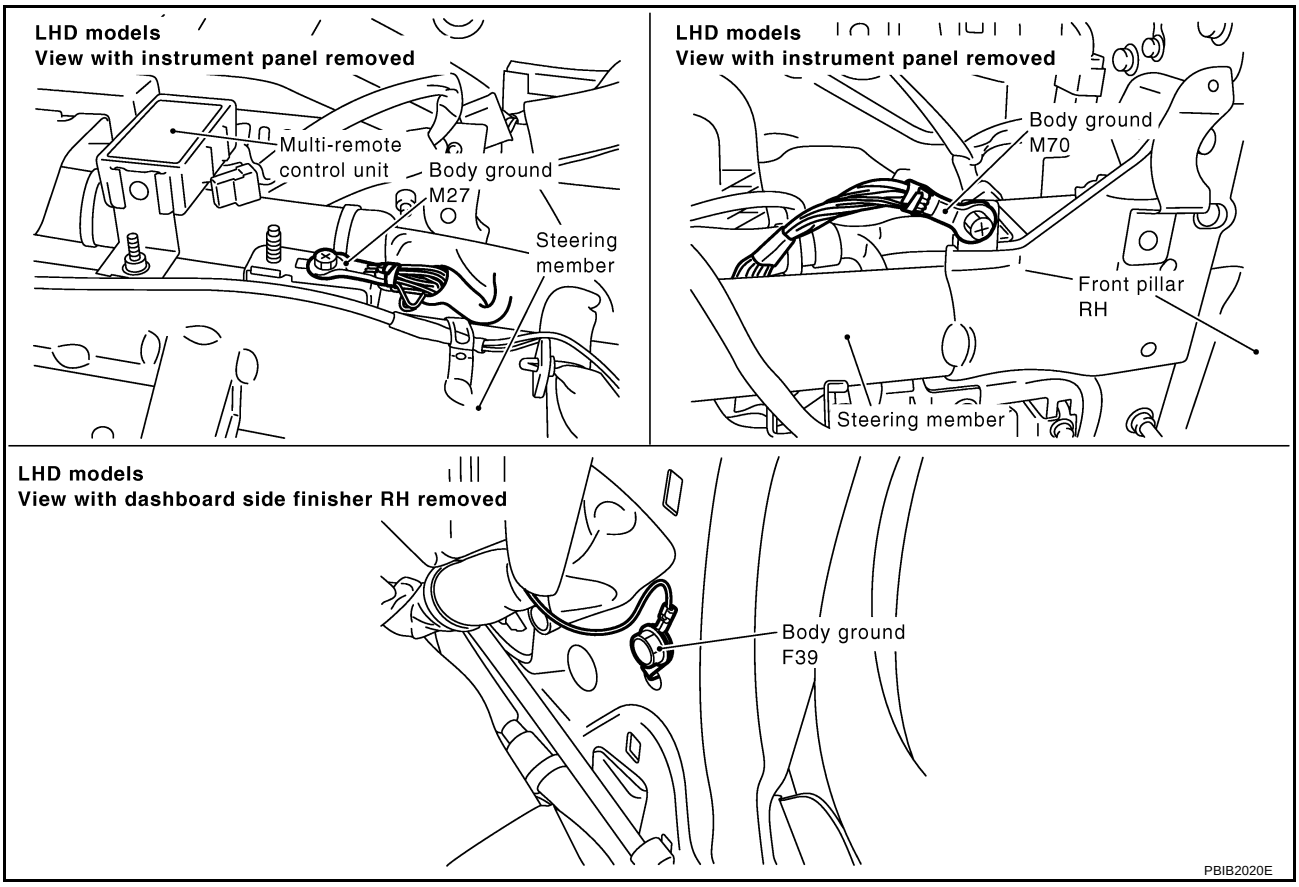
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS0020Z

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

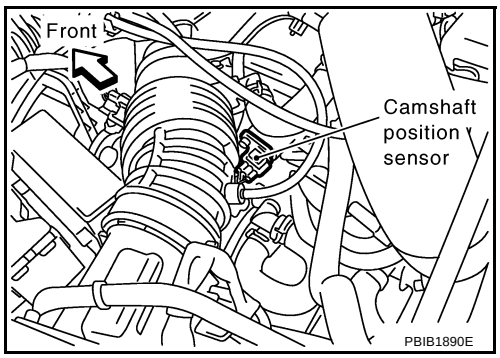


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

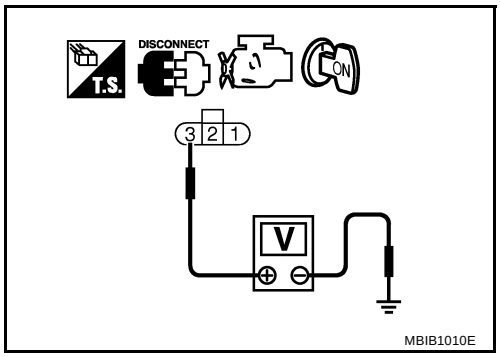
2. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between CMP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and CMP sensor terminal 2.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 47 and CMP sensor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1213, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace camshaft position sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

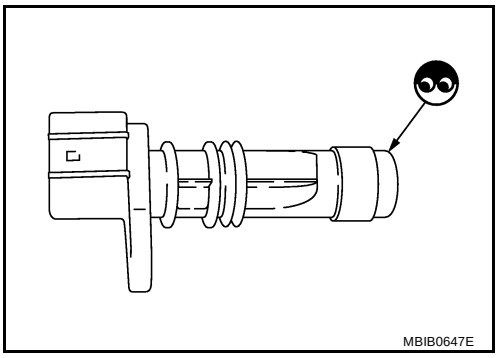
>> **INSPECTION END**

Component Inspection

BBS00210

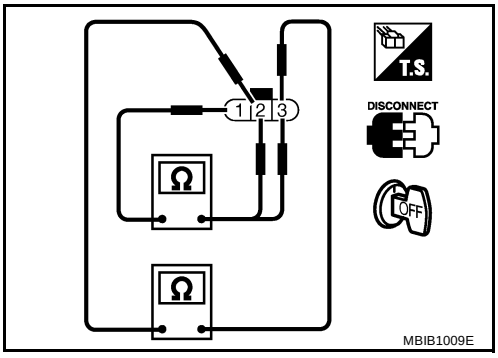
CAMSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.


MBIB0647E

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
3 (+) - 1 (-)	
3 (+) - 2 (-)	



MBIB1009E

6. If NG, replace camshaft position sensor.

Removal and Installation

BBS00211

CAMSHAFT POSITION SENSOR

Refer to EM-167, "VACUUM PUMP" .

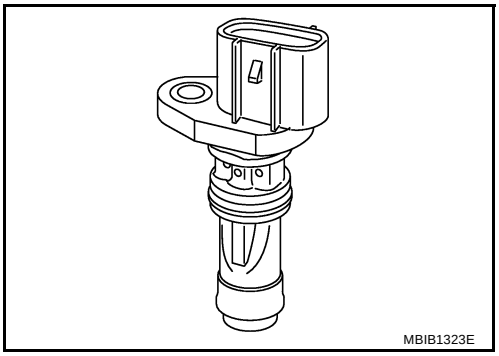
DTC P0341 CMP SENSOR

PFP:23731

Description

BBS00212

The camshaft position (CMP) sensor senses the retraction with camshaft (left side) to identify a particular cylinder. The camshaft position (CMP) sensor senses the piston position.
When the crankshaft position (CKP) sensor system becomes inoperative, the camshaft position (CMP) sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.


MBIB1323E

On Board Diagnosis Logic

BBS00213

NOTE:
If DTC P0341 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0341 0341	Camshaft position sensor circuit range/performance	Camshaft position sensor signal is not in the normal pattern when engine is running.	● Harness connectors (The sensor circuit is opener shorted.) ● Camshaft position sensor ● Starter motor ● Starting system circuit ● Signal plate

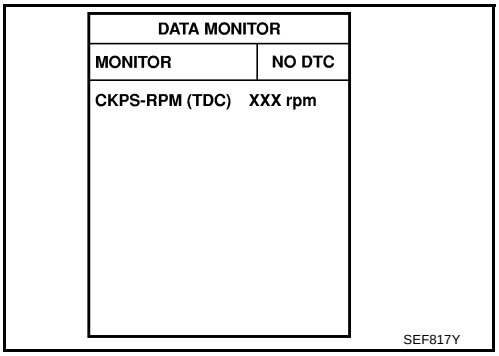
DTC Confirmation Procedure

BBS00214

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If 1st trip DTC is detected, go to EC-1216, "Diagnostic Procedure" .



SEF817Y

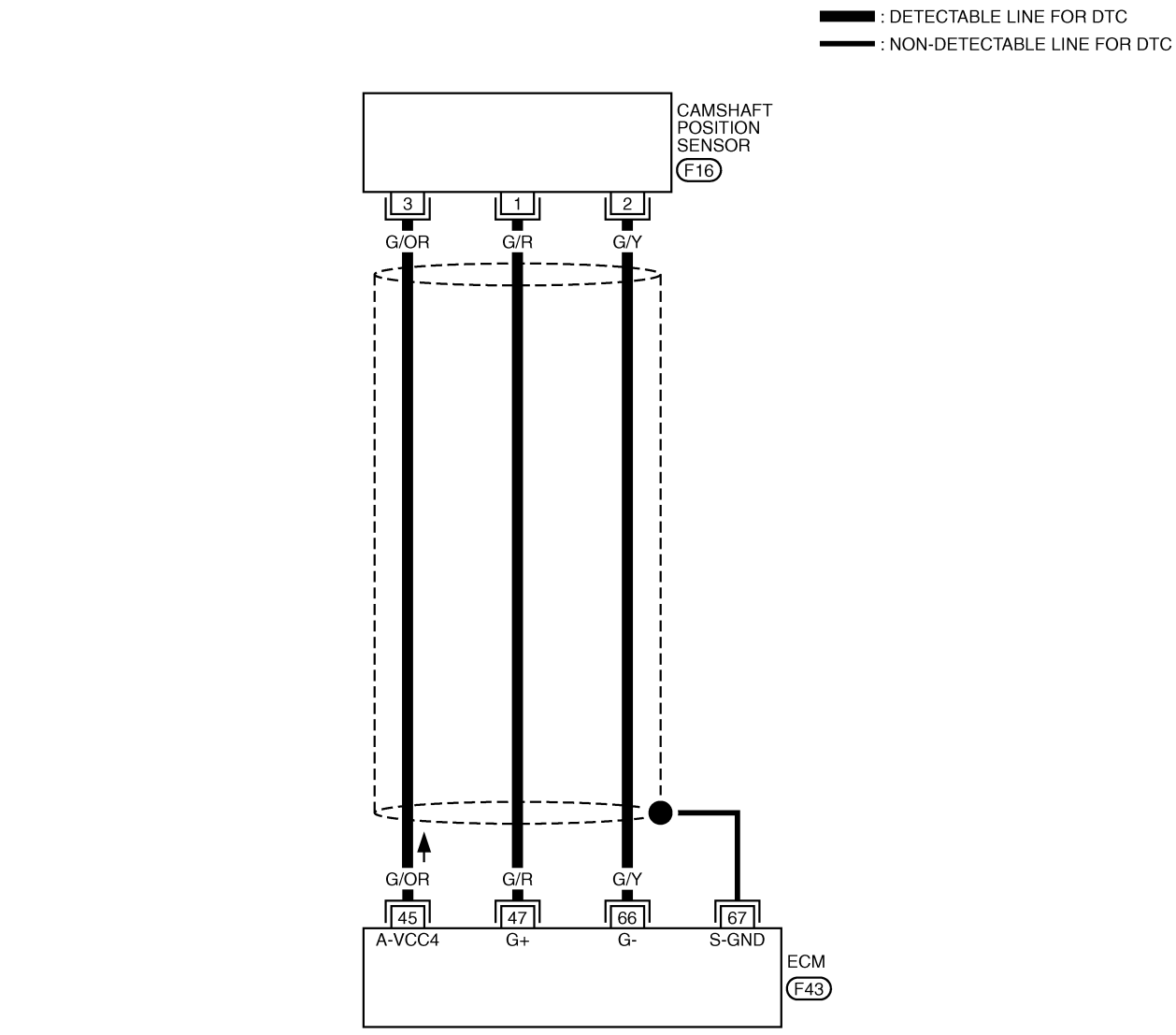
WITH GST

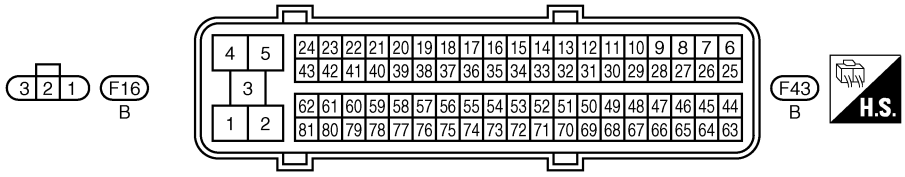
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS00215

EC-CMPS-01

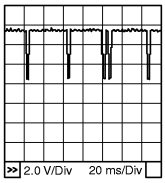
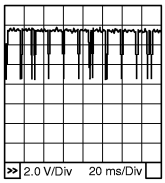




TBWA0571E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
45	G/OR	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
47	G/R	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 6V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 6V ★  MBIB0878E
66	G/Y	Camshaft position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS00216

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

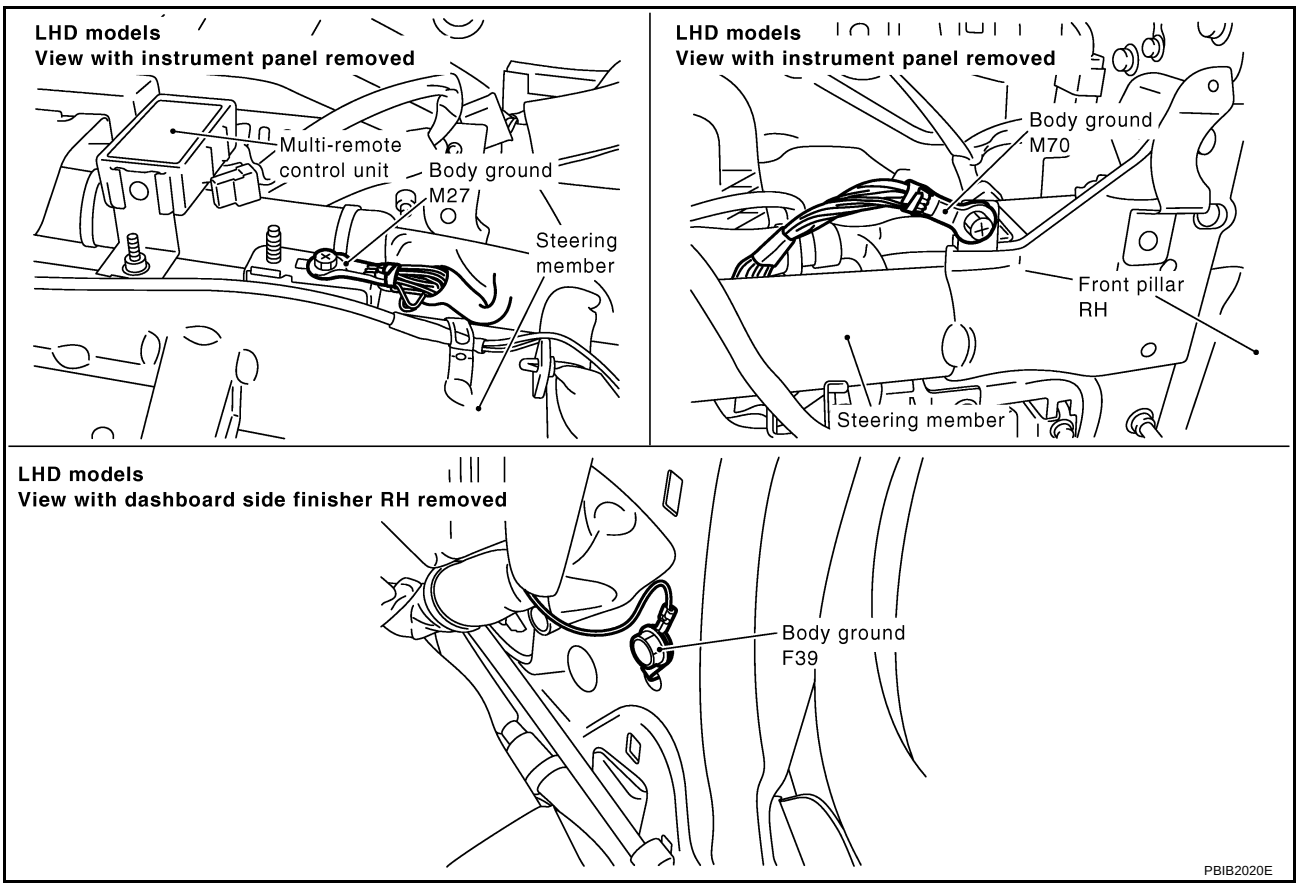
Does the starter motor operate?

Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-23, "STARTING SYSTEM" .)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

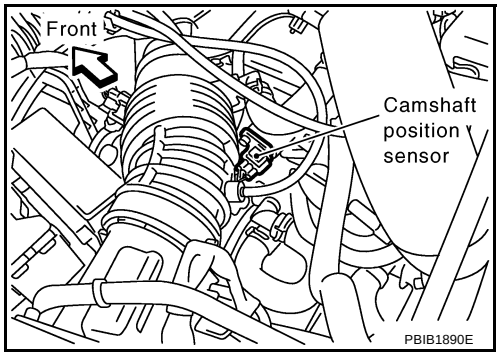


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

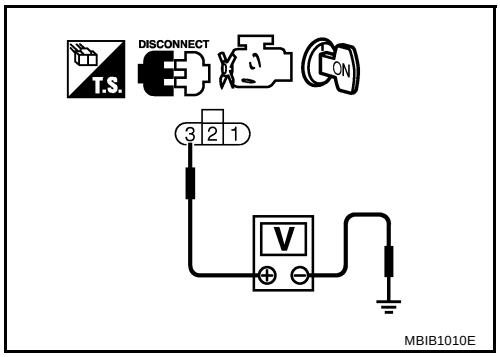
3. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between CMP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and CMP sensor terminal 2.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 47 and CMP sensor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1219, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace camshaft position sensor.

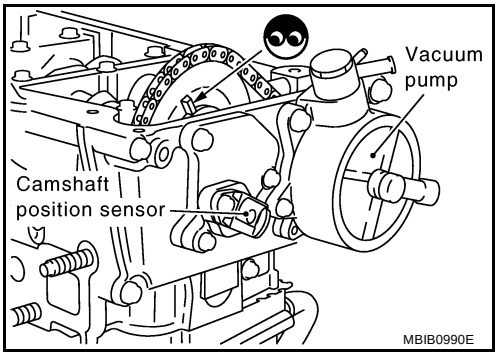
7. CHECK CAMSHAFT (EXHAUST)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 8.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

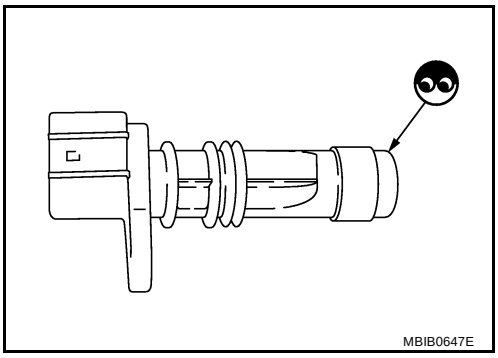
>> **INSPECTION END**

Component Inspection

BBS00217

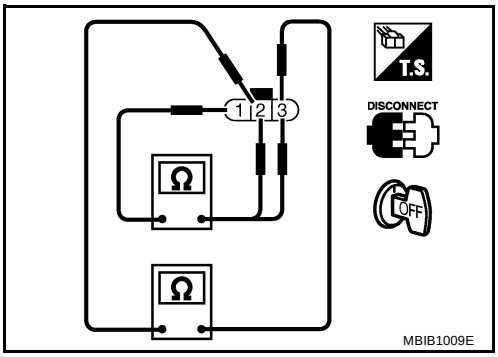
CAMSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
3 (+) - 1 (-)	
3 (+) - 2 (-)	



6. If NG, replace camshaft position sensor.

Removal and Installation

BBS00218

CAMSHAFT POSITION SENSOR

Refer to EM-167, "VACUUM PUMP" .

DTC P0380 GLOW RELAY

PFP:25230

On Board Diagnosis Logic

BBS00219

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0380 0380	Glow relay circuit	An excessively low voltage is sent to ECM through glow relay.	● Harness or connectors (The glow relay circuit is open or shorted.) ● Glow relay
		An excessively high voltage is sent to ECM through glow relay.	● Harness or connectors (The glow relay circuit is shorted.) ● Glow relay

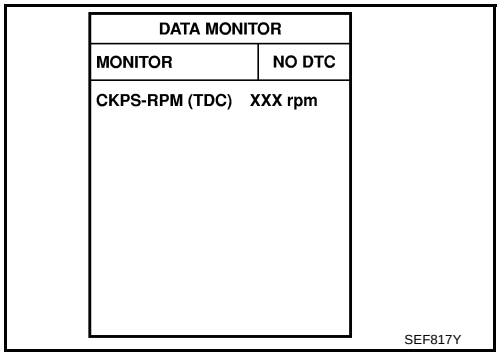
DTC Confirmation Procedure

BBS0021A

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1222, "Diagnostic Procedure" .



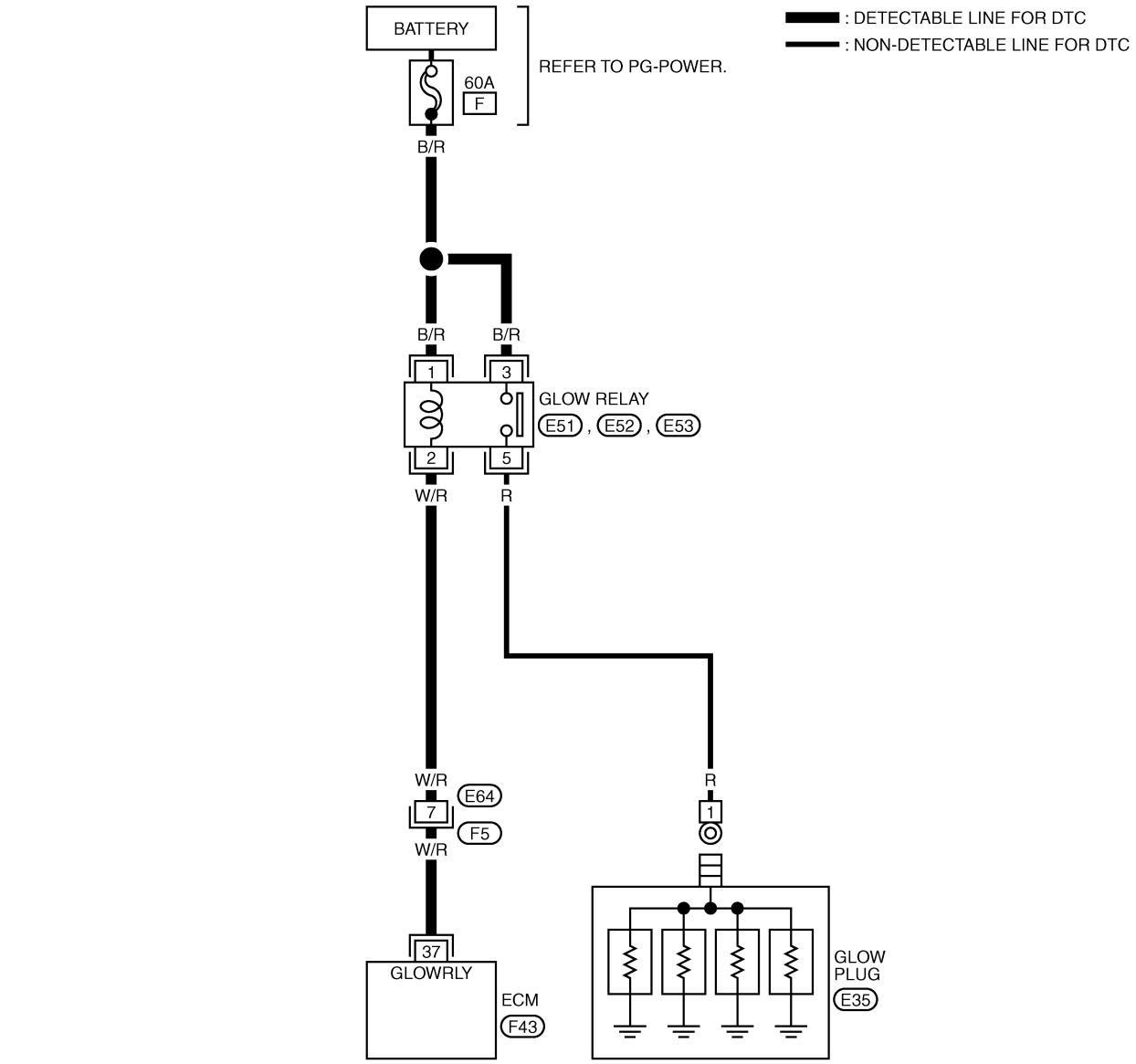
WITH GST

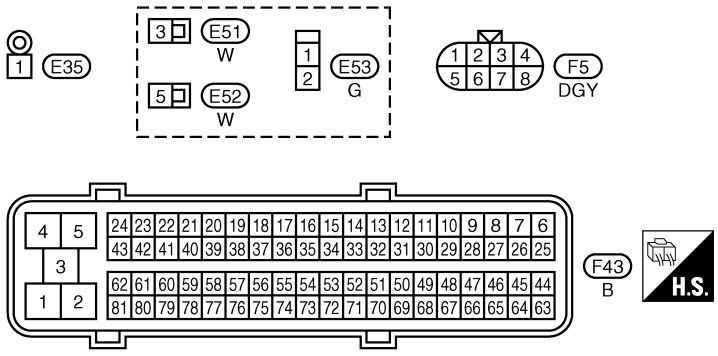
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS0021B

EC-GLORLY-01





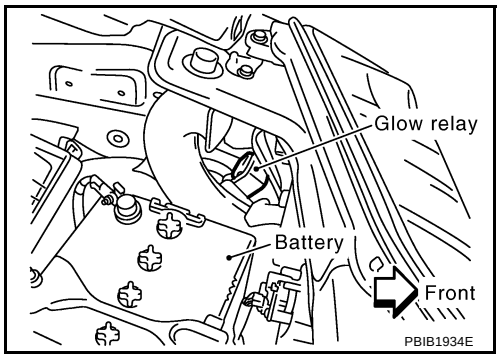
TBWB0908E

Diagnostic Procedure

BBS0021C

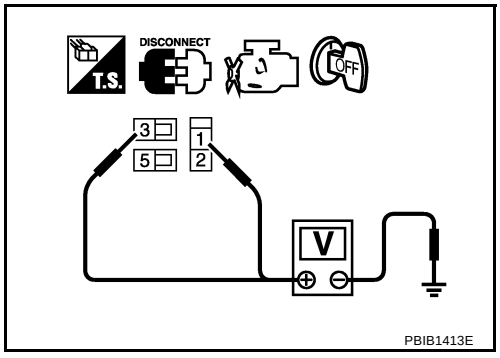
1. CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay.



3. Check voltage between ECM relay terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- 60A fusible link
- Harness for open and short between glow relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK GLOW RELAY OUTPUT SIGNAL CIRCUIT FOR SHORT TO GROUND

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 37 and glow relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E64, F5
- Harness for open and short between glow relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK GLOW RELAY

Refer to EC-1223, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace glow relay.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

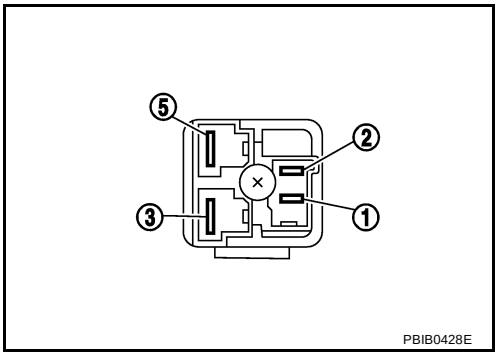
BBS0021D

GLOW RELAY

Check continuity between glow relay terminals (3) and (5) under the following conditions.

Conditions	Continuity
12V direct current supply between terminals (1) and (2)	Yes
No current supply	No

Operation takes less than 1 second.



PBIB0428E

DTC P0401 EGR FUNCTION

PFP:14710

Description

BBS0021E

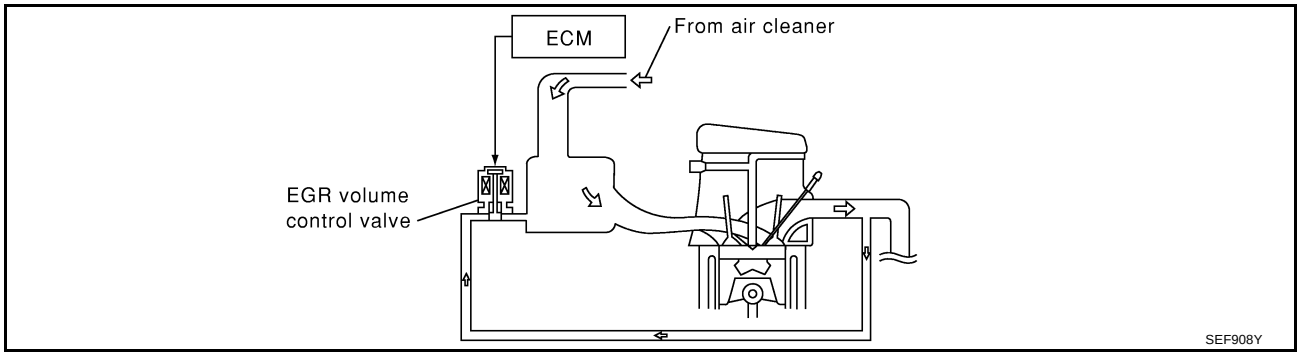
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	EGR volume control	EGR volume control valve
Vehicle speed sensor	Vehicle speed*		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Accelerator pedal position sensor	Accelerator pedal position		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation*		

*: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.
The EGR volume control valve remains close under the following conditions.

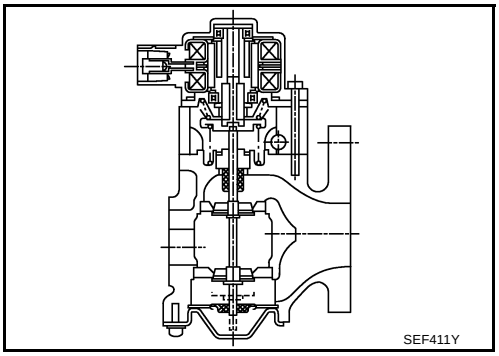
- Engine stopped
- Engine starting
- Low engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed



COMPONENT DESCRIPTION

EGR Volume Control Valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.



CONSULT-II Reference Value in Data Monitor Mode

BBS0021F

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	After 1 minute at idle	More than 10 steps
		Revving engine from idle to 3,600 rpm	0 step

On Board Diagnosis Logic

BBS0021G

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0401 0401	Exhaust gas recirculation flow insufficient detected	The exhaust gas recirculation flow is insufficient.	● Harness or connectors (The EGR volume control valve circuit is open or shorted.) ● EGR volume control valve stuck closed ● EGR passage clogged

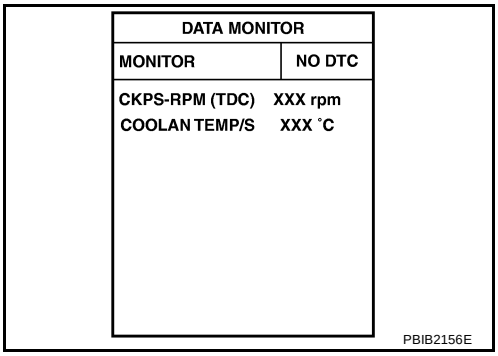
DTC Confirmation Procedure

BBS0021H

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

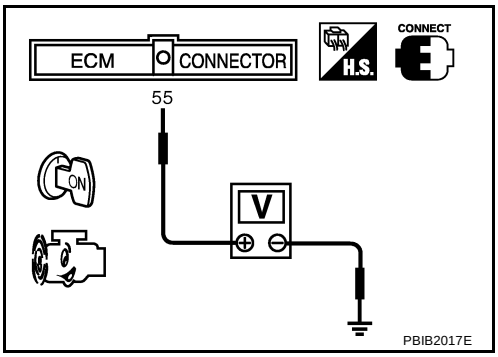
WITH CONSULT-II

1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine.



3. Maintain the following conditions for at least 40 consecutive seconds.

COOLAN TEMP/S	50 - 89 °C (122 - 192 °F)
Voltage between ECM terminal 55 (Intake air temperature sensor) and ground	1.7 - 2.6V



4. If 1st trip DTC is detected, go to EC-1227, "Diagnostic Procedure" .

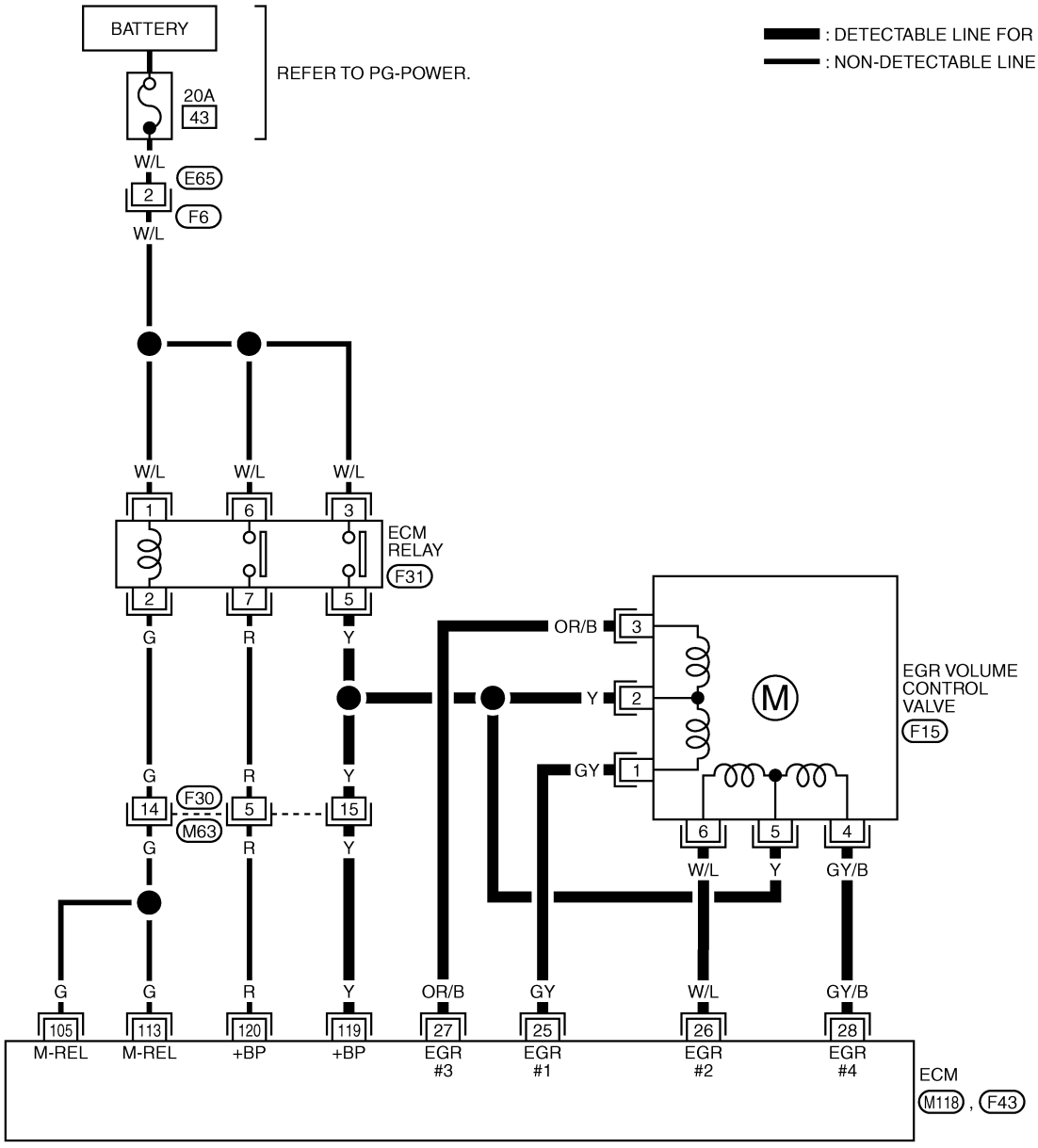
WITH GST

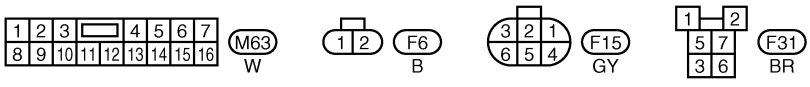
Follow the procedure “WITH CONSULT-II” above.

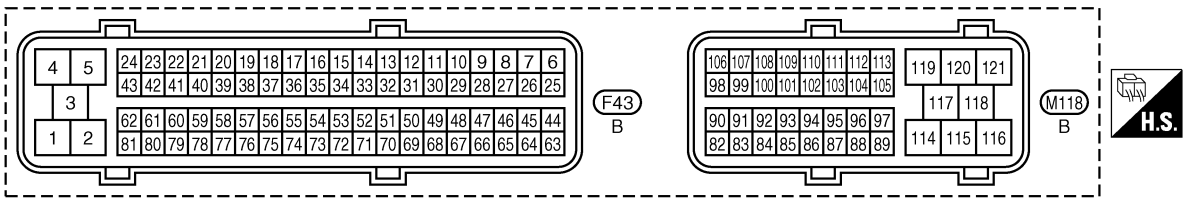
Wiring Diagram

BBS0021I

EC-EGVC/V-01







TBWA0579E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

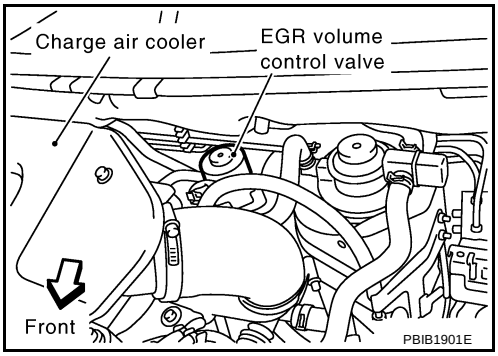
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
25 26 27 28	GY W/L OR/B GY/B	EGR volume control valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.1 - 14V (Voltage signals of each ECM terminals differ according to the control position of EGR volume control valve.)

Diagnostic Procedure

BBS0021J

1. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Turn ignition switch ON.

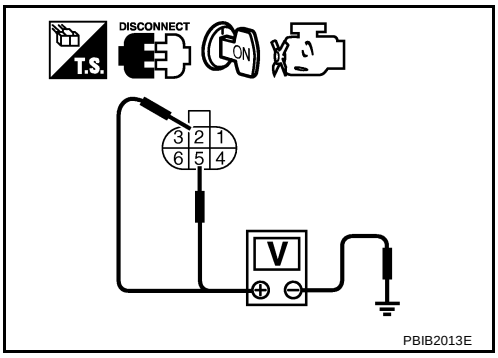


4. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between EGR volume control valve and ECM
- Harness for open or short between EGR volume control valve and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve terminal
25	1
26	6
27	3
28	4

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EGR VOLUME CONTROL VALVE

Refer to EC-1229, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace EGR volume control valve.

5. CHECK EGR PASSAGE

Check the following for clogging and cracks.

- EGR tube
- EGR hose
- EGR cooler

OK or NG

OK >> GO TO 6.
NG >> Repair or replace EGR passage.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

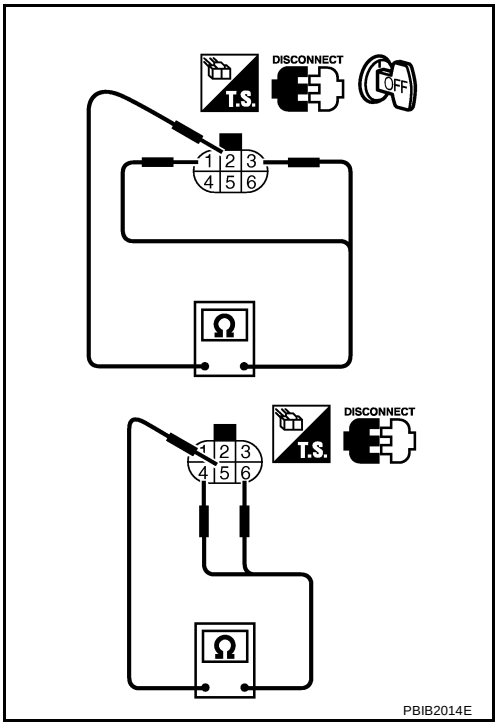
BBS0021K

EGR VOLUME CONTROL VALVE

With CONSULT-II

1. Disconnect EGR volume control valve harness connector.
2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

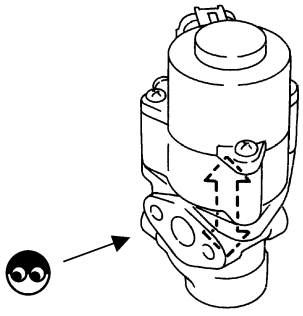
Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17



If NG, replace EGR volume control valve.
If OK, go to next step.

3. Remove EGR volume control valve from cylinder head.
4. Reconnect EGR volume control valve harness connector.
5. Turn ignition switch ON.
6. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
CKPS-RPM (TDC)	XXX rpm



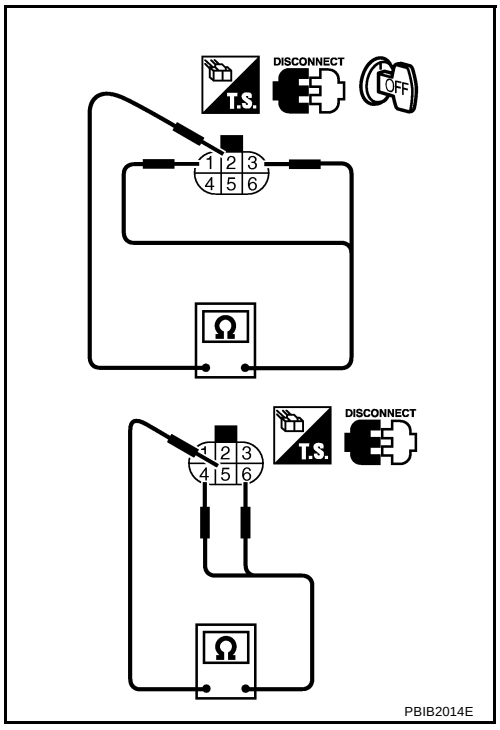
If NG, replace the EGR volume control valve.

NOTE:
When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.

Without CONSULT-II

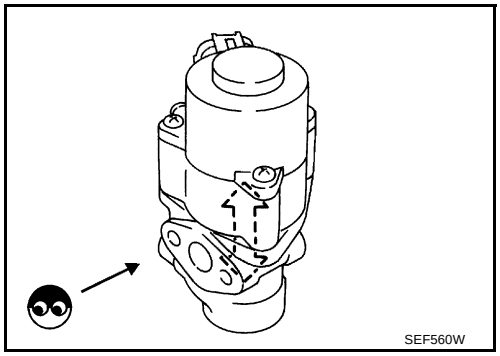
1. Disconnect EGR volume control valve harness connector.
2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17



   If NG, replace EGR volume control valve.
   If OK, go to next step.
3. Remove EGR volume control valve from cylinder head.
4. Reconnect EGR volume control valve harness connector.
5. Turn ignition switch ON and OFF.
6. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
   If NG, replace EGR volume control valve.

   NOTE:
   When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.



Removal and Installation

BBS0021L

EGR VOLUME CONTROL VALVE

Refer to EM-145, "INTAKE MANIFOLD" .

DTC P0404 EGR VOLUME CONTROL VALVE

PFP:14710

Description

BBS0021M

SYSTEM DESCRIPTION

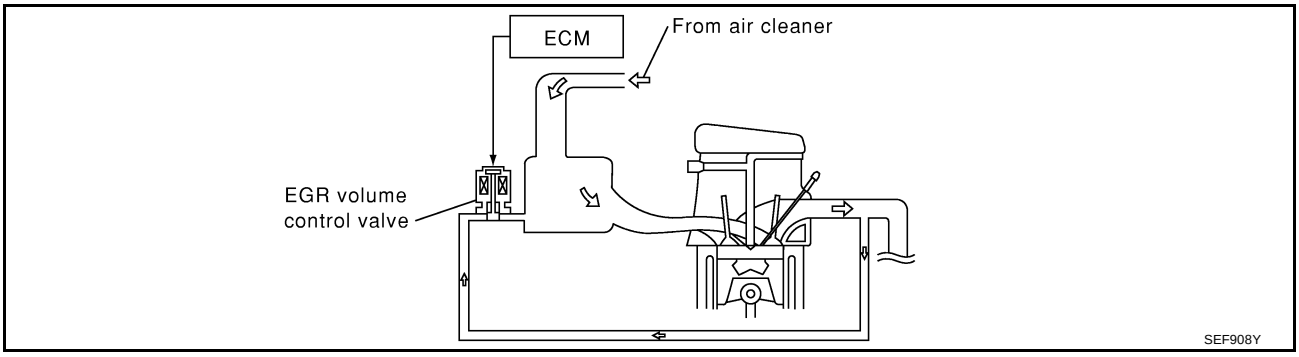
Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	EGR volume control	EGR volume control valve
Vehicle speed sensor	Vehicle speed*		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Accelerator pedal position sensor	Accelerator pedal position		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation*		

*: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.

The EGR volume control valve remains close under the following conditions.

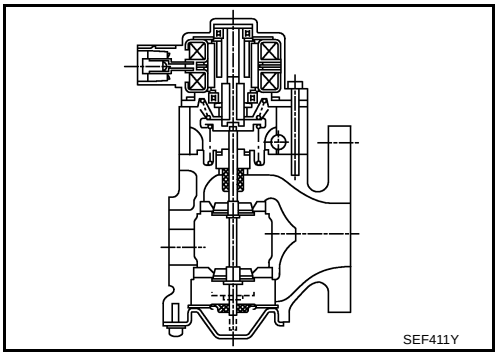
- Engine stopped
- Engine starting
- Low engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed



COMPONENT DESCRIPTION

EGR Volume Control Valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.



CONSULT-II Reference Value in Data Monitor Mode

BBS0021N

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	After 1 minute at idle	More than 10 steps
		Revving engine from idle to 3,600 rpm	0 step

On Board Diagnosis Logic

BBS0021O

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0404 0404	Exhaust gas recirculation control circuit range/performance	An improper voltage signal is sent to ECM through EGR volume control valve.	● Harness or connectors (The EGR volume control valve circuit is open or shorted.) ● EGR volume control valve stuck closed

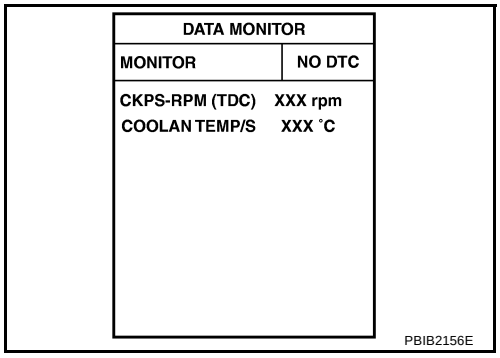
DTC Confirmation Procedure

BBS0021P

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

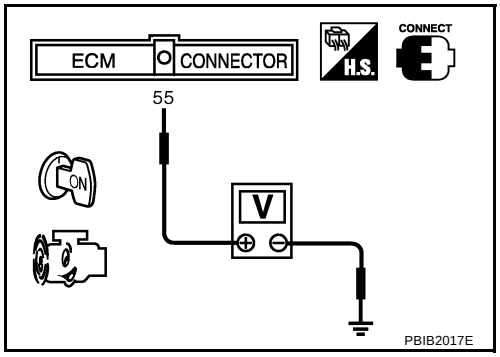
1. Turn ignition switch ON and select “DATA MONITOR” mode with CONSULT-II.
2. Start engine.



3. Maintain the following conditions for at least 20 consecutive seconds.

COOLAN TEMP/S	22 - 87 °C (72 - 189 °F)
Voltage between ECM terminal 55 (Intake air temperature sensor) and ground	0.9 - 4.0V

4. If 1st trip DTC is detected, go to EC-1234, "Diagnostic Procedure" .



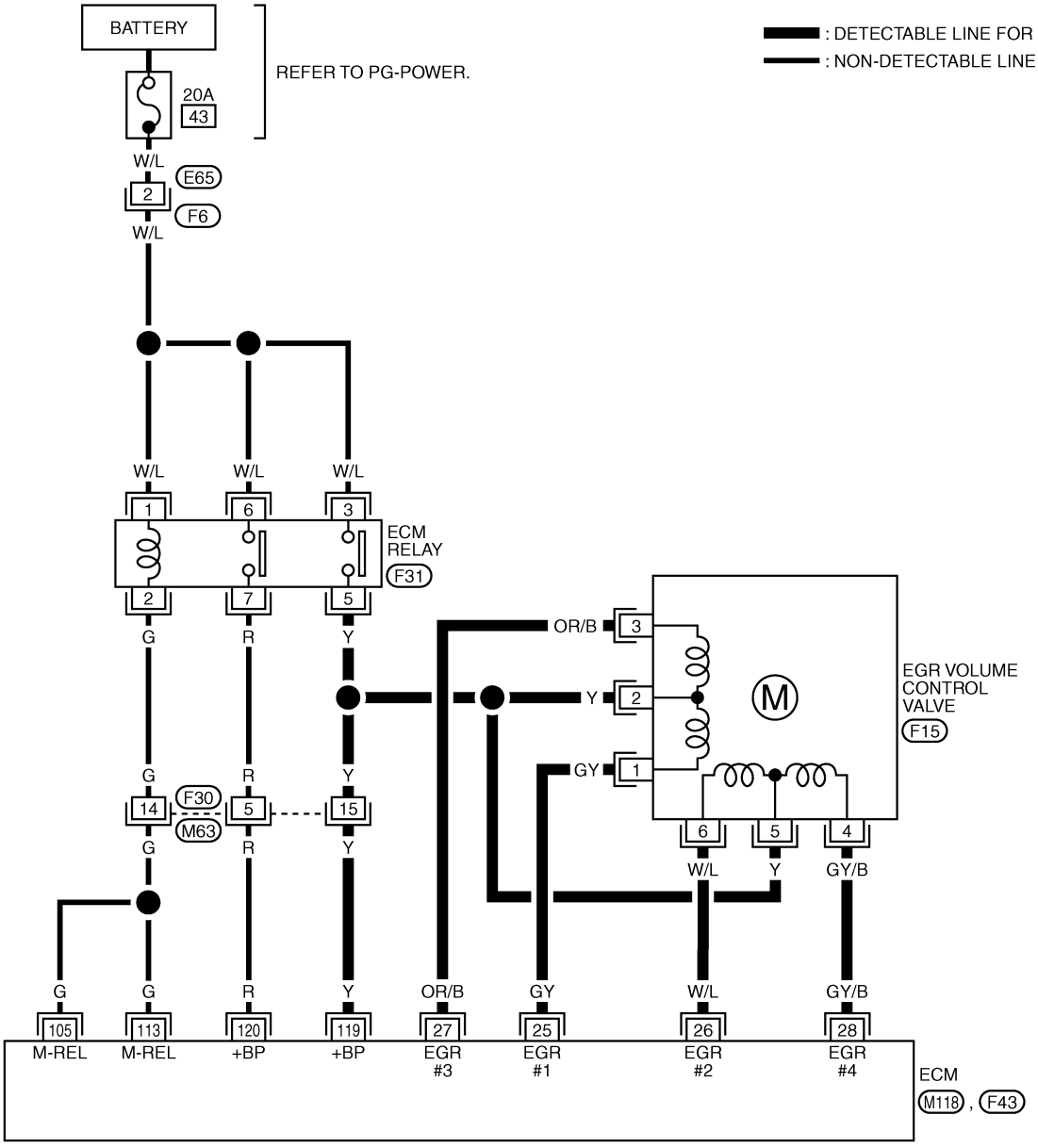
WITH GST

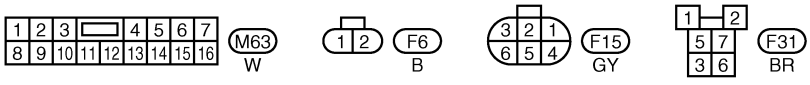
Follow the procedure “WITH CONSULT-II” above.

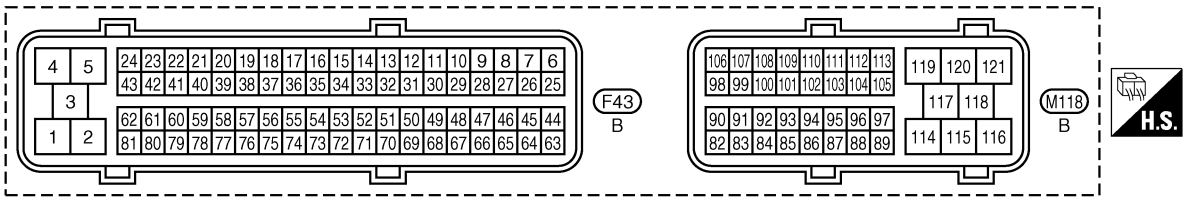
Wiring Diagram

BBS0021Q

EC-EGVC/V-01







TBWA0579E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

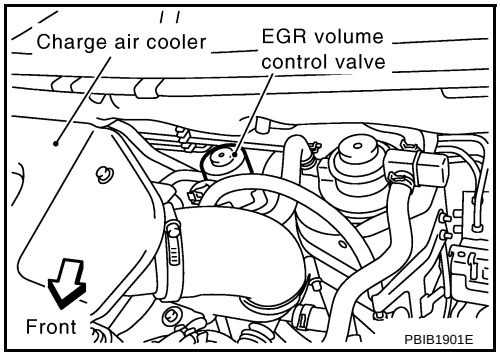
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
25 26 27 28	GY W/L OR/B GY/B	EGR volume control valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.1 - 14V (Voltage signals of each ECM terminals differ according to the control position of EGR volume control valve.)

Diagnostic Procedure

BBS0021R

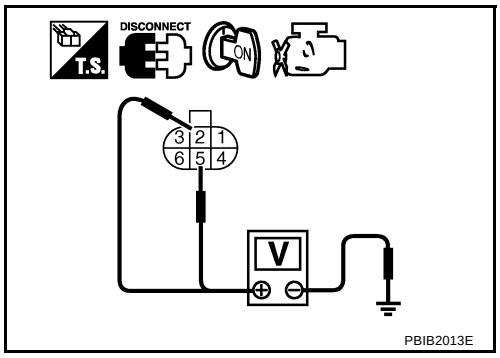
1. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between EGR volume control valve and ECM
- Harness for open or short between EGR volume control valve and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve terminal
25	1
26	6
27	3
28	4

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EGR VOLUME CONTROL VALVE

Refer to EC-1236, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace EGR volume control valve.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS0021S

EGR VOLUME CONTROL VALVE

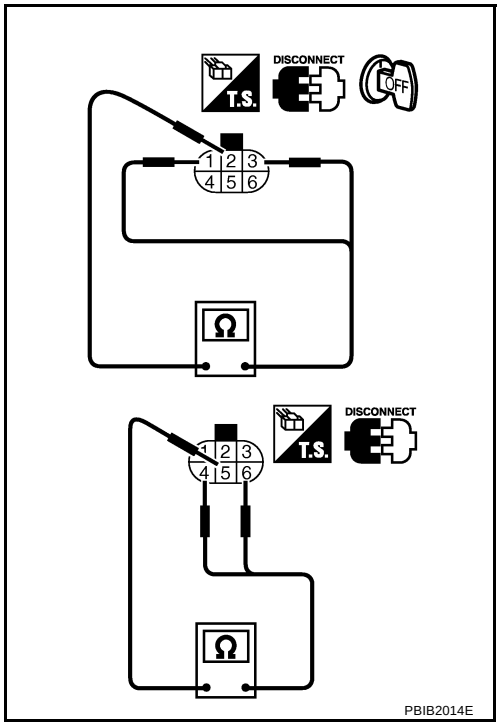
With CONSULT-II

1. Disconnect EGR volume control valve harness connector.
2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17

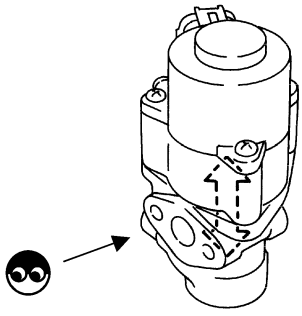
If NG, replace EGR volume control valve.
If OK, go to next step.

3. Remove EGR volume control valve from cylinder head.
4. Reconnect EGR volume control valve harness connector.
5. Turn ignition switch ON.



6. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
CKPS-RPM (TDC)	XXX rpm



If NG, replace the EGR volume control valve.

NOTE:
When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.

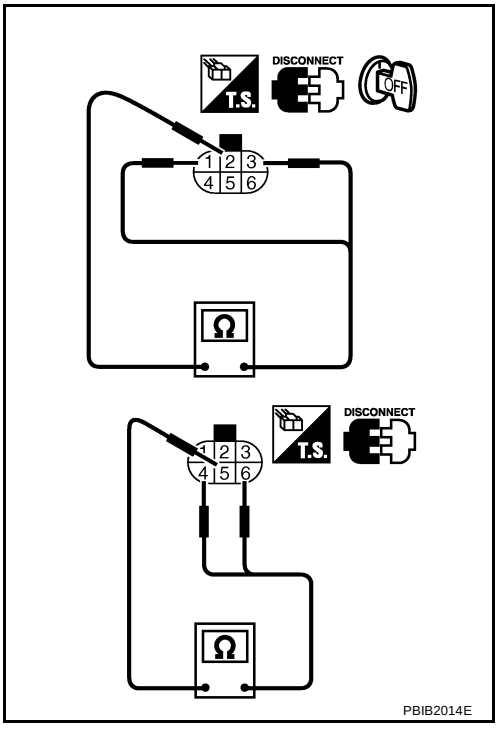
Without CONSULT-II

1. Disconnect EGR volume control valve harness connector.
2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17

If NG, replace EGR volume control valve.
If OK, go to next step.

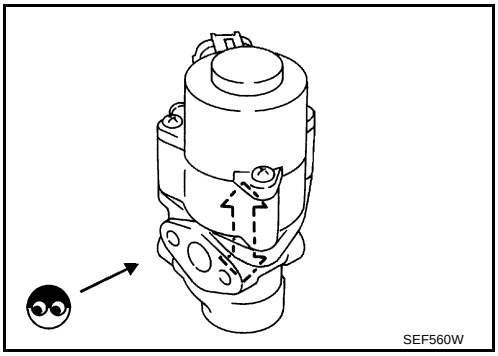
3. Remove EGR volume control valve from cylinder head.
4. Reconnect EGR volume control valve harness connector.
5. Turn ignition switch ON and OFF.



PBIB2014E

6. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
   If NG, replace EGR volume control valve.

   NOTE:
   When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.


SEF560W

BBS0021T

Removal and Installation

EGR VOLUME CONTROL VALVE

Refer to EM-145, "INTAKE MANIFOLD" .

DTC P0427, P0428 FRONT EXHAUST GAS TEMPERATURE SENSOR

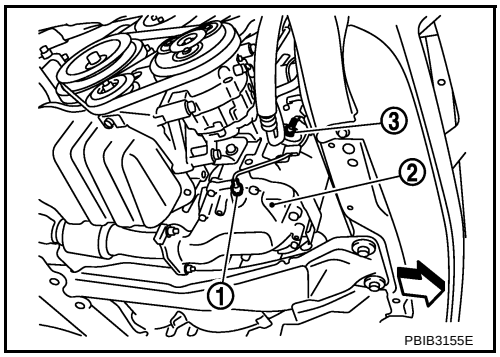
PFP:22630

Description

BBS002JX

Front exhaust gas temperature sensor (3) is installed before DPF and senses exhaust gas temperature. Front exhaust gas temperature sensor uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

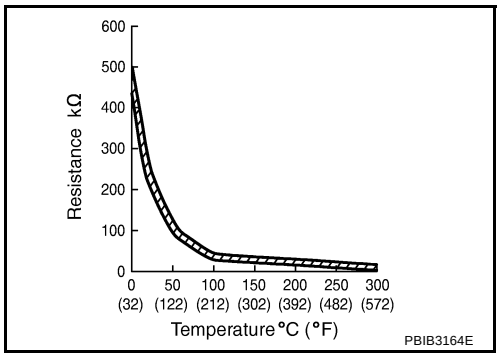
- ⇦: Vehicle front
- Rear exhaust gas temperature sensor (1)
- Oxidation Catalyst with DPF (2)



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	5.2	242
100 (212)	5.1	33.6
350 (662)	3.5	1.71
500 (992)	2.3	0.673

*: This data is reference value and is measured between ECM terminal 56 (Front exhaust gas temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

BBS002JY

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0427 0427	Front exhaust gas temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Front exhaust gas temperature sensor
P0428 0428	Front exhaust gas temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

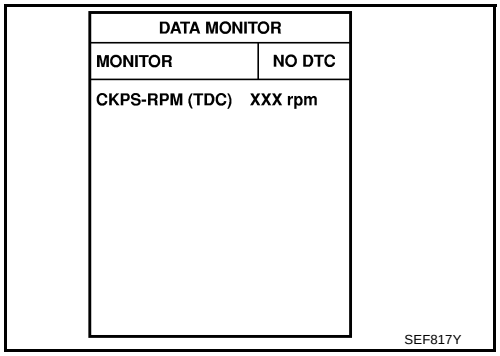
BBS002JZ

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1241, "Diagnostic Procedure" .



WITH GST

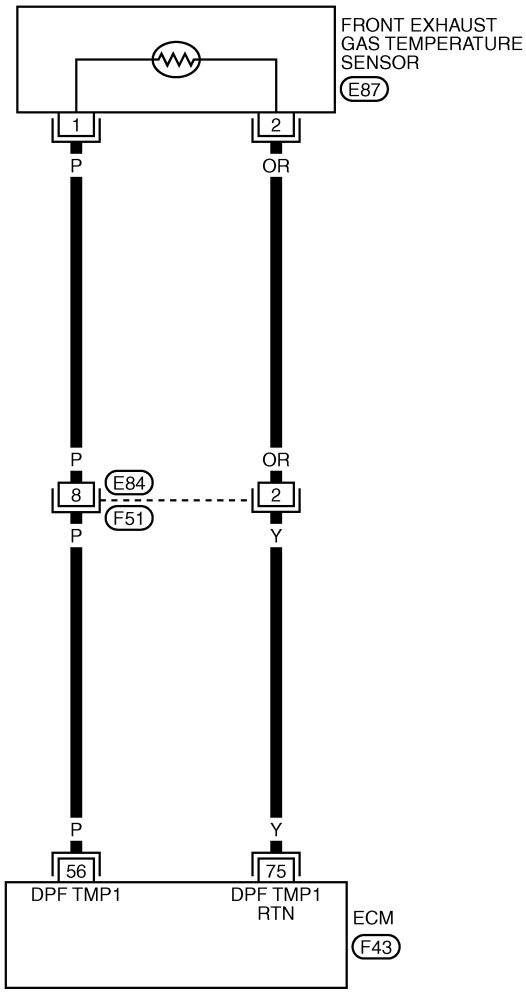
Follow the procedure “WITH CONSULT-II” above.

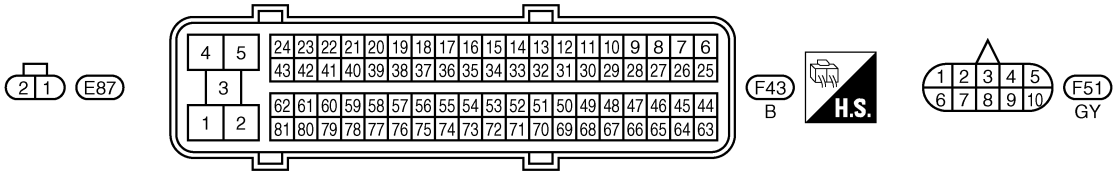
Wiring Diagram

BBS002K0

EC-FEGTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





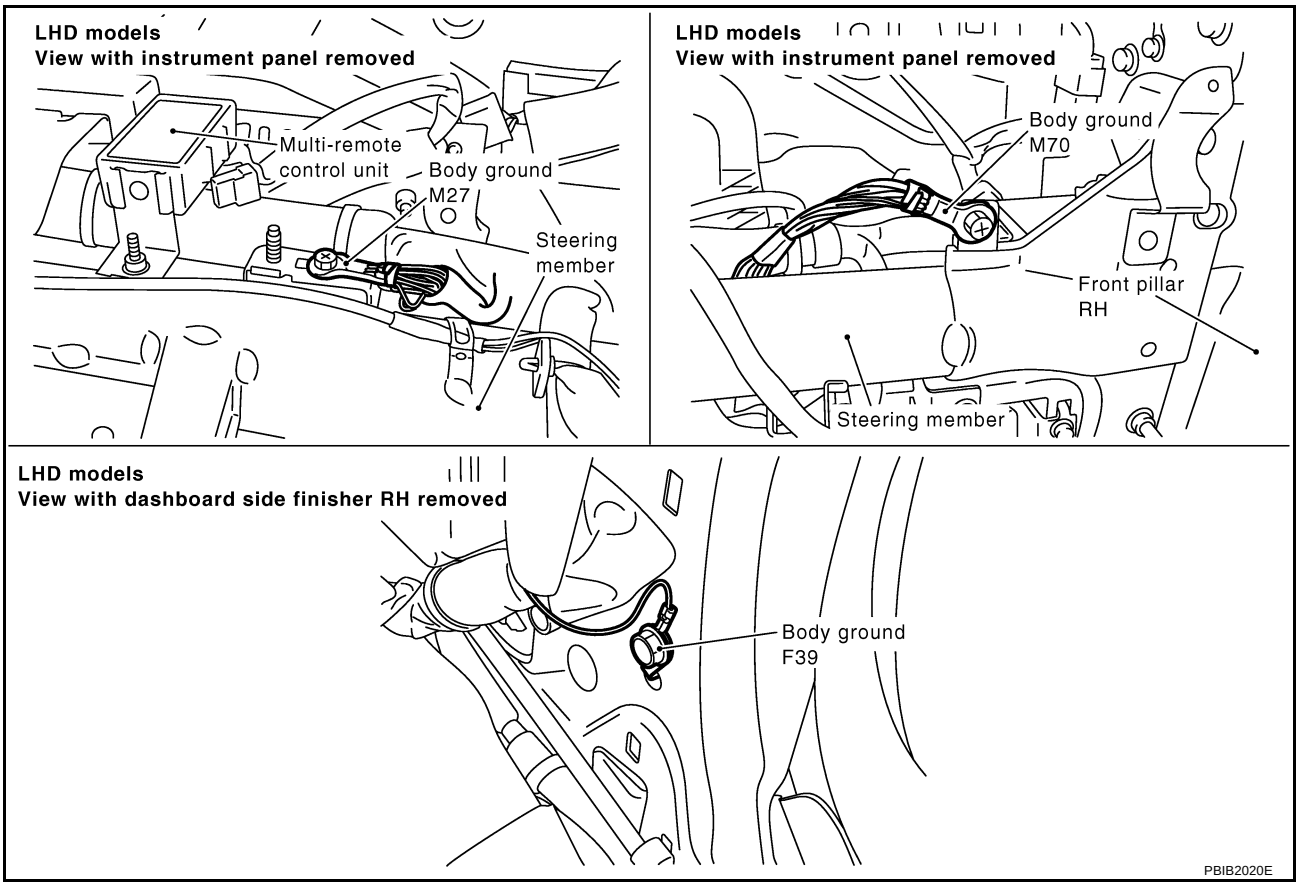
TBWB0919E

Diagnostic Procedure

BBS002K1

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

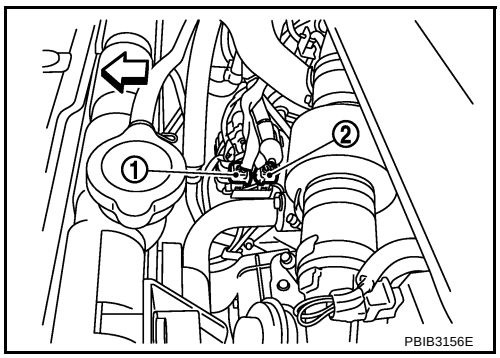


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

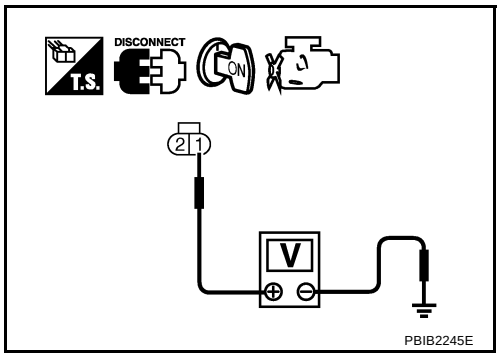
2. CHECK FRONT EXHAUST GAS TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect front exhaust gas temperature sensor harness connector (white) (2).
- ⇦: Vehicle front
- Rear exhaust gas temperature sensor harness connector (black) (1)
2. Turn ignition switch ON.



3. Check voltage between front exhaust gas temperature sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECTED MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between front exhaust gas temperature sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FRONT EXHAUST GAS TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between front exhaust gas temperature sensor terminal 2 and ECM terminal 75. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECTED MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between front exhaust gas temperature sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FRONT EXHAUST GAS TEMPERATURE SENSOR

Refer to EC-1243, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace front exhaust gas temperature sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

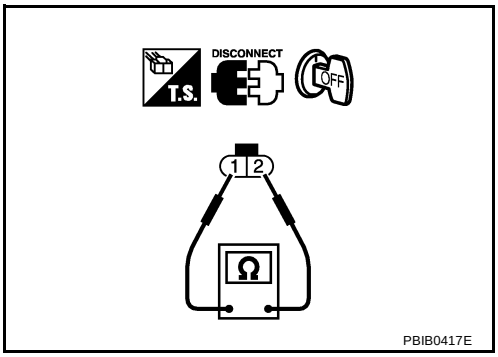
BBS002K2

FRONT EXHAUST GAS TEMPERATURE SENSOR

1. Check resistance between front exhaust gas temperature sensor terminals 1 and 2 under the following conditions.

Front exhaust gas temperature °C (°F)	Resistance (Ω)
More than 20 (68)	Except 0 or ∞

2. If NG, replace front exhaust gas temperature sensor.



Removal and Installation

BBS002K3

FRONT EXHAUST GAS TEMPERATURE SENSOR

Refer to EM-150, "CATALYST" .

DTC P0437, P0438 REAR EXHAUST GAS TEMPERATURE SENSOR

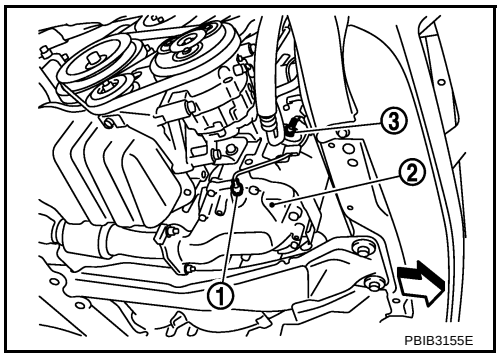
PFP:22630

Description

BBS002K4

Rear exhaust gas temperature sensor (1) is installed after DPF and senses exhaust gas temperature. Rear exhaust gas temperature sensor uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.

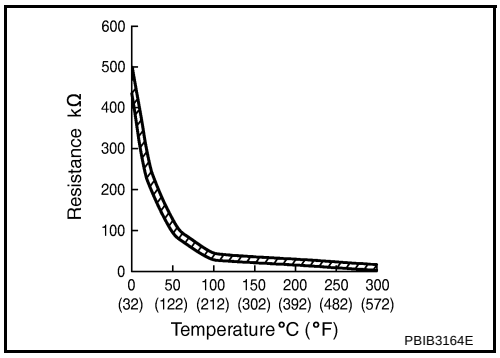
- ⇦: Vehicle front
- Oxidation Catalyst with DPF (2)
- Front exhaust gas temperature sensor (3)



<Reference data>

Engine coolant temperature °C (°F)	Voltage* V	Resistance kΩ
20 (68)	5.2	242
100 (212)	5.1	33.6
350 (662)	3.5	1.71
500 (992)	2.3	0.673

*: This data is reference value and is measured between ECM terminal 57 (Rear exhaust gas temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

BBS002K5

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0437 0437	Rear exhaust gas temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Rear exhaust gas temperature sensor
P0438 0438	Rear exhaust gas temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

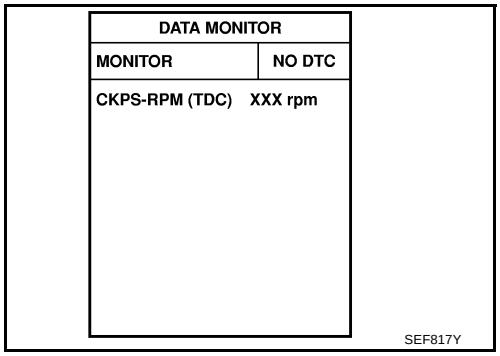
BBS002K6

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1247, "Diagnostic Procedure" .



WITH GST

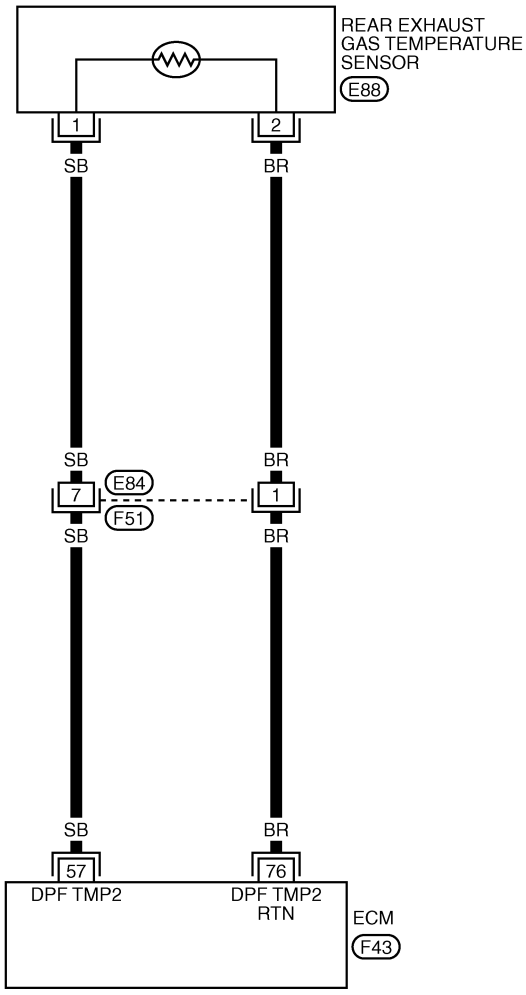
Follow the procedure “WITH CONSULT-II” above.

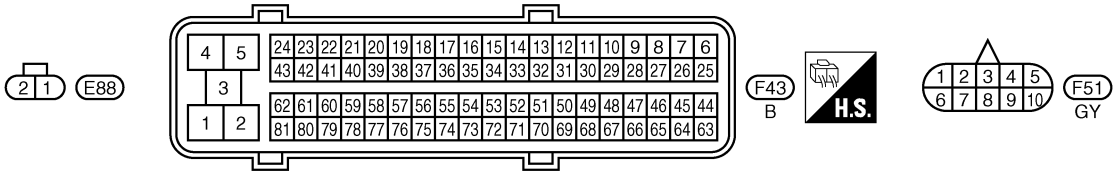
Wiring Diagram

BBS002K7

EC-REGTS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





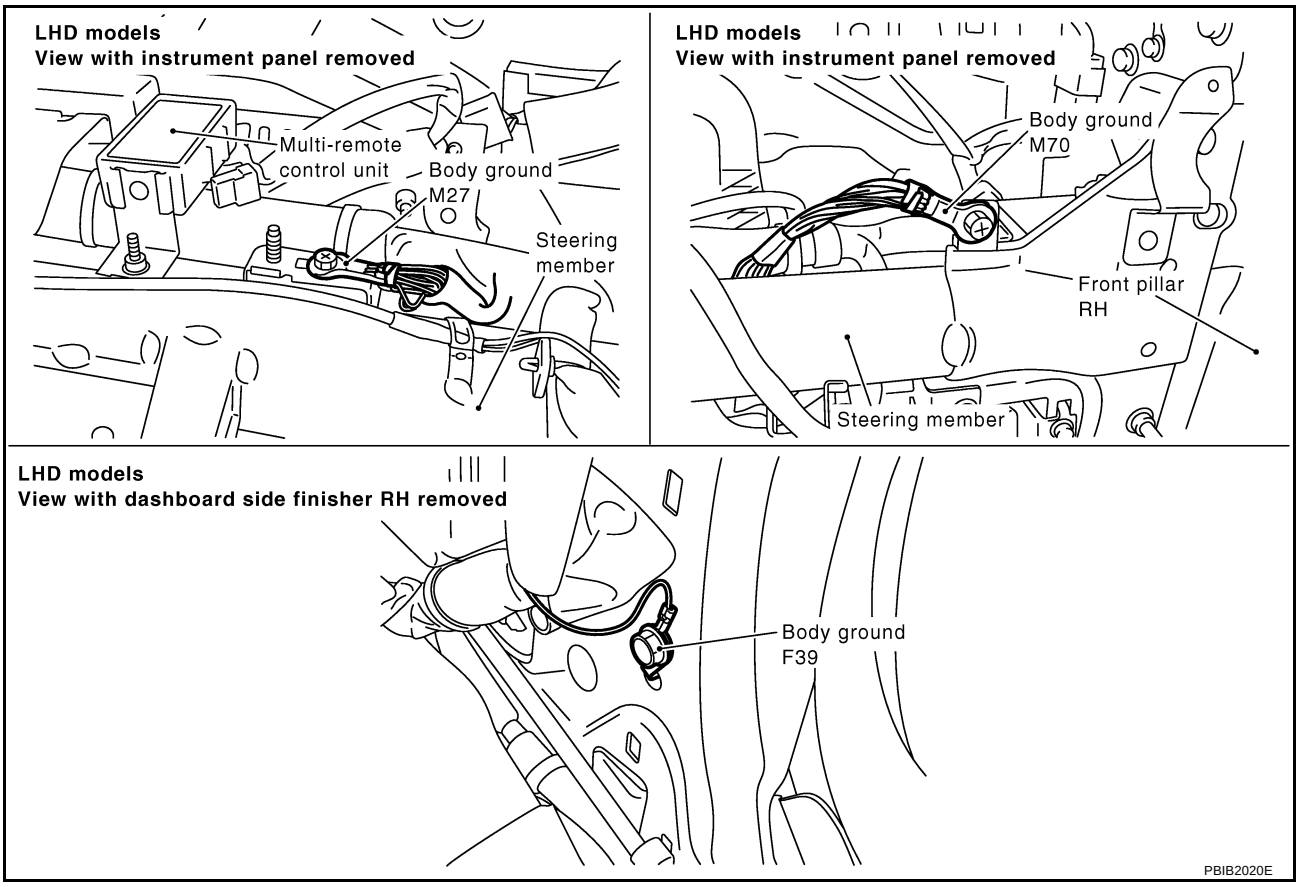
TBWB0920E

Diagnostic Procedure

BBS002K8

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

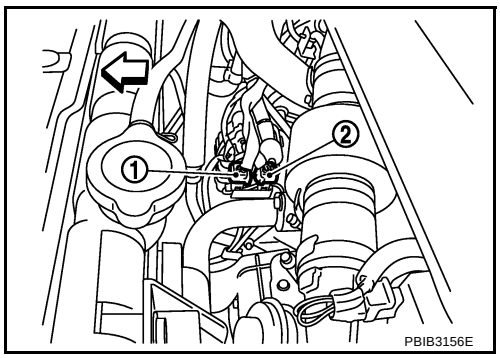


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

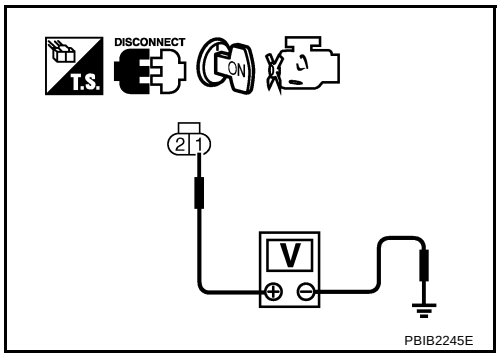
2. CHECK REAR EXHAUST GAS TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect rear exhaust gas temperature sensor harness connector (black) (1).
   - ⇦: Vehicle front
   - Front exhaust gas temperature sensor harness connector (white) (2)
2. Turn ignition switch ON.



3. Check voltage between rear exhaust gas temperature sensor terminal 1 and ground with CONSULT-II or tester.

   Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECTED MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between rear exhaust gas temperature sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK REAR EXHAUST GAS TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between rear exhaust gas temperature sensor terminal 2 and ECM terminal 76. Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECTED MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between rear exhaust gas temperature sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK REAR EXHAUST GAS TEMPERATURE SENSOR

Refer to EC-1249, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace rear exhaust gas temperature sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

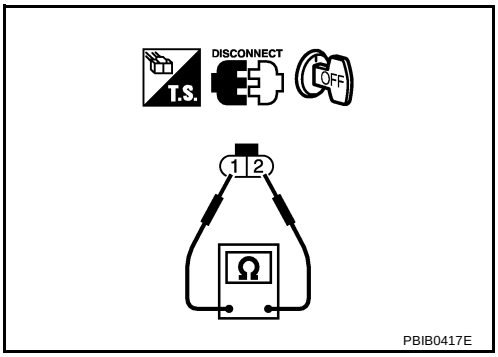
BBS002K9

REAR EXHAUST GAS TEMPERATURE SENSOR

1. Check resistance between rear exhaust gas temperature sensor terminals 1 and 2 under the following conditions.

Rear exhaust gas temperature °C (°F)	Resistance (Ω)
More than 20 (68)	Except 0 or ∞

2. If NG, replace rear exhaust gas temperature sensor.



PBIB0417E

Removal and Installation

BBS002KA

REAR EXHAUST GAS TEMPERATURE SENSOR

Refer to EM-150, "CATALYST" .

DTC P0471 DIFFERENTIAL EXHAUST PRESSURE SENSOR

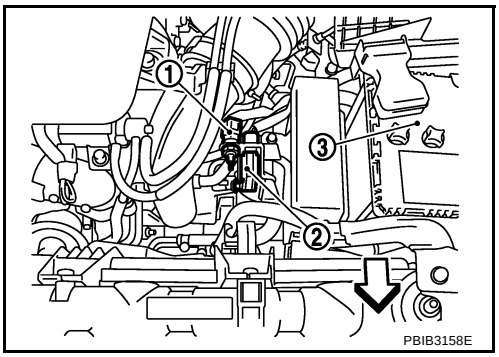
PFP:22771

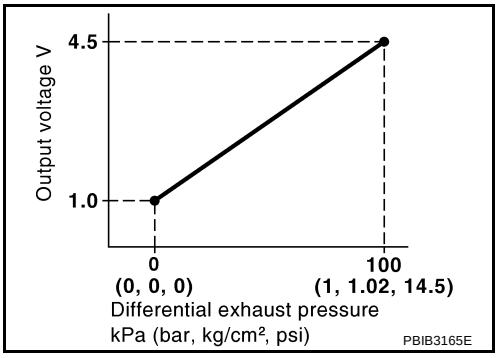
Component Description

BBS002KB

Differential exhaust pressure sensor (2) is connected “oxidation catalyst with DPF” with differential pressure sensor tubes (upstream and downstream). Differential exhaust pressure sensor measures the difference between the exhaust pressure before and after the DPF. Differential exhaust pressure sensor converts the difference into a voltage signal. ECM receives the signal and estimates the amount of particulate matter in DPF.

- ⇦: Vehicle front
- Engine room air temperature sensor (1)
- Battery (3)





CONSULT-II Reference Value in Data Monitor Mode

BBS002ML

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
DF EX PRES SE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	Approx. 2.5 kPa
		2,000 rpm	Approx. 3.5 kPa

On Board Diagnosis Logic

BBS002KC

This self-diagnosis has the one trip detection logic.
The MI will not light up for this diagnosis.

NOTE:
If DTC P0471 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0471 0471	Differential exhaust pressure sensor circuit range/ performance	The output voltage of the differential exhaust pressure sensor remains within the specified range while engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Differential exhaust pressure sensor

DTC Confirmation Procedure

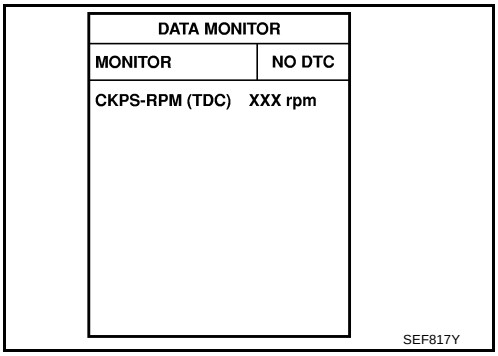
BBS002KD

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine.
4. Keep the engine speed about 2,000 rpm for 5 seconds.
5. Let engine idle.
6. Perform step 4 and 5 for 3 times.
7. If DTC is detected, go to EC-1254, "Diagnostic Procedure" .



WITH GST

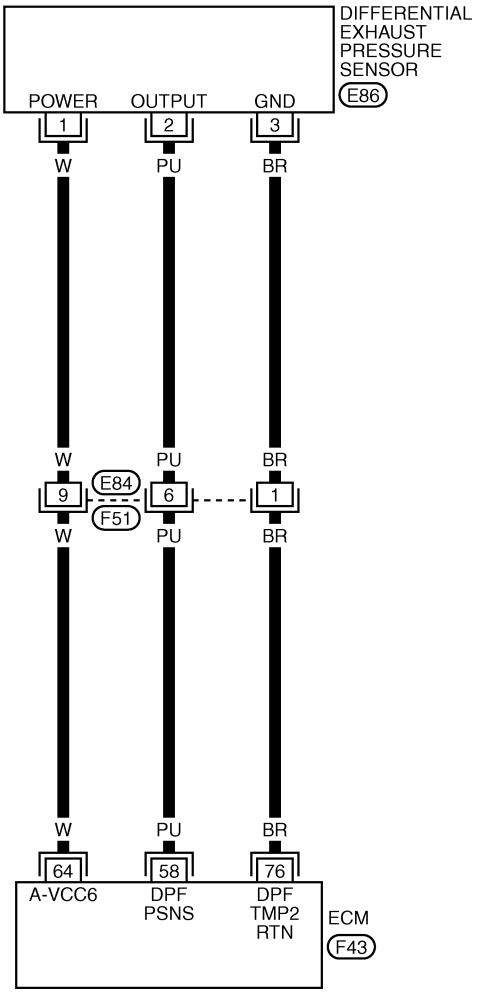
Follow the procedure “WITH CONSULT-II” above.

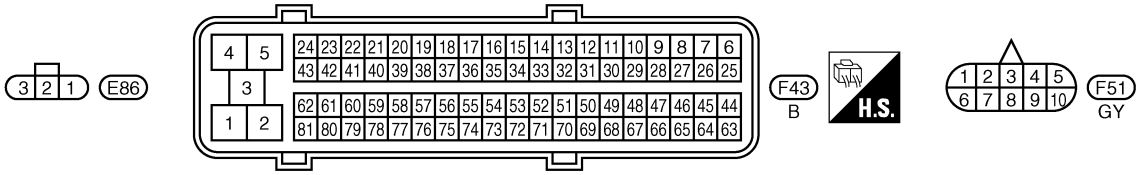
Wiring Diagram

BBS002KE

EC-DEPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWB0917E

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

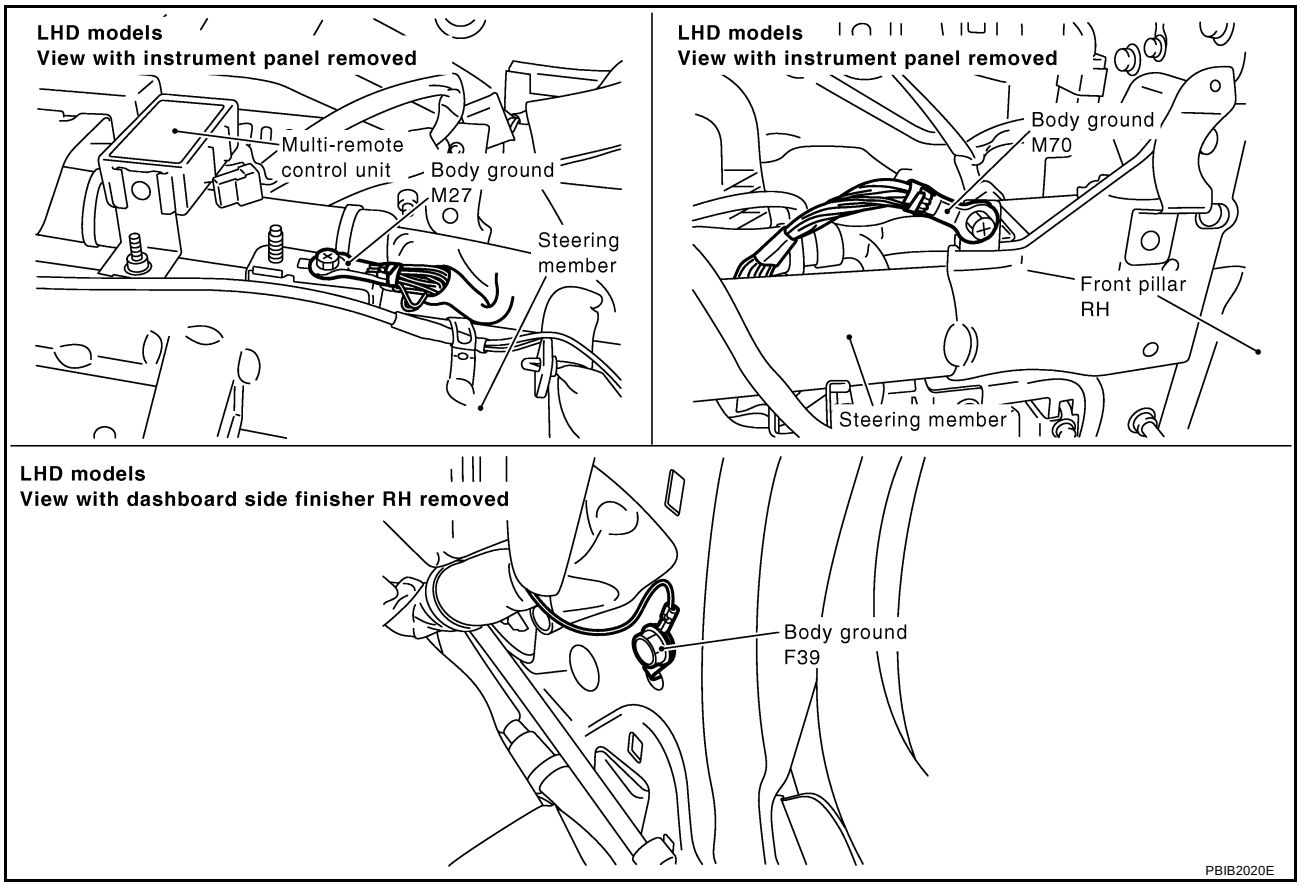
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	PU	Differential exhaust pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 1.3V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 1.5V
64	W	Sensor power supply (Turbocharger boost sensor / Differential exhaust pressure sensor / Throttle position sensor / Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
76	BR	Sensor ground (Differential exhaust pressure sensor / Rear exhaust gas temperature sensor)	**[Ignition switch: ON]**	Approximately 0.3V

Diagnostic Procedure

BBS002KF

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

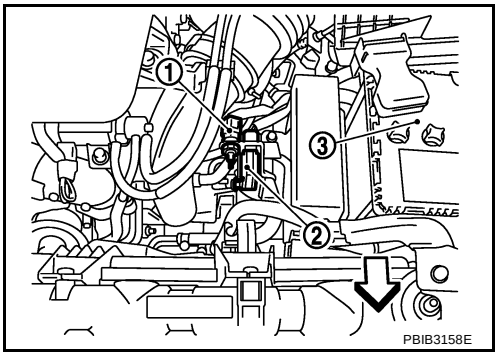


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

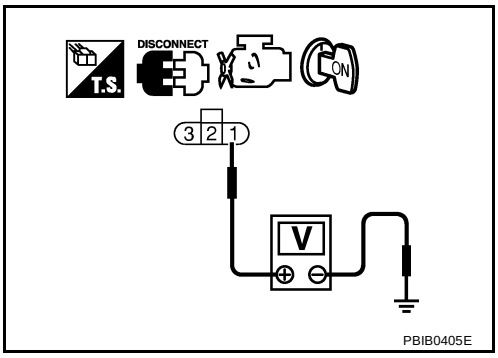
2. CHECK DIFFERENTIAL EXHAUST PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect differential exhaust pressure sensor (2) harness connector.
- ⇦: Vehicle front
- Engine room air temperature sensor (1)
- Battery (3)
2. Turn ignition switch ON.



3. Check voltage between differential exhaust pressure sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECTED MALFUNCTIONING PART

Check the following.
- Harness connectors E84, F51
- Harness for open or short between differential exhaust pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK DIFFERENTIAL EXHAUST PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between differential exhaust pressure sensor terminal 3 and ECM terminal 76. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECTED MALFUNCTIONING PART

Check the following.
- Harness connectors E84, F51
- Harness for open or short between differential exhaust pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK DIFFERENTIAL EXHAUST PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between differential exhaust pressure sensor terminal 2 and ECM terminal 58. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECTED MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between differential exhaust pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK DIFFERENTIAL EXHAUST PRESSURE SENSOR

Refer to EC-1256, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace differential exhaust pressure sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

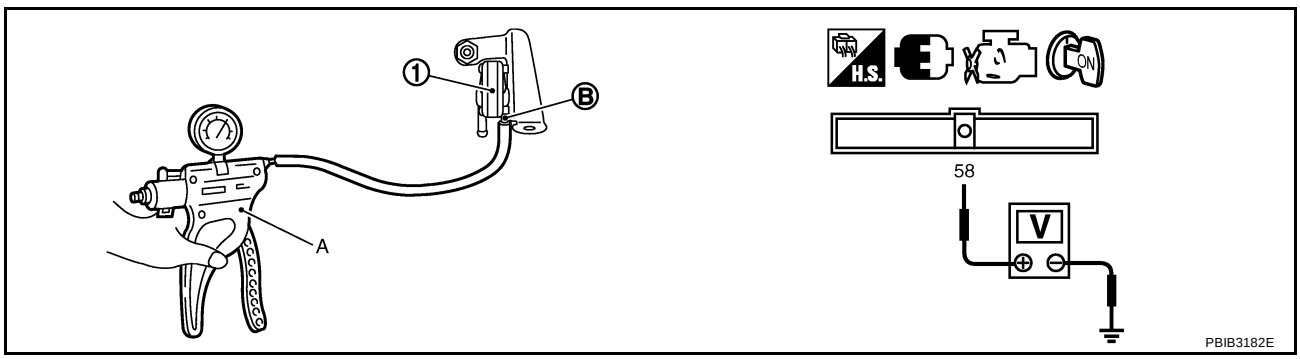
BBS002KG

DIFFERENTIAL EXHAUST PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove differential exhaust pressure sensor tube (Upstream and downstream).

CAUTION:
Never remove the bracket of differential exhaust pressure sensor.

3. Install pressure pump to differential exhaust pressure sensor hose connector (Upstream side).
4. Turn ignition switch ON and check output voltage between ECM terminal 58 and ground under the following conditions.



1. Differential exhaust pressure sensor
A. Pressure pump
B. Differential exhaust pressure sensor hose connector (Upstream side)

Applied pressure kPa (mbar, mmHg, inHg)	Voltage (V)
Not applied	1.0
100 (1,000, 750, 29.53)	4.5

CAUTION:

Do not apply pressure over 150 kPa (1,500 mbar, 1,125 mmHg, 44.29 inHg)

5. If NG, replace differential exhaust pressure sensor.

Removal and Installation

BBS002KH

DIFFERENTIAL EXHAUST PRESSURE SENSOR

Refer to EM-150, "CATALYST" .

DTC P0472, P0473 DIFFERENTIAL EXHAUST PRESSURE SENSOR

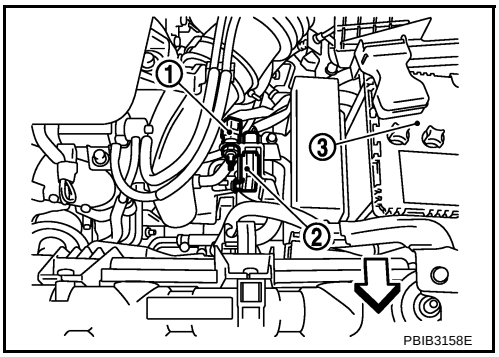
PFP:22771

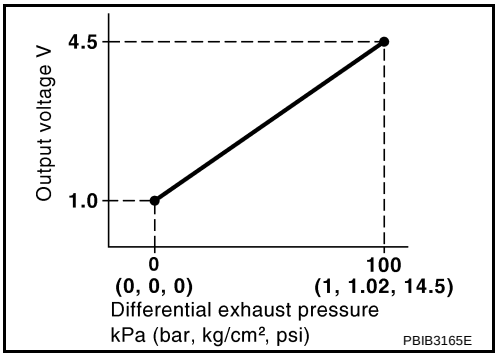
Description

BBS002KI

Differential exhaust pressure sensor (2) is connected “oxidation catalyst with DPF” with differential pressure sensor tubes (upstream and downstream). Differential exhaust pressure sensor measures the difference between the exhaust pressure before and after the DPF. Differential exhaust pressure sensor converts the difference into a voltage signal. ECM receives the signal and estimates the amount of particulate matter in DPF.

- ⇦: Vehicle front
- Engine room air temperature sensor (1)
- Battery (3)





CONSULT-II Reference Value in Data Monitor Mode

BBS002MH

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
DF EX PRES SE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	Approx. 2.5 kPa
		2,000 rpm	Approx. 3.5 kPa

On Board Diagnosis Logic

BBS002KJ

NOTE:
If DTC P0472 or P0473 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0472 0472	Differential exhaust pressure sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Differential exhaust pressure sensor
P0473 0473	Differential exhaust pressure sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

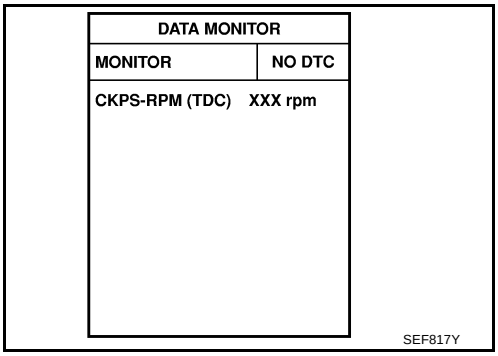
BBS002KK

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1262, "Diagnostic Procedure" .



WITH GST

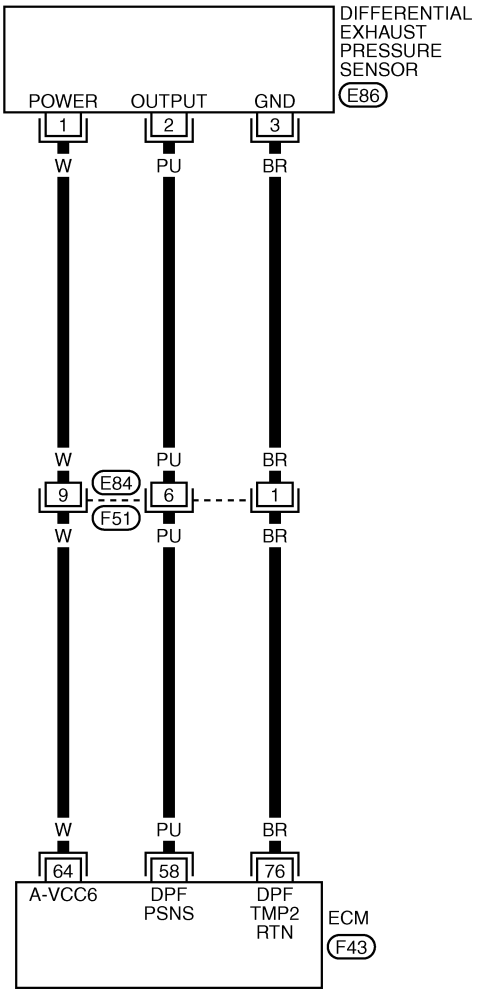
Follow the procedure “WITH CONSULT-II” above.

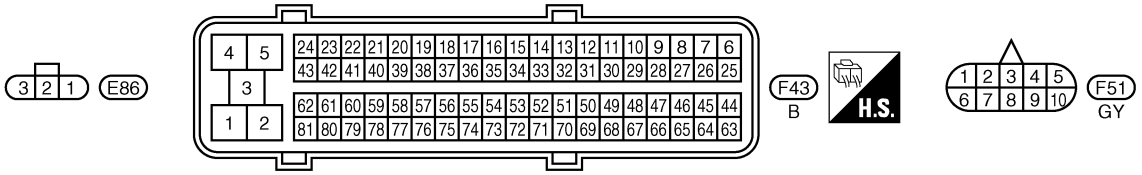
Wiring Diagram

BBS002KL

EC-DEPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWB0917E

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

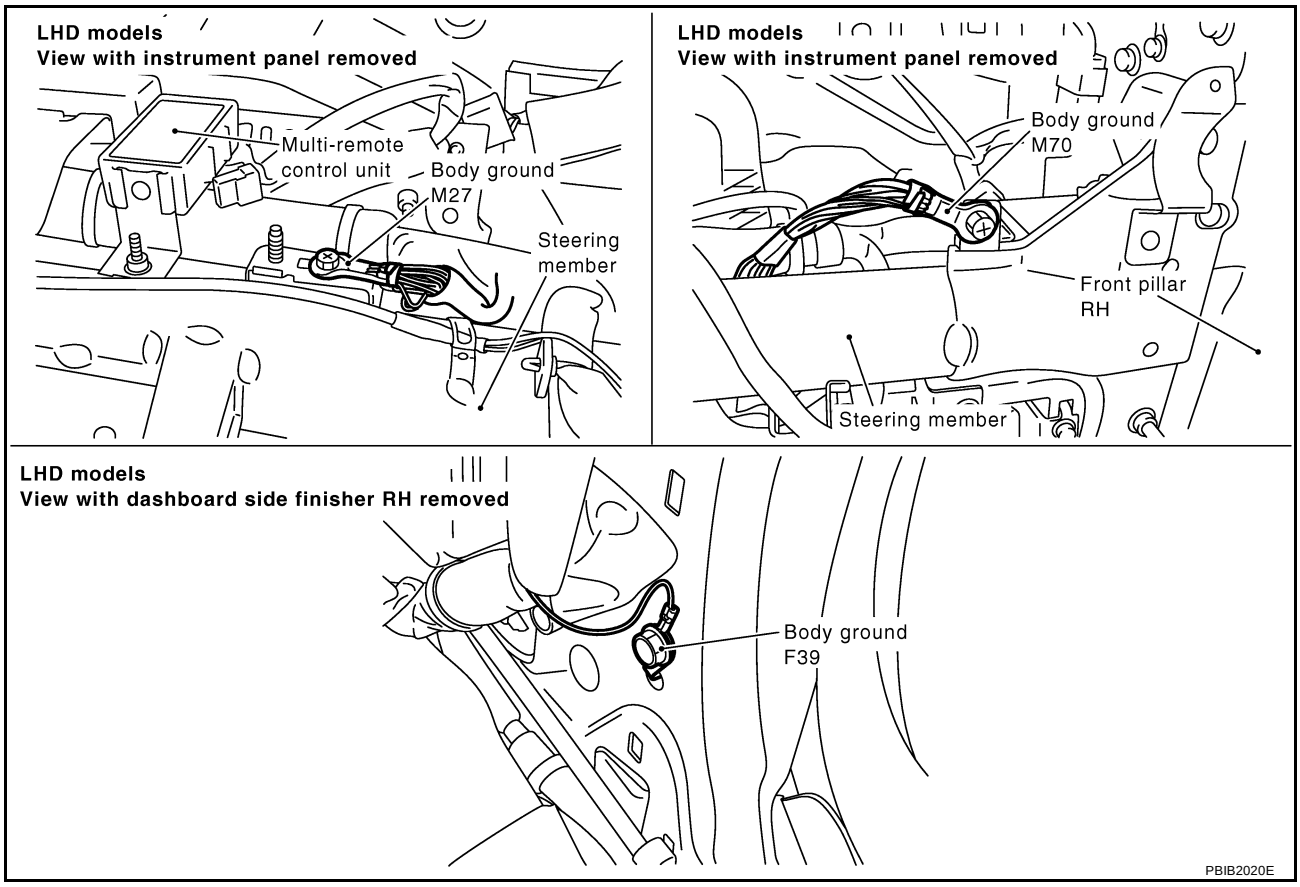
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
58	PU	Differential exhaust pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 1.3V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	Approximately 1.5V
64	W	Sensor power supply (Turbocharger boost sensor / Differential exhaust pressure sensor / Throttle position sensor / Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
76	BR	Sensor ground (Differential exhaust pressure sensor / Rear exhaust gas temperature sensor)	**[Ignition switch: ON]**	Approximately 0.3V

Diagnostic Procedure

BBS002KM

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

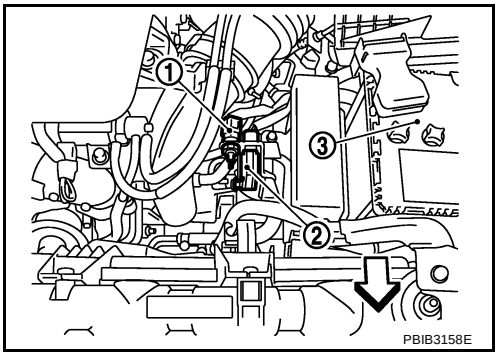


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

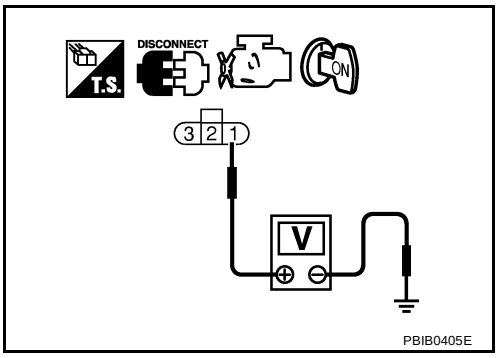
2. CHECK DIFFERENTIAL EXHAUST PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect differential exhaust pressure sensor (2) harness connector.
   - ⇦: Vehicle front
   - Engine room air temperature sensor (1)
   - Battery (3)
2. Turn ignition switch ON.



3. Check voltage between differential exhaust pressure sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECTED MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between differential exhaust pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK DIFFERENTIAL EXHAUST PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between differential exhaust pressure sensor terminal 3 and ECM terminal 76. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECTED MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between differential exhaust pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK DIFFERENTIAL EXHAUST PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between differential exhaust pressure sensor terminal 2 and ECM terminal 58. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. DETECTED MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between differential exhaust pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

8. CHECK DIFFERENTIAL EXHAUST PRESSURE SENSOR

Refer to EC-1264, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> Replace differential exhaust pressure sensor.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

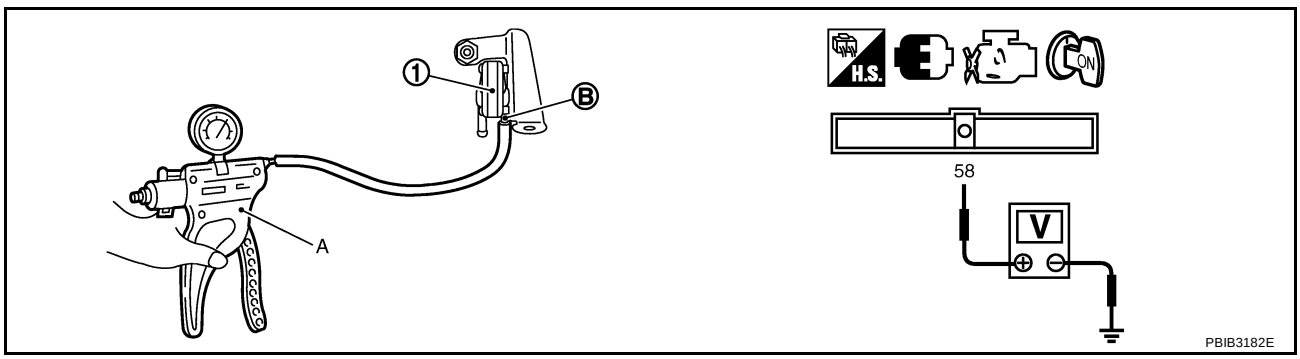
BBS002KN

DIFFERENTIAL EXHAUST PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove differential exhaust pressure sensor tube (Upstream and downstream).

CAUTION:
Never remove the bracket of differential exhaust pressure sensor.

3. Install pressure pump to differential exhaust pressure sensor hose connector (Upstream side).
4. Turn ignition switch ON and check output voltage between ECM terminal 58 and ground under the following conditions.



1. Differential exhaust pressure sensor
A. Pressure pump
B. Differential exhaust pressure sensor hose connector (Upstream side)

Applied pressure kPa (mbar, mmHg, inHg)	Voltage (V)
Not applied	1.0
100 (1,000, 750, 29.53)	4.5

CAUTION:

Do not apply pressure over 150 kPa (1,500 mbar, 1,125 mmHg, 44.29 inHg)

5. If NG, replace differential exhaust pressure sensor.

Removal and Installation

BBS002KO

DIFFERENTIAL EXHAUST PRESSURE SENSOR

Refer to EM-150, "CATALYST" .

DTC P0478 DIFFERENTIAL EXHAUST PRESSURE SENSOR

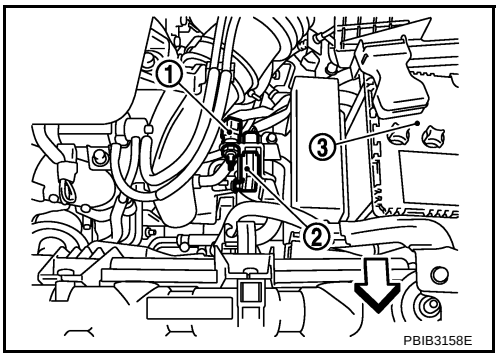
PFP:22771

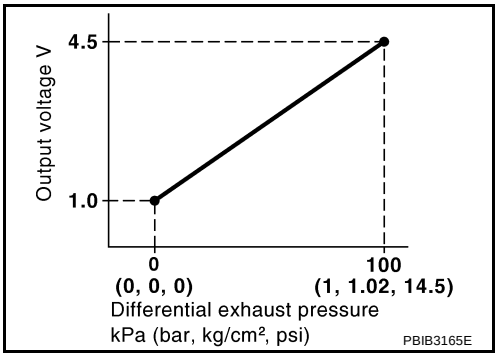
Component Description

BBS002KP

Differential exhaust pressure sensor (2) is connected “oxidation catalyst with DPF” with differential pressure sensor tubes (upstream and downstream). Differential exhaust pressure sensor measures the difference between the exhaust pressure before and after the DPF. Differential exhaust pressure sensor converts the difference into a voltage signal. ECM receives the signal and estimates the amount of particulate matter in DPF.

- ⇦: Vehicle front
- Engine room air temperature sensor (1)
- Battery (3)





CONSULT-II Reference Value in Data Monitor Mode

BBS002MI

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
DF EX PRES SE	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	Approx. 2.5 kPa
		2,000 rpm	Approx. 3.5 kPa

On Board Diagnosis Logic

BBS002KQ

This self-diagnosis has the one trip detection logic.
MI will not light up for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0478 0478	Differential exhaust pressure sensor (Upstream)	Differential exhaust pressure sensor (Upstream) malfunction.	● Differential exhaust pressure sensor ● Differential exhaust pressure sensor tube (Upstream) leaks ● Differential pressure sensor tube installed incorrectly

DTC Confirmation Procedure

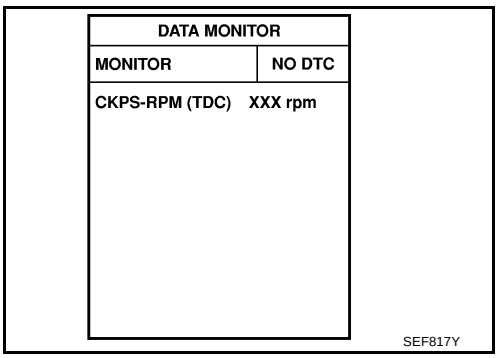
BBS002KR

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 1 second.
4. If DTC is detected, go to EC-1267, "Diagnostic Procedure" .



WITH GST

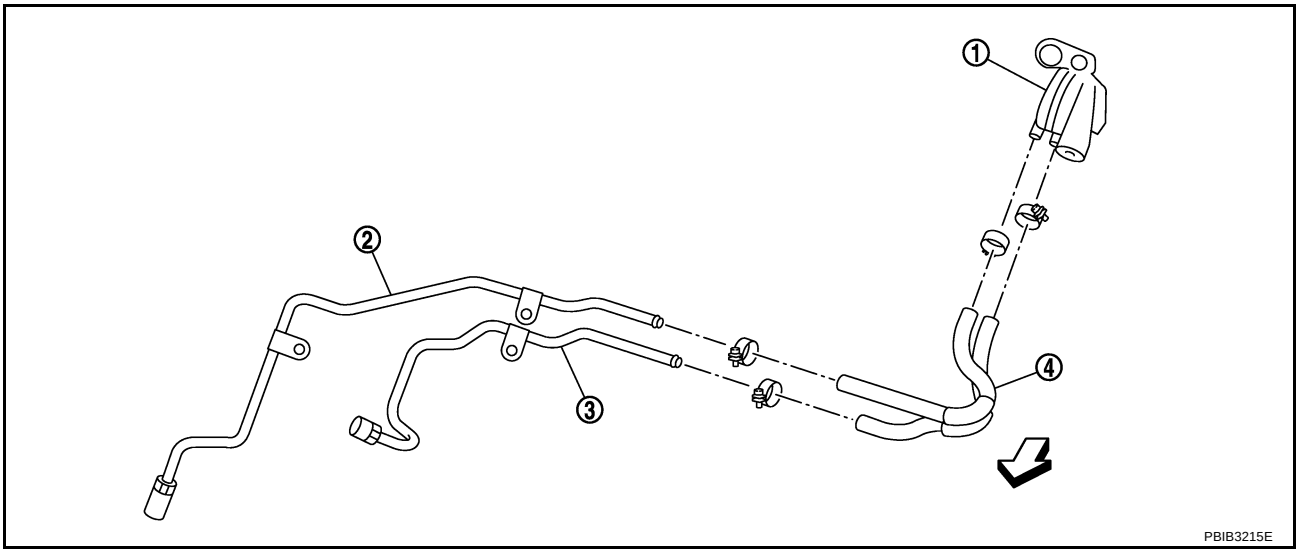
Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS002KS

1. CHECK DIFFERENTIAL EXHAUST PRESSURE TUBE (UPSTREAM)

1. Remove differential exhaust pressure sensor tube (Upstream).
2. Check differential exhaust pressure tube (Upstream) for crack, clogging, improper connection or disconnection.



⇦ : Vehicle front

1. Differentia exhaust pressure sensor
2. Differential exhaust pressure sensor tube (downstream)
3. Differential exhaust pressure sensor tube (upstream)
4. Differential exhaust pressure sensor hose

OK or NG

OK >> GO TO 2.
NG >> Repair differential exhaust pressure tube (Upstream).

2. CHECK DIFFERENTIAL EXHAUST PRESSURE SENSOR

Refer to EC-1268, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace differential exhaust pressure sensor.

3. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

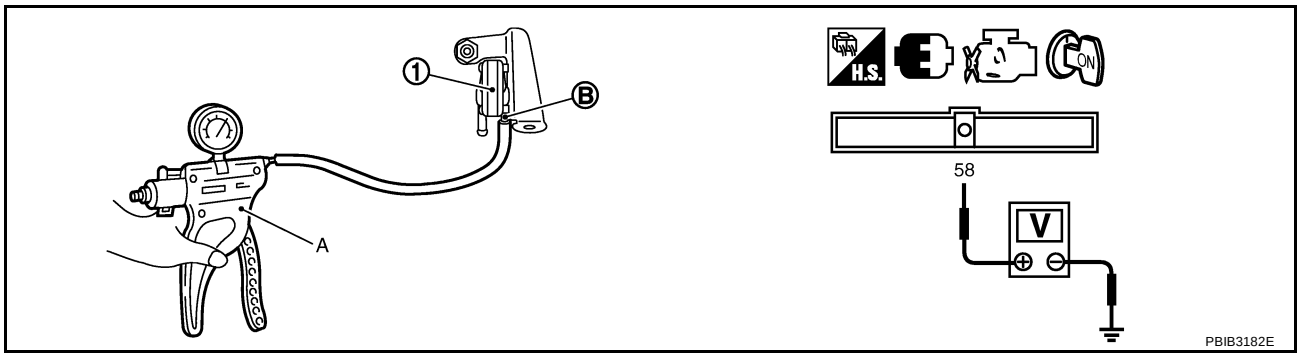
Component Inspection

BBS002KT

DIFFERENTIAL EXHAUST PRESSURE SENSOR

1. Turn ignition switch OFF.
2. Remove differential exhaust pressure sensor tube (Upstream and downstream).

   CAUTION:
   Never remove the bracket of differential exhaust pressure sensor.
3. Install pressure pump to differential exhaust pressure sensor hose connector (Upstream side).
4. Turn ignition switch ON and check output voltage between ECM terminal 58 and ground under the following conditions.



1. Differential exhaust pressure sensor
A. Pressure pump
B. Differential exhaust pressure sensor hose connector (Upstream side)

Applied pressure kPa (mbar, mmHg, inHg)	Voltage (V)
Not applied	1.0
100 (1,000, 750, 29.53)	4.5

CAUTION:
Do not apply pressure over 150 kPa (1,500 mbar, 1,125 mmHg, 44.29 inHg)

5. If NG, replace differential exhaust pressure sensor.

Removal and Installation

BBS002KU

DIFFERENTIAL EXHAUST PRESSURE SENSOR

Refer to EM-150, "CATALYST" .

DTC P0501 ASCD VEHICLE SPEED SENSOR

PFP:24810

Component Description

BBS0021U

The ECM receives vehicle speed sensor signal via CAN communication line. It is sent from combination meter. The ECM uses this signal for ASCD control. Refer to EC-1454, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

BBS0021V

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

NOTE:

- **If DTC P0501 is displayed with DTC U1000 first perform the trouble diagnosis for DTC U1000. Refer to EC-1068, "DTC U1000 CAN COMMUNICATION LINE" .**
- **If DTC P0501 is displayed with DTC P0606, first perform the trouble diagnosis for DTC P0606. Refer to EC-1298, "DTC P0606 ECM".**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0501 0501	Vehicle speed sensor range/performance	A change of vehicle speed signal is excessively large during specified time.	● Harness or connectors (The CAN communication line is open or shorted.) ● Combination meter ● ABS actuator and electric unit (control unit) (models without ESP) ● ESP/TCS/ABS control unit (models with ESP) ● Wheel sensor ● ECM

DTC Confirmation Procedure

BBS0021W

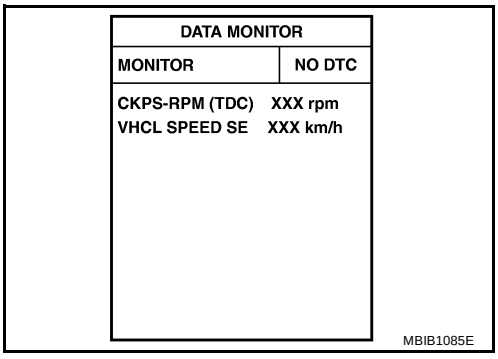
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine (ESP switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 10 km/h (6 MPH) for at least 5 seconds.
4. If DTC is detected, go to EC-1270, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS0021X

1. CHECK DTC WITH ESP/TCS/ABS CONTROL UNIT (MODELS WITH ESP) OR “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)” (MODELS WITHOUT ESP)

Refer to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP) or BRC-9, "TROUBLE DIAGNOSIS" (models without ESP).

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

DTC P0502 ASCD VEHICLE SPEED SENSOR

PFP:24810

Component Description

BBS0021Y

The ECM receives vehicle speed sensor signal via CAN communication line. It is sent from combination meter. The ECM uses this signal for ASCD control. Refer to EC-1454, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

BBS0021Z

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

NOTE:

- **If DTC P0502 is displayed with DTC U1000 first perform the trouble diagnosis for DTC U1000. Refer to EC-1068, "DTC U1000 CAN COMMUNICATION LINE" .**
- **If DTC P0502 is displayed with DTC P0606, first perform the trouble diagnosis for DTC P0606. Refer to EC-1298, "DTC P0606 ECM".**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0502 0502	Vehicle speed sensor circuit low input	Vehicle speed signal is excessively low compared with the driving condition.	● Harness or connectors (The CAN communication line is open or shorted.) ● Combination meter ● ABS actuator and electric unit (control unit) (models without ESP) ● ESP/TCS/ABS control unit (models with ESP) ● Wheel sensor ● ECM

DTC Confirmation Procedure

BBS00220

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

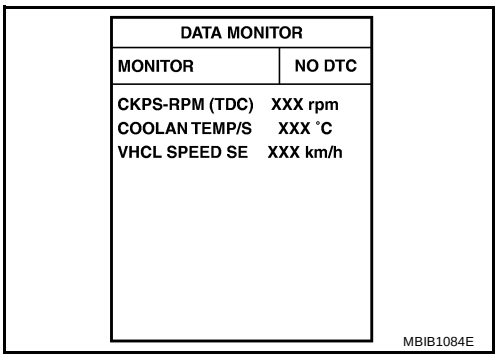
TESTING CONDITION:
Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature (ESP switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Maintain the following condition for at least 5 seconds.

CKPS·RPM (TDC)	More than 2,800 rpm
COOLAN TEMP/S	More than 60°C (140 °F)
Clutch pedal	Fully released
Shift lever	1st position

4. If DTC is detected, go to EC-1272, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS00221

1. CHECK DTC WITH ESP/TCS/ABS CONTROL UNIT (MODELS WITH ESP) OR “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)” (MODELS WITHOUT ESP)

Refer to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP) or BRC-9, "TROUBLE DIAGNOSIS" (models without ESP).

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

DTC P0503 ASCD VEHICLE SPEED SENSOR

PFP:24810

Component Description

BBS00222

The ECM receives vehicle speed sensor signal via CAN communication line. It is sent from combination meter. The ECM uses this signal for ASCD control. Refer to EC-1454, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

BBS00223

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

NOTE:

- **If DTC P0503 is displayed with DTC U1000 first perform the trouble diagnosis for DTC U1000. Refer to EC-1068, "DTC U1000 CAN COMMUNICATION LINE" .**
- **If DTC P0503 is displayed with DTC P0606, first perform the trouble diagnosis for DTC P0606. Refer to EC-1298, "DTC P0606 ECM".**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0503 0503	Vehicle speed sensor circuit high input	Vehicle speed signal is excessively high compared with the driving condition.	● Harness or connectors (The CAN communication line is open or shorted.) ● Combination meter ● ABS actuator and electric unit (control unit) (models without ESP) ● ESP/TCS/ABS control unit (models with ESP) ● Wheel sensor ● ECM

DTC Confirmation Procedure

BBS00224

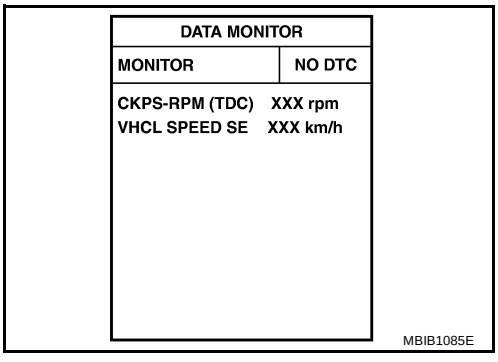
CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine (ESP switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 10 km/h (6 MPH) for at least 5 seconds.
4. If DTC is detected, go to EC-1274, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS00225

1. CHECK DTC WITH ESP/TCS/ABS CONTROL UNIT (MODELS WITH ESP) OR “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)” (MODELS WITHOUT ESP)

Refer to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP system) or BRC-9, "TROUBLE DIAGNOSIS" (models without ESP system).

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

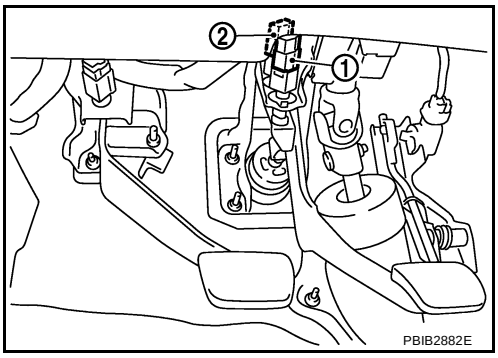
DTC P0504 ASCD BRAKE SWITCH

PFP:25320

Component Description

BBS00226

When the brake pedal is depressed, ASCD brake switch (1) and stop lamp switch (2) are turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-1454, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

BBS00227

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
BRAKE SW2 (ASCD brake switch)	● Ignition switch: ON	Brake pedal and clutch pedal: Fully released	OFF
		Brake pedal and/or clutch pedal: Slightly depressed	ON

On Board Diagnosis Logic

BBS00228

This self-diagnosis has the one trip detection logic.
The MI will not light up for this diagnosis.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0504 0504	ASCD brake switch	● When the vehicle speed is above 5 km/h (3 MPH), ON signal from the stop lamp switch and OFF signal from the ASCD brake switch are sent to the ECM at the same time.	● Harness or connectors (The stop lamp switch circuit is open or shorted.) ● Harness or connectors (The ASCD brake switch circuit is open or shorted.) ● Harness or connectors (The ASCD clutch switch circuit is open or shorted.) ● Stop lamp switch ● ASCD brake switch ● ASCD clutch switch ● Incorrect stop lamp switch installation ● Incorrect ASCD brake switch installation ● Incorrect ASCD clutch switch installation ● ECM

DTC confirmation Procedure

BBS00229

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:
Steps 3 and 4 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine (ESP switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Press MAIN switch and make sure that CRUISE indicator lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

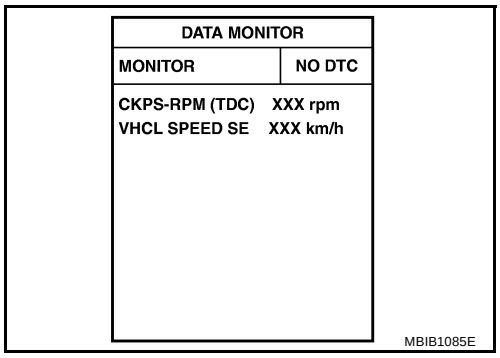
VHCL SPEED SE	More than 5 km/h (3 MPH)
Shift lever	Suitable position

If DTC is detected, go to EC-1278, "Diagnostic Procedure" .
If DTC is not detected, go to the following step.

5. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 5 km/h (3 MPH)
Shift lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned condition.

6. If DTC is detected, go to EC-1278, "Diagnostic Procedure" .



WITH GST

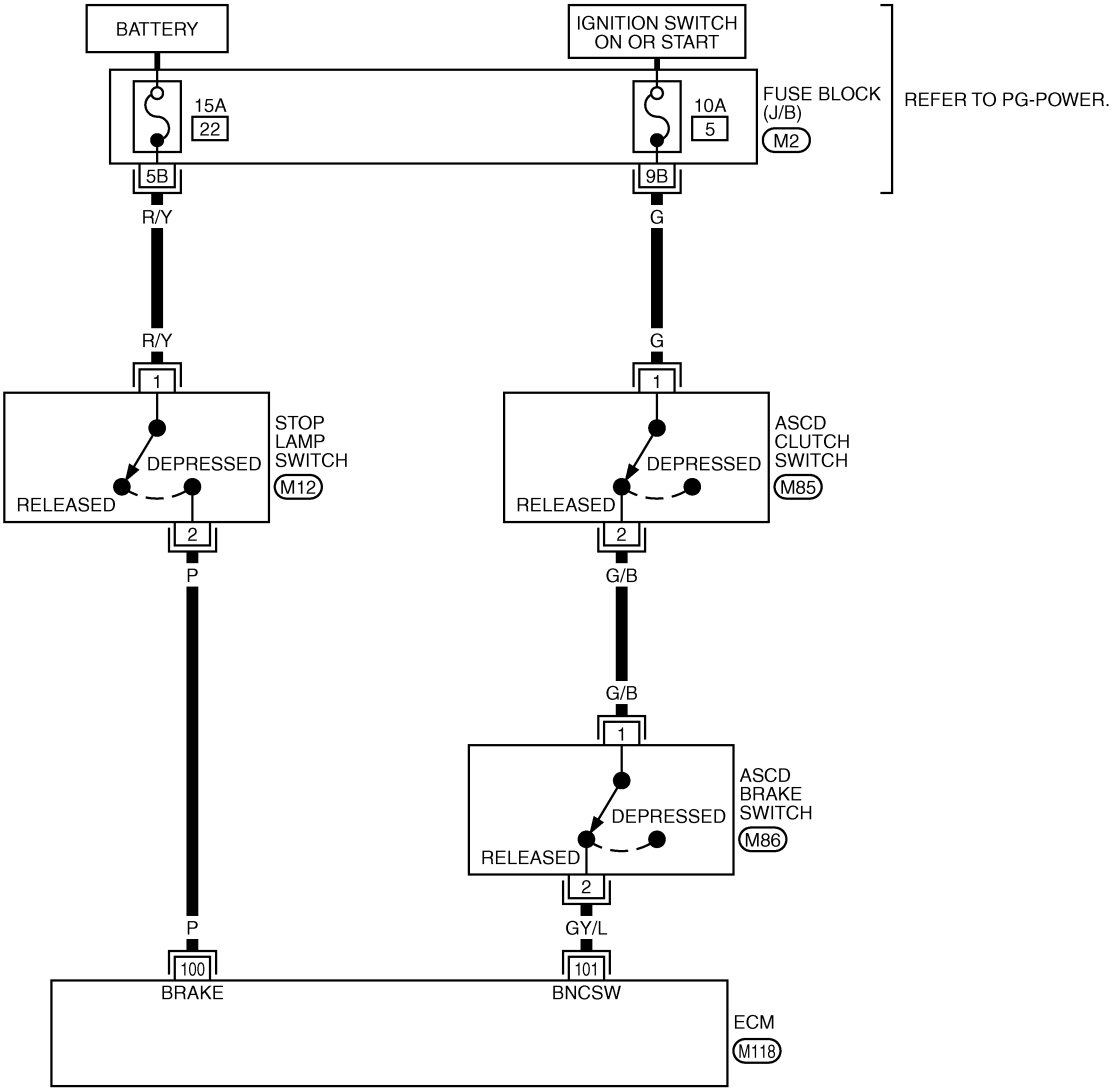
Follow the procedure “WITH CONSULT-II” above.

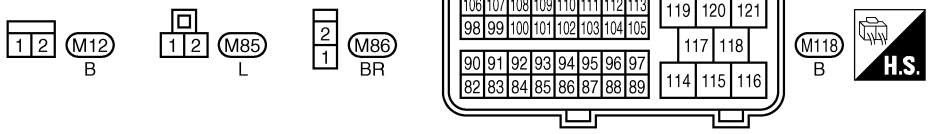
Wiring Diagram

BBS0022A

EC-ASC/BS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0477E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
100	P	Stop lamp switch	**[Ignition switch OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
101	GY/L	ASCD brake switch	**[Ignition switch ON]** ● Brake pedal and clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Brake pedal and/or clutch pedal: Slightly depressed	Approximately 0V

Diagnostic Procedure

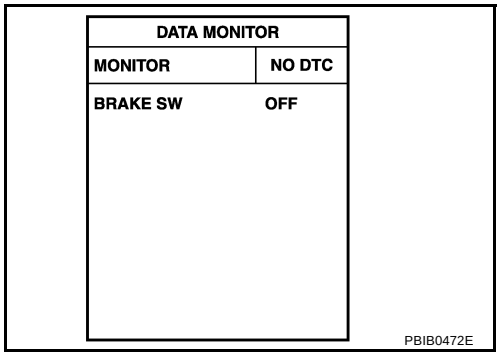
BBS0022B

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW” indication under the following conditions.

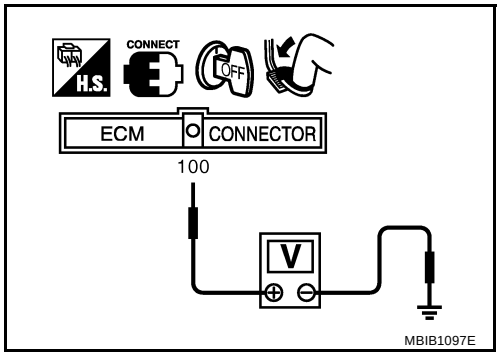
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 100 and ground under the following conditions.

Condition	Voltage
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	battery voltage



OK or NG

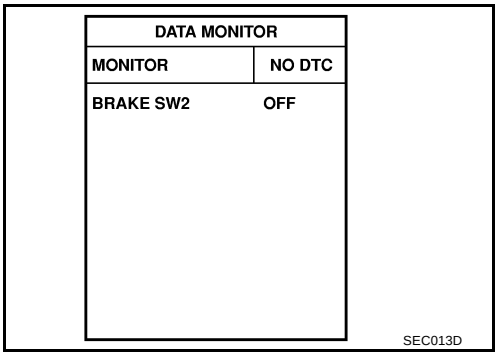
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

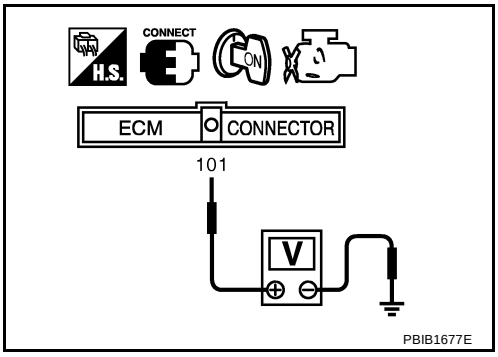
CONDITION	INDICATION
Brake pedal and clutch pedal: Fully released	OFF
Brake pedal and/or clutch pedal: Slightly depressed	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 101 and ground under the following conditions.

Condition	Voltage
Brake pedal and clutch pedal: Fully released	Battery voltage
Brake pedal and/or clutch pedal: Slightly depressed	Approximately 0V

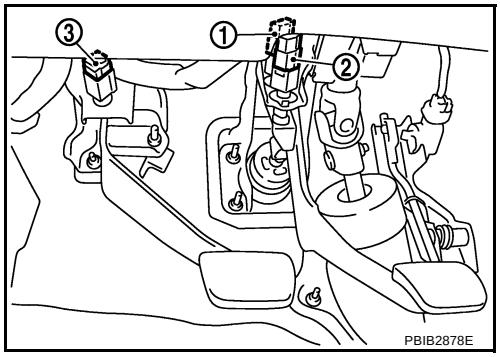


OK or NG

OK >> GO TO 14.
NG >> GO TO 7.

3. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector (1).
   - ASCD brake switch harness connector (2)
   - ASCD clutch switch harness connector (3)

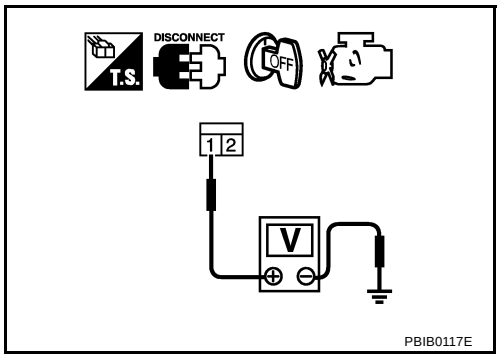


3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 15A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 100 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK STOP LAMP SWITCH

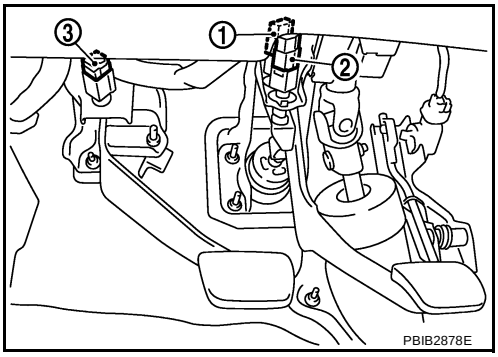
Refer to EC-1283, "Component Inspection"

OK or NG

OK >> GO TO 14.
NG >> Replace stop lamp switch.

7. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch (2) harness connector.
   - Stop lamp switch (1)
   - ASCD clutch switch (3)
3. Turn ignition switch ON.

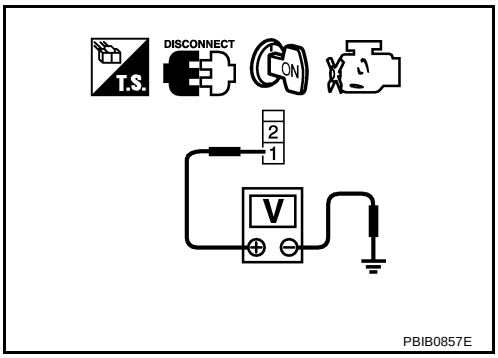


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

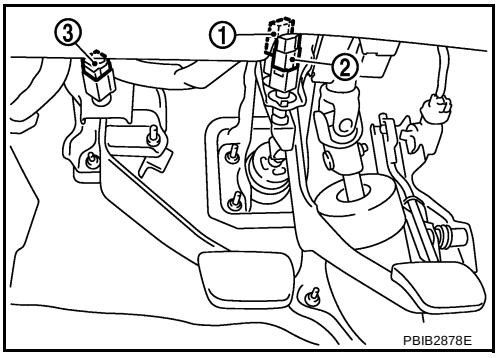
OK or NG

OK >> GO TO 12.
NG >> GO TO 8.



8. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector (3).
   - Stop lamp switch harness connector (1)
   - ASCD brake switch harness connector (2)
3. Turn ignition switch ON.

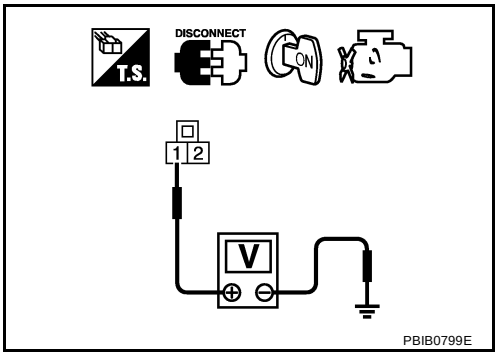


4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.



9. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between ASCD clutch switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD clutch switch terminal 2 and ASCD brake switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ASCD CLUTCH SWITCH

Refer to EC-1283, "Component Inspection"

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD clutch switch.

12. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ASCD BRAKE SWITCH

Refer to EC-1283, "Component Inspection"

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD brake switch.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

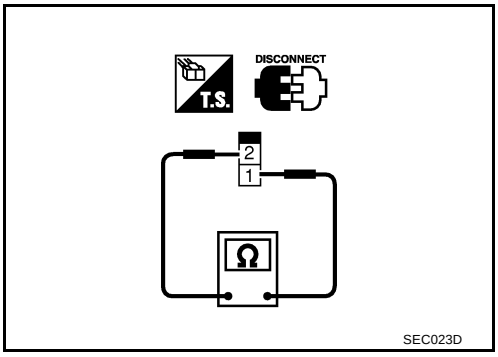
BBS0022C

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

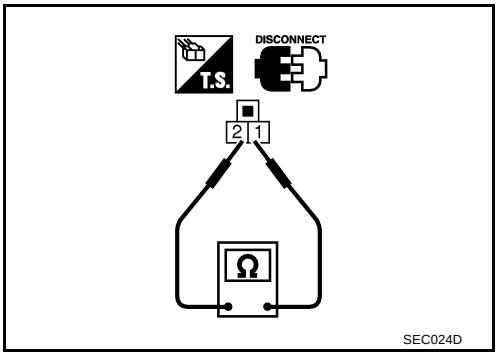


ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to CL-5, "CLUTCH PEDAL" , and perform step 3 again.

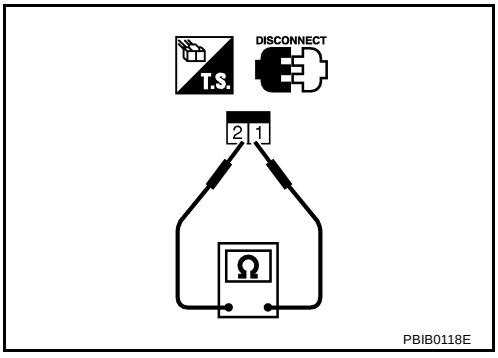


STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.



DTC P0563 BATTERY VOLTAGE

PFP:24410

On Board Diagnosis Logic

BBS0022D

This self-diagnosis has the one trip detection logic.
MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0563 0563	Battery voltage high	An excessively high voltage from the battery is sent to ECM.	● Battery ● Battery terminal ● Alternator ● Incorrect jump starting

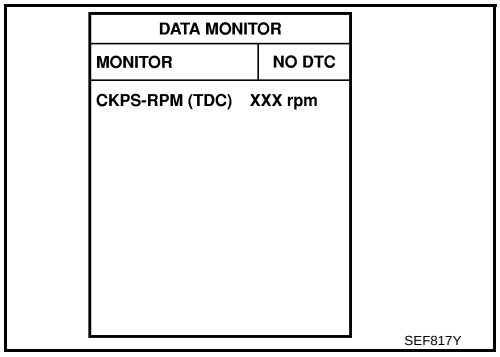
DTC Confirmation Procedure

BBS0022E

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 35 seconds.
4. If DTC is detected, go to EC-1284, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS0022F

1. INSPECTION START

Are jumper cables connected for the jump starting?

Yes or No

Yes >> GO TO 3.
No >> GO TO 2.

2. CHECK BATTERY AND ALTERNATOR

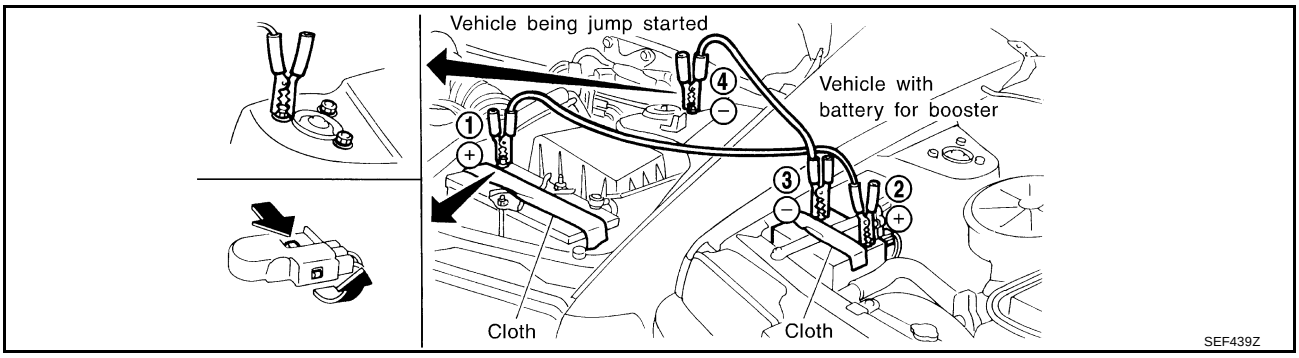
Check that the proper type of battery and type of alternator are installed.
Refer to, SC-4, "BATTERY" and SC-13, "CHARGING SYSTEM" .

OK or NG

OK >> GO TO 5.
NG >> Replace with a proper one.

3. CHECK JUMPER CABLES INSTALLATION

Check that the jumper cables are connected in the correct sequence.



OK or NG

OK >> GO TO 4.
NG >> Reconnect jumper cables properly.

4. CHECK BATTERY FOR BOOSTER

Check that the battery for the booster is a 12V battery.

OK or NG

OK >> GO TO 5.
NG >> Change the vehicle for booster.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1284, "DTC Confirmation Procedure" , again.
5. Is DTC P0563 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. Perform EC-1284, "DTC Confirmation Procedure" , again.
4. Is DTC P0563 displayed again?

Yes or No

Yes >> GO TO 6.
No >> GO TO 7.

6. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .
5. Perform Service Regeneration (models with DPF). Refer to EC-997, "Service Regeneration" .

>> **INSPECTION END**

7. CHECK ELECTRICAL PARTS DAMAGE

Check the following for damage.

- Wiring harness and harness connectors for burn
- Fuses for short

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace malfunctioning part.

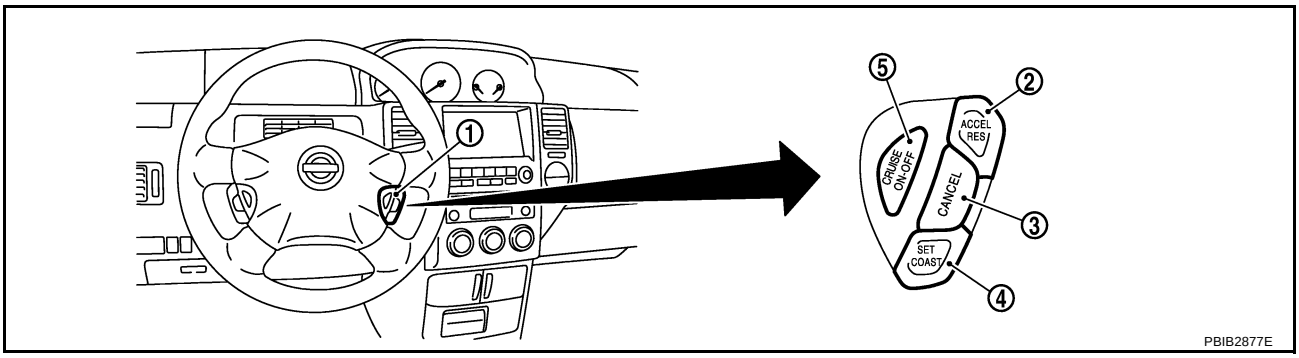
DTC P0580, P0581 ASCD STEERING SWITCH

PFP:25551

Component Description

BBS0022G

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. CANCEL switch
4. SET/COAST switch
5. MAIN switch

Refer to EC-1454, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

BBS0022H

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	● Ignition switch: ON	MAIN switch: Released	OFF
		MAIN switch: Pressed	ON
CANCEL SW	● Ignition switch: ON	CANCEL switch: Released	OFF
		CANCEL switch: Pressed	ON
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Released	OFF
		RESUME/ACCELERATE switch: Pressed	ON
SET SW	● Ignition switch: ON	SET/COAST switch: Released	OFF
		SET/COAST switch: Pressed	ON

On Board Diagnosis Logic

BBS0022I

These self-diagnoses have the one trip detection logic.
MI will not light up for these diagnoses.

NOTE:
If DTC P0580 or P0581 is displayed with DTC P0606, first perform the trouble diagnosis for DTC P0605. Refer to EC-1296, "DTC P0605 ECM".

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0580 0580	ASCD steering switch circuit low input	● ECM detects that the ASCD steering switch is stuck ON.	● Harness or connectors (The switch circuit is open or shorted.) ● ASCD steering switch ● ECM
P0581 0581	ASCD steering switch circuit high input	● An excessively high voltage signal from the ASCD steering switch is sent to ECM.	

DTC Confirmation Procedure

BBS0022J

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If DTC is detected, go to EC-1292, "Diagnostic Procedure" .

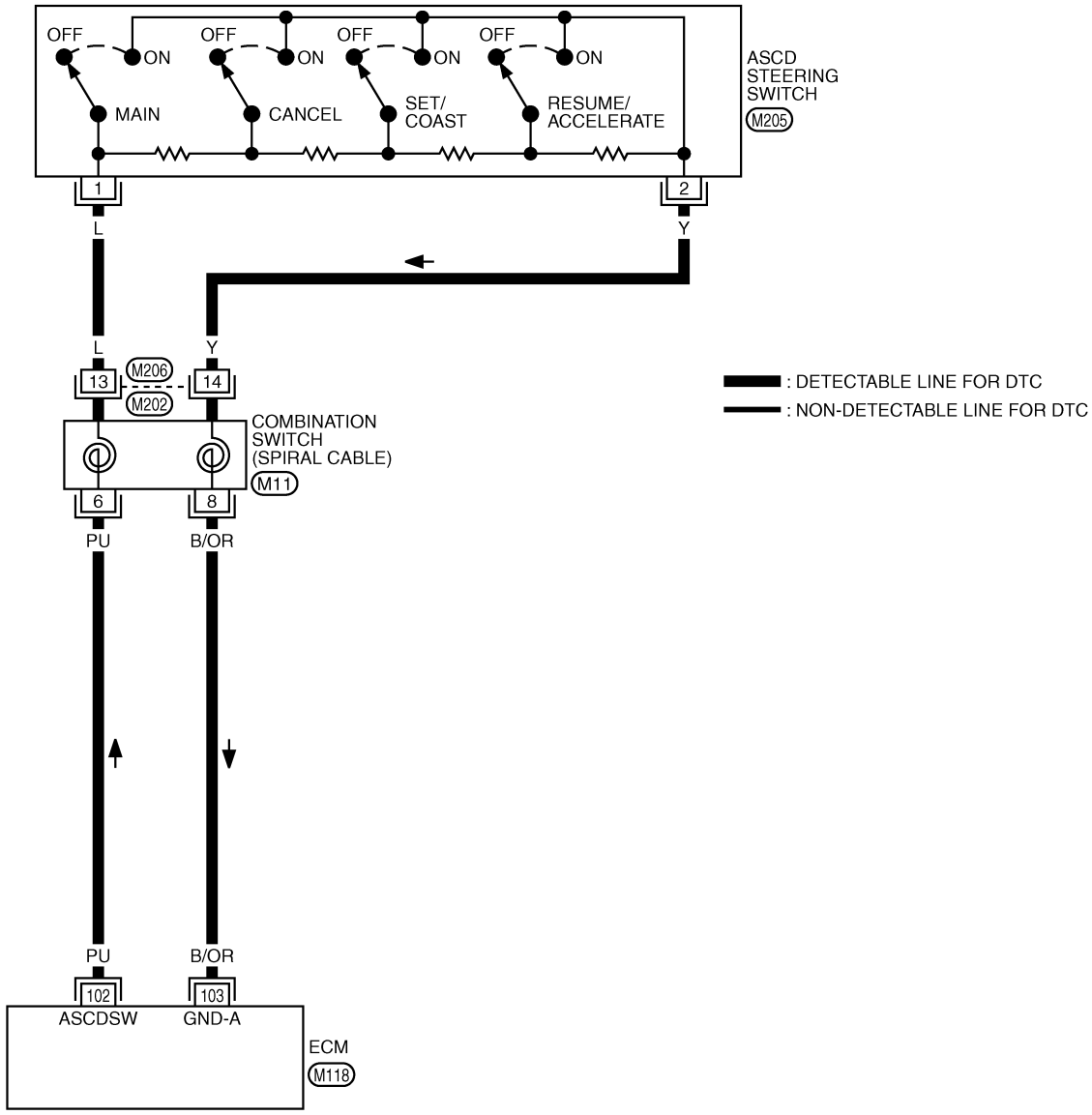
WITH GST

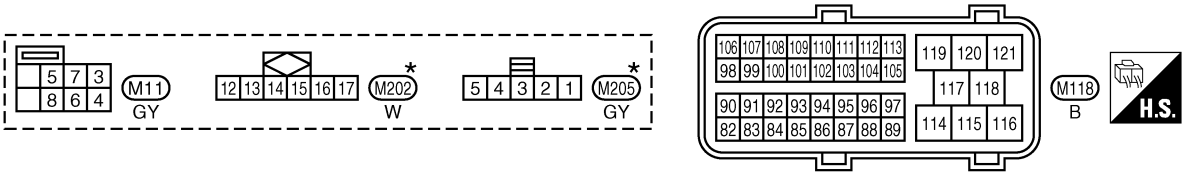
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram
LHD MODELS

BBS0022K

EC-ASC/SW-01



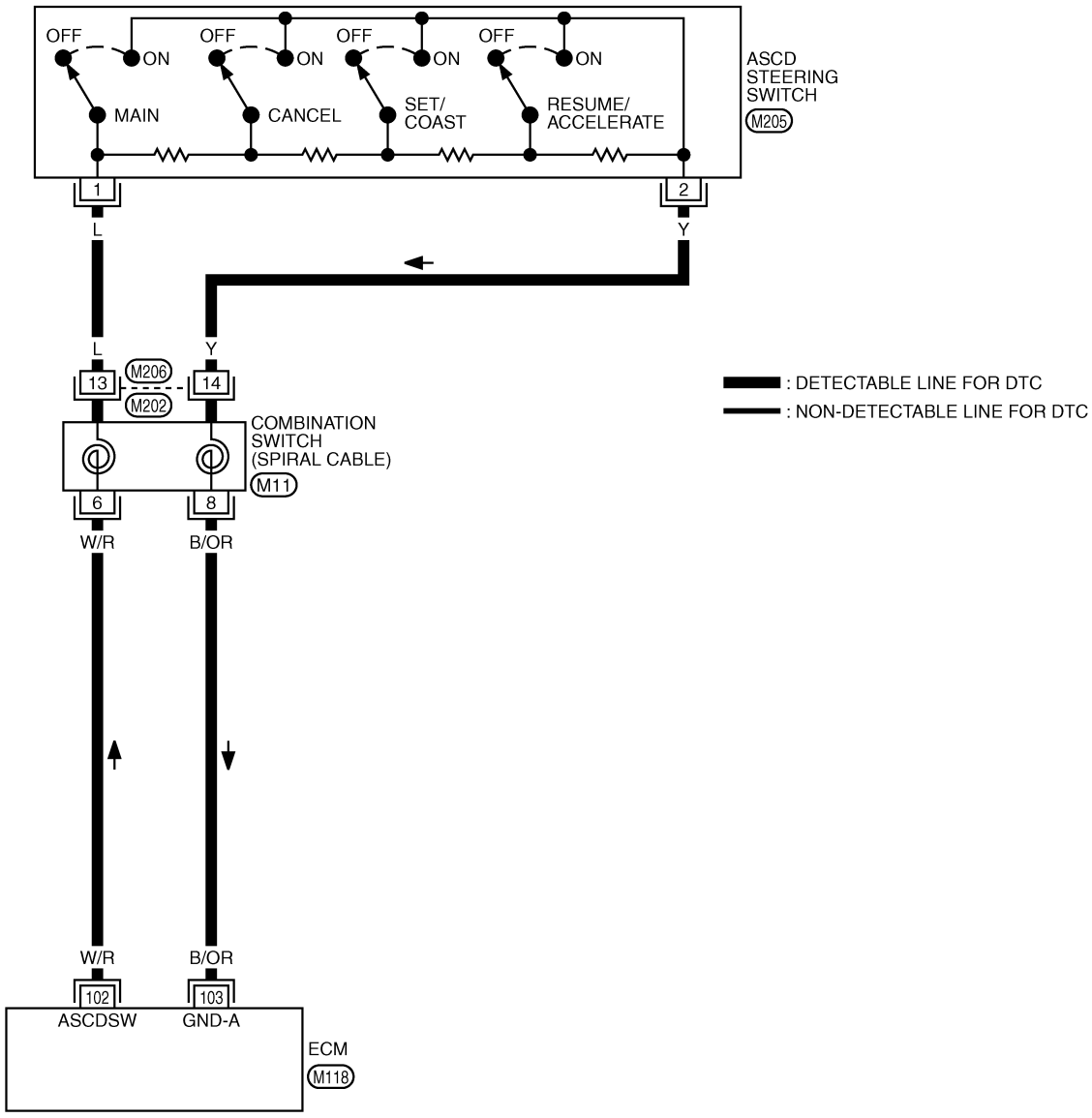


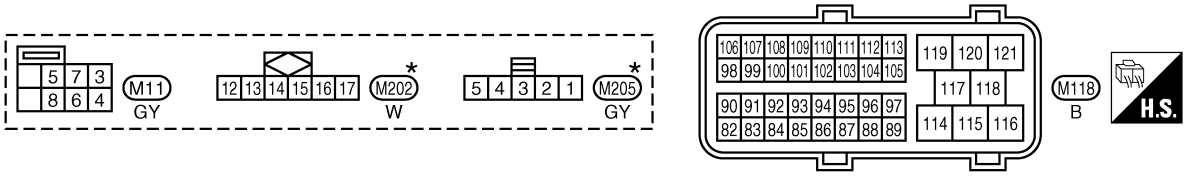
*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION.

TBWB0475E

RHD MODELS

EC-ASC/SW-02





*: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION.

TBWB0476E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	PU*1 W/R*2	ASCD steering switch	**[Ignition switch ON]** ● ASCD steering switch: OFF	Approximately 4.3V
			[Ignition switch ON] ● MAIN switch: Pressed	Approximately 0.3V
			[Ignition switch ON] ● CANCEL switch: Pressed	Approximately 1.3V
			[Ignition switch ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3.3V
			[Ignition switch ON] ● SET/COAST switch: Pressed	Approximately 2.3V
103	B/OR	ASCD steering switch ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

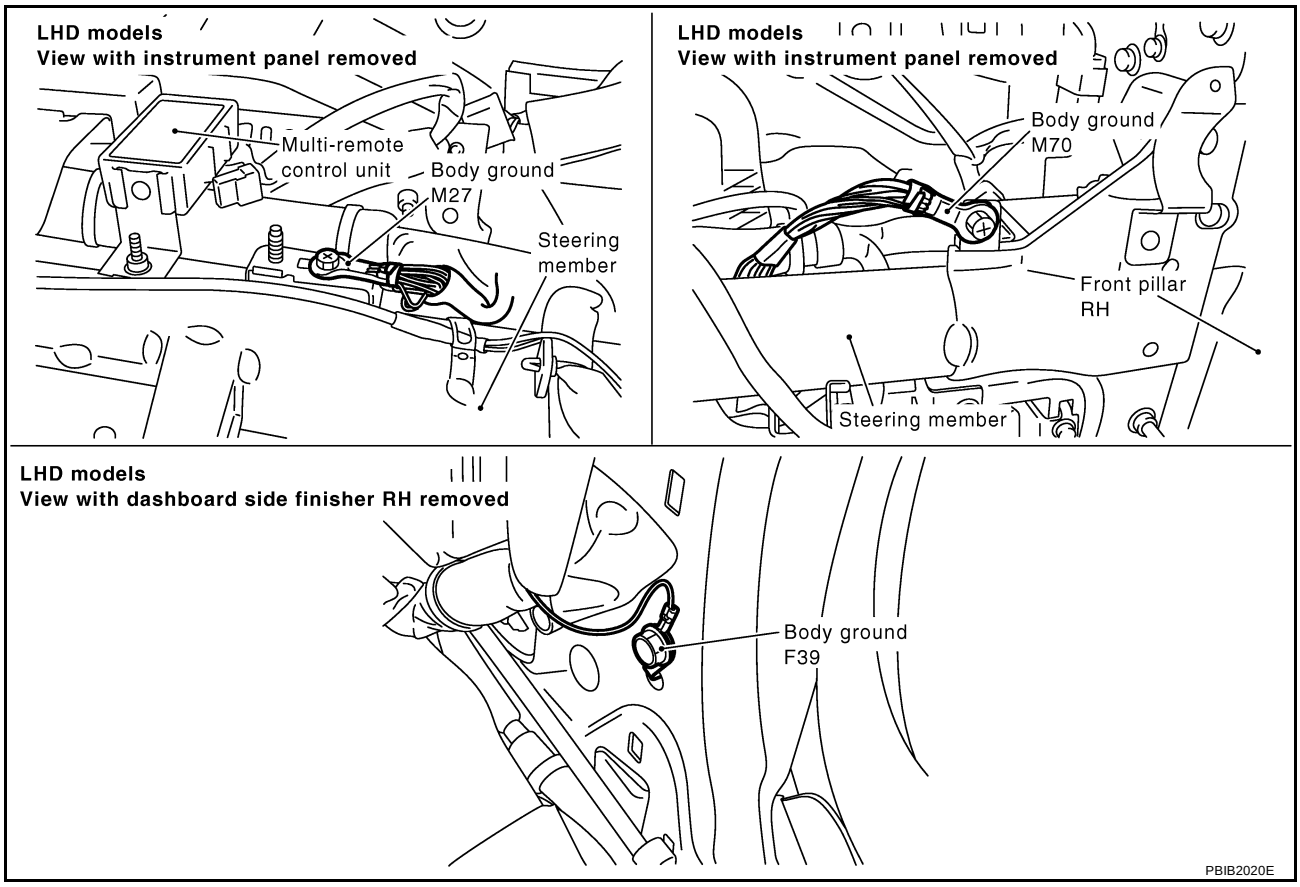
*1: LHD models
*2: RHD models

Diagnostic Procedure

BBS0022L

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .



OK or NG

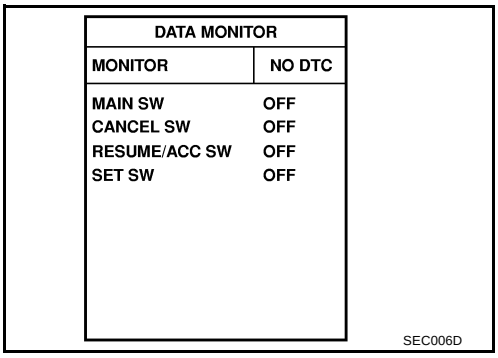
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-II

1. Turn ignition switch ON.
2. Select “MAIN SW”, “RESUME/ACC SW”, “SET SW” and “CANCEL SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check each item indication under the following conditions.

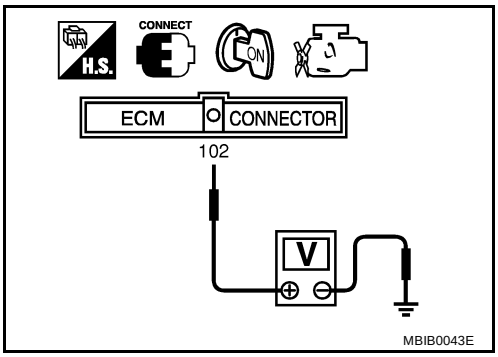
Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF
RESUME/ACCEL-ERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 and ground under the following conditions.

Switch	Condition	Voltage (V)
MAIN switch	Pressed	Approx. 0.3
	Released	Approx. 4.3
CANCEL switch	Pressed	Approx. 1.3
	Released	Approx. 4.3
RESUME/ACCELERATE switch	Pressed	Approx. 3.3
	Released	Approx. 4.3
SET/COAST switch	Pressed	Approx. 2.3
	Released	Approx. 4.3



OK or NG

OK >> GO TO 8.
NG >> GO TO 3.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

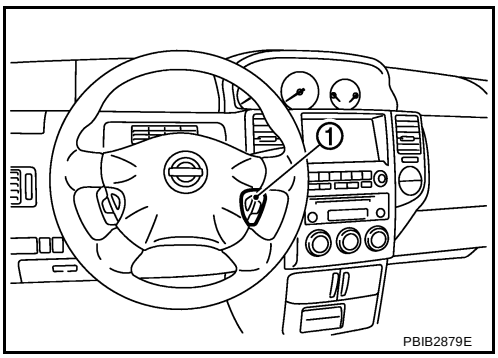
1. Turn ignition switch OFF.
2. Disconnect ASCD steering switch (1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ASCD steering switch terminal 2 and ECM terminal 103. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M206, M202
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 102 and ASCD steering switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M206, M202
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-1295, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

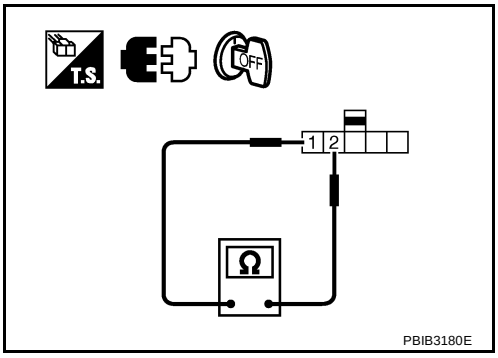
>> **INSPECTION END**

Component Inspection

BBS0022M

ASCD STEERING SWITCH

1. Disconnect ASCD steering switch.
2. Check continuity between ASCD steering switch terminals 1 and 2 with pushing each switch.



Switch	Condition	Resistance (Ω)
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000

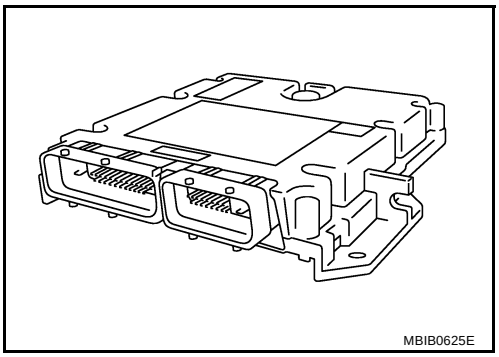
DTC P0605 ECM

PFP:23710

Description

BBS0022N

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


MBIB0625E

On Board Diagnosis Logic

BBS0022O

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0605 0605	Engine control module (ROM)	ECM ROM is malfunctioning.	● ECM

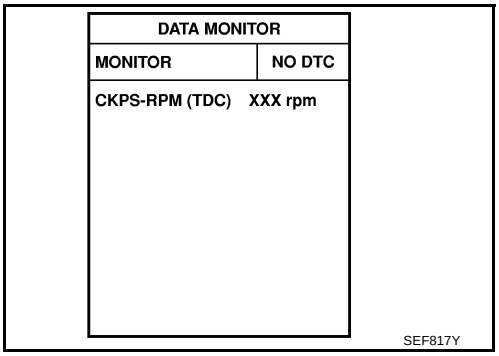
DTC Confirmation Procedure

BBS0022P

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1297, "Diagnostic Procedure" .



SEF817Y

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS0022Q

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1296, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P0605 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. Perform EC-1296, "DTC Confirmation Procedure" , again.
4. Is DTC P0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .
5. Perform Service Regeneration (models with DPF). Refer to EC-997, "Service Regeneration" .

>> **INSPECTION END**

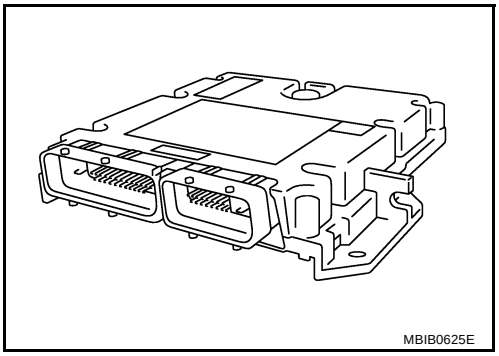
DTC P0606 ECM

PFP:23710

Description

BBS0022R

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


MBIB0625E

On Board Diagnosis Logic

BBS0022S

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0606 0606	Engine control module (Processor)	ECM calculation function is malfunctioning.	● ECM

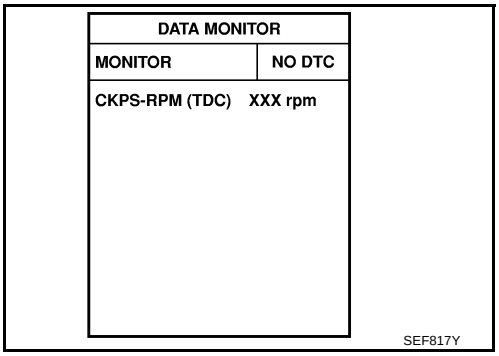
DTC Confirmation Procedure

BBS0022T

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1299, "Diagnostic Procedure" .



SEF817Y

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS0022U

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1298, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P0606 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. Perform EC-1298, "DTC Confirmation Procedure" , again.
4. Is DTC P0606 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .
5. Perform Service Regeneration (models with DPF). Refer to EC-997, "Service Regeneration" .

>> **INSPECTION END**

DTC P0628, P0629 FUEL PUMP

PFP:16700

Description

BBS0022V

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

BBS0022W

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

On Board Diagnosis Logic

BBS0022X

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0628 0628	Fuel pump control circuit low input	ECM detects a control circuit for the fuel pump is open or short to ground.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump
P0629 0629	Fuel pump control circuit high output	ECM detects a control circuit for the fuel pump is short to power.	

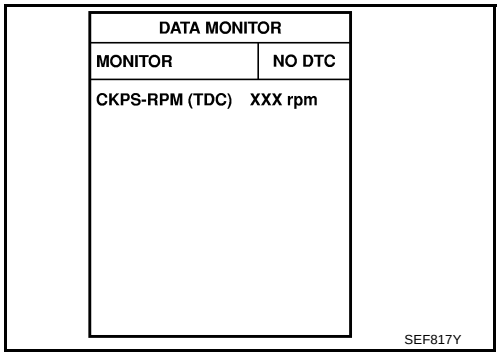
DTC Confirmation Procedure

BBS0022Y

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Let engine idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1303, "Diagnostic Procedure" .



WITH GST

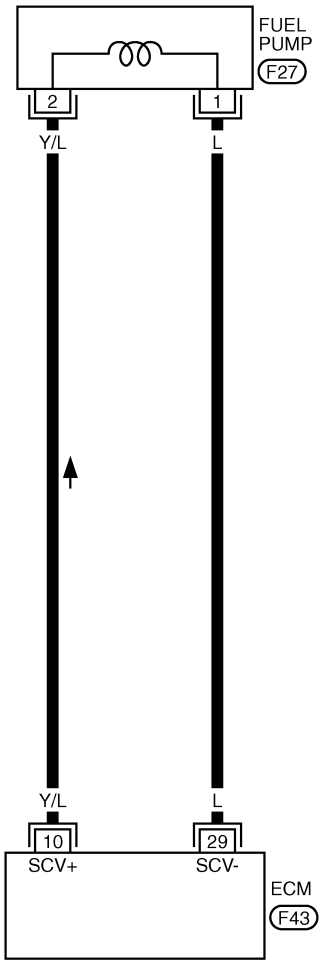
Follow the procedure “WITH CONSULT-II” above.

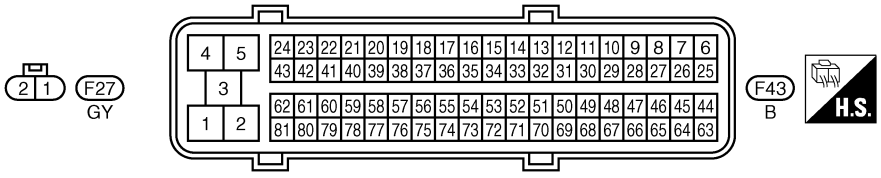
Wiring Diagram

BBS0022Z

EC-F/PUMP-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



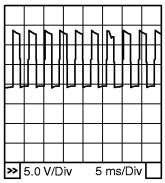
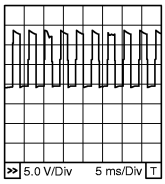
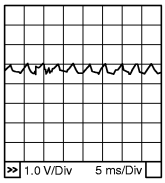
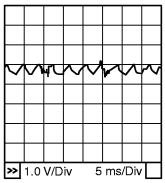


TBWA0574E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0886E
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

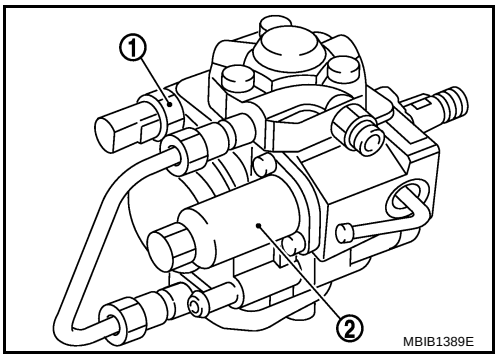
Diagnostic Procedure

BBS00230

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.



4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP

Refer to EC-1304, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

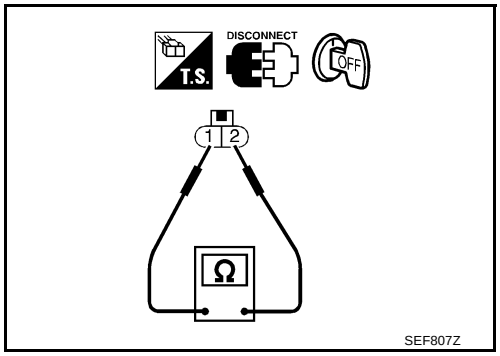
BBS00231

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

BBS00232

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P0638 ELECTRIC THROTTLE CONTROL ACTUATOR FUNCTION

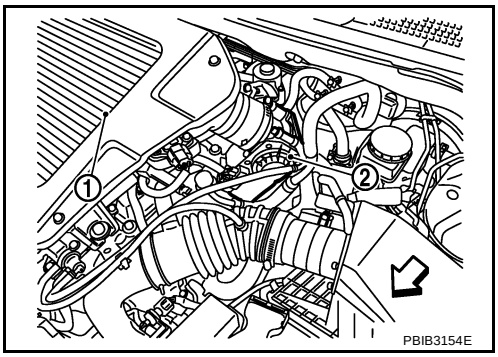
PFP:16119

Component Description

BBS002KV

Electric throttle control actuator (2) consists of throttle control motor which operates throttle valve, throttle position sensor which detects the opening angle of throttle valve, etc.
Throttle valve is fully opened when regeneration is not performed. The valve is closed only to perform regeneration.
Based on the signal from throttle position sensor, ECM judges whether or not throttle control actuator operates properly.

- ⇦: Vehicle front
- Charge air cooler (1)



On Board Diagnosis Logic

BBS002KW

This self-diagnosis has the one trip detection logic.
The MI will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0638 0638	Electric throttle control actuator range/performance	There is a gap between angle of target and phase-control angle.	● Electric throttle control actuator

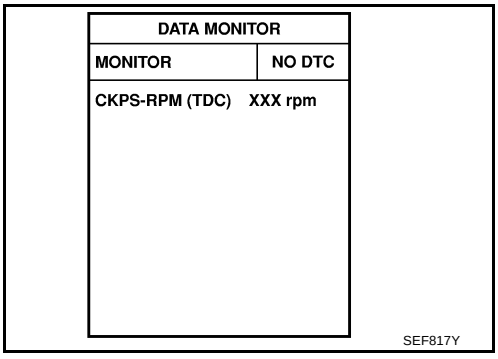
DTC Confirmation Procedure

BBS002KX

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for 10 seconds.
4. If DTC is detected, go to EC-1306, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS002KY

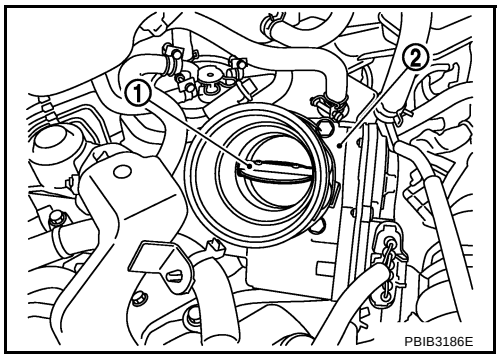
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve (1) and the housing.

– Electric throttle control actuator (2)

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

With CONSULT-II

1. Replace the electric throttle control actuator.
2. Turn ignition switch ON and OFF.
3. Turn ignition switch ON and select “TARGET ETC ANGLE” in “ACTIVE TEST” mode.
4. Make sure that throttle valve operates correctly.

Without CONSULT-II

1. Replace the electric throttle control actuator.
2. Turn ignition switch ON and OFF.
3. Turn ignition switch ON and OFF, and make sure that throttle valve operates correctly.

>> **INSPECTION END**

ACTIVE TEST	
TARGET ETC ANGLE	XXX deg
MONITOR	
CKPS-RPM (TDC)	XXX rpm
THRTL SEN	XXX V

PBIB3206E

DTC P0642, P0643 SENSOR POWER SUPPLY

PFP:18002

On Board Diagnosis Logic

BBS00233

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0642 0642	Sensor power supply circuit low	ECM detects a voltage of power source for sensor is excessively low.	● Harness or connectors (The APP sensor 1 power supply circuit is shorted.) (Crankshaft position sensor circuit is shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1) ● Crankshaft position sensor
P0643 0643	Sensor power supply circuit high	ECM detects a voltage of power source for Sensor is excessively high.	

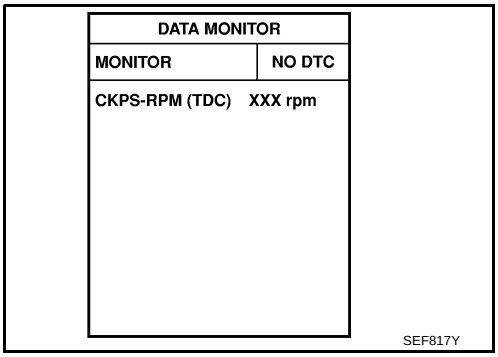
DTC Confirmation Procedure

BBS00234

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1310, "Diagnostic Procedure" .



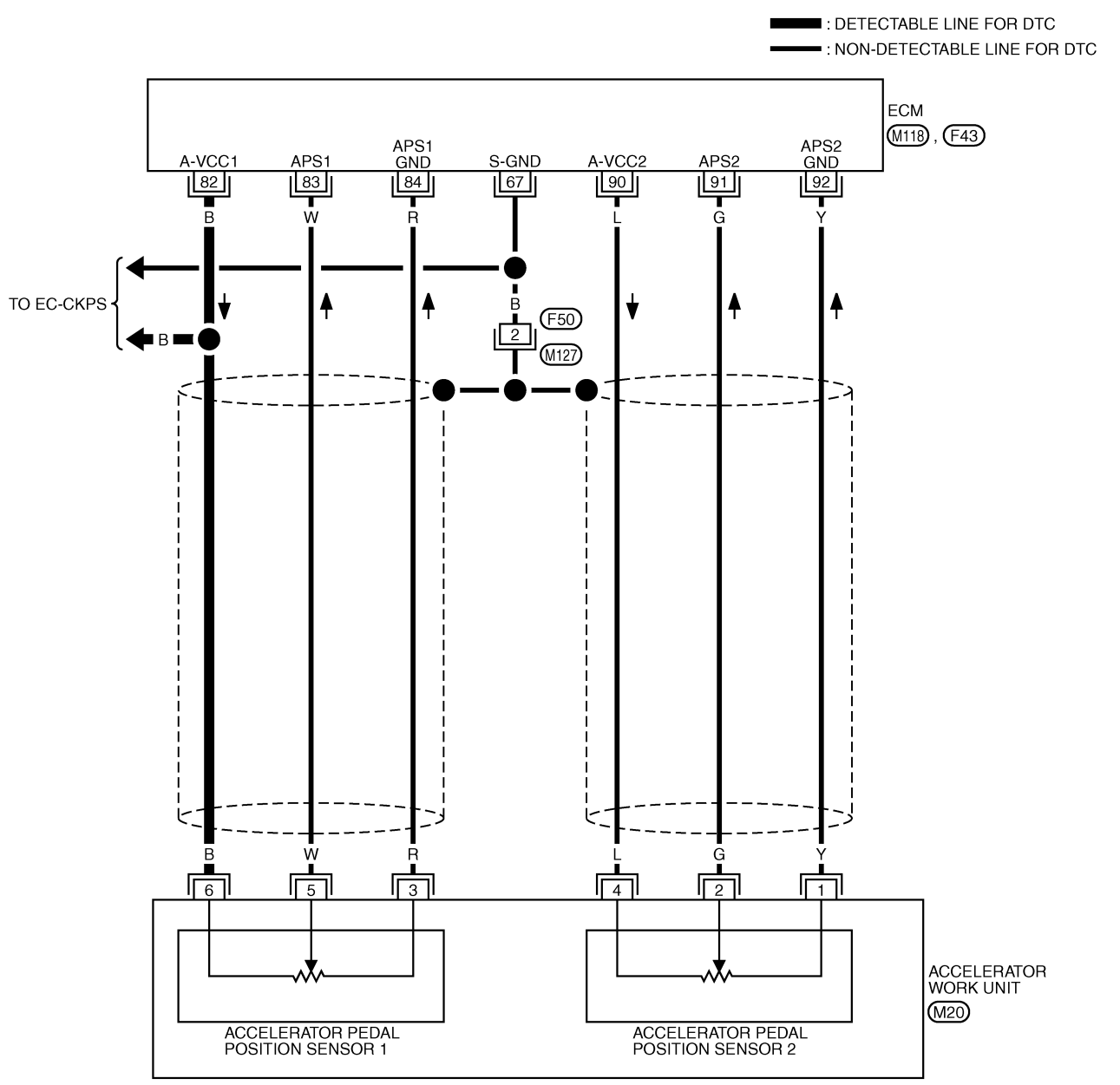
WITH GST

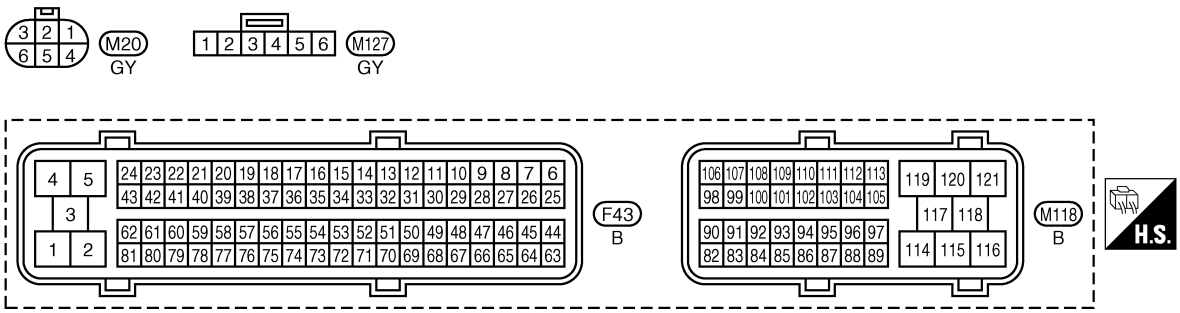
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS00235

EC-APP1PW-01





TBWB0909E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

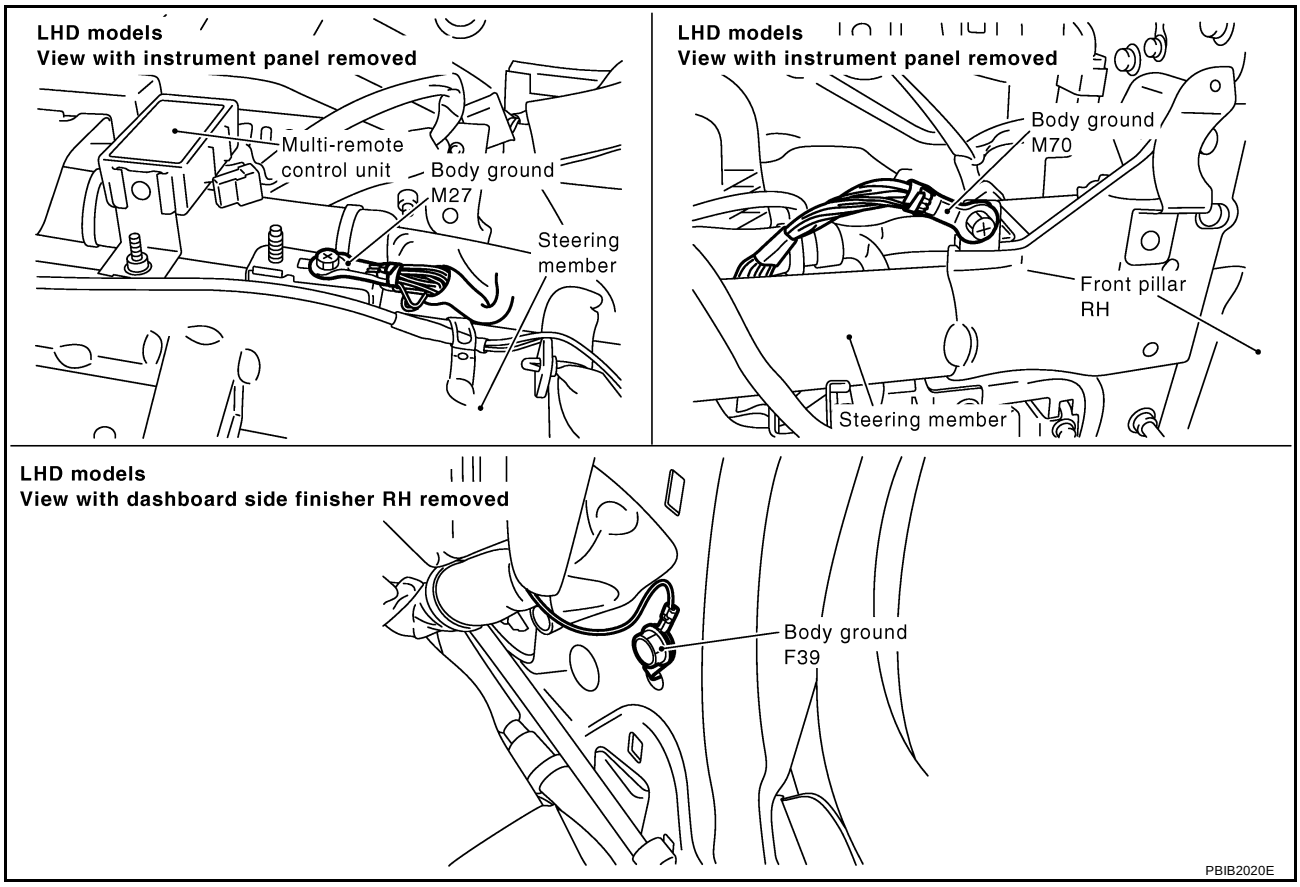
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V
83	W	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.8 - 1.3V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.0V
84	R	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
90	L	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	G	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.45 - 0.9V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.25 - 2.7V
92	Y	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS00236

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

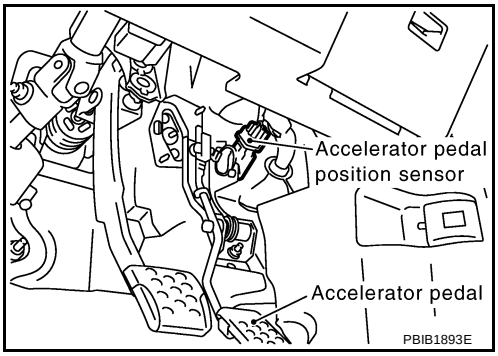


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

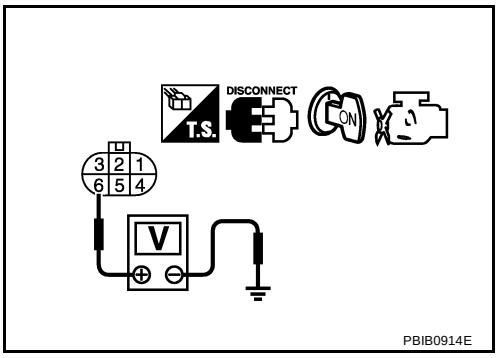
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check the following.
Harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
82	APP sensor terminal 6	EC-1308
	Crankshaft position sensor terminal 1	EC-1197

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1201, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace crankshaft position sensor.

5. CHECK APP SENSOR

Refer to EC-1119, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0652, P0653 SENSOR POWER SUPPLY

PFP:18002

On Board Diagnosis Logic

BBS00237

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0652	Sensor power supply circuit low	ECM detects a voltage of power source for sensor is excessively low.	● Harness or connectors (APP sensor 2 power supply circuit is shorted.) (Camshaft position sensor circuit is shorted.) (Fuel rail pressure sensor circuit is shorted.) (Turbocharger boost sensor circuit is shorted.) (Differential pressure sensor circuit is shorted.) (Throttle position sensor circuit is shorted.) (Refrigerant pressure sensor circuit is shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2) ● Camshaft position sensor ● Fuel rail pressure sensor ● Turbocharger boost sensor ● Differential pressure sensor ● Throttle position sensor ● Refrigerant pressure sensor
P0653 0653	Sensor power supply circuit high	ECM detects a voltage of power source for Sensor is excessively high.	

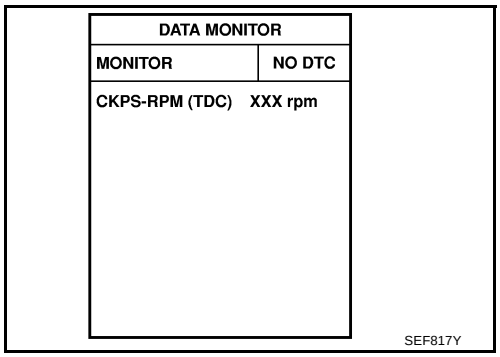
DTC Confirmation Procedure

BBS00238

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1315, "Diagnostic Procedure" .



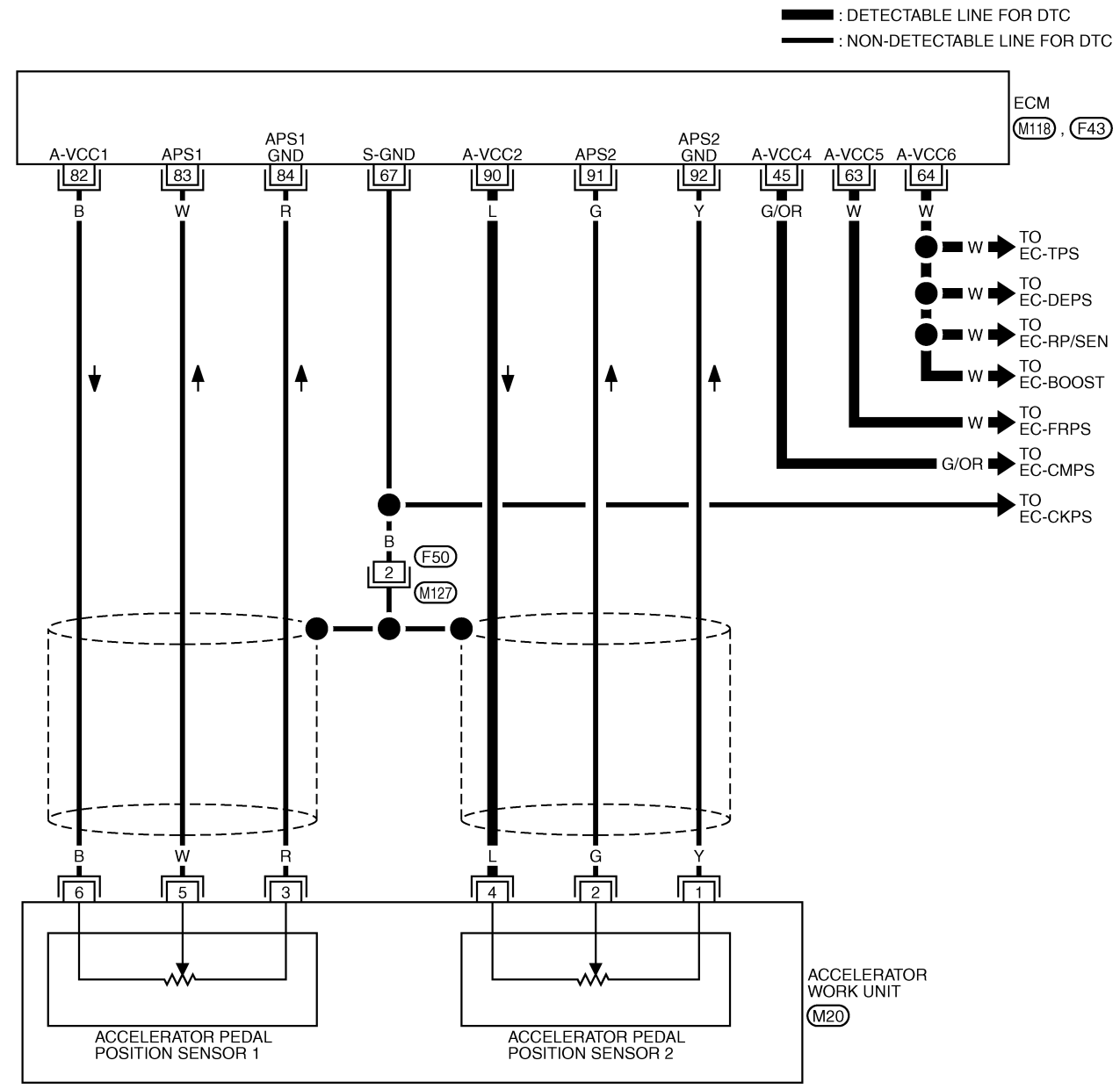
WITH GST

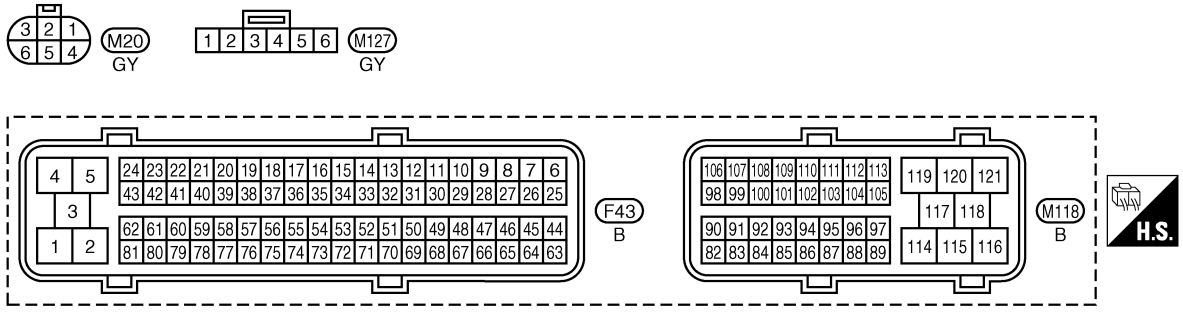
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS00239

EC-APP2PW-01





TBWB0910E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

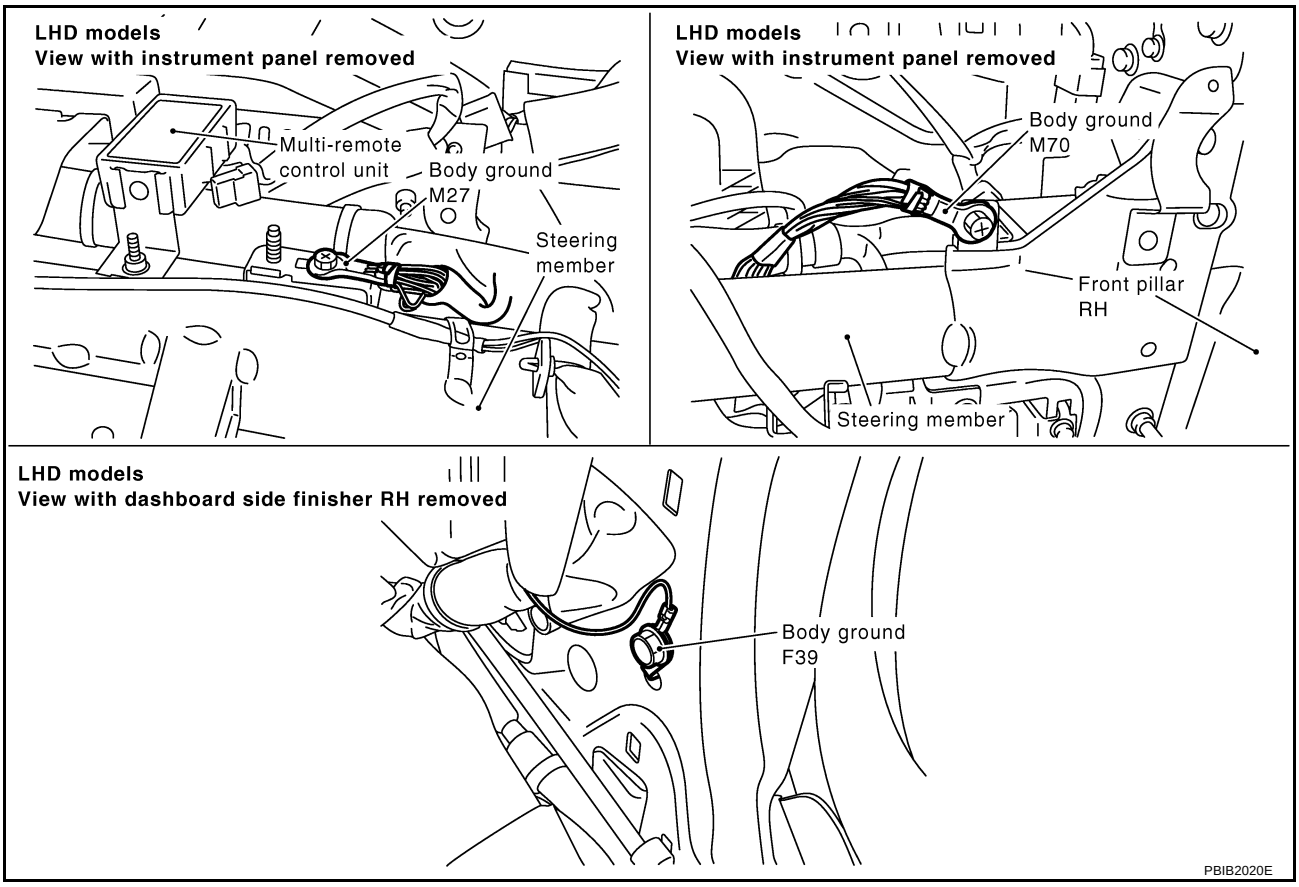
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	G/OR	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
63	W	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
64	W	Sensor power supply (Turbocharger boost sensor / Differential exhaust pressure sensor / Throttle position sensor / Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V
83	W	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.8 - 1.3V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.0V
84	R	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
90	L	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	G	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.45 - 0.9V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.25 - 2.7V
92	Y	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS0023A

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

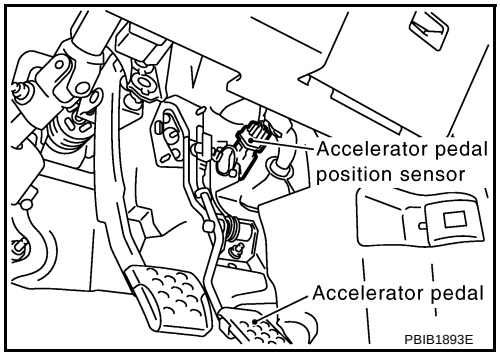


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

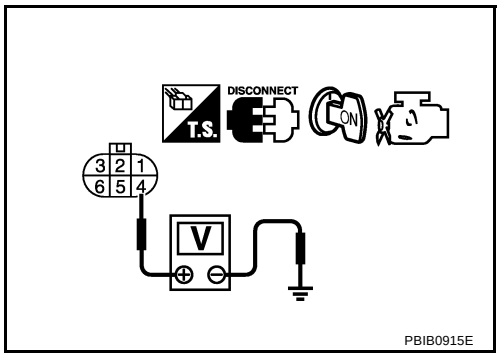
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check the following.
Harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
90	APP sensor terminal 4	EC-1313
45	Camshaft position sensor terminal 3	EC-1209
63	Fuel rail pressure sensor terminal 1	EC-1146
64	Turbocharger boost sensor terminal 1	EC-1191
	Differential exhaust pressure sensor terminal 1	EC-1260
	Throttle position sensor terminal 2	EC-1399
	Refrigerant pressure sensor terminal 3	EC-1437

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

- Camshaft position sensor (Refer to EC-1213, "Component Inspection" .)
- Fuel rail pressure sensor (Refer to EC-1150, "Component Inspection" .)
- Turbocharger boost sensor (Refer to EC-1195, "Component Inspection" .)
- Differential exhaust pressure sensor (Refer to EC-1264, "Component Inspection" .)
- Throttle position sensor (Refer to EC-1402, "Component Inspection" .)
- Refrigerant pressure sensor (Refer to ATC-90, "COMPONENT INSPECTION" .)

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning component.

5. CHECK APP SENSOR

Refer to EC-1119, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0686 ECM RELAY

PFP:25230

On Board Diagnosis Logic

BBS0023B

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0686 0686	ECM relay circuit	ECM detects ECM relay is stuck closed even if ignition switch OFF.	● Harness or connectors (The ECM relay circuit is shorted.) ● ECM relay

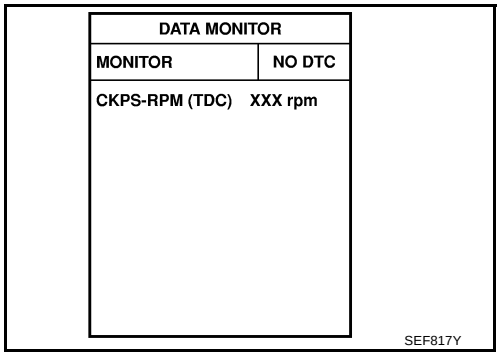
DTC Confirmation Procedure

BBS0023C

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and then turn OFF.
2. Wait at least 30 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If DTC is detected, go to EC-1320, "Diagnostic Procedure" .

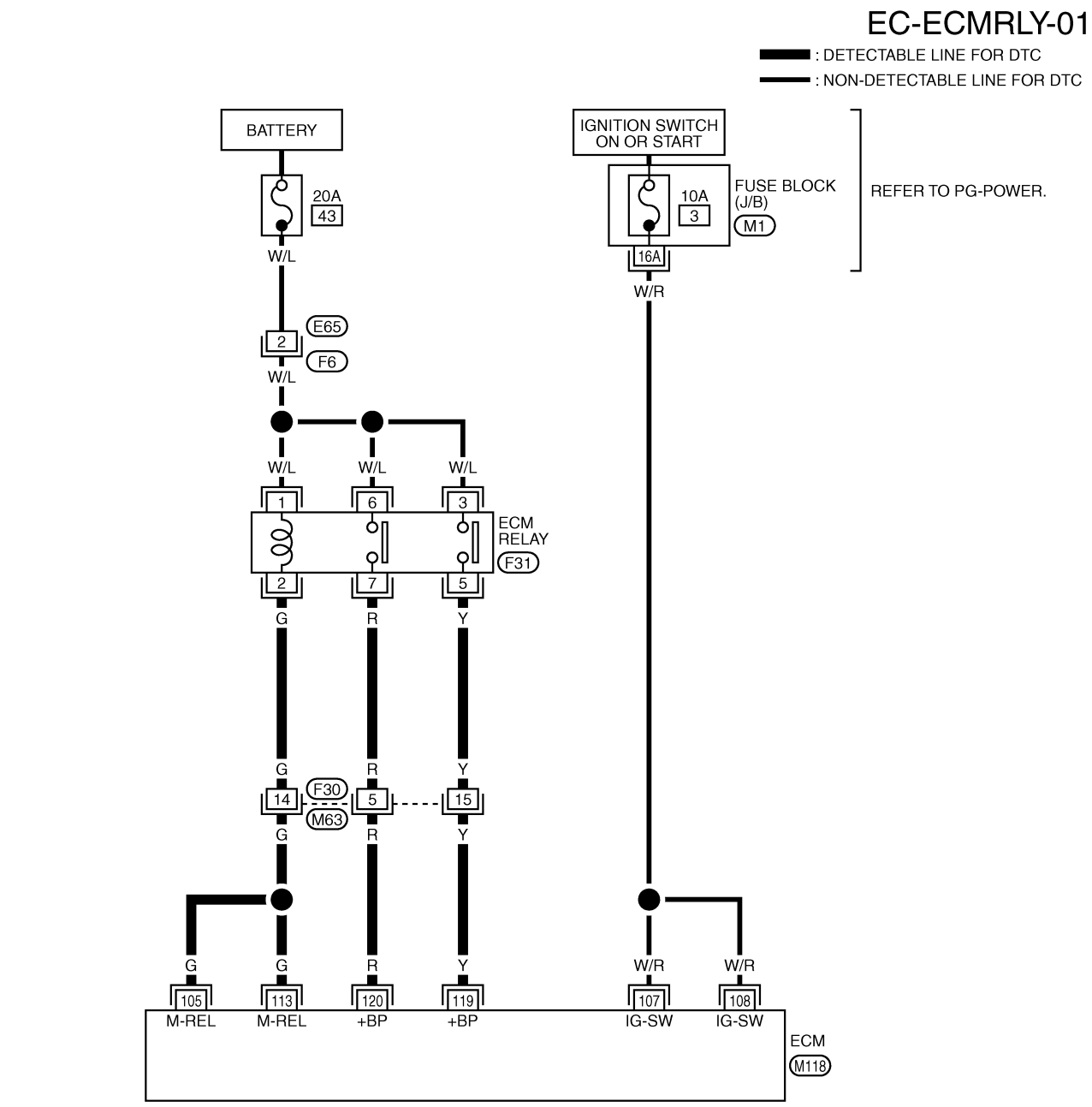


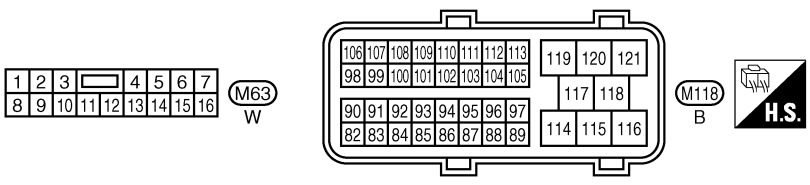
WITH GST

Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS0023D





REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0576E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	W/R W/R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS0023E

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR SHORT TO GROUND

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 105, 113 and ground. Refer to Wiring Diagram.

Continuity should not exist.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between ECM and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK ECM INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

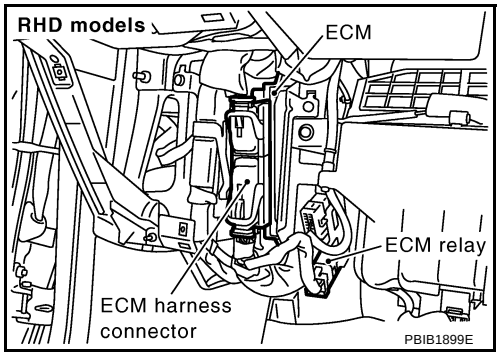
1. Disconnect ECM relay.
2. Check harness continuity between ECM terminal 119 and ECM relay terminal 5, ECM terminals 120 and ECM relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between ECM and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ECM RELAY

Refer to EC-1321, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace ECM relay.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

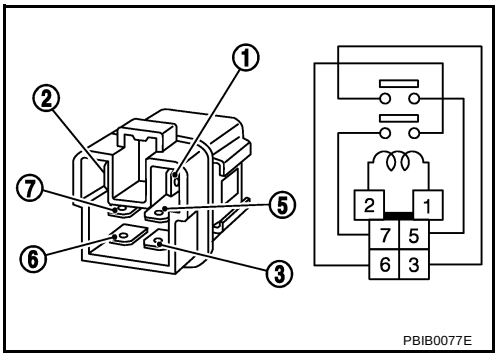
BBS0023F

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals (3) and (5), (6) and (7).

Condition	Continuity
12V direct current supply between terminals (1) and (2)	Yes
OFF	No

3. If NG, replace ECM relay.



DTC P1211 TCS CONTROL UNIT

PFP:47850

Description

BBS0023G

The malfunction information related to TCS is transferred through the CAN communication line from ESP/TCS/ABS control unit to ECM.

NOTE:
Be sure to erase the malfunction information such as DTC not only for ESP/TCS/ABS control unit but also for ECM after TCS related repair.

On Board Diagnosis Logic

BBS0023H

This self-diagnosis has the one trip detection logic.
MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211 1211	TCS control unit	ECM receives a malfunction information from ESP/TCS/ABS control unit.	● ESP/TCS/ABS control unit ● TCS related parts

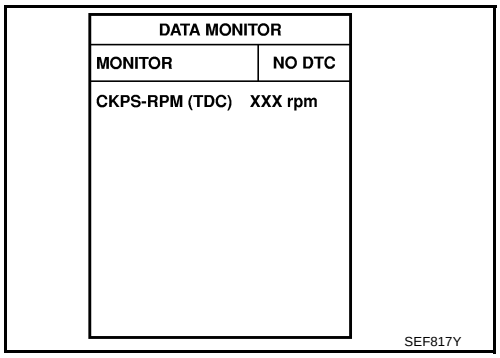
DTC Confirmation Procedure

BBS0023I

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1322, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSLT-II” above.

Diagnostic Procedure

BBS0023J

Go to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP) or BRC-9, "TROUBLE DIAGNOSIS" (model without ESP).

DTC P1212 TCS COMMUNICATION LINE

PFP:47850

Description

BBS0023K

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and ESP/TCS/ABS control unit.

NOTE:

- **If DTC P1212 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-1068, "DTC U1000 CAN COMMUNICATION LINE" .**
- **Be sure to erase the malfunction information such as DTC not only for ESP/TCS/ABS control unit but also for ECM after TCS related repair.**

On Board Diagnosis Logic

BBS0023L

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212 1212	TCS communication line	ECM can not receive the information from ESP/ TCS/ABS control unit continuously.	● Harness or connectors (The CAN communication line is open or shorted.) ● ESP/TCS/ABS control unit ● Dead (Weak) battery

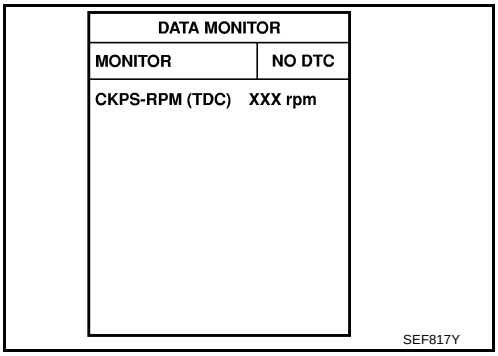
DTC Confirmation Procedure

BBS0023M

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1323, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS0023N

Go to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP) or BRC-9, "TROUBLE DIAGNOSIS" (model without ESP).

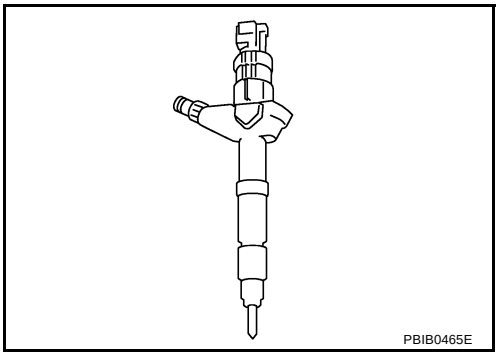
DTC P1268 - P1271 FUEL INJECTOR

PFP:16600

Component Description

BBS0023V

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

BBS0023W

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

On Board Diagnosis Logic

BBS0023X

This self-diagnosis has the one trip detection logic.
The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1268 1268	No. 1 cylinder fuel injector	The valve built into No. 1 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	● Fuel injector ● Injector adjustment value
P1269 1269	No. 2 cylinder fuel injector	The valve built into No. 2 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	
P1270 1270	No. 3 cylinder fuel injector	The valve built into No. 3 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	
P1271 1271	No. 4 cylinder fuel injector	The valve built into No. 4 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	

DTC Confirmation Procedure

BBS0023Y

CAUTION:

Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

NOTE:

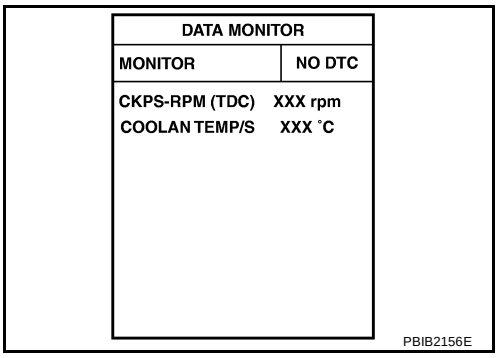
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON, and select “DATA MONITOR” mode with CONSULT-II.
2. Restart engine and let it idle for about 15 minutes.
3. If DTC is detected, go to EC-1328, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
4. Drive vehicle and maintain the following conditions for at least 60 seconds.

CKPS·RPM	700 - 2000 rpm (A constant rotation is maintained)
COOLAN TEMP/S	Less than 75°C (167°F)
Shift lever	Suitable position
Accelerator pedal	Hold the accelerator pedal as steady as possible.

5. If DTC is detected, go to EC-1328, "Diagnostic Procedure" .



WITH GST

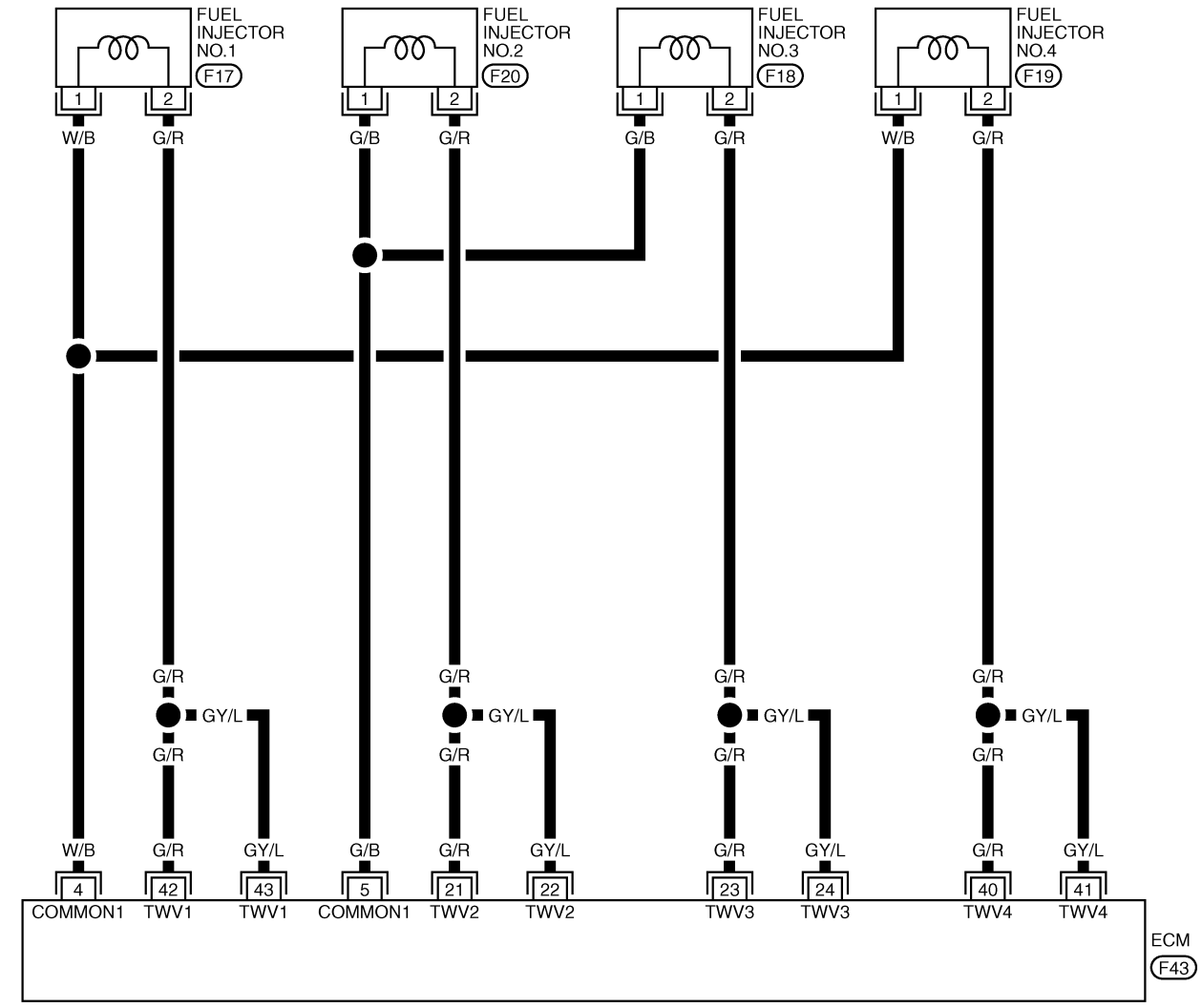
Follow the procedure “WITH CONSULT-II” above.

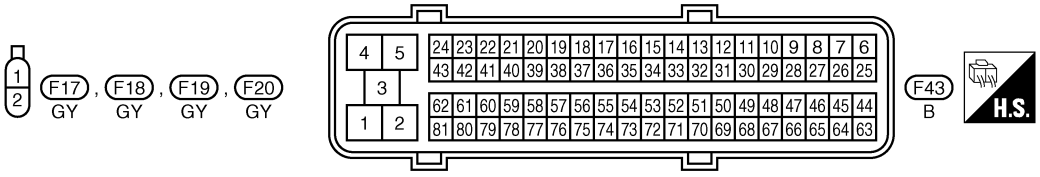
Wiring Diagram

BBS0023Z

EC-INJECT-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

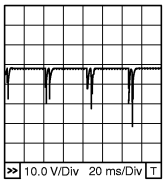
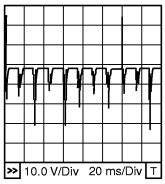
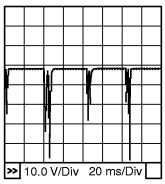
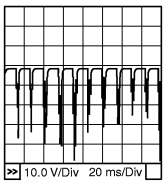




TBWB0903E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	W/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	5 - 10V ★  MBIB0883E
5	G/B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	5 - 10V ★  MBIB0884E
21 22 23 24 40 41 42 43	G/R GY/L G/R GY/L G/R GY/L G/R GY/L	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3 Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 9V ★  MBIB0882E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

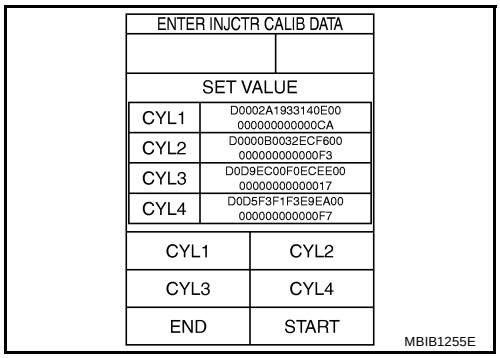
Diagnostic Procedure

BBS00240

1. CHECK INJECTOR ADJUSTMENT VALUE

1. Turn ignition switch ON.
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.
3. Check injector adjustment values displayed on CONSULT-II screen.

The value displayed on CONSULT-II screen should be same as injector adjustment value printed on each fuel injector.

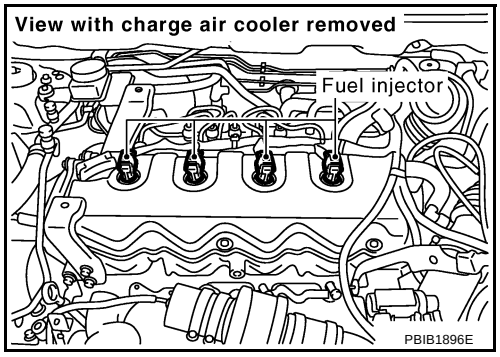


OK or NG

OK >> GO TO 2.
NG >> Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .

2. CHECK FUEL INJECOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.



DTC	Terminal		Cylinder
	ECM	Fuel injector	
P1268	4	1	No.1
P1269	5	1	No.2
P1270	5	1	No.3
P1271	4	1	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

DTC	Terminal		Cylinder
	ECM	Fuel injector	
P1268	42, 43	2	No.1
P1269	21, 22	2	No.2
P1270	23, 24	2	No.3
P1271	40, 41	2	No.4

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL INJECTOR-I

Refer to EC-1331, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHECK FUEL INJECTOR-II

With CONSULT-II

1. Remove two fuel injectors.
   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .
6. Select “SELF DIAG RESULTS” mode with CONSULT-II.
7. Touch “ERASE”.
8. Perform EC-1325, "DTC Confirmation Procedure" .
9. Is DTC displayed for the other cylinder?

With GST

1. Remove two fuel injectors.
   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .
6. Select Service $04 with GST.
7. Perform EC-1325, "DTC Confirmation Procedure" .
8. Is DTC displayed for the other cylinder?

Yes or No

Yes >> GO TO 6.
No >> GO TO 7.

6. REPLACE FUEL INJECOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

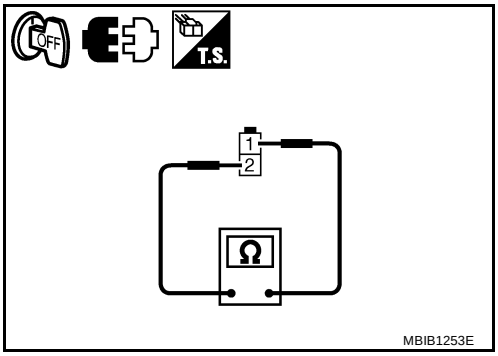
BBS00241

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 0.2 - 0.8Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel injector.



Removal and Installation

BBS00242

FUEL INJECTOR

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

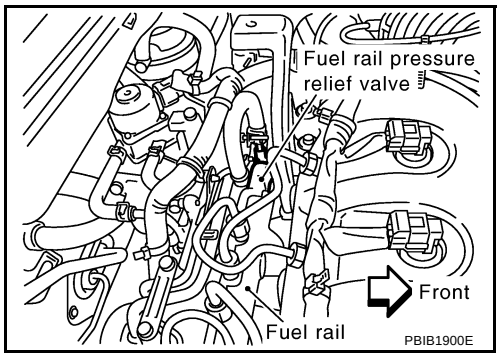
DTC P1272 FUEL PUMP

PFP:16700

Description

BBS00243

When the fuel pressure in fuel rail increases to excessively high, fuel pressure relief valve opens to carry excess fuel to the return hose.



CONSULT-II Reference Value in Data Monitor Mode

BBS00244

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

On Board Diagnosis Logic

BBS00245

NOTE:
If DTC P1272 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1272 1272	Fuel rail pressure relief valve open	Fuel rail pressure relief valve is open because of fuel pressure control system malfunction.	● Harness or connectors (Fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor ● Air mixed with fuel ● Lack of fuel ● Fuel transport pump operation

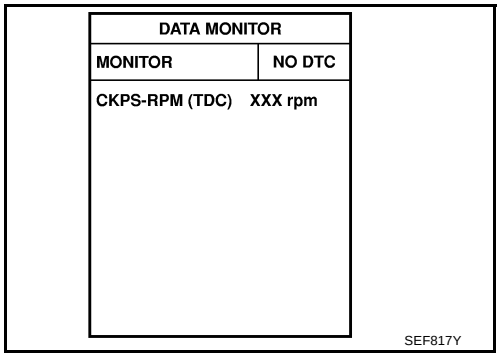
DTC Confirmation Procedure

BBS00246

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds, then release the accelerator pedal.
4. If 1st trip DTC is detected, go to EC-1335, "Diagnostic Procedure" .



WITH GST

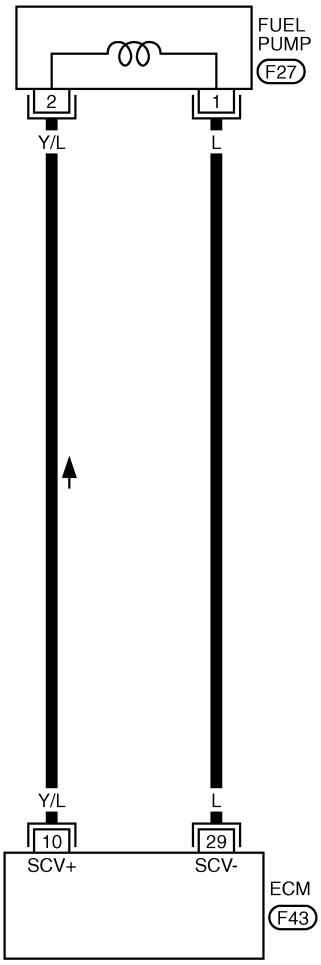
Follow the procedure “WITH CONSULT-II” above.

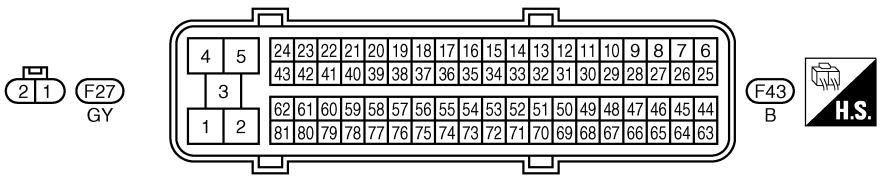
Wiring Diagram

BBS00247

EC-F/PUMP-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

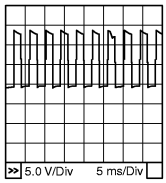
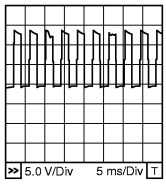
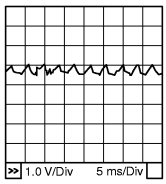
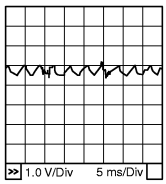




TBWA0574E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0886E
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS00248

1. CHECK FUEL TRANSPORT PUMP OPERATION

Perform Diagnostic Procedure for fuel transport pump. Refer to EC-1431 .

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of Diagnostic Procedure for fuel transport pump.

2. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1332, "DTC Confirmation Procedure" , again.
7. Is 1st trip DTC detected again?

With GST

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select Service $04 with GST.
5. Perform EC-1332, "DTC Confirmation Procedure" , again.
6. Is 1st trip DTC detected again?

Yes or No

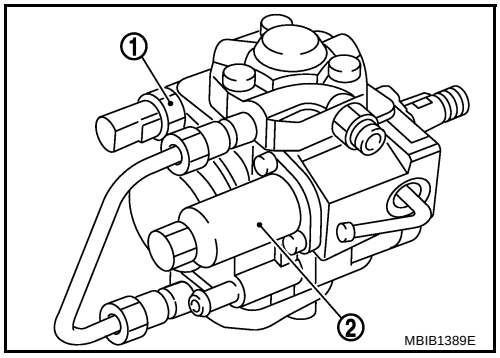
Yes >> GO TO 3.
No >> **INSPECTION END**

3. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL PUMP

Refer to EC-1337, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 8.

6. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1150, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace fuel rail.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Component Inspection

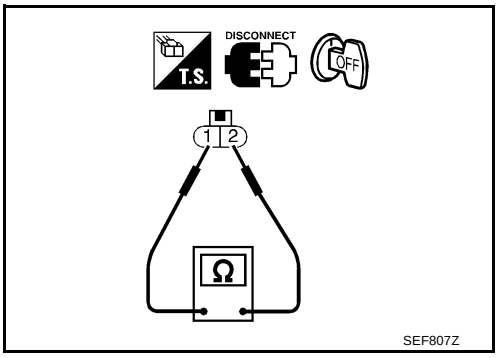
BBS00249

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

BBS0024A

FUEL RAIL

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P1273 FUEL PUMP

PFP:16700

Description

BBS0024B

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel pump increases, the fuel raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

BBS0024C

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

On Board Diagnosis Logic

BBS0024D

NOTE:

- **If DTC P1273 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1273 1273	Fuel pump insufficient flow	ECM detects the abnormal pulse of fuel pressure.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump ● Injector adjustment value ● Air mixed with fuel ● Lack of fuel ● Fuel rail pressure sensor ● Fuel transport pump operation

DTC Confirmation Procedure

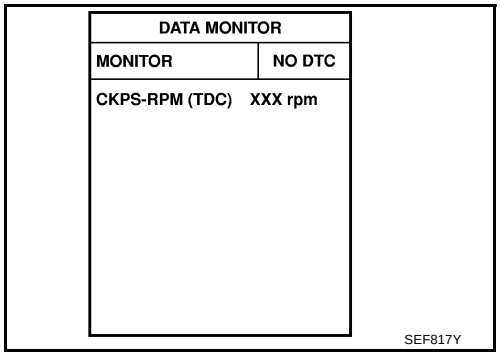
BBS0024E

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 10 seconds.
4. If 1st trip DTC is detected, go to EC-1340, "Diagnostic Procedure" .



WITH GST

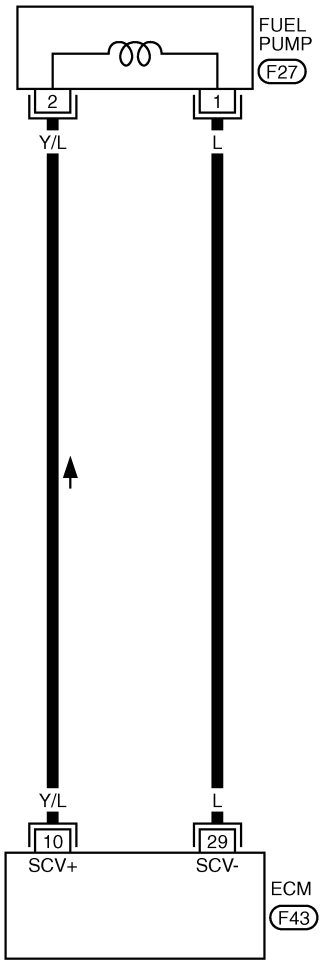
Follow the procedure “WITH CONSULT-II” above.

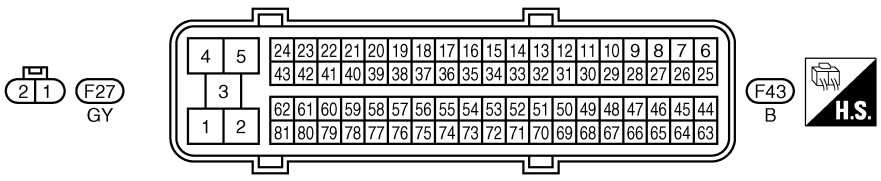
Wiring Diagram

BBS0024F

EC-F/PUMP-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

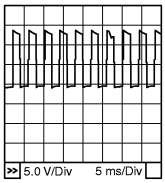
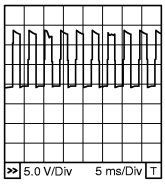
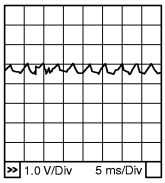
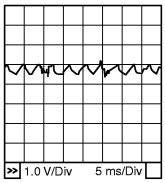




TBWA0574E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0886E
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS0024G

1. CHECK FUEL TRANSPORT PUMP OPERATION

Perform Diagnostic Procedure for fuel transport pump. Refer to EC-1431 .

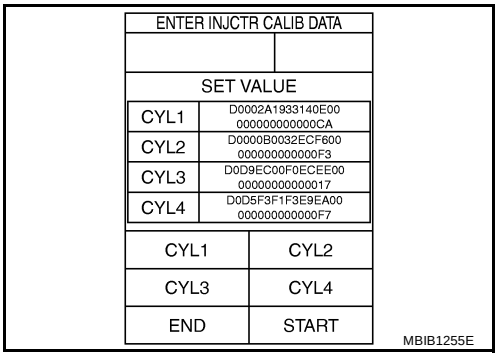
OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of Diagnostic Procedure for fuel transport pump.

2. CHECK INJECTOR ADJUSTMENT VALUE

1. Turn ignition switch ON.
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.
3. Check injector adjustment values displayed on CONSULT-II screen.

The value displayed on CONSULT-II screen should be same as injector adjustment value printed on each fuel injector.



OK or NG

OK >> GO TO 2.
NG >> Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .

3. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1338, "DTC Confirmation Procedure" , again.
7. Is 1st trip DTC detected again?

With GST

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select Service $04 with GST.
5. Perform EC-1338, "DTC Confirmation Procedure" , again.
6. Is 1st trip DTC detected again?

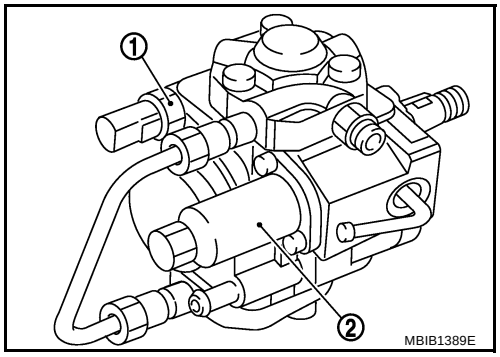
Yes or No

Yes >> GO TO 4.
No >> **INSPECTION END**

4. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
- Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 2.
Refer to Wiring Diagram.

Continuity should exist.



4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1150, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace fuel rail.

7. CHECK FUEL PUMP

Refer to EC-1343, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

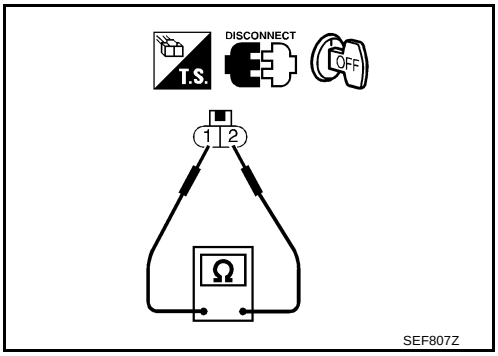
BBS0024H

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

BBS0024I

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P1274 FUEL PUMP

PFP:16700

Description

BBS0024J

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

BBS0024K

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

On Board Diagnosis Logic

BBS0024L

This self-diagnosis has the one trip detection logic.

NOTE:
If DTC P1274 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1274 1274	Fuel pump protection	Fuel pressure is too much higher than the target value.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor

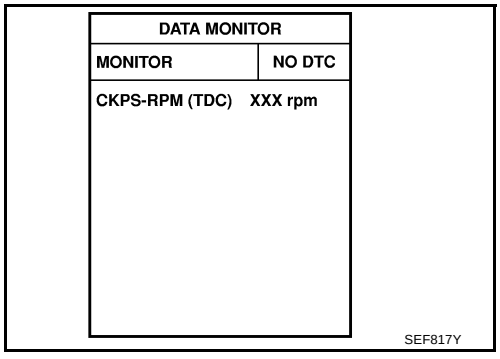
DTC Confirmation Procedure

BBS0024M

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Tuning ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let idle for at least 5 seconds.
4. If DTC is detected, go to EC-1347, "Diagnostic Procedure" .



WITH GST

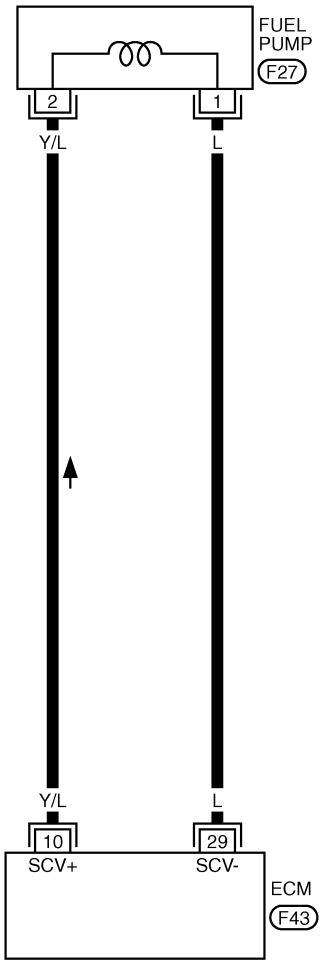
Follow the procedure “WITH CONSULT-II” above.

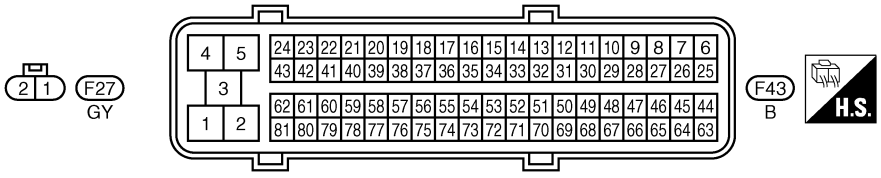
Wiring Diagram

BBS0024N

EC-F/PUMP-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

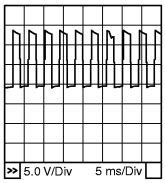
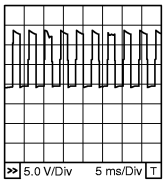
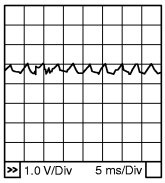
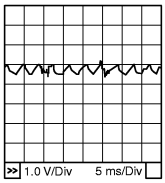




TBWA0574E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0886E
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

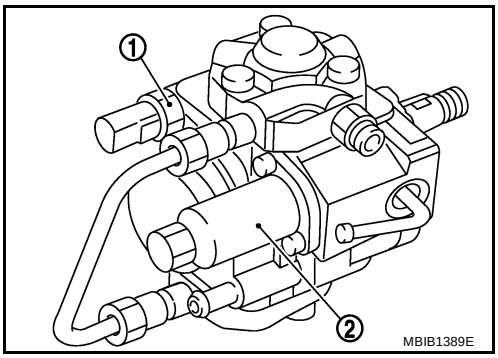
Diagnostic Procedure

BBS0024O

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.



4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1150, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK FUEL PUMP

Refer to EC-1348, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

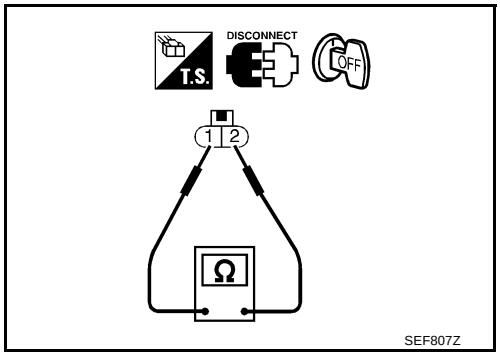
BBS0024P

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

BBS0024Q

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P1275 FUEL PUMP

PFP:16700

Description

BBS0024R

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

BBS0024S

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

On Board Diagnosis Logic

BBS0024T

This self-diagnosis has the one trip detection logic.

NOTE:

If DTC P1275 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1275 1275	Fuel pump exchange	Fuel pressure is too much higher than the target value.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor

DTC Confirmation Procedure

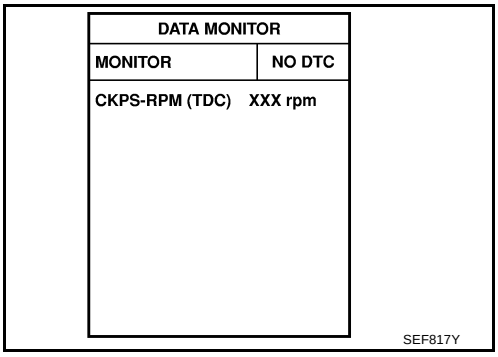
BBS0024U

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 60 seconds.
4. If DTC is detected, go to EC-1352, "Diagnostic Procedure" .



WITH GST

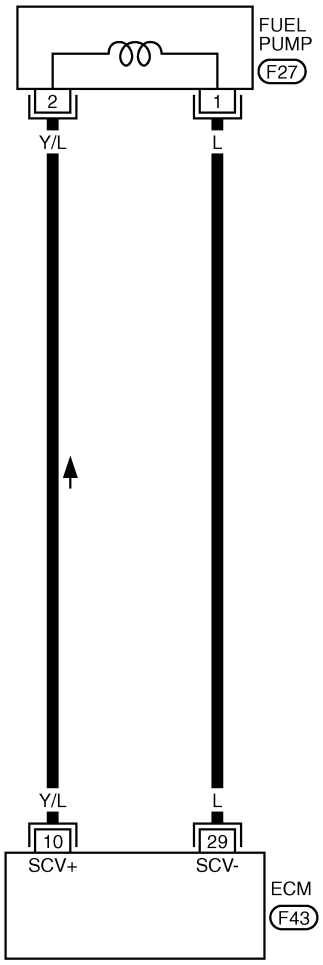
Follow the procedure “WITH CONSULT-II” above.

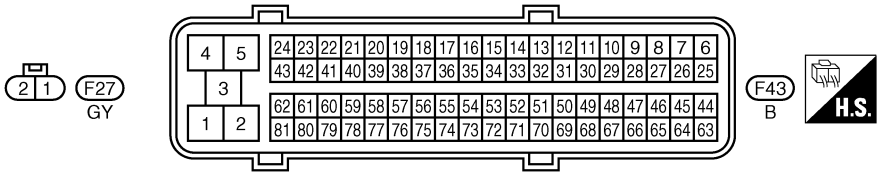
Wiring Diagram

BBS0024V

EC-F/PUMP-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

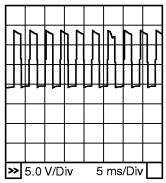
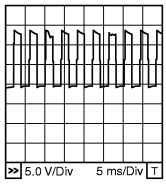
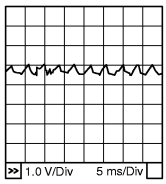
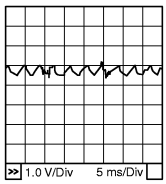




TBWA0574E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0886E
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

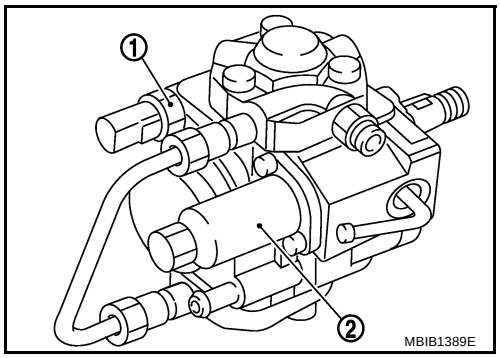
Diagnostic Procedure

BBS0024W

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
- Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 2.
Refer to Wiring Diagram.

Continuity should exist.



4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1150, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK FUEL PUMP

Refer to EC-1353, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

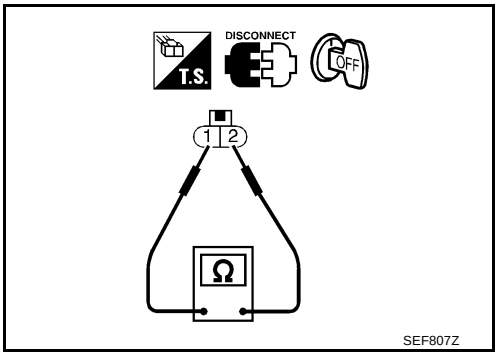
BBS0024X

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

BBS0024Y

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

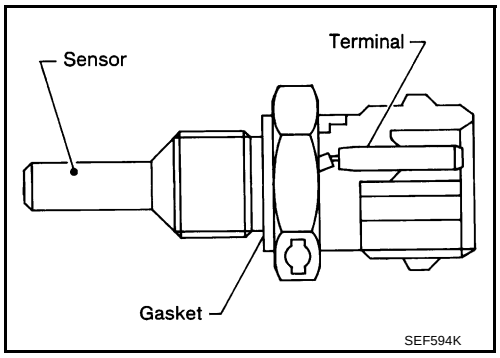
DTC P1472, P1473 ENGINE ROOM AIR TEMPERATURE SENSOR

PFP:22630

Description

BBS002KZ

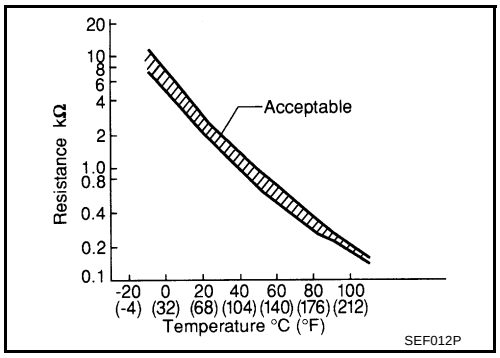
Engine room air temperature sensor detects ambient temperature around differential exhaust pressure sensor. Engine room air temperature sensor converts the temperature in to a voltage signal and sent the signal to ECM. Based on the signal, ECM compensate for the characteristic of differential exhaust pressure sensor which changes with the temperature.
Engine room air temperature sensor uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Engine room air temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.7	7.0 - 11.4
20 (68)	3.8	2.1 - 2.9
50 (122)	2.6	0.68 - 1.00
90 (194)	1.3	0.236 - 0.260

*: This data is reference value and is measured between ECM terminal 79 (Engine room air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

BBS002L0

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1472 1472	Engine room air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine room air temperature sensor
P1473 1473	Engine room air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

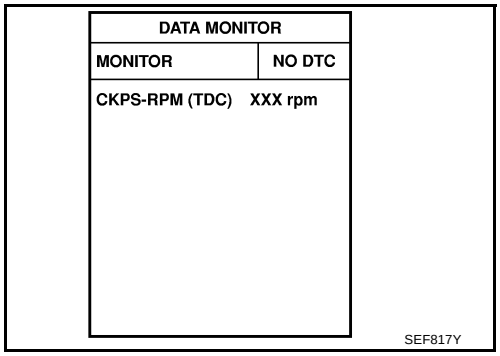
DTC Confirmation Procedure

BBS002L1

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1357, "Diagnostic Procedure" .



WITH GST

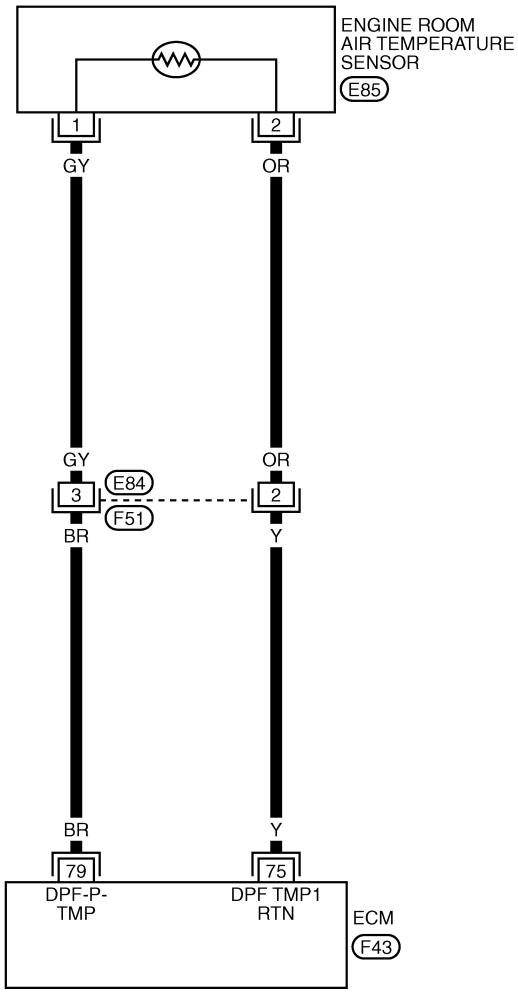
Follow the procedure “WITH CONSULT-II” above.

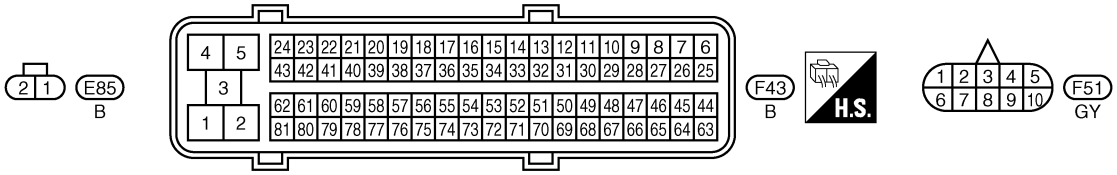
Wiring Diagram

BBS002L2

EC-ERATS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





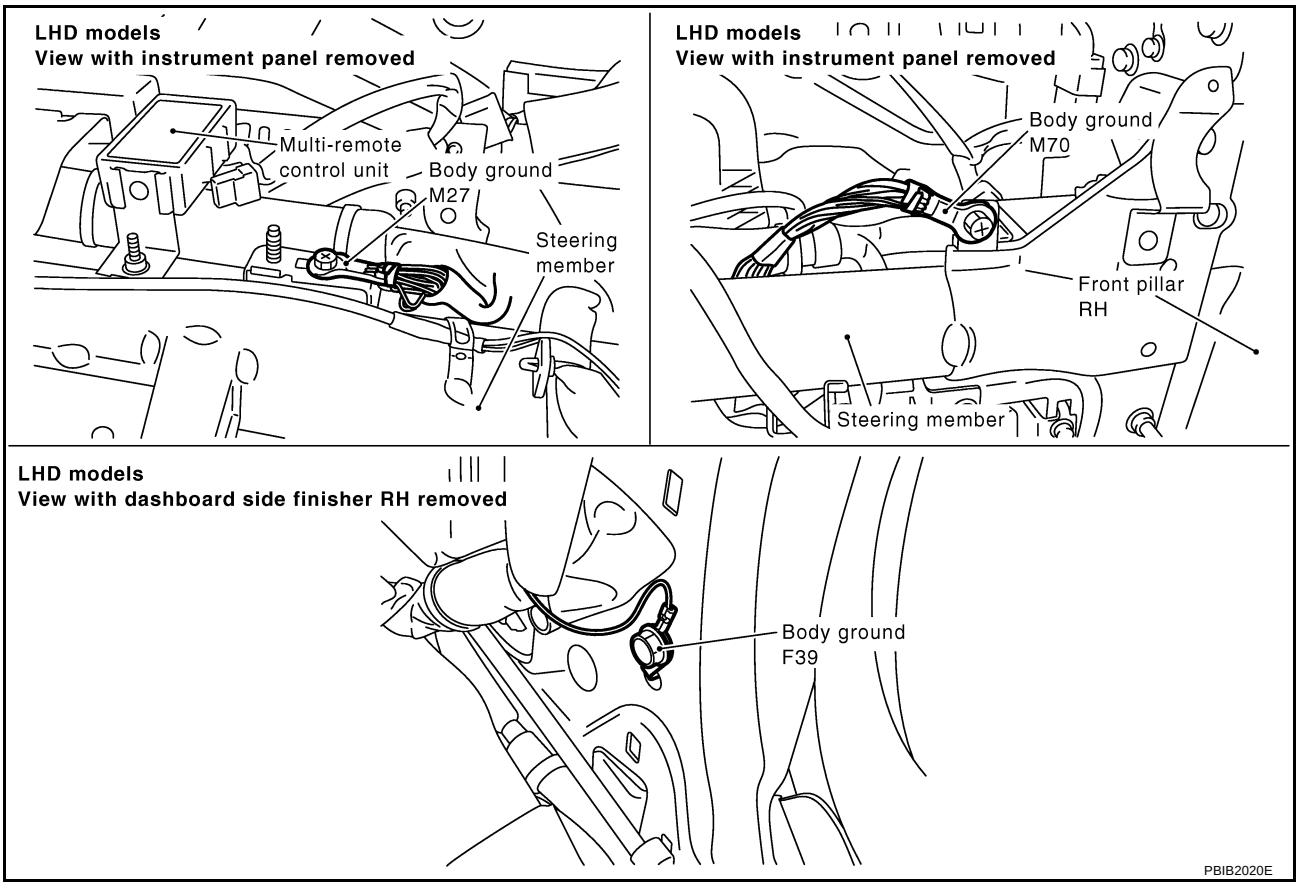
TBWB0918E

Diagnostic Procedure

BBS002L3

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

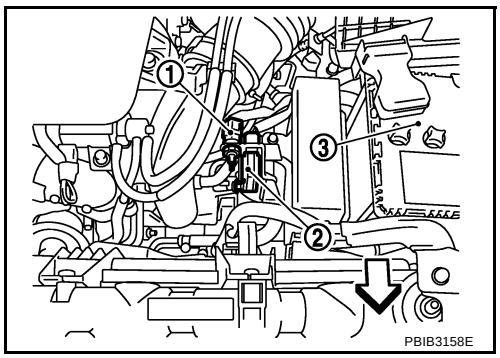


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

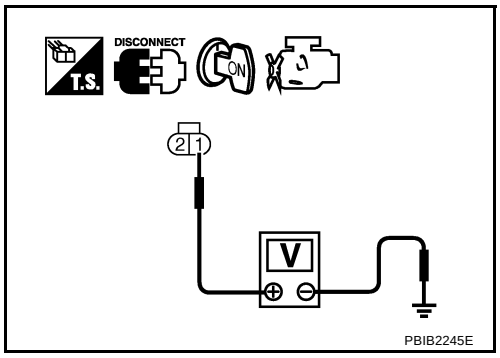
2. CHECK ENGINE ROOM AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine room air temperature sensor (1) harness connector.
   - ⇦: Vehicle front
   - Differential exhaust pressure sensor (2)
   - Battery (3)
2. Turn ignition switch ON.



3. Check voltage between engine room air temperature sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECTED MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between engine room air temperature sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE ROOM AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between engine room air temperature sensor terminal 2 and ECM terminal 75. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECTED MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between engine room air temperature sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK ENGINE ROOM AIR TEMPERATURE SENSOR

Refer to EC-1359, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace engine room air temperature sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

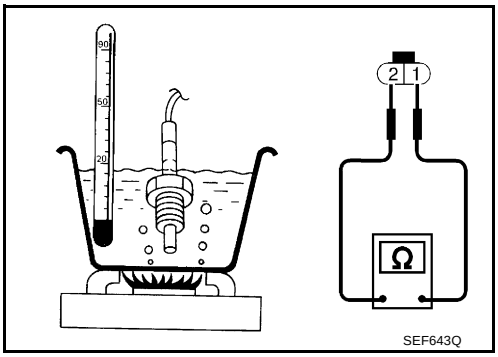
>> **INSPECTION END**

Component Inspection

BBS002L4

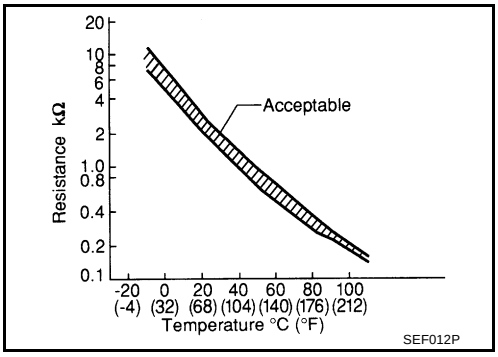
ENGINE ROOM AIR TEMPERATURE SENSOR

1. Check resistance between engine room air temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine room air temperature °C (°F)	Resistance kΩ
20 (68)	2.37 - 2.63
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine room air temperature sensor.

Removal and Installation

BBS002L5

ENGINE ROOM AIR TEMPERATURE SENSOR

Refer to EM-150, "CATALYST" .

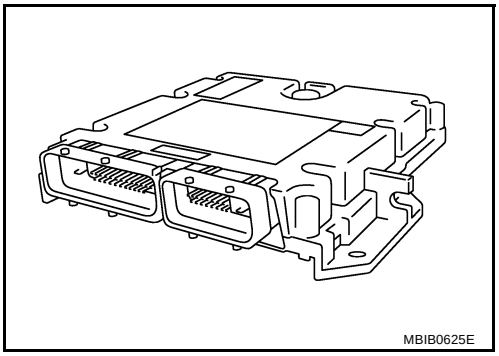
DTC P1616 ECM

PFP:23710

Description

BBS002HW

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


MBIB0625E

On Board Diagnosis Logic

BBS002HX

This self-diagnosis has the one trip detection logic.
The MI will not light up for this diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1616 1616	Engine control module (ROM)	ECM ROM is malfunctioning.	● ECM

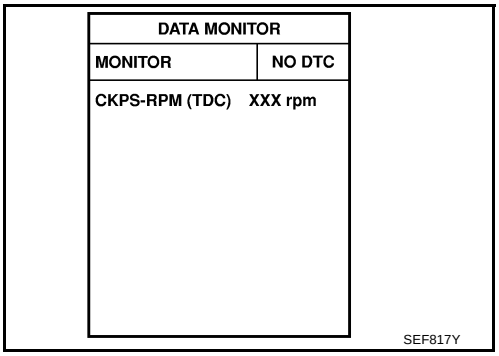
DTC Confirmation Procedure

BBS002HY

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1361, "Diagnostic Procedure" .



SEF817Y

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS002HZ

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1360, "DTC Confirmation Procedure" , again.
5. Is DTC P1616 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. Perform EC-1360, "DTC Confirmation Procedure" , again.
4. Is DTC P1616 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .
5. Perform Service Regeneration (models with DPF). Refer to EC-997, "Service Regeneration" .

>> **INSPECTION END**

DTC P1622 INJECTOR ADJUSTMENT VALUE

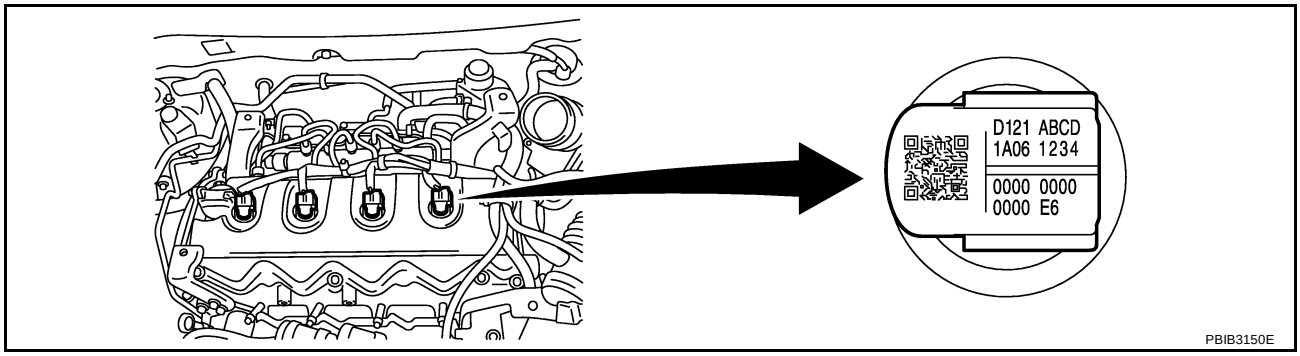
PFP:23710

Description

BBS002I0

Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector.The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control. A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the fuel injector which is installed on the vehicle



Example: Injector adjustment value = D121ABCD1A06123400000000000E6

On Board Diagnosis Logic

BBS002I1

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1622 1622	Injector adjustment value data uninput	Injector adjustment value is not stored in ECM.	● Injector adjustment value (Injector adjustment value has not been written onto ECM memory yet, or the value has been initialized.)

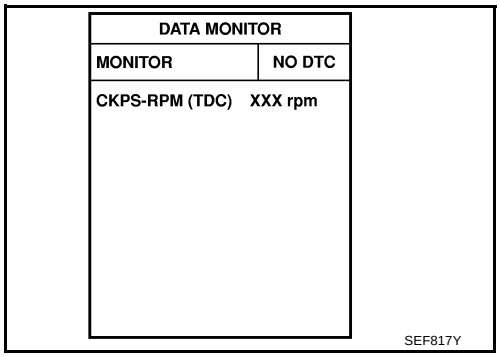
DTC Confirmation Procedure

BBS002I2

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1363, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS002I3

1. PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

DTC P1623 INJECTOR ADJUSTMENT VALUE

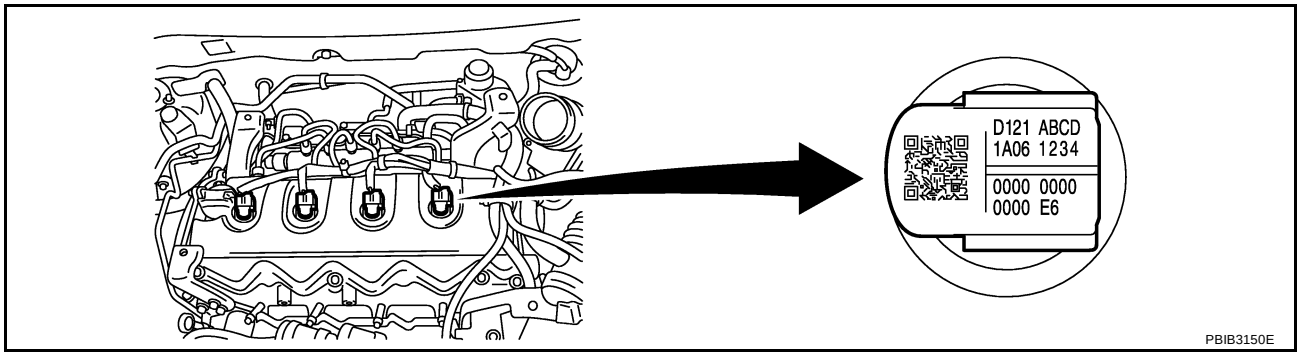
PFP:23710

Description

BBS002I4

Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector. The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control.
A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the fuel injector which is installed on the vehicle



Example: Injector adjustment value = D121ABCD1A06123400000000000E6

On Board Diagnosis Logic

BBS002I5

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1623 1623	Injector adjustment value data error	ECM detects the abnormal value of injector adjustment value.	● CONSULT-II communication status (The status of CONSULT-II communication becomes improper during Injector Adjustment Value Registration.) ● ECM

NOTE:
This DTC is not detected when injector adjustment value (not correct but existent) is stored in ECM.

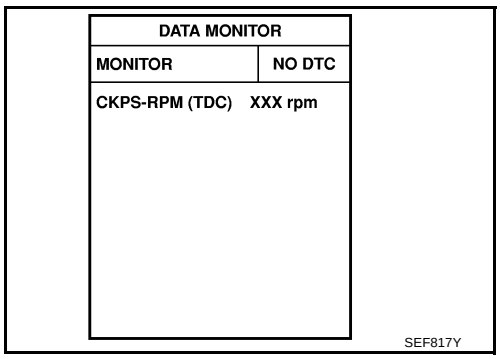
DTC Confirmation Procedure

BBS002I6

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1365, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

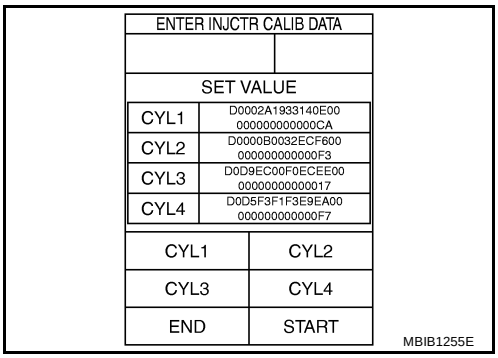
Diagnostic Procedure

BBS002I7

1. CHECK INJECTOR ADJUSTMENT VALUE

1. Turn ignition switch ON.
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.
3. Check injector adjustment values displayed on CONSULT-II screen.

The value displayed on CONSULT-II screen should be same as injector adjustment value printed on each fuel injector.



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .

NOTE:
When two or more injector adjustment value are improper, it is useful to perform “INJ ADJ VAL CLR” in “WORK SUPPORT” mode with CONSULT-II. And then perform Injector Adjustment Value Registration.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Select “SELF DIAG RESULTS” mode with CONSULT-II.
2. Touch “ERASE”.
3. Perform EC-1364, "DTC Confirmation Procedure" , again.
4. Is DTC P1623 displayed again?

With GST

1. Select Service $04 with GST.
2. Perform EC-1364, "DTC Confirmation Procedure" , again.
3. Is DTC P1623 displayed again?

Yes or No

Yes >> GO TO 4.
No >> **INSPECTION END**

4. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .
5. Perform Service Regeneration (models with DPF). Refer to EC-997, "Service Regeneration" .

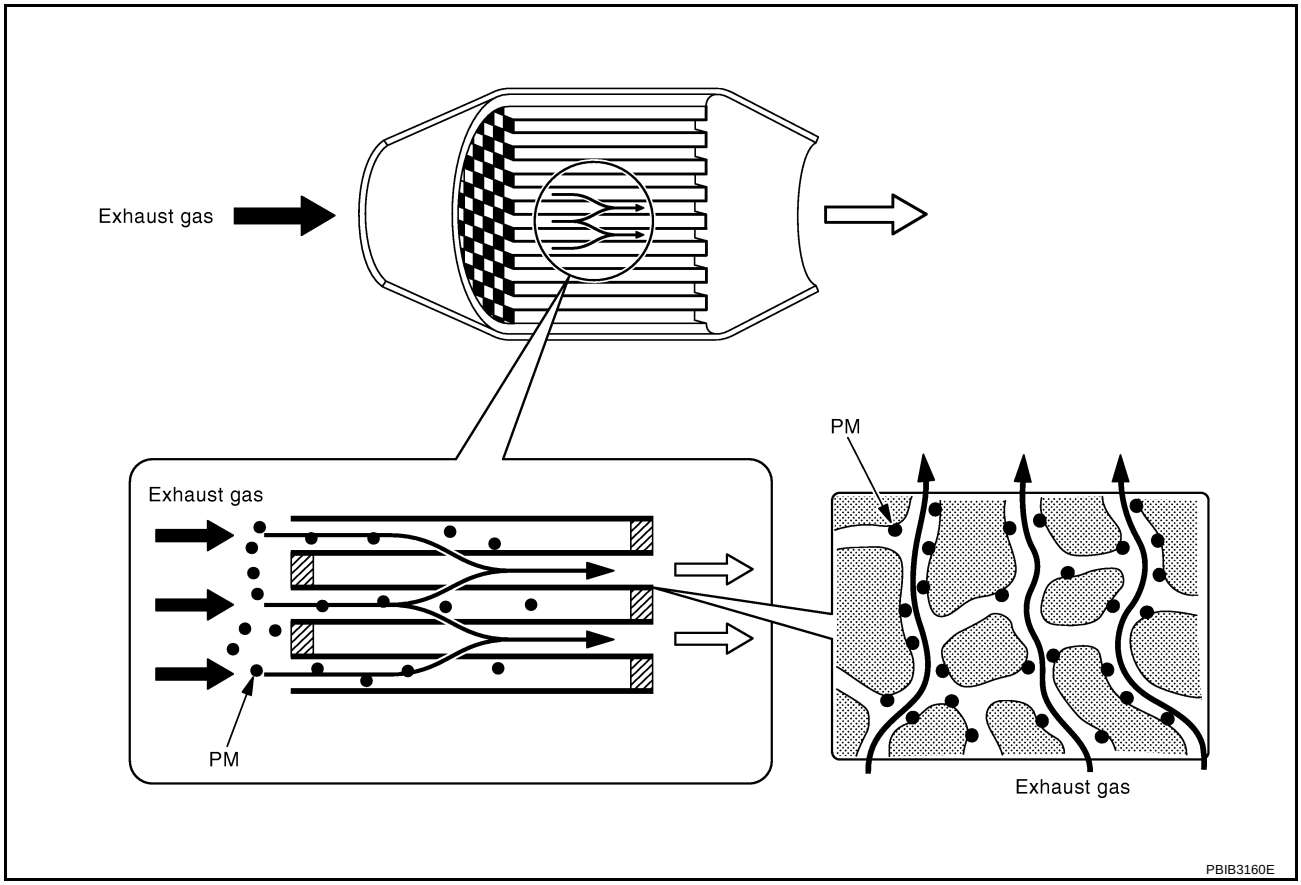
>> **INSPECTION END**

DTC P2002 DPF

PFP:208D0

Component Description

BBS002L6



DPF (Diesel Particulate Filter) is placed in oxidation catalyst assembly and traps PM (Particulate Matter) in exhaust gas. DPF is formed in a honeycomb form made of ceramic. This structure facilitates to trap particulate matter.
When the amount of particulate matter in the DPF reaches the specified level, the particulate matter needs to be reduced through burning to maintain the DPF function. This reducing of particulate matter is called Regeneration and should be performed periodically. DPF can be effective for a long time through the cycle of trapping particulate matter and regeneration.

On Board Diagnosis Logic

BBS002L7

This self-diagnosis has the one trip detection logic.
The MI will not light up for this diagnosis.

NOTE:
If DTC P2002 is displayed with other DTC, first perform the trouble diagnosis for other DTC.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2002 2002	Diesel particulate filter (DPF) efficiency below threshold	● Differential exhaust pressure exceeds a standard level for more than 10 seconds. ● Exhaust gas temperature does not raise during DPF regeneration.	● Oxidation catalyst with DPF ● Front exhaust gas temperature sensor ● Rear exhaust gas temperature sensor

FAIL-SAFE MODE

When the malfunction is detected, the ECM enters fail-safe.

Detected items	Engine operating condition in fail-safe mode
Particulate matter over accumulation	Engine speed will not rise more than 2,000 rpm due to the fuel cut.

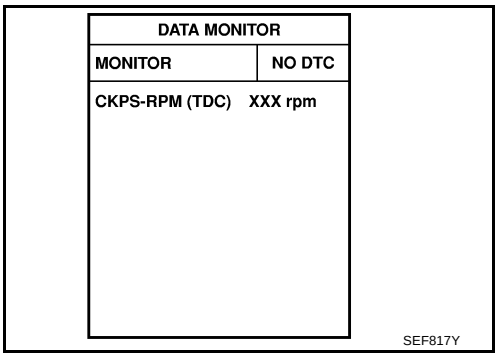
DTC Confirmation Procedure

BBS002L8

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1367, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS002L9

1. CHECK FRONT EXHAUST GAS TEMPERATURE SENSOR

Refer to EC-1243, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace front exhaust gas temperature sensor.

2. CHECK REAR EXHAUST GAS TEMPERATURE SENSOR

Refer to EC-1249, "Component Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Replace rear exhaust gas temperature sensor.

3. CHECK DPF

Refer to EC-1367, "Component Inspection" .

OK or NG

OK >> **INSPECTION END**
NG >> Replace oxidation catalyst with DPF.

Component Inspection

BBS002MQ

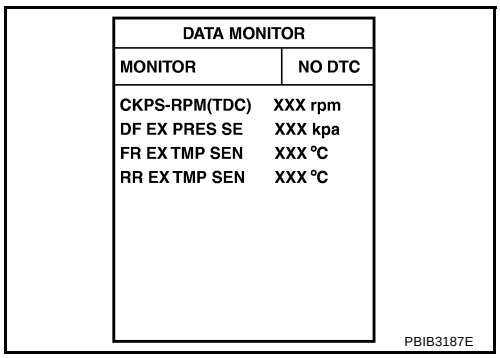
DPF

1. Check DPF for damage. If NG, go to 7.
2. Perform “Service Regeneration”. Refer to EC-997, "Service Regeneration" .
3. Turn ignition switch ON.

4. Select “DATA MONITOR” mode with CONSULT-II.
5. Start engine and warm it up to normal operating temperature.
6. Check “DF EX PRES SE” signal under the following conditions.

Condition	DF EX PRES SE [kPa]
● CKPS·RPM: 2000rpm ● FR EX TMP SEN: 150 - 200°C (302 - 392°F) ● RR EX TMP SEN: 150 - 200°C (302 - 392°F)	Less than 2.5

7. If NG, replace oxidation catalyst with DPF.
8. Perform “DPF Data Clear”. Refer to EC-999, "DPF Data Clear" .



Removal and Installation

BBS002MR

OXIDATION CATALYST WITH DPF

Refer to EM-150, "CATALYST" .

DTC P2118 THROTTLE CONTROL MOTOR

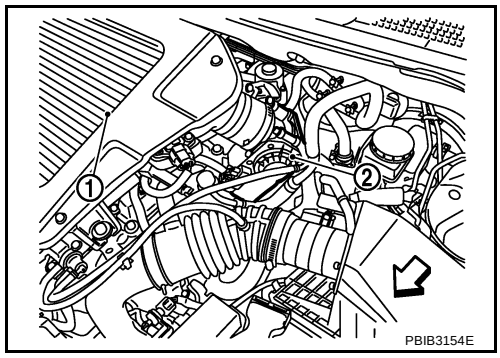
PFP:16119

Component Description

BBS002LA

Throttle control motor is operated by ECM and it opens and closed throttle valve. Throttle valve is fully opened when regeneration is not performed. The valve is closed only to perform regeneration.
Based on the signal from throttle position sensor, ECM judges whether throttle control actuator (2) operates throttle valve properly or not.

- ⇦: Vehicle front
- Charge air cooler (1)



CONSULT-II Reference Value in Data Monitor Mode

BBS002MJ

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
ETC OPEN ANGL	● Ignition switch: ON	84.0 °

On Board Diagnosis Logic

BBS002LB

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2101 2101	Throttle control motor circuit range/ performance	The signal voltage transmitted from the ECM to sensor is higher.	● Harness or connectors (Throttle control motor circuit is shorted.) ● Electric throttle control actuator (Throttle control motor)

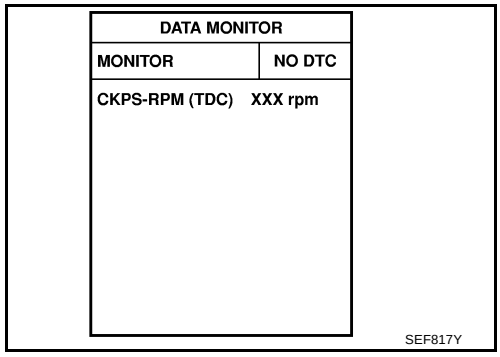
DTC Confirmation Procedure

BBS002LC

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 1 second.
4. If 1st trip DTC is detected, go to EC-1371, "Diagnostic Procedure" .



WITH GST

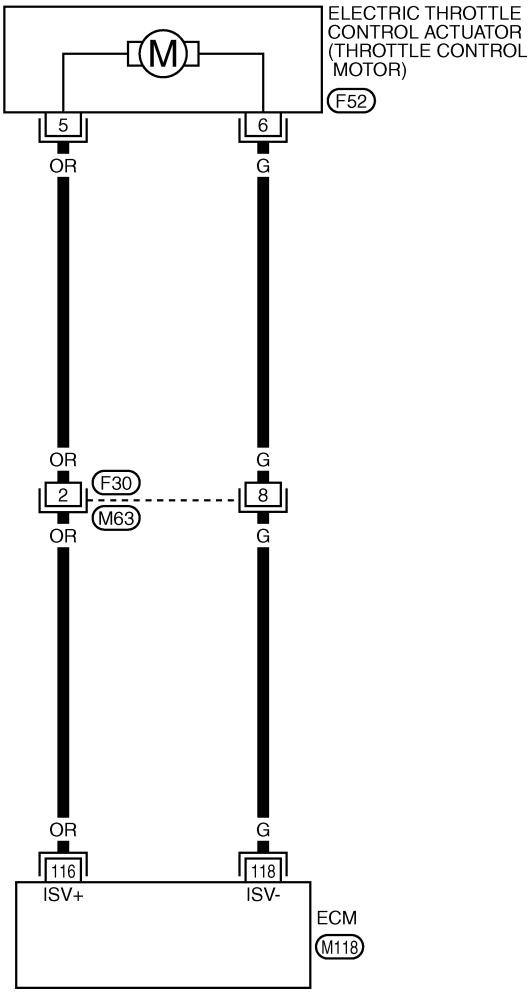
Follow the procedure “WITH CONSULT-II” above.

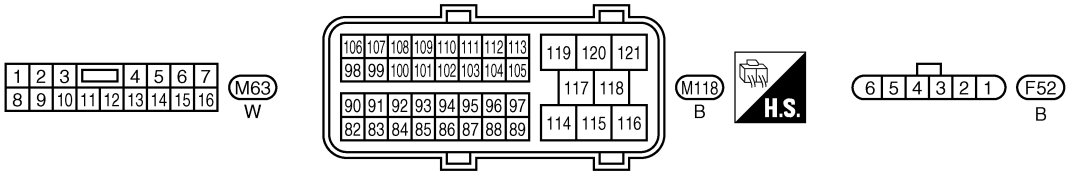
Wiring Diagram

BBS002LD

EC-ETC-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWB0916E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

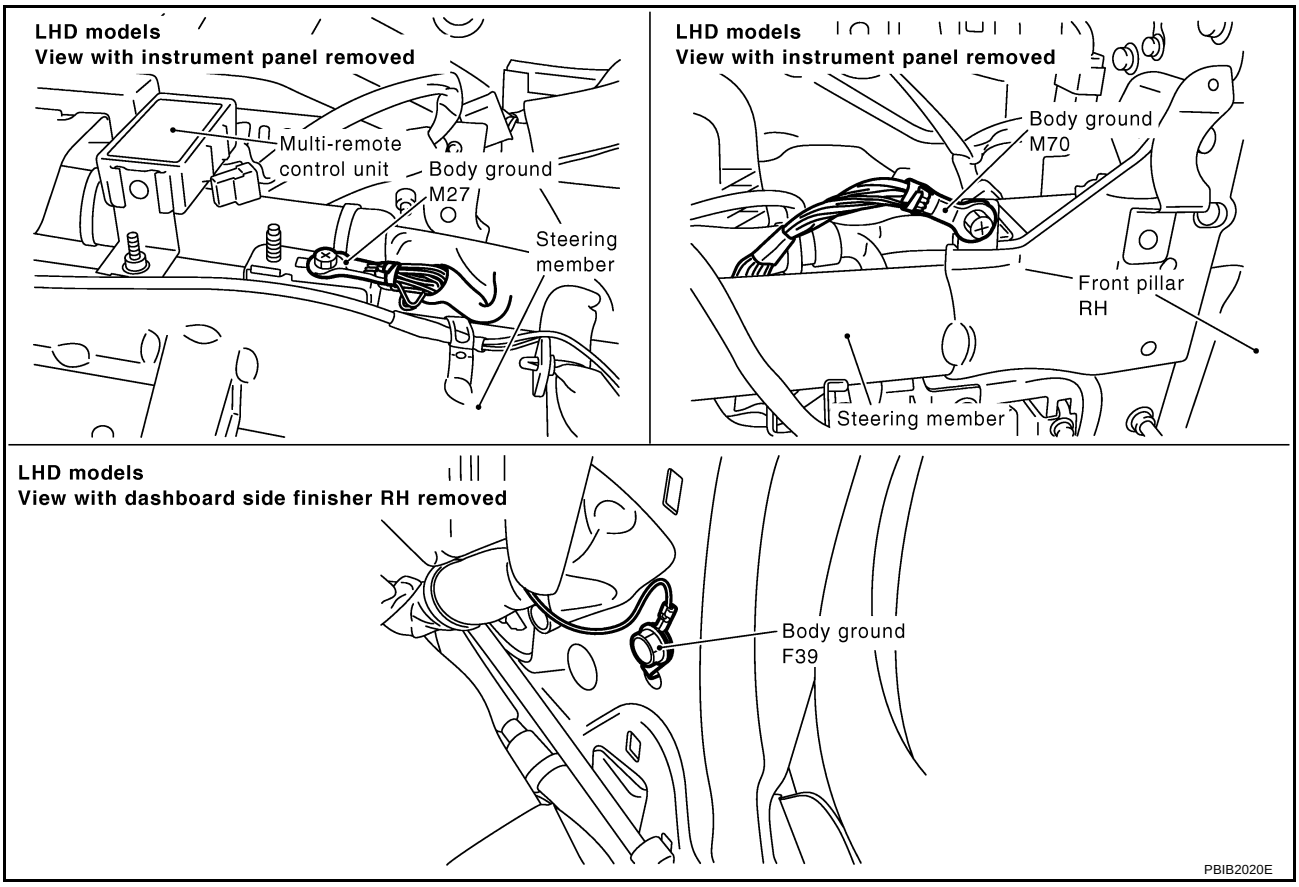
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
116	OR	Throttle control motor (Open)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)
118	G	Throttle control motor (Close)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS002LE

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten three ground screws on the body. Refer to EC-1067, "Ground Inspection" .

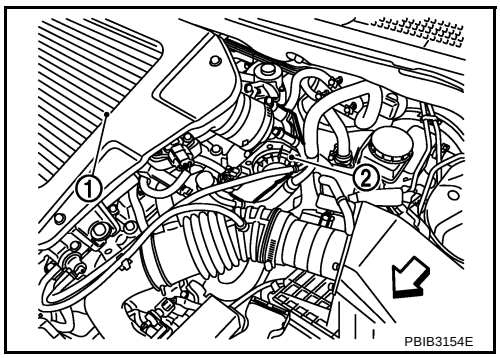


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK THROTTLE CONTROL MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect electric throttle control actuator (2) harness connector.
- ⇦: Vehicle front
- Charge air cooler (1)
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals. Refer to Wiring Diagram.



Electric throttle control actuator terminal	ECM terminal	Continuity
5	116	Should exist
	118	Should not exist
6	116	Should not exist
	118	Should exist

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between electric throttle control actuator and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE CONTROL MOTOR

Refer to EC-1373, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 6.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

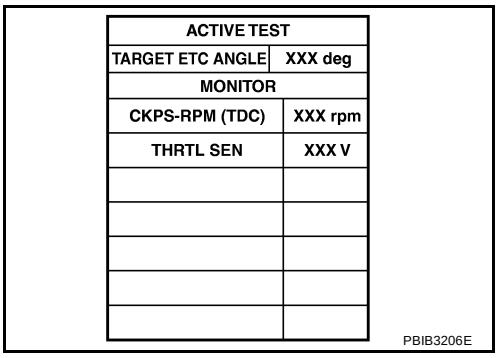
OK or NG

OK >> GO TO 6.
NG >> Repair or replace harness or connectors.

6. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

With CONSULT-II

1. Replace the electric throttle control actuator.
2. Turn ignition switch ON and OFF.
3. Turn ignition switch ON and select “TARGET ETC ANGLE” in “ACTIVE TEST” mode.
4. Make sure that throttle valve operates correctly.



Without CONSULT-II

1. Replace the electric throttle control actuator.
2. Turn ignition switch ON and OFF.
3. Turn ignition switch ON and OFF, and make sure that throttle valve operates correctly.

>> **INSPECTION END**

Component Inspection

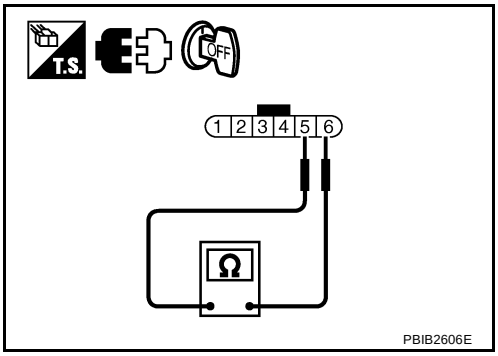
BBS002LF

THROTTLE CONTROL MOTOR

1. Disconnect electric throttle control actuator harness connector.
2. Check resistance between terminals 5 and 6.

Resistance: Approximately 0.3 - 100 Ω [at 25°C(77°)]

3. If NG, replace electric throttle control actuator.



Removal and Installation

BBS002LG

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-145, "Removal and Installation" .

DTC P2119 ELECTRIC THROTTLE CONTROL ACTUATOR

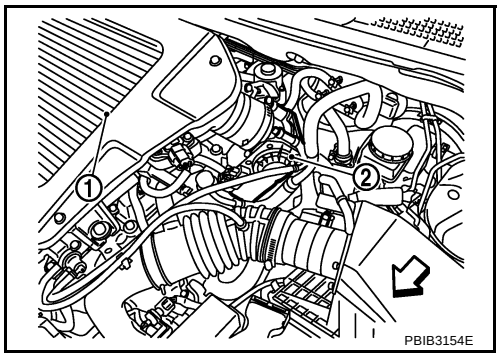
PFP:16119

Component Description

BBS002LH

Electric throttle control actuator (2) consists of throttle control motor which operates throttle valve, throttle position sensor which detects the opening angle of throttle valve, etc.
Throttle valve is fully opened when regeneration is not performed. The valve is closed only to perform regeneration.
Based on the signal from throttle position sensor, ECM judges whether or not throttle control actuator operates properly.

- ⇦: Vehicle front
- Charge air cooler (1)



On Board Diagnosis Logic

BBS002LI

This self-diagnosis has the one trip detection logic.
MI will not light up for these diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2119 2119	Electric throttle control actuator range/performance	Electric throttle control actuator does not function properly due to the return spring malfunction.	● Electric throttle control actuator

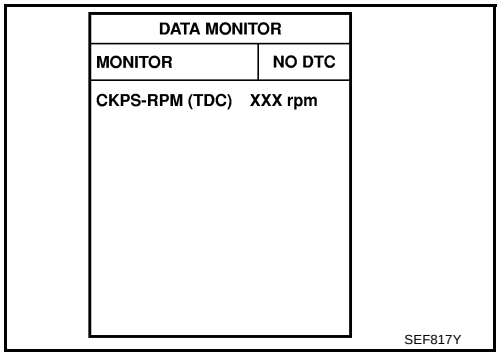
DTC Confirmation Procedure

BBS002LJ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. If DTC is detected, go to EC-1365, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS002LK

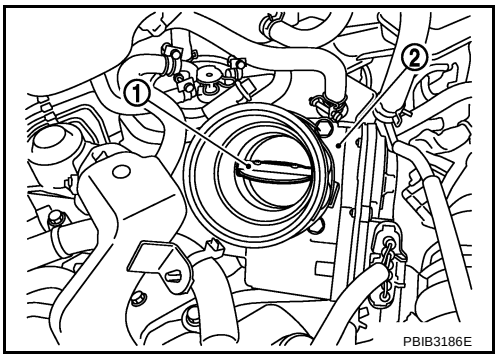
1. CHECK ELECTRIC THROTTLE CONTROL ACTUATOR VISUALLY

1. Remove the intake air duct.
2. Check if a foreign matter is caught between the throttle valve (1) and the housing.

– Electric throttle control actuator (2)

OK or NG

OK >> GO TO 2.
NG >> Remove the foreign matter and clean the electric throttle control actuator inside.



2. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

With CONSULT-II

1. Replace the electric throttle control actuator.
2. Turn ignition switch ON and OFF.
3. Turn ignition switch ON and select “TARGET ETC ANGLE” in “ACTIVE TEST” mode.
4. Make sure that throttle valve operates correctly.

Without CONSULT-II

1. Replace the electric throttle control actuator.
2. Turn ignition switch ON and OFF.
3. Turn ignition switch ON and OFF, and make sure that throttle valve operates correctly.

>> **INSPECTION END**

ACTIVE TEST	
TARGET ETC ANGLE	XXX deg
MONITOR	
CKPS-RPM (TDC)	XXX rpm
THRTL SEN	XXX V

PBIB3206E

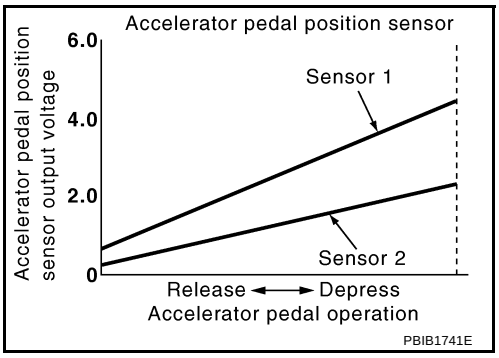
DTC P2135 APP SENSOR

PFP:18002

Description

BBS0024Z

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



CONSULT-II Reference Value in Data Monitor Mode

BBS00250

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.15 - 0.6V
		Accelerator pedal: Fully depressed	1.95 - 2.4V

*: This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

BBS00251

This self-diagnosis has the one trip detection logic.
The MI will not light up for this self-diagnosis.

NOTE:

- **If DTC P2135 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-1307, "DTC P0642, P0643 SENSOR POWER SUPPLY" .**
- **If DTC P2135 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1312, "DTC P0652, P0653 SENSOR POWER SUPPLY" .**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Accelerator pedal position sensor 1, 2 signal correlation	The correlation between APP sensor 1 signal and APP sensor 2 signal is out of the normal range.	● Harness or connectors (The APP sensor circuit is open or shorted.) ● Accelerator pedal position sensor (APP sensor 1 and 2)

DTC Confirmation Procedure

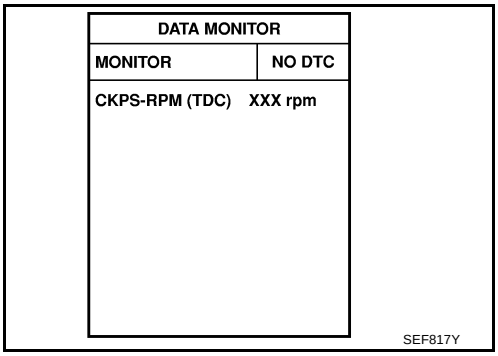
BBS00252

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. Depress accelerator pedal slowly spending 5 seconds, and then release it slowly spending 5 seconds.
5. If DTC is detected, go to EC-1380, "Diagnostic Procedure" .



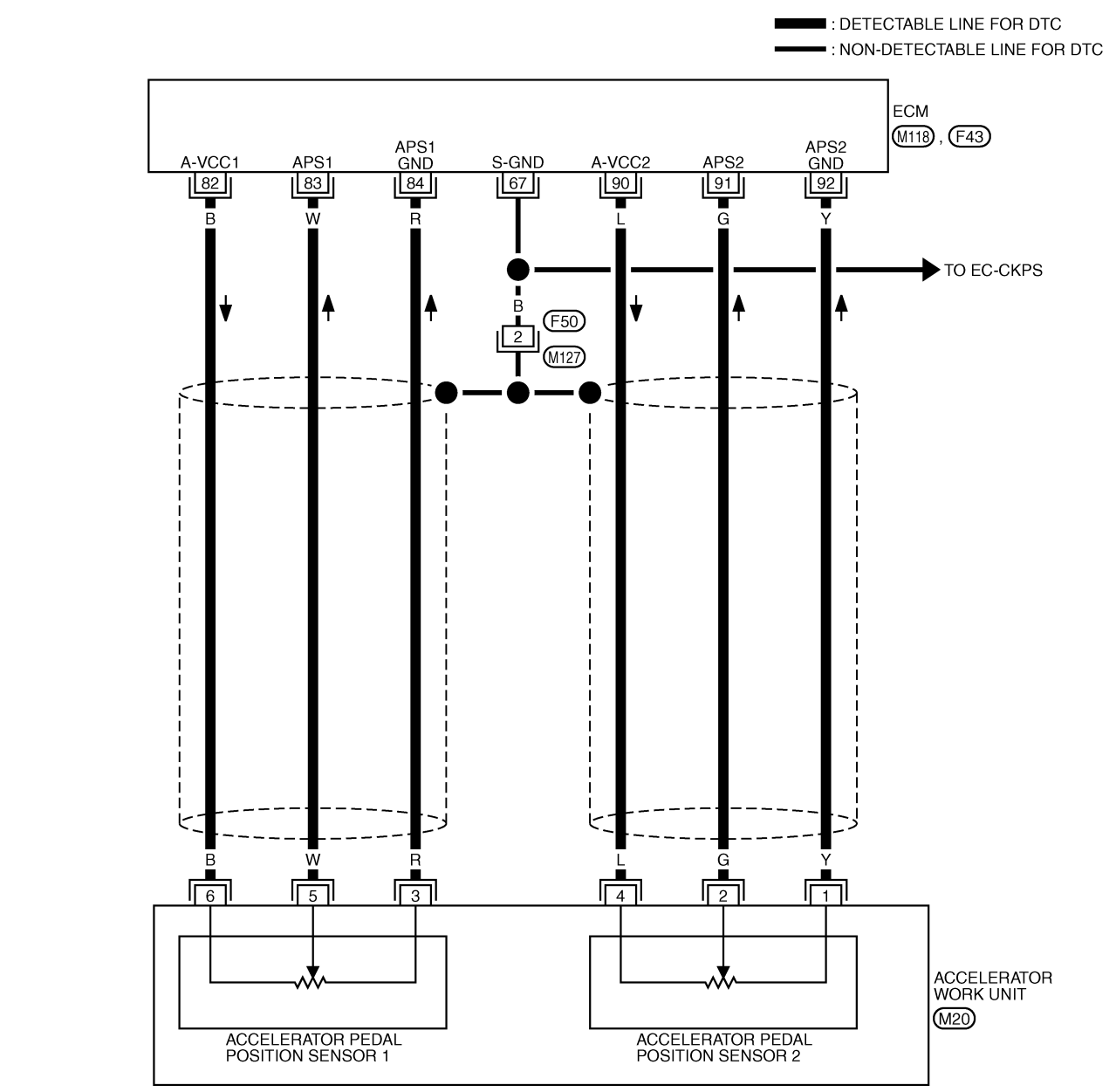
WITH GST

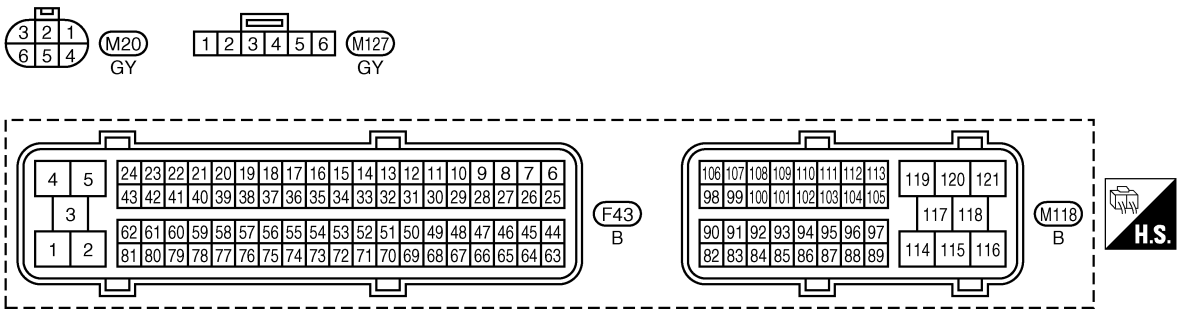
Follow the procedure “WITH CONSULT-II” above.

Wiring Diagram

BBS00253

EC-APPS3-01





TBWB0911E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

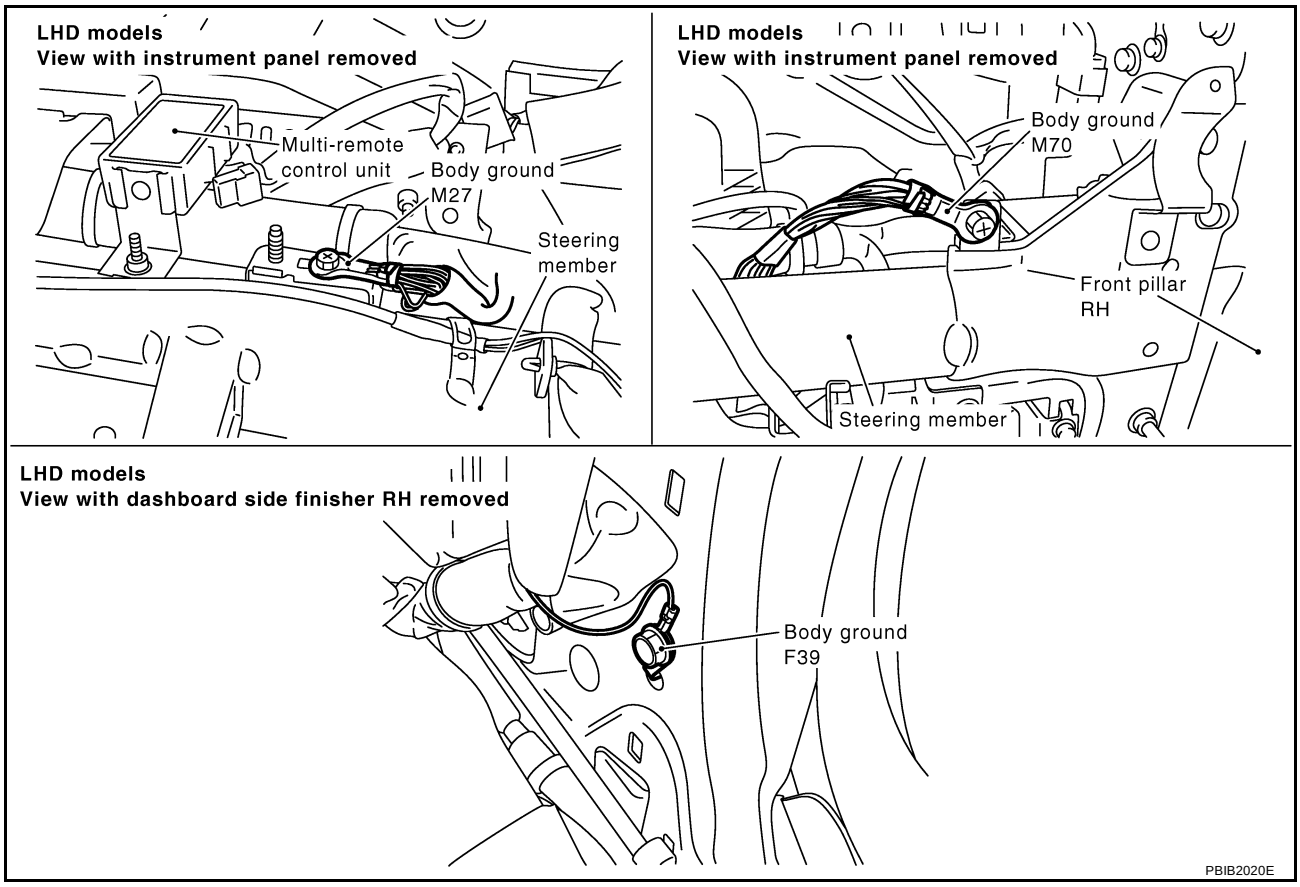
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V
83	W	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.8 - 1.3V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.0V
84	R	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
90	L	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	G	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.45 - 0.9V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.25 - 2.7V
92	Y	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS00254

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

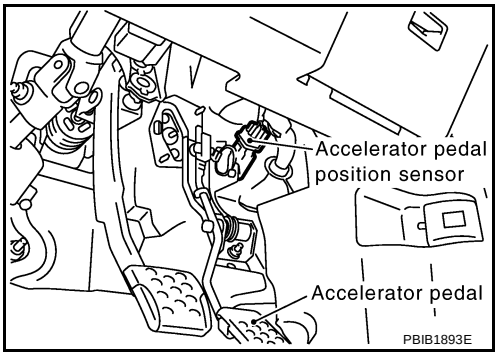


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

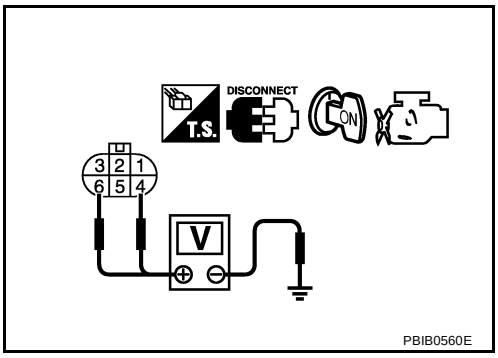
2. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminals 4, 6 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminals 3 and ECM terminal 84, APP sensor terminal 1 and ECM terminal 92.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 83 and APP sensor terminal 5, ECM terminal 91 and APP sensor terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1382, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

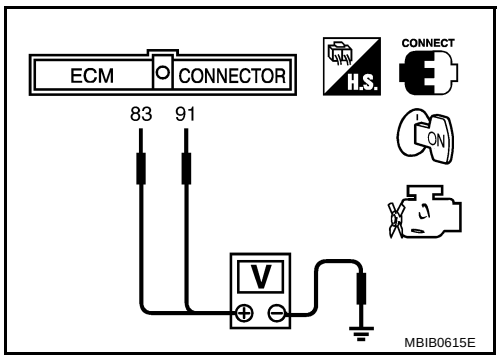
>> **INSPECTION END**

Component Inspection

BBS00255

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.8 - 1.3V
	Fully depressed	4.2 - 5.0V
91 (Accelerator pedal position sensor 2)	Fully released	0.45 - 0.9V
	Fully depressed	2.25 - 2.7V

4. If NG, replace accelerator pedal assembly.

Removal and Installation

BBS00256

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

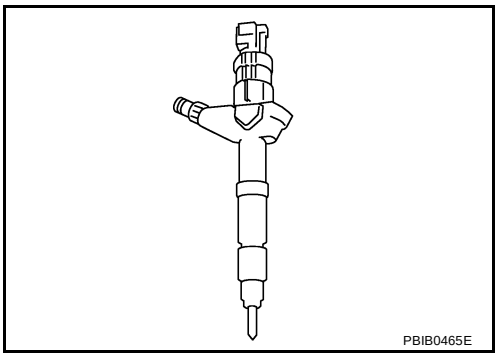
DTC P2146, P2149 FUEL INJECTOR POWER SUPPLY

PFP:16600

Component Description

BBS00257

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

BBS00258

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

On Board Diagnosis Logic

BBS00259

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2146 2146	No. 1 and 4 cylinder fuel injector power supply circuit open	An improper voltage signal is sent to ECM through No. 1 and 4 cylinder fuel injector.	● Harness or connectors (The fuel injector circuit is open.)
P2149 2149	No. 2 and 3 cylinder fuel injector power supply circuit open	An improper voltage signal is sent to ECM through No. 2 and 3 cylinder fuel injector.	

DTC Confirmation Procedure

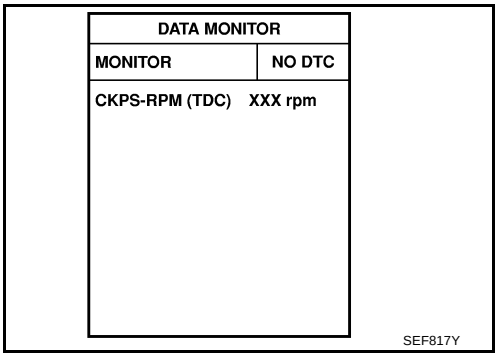
BBS0025A

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION
Before performing the following procedure, confirm the ambient temperature is more than -20°C (-4°F).

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1386, "Diagnostic Procedure" .



SEF817Y

WITH GST

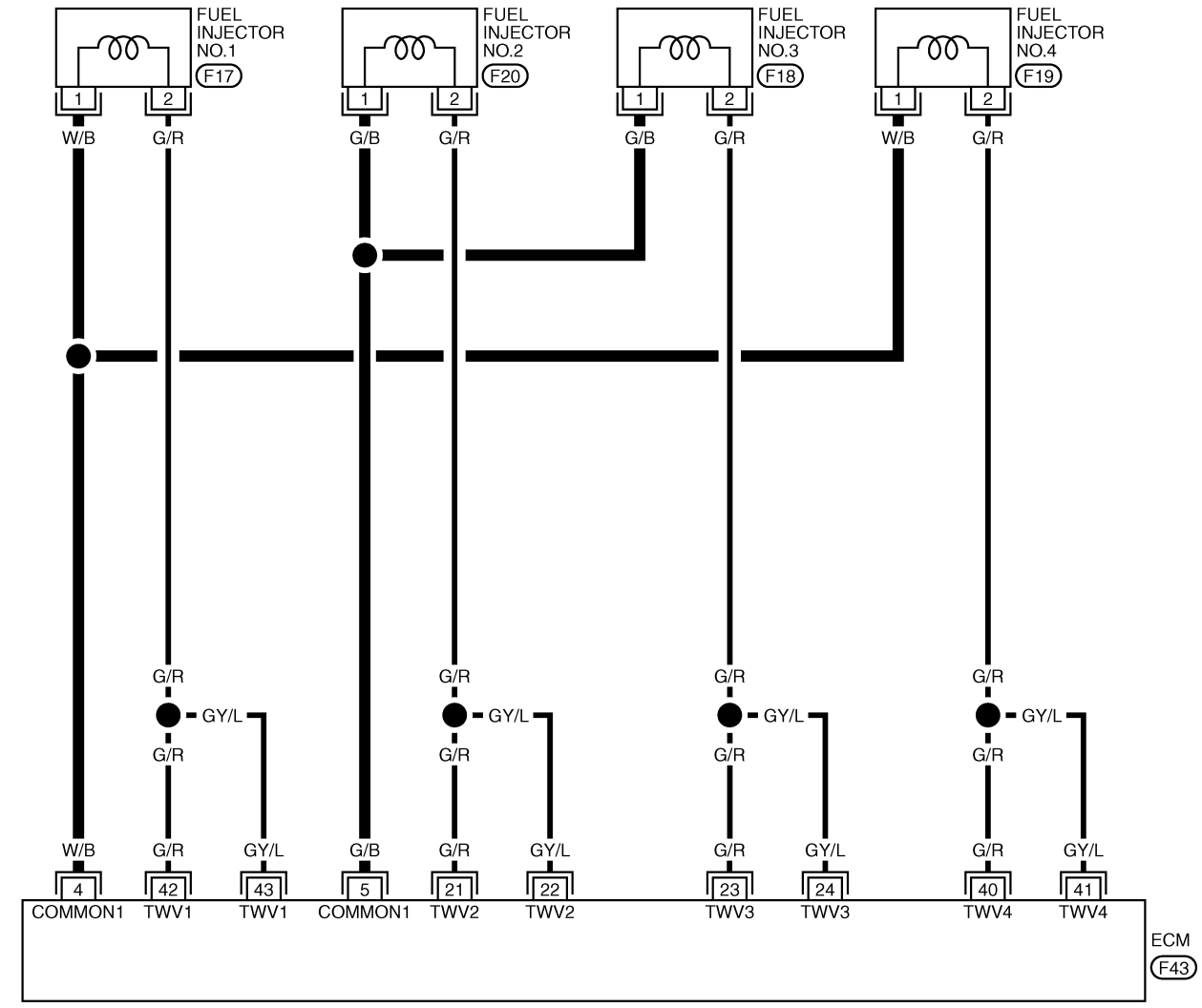
Follow the procedure “WITH CONSULT-II” above.

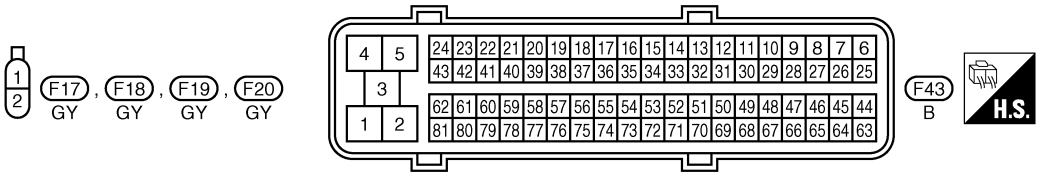
Wiring Diagram

BBS0025B

EC-INJ/PW-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

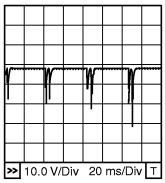
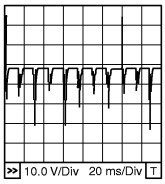
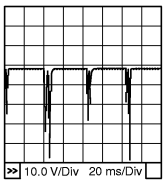
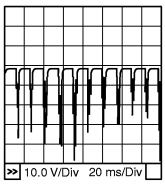




TBWB0912E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	W/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	5 - 10V ★  MBIB0883E
5	G/B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	5 - 10V ★  MBIB0884E
21 22 23 24 40 41 42 43	G/R GY/L G/R GY/L G/R GY/L G/R GY/L	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3 Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 9V ★  MBIB0882E

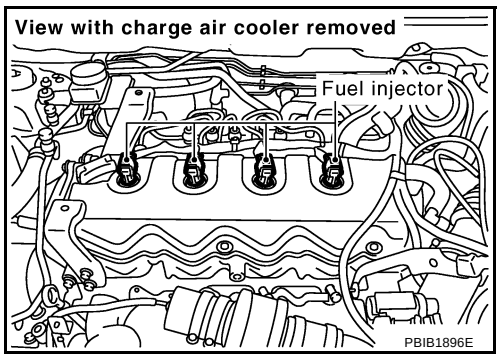
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS0025C

1. CHECK FUEL INJECOR POWER CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.



Terminal		Cylinder
ECM	Fuel injector	
4	1	No.1
5	1	No.2
5	1	No.3
4	1	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

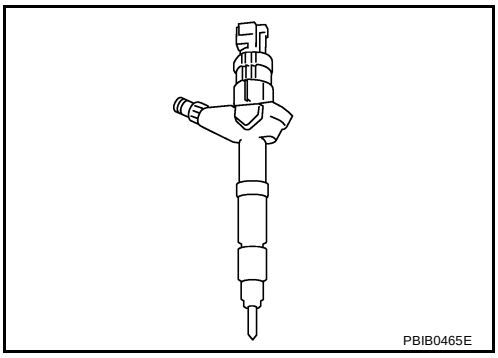
DTC P2147, P2148 FUEL INJECTOR CIRCUIT

PFP:16600

Component Description

BBS0025D

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

BBS0025E

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

On Board Diagnosis Logic

BBS0025F

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2147 2147	Fuel injector circuit low input	ECM detects the fuel injector circuit is shorted to ground.	● Harness or connectors (The fuel injector circuit is shorted.)
P2148 2148	Fuel injector circuit high input	ECM detects the fuel injector circuit is shorted to power.	

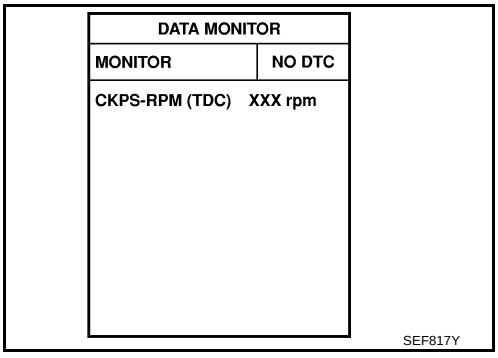
DTC Confirmation Procedure

BBS0025G

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1390, "Diagnostic Procedure" .



SEF817Y

WITH GST

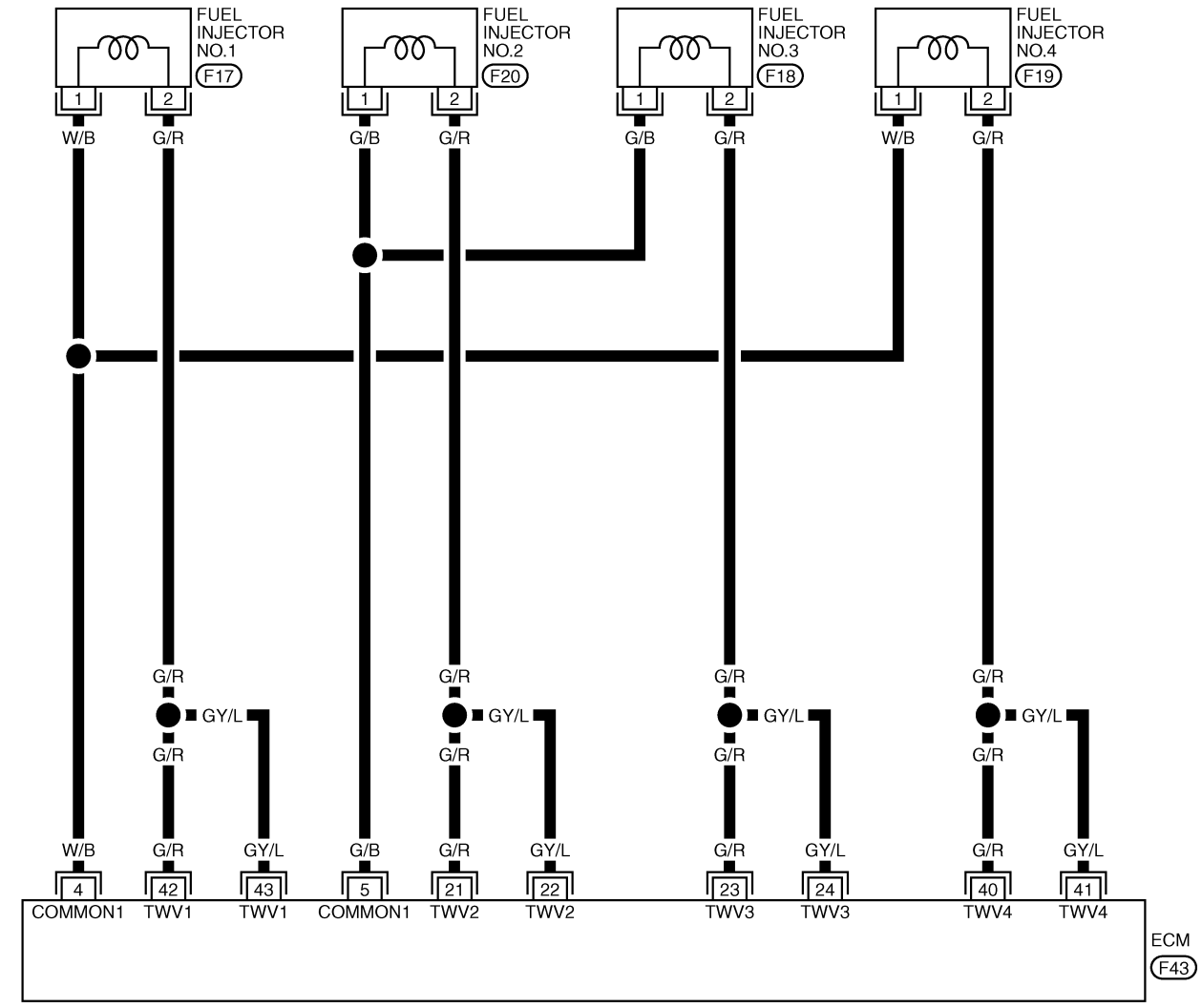
Follow the procedure “WITH CONSULT-II” above.

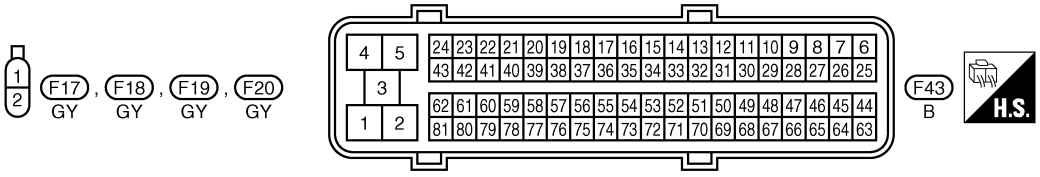
Wiring Diagram

BBS0025H

EC-INJECT-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

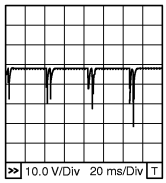
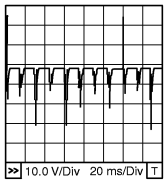
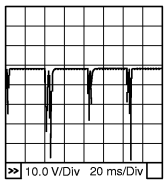
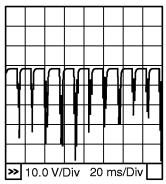




TBWB0903E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	W/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	5 - 10V ★  MBIB0883E
5	G/B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	5 - 10V ★  MBIB0884E
21 22 23 24 40 41 42 43	G/R GY/L G/R GY/L G/R GY/L G/R GY/L	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3 Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 9V ★  MBIB0882E

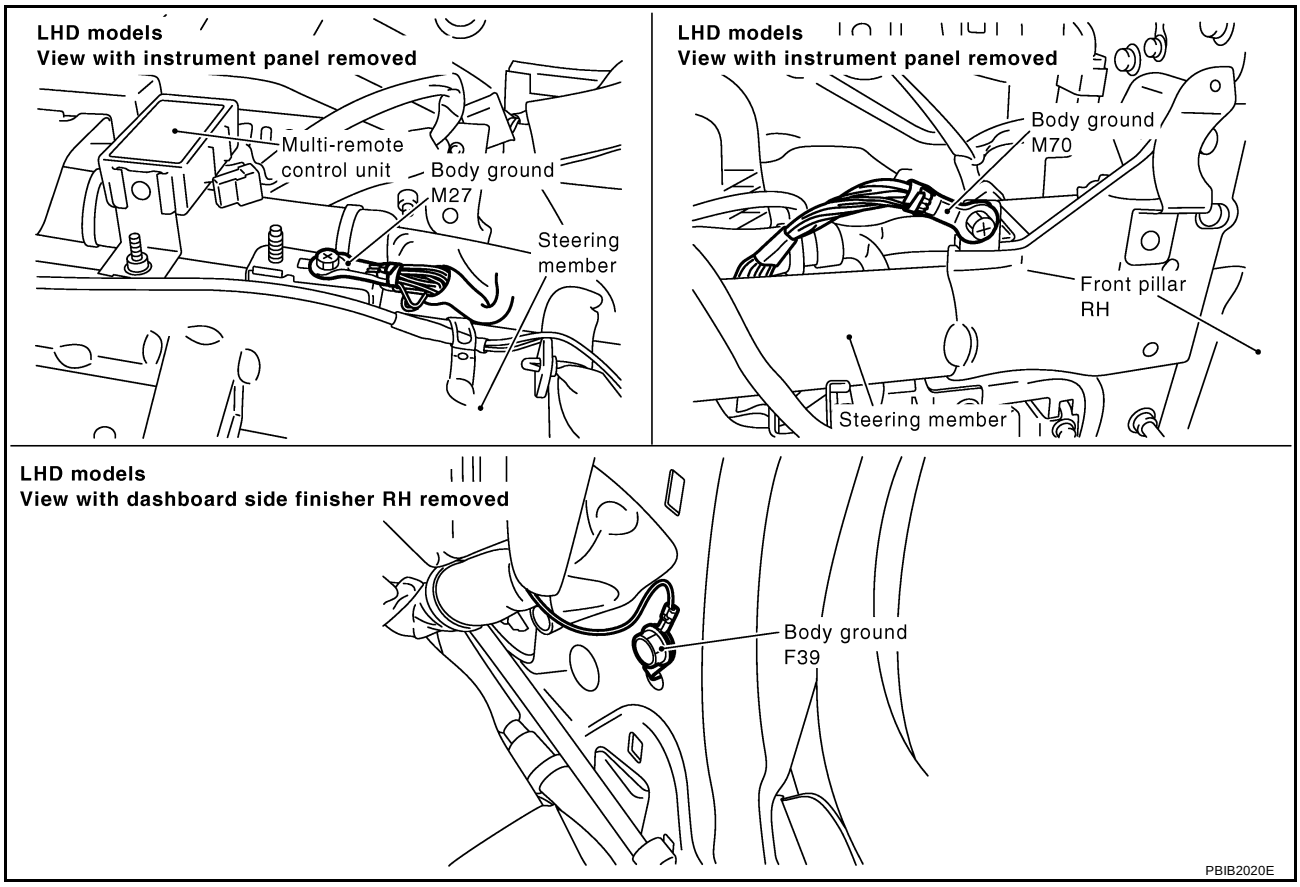
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS0025I

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

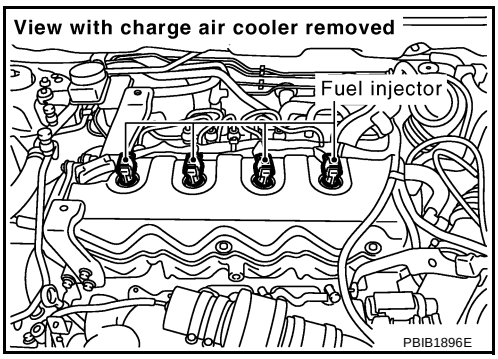


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect fuel injector harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.



Cylinder	Terminal		Continuity
	Fuel injector	ECM	
No.1	1	42, 43	Should not exist
		4	Should exist
	2	42,43	Should exist
		4	Should not exist
No.2	1	21, 22	Should not exist
		5	Should exist
	2	21, 22	Should exist
		5	Should not exist
No.3	1	23, 24	Should not exist
		5	Should exist
	2	23, 24	Should exist
		5	Should not exist
No.4	1	40, 41	Should not exist
		4	Should exist
	2	40, 41	Should exist
		4	Should not exist

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK FUEL INJECTOR

Refer to EC-1392, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL INJECOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

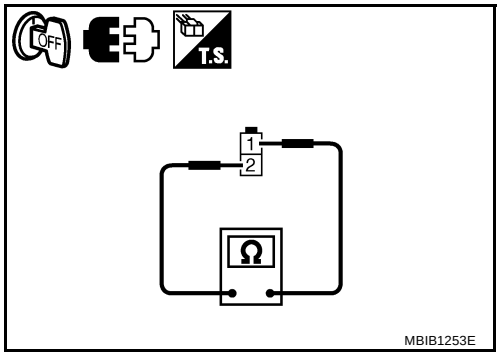
BBS0025J

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 0.2 - 0.8Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel injector.



Removal and Installation

BBS0025K

FUEL INJECTOR

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

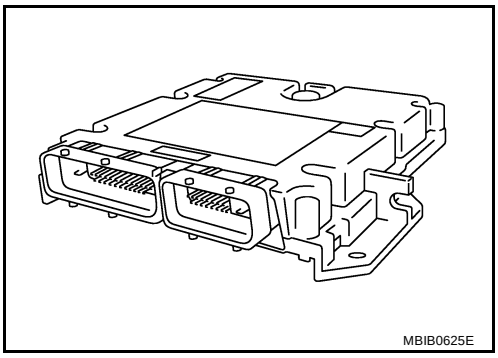
DTC P2228, P2229 BARO SENSOR

PFP:23731

Description

BBS0025L

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.


MBIB0625E

On Board Diagnosis Logic

BBS0025M

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2228 2228	Barometric pressure sensor circuit low input	An excessively low voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	● ECM
P2229 2229	Barometric pressure sensor circuit high input	An excessively high voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	

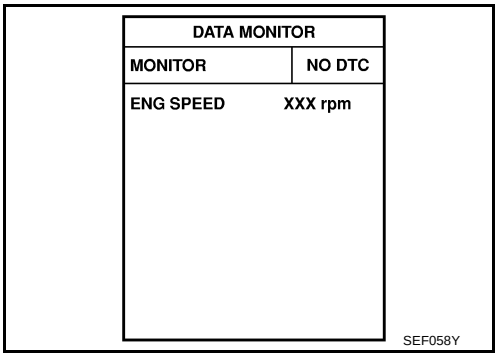
DTC Confirmation Procedure

BBS0025N

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If 1st trip DTC is detected, go to EC-1394, "Diagnostic Procedure" .



SEF058Y

WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS0025O

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1393, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P2228 or P2229 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. Perform EC-1393, "DTC Confirmation Procedure" , again.
4. Is 1st trip DTC P2228 or P2229 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Valve Clearing. Refer to EC-994, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-995, "Injector Adjustment Value Registration" .
5. Perform Service Regeneration (models with DPF). Refer to EC-997, "Service Regeneration" .

>> **INSPECTION END**

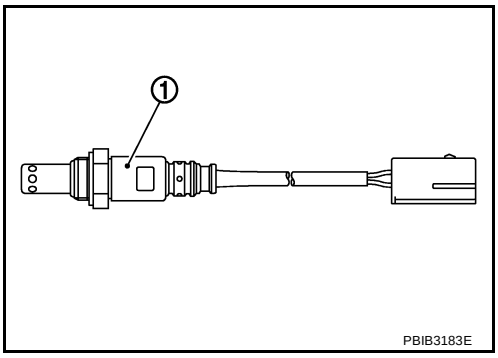
DTC P2297 A/F SENSOR 1

PFP:226A3

Component Description

BBS002LL

Air fuel ratio (A/F) sensor 1(1) is installed on the downstream of Oxidation Catalyst with DPF. A/F sensor 1 measures the oxygen level in the exhaust gas and converts it into a voltage signal. A/F sensor 1 sends the signal to ECM. Based on the signal from A/F sensor 1 ECM calculates the air fuel mixture ratio. ECM uses the calculated ratio for the DPF regeneration control.
A heater is integrated in A/F sensor 1 to ensure the required operating temperature.



CONSULT-II Reference Value in Data Monitor Mode

BBS002M9

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
A/F SEN1	● Engine: After warming up	Idle	Approx. 2200 [mV]

On Board Diagnosis Logic

BBS002LM

NOTE:

- **If DTC P2297 is displayed with DTC P0101, first perform the trouble diagnosis for DTC P0101. Refer to EC-1086, "DTC P0101 MAF SENSOR" .**
- **If DTC P2297 is displayed with DTC P2228 or P2229, first perform the trouble diagnosis for DTC P2228, P2229. Refer to EC-1393, "DTC P2228, P2229 BARO SENSOR" .**
- **If DTC P2297 is displayed with DTC P1268, P1269, P1270, P1271, first perform the trouble diagnosis for DTC P1268, P1269, P1270, P1271. Refer to EC-1324, "DTC P1268 - P1271 FUEL INJECTOR" .**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible Cause
P2297 2297	Air fuel ratio (A/F) sensor 1 out of range during deceleration	● The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is less than 3.7V. ● The A/F signal computed by ECM from the air fuel ratio (A/F) sensor 1 signal is more than 4.4V.	● Mass air flow sensor ● Front exhaust gas temperature sensor ● Rear exhaust gas temperature sensor ● A/F sensor learning value (The value is out of the specified range.) ● Exhaust tube is connected incorrectly or clogged.

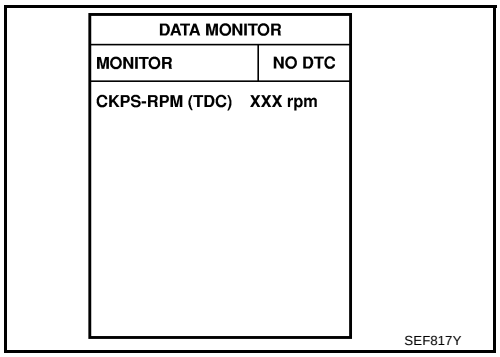
DTC Confirmation Procedure

BBS002LN

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at a speed of 80 km/h (50 MPH) for a 6 minutes in the suitable gear position.
4. Stop vehicle and let engine idle for 5 seconds.
5. If 1st trip DTC is detected, go to EC-1396, "Diagnostic Procedure" .



WITH GST

Follow the procedure “WITH CONSULT-II” above.

Diagnostic Procedure

BBS002LP

1. CLEAR A/F SENSOR LEARNING VALUE

Perform A/F sensor Learning Value Clear. Refer to EC-1000, "A/F Sensor Learning Value Clear" .

>> GO TO 2.

2. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. **Perform DTC Confirmation Procedure.**
   See EC-1396 .
5. Is the DTC P2297 displayed again?

With GST

1. Turn ignition switch ON.
2. Select Service $04 with GST.
3. **Perform DTC Confirmation Procedure.**
   See EC-1396 .
4. Is the DTC P2297 displayed again?

Yes or No

Yes >> GO TO 3.
No >> **INSPECTION END**

3. CHECK EXHAUST TUBE

Refer to EX-2, "EXHAUST SYSTEM" .
Is exhaust tube connected incorrectly or clogged?

Yes or No

Yes >> Repair or replace exhaust tube.
No >> GO TO 4.

4. CHECK MASS AIR FLOW SENSOR

Refer to EC-1093, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace mass air flow sensor.

5. CHECK FRONT EXHAUST GAS TEMPERAUTRE SENSOR

Refer to EC-1243, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace front exhaust gas temperature sensor.

6. CHECK REAR EXHAUST GAS TEMPERATURE SENSOR

Refer to EC-1249, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace rear exhaust gas temperature sensor.

7. CHECK INTERMITTENT INCIDENT

Perform EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

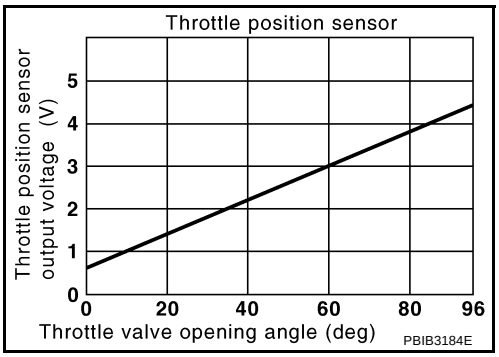
DTC P2621, P2622 TP SENSOR

PFP:16119

Description

BBS002LR

Electric throttle control actuator consists of the following two components, throttle control motor with gear which operates throttle valve, throttle position sensor which detects throttle position sensor.
Throttle valve is fully opened when regeneration is not performed. The valve is closed only to perform regeneration.
Throttle position sensor detects the opening angle of throttle valve and converts the angle into a voltage signal. Based on the signal, ECM judges whether throttle control actuator operates throttle valve properly or not.



CONSULT-II Reference Value in Data Monitor Mode

BBS002MK

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
THRTL SEN	● Ignition switch: ON	3.35 - 4.55 V

On Board Diagnosis Logic

BBS002LS

NOTE:
If DTC P2621 or P2622 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-1307, "DTC P0642, P0643 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2621 2621	Throttle position sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The TP sensor circuit is open or shorted.) ● Throttle position sensor
P2622 2622	Throttle position sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

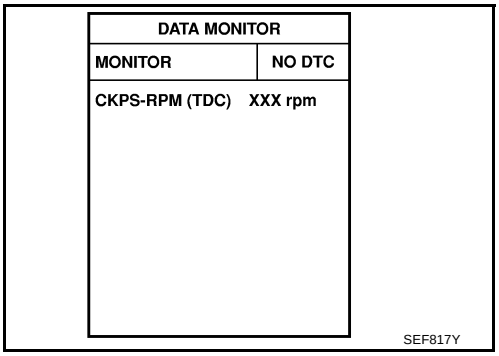
DTC Confirmation Procedure

BBS002LT

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 1 second.
4. If 1st trip DTC is detected, go to EC-1400, "Diagnostic Procedure" .



WITH GST

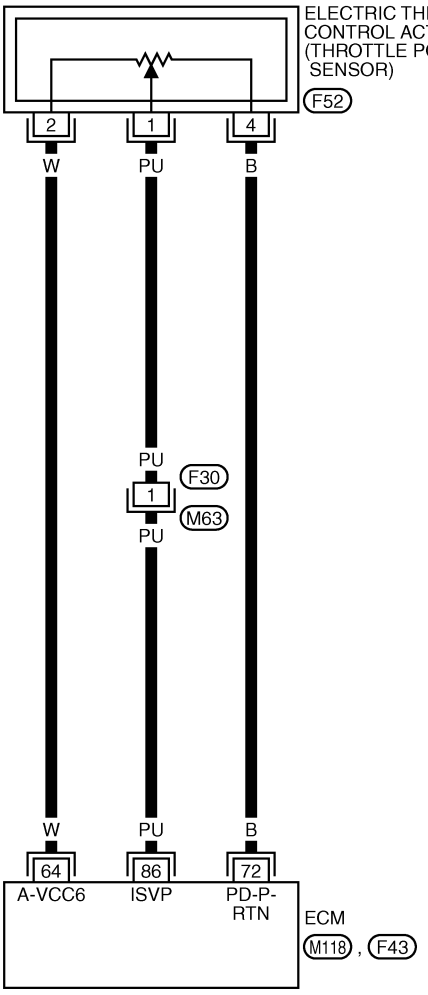
Follow the procedure “WITH CONSULT-II” above.

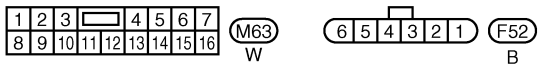
Wiring Diagram

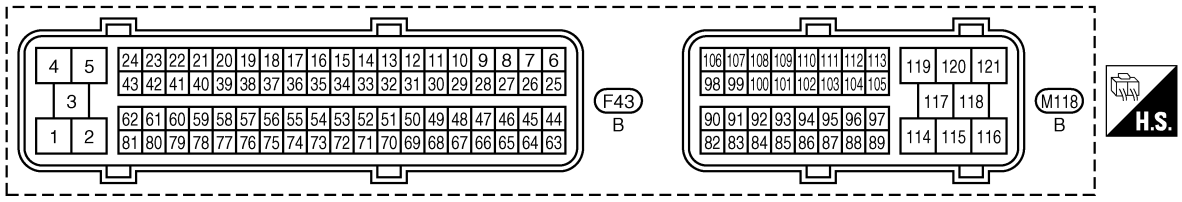
BBS002LU

EC-TPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC







TBWB0915E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

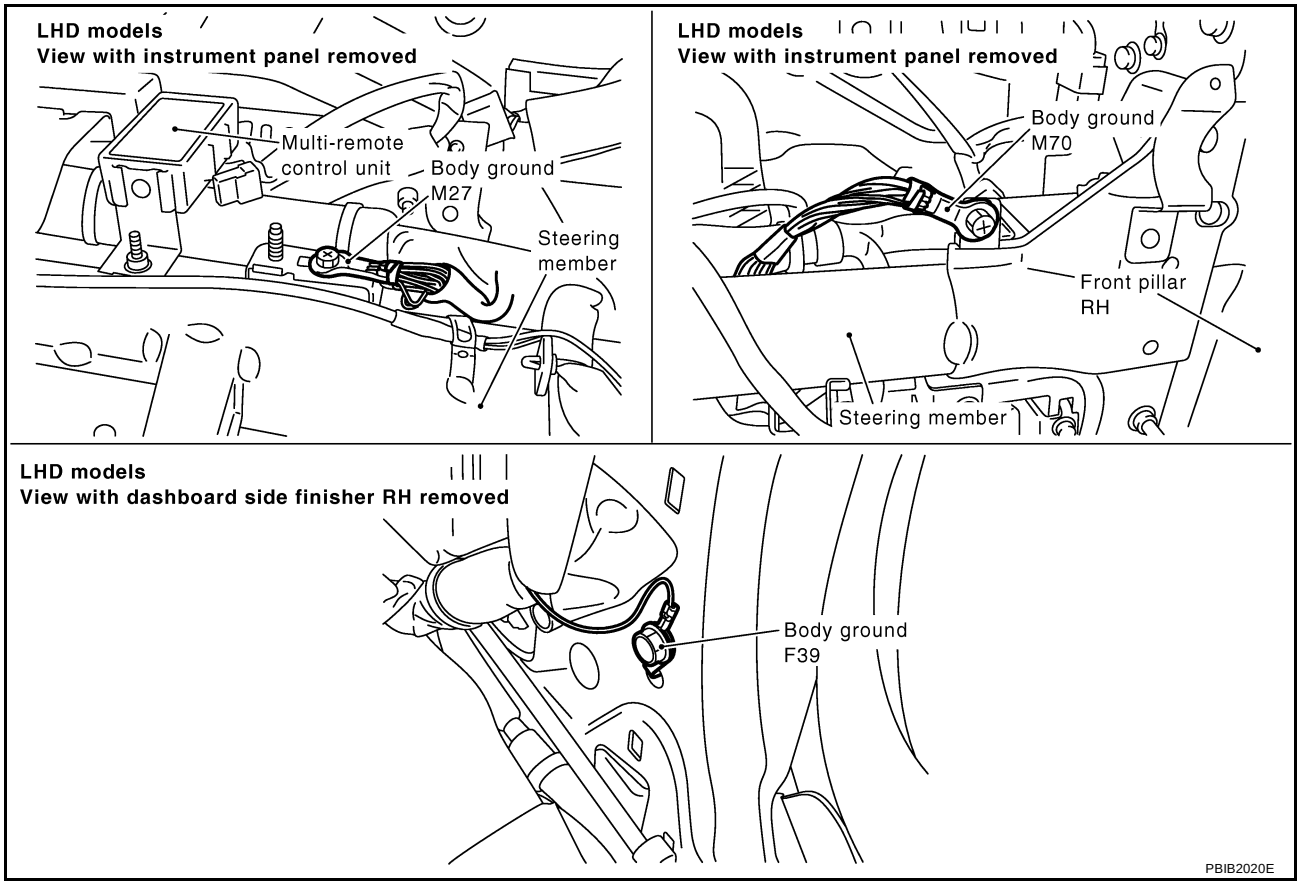
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
64	W	Sensor power supply (Turbocharger boost sensor / Differential exhaust pressure sensor / Throttle position sensor / Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
86	PU	Throttle position sensor	**[Ignition switch ON]**	3.65 - 4.85V
72	B	Sensor ground (Throttle position sensor / Refrigerant pressure sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS002LV

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .

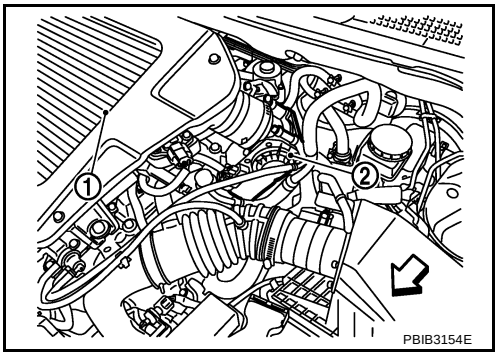


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

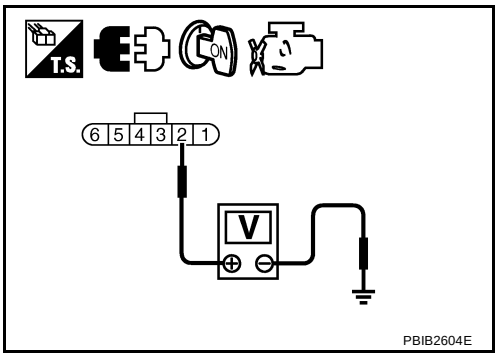
2. CHECK THROTTLE POSITION SENSOR POWER SUPPLY CIRCUIT

1. Disconnect electric throttle control actuator (2) harness connector.
   - ⇦: Vehicle front
   - Charge air cooler (1)
2. Turn ignition switch ON.



3. Check voltage between electric throttle control actuator terminal 2 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK THROTTLE POSITION SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between electric throttle control actuator terminal 4 and ECM terminal 72. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK THROTTLE POSITION SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between electric throttle control actuator terminal 1 and ECM terminal 86. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECTED MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between electric throttle control actuator and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK THROTTLE POSITION SENSOR

Refer to EC-1745, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> GO TO 7.

7. REPLACE ELECTRIC THROTTLE CONTROL ACTUATOR

With CONSULT-II

1. Replace the electric throttle control actuator.
2. Turn ignition switch ON and OFF.
3. Turn ignition switch ON and select “TARGET ETC ANGLE” in “ACTIVE TEST” mode.
4. Make sure that throttle valve operates correctly.

Without CONSULT-II

1. Replace the electric throttle control actuator.
2. Turn ignition switch ON and OFF.
3. Turn ignition switch ON and OFF, and make sure that throttle valve operates correctly.

>> **INSPECTION END**

ACTIVE TEST	
TARGET ETC ANGLE	XXX deg
MONITOR	
CKPS-RPM (TDC)	XXX rpm
THRTL SEN	XXX V

PBIB3206E

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS002LW

THROTTLE POSITION SENSOR

With CONSULT-II

1. Turn ignition switch OFF.
2. Reconnect harness connectors disconnected.
3. Turn ignition switch ON.
4. Select “TARGET ETC ANGLE” in “ACTIVE TEST” mode, and select “THRTL SEN” as the monitor item with CONSULT-II.
5. Check indication under the following conditions.

Condition [TARGET ETC ANGLE (deg)]	THRTL SEN (V)
0.0	0.33 - 087
84.0	3.35 - 4.55

6. If NG, replace electric throttle control actuator.

ACTIVE TEST	
TARGET ETC ANGLE	XXX deg
MONITOR	
CKPS-RPM (TDC)	XXX rpm
THRTL SEN	XXX V

PBIB3206E

Removal and Installation

BBS002LX

ELECTRIC THROTTLE CONTROL ACTUATOR

Refer to EM-145, "Removal and Installation" .

GLOW CONTROL SYSTEM

PFP:25230

Description

BBS0025P

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	Glow control	Glow lamp Glow relay Glow plugs
Engine coolant temperature sensor	Engine coolant temperature		

When engine coolant temperature is more than approximately 80°C (176°F), the glow relay turns off.
When coolant temperature is lower than approximately 80°C (176°F):

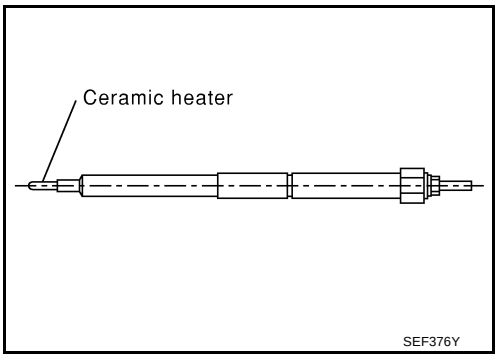
- Ignition switch ON
  After ignition switch has turned to ON, the glow relay turns ON for a certain period of time in relation to engine coolant temperature, allowing current to flow through glow plug.
- Cranking
  The glow relay turns ON, allowing current to flow through glow plug.
- Starting
  After engine has started, current continues to flow through glow plug (after-glow mode) for a certain period in relation to engine coolant temperature.

The glow indicator lamp turns ON for a certain period of time in relation to engine coolant temperature at the time glow relay is turned ON.

COMPONENT DESCRIPTION

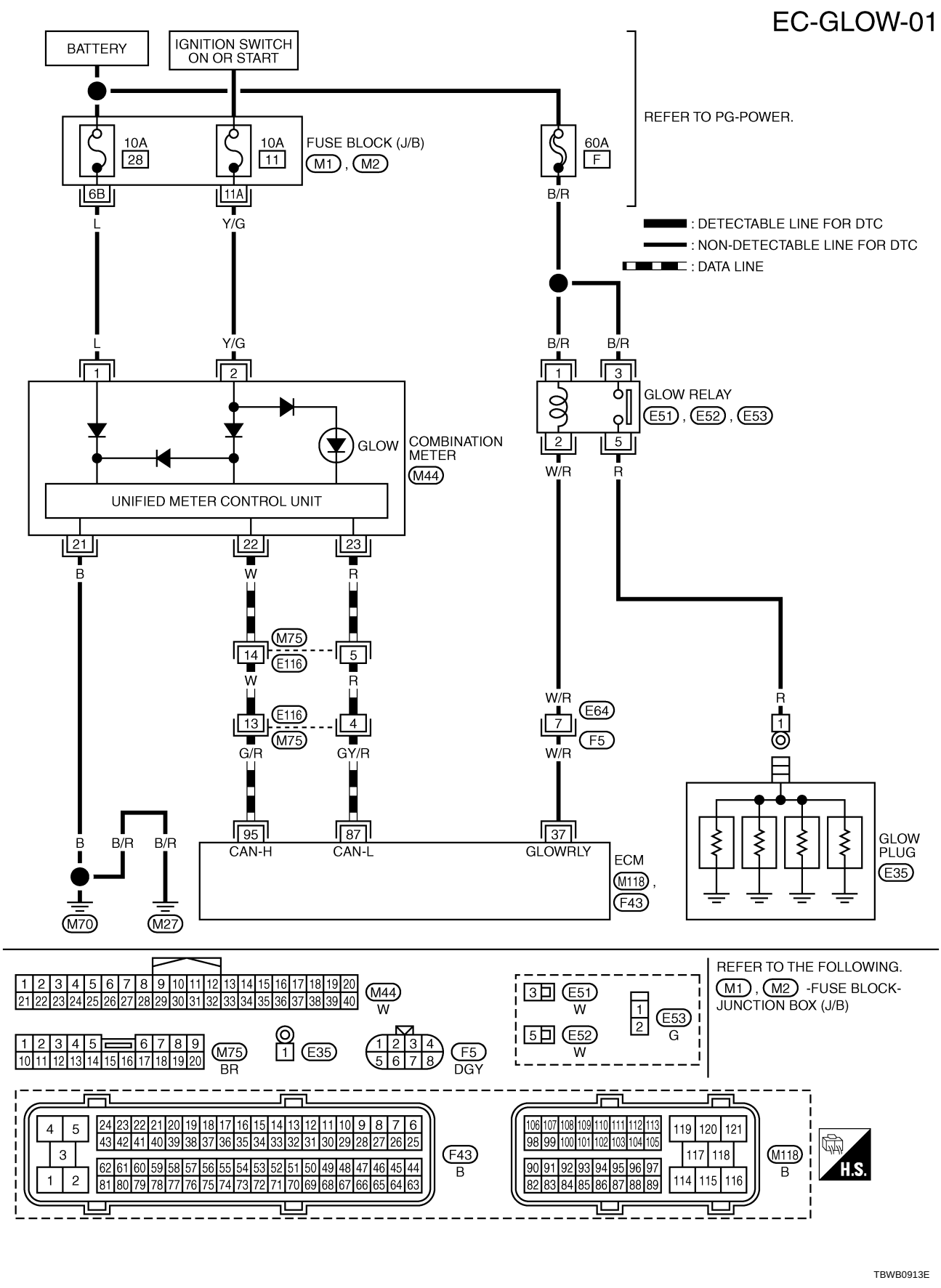
Glow Plug

The glow plug is provided with a ceramic heating element to obtain a high-temperature resistance. It glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow relay.



Wiring Diagram
LHD MODELS

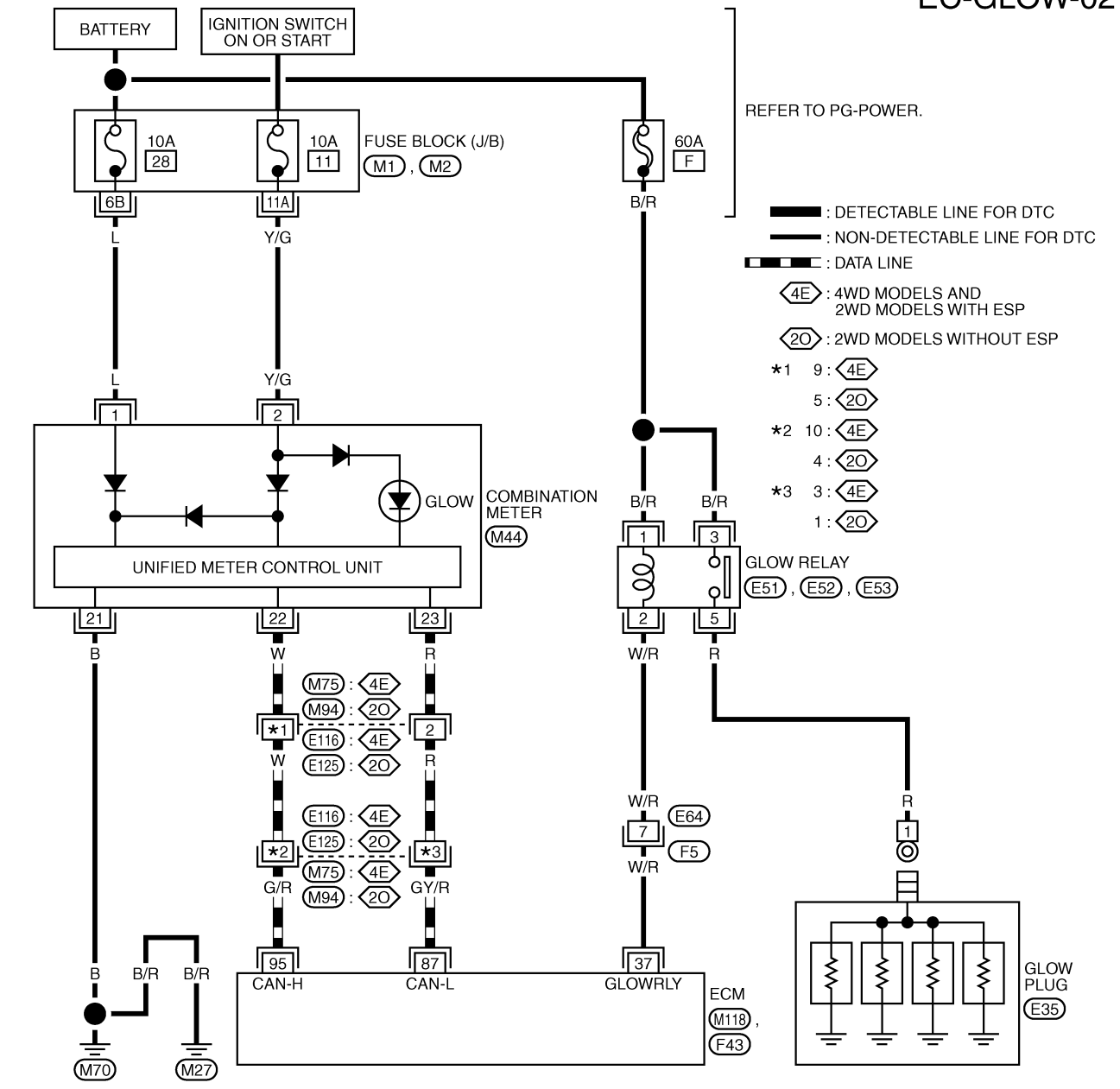
BBS0025Q

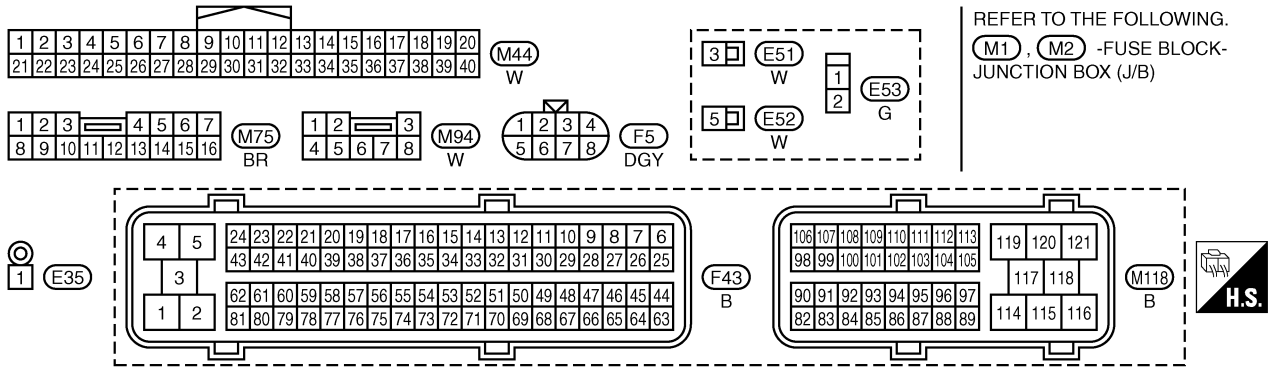


TBWB0913E

RHD MODELS

EC-GLOW-02





TBWB0986E

Diagnostic Procedure

BBS0025R

1. INSPECTION START

Check fuel level, fuel supplying system, starter motor, etc.

OK or NG

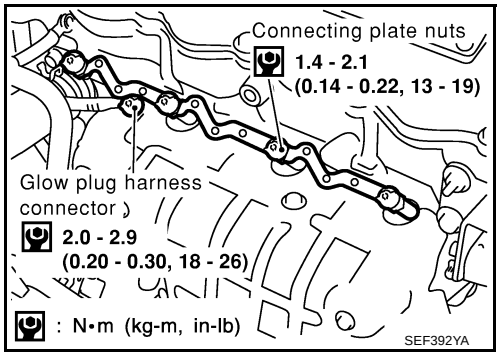
OK >> GO TO 2.
NG >> Correct.

2. CHECK INSTALLATION

Check that glow plug nut and all glow plug connecting plate nuts are installed properly.

OK or NG

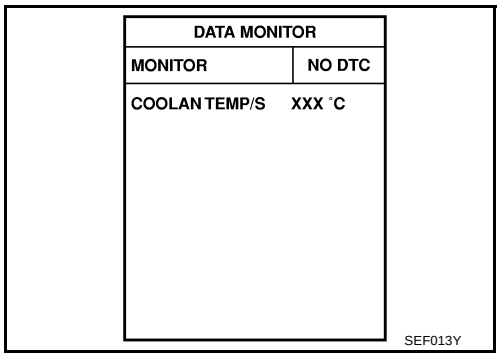
OK >> GO TO 3.
NG >> Install properly.



3. CHECK GLOW INDICATOR LAMP OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
3. Confirm that “COOLAN TEMP/S” indicates below 80°C (176°F). If it indicates above 80°C (176°F), cool down engine.
4. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
5. Make sure that glow indicator lamp is turned ON for 1.5 seconds or more after turning ignition switch ON, and then glow indicator lamp turned OFF.

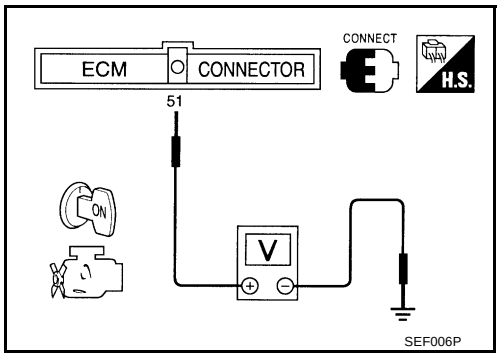


Without CONSULT-II

1. Turn ignition switch ON.
2. Confirm that the voltage between ECM terminal 51 (engine coolant temperature sensor signal) and ground is above 1.53V. If it is below 1.53V, cool down engine.
3. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
4. Make sure that glow indicator lamp is turned ON for 1.5 seconds or more after turning ignition switch ON, and then glow indicator lamp turned OFF.

OK or NG

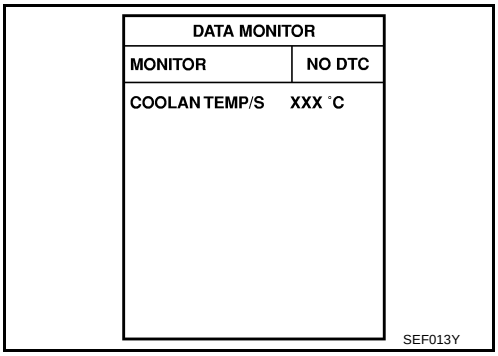
OK >> GO TO 4.
NG >> GO TO 5.



4. CHECK GLOW CONTROL SYSTEM OVERALL FUNCTION

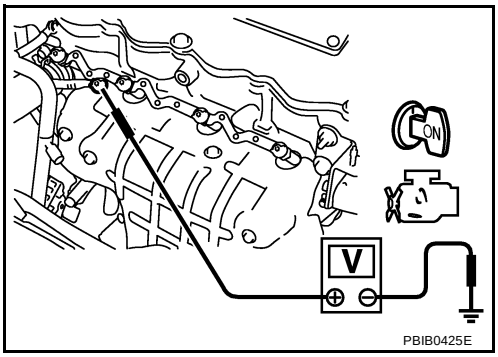
With CONSULT-II

1. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
2. Confirm that “COOLAN TEMP/S” indicates approximately 25°C (77°F). If NG, cool down engine.
3. Turn ignition switch OFF.
4. Set voltmeter probe between glow plug and engine body.
5. Turn ignition switch ON.



6. Check the voltage between glow plug and engine body under the following conditions.

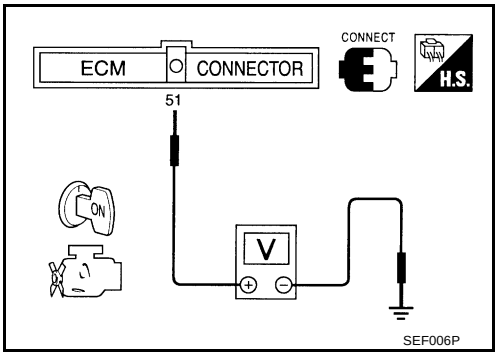
Conditions	Voltage
For 20 seconds after turning ignition switch ON	Battery voltage
More than 20 seconds after turning ignition switch ON	Approx. 0V



Without CONSULT-II

1. Confirm that the voltage between ECM terminal 51 (engine coolant temperature sensor signal) and ground is above 3.62V. If it is below 3.62V, cool down engine.
2. Turn ignition switch OFF.
3. Set voltmeter probe between glow plug and engine body.
4. Turn ignition switch ON.
5. Check the voltage between glow plug and engine body under the following conditions.

Conditions	Voltage
For 20 seconds after turning ignition switch ON	Battery voltage
More than 20 seconds after turning ignition switch ON	Approx. 0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

5. CHECK DTC

Check that DTC U1000 is not displayed.

Yes or No

Yes >> Perform trouble diagnoses for DTC U1000, refer to EC-1068, "DTC U1000 CAN COMMUNICATION LINE" .
No >> GO TO 6.

6. CHECK COMBINATON METER OPERATION

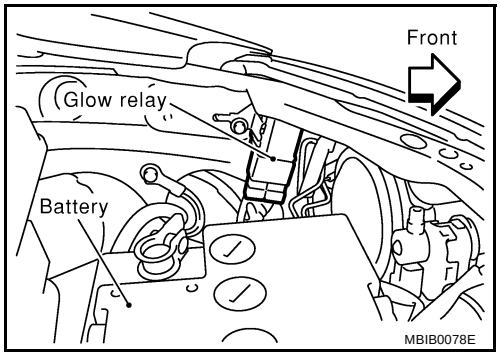
Does combination meter operate normally?

Yes or No

Yes >> GO TO 14.
No >> Check combination meter circuit. Refer to DI-4, "COMBINATION METERS" .

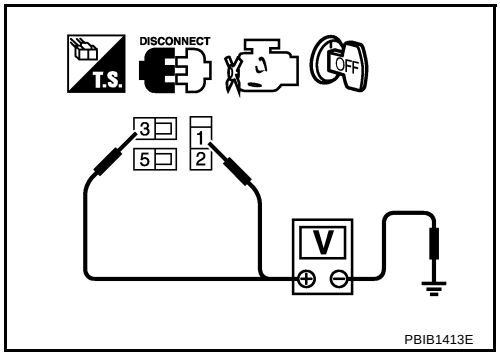
7. CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay.



3. Check voltage between glow relay terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- 60A fusible link
- Harness for open or short between glow relay and battery

>> Repair harness or connectors.

9. CHECK GLOW RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 37 and glow relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E64, F5
- Harness for open or short between glow relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK HARNESS CONTINUITY BETWEEN GLOW RELAY AND GLOW PLUG FOR OPEN AND SHORT

1. Disconnect glow plug harness connector.
2. Check harness continuity between glow relay terminal 5 and glow plug harness connector. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK GLOW RELAY

Refer to EC-1410, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace glow relay.

13. CHECK GLOW PLUG

Refer to EC-1410, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace glow plug.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

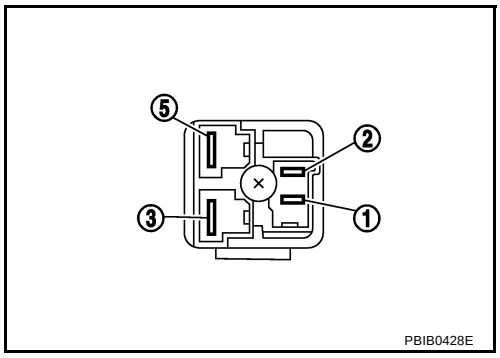
BBS0025S

GLOW RELAY

Check continuity between glow relay terminals (3) and (5) under the following conditions.

Conditions	Continuity
12V direct current supply between terminals (1) and (2)	Yes
No current supply	No

Operation takes less than 1 second.



GLOW PLUG

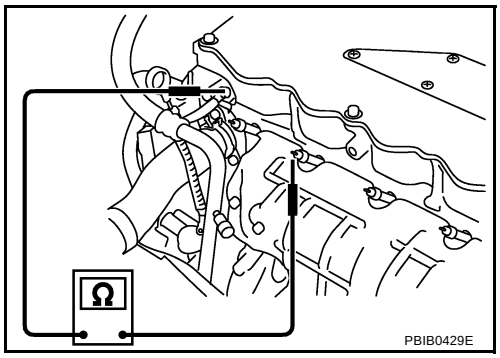
1. Remove glow plug connecting plate.
2. Check glow plug resistance.

Resistance: Approximately 0.8 Ω [at 25°C (77°F)]

NOTE:

- **Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one.**
- **If glow plug is dropped from a height of 10 cm (3.94 in) or higher, replace with a new one.**
- **If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool.**
- **Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque.**

: 20.1 N-m (2.1 kg-m, 15 ft-lb)



Removal and Installation

BBS0025T

GLOW PLUG

Refer to EM-166, "GLOW PLUG" .

BRAKE SWITCH

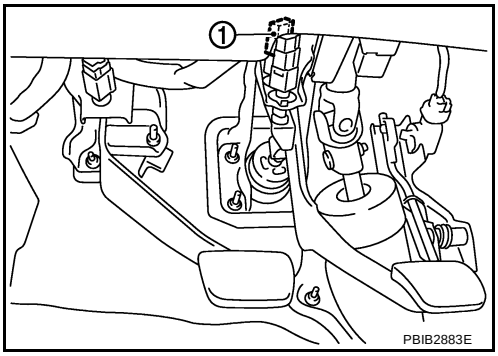
PFP:25230

Description

BBS0025U

STOP LAMP SWITCH

The stop lamp switch (1) is installed to brake pedal bracket. The switch senses brake pedal position and sends an ON-OFF signal to the ECM. The ECM uses the signal to control the fuel injection control system.



ASCD BRAKE SWITCH (MODELS WITH ASCD)

When depress on the brake pedal, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal)
Refer to EC-1454, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

BBS0025V

Specification data are reference values.

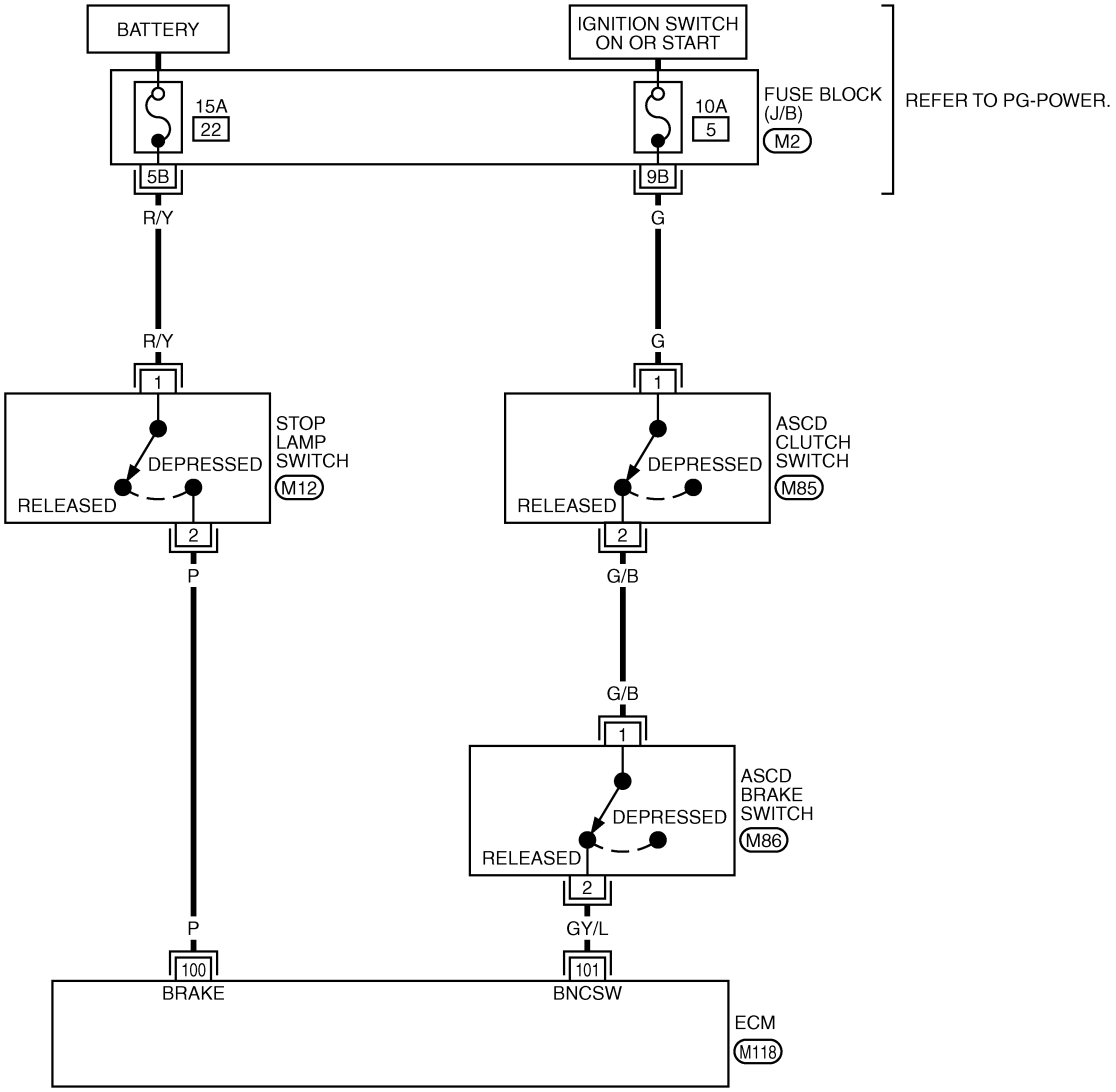
MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
BRAKE SW2 (ASCD brake switch)	● Ignition switch: ON	Brake pedal and clutch pedal: Fully released	OFF
		Brake pedal and/or clutch pedal: Slightly depressed	ON

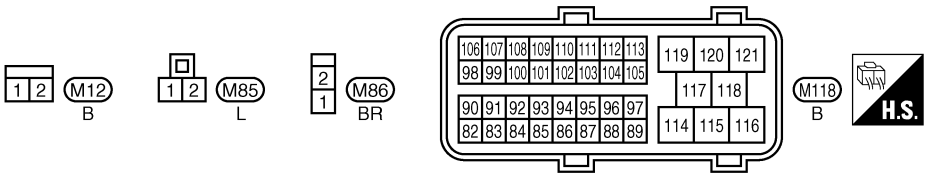
Wiring Diagram

BBS0025W

EC-BRK/SW-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0914E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
100	P	Stop lamp switch	**[Ignition switch OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
101	GY/L	ASCD brake switch	**[Ignition switch ON]** ● Brake pedal and clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Brake pedal and/or clutch pedal: Slightly depressed	Approximately 0V

Diagnostic Procedure

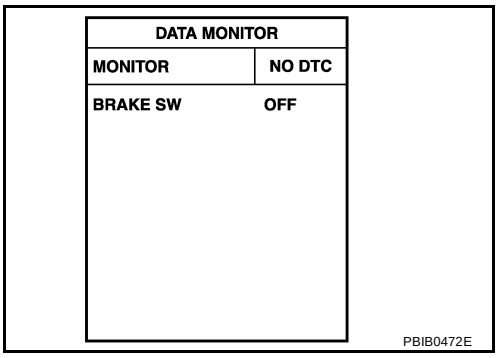
BBS0025X

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW” indication under the following conditions.

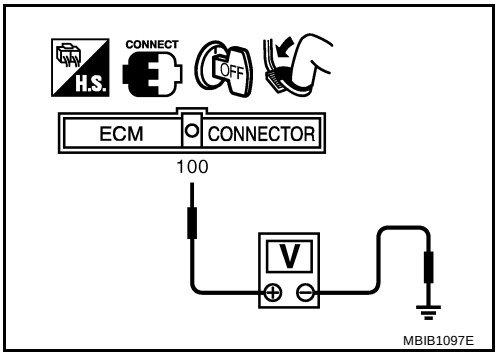
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 100 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



OK or NG

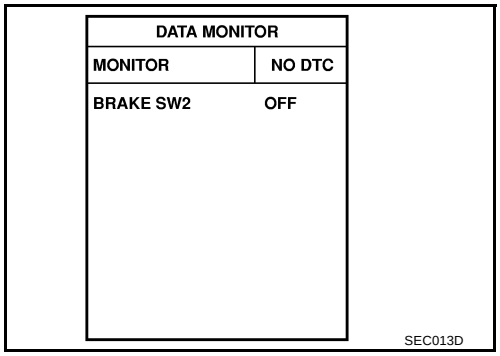
OK (Models with ASCD)>>GO TO 2.
OK (Models without ASCD)>>**INSPECTION END**
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

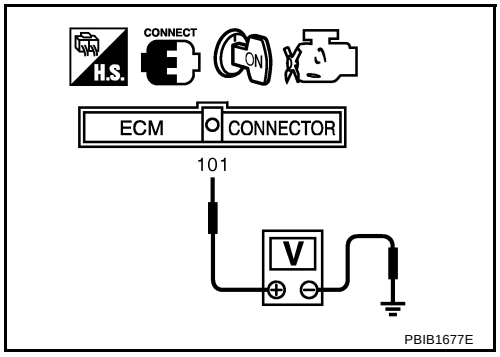
CONDITION	INDICATION
Clutch pedal and brake pedal: Fully released	OFF
Clutch pedal and/or brake pedal: Slightly depressed	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and brake pedal: Fully released	Battery voltage
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V

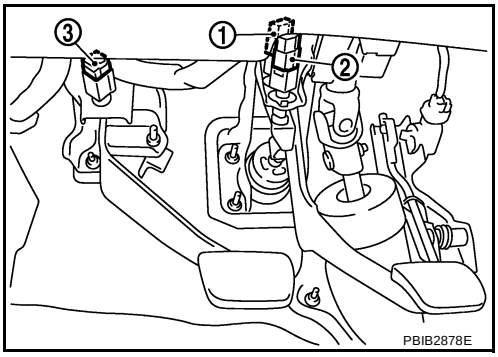


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

3. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector (1).
   - ASCD brake switch harness connector (2)
   - ASCD clutch switch harness connector (3)

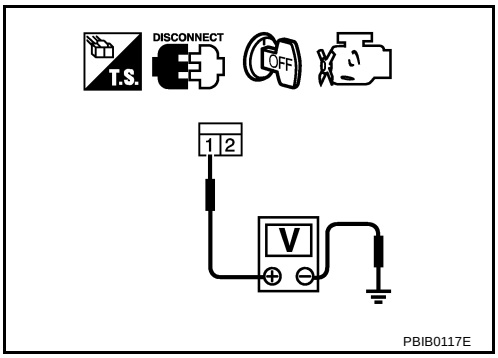


3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 15A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 100 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK STOP LAMP SWITCH

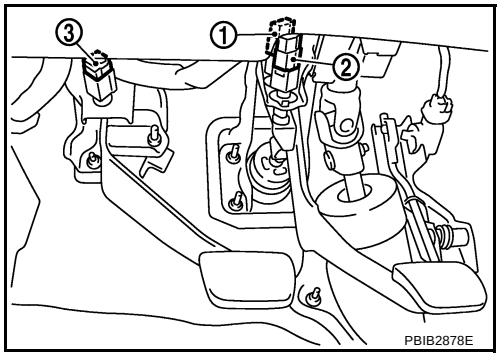
Refer to EC-1418, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace stop lamp switch.

7. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch (2) harness connector.
- Stop lamp switch (1)
- ASCD clutch switch (3)
3. Turn ignition switch ON.

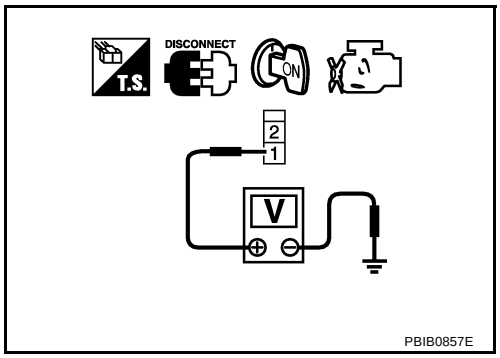


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

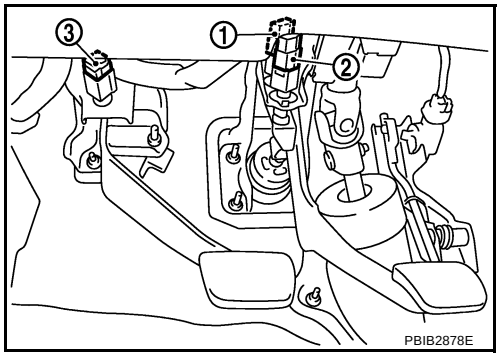
OK or NG

OK >> GO TO 12.
NG >> GO TO 8.



8. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector (3).
- Stop lamp switch harness connector (1)
- ASCD brake switch harness connector (2)

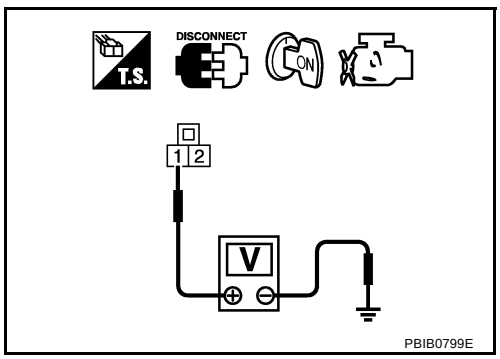


3. Turn ignition switch ON.
4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.



9. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between ASCD clutch switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD clutch switch terminal 2 and ASCD brake switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ASCD CLUTCH SWITCH

Refer to EC-1418, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD clutch switch.

12. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ASCD BRAKE SWITCH

Refer to EC-1418, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD brake switch.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

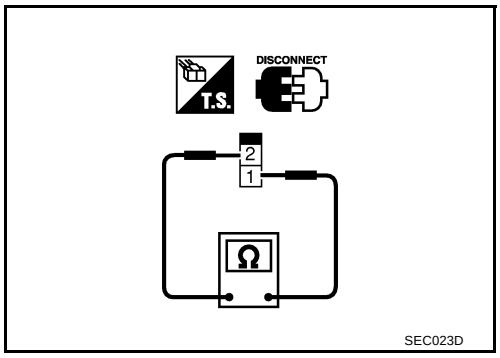
BBS0025Y

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

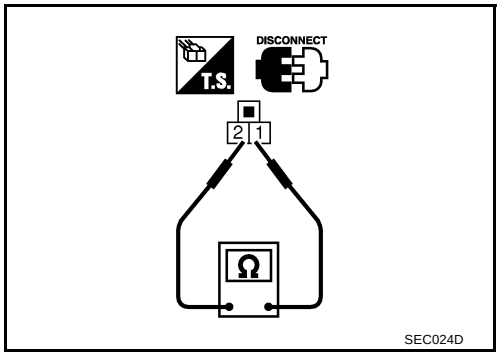


ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to CL-5, "CLUTCH PEDAL" , and perform step 3 again.

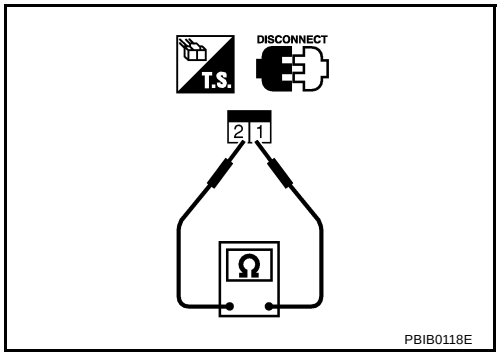


STOP LAMP SWITCH

1. Disconnect stop lamp switch harness connector.
2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 2 again.



PNP SWITCH

PFP:32006

Description

BBS0025Z

When the gear position is in Neutral, park/neutral position is ON. ECM detects the position because the continuity of the line (the “ON” signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

BBS00260

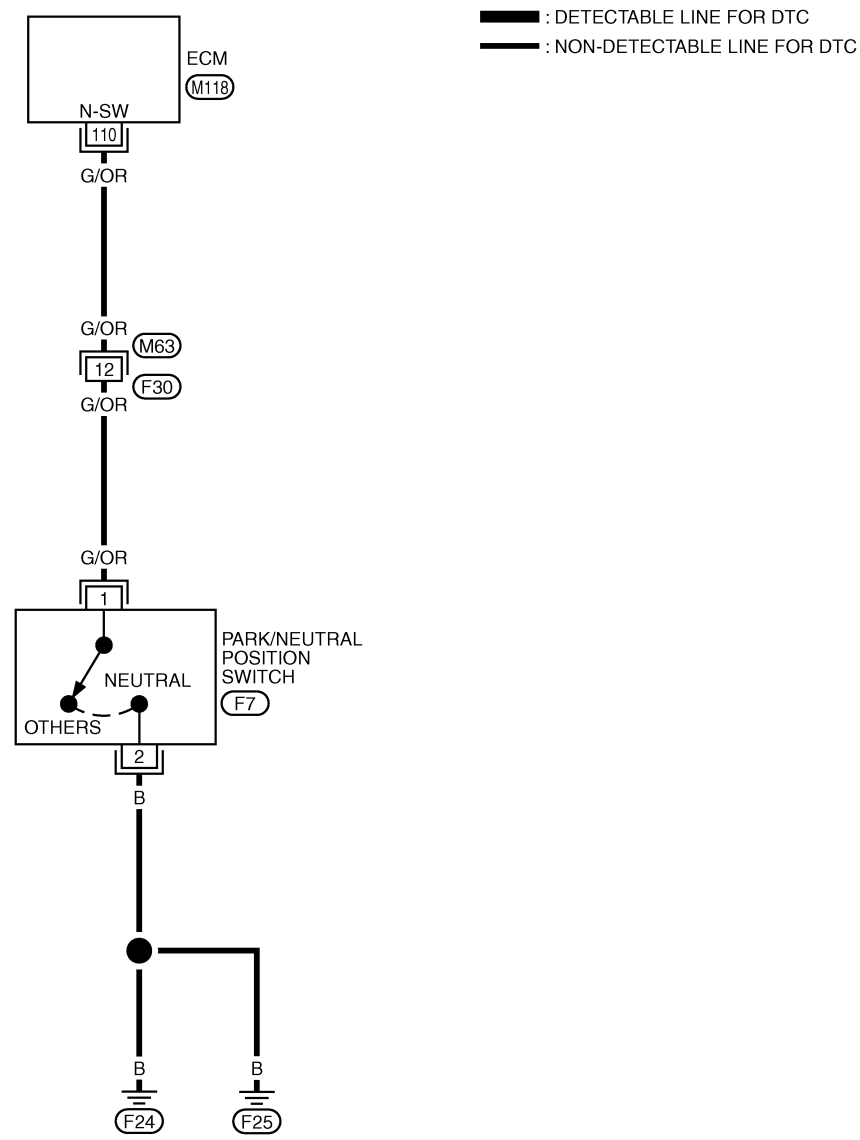
Specification data are reference values.

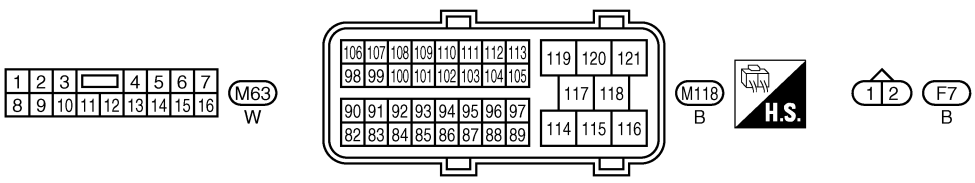
MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: Neutral position	ON
		Shift lever: Except above	OFF

Wiring Diagram

BBS00261

EC-PNP/SW-01





TBWA0581E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
110	G/OR	Park/Neutral position switch	**[Ignition switch ON]** ● Shift lever: Neutral	Approximately 0V
			[Ignition switch ON] ● Shift lever: Except above	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

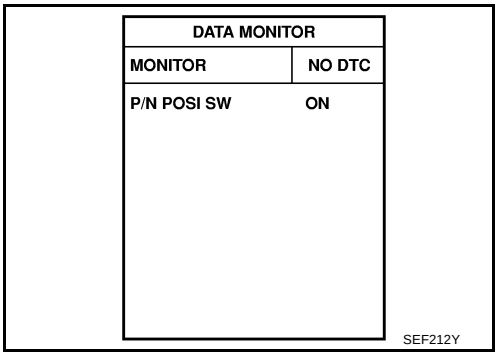
BBS00262

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “P/N POSI SW” signal under the following conditions.

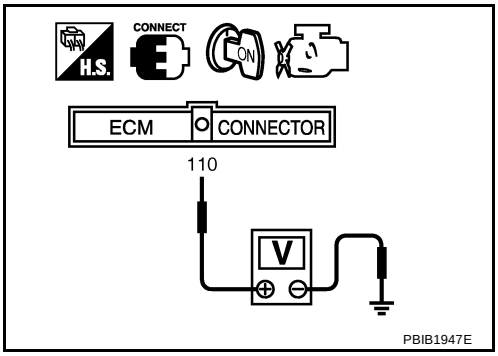
Shift lever position	P/N POSI SW
Neutral position	ON
Except the above position	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 110 and ground under the following conditions.

Shift lever position	Voltage
Neutral position	Approximately 0V
Except the above position	Battery voltage



OK or NG

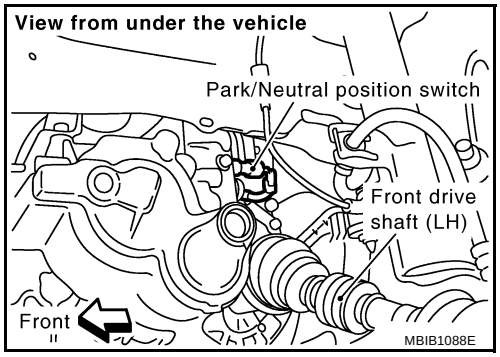
OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to power in harness or connectors.

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 110 and PNP switch terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M63, F30
- Harness for open or short between PNP switch and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PARK/NEUTRAL POSITION SWITCH

Refer to MT-15, "POSITION SWITCH" .

OK or NG

OK >> GO TO 6.
NG >> Replace park/neutral position switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

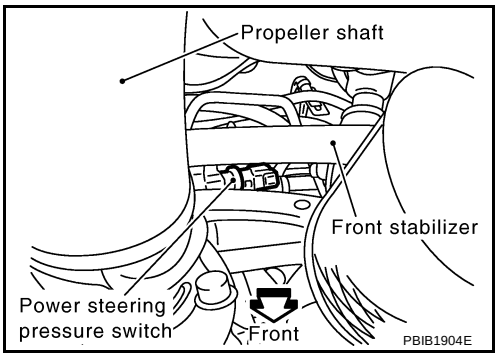
PSP SWITCH

PFP:49761

Component Description

BBS00263

The power steering pressure switch is attached to the power steering high-pressure tube and detects a power steering load.
When a power steering load is detected, it signals the ECM. The ECM adjusts the fuel injector pulse width to increase the idle speed and adjust for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

BBS00264

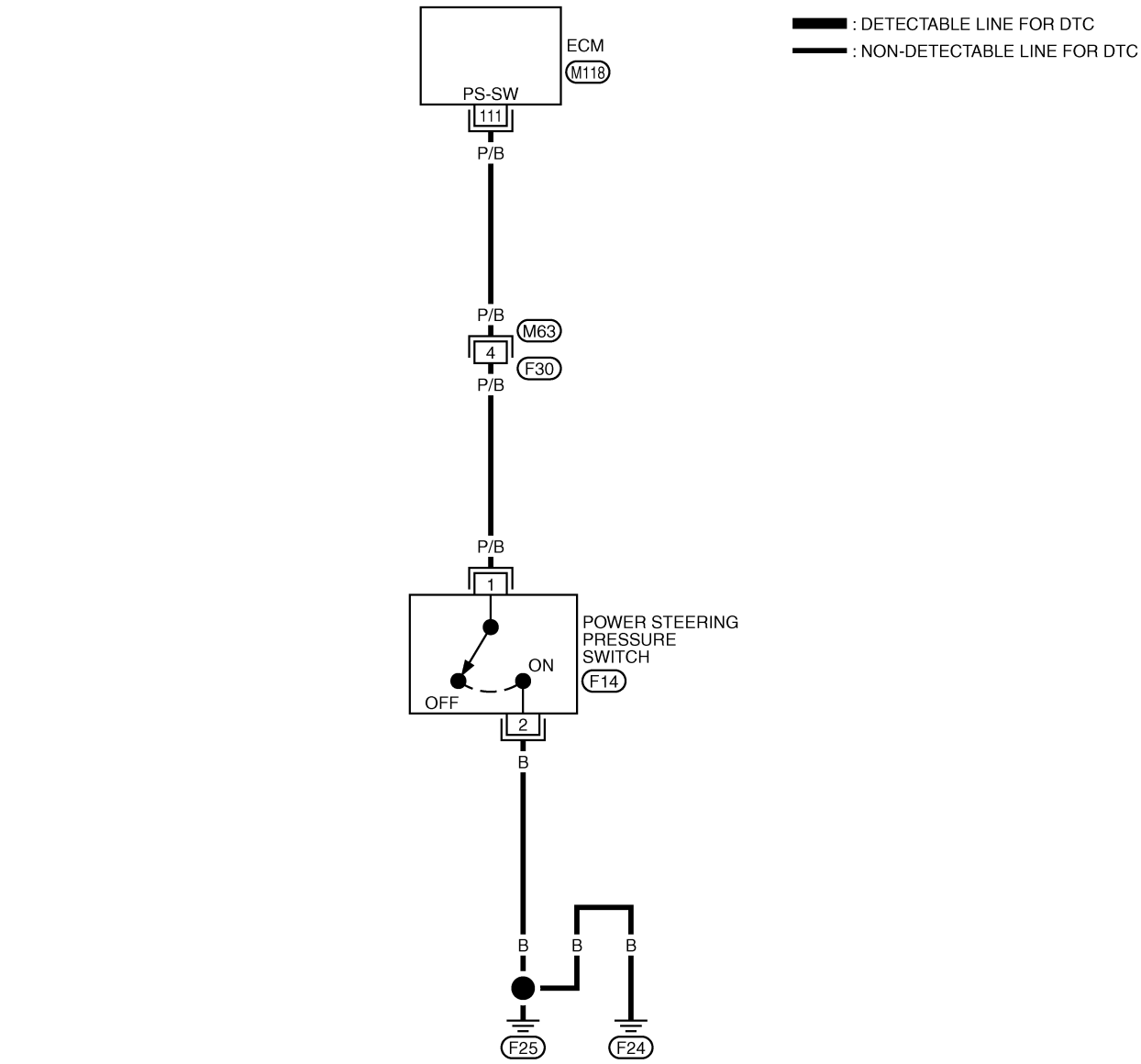
Specification data are reference values.

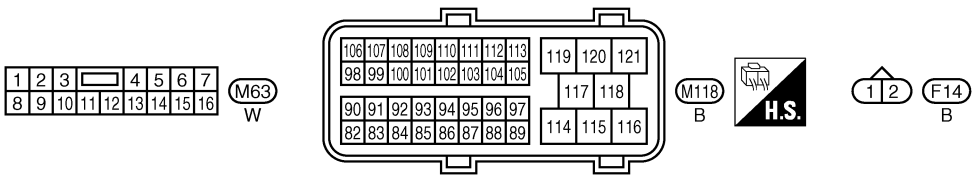
MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON

Wiring Diagram

BBS00265

EC-PST/SW-01





TBWA0583E

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	P/B	Power steering pressure switch	**[Engine is running]** ● Steering wheel: Being turned	Approximately 0V
			[Engine is running] ● Steering wheel: Not being turned	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

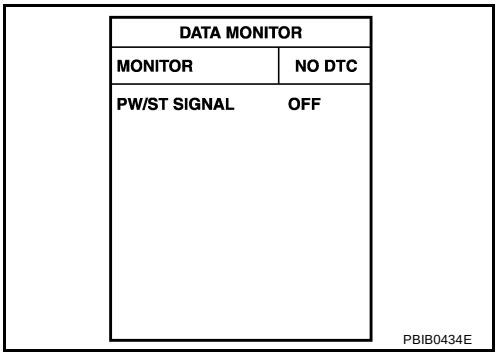
BBS00266

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

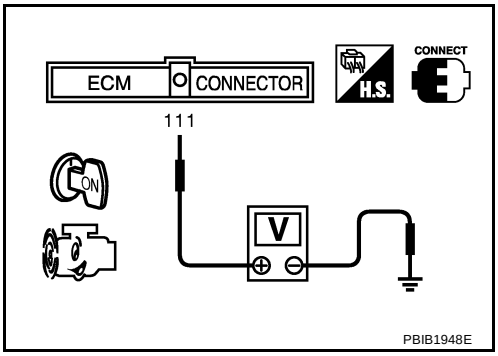
Conditions	PW/ST SIGNAL
Steering wheel: Not being turned	OFF
Steering wheel: Being turned	ON



Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 99 and ground under the following conditions.

Conditions	Voltage
Steering wheel: Not being turned	Battery voltage
Steering wheel: Being turned	Approximately 0V



OK or NG

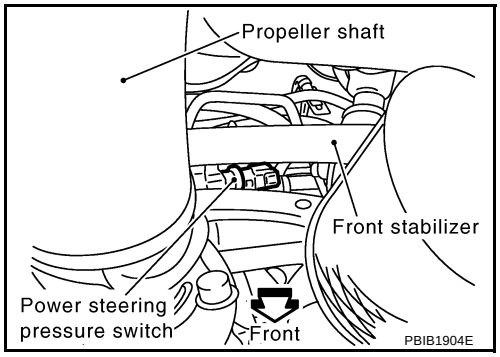
OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK POWER STEERING PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect power steering pressure switch harness connector.
3. Check harness continuity between power steering pressure switch terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to power in harness or connectors.

3. CHECK POWER STEERING PRESSURE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 111 and power steering pressure switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M63, F30
- Harness for open and short between power steering pressure switch and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK POWER STEERING PRESSURE SWITCH

Refer to EC-1427, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace power steering pressure switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

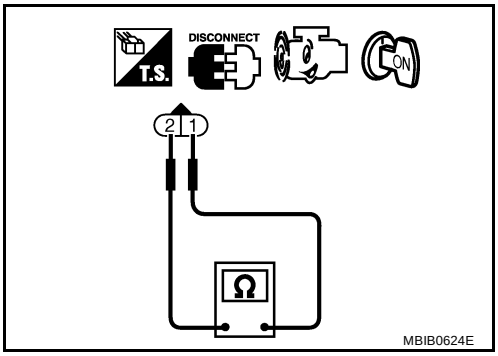
Component Inspection

BBS00267

POWER STEERING PRESSURE SWITCH

1. Disconnect power steering pressure switch harness connector and then start engine.
2. Check continuity between power steering pressure switch terminal 1 and 2 under the following conditions.

Conditions	Continuity
Steering wheel: Being turned	Yes
Steering wheel: Not being turned	No



Removal and Installation

BBS00268

Refer to PS-37, "HYDRAULIC LINE" .

FUEL TRANSPORT PUMP

PFP:17020

Description

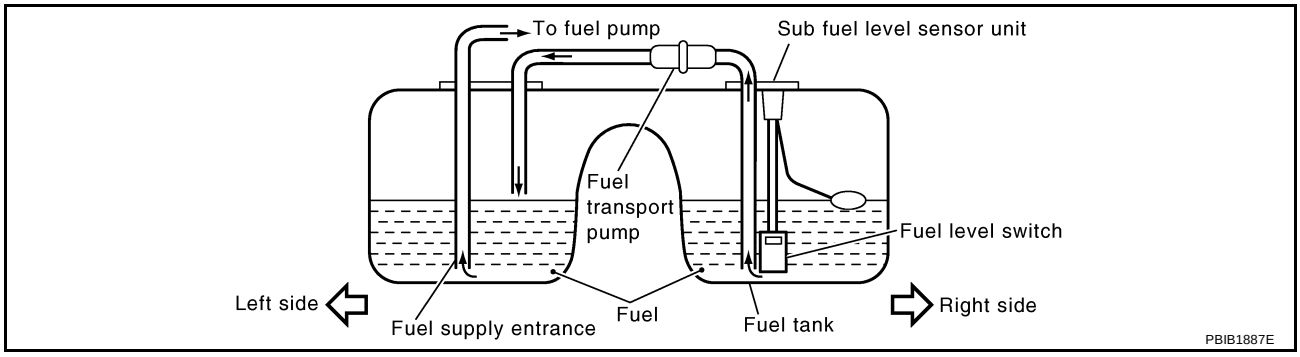
BBS00269

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel transport pump control	Fuel transport pump relay
Fuel level switch	Fuel level		

Condition	Fuel transport pump operation
Engine is running.	Operates
Engine is stopped.	Stops
The remainder of the fuel in the fuel tank is less than specified value.	Stops

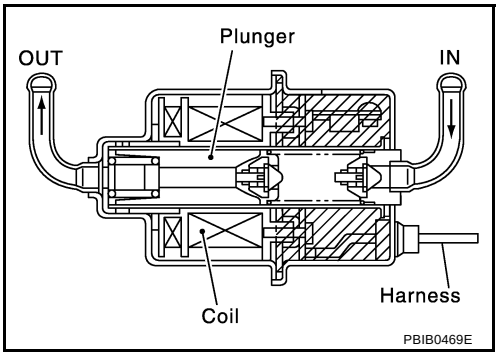
Fuel supply entrance of fuel tank is at the left side of fuel tank. The duel at the right side of the fuel tank is sent to the left side of the fuel tank by fuel transport pump.
When the ECM receives engine revolution signal from the crankshaft position sensor, it knows that the engine is rotating, and causes the pump operate. If the remainder of the fuel at the right side of the fuel tank decreases, fuel level switch sends a signal to the ECM. When the ECM receives a signal from the fuel level switch, the ECM stops the operation of the pump.
The ECM does not directly drive the fuel transport pump. It controls the ON/OFF fuel transport pump relay, which in turn controls the fuel transport pump.



COMPONENT DESCRIPTION

Fuel Transport Pump

Fuel transport pump sends the fuel from right side of fuel tank to left side.

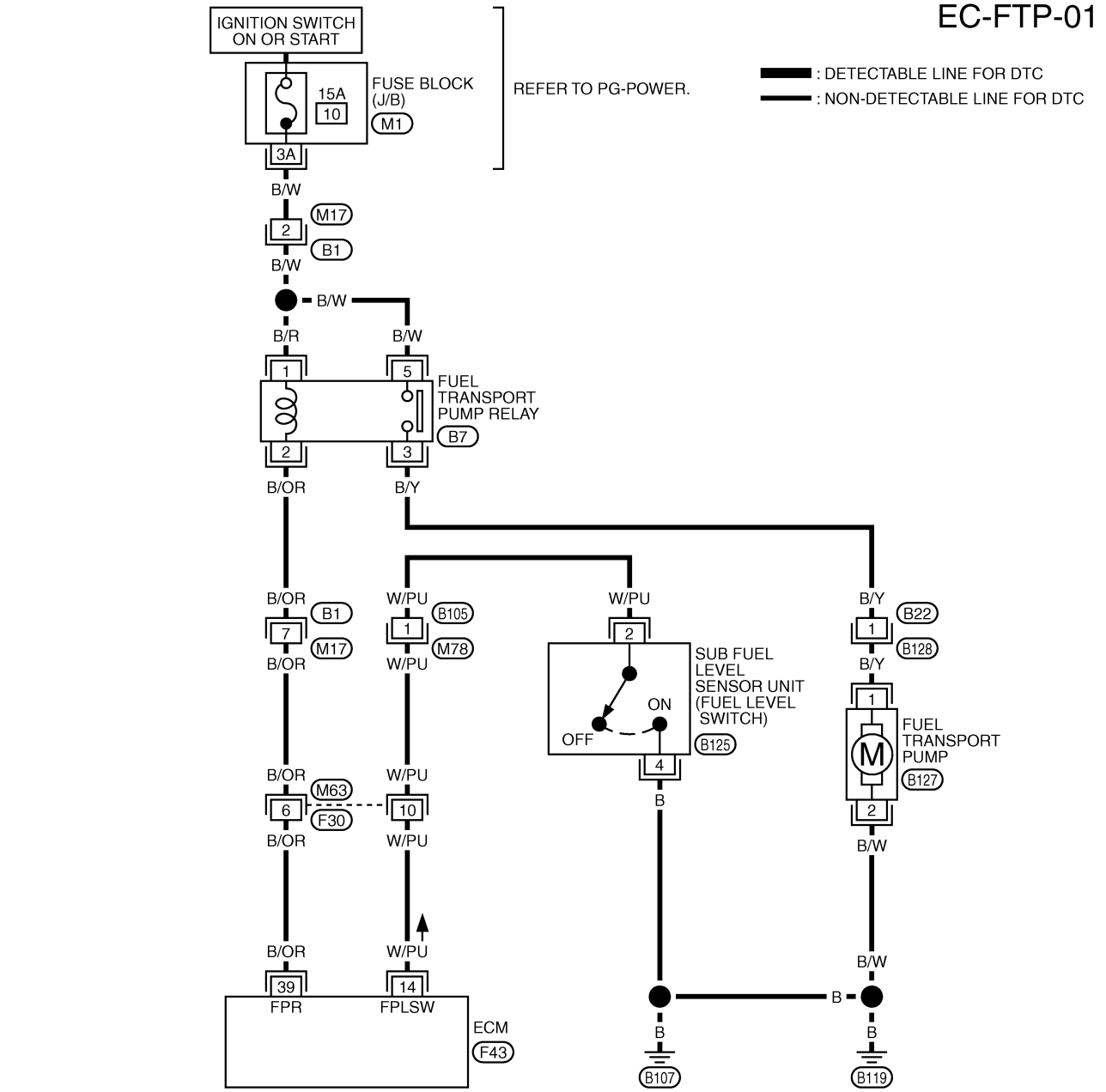


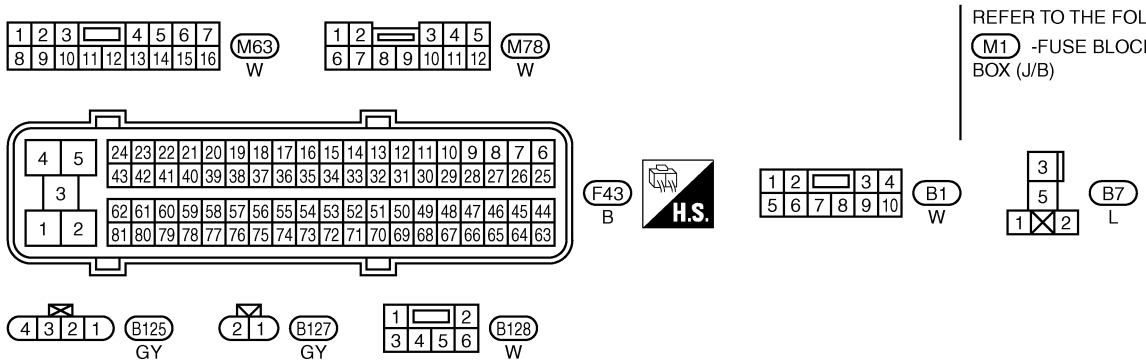
Fuel Level Switch

Fuel level switch is assembled in sub fuel level sensor unit. When the remainder of the fuel at the right side of the fuel tank is less than specified value, the switch is turned OFF.

Wiring Diagram
LHD MODELS

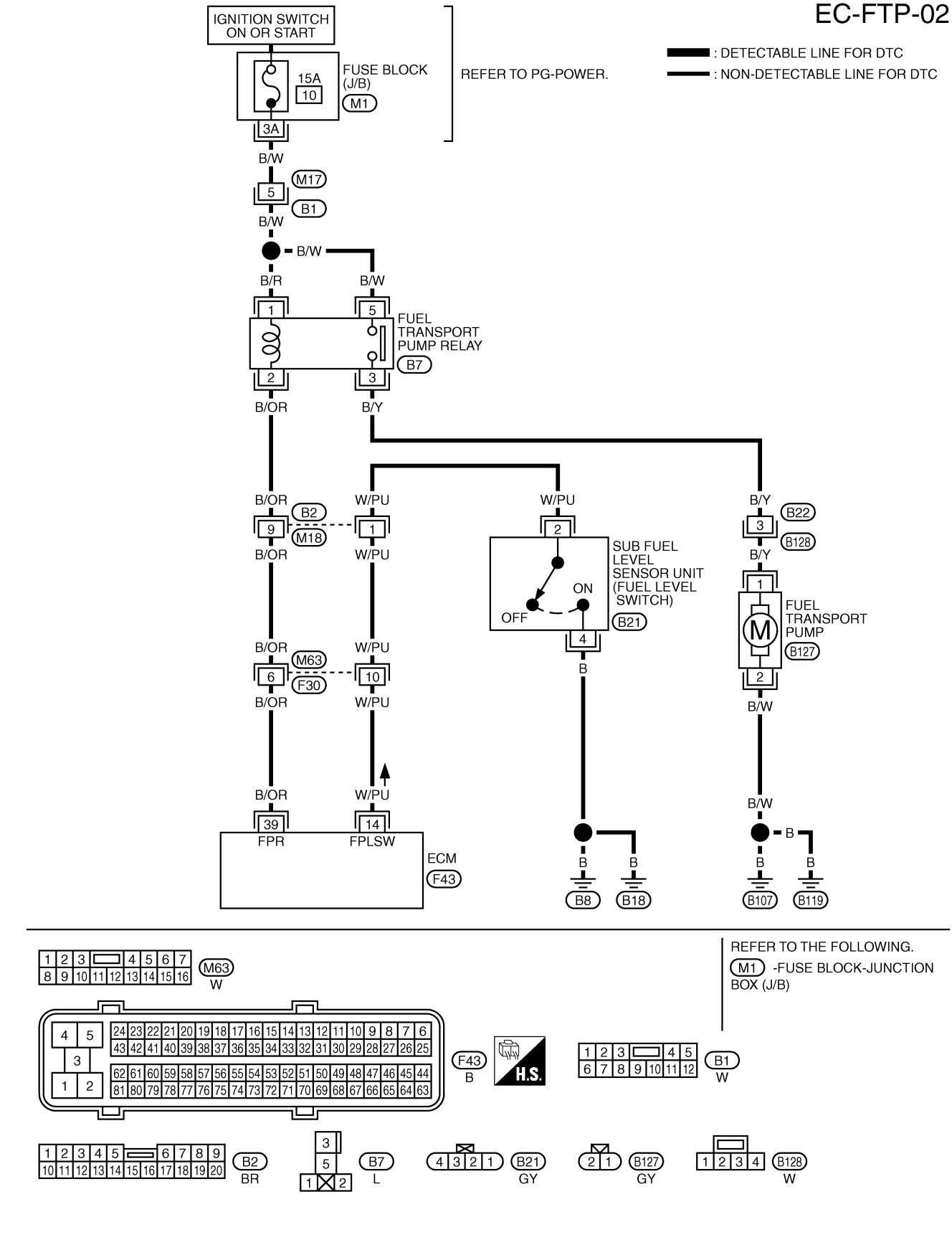
BBS0026A





TBWA0590E

RHD MODELS



TBWA0591E

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

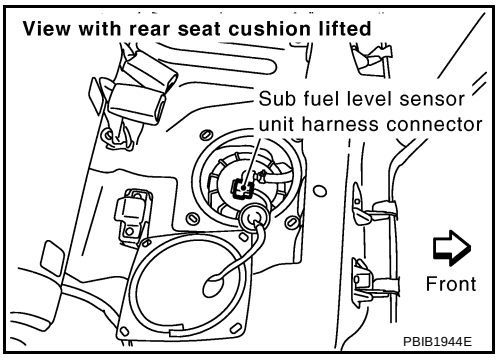
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	W/PU	Fuel level switch	**[Ignition switch ON]** ● Some fuel is in the fuel tank	Approximately 0V
			[Ignition switch ON] ● No fuel is in the fuel tank	BATTERY VOLTAGE (11 - 14V)
39	B/OR	Fuel transport pump relay	**[Engine is running]** ● Some fuel is in the fuel tank	Approximately 0V
			[Engine is running] ● No fuel is in the fuel tank	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS0026B

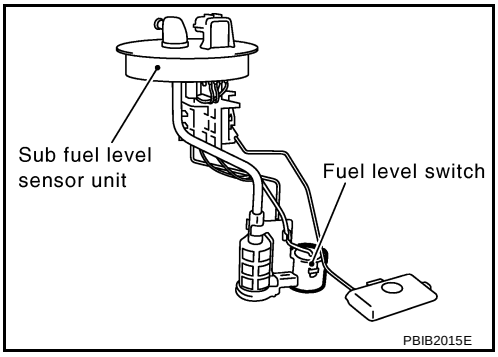
1. CHECK OVERALL FUNCTION

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect sub fuel level sensor unit harness connector.
4. Remove sub fuel level sensor unit.
5. Reconnect sub fuel level sensor unit harness connector.



6. Soak fuel level switch in fuel and check operating sound of fuel transport pump.

Operating sound should exist.



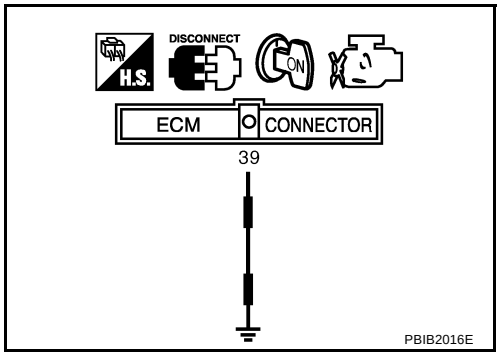
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK FUEL TRASPORT PUMP FUNCTION

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Install suitable harness between ECM harness connector terminal 39 and ground.
4. Turn ignition switch ON.
5. Listen the fuel transport pump operating sound.

Operating sound should exist.

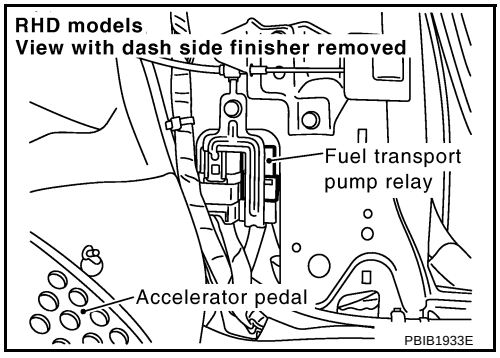


OK or NG

OK >> GO TO 11.
NG >> GO TO 3.

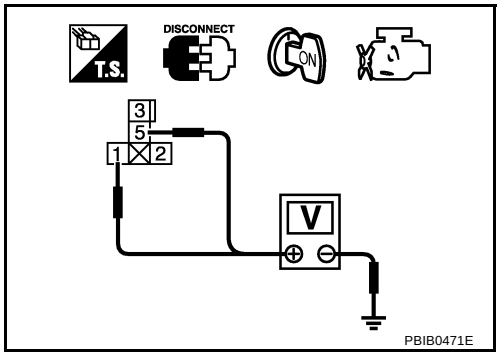
3. CHECK FUEL TRASPORT PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Reconnect ECM harness connector.
3. Disconnect fuel transport pump relay.
4. Turn ignition switch ON.



5. Check voltage between fuel transport pump relay terminals 1, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PERT

Check the following.

- Harness connectors M17, B1
- Fuse block (J/B) connectors M1
- 15A fuse
- Harness for open or short between fuse and fuel transport pump relay

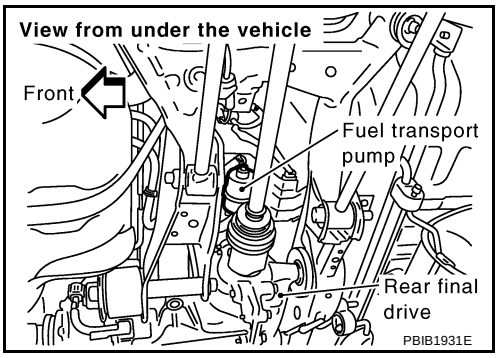
>> Repair harness or connectors.

5. CHECK FUEL TRANSPORT PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel transport pump harness connector.
3. Check harness continuity between fuel transport pump relay terminal 3 and fuel transport pump terminal 1 and between fuel transport pump terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector B22, B128
- Harness for open or short between fuel transport pump relay and fuel transport pump
- Harness for open or short between fuel transport pump and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK FUEL TRANSPORT PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 39 and fuel transport pump relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNSTIONING PART

Check the following.

- Harness connector M17, B1 (LHD models)
- Harness connector M18, B2 (RHD models)
- Harness connector M63, F30
- Harness for open or short between ECM and fuel transport pump relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK FUEL TRANSPORT PUMP RELAY

Refer to EC-1435, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace fuel transport pump relay.

10. CHECK TRANSPORT PUMP

Refer to EC-1435, "Component Inspection" .

OK or NG

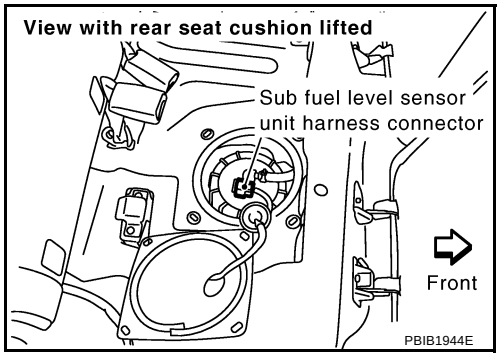
OK >> GO TO 14.
NG >> Replace fuel transport pump.

11. CHECK FUEL LEVEL SWITCH POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect sub fuel level sensor unit harness connector.
4. Check harness continuity between ECM terminal 14 and sub fuel level sensor unit terminal 2, between sub fuel level sensor unit terminal 4 and ground. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F30, M63
- Harness connector M78, B105 (LHD models)
- Harness connectors M18, B2 (RHD models)
- Harness for open or short between ECM and sub fuel level sensor unit
- Harness for open or short between sub fuel level sensor unit and ground.

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK FUEL LEVEL SWITCH

Refer to EC-1435, "Component Inspection"

OK or NG

OK >> GO TO 14.
NG >> Replace sub fuel level sensor unit.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"

>> **INSPECTION END**

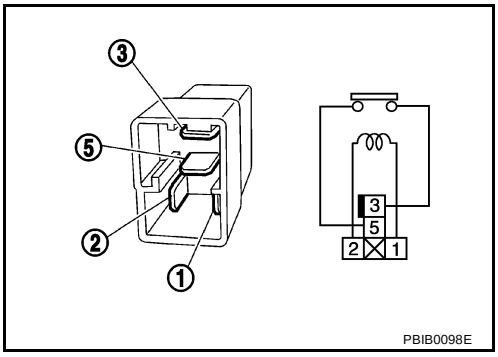
Component Inspection

BBS0026C

FUEL TRANSPORT PUMP RELAY

Check continuity between terminals (3) and (5) under the following conitions.

Conditions	Continuity
12V direct current supply between terminals (1) and (2)	Yes
No current supply	No



PBIB0098E

FUEL TRANSPORT PUMP

1. Remove fuel transport pump.
2. Apply battery voltage between fuel transport pump terminal 1 and 2.
3. Check operating sound of fuel transport pump under the following conditions.

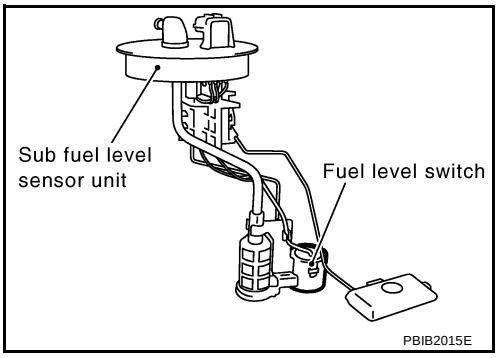
Conditions	Operating sound
12V direct current supply between fuel transport pump terminals 1 and 2	Yes
No current supply	No

4. Listen fuel transport pump operating sound.

FUEL LEVEL SWITCH

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Check continuity between sub fuel level sensor unit terminal 2 and 4 under the following conditions.

Conditions	Continuity
Fuel level switch is soaked in fuel.	Yes
Fuel level switch is not soaked in fuel.	No



PBIB2015E

Removal and Installation

BBS0026D

FUEL TRANSPORT PUMP

Refer to FL-25, "FUEL TANK" .

SUB FUEL LEVEL SENSOR UNIT

Refer to FL-21, "FUEL LEVEL SENSOR UNIT" .

REFRIGERANT PRESSURE SENSOR

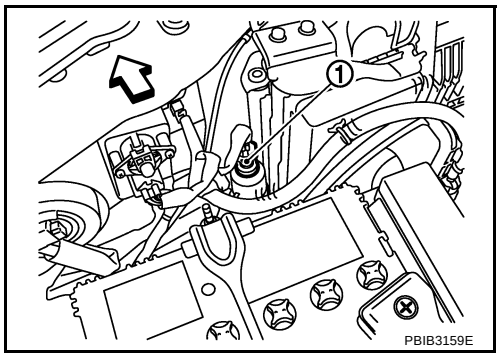
PFP:92136

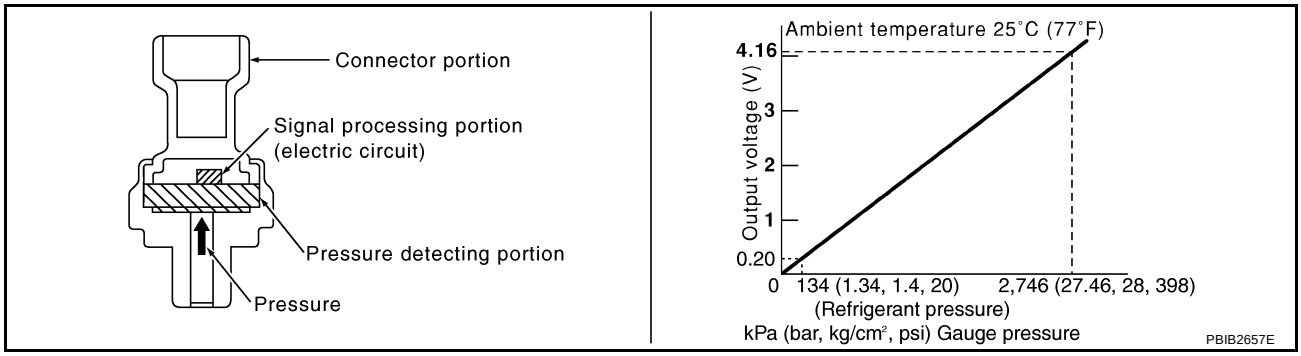
Component Description

BBS002I8

The refrigerant pressure sensor (1) is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

- ⇦: Vehicle front



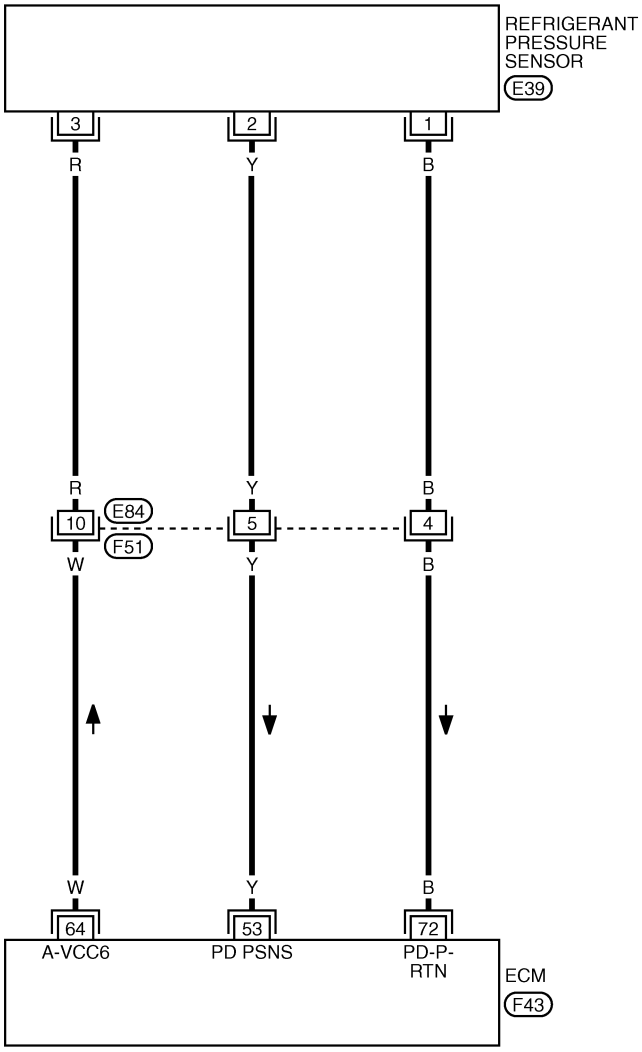


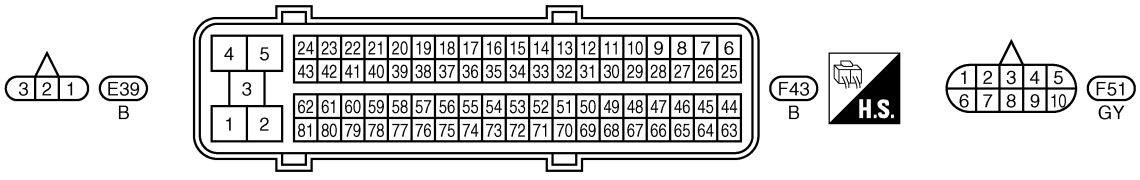
Wiring Diagram

BBS002I9

EC-RP/SEN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWB0924E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
53	Y	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower fan switch: ON (Compressor operates)	1.0 - 4.0V
64	W	Sensor power supply (Turbocharger boost sensor / Differential exhaust pressure sensor / Throttle position sensor / Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
72	B	Sensor ground (Throttle position sensor / Refrigerant pressure sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

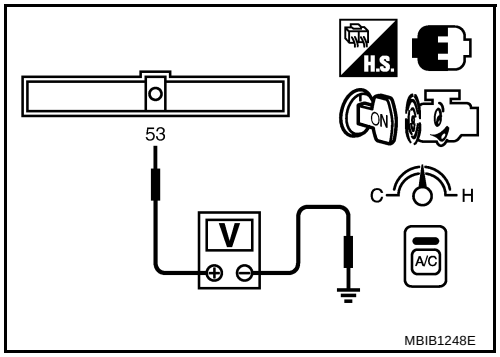
Diagnostic Procedure

BBS002IA

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower fan switch ON.
3. Check voltage between ECM terminal 53 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

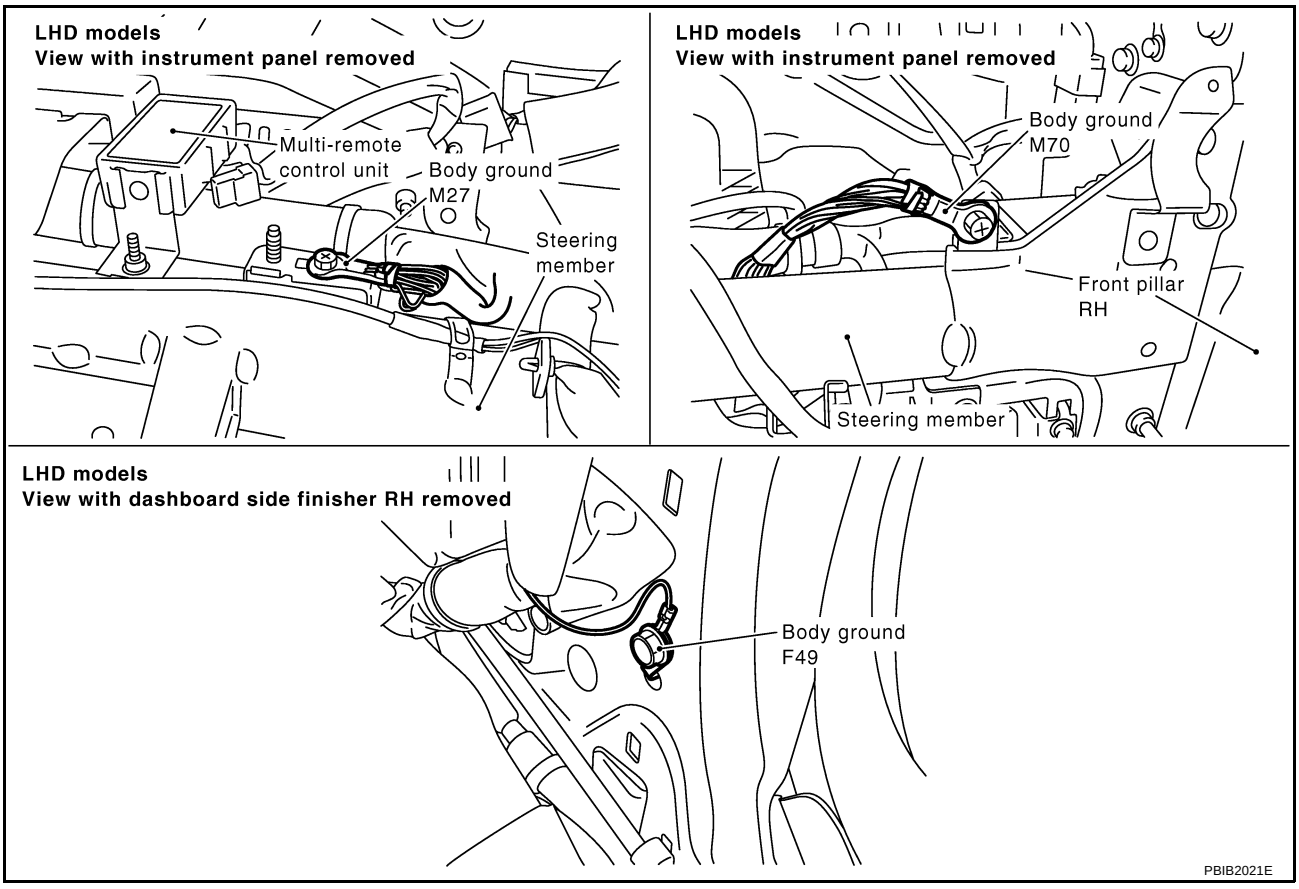


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower switch OFF.
2. Stop engine.
3. Loosen and retighten three ground screws on the body.
   Refer to EC-1067, "Ground Inspection" .

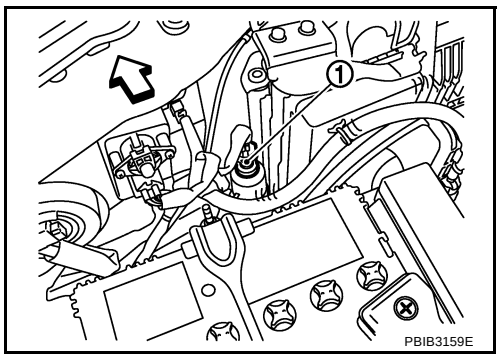


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

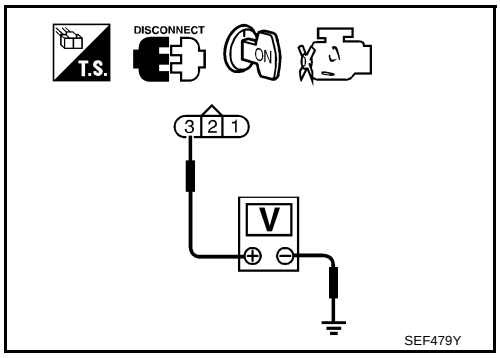
3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor (1) harness connector.
- ⇦: Vehicle front
2. Turn ignition switch ON.



3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 72. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between refrigerant pressure sensor terminal 2 and ECM terminal 53. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

BBS002IB

REFRIGERANT PRESSURE SENSOR

Refer to ATC-139, "REFRIGERANT LINES" .

ASCD INDICATOR

PFP:24814

Component Description

BBS0026G

ASCD indicator lamp illuminates to indicate ASCD operation status. The Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET indicator illuminates when the following conditions are met.

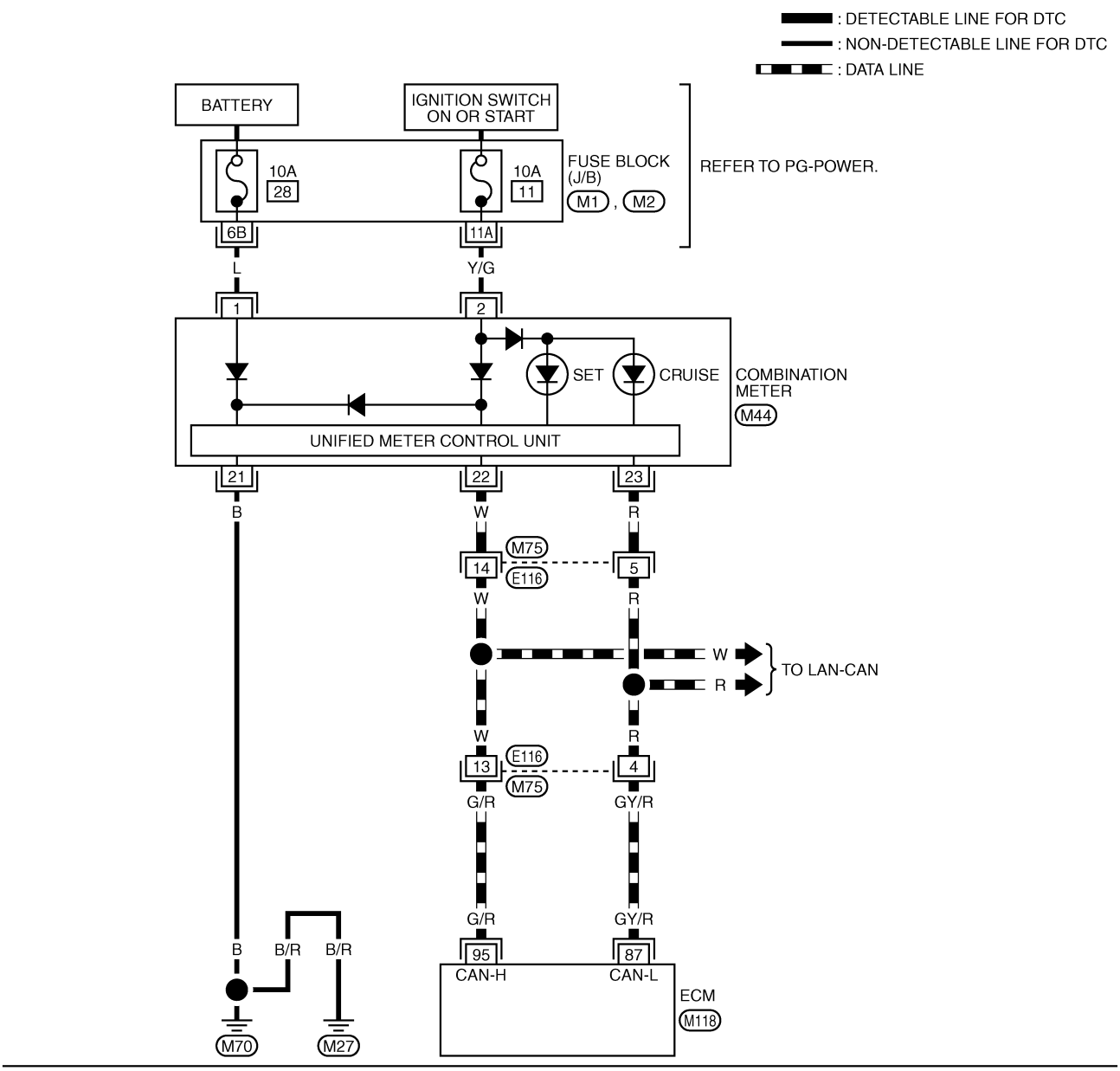
- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

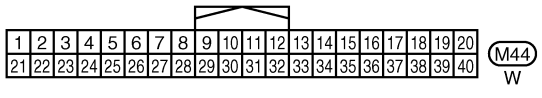
SET indicator remains lit during ASCD control.
Refer to EC-1454, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

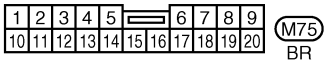
Wiring Diagram—LHD Models

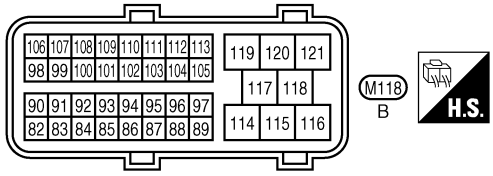
BBS0026H

EC-ASCIND-01







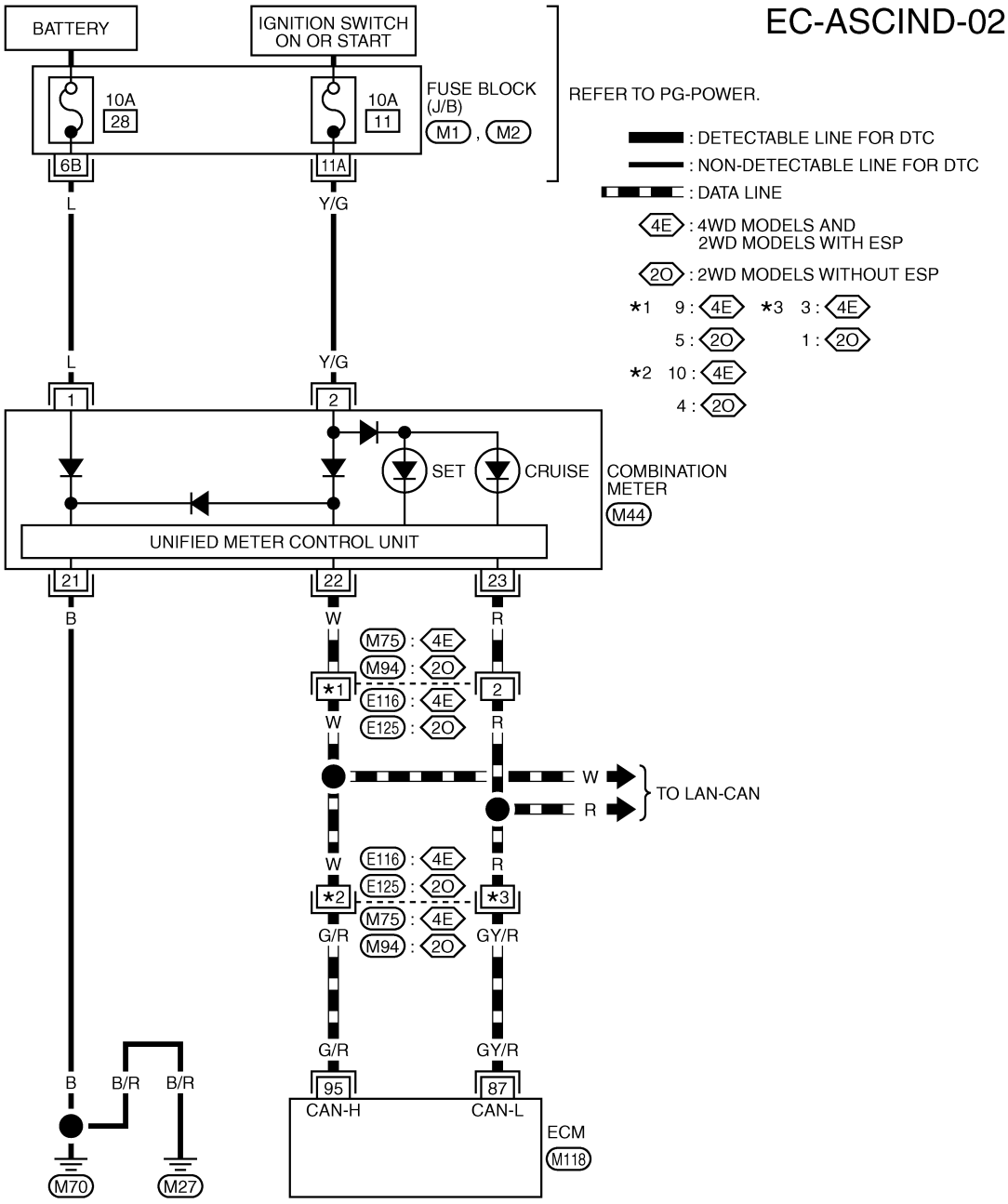


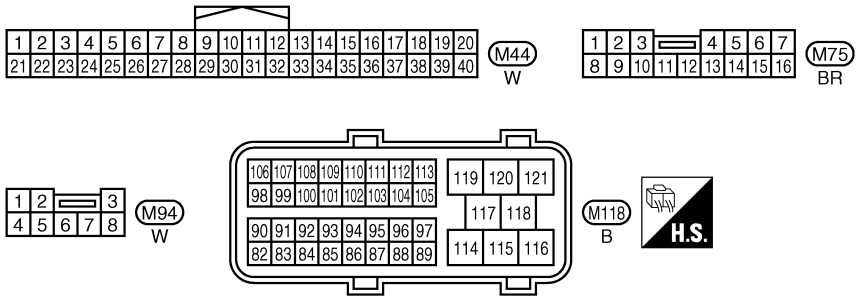
REFER TO THE FOLLOWING.
M1 , M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0478E

Wiring Diagram—RHD Models

BBS0026I





REFER TO THE FOLLOWING.
M1 , M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0647E

Diagnostic Procedure

BBS0026J

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	● MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 185 km/h (115 MPH)	● ASCD: Operating	ON
		● ASCD: Not operating	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK DTC

Check that DTC U1000 is not displayed.

OK or NG

OK >> Perform trouble diagnoses for DTC U1000. Refer to EC-1068, "DTC U1000 CAN COMMUNICATION LINE" .
NG >> GO TO 3.

3. CHECK COMBINATION METER OPERATION

Does combination meter operate normally?

Yes or No

Yes >> GO TO 4.
No >> Check combination meter circuit. Refer to DI-4, "COMBINATION METERS" .

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

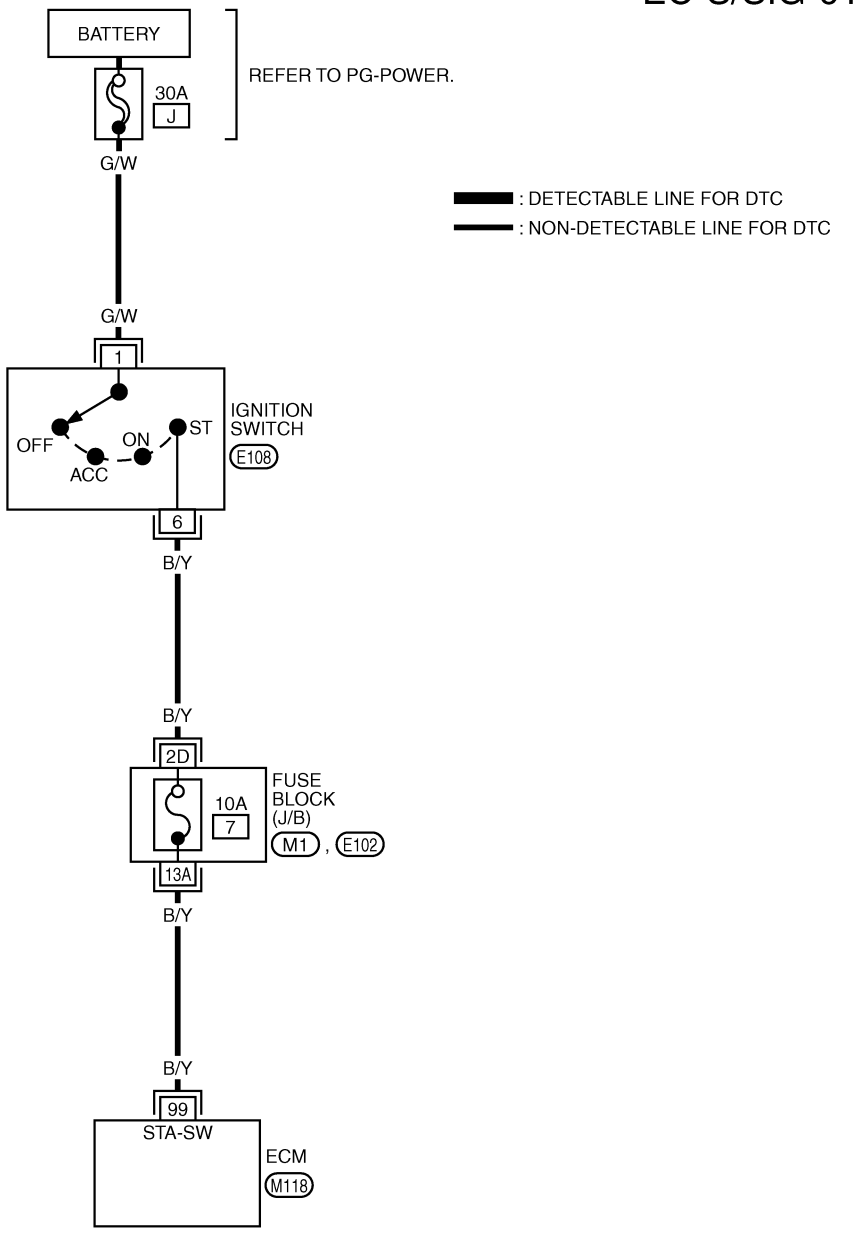
START SIGNAL

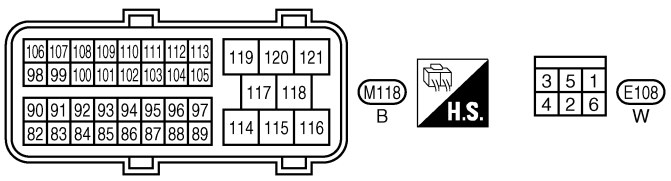
PFP:48750

Wiring Diagram

BBS0026K

EC-S/SIG-01





REFER TO THE FOLLOWING.
M1 , E102 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0582E

Diagnostic Procedure

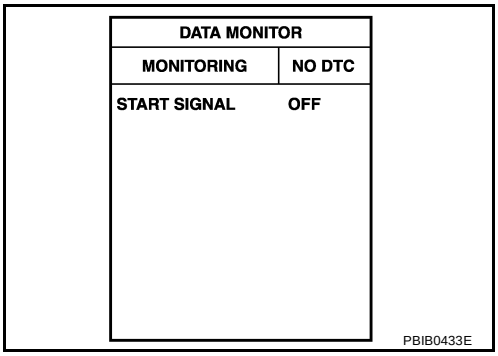
BBS0026L

1. CHECK START SIGNAL OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

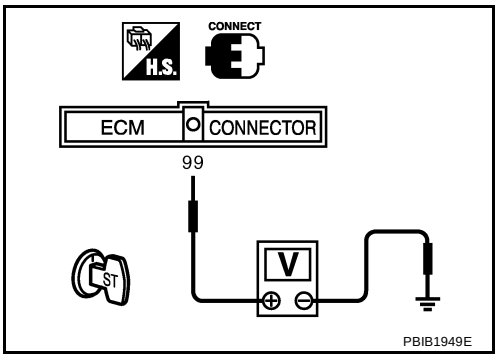
Condition	START SIGNAL
Ignition switch: ON	OFF
Ignition switch: START	ON



Without CONSULT-II

Check voltage between ECM terminal 99 and ground under the following conditions.

Condition	Voltage
Ignition switch: ON	Approximately 0V
Ignition switch: START	Battery voltage



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK START SIGNAL INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and ignition switch harness connector.
3. Check harness continuity between ECM terminal 99 and ignition switch terminal 6. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connectors M1, E102
- Harness for open or short between ECM and ignition switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1058, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

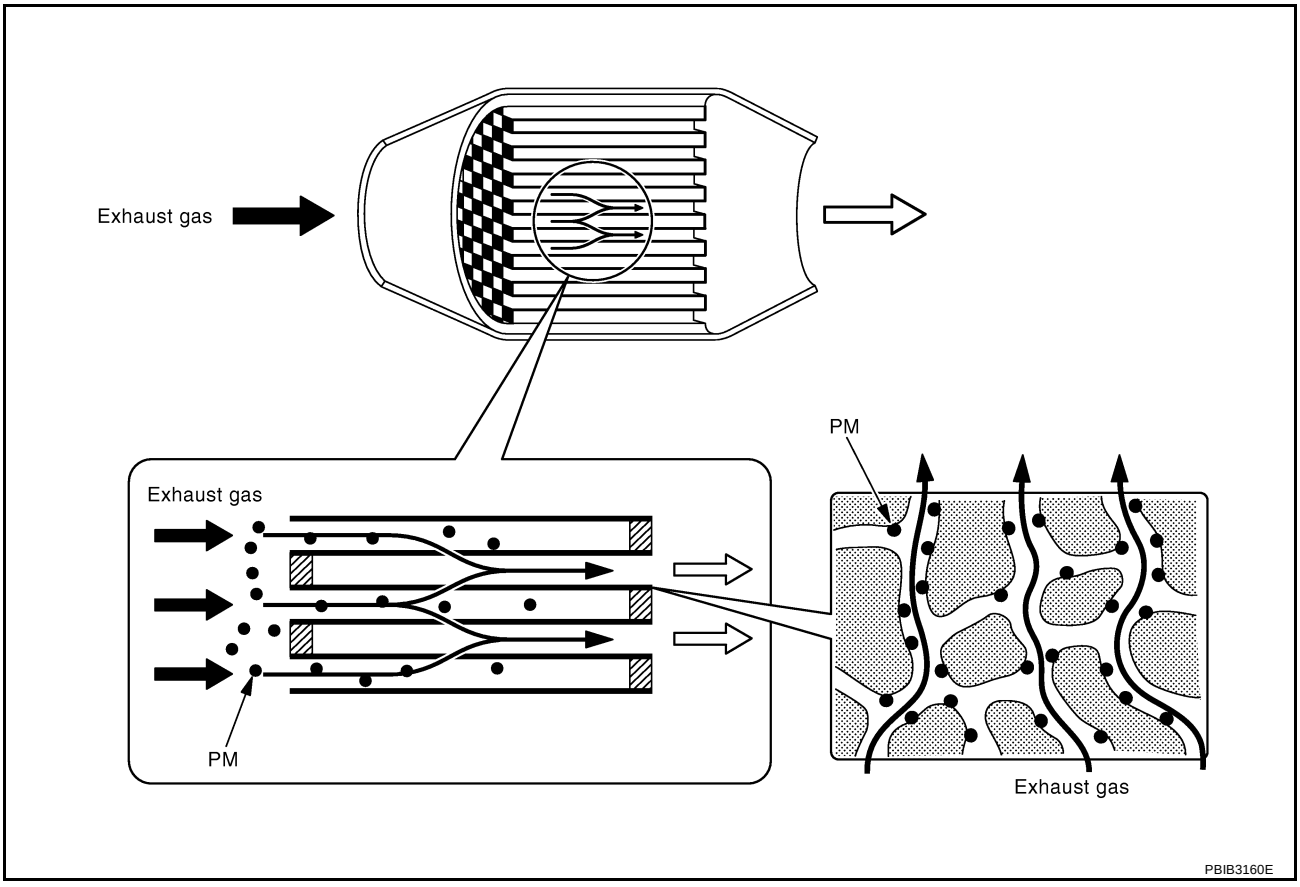
DPF

PFP:208D0

Description

BBS002M1

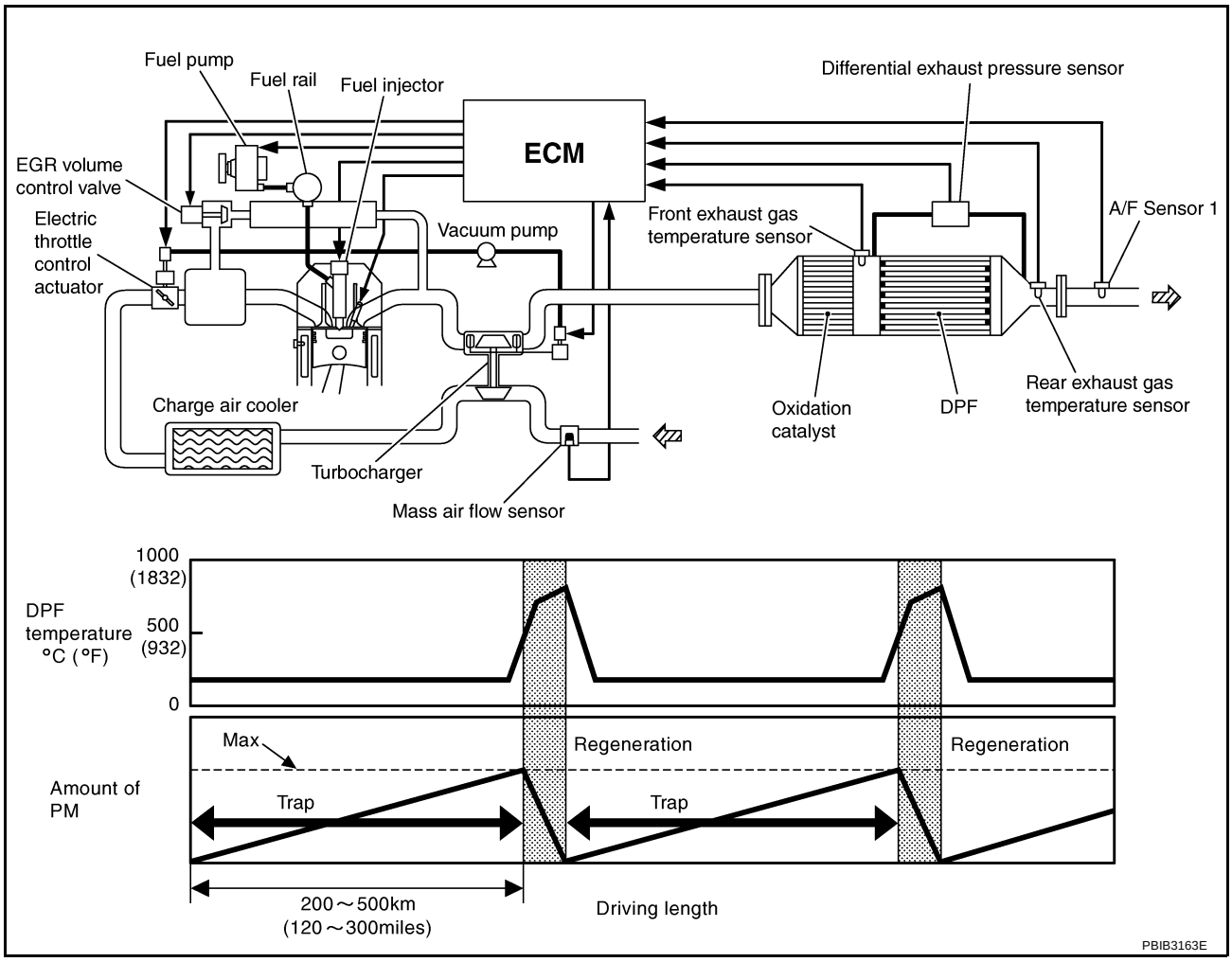
COMPONENT DESCRIPTION



DPF (Diesel Particulate Filter) is placed in oxidation catalyst assembly and traps PM (Particulate Matter) in exhaust gas. DPF is formed in a honeycomb form made of ceramic. This structure facilitates to trap particulate matter.

When the amount of particulate matter in the DPF reaches the specified level, the particulate matter needs to be reduced through burning to maintain the DPF function. This reducing of particulate matter is called Regeneration and should be performed periodically. DPF can be effective for a long time through the cycle of trapping particulate matter and regeneration.

SYSTEM DESCRIPTION



Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	Regeneration control	● Fuel injector ● Electric throttle control actuator
Camshaft position sensor	Piston position		
Engine coolant temperature sensor	Engine coolant temperature		
Mass air flow sensor	Amount of intake air		
Combination meter	Vehicle speed*		
Differential pressure sensor	Differential pressure		
A/F sensor 1	Density of oxygen in exhaust gas		
Front exhaust gas temperature sensor	Front exhaust gas temperature		
Rear exhaust gas temperature sensor	Rear exhaust gas temperature		

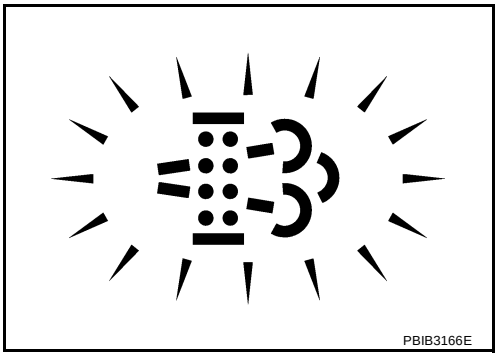
*: This signal is sent to the ECM through CAN communication line.

NOTE:
In addition to the controls described above, ECM performs fuel injection control and EGR volume control for the regeneration.

ECM estimates the amount of particulate matter in DPF based on the mileage and the differential exhaust pressure. ECM automatically performs regeneration when the amount of particulate matter in DPF reaches the specified level. When performing regeneration, ECM raise the exhaust gas temperature to activate Oxidation Catalyst. ECM performs the followings to raise exhaust gas temperature.

- Closing throttle valve to reduce intake air volume
- Retarding fuel injection timing
- Injecting additional fuel into combustion chamber during exhaust stroke (post injection)
- Performing EGR control

When exhaust gas temperature reaches the specified value, oxidation catalyst is activated. The trapped particulate matter is burned through a catalytic reaction using exhaust gas heat at 600 °C.
During regeneration ECM performs a feedback control to keep emission levels low and burn particulate matter safely and efficiently. This feedback control is performed based on the air fuel mixture ratio and the exhaust gas temperature.
When performing regeneration, ECM raise the exhaust gas temperature to activate Oxidation Catalyst. If the vehicle is driven in the driving pattern in which the exhaust gas temperature can not be raised, DPF warning light as shown in the figure lights up. DPF warning light is located on combination meter.
When DPF warning light lights up, drive the vehicle under any of the following condition to complete regeneration.


PBIB3166E

- The vehicle is driven continuously at 80km/h for 30 minutes*
- The vehicle is driven continuously 15km or more without being caught in traffic jam

If the vehicle is driven in the driving pattern in which the exhaust gas temperature can not be raised after DPF warning light lights up, ECM performs the following to protect DPF.

- ECM enters fail-safe mode and limits engine speed to 2,000 rpm with fuel cut.
- ECM stores DTC P2002 in the memory.

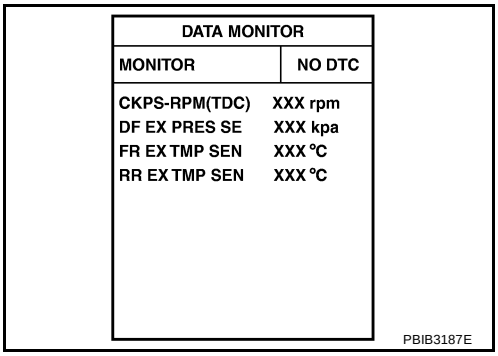
To recover from the condition described above, perform “Service Regeneration” with CONSULT-II to reduce the particulate matter through burning. Refer to EC-997, "Service Regeneration" .
*: Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

Component Inspection

BBS002M3

DPF

1. Check DPF for damage. If NG, go to 7.
2. Perform “Service Regeneration”. Refer to EC-997, "Service Regeneration" .
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. Start engine and warm it up to normal operating temperature.
6. Check “DF EX PRES SE” signal under the following conditions.



PBIB3187E

Condition	DF EX PRES SE [kPa]
● CKPS·RPM: 2000rpm ● FR EX TMP SEN: 150 - 200°C (302 - 392°F) ● RR EX TMP SEN: 150 - 200°C (302 - 392°F)	Less than 2.5

7. If NG, replace oxidation catalyst with DPF.
8. Perform “DPF Data Clear”. Refer to EC-999, "DPF Data Clear" .

Removal and Installation

BBS002M4

OXIDATION CATALYST WITH DPF

Refer to EM-150, "CATALYST" .

MI & DATA LINK CONNECTORS

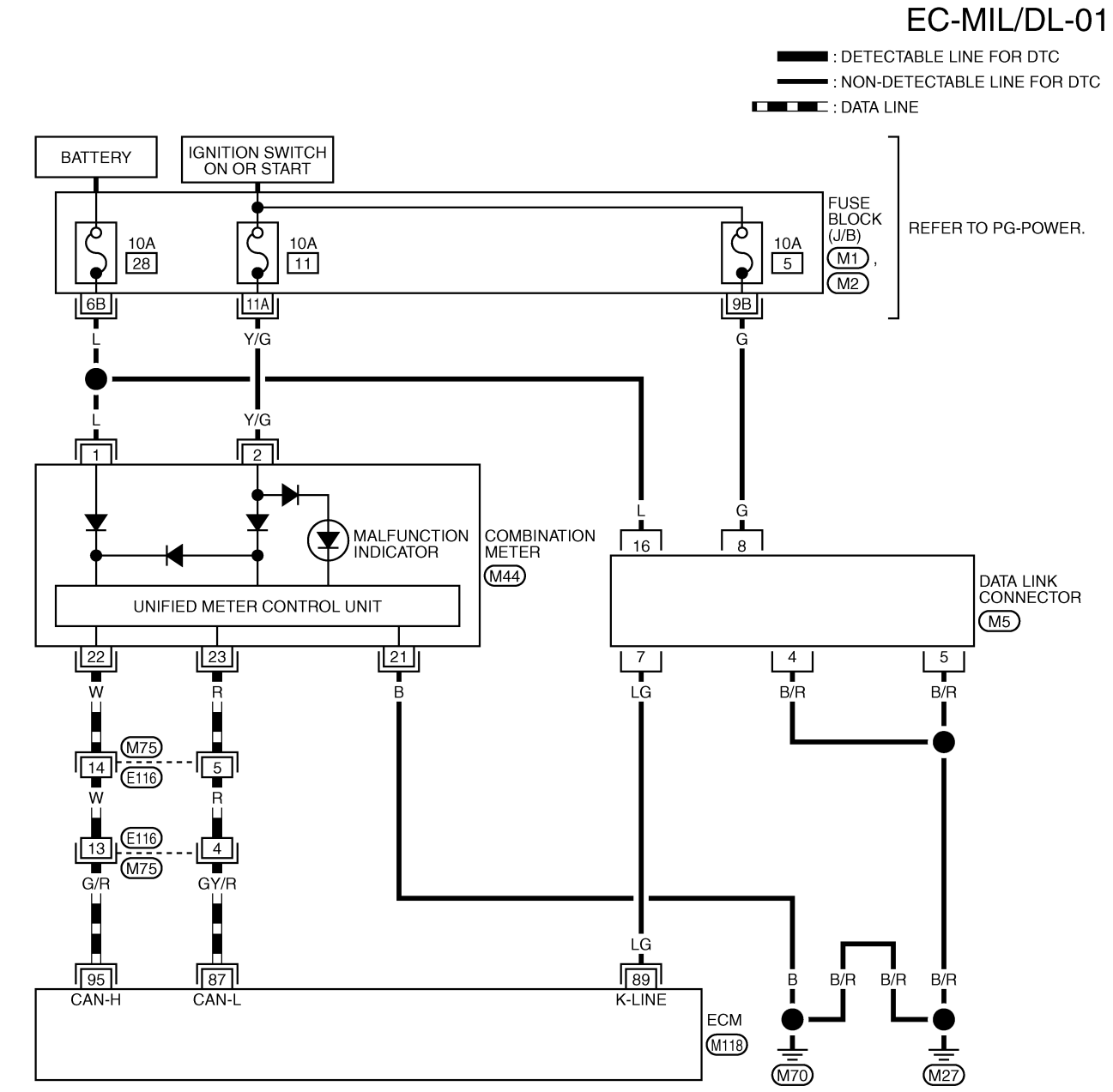
PFP:24814

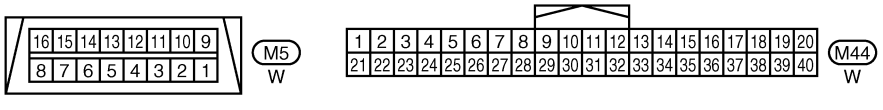
Wiring Diagram

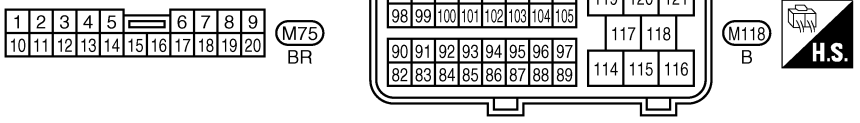
BBS0026M

LHD MODELS

EC-MIL/DL-01





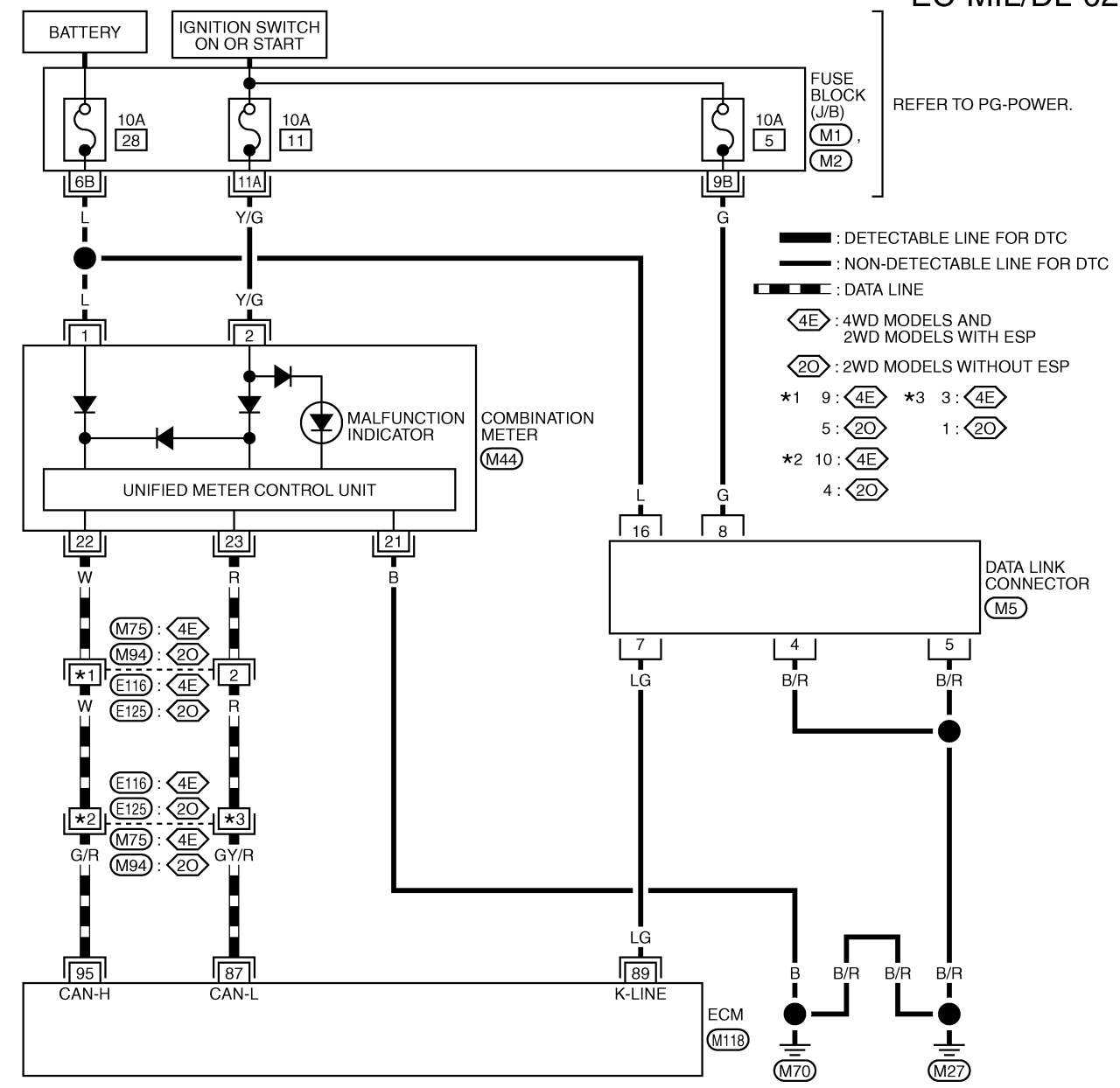


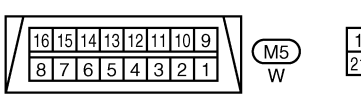
REFER TO THE FOLLOWING.
M1, M2 -FUSE BLOCK-JUNCTION BOX (J/B)

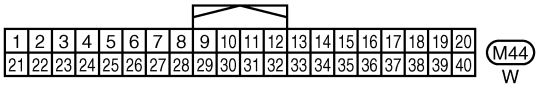
TBWA0585E

RHD MODELS

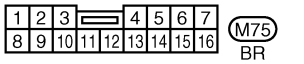
EC-MIL/DL-02

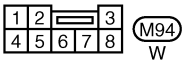


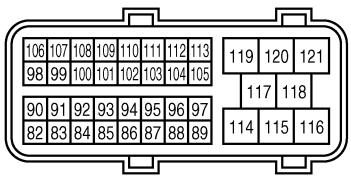




REFER TO THE FOLLOWING.
M1, M2 -FUSE BLOCK-JUNCTION BOX (J/B)







TBWB0646E

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

PFP:18930

System Description

BBS0026E

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Fuel injector and Fuel pump
Stop lamp switch	Brake pedal operation		
ASCD clutch switch	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Combination meter	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 185 km/h (115 MPH).
ECM controls fuel injection value to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

SET OPERATION

Press ASCD MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 185 km/h (115 MPH), press SET switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is depressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is depressed
- More than 2 switches at ASCD steering switch are depressed at the same time (Set speed will be cleared.).
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to the neutral position
- Vehicle speed increased to 13 km/h higher than the set speed
- Vehicle speed decreased to 13 km/h lower than the set speed
- ESP system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is depressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is depressed after cancel operation other than depressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Clutch pedal is released

- Vehicle speed is greater than 40 km/h (25 MPH) and less than 185 km/h (115 MPH)

Component Description

BBS0026F

ASCD STEERING SWITCH

Refer to EC-1287 .

ASCD BRAKE SWITCH

Refer to EC-1275 and EC-1411 .

ASCD CLUTCH SWITCH

Refer to EC-1275 and EC-1411 .

STOP LAMP SWITCH

Refer to EC-1275 and EC-1411 .

ASCD INDICATOR

Refer to EC-1442 .

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00100

General Specifications

BBS0026N

Target idle speed	No load* (in Neutral position)	725 ± 25 rpm
Air conditioner: ON and/or DPF: Regeneration	In Neutral position	850 ± 25 rpm
Maximum engine speed		4,900 rpm

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

BBS0026O

Supply voltage	Battery voltage (11 - 14V)
Ignition switch ON (Engine stopped.)	Approx. 0.4V
Idle (Engine is warmed up to normal operating temperature.)	1.3 - 1.6V*

*: Engine is warmed up to normal operating temperature and running under no load.

Intake Air Temperature Sensor

BBS002IT

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200
80 (176)	0.283 - 0.359

Engine Coolant Temperature Sensor

BBS0026P

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Air Fuel Ratio (A/F) Sensor 1 Heater

BBS002MM

Resistance [at 25°C (77°F)]	1.8 - 2.44Ω

Fuel Rail Pressure Sensor

BBS0026Q

Supply voltage	Approximately 5V
Idle (Engine is warmed up to normal operating temperature.)	1.7 - 2.0V
2,000 rpm (Engine is warmed up to normal operating temperature.)	2.0 - 2.3V

Fuel Injector

BBS002IZ

Resistance [at 10 - 60°C (50 - 140°F)]	0.2 - 0.8Ω

Crankshaft Position Sensor

BBS0026T

Refer to EC-1201, "Component Inspection" .

Camshaft Position Sensor

BBS0026U

Refer to EC-1213, "Component Inspection" .

Glow Plug

BBS0026R

Resistance [at 25°C (77°F)]	Approximately 0.8Ω

EGR Volume Control Valve

BBS0026S

Resistance [at 25°C (77°F)]	13 - 17Ω

Front Exhaust Gas Temperature Sensor

BBS002MN

Resistance [at more than 20°C (68°F)]	Except 0 or ∞ Ω

Rear Exhaust Gas Temperature Sensor

BBS002MO

Resistance [at more than 20°C (68°F)]	Except 0 or ∞ Ω

Fuel Pump

BBS002J0

Resistance [at 10 - 60°C (50 - 140°F)]	1.5 - 3.0Ω

Engine Room Air Temperature Sensor

BBS002MP

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Throttle Control Motor

BBS003ZC

Resistance [at 25°C (77°F)]	Approximately 0.3 - 100Ω

INDEX FOR DTC

PFP:00024

Alphabetical Index

BBS0026V

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to GI-46, "IDENTIFICATION PLATE" .

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1530, "DTC U1000 CAN COMMUNICATION LINE" .

X: Applicable —: Not applicable

Items (CONSULT-II screen terms)	DTC		MI lighting up	Reference page
	CONSULT-II	ECM*1		
APP SEN 1/CIRCUIT	P0122	0122	—	EC-1563
APP SEN 1/CIRCUIT	P0123	0123	—	EC-1563
APP SEN 2/CIRCUIT	P0222	0222	—	EC-1605
APP SEN 2/CIRCUIT	P0223	0223	—	EC-1605
APP SENSOR	P2135	2135	—	EC-1739
BARO SEN/CIRC	P2228	2228	—	EC-1756
BARO SEN/CIRC	P2229	2229	—	EC-1756
BATTERY VOLTAGE	P0563	0563	—	EC-1665
BRAKE SW/CIRCUIT	P0504	0504	—	EC-1655
CAN COMM CIRCUIT	U1000	1000*2	—	EC-1530
CKP SEN/CIRCUIT	P0335	0335	×	EC-1624
CKP SENSOR	P0336	0336	×	EC-1630
CMP SEN/CIRCUIT	P0340	0340	×	EC-1636
CMP SENSOR	P0341	0341	×	EC-1642
CMP/CKP RELATION	P0016	0016	—	EC-1533
CYL1 INJECTOR	P0201	0201	—	EC-1582
CYL2 INJECTOR	P0202	0202	—	EC-1582
CYL3 INJECTOR	P0203	0203	—	EC-1582
CYL4 INJECTOR	P0204	0204	—	EC-1582
ECM	P0605	0605	×	EC-1677
ECM	P0606	0606	×	EC-1679
ECM	P1616	1616	—	EC-1733
ECM RELAY	P0686	0686	—	EC-1697
ECT SEN/CIRCUIT	P0117	0117	—	EC-1557
ECT SEN/CIRCUIT	P0118	0118	—	EC-1557
ENG OVER TEMP	P0217	0217	×	EC-1589
FRP RELIEF VALVE	P1272	1272	—	EC-1711
FRP SEN/CIRC	P0192	0192	—	EC-1574
FRP SEN/CIRC	P0193	0193	—	EC-1574
FUEL LEAK	P0093	0093	×	EC-1539
FUEL PUMP	P0089	0089	—	EC-1537
FUEL PUMP	P1273	1273	—	EC-1717
FUEL PUMP	P1274	1274	×	EC-1723
FUEL PUMP	P1275	1275	×	EC-1728
FUEL PUMP/CIRC	P0628	0628	×	EC-1681
FUEL PUMP/CIRC	P0629	0629	×	EC-1681

Items (CONSULT-II screen terms)	DTC		MI lighting up	Reference page
	CONSULT-II	ECM*1		
FUEL TEMP SEN/CIRC	P0182	0182	—	EC-1570
FUEL TEMP SEN/CIRC	P0183	0183	—	EC-1570
HIGH FUEL PRESS	P0088	0088	×	EC-1535
IAT SEN/CIRCUIT	P0112	0112	—	EC-1551
IAT SEN/CIRCUIT	P0113	0113	—	EC-1551
INJ ADJ VAL ERROR	P1623	1623	—	EC-1737
INJ ADJ VAL UNRGST	P1622	1622	—	EC-1735
INJ PWR/CIRC	P2146	2146	×	EC-1746
INJ PWR/CIRC	P2149	2149	×	EC-1746
INJECTOR	P0200	0200	×	EC-1580
INJECTOR/CIRC	P2147	2147	×	EC-1750
INJECTOR/CIRC	P2148	2148	×	EC-1750
INJECTOR 1	P1268	1268	—	EC-1703
INJECTOR 2	P1269	1269	—	EC-1703
INJECTOR 3	P1270	1270	—	EC-1703
INJECTOR 4	P1271	1271	—	EC-1703
MAF SEN/CIRCUIT	P0102	0102	—	EC-1543
MAF SEN/CIRCUIT	P0103	0103	—	EC-1543
NATS MALFUNCTION	P1610 - P1615	1610 - 1615	—	BL-107
NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.	**P0000**	0000	—	—
SENSOR PWR/CIRC1	P0642	0642	—	EC-1686
SENSOR PWR/CIRC1	P0643	0643	—	EC-1686
SENSOR PWR/CIRC2	P0652	0652	—	EC-1691
SENSOR PWR/CIRC2	P0653	0653	—	EC-1691
STRG SW/CIRC	P0580	0580	—	EC-1668
STRG SW/CIRC	P0581	0581	—	EC-1668
TC BOOST SEN/CIRC	P0237	0237	—	EC-1618
TC BOOST SEN/CIRC	P0238	0238	—	EC-1618
TC SYSTEM	P0234	0234	—	EC-1612
TCS/CIRC	P1212	1212	×	EC-1702
TCS C/U FUNCTN	P1211	1211	×	EC-1701
VEHICLE SPEED	P0501	0501	—	EC-1649
VEHICLE SPEED	P0502	0502	—	EC-1651
VEHICLE SPEED	P0503	0503	—	EC-1653

*1: In Diagnostic Test Mode II (Self-diagnostic results).
*2: The troubleshooting for this DTC needs CONSULT-II.

DTC No. Index

BBS0026W

Check if the vehicle is a model with Euro-OBD (E-OBD) system or not by the “Type approval number” on the identification plate. Refer to GI-46, "IDENTIFICATION PLATE" .

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1530, "DTC U1000 CAN COMMUNICATION LINE" .

X: Applicable —: Not applicable

DTC		Items (CONSULT-II screen item)	MI lighting up	Reference page
CONSULT-II	ECM*1			
U1000	1000*2	CAN COMM CIRCUIT	—	EC-1530
P0000	0000	**NO DTC IS DETECTED. FURTHER TESTING MAY BE REQUIRED.**	—	—
P0016	0016	CMP/CKP RELATION	—	EC-1533
P0088	0088	HIGH FUEL PRESS	×	EC-1535
P0089	0089	FUEL PUMP	—	EC-1537
P0093	0093	FUEL LEAK	×	EC-1539
P0102	0102	MAF SEN/CIRCUIT	—	EC-1543
P0103	0103	MAF SEN/CIRCUIT	—	EC-1543
P0112	0112	IAT SEN/CIRCUIT	—	EC-1551
P0113	0113	IAT SEN/CIRCUIT	—	EC-1551
P0117	0117	ECT SEN/CIRC	—	EC-1557
P0118	0118	ECT SEN/CIRC	—	EC-1557
P0122	0122	APP SEN 1/CIRCUIT	—	EC-1563
P0123	0123	APP SEN 1/CIRCUIT	—	EC-1563
P0182	0182	FUEL TEMP SEN/CIRC	—	EC-1570
P0183	0183	FUEL TEMP SEN/CIRC	—	EC-1570
P0192	0192	FRP SEN/CIRC	—	EC-1574
P0193	0193	FRP SEN/CIRC	—	EC-1574
P0200	0200	INJECTOR	×	EC-1580
P0201	0201	CYL1 INJECTOR	—	EC-1582
P0202	0202	CYL2 INJECTOR	—	EC-1582
P0203	0203	CYL3 INJECTOR	—	EC-1582
P0204	0204	CYL4 INJECTOR	—	EC-1582
P0217	0217	ENG OVER TEMP	×	EC-1589
P0222	0222	APP SEN 2/CIRCUIT	—	EC-1605
P0223	0223	APP SEN 2/CIRCUIT	—	EC-1605
P0234	0234	TC SYSTEM	—	EC-1612
P0237	0237	TC BOOST SEN/CIRC	—	EC-1618
P0238	0238	TC BOOST SEN/CIRC	—	EC-1618
P0335	0335	CKP SEN/CIRCUIT	×	EC-1624
P0336	0336	CKP SENSOR	×	EC-1630
P0340	0340	CMP SEN/CIRCUIT	×	EC-1636
P0341	0341	CMP SENSOR	×	EC-1642
P0501	0501	VEHICLE SPEED	—	EC-1649
P0502	0502	VEHICLE SPEED	—	EC-1651
P0503	0503	VEHICLE SPEED	—	EC-1653

DTC		Items (CONSULT-II screen item)	MI lighting up	Reference page
CONSULT-II	ECM*1			
P0504	0504	BRAKE SW/CIRCUIT	—	EC-1655
P0563	0563	BATTERY VOLTAGE	—	EC-1665
P0580	0580	STRG SW/CIRC	—	EC-1668
P0581	0581	STRG SW/CIRC	—	EC-1668
P0605	0605	ECM	×	EC-1677
P0606	0606	ECM	×	EC-1679
P0628	0628	FUEL PUMP/CIRC	×	EC-1681
P0629	0629	FUEL PUMP/CIRC	×	EC-1681
P0642	0642	SENSOR PWR/CIRC1	—	EC-1686
P0643	0643	SENSOR PWR/CIRC1	—	EC-1686
P0652	0652	SENSOR PWR/CIRC2	—	EC-1691
P0653	0653	SENSOR PWR/CIRC2	—	EC-1691
P0686	0686	ECM RELAY	—	EC-1697
P1211	1211	TCS C/U FUNCTN	—	EC-1701
P1212	1212	TCS/CIRC	—	EC-1702
P1268	1268	INJECTOR 1	—	EC-1703
P1269	1269	INJECTOR 2	—	EC-1703
P1270	1270	INJECTOR 3	—	EC-1703
P1271	1271	INJECTOR 4	—	EC-1703
P1272	1272	FRP RELIEF VALVE	—	EC-1711
P1273	1273	FUEL PUMP	—	EC-1717
P1274	1274	FUEL PUMP	×	EC-1723
P1275	1275	FUEL PUMP	×	EC-1728
P1610 - P1615	1610 - 1615	NATS MALFUNTION	—	BL-107
P1616	1616	ECM	—	EC-1733
P1622	1622	INJ ADJ VAL UNRGST	—	EC-1735
P1623	1623	INJ ADJ VAL ERROR	—	EC-1737
P2135	2135	APP SENSOR	—	EC-1739
P2146	2146	INJ PWR/CIRC	×	EC-1746
P2147	2147	INJECTOR/CIRC	×	EC-1750
P2148	2148	INJECTOR/CIRC	×	EC-1750
P2149	2149	INJ PWR/CIRC	×	EC-1746
P2228	2228	BARO SEN/CIRC	—	EC-1756
P2229	2229	BARO SEN/CIRC	—	EC-1756

*1: In Diagnostic Test Mode II (Self-diagnostic results).
*2: The troubleshooting for this DTC needs CONSULT-II.

PRECAUTIONS

PFP:00001

Precautions for Supplemental Restraint System (SRS) “AIR BAG” and “SEAT BELT PRE-TENSIONER”

BBS0026X

The Supplemental Restraint System such as “AIR BAG” and “SEAT BELT PRE-TENSIONER”, used along with a front seat belt, helps to reduce the risk or severity of injury to the driver and front passenger for certain types of collision. Information necessary to service the system safely is included in the SRS and SB section of this Service Manual.

WARNING:

- **To avoid rendering the SRS inoperative, which could increase the risk of personal injury or death in the event of a collision which would result in air bag inflation, all maintenance must be performed by an authorized NISSAN/INFINITI dealer.**
- **Improper maintenance, including incorrect removal and installation of the SRS, can lead to personal injury caused by unintentional activation of the system. For removal of Spiral Cable and Air Bag Module, see the SRS section.**
- **Do not use electrical test equipment on any circuit related to the SRS unless instructed to in this Service Manual. SRS wiring harnesses can be identified by yellow and/or orange harnesses or harness connectors.**

On Board Diagnostic (OBD) System of Engine

BBS0026Y

The ECM has an on board diagnostic system. It will light up the malfunction indicator (MI) to warn the driver of a malfunction causing emission deterioration.

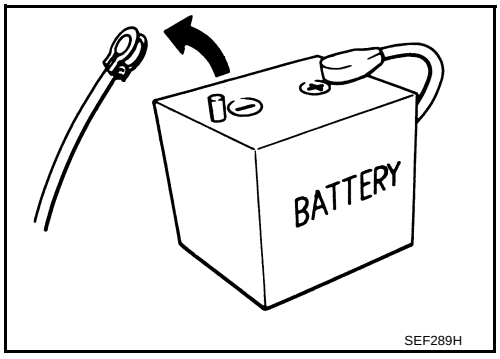
CAUTION:

- **Be sure to turn the ignition switch OFF and disconnect the battery negative cable before any repair or inspection work. The open/short circuit of related switches, sensors, solenoid valves, etc. will cause the MI to light up.**
- **Be sure to connect and lock the connectors securely after work. A loose (unlocked) connector will cause the MI to light up due to the open circuit. (Be sure the connector is free from water, grease, dirt, bent terminals, etc.)**
- **Certain systems and components, especially those related to OBD, may use a new style slide-locking type harness connector. For description and how to disconnect, refer to PG-74, "HARNESS CONNECTOR" .**
- **Be sure to route and secure the harnesses properly after work. The interference of the harness with a bracket, etc. may cause the MI to light up due to the short circuit.**
- **Be sure to connect rubber tubes properly after work. A misconnected or disconnected rubber tube may cause the MI to light up due to the malfunction of the fuel system, etc.**
- **Be sure to erase the unnecessary malfunction information (repairs completed) from the ECM before returning the vehicle to the customer.**

Precautions

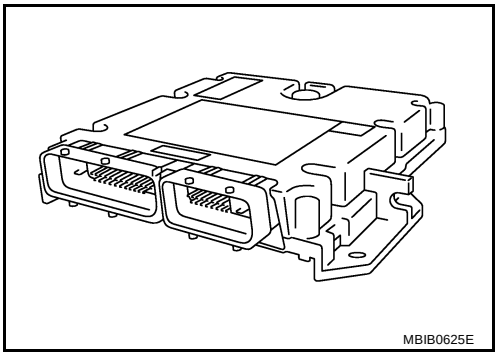
BBS0026Z

- **Always use a 12 volt battery as power source.**
- **Do not attempt to disconnect battery cables while engine is running.**
- **Before connecting or disconnecting the ECM harness connector, turn ignition switch OFF and disconnect battery negative cable. Failure to do so may damage the ECM because battery voltage is applied to ECM even if ignition switch is turned off.**
- **Before removing parts, turn ignition switch OFF and then disconnect battery negative cable.**

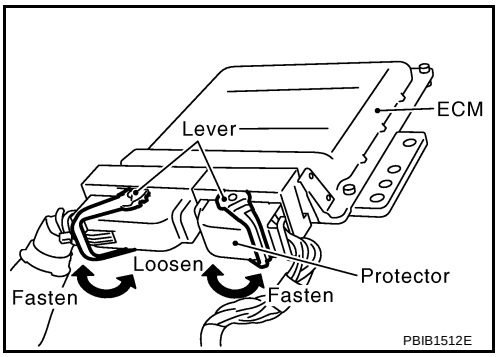


SEF289H

- **Do not disassemble ECM.**

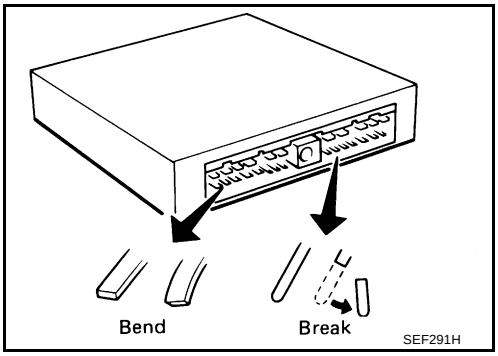

MBIB0625E

- **When connecting ECM harness connector, fasten it securely with levers as far as they will go as shown in the figure.**



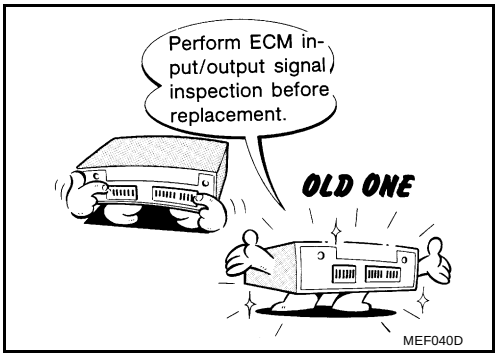
PBIB1512E

- **When connecting or disconnecting pin connectors into or from ECM, take care not to damage pin terminals (bend or break).**
  Make sure that there are not any bends or breaks on ECM pin terminal, when connecting pin connectors.
- **Securely connect ECM harness connectors.**
  A poor connection can cause an extremely high (surge) voltage to develop in coil and condenser, thus resulting in damage to IC's.
- **Keep engine control system harness at least 10cm (4 in) away from adjacent harness, to prevent engine control system malfunctions due to receiving external noise, degraded operation of IC's, etc.**
- **Keep engine control system parts and harness dry.**



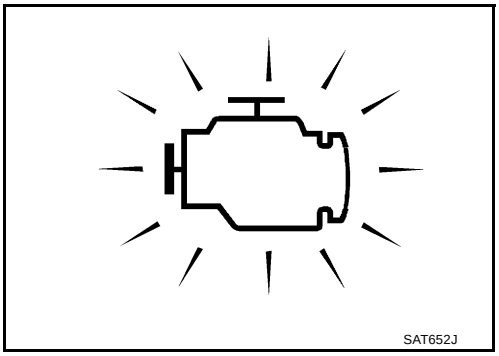
SEF291H

- **Before replacing ECM, perform ECM Terminals and Reference Value inspection and make sure ECM functions properly. Refer to EC-1502, "ECM Terminals And Reference Value" .**
- **Handle mass air flow sensor carefully to avoid damage.**
- **Do not disassemble mass air flow sensor.**
- **Do not clean mass air flow sensor with any type of detergent.**
- **Even a slight leak in the air intake system can cause serious incidents.**
- **Do not shock or jar the camshaft position sensor, crankshaft position sensor.**

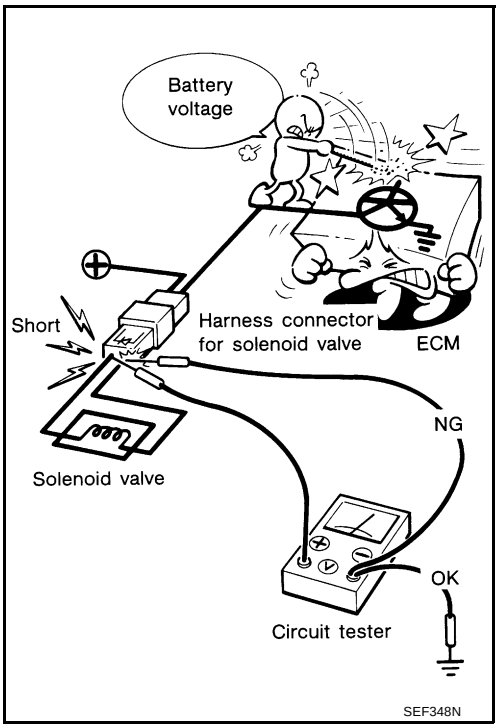


MEF040D

- **After performing each TROUBLE DIAGNOSIS, perform DTC Confirmation Procedure or Overall Function Check.**
  The DTC should not be displayed in the DTC Confirmation Procedure if the repair is completed. The Overall Function Check should be a good result if the repair is completed.

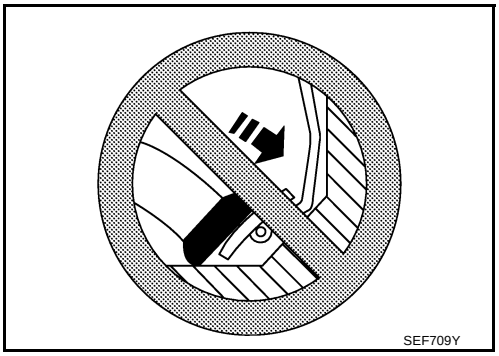

SAT652J

- **When measuring ECM signals with a circuit tester, never allow the two tester probes to contact.**
  Accidental contact of probes will cause a short circuit and damage the ECM power transistor.
- **Do not use ECM ground terminals when measuring input/ output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.**
- **Do not disassemble fuel pump.**
  If NG, take proper action.
- **Do not disassemble fuel injector.**
  If NG, replace fuel injector.

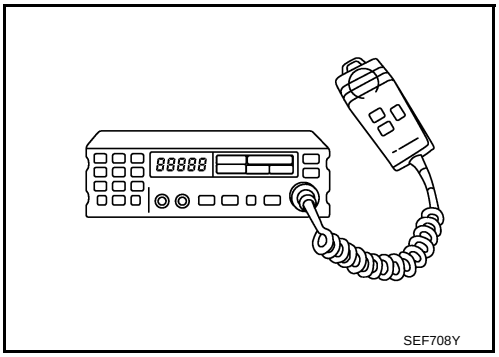


SEF348N

- **Do not depress accelerator pedal when staring.**
- **Immediately after staring, do not rev up engine unnecessarily.**
- **Do not rev up engine just prior to shutdown.**


SEF709Y

- **When installing C.B. ham radio or a mobile phone, be sure to observe the following as it may adversely affect electronic control systems depending on installation location.**
  - **Keep the antenna as far as possible from the electronic control units.**
  - **Keep the antenna feeder line more than 20 cm (8 in) away from the harness of electronic controls.**
    Do not let them run parallel for a long distance.
  - **Adjust the antenna and feeder line so that the standingwave radio can be kept smaller.**
  - **Be sure to ground the radio to vehicle body.**



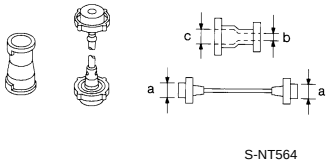
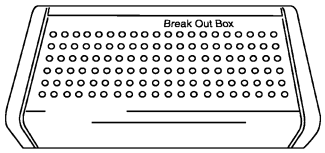
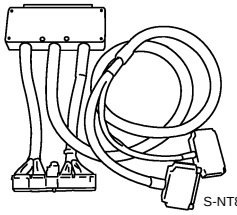
SEF708Y

PREPARATION

PFP:00002

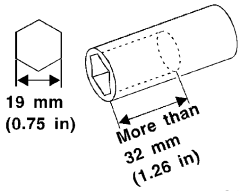
Special Service Tools

BBS00271

Tool number Tool name	Description
EG17650301 Radiator cap tester adapter  S-NT564	Adapting radiator cap tester to radiator cap and radiator filler neck **a: 28 (1.10) dia.** **b: 31.4 (1.236) dia.** **c: 41.3 (1.626) dia.** Unit: mm (in)
KV109E0010 Break-out box  S-NT825	Measuring the ECM signals with a circuit tester
KV109E0080 Y-cable adapter  S-NT826	Measuring the ECM signals with a circuit tester

Commercial Service Tools

BBS00272

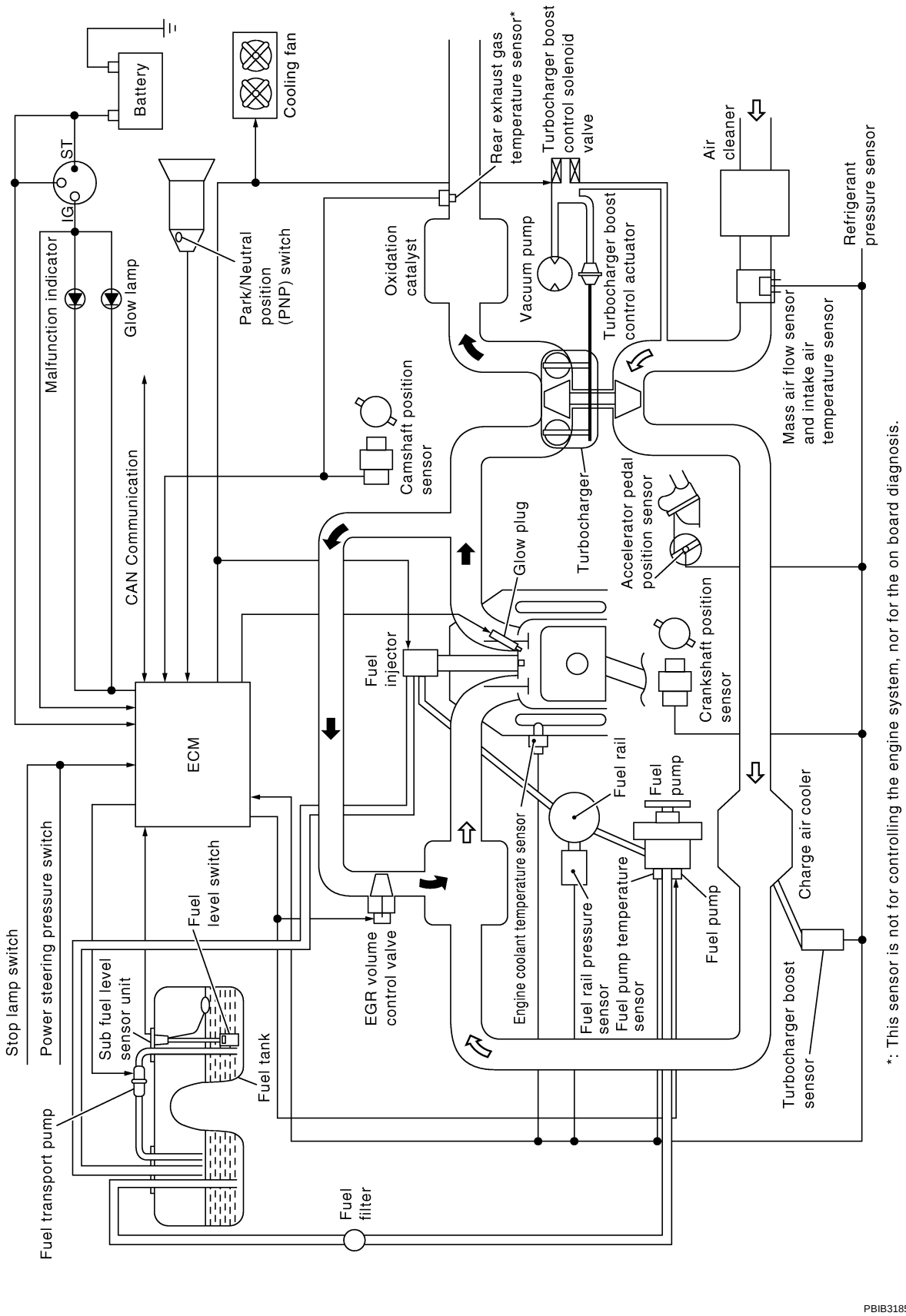
Tool name	Description
Socket wrench  S-NT705	Removing and installing engine coolant temperature sensor

ENGINE CONTROL SYSTEM

PFP:23710

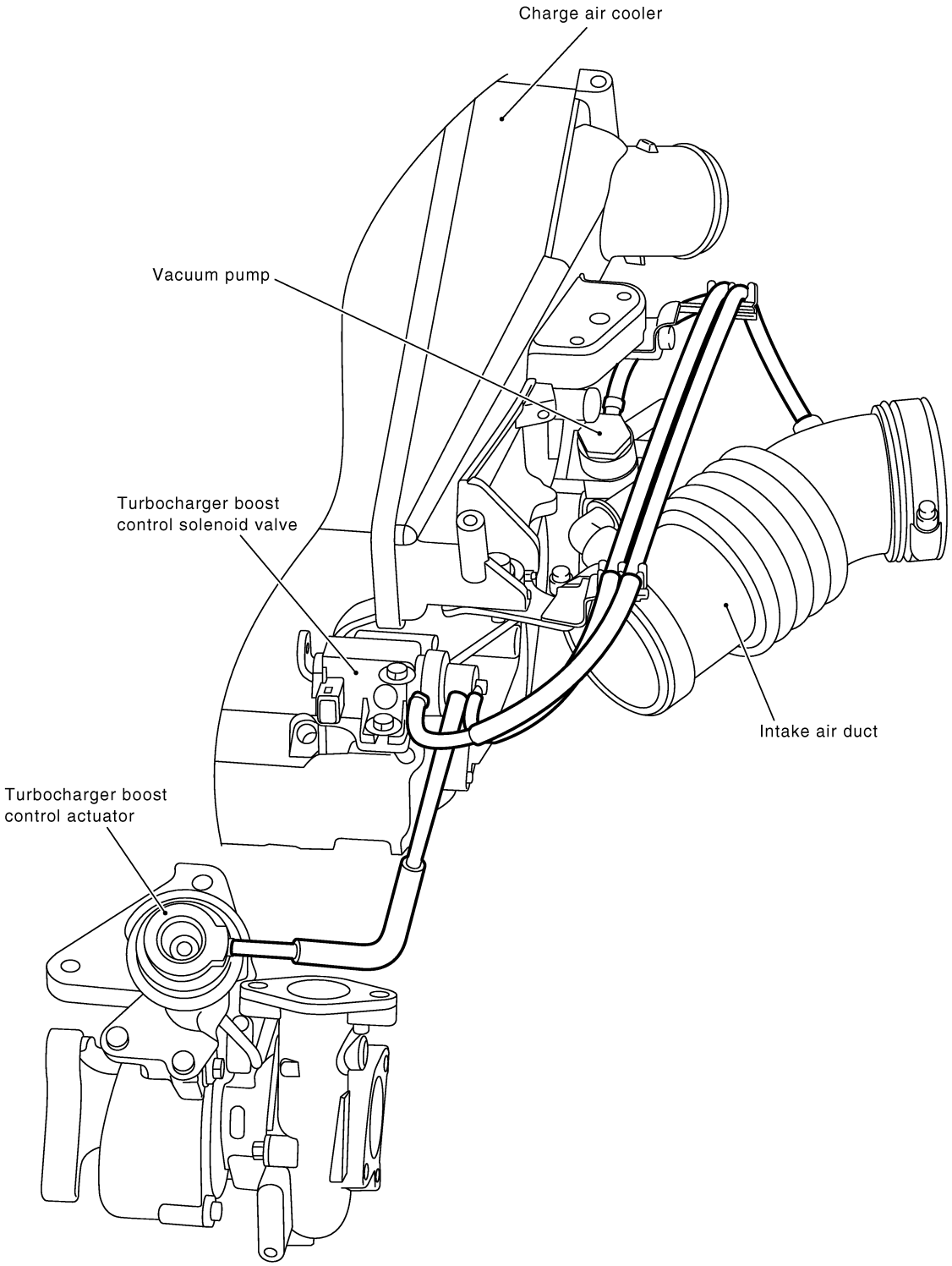
System Diagram

BBS00273



Vacuum Hose Drawing

BBS00274



NOTE: Do not use soapy water or any type of solvent while installing vacuum horses.

PBIB2019E

Refer to EC-1466, "System Diagram" for Vacuum Control System.

System Chart

BBS00275

Input (Sensor)	ECM Function	Output (Actuator)
● Accelerator pedal position sensor ● Fuel rail pressure sensor ● Fuel pump temperature sensor ● Engine coolant temperature sensor ● Mass air flow sensor ● Intake air temperature sensor ● Crankshaft position sensor ● Camshaft position sensor ● Turbocharger boost sensor ● Vehicle speed sensor*1 ● ESP/TCS/ABS control unit*1 ● Ignition switch ● Stop lamp switch ● Air conditioner switch*1 ● Park/neutral position switch ● Battery voltage ● Fuel level switch ● Refrigerant pressure sensor ● Power steering pressure switch	Fuel injection control	Fuel injector and Fuel pump
	Fuel injection timing control	Fuel injector and Fuel pump
	Fuel cut control	Fuel injector and Fuel pump
	ASCD vehicle speed control	Fuel injector and Fuel pump
	Glow control system	Glow relay and glow indicator lamp*2
	On board diagnostic system	Malfunction indicator (MI)*2
	EGR volume control	EGR volume control valve
	Cooling fan control	Cooling fan relay
	Turbocharger boost control	Turbocharger boost control solenoid valve
	Fuel transport pump control	Fuel transport pump relay
	Air conditioning cut control	Air conditioner relay

*1: The input signal is sent to the ECM through CAN communication line.
*2: The output signal is sent from the ECM through CAN communication line.

Fuel Injection Control System

BBS00276

SYSTEM DESCRIPTION

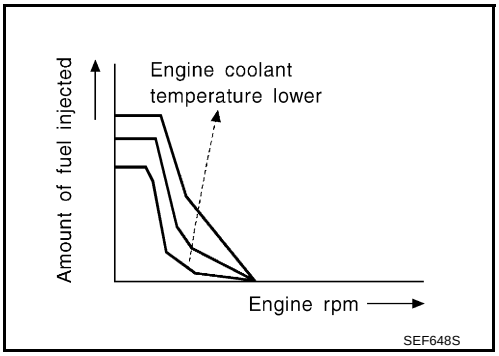
Three types of fuel injection control are provided to accommodate engine operating conditions; normal control, idle control and start control. The ECM determines the appropriate fuel injection control. Under each control, the amount of fuel injected is adjusted to improve engine performance.
Pulse signals are sent to fuel injectors according to the input signals to adjust the amount of fuel injected to preset value.

START CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Fuel injection control (start control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		
Camshaft position sensor	Piston position		
Ignition switch	Start signal		
Fuel rail pressure sensor	Fuel rail pressure		

When the ECM receives a start signal from the ignition switch, the ECM adapts the fuel injection system for the start control. The amount of fuel injected at engine starting is a preset program value in the ECM. The program is determined by the engine speed, engine coolant temperature and fuel rail pressure.
For better startability under cool engine conditions, the lower the coolant temperature becomes, the greater the amount of fuel injected. The ECM ends the start control when the engine speed reaches the specific value, and shifts the control to the normal or idle control.



IDLE CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Engine coolant temperature sensor	Engine coolant temperature	Fuel injection control (Idle control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		
Battery	Battery voltage		
Accelerator pedal position sensor	Accelerator pedal position		
Fuel rail pressure sensor	Fuel rail pressure		
Vehicle speed sensor	Vehicle speed*		
Air conditioner switch	Air conditioner signal*		

*: The input signal is sent to the ECM through CAN communication line.

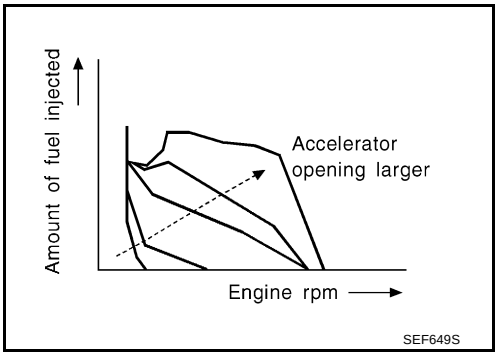
When the ECM determines that the engine speed is at idle, the fuel injection system is adapted for the idle control. The ECM regulates the amount of fuel injected corresponding to changes in load applied to the engine to keep engine speed constant. The ECM also provides the system with a fast idle control in response to the engine coolant temperature signal.

NORMAL CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	Fuel injection control (Normal control)	Fuel injector Fuel pump
Accelerator pedal position sensor	Accelerator position		
Fuel rail pressure sensor	Fuel rail pressure		

The amount of fuel injected under normal driving conditions is determined according to sensor signals. The crankshaft position sensor detects engine speed, the accelerator pedal position sensor detects accelerator pedal position and fuel rail pressure sensor detects fuel rail pressure. These sensors send signals to the ECM.
The fuel injection data, predetermined by correlation between various engine speeds, accelerator pedal positions and fuel rail pressure are stored in the ECM memory, forming a map. The ECM determines the optimal amount of fuel to be injected using the sensor signals in comparison with the map.



MAXIMUM AMOUNT CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Mass air flow sensor	Amount of intake air	Fuel injection control (Maximum amount control)	Fuel Injector
Engine coolant temperature sensor	Engine coolant temperature		
Crankshaft position sensor	Engine speed		
Accelerator pedal position sensor	Accelerator pedal position		

The maximum injection amount is controlled to an optimum by the engine speed, intake air amount, engine coolant temperature, and accelerator opening in accordance with the driving conditions.
This prevents the oversupply of the injection amount caused by decreased air density at a high altitude or during a system failure.

DECELERATION CONTROL

Input/Output Signal Chart

Sensor	Input Signal to ECM	ECM Function	Actuator
Accelerator pedal position sensor	Accelerator pedal position	Fuel injection control (Deceleration control)	Fuel injector Fuel pump
Crankshaft position sensor	Engine speed		

The ECM sends a fuel cut signal to the fuel injectors and fuel pump during deceleration for better fuel efficiency. The ECM determines the time of deceleration according to signals from the accelerator pedal position sensor and crankshaft position sensor.

Fuel Injection Timing Control System

BBS00277

DESCRIPTION

The target fuel injection timing in accordance with the engine speed and the fuel injection amount are recorded as a map in the ECM beforehand. The ECM determines the optimum injection timing using sensor signals accordance with the map.

Air Conditioning Cut Control

BBS00278

INPUT / OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Air conditioner switch	Air conditioner ON signal*	Air conditioner cut control	Air conditioner relay
Accelerator pedal position sensor	Accelerator pedal opening angle		
Vehicle speed sensor	Vehicle speed*		
Engine coolant temperature sensor	Engine coolant temperature		
Refrigerant pressure sensor	Refrigerant pressure		

*: The input signal is sent to the ECM through CAN communication line.

SYSTEM DESCRIPTION

This system improves acceleration when the air conditioner is used.
When the accelerator pedal is fully depressed, the air conditioner is turned off for a few seconds.
When engine coolant temperature becomes excessively high, the air conditioner is turned off. This continues until the engine coolant temperature returns to normal.

Fuel Cut Control (At No Load & High Engine Speed)

BBS00279

INPUT/OUTPUT SIGNAL CHART

Sensor	Input Signal to ECM	ECM Function	Actuator
Vehicle speed sensor	Vehicle speed*	Fuel cut control	Fuel injector
Accelerator pedal position sensor	Accelerator pedal position		
Crankshaft position sensor	Engine speed		

*: The input signal is sent to the ECM through CAN communication line.

If the engine speed is above 2,800 rpm under no load (for example, the shift position is neutral and engine speed is over 2,800 rpm) fuel will be cut off after some time. The exact time when the fuel is cut off varies based on engine speed. Fuel cut will be operated until the engine speed reaches 1,500 rpm, then fuel cut will be cancelled.

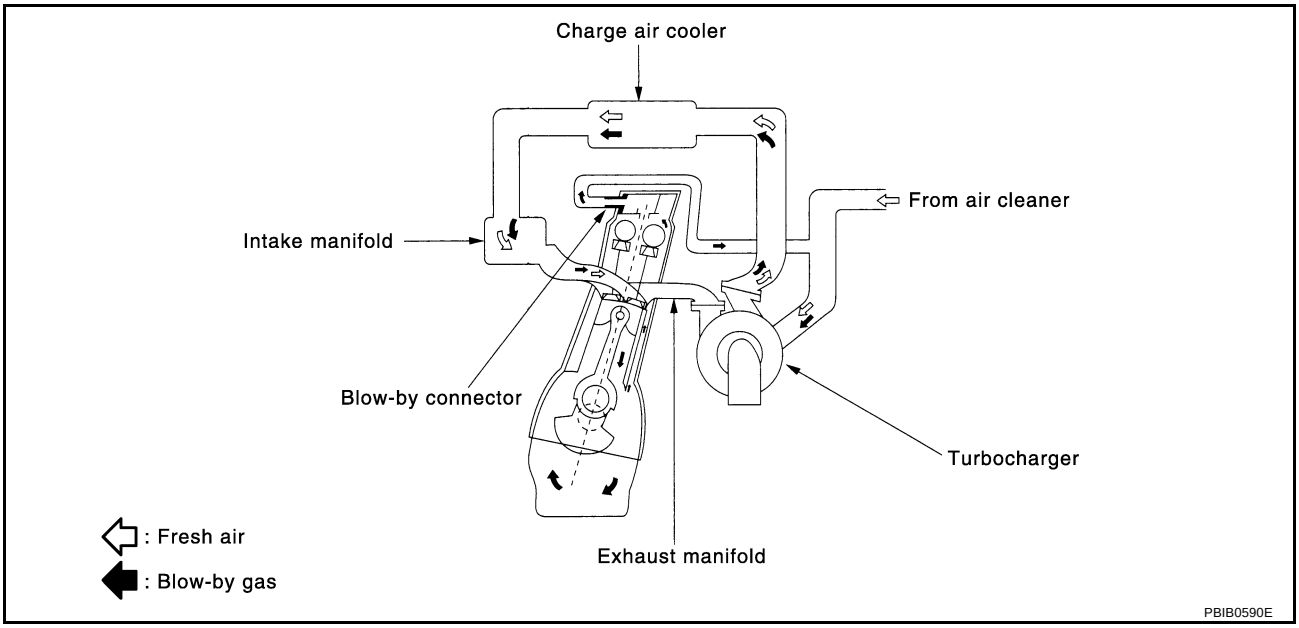
NOTE:
This function is different from deceleration control listed under EC-1468, "Fuel Injection Control System" .

Crankcase Ventilation System

BBS0027A

DESCRIPTION

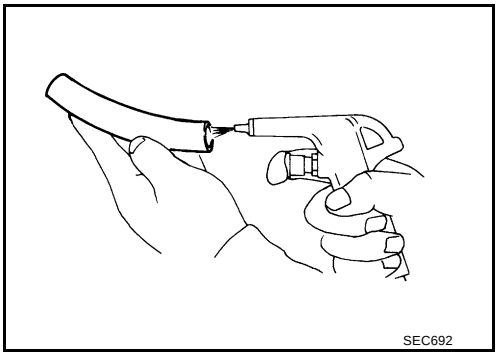
In this system, blow-by gas is sucked into the air duct after oil separation by oil separator in the rocker cover.



INSPECTION

Ventilation Hose

1. Check hoses and hose connections for leaks.
2. Disconnect all hoses and clean with compressed air. If any hose cannot be freed of obstructions, replace.



CAN Communication

BBS0027B

SYSTEM DESCRIPTION

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.
Refer to LAN-25, "CAN Communication Unit" , about CAN communication for detail.

BASIC SERVICE PROCEDURE

PFP:00018

Fuel Filter

BBS0027C

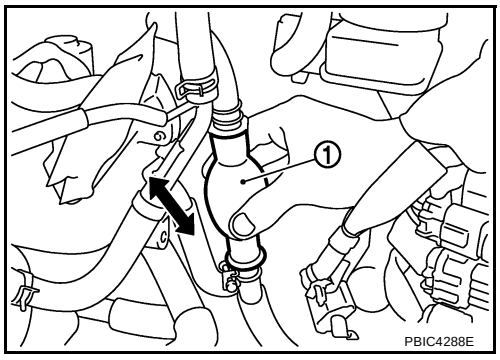
DESCRIPTION

A water draining cock is on the lower side and a priming pump for bleeding air is on the upper side.

AIR BLEEDING

After fuel filter is replaced and after fuel system components are removed/installed, bleed air from fuel line as follows:

1. Prime the circuit using the priming pump (1).
2. Perform engine cranking with repeating several times until engine starting.



CAUTION:

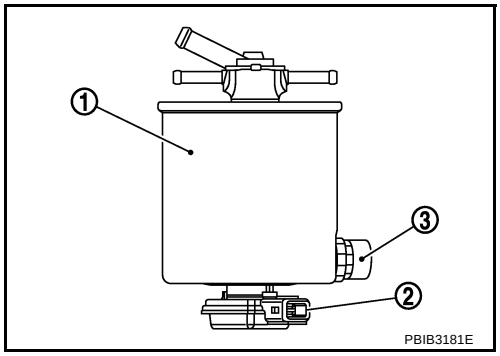
- **Crank engine until it starts. Do not crank engine for more than 30 seconds.**
- **Prepare a tray to collect fuel. Prevent fuel from adhering to rubber parts, especially the engine mounting insulator.**

WATER DRAINING

1. Prepare a tray at the drain plug open end.
2. Loosen drain plug (3), and operate priming pump to drain water from fuel filter (1).
   - Fuel filter sensor (2)

   CAUTION:
   - **Water in filter is drained with fuel. Prepare larger capacity pan than fuel filter volume.**
   - **Drained water is mixed with fuel. Prevent fuel from adhering to rubber parts such as engine mounting insulator.**
3. After draining, close drain plug by hand.

   CAUTION:
   If drain plug is tightened excessively, it may be damaged and fuel will leak. Do not use tools to tighten drain cock.
4. Bleed air in fuel piping. Refer to EC-1472, "AIR BLEEDING" .
5. Start engine and make sure there is no fuel leakage.



Fuel Pump Learning Value Clearing

BBS0027D

DESCRIPTION

In order to always keep optimum fuel pressure in fuel rail, the ECM controls fuel pump in high precision with monitoring the signal of fuel rail pressure sensor.
Accordingly, the ECM always learns characteristic value of fuel pump. Fuel Pump Learning Value Clearing is an operation to clear the value of the fuel pump learning.
Fuel Pump Learning Value Clearing should be performed under the following conditions.

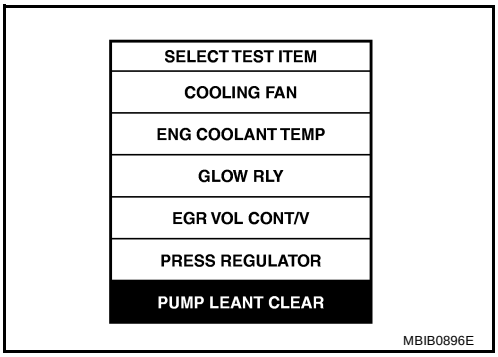
- Fuel pump is changed.
- ECM is replaced with used one which stores the fuel pump learning value of other fuel pump.

OPERATION PROCEDURE

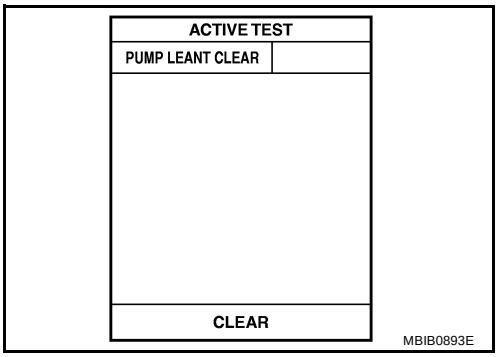
NOTE:
When removing fuel pump, perform Fuel Pump Learning Value Clearing before starting engine.

With CONSULT-II

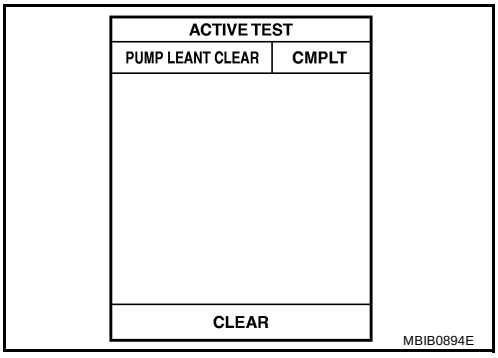
1. Turn ignition switch ON.
2. Select “PUMP LEARNT CLEAR” in “ACTIVE TEST” mode with CONSULT-II.



3. Touch “CLEAR” and wait a few seconds.



4. Make sure that “CMPLT” is displayed on CONSULT-II screen.



Without CONSULT-II

Fuel pump learning value can be erased from the back up memory in the ECM by the same operation as erasing DTC.In detail, refer to EC-1476, "Without CONSULT-II" .

Injector Adjustment Value Registration

BBS002IC

DESCRIPTION

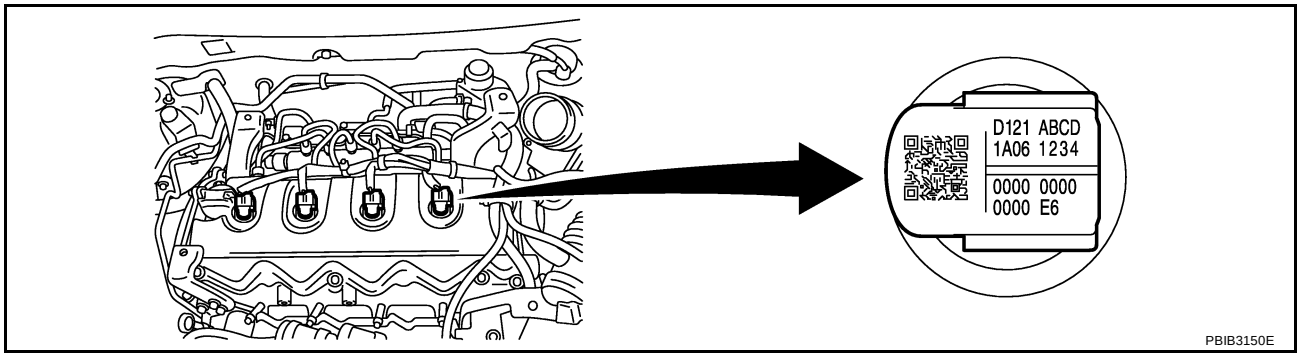
Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector.The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control. A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the injector which is installed on the vehicle

Injector Adjustment Value Registration must be performed after the following cases.

- Injector(s) are replaced.
- ECM is replaced.

For the first case, Injector Adjustment Value Registration for the replaced fuel injector must be performed. And for the second case, Injector Adjustment Value Registration for all the fuel injectors must be performed.



Example: Injector adjustment value = D121ABCD1A06123400000000000E6

OPERATION PROCEDURE

NOTE:

- **Before performing this procedure, record injector adjustment value printed on a fuel injector.**
- **When all fuel injectors are replaced or ECM is replaced, it is recommended to perform “INJ ADJ VAL CLR” in “WORK SUPPORT” mode before performing this procedure. By performing “INJ ADJ VAL CLR” in “WORK SUPPORT” mode, injector adjustment value stored in ECM is initialized.**

1. Turn ignition switch ON (engine stopped).
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.
3. Touch “START”.

   NOTE:
   When touching “START”, CONSULT-II reads injector adjustment values stored in ECM.
4. Select the number of the cylinder which needs Injector Adjustment Value Registration.
5. Input injector adjustment value, and touch “ENTER”.

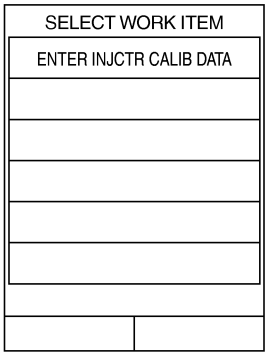
   NOTE:
   Input injector adjustment value is stored in CONSULT-II.
6. Repeat step 4 - 5 till there is no cylinder which needs Injector Adjustment Value Registration, and touch “START”.

   NOTE:
   When touching “START”, injector adjustment values stored in CONSULT-II are written onto ECM memory.
7. After “CMND FINISHED” is displayed, make sure that the following values are same for each cylinder.
   - Injector adjustment value which is printed on a fuel injector.
   - Injector adjustment value which is displayed on CONSULT-II screen.

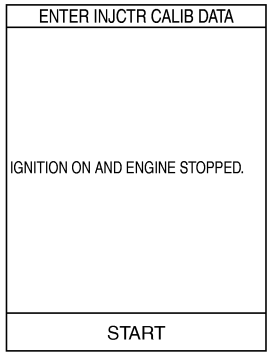
   NOTE:
   - In this step, CONSULT-II reads injector adjustment values stored in ECM and displays the values on the CONSULT-II screen. This is for checking if injector adjustment values are written onto ECM memory correctly.

- If DTC is detected, perform DTC Confirmation Procedure for the DTC, and check if the same DTC is detected again.

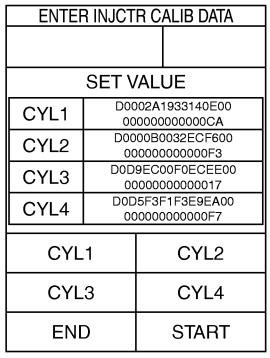
1. Turn ignition switch ON (engine stopped).



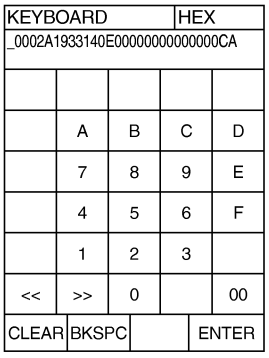
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.



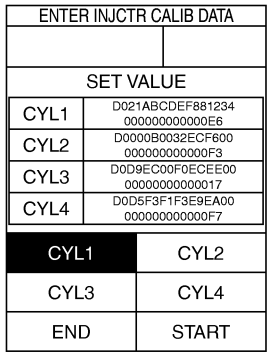
3. Touch “START”.



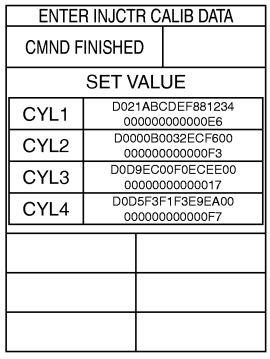
4. Select the number of the cylinder which needs Injector Adjustment Value Registration.



5. Input injector adjustment value, and touch “ENTER”.



6. Repeat step 4 - 5 till there is no cylinder which needs Injector Adjustment Value Registration, and touch “START”.



7. After “CMND FINISHED” is displayed, make sure that the following values are same for each cylinder.
   - Injector adjustment value which is printed on a injector.
   - Injector adjustment value which is displayed on CONSULT-II screen.

MBIB1254E

ON BOARD DIAGNOSTIC (OBD) SYSTEM

PFP:00028

DTC and MI Detection Logic

BBS0027E

When a malfunction is detected, the malfunction (DTC) and freeze frame data are stored in the ECM memory. The MI will light up each time the ECM detects malfunction. For diagnostic items causing the MI to light up, refer to EC-1458, "INDEX FOR DTC" .

Diagnostic Trouble Code (DTC)

BBS0027F

HOW TO READ DTC

The DTC can be read by the following methods.

With CONSULT-II

CONSULT-II displays the DTC in “SELF-DIAG RESULTS” mode. Example: P0117, P0335, P1268, etc. (CONSULT-II also displays the malfunctioning component or system.)

Without CONSULT-II

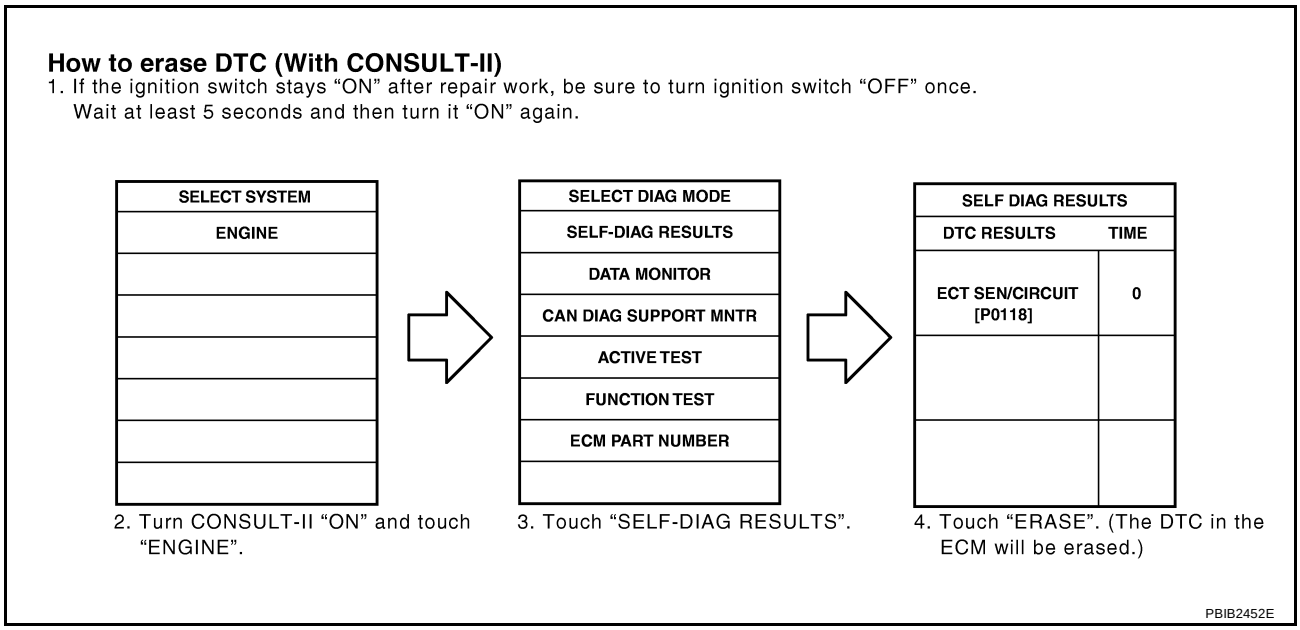
The number of blinks of the MI in the Diagnostic Test Mode II (Self-Diagnostic Results) indicates the DTC. Example: 0117, 0335, 1268, etc.

- **Output of a DTC indicates a malfunction. However, the Diagnostic Test Mode II does not indicate whether the malfunction is still occurring or has occurred in the past and has returned to normal. CONSULT-II can identify malfunction status as shown below. Therefore, using CONSULT-II (if available) is recommended.**

HOW TO ERASE DTC

With CONSULT-II

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once. Wait at least 5 seconds and then turn it ON (engine stopped) again.
2. Touch “ENGINE”.
3. Touch “SELF-DIAG RESULTS”.
4. Touch “ERASE”. (The DTC in the ECM will be erased.)



The emission related diagnostic information in the ECM can be erased by selecting “ERASE” in the “SELF-DIAG RESULTS” mode with CONSULT-II.

Without CONSULT-II

1. If the ignition switch stays ON after repair work, be sure to turn ignition switch OFF once.
2. Wait at least 10 seconds and then turn it ON (engine stopped) again.
3. Change the diagnostic test mode from Mode II to Mode I by depressing the accelerator pedal. Refer to EC-1478, "HOW TO SWITCH DIAGNOSTIC TEST MODE" .

- **If the battery is disconnected, the emission-related diagnostic information will be lost within 24 hours.**
- **The following data are cleared when the ECM memory is erased.**
  - Diagnostic trouble codes
  - Freeze frame data
  - Fuel pump learning value

Actual work procedures are explained using a DTC as an example. Be careful so that not only the DTC, but all of the data listed above, are cleared from the ECM memory during work procedures.

Freeze Frame Data

BBS0027G

The ECM records the driving conditions such as calculated load value, engine coolant temperature, engine speed, vehicle speed and intake manifold pressure at the moment a malfunction is detected.
The data, stored together with the DTC data, are called freeze frame data and displayed on CONSULT-II. For details, see EC-1512 .
Only one set of freeze frame data can be stored in the ECM. If freeze frame data is stored in the ECM memory and another freeze frame data occurs later, the first (original) freeze frame data remains unchanged in the ECM memory.
Freeze frame data (along with the DTCs) are cleared when the ECM memory is erased. Procedures for clearing the ECM memory are described in EC-1476, "HOW TO ERASE DTC" .

NATS (Nissan Anti-Theft System)

BBS0027H

- **If the security indicator lights up with the ignition switch in the ON position or “NATS MALFUNCTION” is displayed on “SELF-DIAG RESULTS” screen, perform self-diagnostic results mode with CONSULT-II using NATS program card. Refer to BL-107, "NATS (NISSAN ANTI-THEFT SYSTEM)" .**
- **Confirm no self-diagnostic results of NATS is displayed before touching “ERASE” in “SELF-DAIG RESULTS” mode with CONSULT-II.**
- **When replacing ECM, initialization of NATS system and registration of all NATS ignition key IDs must be carried out with CONSULT-II using NATS program card.**
  Therefore, be sure to receive all keys from vehicle owner.
  Regarding the procedure of NATS initialization and all NATS ignition key ID registration, refer to CONSULT-II operation manual, NATS.

SELF DIAG RESULTS	
DTC RESULTS	TIME
NATS MALFUNCTION [P1610]	0

SEF543X

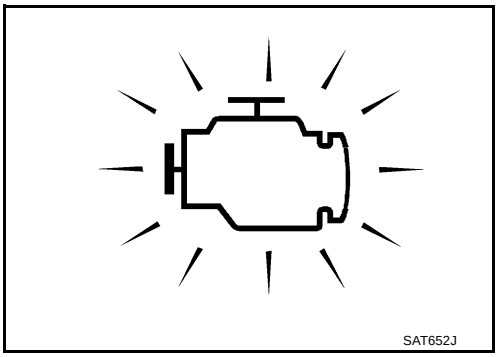
Malfunction Indicator (MI)

BBS0027I

DESCRIPTION

The MI is located on the instrument panel.

1. The MI will light up when the ignition switch is turned ON without the engine running. This is a bulb check.
   - If the MI does not light up, refer to EC-1817, "MI & DATA LINK CONNECTORS" .
2. When the engine is started, the MI should go off.
   If the MI remains on, the on board diagnostic system has detected an engine system malfunction.



SAT652J

ON BOARD DIAGNOSTIC SYSTEM FUNCTION

The on board diagnostic system has the following three functions.

Diagnostic Test Mode	KEY and ENG. Status	Function	Explanation of Function
Mode I	Ignition switch in ON position Engine stopped	BULB CHECK	This function checks the MI bulb for damage (blown, open circuit, etc.). If the MI does not come on, check MI circuit. (See EC-1817, "MI & DATA LINK CONNECTORS" .)
	Engine running	MALFUNCTION WARNING	This is a usual driving condition. When ECM detects a malfunction, the MI will light up to inform the driver that a malfunction has been detected.
Mode II	Ignition switch in ON position Engine stopped	SELF-DIAGNOSTIC RESULTS	This function allows DTCs to be read.

HOW TO SWITCH DIAGNOSTIC TEST MODE

NOTE:

- **It is better to count the time accurately with a clock.**
- **It is impossible to switch the diagnostic mode when an accelerator pedal position sensor circuit has a malfunction.**
- **Always ECM returns to Diagnostic Test Mode I after ignition switch is turned OFF.**

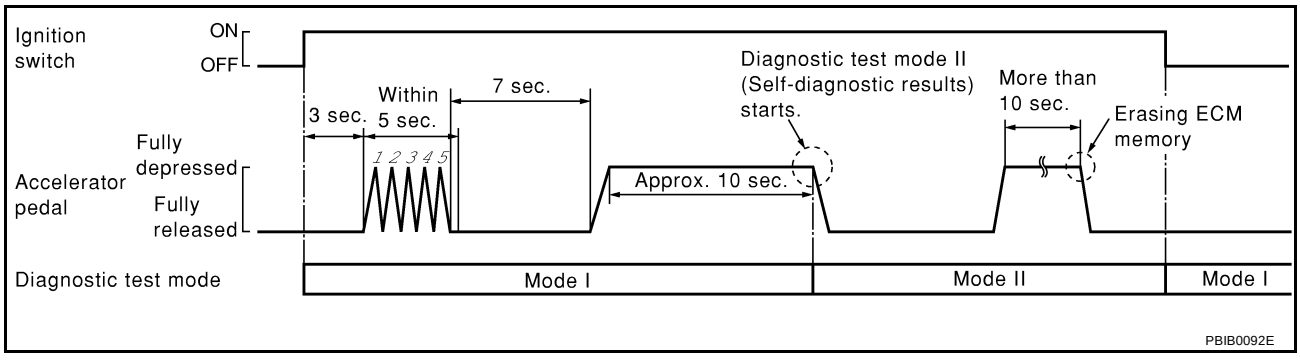
How to Set Diagnostic Test Mode II (Self-diagnostic Results)

1. Confirm that accelerator pedal is fully released, turn ignition switch ON and wait 3 seconds.
2. Repeat the following procedure quickly five times within 5 seconds.

a. Fully depress the accelerator pedal.

b. Fully release the accelerator pedal.

3. Wait 7 seconds, fully depress the accelerator pedal and keep it for approx. 10 seconds until the MI starts blinking.
4. Fully release the accelerator pedal.
   ECM has entered to Diagnostic Test Mode II (Self-diagnostic results).



How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

1. Set ECM in Diagnostic Test Mode II (Self-diagnostic results). Refer to EC-1478, "How to Set Diagnostic Test Mode II (Self-diagnostic Results)" .
2. Fully depress the accelerator pedal and keep it for more than 10 seconds.
   The emission-related diagnostic information has been erased from the backup memory in the ECM.
3. Fully release the accelerator pedal, and confirm the DTC 0000 is displayed.

DIAGNOSTIC TEST MODE I — BULB CHECK

In this mode, the MI on the instrument panel should stay ON. If it remains OFF, check the bulb. Refer to EC-1817, "MI & DATA LINK CONNECTORS" .

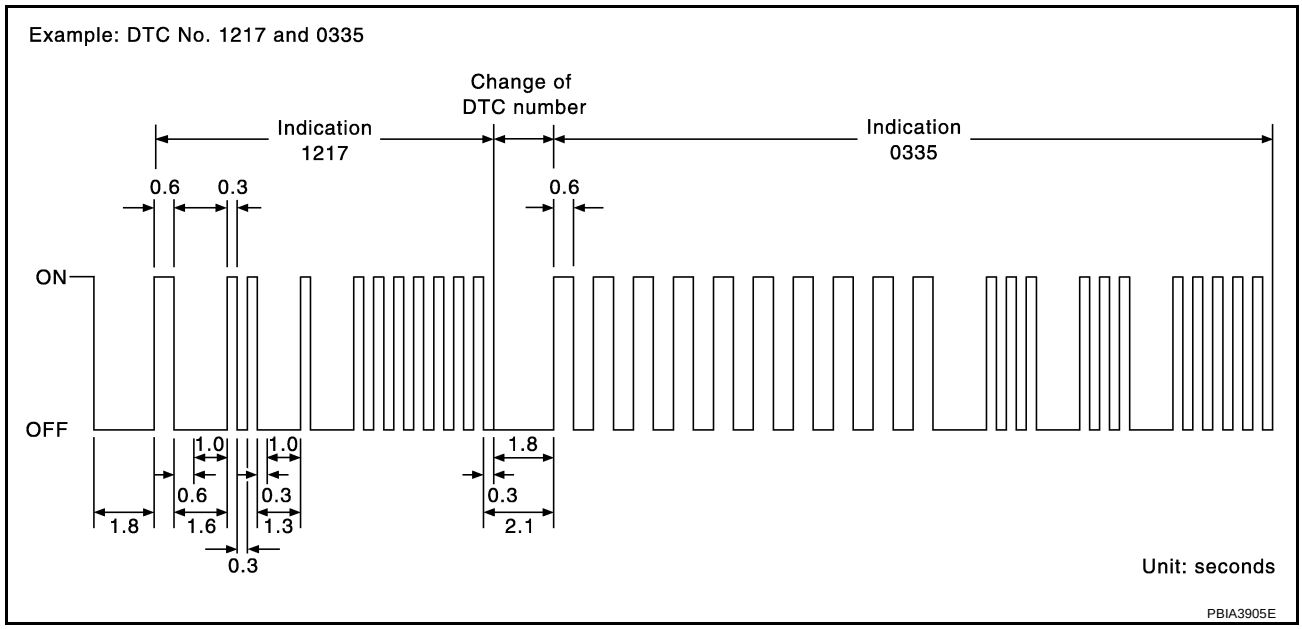
DIAGNOSTIC TEST MODE I — MALFUNCTION WARNING

MI	Condition
ON	When the malfunction is detected.
OFF	No malfunction.

These DTC numbers are clarified in Diagnostic Test Mode II (SELF-DIAGNOSTIC RESULTS)

DIAGNOSTIC TEST MODE II — SELF-DIAGNOSTIC RESULTS

In this mode, the DTC is indicated by the number of blinks of the MI as shown below. A DTC will be used as an example for how to read a code.



A particular trouble code can be identified by the number of four-digit numeral flashes. The “zero” is indicated by the number of ten flashes. The length of time the 1,000th-digit numeral flashes on and off is 1.2 seconds consisting of an ON (0.6-second) - OFF (0.6-second) cycle.
The 100th-digit numeral and lower digit numerals consist of a 0.3-second ON and 0.3-second OFF cycle.
A change from one digit numeral to another occurs at an interval of 1.0-second OFF. In other words, the later numeral appears on the display 1.3 seconds after the former numeral has disappeared.
A change from one trouble code to another occurs at an interval of 1.8-second OFF.
In this way, all the detected malfunctions are classified by their DTC numbers. The DTC 0000 refers to no malfunction. (See EC-1458, "INDEX FOR DTC")

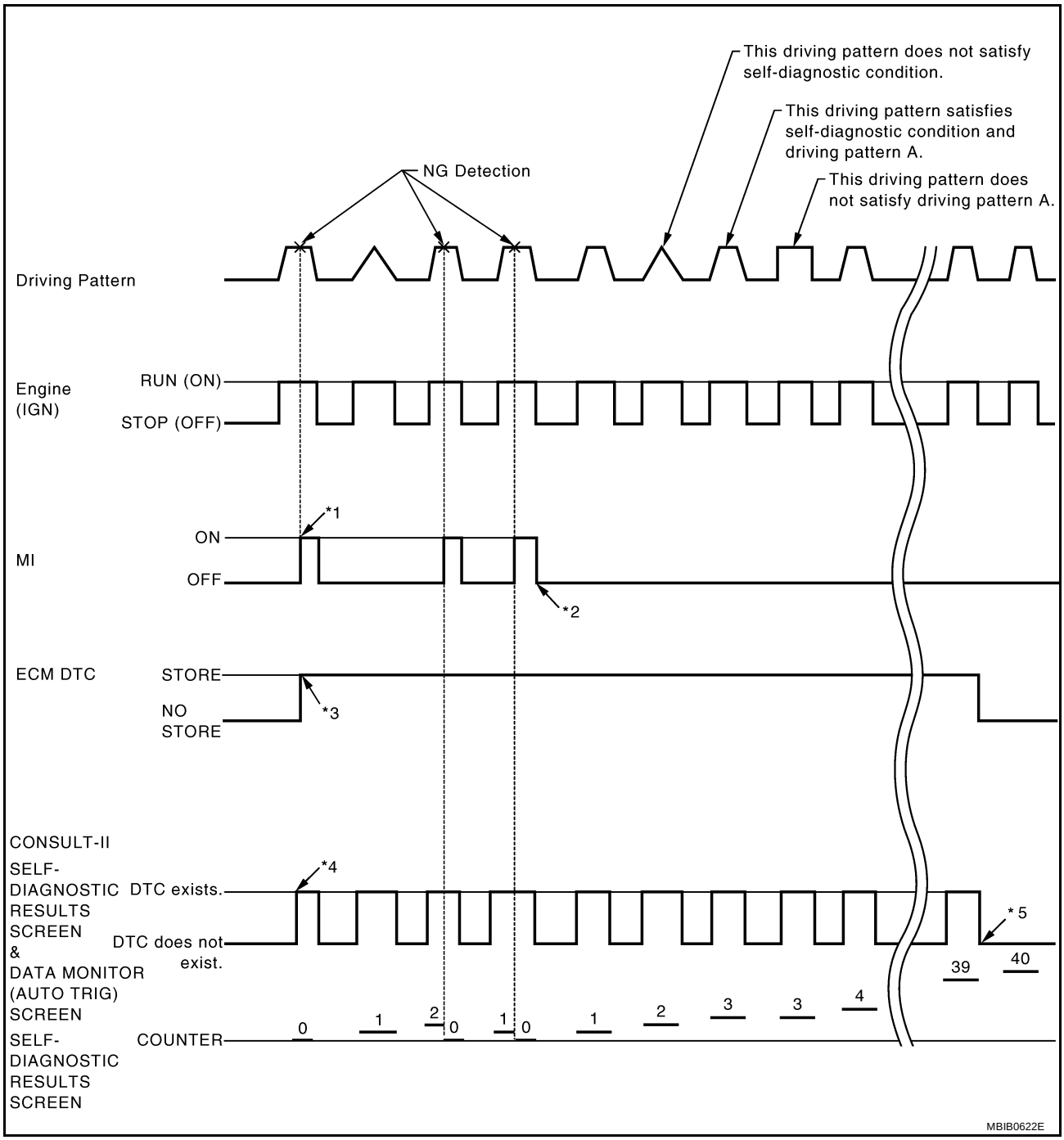
How to Erase Diagnostic Test Mode II (Self-diagnostic Results)

The DTC can be erased from the back up memory in the ECM by depressing accelerator pedal. Refer to EC-1479, "How to Erase Diagnostic Test Mode II (Self-diagnostic Results)" .

- **If the battery is disconnected, the DTC will be lost from the backup memory within 24 hours.**
- **Be careful not to erase the stored memory before starting trouble diagnoses.**

Relationship Between MI, DTC, CONSULT-II and Driving Patterns

BBS0027J



*1: When a malfunction is detected, MI will light up.

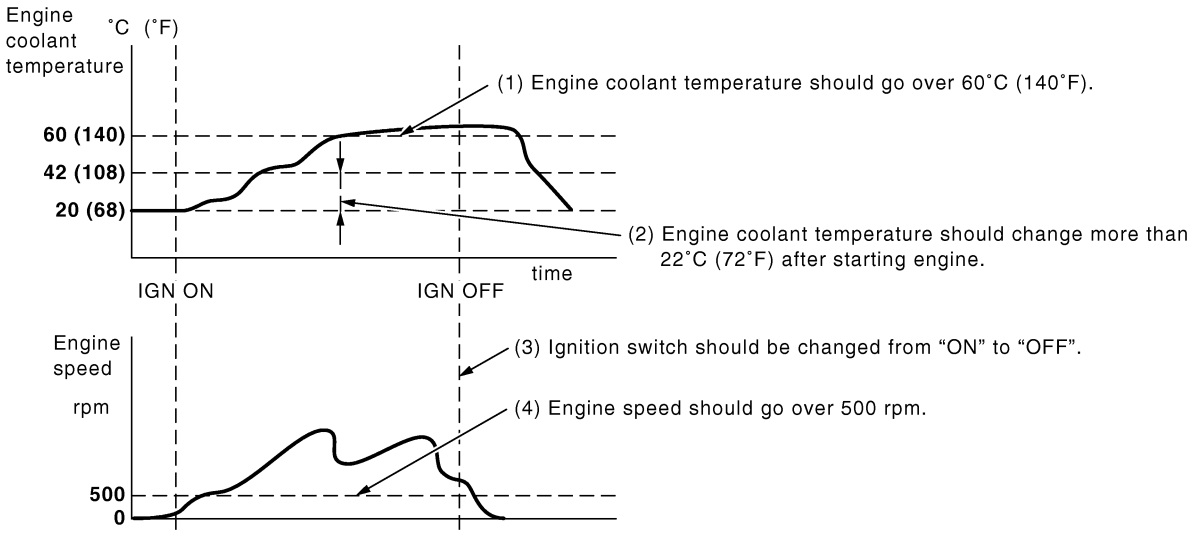
*2: MI will not light up after ignition switch is turned OFF.

*3: When a malfunction is detected for the first time, the DTC will be stored in ECM.

*4: Other screens except SELF-DIAGNOSTIC RESULTS & DATA MONITOR (AUTO TRIG) cannot display the malfunction. DATA MONITOR (AUTO TRIG) can display the malfunction at the moment it is detected.

*5: The DTC will not be displayed any longer after vehicle is driven 40 times (Driving pattern A) without the same malfunction. (The DTC still remain in ECM.)

DRIVING PATTERN A



- The counter will be cleared when the malfunction is detected regardless of (1) - (4).
- The counter will be counted up when (1) - (4) are satisfied without the same malfunction.
- The DTC will not be displayed after the counter reaches 40.

TROUBLE DIAGNOSIS

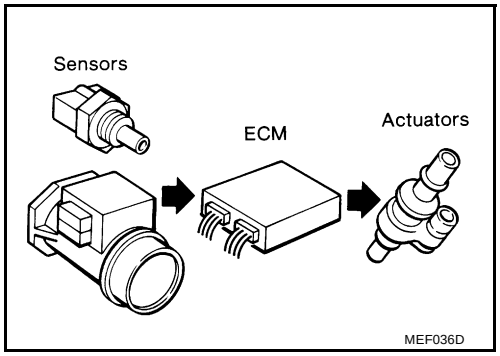
PFP:00004

Trouble Diagnosis Introduction

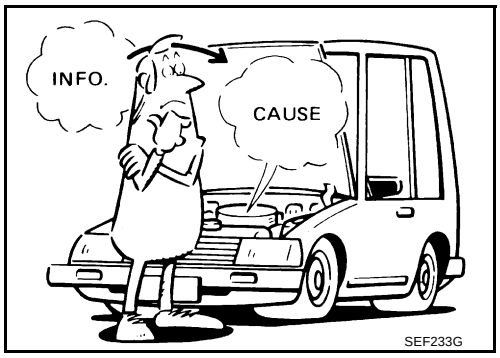
BBS0027K

INTRODUCTION

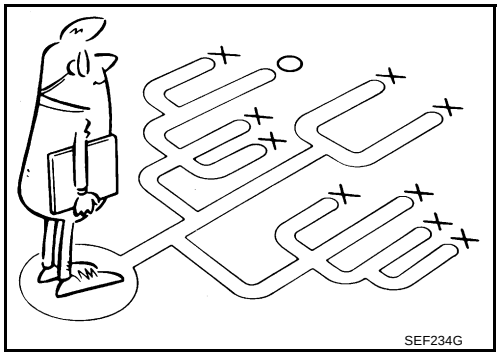
The engine has an ECM to control major systems such as fuel injection control, fuel injection timing control, glow control system, etc. The ECM accepts input signals from sensors and instantly actuators. It is essential that both input and output signals are proper and stable. At the same time, it is important that there are no malfunctions such as vacuum leaks, or other malfunctions with the engine.



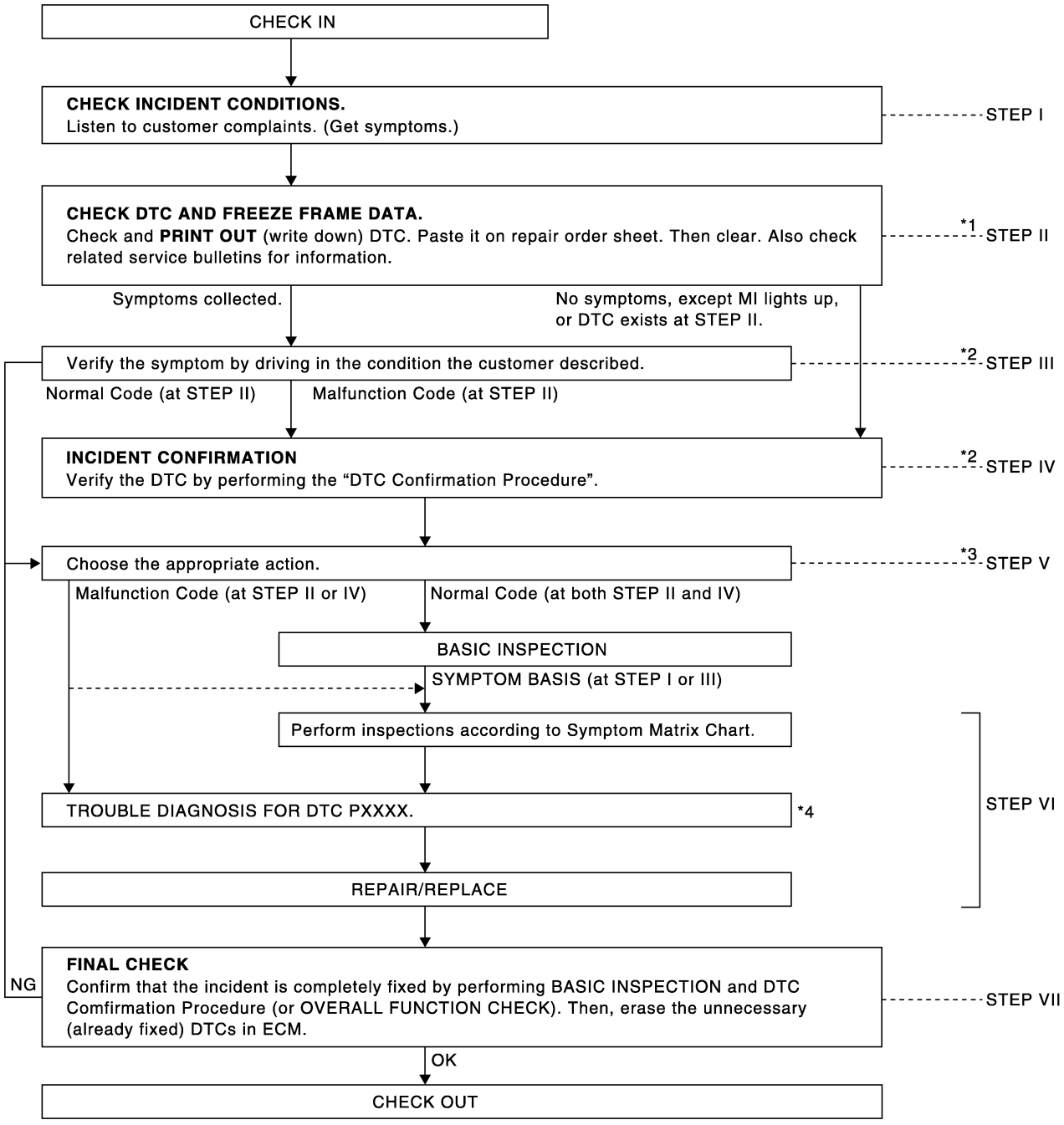
It is much more difficult to diagnose a malfunction that occurs intermittently rather than continuously. Most intermittent malfunctions are caused by poor electric connections or improper wiring. In this case, careful checking of suspected circuits may help prevent the replacement of good parts.



A visual check only may not find the cause of the incidents. A road test with CONSULT-II or a circuit tester connected should be performed. Follow the EC-1483, "WORK FLOW" .
Before undertaking actual checks, take a few minutes to talk with a customer who approaches with a driveability complaint. The customer can supply good information about such incidents, especially intermittent ones. Find out what symptoms are present and under what conditions they occur. A Diagnostic Worksheet like the example on next page should be used.
Start your diagnosis by looking for conventional incidents first. This will help troubleshoot driveability incidents on an electronically controlled engine vehicle.



WORK FLOW



PBIB0477E

*1 If time data of "SELF-DIAG RESULTS" is other than "0", perform EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*2 If the incident cannot be verified, perform EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

*3 If the on board diagnostic system cannot be performed, check main power supply and ground circuit. Refer to EC-1521, "POWER SUPPLY AND GROUND CIRCUIT" .

*4 If malfunctioning part cannot be detected, perform EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

Description for Work Flow

STEP	DESCRIPTION
STEP I	Get detailed information about the conditions and the environment when the incident/symptom occurred using the EC-1484, "DIAGNOSTIC WORK SHEET" .
STEP II	Before confirming the concern, check and write down (print out using CONSULT-II) the DTC and the freeze frame data, then erase the DTC. The DTC and the freeze frame data can be used when duplicating the incident at STEP III & IV. Refer to EC-1477 . If the incident cannot be verified, perform EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . Study the relationship between the cause, specified by DTC, and the symptom described by the customer. (The Symptom Matrix Chart will be useful. Refer toEC-1491) Also check related service bulletins for information.
STEP III	Try to confirm the symptom and under what conditions the incident occurs. The DIAGNOSTIC WORK SHEET and the freeze frame data are useful to verify the incident. Connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . If the malfunction code is detected, skip STEP IV and perform STEP V.
STEP IV	Try to detect the DTC by driving in (or performing) the DTC Confirmation Procedure. Check and read the DTC and the freeze frame data by using CONSULT-II. During the DTC verification, be sure to connect CONSULT-II to the vehicle in DATA MONITOR (AUTO TRIG) mode and check real time diagnosis results. If the incident cannot be verified, perform EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" . In case the DTC Confirmation Procedure is not available, perform the Overall Function Check instead. The DTC cannot be displayed by this check, however, this simplified check is an effective alternative. The “NG” result of the Overall Function Check is the same as the DTC detection.
STEP V	Take the appropriate action based on the results of STEP I through IV. If the malfunction code is indicated, proceed to Trouble Diagnosis for DTC PXXXX. If the normal code is indicated, proceed to the Basic Inspection, EC-1487 . Then perform inspections according to the Symptom Matrix Chart. Refer to EC-1491 .
STEP VI	Identify where to begin diagnosis based on the relationship study between symptom and possible causes. Inspect the system for mechanical binding, loose connectors or wiring damage using (tracing) Harness Layouts. Gently shake the related connectors, components or wiring harness with CONSULT-II set in “DATA MONITOR (AUTO TRIG)” mode. Check the voltage of the related ECM terminals or monitor the output data from the related sensors with CONSULT-II. Refer to EC-1502 or EC-1516 . The Diagnostic Procedure in EC section contains a description based on open circuit inspection. A short circuit inspection is also required for the circuit check in the Diagnostic Procedure. For details, refer to GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident" , “Circuit Inspection”. Repair or replace the malfunction parts. If the malfunctioning part cannot be detected, perform EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .
STEP VII	Once you have repaired the circuit or replaced a component, you need to run the engine in the same conditions and circumstances which resulted in the customer's initial complaint. Perform the DTC Confirmation Procedure and confirm the normal code (DTC P0000) is detected. If the incident is still detected in the final check, perform STEP VI by using a different method from the previous one. Before returning the vehicle to the customer, be sure to erase the unnecessary (already fixed) DTC in ECM. (Refer to EC-1476 .)

DIAGNOSTIC WORK SHEET

There are many operating conditions that lead to the malfunction of engine components. A good grasp of such conditions can make troubleshooting faster and more accurate.
In general, each customer feels differently about an incident. It is important to fully understand the symptoms or conditions for a customer complaint.
Utilize a diagnostic worksheet like the one shown below in order to organize all the information for troubleshooting.

KEY POINTS

WHAT ..... Vehicle & engine model
WHEN ..... Date, Frequencies
WHERE..... Road conditions
HOW ..... Operating conditions, Weather conditions, Symptoms

SEF907L

Worksheet Sample

Customer name MR/MS		Model & Year	VIN
Engine #		Trans.	Mileage
Incident Date		Manuf. Date	In Service Date
Symptoms	☐ Startability	☐ Impossible to start ☐ No combustion ☐ Partial combustion ☐ Partial combustion affected by throttle position ☐ Partial combustion when engine is cool ☐ Possible but hard to start ☐ Others [ ]	
	☐ Idling	☐ No fast idle ☐ Unstable ☐ High idle ☐ Low idle ☐ Others [ ]	
	☐ Driveability	☐ Stumble ☐ Surge ☐ Knock ☐ Lack of power ☐ Others [ ]	
	☐ Engine stall	☐ At the time of start ☐ While idling ☐ While accelerating ☐ While decelerating ☐ Just after stopping ☐ While loading	
Incident occurrence		☐ Just after delivery ☐ Recently ☐ In the morning ☐ At night ☐ In the daytime	
Frequency		☐ All the time ☐ Under certain conditions ☐ Sometimes	
Weather conditions		☐ Not affected	
	Weather	☐ Fine ☐ Raining ☐ Snowing ☐ Others [ ]	
	Temperature	☐ Hot ☐ Warm ☐ Cool ☐ Cold ☐ Humid °F	
Engine conditions		☐ Cold ☐ During warm-up ☐ After warm-up Engine speed 0 2,000 4,000 6,000 8,000 rpm	
Road conditions		☐ In town ☐ In suburbs ☐ Highway ☐ Off road (up/down)	
Driving conditions		☐ Not affected ☐ At starting ☐ While idling ☐ At racing ☐ While accelerating ☐ While cruising ☐ While decelerating ☐ While turning (RH/LH) Vehicle speed 0 10 20 30 40 50 60 MPH	
Malfunction indicator		☐ Turned on ☐ Not turned on	

MTBL0533

DTC Inspection Priority Chart

BBS0027L

If some DTCs are displayed at the same time, perform inspections one by one based on the following priority chart.

NOTE:
If DTC U1000 is displayed with other DTC, first perform the trouble diagnosis for DTC U1000. Refer to EC-1530, "DTC U1000 CAN COMMUNICATION LINE" .

Priority	Detected items (DTC)
1	● U1000 CAN communication line ● P0016 Crankshaft position - camshaft position correlation ● P0102 P0103 Mass air flow sensor ● P0112 P0113 Intake air temperature sensor ● P0117 P0118 Engine coolant temperature sensor ● P0122 P0123 P0222 P0223 P2135 Accelerator pedal position sensor ● P0182 P0183 Fuel pump temperature sensor ● P0192 P0193 Fuel rail pressure sensor ● P0237 P0238 Turbocharger boost sensor ● P0335 P0336 Crankshaft position sensor ● P0340 P0341 Camshaft position sensor ● P0563 Battery voltage ● P0605 P0606 P1616 ECM ● P0642 P0643 P0652 P0653 Sensor power supply ● P1610 - P1615 NATS ● P1622 P1623 Injector adjustment value ● P2228 P2229 Barometric pressure sensor
2	● P0089 P0628 P0629 P1272 - P1275 Fuel pump ● P0200 - P0204 P1268 - P1271 P2146 - P2149 Fuel injector ● P0686 ECM relay ● P1212 TCS communication line
3	● P0088 P0093 Fuel system ● P0217 Engine over temperature (OVERHEAT) ● P0234 Turbocharger system ● P0501 P0502 P0503 ASCD vehicle speed sensor ● P0504 ASCD brake switch ● P0580 P0581 ASCD steering switch ● P1211 TCS control unit

Basic Inspection

BBS0027M

Precaution:
Perform Basic Inspection without electrical or mechanical loads applied;

- **Headlamp switch is OFF.**
- **On vehicles equipped with daytime light systems, set lighting switch to the 1st position to light only small lamps.**
- **Air conditioner switch is OFF.**
- **Rear defogger switch is OFF.**
- **Steering wheel is in the straight-ahead position, etc.**

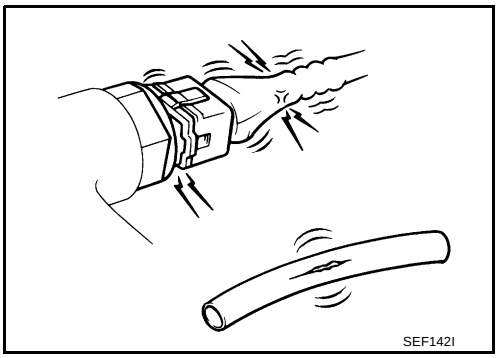
1. INSPECTION START

1. Check service records for any recent repairs that may indicate a related malfunction.
2. Check the current need for scheduled maintenance, especially for fuel filter and air cleaner filter. Refer to MA-7, "Periodic Maintenance" .
3. Open engine hood and check the following:

- Harness connectors for improper connections
- Vacuum hoses for splits, kinks, or improper connections
- Wiring for improper connections, pinches, or cuts

4. Start engine and warm it up to the normal operating temperature.

>> GO TO 2.


SEF142I

2. PREPARATION FOR CHECKING IDLE SPEED

With CONSULT-II
Connect CONSULT-II to the data link connector.
Without CONSULT-II
Install diesel tacho tester to the vehicle.

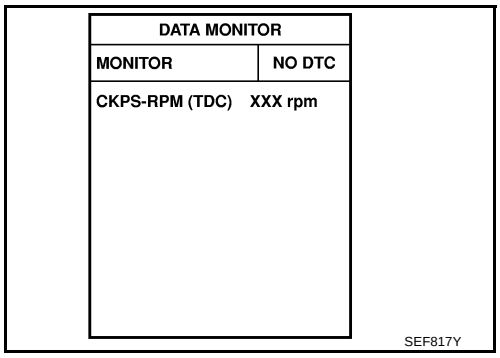
>> GO TO 3.

3. CHECK IDLE SPEED

With CONSULT-II

1. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
2. Read idle speed.

725±25 rpm



Without CONSULT-II

Read idle speed.

725±25 rpm

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 4.

4. CHECK FOR INTAKE AIR LEAK

Listen for an intake air leak after the mass air flow sensor.

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. BLEED AIR FROM FUEL SYSTEM

1. Stop engine.
2. Use priming pump to bleed air from fuel system. Refer to EC-1472, "AIR BLEEDING" .

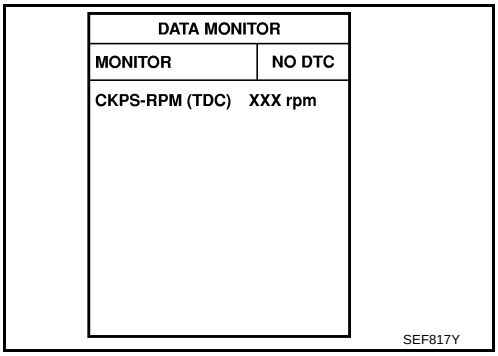
>> GO TO 6.

6. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

725±25 rpm



Without CONSULT-II

Read idle speed.

725±25 rpm

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

7. DRAIN WATER FROM FUEL FILTER

Drain water from fuel filter. Refer to EC-1472, "WATER DRAINING" .

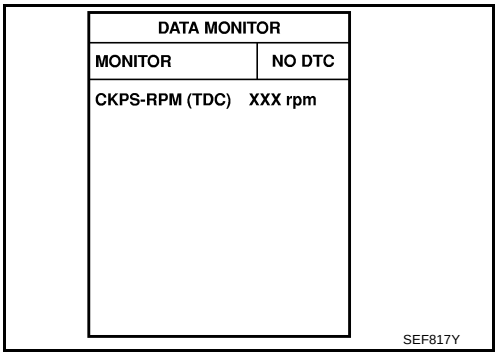
>> GO TO 8.

8. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

725±25 rpm



Without CONSULT-II

Read idle speed.

725±25 rpm

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 9.

9. CHECK AIR CLEANER FILTER

Check air cleaner filter for clogging or breaks.

OK or NG

OK >> GO TO 10.
NG >> Replace air cleaner filter.

10. CHECK BATTERY VOLTAGE

Check battery voltage.

Voltage: More than 12.13V

OK or NG

OK >> GO TO 12.
NG >> GO TO 11.

11. CHECK BATTERY

Refer to SC-4, "BATTERY" .

OK or NG

OK >> Check charging system. Refer to SC-13, "CHARGING SYSTEM" .
NG >> Repair or replace.

12. CHECK COMPRESSION PRESSURE

Check compression pressure. Refer to EM-214, "CHECKING COMPRESSION PRESSURE" .

OK or NG

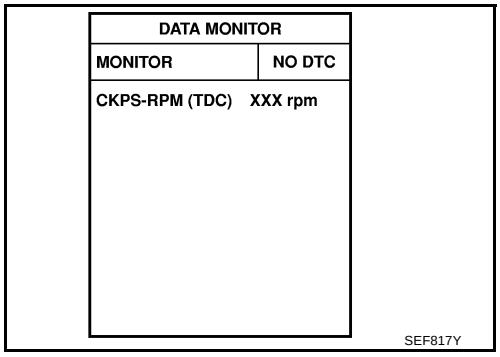
OK >> GO TO 13.
NG >> Follow the instruction of “CHECKING COMPRESSION PRESSURE”.

13. CHECK IDLE SPEED AGAIN

With CONSULT-II

1. Start engine and let it idle.
2. Select “CKPS·RPM (TDC)” in “DATA MONITOR” mode with CONSULT-II.
3. Read idle speed.

725±25 rpm



Without CONSULT-II

Read idle speed.

725±25 rpm

OK or NG

OK >> **INSPECTION END**
NG >> 1. Replace fuel injector.
2. GO TO 3.

Symptom Matrix Chart

BBS0027N

SYSTEM — Basic engine control system		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL			HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	
		NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING							
Warranty symptom code		AA				AB			AC	AD	AE		AF		
Fuel pump		5	5	5	5	5	5	5	5		5	5		5	—
Fuel injector		3	3	3	3	3	3	3	3	3	4	4	3	3	EC-1582
Glow control system		1	1	1	1					1					EC-1758
Engine body		3	3	3	3	3	3	3		3	4	4		3	EM-227
Fuel transport pump						2	2	2							EC-1796
EGR system											3	3			EC-1766
Air cleaner and duct											3	3			EM-141
Fuel rail pressure relief valve		3	3	3	3	3	3	3	3		3	3		3	EC-1539
ENGINE CONTROL	Fuel pump circuit	4	4	4	4	4	4	4	4		4	4		4	EC-1681
	Fuel injector circuit	1	1	1	1	1	1	1	1	1	1	1	1	1	EC-1582
	Fuel injector adjustment value								1	1	1	1			EC-1474
	Mass air flow sensor circuit								1		1	1			EC-1543
	Engine coolant temperature circuit			1		1		1						1	EC-1557
	Vehicle speed signal circuit											1			LAN-25
	Accelerator pedal position sensor circuit								1		1	1			EC-1563
	Fuel rail pressure sensor circuit														EC-1574

SYSTEM — Basic engine control system		SYMPTOM													Reference page
		HARD/NO START/RESTART (EXCP. HA)				ENGINE STALL			HESITATION/SURGING/FLAT SPOT	KNOCK/DETONATION	LACK OF POWER	POOR ACCELERATION	HI IDLE	LOW IDLE	
		NO START (with first firing)	NO START (without first firing)	HARD TO START WHEN ENGINE IS COLD	HARD TO START WHEN ENGINE IS HOT	AT IDLE	DURING DRIVING	WHEN DECELERATING							
Warranty symptom code		AA				AB			AC	AD	AE		AF		
ENGINE CONTROL	Crankshaft position sensor circuit		1	1	1	1	1	1	1	1	1	1			EC-1624
	Camshaft position sensor circuit			3	3										EC-1636
	Turbocharger boost sensor circuit								1		1	1			EC-1774
	Turbocharger boost control solenoid valve circuit								1		1	1			EC-1774
	Start signal circuit	1	1	1	1	1		1	1		1	1			EC-1814
	Ignition switch circuit		1			1	1	1							EC-1521
	Power supply for ECM circuit		1			1	1	1							EC-1521
	Cooling fan relay circuit														EC-1589
	EGR volume control valve circuit								1		1	1			EC-1766
	Glow relay circuit	1	1	1	1										EC-1758
	Refrigerant pressure sensor circuit					2		2					3	3	EC-1804
	ECM relay (Self-shutoff) circuit		1				1	1	1						EC-1697
	ECM	2	2	2	2	2	2	2	2	2	2	2	2	2	EC-1677, EC-1679, EC-1733, EC-1756
NATS (Nissan Anti-theft System)			1												EC-1477

1 - 5: The numbers refer to the order of inspection.
(continued on next page)

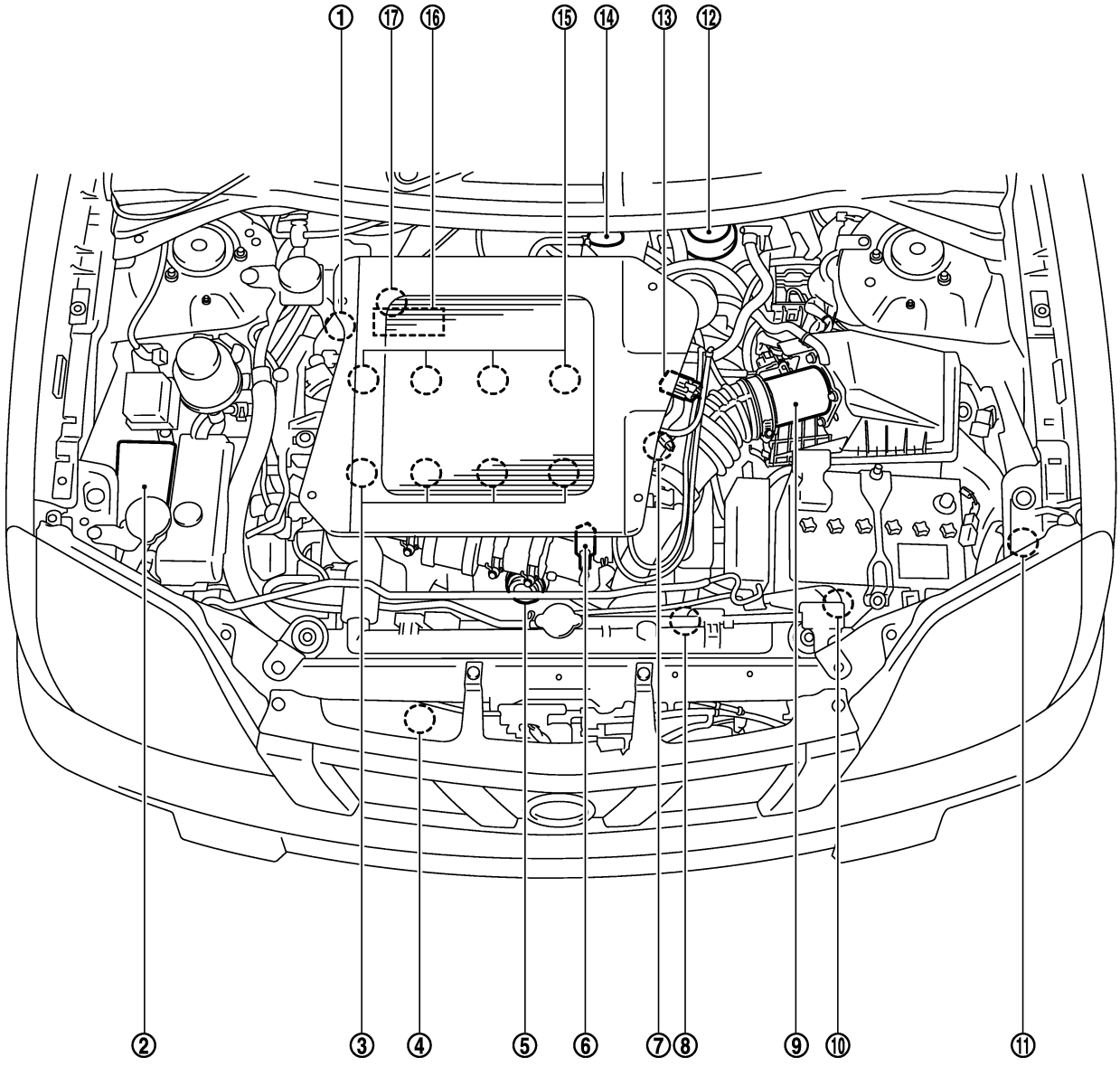
SYSTEM — Basic engine control system		SYMPTOM											Reference page
		ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	Malfunction indicator illuminates.	Can be detected by CONSULT-II?	
								BLACK SMOKE	WHITE SMOKE				
Warranty symptom code		AG	AH	AJ	AK	AL	AM	AP		HA			
Fuel pump		5	5	5		5					1	1	—
Fuel injector		3	3	3		4		4	4		1	1	EC-1582
Glow control system									1				EC-1758
Engine body			3	3	3	3	1		3				EM-227
Fuel transport pump													EC-1796
EGR system								3					EC-1766
Air cleaner and duct								3					EM-141
Fuel rail pressure relief valve		3	3	3		3					1	1	EC-1539
ENGINE CONTROL	Fuel pump circuit	4	4	4		4					1	1	EC-1717
	Fuel injector circuit	1	1	1		1		1	1		1	1	EC-1582
	Fuel injector adjustment value	1	1			1		1	1			1	EC-1474
	Mass air flow sensor circuit							1			1	1	EC-1543
	Engine coolant temperature circuit	1	1		1						1	1	EC-1557
	Vehicle speed signal circuit										1	1	LAN-25
	Accelerator pedal position sensor circuit			1							1	1	EC-1563
	Fuel rail pressure sensor circuit										1	1	EC-1574

SYSTEM — Basic engine control system		SYMPTOM											Reference page
		ROUGH IDLE/HUNTING	IDLING VIBRATION	SLOW/NO RETURN TO IDLE	OVERHEAT/HIGH ENGINE COOLANT TEMPERATURE	EXCESSIVE FUEL CONSUMPTION	EXCESSIVE OIL CONSUMPTION	ABNORMAL SMOKE COLOR		DEAD BATTERY (UNDER CHARGE)	Malfunction indicator illuminates.	Can be detected by CONSULT-II?	
								BLACK SMOKE	WHITE SMOKE				
Warranty symptom code		AG	AH	AJ	AK	AL	AM	AP		HA			
ENGINE CONTROL	Crankshaft position sensor circuit	1	1								1	1	EC-1624
	Camshaft position sensor circuit										1	1	EC-1636
	Turbocharger boost sensor circuit										1	1	EC-1618
	Turbocharger boost control solenoid valve circuit							1	1				EC-1774
	Start signal circuit												EC-1814
	Ignition switch circuit												EC-1521
	Power supply for ECM circuit										1	1	EC-1521
	Cooling fan relay circuit				2								EC-1589
	EGR volume control valve circuit							1					EC-1766
	Glow relay circuit								1				EC-1758
	Refrigerant pressure sensor circuit			3		4							EC-1804
	ECM relay (Self-shutoff) circuit											1	EC-1697
	ECM	2	2	2	2	2	2	2	2	2	2	2	EC-1677, EC-1679, EC-1733, EC-1756
NATS (Nissan Anti-theft System)												1	EC-1477

1 - 5: The numbers refer to the order of inspection.

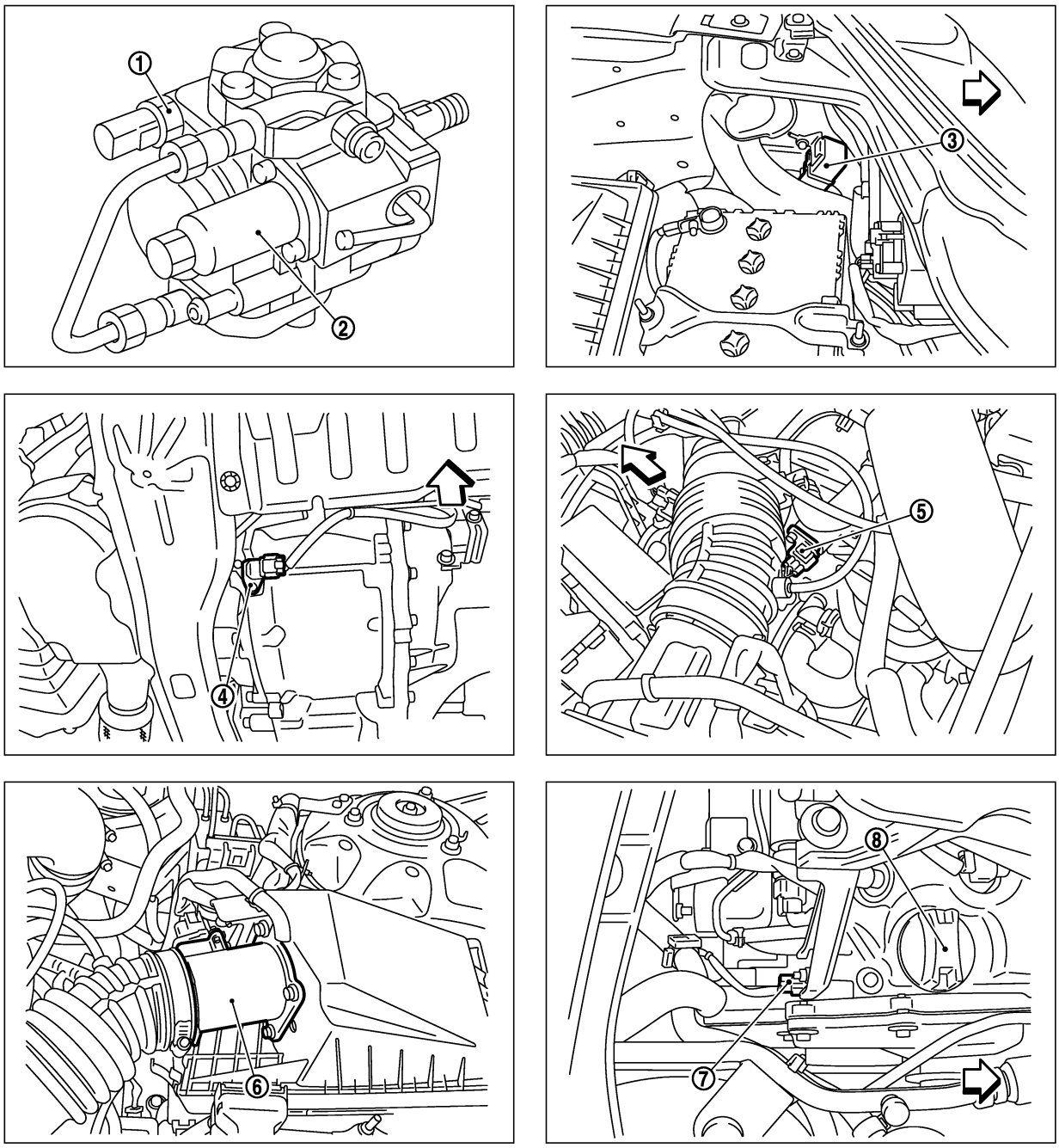
Engine Control Component Parts Location

BBS0027O



PBIB3188E

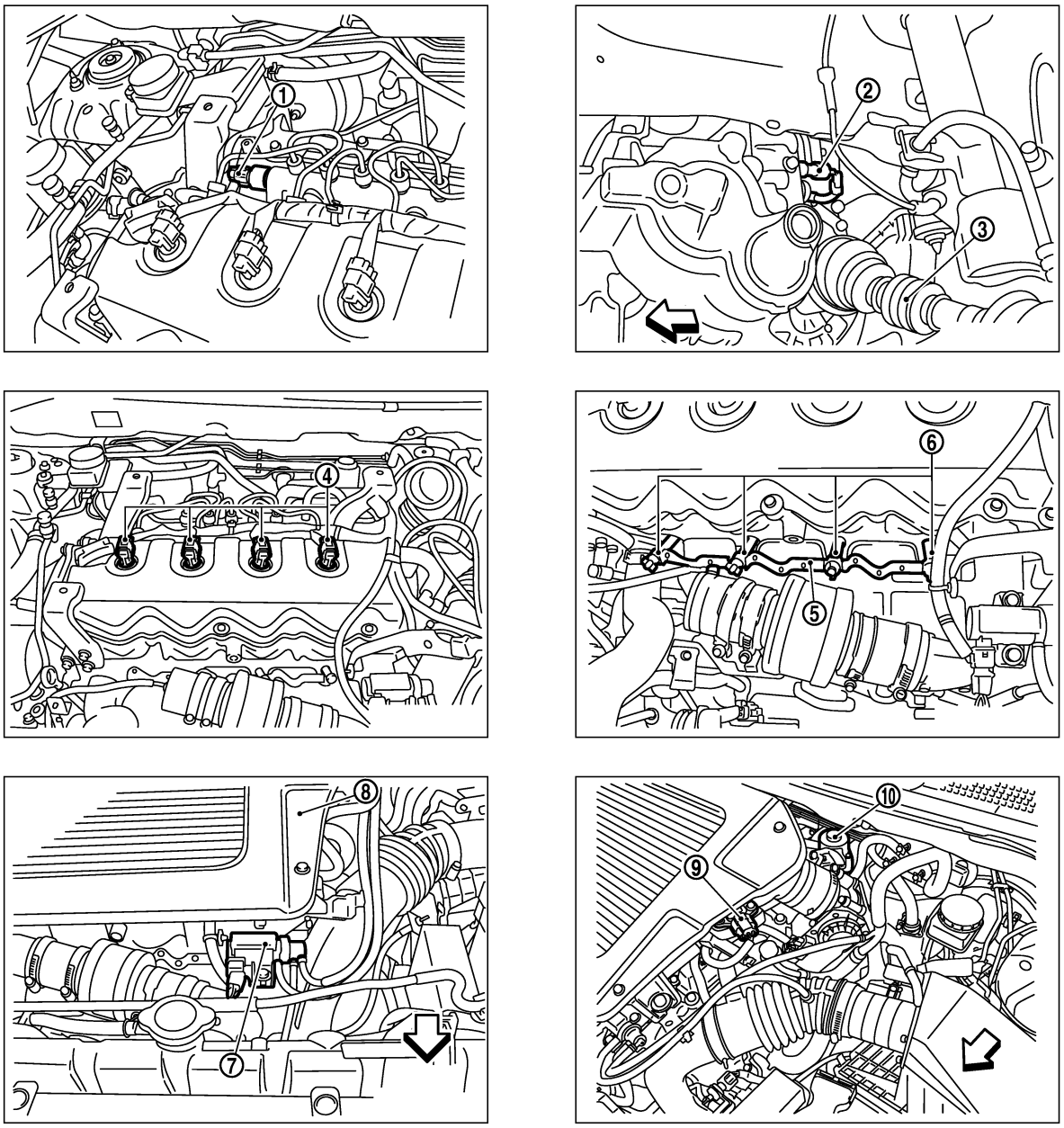
1. Engine coolant temperature sensor
2. Relay box
3. Glow plug
4. Cooling fan motor-2
5. Turbocharger boost control actuator
6. Turbocharger boost control solenoid valve
7. Camshaft position sensor
8. Cooling fan motor-1
9. Mass air flow sensor
10. Refrigerant pressure sensor
11. Glow relay
12. Fuel filter
13. Turbocharger boost sensor
14. EGR volume control valver
15. Fuel injector
16. Fuel pump
17. Fuel rail pressure sensor



PBIB3147E

⇦ : Vehicle front

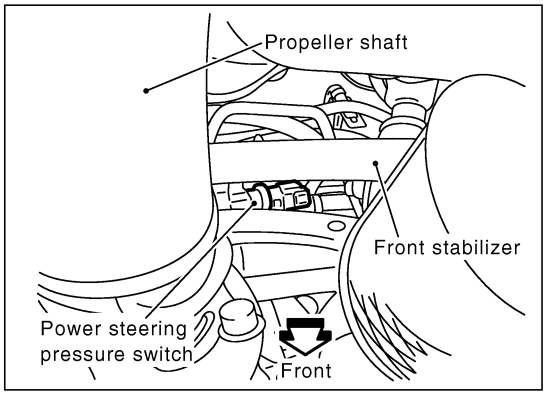
1. Fuel pump temperature sensor
2. Fuel pump
3. Glow relay
4. Crankshaft position sensor (View from under the vehicle)
5. Camshaft position sensor
6. Mass air flow sensor
7. Fuel rail pressure sensor
8. Oil filler cap

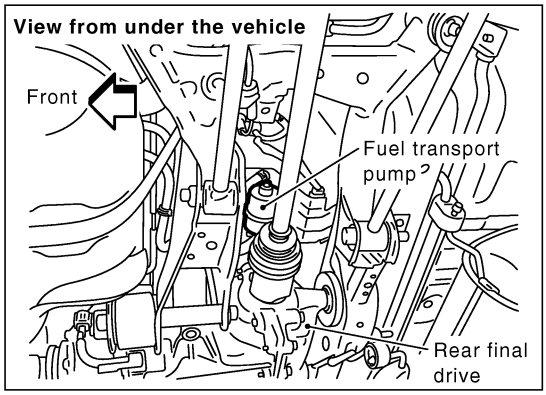


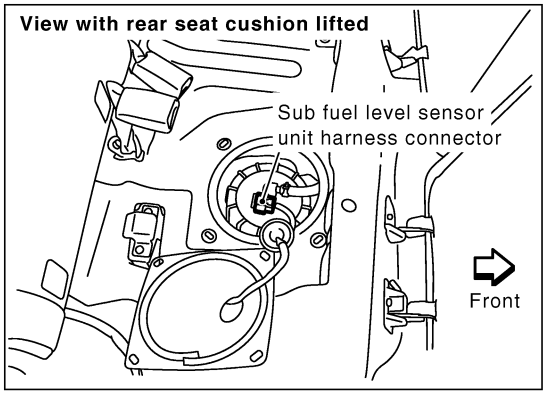
PBIB3189E

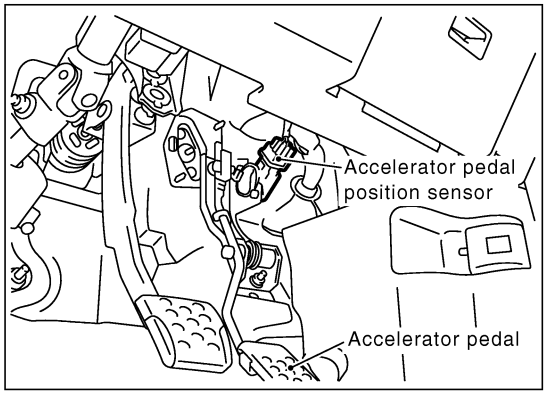
⇦ : Vehicle front

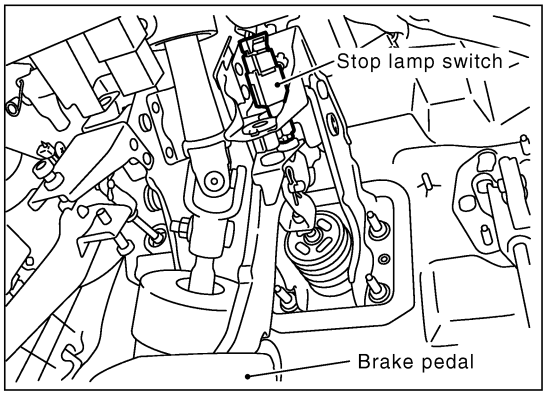
1. Fuel rail pressure sensor
2. PNP switch (View from under the vehicle)
3. Front drive shaft (LH)
4. Fuel injector
5. Connecting plate
6. Glow plug
7. Turbocharger boost control solenoid valve
8. Charge air cooler
9. Turbocharger boost sensor
10. EGR volume control valve

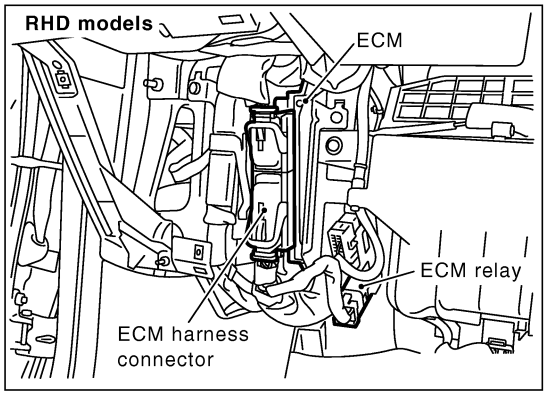

Propeller shaft
Front stabilizer
Power steering
pressure switch
Front


View from under the vehicle
Front
Fuel transport
pump
Rear final
drive

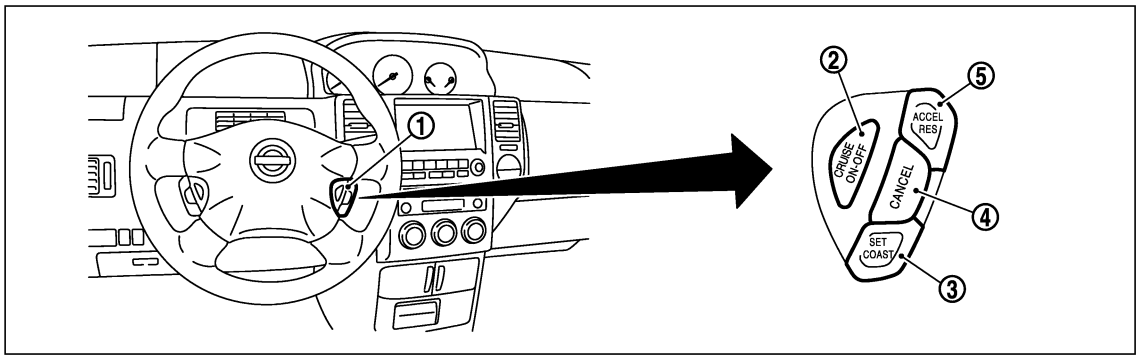

View with rear seat cushion lifted
Sub fuel level sensor
unit harness connector
Front

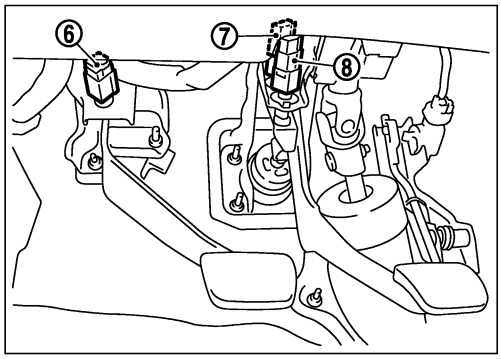

Accelerator pedal
position sensor
Accelerator pedal

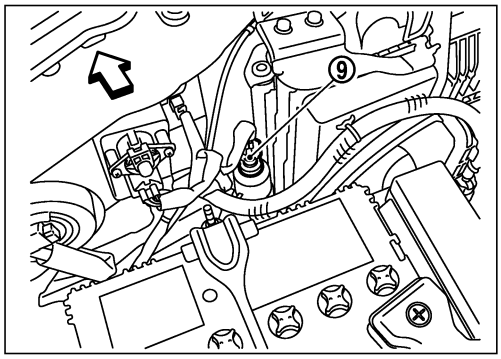

Stop lamp switch
Brake pedal


RHD models
ECM
ECM relay
ECM harness
connector

PBIB1940E





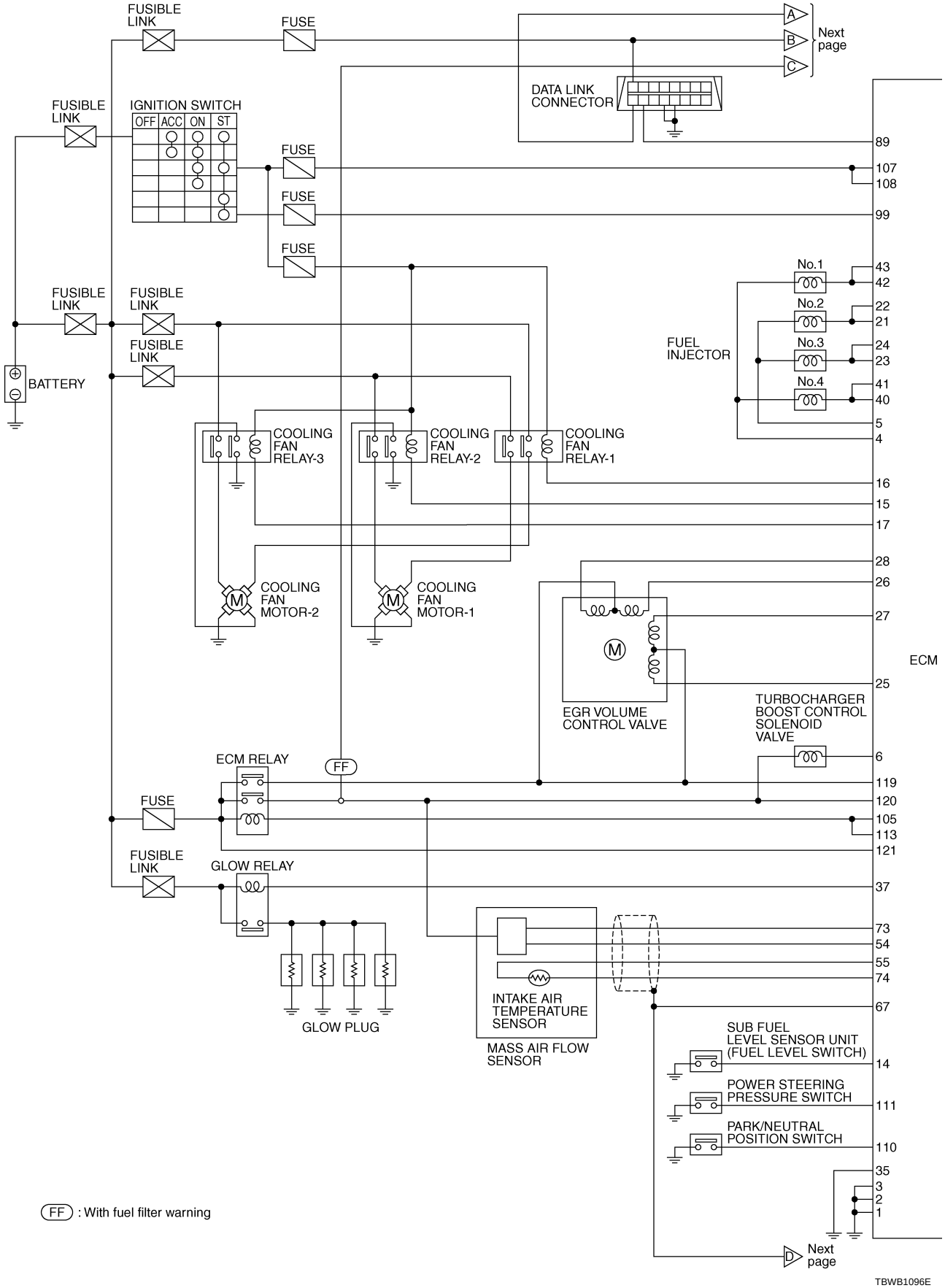


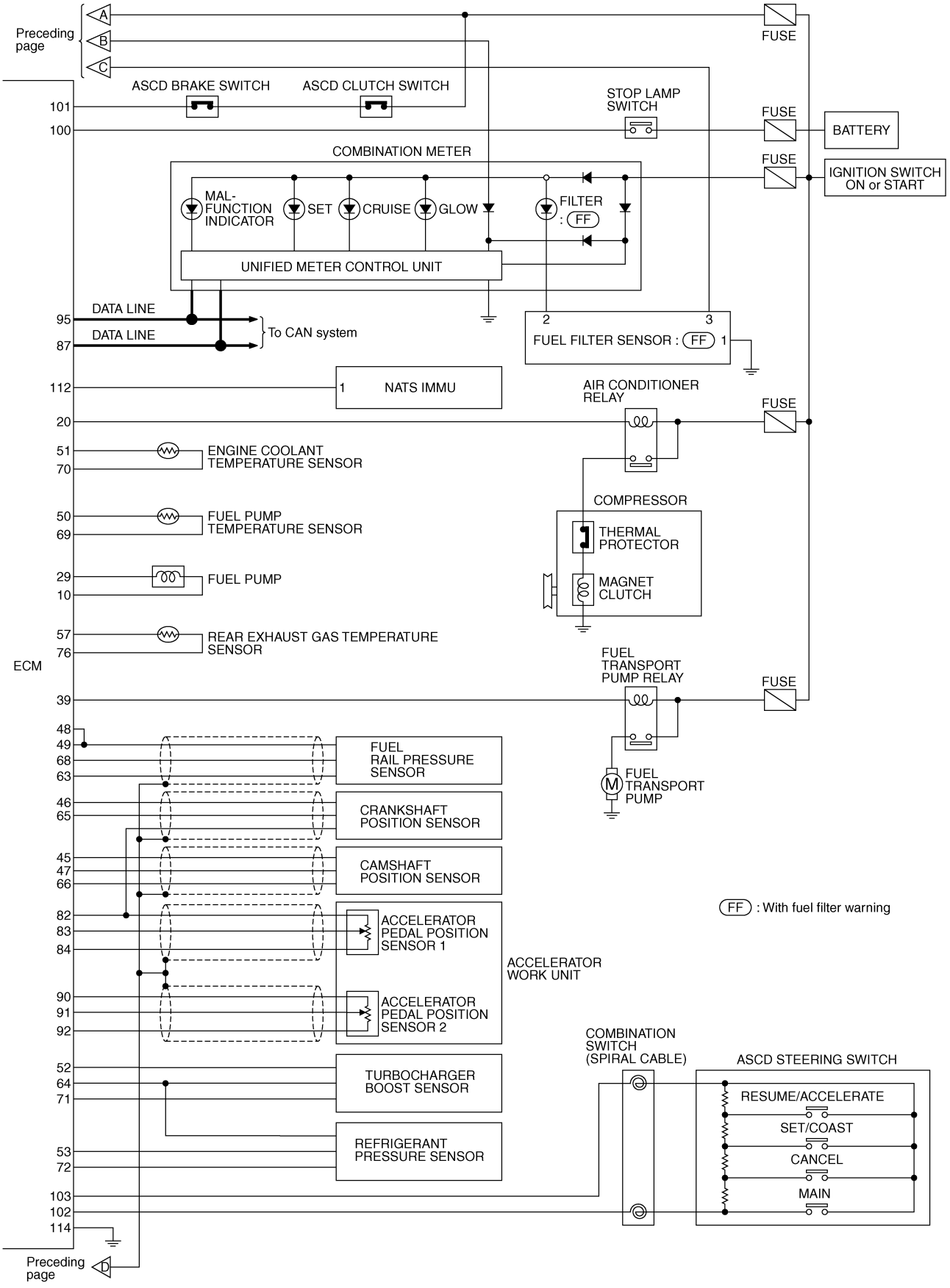
PBIB3190E

1. ASCD steering switch
2. MAIN switch
3. SET/COAST switchCANSEL switch
4. CANSEL switch
5. RESUME/ACCELERATE switch
6. ASCD clutch switch
7. Stop lamp switch
8. ASCD brake switch
9. Refrigerant pressure sensor

Circuit Diagram

BBS0027P

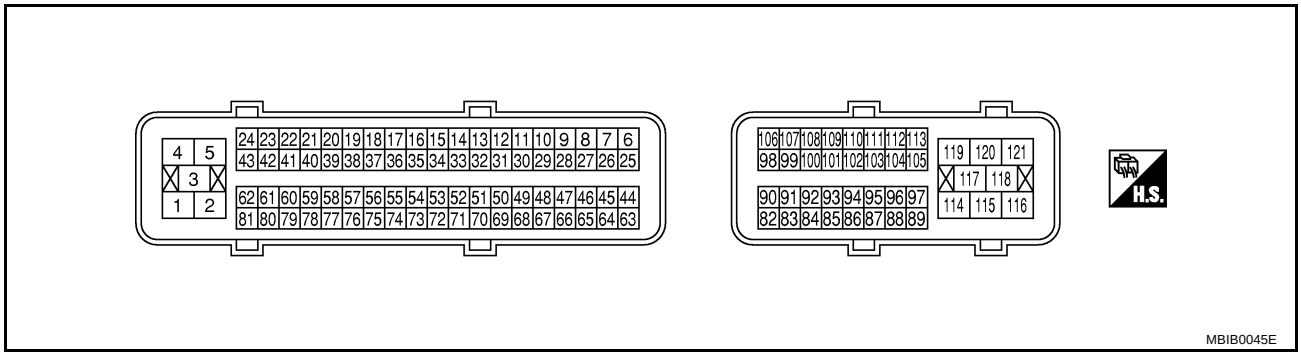



Preceding page
A
B
C
FUSE
ASCD BRAKE SWITCH
ASCD CLUTCH SWITCH
STOP LAMP SWITCH
101
100
FUSE
BATTERY
COMBINATION METER
FUSE
IGNITION SWITCH ON or START
MAL-FUNCTION INDICATOR
SET
CRUISE
GLOW
FILTER : FF
UNIFIED METER CONTROL UNIT
DATA LINE
95
87
DATA LINE
To CAN system
2
3
FUEL FILTER SENSOR : FF
1
112
1
NATS IMMU
AIR CONDITIONER RELAY
FUSE
20
51
70
ENGINE COOLANT TEMPERATURE SENSOR
COMPRESSOR
50
69
FUEL PUMP TEMPERATURE SENSOR
THERMAL PROTECTOR
MAGNET CLUTCH
29
10
FUEL PUMP
57
76
REAR EXHAUST GAS TEMPERATURE SENSOR
ECM
FUEL TRANSPORT PUMP RELAY
FUSE
39
48
49
68
63
FUEL RAIL PRESSURE SENSOR
FUEL TRANSPORT PUMP
46
65
CRANKSHAFT POSITION SENSOR
45
47
66
CAMSHAFT POSITION SENSOR
FF : With fuel filter warning
82
83
84
ACCELERATOR PEDAL POSITION SENSOR 1
ACCELERATOR WORK UNIT
90
91
92
ACCELERATOR PEDAL POSITION SENSOR 2
COMBINATION SWITCH (SPIRAL CABLE)
ASCD STEERING SWITCH
52
64
71
TURBOCHARGER BOOST SENSOR
RESUME/ACCELERATE
SET/COAST
CANCEL
MAIN
REFRIGERANT PRESSURE SENSOR
53
72
103
102
114
Preceding page
D

TBWB1097E

ECM Harness Connector Terminal Layout

BBS0027Q

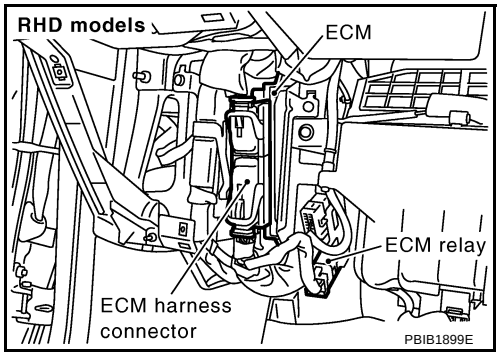


ECM Terminals And Reference Value

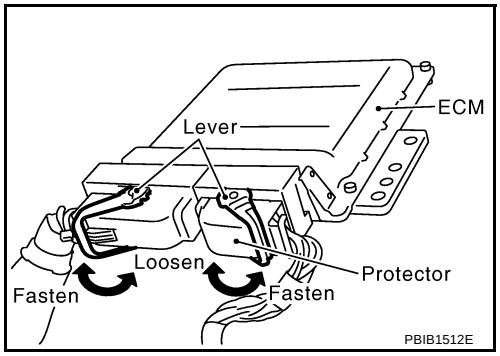
BBS0027R

PREPARATION

1. ECM is located behind the glove box. For this inspection, remove glove box.
2. Remove ECM harness protector.



3. When disconnecting ECM harness connector, loosen it with levers as far as they will go as shown in the figure.
4. Connect a break-out box (SST) and Y-cable adapter (SST) between the ECM and ECM harness connector.
   - Use extreme care not to touch 2 pins at one time.
   - Data is for comparison and may not be exact.

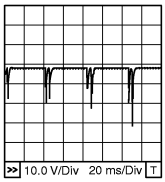
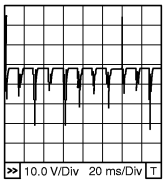
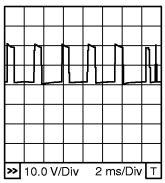
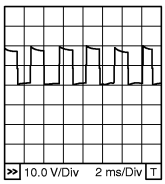
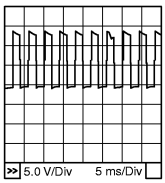
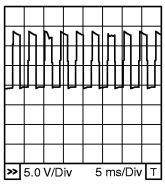


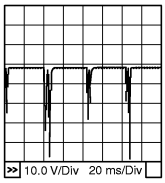
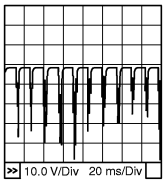
ECM INSPECTION TABLE

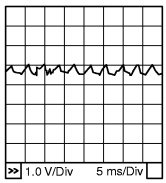
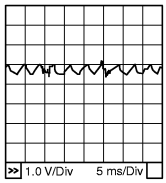
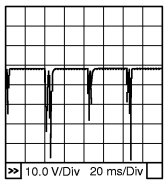
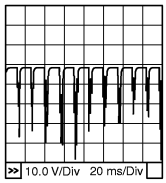
Remarks: Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

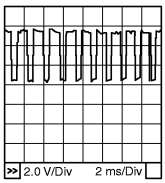
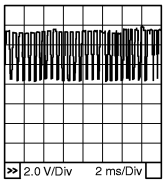
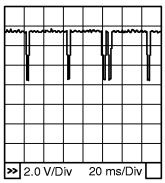
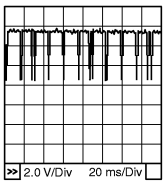
CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
1 2 3	B B B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
4	W/B	Fuel injector power supply (For cylinder No. 1 and 4) Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	5 - 10V ★  MBIB0883E
5	G/B		**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	5 - 10V ★  MBIB0884E
6	L	Turbocharger boost control solenoid valve	**[Ignition switch ON]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0889E
			[Ignition switch ON] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0890E
10	Y/L	Fuel pump power	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0886E

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
14	W/PU	Fuel level switch	**[Ignition switch ON]** ● Some fuel is in the fuel tank	Approximately 0V
			[Ignition switch ON] ● No fuel is in the fuel tank	BATTERY VOLTAGE (11 - 14V)
15	LG/B	Cooling fan relay-2	**[Engine is running]** ● Cooling fan: Not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan: Operating	Approximately 0.1V
16	LG	Cooling fan relay-1	**[Engine is running]** ● Cooling fan: Not operating ● Cooling fan: Operating at low speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan: Operating at middle speed ● Cooling fan: Operating at high speed	Approximately 0.1V
17	SB	Cooling fan relay-3	**[Engine is running]** ● Cooling fan: Not operating ● Cooling fan: Operating at low speed ● Cooling fan: Operating at middle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan: Operating at high speed	Approximately 0.1V
20	L	Air conditioner relay	**[Engine is running]** ● Air conditioner switch: OFF	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Both air conditioner switch and blower fan switch: ON (Compressor is operating)	Approximately 0.1V
21 22 23 24	G/R GY/L G/R GY/L	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 9V ★  MBIB0882E
25 26 27 28	GY W/L OR/B GY/B	EGR volume control valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.1 - 14V (Voltage signals of each ECM terminals differ according to the control position of EGR volume control valve.)

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E
37	W/R	Glow relay	Refer to EC-1758, "GLOW CONTROL SYSTEM" .	
39	B/OR	Fuel transport pump relay	**[Engine is running]** ● Some fuel is in the fuel tank	Approximately 0V
			[Engine is running] ● No fuel is in the fuel tank	BATTERY VOLTAGE (11 - 14V)
40 41 42 43	G/R GY/L G/R GY/L	Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 9V ★  MBIB0882E
45	G/OR	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
46	L	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 6V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 6V ★  MBIB0880E
47	G/R	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 6V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 6V ★  MBIB0878E
48 49	Y/R R	Fuel rail pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.7 - 2.0V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	2.0 - 2.3V
50	PU	Fuel pump temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with fuel pump temperature
51	L/OR	Engine coolant temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with engine coolant temperature
52	Y	Turbocharger boost sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	2.3 - 2.6V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	2.5 - 2.8V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
53	Y	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower fan switch: ON (Compressor operates)	1.0 - 4.0V
54	W	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.7V
			[Engine is running] ● **Warm-up condition** ● Idle speed	1.6 - 1.9V
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm.	1.6 - 1.9V to Approximately 4.3V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
55	G	Intake air temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.2V Output voltage varies with intake air temperature
63	W	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
64	W	Sensor power supply (Turbocharger boost sensor / Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
65	L/R	Crankshaft position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
66	G/Y	Camshaft position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
68	B	Fuel rail pressure sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
69	B	Fuel pump temperature sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
70	B	Engine coolant temperature sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
71	B	Turbocharger boost sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
72	B	Sensor ground (Refrigerant pressure sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
73	B	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
74	R	Intake air temperature sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V
83	W	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.8 - 1.3V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.0V
84	R	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
87	GY/R	CAN communication line	**[Ignition switch ON]**	Approximately 2.0 - 2.6V Output voltage varies with the communication status.
89	LG	Data link connector	**[Ignition switch ON]** ● CONSULT-II: Disconnected	Approximately 0V - Battery voltage (11 - 14V)
90	L	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	G	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.45 - 0.9V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.25 - 2.7V
92	Y	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
95	G/R	CAN communication line	**[Ignition switch ON]**	Approximately 2.6 - 3.2V Output voltage varies with the communication status.
99	B/Y	Start signal	**[Ignition switch ON]**	Approximately 0.3V
			[Ignition switch START]	BATTERY VOLTAGE (11 - 14V)
100	P	Stop lamp switch	**[Ignition switch OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
101	GY/L	ASCD brake switch	**[Ignition switch ON]** ● Brake pedal and clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch OFF] ● Brake pedal and/or clutch pedal: Slightly depressed	Approximately 0V

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
102	PU*1 W/R*2	ASCD steering switch	**[Ignition switch ON]** ● ASCD steering switch: OFF	Approximately 4.3V
			[Ignition switch ON] ● MAIN switch: Pressed	Approximately 0.3V
			[Ignition switch ON] ● CANCEL switch: Pressed	Approximately 1.3V
			[Ignition switch ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3.3V
			[Ignition switch ON] ● SET/COAST switch: Pressed	Approximately 2.3V
103	B/OR	ASCD steering switch ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
105	G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	W/R W/R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
110	G/OR	Park/Neutral position switch	**[Ignition switch ON]** ● Shift lever: Neutral	Approximately 0V
			[Ignition switch ON] ● Shift lever: Except above	BATTERY VOLTAGE (11 - 14V)
111	P/B	Power steering pressure switch	**[Engine is running]** ● Steering wheel: Being turned	Approximately 0V
			[Engine is running] ● Steering wheel: Not being turned	BATTERY VOLTAGE (11 - 14V)
113	G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
114	B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)
*1: LHD models
*2: RHD models

CONSULT-II Function (ENGINE)

BBS0027S

FUNCTION

Diagnostic test mode	Function
Work support	This mode enables a technician to adjust some devices faster and more accurately by following the indications on the CONSULT-II unit.
Self-diagnostic results	Self-diagnostic results such as DTCs and freeze frame data can be read and erased quickly.*
Data monitor	Input/Output data in the ECM can be read.
CAN diagnostic support monitor	The results of transmit/receive diagnosis of CAN communication can be read.
Active test	Diagnostic Test Mode in which CONSULT-II drives some actuators apart from the ECMs and also shifts some parameters in a specified range.
Function test	This mode is used to inform customers when their vehicle condition requires periodic maintenance.
ECM part number	ECM part number can be read.

*: The following emission-related diagnostic information is cleared when the ECM memory is erased.

- Diagnostic trouble codes
- Freeze frame data

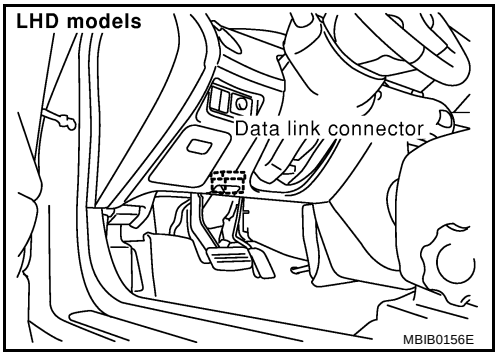
ENGINE CONTROL COMPONENT PARTS/CONTROL SYSTEMS APPLICATION

Item			DIAGNOSTIC TEST MODE			
			SELF-DIAG RESULTS		DATA MONITOR	ACTIVE TEST
			DTC	FREEZE FRAME DATA		
ENGINE CONTROL COMPONENT PARTS	INPUT	Crankshaft position sensor	×	×	×	
		Camshaft position sensor	×			
		Engine coolant temperature sensor	×	×	×	×
		Vehicle speed sensor	×	×	×	
		Fuel pump temperature sensor	×		×	
		Accelerator pedal position sensor 1	×		×	
		Accelerator pedal position sensor 2	×		×	
		Fuel rail pressure sensor	×		×	
		Mass air flow sensor	×		×	
		Intake air temperature sensor	×			
		Turbocharger boost sensor	×	×	×	
		Refrigerant pressure sensor			×	
		Battery voltage	×		×	
		Park/neutral position (PNP) switch			×	
		Power steering pressure switch			×	
		Stop lamp switch			×	
		Barometric pressure sensor (built-into ECM)	×		×	
		ASCD steering switch	×		×	
		ASCD brake switch	×		×	
		ASCD clutch switch	×		×	
	OUTPUT	Fuel pump	×		×	×
		Fuel injector	×		×	×
		Glow relay			×	×
		Cooling fan relay	×		×	×
		EGR volume control valve			×	×

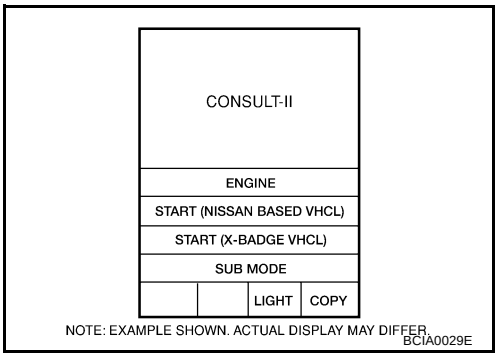
X: Applicable

INSPECTION PROCEDURE

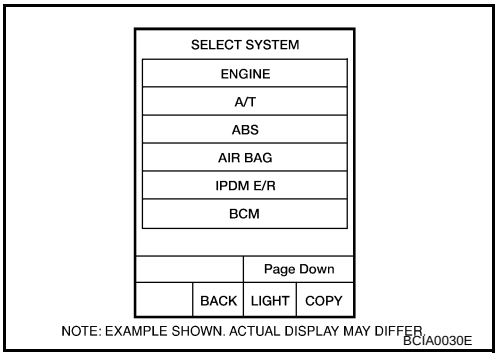
1. Turn ignition switch OFF.
2. Connect CONSULT-II to data link connector, which is located under the driver side dash panel.
3. Turn ignition switch ON.



4. Touch “START (NISSAN BASED VHCL)”.

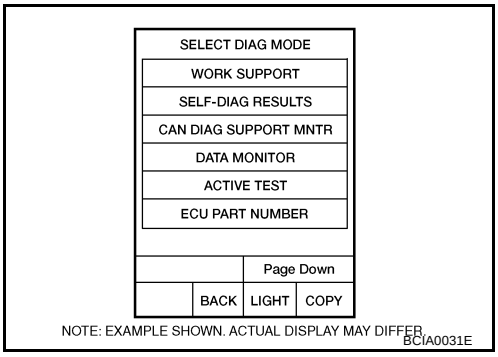


5. Touch “ENGINE”.
   If “ENGINE” is not indicated, go to GI-35, "CONSULT-II Data Link Connector (DLC) Circuit"



6. Perform each diagnostic test mode according to each service procedure.

For further information, see the CONSULT-II Operation Manual.



WORK SUPPORT MODE

Work Item

WORK ITEM	DESCRIPTION	USAGE
ENTER INJCTR CALIB DATA	● Injector adjustment value is written onto ECM memory.	When performing Injector Adjustment Value Registration.
INJ ADJ VAL CLR	● Injector adjustment value stored in ECM is initialized.	Before changing injector adjustment value stored in ECM, it is recommended to perform this work item.

SELF-DIAGNOSTIC MODE

Self Diagnostic Item

Regarding items detected in “SELF-DIAG RESULTS” mode, refer to EC-1458, "INDEX FOR DTC" .

Freeze Frame Data

Freeze frame data item	Description
DIAG TROUBLE CODE [PXXXX]	● The engine control component part/control system has a trouble code, it is displayed as “PXXXX”. (Refer to EC-1458, "INDEX FOR DTC" .)
CAL/LD VALUE [%]	● The calculated load value at the moment a malfunction is detected is displayed.
COOLANT TEMP [°C] or [°F]	● The engine coolant temperature at the moment a malfunction is detected is displayed.
ENGINE SPEED [rpm]	● The engine speed at the moment a malfunction is detected is displayed.
VEHICL SPEED [km/h] or [mph]	● The vehicle speed at the moment a malfunction is detected is displayed.
INT MANI PRES [kPa]	● The intake manifold pressure at the moment a malfunction is detected is displayed.

DATA MONITOR MODE

MONITOR ITEM	ECM INPUT SIGNAL	MAIN SIGNALS	CONDITION	SPECIFICATION
CKPS·RPM (TDC) [rpm]	×	×	● The engine speed computed from the crankshaft position sensor signal is displayed.	
COOLAN TEMP/S [°C] or [°F]	×	×	● The engine coolant temperature (determined by the signal voltage of the engine coolant temperature sensor) is displayed.	When the engine coolant temperature circuit is open or short, ECM enters fail-safe mode. The engine coolant temperature determined by the ECM is displayed.
VHCL SPEED SE [km/h] or [mph]	×	×	● The vehicle speed computed form the vehicle speed sensor signal is displayed.	
FUEL TEMP SEN [°C] or [°F]	×	×	● The fuel temperature (determined by the signal voltage of the fuel pump temperature sensor) is displayed.	
ACCEL POS SEN [V]	×	×	● The accelerator pedal position sensor 1 signal voltage is displayed.	These signals are converted by ECM internally. Thus, they differ from ECM terminals voltage.
ACCEL SEN 2 [V]	×	×	● The accelerator pedal position sensor 2 signal voltage is displayed.	
ACT CR PRESS [MPa]	×	×	● The Fuel rail pressure (determined by the signal voltage of the fuel rail pressure sensor) is displayed.	
BATTERY VOLT [V]	×	×	● The power supply voltage of ECM is displayed.	
P/N POSI SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from the park/neutral position switch signal.	

MONITOR ITEM	ECM INPUT SIGNAL	MAIN SIG-NALS	CONDITION	SPECIFICATION
START SIGNAL [ON/OFF]	×	×	● indicates [ON/OFF] condition from the starter signal.	
PW/ST SIGNAL [ON/OFF]	×		● indicates [ON/OFF] condition from the power steering pressure switch signal.	
BRAKE SW [ON/OFF]	×	×	● indicates [ON/OFF] condition from the stop lamp switch signal.	
BRAKE SW2 [ON/OFF]	×	×	● indicates [ON/OFF] condition from the ASCD brake switch and ASCD clutch switch signal.	
IGN SW [ON/OFF]	×	×	● Indicates [ON/OFF] condition from ignition switch signal.	
MAS AIR/FL SE [V]	×	×	● The signal voltage of the mass air flow sensor is displayed.	
MAIN INJ WID [msec]		×	● Indicates the actual fuel injection pulse width compensated by ECM according to the input signals.	
PUMP CURRENT [mA]		×	● Indicates the fuel pump power supply current from the ECM.	
GLOW RLY [ON/OFF]		×	● The glow relay control condition (determined by ECM according to the input signal) is displayed.	
COOLING FAN [OFF/LOW/MID/HI]		×	● Indicates the control condition of the cooling fans (determined by ECM according to the input signal). LOW ... Operates at low speed. MID ... Operates at middle speed. HI ... Operates at high speed. OFF ... Stopped	
EGR VOL CON/V [step]		×	● Indicates the EGR volume control value computed by the ECM according to the input signals. ● The opening becomes larger as the value increases.	
INT/A VOLUME [mg/]			● The intake air volume computed from the mass air flow sensor signal is displayed.	
BARO SEN [kPa]	×	×	● The barometric pressure (determined by the signal voltage from the absolute pressure sensor built into the ECM) is displayed.	
INT/M PRES SE [kPa]			● Turbocharger boost (determined by the signal voltage from the turbocharger boost sensor) is displayed.	
CYL COUNT [1/2/3/4]			● The cylinder being injected is displayed. 1 ... Cylinder No.1 is injected. 2 ... Cylinder No.2 is injected. 3 ... Cylinder No.3 is injected. 4 ... Cylinder No.4 is injected.	
SET SW [ON/OFF]	×		● Indicates [ON/OFF] condition from SET/COAST switch signal.	
RESUME/ACC SW [ON/OFF]	×		● Indicates [ON/OFF] condition from RESUME/ACCELERATE switch signal.	
CANCEL SW [ON/OFF]	×		● Indicates [ON/OFF] condition from CANCEL switch signal.	

MONITOR ITEM	ECM INPUT SIGNAL	MAIN SIG-NALS	CONDITION	SPECIFICATION
MAIN SW [ON/OFF]	×		● Indicates [ON/OFF] condition from MAIN switch signal.	
AC PRESS SEN [V]			● The signal voltage from the refrigerant pressure sensor is displayed.	
Voltage [V]			Voltage, frequency, duty cycle or pulse width measured by the probe.	Only “#” is displayed if item is unable to be measured. Figures with “#”s are temporary ones. They are the same figures as an actual piece of data which was just previously measured. [Hz] or [%]
Frequency [msec], [Hz] or [%]				
DUTY-HI				
DUTY-LOW				
PLS WIDTH-HI				
PLS WIDTH-LOW				

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.

ACTIVE TEST MODE

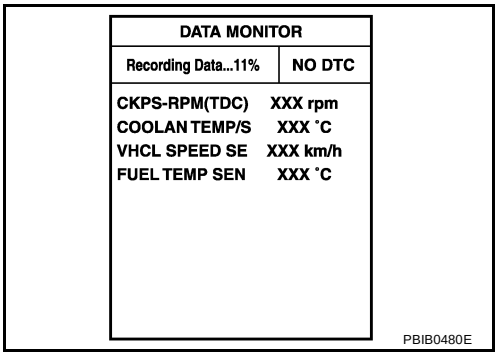
TEST ITEM	CONDITION	JUDGEMENT	CHECK ITEM (REMEDY)
POWER BAL-ANCE	● Engine: After warming up, idle the engine. ● A/C switch: OFF ● Shift lever: Neutral position ● Cut off each injector signal one at a time using CONSULT-II.	Engine runs rough or dies.	● Harness and connectors ● Compression ● Fuel injector
COOLING FAN *	● Ignition switch: ON ● Operate the cooling fan at LOW, MID, HI speed and turn OFF using CONSULT-II.	Cooling fan moves at LOW, MID, HI speed and stops.	● Harness and connector ● Cooling fan motor ● Cooling fan relay
ENG COOLANT TEMP	● Engine: Return to the original trouble condition ● Change the engine coolant temperature using CONSULT-II.	If trouble symptom disappears, see CHECK ITEM.	● Harness and connectors ● Engine coolant temperature sensor ● Fuel injector
GLOW RLY	● Ignition switch: ON (Engine stopped) ● Turn the glow relay ON and OFF using CONSULT-II and listen to operating sound.	Glow relay makes the operating sound.	● Harness and connector ● Glow relay
EGR VOL CONT/V	● Ignition switch: ON ● Change EGR volume control valve opening step using CONSULT-II.	EGR volume control valve makes an operating sound.	● Harness and connector ● EGR volume control valve
PRES REGULA-TOR	● Ignition switch: ON ● Change fuel rail pressure using CONSULT-II.	Fuel leaks.	● Fuel line ● Fuel pressure relief valve
PUMP LEANT CLEAR	● This mode is used for performing Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .		

*:Leaving cooling fan OFF with CONSULT-II while engine is running may cause the engine to overheat.

REAL TIME DIAGNOSIS IN DATA MONITOR MODE

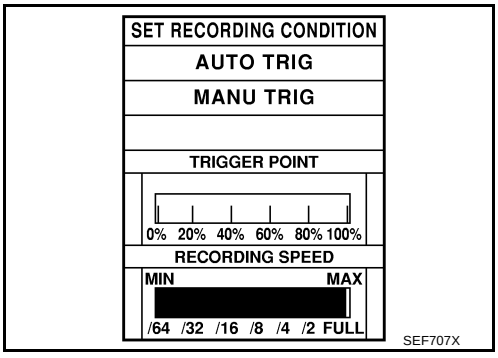
CONSULT-II has two kinds of triggers and they can be selected by touching “SETTING” in “DATA MONITOR” mode.

1. “AUTO TRIG” (Automatic trigger):



- The malfunction will be identified on the CONSULT-II screen in real time.
  In other words, DTC will be displayed if the malfunction is detected by ECM.
  At the moment a malfunction is detected by ECM, “MONITOR” in “DATA MONITOR” screen is changed to “Recording Data ... xx%” as shown in the figure, and the data after the malfunction detection is recorded. Then when the percentage reached 100%, “REAL-TIME DIAG” screen is displayed. If “STOP” is touched on the screen during “ Recording Data ... xx%”, “REAL-TIME DIAG” screen is also displayed.
  The recording time after the malfunction detection and the recording speed can be changed by “TRIGGER POINT” and “Recording Speed”. Refer to CONSULT-II OPERATION MANUAL.

2. “MANU TRIG” (Manual trigger):



- DTC will not be displayed automatically on CONSULT-II screen even though a malfunction is detected by ECM.
  DATA MONITOR can be performed continuously even though a malfunction is detected.

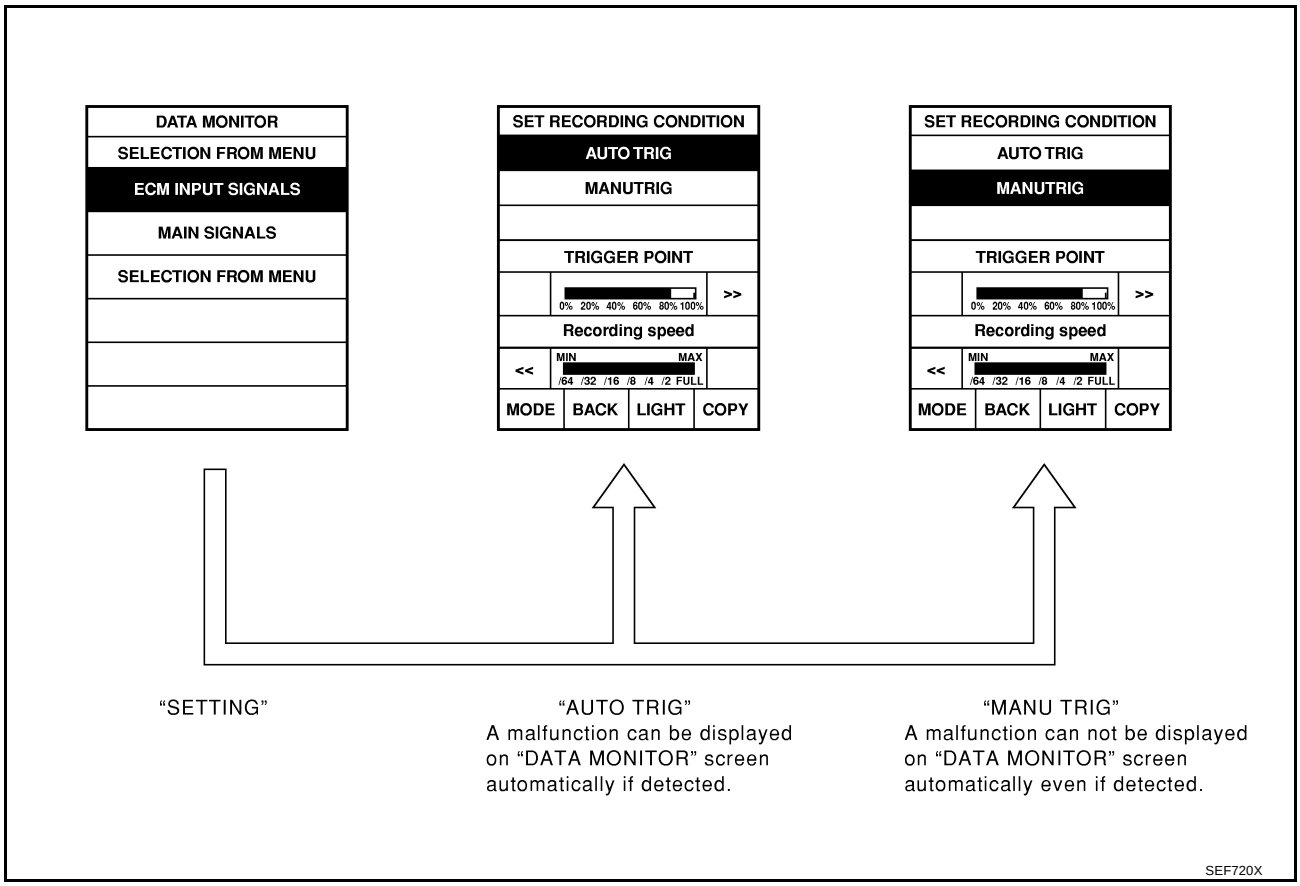
Use these triggers as follows:

1. “AUTO TRIG”

- While trying to detect the DTC by performing the DTC Confirmation Procedure, be sure to select to “DATA MONITOR (AUTO TRIG)” mode. You can confirm the malfunction at the moment it is detected.
- While narrowing down the possible causes, CONSULT-II should be set in “DATA MONITOR (AUTO TRIG)” mode, especially in case the incident is intermittent.
  When you are inspecting the circuit by gently shaking (or twisting) the suspicious connectors, components and harness in the DTC Confirmation Procedure, the moment a malfunction is found the DTC will be displayed. Refer to GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident" , “INCIDENT SIMULATION TESTS”.

2. “MANU TRIG”

– If the malfunction is displayed as soon as “DATA MONITOR” is selected, reset CONSULT-II to “MANU TRIG”. By selecting “MANU TRIG” you can monitor and store the data. The data can be utilized for further diagnosis, such as a comparison with the value for the normal operating condition.



FUNCTION TEST

This mode is used to inform customers of their vehicle condition of periodic maintenance.

CONSULT-II Reference Value in Data Monitor Mode

BBS0027T

Remarks:
- Specification data are reference values.
- Specification data are output/input values which are detected or supplied by the ECM at the connector.

* Specification data may not be directly related to their components signals/values/operations.

MONITOR ITEM	CONDITION		SPECIFICATION
CKPS-RPM (TDC)	● Run engine and compare CONSULT-II value with the tachometer indication.		Almost the same speed as the tachometer indication
COOLAN TEMP/S	● Engine: After warming up		More than 70°C (158°F)
VHCL SPEED SE	● Turn drive wheels and compare CONSULT-II value with the speedometer indication		Almost the same speed as the speedometer indication
FUEL TEMP SEN	● Engine: After warming up		More than 40°C (104°F)
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.15 - 0.6V
		Accelerator pedal: Fully depressed	1.95 - 2.4V
MAS AIR/FL SE*	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Ignition switch: ON (Engine stopped)	Approximately 0.4V
		Idle	1.3 - 1.6V
		Engine is revving from idle to about 4,000 rpm.	1.3 - 1.6V to Approximately 4.0V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)

MONITOR ITEM	CONDITION		SPECIFICATION
BATTERY VOLT	● Ignition switch: ON (Engine stopped)		11 - 14V
P/N POSI SW	● Ignition switch: ON	Shift lever: Neutral position	ON
		Except above	OFF
START SIGNAL	● Ignition switch: ON → START → ON		OFF → ON → OFF
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON
BRAKE SW	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
IGN SW	● Ignition switch: ON → OFF		ON → OFF
ACT CR PRESS	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	20 - 30 MPa
		2,000 rpm	45 - 55 MPa
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec
GLOW RLY	Refer to EC-1758, "GLOW CONTROL SYSTEM" .		
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA
COOLING FAN	● When cooling fan is stopped.		OFF
	● When cooling fans operate at low speed.		LOW
	● When cooling fans operate at middle speed.		MID
	● When cooling fans operate at high speed.		HI
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	After 1 minute at idle	More than 10 steps
		Revving engine from idle to 3,600 rpm	0 step
INT/A VOLUME	● Engine: After warming up, idle the engine		150 - 450 mg/st
INT/M PRES SE [kPa]	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	Approx. 100 kPa
		2,800 rpm	Approx. 126 kPa
		4,000 rpm	Approx. 106 kPa
BARO SEN	● Ignition switch: ON		Altitude Approx. 0m: Approx. 100.62 kPa (1.0062 bar, 1.026 kg/cm^2 , 14.59 psi) Approx. 1,000 m: Approx. 88.95 kPa (0.8895 bar, 0.907 kg/cm^2 , 12.90 psi) Approx. 1,500 m: Approx. 83.16 kPa (0.8316 bar, 0.848 kg/cm^2 , 12.06 psi) Approx. 2,000 m: Approx. 78.36 kPa (0.7836 bar, 0.799 kg/cm^2 , 11.36 psi)
CYL COUNT	● Engine is running		1 → 3 → 4 → 2

MONITOR ITEM	CONDITION		SPECIFICATION
SET SW	● Ignition switch: ON	SET/COAST switch: Released	OFF
		SET/COAST switch: Pressed	ON
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Released	OFF
		RESUME/ACCELERATE switch: Pressed	ON
CANCEL SW	● Ignition switch: ON	CANCEL switch: Released	OFF
		CANCEL switch: Pressed	ON
MAIN SW	● Ignition switch: ON	MAIN switch: Released	OFF
		MAIN switch: Pressed	ON
AC PRESS SEN	● Engine: Idle ● Both A/C switch and blower fan switch: ON (Compressor operates)		1.0 - 4.0 V
SET SW	● Ignition switch: ON	SET/COAST switch: Released	OFF
		SET/COAST switch: Pressed	ON
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Released	OFF
		RESUME/ACCELERATE switch: Pressed	ON
CANCEL SW	● Ignition switch: ON	CANCEL switch: Released	OFF
		CANCEL switch: Pressed	ON

NOTE:
Any monitored item that does not match the vehicle being diagnosed is deleted from the display automatically.
*: This signal is converted by ECM internally. Thus, this differs from ECM terminals voltage.

Major Sensor Reference Graph in Data Monitor Mode

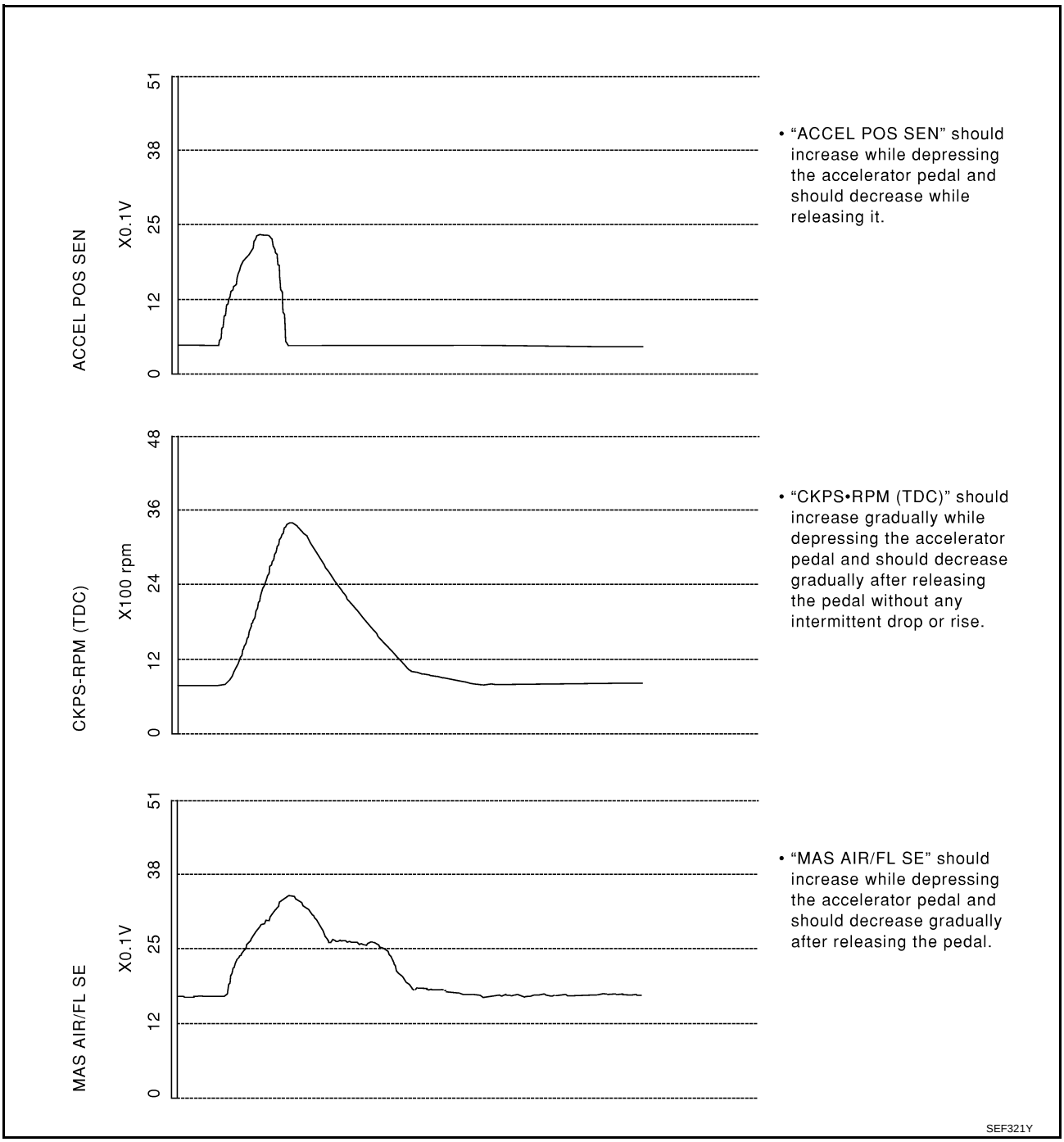
BBS0027U

The following are the major sensor reference graphs in “DATA MONITOR” mode.

ACCEL POS SEN, “CKPS·RPM (TDC)”, “MAS AIR/FL SE”

Below is the data for “ACCEL POS SEN”, “CKPS·RPM (TDC)” and “MAS AIR/FL SE” when revving engine quickly up to 3,000 rpm under no load after warming up engine to the normal operating temperature.

Each value is for reference, the exact value may vary.



TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT

PFP:00006

Description

BBS0027V

Intermittent incidents may occur. In many cases, the incident resolves itself (the part or circuit function returns to normal without intervention). It is important to realize that the symptoms described in the customer's complaint often do not recur on DTC visits. Realize also that the most frequent cause of intermittent incidents occurrences is poor electrical connections. Because of this, the conditions under which the incident occurred may not be clear. Therefore, circuit checks made as part of the standard diagnostic procedure may not indicate the specific malfunctioning area.

COMMON INTERMITTENT INCIDENTS REPORT SITUATIONS

STEP in Work Flow	Situation
II	The CONSULT-II is used. The SELF-DIAG RESULTS screen shows time data other than “0”.
III	The symptom described by the customer does not recur.
IV	DTC does not appear during the DTC Confirmation Procedure.
VI	The Diagnostic Procedure for XXXX does not indicate the malfunctioning area.

Diagnostic Procedure

BBS0027W

1. INSPECTION START

Erase DTCs. Refer to EC-1476, "HOW TO ERASE DTC" .

>> GO TO 2.

2. CHECK GROUND TERMINALS

Check ground terminals for corroding or loose connection.
Refer to EC-1528, "Ground Inspection" .

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. SEARCH FOR ELECTRICAL INCIDENT

Perform GI-23, "How to Perform Efficient Diagnosis for an Electrical Incident" , “INCIDENT SIMULATION TESTS”.

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace.

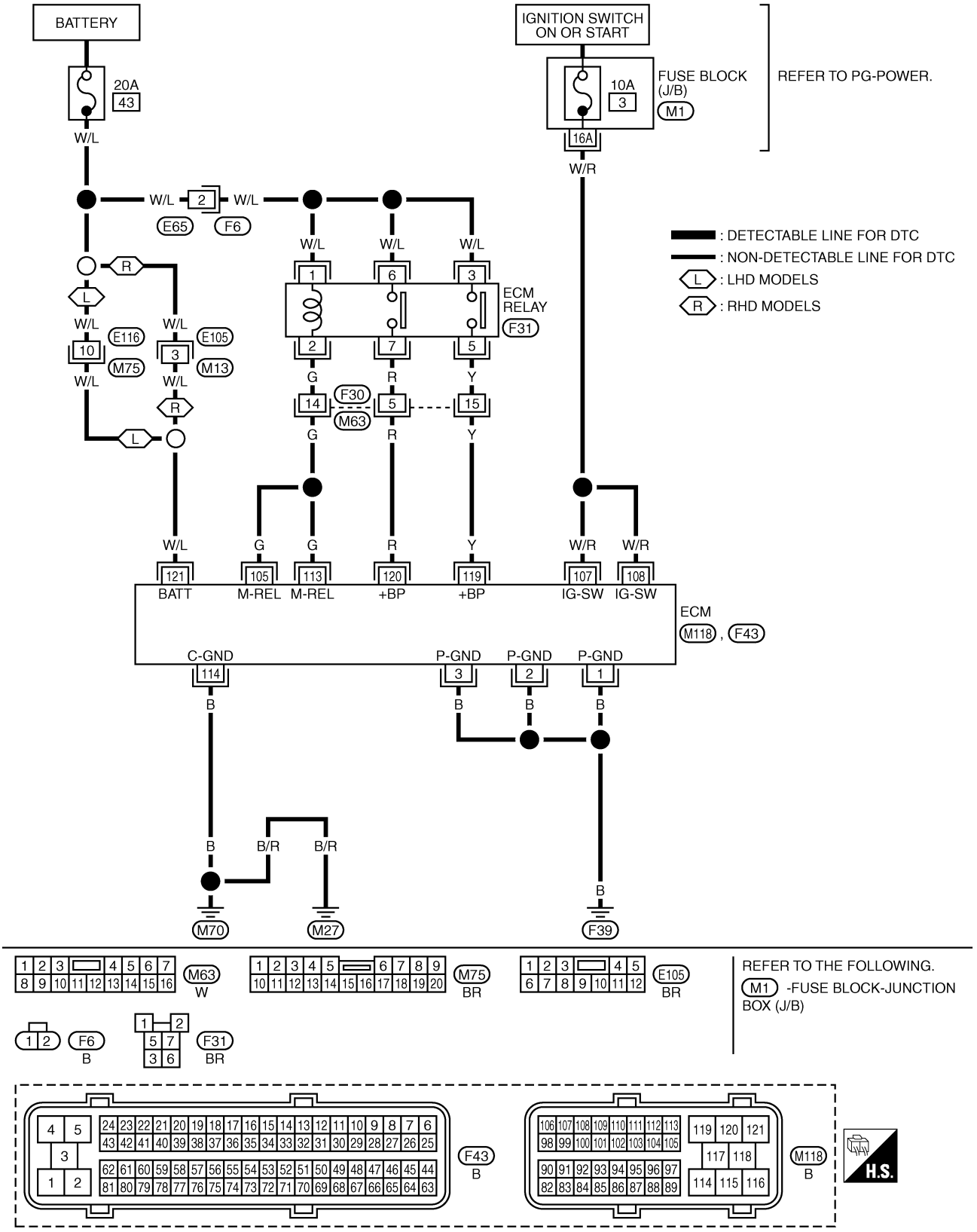
POWER SUPPLY AND GROUND CIRCUIT

PFP:24110

Wiring Diagram

BBS0027X

EC-MAIN-01



TBWB1098E

Remarks: Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
1 2 3	B B B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
105	G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	W/R W/R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
113	G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
114	B	ECM ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0V
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
121	W/L	Power supply for ECM (Back-up)	**[Ignition switch OFF]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS0027Y

1. INSPECTION START

Start engine.
Is engine running?

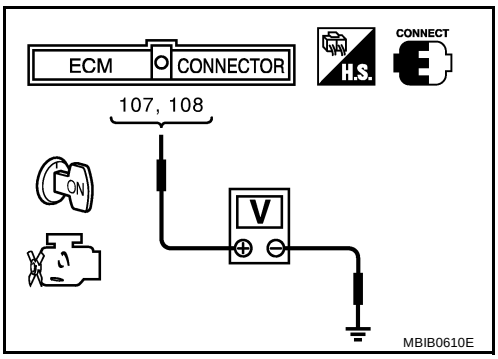
Yes or No

Yes >> GO TO 6.
No >> GO TO 2.

2. CHECK ECM POWER SUPPLY CIRCUIT-I

1. Turn ignition switch ON.
2. Check voltage between ECM terminals 107, 108 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

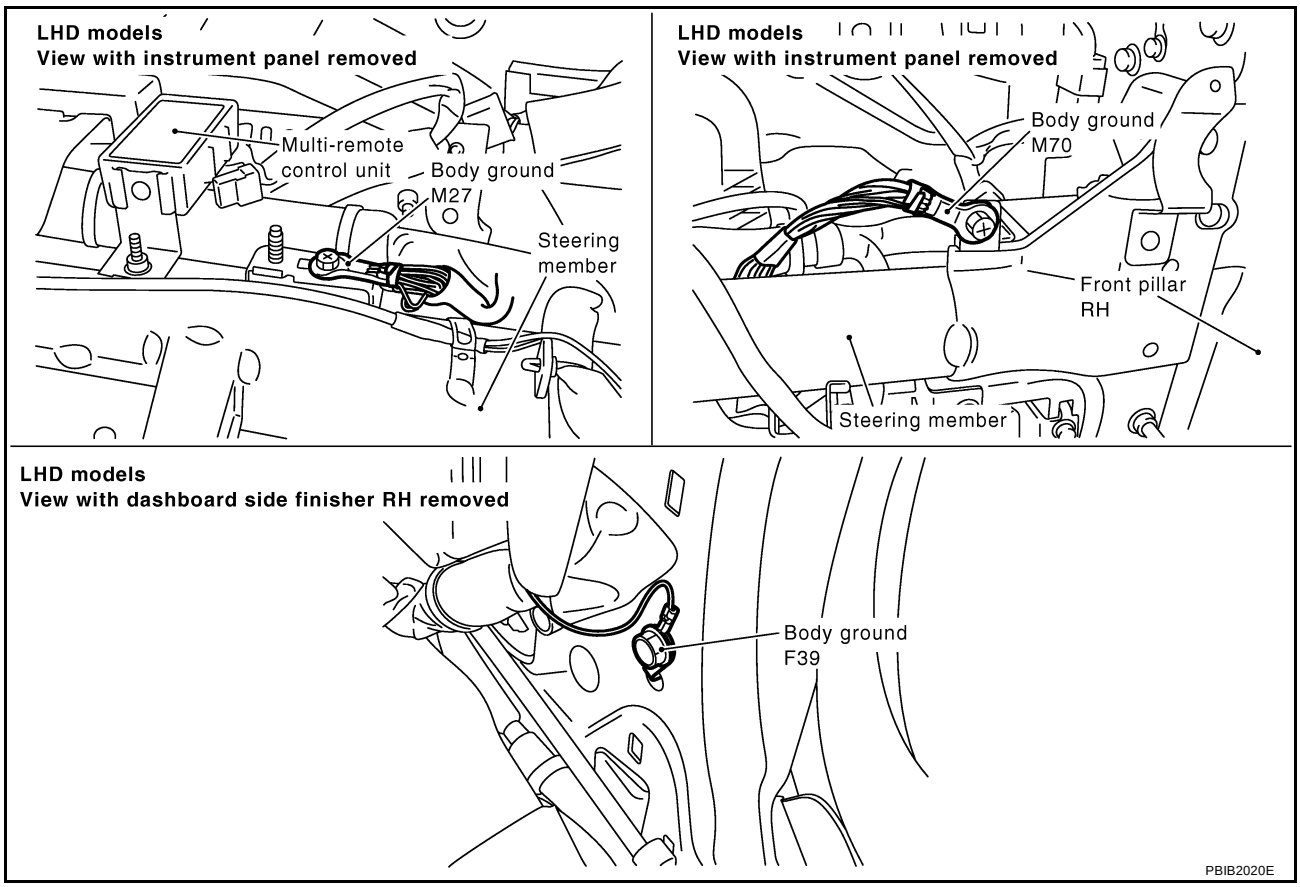
Check the following.

- Fuse block (J/B) connector M1
- 10A fuse
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .



OK or NG

OK >> GO TO 5.
NG >> Repair or replace ground connections.

5. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 1, 2, 3, 114 and body ground. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to power.

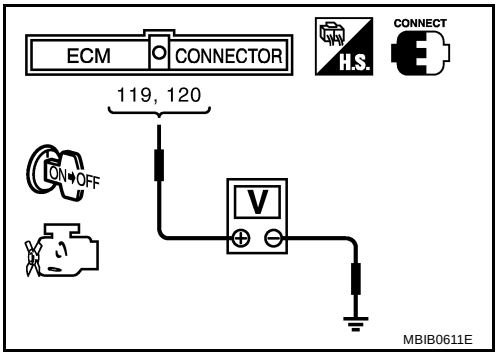
OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to power in harness or connectors.

6. CHECK ECM POWER SUPPLY CIRCUIT-II

1. Turn ignition switch OFF.
2. Reconnect ECM harness connector.
3. Turn ignition switch ON and then OFF.
4. Check voltage between ECM terminals 119, 120 and ground with CONSULT-II or tester.

Voltage: After turning ignition switch OFF, battery voltage will exist for a few seconds, then drop to approximately 0V.

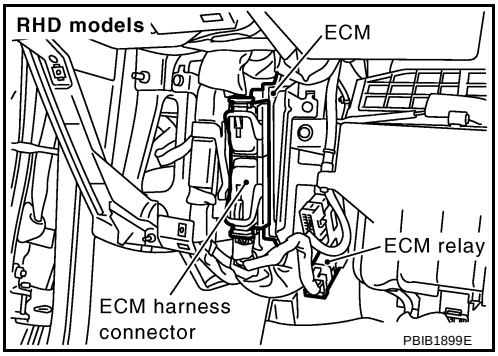


OK or NG

OK >> GO TO 14.
NG (Battery voltage does not exist)>>GO TO 7.
NG (Battery voltage exists for more then a few seconds)>>GO TO 9.

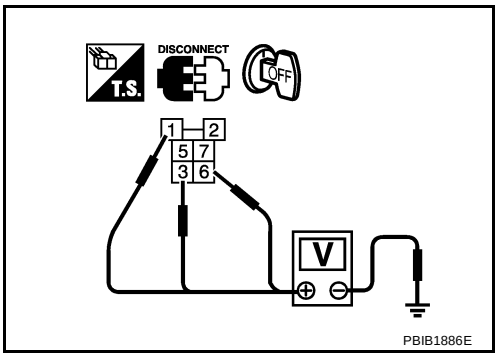
7. CHECK ECM POWER SUPPLY CIRCUIT-III

1. Disconnect ECM relay.



2. Check voltage between relay terminals 1, 3, 6 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E65, F6
- 20A fuse
- Harness for open or short between ECM relay and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminals 105, 113 and ECM relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between ECM and ECM relay.

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ECM POWER SUPPLY CIRCUIT-IV

1. Check harness continuity between ECM terminal 119 and ECM relay terminal 5, ECM terminal 120 and ECM relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between ECM and ECM relay.

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ECM RELAY

Refer to EC-1528, "Component Inspection" .

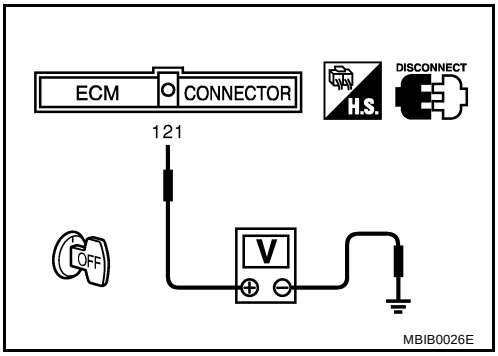
OK or NG

OK >> GO TO 14.
NG >> Replace ECM relay.

14. CHECK ECM POWER SUPPLY CIRCUIT-V

Check voltage between ECM terminal 121 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 16.
NG >> GO TO 15.

15. DETECT MALFUNCTIONING PART

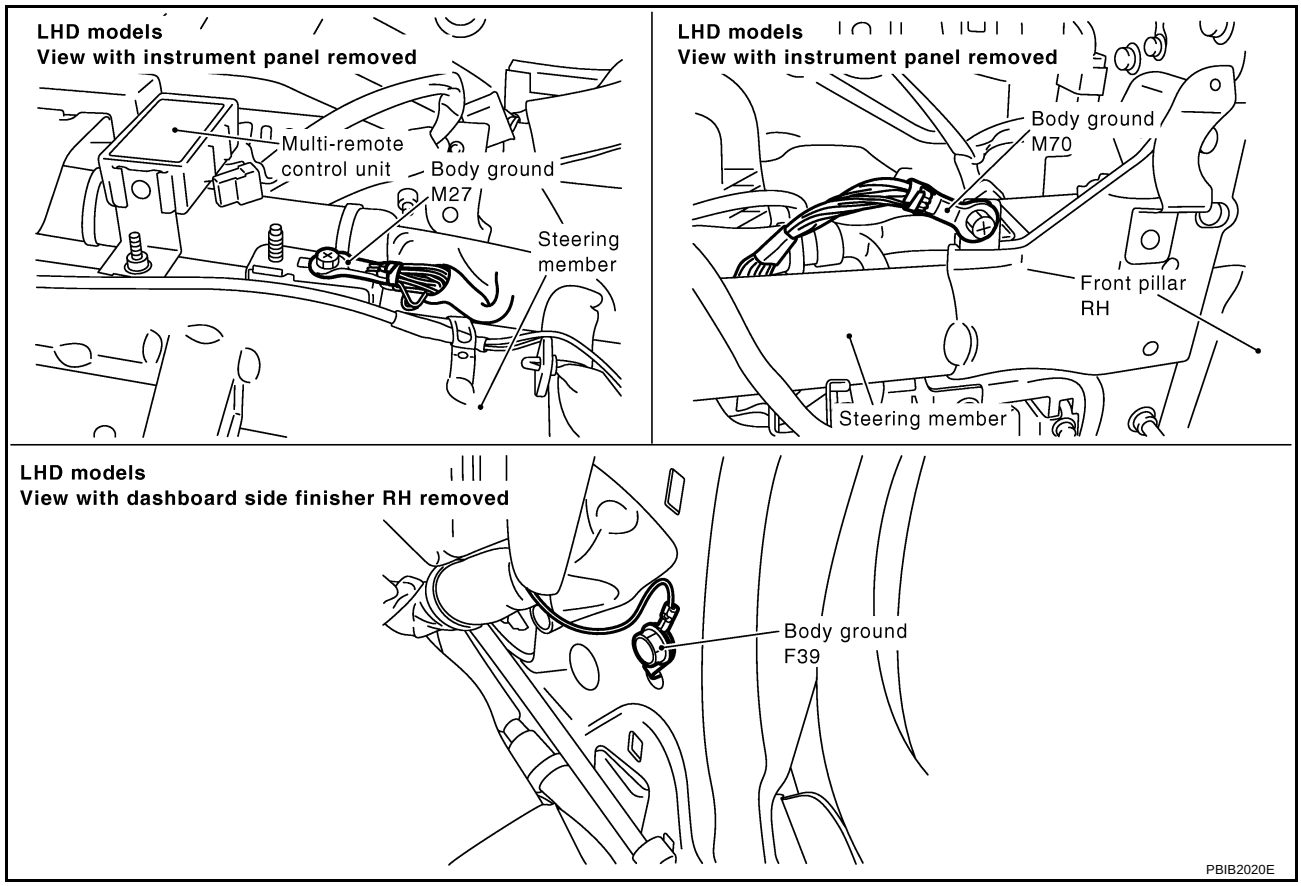
Check the following.

- 20A fuse
- Harness connectors E116, M75 (LHD models)
- Harness connectors E105, M13 (RHD models)
- Harness for open or short between ECM and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

16. CHECK GROUND CONNECTIONS

Loosen and retighten ground screws on the body. Refer to EC-1067, "Ground Inspection" .



OK or NG

OK >> GO TO 17.
NG >> Repair or replace ground connections.

17. CHECK ECM GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 1, 2, 3, 114 and body ground. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to power.

OK or NG

OK >> GO TO 18.
NG >> Repair open circuit or short to power in harness or connectors.

18. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

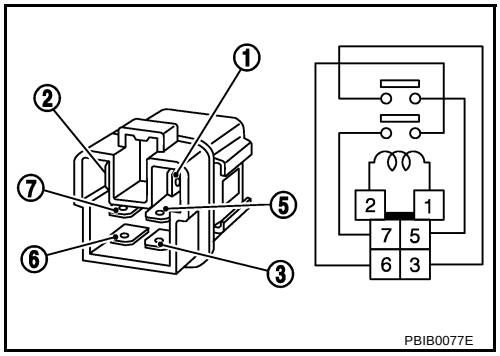
BBS0027Z

ECM RELAY

1. Apply 12V direct current between ECM relay terminals 1 and 2.
2. Check continuity between relay terminals (3) and (5), (6) and (7).

Condition	Continuity
12V direct current supply between terminals (1) and (2)	Yes
OFF	No

3. If NG, replace ECM relay.



Ground Inspection

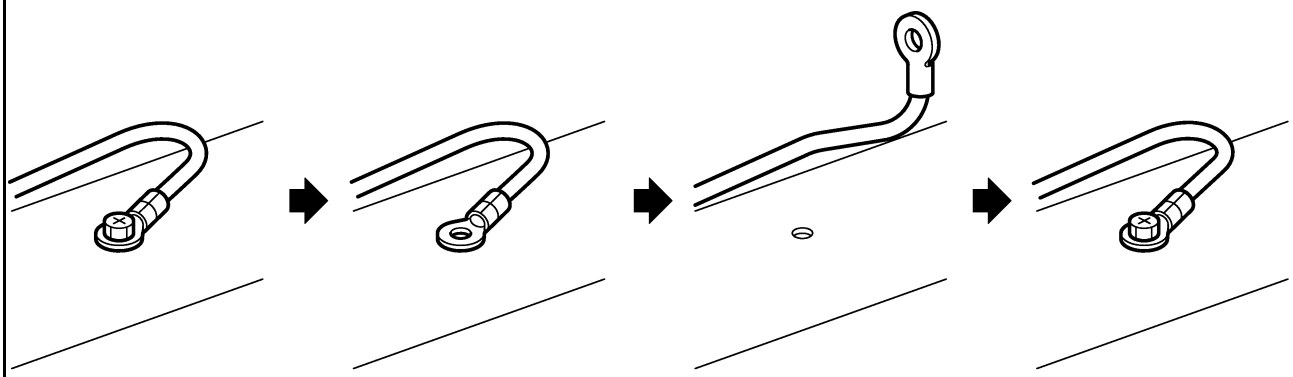
BBS00280

Ground connections are very important to the proper operation of electrical and electronic circuits. Ground connections are often exposed to moisture, dirt and other corrosive elements. The corrosion (rust) can become an unwanted resistance. This unwanted resistance can change the way a circuit works.
Electronically controlled circuits are very sensitive to proper grounding. A loose or corroded ground can drastically affect an electronically controlled circuit. A poor or corroded ground can easily affect the circuit. Even when the ground connection looks clean, there can be a thin film of rust on the surface.
When inspecting a ground connection follow these rules:

- Remove the ground bolt or screw.
- Inspect all mating surfaces for tarnish, dirt, rust, etc.
- Clean as required to assure good contact.
- Reinstall bolt or screw securely.
- Inspect for “add-on” accessories which may be interfering with the ground circuit.
- If several wires are crimped into one ground eyelet terminal, check for proper crimps. Make sure all of the wires are clean, securely fastened and providing a good ground path. If multiple wires are cased in one eyelet make sure no ground wires have excess wire insulation.

For detailed ground distribution information, refer to PG-13, "Ground Distribution" .

Ground Inspection



DTC U1000 CAN COMMUNICATION LINE

PFP:23710

Description

BBS00281

CAN (Controller Area Network) is a serial communication line for real time application. It is an on-vehicle multiplex communication line with high data communication speed and excellent error detection ability. Many electronic control units are equipped onto a vehicle, and each control unit shares information and links with other control units during operation (not independent). In CAN communication, control units are connected with 2 communication lines (CAN H line, CAN L line) allowing a high rate of information transmission with less wiring. Each control unit transmits/receives data but selectively reads required data only.

On Board Diagnosis Logic

BBS00282

The MI will not light up for this self-diagnosis.

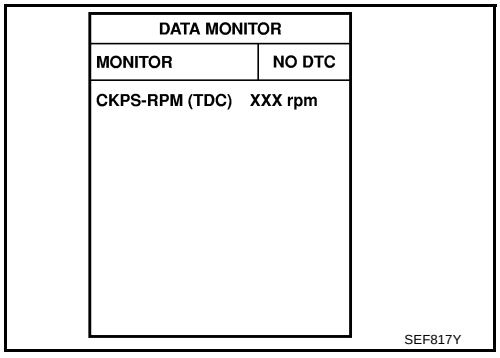
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
U1000 1000	CAN communication line	● ECM can not communicate to other control unit. ● ECM can not communicate for more than the specified time.	● Harness or connectors (CAN communication line is open or shorted)

DTC Confirmation Procedure

BBS00283

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

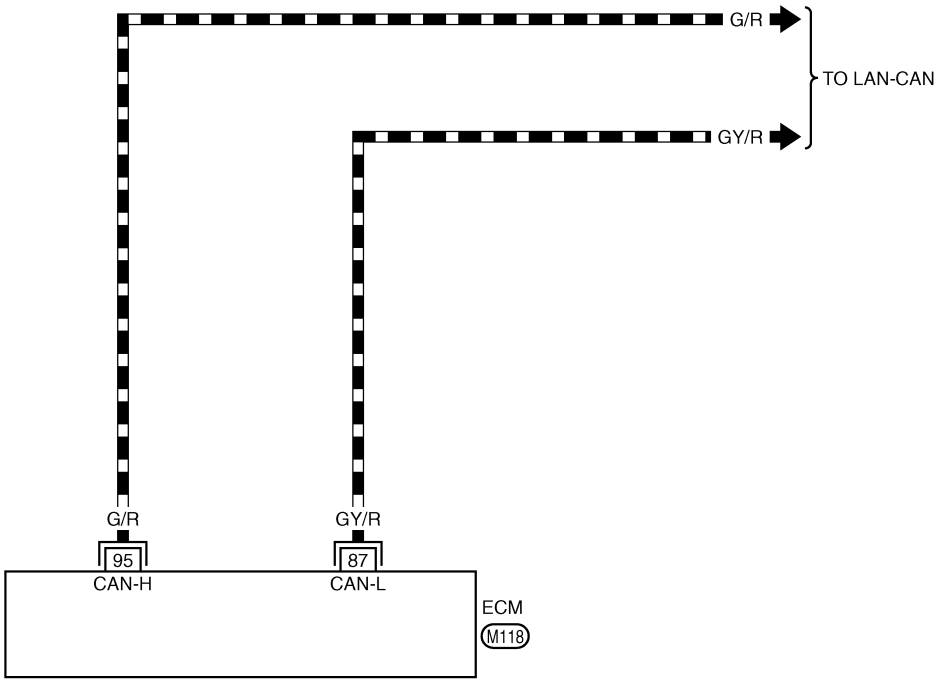
1. Turn ignition switch ON and wait at least 3 seconds.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. If DTC is detected, go to EC-1532, "Diagnostic Procedure" .

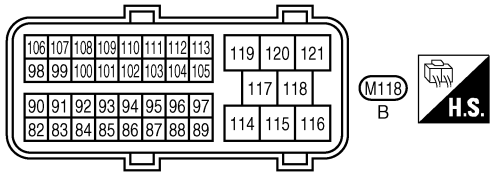


Wiring Diagram

BBS00284

EC-CAN-01





TBWA0564E

Diagnostic Procedure

BBS00285

Go to LAN-25, "CAN Communication Unit" .

DTC P0016 CKP - CMP CORRELATION

PFP:10328

On Board Diagnosis Logic

BBS00286

The MI will not light up for this self-diagnosis.

NOTE:
If DTC P0016 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0016 0016	Crankshaft position - camshaft position correlation	The correlation between crankshaft position sensor signal and camshaft position sensor signal is out of the normal range.	● Camshaft position sensor ● Crankshaft position sensor ● Timing chain ● Signal plate

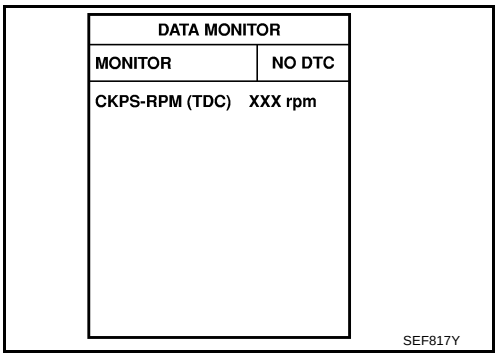
DTC Confirmation Procedure

BBS00287

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1533, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1533, "Diagnostic Procedure" .

Diagnostic Procedure

BBS00288

1. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1629, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace camshaft position sensor.

2. CHECK SPROCKET

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 3.
NG >> Remove debris and clean the signal plate or replace sprocket.

3. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1641, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace crankshaft position sensor.

4. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 5.
NG >> Replace the signal plate.

5. CHECK TIMING CHAIN

Refer to EM-198, "SECONDARY TIMING CHAIN" , EM-203, "PRIMARY TIMING CHAIN" and EM-167, "VACUUM PUMP" .

OK or NG

OK >> GO TO 6.
NG >> Replace timing chain.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0088 FUEL SYSTEM

PFP:17520

On Board Diagnosis Logic

BBS00289

NOTE:
If DTC P0088 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0088 0088	Fuel rail pressure too high	Fuel pressure is too much higher than the specified value.	● Fuel pump ● Fuel injector ● Fuel rail pressure sensor

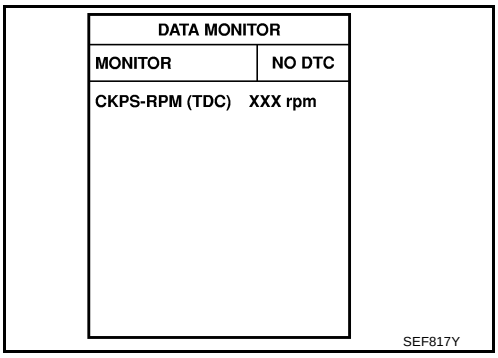
DTC Confirmation Procedure

BBS0028A

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 20 seconds.
4. If DTC is detected, go to EC-1535, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Keep engine speed more than 2,000 rpm for at least 20 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1535, "Diagnostic Procedure" .

Diagnostic Procedure

BBS0028B

1. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1579, "Component Inspection" .

OK or NG

OK >> GO TO 2.
NG >> Replace fuel rail.

2. CHECK FUEL INJECTOR

Refer to EC-1588, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. REPLACE FUEL INJECTOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

4. CHECK FUEL PUMP

Refer to EC-1685, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

BBS0028C

FUEL INJECTOR

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P0089 FUEL PUMP

PFP:16700

On Board Diagnosis Logic

BBS0028D

The MI will not light up for this self-diagnosis.

NOTE:
If DTC P0089 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0089 0089	Fuel pump performance	Fuel pressure is too much higher than the target value.	● Fuel pump ● Air mixed with fuel ● Lack of fuel ● Fuel rail pressure sensor ● Fuel transport pump operation

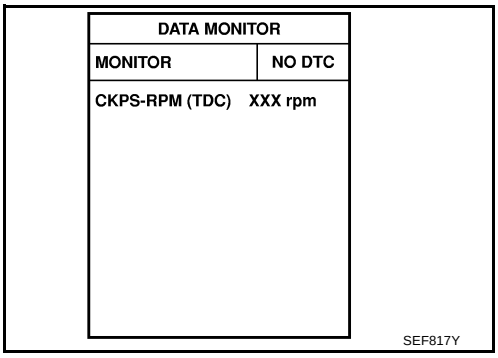
DTC Confirmation Procedure

BBS0028E

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Let engine idle for at least 30 seconds.
4. If DTC is detected, go to EC-1537, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Let engine idle for at least 30 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1537, "Diagnostic Procedure" .

Diagnostic Procedure

BBS0028F

1. CHECK FUEL TRANSPORT PUMP OPERATION

Perform Diagnostic Procedure for fuel transport pump. Refer to EC-1799 .

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of Diagnostic Procedure for fuel transport pump.

2. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1537, "DTC Confirmation Procedure" , again.
7. Is DTC detected again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
5. Perform EC-1537, "DTC Confirmation Procedure" , again.
6. Is DTC detected again?

Yes or No

Yes >> GO TO 3.
No >> **INSPECTION END**

3. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1579, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK FUEL PUMP

Perform EC-1681, "DTC Confirmation Procedure" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace Fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Removal and Installation

BBS0028G

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P0093 FUEL SYSTEM

PFP:17520

On Board Diagnosis Logic

BBS0028H

NOTE:
If DTC P0093 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0093 0093	Fuel system leak	ECM detects a fuel system leak. (The relation between the output voltage to the fuel pump and input voltage from the fuel rail pressure sensor is out of the normal range.)	● Fuel pump ● Fuel rail ● Fuel pipe ● Fuel rail pressure relief valve ● Air mixed with fuel ● Lack of fuel ● Fuel transport pump operation

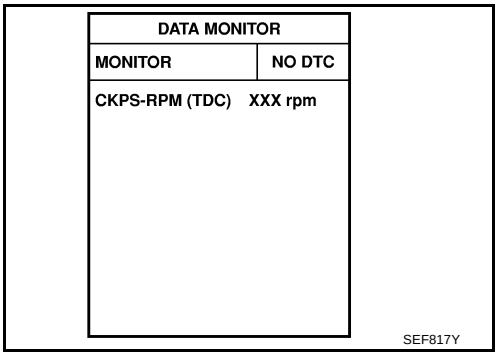
DTC Confirmation Procedure

BBS0028I

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
4. If DTC is detected, go to EC-1539, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1539, "Diagnostic Procedure" .

Diagnostic Procedure

BBS0028J

1. CHECK FUEL TRANSPORT PUMP OPERATION

Perform Diagnostic Procedure for fuel transport pump. Refer to EC-1799 .

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of Diagnostic Procedure for fuel transport pump.

2. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1539, "DTC Confirmation Procedure" , again.
7. Is DTC detected again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
5. Perform EC-1539, "DTC Confirmation Procedure" , again.
6. Is DTC detected again?

Yes or No

Yes >> GO TO 3.
No >> **INSPECTION END**

3. CHECK FUEL LINE FOR LEAK

1. Start engine.
2. Visually check the following for fuel leak.

- Fuel tube from fuel pump to fuel rail
- Fuel rail
- Fuel tube from fuel rail to fuel injector

3. Also check for improper connection or pinches.

OK or NG

OK >> GO TO 4.
NG >> Repair malfunctioning part.

4. CHECK FUEL RAIL PRESSURE RELIEF VALVE

Refer to EC-1541, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace fuel rail.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 6.
NG >> Repair or replace.

6. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Component Inspection

BBS0028K

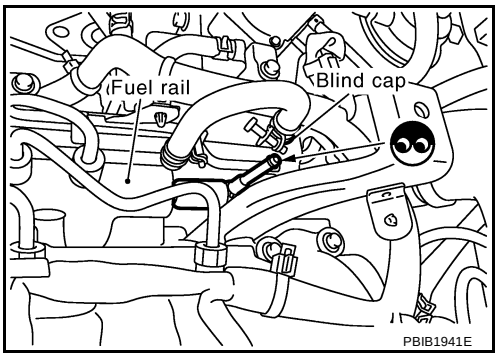
FUEL RAIL PRESSURE RELIEF VALVE

With CONSULT-II

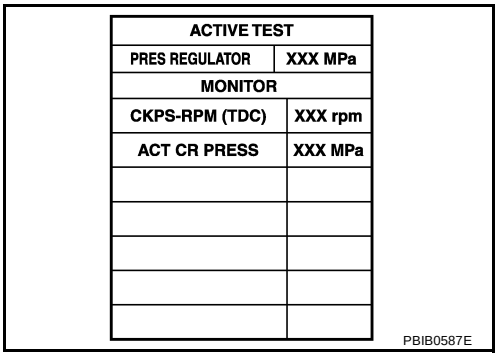
WARNING:

- **Confirm that the engine is cooled down and there are no fire hazards near the vehicle.**
- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.**

1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Turn ignition switch ON.



5. Select “PRES REGULATOR” in “ACTIVE TEST MODE” with CONSULT-II.
6. Start engine and keep engine speed 2,000 rpm.
7. Raise fuel pressure to 180 MPa with touching “UP” or “Qu” on the CONSULT-II screen.
8. Confirm that the fuel does not come out from the fuel rail pressure relief valve.



WARNING:

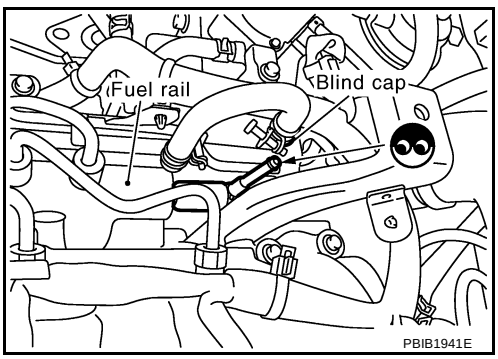
- **Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.**
- **If the fuel comes out, stop the engine immediately.**

Without CONSULT-II

WARNING:

- **Confirm that the engine is cooled down and there are no fire hazards near the vehicle.**
- **Prepare pans or saucers under the disconnected fuel line because the fuel may spill out.**

1. Turn ignition switch OFF.
2. Remove fuel hose from fuel rail pressure relief valve.
3. Attach a blind cap or plug to removed hose.
4. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds.
5. Confirm that the fuel does not come out from the fuel rail pressure relief valve.



WARNING:

- **Be careful not to allow leaked fuel to contaminate engine compartment. Especially, ensure to keep engine mount insulator clear of fuel.**
- **If the fuel comes out, stop the engine immediately.**

Removal and Installation

BBS0028L

FUEL RAIL

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

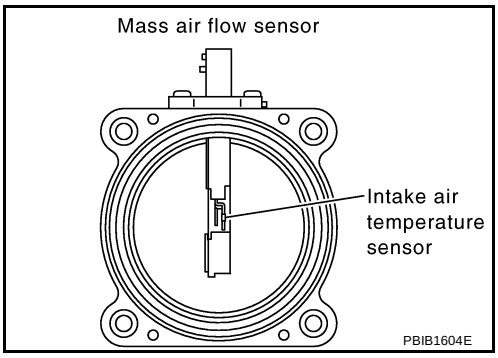
DTC P0102, P0103 MAF SENSOR

PFP:22680

Component Description

BBS0028M

The mass air flow sensor is placed in the stream of intake air. It measures the intake flow rate by measuring a part of the entire intake flow. The mass air flow sensor controls the temperature of the hot wire to a certain amount. The heat generated by the hot wire is reduced as the intake air flows around it. The more air, the greater the heat loss.
Therefore, the electric current supplied to hot wire is changed to maintain the temperature of the hot wire as air flow increases. The ECM detects the air flow by means of this current change.



CONSULT-II Reference Value in Data Monitor Mode

BBS0028N

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAS AIR/FL SE*	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Ignition switch: ON (Engine stopped)	Approximately 0.4V
		Idle	1.3 - 1.6V
		Engine is revving from idle to about 4,000 rpm.	1.3 - 1.6V to Approximately 4.0V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)

This signal is converted by ECM internally. Thus, it differs from ECM terminal voltage.

On Board Diagnosis Logic

BBS0028O

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0102 0102	Mass air flow sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Mass air flow sensor
P0103 0103	Mass air flow sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

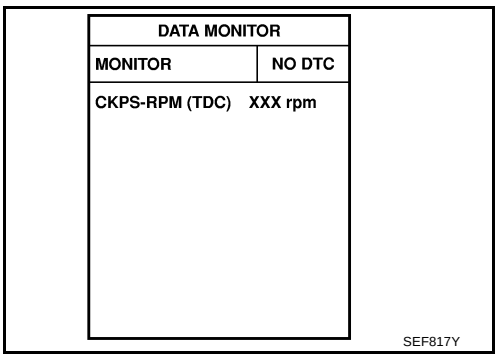
DTC Confirmation Procedure

BBS0028P

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1522, "Diagnostic Procedure" .



WITHOUT CONSULT-II

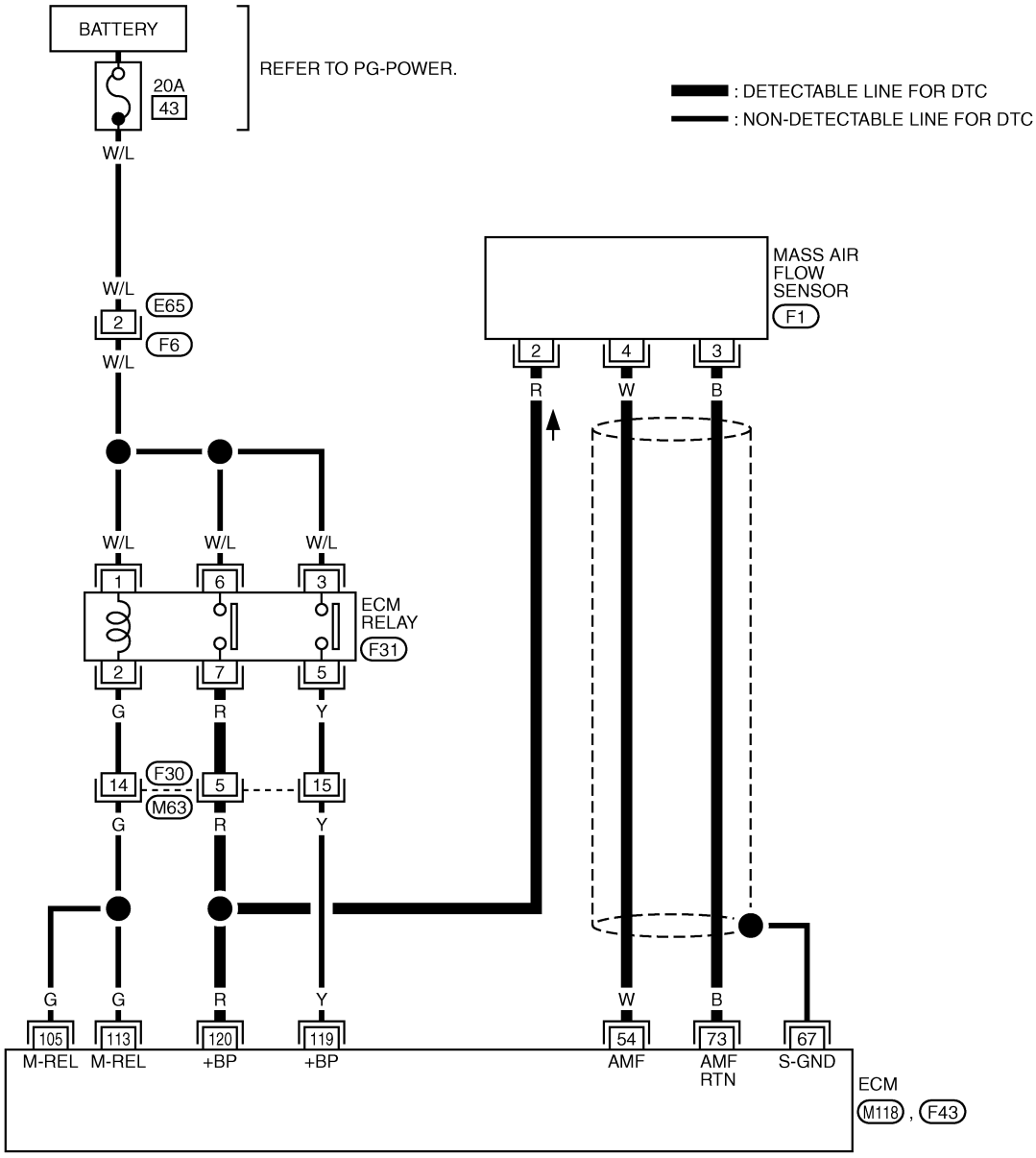
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.

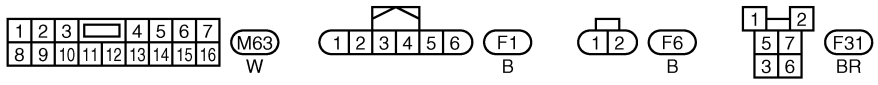
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1547, "Diagnostic Procedure" .

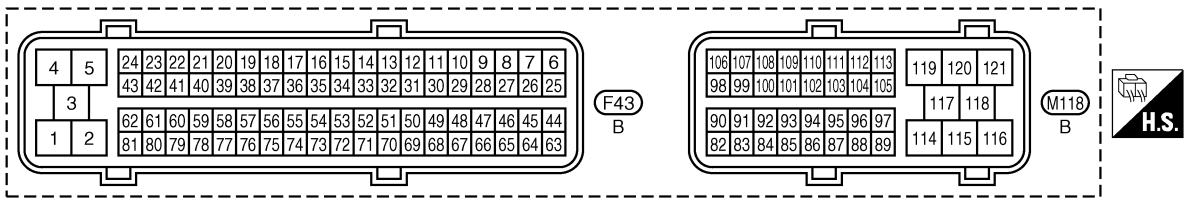
Wiring Diagram

BBS0028Q

EC-MAFS-01







TBWA0565E

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

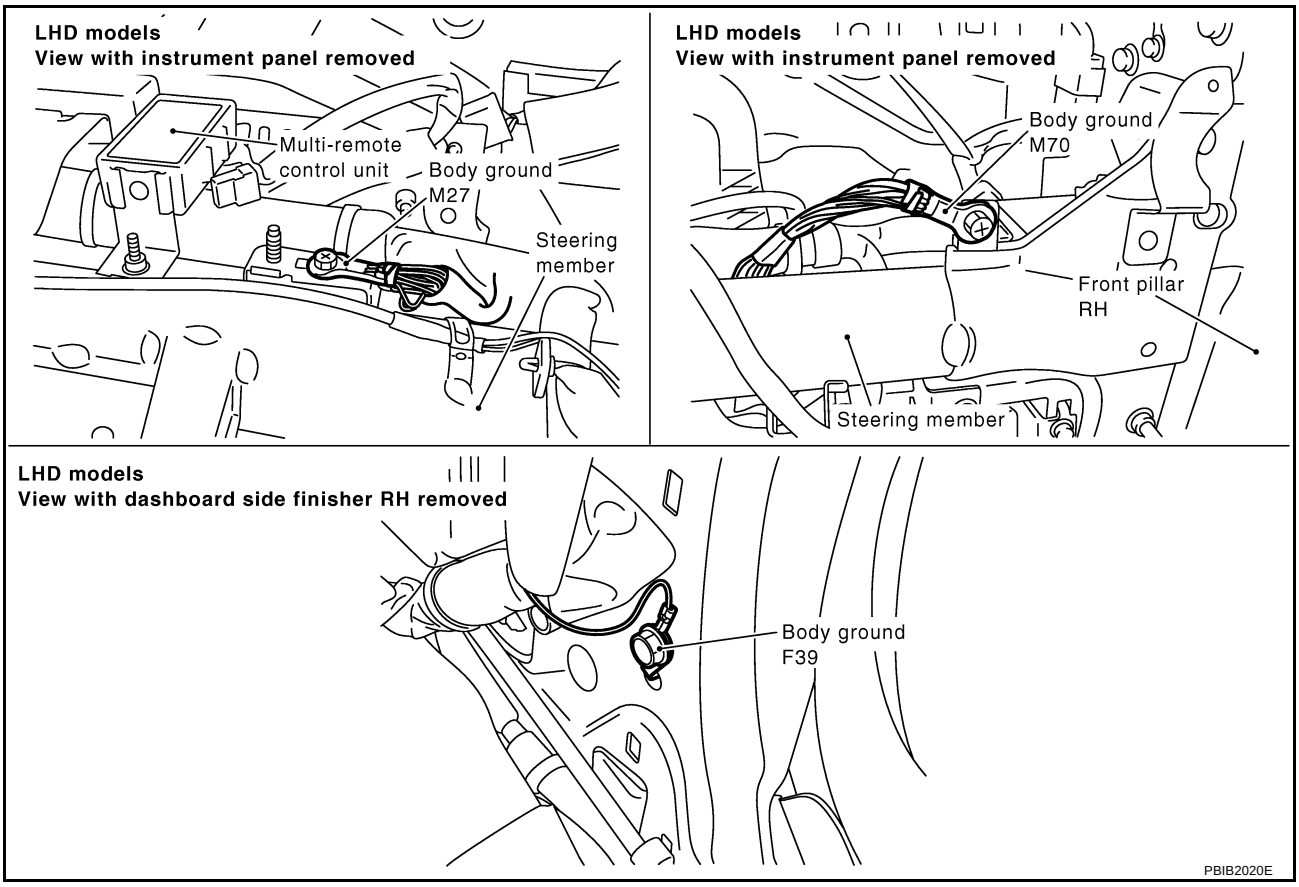
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
54	W	Mass air flow sensor	**[Ignition switch: ON]**	Approximately 0.7V
			[Engine is running] ● **Warm-up condition** ● Idle speed	1.6 - 1.9V
			[Engine is running] ● **Warm-up condition** ● Engine is revving from idle to about 4,000 rpm.	1.6 - 1.9V to Approximately 4.3V (Check for liner voltage rise in response to engine being increased to about 4,000 rpm)
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
73	B	Mass air flow sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS0028R

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

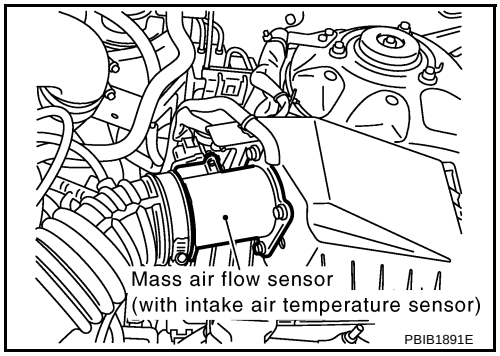


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

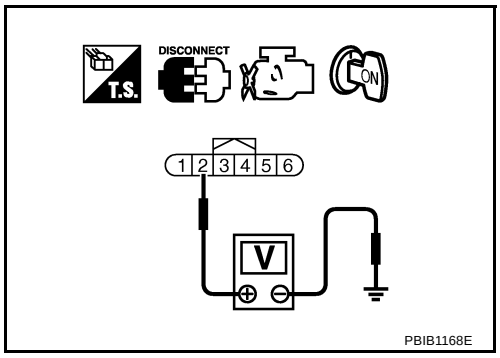
2. CHECK MAFS POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between mass air flow sensor terminals 2 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between ECM relay and mass air flow sensor
- Harness for open or short between mass air flow sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK MAFS GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between mass air flow sensor terminal 3 and ECM terminal 73. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK MAFS INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between mass air flow sensor terminal 4 and ECM terminal 54. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK MASS AIR FLOW SENSOR

Refer to EC-1549, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace mass air flow sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

BBS0028S

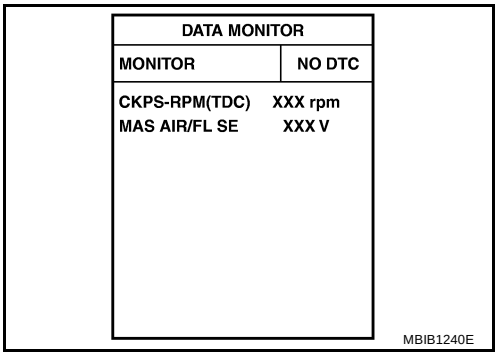
MASS AIR FLOW SENSOR

With CONSULT-II

1. Reconnect all harness connectors disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Connect CONSULT-II and select “DATA MONITOR” mode.
4. Select “MAS AIR/FL SE” and check indication under the following conditions.

Condition	MAS AIR/FL SE (V)
Ignition switch ON (Engine stopped.)	Approx. 0.4
Idle (Engine is warmed-up to normal operating temperature.)	1.3 - 1.6
Idle to about 4,000 rpm	1.3 - 1.6 to Approx. 4.0*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.



5. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
- Crushed air ducts
- Malfunctioning seal of air cleaner element
- Uneven dirt of air cleaner element
- Improper specification of intake air system parts

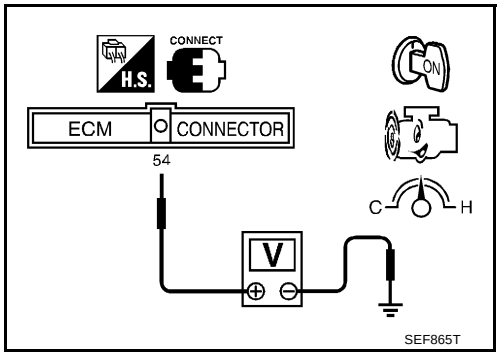
b. If NG, repair or replace malfunctioning part and perform step 2 to 4 again.
If OK, go to next step.

6. Turn ignition switch OFF.
7. Disconnect mass air flow sensor harness connector and reconnect it again.
8. Perform step 2 to 4 again.
9. If NG, clean or replace mass air flow sensor.

Without CONSULT-II

1. Reconnect all harness connectors disconnected.

2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminal 54 (Mass air flow sensor signal) and ground.



Condition	Voltage V
Ignition switch ON (Engine stopped.)	Approx. 0.7
Idle (Engine is warmed-up to normal operating temperature.)	1.6 - 1.9
Idle to about 4,000 rpm	1.6 - 1.9 to Approx. 4.3*

*: Check for linear voltage rise in response to engine being increased to about 4,000 rpm.

4. If the voltage is out of specification, proceed the following.

a. Check for the cause of uneven air flow through mass air flow sensor. Refer to following.
   - Crushed air ducts
   - Malfunctioning seal of air cleaner element
   - Uneven dirt of air cleaner element
   - Improper specification of intake air system parts

b. If NG, repair or replace malfunctioning part and perform step 2 to 3 again.
   If OK, go to next step.

5. Turn ignition switch OFF.
6. Disconnect mass air flow sensor harness connector and reconnect it again.
7. Perform step 2 and 3 again.
8. If NG, clean or replace mass air flow sensor.

Removal and Installation

BBS0028T

MASS AIR FLOW SENSOR

Refer to EM-141, "AIR CLEANER AND AIR DUCT" .

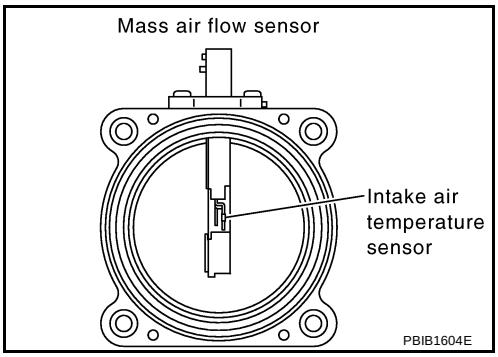
DTC P0112, P0113 IAT SENSOR

PFP:22630

Component Description

BBS0028U

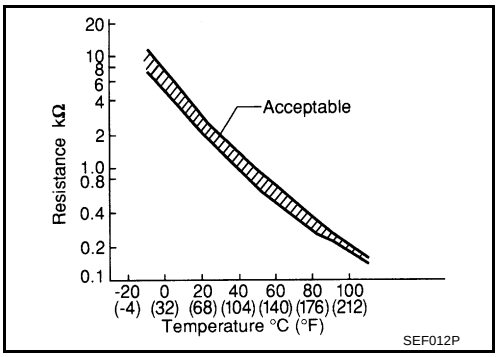
The intake air temperature sensor is built into mass air flow sensor. The sensor detects intake air temperature and transmits a signal to the ECM.
The temperature sensing unit uses a thermistor which is sensitive to the change in temperature. Electrical resistance of the thermistor decreases in response to the temperature rise.



<Reference data>

Intake air temperature °C (°F)	Voltage* V	Resistance kΩ
25 (77)	2.4	1.800 - 2.200
80 (176)	0.8	0.283 - 0.359

*: This data is reference values and is measured between ECM terminal 55 (Intake air temperature sensor) and ground.



CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

BBS0028V

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0112 0112	Intake air temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Intake air temperature sensor
P0113 0113	Intake air temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

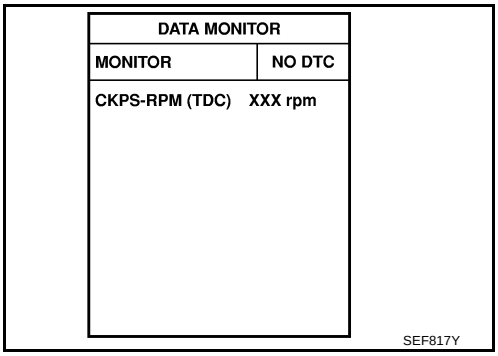
DTC Confirmation Procedure

BBS0028W

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1554, "Diagnostic Procedure" .



WITHOUT CONSULT-II

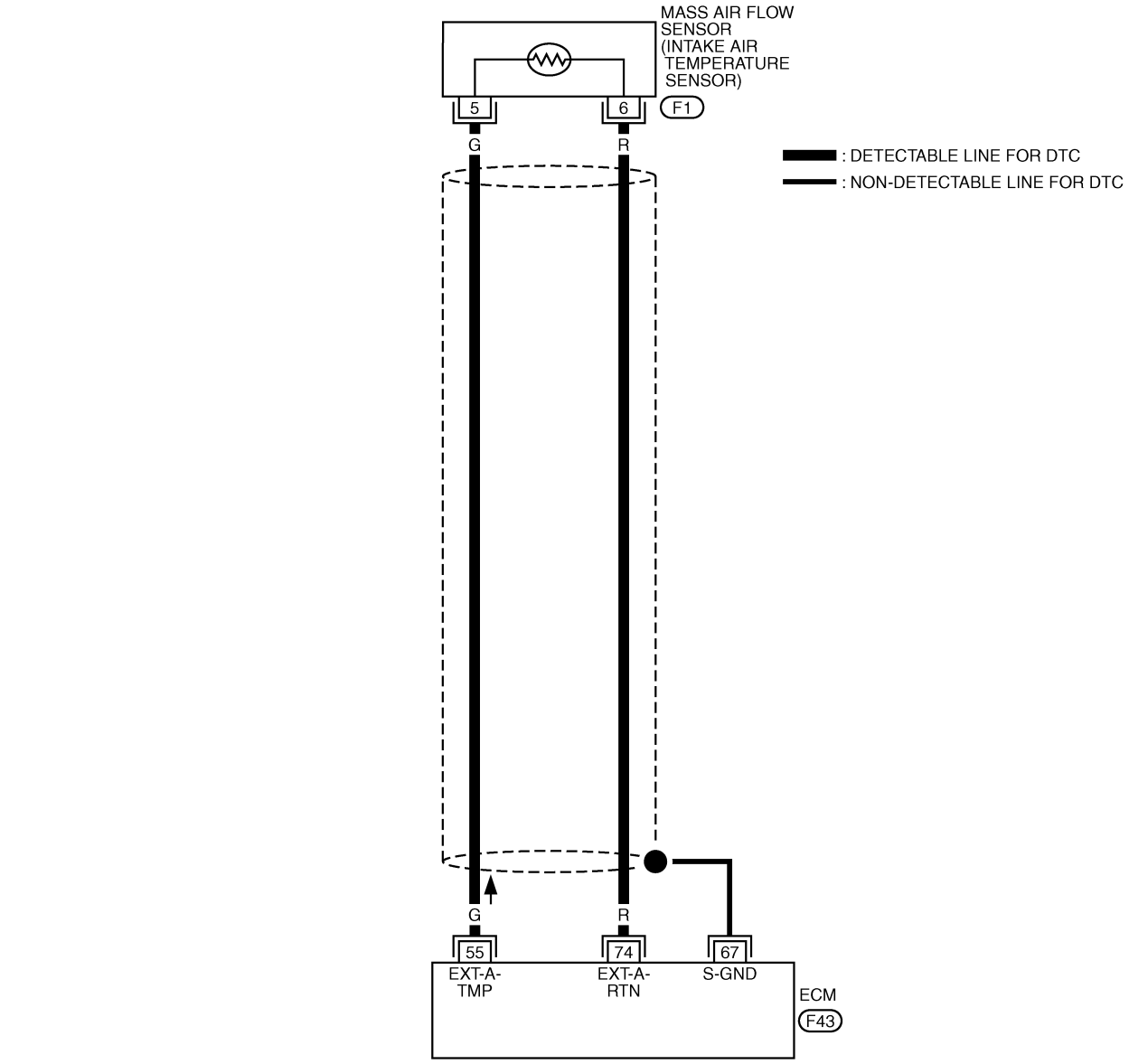
1. Turn ignition switch ON and wait at least 5 seconds.

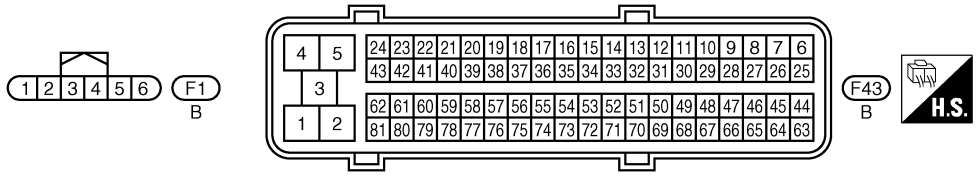
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1554, "Diagnostic Procedure" .

Wiring Diagram

BBS0028X

EC-IATS-01





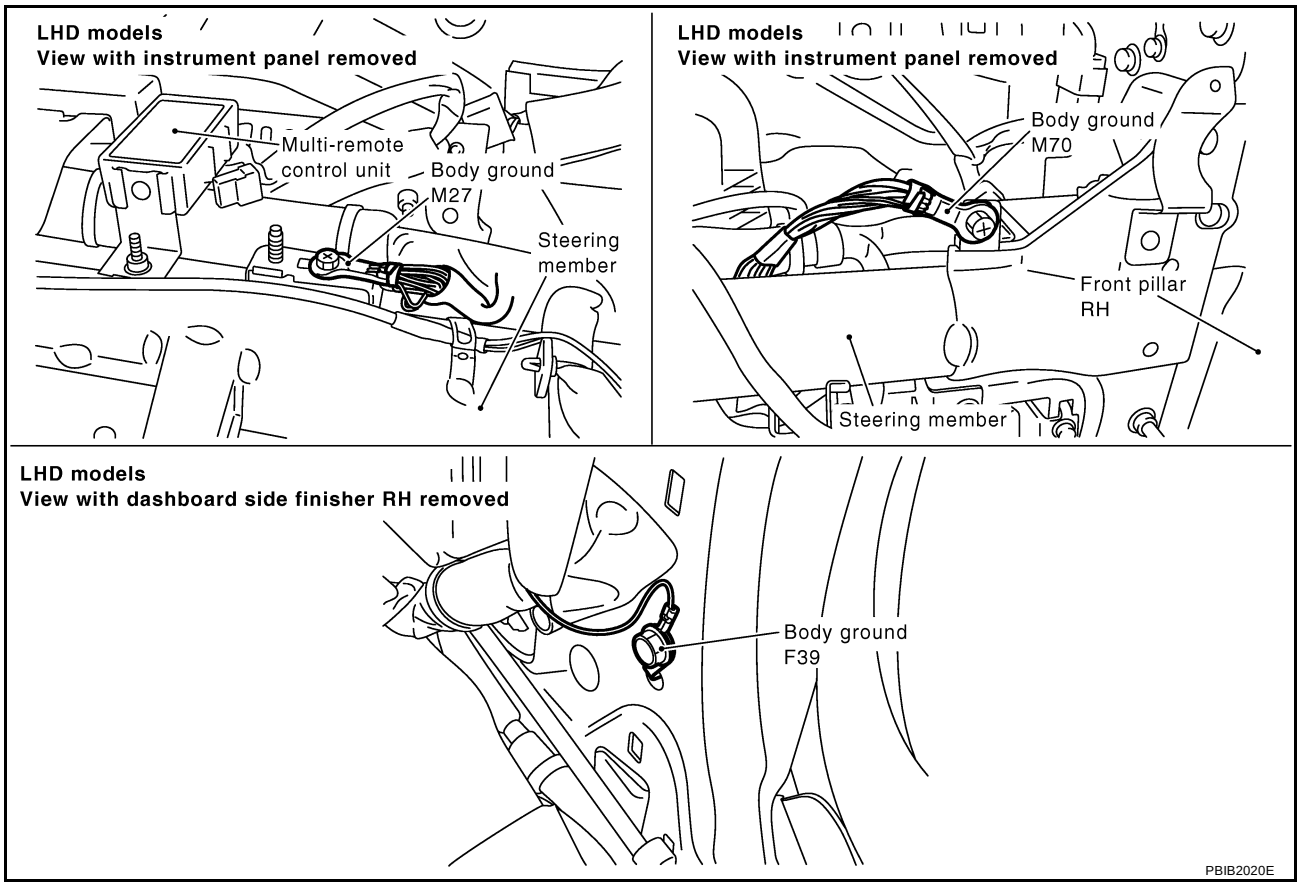
TBWA0587E

Diagnostic Procedure

BBS0028Y

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

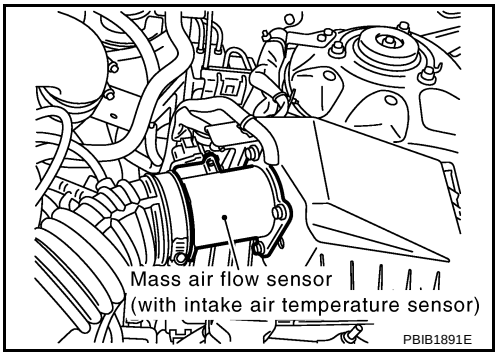


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK INTAKE AIR TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect mass air flow sensor (intake air temperature sensor is built-into) harness connector.
2. Turn ignition switch ON.

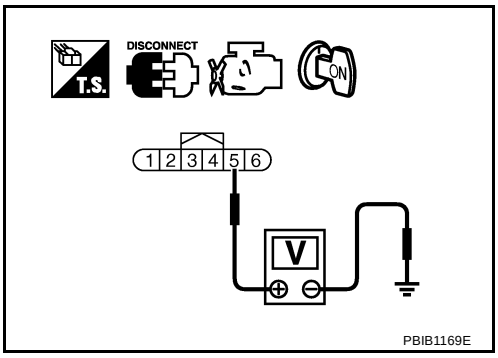


3. Check voltage between MAF sensor terminal 5 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

OK or NG

OK >> GO TO 3.
NG >> Repair harness or connectors.



3. CHECK INTAKE AIR TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between MAF sensor terminal 6 and ECM terminal 74. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTAKE AIR TEMPERATURE SENSOR

Refer to EC-1556, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace mass air flow sensor (with intake air temperature sensor).

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

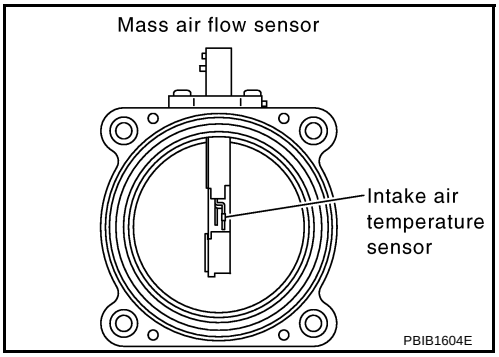
BBS0028Z

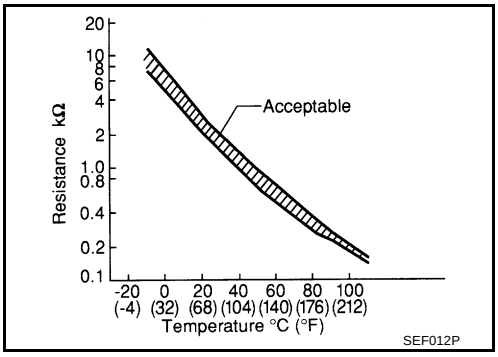
INTAKE AIR TEMPERATURE SENSOR

1. Check resistance between mass air flow sensor terminals 5 and 6 under the following conditions.

Intake air temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200

2. If NG, replace mass air flow sensor (with intake air temperature sensor).





Removal and Installation

BBS00290

MASS AIR FLOW SENSOR

Refer to EM-141, "AIR CLEANER AND AIR DUCT" .

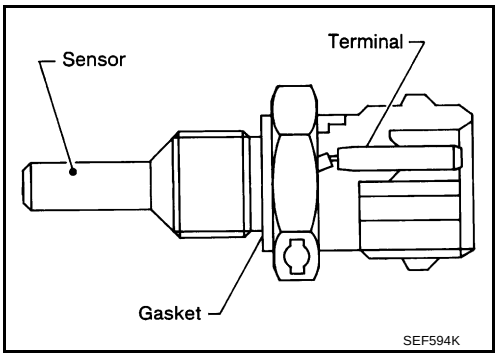
DTC P0117, P0118 ECT SENSOR

PFP:22630

Description

BBS00291

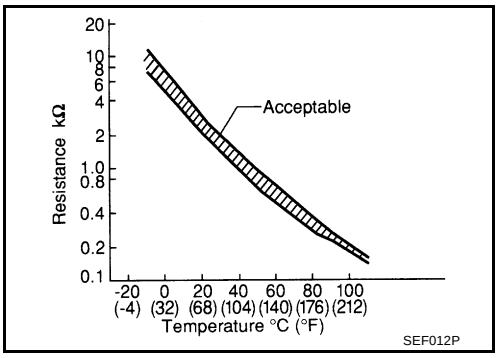
The engine coolant temperature sensor is used to detect the engine coolant temperature. The sensor modifies a voltage signal from the ECM. The modified signal returns to the ECM as the engine coolant temperature input. The sensor uses a thermistor which is sensitive to the change in temperature. The electrical resistance of the thermistor decreases as temperature increases.



<Reference data>

Engine coolant temperature °C (°F)	Voltage* (V)	Resistance (kΩ)
–10 (14)	4.7	7.0 - 11.4
20 (68)	3.8	2.1 - 2.9
50 (122)	2.6	0.68 - 1.00
90 (194)	1.3	0.236 - 0.260

*: This data is reference values and is measured between ECM terminal 51 (Engine coolant temperature sensor) and ground.



CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

On Board Diagnosis Logic

BBS00292

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0117 0117	Engine coolant temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Engine coolant temperature sensor
P0118 0118	Engine coolant temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

DTC Confirmation Procedure

BBS00293

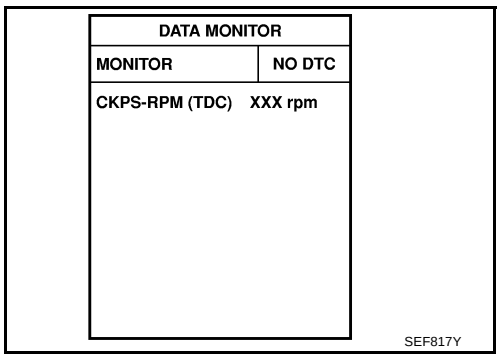
NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1560, "Diagnostic Procedure" .



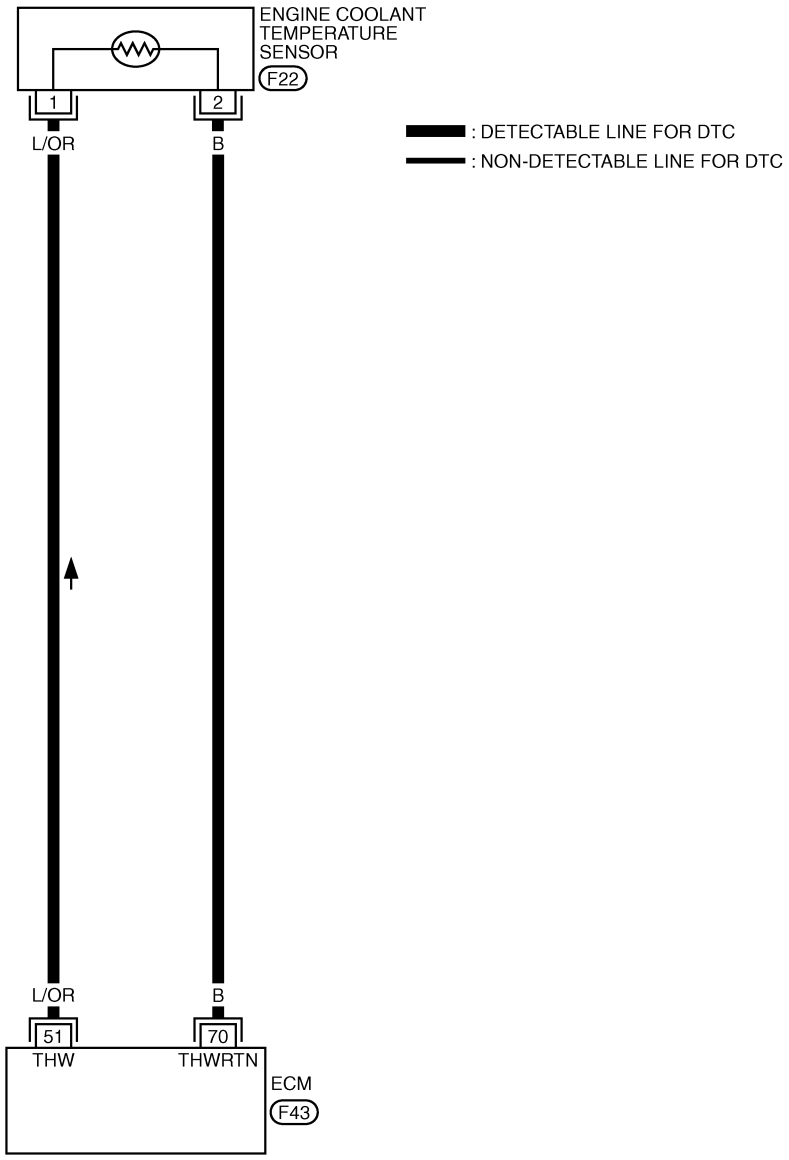
WITHOUT CONSULT-II

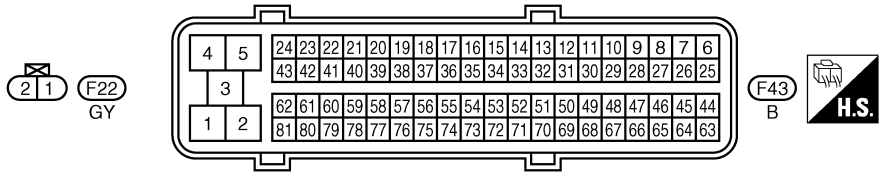
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1560, "Diagnostic Procedure" .

Wiring Diagram

BBS00294

EC-ECTS-01





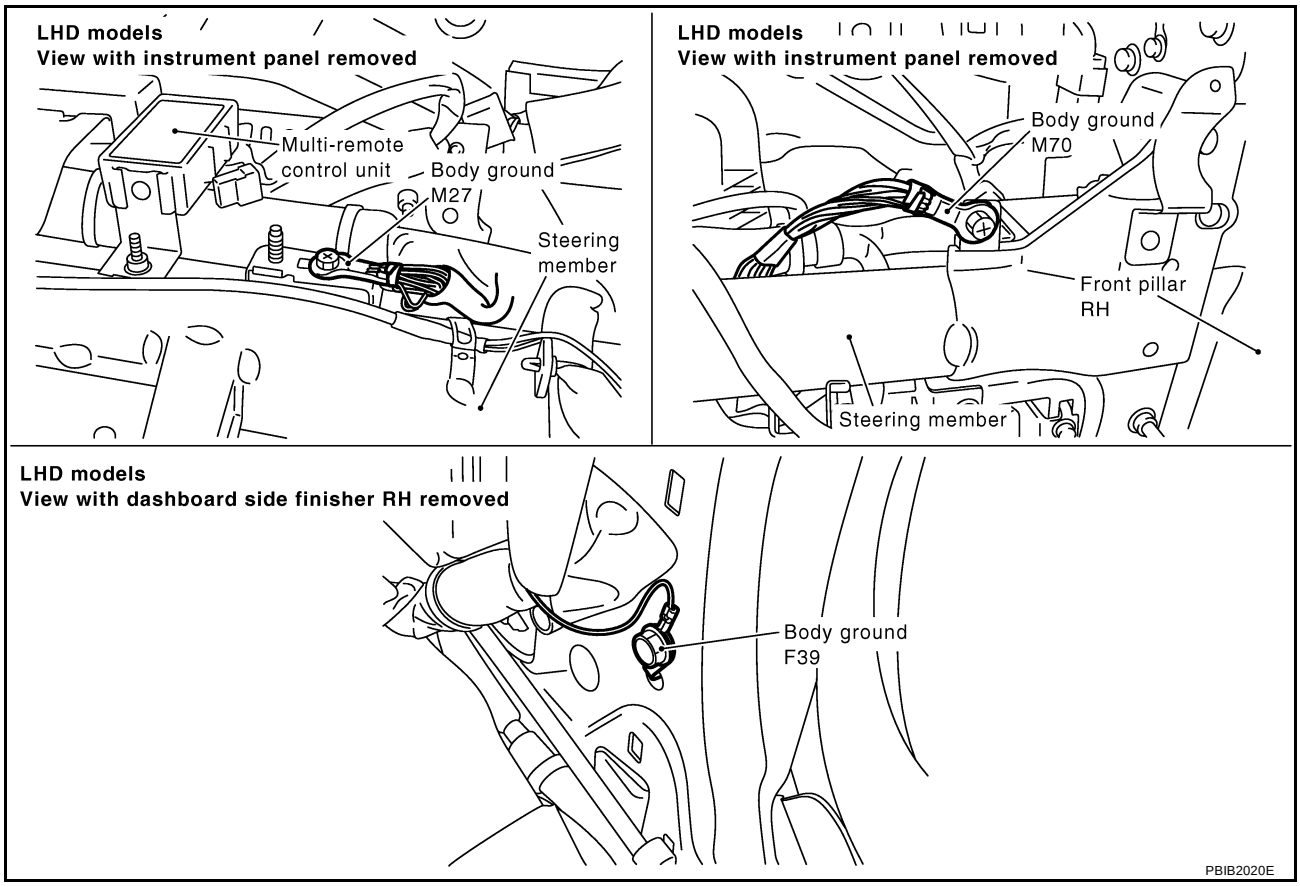
TBWA0566E

Diagnostic Procedure

BBS00295

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

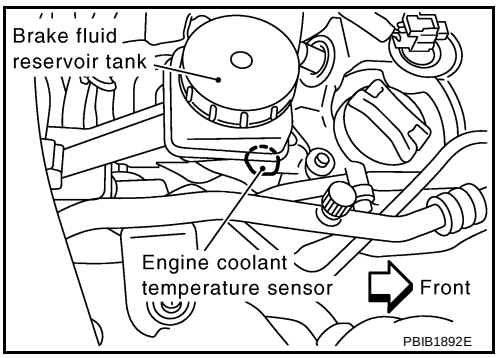


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

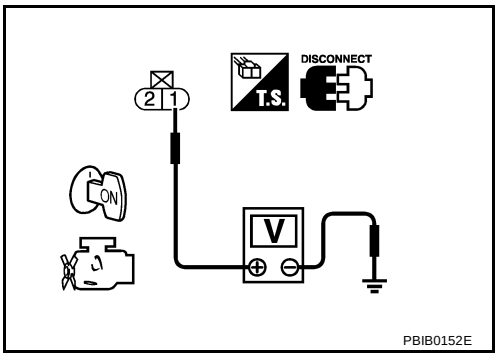
2. CHECK ECT SENSOR POWER SUPPLY CIRCUIT

1. Disconnect engine coolant temperature sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between ECT sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair harness or connectors.

3. CHECK ECT SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECT sensor terminal 2 and ECM terminal 70. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR

Refer to EC-1562, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace engine coolant temperature sensor.

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

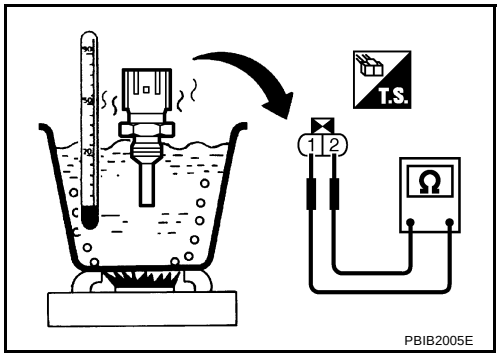
>> **INSPECTION END**

Component Inspection

BBS00296

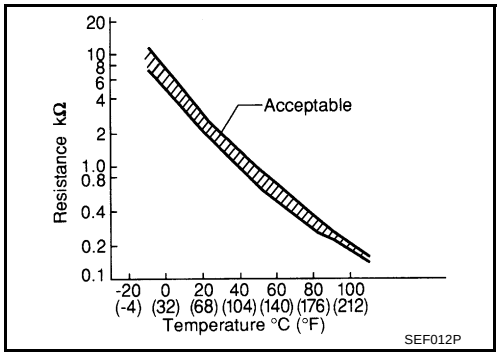
ENGINE COOLANT TEMPERATURE SENSOR

1. Check resistance between engine coolant temperature sensor terminals 1 and 2 as shown in the figure.



<Reference data>

Engine coolant temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260



2. If NG, replace engine coolant temperature sensor.

Removal and Installation

BBS00297

ENGINE COOLANT TEMPERATURE SENSOR

Refer to EM-214, "CYLINDER HEAD" .

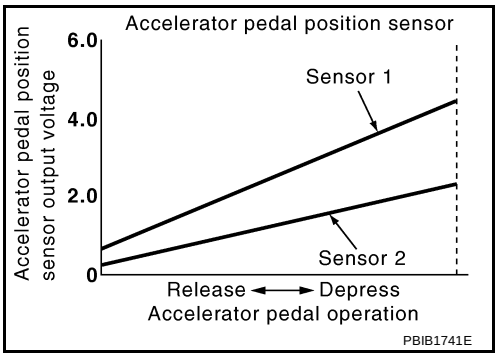
DTC P0122, P0123 APP SENSOR

PFP:18002

Description

BBS00298

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



CONSULT-II Reference Value in Data Monitor Mode

BBS00299

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.15 - 0.6V
		Accelerator pedal: Fully depressed	1.95 - 2.4V

*: This signal is converted by ECM internally. Thus, this differs from ECM terminals voltage.

On Board Diagnosis Logic

BBS0029A

The MI will not light up for these self-diagnoses.

NOTE:
If DTC P0122 or P0123 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-1686, "DTC P0642, P0643 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0122 0122	Accelerator pedal position sensor 1 circuit low input	An excessively low voltage from the APP sensor 1 is sent to ECM.	● Harness or connectors (The APP sensor 1 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1)
P0123 0123	Accelerator pedal position sensor 1 circuit high input	An excessively high voltage from the APP sensor 1 is sent to ECM.	

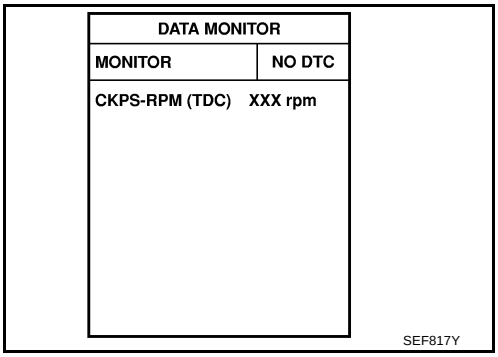
DTC Confirmation Procedure

BBS0029B

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1567, "Diagnostic Procedure" .



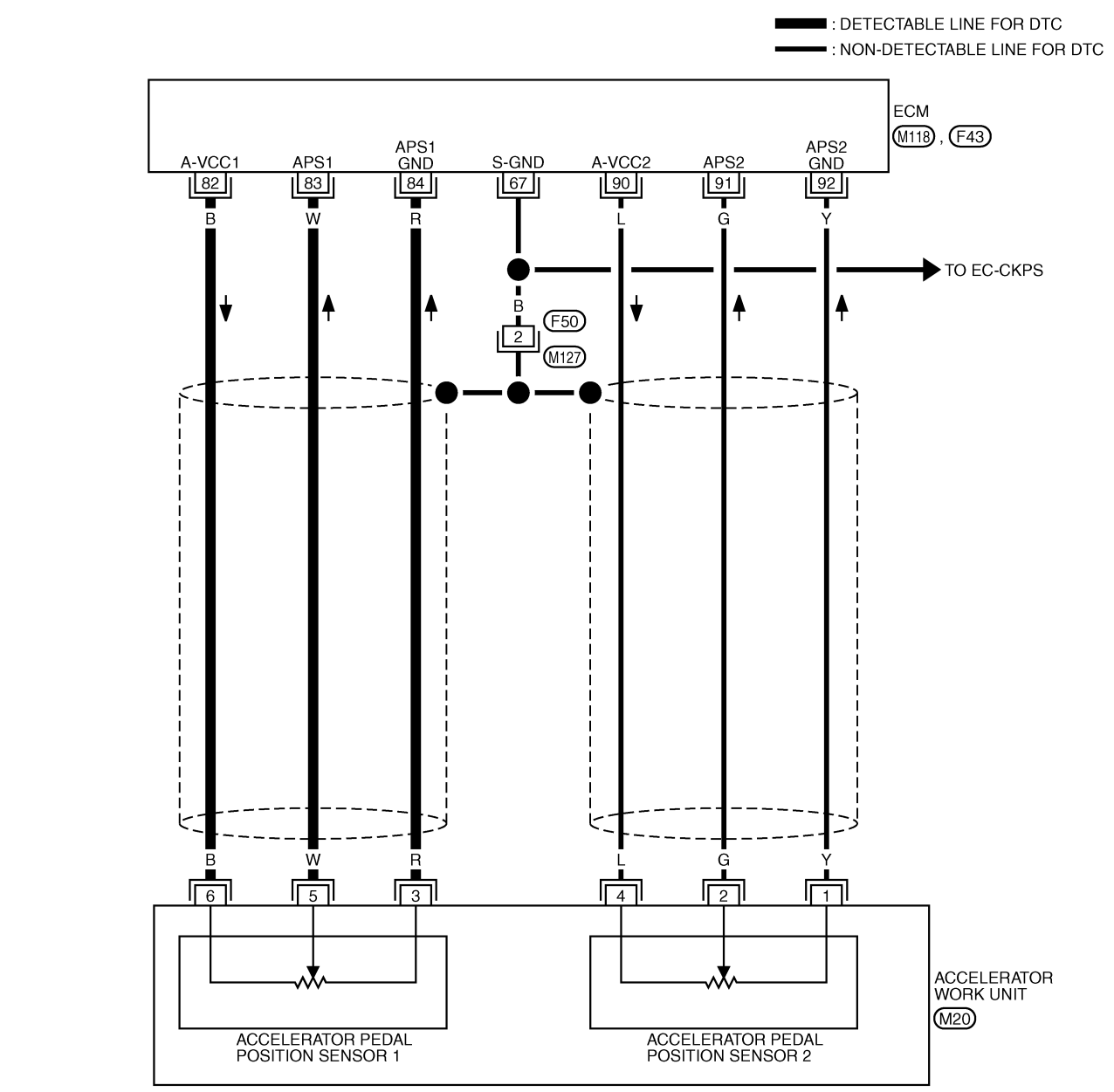
WITHOUT CONSULT-II

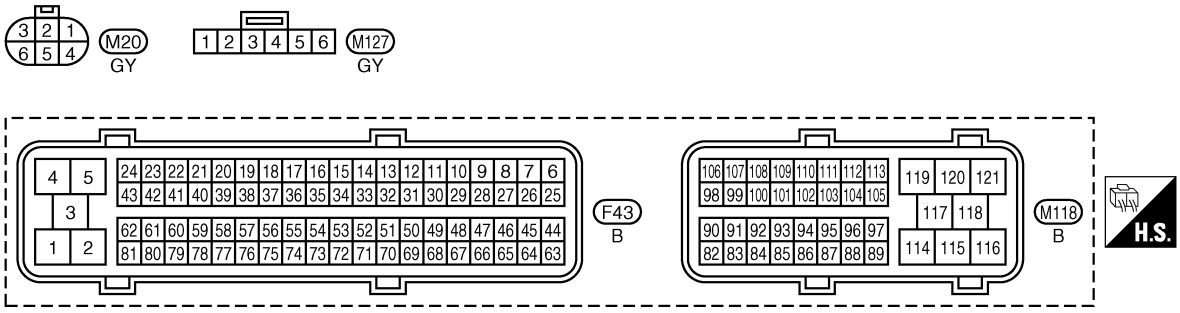
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1567, "Diagnostic Procedure" .

Wiring Diagram

BBS0029C

EC-APPS1-01





TBWB0902E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

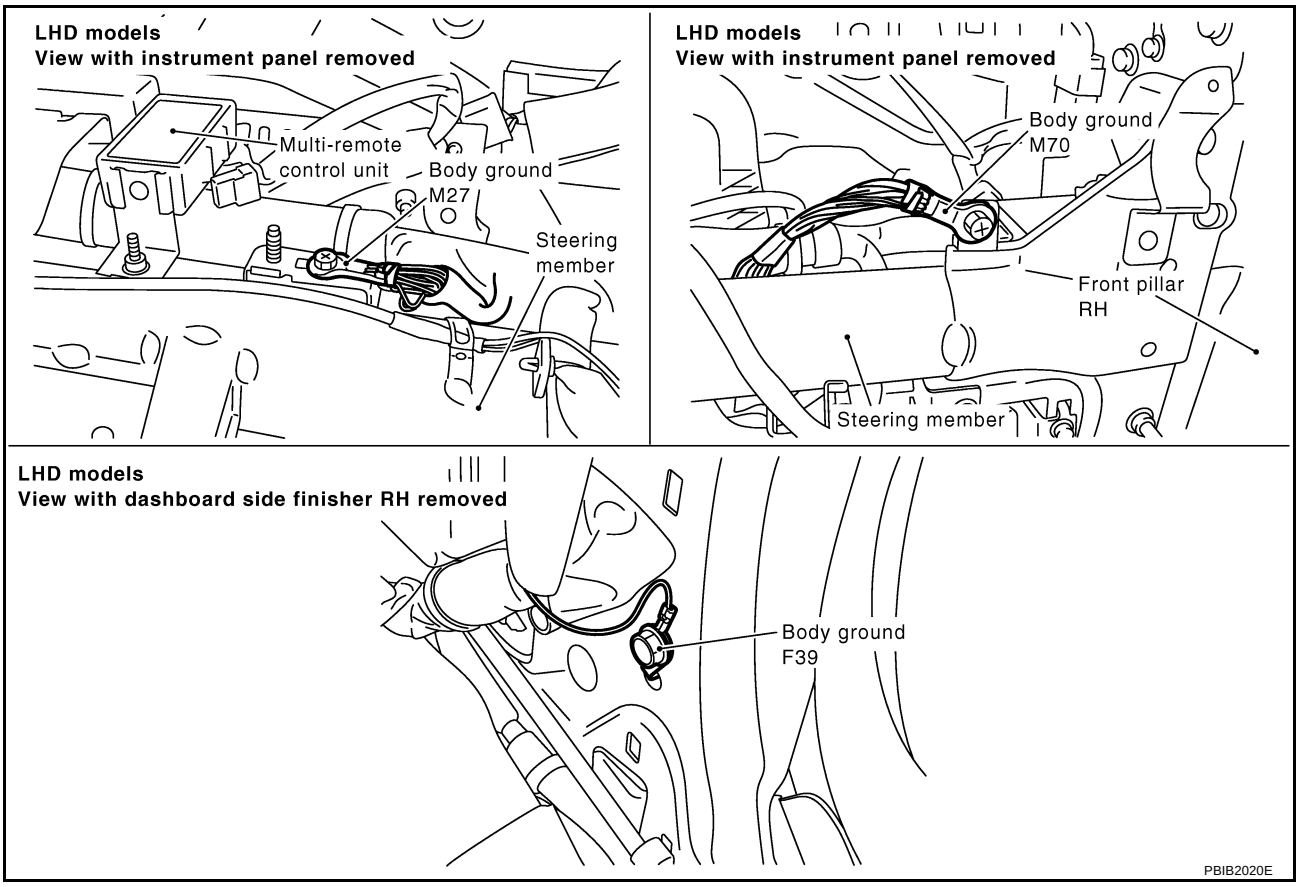
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1/ Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V
83	W	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.8 - 1.3V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.0V
84	R	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
90	L	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	G	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.45 - 0.9V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.25 - 2.7V
92	Y	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS0029D

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

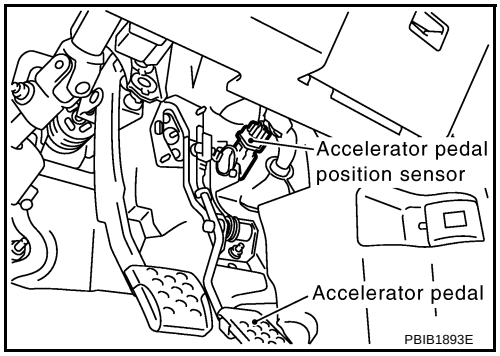


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

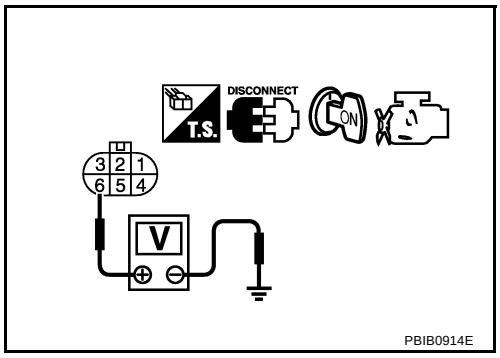
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 1 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 3 and ECM terminal 84. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 83 and APP sensor terminal 5. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1569, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

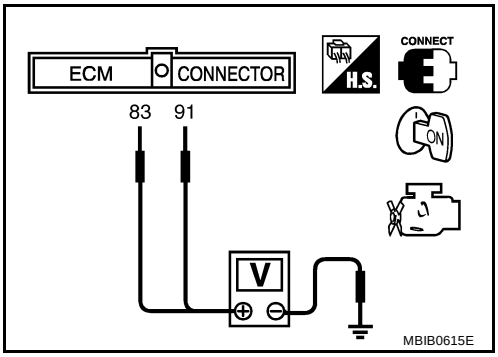
>> **INSPECTION END**

Component Inspection

BBS0029E

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and ground under the following conditions.



Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.8 - 1.3V
	Fully depressed	4.2 - 5.0V
91 (Accelerator pedal position sensor 2)	Fully released	0.45 - 0.9V
	Fully depressed	2.25 - 2.7V

4. If NG, replace accelerator pedal assembly.

Removal and Installation

BBS0029F

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

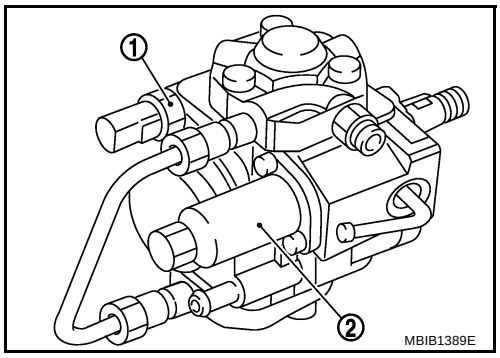
DTC P0182, P0183 FUEL PUMP TEMPERATURE SENSOR

PFP:16700

Description

BBS0029G

Fuel pump temperature sensor (1) is built in the fuel pump (2). The sensor detects the fuel temperature in the fuel pump and calibrates the fuel injection amount change by fuel temperature.



CONSULT-II Reference Value in Data Monitor Mode

BBS0029H

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
FUEL TEMP SEN	● Engine: After warming up	More than 40°C (104°F)

On Board Diagnosis Logic

BBS0029I

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0182 0182	Fuel pump temperature sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel pump temperature sensor
P0183 0183	Fuel pump temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

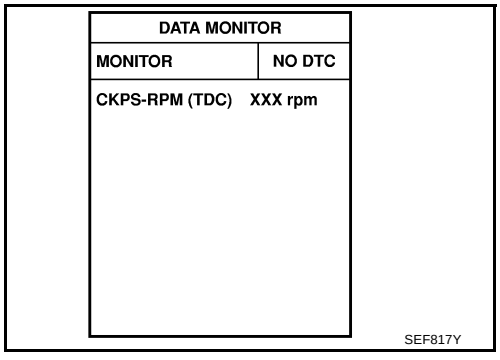
DTC Confirmation Procedure

BBS0029J

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1572, "Diagnostic Procedure" .



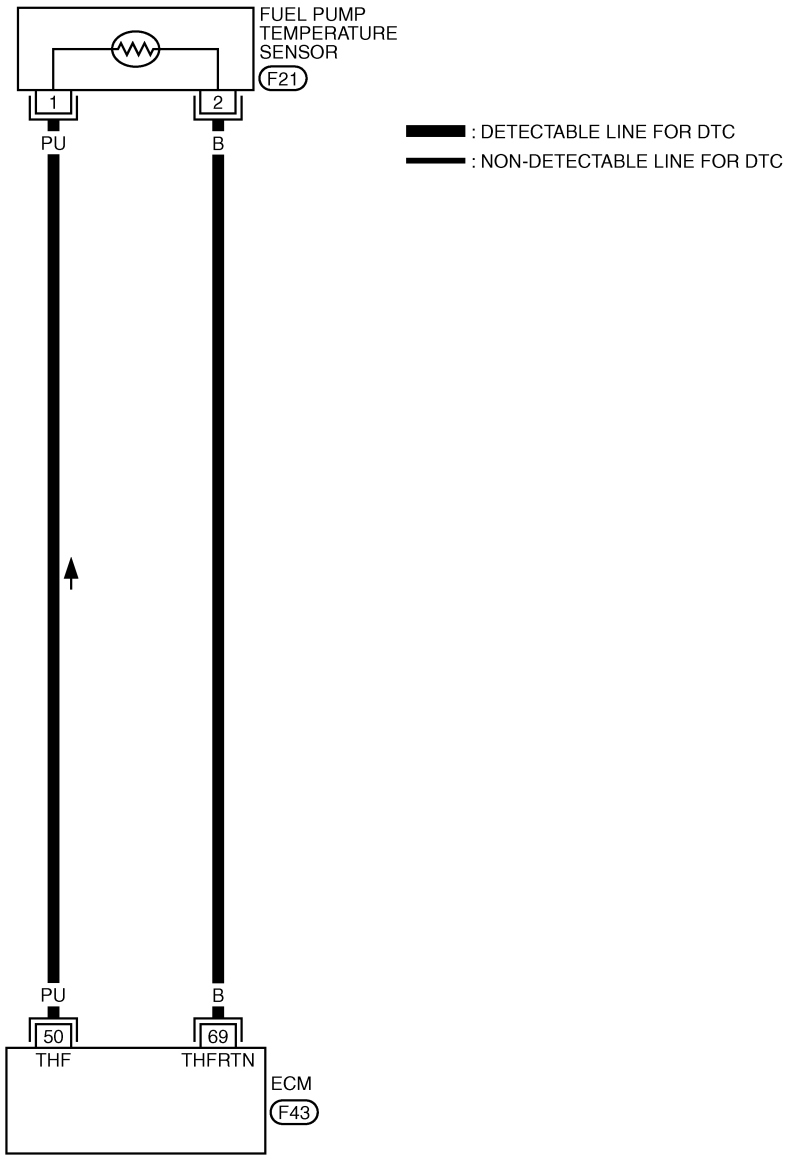
WITHOUT CONSULT-II

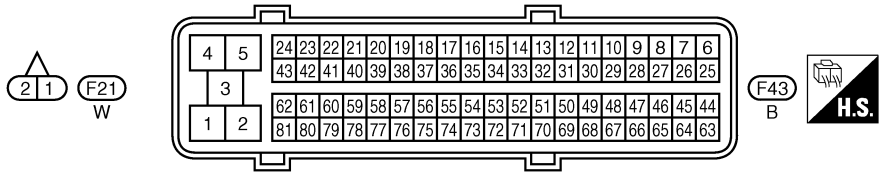
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1572, "Diagnostic Procedure"

Wiring Diagram

BBS0029K

EC-FTS-01





TBWA0572E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

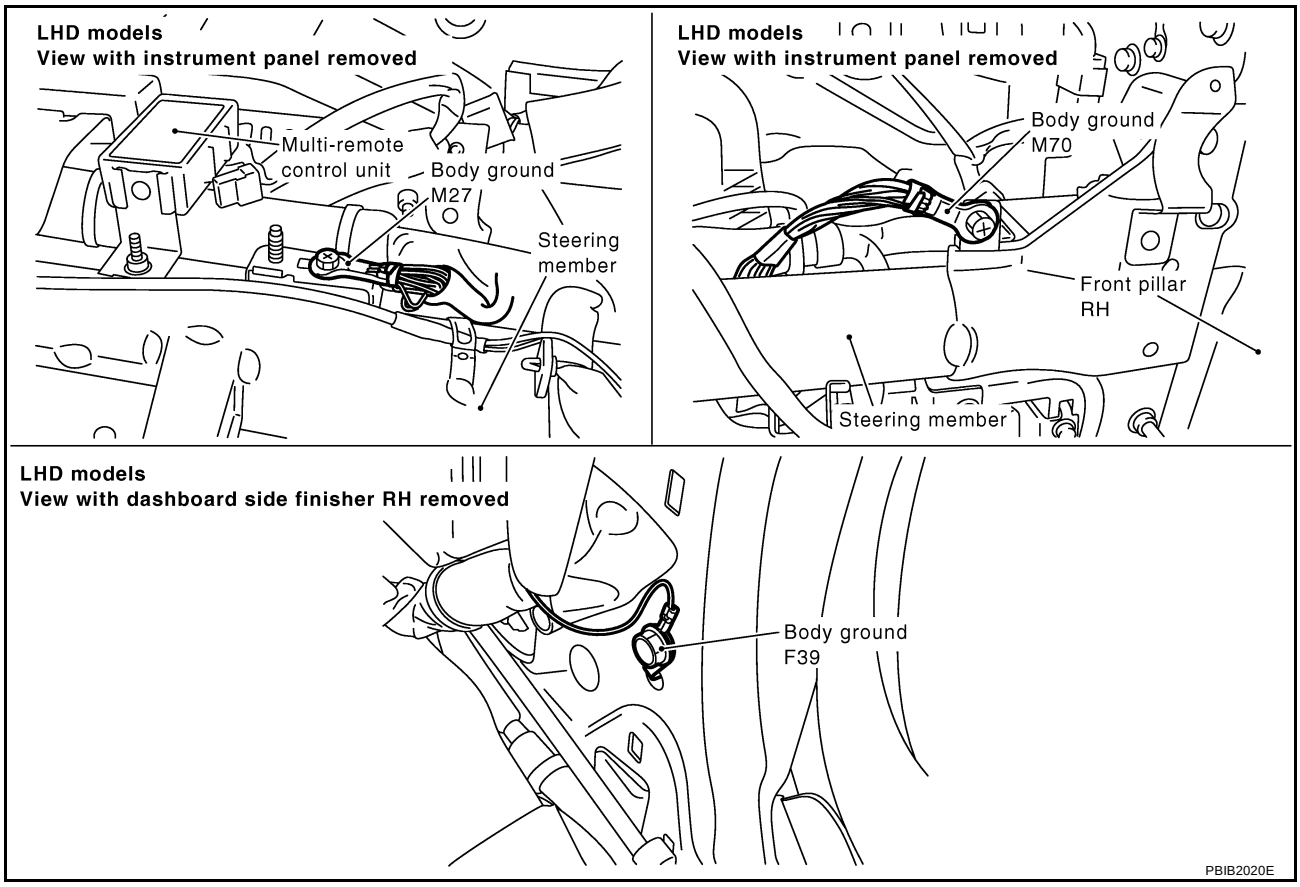
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
50	PU	Fuel pump temperature sensor	**[Engine is running]** ● **Warm-up condition**	Approximately 0.3 - 5.3V Output voltage varies with fuel pump temperature
69	B	Fuel pump temperature sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS0029L

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

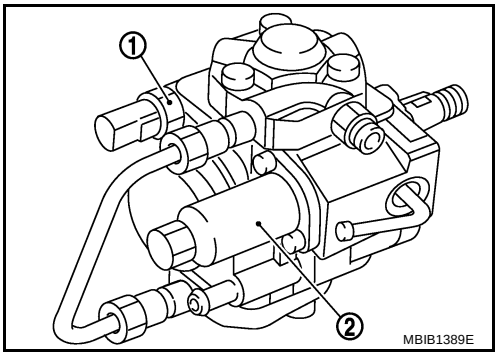


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

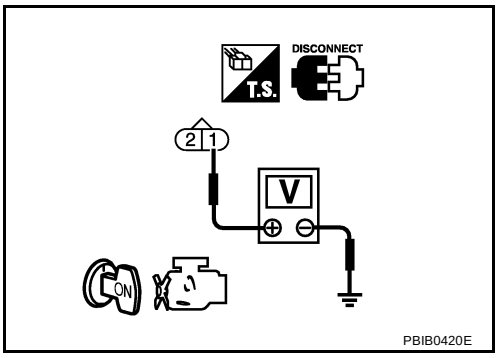
2. CHECK FUEL PUMP TEMPERATURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel pump temperature sensor (1) harness connector.
– Fuel pump (2)
2. Turn ignition switch ON.



3. Check voltage between fuel pump temperature sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair harness or connectors.

3. CHECK FUEL PUMP TEMPERATURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel pump temperature sensor terminal 2 and ECM terminal 69. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 5.
NG >> Repair or replace.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Removal and Installation

BBS0029M

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P0192, P0193 FRP SENSOR

PFP:16638

Description

BBS0029N

The fuel rail pressure (FRP) sensor is placed to the fuel rail. It measures the fuel pressure in the fuel rail. The sensor sends voltage signal to the ECM. As the pressure increases, the voltage rises.
The ECM controls the fuel pressure in the fuel rail by the inlet throttling device. The ECM uses the signal from fuel rail pressure sensor as a feedback signal.

CONSULT-II Reference Value in Data Monitor Mode

BBS0029O

Specification data are reference values.

MONITOR	CONDITION		SPECIFICATOIN
ACT CR PRESS	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	20 - 30 MPa
		2,000 rpm	45 - 55 MPa

On Board Diagnosis Logic

BBS0029P

The MI will not light up for these self-diagnoses.

NOTE:

- **If DTC P0192 or P0193 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0192 0192	Fuel rail pressure sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Fuel rail temperature sensor
P0193 0193	Fuel rail temperature sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

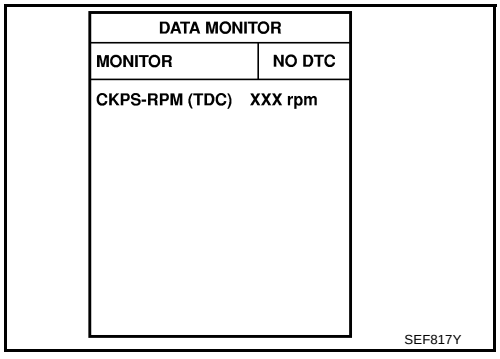
DTC Confirmation Procedure

BBS0029Q

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1577, "Diagnostic Procedure" .



WITHOUT CONSULT-II

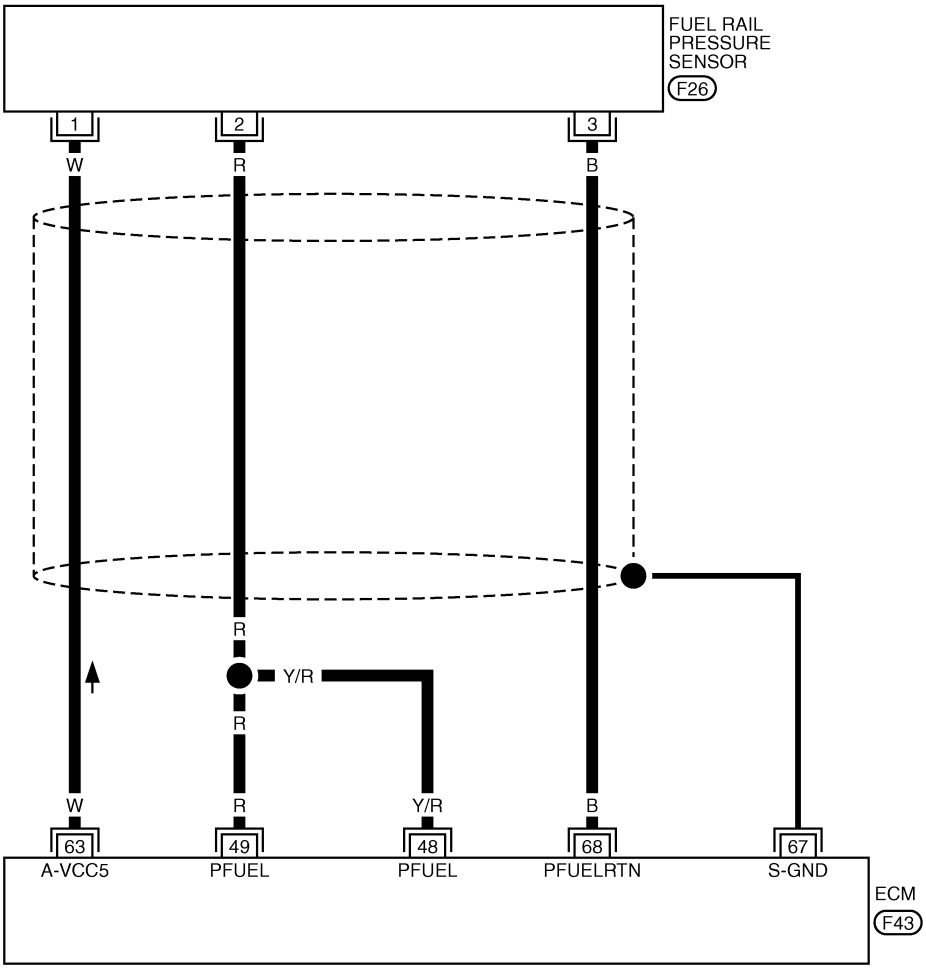
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1577, "Diagnostic Procedure" .

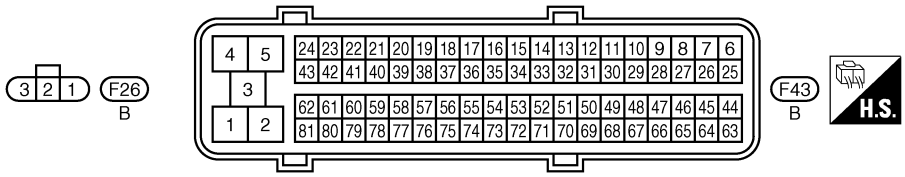
Wiring Diagram

BBS0029R

EC-FRPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWA0568E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

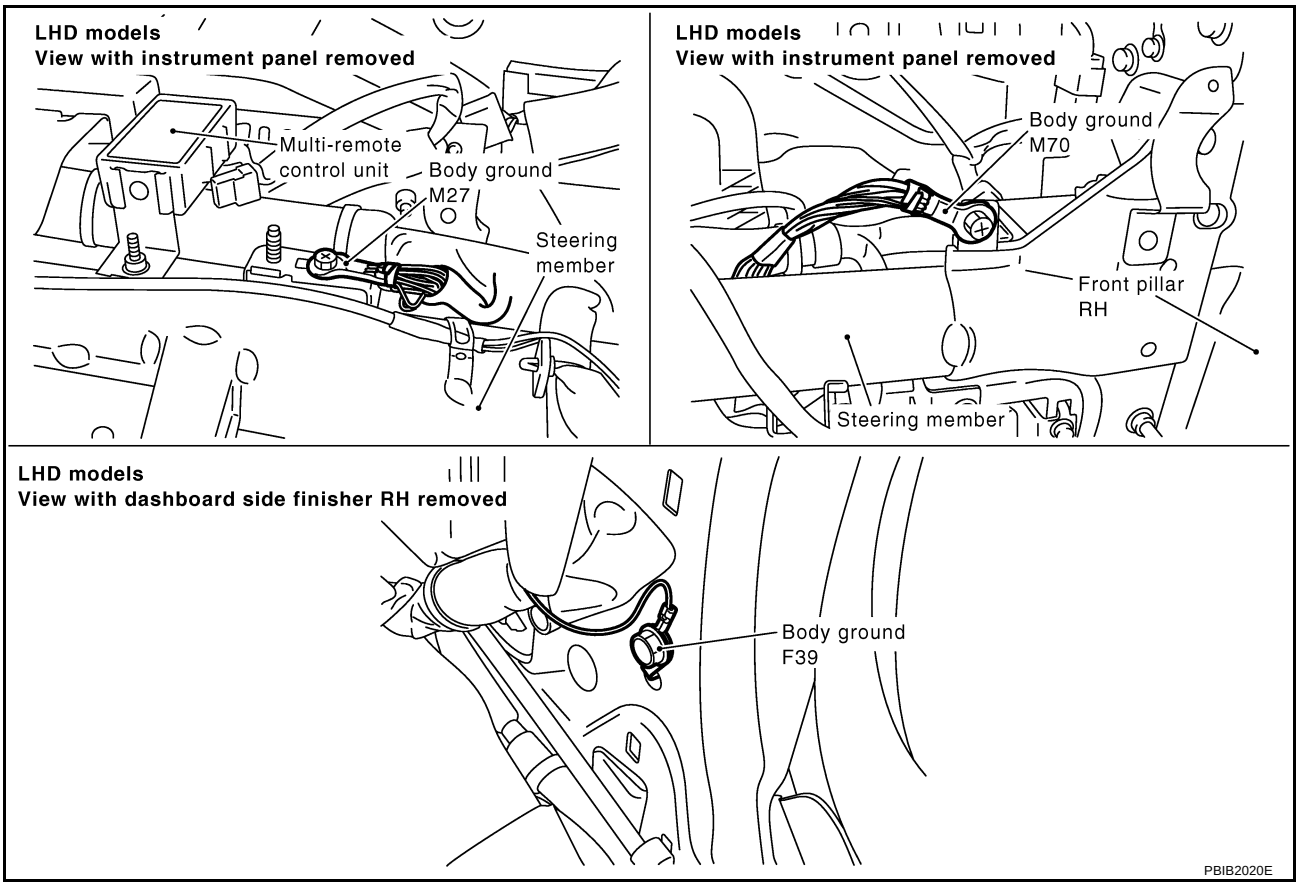
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
48 49	Y/R R	Fuel rail pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	1.7 - 2.0V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	2.0 - 2.3V
63	W	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
68	B	Fuel rail pressure sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS0029S

1. CHECK GROUND CONNECTION

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

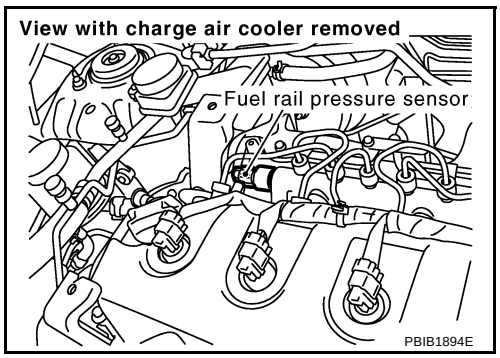


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

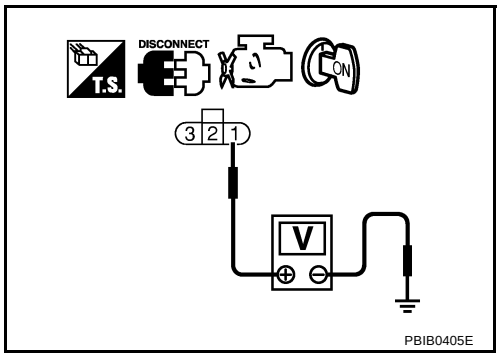
2. CHECK FUEL RAIL PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect fuel rail pressure sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between fuel rail pressure sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between fuel rail pressure sensor terminal 3 and ECM terminal 68. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL RAIL PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 48, 49 and fuel rail pressure sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1579, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace fuel rail.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

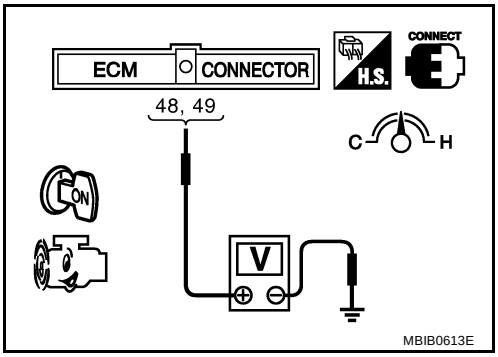
Component Inspection

BBS0029T

FUEL RAIL PRESSURE SENSOR

1. Reconnect harness connector disconnected.
2. Start engine and warm it up to normal operating temperature.
3. Check voltage between ECM terminals 48, 49 (Fuel rail pressure sensor signal) and ground under the following conditions.

Condition	Voltage V
Idle	1.7 - 2.0
2,000 rpm	2.0 - 2.3



4. If the voltage is out of specification, disconnect fuel rail pressure sensor harness connector and connect it again. Then repeat above check.
5. If NG, replace fuel rail.

Removal and Installation

BBS0029U

FUEL RAIL

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

DTC P0200 FUEL INJECTOR

PFP:16600

On Board Diagnosis Logic

BBS0029V

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0200 0200	Fuel injector power supply circuit	ECM detects a voltage of power source for the fuel injector is excessively high or low.	● ECM

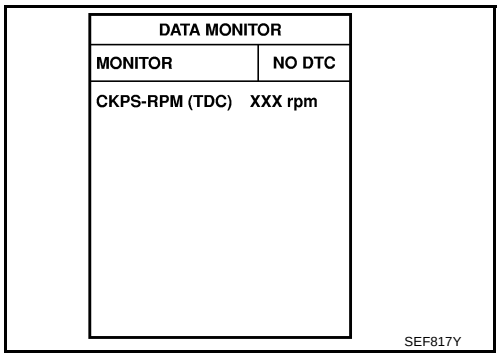
DTC Confirmation Procedure

BBS0029W

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1580, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1580, "Diagnostic Procedure" .

Diagnostic Procedure

BBS0029X

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1580, "DTC Confirmation Procedure" , again.
5. Is DTC P0200 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
3. Perform EC-1580, "DTC Confirmation Procedure" , again.
4. Is DTC 0200 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

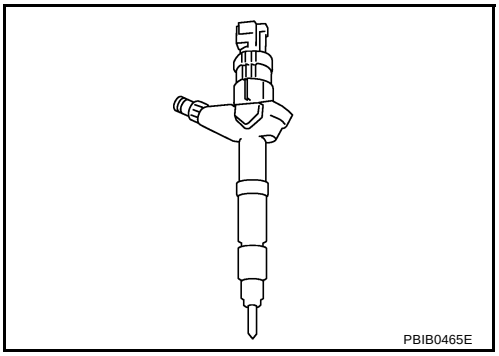
DTC P0201 - P0204 FUEL INJECTOR

PFP:16600

Component Description

BBS0029Y

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

BBS0029Z

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

On Board Diagnosis Logic

BBS002A0

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0201 0201	No. 1 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 1 cylinder fuel injector.	● Harness or connectors (The fuel injector circuit is open.) ● Fuel injector
P0202 0202	No. 2 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 2 cylinder fuel injector.	
P0203 0203	No. 3 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 3 cylinder fuel injector.	
P0204 0204	No. 4 cylinder fuel injector circuit open	An improper voltage signal is sent to ECM through No. 4 cylinder fuel injector.	

DTC Confirmation Procedure

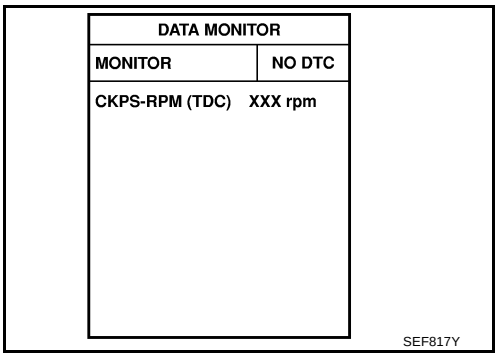
BBS002A1

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION
Before performing the following procedure, confirm the ambient temperature is more than -20°C (-4°F).

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1586, "Diagnostic Procedure" .



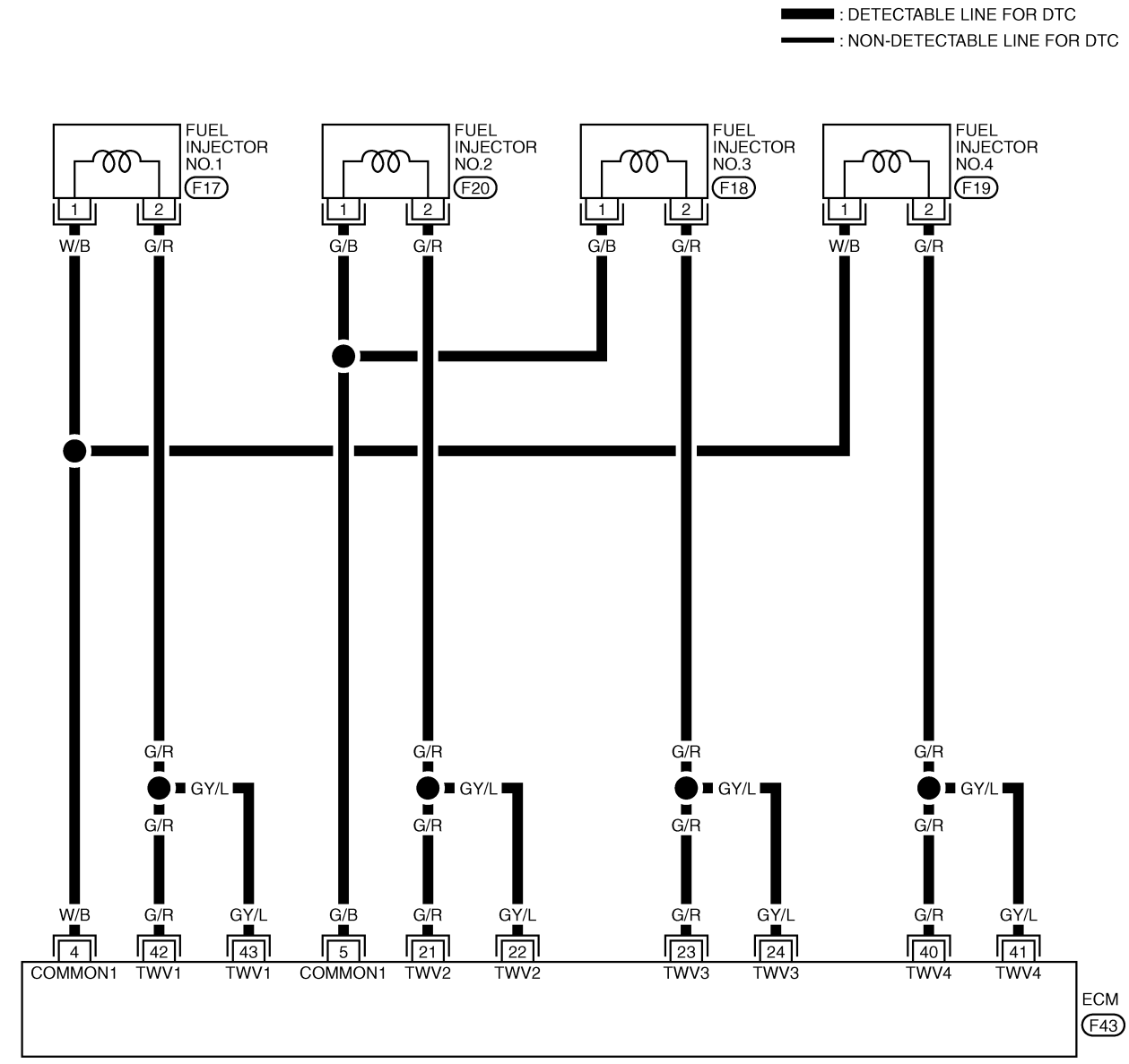
WITHOUT CONSULT-II

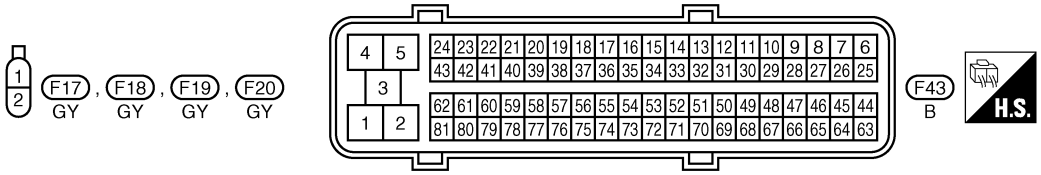
1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1586, "Diagnostic Procedure" .

Wiring Diagram

BBS002A2

EC-INJECT-01

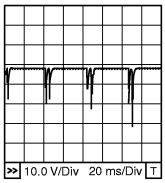
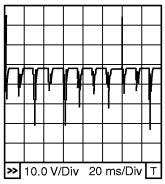
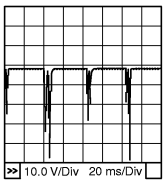
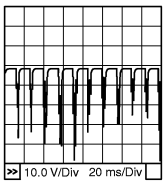




TBWB0903E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	W/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	5 - 10V ★  MBIB0883E
5	G/B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	5 - 10V ★  MBIB0884E
21 22 23 24 40 41 42 43	G/R GY/L G/R GY/L G/R GY/L G/R GY/L	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3 Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 9V ★  MBIB0882E

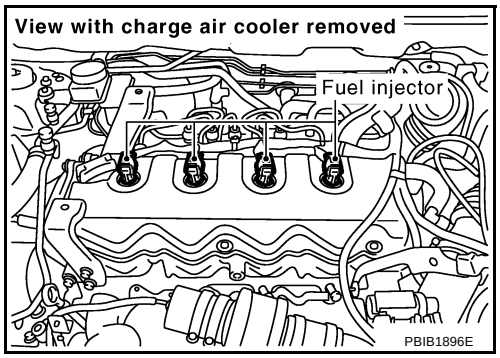
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS002A3

1. CHECK FUEL INJECTOR POWER SUPPLY FOR OPEN AND SHORT CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.



DTC	Terminal		Cylinder
	ECM	Fuel injector	
P0201	4	1	No.1
P0202	5	1	No.2
P0203	5	1	No.3
P0204	4	1	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL INJECOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

DTC	Terminal		Cylinder
	ECM	Fuel injector	
P0201	42, 43	2	No.1
P0202	21, 22	2	No.2
P0203	23, 24	2	No.3
P0204	40, 41	2	No.4

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL INJECTOR-I

Refer to EC-1588, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK FUEL INJECTOR-II

With CONSULT-II

1. Remove two fuel injectors.

   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connectors.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .
6. Select “SELF DIAG RESULTS” mode with CONSULT-II.
7. Touch “ERASE”.
8. Perform DTC Confirmation Procedure, EC-1583, "DTC Confirmation Procedure" .
9. Is DTC displayed for the other cylinder?

Without CONSULT-II

1. Remove two fuel injectors.

   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .
6. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
7. Perform DTC Confirmation Procedure, EC-1583, "DTC Confirmation Procedure" .
8. Is DTC displayed for the other cylinder?

Yes or No

OK >> GO TO 5.
NG >> GO TO 6.

5. REPLACE FUEL INJECTOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

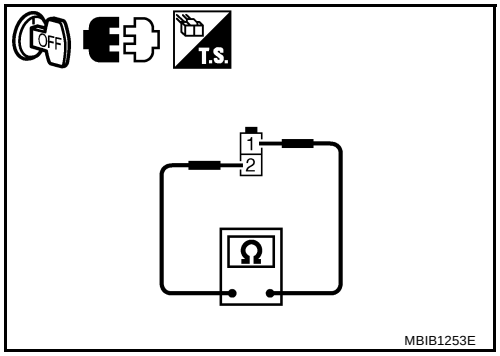
BBS002A4

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 0.2 - 0.8Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel injector.



Removal and Installation

BBS002A5

FUEL INJECTOR

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

DTC P0217 ENGINE OVER TEMPERATURE

PFP:21481

System Description

BBS002A6

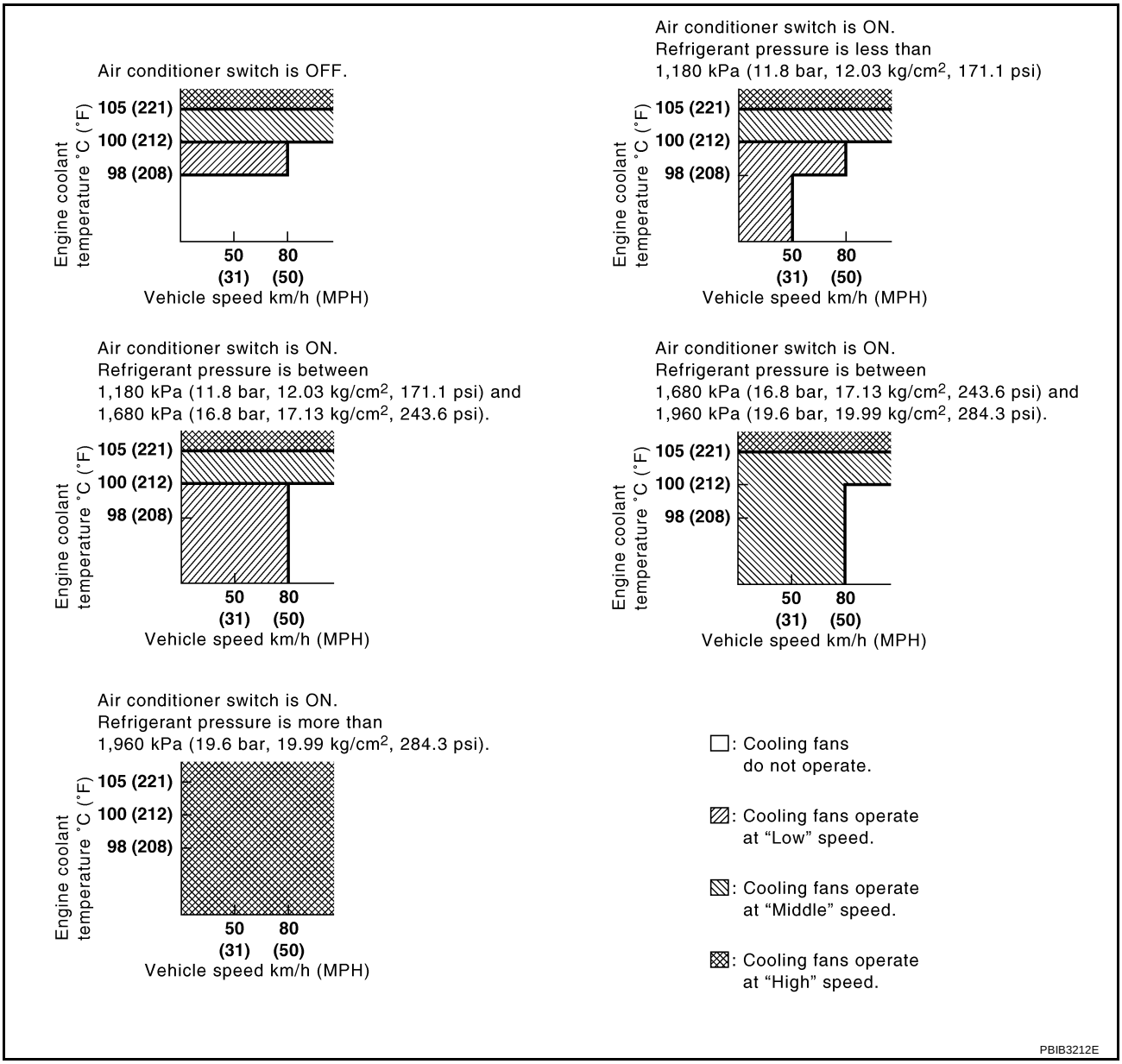
COOLING FAN CONTROL

Sensor	Input signal to ECM	ECM function	Actuator
Vehicle speed sensor	Vehicle speed *	Cooling fan control	Cooling fan relay
Engine coolant temperature sensor	Engine coolant temperature		
Air conditioner switch	Air conditioner ON signal *		
Refrigerant pressure sensor	Refrigerant pressure		

*: This signal is sent to the ECM through CAN communication line.

The ECM controls the cooling fan corresponding to the vehicle speed, engine coolant temperature, refrigerant pressure sensor, and air conditioner ON signal. The control system has 4-step control [HIGH/MID/LOW/OFF].

OPERATION



Cooling fan speed	Cooling fan motor	
	1	2
Low (LOW)	Operating (low speed)	Not operating
Middle (MID)	Operating (high speed)	Operating (low speed)
High (HI)	Operating (high speed)	Operating (high speed)

CONSULT-II Reference Value in Data Monitor Mode

BBS002A7

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
COOLING FAN	● When cooling fan is stopped.	OFF
	● When cooling fans operate at low speed.	LOW
	● When cooling fans operate at middle speed.	MID
	● When cooling fans operate at high speed.	HI

On Board Diagnosis Logic

BBS002A8

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0217 0217	Engine over temperature (Overheat)	● Cooling fan does not operate properly (Overheat). ● Cooling fan system does not operate properly (Overheat). ● Engine coolant was not added to the system using the proper filling method. ● Engine coolant is not within the specified range.	● Harness or connectors (The cooling fan circuit is open or shorted.) ● Cooling fan ● Cooling fan relays ● Radiator hose ● Radiator ● Radiator cap ● Water pump ● Thermostat For more information, refer to EC-1603, "Main 12 Causes of Overheating" .

Overall Function Check

BBS002A9

Use this procedure to check the overall function of the cooling fan. During this check, a DTC might not be confirmed.

WARNING:

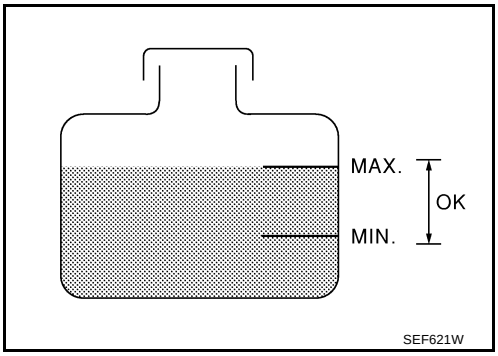
- **Never remove the radiator cap when the engine is hot. Serious burns could be caused by high pressure fluid escaping from the radiator.**
- **Wrap a thick cloth around cap. Carefully remove the cap by turning it a quarter turn to allow built-up pressure to escape. Then turn the cap all the way off.**

WITH CONSULT-II

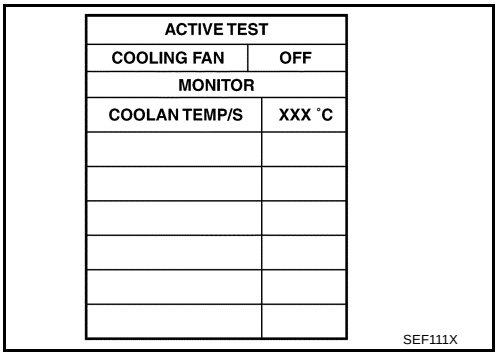
1. Check the coolant level in the reservoir tank and radiator.

   NOTE:
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-1594, "Diagnostic Procedure" .

2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1594, "Diagnostic Procedure" .
3. Turn ignition switch ON.



4. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II.
5. If the results are NG, go to EC-1594, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Check the coolant level in the reservoir tank and radiator.

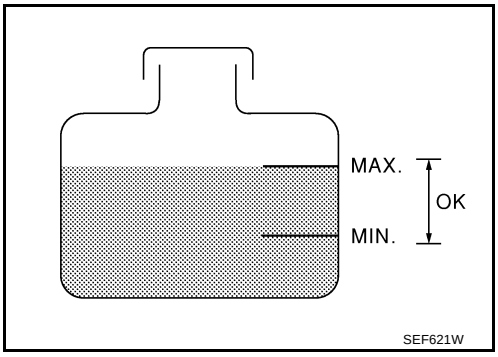
   NOTE:
   Allow engine to cool before checking coolant level.
   If the coolant level in the reservoir tank and/or radiator is below the proper range, skip the following steps and go to EC-1594, "Diagnostic Procedure" .

2. Confirm whether customer filled the coolant or not. If customer filled the coolant, skip the following steps and go to EC-1594, "Diagnostic Procedure" .
3. Start engine.

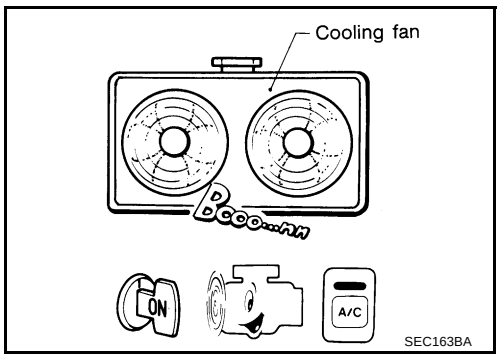
   CAUTION:
   Be careful not to overheat engine.

4. Set temperature control dial to full cold position.
5. Turn air conditioner switch ON.
6. Turn blower fan switch ON.
7. Run engine at idle for a few minutes with air conditioner operating.

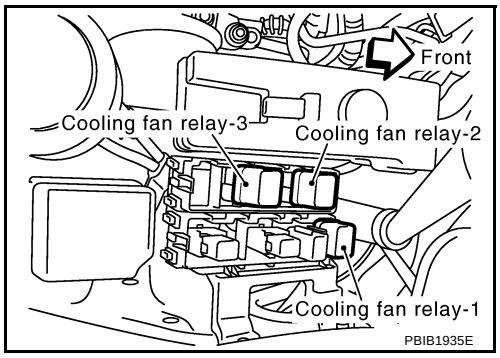
   CAUTION:
   Be careful not to overheat engine.



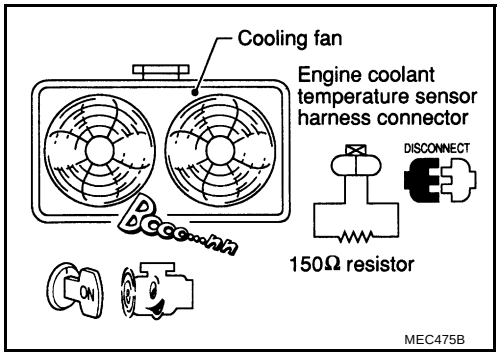
8. Make sure that cooling fans operates at low speed.
   If NG, go to EC-1594, "Diagnostic Procedure" .
   If OK, go to the following step.
9. Turn ignition switch OFF.
10. Turn air conditioner switch and blower fan switch OFF.



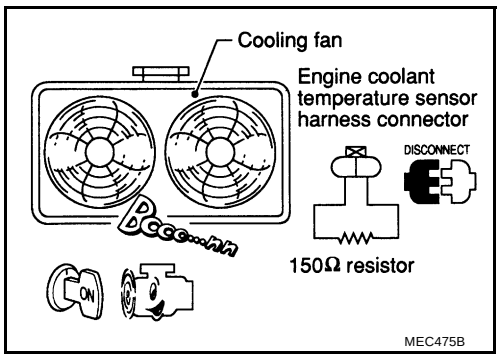
11. Disconnect cooling fan relay-3.
12. Disconnect engine coolant temperature sensor harness connector.
13. Connect 150Ω resistor to engine coolant temperature sensor harness connector.



14. Restart engine and make sure that cooling fan operates at higher speed than low speed (middle speed).
    CAUTION:
    Be careful not to overheat engine.
    If NG, go to EC-1594, "Diagnostic Procedure" .
    If OK, go to the following step.
15. Turn ignition switch OFF.
16. Reconnect cooling fan relay-3.

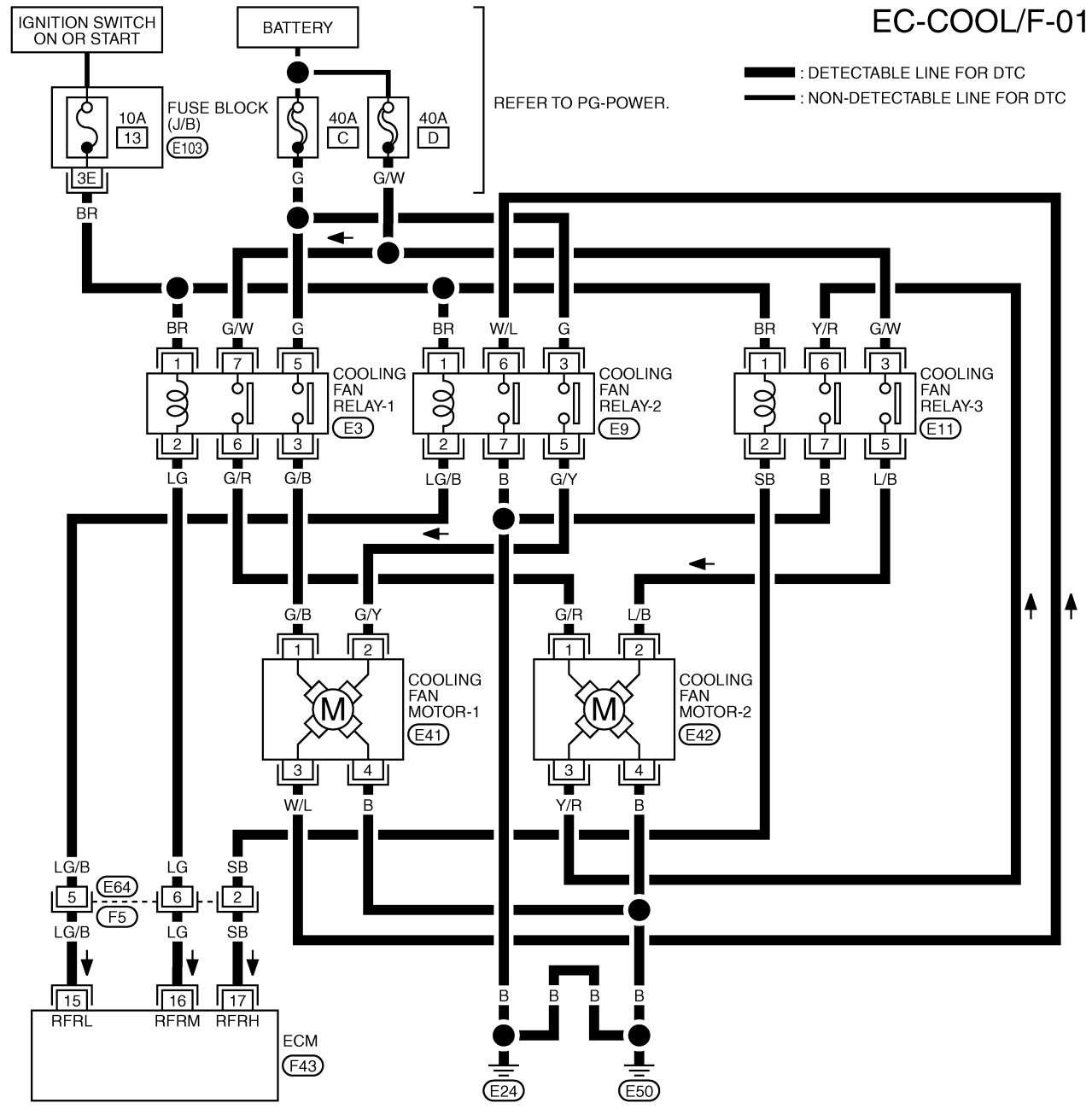


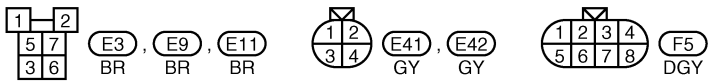
17. Restart engine and make sure that cooling fan operates at higher speed than middle speed.
    CAUTION:
    Be careful not to overheat engine.
18. If NG, go to EC-1594, "Diagnostic Procedure" .

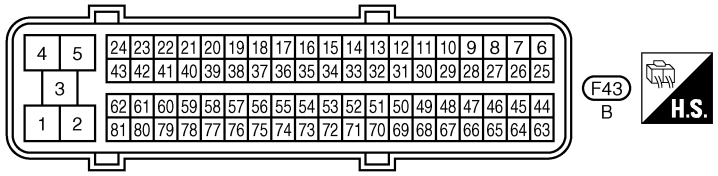


Wiring Diagram

BBS002AA







REFER TO THE FOLLOWING.
E103 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0904E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
15	LG/B	Cooling fan relay-2	**[Engine is running]** ● Cooling fan: Not operating	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan: Operating	Approximately 0.1V
16	LG	Cooling fan relay-1	**[Engine is running]** ● Cooling fan: Not operating ● Cooling fan: Operating at low speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan: Operating at middle speed ● Cooling fan: Operating at high speed	Approximately 0.1V
17	SB	Cooling fan relay-3	**[Engine is running]** ● Cooling fan: Not operating ● Cooling fan: Operating at low speed ● Cooling fan: Operating at middle speed	BATTERY VOLTAGE (11 - 14V)
			[Engine is running] ● Cooling fan: Operating at high speed	Approximately 0.1V

Diagnostic Procedure

BBS002AB

1. INSPECTION START

Do you have CONSULT-II?

Yes or No

Yes >> GO TO 2.
No >> GO TO 5.

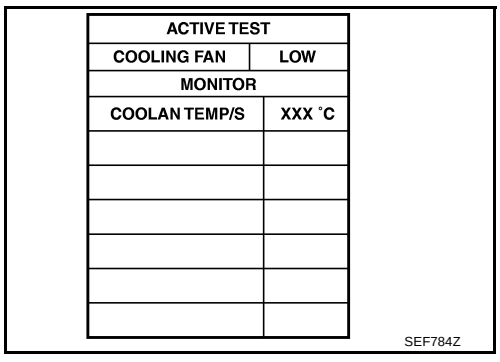
2. CHECK COOLING FAN LOW SPEED OPERATION

With CONSULT-II

1. Turn ignition switch ON.
2. Perform “COOLING FAN” in “ACTIVE TEST” mode with CONSULT-II and touch “LOW” on the CONSULT-II screen.
3. Make sure that cooling fan-1 operate at low speed.

OK or NG

OK >> GO TO 3.
NG >> Check cooling fan low speed control circuit. (Go to EC-1597, "PROCEDURE A" .)



3. CHECK COOLING FAN MIDDLE SPEED OPERATION

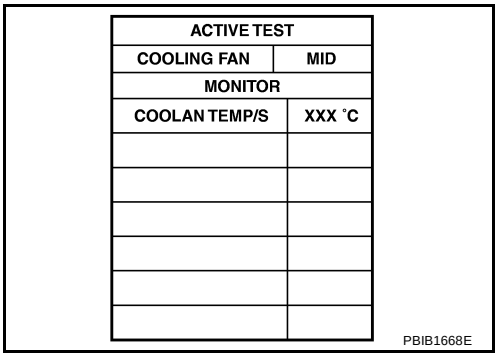
With CONSULT-II

1. Touch “MID”on the CONSULT-II screen.
2. Make sure that cooling fans operate as described below.

– Cooling fan-1 operate at higher speed than low speed.
– Cooling fan-2 operate at low speed.

OK or NG

OK >> GO TO 4.
NG >> Check cooling fan high speed control circuit. (Go to EC-1599, "PROCEDURE B" .)



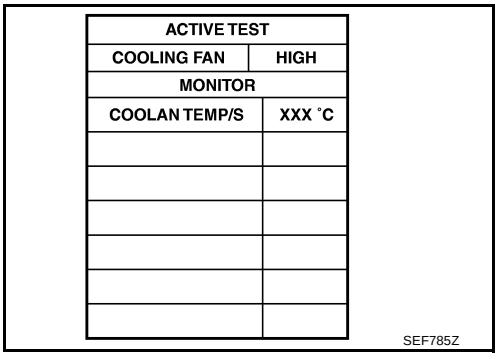
4. CHECK COOLING FAN HIGH SPEED OPERATION

With CONSULT-II

1. Touch “HIGH”on the CONSULT-II screen.
2. Make sure that cooling fan-2 operate at higher speed than low speed.

OK or NG

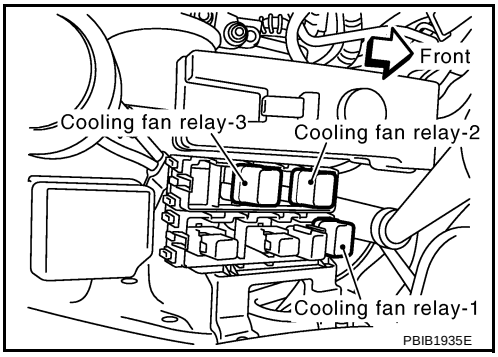
OK >> GO TO 8.
NG >> Check cooling fan high speed control circuit. (Go to EC-1601, "PROCEDURE C" .)



5. CHECK COOLING FAN LOW SPEED OPERATION

Without CONSULT-II

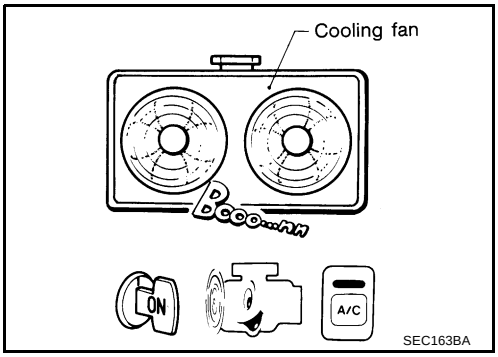
1. Disconnect cooling fan relays-1 and -3.
2. Start engine and let it idle.
3. Set temperature dial at full cold position.
4. Turn air conditioner switch ON.
5. Turn blower fan switch ON.



6. Make sure that cooling fan-1 operate at low speed.

OK or NG

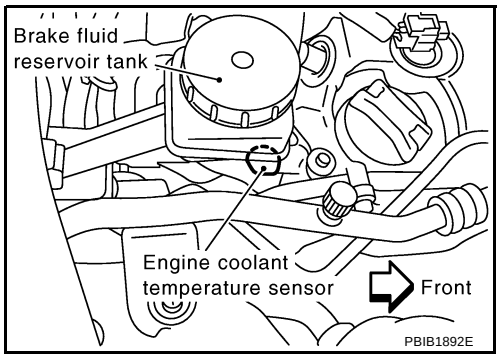
OK >> GO TO 6.
NG >> Check cooling fan low speed control circuit. (Go to EC-1597, "PROCEDURE A" .)



6. CHECK COOLING FAN MIDDLE SPEED OPERATION

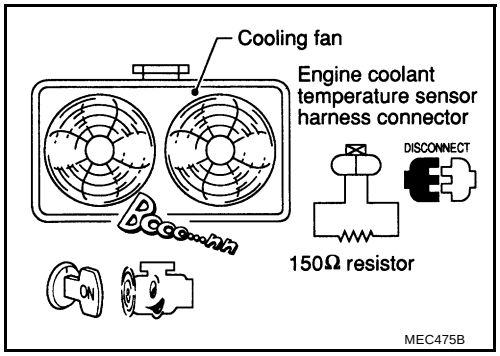
Without CONSULT-II

1. Turn ignition switch OFF.
2. Reconnect cooling fan relay-1.
3. Turn air conditioner switch and blower fan switch OFF.
4. Disconnect engine coolant temperature sensor harness connector.
5. Connect 150Ω resistor to engine coolant temperature sensor harness connector.



6. Restart engine and make sure that cooling fans operate as described below.

– Cooling fan-1 operate at higher speed than low speed.
– Cooling fan-2 operate at low speed.



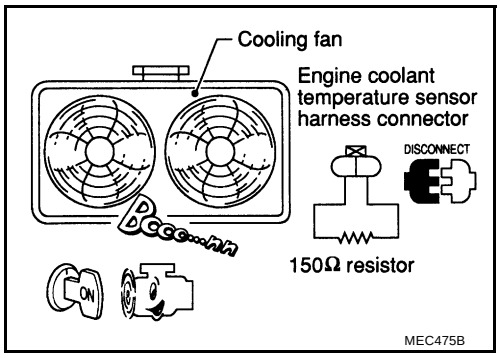
OK or NG

OK >> GO TO 7.
NG >> Check cooling fan high speed control circuit. (Go to EC-1599, "PROCEDURE B" .)

7. CHECK COOLING FAN MIGH SPEED OPERATION

Without CONSULT-II

1. Turn ignition switch OFF.
2. Reconnect cooling fan relay-3.
3. Restart engine and make sure that cooling fan-2 operate at higher speed than low speed.



OK or NG

OK >> GO TO 8.
NG >> Check cooling fan high speed control circuit. (Go to EC-1601, "PROCEDURE C" .)

8. CHECK COOLING SYSTEM FOR LEAK

Refer to CO-32, "CHECKING RADIATOR SYSTEM FOR LEAKS" .

OK or NG

OK >> GO TO 9.
NG >> Check the following for leak.

- Hose
- Radiator
- Water pump (Refer to CO-44, "WATER PUMP" .)

9. CHECK RADIATOR CAP

Refer to CO-36, "Checking Radiator Cap" .

OK or NG

OK >> GO TO 10.
NG >> Replace radiator cap.

10. CHECK COMPONENT PARTS

Check the following.

- Thermostat. Refer to CO-46, "THERMOSTAT AND WATER PIPING" .
- Engine coolant temperature sensor. Refer to EC-1562, "Component Inspection" .

OK or NG

OK >> GO TO 11.
NG >> Replace malfunctioning component.

11. CHECK MAIN 12 CAUSES

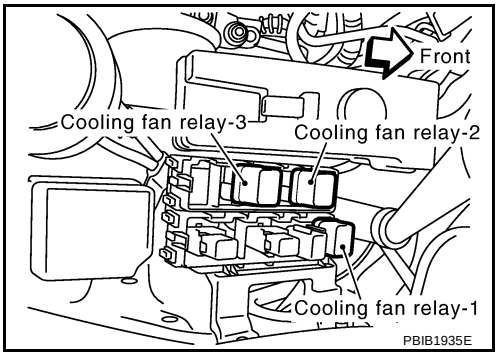
If the cause cannot be isolated, go to EC-1603, "Main 12 Causes of Overheating" .

>> **INSPECTION END**

PROCEDURE A

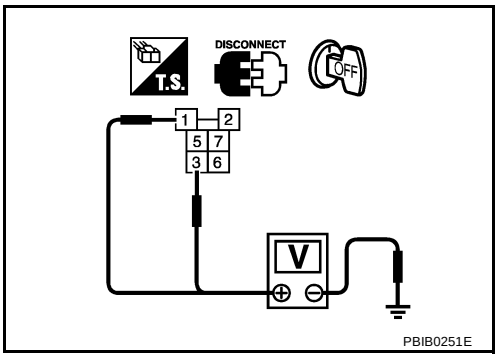
1. CHECK COOLING FAN POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-2.
3. Turn ignition switch ON.



4. Check voltage between cooling fan relay-2 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

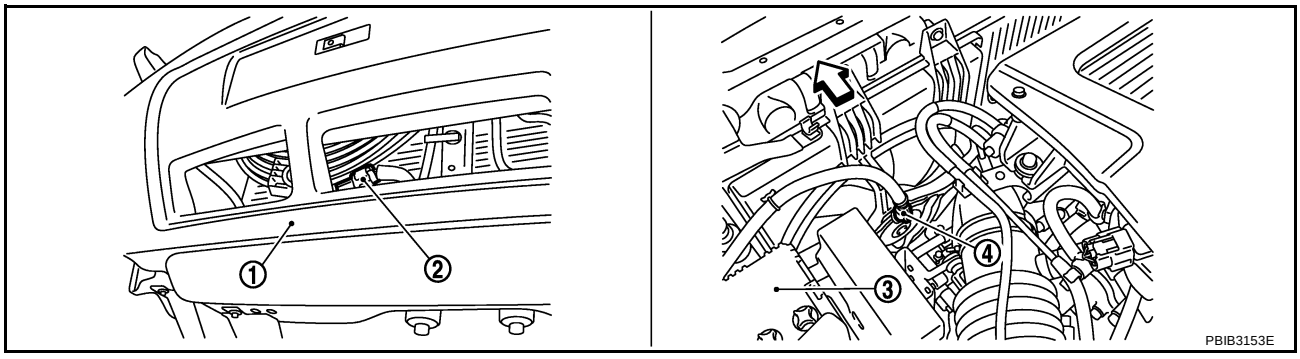
Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector.



⇦ : Vehicle front

1. Front bumper
2. Cooling fan motor-2 harness connector
3. Battery
4. Cooling fan motor-1 harness connector

3. Check harness continuity between the following.

- Cooling fan relay-2 terminal 5 and cooling fan motor-1 terminal 2
- Cooling fan relay-2 terminal 6 and cooling fan motor-1 terminal 3
- Cooling fan relay-2 terminal 7 and ground
- Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between cooling fan relay-2 terminal 2 and ECM terminal 15. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E64, F5
- Harness for open or short between cooling fan relay-2 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-2

Refer to EC-1604, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay-2.

7. CHECK COOLING FAN MOTOR-1

Refer to EC-1604, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace cooling fan motor-1.

8. CHECK INTERMITTENT INCIDENT

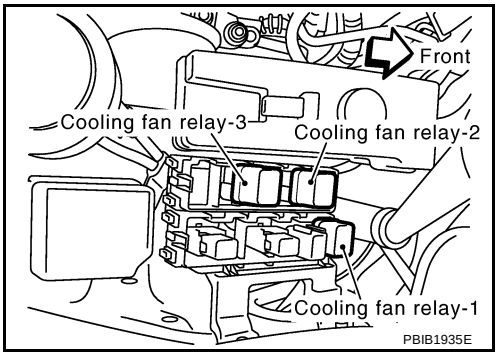
Perform EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

PROCEDURE B

1. CHECK COOLING FAN RELAY-1 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-1.
3. Turn ignition switch ON.

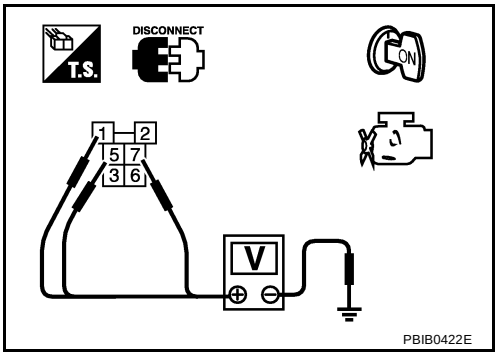


4. Check voltage between cooling fan relay-1 terminals 1, 5, 7 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

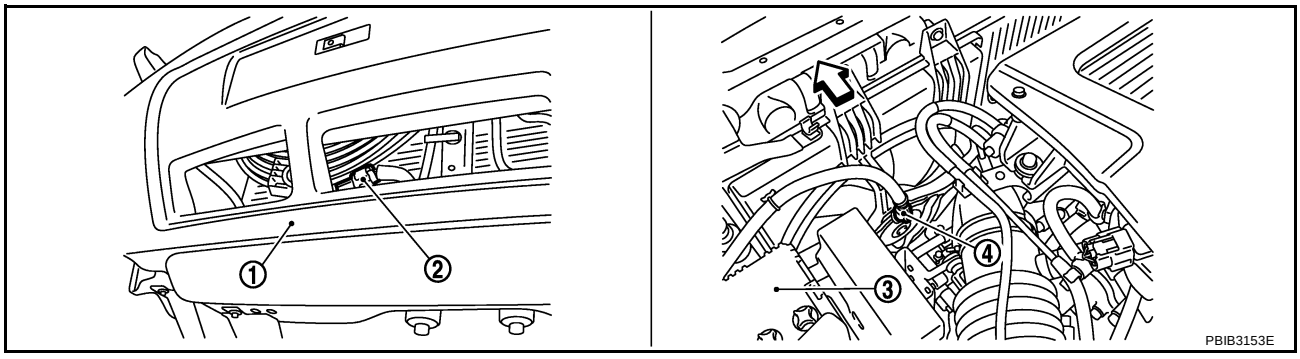
Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-1 and fuse
- Harness for open or short between cooling fan relay-1 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN RELAY GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-1 harness connector and cooling fan motor-2 harness connector.



⇦ : Vehicle front

1. Front bumper
2. Cooling fan motor-2 harness connector
3. Battery
4. Cooling fan motor-1 harness connector

3. Check harness continuity between the following.

- Cooling fan relay-1 terminal 3 and cooling fan motor-1 terminal 1
- Cooling fan relay-1 terminal 6 and cooling fan motor-2 terminal 1
- Cooling fan motor-1 terminal 4 and ground.
- Cooling fan motor-2 terminal 4 and ground.

Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between cooling fan relay-1 terminal 2 and ECM terminal 16.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E64, F5
- Harness for open or short between cooling fan relay-1 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-1

Refer to EC-1604, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay-1.

7. CHECK COOLING FAN MOTORS-1 AND -2

Refer to EC-1604, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan motors.

8. CHECK INTERMITTENT INCIDENT

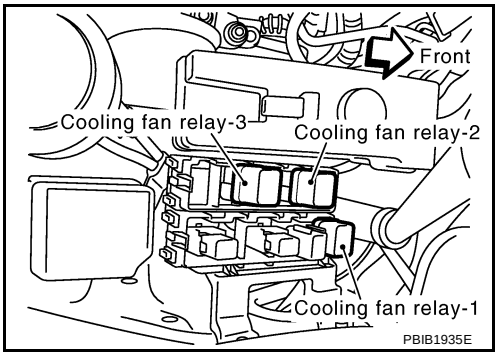
Perform EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

PROCEDURE C

1. CHECK COOLING FAN RELAY-3 POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect cooling fan relay-3.
3. Turn ignition switch ON.

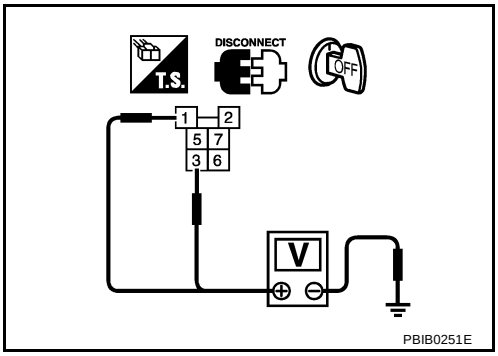


4. Check voltage between cooling fan relay-3 terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.



2. DETECT MALFUNCTIONING PART

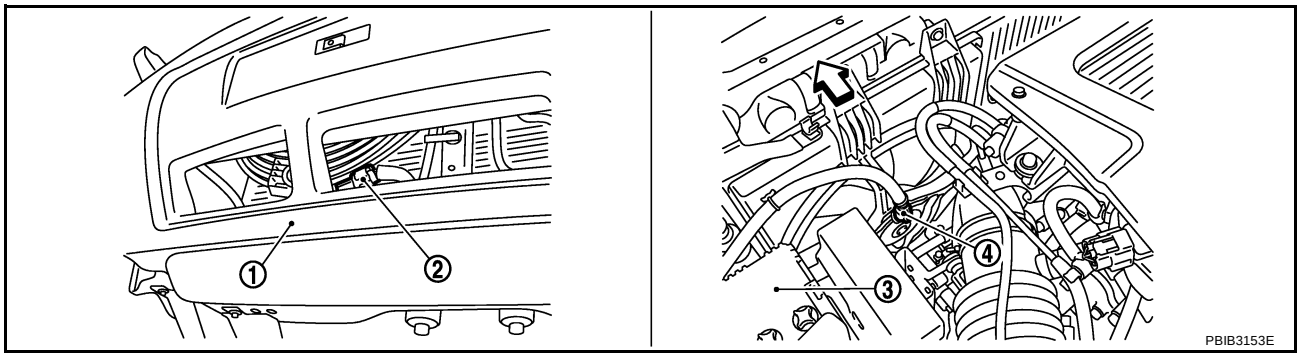
Check the following.

- Fuse block (J/B) connector E103
- 10A fuse
- 40A fusible links
- Harness for open or short between cooling fan relay-3 and fuse
- Harness for open or short between cooling fan relay-3 and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK COOLING FAN RELAY GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect cooling fan motor-2 harness connector.



⇦ : Vehicle front

1. Front bumper
2. Cooling fan motor-2 harness connector
3. Battery
4. Cooling fan motor-1 harness connector

3. Check harness continuity between the following.

- Cooling fan relay-3 terminal 5 and cooling fan motor-2 terminal 2
- Cooling fan relay-3 terminal 6 and cooling fan motor-2 terminal 3
- Cooling fan relay-3 terminal 7 and ground
  Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to power in harness or connectors.

4. CHECK COOLING FAN MOTOR OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between cooling fan relay-3 terminal 2 and ECM terminal 17.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E64, F5
- Harness for open or short between cooling fan relay-3 and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK COOLING FAN RELAY-3

Refer to EC-1604, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan relay-3.

7. CHECK COOLING FAN MOTOR-2

Refer to EC-1604, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace cooling fan motor-2.

8. CHECK INTERMITTENT INCIDENT

Perform EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Main 12 Causes of Overheating

BBS002AC

Engine	Step	Inspection item	Equipment	Standard	Reference page
OFF	1	● Blocked radiator ● Blocked condenser ● Blocked radiator grille ● Blocked bumper	● Visual	No blocking	—
	2	● Coolant mixture	● Coolant tester	50 - 50% coolant mixture	See MA-19, "Engine Coolant Mixture Ratio" .
	3	● Coolant level	● Visual	Coolant up to MAX level in reservoir tank and radiator filler neck	See CO-32, "LEVEL CHECK" .
	4	● Radiator cap	● Pressure tester	59 - 98 kPa (0.59 - 0.98 bar, 0.6 - 1.0 kg/cm^2 , 9 - 14 psi) (Limit)	See MA-33, "CHECKING RADIATOR CAP" .
ON*2	5	● Coolant leaks	● Visual	No leaks	See CO-32, "CHECKING RADIATOR SYSTEM FOR LEAKS" .
ON*2	6	● Thermostat	● Touch the upper and lower radiator hoses	Both hoses should be hot	See CO-46, "THERMOSTAT AND WATER PIPING" , and CO-35, "RADIATOR" .
ON*1	7	● Cooling fan	● CONSULT-II	Operating	See trouble diagnosis for DTC P0217 (EC-1589).
OFF	8	● Combustion gas leak	● Color checker chemical tester 4 Gas analyzer	Negative	—

Engine	Step	Inspection item	Equipment	Standard	Reference page
ON*3	9	● Coolant temperature gauge	● Visual	Gauge less than 3/4 when driving	—
		● Coolant overflow to reservoir tank	● Visual	No overflow during driving and idling	See MA-30, "Changing Engine Coolant" .
OFF*4	10	● Coolant return from reservoir tank to radiator	● Visual	Should be initial level in reservoir tank	See CO-32, "LEVEL CHECK" .
OFF	11	● Cylinder head	● Straight gauge feeler gauge	0.1 mm (0.004 in) Maximum distortion (warping)	SeeEM-214, "CYLINDER HEAD" .
	12	● Cylinder block and pistons	● Visual	No scuffing on cylinder walls or piston	See EM-235, "CYLINDER BLOCK" .

*1: Turn the ignition switch ON.
*2: Engine running at 3,000 rpm for 10 minutes.
*3: Drive at 90 km/h (55 MPH) for 30 minutes and then let idle for 10 minutes.
*4: After 60 minutes of cool down time.
For more information, refer to CO-28, "OVERHEATING CAUSE ANALYSIS" .

Component Inspection

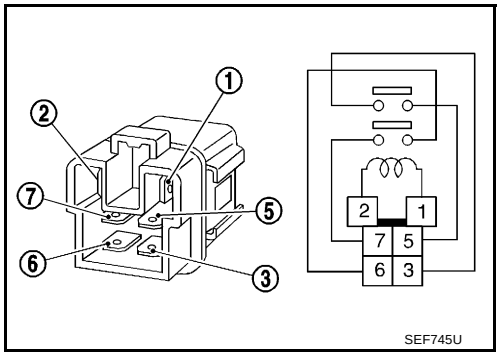
BBS002AD

COOLING FAN RELAY-1, -2 AND -3

Check continuity between terminals (3) and (5), (6) and (7).

Conditions	Continuity
12V direct current supply between terminals (1) and (2)	Yes
No current supply	No

If NG, replace relay.

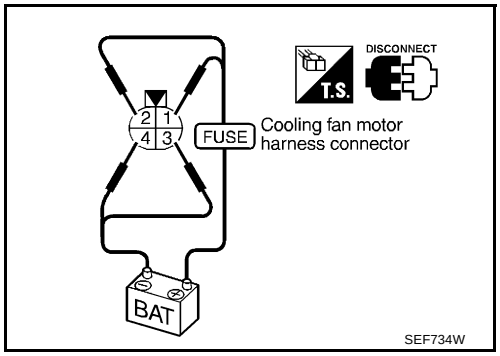


COOLING FAN MOTORS-1 AND -2

1. Disconnect cooling fan motor harness connectors.
2. Supply cooling fan motor terminals with battery voltage and check operation.

	Speed	Terminals	
		(+)	(-)
Cooling fan motor	Low	1	4
	High	1, 2	3, 4

Cooling fan motor should operate.
If NG, replace cooling fan motor.



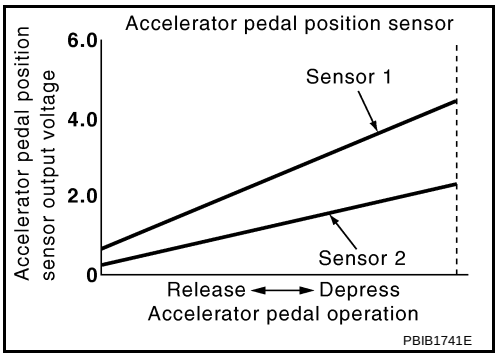
DTC P0222, P0223 APP SENSOR

PFP:18002

Description

BBS002AE

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



CONSULT-II Reference Value in Data Monitor Mode

BBS002AF

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.15 - 0.6V
		Accelerator pedal: Fully depressed	1.95 - 2.4V

*: This signal is converted by ECM internally. Thus, this differs from ECM terminals voltage.

On Board Diagnosis Logic

BBS002AG

The MI will not light up for these self-diagnoses.

NOTE:
If DTC P0222 or P0223 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0222 0222	Accelerator pedal position sensor 2 circuit low input	An excessively low voltage from the APP sensor 2 is sent to ECM.	● Harness or connectors (The APP sensor 2 circuit is open or shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2)
P0223 0223	Accelerator pedal position sensor 2 circuit high input	An excessively high voltage from the APP sensor 2 is sent to ECM.	

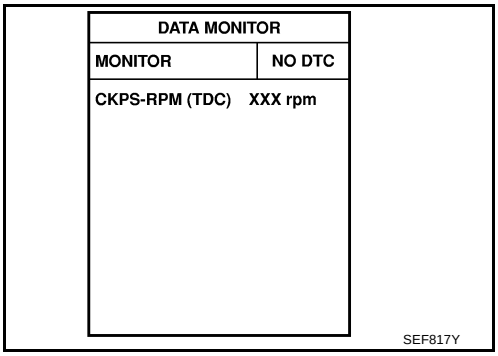
DTC Confirmation Procedure

BBS002AH

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1609, "Diagnostic Procedure" .



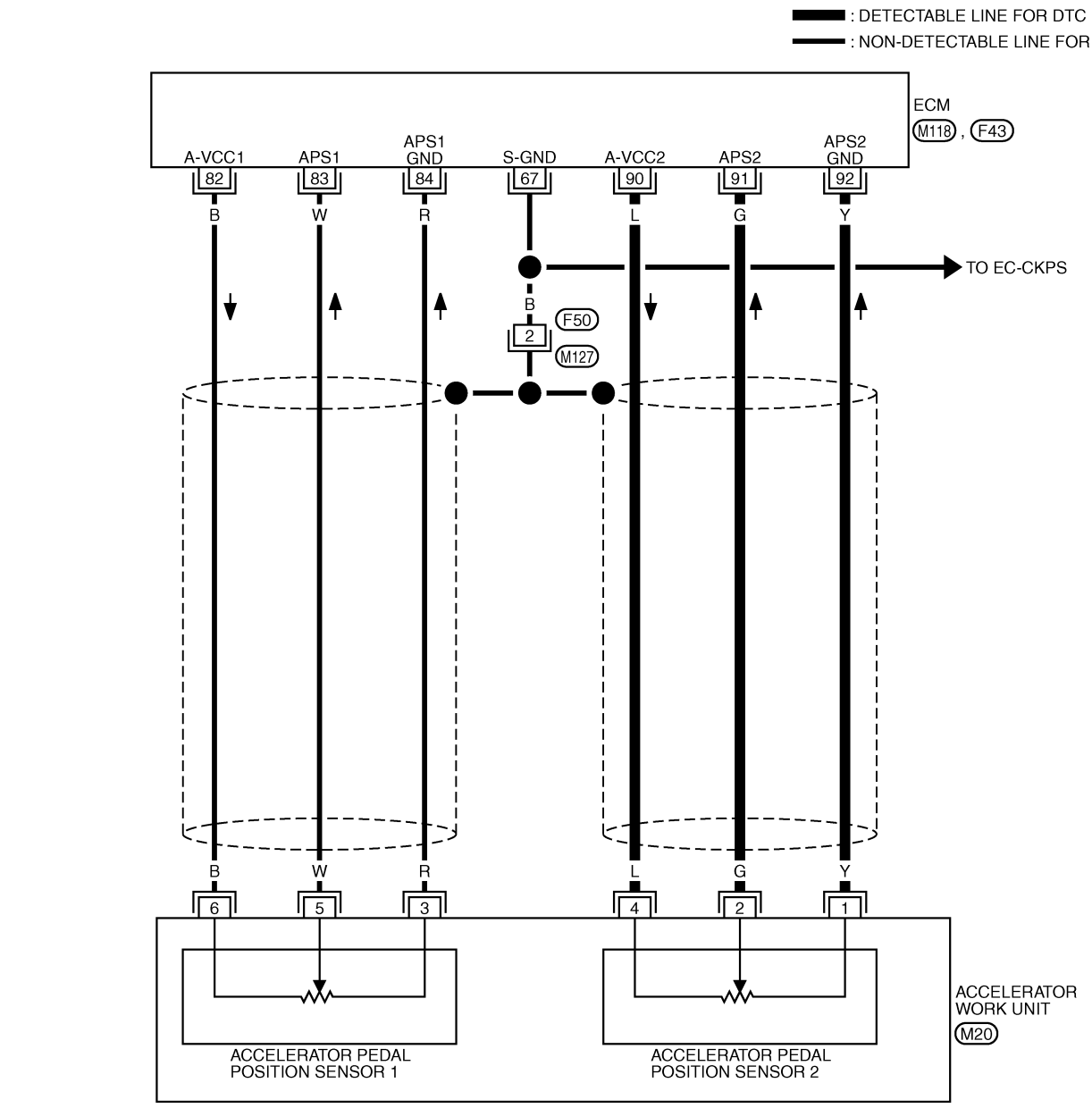
WITHOUT CONSULT-II

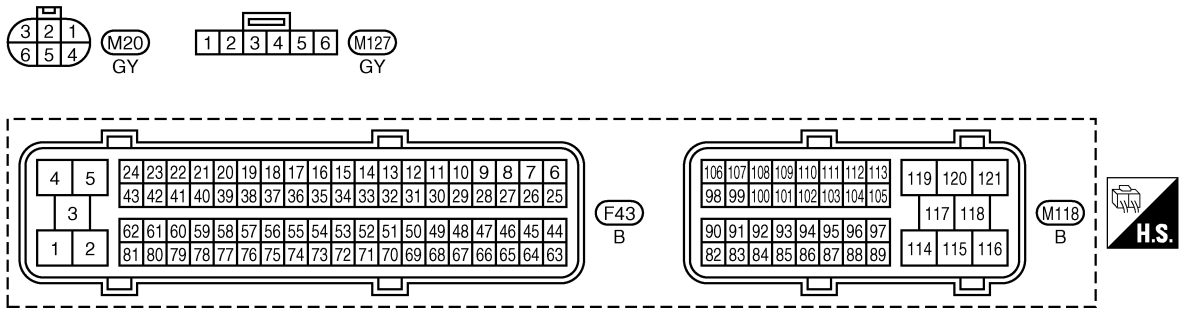
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1609, "Diagnostic Procedure" .

Wiring Diagram

BBS002AI

EC-APPS2-01





TBWB0906E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

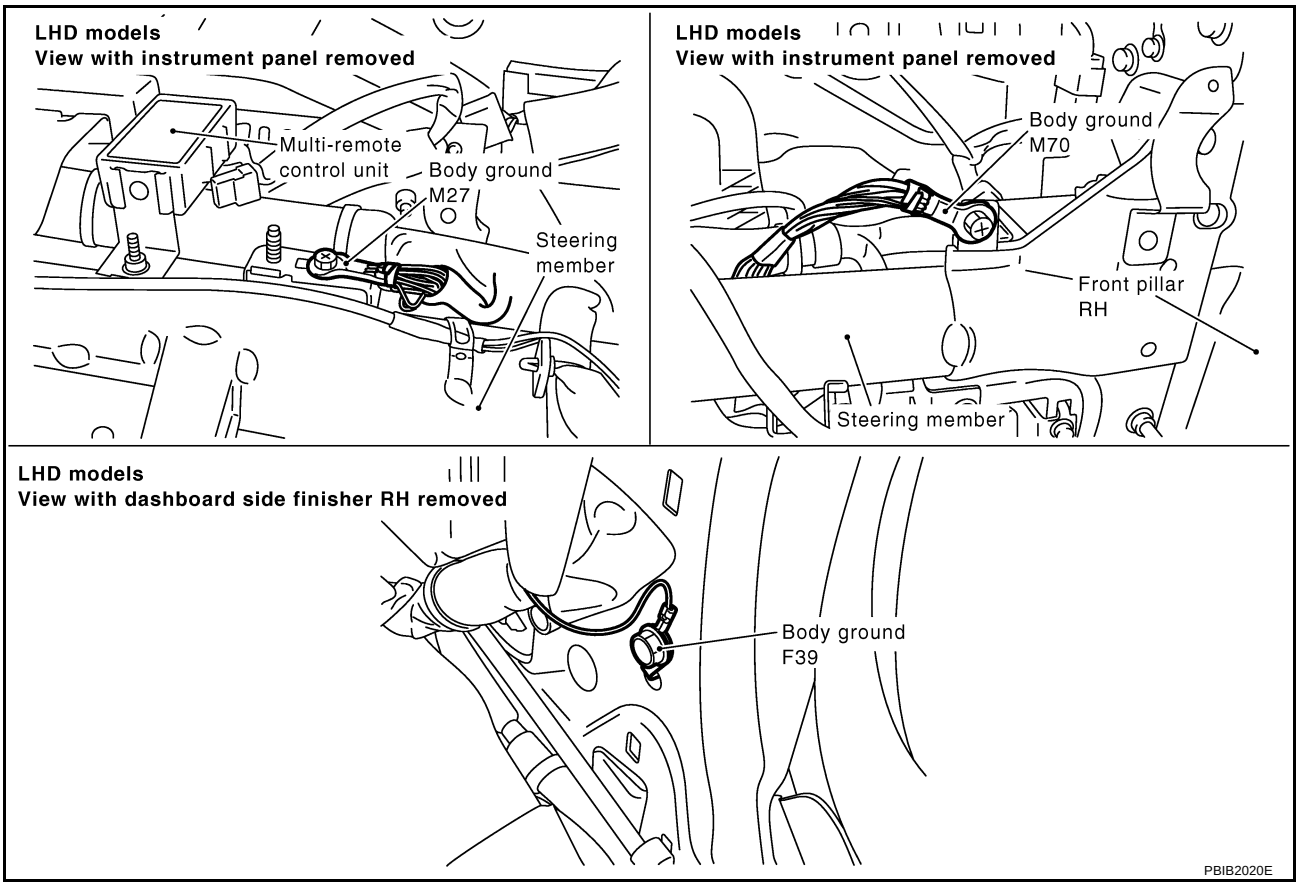
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1/ Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V
83	W	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.8 - 1.3V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.0V
84	R	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
90	L	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	G	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.45 - 0.9V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.25 - 2.7V
92	Y	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS002AJ

1. CHCEK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

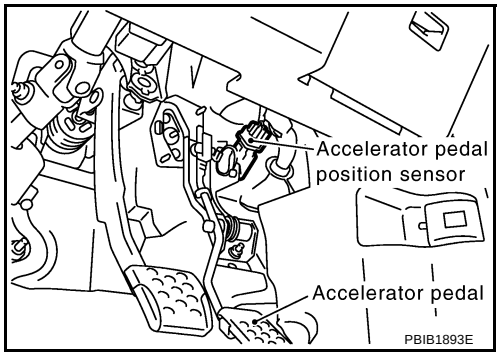


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

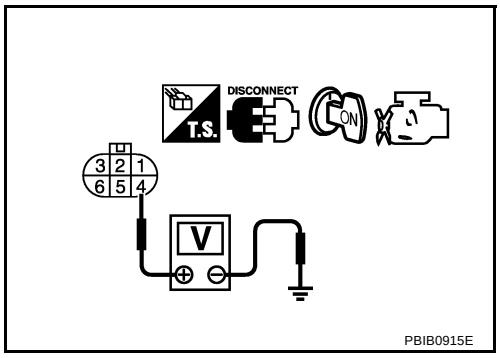
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR 2 GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminal 1 and ECM terminal 92. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR 2 INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 91 and APP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1611, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

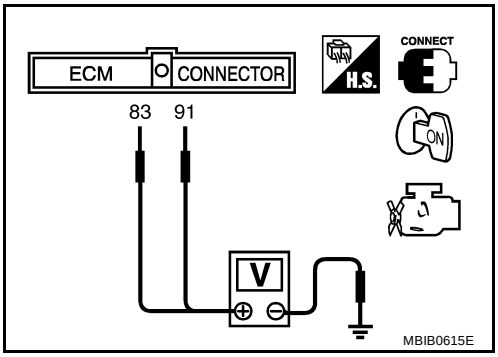
Component Inspection

BBS002AK

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.8 - 1.3V
	Fully depressed	4.2 - 5.0V
91 (Accelerator pedal position sensor 2)	Fully released	0.45 - 0.9V
	Fully depressed	2.25 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

BBS002AL

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

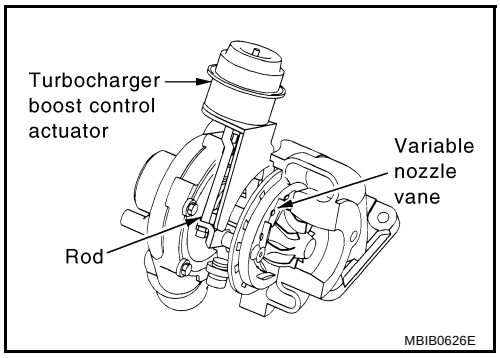
DTC P0234 TC SYSTEM

PFP:14411

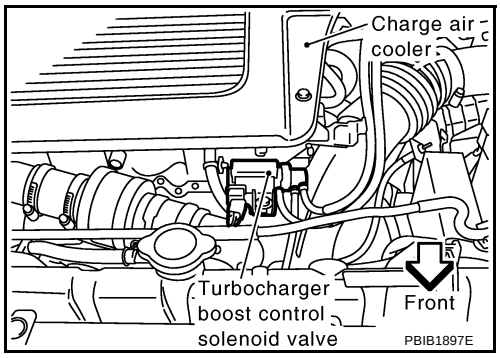
Description

BBS002AM

The load from the turbocharger boost control solenoid valve controls the actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted.



The turbocharger boost control solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.



On Board Diagnosis Logic

BBS002AN

The MI will not light up for these self-diagnoses.

NOTE:
If DTC P0234 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

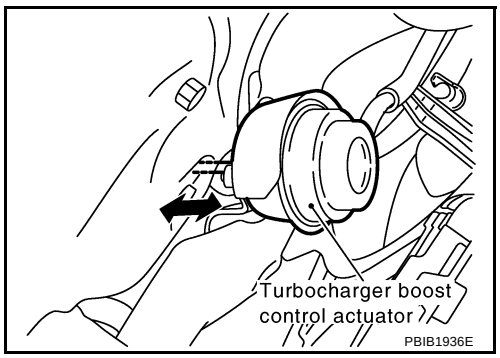
DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0234 0234	Turbocharger overboost condition	ECM detects turbocharger boost pressure is excessively high.	● Turbocharger ● Vacuum pump ● Turbocharger boost sensor ● Turbocharger boost control solenoid valve

Overall Function Check

BBS002AO

Use this procedure to check the overall function of the turbocharger. During this check, a DTC might not be confirmed.

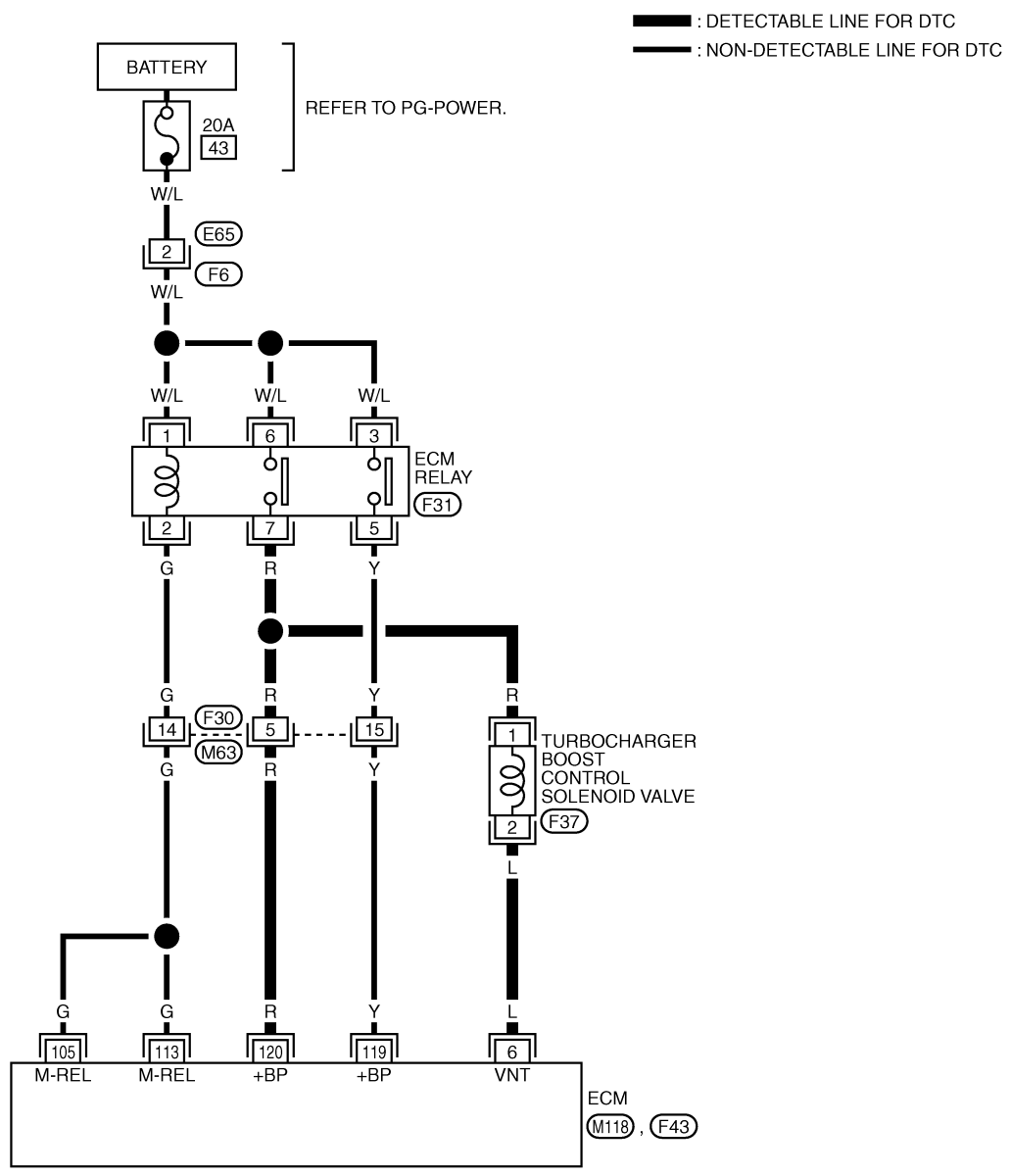
1. Start engine and let it idle.
2. Make sure that turbocharger control actuator rod moves slightly when engine is started.
3. If NG, go to EC-1614, "Diagnostic Procedure" .

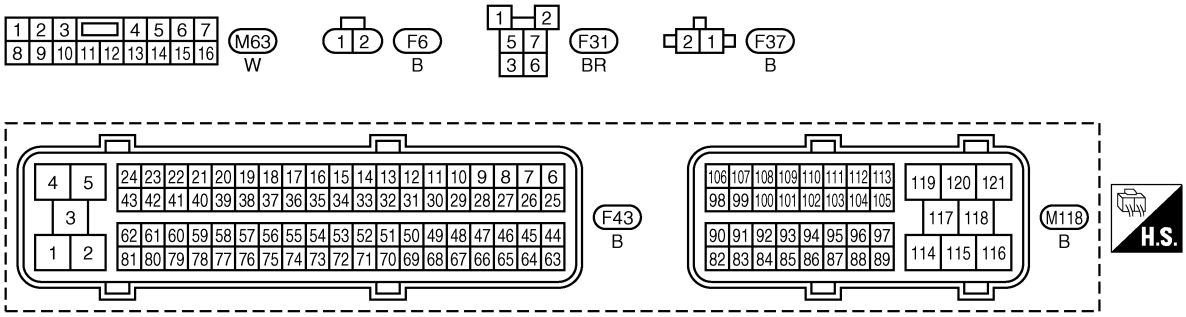


Wiring Diagram

BBS002AP

EC-TCC/V-01

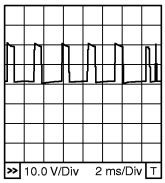
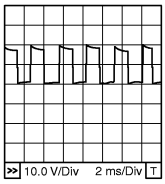




TBWA0588E

Specification data are reference valves, and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
6	L	Turbocharger boost control solenoid valve	**[Ignition switch ON]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0889E
			[Ignition switch ON] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0890E
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

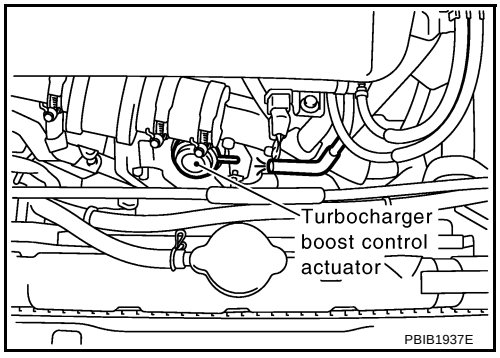
Diagnostic Procedure

BBS002AQ

1. CHECK VACUUM SOURCE

1. Turn ignition switch OFF.
2. Disconnect vacuum hose connected to turbocharger control actuator.
3. Start engine and let it idle.
4. Check vacuum hose for vacuum existence.

Vacuum should exist.



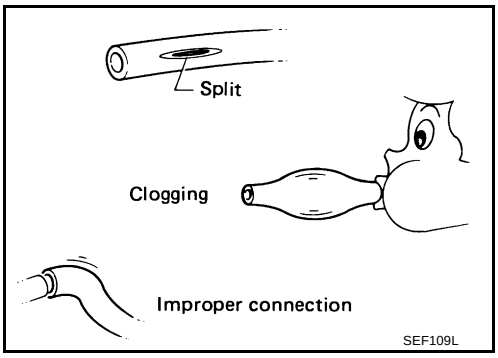
PBIB1937E

OK or NG

OK >> GO TO 8.
NG >> GO TO 2.

2. CHECK VACUUM HOSES AND VACUUM GALLERY

1. Turn ignition switch OFF.
2. Check vacuum hoses and vacuum gallery for clogging, cracks or improper connection. Refer to EC-1467, "Vacuum Hose Drawing" .

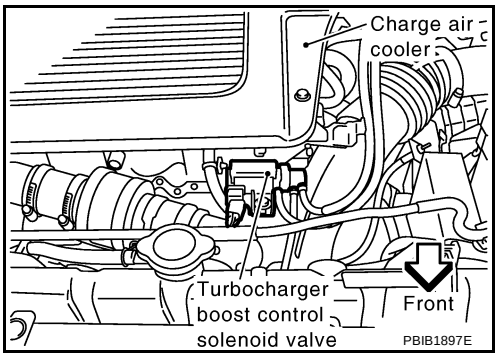


OK or NG

OK >> GO TO 3.
NG >> Repair or replace vacuum hoses and vacuum gallery.

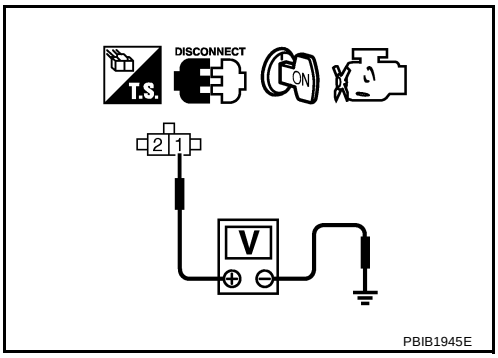
3. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Turn ignition switch ON.



3. Check voltage between turbocharger boost control solenoid valve terminals 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between turbocharger boost control solenoid valve and ECM relay
- Harness for open or short between turbocharger boost control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 6 and turbocharger boost control solenoid valve terminals 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK TURBOCHARGE BOOST CONTROL SOLENOID VALVE

Refer to EC-1617, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace turbocharger boost control solenoid valve.

7. CHECK VACUUM PUMP

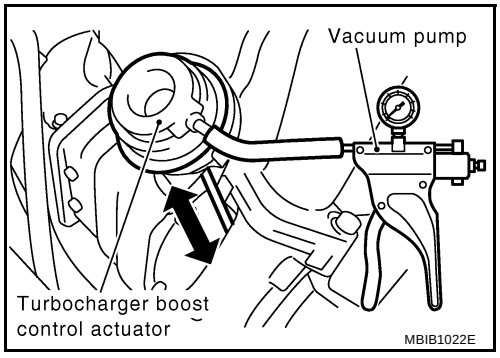
Refer to EM-167, "VACUUM PUMP" .

OK or NG

OK >> GO TO 8.
NG >> Replace vacuum pump assembly.

8. CHECK TURBOCHARGER BOOST CONTROL ACTUATOR

1. Turn ignition switch OFF.
2. Install a vacuum pump to turbocharger boost control actuator.
3. Make sure that the turbocharger boost control actuator rod moves smoothly when applying vacuum of -53.3kPa (-533mbar, -400mmHg, -15.75inHg) and releasing it.



OK or NG

OK >> GO TO 9.
NG >> Replace turbocharger assembly.

9. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1623, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace turbocharger boost sensor.

10. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

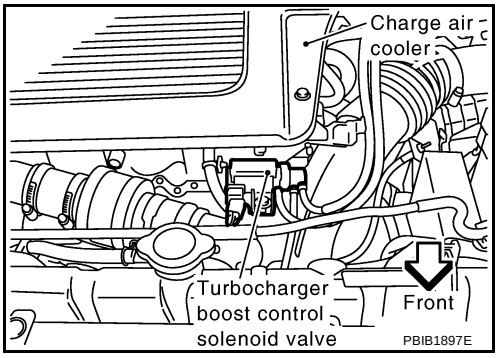
>> **INSPECTION END**

Component Inspection

BBS002AR

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Apply 12V direct current between turbocharger boost control solenoid valve terminals.

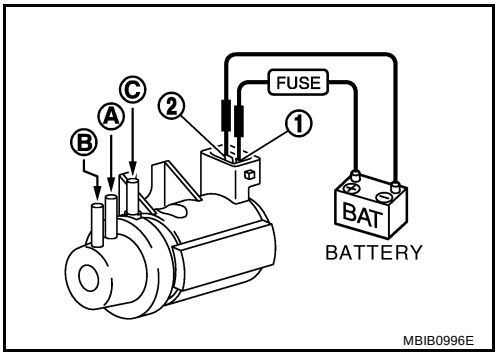


3. Check air passage continuity of turbocharger boost control solenoid valve under the following conditions.

CONDITIONS	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals (1) and (2)	Yes	No
No supply	No	Yes

Operation takes less than 1 second.

If NG, replace turbocharger boost control solenoid valve.



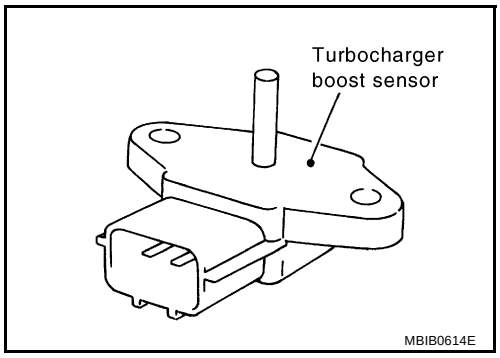
DTC P0237, P0238 TC BOOST SENSOR

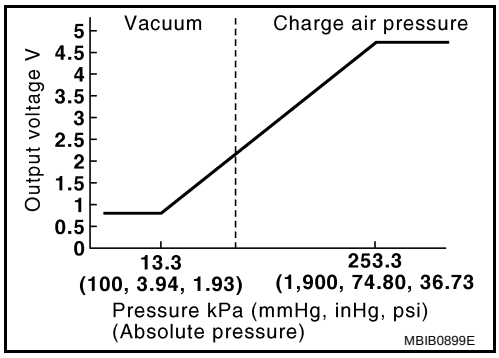
PFP:22365

Component Description

BBS002AT

The turbocharger boost sensor detects pressure in the exit side of the charge air cooler. The sensor output voltage to the ECM increases as pressure increases.





CONSULT-II Reference Value in Data Monitor Mode

BBS002AU

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
INT/M PRES SE [kPa]	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	Approx. 100 kPa
		2,800 rpm	Approx. 126 kPa
		4,000 rpm	Approx. 106 kPa

On Board Diagnosis Logic

BBS002AV

The MI will not light up for these self-diagnoses.

NOTE:
If DTC P0237 or P0238 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0237 0237	Turbocharger boost sensor circuit low input	An excessively low voltage from the sensor is sent to ECM.	● Harness or connectors (The sensor circuit is open or shorted.) ● Turbocharger boost sensor
P0238 0238	Turbocharger boost sensor circuit high input	An excessively high voltage from the sensor is sent to ECM.	

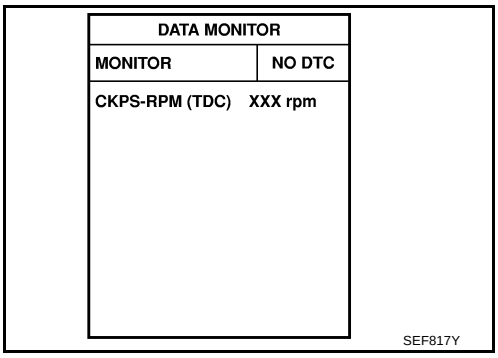
DTC Confirmation Procedure

BBS002AW

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1621, "Diagnostic Procedure" .



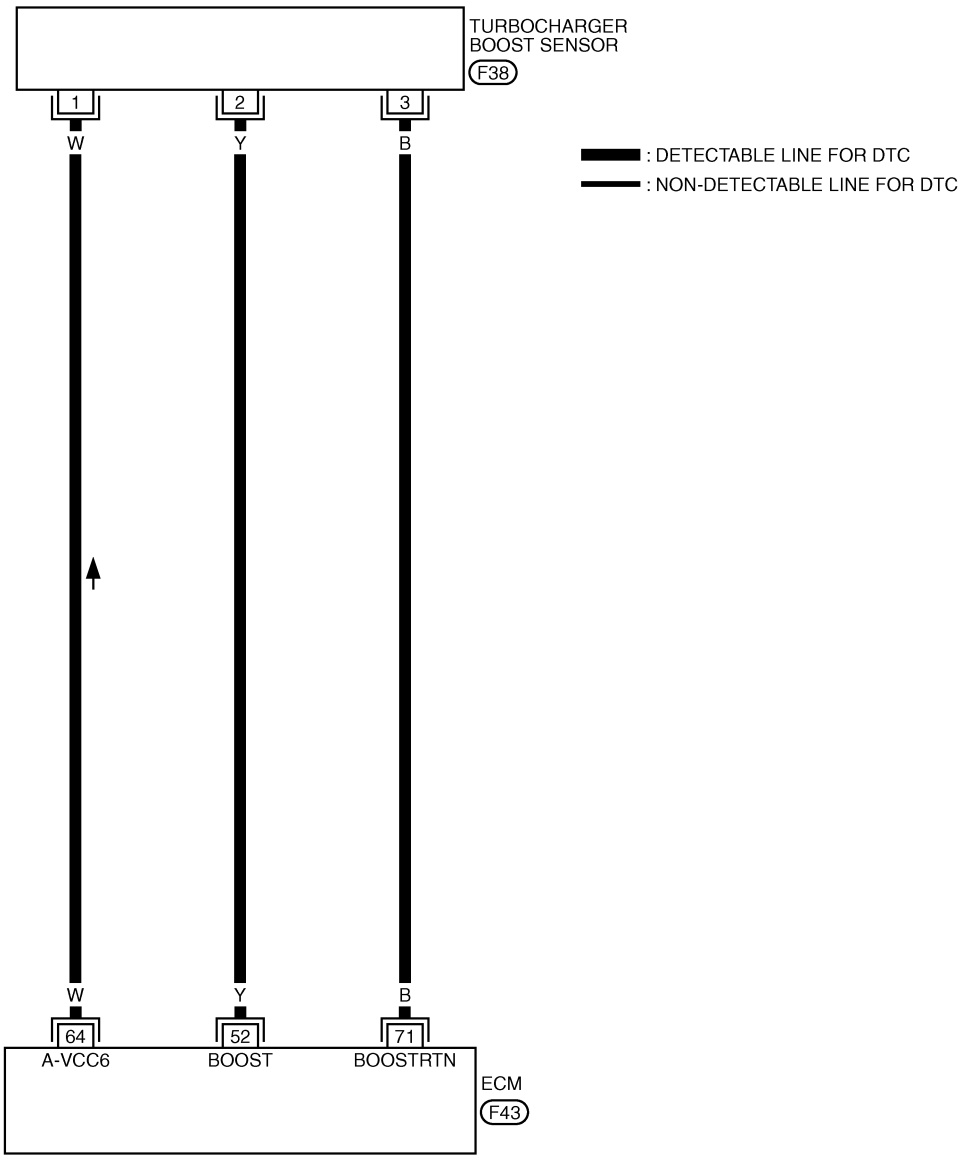
WITHOUT CONSULT-II

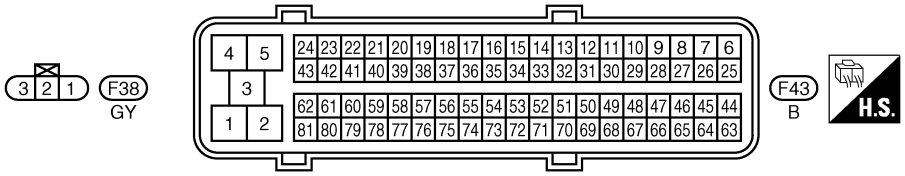
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1614, "Diagnostic Procedure" .

Wiring Diagram

BBS002AX

EC-BOOST-01





TBWA0589E

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

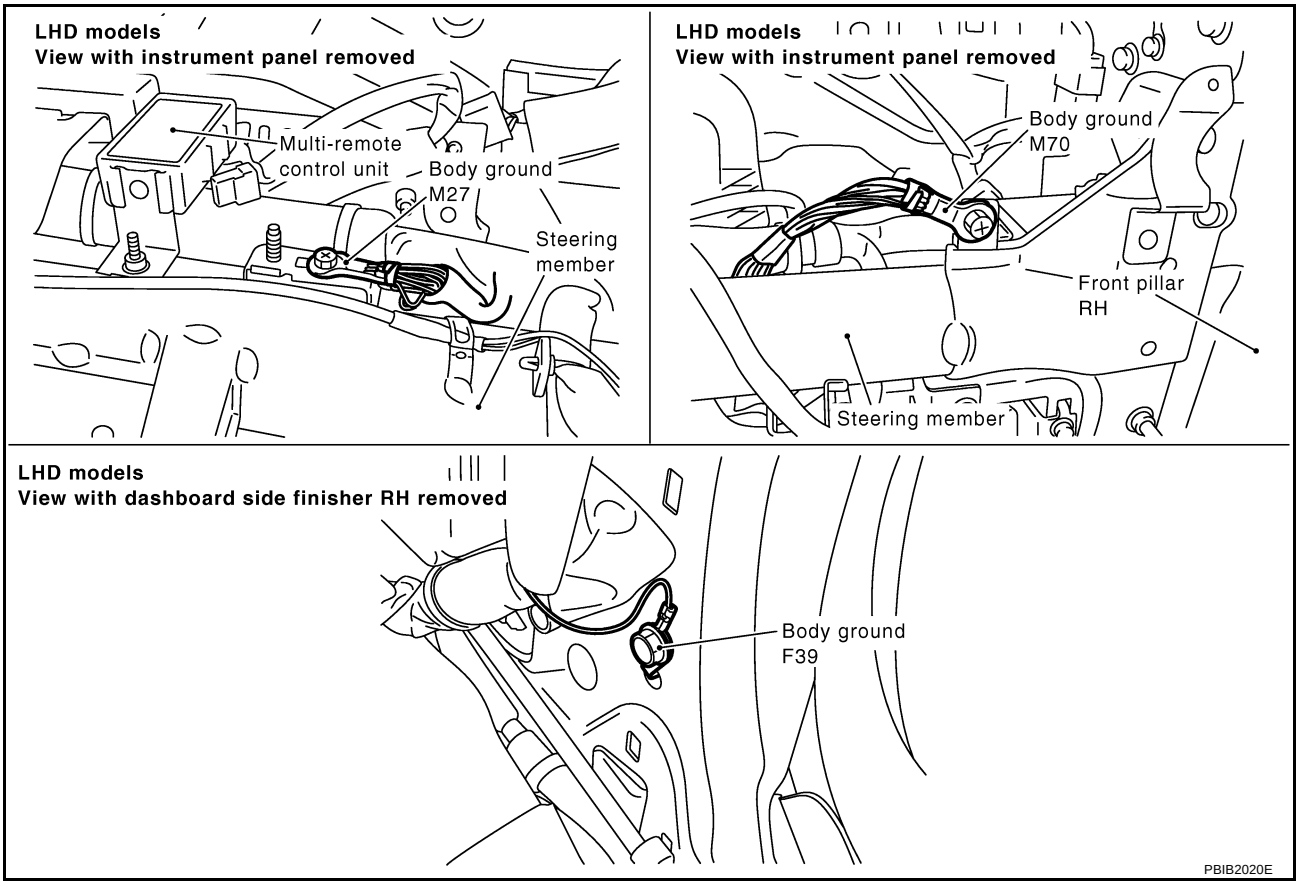
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
52	Y	Turbocharger boost sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed	2.3 - 2.6V
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	2.5 - 2.8V
64	W	Turbocharger boost sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
71	B	Turbocharger boost sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS002AY

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

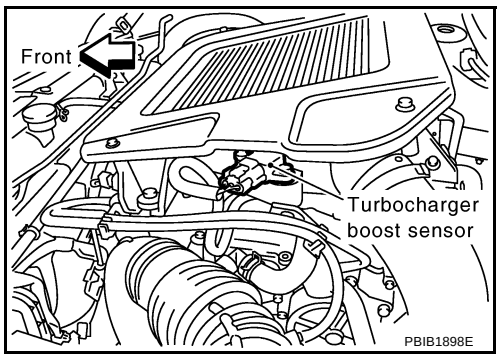


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

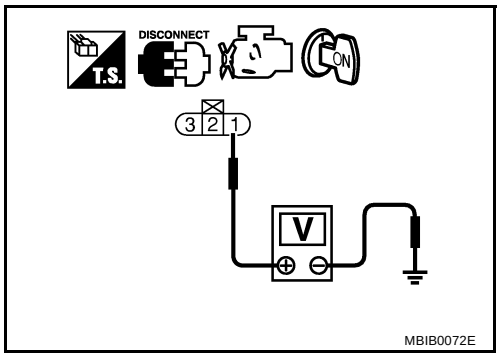
2. CHECK TURBOCHARGER BOOST SENSOR POWER SUPPLY CIRCUIT

1. Disconnect turbocharge boost sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between turbocharge boost sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK TURBOCHAGER BOOST SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between turbocharger boost sensor terminal 3 and ECM terminal 71. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK TURBOCHAGER BOOST SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminals 52 and turbocharger boost sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness connectors.

5. CHECK TURBOCHARGER BOOST SENSOR

Refer to EC-1623, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace turbocharger boost sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

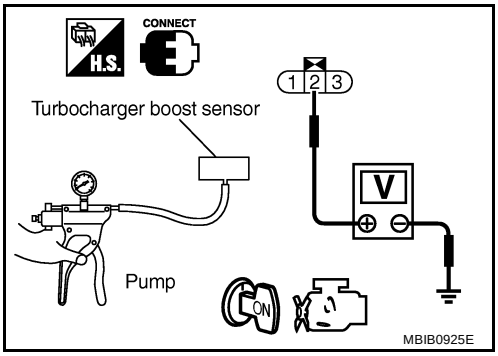
BBS002AZ

CHECK TURBOCHARGER BOOST SENSOR

1. Remove turbocharger boost sensor with its harness connected.
2. Turn ignition switch ON.
3. Use pump to apply pressure sensor as shown in the figure.

   CAUTION:
   - **Always calibrate the pressure pump gauge when using it.**
   - **Inspection should be done at room temperature [10-30°C (50-86°F)].**
4. Check the output voltage between turbocharger boost sensor terminal 2 and ground.

Pressure (Relative to atmospheric pressure)	Voltage V
0 kPa (0 mbar, 0 mmHg, 0 inHg)	Approximately 2.3V
+40 kPa (400 mbar, 300mmHg, 11.81 inHg)	Approximately 2.9V



Removal and Installation

BBS002B0

TURBOCHARGER BOOST SENSOR

Refer to EM-143, "CHARGE AIR COOLER" .

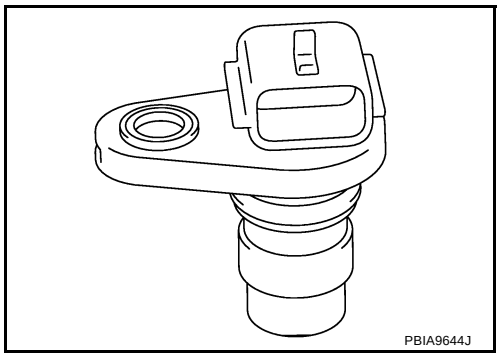
DTC P0335 CKP SENSOR

PFP:23731

Description

BBS002B1

The crankshaft position (CKP) sensor is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


PBIA9644J

CONSULT-II Reference Value in Data Monitor Mode

BBS002B2

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS-RPM (TDC)	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication

On Board Diagnosis Logic

BBS002B3

NOTE:
If DTC P0335 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-1686, "DTC P0642, P0643 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0335 0335	Crankshaft position sensor circuit	Crankshaft position sensor signal is not detect by the ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor

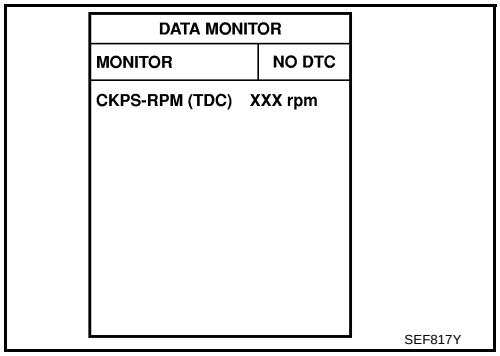
DTC Confirmation Procedure

BBS002B4

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If DTC is detected, go to EC-1627, "Diagnostic Procedure" .



SEF817Y

WITHOUT CONSULT-II

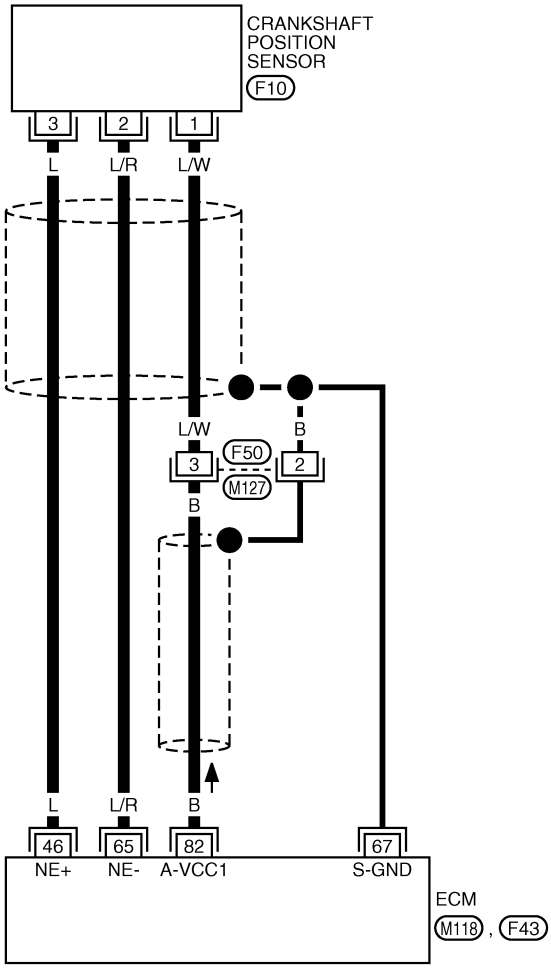
1. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1627, "Diagnostic Procedure" .

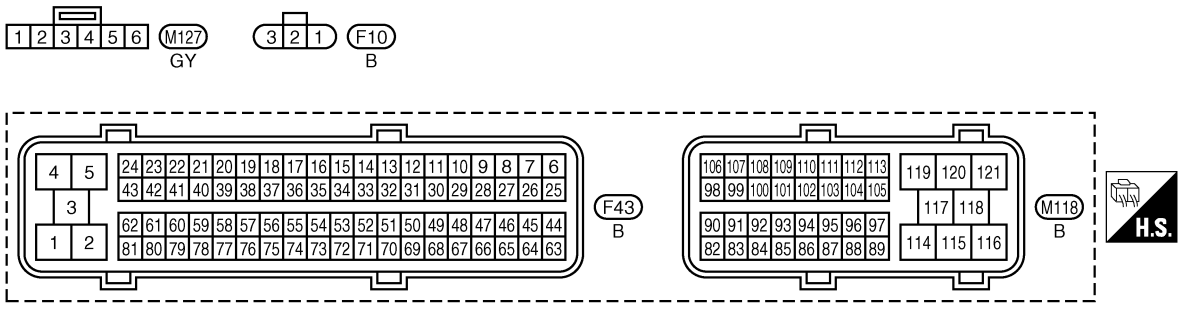
Wiring Diagram

BBS002B5

EC-CKPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



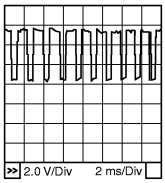
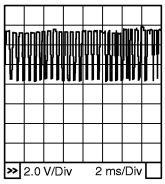


TBWB0907E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
46	L	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 6V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 6V ★  MBIB0880E
65	L/R	Crankshaft position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V

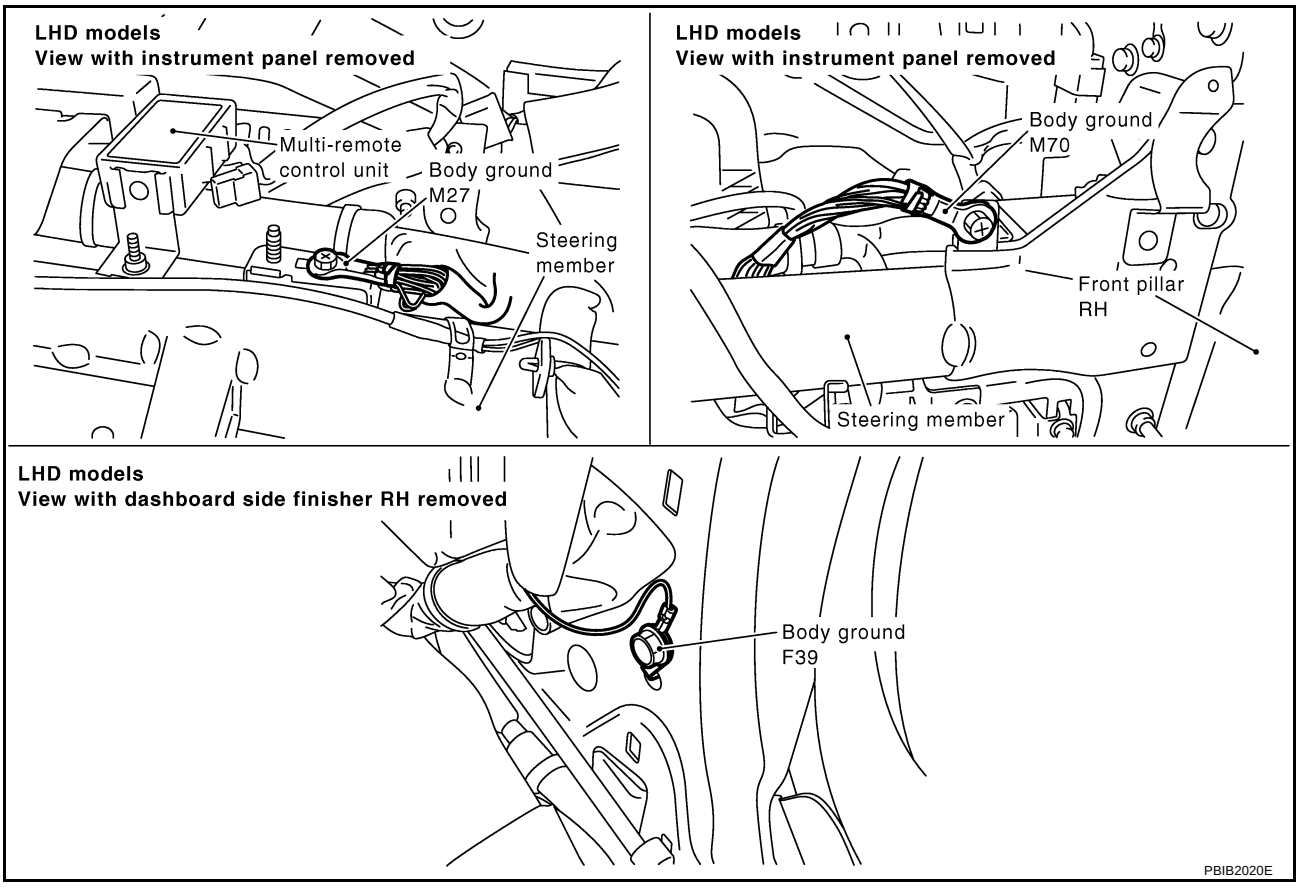
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS002B6

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

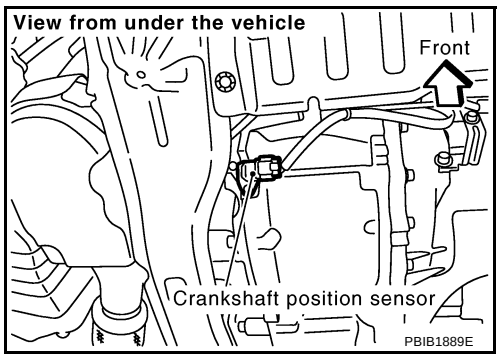


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

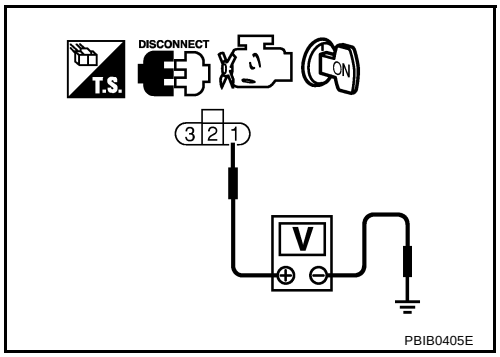
2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between CKP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F50, M127
- Harness for open or short between CKP sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 65 and CKP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for and short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 46 and CKP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1629, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace crankshaft position sensor.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

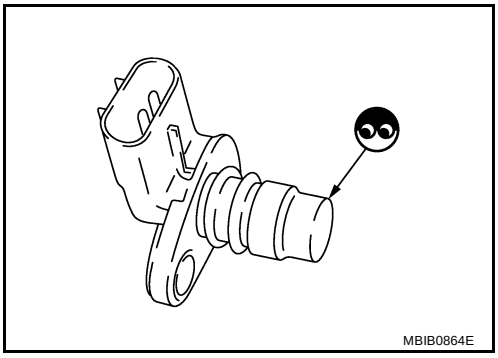
>> **INSPECTION END**

Component Inspection

BBS002B7

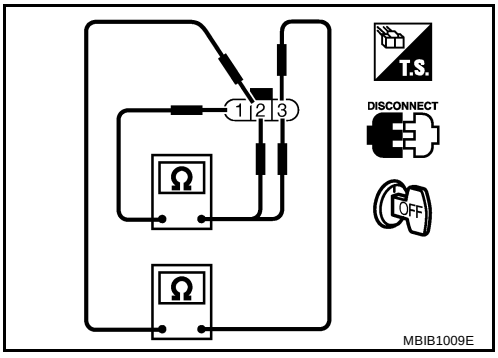
CRANKSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.


MBIB0864E

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	Except 0
2 (+) - 3 (-)	



MBIB1009E

6. If NG, replace crankshaft position sensor.

Removal and Installation

BBS002B8

CRANKSHAFT POSITION SENSOR

Refer to EM-161, "OIL PAN AND OIL STRAINER" .

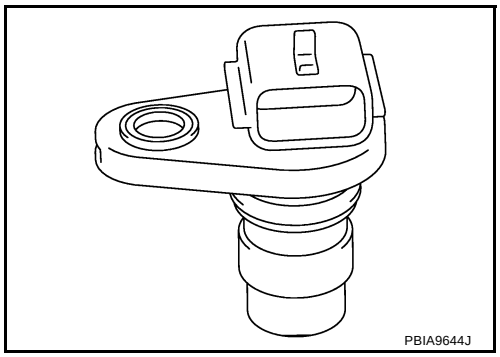
DTC P0336 CKP SENSOR

PFP:23731

Description

BBS002IU

The crankshaft position (CKP) sensor is located on the cylinder block rear housing facing the gear teeth (cogs) of the signal plate at the end of the crankshaft. It detects the fluctuation of the engine revolution.
The sensor consists of a permanent magnet and Hall IC.
When the engine is running, the high and low parts of the teeth cause the gap with the sensor to change. The changing gap causes the magnetic field near the sensor to change. Due to the changing magnetic field, the voltage from the sensor changes. The ECM receives the voltage signal and detects the fluctuation of the engine revolution.


PBIA9644J

CONSULT-II Reference Value in Data Monitor Mode

BBS002BA

Specification data are reference values.

MONITOR ITEM	CONDITION	SPECIFICATION
CKPS·RPM (TDC)	● Run engine and compare CONSULT-II value with the tachometer indication.	Almost the same speed as the tachometer indication.

On Board Diagnosis Logic

BBS002BB

NOTE:
If DTC P0336 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-1686, "DTC P0642, P0643 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0336 0336	Crankshaft position sensor circuit range/performance	Crankshaft position sensor signal is not in the normal pattern when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Crankshaft position sensor ● Signal plate

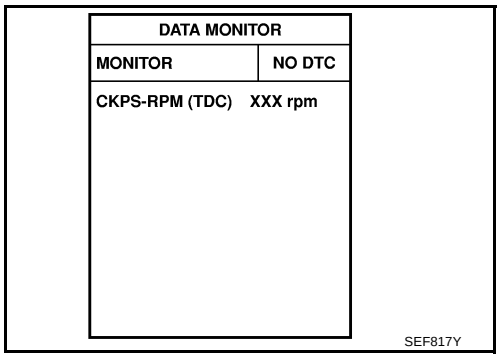
DTC Confirmation Procedure

BBS002BC

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If DTC is detected, go to EC-1633, "Diagnostic Procedure" .



SEF817Y

WITHOUT CONSULT-II

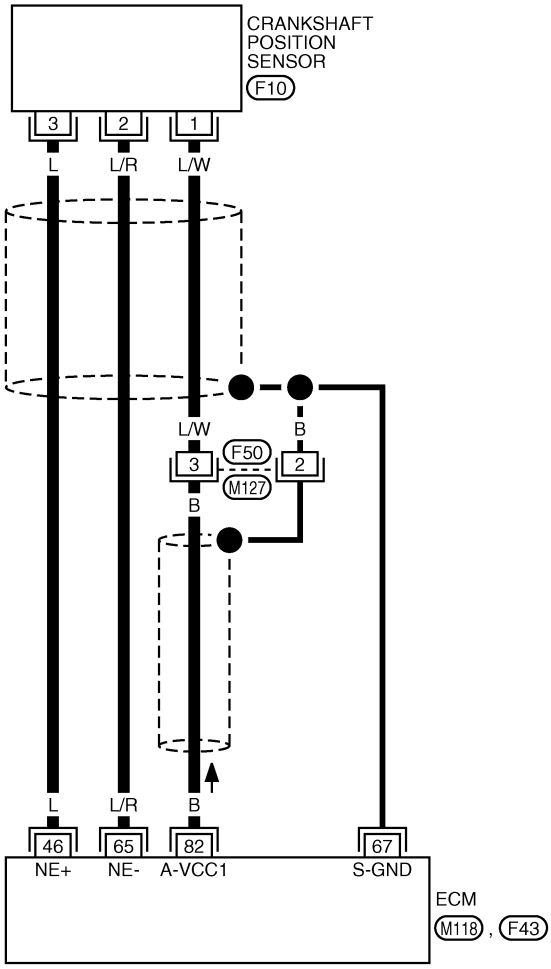
1. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1633, "Diagnostic Procedure" .

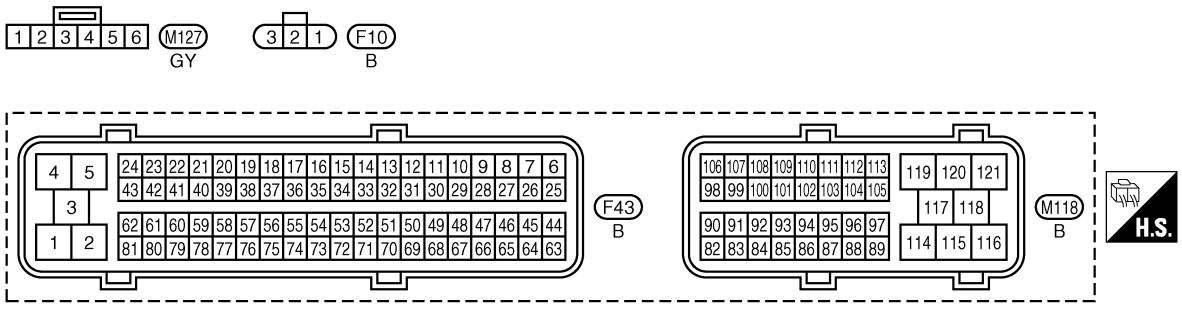
Wiring Diagram

BBS002BD

EC-CKPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



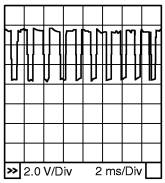
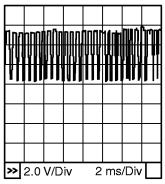


TBWB0907E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
46	L	Crankshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 6V ★  MBIB0879E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 6V ★  MBIB0880E
65	L/R	Crankshaft position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V

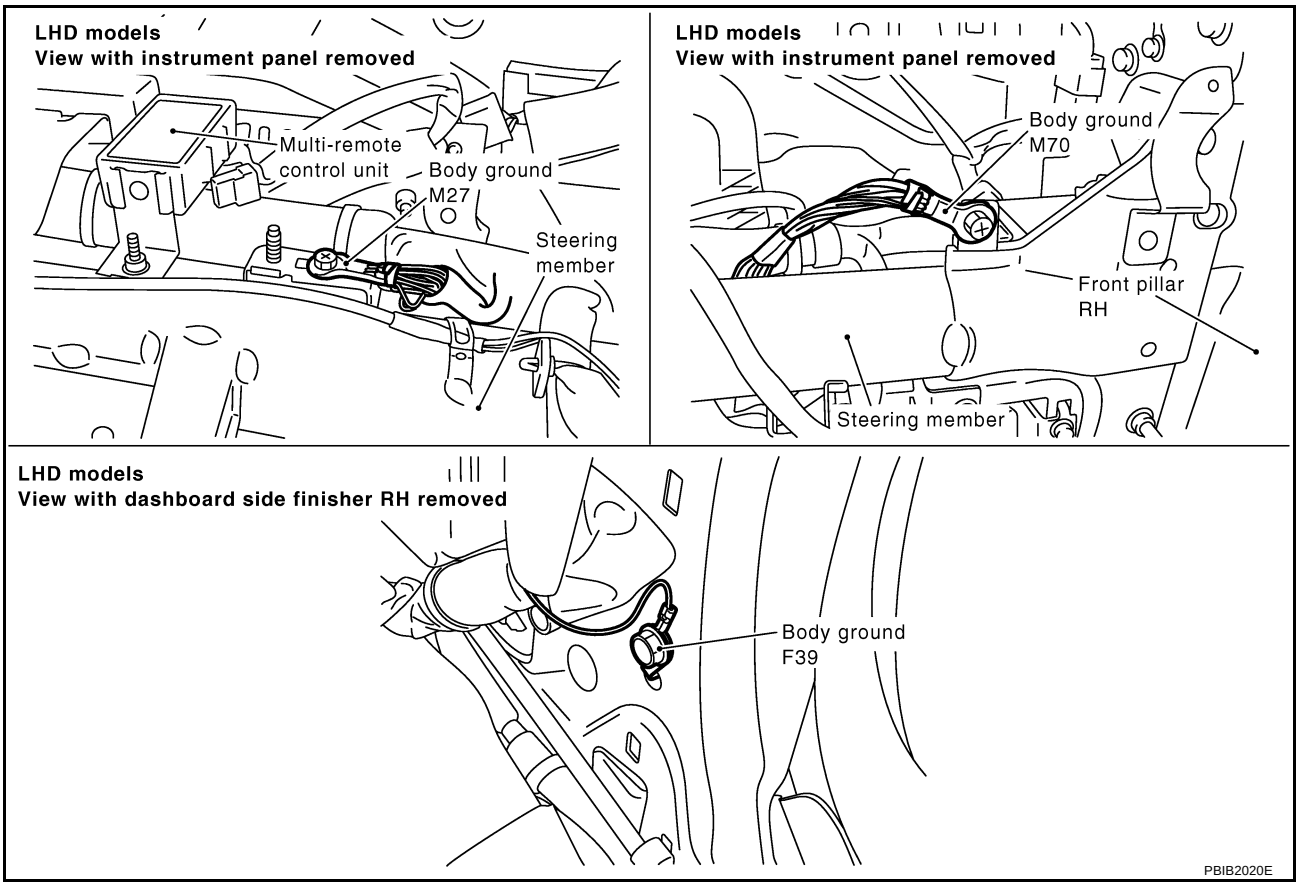
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS002BE

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

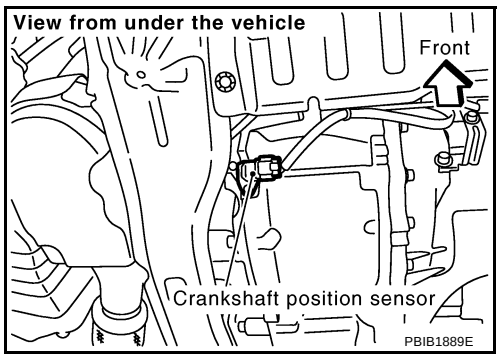


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK CKP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect crankshaft position (CKP) sensor harness connector.
2. Turn ignition switch ON.



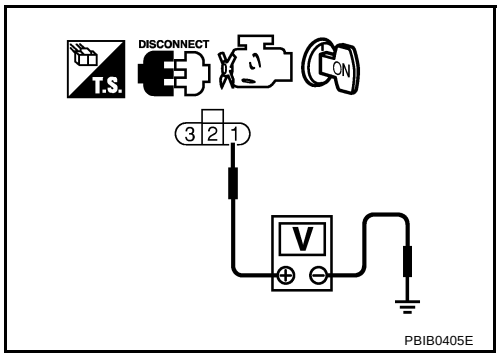
3. Check voltage between CKP sensor terminal 1 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F50, M127
- Harness for open or short between CKP sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CKP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 65 and CKP sensor terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for and short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CKP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 46 and CKP sensor terminal 3. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1635, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace crankshaft position sensor.

7. CHECK GEAR TOOTH

Visually check for chipping signal plate gear tooth.

OK or NG

OK >> GO TO 8.
NG >> Replace the signal plate.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

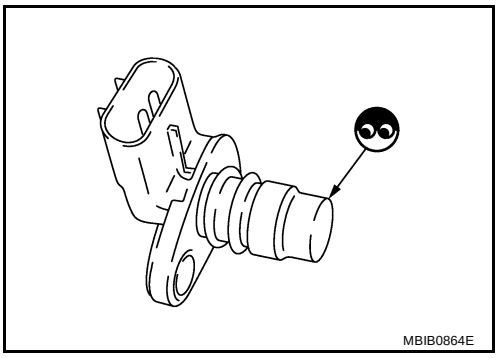
>> **INSPECTION END**

Component Inspection

BBS002BF

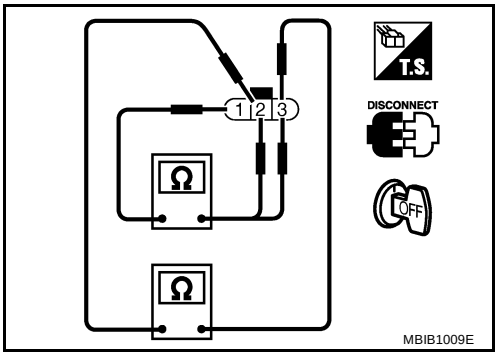
CRANKSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect crankshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.


MBIB0864E

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
1 (+) - 3 (-)	Except 0
2 (+) - 3 (-)	



MBIB1009E

6. If NG, replace crankshaft position sensor.

Removal and Installation

BBS002BG

CRANKSHAFT POSITION SENSOR

Refer to EM-161, "OIL PAN AND OIL STRAINER" .

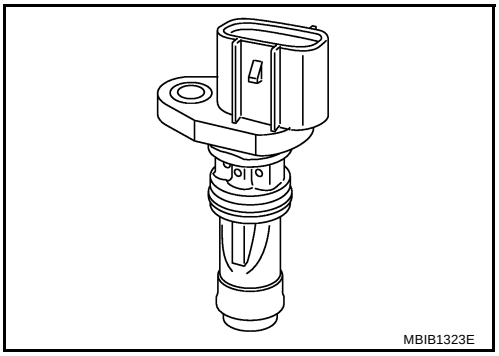
DTC P0340 CMP SENSOR

PFP:23731

Description

BBS002BH

The camshaft position (CMP) sensor senses the retraction with camshaft (left side) to identify a particular cylinder. The camshaft position (CMP) sensor senses the piston position.
When the crankshaft position (CKP) sensor system becomes inoperative, the camshaft position (CMP) sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.


MBIB1323E

On Board Diagnosis Logic

BBS002BI

NOTE:
If DTC P0340 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0340 0340	Camshaft position sensor circuit	Camshaft position sensor signal is not detect by the ECM when engine is running.	● Harness or connectors (The sensor circuit is open or shorted.) ● Camshaft position sensor

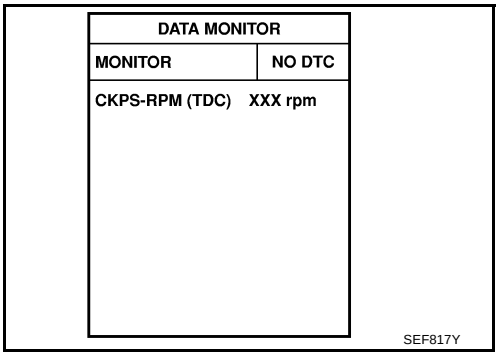
DTC Confirmation Procedure

BBS002BJ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If DTC is detected, go to EC-1639, "Diagnostic Procedure" .



SEF817Y

WITHOUT CONSULT-II

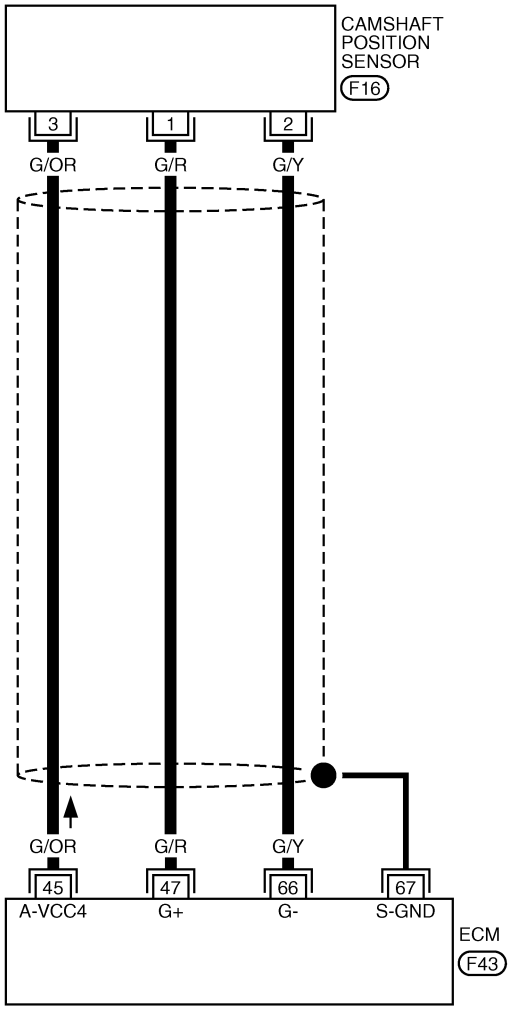
1. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1639, "Diagnostic Procedure" .

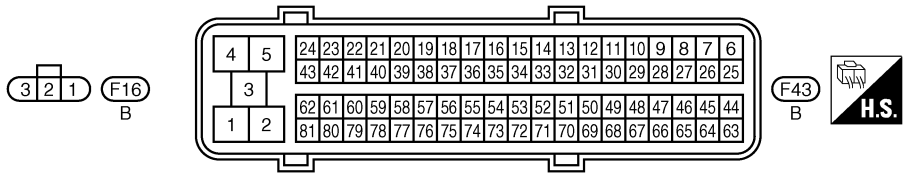
Wiring Diagram

BBS002BK

EC-CMPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



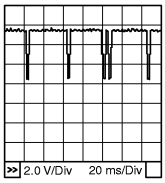
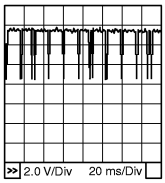


TBWA0571E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
45	G/OR	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
47	G/R	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 6V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 6V ★  MBIB0878E
66	G/Y	Camshaft position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

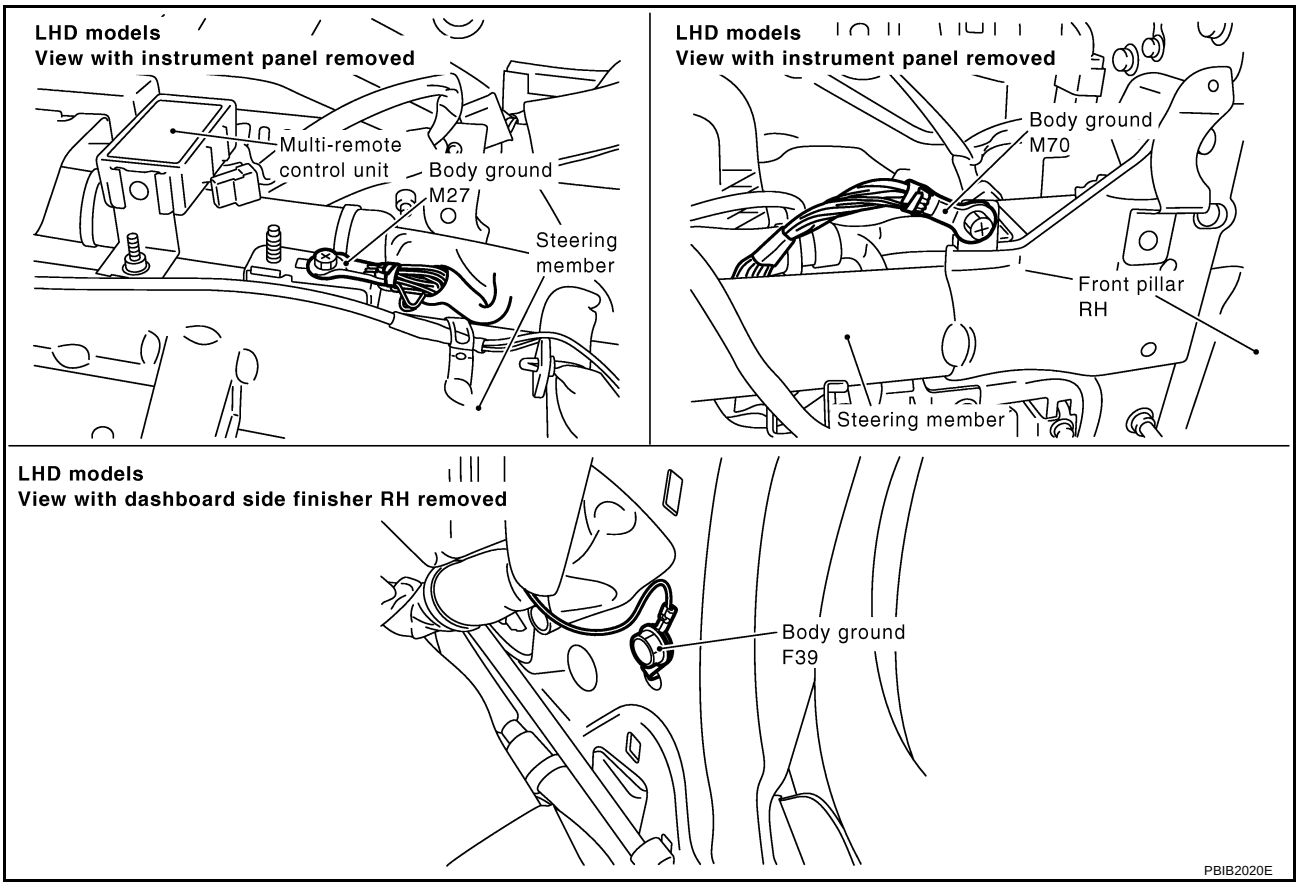
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS002BL

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

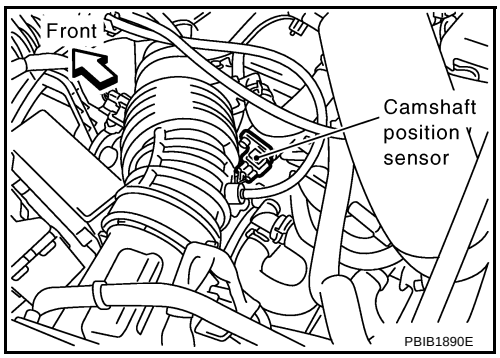


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

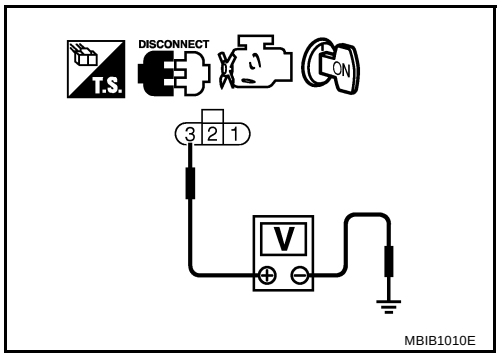
2. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between CMP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and CMP sensor terminal 2.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 47 and CMP sensor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1641, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace camshaft position sensor.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

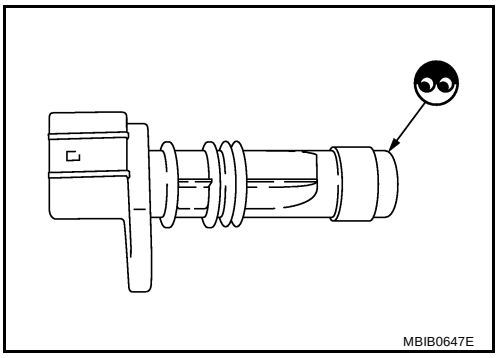
>> **INSPECTION END**

Component Inspection

BBS002BM

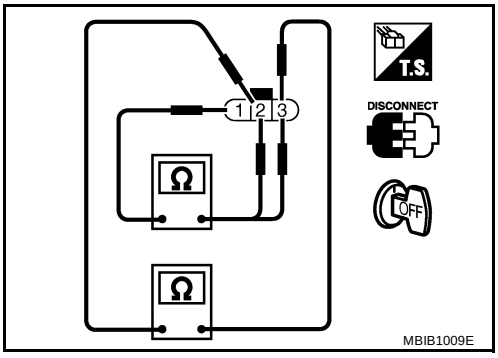
CAMSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.


MBIB0647E

5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
3 (+) - 1 (-)	
3 (+) - 2 (-)	



MBIB1009E

6. If NG, replace camshaft position sensor.

Removal and Installation

BBS002BN

CAMSHAFT POSITION SENSOR

Refer to EM-167, "VACUUM PUMP" .

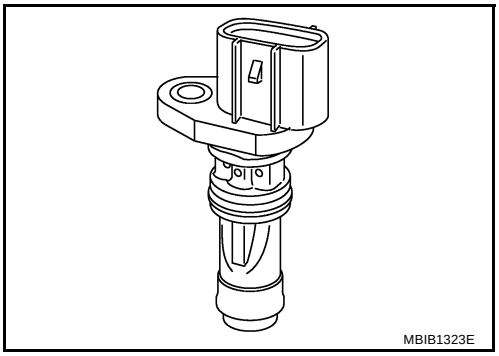
DTC P0341 CMP SENSOR

PFP:23731

Description

BBS002BO

The camshaft position (CMP) sensor senses the retraction with camshaft (left side) to identify a particular cylinder. The camshaft position (CMP) sensor senses the piston position.
When the crankshaft position (CKP) sensor system becomes inoperative, the camshaft position (CMP) sensor provides various controls of engine parts instead, utilizing timing of cylinder identification signals.
The sensor consists of a permanent magnet and Hall IC.
When engine is running, the high and low parts of the teeth cause the gap with the sensor to change.
The changing gap causes the magnetic field near the sensor to change.
Due to the changing magnetic field, the voltage from the sensor changes.


MBIB1323E

On Board Diagnosis Logic

BBS002BP

NOTE:
If DTC P0341 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0341 0341	Camshaft position sensor circuit range/performance	Camshaft position sensor signal is not in the normal pattern when engine is running.	● Harness connectors (The sensor circuit is opener shorted.) ● Camshaft position sensor ● Starter motor ● Starting system circuit ● Signal plate

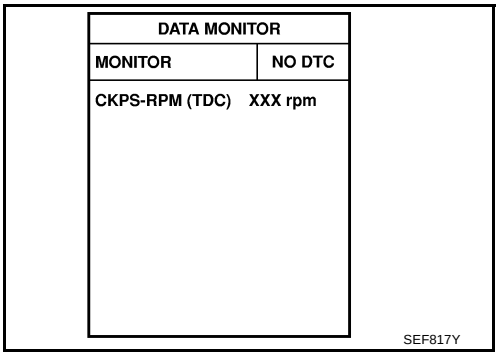
DTC Confirmation Procedure

BBS002BQ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
4. If DTC is detected, go to EC-1644, "Diagnostic Procedure" .



SEF817Y

WITHOUT CONSULT-II

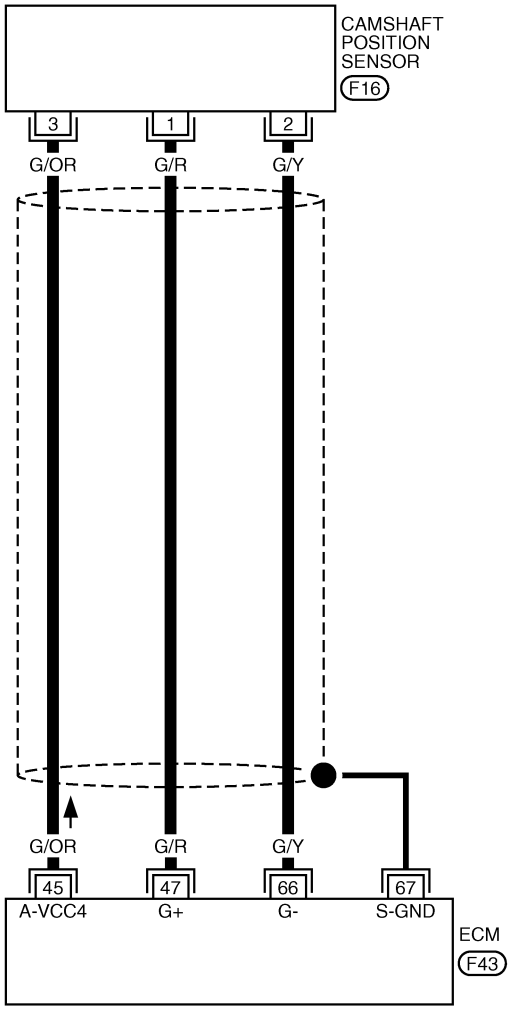
1. Start engine and let it idle for at least 5 seconds.
   If engine could not start, keep ignition switch at START position for 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1644, "Diagnostic Procedure" .

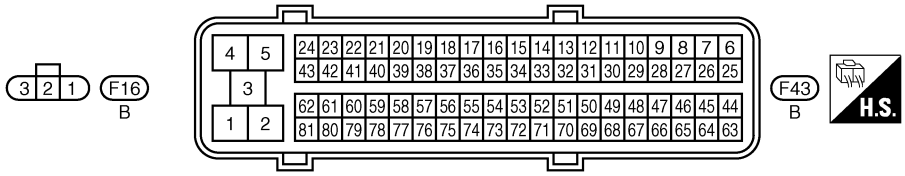
Wiring Diagram

BBS002BR

EC-CMPS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

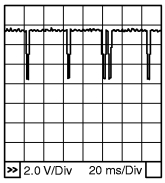
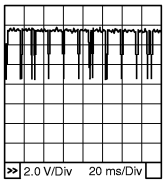




TBWA0571E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
45	G/OR	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
47	G/R	Camshaft position sensor	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 6V ★  MBIB0877E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 6V ★  MBIB0878E
66	G/Y	Camshaft position sensor ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS002BS

1. CHECK STARTING SYSTEM

Turn ignition switch to START position.

Does the engine turn over?

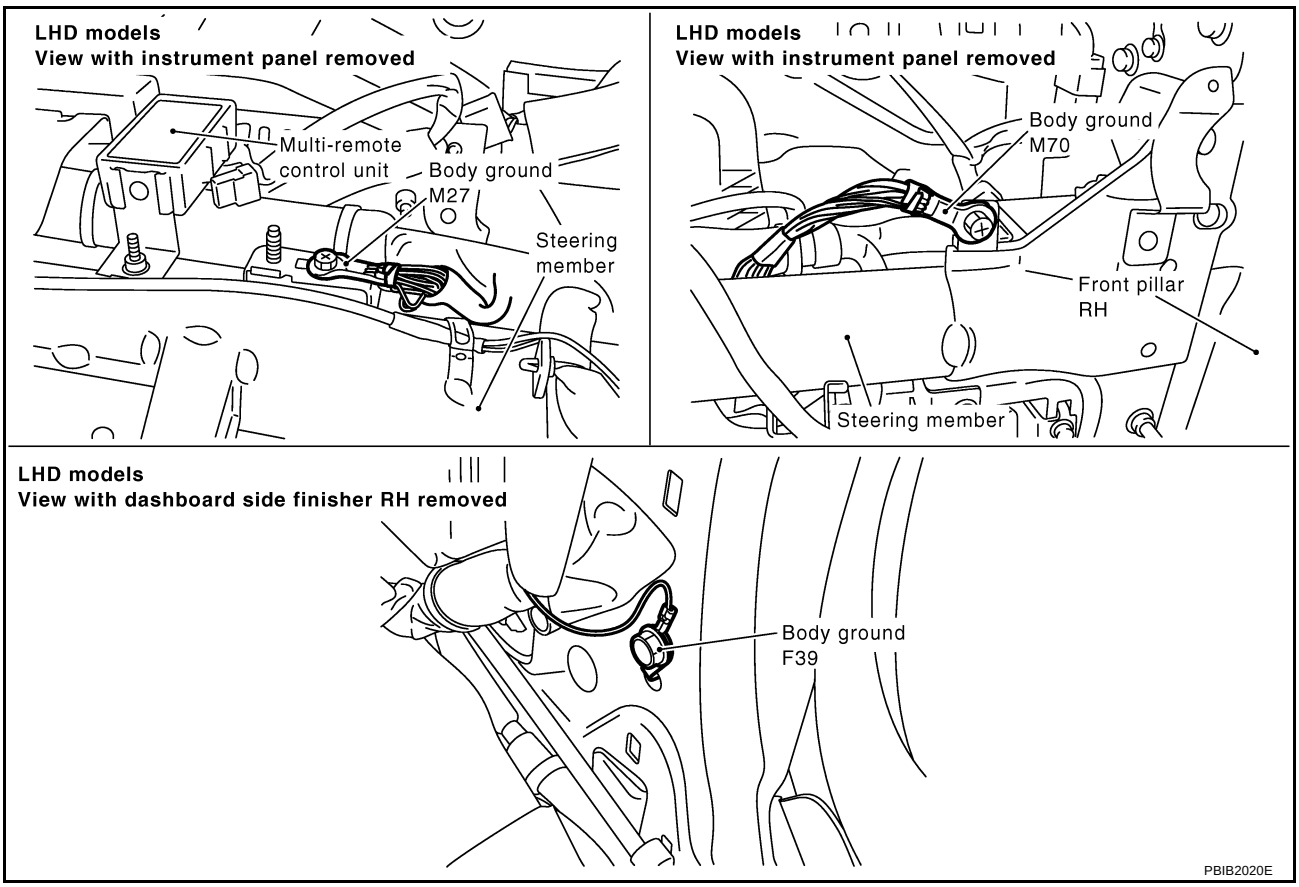
Does the starter motor operate?

Yes or No

Yes >> GO TO 2.
No >> Check starting system. (Refer to SC-23, "STARTING SYSTEM" .)

2. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

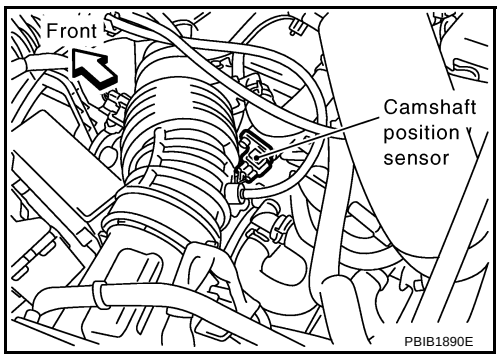


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

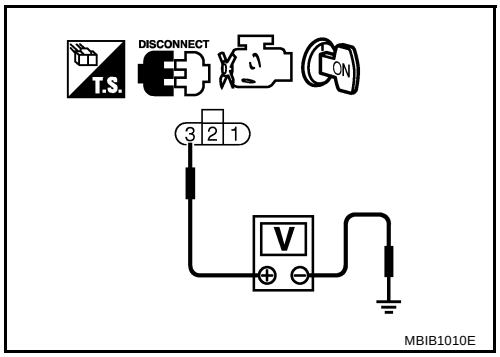
3. CHECK CMP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect camshaft position (CMP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between CMP sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK CMP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 66 and CMP sensor terminal 2.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK CMP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 47 and CMP sensor terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground or short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK CAMSHAFT POSITION SENSOR

Refer to EC-1648, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace camshaft position sensor.

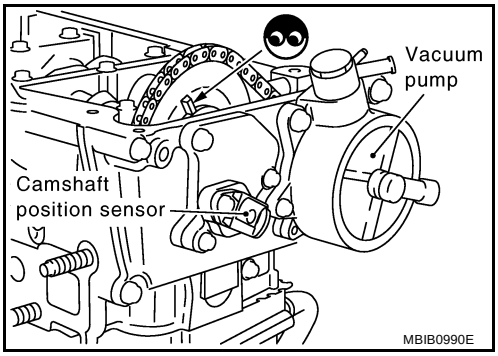
7. CHECK CAMSHAFT (EXHAUST)

Check the following.

- Accumulation of debris to the signal plate of camshaft rear end
- Chipping signal plate of camshaft rear end

OK or NG

OK >> GO TO 8.
NG >> Remove debris and clean the signal plate of camshaft rear end or replace camshaft.



8. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

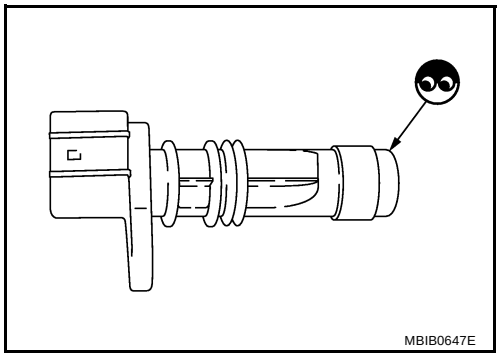
>> **INSPECTION END**

Component Inspection

BBS002BT

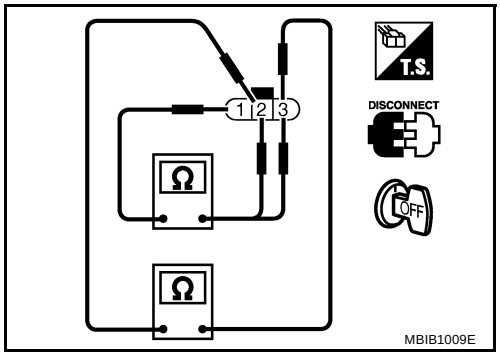
CAMSHAFT POSITION SENSOR

1. Loosen the fixing bolt of the sensor.
2. Disconnect camshaft position sensor harness connector.
3. Remove the sensor.
4. Visually check the sensor for chipping.



5. Check resistance as shown in the figure.

Terminal No. (Polarity)	Resistance Ω [at 25°C (77°F)]
1 (+) - 2 (-)	Except 0 or ∞
3 (+) - 1 (-)	
3 (+) - 2 (-)	



6. If NG, replace camshaft position sensor.

Removal and Installation

BBS002BU

CAMSHAFT POSITION SENSOR

Refer to EM-167, "VACUUM PUMP" .

DTC P0501 ASCD VEHICLE SPEED SENSOR

PFP:24810

Component Description

BBS002BV

The ECM receives vehicle speed sensor signal via CAN communication line. It is sent from combination meter. The ECM uses this signal for ASCD control. Refer to EC-1819, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

BBS002BW

The MI will not light up for this self-diagnosis.

NOTE:

- **If DTC P0501 is displayed with DTC U1000 first perform the trouble diagnosis for DTC U1000. Refer to EC-1530, "DTC U1000 CAN COMMUNICATION LINE" .**
- **If DTC P0501 is displayed with DTC P0606 first perform the trouble diagnosis for DTC P0606. Refer to EC-1679, "DTC P0606 ECM" .**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0501 0501	Vehicle speed sensor range/performance	A change of vehicle speed signal is excessively large during specified time.	● Harness or connectors (The CAN communication line is open or shorted.) ● Combination meter ● ABS actuator and electric unit (control unit) (models without ESP) ● ESP/TCS/ABS control unit (models with ESP) ● Wheel sensor ● ECM

DTC Confirmation Procedure

BBS002BX

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

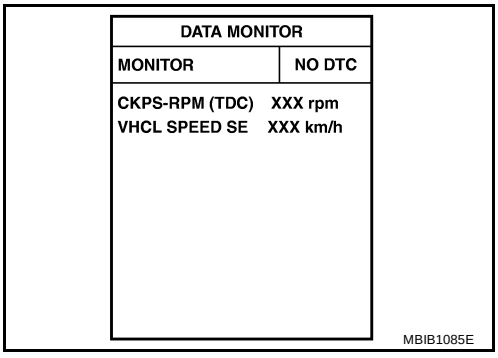
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine (ESP switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 10 km/h (6 MPH) for at least 5 seconds.
4. If DTC is detected, go to EC-1650, "Diagnostic Procedure" .



WITHOUT CONSULT-II

TESTING CONDITION:
Step 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

1. Start engine (ESP switch OFF).
2. Drive the vehicle at more than 10 km/h (6 MPH).
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1650, "Diagnostic Procedure" .

Diagnostic Procedure

BBS002BY

1. CHECK DTC WITH ESP/TCS/ABS CONTROL UNIT (MODELS WITH ESP) OR “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)” (MODELS WITHOUT ESP)

Refer to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP) or BRC-9, "TROUBLE DIAGNOSIS" (models without ESP).

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

DTC P0502 ASCD VEHICLE SPEED SENSOR

PFP:24810

Component Description

BBS002BZ

The ECM receives vehicle speed sensor signal via CAN communication line. It is sent from combination meter. The ECM uses this signal for ASCD control. Refer to EC-1819, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

BBS002C0

The MI will not light up for this self-diagnosis.

NOTE:

- **If DTC P0502 is displayed with DTC U1000 first perform the trouble diagnosis for DTC U1000. Refer to EC-1530, "DTC U1000 CAN COMMUNICATION LINE" .**
- **If DTC P0502 is displayed with DTC P0606 first perform the trouble diagnosis for DTC P0606. Refer to EC-1679, "DTC P0606 ECM" .**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0502 0502	Vehicle speed sensor circuit low input	Vehicle speed signal is excessively low compared with the driving condition.	● Harness or connectors (The CAN communication line is open or shorted.) ● Combination meter ● ABS actuator and electric unit (control unit) (models without ESP) ● ESP/TCS/ABS control unit (models with ESP) ● Wheel sensor ● ECM

DTC Confirmation Procedure

BBS002C1

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

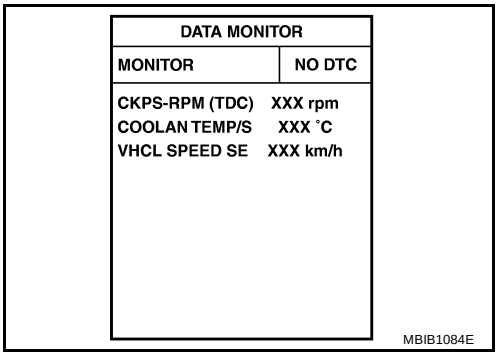
Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature (ESP switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Maintain the following condition for at least 5 seconds.

CKPS·RPM (TDC)	More than 2,800 rpm
COOLAN TEMP/S	More than 60°C (140 °F)
Clutch pedal	Fully released
Shift lever	1st position

4. If DTC is detected, go to EC-1652, "Diagnostic Procedure" .



WITHOUT CONSULT-II

TESTING CONDITION:

Step 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

1. Start engine and warm it up to normal operating temperature (ESP switch OFF).
2. Maintain the following condition for at least 5 seconds.

Engine speed	More than 2,800 rpm
Clutch pedal	Fully released
Shift lever	1st position

3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1652, "Diagnostic Procedure" .

Diagnostic Procedure

BBS002C2

1. CHECK DTC WITH ESP/TCS/ABS CONTROL UNIT (MODELS WITH ESP) OR “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)” (MODELS WITHOUT ESP)

Refer to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP) or BRC-9, "TROUBLE DIAGNOSIS" (models without ESP).

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

DTC P0503 ASCD VEHICLE SPEED SENSOR

PFP:24810

Component Description

BBS002C3

The ECM receives vehicle speed sensor signal via CAN communication line. It is sent from combination meter. The ECM uses this signal for ASCD control. Refer to EC-1819, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for ASCD functions.

On Board Diagnosis Logic

BBS002C4

The MI will not light up for this self-diagnosis.

NOTE:

- **If DTC P0503 is displayed with DTC U1000 first perform the trouble diagnosis for DTC U1000. Refer to EC-1530, "DTC U1000 CAN COMMUNICATION LINE" .**
- **If DTC P0503 is displayed with DTC P0606 first perform the trouble diagnosis for DTC P0606. Refer to EC-1679, "DTC P0606 ECM" .**

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0503 0503	Vehicle speed sensor circuit high input	Vehicle speed signal is excessively high compared with the driving condition.	● Harness or connectors (The CAN communication line is open or shorted.) ● Combination meter ● ABS actuator and electric unit (control unit) (models without ESP) ● ESP/TCS/ABS control unit (models with ESP) ● Wheel sensor ● ECM

DTC Confirmation Procedure

BBS002C5

CAUTION:

Always drive vehicle at a safe speed.

NOTE:

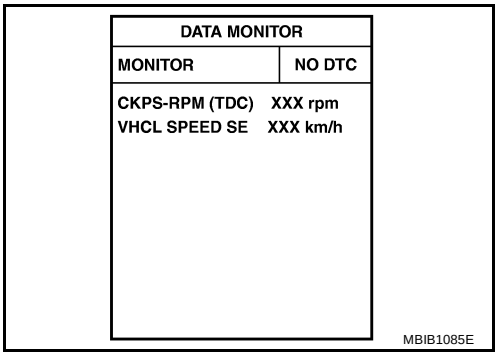
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION:

Step 3 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine (ESP switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Drive the vehicle at more than 10 km/h (6 MPH) for at least 5 seconds.
4. If DTC is detected, go to EC-1654, "Diagnostic Procedure" .



WITHOUT CONSULT-II

TESTING CONDITION:
Step 2 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

1. Start engine.
2. Drive the vehicle at more than 10 km/h (6 MPH).
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1654, "Diagnostic Procedure" .

Diagnostic Procedure

BBS002C6

1. CHECK DTC WITH ESP/TCS/ABS CONTROL UNIT (MODELS WITH ESP) OR “ABS ACTUATOR AND ELECTRIC UNIT (CONTROL UNIT)” (MODELS WITHOUT ESP)

Refer to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP) or BRC-9, "TROUBLE DIAGNOSIS" (models without ESP).

OK or NG

OK >> GO TO 2.
NG >> Repair or replace.

2. CHECK COMBINATION METER

Check combination meter function.
Refer to DI-4, "COMBINATION METERS" .

>> **INSPECTION END**

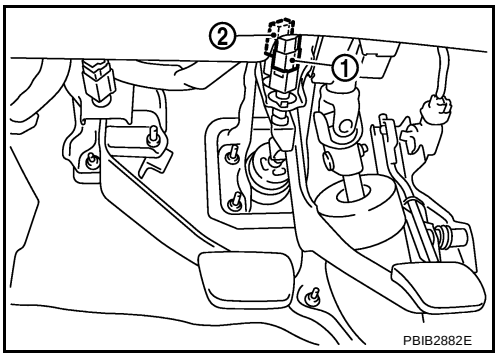
DTC P0504 ASCD BRAKE SWITCH

PFP:25320

Component Description

BBS002C7

When the brake pedal is depressed, ASCD brake switch (1) and stop lamp switch (2) are turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-1819, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.



CONSULT-II Reference Value in Data Monitor Mode

BBS002C8

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
BRAKE SW2 (ASCD brake switch)	● Ignition switch: ON	Brake pedal and clutch pedal: Fully released	OFF
		Brake pedal and/or clutch pedal: Slightly depressed	ON

On Board Diagnosis Logic

BBS002C9

MI will not light up for this diagnosis.

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0504 0504	ASCD brake switch	● When the vehicle speed is above 5 km/h (3 MPH), ON signal from the stop lamp switch and OFF signal from the ASCD brake switch are sent to the ECM at the same time.	● Harness or connectors (The stop lamp switch circuit is open or shorted.) ● Harness or connectors (The ASCD brake switch circuit is open or shorted.) ● Harness or connectors (The ASCD clutch switch circuit is open or shorted.) ● Stop lamp switch ● ASCD brake switch ● ASCD clutch switch ● Incorrect stop lamp switch installation ● Incorrect ASCD brake switch installation ● Incorrect ASCD clutch switch installation ● ECM

DTC Confirmation Procedure

BBS002CA

CAUTION:
Always drive vehicle at a safe speed.

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

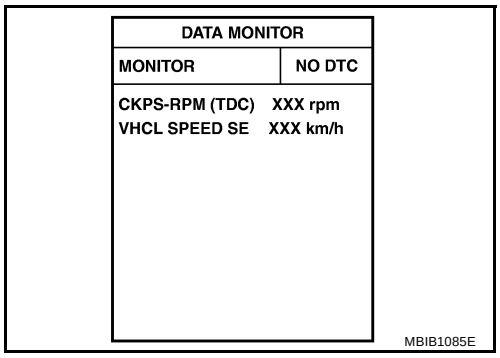
TESTING CONDITION:
Steps 3 and 4 may be conducted with the drive wheels lifted in the shop or by driving the vehicle. If a road test is expected to be easier, it is unnecessary to lift the vehicle.

WITH CONSULT-II

1. Start engine (ESP switch OFF).
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Press MAIN switch and make sure that CRUISE indicator lights up.
4. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 5 km/h (3 MPH)
Shift lever	Suitable position

If DTC is detected, go to EC-1659, "Diagnostic Procedure" .
If DTC is not detected, go to the following step.



5. Drive the vehicle for at least 5 consecutive seconds under the following condition.

VHCL SPEED SE	More than 5 km/h (3 MPH)
Shift lever	Suitable position
Driving location	Depress the brake pedal for more than five seconds so as not to come off from the above-mentioned condition.

6. If DTC is detected, go to EC-1659, "Diagnostic Procedure" .

Overall Function Check

BBS002CB

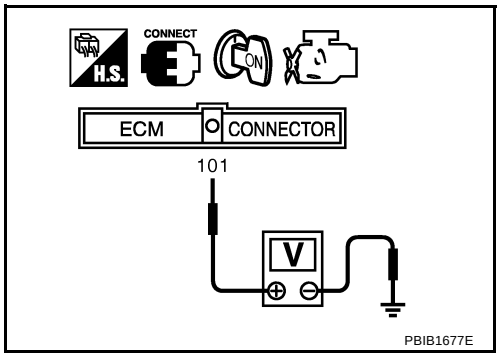
Use this procedure to check the overall function of the ASCD brake switch circuit. During this check, a DTC might not be confirmed.

WITHOUT CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 101 (ASCD brake switch signal) and ground under the following conditions.

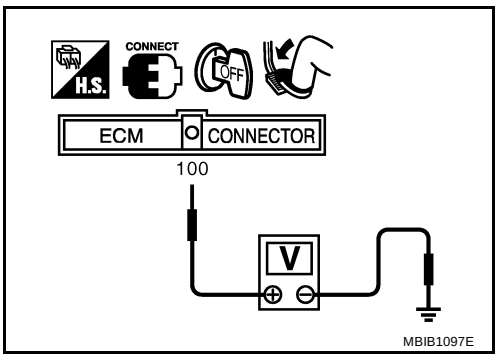
CONDITION	VOLTAGE
Clutch pedal and brake pedal: Fully released	Battery voltage
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V

3. If NG, go to EC-1659, "Diagnostic Procedure" .
If OK, go to next step.



4. Check voltage between ECM terminal 100 (Stop lamp switch signal) and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



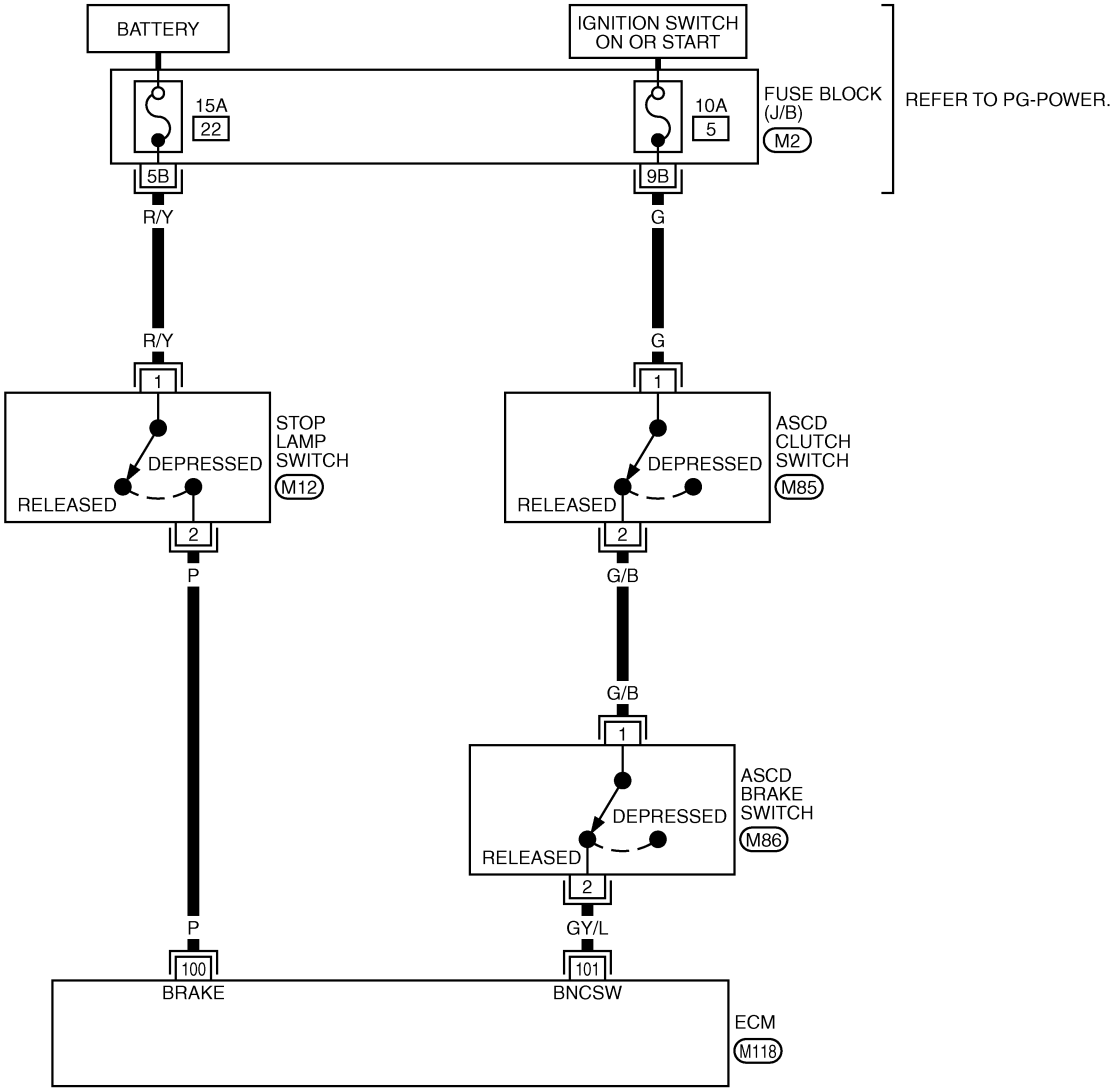
5. If NG, go to EC-1659, "Diagnostic Procedure" .

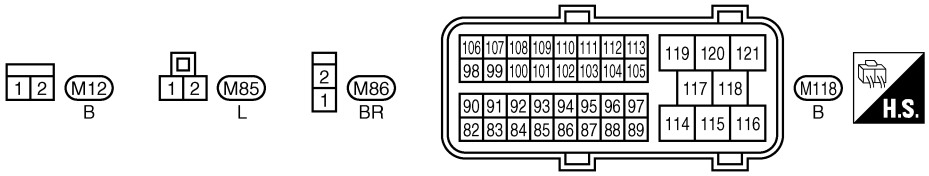
Wiring Diagram

BBS002CC

EC-ASC/BS-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0477E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
100	P	Stop lamp switch	**[Ignition switch OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
101	GY/L	ASCD brake switch	**[Ignition switch ON]** ● Brake pedal and clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Brake pedal and/or clutch pedal: Slightly depressed	Approximately 0V

Diagnostic Procedure

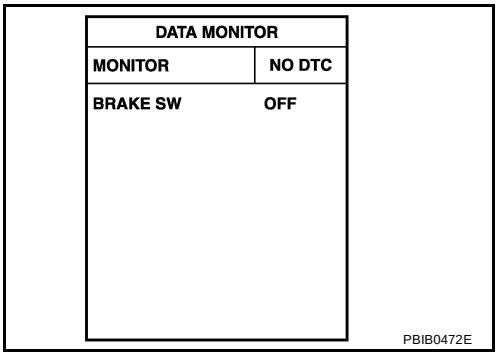
BBS002CD

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW” indication under the following conditions.

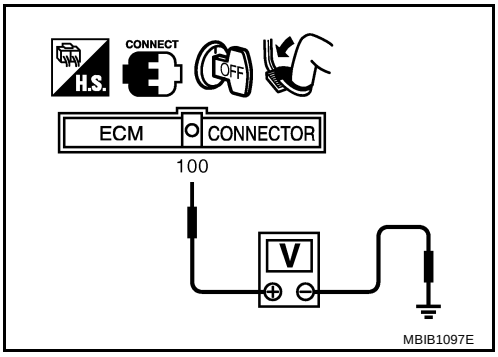
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 100 and ground under the following conditions.

Condition	Voltage
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	battery voltage



OK or NG

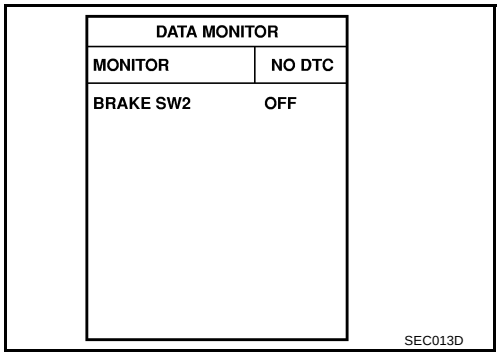
OK >> GO TO 2.
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

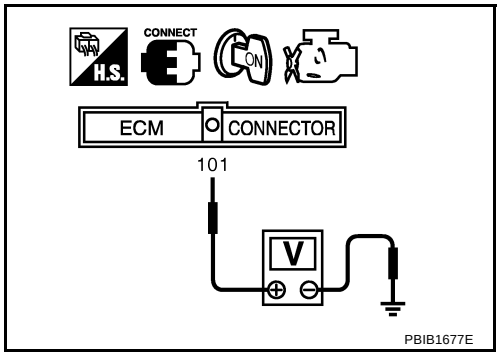
CONDITION	INDICATION
Brake pedal and clutch pedal: Fully released	OFF
Brake pedal and/or clutch pedal: Slightly depressed	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 101 and ground under the following conditions.

Condition	Voltage
Brake pedal and clutch pedal: Fully released	Battery voltage
Brake pedal and/or clutch pedal: Slightly depressed	Approximately 0V

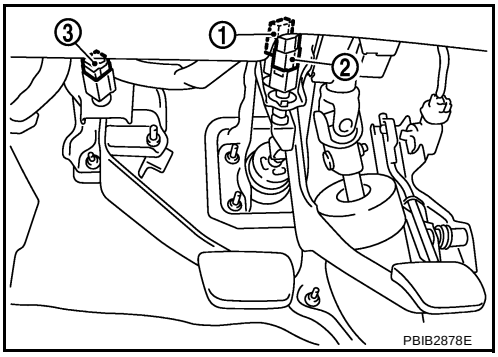


OK or NG

OK >> GO TO 14.
NG >> GO TO 7.

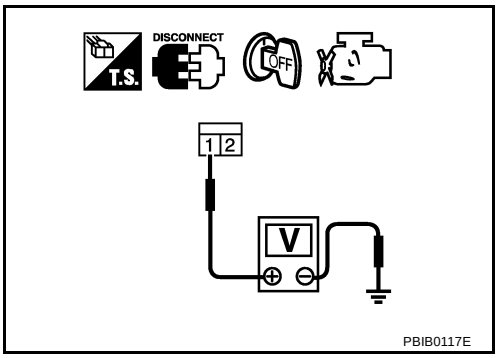
3. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector (1).
   - ASCD brake switch harness connector (2)
   - ASCD clutch switch harness connector (3)



3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 15A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 100 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK STOP LAMP SWITCH

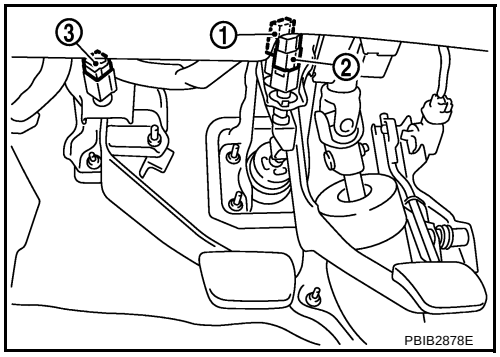
Refer to EC-1664, "Component Inspection"

OK or NG

OK >> GO TO 14.
NG >> Replace stop lamp switch.

7. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch (2) harness connector.
   - Stop lamp switch (1)
   - ASCD clutch switch (3)
3. Turn ignition switch ON.

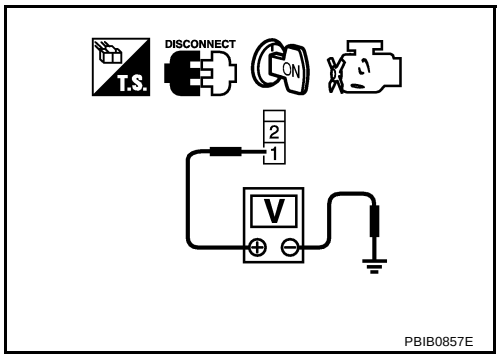


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

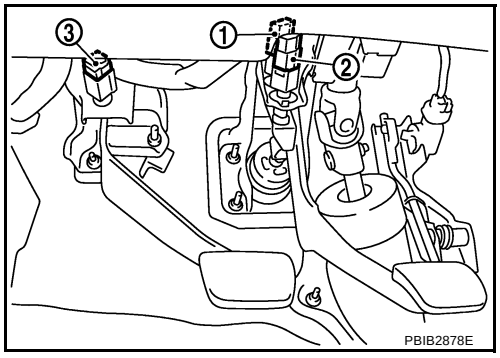
OK or NG

OK >> GO TO 12.
NG >> GO TO 8.



8. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector (3).
   - Stop lamp switch harness connector (1)
   - ASCD brake switch harness connector (2)
3. Turn ignition switch ON.

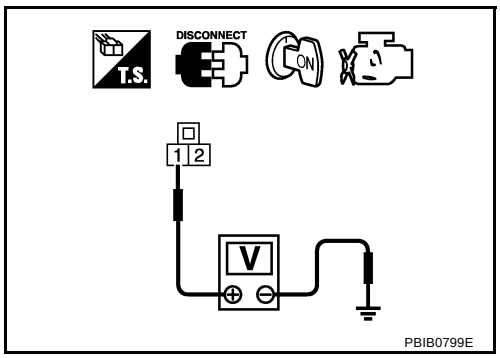


4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.



9. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between ASCD clutch switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD clutch switch terminal 2 and ASCD brake switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ASCD CLUTCH SWITCH

Refer to EC-1664, "Component Inspection"

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD clutch switch.

12. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ASCD BRAKE SWITCH

Refer to EC-1664, "Component Inspection"

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD brake switch.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

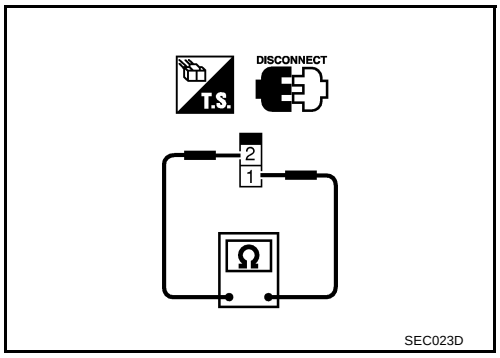
BBS002CE

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

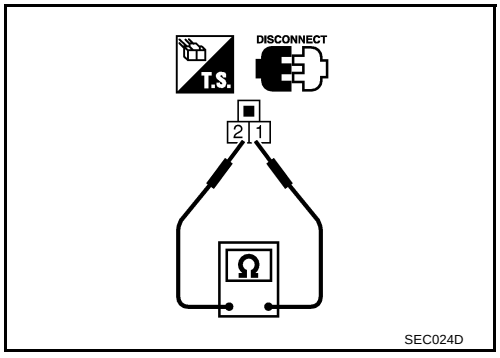


ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to CL-5, "CLUTCH PEDAL" , and perform step 3 again.

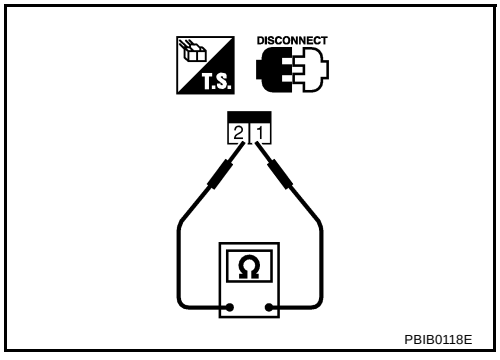


STOP LAMP SWITCH

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector.
3. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.



DTC P0563 BATTERY VOLTAGE

PFP:24410

On Board Diagnosis Logic

BBS002CF

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0563 0563	Battery voltage high	An excessively high voltage from the battery is sent to ECM.	● Battery ● Battery terminal ● Alternator ● Incorrect jump starting

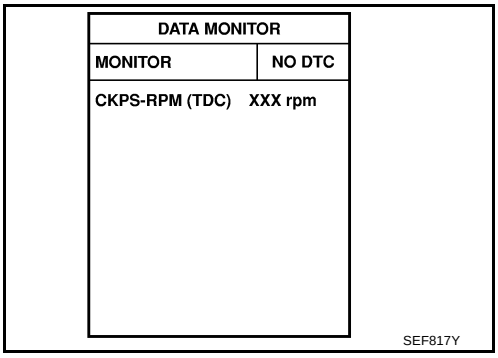
DTC Confirmation Procedure

BBS002CG

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 35 seconds.
4. If DTC is detected, go to EC-1665, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Start engine and let it idle for at least 35 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1665, "Diagnostic Procedure" .

Diagnostic Procedure

BBS002CH

1. INSPECTION START

Are jumper cables connected for the jump starting?

Yes or No

Yes >> GO TO 3.
No >> GO TO 2.

2. CHECK BATTERY AND ALTERNATOR

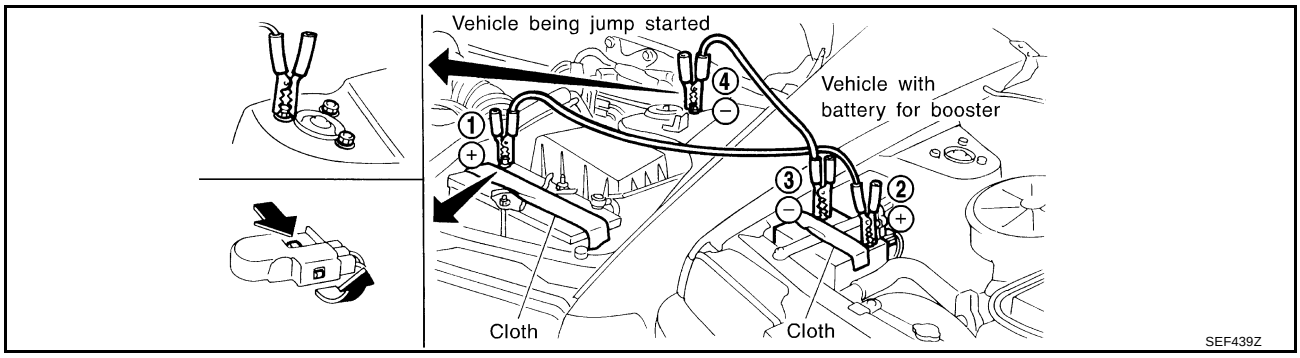
Check that the proper type of battery and type of alternator are installed.
Refer to SC-4, "BATTERY" and SC-13, "CHARGING SYSTEM" .

OK or NG

OK >> GO TO 5.
NG >> Replace with a proper one.

3. CHECK JUMPER CABLES INSTALLATION

Check that the jumper cables are connected in the correct sequence.



OK or NG

OK >> GO TO 4.
NG >> Reconnect jumper cables properly.

4. CHECK BATTERY FOR BOOSTER

Check that the battery for the booster is a 12V battery.

OK or NG

OK >> GO TO 5.
NG >> Change the vehicle for booster.

5. PERFORM DTC CONFIRMATION PROCEDURE AGAIN

With CONSULT-II

1. Select “SELF DIAG RESULTS” mode with CONSULT-II.
2. Touch “ERASE”.
3. Perform EC-1665, "DTC Confirmation Procedure" , again.
4. Is DTC P0563 displayed again?

Without CONSULT-II

1. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
2. Perform EC-1665, "DTC Confirmation Procedure" , again.
3. Is DTC 0563 displayed again?

Yes or No

Yes >> GO TO 6.
No >> GO TO 7.

6. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

7. CHECK ELECTRICAL PARTS DAMAGE

Check the following for damage.

- Wiring harness and harness connectors for burn
- Fuses for short

OK or NG

OK >> **INSPECTION END**
NG >> Repair or replace malfunctioning part.

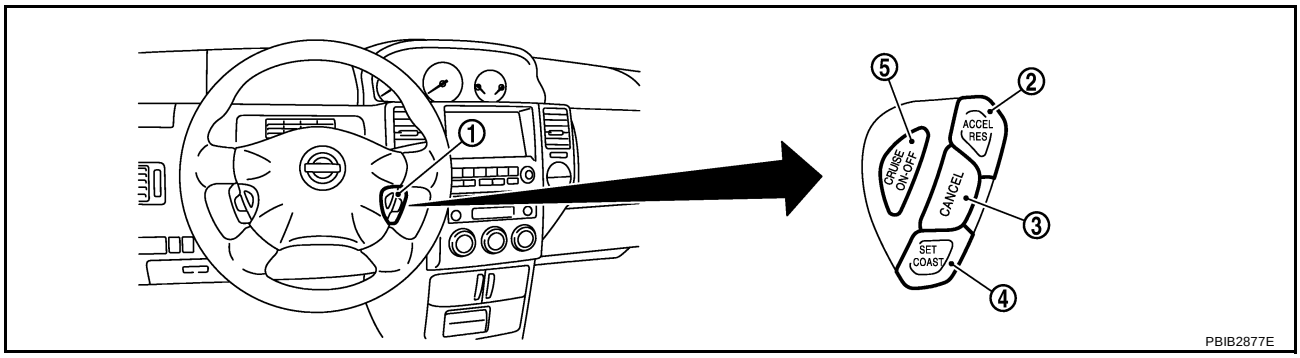
DTC P0580, P0581 ASCD STEERING SWITCH

PFP:25551

Component Description

BBS002CI

ASCD steering switch has variant values of electrical resistance for each button. ECM reads voltage variation of switch, and determines which button is operated.



1. ASCD steering switch
2. RESUME/ACCELERATE switch
3. CANCEL switch
4. SET/COAST switch
5. MAIN switch

Refer to EC-1819, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

BBS002CJ

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN SW	● Ignition switch: ON	MAIN switch: Released	OFF
		MAIN switch: Pressed	ON
CANCEL SW	● Ignition switch: ON	CANCEL switch: Released	OFF
		CANCEL switch: Pressed	ON
RESUME/ACC SW	● Ignition switch: ON	RESUME/ACCELERATE switch: Released	OFF
		RESUME/ACCELERATE switch: Pressed	ON
SET SW	● Ignition switch: ON	SET/COAST switch: Released	OFF
		SET/COAST switch: Pressed	ON

On Board Diagnosis Logic

BBS002CK

MI will not light up for these diagnoses.

NOTE:
If DTC P0580 or P0581 is displayed with DTC P0606, first perform the trouble diagnosis for DTC P0606. Refer to EC-1677, "DTC P0605 ECM".

DTC No.	Trouble Diagnosis Name	DTC Detecting Condition	Possible Cause
P0580 0580	ASCD steering switch circuit low input	● ECM detects that the ASCD steering switch is stuck ON.	● Harness or connectors (The switch circuit is open or shorted.) ● ASCD steering switch ● ECM
P0581 0581	ASCD steering switch circuit high input	● An excessively high voltage signal from the ASCD steering switch is sent to ECM.	

DTC Confirmation Procedure

BBS002CL

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 10 seconds.
4. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Press SET COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
7. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
8. If DTC is detected, go to EC-1673, "Diagnostic Procedure" .

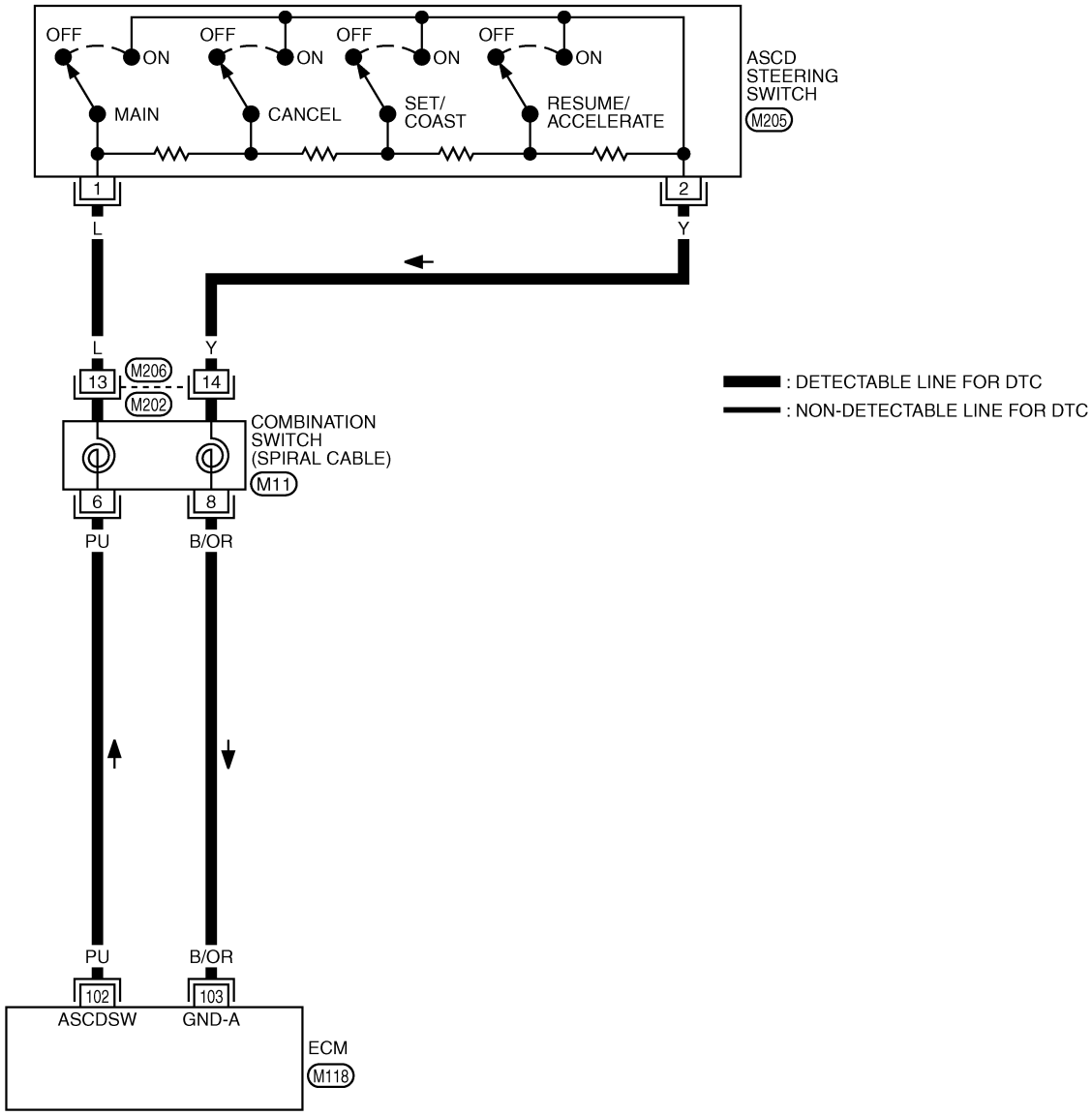
WITHOUT CONSULT-II

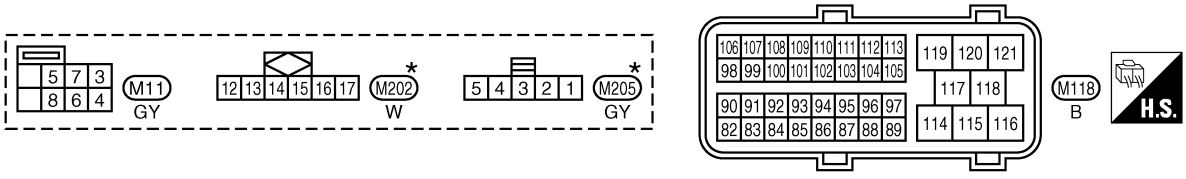
1. Turn ignition switch ON and wait at least 10 seconds.
2. Press MAIN switch for at least 10 seconds, then release it and wait at least 10 seconds.
3. Press RESUME/ACCELERATE switch for at least 10 seconds, then release it and wait at least 10 seconds.
4. Press SET/COAST switch for at least 10 seconds, then release it and wait at least 10 seconds.
5. Press CANCEL switch for at least 10 seconds, then release it and wait at least 10 seconds.
6. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
7. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
8. If DTC is detected, go to EC-1673, "Diagnostic Procedure" .

Wiring Diagram
LHD MODELS

BBS002CM

EC-ASC/SW-01



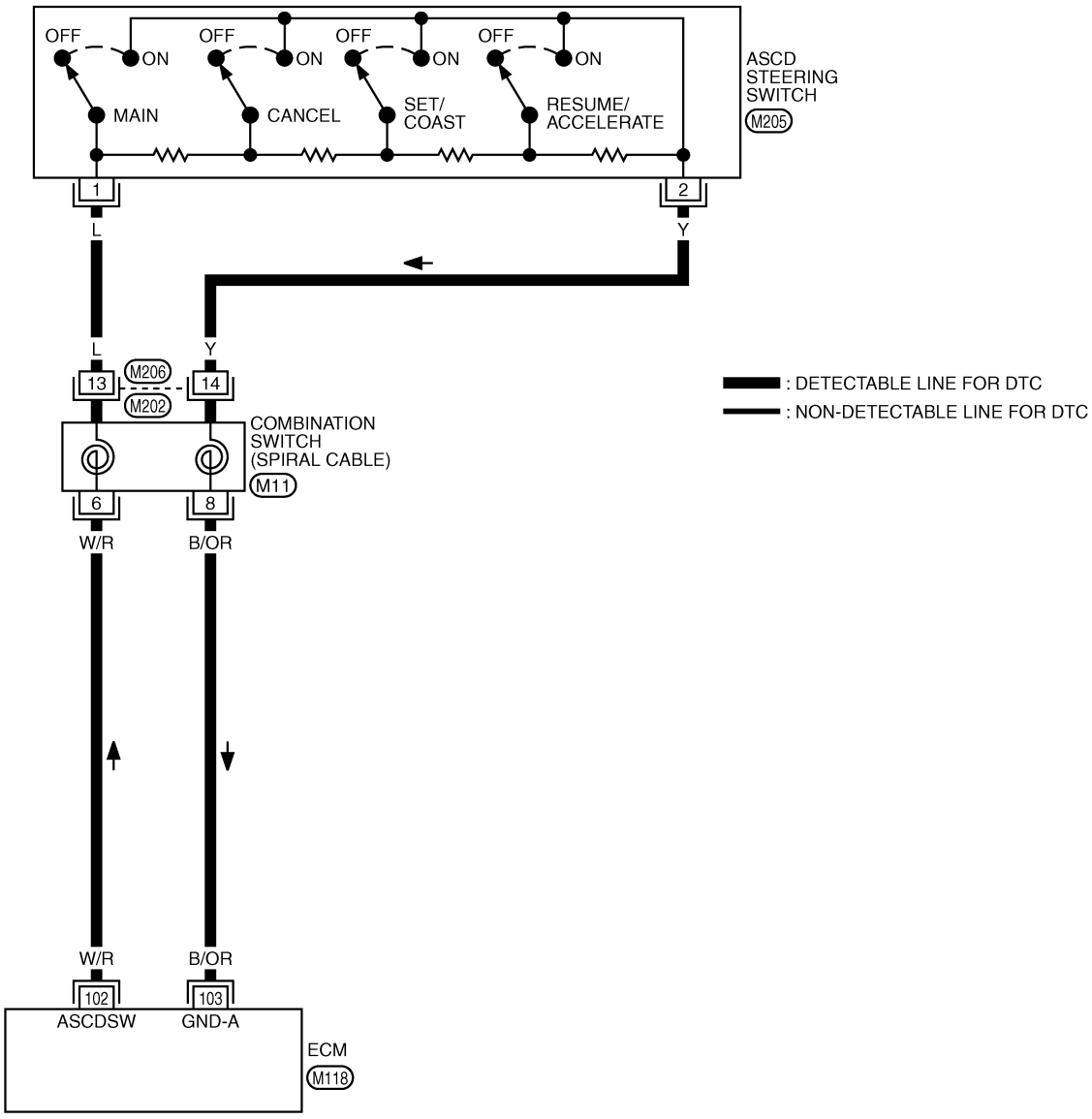


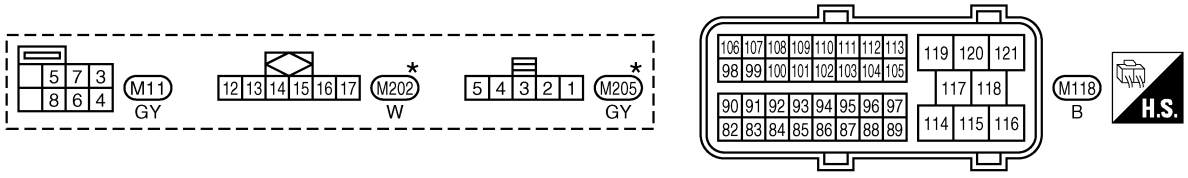
★: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION.

TBWB0475E

RHD MODELS

EC-ASC/SW-02





∗: THIS CONNECTOR IS NOT SHOWN IN "HARNESS LAYOUT", PG SECTION.

TBWB0476E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
102	PU*1 W/R*2	ASCD steering switch	**[Ignition switch ON]** ● ASCD steering switch: OFF	Approximately 4.3V
			[Ignition switch ON] ● MAIN switch: Pressed	Approximately 0.3V
			[Ignition switch ON] ● CANCEL switch: Pressed	Approximately 1.3V
			[Ignition switch ON] ● RESUME/ACCELERATE switch: Pressed	Approximately 3.3V
			[Ignition switch ON] ● SET/COAST switch: Pressed	Approximately 2.3V
103	B/OR	ASCD steering switch ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

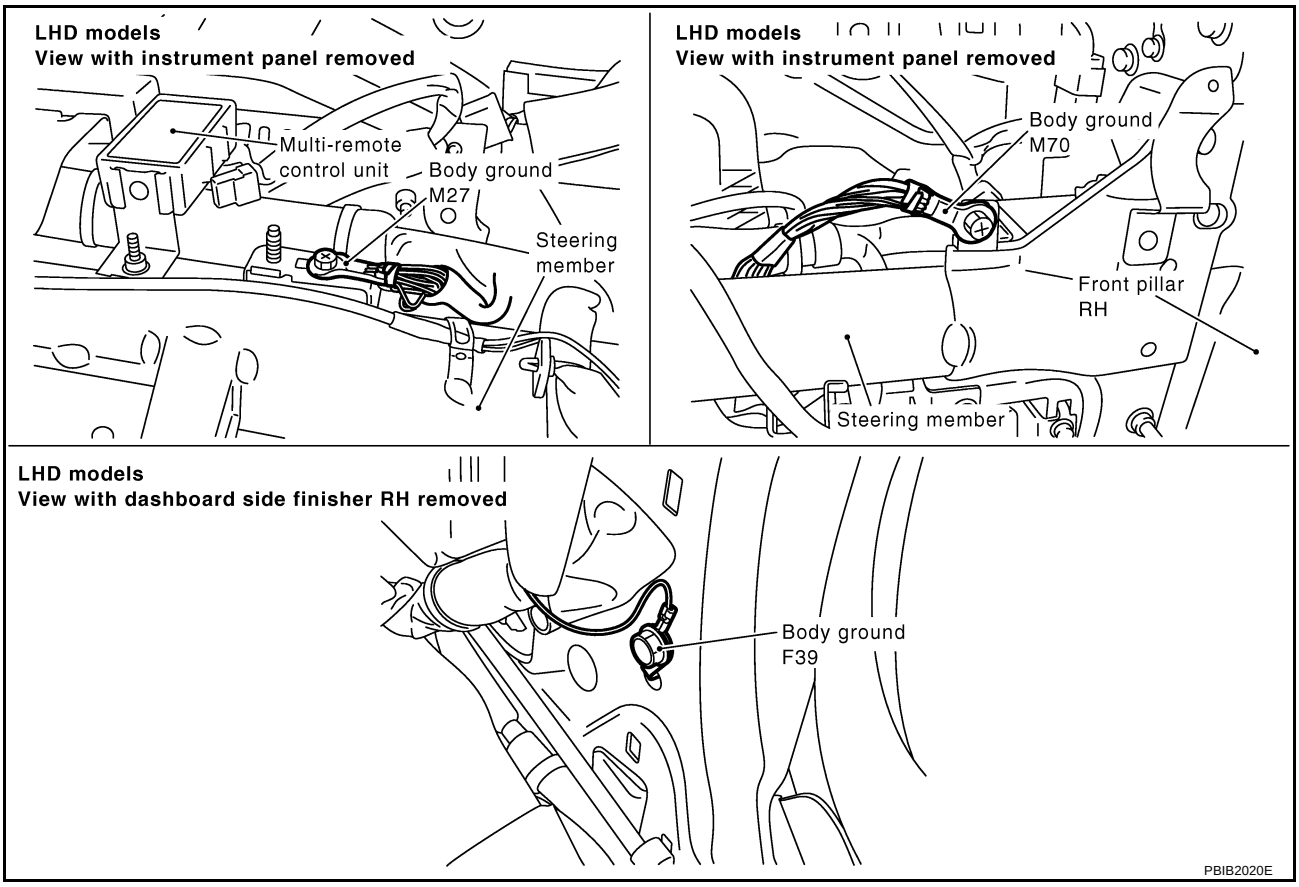
*1: LHD models
*2: RHD models

Diagnostic Procedure

BBS002CN

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .



OK or NG

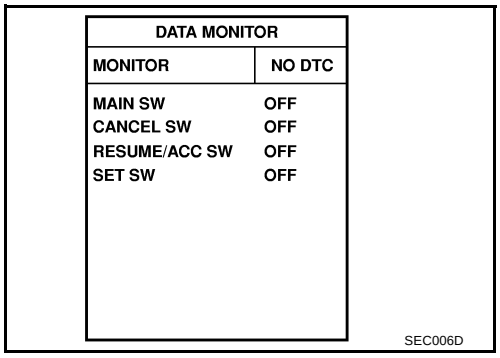
OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ASCD STEERING SWITCH CIRCUIT

With CONSULT-II

1. Turn ignition switch ON.
2. Select “MAIN SW”, “RESUME/ACC SW”, “SET SW” and “CANCEL SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check each item indication under the following conditions.

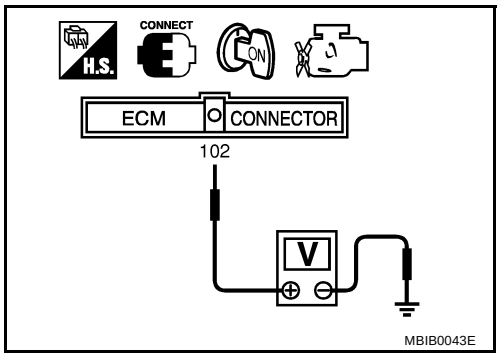
Switch	Monitor item	Condition	Indication
MAIN switch	MAIN SW	Pressed	ON
		Released	OFF
CANCEL switch	CANCEL SW	Pressed	ON
		Released	OFF
RESUME/ACCEL-ERATE switch	RESUME/ACC SW	Pressed	ON
		Released	OFF
SET/COAST switch	SET SW	Pressed	ON
		Released	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 102 and ground under the following conditions.

Switch	Condition	Voltage (V)
MAIN switch	Pressed	Approx. 0.3
	Released	Approx. 4.3
CANCEL switch	Pressed	Approx. 1.3
	Released	Approx. 4.3
RESUME/ACCELER-ATE switch	Pressed	Approx. 3.3
	Released	Approx. 4.3
SET/COAST switch	Pressed	Approx. 2.3
	Released	Approx. 4.3



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

3. CHECK ASCD STEERING SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

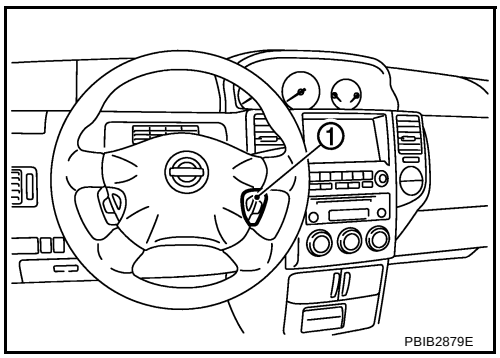
1. Turn ignition switch OFF.
2. Disconnect ASCD steering switch (1) harness connector.
3. Disconnect ECM harness connector.
4. Check harness continuity between ASCD steering switch terminal 2 and ECM terminal 103. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M206, M202
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ASCD STEERING SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 102 and ASCD steering switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M206, M202
- Combination switch (spiral cable)
- Harness for open and short between ECM and ASCD steering switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK ASCD STEERING SWITCH

Refer to EC-1676, "Component Inspection" .

OK or NG

OK >> GO TO 8.
NG >> Replace ASCD steering switch.

8. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

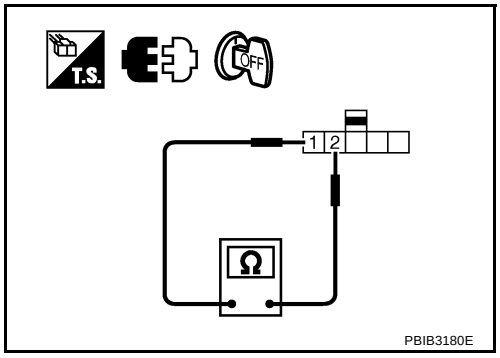
Component Inspection

BBS002CO

ASCD STEERING SWITCH

1. Disconnect ASCD steering switch.
2. Check continuity between ASCD steering switch terminals 1 and 2 with pushing each switch.

Switch	Condition	Resistance (Ω)
MAIN switch	Pressed	Approx. 0
	Released	Approx. 4,000
CANCEL switch	Pressed	Approx. 250
	Released	Approx. 4,000
RESUME/ACCELERATE switch	Pressed	Approx. 1,480
	Released	Approx. 4,000
SET/COAST switch	Pressed	Approx. 660
	Released	Approx. 4,000



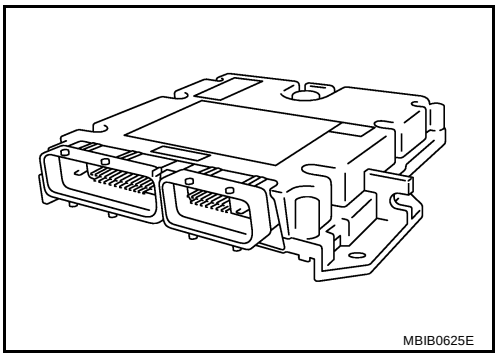
DTC P0605 ECM

PFP:23710

Description

BBS002CP

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


MBIB0625E

On Board Diagnosis Logic

BBS002CQ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0605 0605	Engine control module (ROM)	ECM ROM is malfunctioning.	● ECM

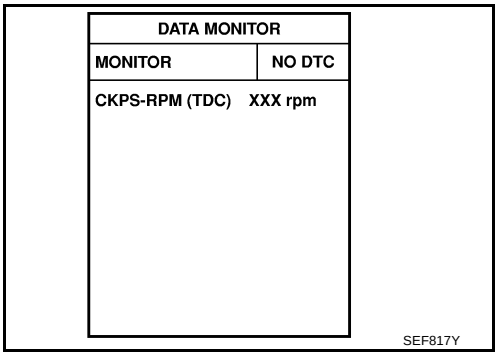
DTC Confirmation Procedure

BBS002CR

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1678, "Diagnostic Procedure" .



SEF817Y

WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1678, "Diagnostic Procedure" .

Diagnostic Procedure

BBS002CS

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1677, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P0605 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
3. Perform EC-1677, "DTC Confirmation Procedure" , again.
4. Is DTC 0605 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

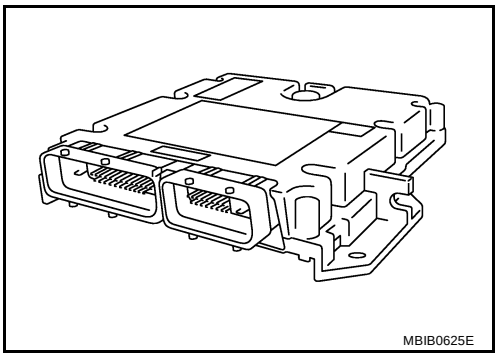
DTC P0606 ECM

PFP:23710

Description

BBS002CT

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


MBIB0625E

On Board Diagnosis Logic

BBS002CU

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0606 0606	Engine control module (Processor)	ECM calculation function is malfunctioning.	● ECM

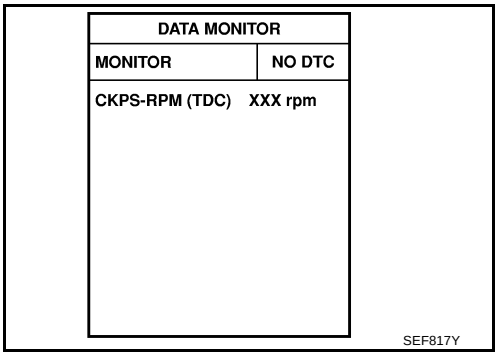
DTC Confirmation Procedure

BBS002CV

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1680, "Diagnostic Procedure" .



SEF817Y

WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1680, "Diagnostic Procedure" .

Diagnostic Procedure

BBS002CW

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1679, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P0606 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
3. Perform EC-1679, "DTC Confirmation Procedure" , again.
4. Is DTC 0606 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform “Fuel Pump Learning Value Clearing”. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

DTC P0628, P0629 FUEL PUMP

PFP:16700

Description

BBS002CX

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

BBS002CY

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

On Board Diagnosis Logic

BBS002CZ

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0628 0628	Fuel pump control circuit low input	ECM detects a control circuit for the fuel pump is open or short to ground.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump
P0629 0629	Fuel pump control circuit high output	ECM detects a control circuit for the fuel pump is short to power.	

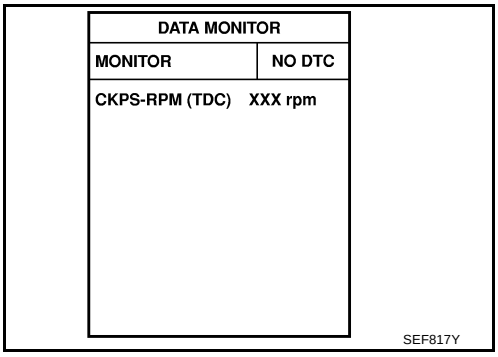
DTC Confirmation Procedure

BBS002D0

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Let engine idle for at least 5 seconds.
4. If DTC is detected, go to EC-1684, "Diagnostic Procedure" .



WITHOUT CONSULT-II

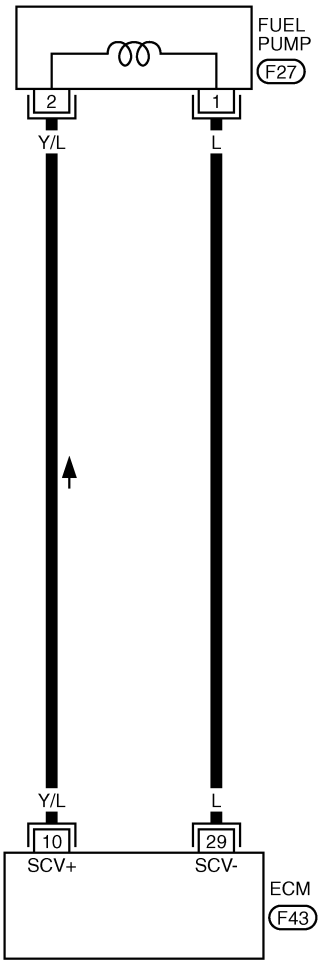
1. Start engine and warm it up to normal operating temperature.
2. Let engine idle for at least 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1684, "Diagnostic Procedure" .

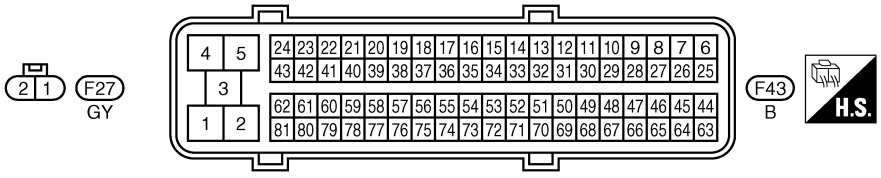
Wiring Diagram

BBS002D1

EC-F/PUMP-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

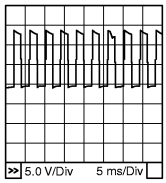
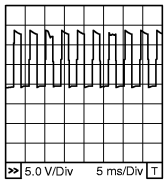
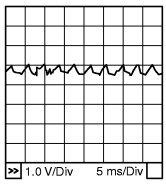
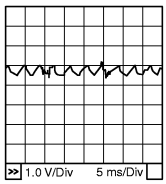




TBWA0574E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0886E
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

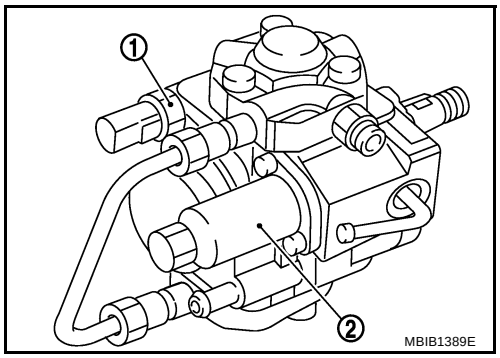
BBS002D2

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL PUMP

Refer to EC-1685, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

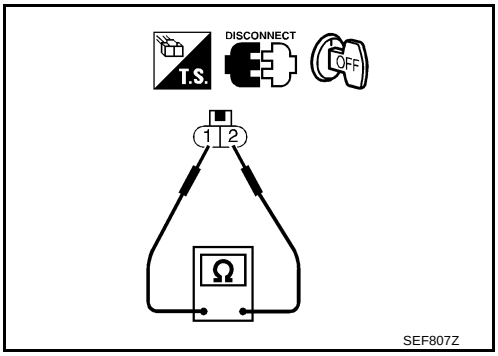
BBS002D3

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

BBS002D4

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P0642, P0643 SENSOR POWER SUPPLY

PFP:18002

On Board Diagnosis Logic

BBS002D5

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0642 0642	Sensor power supply circuit low	ECM detects a voltage of power source for sensor is excessively low.	● Harness or connectors (The APP sensor 1 power supply circuit is shorted.) (Crankshaft position sensor circuit is shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 1) ● Crankshaft position sensor
P0643 0643	Sensor power supply circuit high	ECM detects a voltage of power source for Sensor is excessively high.	

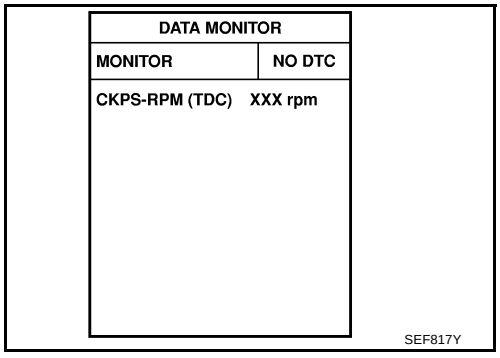
DTC Confirmation Procedure

BBS002D6

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1689, "Diagnostic Procedure" .



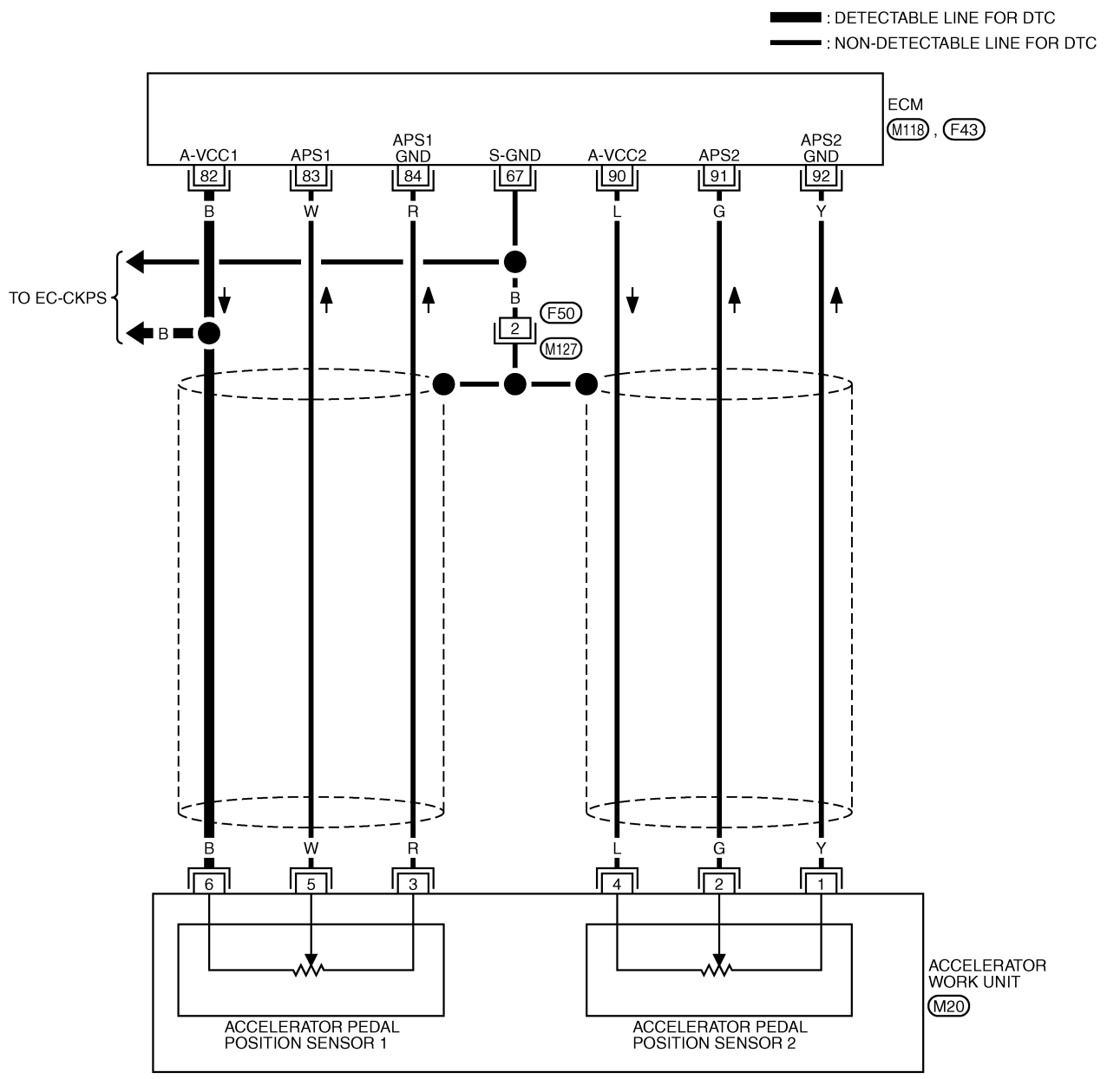
WITHOUT CONSULT-II

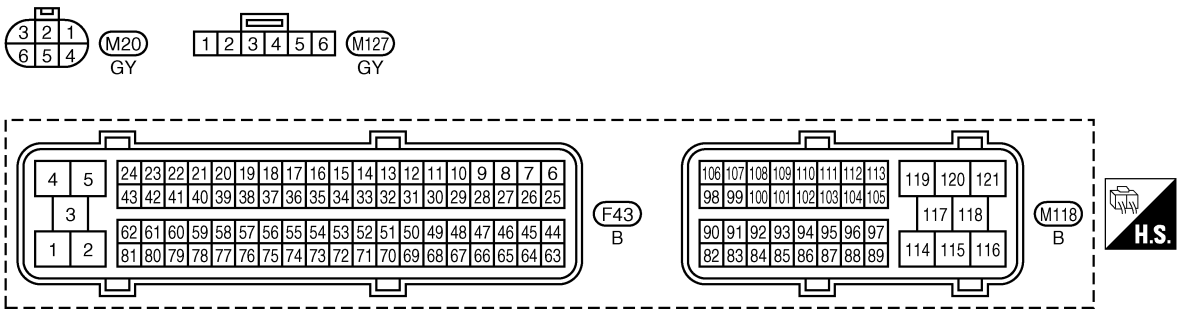
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1689, "Diagnostic Procedure" .

Wiring Diagram

BBS002D7

EC-APP1PW-01





TBWB0909E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

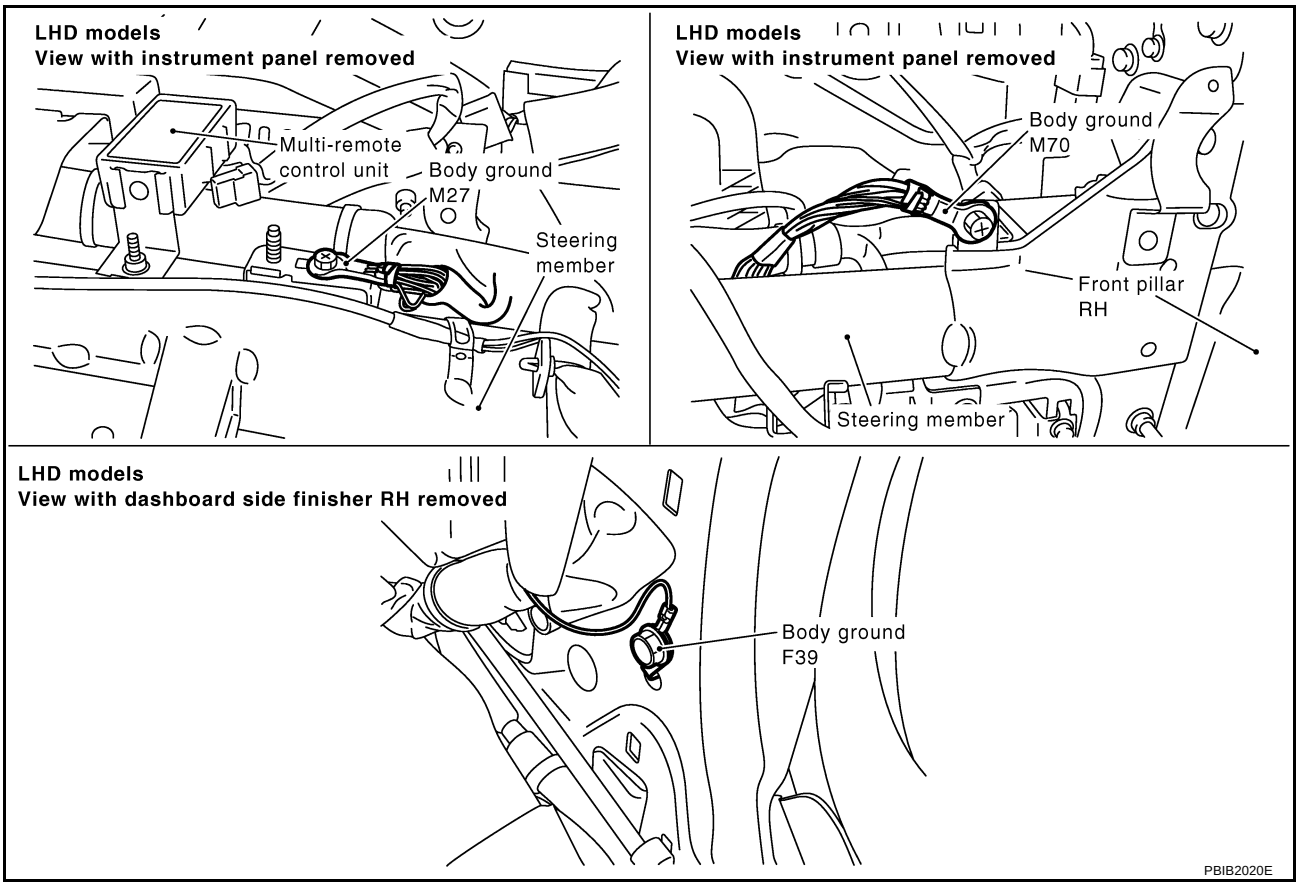
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V
83	W	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.8 - 1.3V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.0V
84	R	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
90	L	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	G	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.45 - 0.9V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.25 - 2.7V
92	Y	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS002D8

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

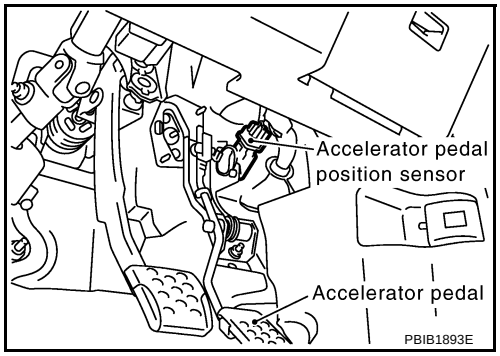


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

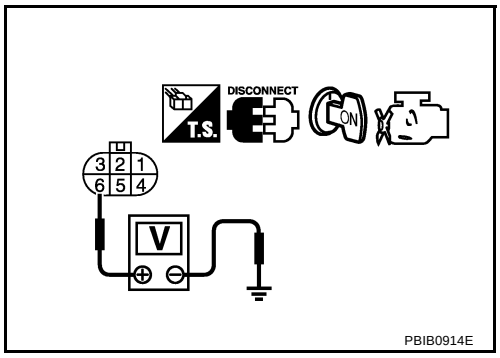
2. CHECK APP SENSOR 1 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 6 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check the following.
Harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
82	APP sensor terminal 6	EC-1687
	Crankshaft position sensor terminal 1	EC-1625

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK CRANKSHAFT POSITION SENSOR

Refer to EC-1629, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> Replace crankshaft position sensor.

5. CHECK APP SENSOR

Refer to EC-1569, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0652, P0653 SENSOR POWER SUPPLY

PFP:18002

On Board Diagnosis Logic

BBS002D9

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0652 0652	Sensor power supply circuit low	ECM detects a voltage of power source for sensor is excessively low.	● Harness or connectors (APP sensor 2 power supply circuit is shorted.) (Camshaft position sensor circuit is shorted.) (Fuel rail pressure sensor circuit is shorted.) (Turbocharger boost sensor circuit is shorted.) ● Accelerator pedal position sensor (Accelerator pedal position sensor 2) ● Camshaft position sensor ● Fuel rail pressure sensor ● Turbocharger boost sensor ● Refrigerant pressure sensor
P0653 0653	Sensor power supply circuit high input	ECM detects a voltage of power source for Sensor is excessively high.	

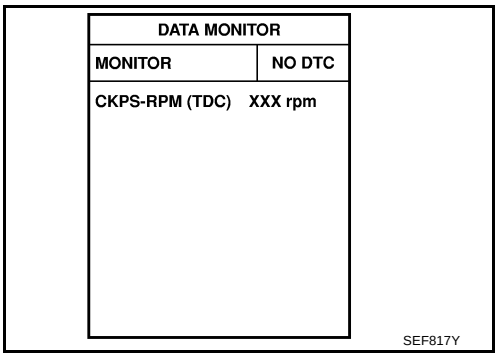
DTC Confirmation Procedure

BBS002DA

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1694, "Diagnostic Procedure" .



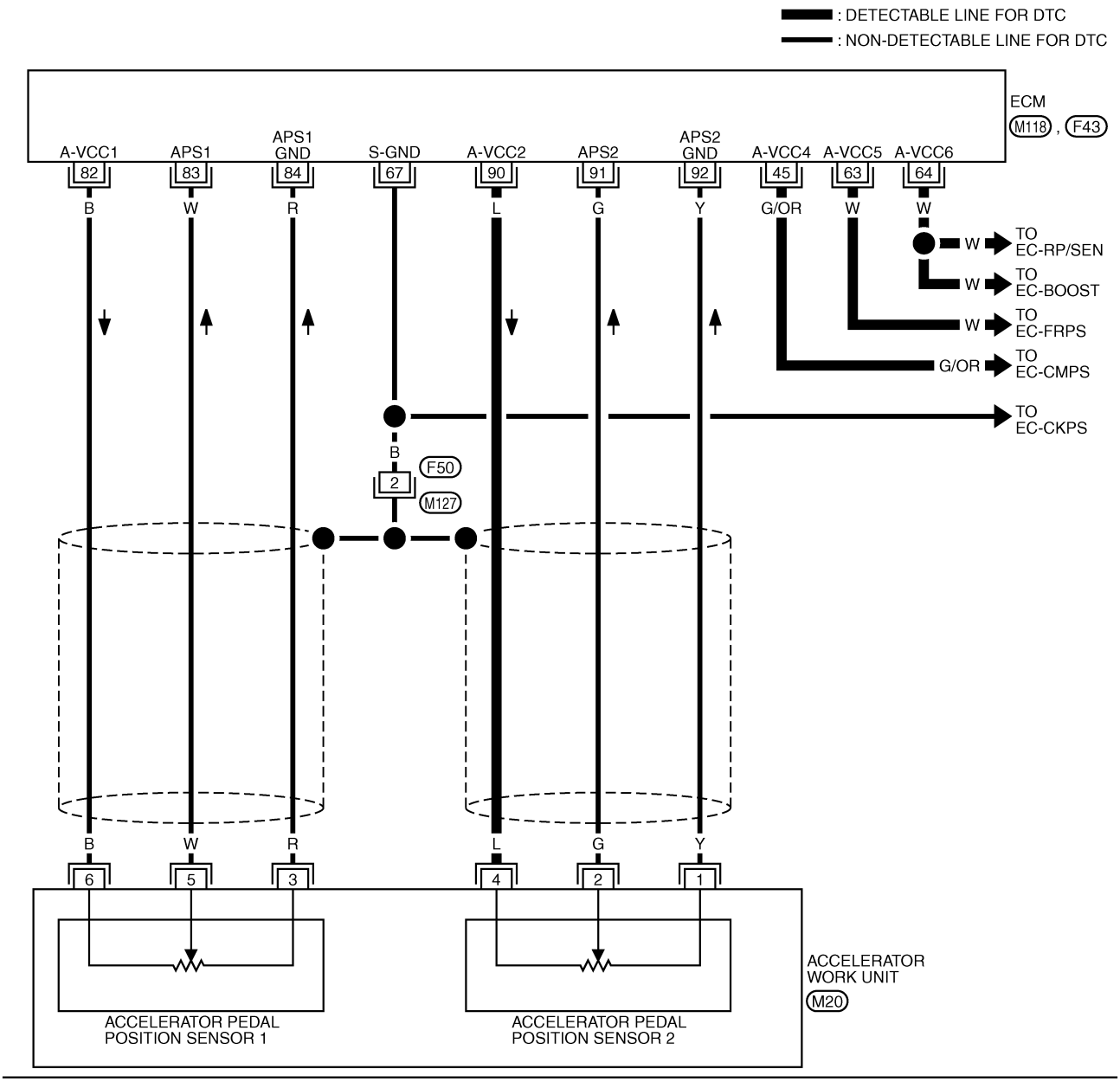
WITHOUT CONSULT-II

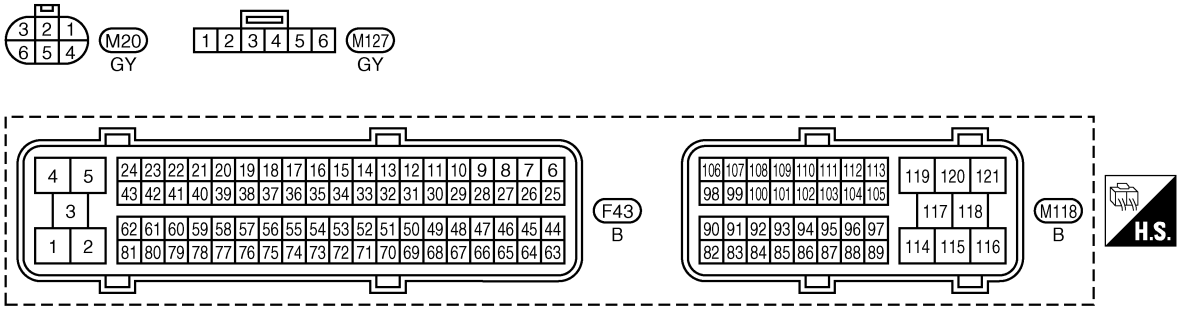
1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1694, "Diagnostic Procedure" .

Wiring Diagram

BBS002DB

EC-APP2PW-01





TBWB1099E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

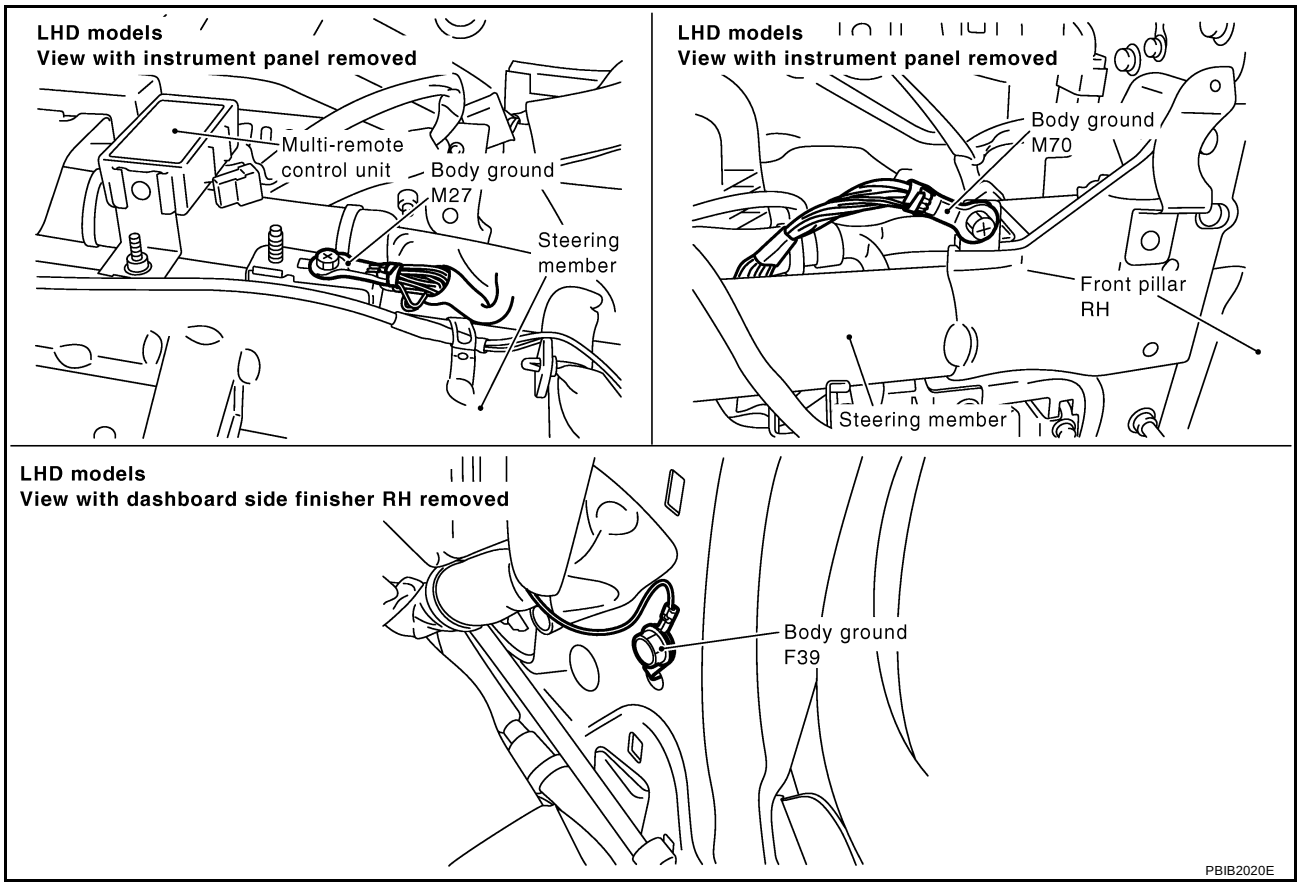
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
45	G/OR	Camshaft position sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
63	W	Fuel rail pressure sensor power supply	**[Ignition switch ON]**	Approximately 5.3V
64	W	Sensor power supply (Turbocharger boost sensor / Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V
83	W	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.8 - 1.3V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.0V
84	R	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
90	L	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	G	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.45 - 0.9V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.25 - 2.7V
92	Y	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS002DC

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

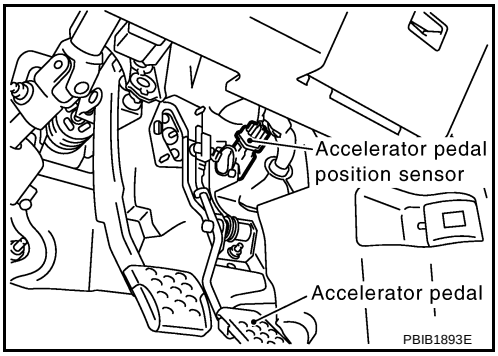


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

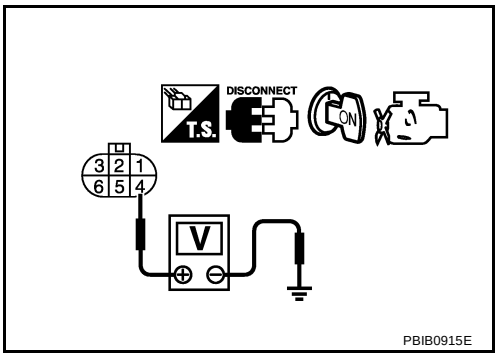
2. CHECK APP SENSOR 2 POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminal 4 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 5.
NG >> GO TO 3.

3. CHECK SENSOR POWER SUPPLY CIRCUITS

Check the following.
Harness for short to power and short to ground, between the following terminals.

ECM terminal	Sensor terminal	Reference Wiring Diagram
90	APP sensor terminal 4	EC-1692
45	Camshaft position sensor terminal 3	EC-1637
63	Fuel rail pressure sensor terminal 1	EC-1575
64	Turbocharger boost sensor terminal 1	EC-1620
	Refrigerant pressure sensor terminal 3	EC-1805

OK or NG

OK >> GO TO 4.
NG >> Repair short to ground or short to power in harness or connectors.

4. CHECK COMPONENTS

Check the following.

- Camshaft position sensor (Refer to EC-1641, "Component Inspection" .)
- Fuel rail pressure sensor (Refer to EC-1579, "Component Inspection" .)
- Turbocharger boost sensor (Refer to EC-1623, "Component Inspection" .)
- Refrigerant pressure sensor (Refer to ATC-90, "COMPONENT INSPECTION" .)

OK or NG

OK >> GO TO 5.
NG >> Replace malfunctioning component.

5. CHECK APP SENSOR

Refer to EC-1611, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

DTC P0686 ECM RELAY

PFP:25230

On Board Diagnosis Logic

BBS002DD

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P0686 0686	ECM relay circuit	ECM detects ECM relay is stuck closed even if ignition switch OFF.	● Harness or connectors (The ECM relay circuit is shorted.) ● ECM relay

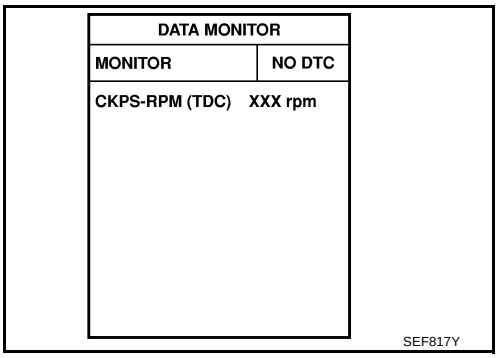
DTC Confirmation Procedure

BBS002DE

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON and then turn OFF.
2. Wait at least 30 seconds.
3. Turn ignition switch ON.
4. Select “DATA MONITOR” mode with CONSULT-II.
5. If DTC is detected, go to EC-1699, "Diagnostic Procedure" .

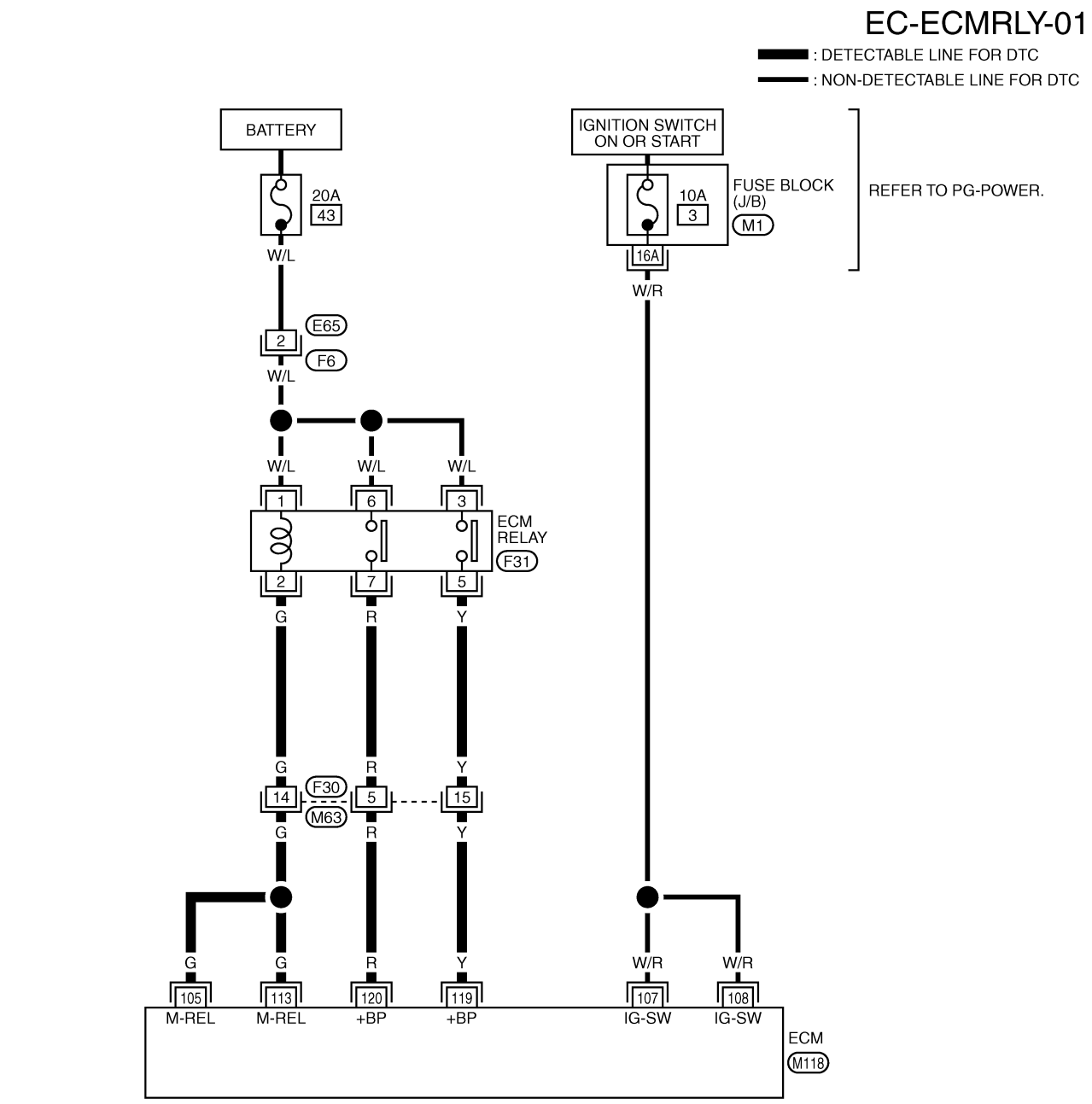


WITHOUT CONSULT-II

1. Turn ignition switch ON and then turn OFF.
2. Wait at least 30 seconds.
3. Turn ignition switch ON.
4. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
5. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
6. If DTC is detected, go to EC-1699, "Diagnostic Procedure" .

Wiring Diagram

BBS002DF



Specification data are reference values and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
107 108	W/R W/R	Ignition switch	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS002DG

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR SHORT TO GROUND

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals 105, 113 and ground. Refer to Wiring Diagram.

Continuity should not exist.

OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between ECM and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK ECM INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

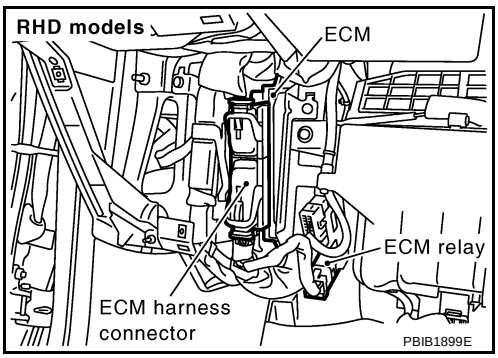
1. Disconnect ECM relay.
2. Check harness continuity between ECM terminal 119 and ECM relay terminal 5, ECM terminals 120 and ECM relay terminal 7. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between ECM and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK ECM RELAY

Refer to EC-1700, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace ECM relay.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

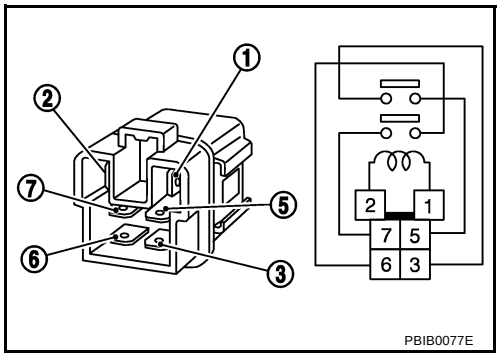
BBS002DH

ECM RELAY

1. Apply 12V direct current between ECM relay terminals (1) and (2).
2. Check continuity between relay terminals (3) and (5), (6) and (7).

Condition	Continuity
12V direct current supply between terminals (1) and (2)	Yes
OFF	No

3. If NG, replace ECM relay.



DTC P1211 TCS CONTROL UNIT

PFP:47850

Description

BBS002DI

The malfunction information related to TCS is transferred through the CAN communication line from ESP/TCS/ABS control unit to ECM.

Be sure to erase the malfunction information such as DTC not only for ESP/TCS/ABS control unit but also for ECM after TCS related repair.

On Board Diagnosis Logic

BBS002DJ

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1211 1211	TCS control unit	ECM receives a malfunction information from ESP/TCS/ABS control unit.	● ESP/TCS/ABS control unit ● TCS related parts

DTC Confirmation Procedure

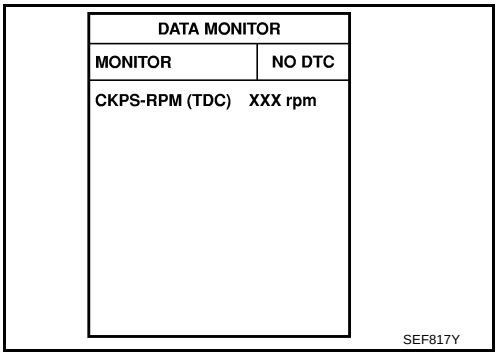
BBS002DK

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1701, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1701, "Diagnostic Procedure" .

Diagnostic Procedure

BBS002DL

Go to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP) or BRC-9, "TROUBLE DIAGNOSIS" (model without ESP).

DTC P1212 TCS COMMUNICATION LINE

PFP:47850

Description

BBS002DM

This CAN communication line is used to control the smooth engine operation during the TCS operation. Pulse signals are exchanged between ECM and ESP/TCS/ABS control unit.

NOTE:

- **If DTC P1212 is displayed with DTC U1000, first perform the trouble diagnosis for DTC U1000. Refer to EC-1530, "DTC U1000 CAN COMMUNICATION LINE" .**
- **Be sure to erase the malfunction information such as DTC not only for ESP/TCS/ABS control unit but also for ECM after TCS related repair.**

On Board Diagnosis Logic

BBS002DN

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1212 1212	TCS communication line	ECM can not receive the information from ESP/TCS/ABS control unit continuously.	● Harness or connectors (The CAN communication line is open or shorted.) ● ESP/TCS/ABS control unit ● Dead (Weak) battery

DTC Confirmation Procedure

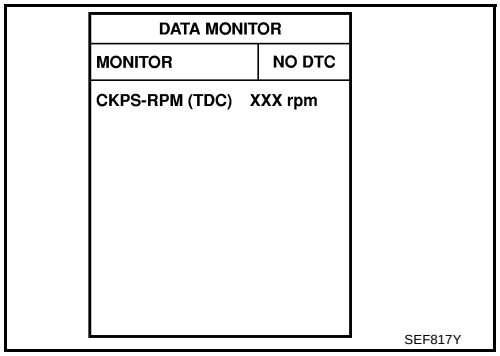
BBS002DO

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1702, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1702, "Diagnostic Procedure" .

Diagnostic Procedure

BBS002DP

Go to BRC-52, "TROUBLE DIAGNOSIS" (models with ESP) or BRC-9, "TROUBLE DIAGNOSIS" (model without ESP).

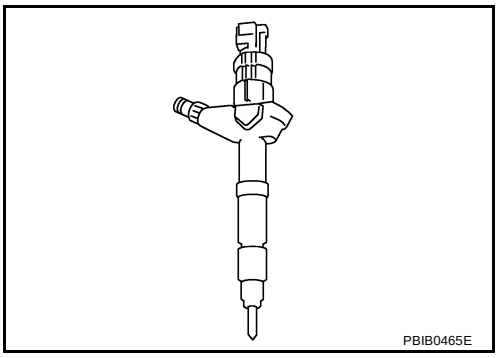
DTC P1268 - P1271 FUEL INJECTOR

PFP:16600

Component Description

BBS002DX

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

BBS002DY

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

On Board Diagnosis Logic

BBS002DZ

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1268 1268	No. 1 cylinder fuel injector	The valve built into No. 1 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	● Fuel injector
P1269 1269	No. 2 cylinder fuel injector	The valve built into No. 2 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	
P1270 1270	No. 3 cylinder fuel injector	The valve built into No. 3 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	
P1271 1271	No. 4 cylinder fuel injector	The valve built into No. 4 cylinder fuel injector is not closed properly (stuck open) when the injector is not energized.	

DTC Confirmation Procedure

BBS002E0

CAUTION:

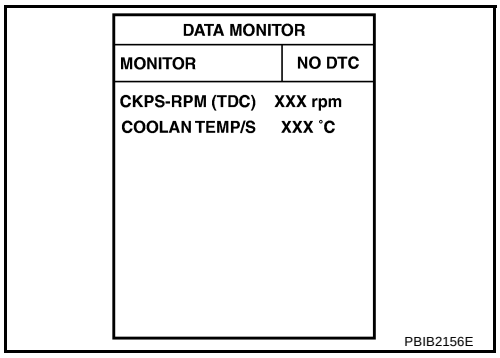
Always drive vehicle in safe manner according to traffic conditions and obey all traffic laws when driving.

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON, and select “DATA MONITOR” mode with CONSULT-II.
2. Restart engine and let it idle for about 15 minutes.
3. If DTC is detected, go to EC-1707, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
4. Drive vehicle and maintain the following conditions for at least 60 seconds.



CKPS·RPM	700 - 2000 rpm (A constant rotation is maintained)
COOLAN TEMP/S	Less than 75°C (167°F)
Shift lever	Suitable position
Accelerator pedal	Hold the accelerator pedal as steady as possible.

5. If DTC is detected, go to EC-1707, "Diagnostic Procedure" .

WITHOUT CONSULT-II

1. Start engine and let it idle for about 15 minutes.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1707, "Diagnostic Procedure" .
   If DTC is not detected, go to next step.
5. Set voltmeter probes between ECM terminal 70 (engine coolant temperature sensor signal) and ground.
6. Restart engine and drive vehicle and maintain the following conditions for at least 60 seconds.

Engine speed·	700 - 2000 rpm (A constant rotation is maintained)
Voltage between ECM terminal 70 and ground	More than 0.6V
Shift lever	Suitable position
Accelerator pedal	Hold the accelerator pedal as steady as possible.

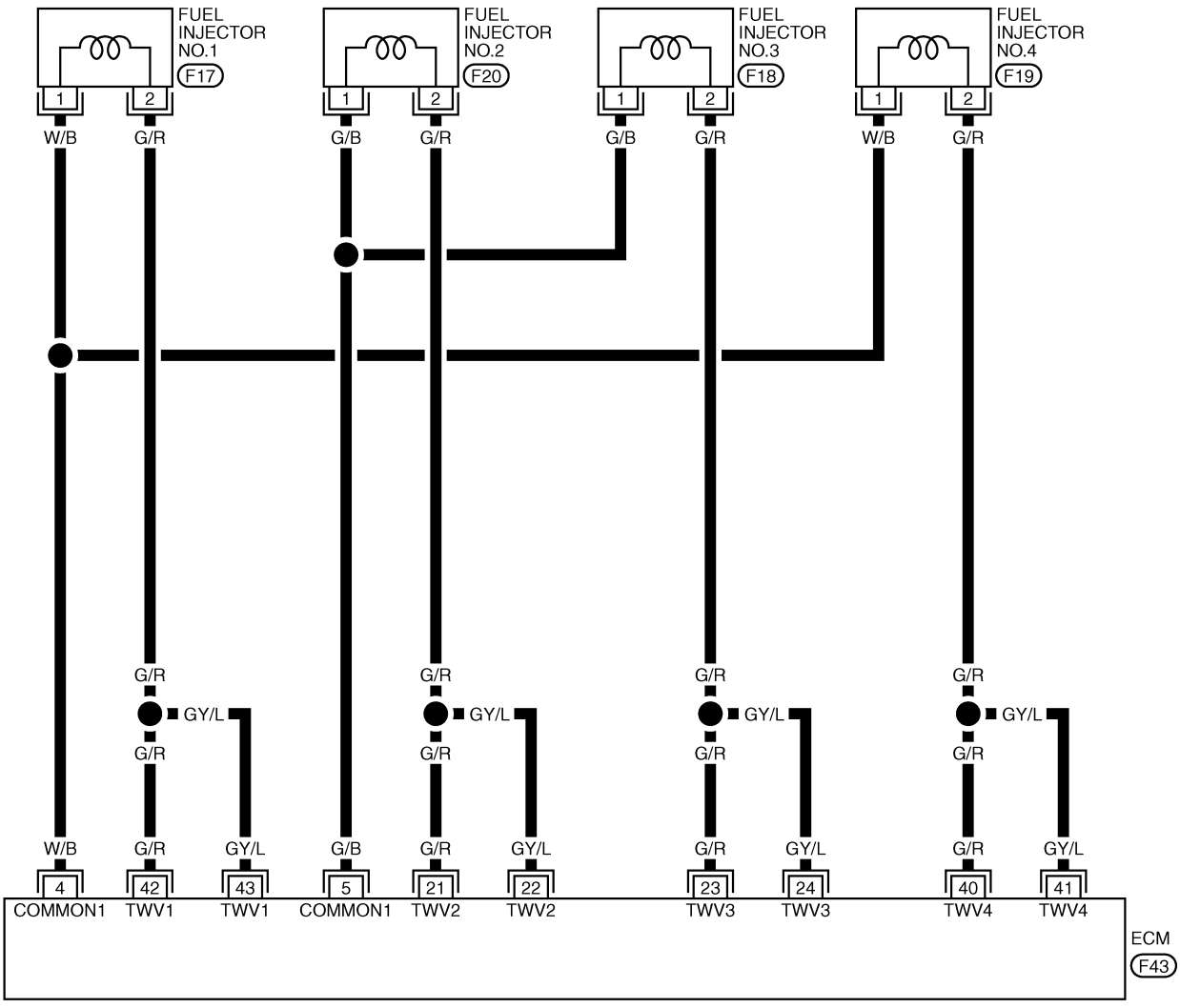
7. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
8. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
9. If DTC is detected, go to EC-1707, "Diagnostic Procedure" .

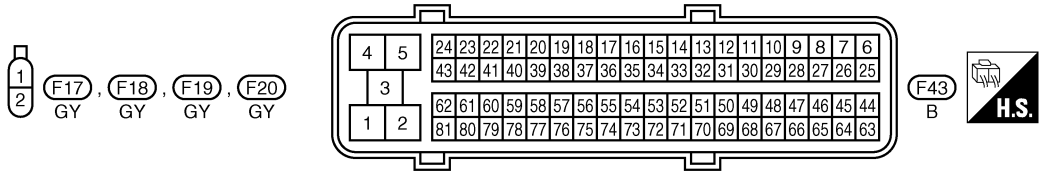
Wiring Diagram

BBS002E1

EC-INJECT-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



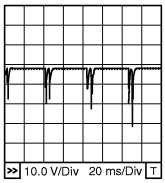
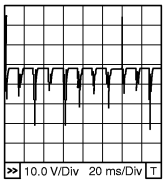
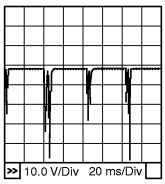
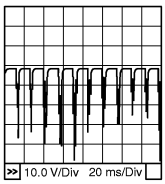


TBWB0903E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	W/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	5 - 10V ★  MBIB0883E
5	G/B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	5 - 10V ★  MBIB0884E
21 22 23 24 40 41 42 43	G/R GY/L G/R GY/L G/R GY/L G/R GY/L	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3 Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 9V ★  MBIB0882E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

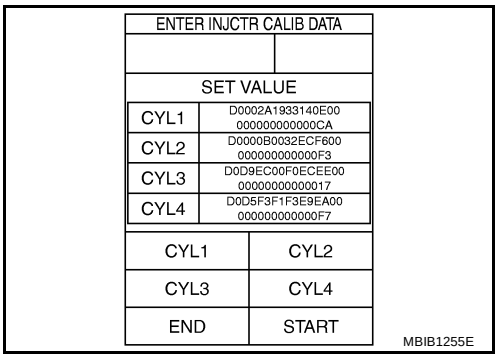
Diagnostic Procedure

BBS002E2

1. CHECK INJECTOR ADJUSTMENT VALUE

1. Turn ignition switch ON.
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.
3. Check injector adjustment values displayed on CONSULT-II screen.

The value displayed on CONSULT-II screen should be same as injector adjustment value printed on each fuel injector.

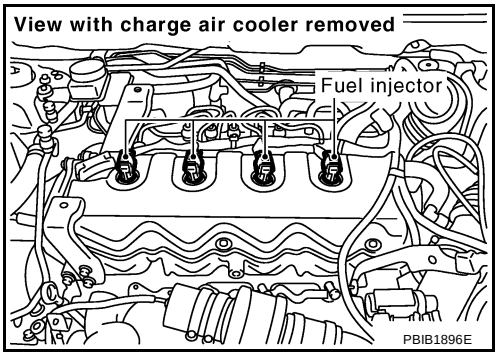


OK or NG

OK >> GO TO 2.
NG >> Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

2. CHECK FUEL INJECOR POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.



DTC	Terminal		Cylinder
	ECM	Fuel injector	
P1268	4	1	No.1
P1269	5	1	No.2
P1270	5	1	No.3
P1271	4	1	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder. Refer to Wiring Diagram.

DTC	Terminal		Cylinder
	ECM	Fuel injector	
P1268	42, 43	2	No.1
P1269	21, 22	2	No.2
P1270	23, 24	2	No.3
P1271	40, 41	2	No.4

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL INJECTOR-I

Refer to EC-1710, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> GO TO 6.

5. CHECK FUEL INJECTOR-II

With CONSULT-II

1. Remove two fuel injectors.
   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .
6. Select “SELF DIAG RESULTS” mode with CONSULT-II.
7. Touch “ERASE”.
8. Perform DTC Confirmation Procedure, EC-1704, "DTC Confirmation Procedure" .
9. Is DTC displayed for the other cylinder?

Without CONSULT-II

1. Remove two fuel injectors.
   NOTE:
   One is from malfunctioning cylinder and the other is from any cylinder other than the malfunctioning cylinder.
2. Swap the two fuel injectors to the other cylinder.
3. Reconnect ECM harness connector and fuel injector harness connector.
4. Turn ignition switch ON.
5. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .
6. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
7. Perform DTC Confirmation Procedure, EC-1704, "DTC Confirmation Procedure" .
8. Is DTC displayed for the other cylinder?

Yes or No

OK >> GO TO 6.
NG >> GO TO 7.

6. REPLACE FUEL INJECTOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

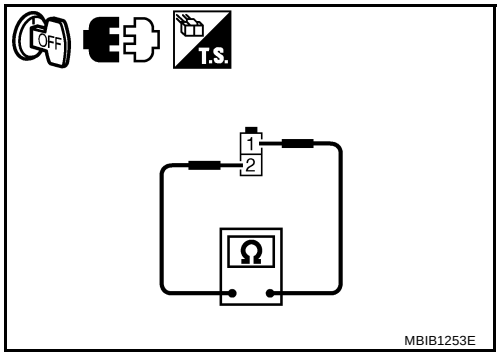
BBS002E3

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 0.2 - 0.8Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel injector.



Removal and Installation

BBS002E4

FUEL INJECTOR

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

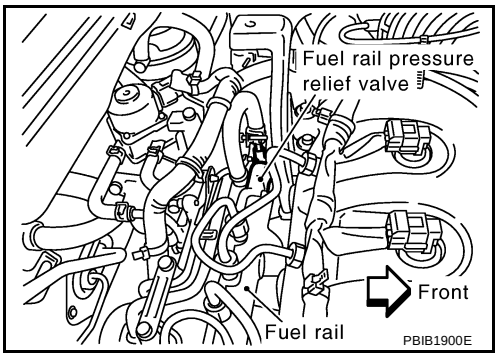
DTC P1272 FUEL PUMP

PFP:16700

Description

BBS002E5

When the fuel pressure in fuel rail increases to excessively high, fuel pressure relief valve opens to carry excess fuel to the return hose.



CONSULT-II Reference Value in Data Monitor Mode

BBS002E6

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

On Board Diagnosis Logic

BBS002E7

The MI will not light up for this self-diagnosis.

NOTE:

If DTC P1272 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1272 1272	Fuel rail pressure relief valve open	Fuel rail pressure relief valve is open because of fuel pressure control system malfunction.	● Harness or connectors (Fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor ● Air mixed with fuel ● Lack of fuel ● Fuel transport pump operation

DTC Confirmation Procedure

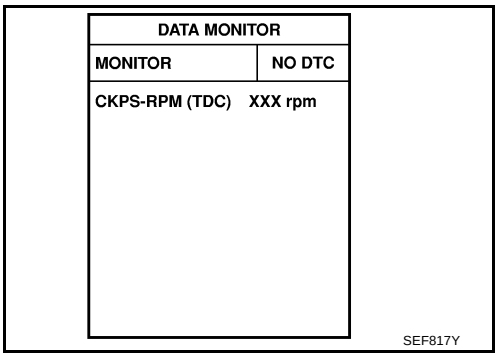
BBS002E8

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds, then release the accelerator pedal.
4. If DTC is detected, go to EC-1714, "Diagnostic Procedure" .



WITHOUT CONSULT-II

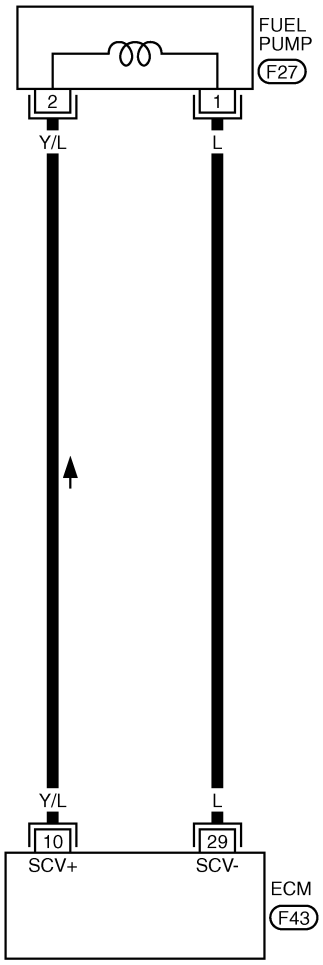
1. Start engine and keep engine speed more than 4,000 rpm for at least 5 seconds, then release the accelerator pedal.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1714, "Diagnostic Procedure" .

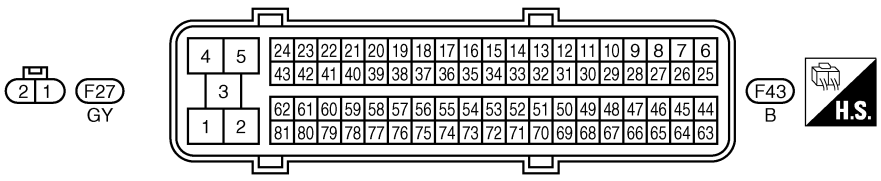
Wiring Diagram

BBS002E9

EC-F/PUMP-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

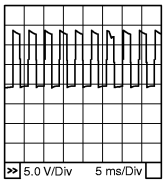
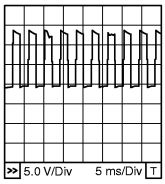
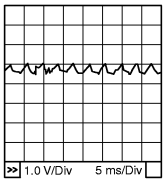
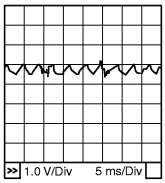




TBWA0574E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0886E
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS002EA

1. CHECK FUEL TRANSPORT PUMP OPERATION

Perform Diagnostic Procedure for fuel transport pump. Refer to EC-1799 .

OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of Diagnostic Procedure for fuel transport pump.

2. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning value clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1711, "DTC Confirmation Procedure" , again.
7. Is DTC detected again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
5. Perform EC-1711, "DTC Confirmation Procedure" , again.
6. Is DTC detected again?

Yes or No

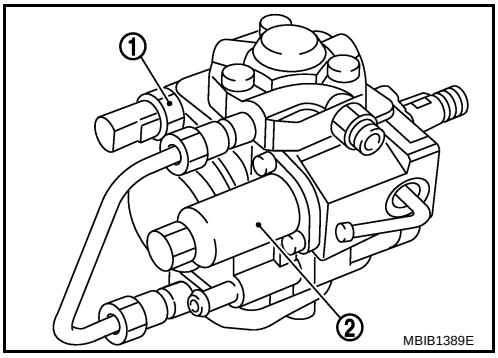
Yes >> GO TO 3.
No >> **INSPECTION END**

3. CHECK FUEL PUMP POWER SUPPLY CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL PUMP

Refer to EC-1716, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 8.

6. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1579, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace fuel rail.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> GO TO 8.
NG >> Repair or replace.

8. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

Component Inspection

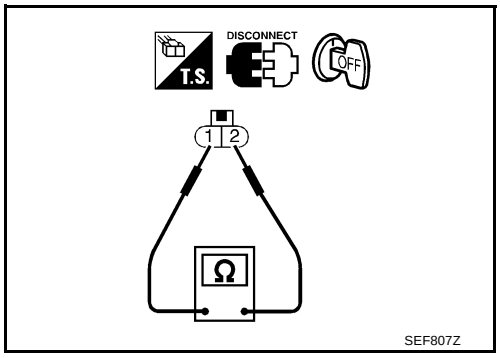
BBS002EB

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

BBS002EC

FUEL RAIL

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P1273 FUEL PUMP

PFP:16700

Description

BBS002ED

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel pump increases, the fuel raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

BBS002EE

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

On Board Diagnosis Logic

BBS002EF

The MI will not light up for this self-diagnosis.

NOTE:

If DTC P1273 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1273 1273	Fuel pump insufficient flow	ECM detects the abnormal pulse of fuel pressure.	● Fuel pump ● Air mixed with fuel ● Lack of fuel ● Fuel rail pressure sensor ● Fuel transport pump operation

DTC Confirmation Procedure

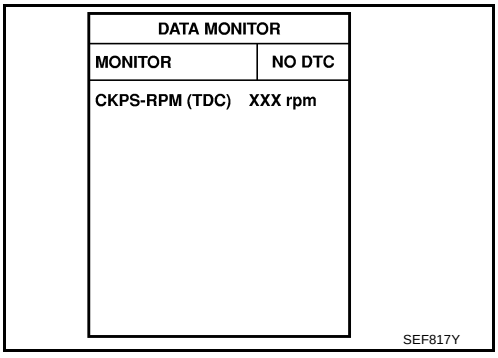
BBS002EG

NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 10 seconds.
4. If DTC is detected, go to EC-1719, "Diagnostic Procedure" .



WITHOUT CONSULT-II

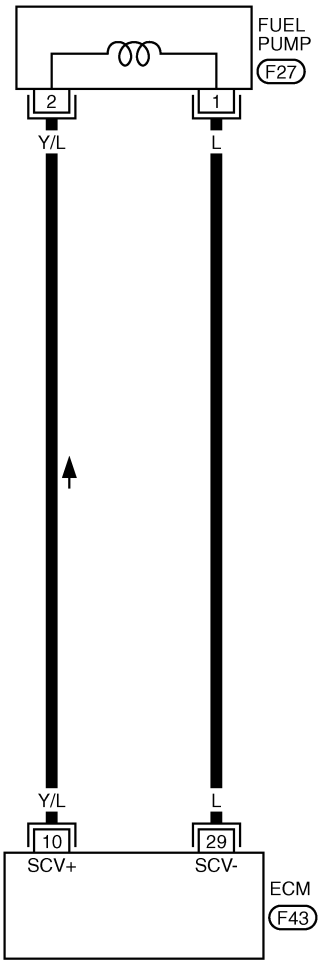
1. Start engine and warm it up to normal operating temperature.
2. Keep engine speed more than 2,000 rpm for at least 10 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1719, "Diagnostic Procedure" .

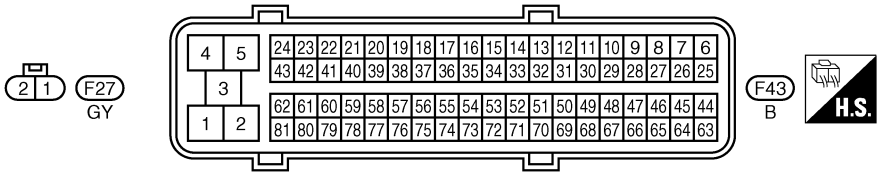
Wiring Diagram

BBS002EH

EC-F/PUMP-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

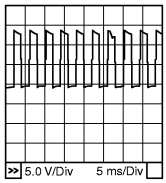
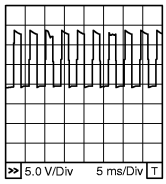
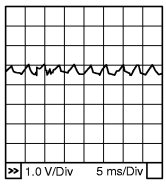
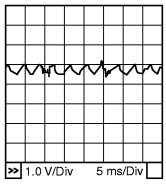




TBWA0574E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0886E
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS002EI

1. CHECK FUEL TRANSPORT PUMP OPERATION

Perform Diagnostic Procedure for fuel transport pump. Refer to EC-1799 .

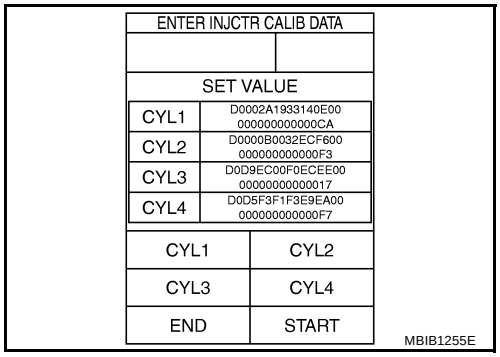
OK or NG

OK >> GO TO 2.
NG >> Follow the instruction of Diagnostic Procedure for fuel transport pump.

2. CHECK INJECTOR ADJUSTMENT VALUE

1. Turn ignition switch ON.
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.
3. Check injector adjustment values displayed on CONSULT-II screen.

The value displayed on CONSULT-II screen should be same as injector adjustment value printed on each fuel injector.



OK or NG

OK >> GO TO 2.
NG >> Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

3. PERFORM FUEL PUMP LEARNING VALUE CLEARING

NOTE:
If the DTC is detected because of air mixed with fuel (i.e.: caused by lack of fuel), it may become normal by performing following procedure.

With CONSULT-II

1. Turn ignition switch ON.
2. Clear fuel pump learning value. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Select “SELF-DIAG RESULT” mode with CONSULT-II.
5. Touch “ERASE”.
6. Perform EC-1717, "DTC Confirmation Procedure" , again.
7. Is DTC detected again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Clear fuel pump learning value. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
3. Start engine and let it idle for at least 60 seconds.
4. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
5. Perform EC-1717, "DTC Confirmation Procedure" , again.
6. Is DTC displayed again?

Yes or No

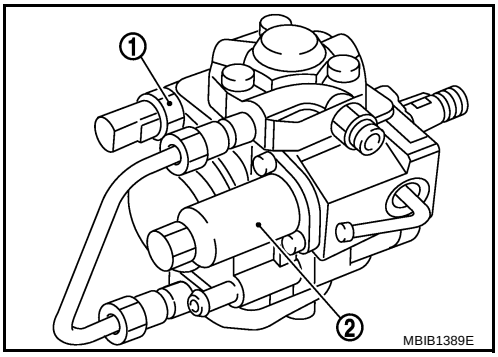
Yes >> GO TO 4.
No >> **INSPECTION END**

4. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1579, "Component Inspection" .

OK or NG

OK >> GO TO 7.
NG >> Replace fuel rail.

7. CHECK FUEL PUMP

Refer to EC-1722, "Component Inspection" .

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

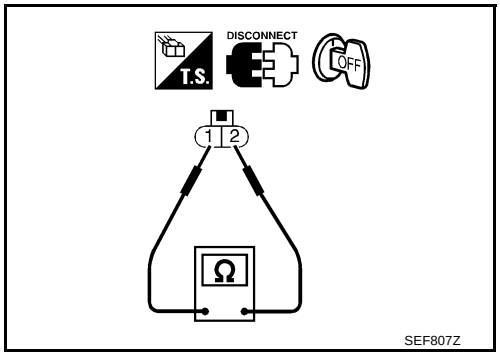
BBS002EJ

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

BBS002EK

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P1274 FUEL PUMP

PFP:16700

Description

BBS002EL

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to the fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

BBS002EM

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

On Board Diagnosis Logic

BBS002EN

NOTE:
If DTC P1274 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1274 1274	Fuel pump protection	Fuel pressure is too much higher than the target value.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor

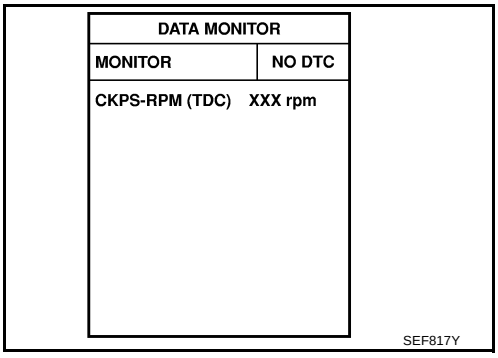
DTC Confirmation Procedure

BBS002EO

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Tuning ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let idle for at least 5 seconds.
4. If DTC is detected, go to EC-1726, "Diagnostic Procedure" .



WITHOUT CONSULT-II

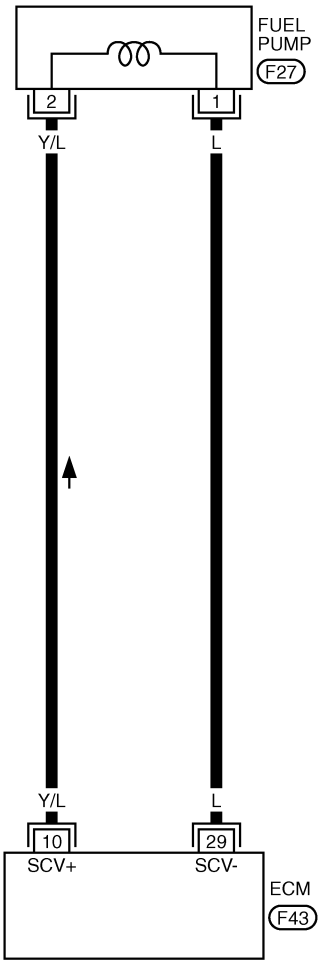
1. Start engine and let idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1726, "Diagnostic Procedure" .

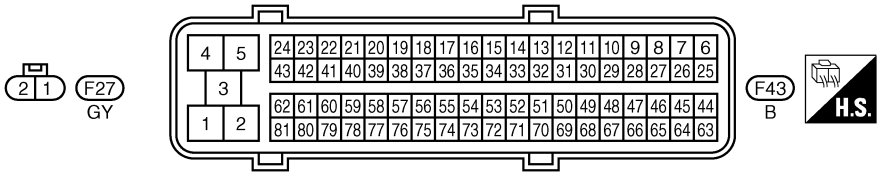
Wiring Diagram

BBS002EP

EC-F/PUMP-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC

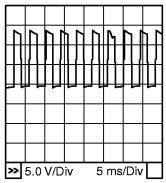
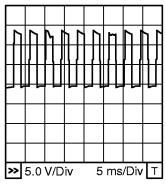
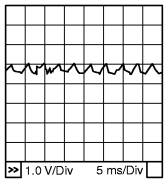
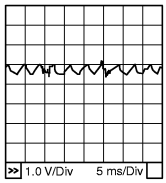




TBWA0574E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0886E
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

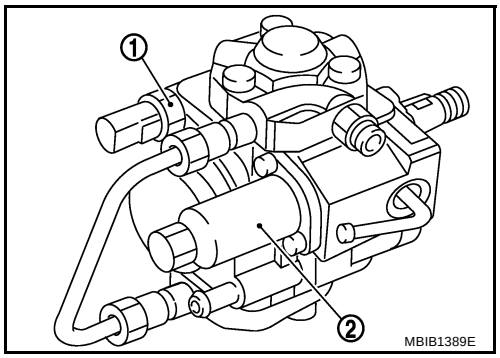
Diagnostic Procedure

BBS002EQ

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
- Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 2.
Refer to Wiring Diagram.

Continuity should exist.



4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 1.
Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1579, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK FUEL PUMP

Refer to EC-1727, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

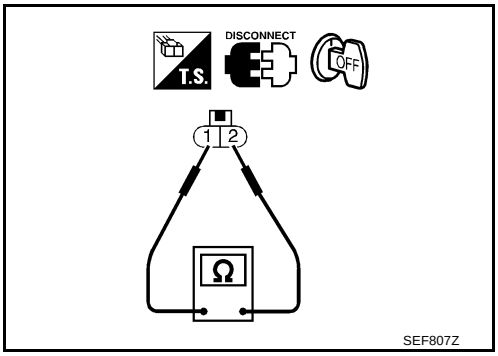
BBS002ER

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

BBS002ES

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

DTC P1275 FUEL PUMP

PFP:16700

Description

BBS002ET

To control the amount of the fuel inhalation of the fuel pump, a plunger is built into the fuel pump. When the amount of the fuel inhalation of fuel increases, the fuel pump raises the fuel exhalation pressure. As a result, the fuel injection pressure is raised. When the load of the engine increases, the ECM sends a signal to fuel pump to raise the injection pressure.

CONSULT-II Reference Value in Data Monitor Mode

BBS002EU

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
PUMP CURRENT	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	Idle	1,700 - 1,900 mA
		2,000 rpm	1,600 - 1,800 mA

On Board Diagnosis Logic

BBS002EV

NOTE:
If DTC P1275 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1275 1275	Fuel pump exchange	Fuel pressure is too much higher than the target value.	● Harness or connectors (The fuel pump circuit is open or shorted.) ● Fuel pump ● Fuel rail pressure sensor

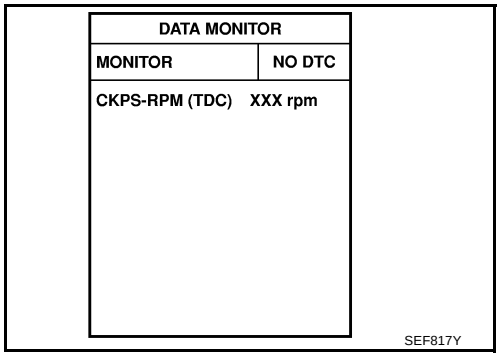
DTC Confirmation Procedure

BBS002EW

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Start engine and warm it up to normal operating temperature.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Keep engine speed more than 2,000 rpm for at least 60 seconds.
4. If DTC is detected, go to EC-1731, "Diagnostic Procedure" .



WITHOUT CONSULT-II

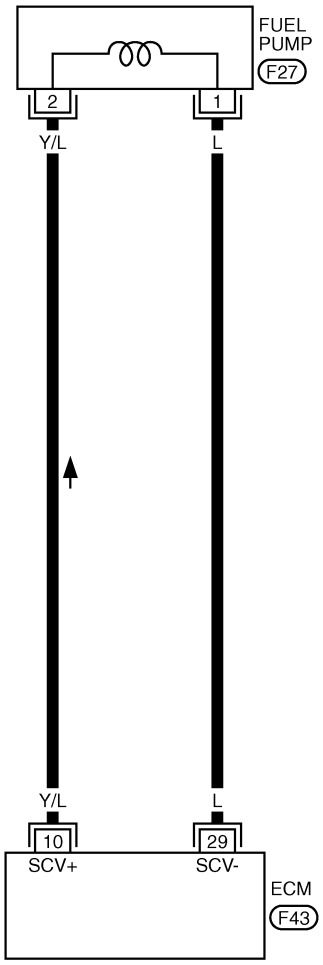
1. Start engine and warm it up to normal operating temperature.
2. Keep engine speed more than 2,000 rpm for at least 60 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1731, "Diagnostic Procedure" .

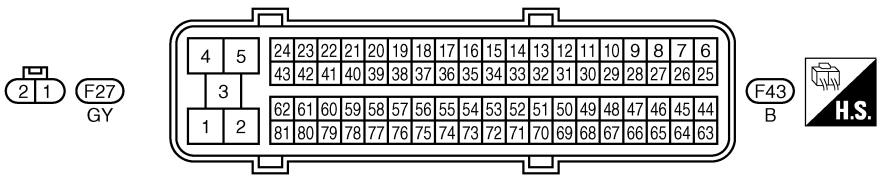
Wiring Diagram

BBS002EX

EC-F/PUMP-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



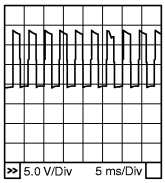
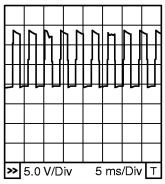
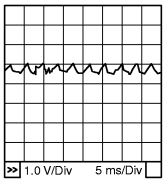
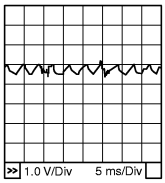


TBWA0574E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
10	Y/L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0885E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 12.5V ★  MBIB0886E
29	L	Fuel pump	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.5 - 1.0V ★  MBIB0887E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0.5 - 1.0V ★  MBIB0888E

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

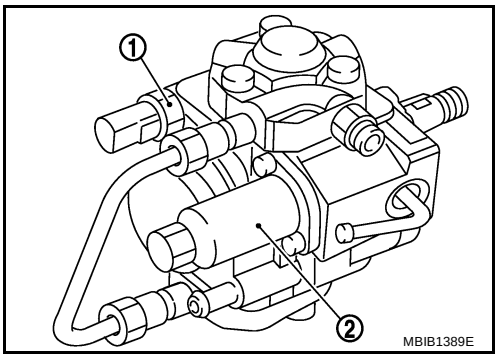
Diagnostic Procedure

BBS002EY

1. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and fuel pump (2) harness connector.
   - Fuel pump temperature sensor (1)
3. Check harness continuity between ECM terminal 10 and fuel pump terminal 2.
   Refer to Wiring Diagram.

   Continuity should exist.



4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK FUEL PUMP GROUND CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 29 and fuel pump terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK FUEL RAIL PRESSURE SENSOR

Refer to EC-1579, "Component Inspection" .

OK or NG

OK >> GO TO 4.
NG >> Replace fuel rail.

4. CHECK FUEL PUMP

Refer to EC-1732, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> GO TO 5.

5. REPLACE FUEL PUMP

1. Replace fuel pump.
2. Perform Fuel Pump Learning Valve Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .

>> **INSPECTION END**

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

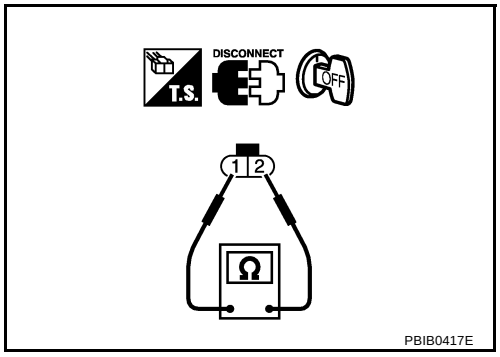
BBS002EZ

FUEL PUMP

1. Disconnect fuel pump harness connector.
2. Check resistance between fuel pump terminals 1 and 2.

Resistance: 1.5 - 3.0Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel pump.



Removal and Installation

BBS002F0

FUEL PUMP

Refer to EM-176, "FUEL PUMP" .

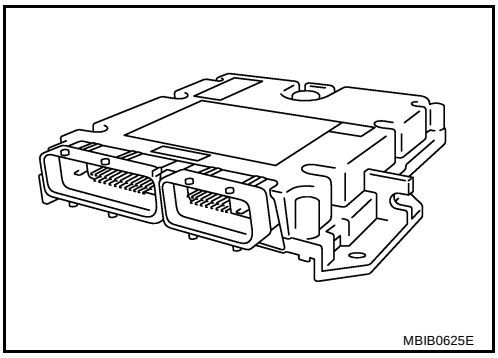
DTC P1616 ECM

PFP:23710

Description

BBS002ID

The ECM consists of a microcomputer and connectors for signal input and output and for power supply. The ECM controls the engine.


MBIB0625E

On Board Diagnosis Logic

BBS002IE

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1616 1616	Engine control module (ROM)	ECM ROM is malfunctioning.	● ECM

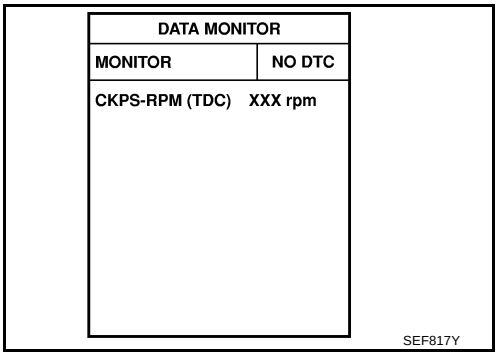
DTC Confirmation Procedure

BBS002IF

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1734, "Diagnostic Procedure" .



SEF817Y

WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1734, "Diagnostic Procedure" .

Diagnostic Procedure

BBS002IG

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1733, "DTC Confirmation Procedure" , again.
5. Is DTC P1616 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
3. Perform EC-1733, "DTC Confirmation Procedure" , again.
4. Is DTC 1616 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

DTC P1622 INJECTOR ADJUSTMENT VALUE

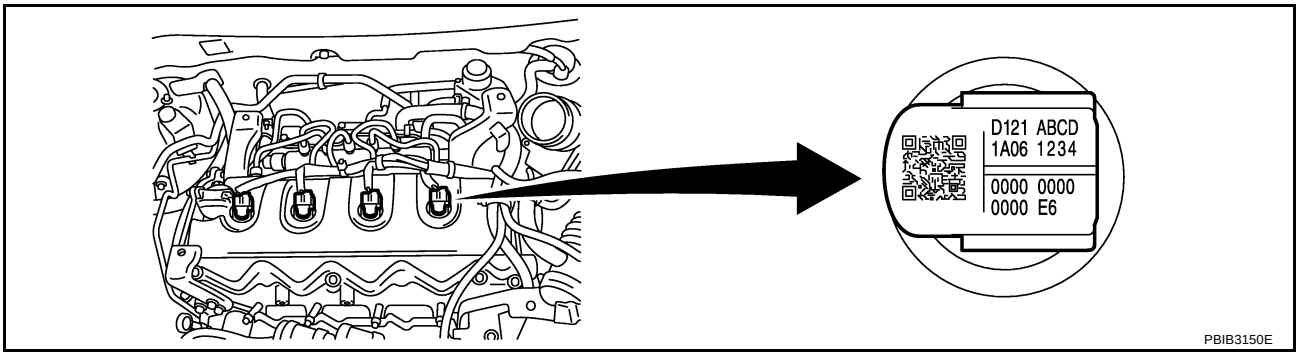
PFP:23710

Description

BBS002IH

Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector.The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control. A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the fuel injector which is installed on the vehicle



Example: Injector adjustment value = D121ABCD1A06123400000000000E6

On Board Diagnosis Logic

BBS002II

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1622 1622	Injector adjustment value data uninput	Injector adjustment value is not stored in ECM.	● Injector adjustment value (Injector adjustment value has not been written onto ECM memory yet, or the value has been initialized.)

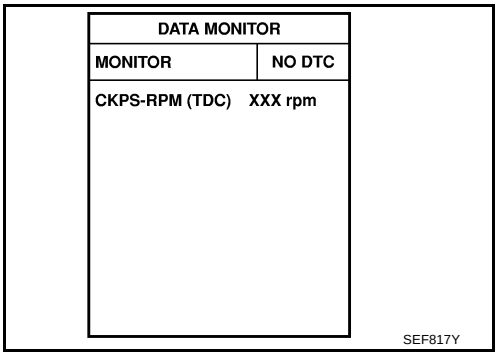
DTC Confirmation Procedure

BBS002IJ

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1736, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1736, "Diagnostic Procedure" .

Diagnostic Procedure

BBS002IK

1. PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

DTC P1623 INJECTOR ADJUSTMENT VALUE

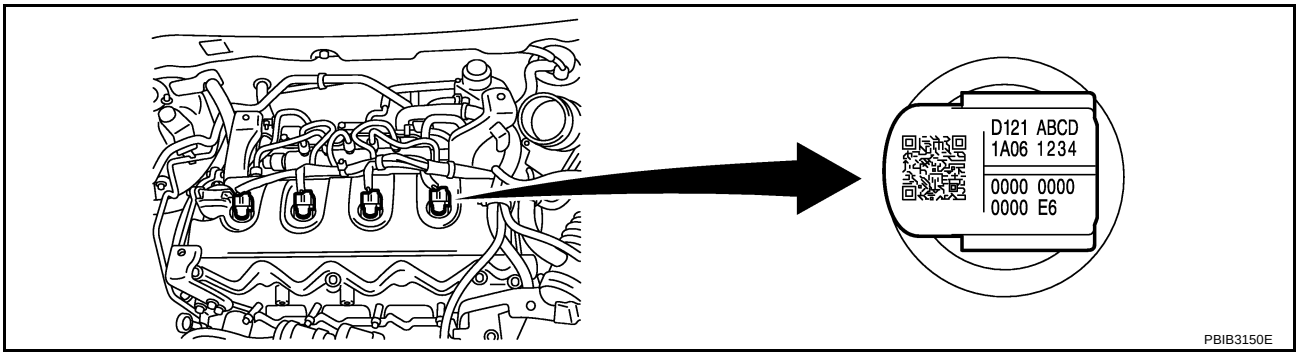
PFP:23710

Description

BBS002IL

Injector adjustment value indicates manufacturing tolerance and the value is printed on the top of fuel injector.The injector adjustment value which is correctly stored in ECM is needed for precise fuel injection control. A performance of emission control and a drivability may effect when there is a mismatch between the following two values.

- The injector adjustment value stored in ECM
- The injector adjustment value of the fuel injector which is installed on the vehicle



Example: Injector adjustment value = D121ABCD1A06123400000000000E6

On Board Diagnosis Logic

BBS002IM

The MI will not light up for this self-diagnosis.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P1623 1623	Injector adjustment value data error	ECM detects the abnormal value of injector adjustment value.	● CONSULT-II communication status (The status of CONSULT-II communication becomes improper during Injector Adjustment Value Registration.) ● ECM

NOTE:
This DTC is not detected when injector adjustment value (not correct but existent) is stored in ECM.

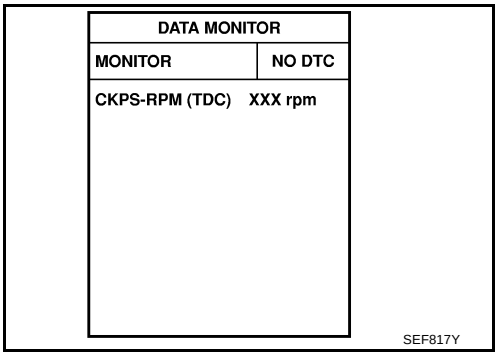
DTC Confirmation Procedure

BBS002IN

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1738, "Diagnostic Procedure" .



WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.

4. If DTC is detected, go to EC-1738, "Diagnostic Procedure" .

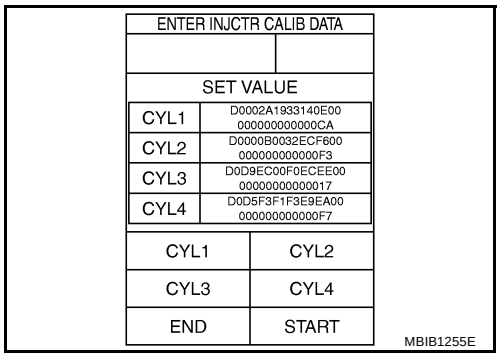
Diagnostic Procedure

BBS002IO

1. CHECK INJECTOR ADJUSTMENT VALUE

1. Turn ignition switch ON.
2. Select “ENTER INJECTOR CALIB DATA” in “WORK SUPPORT” mode with CONSULT-II.
3. Check injector adjustment values displayed on CONSULT-II screen.

The value displayed on CONSULT-II screen should be same as injector adjustment value printed on each fuel injector.



OK or NG

OK >> GO TO 3.
NG >> GO TO 2.

2. PERFORM INJECTOR ADJUSTMENT VALUE REGISTRATION

Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

NOTE:
When two or more injector adjustment value are improper, it is useful to perform “INJ ADJ VAL CLR” in “WORK SUPPORT” mode with CONSULT-II. And then perform Injector Adjustment Value Registration.

>> GO TO 3.

3. PERFORM DTC CONFIRMATION PROCEDURE

With CONSULT-II

1. Select “SELF DIAG RESULTS” mode with CONSULT-II.
2. Touch “ERASE”.
3. Perform EC-1737, "DTC Confirmation Procedure" , again.
4. Is DTC P1623 displayed again?

Without CONSULT-II

1. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
2. Perform EC-1737, "DTC Confirmation Procedure" , again.
3. Is DTC 1623 displayed again?

Yes or No

Yes >> GO TO 4.
No >> **INSPECTION END**

4. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

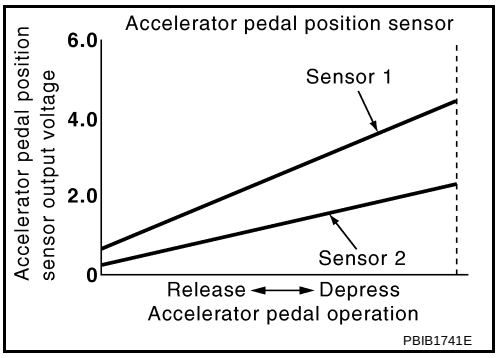
DTC P2135 APP SENSOR

PFP:18002

Description

BBS002F1

The accelerator pedal position sensor is installed on the upper end of the accelerator pedal assembly. The sensors detect the accelerator pedal position and sends a signal to the ECM. The ECM uses the signal to determine the amount of fuel to be injected.



CONSULT-II Reference Value in Data Monitor Mode

BBS002F2

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
ACCEL POS SEN*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.5 - 1.0V
		Accelerator pedal: Fully depressed	4.0 - 4.8V
ACCEL SEN 2*	● Ignition switch: ON (Engine stopped)	Accelerator pedal: Fully released	0.15 - 0.6V
		Accelerator pedal: Fully depressed	1.95 - 2.4V

*: These signals are converted by ECM internally. Thus, these differ from ECM terminals voltage.

On Board Diagnosis Logic

BBS002F3

The MI will not light up for this self-diagnosis.

NOTE:

- **If DTC P2135 is displayed with DTC P0642 or P0643, first perform trouble diagnosis for DTC P0642 or P0643. Refer to EC-1686, "DTC P0642, P0643 SENSOR POWER SUPPLY" .**
- **If DTC P2135 is displayed with DTC P0652 or P0653, first perform trouble diagnosis for DTC P0652 or P0653. Refer to EC-1691, "DTC P0652, P0653 SENSOR POWER SUPPLY" .**

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2135 2135	Accelerator pedal position sensor 1, 2 signal correlation	The correlation between APP sensor 1 signal and APP sensor 2 signal is out of the normal range.	● Harness or connectors (The APP sensor circuit is open or shorted.) ● Accelerator pedal position sensor (APP sensor 1 and 2)

DTC Confirmation Procedure

BBS002F4

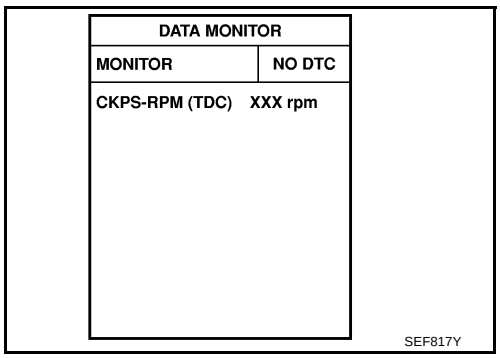
NOTE:

If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.

2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. Depress accelerator pedal slowly spending 5 seconds, and then release it slowly spending 5 seconds.
5. If DTC is detected, go to EC-1743, "Diagnostic Procedure" .



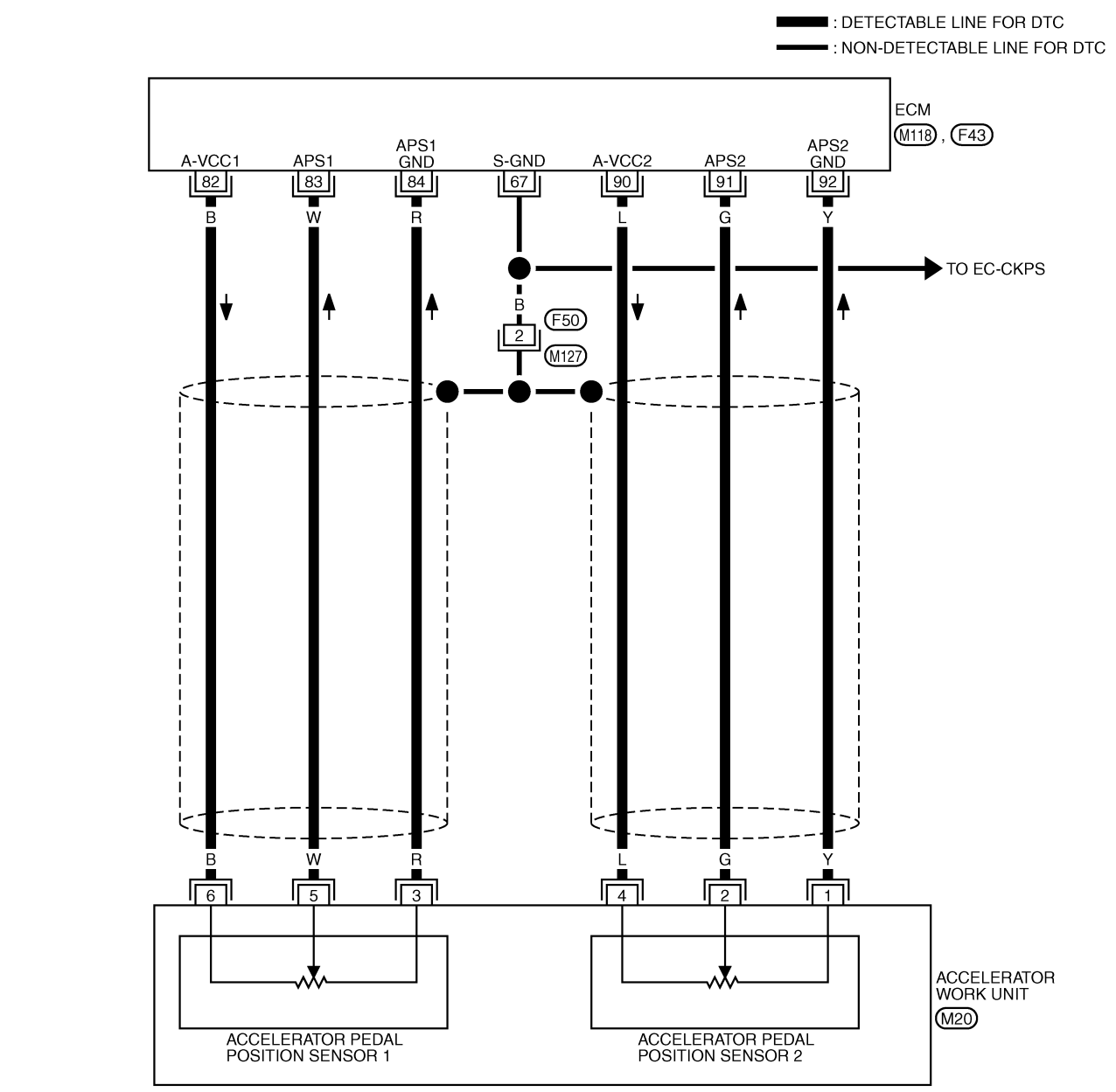
WITHOUT CONSULT-II

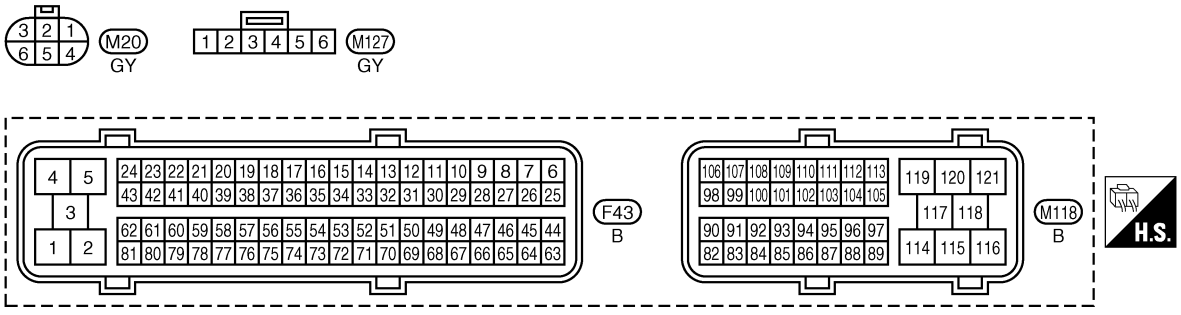
1. Turn ignition switch ON and wait at least 5 seconds.
2. Depress accelerator pedal slowly spending 5 seconds, and then release it slowly spending 5 seconds.
3. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
4. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
5. If DTC is detected, go to EC-1743, "Diagnostic Procedure" .

Wiring Diagram

BBS002F5

EC-APPS3-01





TBWB0911E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

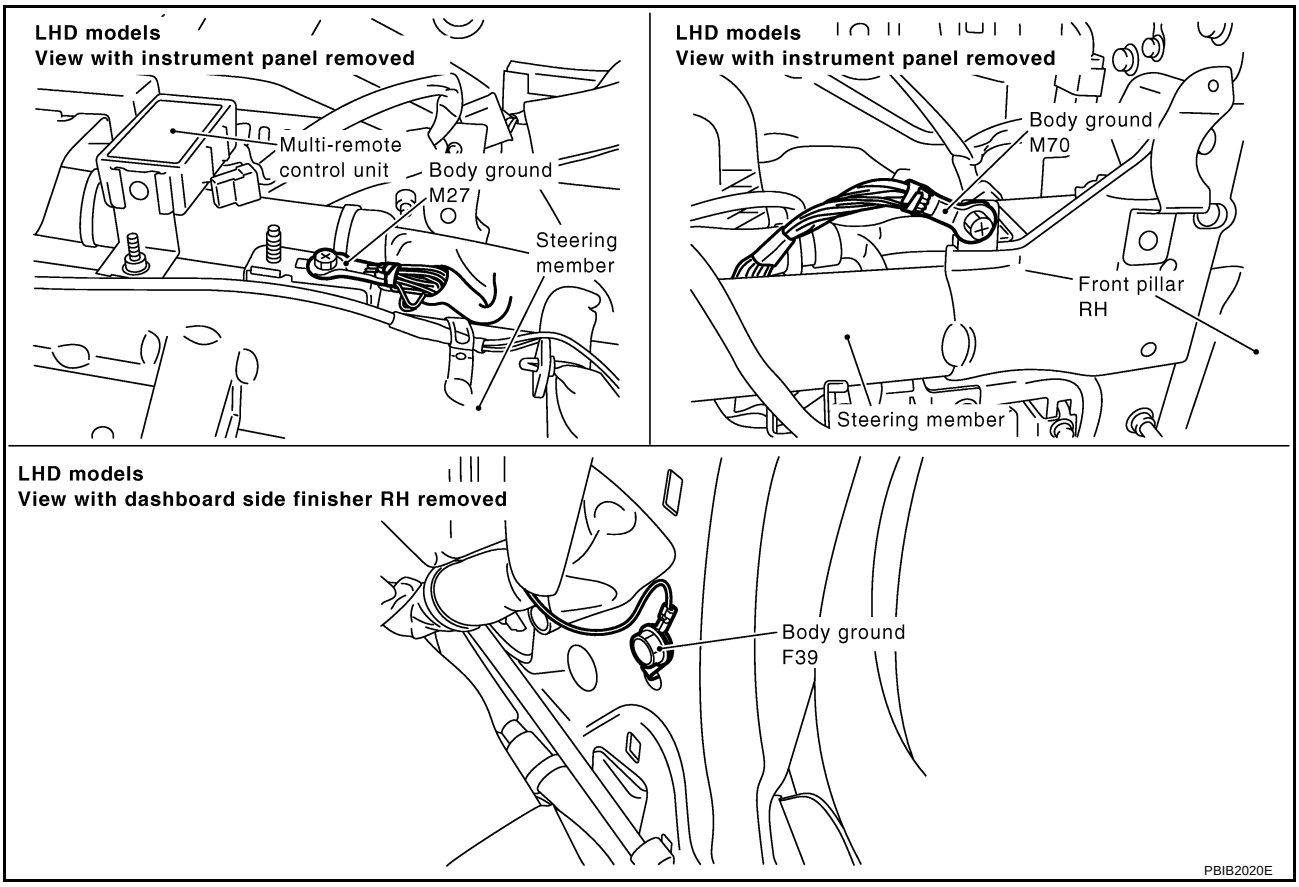
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
67	—	Sensor ground (Sensors shield circuit)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
82	B	Sensor power supply (Accelerator pedal position sensor 1 / Crankshaft position sensor)	**[Ignition switch ON]**	Approximately 5.3V
83	W	Accelerator pedal position sensor 1	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.8 - 1.3V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	4.2 - 5.0V
84	R	Accelerator pedal position sensor 1 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V
90	L	Accelerator pedal position sensor 2 power supply	**[Ignition switch ON]**	Approximately 5.3V
91	G	Accelerator pedal position sensor 2	**[Ignition switch ON]** ● Engine stopped ● Accelerator pedal: Fully released	0.45 - 0.9V
			[Ignition switch ON] ● Engine stopped ● Accelerator pedal: Fully depressed	2.25 - 2.7V
92	Y	Accelerator pedal position sensor 2 ground	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

Diagnostic Procedure

BBS002F6

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

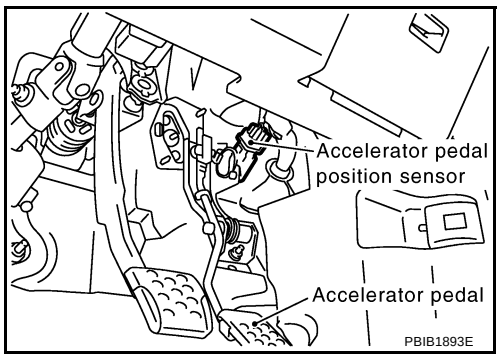


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

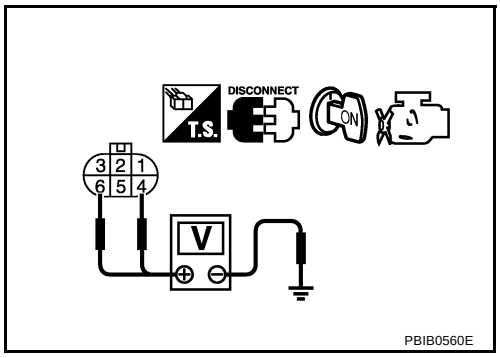
2. CHECK APP SENSOR POWER SUPPLY CIRCUIT

1. Disconnect accelerator pedal position (APP) sensor harness connector.
2. Turn ignition switch ON.



3. Check voltage between APP sensor terminals 4, 6 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

3. CHECK APP SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between APP sensor terminals 3 and ECM terminal 84, APP sensor terminal 1 and ECM terminal 92.
   Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK APP SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between ECM terminal 83 and APP sensor terminal 5, ECM terminal 91 and APP sensor terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK APP SENSOR

Refer to EC-1745, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace accelerator pedal assembly.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

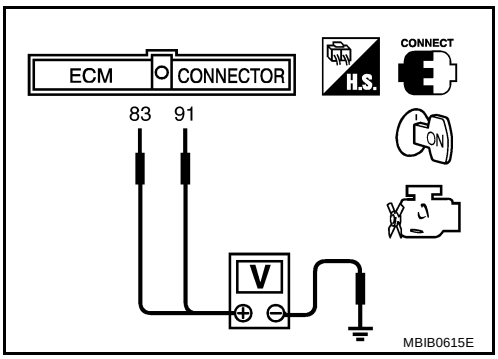
Component Inspection

BBS002F7

ACCELERATOR PEDAL POSITION SENSOR

1. Reconnect all harness connectors disconnected.
2. Turn ignition switch ON.
3. Check voltage between ECM terminals 83 (APP sensor 1 signal), 91 (APP sensor 2 signal) and ground under the following conditions.

Terminal	Accelerator pedal	Voltage
83 (Accelerator pedal position sensor 1)	Fully released	0.8 - 1.3V
	Fully depressed	4.2 - 5.0V
91 (Accelerator pedal position sensor 2)	Fully released	0.45 - 0.9V
	Fully depressed	2.25 - 2.7V



4. If NG, replace accelerator pedal assembly.

Removal and Installation

BBS002F8

ACCELERATOR PEDAL

Refer to ACC-2, "ACCELERATOR CONTROL SYSTEM" .

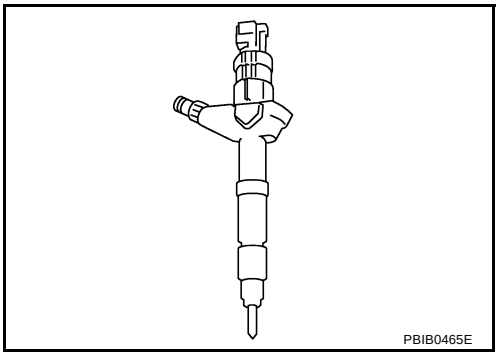
DTC P2146, P2149 FUEL INJECTOR POWER SUPPLY

PFP:16600

Component Description

BBS002F9

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.


PBIB0465E

CONSULT-II Reference Value in Data Monitor Mode

BBS002FA

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

On Board Diagnosis Logic

BBS002FB

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2146 2146	No. 1 and 4 cylinder fuel injector power supply circuit open	An improper voltage signal is sent to ECM through No. 1 and 4 cylinder fuel injector.	● Harness or connectors (The fuel injector circuit is open.)
P2149 2149	No. 2 and 3 cylinder fuel injector power supply circuit open	An improper voltage signal is sent to ECM through No. 2 and 3 cylinder fuel injector.	

DTC Confirmation Procedure

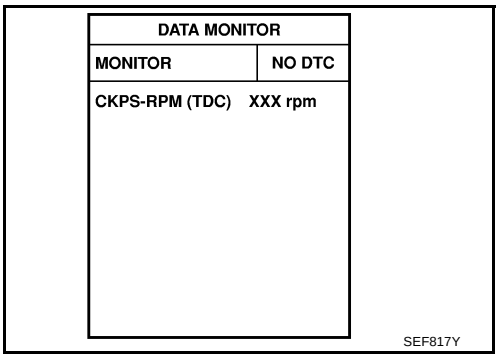
BBS002FC

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

TESTING CONDITION
Before performing the following procedure, confirm the ambient temperature is more than -20°C (-4°F).

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1749, "Diagnostic Procedure" .



SEF817Y

WITHOUT CONSULT-II

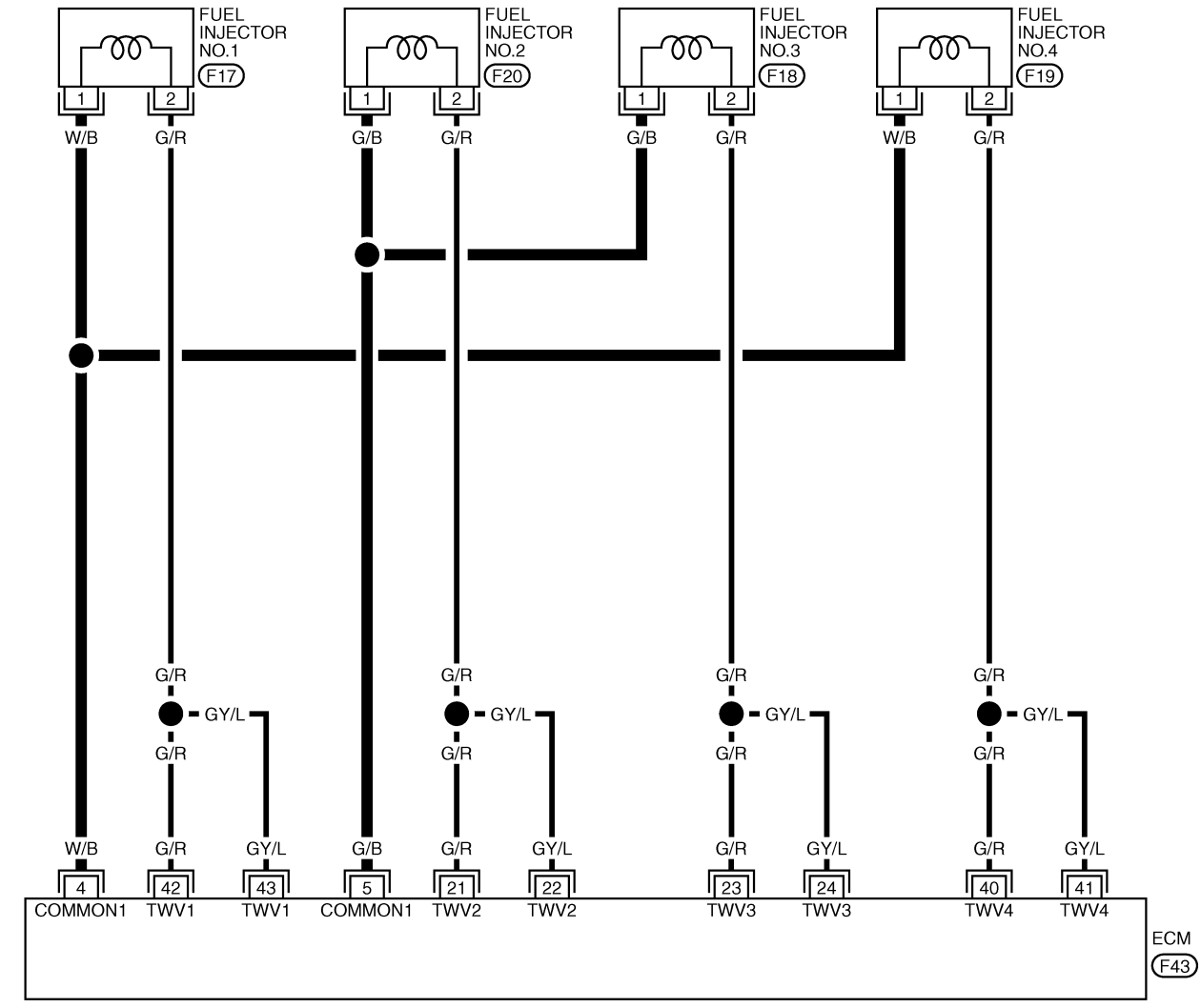
1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1749, "Diagnostic Procedure" .

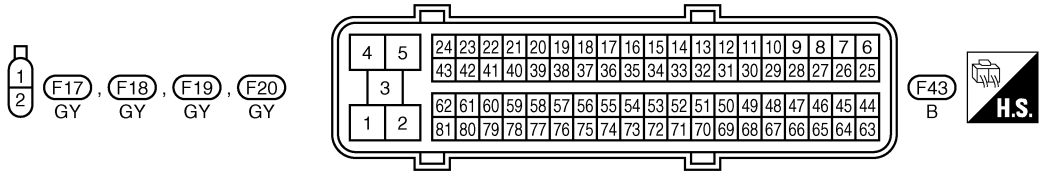
Wiring Diagram

BBS002FD

EC-INJ/PW-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



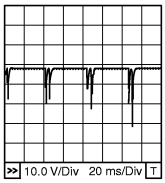
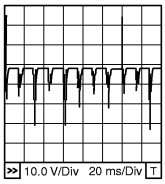
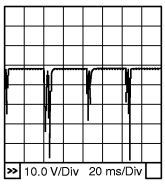
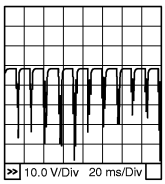


TBWB0912E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	W/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	5 - 10V ★  MBIB0883E
5	G/B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	5 - 10V ★  MBIB0884E
21 22 23 24 40 41 42 43	G/R GY/L G/R GY/L G/R GY/L G/R GY/L	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3 Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 9V ★  MBIB0882E

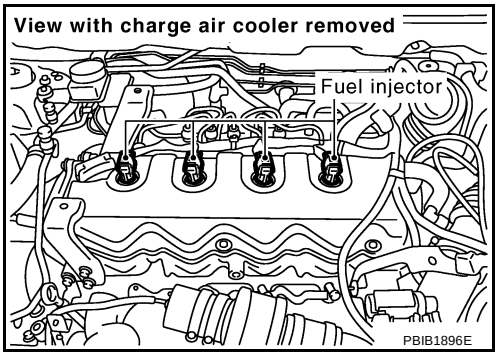
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS002FE

1. CHECK FUEL INJECOR POWER CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect fuel injector harness connector.
4. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.



Terminal		Cylinder
ECM	Fuel injector	
4	1	No.1
5	1	No.2
5	1	No.3
4	1	No.4

Continuity should exist.

5. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 2.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

2. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

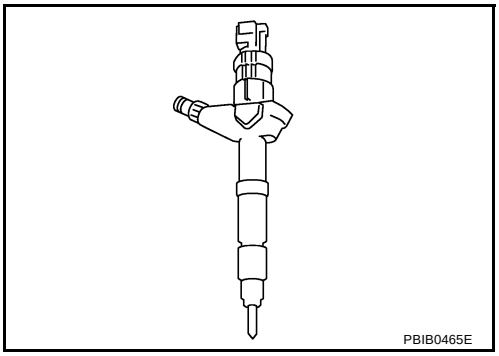
DTC P2147, P2148 FUEL INJECTOR CIRCUIT

PFP:16600

Component Description

BBS002FF

The fuel injector is a small, precise solenoid valve. When the ECM supplies a ground to the fuel injector circuit, the coil in the fuel injector is energized. The energized coil pulls the needle valve back and allows fuel to flow through the fuel injector into the cylinder. The amount of fuel injected depends upon the injection pulse duration. Pulse duration is the length of time the fuel injector remains open. The ECM controls the injection pulse duration based on engine fuel needs.



CONSULT-II Reference Value in Data Monitor Mode

BBS002FG

Specification data are reference values.

MONITOR ITEM	CONDITION		SPECIFICATION
MAIN INJ WID	● Engine: After warming up ● Shift lever: Neutral position ● Idle speed	No load	0.68 - 0.78 msec
		Blower fan switch: ON Rear window defogger switch: ON	0.78 - 0.88 msec

On Board Diagnosis Logic

BBS002FH

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2147 2147	Fuel injector circuit low input	ECM detects the fuel injector circuit is shorted to ground.	● Harness or connectors (The fuel injector circuit is shorted.)
P2148 2148	Fuel injector circuit high input	ECM detects the fuel injector circuit is shorted to power.	

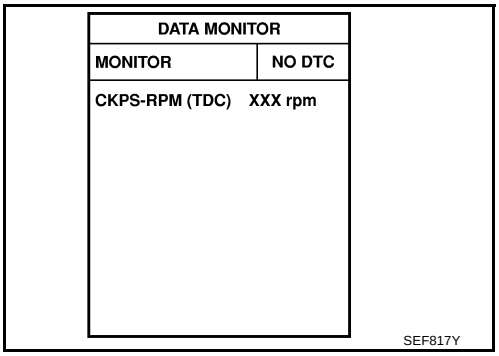
DTC Confirmation Procedure

BBS002FI

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Start engine and let it idle for at least 5 seconds.
4. If DTC is detected, go to EC-1753, "Diagnostic Procedure" .



WITHOUT CONSULT-II

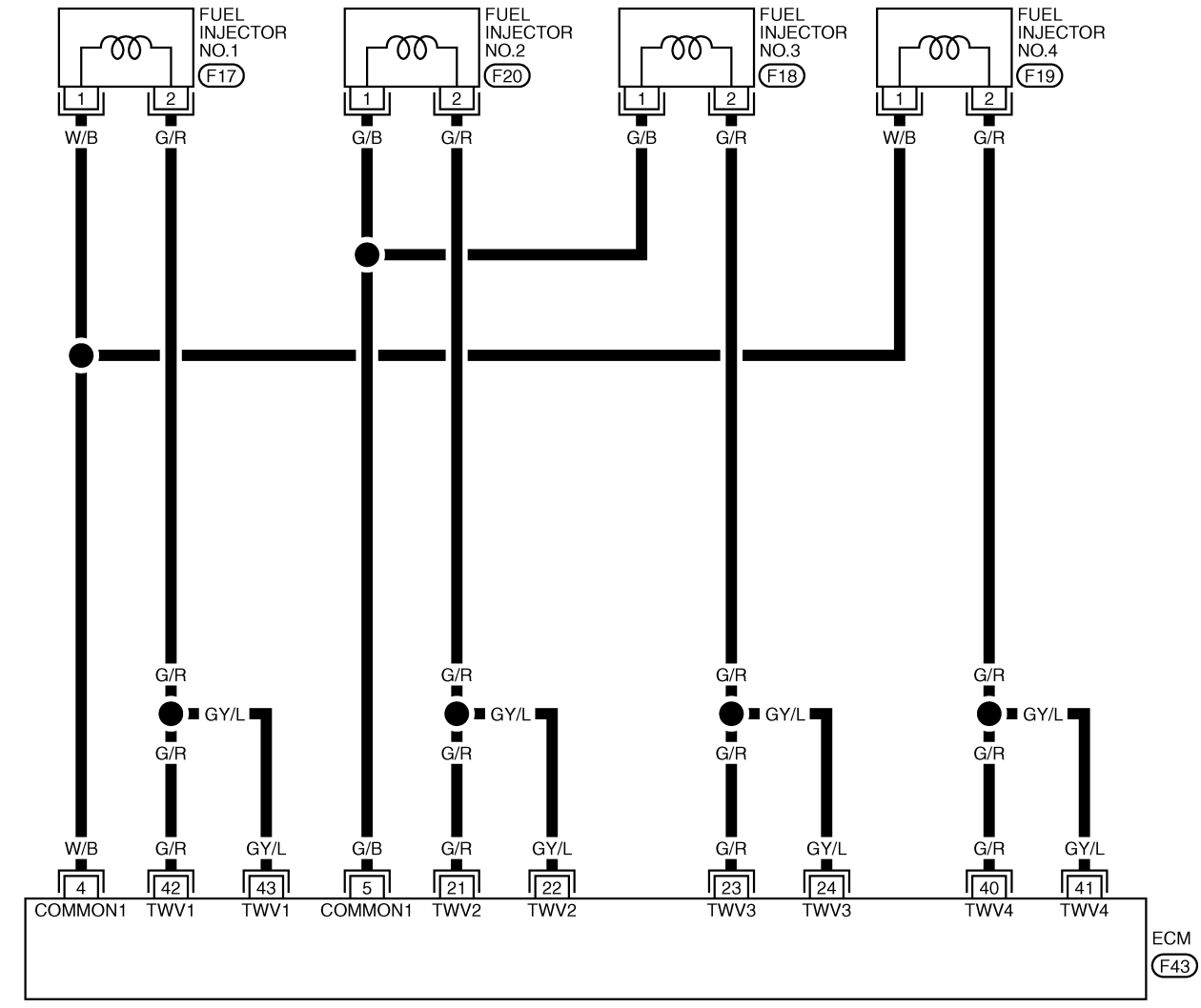
1. Start engine and let it idle for at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1753, "Diagnostic Procedure" .

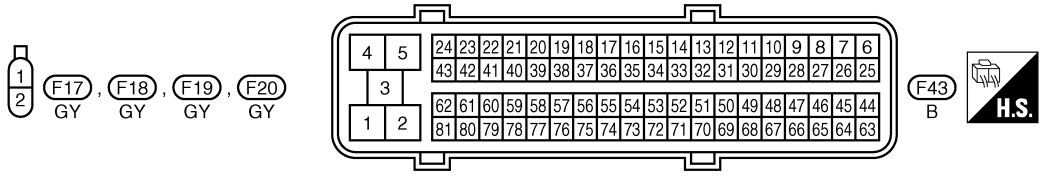
Wiring Diagram

BBS002FJ

EC-INJECT-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC



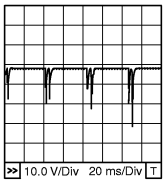
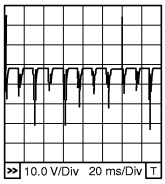
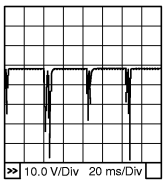
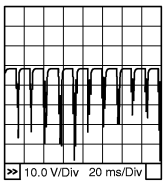


TBWB0903E

Specification data are reference values and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
4	W/B	Fuel injector power supply (For cylinder No. 1 and 4)	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	5 - 10V ★  MBIB0883E
5	G/B	Fuel injector power supply (For cylinder No. 2 and 3)	**[Engine is running]** ● **Warm-up condition** ● Engine speed: 2,000 rpm	5 - 10V ★  MBIB0884E
21 22 23 24 40 41 42 43	G/R GY/L G/R GY/L G/R GY/L G/R GY/L	Fuel injector No. 2 Fuel injector No. 2 Fuel injector No. 3 Fuel injector No. 3 Fuel injector No. 4 Fuel injector No. 4 Fuel injector No. 1 Fuel injector No. 1	**[Engine is running]** ● **Warm-up condition** ● Idle speed **NOTE:** The pulse cycle changes depending on rpm at idle.	0 - 9V ★  MBIB0881E
			[Engine is running] ● **Warm-up condition** ● Engine speed: 2,000 rpm	0 - 9V ★  MBIB0882E

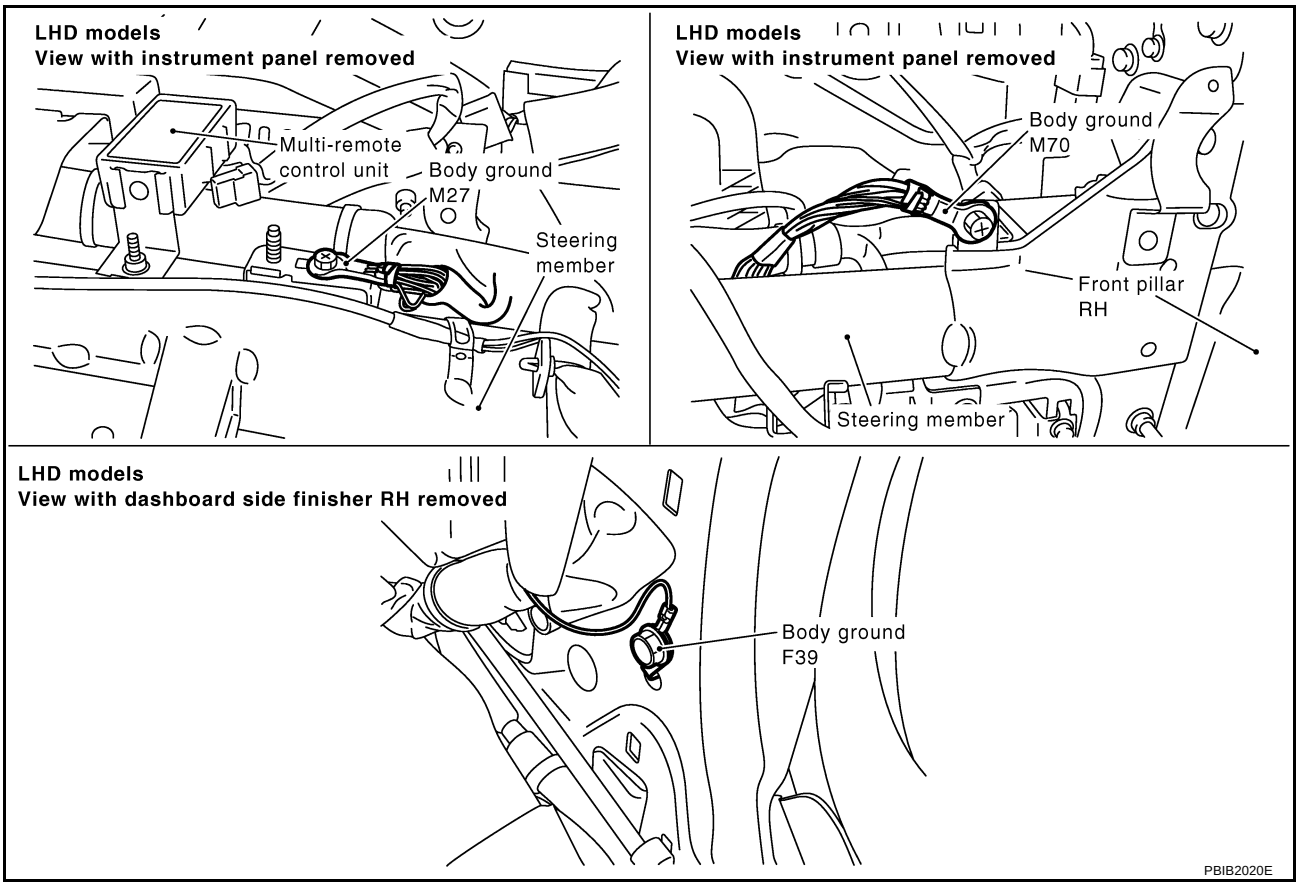
★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

BBS002FK

1. CHECK GROUND CONNECTIONS

1. Turn ignition switch OFF.
2. Loosen and retighten ground screws on the body. Refer to EC-1528, "Ground Inspection" .

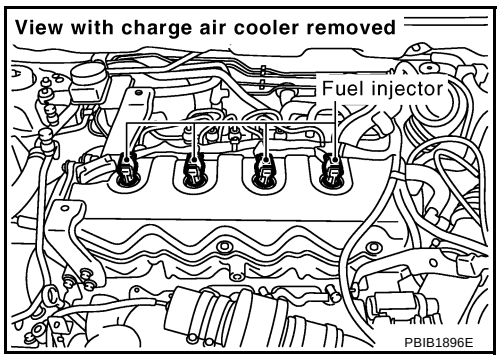


OK or NG

OK >> GO TO 2.
NG >> Repair or replace ground connections.

2. CHECK ECM OUTPUT SIGNAL CIRCUIT FOR OPEN OR SHORT

1. Disconnect fuel injector harness connector.
2. Disconnect ECM harness connector.
3. Check harness continuity between the following terminals corresponding to the malfunctioning cylinder.
   Refer to Wiring Diagram.



Cylinder	Terminal		Continuity
	Fuel injector	ECM	
No.1	1	42, 43	Should not exist
		4	Should exist
	2	42,43	Should exist
		4	Should not exist
No.2	1	21, 22	Should not exist
		5	Should exist
	2	21, 22	Should exist
		5	Should not exist
No.3	1	23, 24	Should not exist
		5	Should exist
	2	23, 24	Should exist
		5	Should not exist
No.4	1	40, 41	Should not exist
		4	Should exist
	2	40, 41	Should exist
		4	Should not exist

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair or replace.

3. CHECK FUEL INJECTOR

Refer to EC-1755, "Component Inspection" .

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. REPLACE FUEL INJECOR

1. Replace fuel injector of malfunctioning cylinder.
2. Perform Injector Adjustment Value Registration.
   Refer to EC-1474, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

5. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

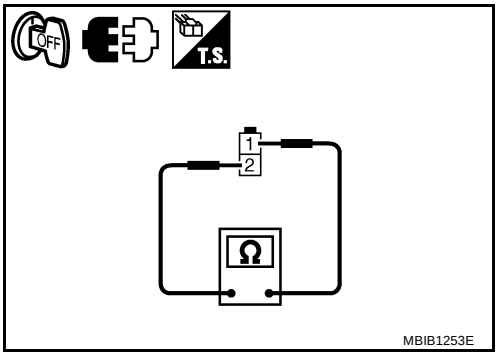
BBS002FL

FUEL INJECTOR

1. Disconnect fuel injector harness connector.
2. Check resistance between terminals as shown in the figure.

Resistance: 0.2 - 0.8Ω [at 10 - 60°C (50 - 140°F)]

3. If NG, replace fuel injector.



Removal and Installation

BBS002FM

FUEL INJECTOR

Refer to EM-171, "INJECTION TUBE AND FUEL INJECTOR" .

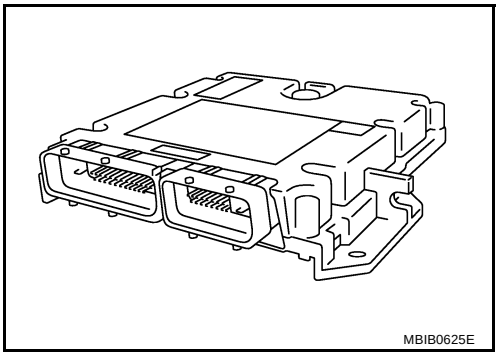
DTC P2228, P2229 BARO SENSOR

PFP:23731

Description

BBS002FN

The barometric pressure sensor is built into ECM. The sensor detects ambient barometric pressure and sends the voltage signal to the microcomputer.


MBIB0625E

On Board Diagnosis Logic

BBS002FO

The MI will not light up for these self-diagnoses.

DTC No.	Trouble diagnosis name	DTC detecting condition	Possible cause
P2228 2228	Barometric pressure sensor circuit low input	An excessively low voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	● ECM
P2229 2229	Barometric pressure sensor circuit high input	An excessively high voltage from the barometric pressure sensor (built-into ECM) is sent to ECM.	

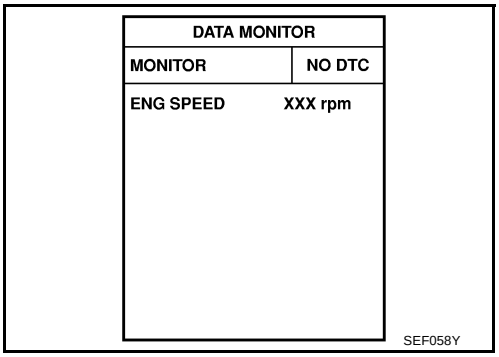
DTC Confirmation Procedure

BBS002FP

NOTE:
If DTC Confirmation Procedure has been previously conducted, always turn ignition switch OFF and wait at least 10 seconds before conducting the next test.

WITH CONSULT-II

1. Turn ignition switch ON.
2. Select “DATA MONITOR” mode with CONSULT-II.
3. Wait at least 5 seconds.
4. If DTC is detected, go to EC-1757, "Diagnostic Procedure" .



SEF058Y

WITHOUT CONSULT-II

1. Turn ignition switch ON and wait at least 5 seconds.
2. Turn ignition switch OFF, wait at least 10 seconds and then turn ON.
3. Perform Diagnostic Test Mode II (Self-diagnostic results) with ECM.
4. If DTC is detected, go to EC-1757, "Diagnostic Procedure" .

Diagnostic Procedure

BBS002FQ

1. INSPECTION START

With CONSULT-II

1. Turn ignition switch ON.
2. Select “SELF DIAG RESULTS” mode with CONSULT-II.
3. Touch “ERASE”.
4. Perform EC-1756, "DTC Confirmation Procedure" , again.
5. Is 1st trip DTC P2228 or P2229 displayed again?

Without CONSULT-II

1. Turn ignition switch ON.
2. Erase the Diagnostic Test Mode II (Self-diagnostic results) memory. Refer to EC-1479 .
3. Perform EC-1756, "DTC Confirmation Procedure" , again.
4. Is DTC 2228 or 2229 displayed again?

Yes or No

Yes >> GO TO 2.
No >> **INSPECTION END**

2. REPLACE ECM

1. Replace ECM.
2. Perform initialization of NATS system and registration of all NATS ignition key IDs. Refer to BL-109, "ECM Re-Communicating Function" .
3. Perform Fuel Pump Learning Value Clearing. Refer to EC-1473, "Fuel Pump Learning Value Clearing" .
4. Perform Injector Adjustment Value Registration. Refer to EC-1474, "Injector Adjustment Value Registration" .

>> **INSPECTION END**

GLOW CONTROL SYSTEM

PFP:25230

Description

BBS002FR

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	Glow control	Glow lamp* Glow relay Glow plugs
Engine coolant temperature sensor	Engine coolant temperature		

*: The output signal is sent from the ECM through CAN communication line.

When engine coolant temperature is more than approximately 80°C (176°F), the glow relay turns off.
When coolant temperature is lower than approximately 80°C (176°F):

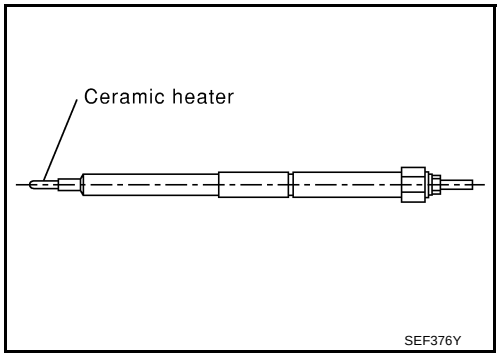
- Ignition switch ON
  After ignition switch has turned to ON, the glow relay turns ON for a certain period of time in relation to engine coolant temperature, allowing current to flow through glow plug.
- Cranking
  The glow relay turns ON, allowing current to flow through glow plug.
- Starting
  After engine has started, current continues to flow through glow plug (after-glow mode) for a certain period in relation to engine coolant temperature.

The glow indicator lamp turns ON for a certain period of time in relation to engine coolant temperature at the time glow relay is turned ON.

COMPONENT DESCRIPTION

Glow Plug

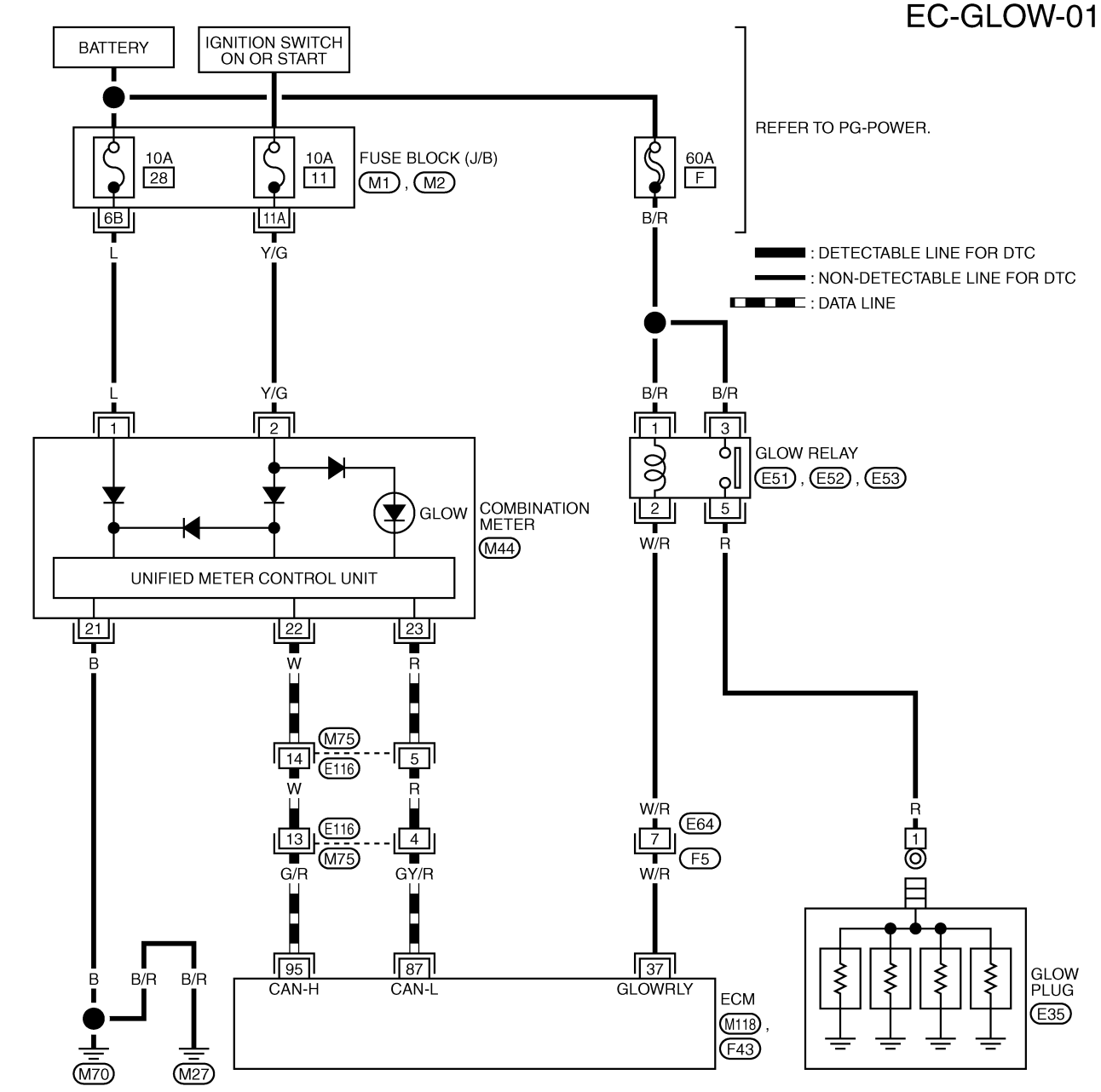
The glow plug is provided with a ceramic heating element to obtain a high-temperature resistance. It glows in response to a signal sent from the ECM, allowing current to flow through the glow plug via the glow relay.

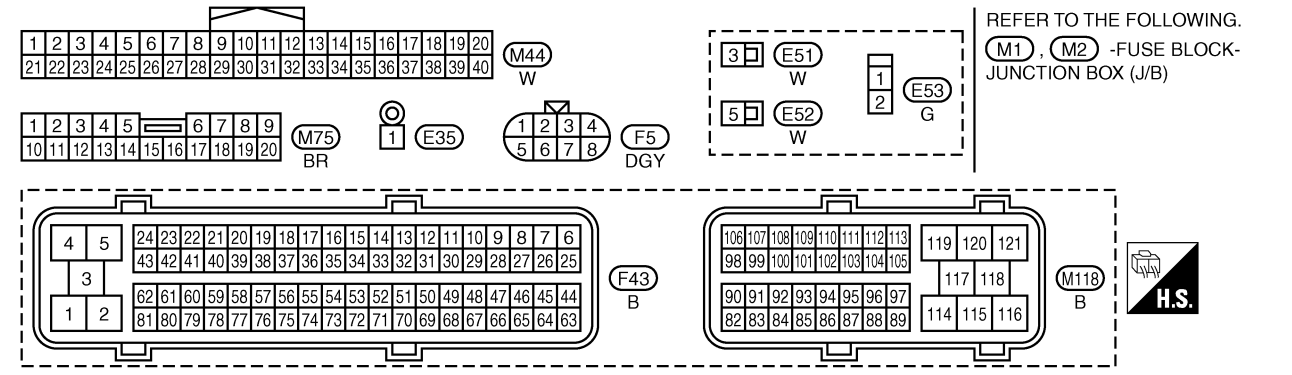


Wiring Diagram
LHD MODELS

BBS002FS

EC-GLOW-01

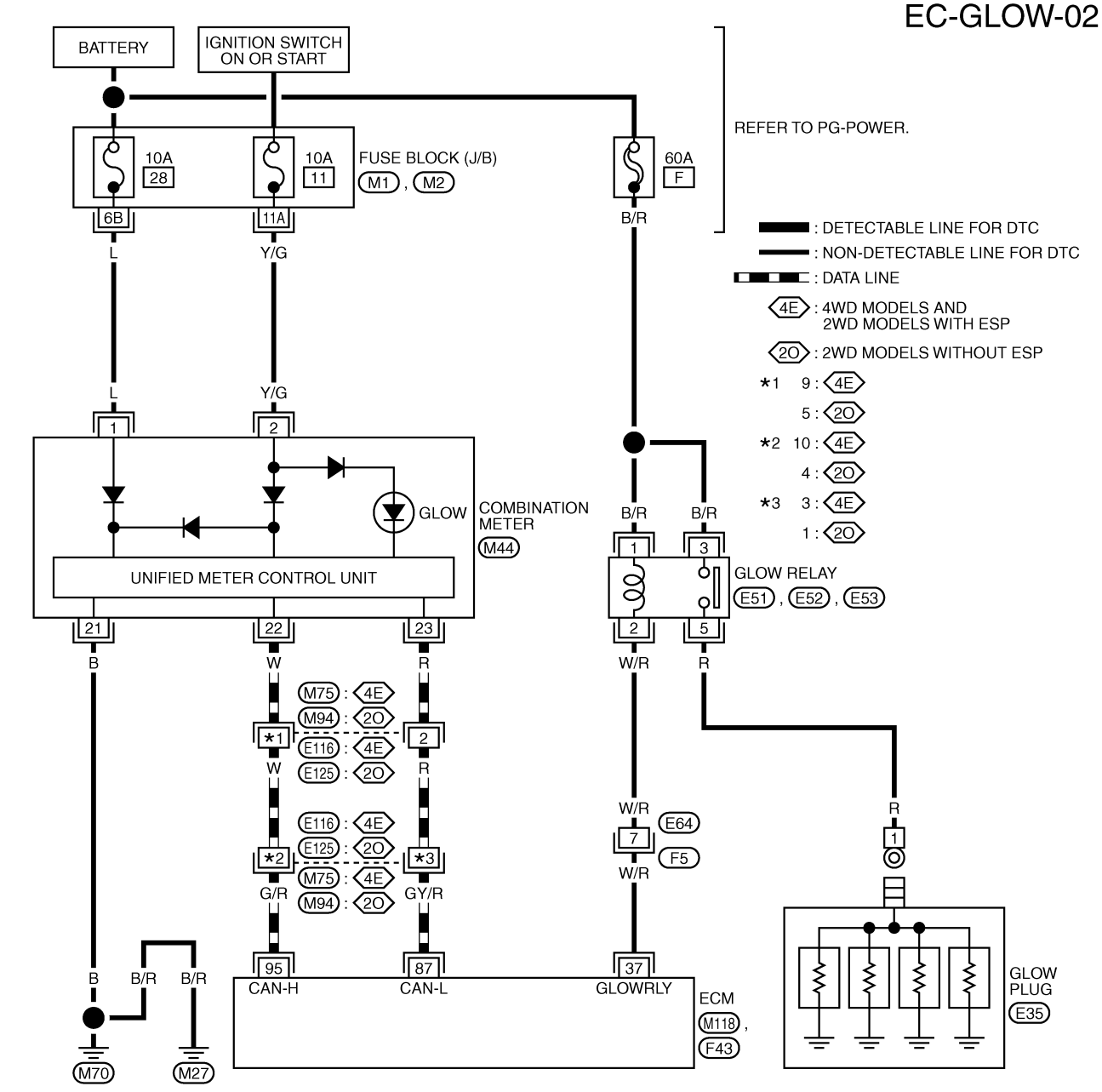




TBWB0913E

RHD MODELS

EC-GLOW-02



TBWB0986E

Diagnostic Procedure

BBS002FT

1. INSPECTION START

Check fuel level, fuel supplying system, starter motor, etc.

OK or NG

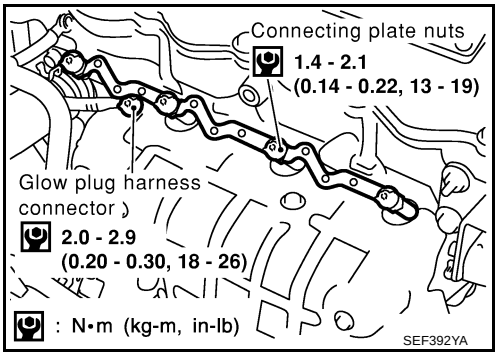
OK >> GO TO 2.
NG >> Correct.

2. CHECK INSTALLATION

Check that glow plug nut and all glow plug connecting plate nuts are installed properly.

OK or NG

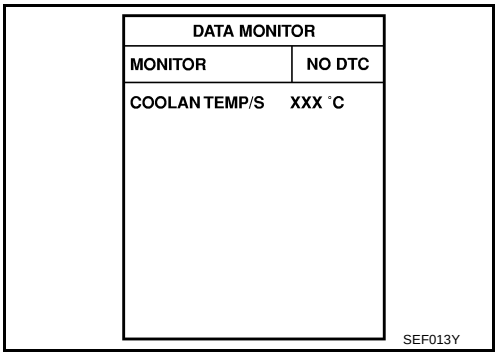
OK >> GO TO 3.
NG >> Install properly.



3. CHECK GLOW INDICATOR LAMP OPERATION

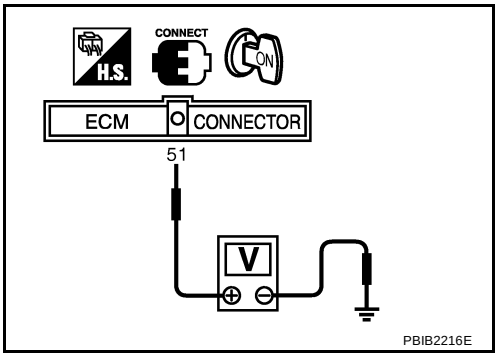
With CONSULT-II

1. Turn ignition switch ON.
2. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
3. Confirm that “COOLAN TEMP/S” indicates below 80°C (176°F). If it indicates above 80°C (176°F), cool down engine.
4. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
5. Make sure that glow indicator lamp is turned ON for 1.5 seconds or more after turning ignition switch ON, and then glow indicator lamp turned OFF.



Without CONSULT-II

1. Set the tester probe between ECM terminal 51 (engine coolant temperature sensor signal) and ground.
2. Confirm that the voltage indicates above 1.53V. If it indicates below 1.53V, cool down engine.
3. Turn ignition switch OFF, wait at least 5 seconds and then turn ON.
4. Make sure that glow indicator lamp is turned ON for 1.5 seconds or more after turning ignition switch ON, and then glow indicator lamp turned OFF.



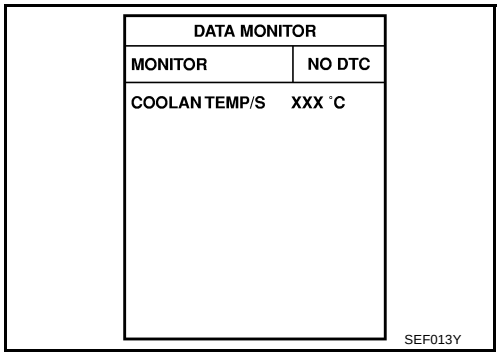
OK or NG

OK >> GO TO 4.
NG >> GO TO 5.

4. CHECK GLOW CONTROL SYSTEM OVERALL FUNCTION

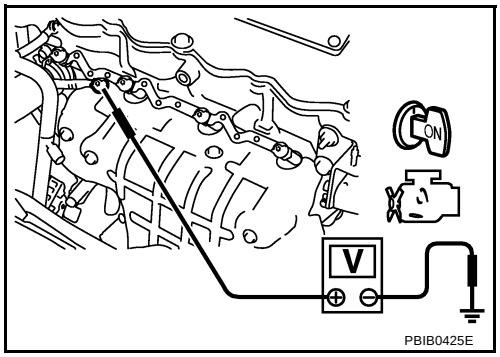
With CONSULT-II

1. Select “COOLAN TEMP/S” in “DATA MONITOR” mode with CONSULT-II.
2. Confirm that “COOLAN TEMP/S” indicates approximately 25°C (77°F). If NG, cool down engine.
3. Turn ignition switch OFF.
4. Set voltmeter probe between glow plug and engine body.
5. Turn ignition switch ON.



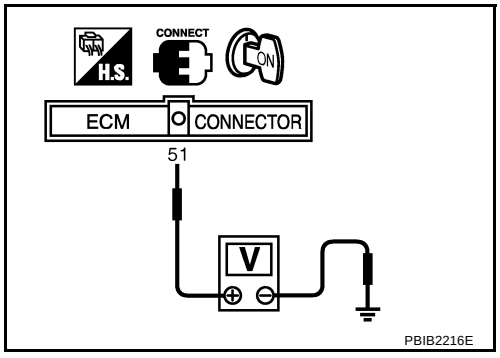
6. Check the voltage between glow plug and engine body under the following conditions.

Conditions	Voltage
For 20 seconds after turning ignition switch ON	Battery voltage
More than 20 seconds after turning ignition switch ON	Approx. 0V



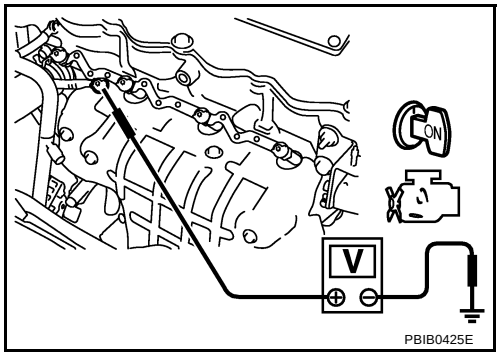
Without CONSULT-II

1. Set the tester probe between ECM terminal 51 (engine coolant temperature sensor signal) and ground.
2. Confirm that the voltage indicates approximately 3.62V. If NG, cool down engine.
3. Turn ignition switch OFF.
4. Set voltmeter probe between glow plug and engine body.
5. Turn ignition switch ON.



6. Check the voltage between glow plug and engine body under the following conditions.

Conditions	Voltage
For 20 seconds after turning ignition switch ON	Battery voltage
More than 20 seconds after turning ignition switch ON	Approx. 0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

5. CHECK DTC

Check that DTC U1000 is not displayed.

Yes or No

Yes >> Perform trouble diagnoses for DTC U1000, refer to EC-1530, "DTC U1000 CAN COMMUNICATION LINE" .

No >> GO TO 6.

6. CHECK COMBINATON METER OPERATION

Does combination meter operate normally?

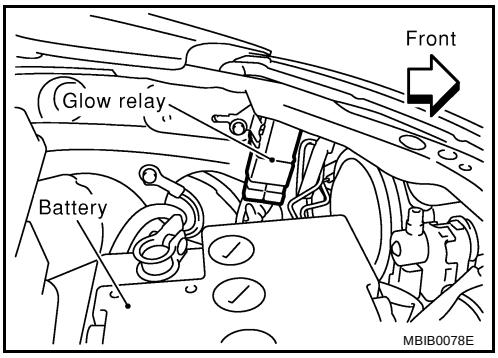
Yes or No

Yes >> GO TO 14.

No >> Check combination meter circuit. Refer to DI-4, "COMBINATION METERS" .

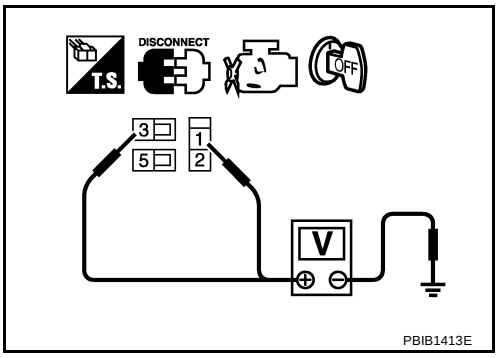
7. CHECK GLOW RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect glow relay.



3. Check voltage between glow relay terminals 1, 3 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 9.

NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- 60A fusible link
- Harness for open or short between glow relay and battery

>> Repair harness or connectors.

9. CHECK GLOW RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 37 and glow relay terminal 2.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> GO TO 10.

10. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E64, F5
- Harness for open or short between glow relay and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK HARNESS CONTINUITY BETWEEN GLOW RELAY AND GLOW PLUG FOR OPEN AND SHORT

1. Disconnect glow plug harness connector.
2. Check harness continuity between glow relay terminal 5 and glow plug harness connector.
   Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 12.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

12. CHECK GLOW RELAY

Refer to EC-1765, "Component Inspection" .

OK or NG

OK >> GO TO 13.
NG >> Replace glow relay.

13. CHECK GLOW PLUG

Refer to EC-1765, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace glow plug.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

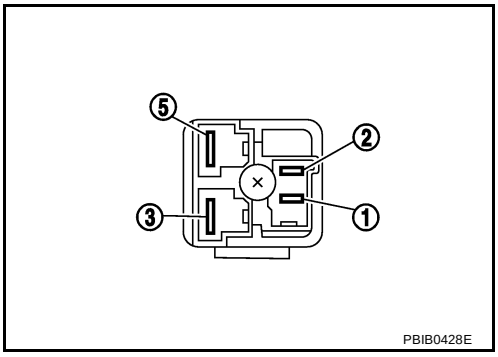
BBS002FU

GLOW RELAY

Check continuity between glow relay terminals (3) and (5) under the following conditions.

Conditions	Continuity
12V direct current supply between terminals (1) and (2)	Yes
No current supply	No

Operation takes less than 1 second.



PBIB0428E

GLOW PLUG

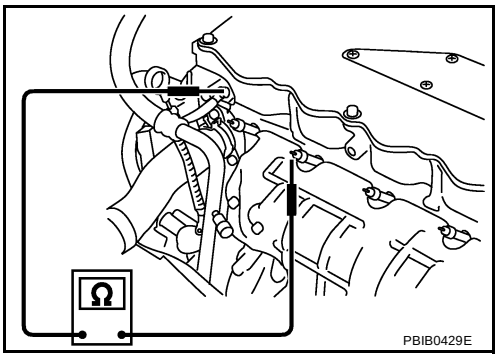
1. Remove glow plug connecting plate.
2. Check glow plug resistance.

Resistance: Approximately 0.8 Ω [at 25°C (77°F)]

NOTE:

- **Do not bump glow plug heating element. If it is bumped, replace glow plug with a new one.**
- **If glow plug is dropped from a height of 10 cm (3.94 in) or higher, replace with a new one.**
- **If glow plug installation hole is contaminated with carbon, remove it with a reamer or suitable tool.**
- **Hand-tighten glow plug by turning it two or three times, then tighten using a tool to specified torque.**

: 20.1 N-m (2.1 kg-m, 15 ft-lb)



PBIB0429E

Removal and Installation

BBS002FV

GLOW PLUG

Refer to EM-166, "GLOW PLUG" .

EGR VOLUME CONTROL SYSTEM

PFP:14710

Description

BBS002FW

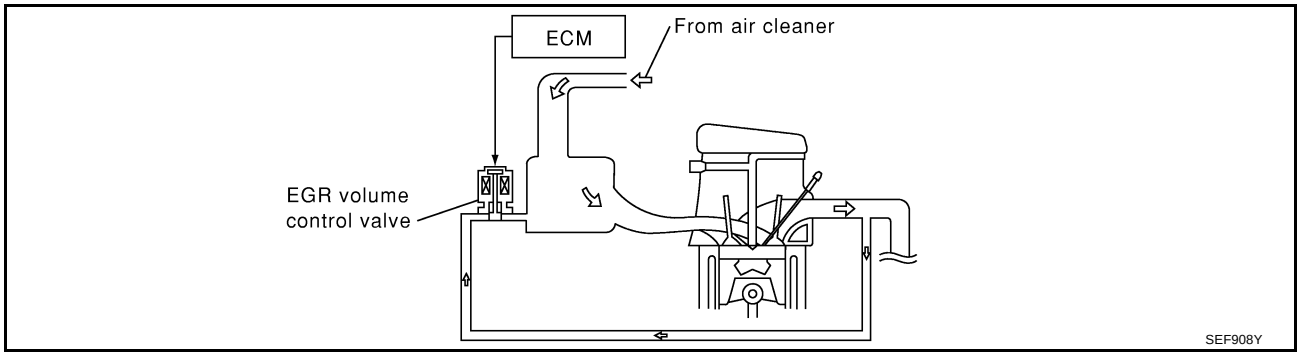
SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM Function	Actuator
Crankshaft position sensor	Engine speed	EGR volume control	EGR volume control valve
Vehicle speed sensor	Vehicle speed*		
Engine coolant temperature sensor	Engine coolant temperature		
Ignition switch	Start signal		
Accelerator pedal position sensor	Accelerator pedal position		
Mass air flow sensor	Amount of intake air		
Air conditioner switch	Air conditioner operation*		

*: This signal is sent to the ECM through CAN communication line.

This system controls flow rate of EGR led from exhaust manifold to intake manifold. The opening of the EGR by-pass passage in the EGR volume control valve changes to control the flow rate. A built-in step motor moves the valve in steps corresponding to the ECM output pulses. The opening of the valve varies for optimum engine control. The optimum value stored in the ECM is determined by considering various engine conditions.
The EGR volume control valve remains close under the following conditions.

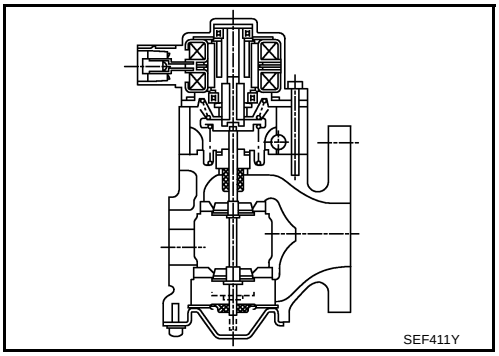
- Engine stopped
- Engine starting
- Low engine coolant temperature
- High engine speed
- Accelerator pedal fully depressed



COMPONENT DESCRIPTION

EGR Volume Control Valve

The EGR volume control valve uses a step motor to control the flow rate of EGR from exhaust manifold. This motor has four winding phases. It operates according to the output pulse signal of the ECM. Two windings are turned ON and OFF in sequence. Each time an ON pulse is issued, the valve opens or closes, changing the flow rate. When no change in the flow rate is needed, the ECM does not issue the pulse signal. A certain voltage signal is issued so that the valve remains at that particular opening.



CONSULT-II Reference Value in Data Monitor Mode

BBS002FX

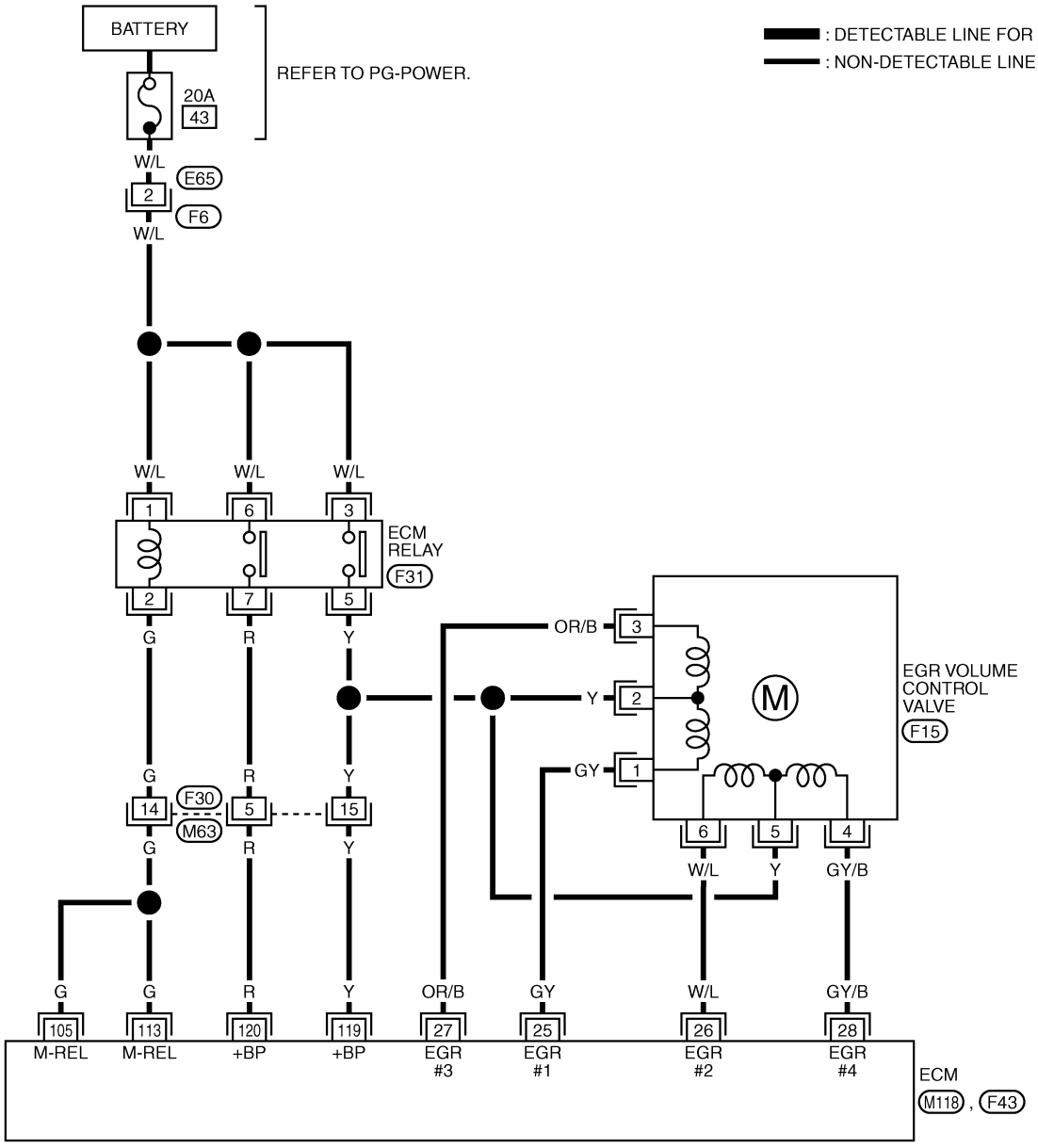
Specification data are reference values.

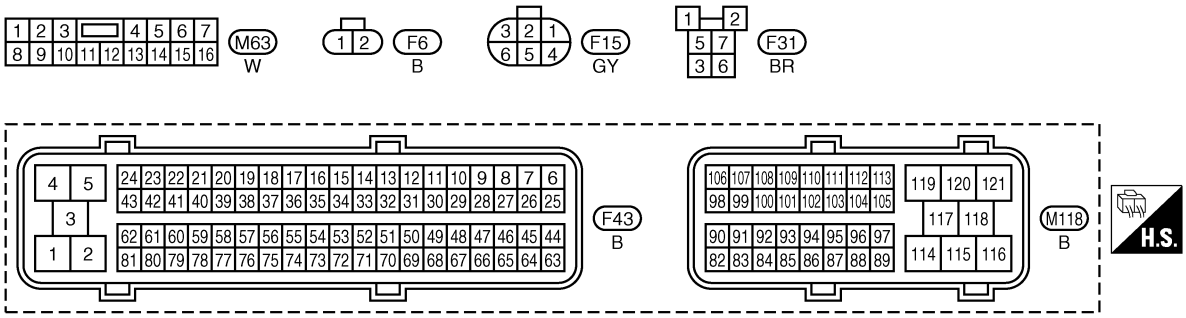
MONITOR ITEM	CONDITION		SPECIFICATION
EGR VOL CON/V	● Engine: After warming up ● Air conditioner switch: OFF ● Shift lever: Neutral position ● No load	After 1 minute at idle	More than 10 steps
		Revving engine from idle to 3,600 rpm	0 step

Wiring Diagram

BBS002FY

EC-EGRVLV-01





TBWB0009E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

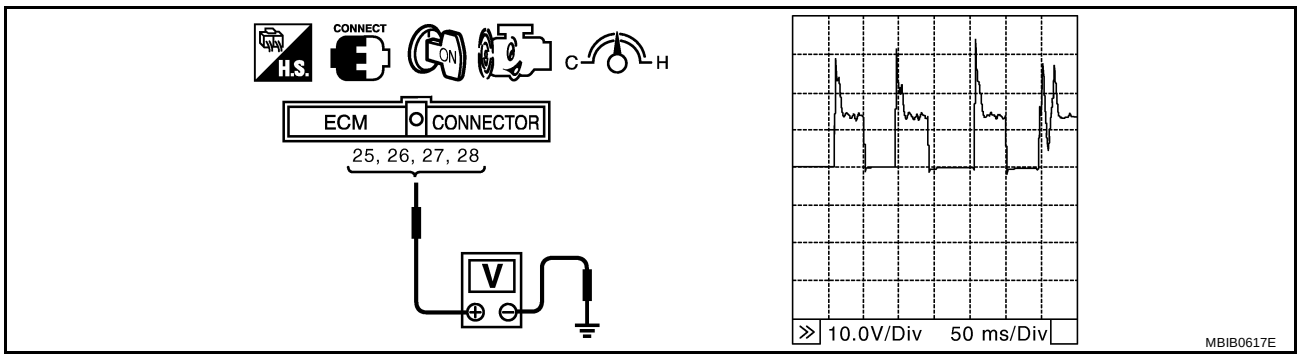
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
25 26 27 28	GY W/L OR/B GY/B	EGR volume control valve	**[Engine is running]** ● **Warm-up condition** ● Idle speed	0.1 - 14V (Voltage signals of each ECM terminals differ according to the control position of EGR volume control valve.)
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS002FZ

1. CHECK EGR VOLUME CONTROL SYSTEM OVERALL FUNCTION

1. Turn ignition switch OFF.
2. Set the oscilloscope probe between ECM terminals 25, 26, 27, 28 and ground.
3. Start engine and let it idle.
4. Check the oscilloscope screen when revving engine up to 3,200 rpm and return to idle.



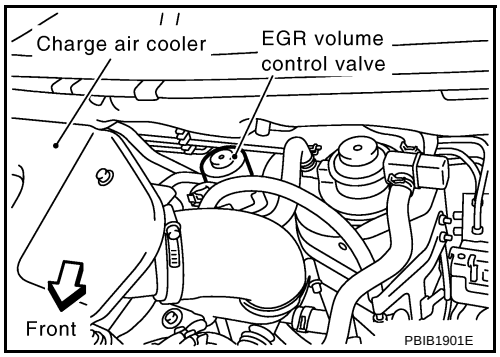
The pulse signal as shown in the figure should appear.

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

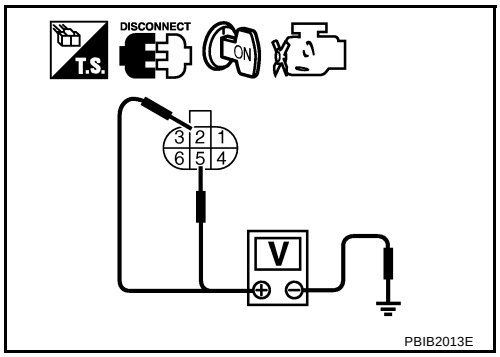
2. CHECK EGR VOLUME CONTROL VALVE POWER SUPPLY CIRCUIT-I

1. Turn ignition switch OFF.
2. Disconnect EGR volume control valve harness connector.
3. Turn ignition switch ON.



4. Check voltage between EGR volume control valve terminals 2, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open or short between EGR volume control valve and ECM
- Harness for open or short between EGR volume control valve and ECM relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK EGR VOLUME CONTROL VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminals and EGR volume control valve terminals as follows. Refer to Wiring Diagram.

ECM terminal	EGR volume control valve terminal
25	1
26	6
27	3
28	4

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK EGR VOLUME CONTROL VALVE

Refer to EC-1772, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace EGR volume control valve.

6. CHECK EGR PASSAGE

Check the following for clogging and cracks.

- EGR tube
- EGR hose
- EGR cooler

OK or NG

OK >> GO TO 7.
NG >> Repair or replace EGR passage.

7. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

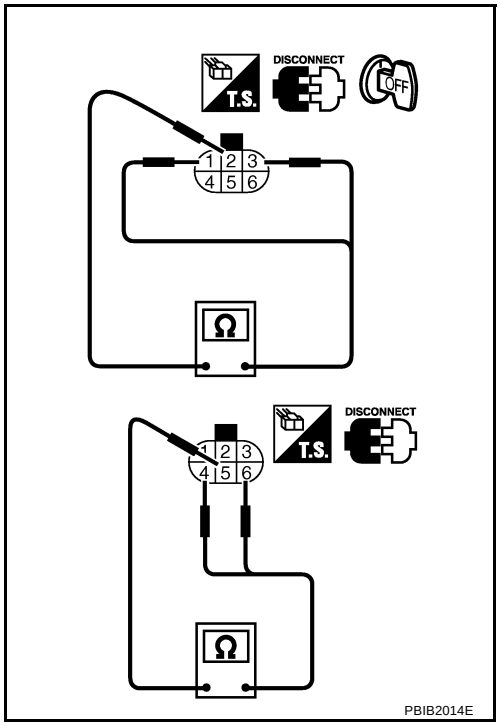
BBS002G0

EGR VOLUME CONTROL VALVE

With CONSULT-II

1. Disconnect EGR volume control valve harness connector.
2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

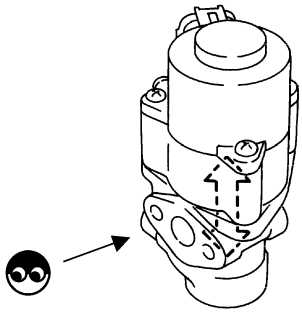
Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17



If NG, replace EGR volume control valve.
If OK, go to next step.

3. Remove EGR volume control valve from cylinder head.
4. Reconnect EGR volume control valve harness connector.
5. Turn ignition switch ON.
6. Perform “EGR VOL CONT/V” in “ACTIVE TEST” mode with CONSULT-II. Check that EGR volume control valve shaft moves smoothly forward and backward according to the valve opening.

ACTIVE TEST	
EGR VOL CONT/V	20 step
MONITOR	
CKPS-RPM (TDC)	XXX rpm



If NG, replace the EGR volume control valve.

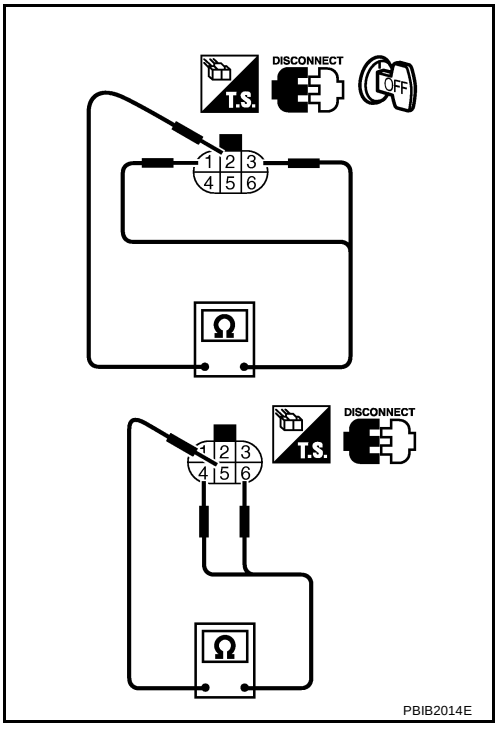
NOTE:
When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.

Without CONSULT-II

1. Disconnect EGR volume control valve harness connector.
2. Check resistance between the following terminals.
   - terminal 2 and terminals 1, 3
   - terminal 5 and terminals 4, 6

Temperature °C (°F)	Resistance Ω
20 (68)	13 - 17

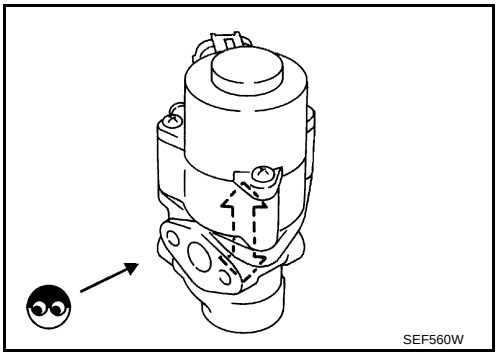
   If NG, replace EGR volume control valve.
   If OK, go to next step.
3. Remove EGR volume control valve from cylinder head.
4. Reconnect EGR volume control valve harness connector.
5. Turn ignition switch ON and OFF.



PBIB2014E

6. Check that EGR volume control valve shaft moves smoothly forward and backward according to the ignition switch position.
   If NG, replace EGR volume control valve.

   NOTE:
   When installing the EGR volume control valve, make sure that the shaft is in the same position before checking.


SEF560W

BBS002G1

Removal and Installation

EGR VOLUME CONTROL VALVE

Refer to EM-145, "INTAKE MANIFOLD" .

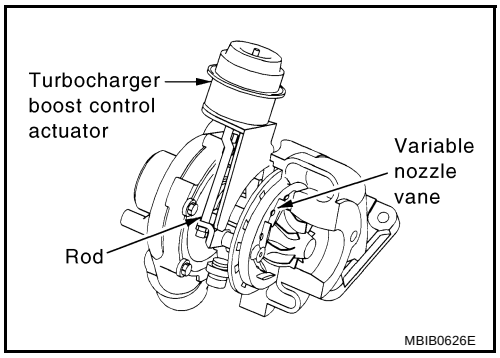
TC BOOST CONTROL SOLENOID VALVE

PFP:14956

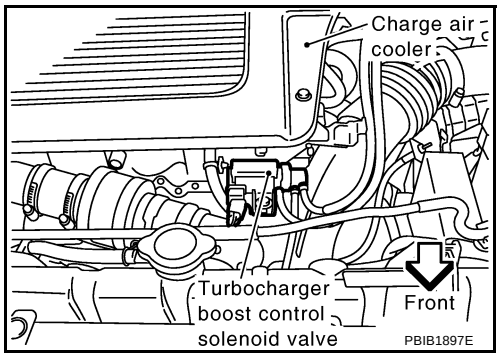
Description

BBS002G2

The turbocharger boost control solenoid valve controls vacuum signal to the turbocharger boost control actuator. By changing the variable nozzle vane opening through the rods, the intake air volume is adjusted.



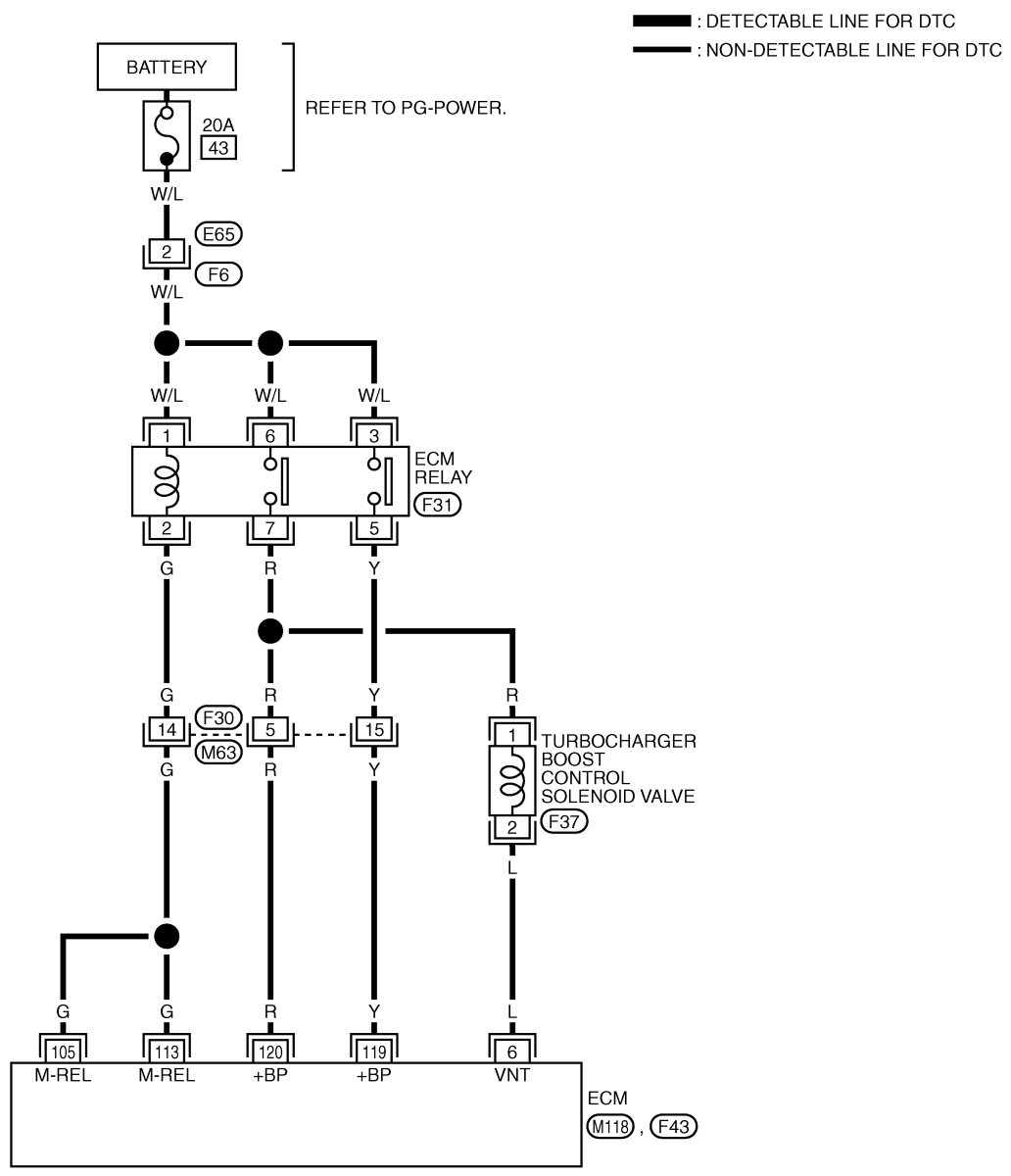
The turbocharger boost control solenoid valve is moved by ON/OFF pulse from the ECM. The longer the ON pulse, the charge air pressure rises.

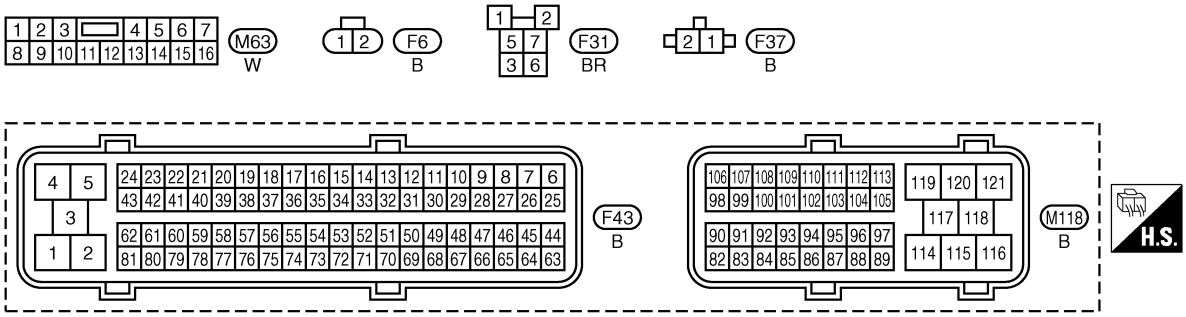


Wiring Diagram

BBS002G3

EC-TCCSV-01



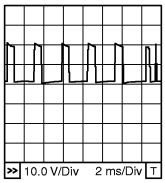
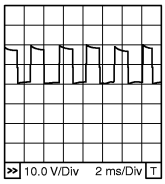


TBWB0010E

Specification data are reference valves, and are measured between each terminal and ground.
Pulse signal is measured by CONSULT-II.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may damage the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage and Pulse Signal)
6	L	Turbocharger boost control solenoid valve	**[Ignition switch ON]** ● **Warm-up condition** ● Idle speed	0 - 12.5V ★  MBIB0889E
			[Ignition switch ON] ● **Warm-up condition** ● Engine speed is 2,000 rpm	0 - 12.5V ★  MBIB0890E
105 113	G G	ECM relay (self-shutoff)	**[Ignition switch ON]** **[Ignition switch OFF]** ● For a few seconds after turning ignition switch OFF	Approximately 1.2V
			[Ignition switch OFF] ● More than a few seconds after turning ignition switch OFF	BATTERY VOLTAGE (11 - 14V)
119 120	Y R	Power supply for ECM	**[Ignition switch ON]**	BATTERY VOLTAGE (11 - 14V)

★: Average voltage for pulse signal (Actual pulse signal can be confirmed by oscilloscope.)

Diagnostic Procedure

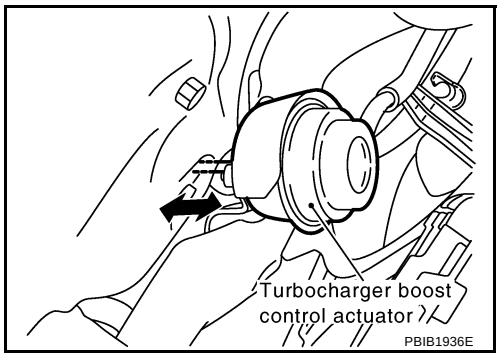
BBS002G4

1. CHECK OVERALL FUNCTION

1. Start engine and let it idle.
2. Make sure that turbocharger control actuator rod moves slightly when engine is started.

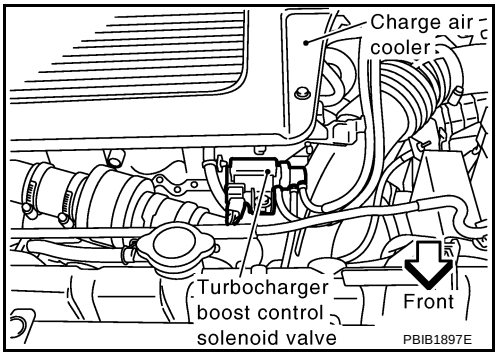
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.



2. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE POWER SUPPLY CIRCUIT

1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Turn ignition switch ON.

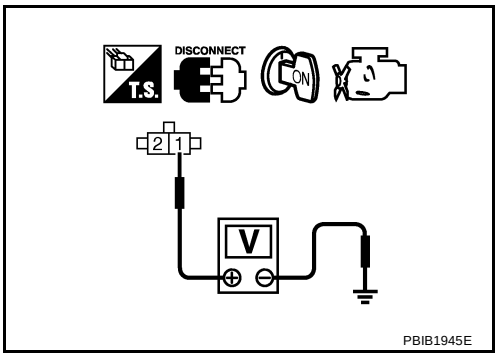


3. Check voltage between turbocharger boost control solenoid valve terminals 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.



3. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors F30, M63
- Harness for open and short between turbocharger boost control solenoid valve and ECM relay
- Harness for open and short between turbocharger boost control solenoid valve and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 6 and turbocharger boost control solenoid valve terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK TURBOCHARGER BOOST CONTROL SOLENOID VALVE

Refer to EC-1778, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace turbocharger boost control solenoid valve.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

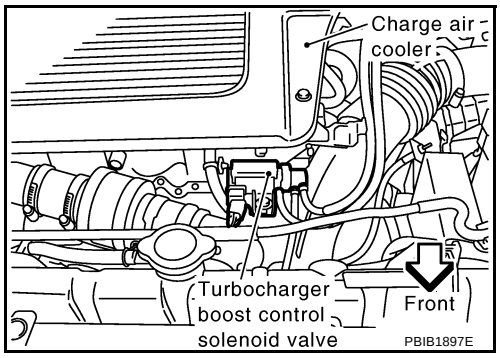
>> **INSPECTION END**

Component Inspection

BBS002G5

TURBOCHARGER BOOST CONTROL SOLENOID VALVE

1. Disconnect turbocharger boost control solenoid valve harness connector.
2. Apply 12V direct current between turbocharger boost control solenoid valve terminals.

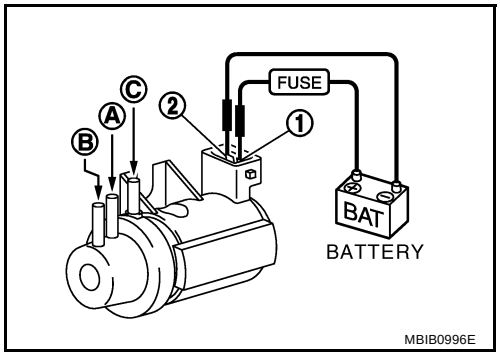


3. Check air passage continuity of turbocharger boost control solenoid valve under the following conditions.

CONDITIONS	Air passage continuity between (A) and (B)	Air passage continuity between (A) and (C)
12V direct current supply between terminals (1) and (2)	Yes	No
No supply	No	Yes

Operation takes less than 1 second.

If NG, replace turbocharger boost control solenoid valve.



BRAKE SWITCH

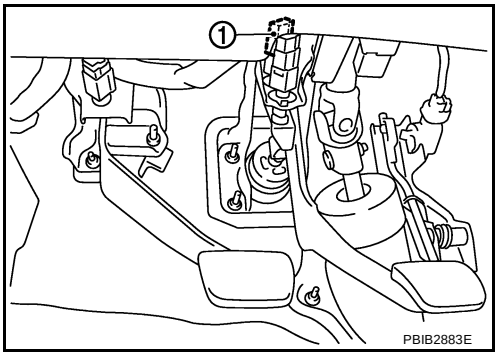
PFP:25230

Description

BBS002G7

STOP LAMP SWITCH

The stop lamp switch (1) is installed to brake pedal bracket. The switch senses brake pedal position and sends an ON-OFF signal to the ECM. The ECM uses the signal to control the fuel injection control system.



ASCD BRAKE SWITCH (MODELS WITH ASCD)

When depress on the brake pedal, ASCD brake switch is turned OFF and stop lamp switch is turned ON. ECM detects the state of the brake pedal by this input of two kinds (ON/OFF signal).
Refer to EC-1819, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

CONSULT-II Reference Value in Data Monitor Mode

BBS002G8

Specification data are reference values.

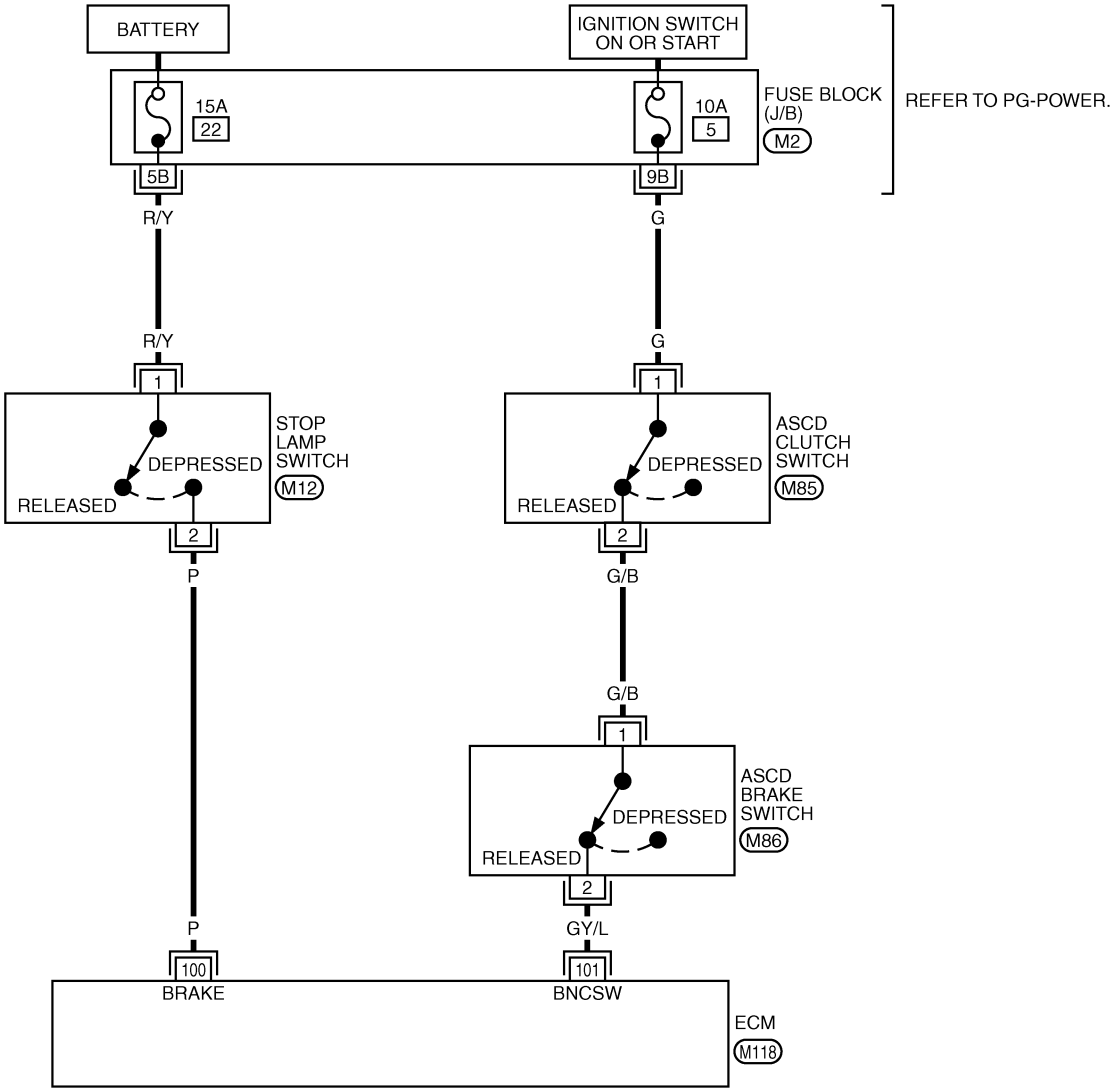
MONITOR ITEM	CONDITION		SPECIFICATION
BRAKE SW (Stop lamp switch)	● Ignition switch: ON	Brake pedal: Fully released	OFF
		Brake pedal: Slightly depressed	ON
BRAKE SW2 (ASCD brake switch)	● Ignition switch: ON	Brake pedal and clutch pedal: Fully released	OFF
		Brake pedal and/or clutch pedal: Slightly depressed	ON

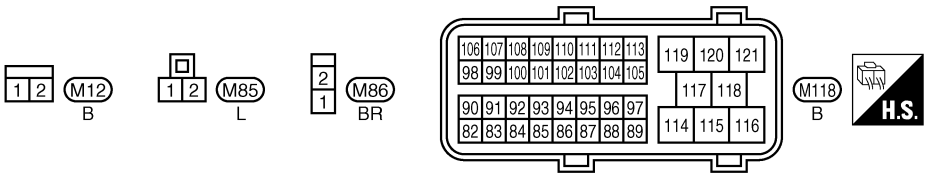
Wiring Diagram

BBS002G9

EC-BRK/SW-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





REFER TO THE FOLLOWING.
M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0914E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
100	P	Stop lamp switch	**[Ignition switch OFF]** ● Brake pedal: Fully released	Approximately 0V
			[Ignition switch OFF] ● Brake pedal: Slightly depressed	BATTERY VOLTAGE (11 - 14V)
101	GY/L	ASCD brake switch	**[Ignition switch ON]** ● Brake pedal and clutch pedal: Fully released	BATTERY VOLTAGE (11 - 14V)
			[Ignition switch ON] ● Brake pedal and/or clutch pedal: Slightly depressed	Approximately 0V

Diagnostic Procedure

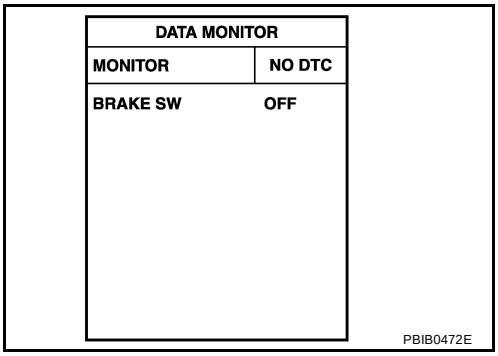
BBS002GA

1. CHECK OVERALL FUNCTION-I

With CONSULT-II

1. Turn ignition switch ON.
2. Select “BRAKE SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “BRAKE SW” indication under the following conditions.

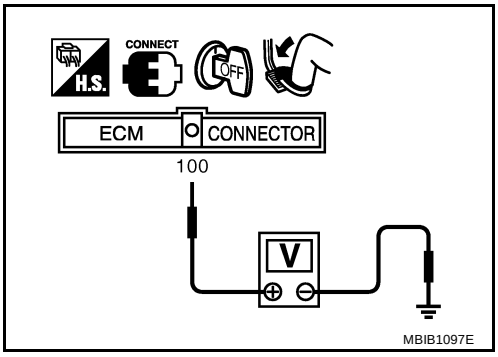
CONDITION	INDICATION
Brake pedal: Fully released	OFF
Brake pedal: Slightly depressed	ON



Without CONSULT-II

Check voltage between ECM terminal 100 and ground under the following conditions.

CONDITION	VOLTAGE
Brake pedal: Fully released	Approximately 0V
Brake pedal: Slightly depressed	Battery voltage



OK or NG

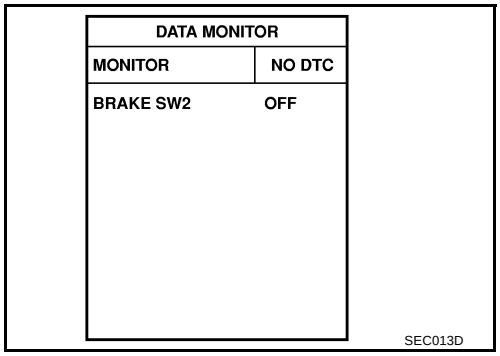
OK (Models with ASCD)>>GO TO 2.
OK (Models without ASCD)>>**INSPECTION END**
NG >> GO TO 3.

2. CHECK OVERALL FUNCTION-II

With CONSULT-II

Check “BRAKE SW2” indication in “DATA MONITOR” mode.

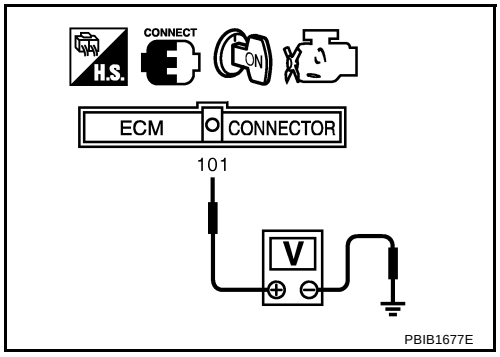
CONDITION	INDICATION
Clutch pedal and brake pedal: Fully released	OFF
Clutch pedal and/or brake pedal: Slightly depressed	ON



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 101 and ground under the following conditions.

CONDITION	VOLTAGE
Clutch pedal and brake pedal: Fully released	Battery voltage
Clutch pedal and/or brake pedal: Slightly depressed	Approximately 0V

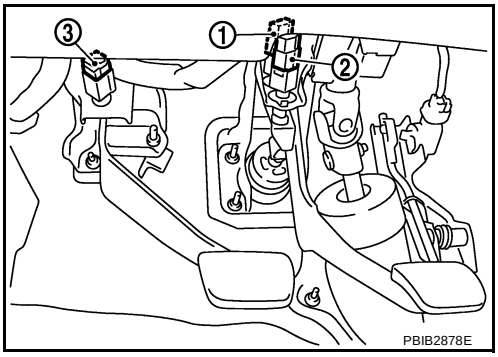


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 7.

3. CHECK STOP LAMP SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect stop lamp switch harness connector (1).
   - ASCD brake switch harness connector (2)
   - ASCD clutch switch harness connector (3)

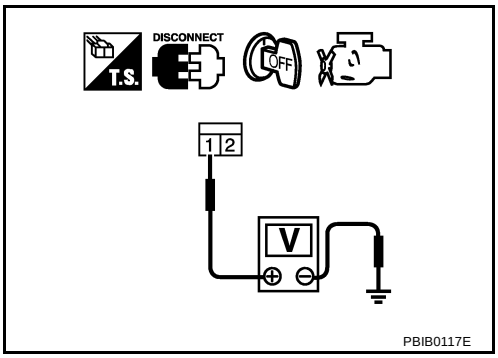


3. Check voltage between stop lamp switch terminal 1 and ground with CONSULT -II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.



4. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 15A fuse
- Harness for open or short between stop lamp switch and battery

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK STOP LAMP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 100 and stop lamp switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 6.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

6. CHECK STOP LAMP SWITCH

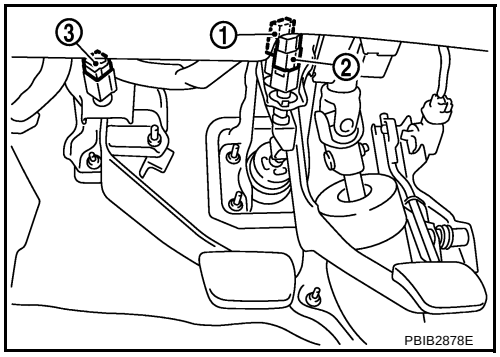
Refer to EC-1786, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace stop lamp switch.

7. CHECK ASCD BRAKE SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch (2) harness connector.
   - Stop lamp switch (1)
   - ASCD clutch switch (3)
3. Turn ignition switch ON.

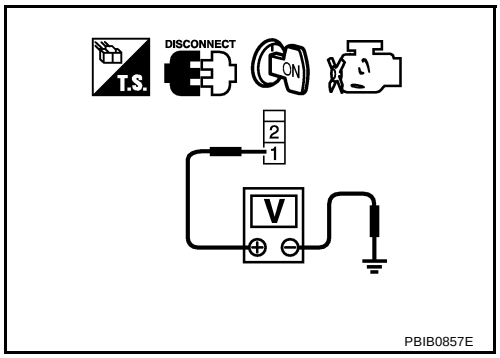


4. Check voltage between ASCD brake switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

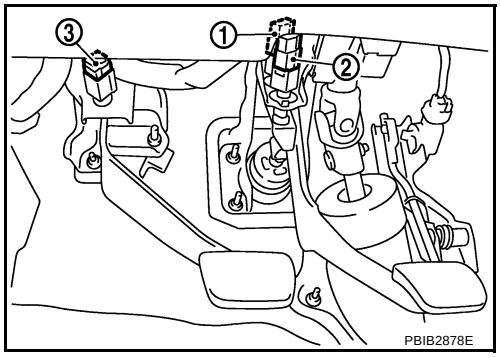
OK or NG

OK >> GO TO 12.
NG >> GO TO 8.



8. CHECK ASCD CLUTCH SWITCH POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector (3).
   - Stop lamp switch harness connector (1)
   - ASCD brake switch harness connector (2)

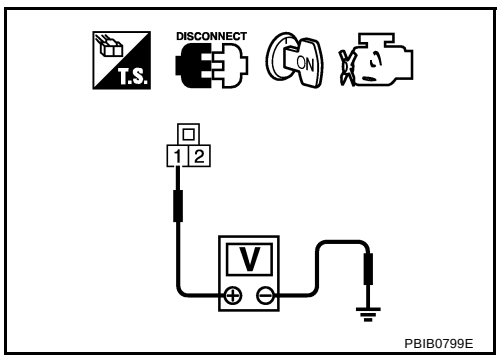


3. Turn ignition switch ON.
4. Check voltage between ASCD clutch switch terminal 1 and ground with CONSULT-II or tester.

Voltage: Battery voltage

OK or NG

OK >> GO TO 10.
NG >> GO TO 9.



9. DETECT MALFUNCTIONING PART

Check the following.

- Fuse block (J/B) connector M2
- 10A fuse
- Harness for open or short between ASCD clutch switch and fuse

>> Repair open circuit or short to ground or short to power in harness or connectors.

10. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Check harness continuity between ASCD clutch switch terminal 2 and ASCD brake switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 11.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

11. CHECK ASCD CLUTCH SWITCH

Refer to EC-1786, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD clutch switch.

12. CHECK ASCD BRAKE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between ECM terminal 101 and ASCD brake switch terminal 2. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 13.
NG >> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK ASCD BRAKE SWITCH

Refer to EC-1786, "Component Inspection" .

OK or NG

OK >> GO TO 14.
NG >> Replace ASCD brake switch.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

Component Inspection

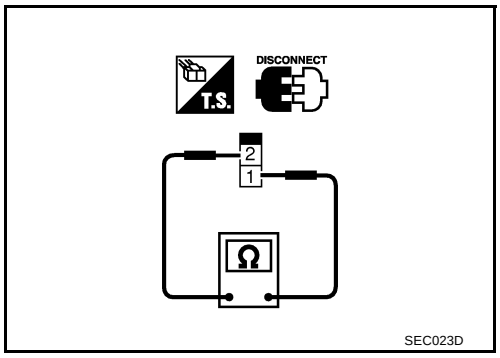
BBS002GB

ASCD BRAKE SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD brake switch harness connector.
3. Check continuity between ASCD brake switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should exist
Brake pedal: Slightly depressed	Should not exist

If NG, adjust ASCD brake switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 3 again.

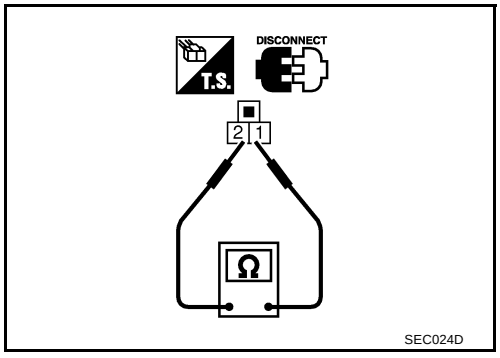


ASCD CLUTCH SWITCH

1. Turn ignition switch OFF.
2. Disconnect ASCD clutch switch harness connector.
3. Check continuity between ASCD clutch switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Clutch pedal: Fully released	Should exist
Clutch pedal: Slightly depressed	Should not exist

If NG, adjust ASCD clutch switch installation, refer to CL-5, "CLUTCH PEDAL" , and perform step 3 again.

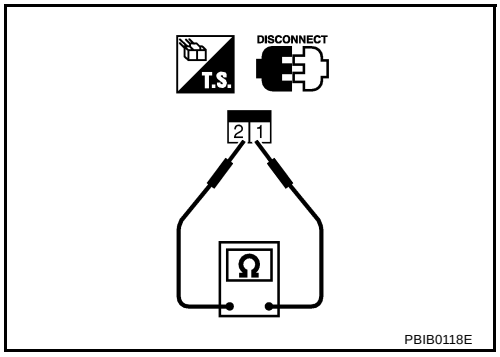


STOP LAMP SWITCH

1. Disconnect stop lamp switch harness connector.
2. Check continuity between stop lamp switch terminals 1 and 2 under the following conditions.

Condition	Continuity
Brake pedal: Fully released	Should not exist
Brake pedal: Slightly depressed	Should exist

If NG, adjust stop lamp switch installation, refer to BR-6, "BRAKE PEDAL" , and perform step 2 again.



PNP SWITCH

PFP:32006

Description

BBS002GC

When the gear position is in Neutral, park/neutral position is ON. ECM detects the position because the continuity of the line (the “ON” signal) exists.

CONSULT-II Reference Value in Data Monitor Mode

BBS002GD

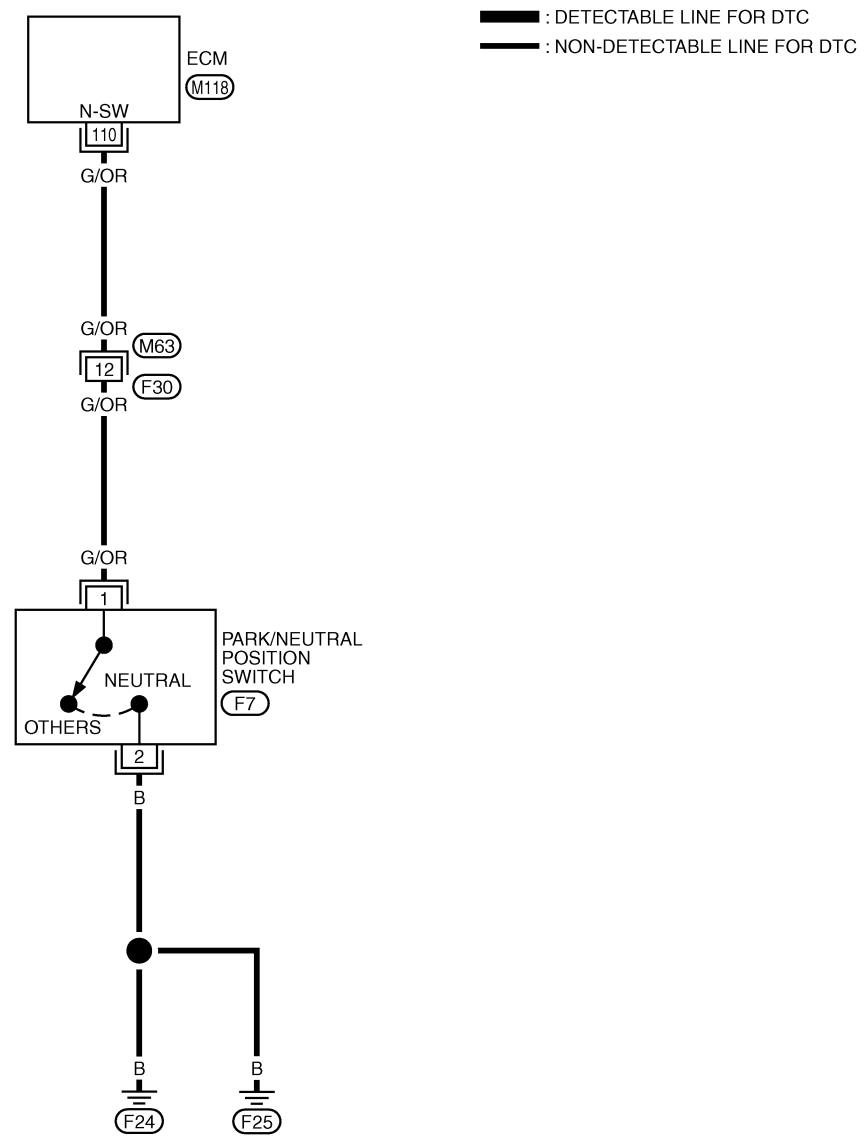
Specification data are reference values.

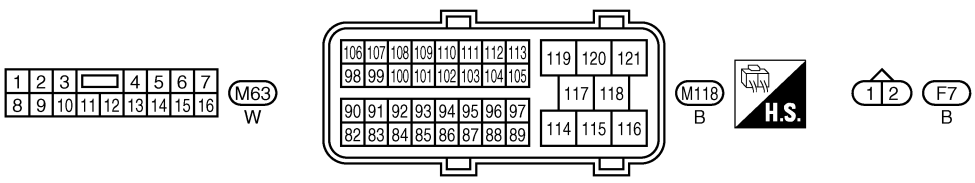
MONITOR ITEM	CONDITION		SPECIFICATION
P/N POSI SW	● Ignition switch: ON	Shift lever: Neutral position	ON
		Shift lever: Except above	OFF

Wiring Diagram

BBS002GE

EC-PNP/SW-01





TBWA0581E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
110	G/OR	Park/Neutral position switch	**[Ignition switch ON]** ● Shift lever: Neutral	Approximately 0V
			[Ignition switch ON] ● Shift lever: Except above	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

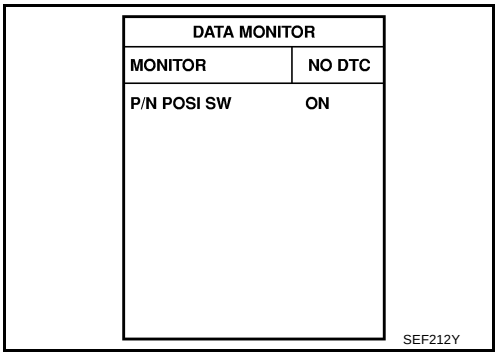
BBS002GF

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Select “P/N POSI SW” in “DATA MONITOR” mode with CONSULT-II.
3. Check “P/N POSI SW” signal under the following conditions.

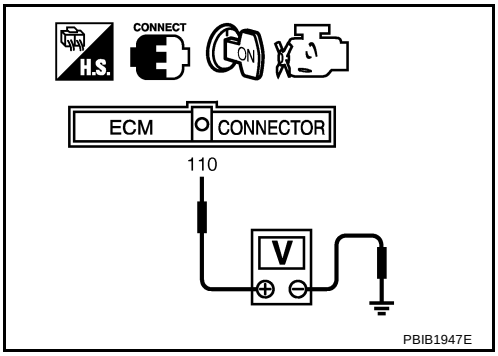
Shift lever position	P/N POSI SW
Neutral position	ON
Except the above position	OFF



Without CONSULT-II

1. Turn ignition switch ON.
2. Check voltage between ECM terminal 110 and ground under the following conditions.

Shift lever position	Voltage
Neutral position	Approximately 0V
Except the above position	Battery voltage



OK or NG

OK >> **INSPECTION END**

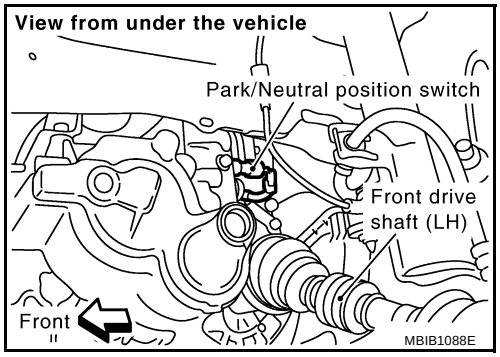
NG >> GO TO 2.

2. CHECK PNP SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect park/neutral position (PNP) switch harness connector.
3. Check harness continuity between PNP switch terminal 2 and ground.
   Refer to Wiring Diagram.

   Continuity should exist.

4. Also check harness for short to power.



OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to power in harness or connectors.

3. CHECK PNP SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 110 and PNP switch terminal 1.
   Refer to Wiring Diagram.

   Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M63, F30
- Harness for open or short between PNP switch and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK PARK/NEUTRAL POSITION SWITCH

Refer to MT-15, "POSITION SWITCH" .

OK or NG

OK >> GO TO 6.
NG >> Replace park/neutral position switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

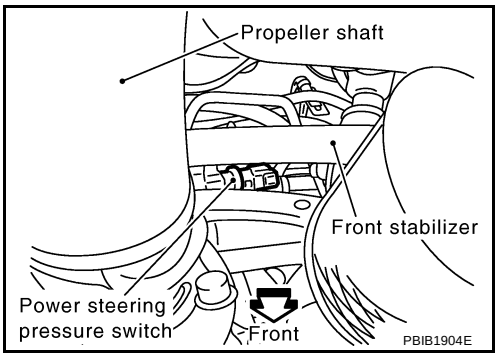
PSP SWITCH

PFP:49761

Component Description

BBS002GG

The power steering pressure switch is attached to the power steering high-pressure tube and detects a power steering load.
When a power steering load is detected, it signals the ECM. The ECM adjusts the fuel injector pulse width to increase the idle speed and adjust for the increased load.



CONSULT-II Reference Value in Data Monitor Mode

BBS002GH

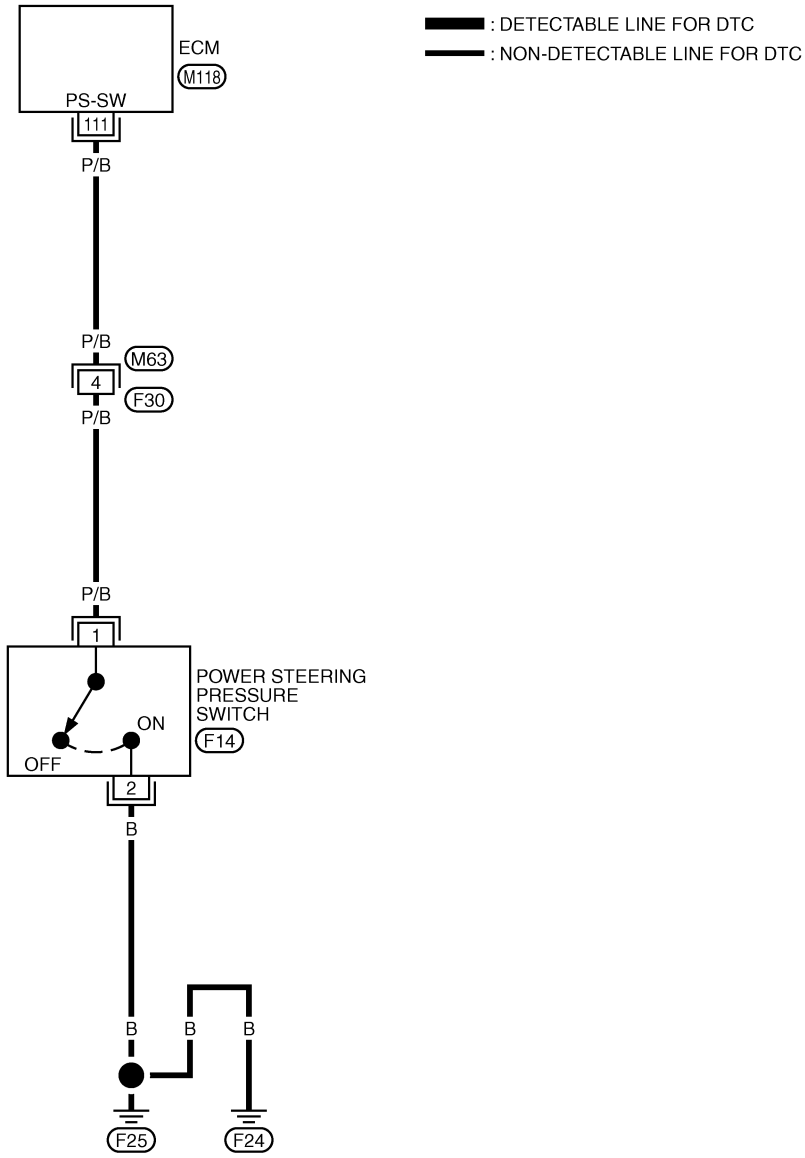
Specification data are reference values.

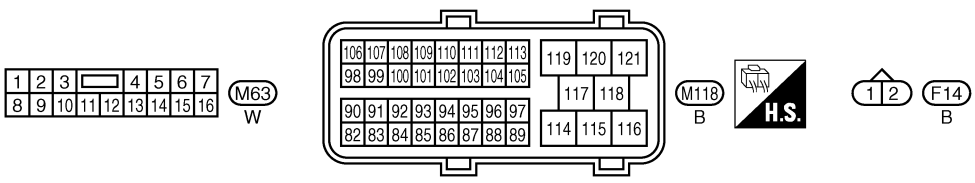
MONITOR ITEM	CONDITION		SPECIFICATION
PW/ST SIGNAL	● Engine: After warming up, idle the engine	Steering wheel: Not being turned	OFF
		Steering wheel: Being turned	ON

Wiring Diagram

BBS002GI

EC-PST/SW-01





TBWA0583E

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:
Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
111	P/B	Power steering pressure switch	**[Engine is running]** ● Steering wheel: Being turned	Approximately 0V
			[Engine is running] ● Steering wheel: Not being turned	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

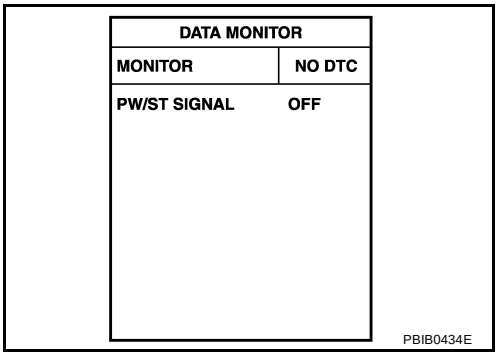
BBS002GJ

1. CHECK OVERALL FUNCTION

With CONSULT-II

1. Start engine.
2. Check “PW/ST SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

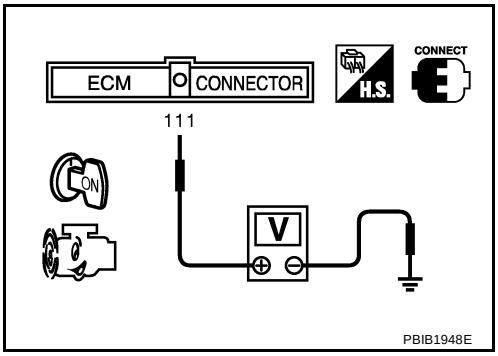
Conditions	PW/ST SIGNAL
Steering wheel: Not being turned	OFF
Steering wheel: Being turned	ON



Without CONSULT-II

1. Start engine.
2. Check voltage between ECM terminal 111 and ground under the following conditions.

Conditions	Voltage
Steering wheel: Not being turned	Battery voltage
Steering wheel: Being turned	Approximately 0V



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK POWER STEERING PRESSURE SWITCH GROUND CIRCUIT FOR OPEN AND SHORT

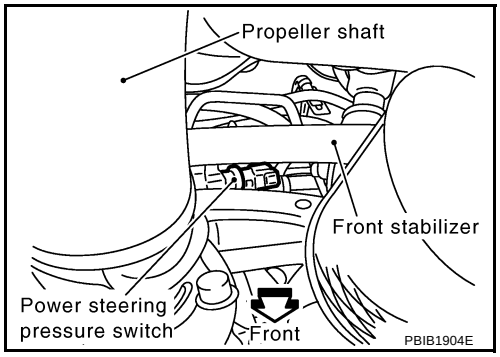
1. Turn ignition switch OFF.
2. Disconnect power steering pressure switch harness connector.
3. Check harness continuity between power steering pressure switch terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to power.

OK or NG

OK >> GO TO 3.
NG >> Repair open circuit or short to power in harness or connectors.



3. CHECK POWER STEERING PRESSURE SWITCH INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 111 and power steering pressure switch terminal 1. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors M63, F30
- Harness for open and short between power steering pressure switch and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK POWER STEERING PRESSURE SWITCH

Refer to EC-1795, "Component Inspection" .

OK or NG

OK >> GO TO 6.
NG >> Replace power steering pressure switch.

6. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

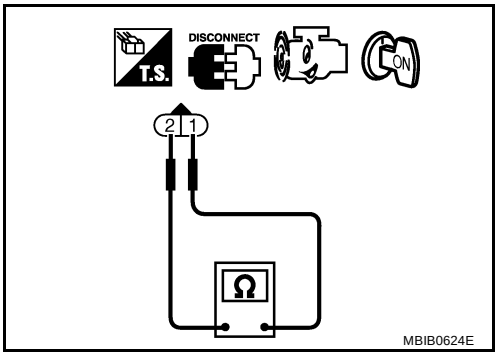
Component Inspection

BBS002GK

POWER STEERING PRESSURE SWITCH

1. Disconnect power steering pressure switch harness connector and then start engine.
2. Check continuity between power steering pressure switch terminal 1 and 2 under the following conditions.

Conditions	Continuity
Steering wheel: Being turned	Yes
Steering wheel: Not being turned	No



Removal and Installation

BBS002GL

Refer to PS-37, "HYDRAULIC LINE" .

FUEL TRANSPORT PUMP

PFP:17020

Description

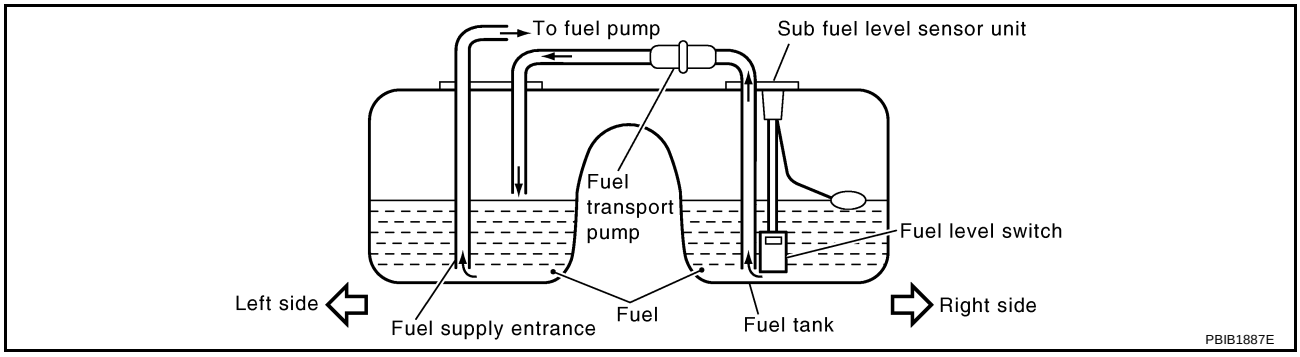
BBS002GM

SYSTEM DESCRIPTION

Sensor	Input Signal to ECM	ECM function	Actuator
Crankshaft position sensor	Engine speed	Fuel transport pump control	Fuel transport pump relay
Fuel level switch	Fuel level		

Condition	Fuel transport pump operation
Engine is running.	Operates
Engine is stopped.	Stops
The remainder of the fuel in the fuel tank is less than specified value.	Stops

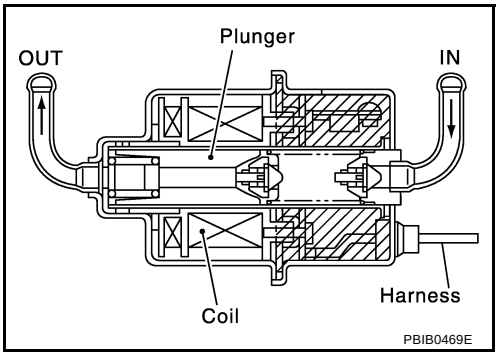
Fuel supply entrance of fuel tank is at the left side of fuel tank. The duel at the right side of the fuel tank is sent to the left side of the fuel tank by fuel transport pump.
When the ECM receives engine revolution signal from the crankshaft position sensor, it knows that the engine is rotating, and causes the pump operate. If the remainder of the fuel at the right side of the fuel tank decreases, fuel level switch sends a signal to the ECM. When the ECM receives a signal from the fuel level switch, the ECM stops the operation of the pump.
The ECM does not directly drive the fuel transport pump. It controls the ON/OFF fuel transport pump relay, which in turn controls the fuel transport pump.



COMPONENT DESCRIPTION

Fuel Transport Pump

Fuel transport pump sends the fuel from right side of fuel tank to left side.

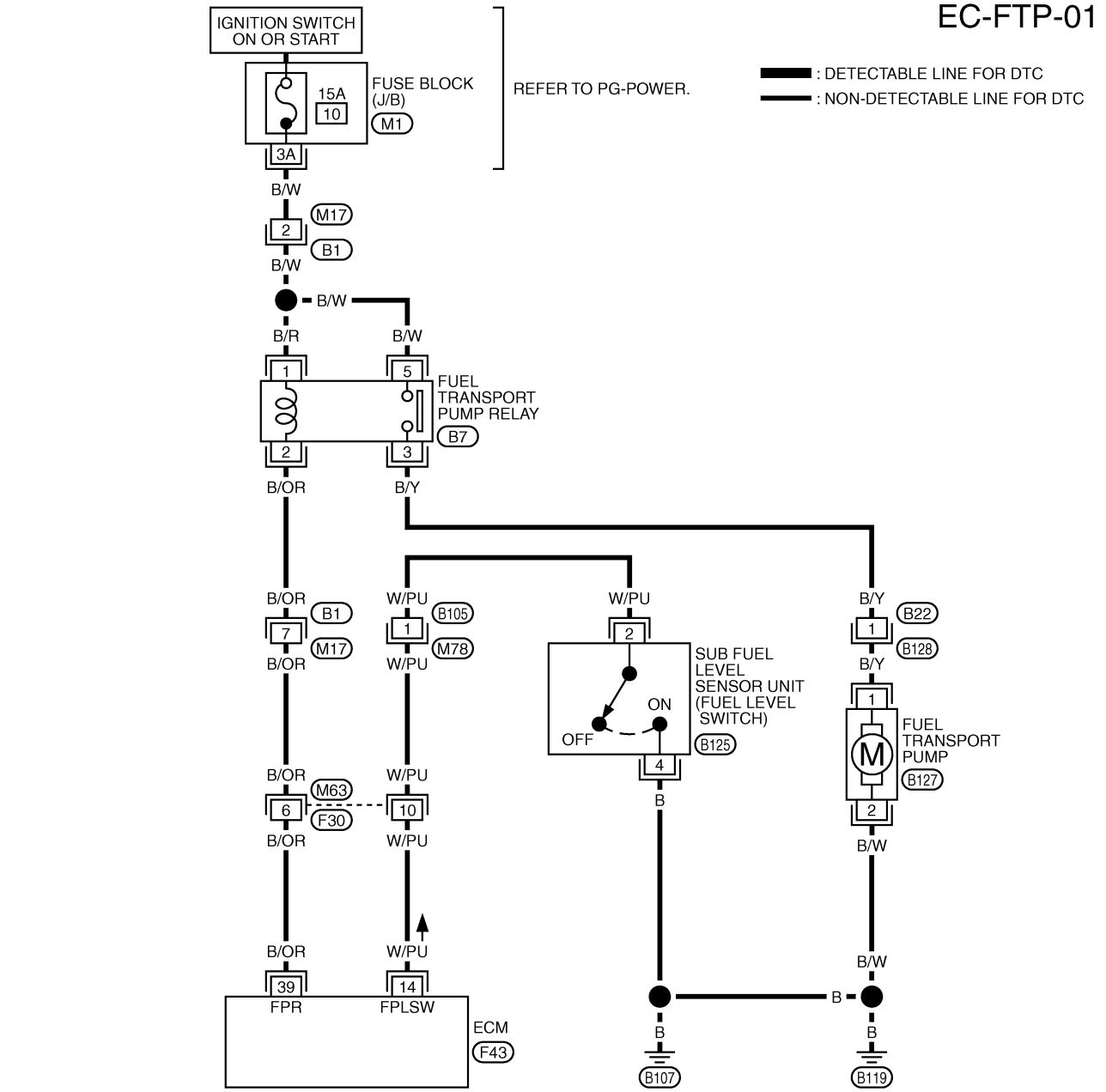


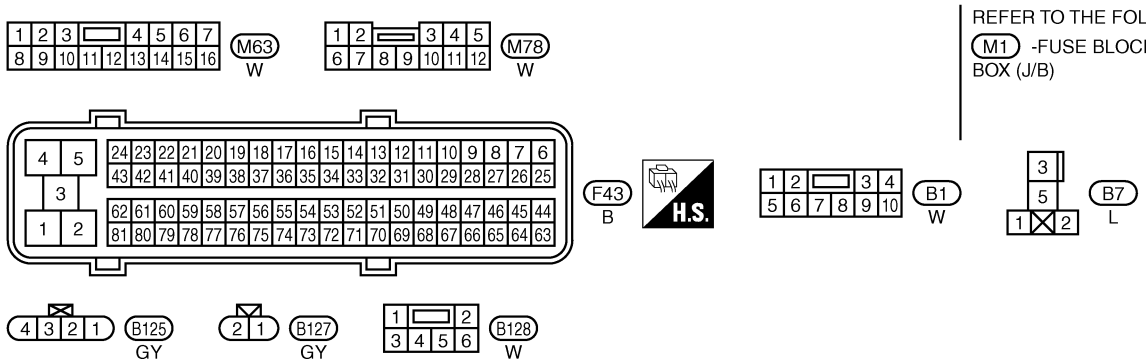
Fuel Level Switch

Fuel level switch is assembled in sub fuel level sensor unit. When the remainder of the fuel at the right side of the fuel tank is less than specified value, the switch is turned OFF.

Wiring Diagram
LHD MODELS

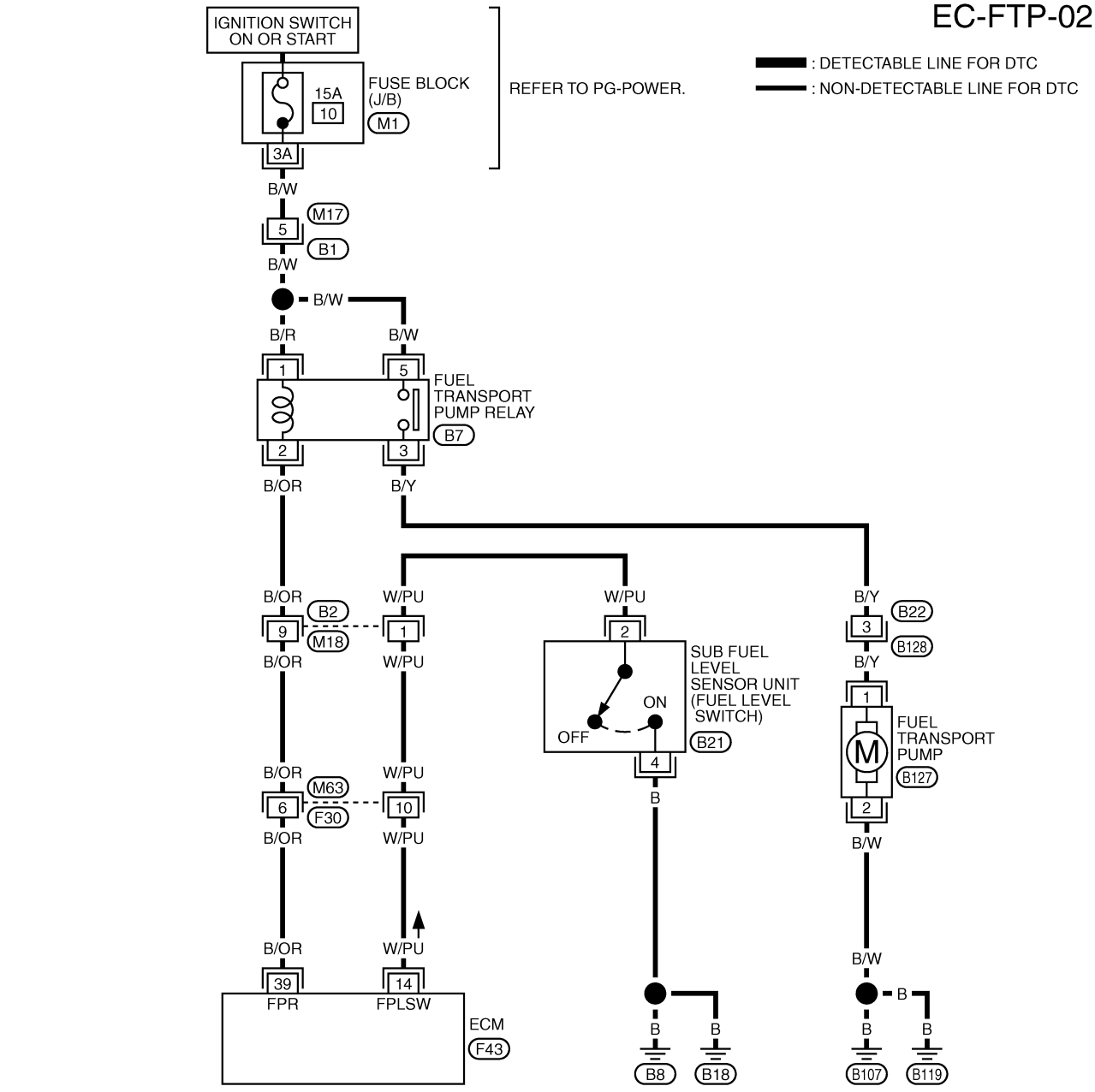
BBS002GN





TBWA0590E

RHD MODELS


EC-FTP-02
: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC
IGNITION SWITCH ON OR START
FUSE BLOCK (J/B)
15A
10
M1
3A
REFER TO PG-POWER.
B/W
M17
5
B1
B/R
1
2
FUEL TRANSPORT PUMP RELAY
B7
3
B/Y
B/OR
W/PU
B2
9
M18
M63
6
F30
39
FPR
14
FPLSW
ECM
F43
SUB FUEL LEVEL SENSOR UNIT (FUEL LEVEL SWITCH)
OFF
ON
B21
4
B
B8
B18
B22
B128
FUEL TRANSPORT PUMP
M
B127
B107
B119
REFER TO THE FOLLOWING.
M1 -FUSE BLOCK-JUNCTION BOX (J/B)
M63
W
F43
B
H.S.
B1
W
B2
BR
B7
L
B21
GY
B127
GY
B128
W
TBWA0591E

Specification data are reference values, and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

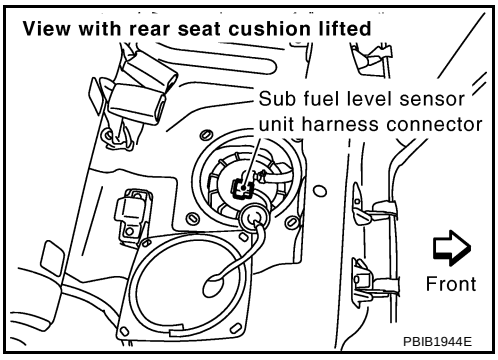
TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
14	W/PU	Fuel level switch	**[Ignition switch ON]** ● Some fuel is in the fuel tank	Approximately 0V
			[Ignition switch ON] ● No fuel is in the fuel tank	BATTERY VOLTAGE (11 - 14V)
39	B/OR	Fuel transport pump relay	**[Engine is running]** ● Some fuel is in the fuel tank	Approximately 0V
			[Engine is running] ● No fuel is in the fuel tank	BATTERY VOLTAGE (11 - 14V)

Diagnostic Procedure

BBS002GO

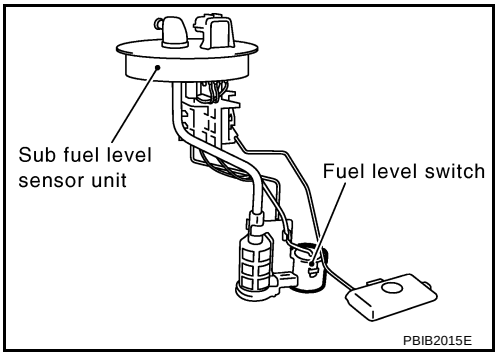
1. CHECK OVERALL FUNCTION

1. Turn ignition switch OFF.
2. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
3. Disconnect sub fuel level sensor unit harness connector.
4. Remove sub fuel level sensor unit.
5. Reconnect sub fuel level sensor unit harness connector.



6. Soak fuel level switch in fuel and check operating sound of fuel transport pump.

Operating sound should exist.



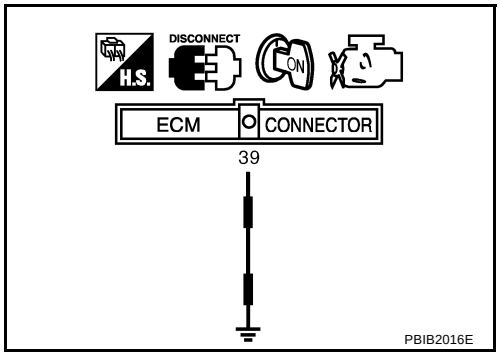
OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK FUEL TRASPORT PUMP FUNCTION

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Install suitable harness between ECM harness connector terminal 39 and ground.
4. Turn ignition switch ON.
5. Listen the fuel transport pump operating sound.

Operating sound should exist.

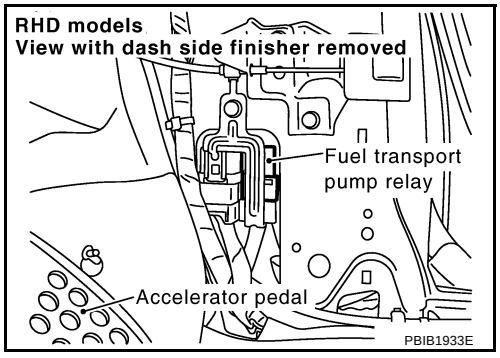


OK or NG

OK >> GO TO 11.
NG >> GO TO 3.

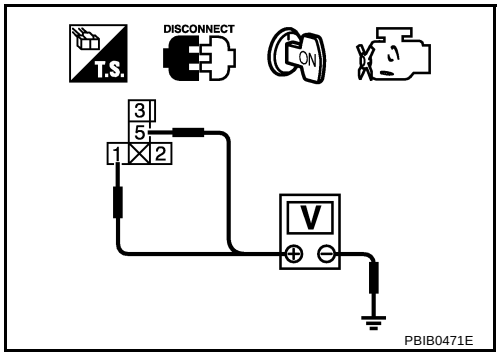
3. CHECK FUEL TRASPORT PUMP RELAY POWER SUPPLY CIRCUIT

1. Turn ignition switch OFF.
2. Reconnect ECM harness connector.
3. Disconnect fuel transport pump relay.
4. Turn ignition switch ON.



5. Check voltage between fuel transport pump relay terminals 1, 5 and ground with CONSULT-II or tester.

Voltage: Battery voltage



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PERT

Check the following.

- Harness connectors M17, B1
- Fuse block (J/B) connectors M1
- 15A fuse
- Harness for open or short between fuse and fuel transport pump relay

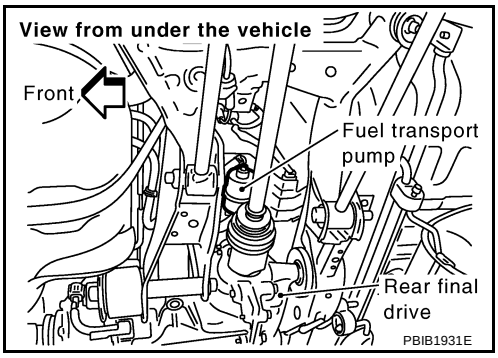
>> Repair harness or connectors.

5. CHECK FUEL TRANSPORT PUMP POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect fuel transport pump harness connector.
3. Check harness continuity between fuel transport pump relay terminal 3 and fuel transport pump terminal 1 and between fuel transport pump terminal 2 and ground. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector B22, B128
- Harness for open or short between fuel transport pump relay and fuel transport pump
- Harness for open or short between fuel transport pump and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK FUEL TRANSPORT PUMP RELAY OUTPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Disconnect ECM harness connector.
2. Check harness continuity between ECM terminal 39 and fuel transport pump relay terminal 2. Refer to Wiring Diagram.

Continuity should exist.

3. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNSTIONING PART

Check the following.

- Harness connector M17, B1 (LHD models)
- Harness connector M18, B2 (RHD models)
- Harness connector M63, F30
- Harness for open or short between ECM and fuel transport pump relay

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK FUEL TRANSPORT PUMP RELAY

Refer to EC-1803, "Component Inspection" .

OK or NG

OK >> GO TO 10.
NG >> Replace fuel transport pump relay.

10. CHECK TRANSPORT PUMP

Refer to EC-1803, "Component Inspection" .

OK or NG

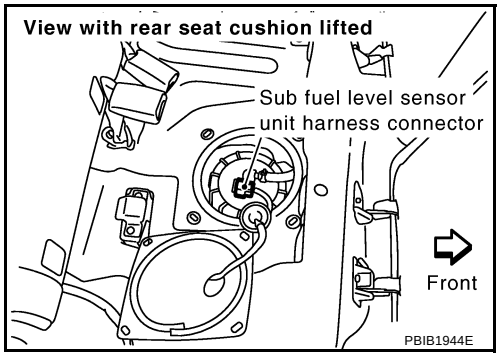
OK >> GO TO 14.
NG >> Replace fuel transport pump.

11. CHECK FUEL LEVEL SWITCH POWER SUPPLY AND GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Disconnect sub fuel level sensor unit harness connector.
4. Check harness continuity between ECM terminal 14 and sub fuel level sensor unit terminal 2, between sub fuel level sensor unit terminal 4 and ground. Refer to Wiring Diagram.

Continuity should exist.

5. Also check harness for short to ground and short to power.



OK or NG

OK >> GO TO 13.
NG >> GO TO 12.

12. DETECT MALFUNCTIONING PART

Check the following.

- Harness connector F30, M63
- Harness connector M78, B105 (LHD models)
- Harness connectors M18, B2 (RHD models)
- Harness for open or short between ECM and sub fuel level sensor unit
- Harness for open or short between sub fuel level sensor unit and ground

>> Repair open circuit or short to ground or short to power in harness or connectors.

13. CHECK FUEL LEVEL SWITCH

Refer to EC-1803, "Component Inspection"

OK or NG

OK >> GO TO 14.
NG >> Replace sub fuel level sensor unit.

14. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT"

>> **INSPECTION END**

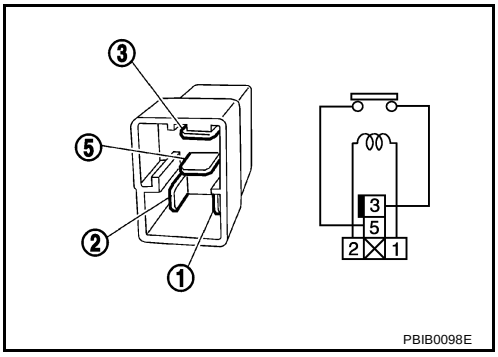
Component Inspection

BBS002GP

FUEL TRANSPORT PUMP RELAY

Check continuity between terminals (3) and (5) under the following conditions.

Conditions	Continuity
12V direct current supply between terminals (1) and (2)	Yes
No current supply	No



PBIB0098E

FUEL TRANSPORT PUMP

1. Remove fuel transport pump.
2. Apply battery voltage between fuel transport pump terminal 1 and 2.
3. Check operating sound of fuel transport pump under the following conditions.

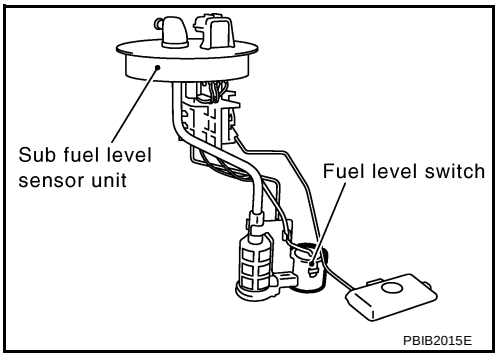
Conditions	Operating sound
12V direct current supply between fuel transport pump terminals 1 and 2	Yes
No current supply	No

4. Listen fuel transport pump operating sound.

FUEL LEVEL SWITCH

1. Confirm that the engine is cooled down and there are no fire hazards near the vehicle.
2. Check continuity between sub fuel level sensor unit terminal 2 and 4 under the following conditions.

Conditions	Continuity
Fuel level switch is soaked in fuel.	Yes
Fuel level switch is not soaked in fuel.	No



PBIB2015E

Removal and Installation

BBS002GQ

FUEL TRANSPORT PUMP

Refer to FL-25, "FUEL TANK" .

SUB FUEL LEVEL SENSOR UNIT

Refer to FL-21, "FUEL LEVEL SENSOR UNIT" .

REFRIGERANT PRESSURE SENSOR

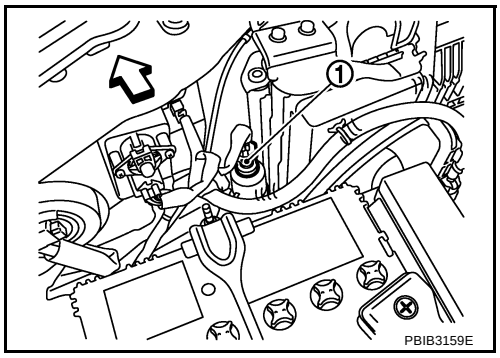
PFP:92136

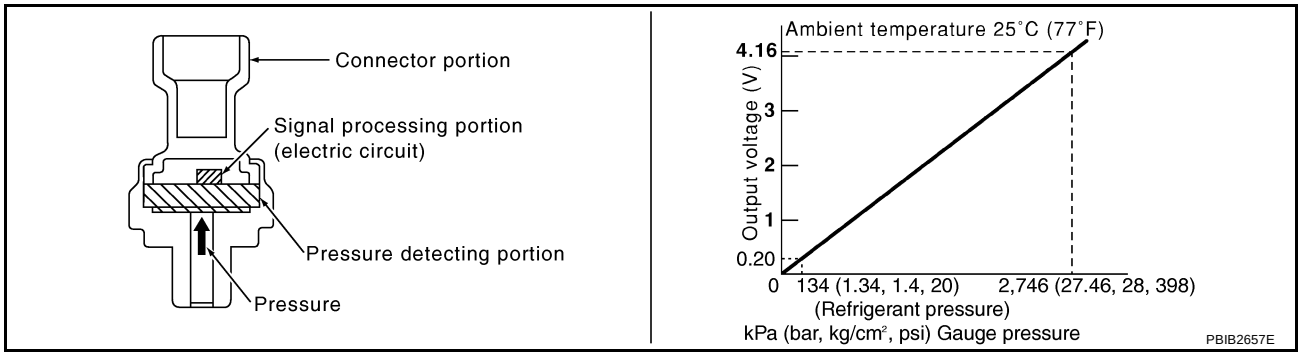
Component Description

BBS002IP

The refrigerant pressure sensor (1) is installed at the liquid tank of the air conditioner system. The sensor uses an electrostatic volume pressure transducer to convert refrigerant pressure to voltage. The voltage signal is sent to ECM, and ECM controls cooling fan system.

- ⇦: Vehicle front



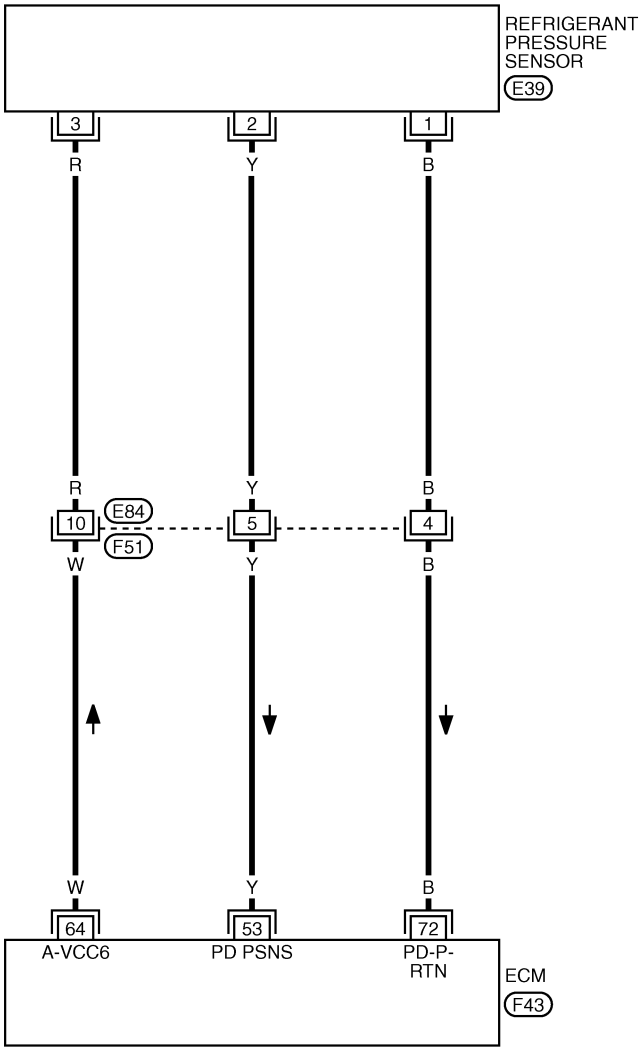


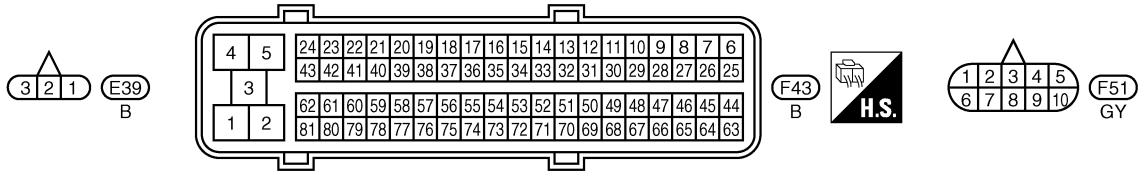
Wiring Diagram

BBS002IQ

EC-RP/SEN-01

: DETECTABLE LINE FOR DTC
: NON-DETECTABLE LINE FOR DTC





TBWB0924E

Specification data are reference values and are measured between each terminal and ground.

CAUTION:

Do not use ECM ground terminals when measuring input/output voltage. Doing so may result in damage to the ECM's transistor. Use a ground other than ECM terminals, such as the ground.

TERMINAL NO.	WIRE COLOR	ITEM	CONDITION	DATA (DC Voltage)
53	Y	Refrigerant pressure sensor	**[Engine is running]** ● **Warm-up condition** ● Both A/C switch and blower fan switch: ON (Compressor operates)	1.0 - 4.0V
64	W	Sensor power supply (Turbocharger boost sensor / Refrigerant pressure sensor)	**[Ignition switch ON]**	Approximately 5.3V
72	B	Sensor ground (Throttle position sensor / Refrigerant pressure sensor)	**[Engine is running]** ● **Warm-up condition** ● Idle speed	Approximately 0.3V

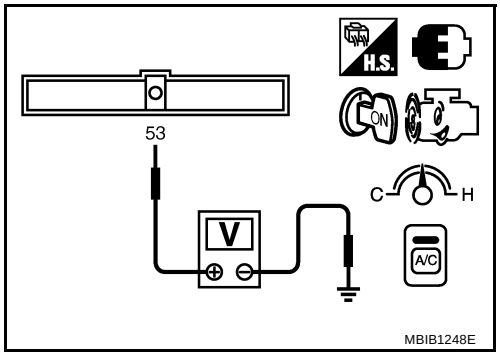
Diagnostic Procedure

BBS002IR

1. CHECK REFRIGERANT PRESSURE SENSOR OVERALL FUNCTION

1. Start engine and warm it up to normal operating temperature.
2. Turn A/C switch and blower switch ON.
3. Check voltage between ECM terminal 53 and ground with CONSULT-II or tester.

Voltage: 1.0 - 4.0V

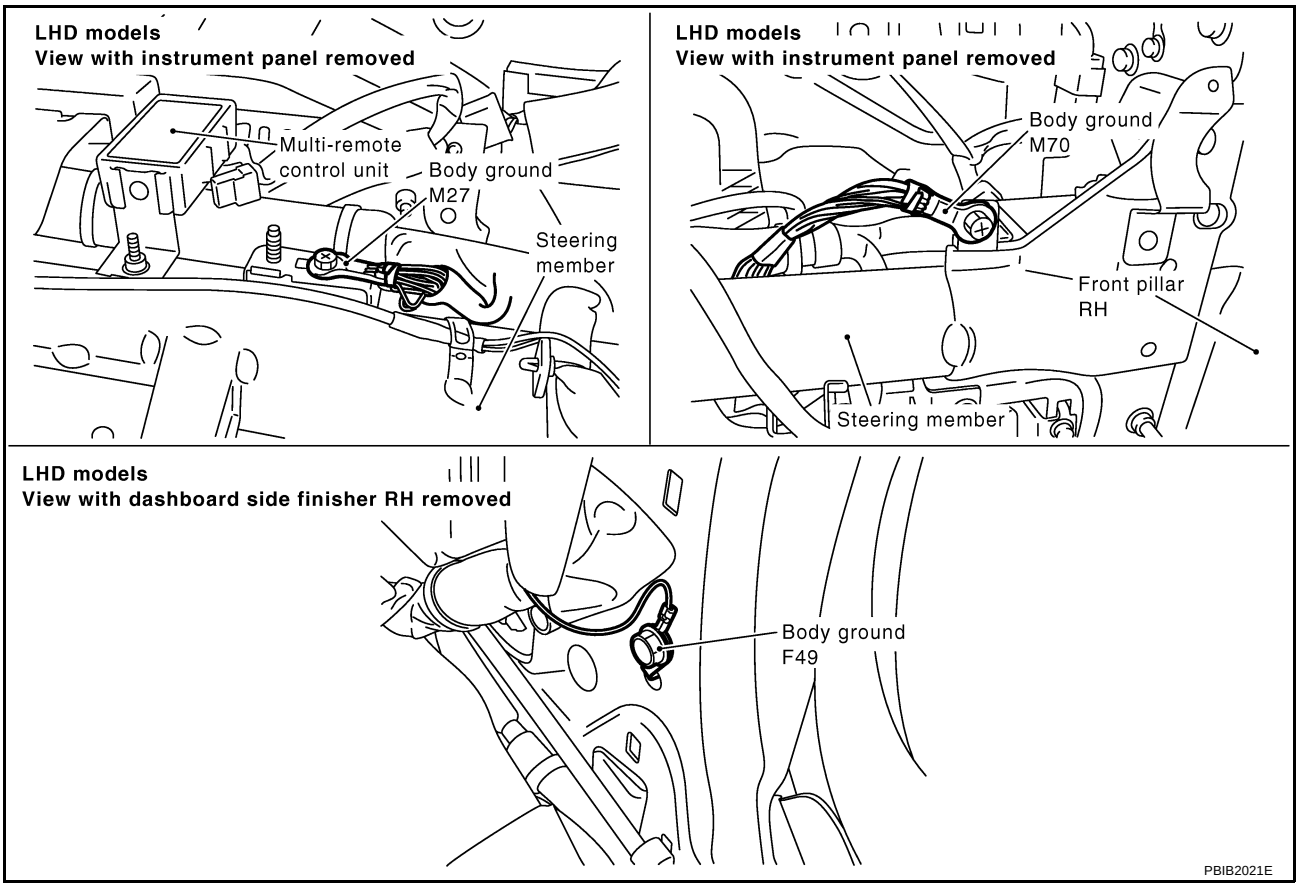


OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK GROUND CONNECTIONS

1. Turn A/C switch and blower fan switch OFF.
2. Stop engine.
3. Loosen and retighten three ground screws on the body.
   Refer to EC-1528, "Ground Inspection" .

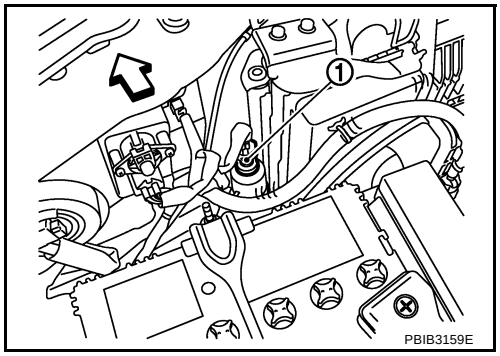


OK or NG

OK >> GO TO 3.
NG >> Repair or replace ground connections.

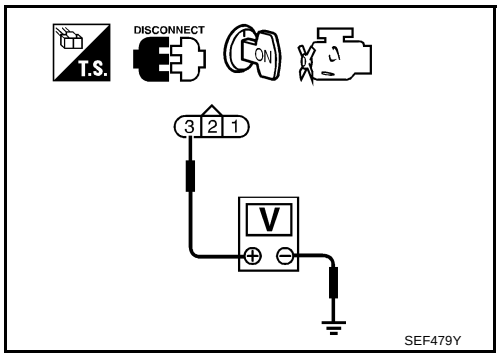
3. CHECK REFRIGERANT PRESSURE SENSOR POWER SUPPLY CIRCUIT

1. Disconnect refrigerant pressure sensor (1) harness connector.
– ⇦: Vehicle front
2. Turn ignition switch ON.



3. Check voltage between refrigerant pressure sensor terminal 3 and ground with CONSULT-II or tester.

Voltage: Approximately 5.3V



OK or NG

OK >> GO TO 5.
NG >> GO TO 4.

4. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

5. CHECK REFRIGERANT PRESSURE SENSOR GROUND CIRCUIT FOR OPEN AND SHORT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector.
3. Check harness continuity between refrigerant pressure sensor terminal 1 and ECM terminal 72. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 7.
NG >> GO TO 6.

6. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

7. CHECK REFRIGERANT PRESSURE SENSOR INPUT SIGNAL CIRCUIT FOR OPEN AND SHORT

1. Check harness continuity between refrigerant pressure sensor terminal 2 and ECM terminal 53. Refer to Wiring Diagram.

Continuity should exist.

2. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 9.
NG >> GO TO 8.

8. DETECT MALFUNCTIONING PART

Check the following.

- Harness connectors E84, F51
- Harness for open or short between refrigerant pressure sensor and ECM

>> Repair open circuit or short to ground or short to power in harness or connectors.

9. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

OK or NG

OK >> Replace refrigerant pressure sensor.
NG >> Repair or replace.

Removal and Installation

BBS002IS

REFRIGERANT PRESSURE SENSOR

Refer to ATC-139, "REFRIGERANT LINES" .

ASCD INDICATOR

PFP:24814

Component Description

BBS002GT

ASCD indicator lamp illuminates to indicate ASCD operation status. The Lamp has two indicators, CRUISE and SET, and is integrated in combination meter.
CRUISE indicator illuminates when MAIN switch on ASCD steering switch is turned ON to indicated that ASCD system is ready for operation.
SET indicator illuminates when the following conditions are met.

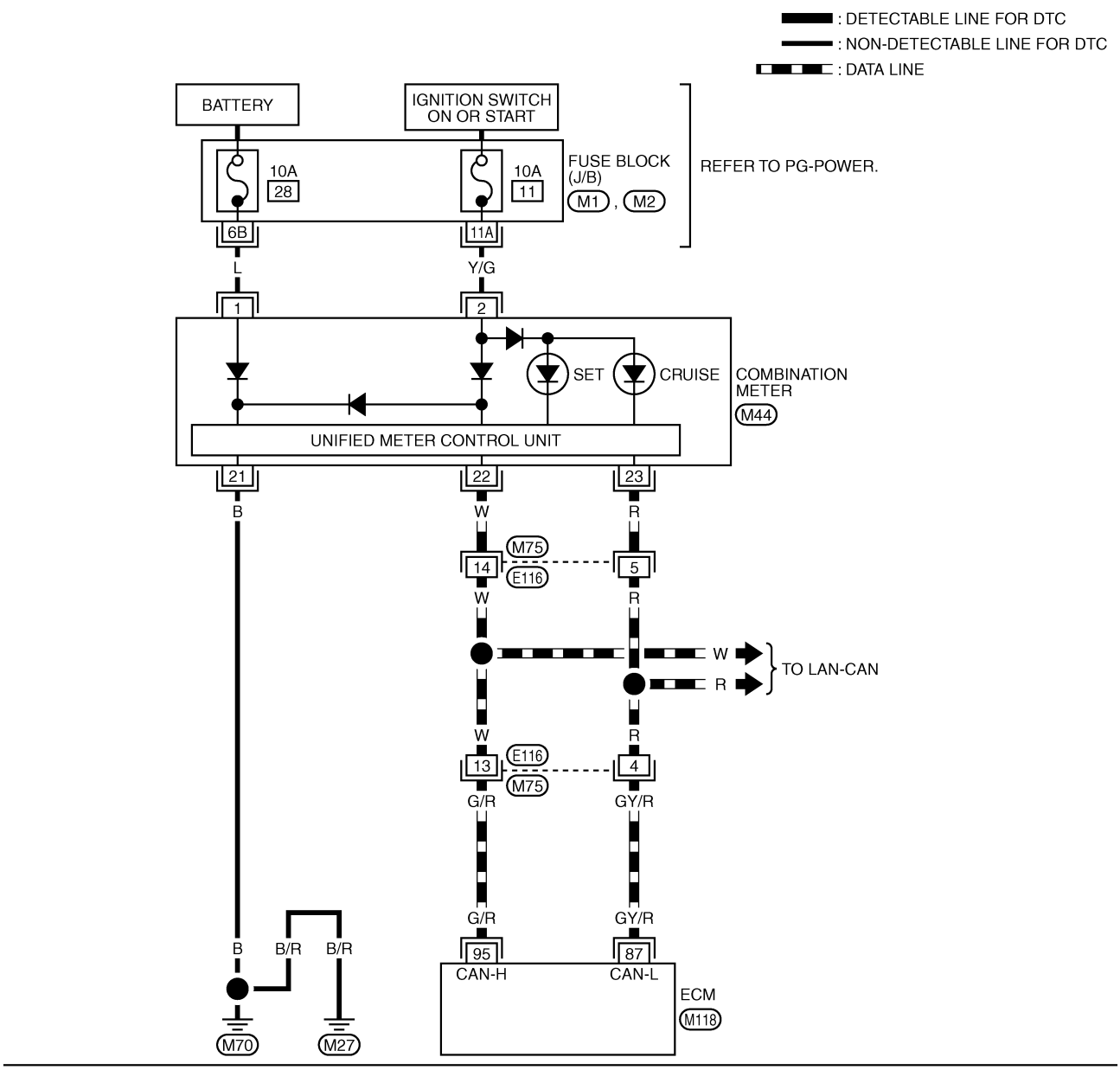
- CRUISE indicator is illuminated.
- SET/COAST switch on ASCD steering switch is turned ON while vehicle speed is within the range of ASCD setting.

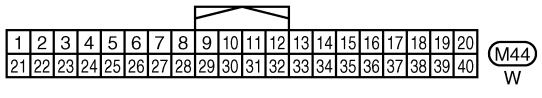
SET indicator remains lit during ASCD control.
Refer to EC-1819, "AUTOMATIC SPEED CONTROL DEVICE (ASCD)" for the ASCD function.

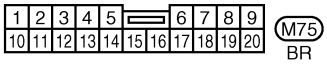
Wiring Diagram—LHD Models

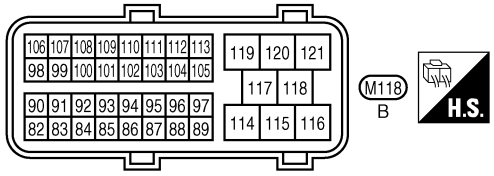
BBS002GU

EC-ASCIND-01







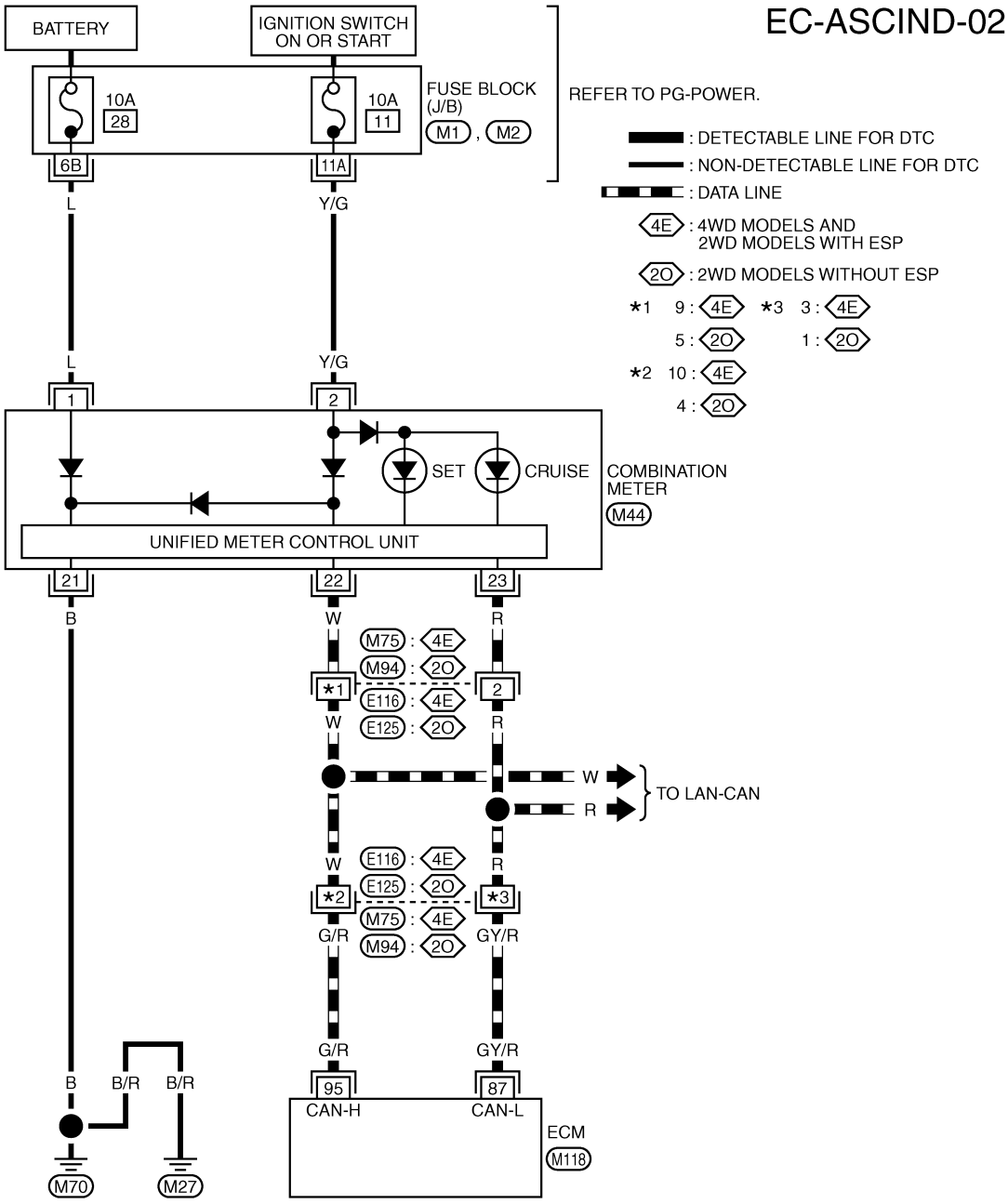


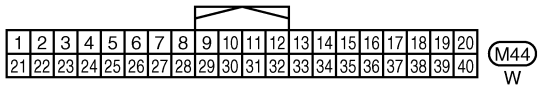
REFER TO THE FOLLOWING.
M1, M2 -FUSE BLOCK-JUNCTION BOX (J/B)

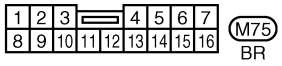
TBWB0478E

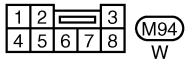
Wiring Diagram—RHD Models

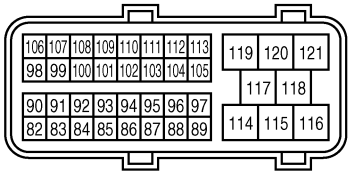
BBS002GV











REFER TO THE FOLLOWING.
M1 , M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0647E

Diagnostic Procedure

BBS002GW

1. CHECK OVERALL FUNCTION

Check ASCD indicator under the following conditions.

ASCD INDICATOR	CONDITION		SPECIFICATION
CRUISE LAMP	● Ignition switch: ON	● MAIN switch: Pressed at the 1st time → at the 2nd time	ON → OFF
SET LAMP	● MAIN switch: ON ● When vehicle speed is between 40 km/h (25 MPH) and 185 km/h (115 MPH)	● ASCD: Operating	ON
		● ASCD: Not operating	OFF

OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK DTC

Check that DTC U1000 is not displayed.

OK or NG

OK >> Perform trouble diagnoses for DTC U1000. Refer to EC-1530, "DTC U1000 CAN COMMUNICATION LINE" .
NG >> GO TO 3.

3. CHECK COMBINATION METER OPERATION

Does combination meter operate normally?

Yes or No

Yes >> GO TO 4.
No >> Check combination meter circuit. Refer to DI-4, "COMBINATION METERS" .

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

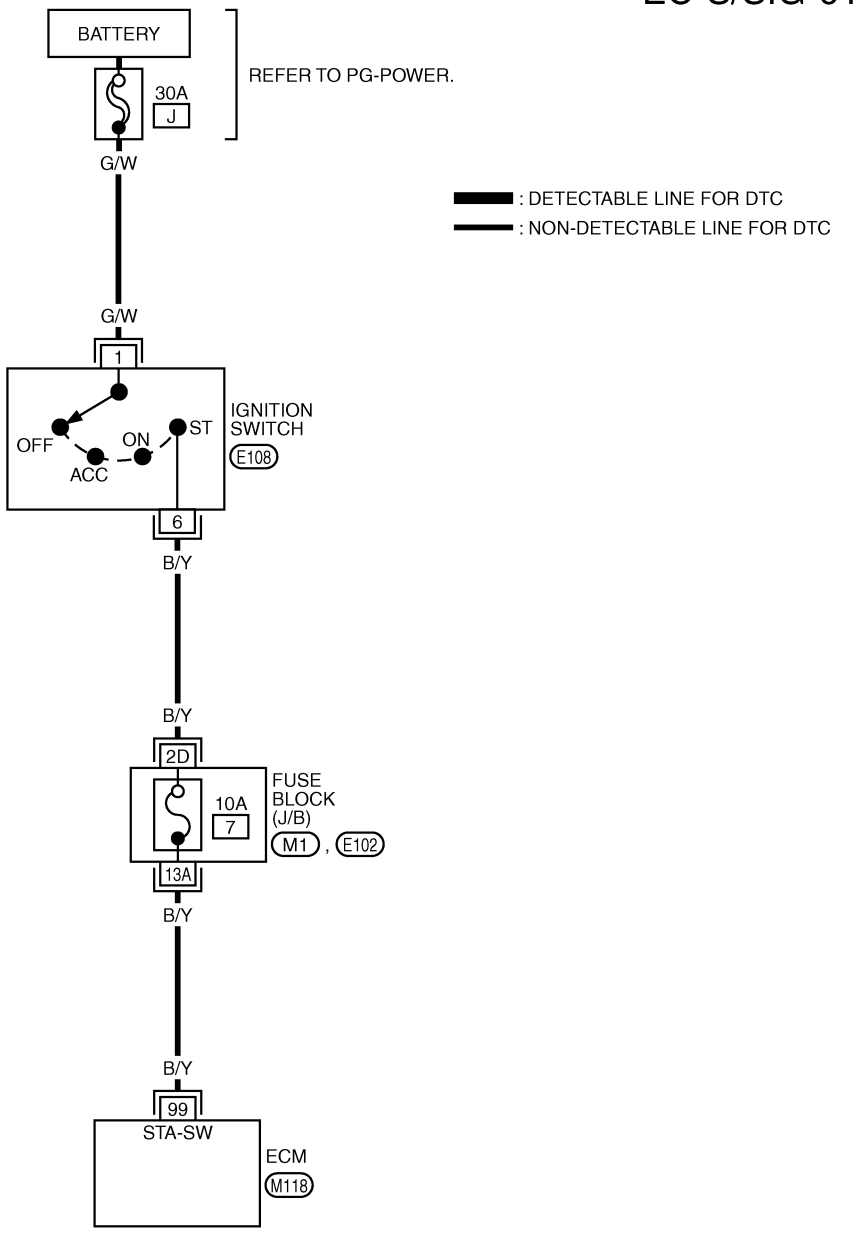
START SIGNAL

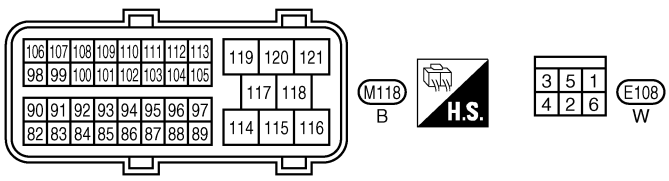
PFP:48750

Wiring Diagram

BBS002GX

EC-S/SIG-01





REFER TO THE FOLLOWING.
M1 , E102 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0582E

Diagnostic Procedure

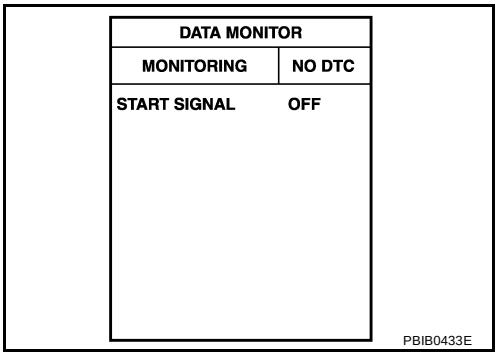
BBS002GY

1. CHECK START SIGNAL OVERALL FUNCTION

With CONSULT-II

1. Turn ignition switch ON.
2. Check “START SIGNAL” in “DATA MONITOR” mode with CONSULT-II under the following conditions.

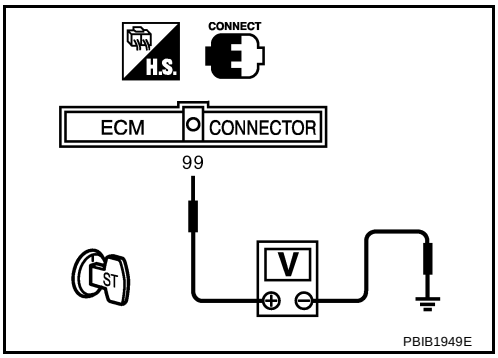
Condition	START SIGNAL
Ignition switch: ON	OFF
Ignition switch: START	ON



Without CONSULT-II

Check voltage between ECM terminal 99 and ground under the following conditions.

Condition	Voltage
Ignition switch: ON	Approximately 0V
Ignition switch: START	Battery voltage



OK or NG

OK >> **INSPECTION END**
NG >> GO TO 2.

2. CHECK START SIGNAL INPUT SIGNAL CIRCUIT

1. Turn ignition switch OFF.
2. Disconnect ECM harness connector and ignition switch harness connector.
3. Check harness continuity between ECM terminal 99 and ignition switch terminal 6. Refer to Wiring Diagram.

Continuity should exist.

4. Also check harness for short to ground and short to power.

OK or NG

OK >> GO TO 4.
NG >> GO TO 3.

3. DETECT MALFUNCTIONING PART

Check the following.

- 10A fuse
- Fuse block (J/B) connectors M1, E102
- Harness for open or short between ECM and ignition switch

>> Repair open circuit or short to ground or short to power in harness or connectors.

4. CHECK INTERMITTENT INCIDENT

Refer to EC-1520, "TROUBLE DIAGNOSIS FOR INTERMITTENT INCIDENT" .

>> **INSPECTION END**

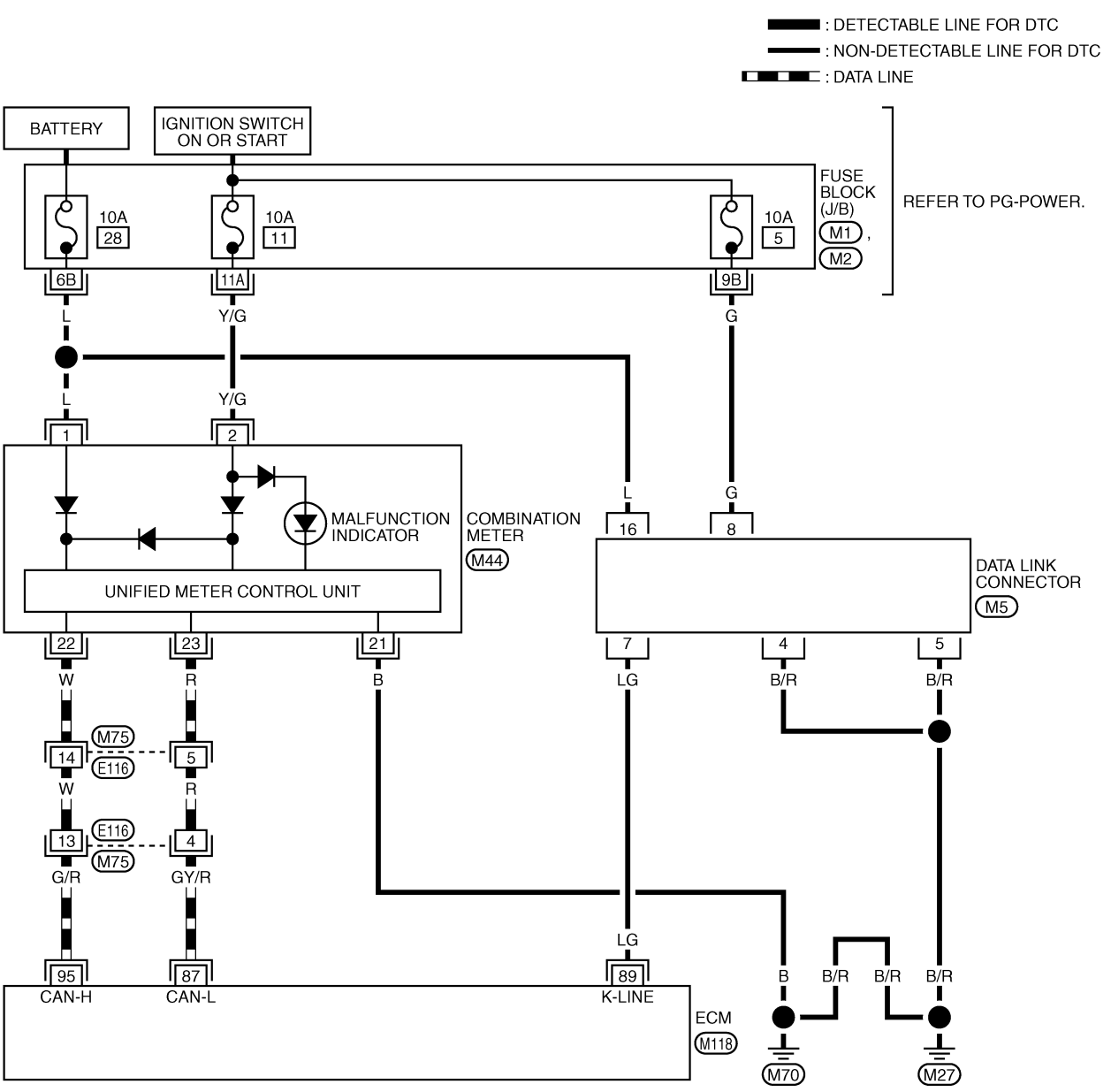
MI & DATA LINK CONNECTORS

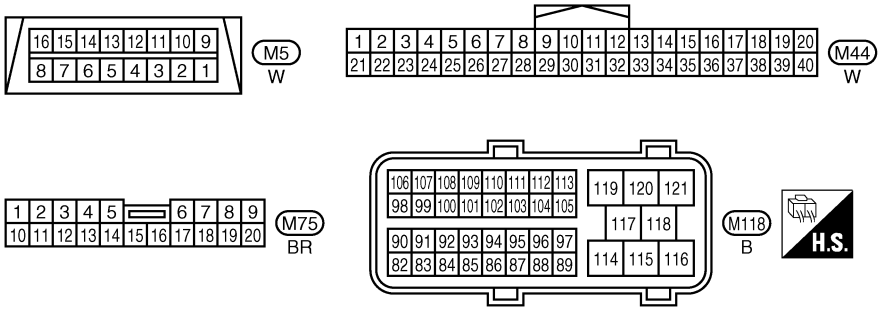
PFP:24814

Wiring Diagram
LHD MODELS

BBS002GZ

EC-MIL/DL-01



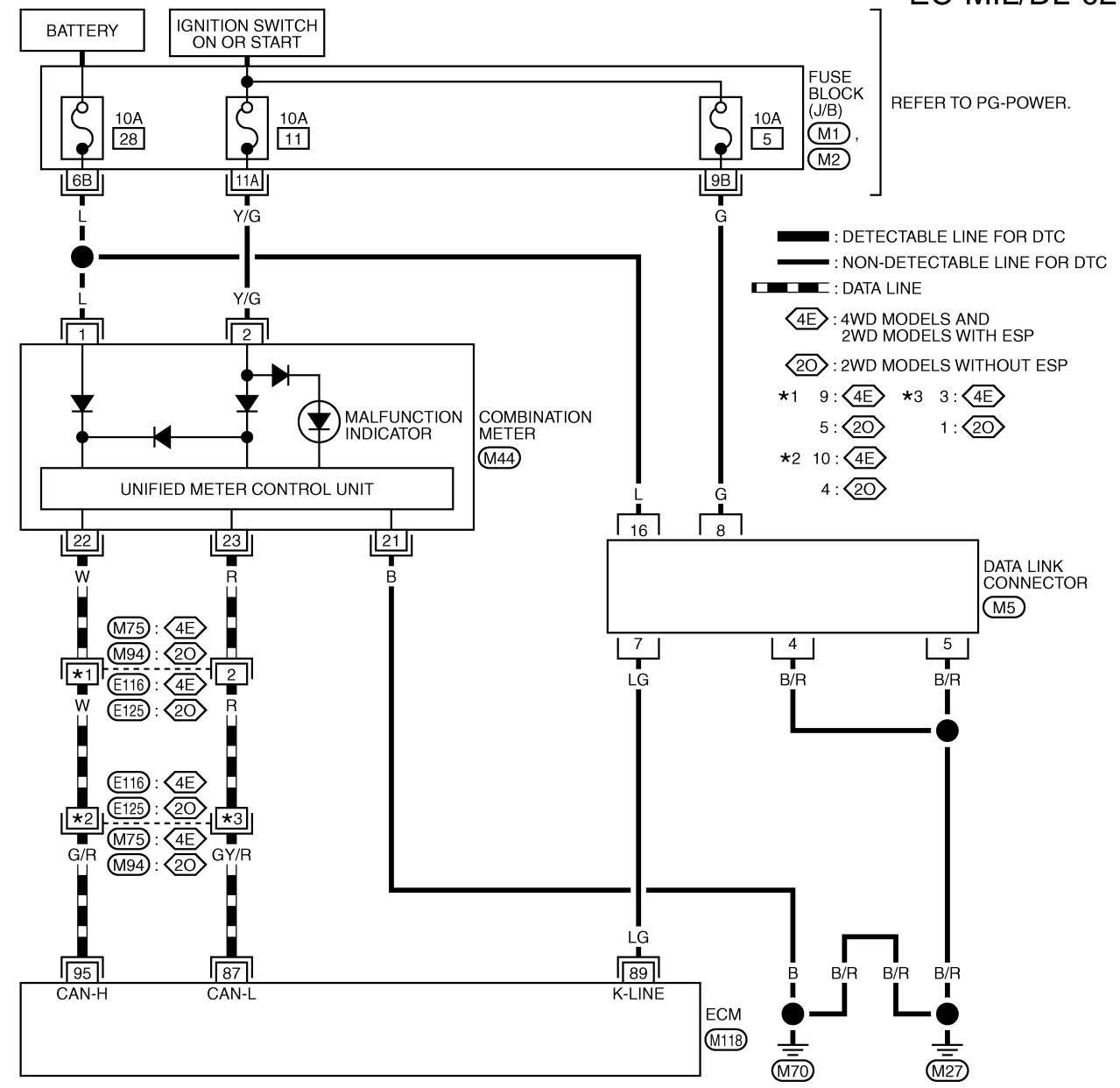


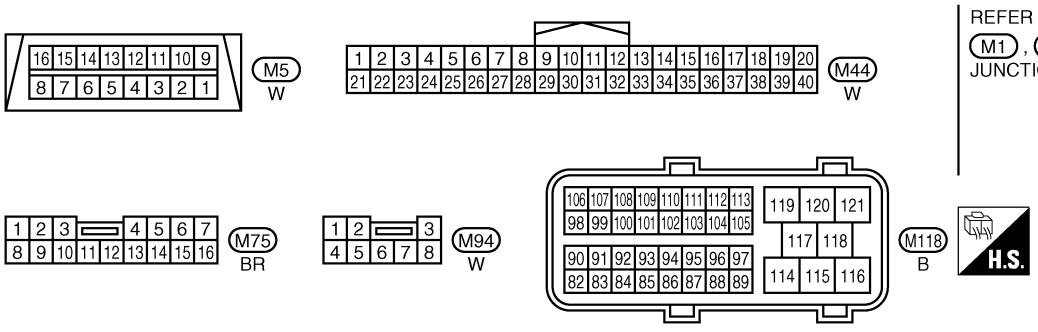
REFER TO THE FOLLOWING.
M1, M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWA0585E

RHD MODELS

EC-MIL/DL-02





REFER TO THE FOLLOWING.
M1, M2 -FUSE BLOCK-JUNCTION BOX (J/B)

TBWB0646E

AUTOMATIC SPEED CONTROL DEVICE (ASCD)

PFP:18930

System Description

BBS002GR

INPUT/OUTPUT SIGNAL CHART

Sensor	Input signal to ECM	ECM function	Actuator
ASCD brake switch	Brake pedal operation	ASCD vehicle speed control	Fuel injector and Fuel pump
Stop lamp switch	Brake pedal operation		
ASCD clutch switch	Clutch pedal operation		
ASCD steering switch	ASCD steering switch operation		
Combination meter	Vehicle speed*		

*: This signal is sent to the ECM through CAN communication line.

BASIC ASCD SYSTEM

Refer to Owner's Manual for ASCD operating instructions.
Automatic Speed Control Device (ASCD) allows a driver to keep vehicle at predetermined constant speed without depressing accelerator pedal. Driver can set vehicle speed in advance between approximately 40 km/h (25 MPH) and 185 km/h (115 MPH).
ECM controls fuel injection value to regulate engine speed.
Operation status of ASCD is indicated by CRUISE indicator and SET indicator in combination meter. If any malfunction occurs in ASCD system, it automatically deactivates control.

SET OPERATION

Press ASCD MAIN switch. (The CRUISE indicator in combination meter illuminates.)
When vehicle speed reaches a desired speed between approximately 40 km/h (25 MPH) and 185 km/h (115 MPH), press SET switch. (Then SET indicator in combination meter illuminates.)

ACCELERATE OPERATION

If the RESUME/ACCELERATE switch is depressed during cruise control driving, increase the vehicle speed until the switch is released or vehicle speed reaches maximum speed controlled by the system.
And then ASCD will keep the new set speed.

CANCEL OPERATION

When any of following conditions exist, cruise operation will be canceled.

- CANCEL switch is depressed
- More than 2 switches at ASCD steering switch are depressed at the same time (Set speed will be cleared.).
- Brake pedal is depressed
- Clutch pedal is depressed or gear position is changed to the neutral position
- Vehicle speed increased to 13 km/h higher than the set speed
- Vehicle speed decreased to 13 km/h lower than the set speed
- ESP system is operated

When the ECM detects any of the following conditions, the ECM will cancel the cruise operation and inform the driver by blinking indicator lamp.

- Malfunction for some self-diagnoses regarding ASCD control: SET lamp will blink quickly.

If MAIN switch is turned to OFF during ASCD is activated, all of ASCD operations will be canceled and vehicle speed memory will be erased.

COAST OPERATION

When the SET/COAST switch is depressed during cruise control driving, decrease vehicle set speed until the switch is released. And then ASCD will keep the new set speed.

RESUME OPERATION

When the RESUME/ACCELERATE switch is depressed after cancel operation other than depressing MAIN switch is performed, vehicle speed will return to last set speed. To resume vehicle set speed, vehicle condition must meet following conditions.

- Brake pedal is released
- Clutch pedal is released

- Vehicle speed is greater than 40 km/h (25 MPH) and less than 185 km/h (115 MPH)

Component Description

BBS002GS

ASCD STEERING SWITCH

Refer to EC-1668 .

ASCD BRAKE SWITCH

Refer to EC-1655 and EC-1779 .

ASCD CLUTCH SWITCH

Refer to EC-1655 .

STOP LAMP SWITCH

Refer to EC-1655 and EC-1779 .

ASCD INDICATOR

Refer to EC-1810 .

SERVICE DATA AND SPECIFICATIONS (SDS)

PFP:00100

General Specifications

BBS002J1

Target idle speed	No load* (in Neutral position)	725 ± 25 rpm
Air conditioner: ON	In Neutral position	850 ± 25 rpm
Maximum engine speed		4,900 rpm

*: Under the following conditions:

- Air conditioner switch: OFF
- Electric load: OFF (Lights, heater fan & rear window defogger)
- Steering wheel: Kept in straight-ahead position

Mass Air Flow Sensor

BBS002H1

Supply voltage	Battery voltage (11 - 14V)
Ignition switch ON (Engine stopped.)	Approx. 0.4V
Idle (Engine is warmed up to normal operating temperature.)	1.3 - 1.6V

*: Engine is warmed up to normal operating temperature and running under no load.

Intake Air Temperature Sensor

BBS002J2

Temperature °C (°F)	Resistance kΩ
25 (77)	1.800 - 2.200
80 (176)	0.283 - 0.359

Engine Coolant Temperature Sensor

BBS002H2

Temperature °C (°F)	Resistance kΩ
20 (68)	2.1 - 2.9
50 (122)	0.68 - 1.00
90 (194)	0.236 - 0.260

Fuel Rail Pressure Sensor

BBS002H3

Supply voltage	Approximately 5V
Idle (Engine is warmed up to normal operating temperature.)	1.7 - 2.0V
2,000 rpm (Engine is warmed up to normal operating temperature.)	2.0 - 2.3V

Fuel Injector

BBS002J3

Resistance [at 10 - 60°C (50 - 140°F)]	0.2 - 0.8Ω

Crankshaft Position Sensor

BBS002H6

Refer to EC-1629, "Component Inspection" .

Camshaft Position Sensor

BBS002H7

Refer to EC-1641, "Component Inspection" .

Glow Plug

BBS002H4

Resistance [at 25°C (77°F)]	Approximately 0.8Ω

EGR Volume Control Valve

BBS002H5

Resistance [at 25°C (77°F)]	13 - 17Ω

Fuel Pump

BBS002J4

Resistance [at 10 - 60°C (50 - 140°F)]	1.5 - 3.0Ω