ENGINE (DIAGNOSTICS)(STI)

EN(STI)(diag)

1. Basic Diagnostic Procedure
2. Check List for Interview
3. General Description
4. Electrical Component Location
5. Engine Control Module (ECM) I/O Signal
6. Data Link Connector
7. General Scan Tool
8. Subaru Select Monitor
9. Read Diagnostic Trouble Code (DTC)
10. Inspection Mode
11. Drive Cycle
12. Clear Memory Mode
13. Active Test
14. Malfunction Indicator Light
15. Diagnostics for Engine Starting Failure
16. Diagnostic Procedure for Subaru Select Monitor Communication
17. List of Diagnostic Trouble Code (DTC)
18. Diagnostic Procedure with Diagnostic Trouble Code (DTC)
19. Diagnostic Procedure without Diagnostic Trouble Code (DTC)
20. General Diagnostic Table

PROCEDURE

1. ENGINE

1. CHECK ENGINE START FAILURE.

1. Ask the customer when and how the trouble occurred using the interview check list. Ref. to ENGINE (DIAGNOSTICS)(STI)>Check List for Interview>CHECK.
2. Start the engine.

Does the engine start?

Yes	Go to 2.
No	Inspection using "Diagnostics for Engine Starting Failure". Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostics for Engine Starting Failure.

2. CHECK ILLUMINATION OF MALFUNCTION INDICATOR LIGHT.

Check the lighting condition of the malfunction indicator light.

Does the malfunction indicator light illuminate?

Yes	Go to 3.
No	Inspection using "General Diagnostic Table". Ref. to ENGINE (DIAGNOSTICS)(STI)>General Diagnostic Table.

3. CHECK COMMUNICATION STATUS.

1. Turn the ignition switch to OFF.
2. Connect the Subaru Select Monitor or general scan tool to the data link connector.
3. Turn the ignition switch to ON, and run the Subaru Select Monitor or general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to the "Subaru Select Monitor". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Does Subaru Select Monitor or general scan tool communicate with vehicle normally?

Yes	Go to 4.
No	Inspection using "Diagnostic Procedure for Subaru Select Monitor Communication". Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure for Subaru Select Monitor Communication.

4. CHECK DTC.

Read DTC using Subaru Select Monitor or general scan tool.
Note:
- **Subaru Select Monitor**
  For detailed operation procedures, refer to "Read Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).
- **General scan tool**
  For detailed operation procedures, refer to the general scan tool operation manual.

Is DTC displayed on Subaru Select Monitor or general scan tool?

Yes	Record DTC and freeze frame data, then repair the trouble cause. Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC). after repair, go to the next step. Go to 5.
No	Repair the related parts. **Note:** **If DTC is not shown on display although the malfunction indicator light illuminates, perform the diagnosis of malfunction indicator light circuit or combination meter. Ref. to ENGINE (DIAGNOSTICS)(STI)>Malfunction Indicator Light.**

5. PERFORM DIAGNOSIS.

1. Perform the Clear Memory Mode. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Perform the Inspection Mode or Drive Cycle. Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.

Is DTC displayed on Subaru Select Monitor or general scan tool?

Yes	Inspect using “Diagnostic Procedure with Diagnostic Trouble Code (DTC)”. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC).
No	Finish the diagnosis.

CHECK

1. CHECK LIST NO. 1

Check the following item when problem has occurred.

Note:

Use copies of this page for interviewing customers.

Customer's name		Engine No.	
Date of purchase		Fuel type	
Date of repair		Odometer reading	km
V.I.N.			miles
Weather	❑ Fine ❑ Cloudy ❑ Rainy ❑ Snowy ❑ Various/Others:		
Ambient air temperature	°C (°F)		
	❑ Hot ❑ Warm ❑ Cool ❑ Cold		
Place	❑ Highway ❑ Suburbs ❑ Inner city ❑ Uphill ❑ Downhill ❑ Rough road ❑ Others:		
Engine temperature	❑ Cold ❑ Warming-up ❑ After warming-up ❑ Any temperature ❑ Others:		
Engine speed	rpm		
Vehicle speed	km/h (MPH)		
Driving conditions	❑ Not affected ❑ At starting ❑ While idling ❑ At racing ❑ While accelerating ❑ While cruising ❑ While decelerating ❑ While turning (RH/LH)		

Headlight	❑ ON/❑ OFF	Rear defogger	❑ ON/❑ OFF
Blower	❑ ON/❑ OFF	Audio	❑ ON/❑ OFF
A/C compressor	❑ ON/❑ OFF	Rear entertainment system	❑ ON/❑ OFF
Radiator fan	❑ ON/❑ OFF	Car phone	❑ ON/❑ OFF
Front wiper	❑ ON/❑ OFF	Wireless device	❑ ON/❑ OFF
Rear wiper	❑ ON/❑ OFF		
Type of engine oil			
• Grade • Viscosity			
Use of additives (engine oil): ❑ Yes / ❑ No			
• Parts			
Refueling of wrong fuel: ❑ Yes / ❑ No			
• Date of refueling • Type of fuel			
Refueling at a gas station that is not usually used: ❑ Yes / ❑ No			
• Date of refueling • Type of fuel			
Use of additives (fuel): ❑ Yes / ❑ No			
• Parts			

2. CHECK LIST NO. 2

Check the following items about the vehicle’s state when the malfunction indicator light turns on and DTC is recorded.

Note:

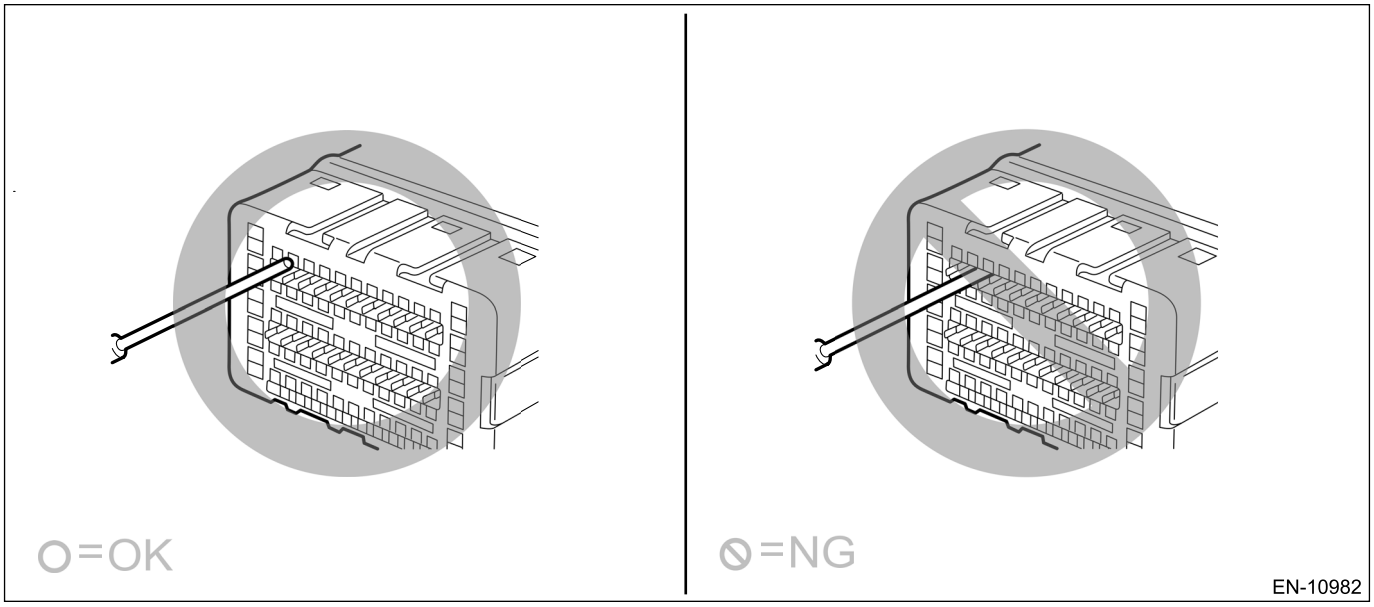
Use copies of this page for interviewing customers.

a) Other warning lights or indicators illuminate: ❑ Yes / ❑ No
❑ Fuel level warning light ❑ Charge warning light ❑ Engine coolant temperature warning light ❑ Oil pressure warning light ❑ ATF temperature warning light or Sport indicator light ❑ Driver’s control center differential indicator light ❑ ABS warning light ❑ VDC warning light ❑ Cruise indicator light ❑ SI-CRUISE warning light ❑ Immobilizer indicator light ❑ STEERING warning light ❑ Electronic parking brake warning light ❑ Glow indicator light ❑ Sedimenter warning light ❑ Others:

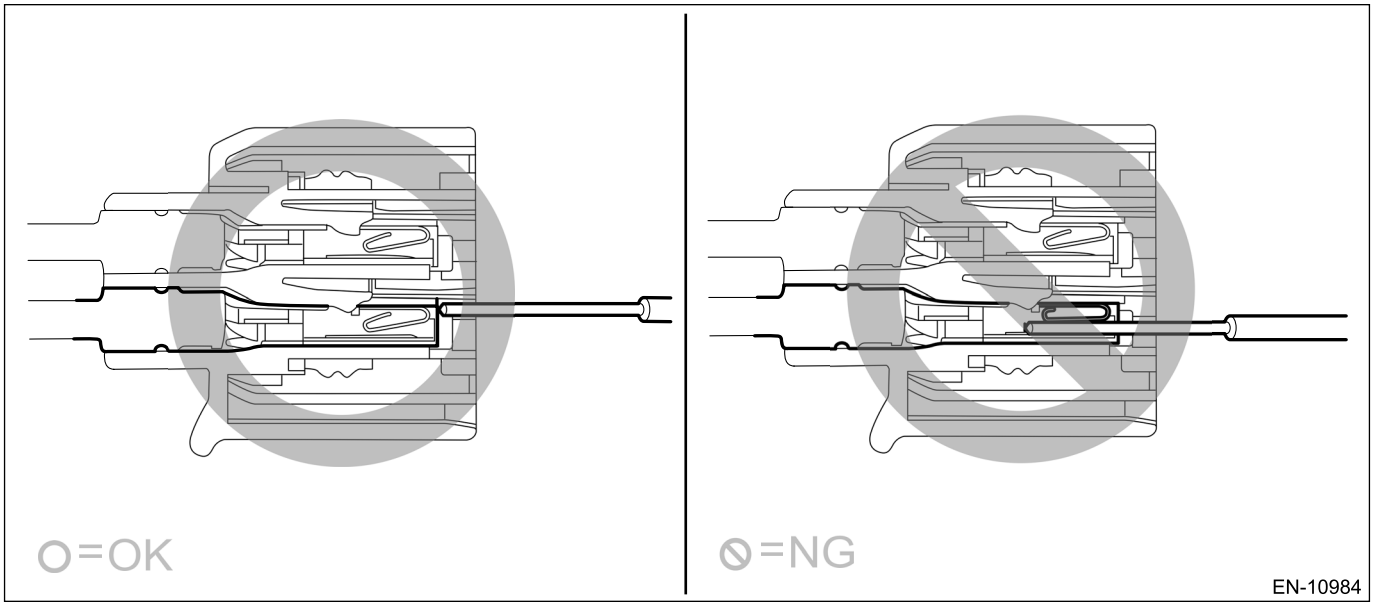
b) Fuel level
• Lack of fuel: ❑ Yes / ❑ No • Indicator position of fuel gauge: • Experienced running out of fuel: ❑ Yes / ❑ No
c) Intentional connecting or disconnecting of connectors or spark plug cords: ❑ Yes / ❑ No
• What:
d) Intentional connecting or disconnecting of hoses: ❑ Yes / ❑ No
• What:
e) Installing of other parts except genuine parts: ❑ Yes / ❑ No
• What: • Where:
f) Occurrence of noise: ❑ Yes / ❑ No
• From where: • What kind:
g) Occurrence of smell: ❑ Yes / ❑ No
• From where: • What kind:
h) Intrusion of water into engine compartment or passenger compartment: ❑ Yes / ❑ No
i) Troubles occurred
❑ Engine does not start. ❑ Engine stalls during idling. ❑ Engine stalls while driving. ❑ Engine speed decreases. ❑ Engine speed does not decrease. ❑ Rough idling ❑ Poor acceleration ❑ Back fire ❑ After fire ❑ Does not shift. ❑ Excessive shift shock

CAUTION

1. Airbag system wiring harness is routed near the ECM, main relay and fuel pump relay.
   Caution:
   - **Do not use electrical test equipment on the airbag system circuits.**
   - **Be careful not to damage the airbag system wiring harness when servicing the ECM, TCM, main relay and fuel pump relay.**
2. Never connect the battery in reverse polarity. Doing so will damage the ECM instantly, and other parts will also be damaged.
3. Do not disconnect the battery cables while the engine is running. A large counter electromotive force will be generated in the generator, and this voltage may damage electronic parts such as ECM etc.
4. When disconnecting the connectors of the electrical components, always be sure to turn the ignition switch to OFF. Perform the Clear Memory Mode after connecting the connectors. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
5. When measuring the voltage or resistance of individual sensor or all electrical control modules, use a tapered pin with a diameter of 0.6 mm (0.024 in) or less and touch it to the tip of terminal.



Never insert the tapered pin into the terminal because it deforms inside which may lead to a malfunction.



Caution:

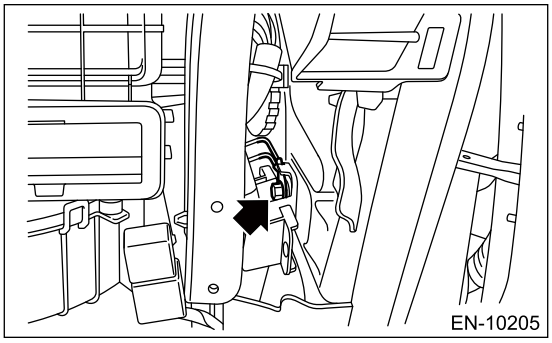
When replacing the ECM, be careful not to use the ECM of wrong specification to avoid any damage on the fuel injection system.

Note:

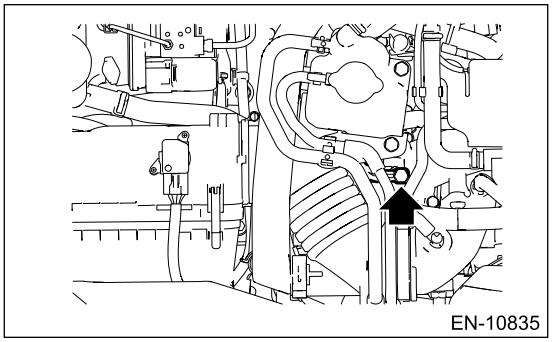
When replacing the ECM of the models with immobilizer, immobilizer system must be registered. For detailed operation procedure, refer to the "REGISTRATION MANUAL FOR IMMOBILIZER".

6. Take care not to allow water to get into the connectors when servicing or washing the vehicle in rainy weather. Avoid exposure to water even if the connectors are waterproof.

7. Use the ground terminal of the bulkhead harness for the grounding point when measuring voltage and resistance inside the passenger compartment.



8. Use the engine ground terminal or engine assembly for the grounding point when measuring the voltage and resistance in engine compartment.



9. All parts related to the engine control system are precision parts. Do not drop or otherwise apply impact. Do not reuse the parts that are dropped accidentally.
10. Observe the following cautions when installing a radio in vehicle.
    Caution:
    - **The antenna must be kept as far apart as possible from the ECM. Ref. to ENGINE (DIAGNOSTICS)(STI)>Electrical Component Location>LOCATION > CONTROL MODULE.**
    - **The antenna feeder must be placed as far apart as possible from the ECM and engine control system harness.**
    - **Carefully adjust the antenna for correct matching.**
    - **When mounting a large power type radio, pay special attention to the three items mentioned above.**
    - **Incorrect installation of the radio may affect the operation of ECM.**
11. When disconnecting the fuel hose, be sure to release the fuel pressure beforehand. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel>PROCEDURE > RELEASING OF FUEL PRESSURE.
12. Warning lights may illuminate when performing driving test with jacked-up or lifted-up condition, but this is not a system malfunction. The reason for this is the rotating speed difference between the front and rear wheels. After diagnosis of engine control system, perform the VDC memory clear procedure of self-diagnosis function. Ref. to VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)>Clear Memory Mode.

ENGINE (DIAGNOSTICS)(STI) > General Description

INSPECTION

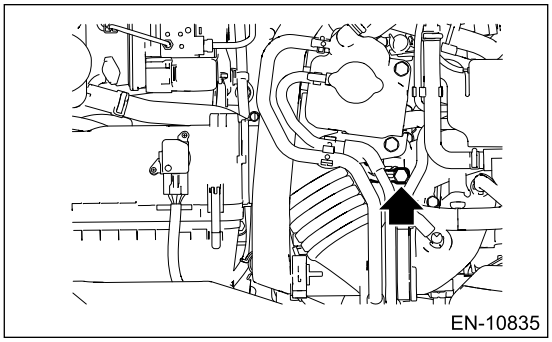
Before performing diagnostics, check the following item which might affect engine problems.

1. BATTERY

1. Check the battery voltage. Ref. to STARTING/CHARGING SYSTEMS(STI)>Battery>INSPECTION.
2. Check the condition of the main and other fuses, and harnesses and connectors. Also check for proper grounding.

2. ENGINE GROUND

Make sure that the engine ground terminal is properly connected to the engine.



ENGINE (DIAGNOSTICS)(STI) > General Description

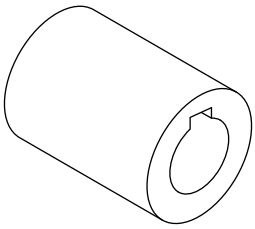
NOTE

- The on-board diagnostic (OBD) system detects and indicates a fault in various inputs and outputs of the complex electronic control. Malfunction indicator light in the combination meter indicates occurrence of a fault or trouble.
- Further, against any failure of sensors that would cause the vehicle to stop running, the fail-safe function is provided to ensure the minimal drivability.
- The OBD system incorporated with the vehicles within this type of engine complies with OBD-II regulations. The OBD system monitors the components and the system malfunction listed in “Engine Section” which affects on emissions.
- When the system decides that a malfunction occurs, malfunction indicator light illuminates. At the same time of the malfunction indicator light illumination or blinking, a DTC and a freeze frame engine conditions are stored into on-board computer.
- The OBD system stores freeze frame engine condition data (engine load, engine coolant temperature, fuel trim, engine speed and vehicle speed, etc.) into on-board computer when it detects a malfunction.
- Freeze frame engine condition data are stored until the DTCs are cleared. However when such malfunctions as fuel trim fault and misfire are detected with the freeze frame engine condition data stored, they are rewritten into those related to the fuel trim fault and misfire.
- When the malfunction does not occur again for three consecutive driving cycles*, malfunction indicator light is turned off, but DTC remains at on-board computer.
  *: One driving cycle means the period between the ignition switch ON and the ignition switch OFF after driving.
- When performing diagnosis, connect the Subaru Select Monitor or general scan tool to the vehicle.

ENGINE (DIAGNOSTICS)(STI) > General Description

PREPARATION TOOL

1. SPECIAL TOOL

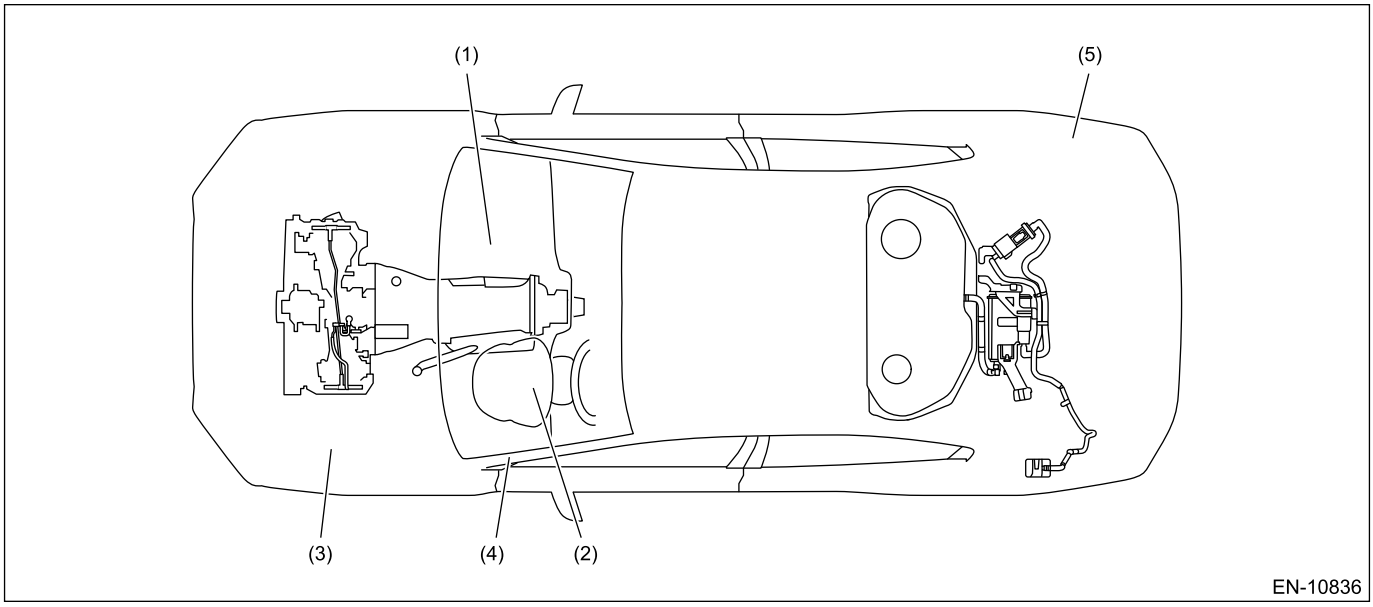
ILLUSTRATION	TOOL NUMBER	DESCRIPTION	REMARKS
 STSSM4	—	SUBARU SELECT MONITOR 4	Used for setting of each function and troubleshooting for electrical system. **Note:** **For detailed operation procedures of Subaru Select Monitor 4, refer to "Application help".**
 ST-499987500	499987500	CRANKSHAFT SOCKET	Used for rotating crankshaft.

2. GENERAL TOOL

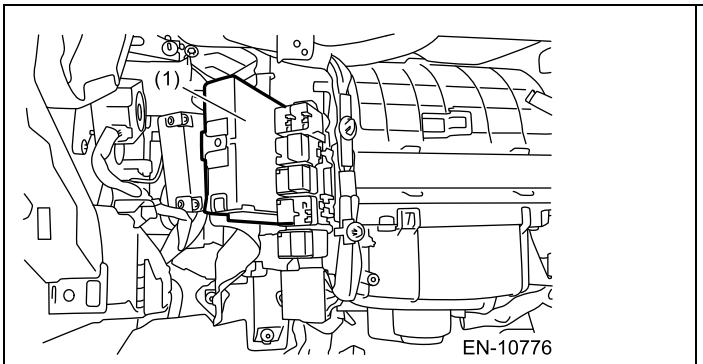
TOOL NAME	REMARKS
Circuit tester	Used for measuring resistance, voltage and current.
Oscilloscope	Used for measuring the sensor.
DST-i	Used together with Subaru Select Monitor 4.

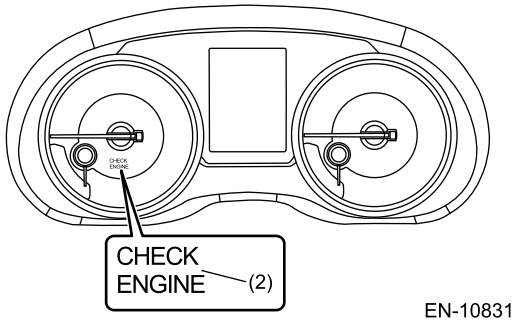
LOCATION

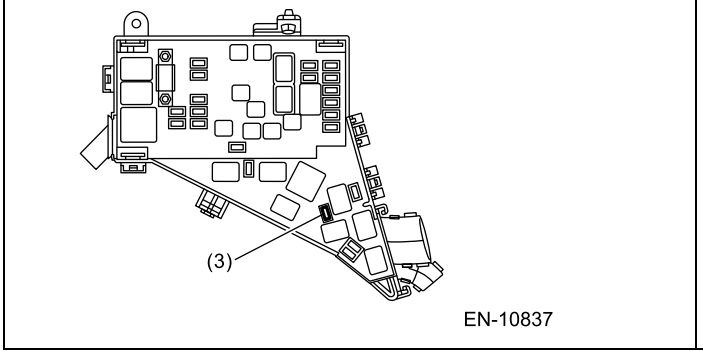
1. CONTROL MODULE

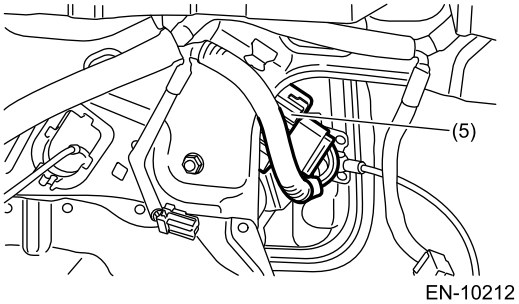


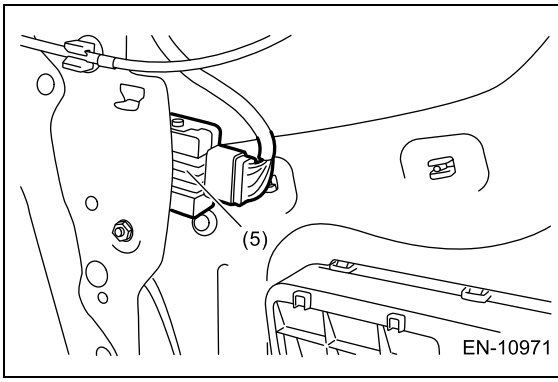
(1) Engine control module (ECM)
(2) Malfunction indicator light
(3) Delivery mode fuse
(4) Data link connector
(5) Fuel pump control unit



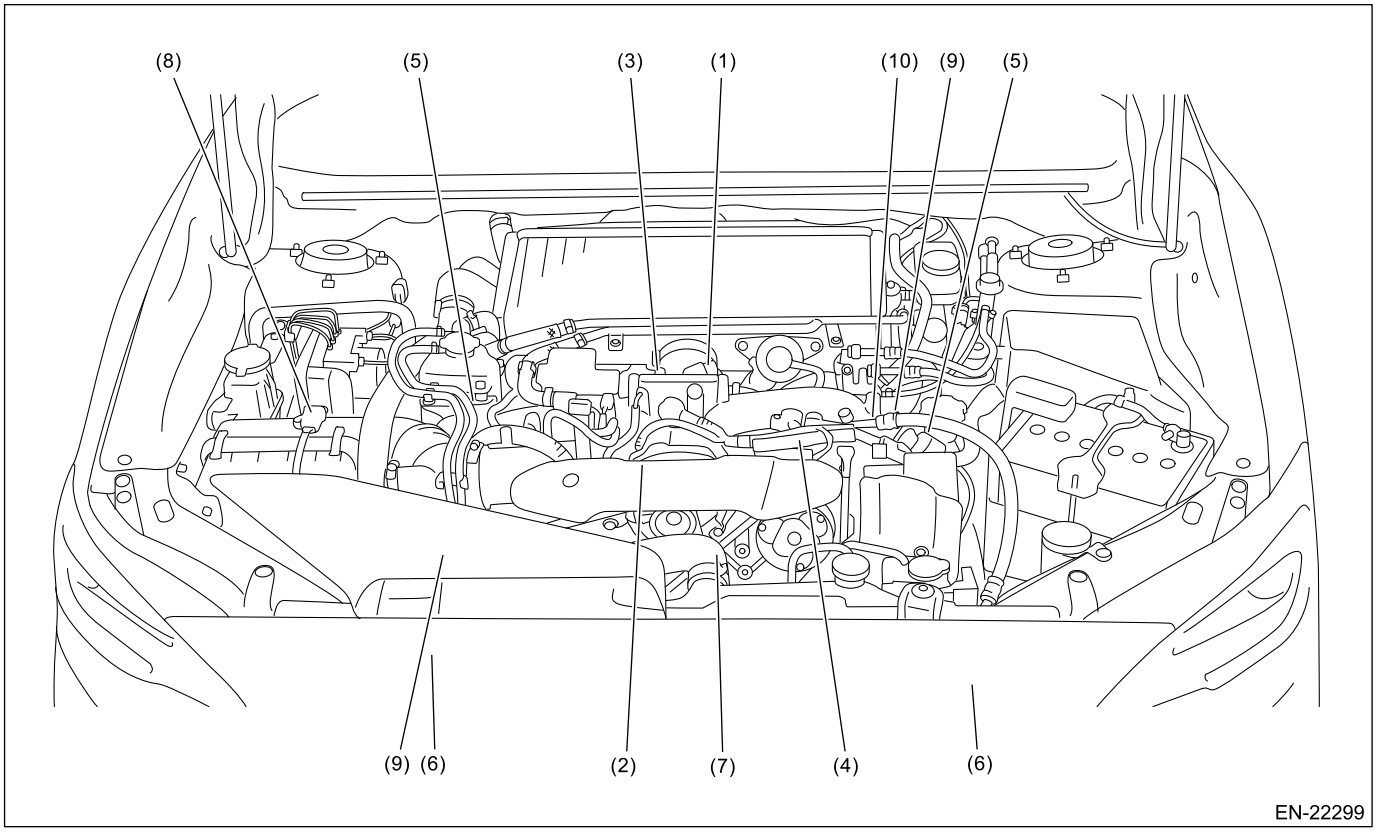




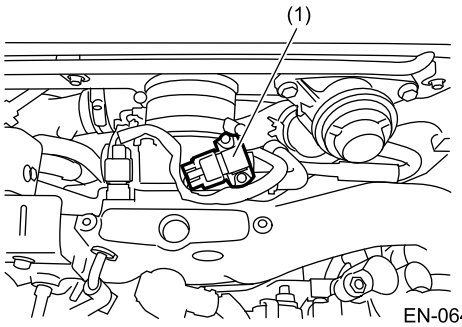




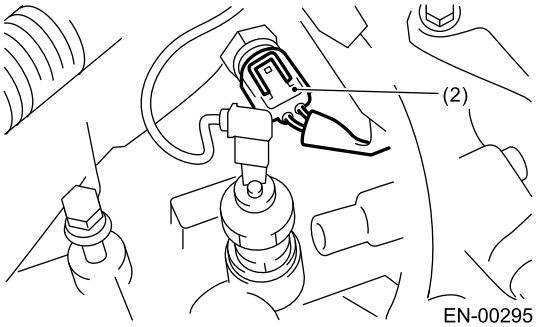
2. SENSOR



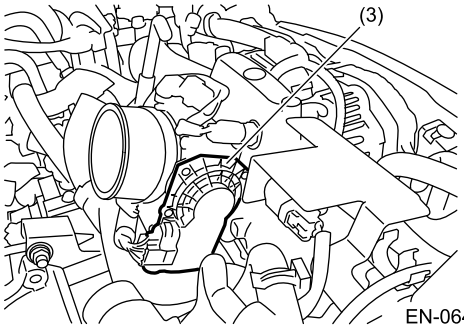
(1) Manifold absolute pressure sensor
(2) Engine coolant temperature sensor
(3) Electronic throttle control
(4) Knock sensor
(5) Intake camshaft position sensor
(6) Exhaust camshaft position sensor
(7) Crankshaft position sensor
(8) Mass air flow and intake air temperature sensor
(9) Tumble generator valve ASSY (with built-in sensor)
(10) Secondary air combination valve LH (with built-in sensor)



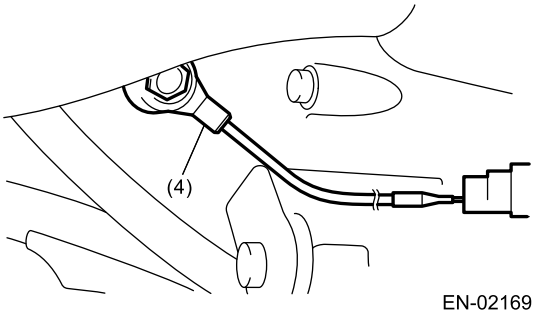
EN-06418



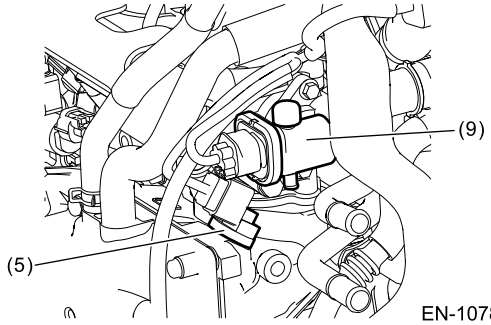
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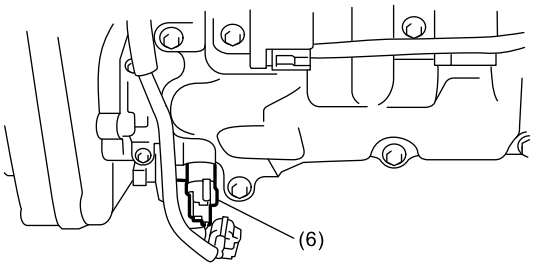
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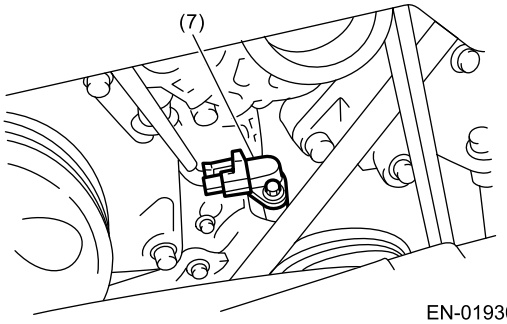
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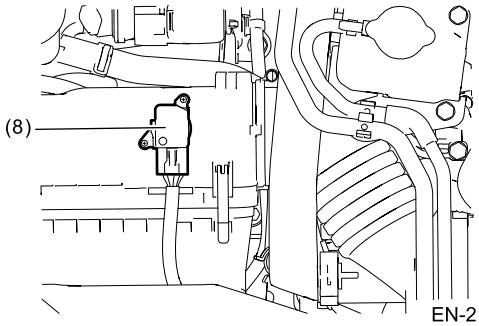
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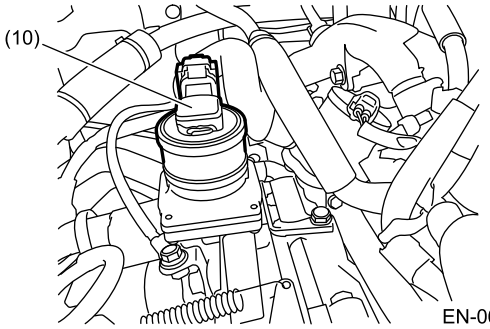
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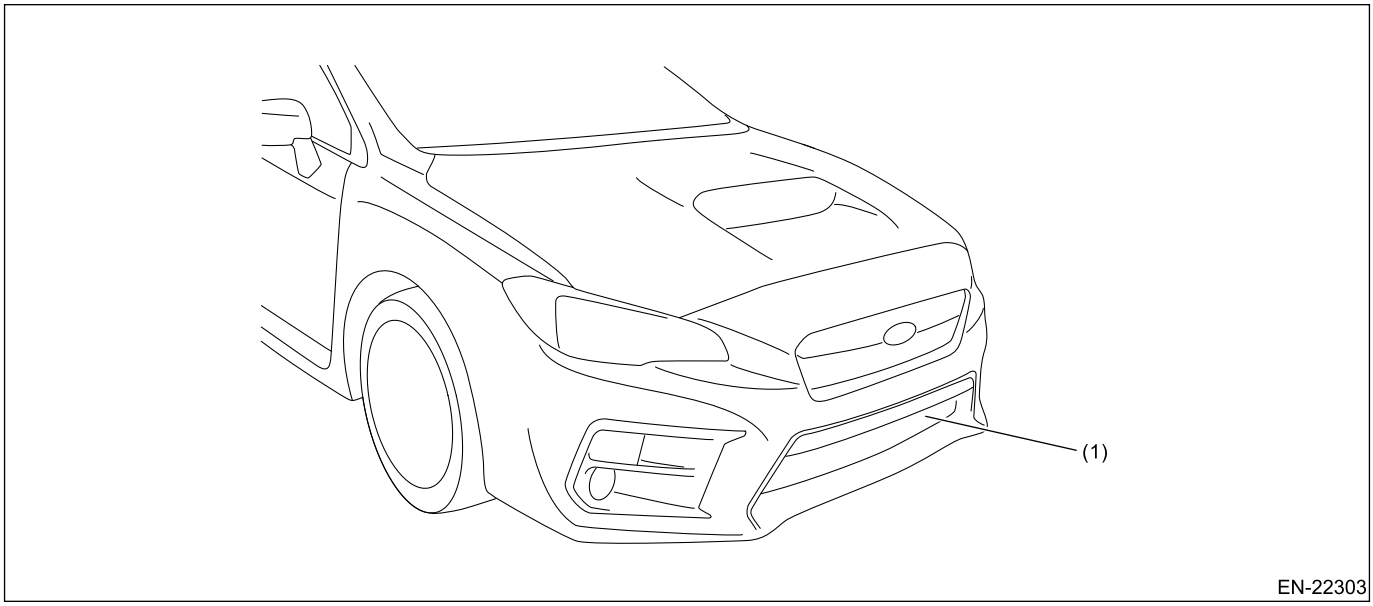
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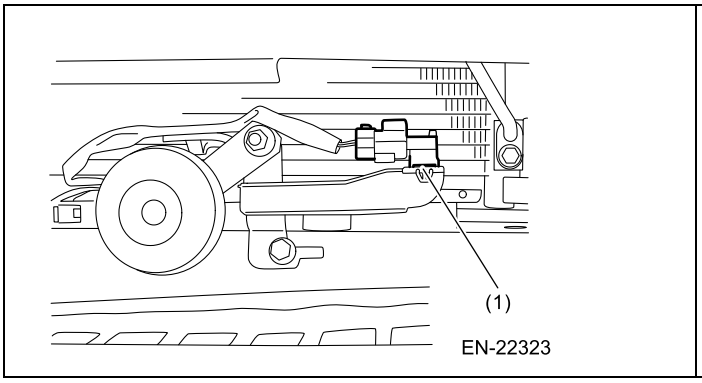
EN-21147

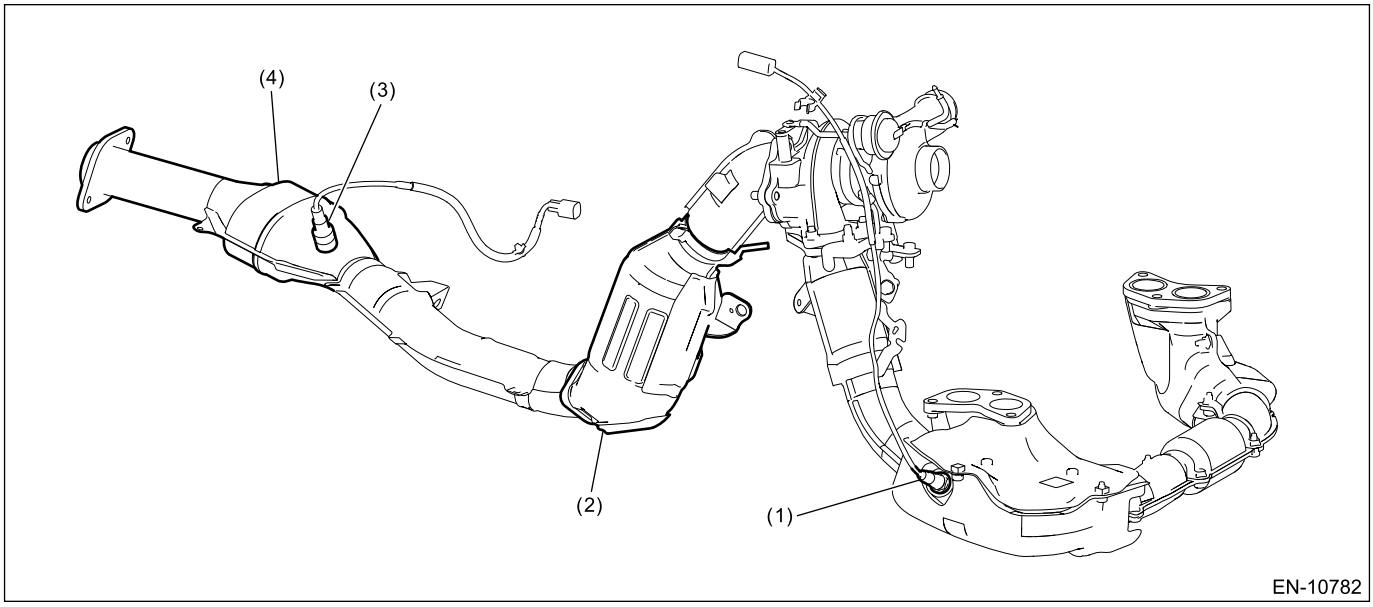


EN-06421

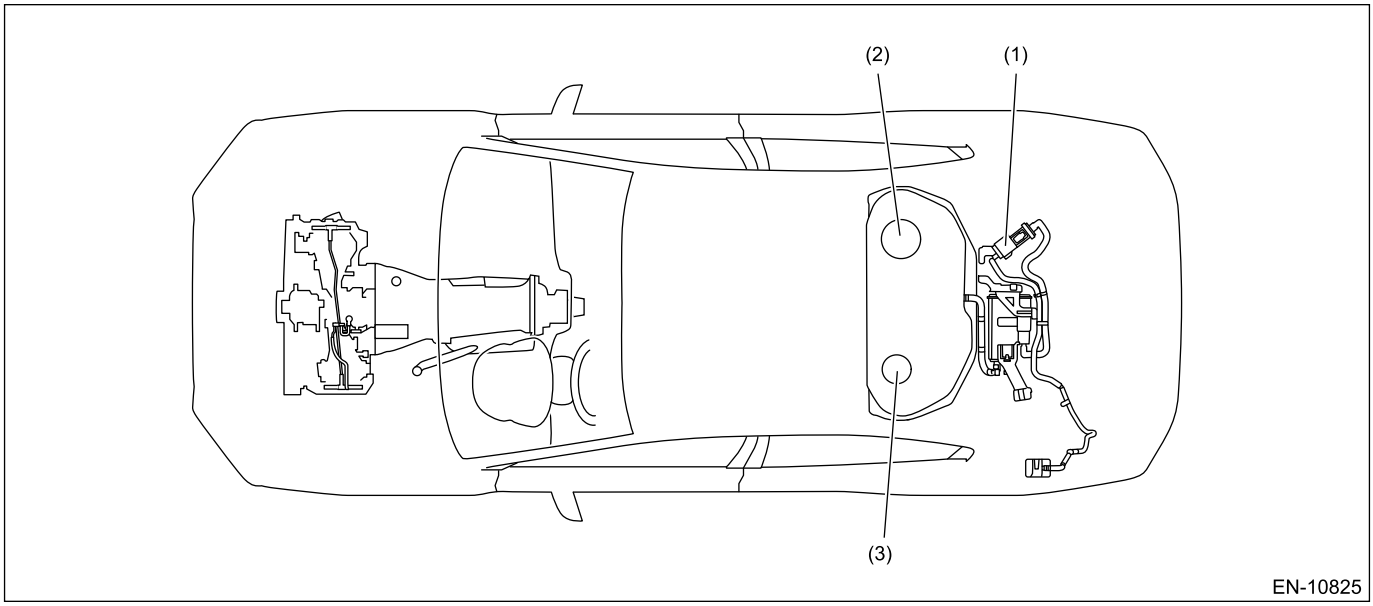


(1) Ambient sensor

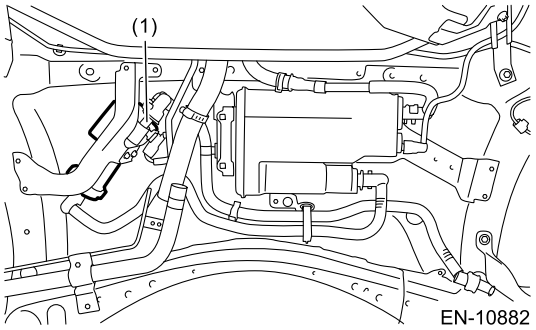


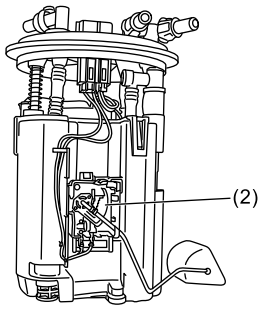


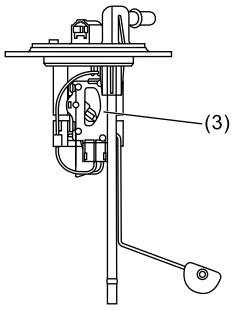
(1) Front oxygen (A/F) sensor
(2) Front catalytic converter
(3) Rear oxygen sensor
(4) Rear catalytic converter



(1) Leak check valve ASSY (with built-in pressure sensor)
(2) Fuel level sensor
(3) Fuel sub level sensor

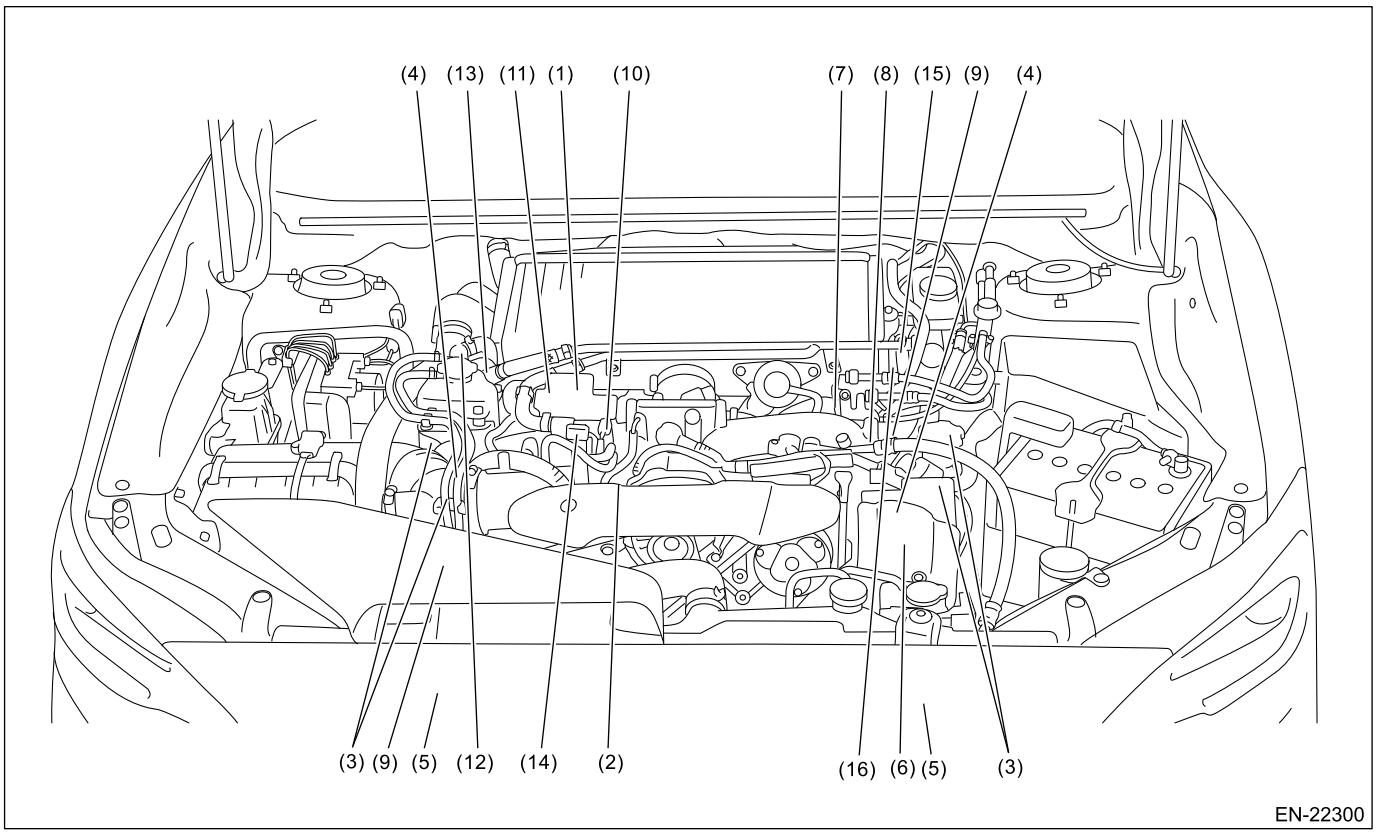




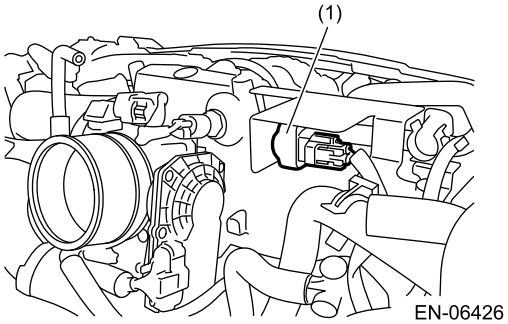


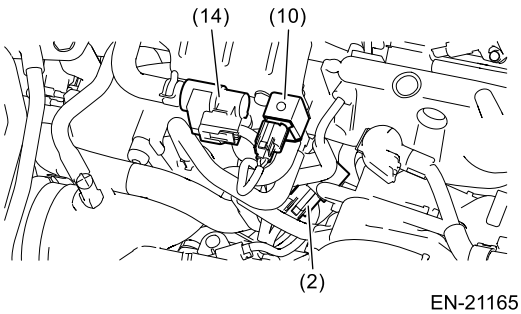
3. SOLENOID VALVE, ACTUATOR, EMISSION CONTROL SYSTEM PARTS AND

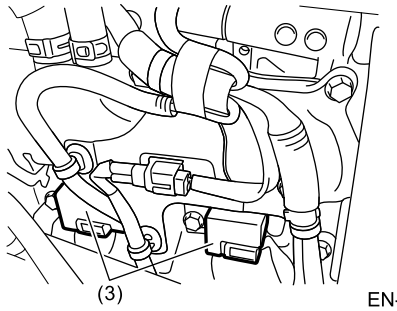
IGNITION SYSTEM PARTS



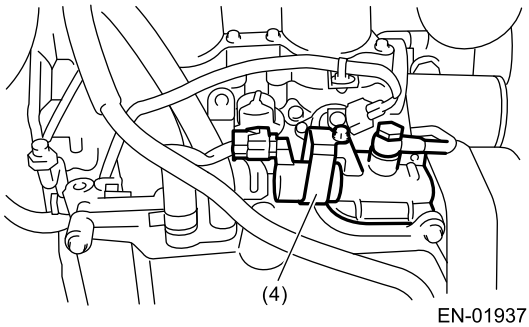
(1) Wastegate control solenoid valve
(2) Purge control solenoid valve 1
(3) Ignition coil
(4) Intake oil flow control solenoid valve
(5) Exhaust oil flow control solenoid valve
(6) Secondary air pump
(7) Secondary air combination valve RH
(8) Secondary air combination valve LH
(9) Tumble generator valve ASSY
(10) Purge control solenoid valve 2
(11) Leak diagnosis connector 1
(12) Leak diagnosis connector 2
(13) Leak diagnosis connector 3
(14) Leak diagnosis connector 4
(15) Leak diagnosis connector 5
(16) Leak diagnosis connector 6



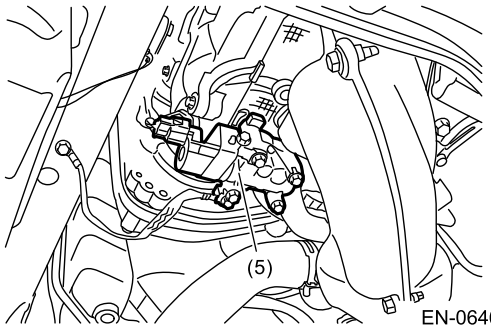




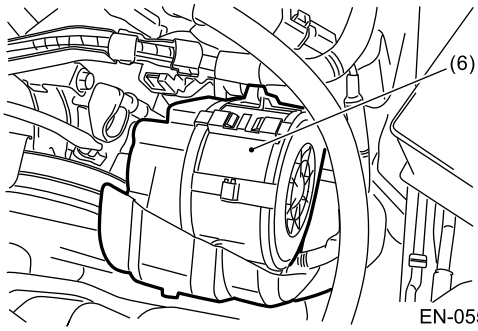
EN-21149



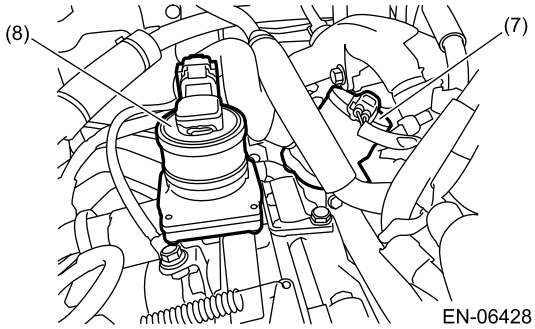
EN-01937



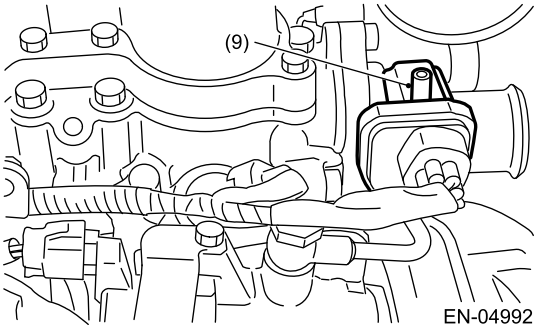
EN-06460



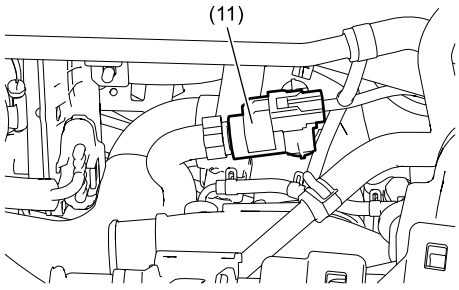
EN-05586



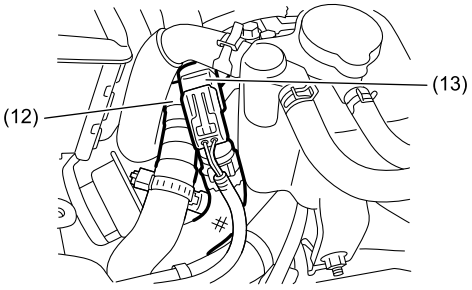
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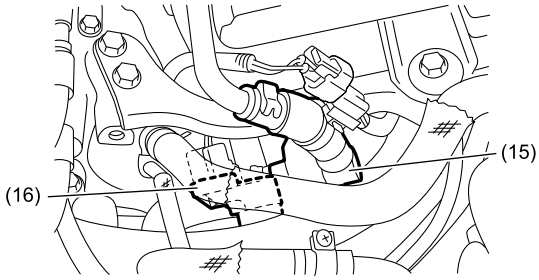
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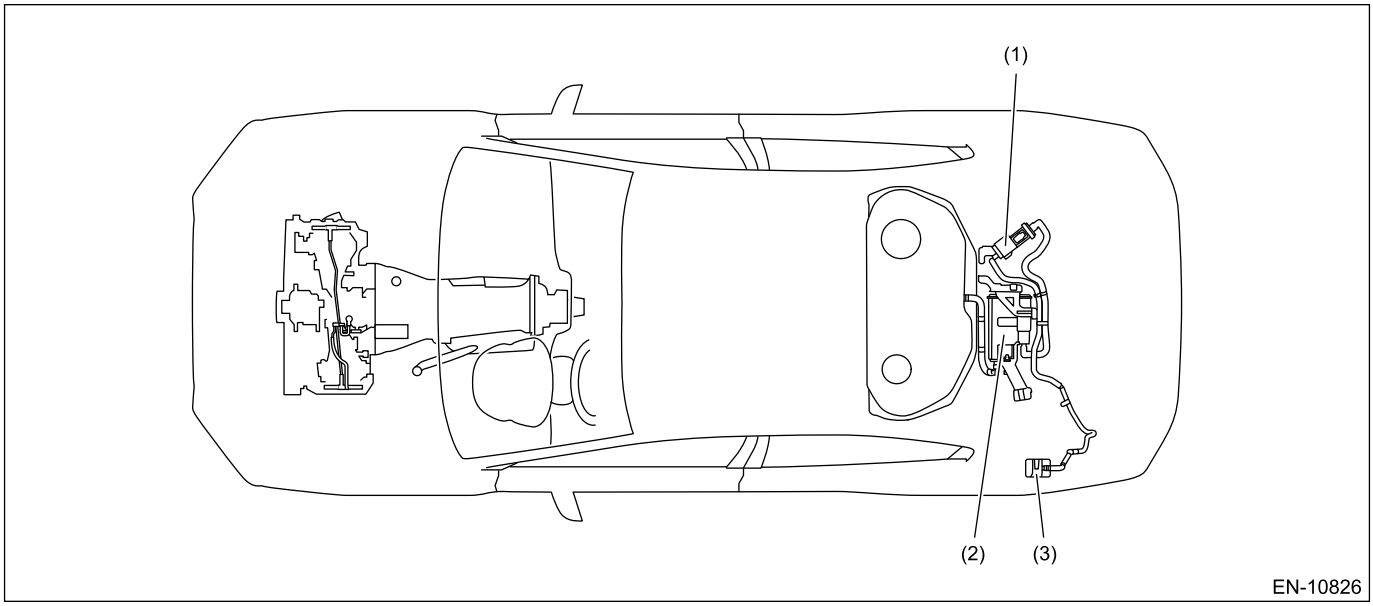
EN-21163



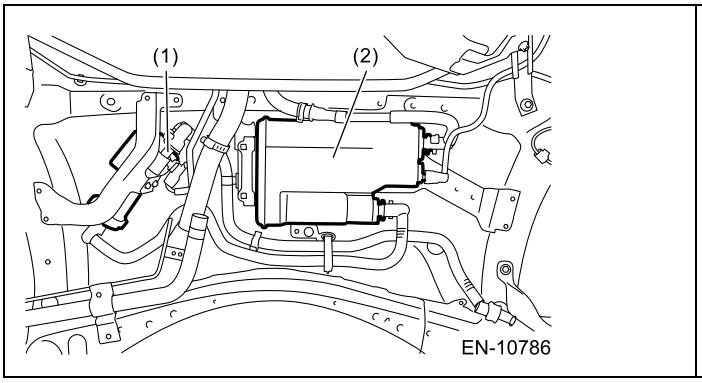
EN-21164

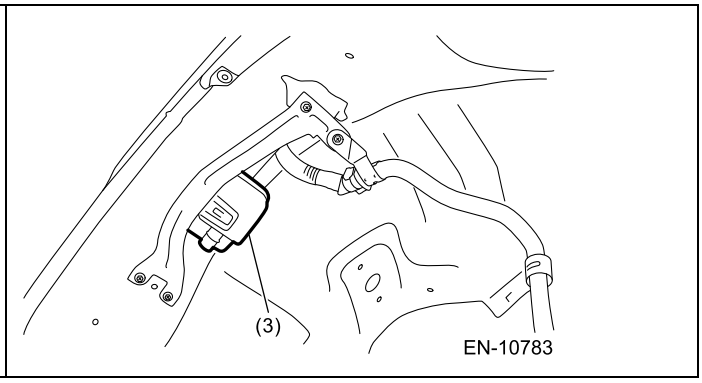


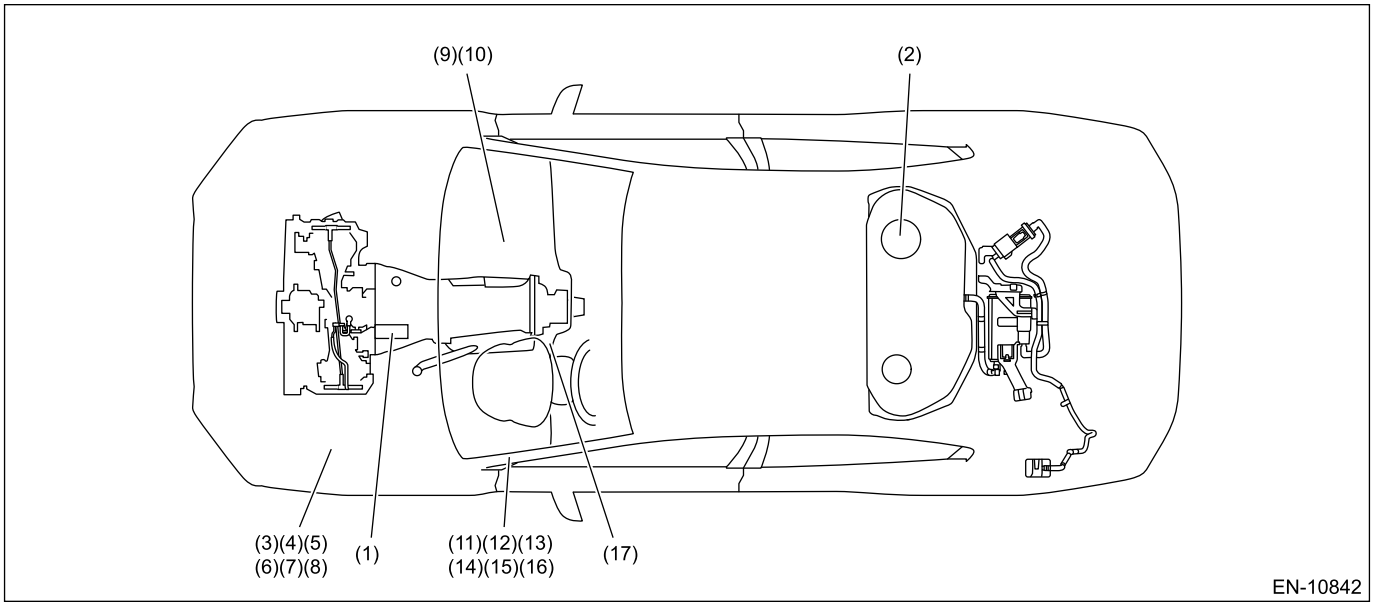
EN-21166



(1) Leak check valve ASSY (2) Canister (3) Drain filter







(1) Starter (7) Secondary air combination valve relay 2 (13) Starter relay 1

(2) Fuel pump

(3) Radiator main fan relay 1

(4) Radiator main fan relay 2

(5) Radiator sub fan relay

(6) Secondary air combination valve relay 1

(8) Secondary air pump relay

(9) Main relay

(10) Fuel pump relay

(11) A/F, oxygen sensor relay

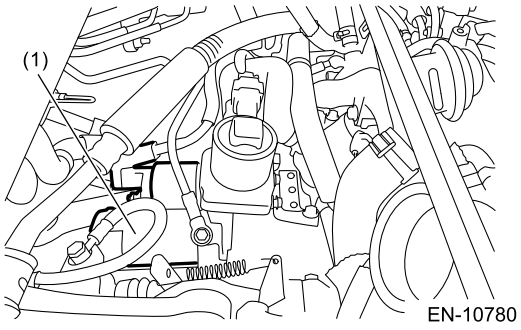
(12) Electronic throttle control relay

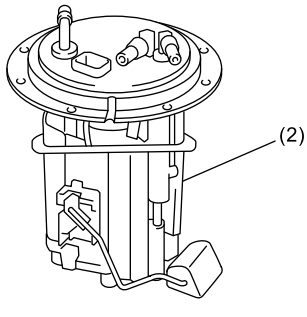
(14) Starter cut relay (model with push button start)

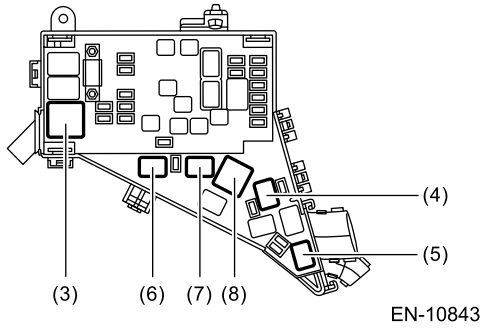
(15) IG relay 1 (push button start) (model with push button start)

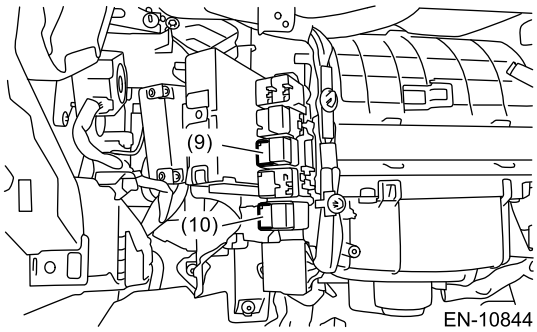
(16) Starter relay (push button start) (model with push button start)

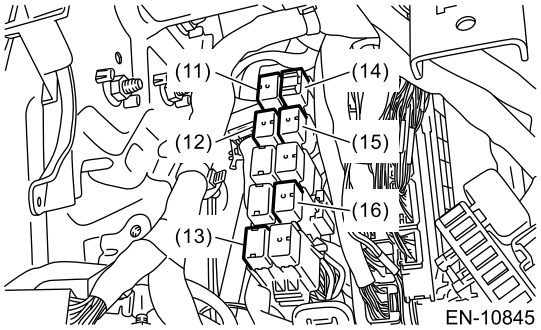
(17) Push button ignition switch (model with push button start)

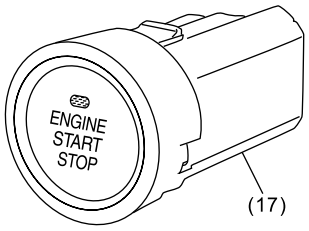




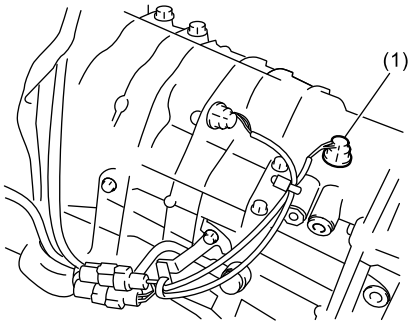






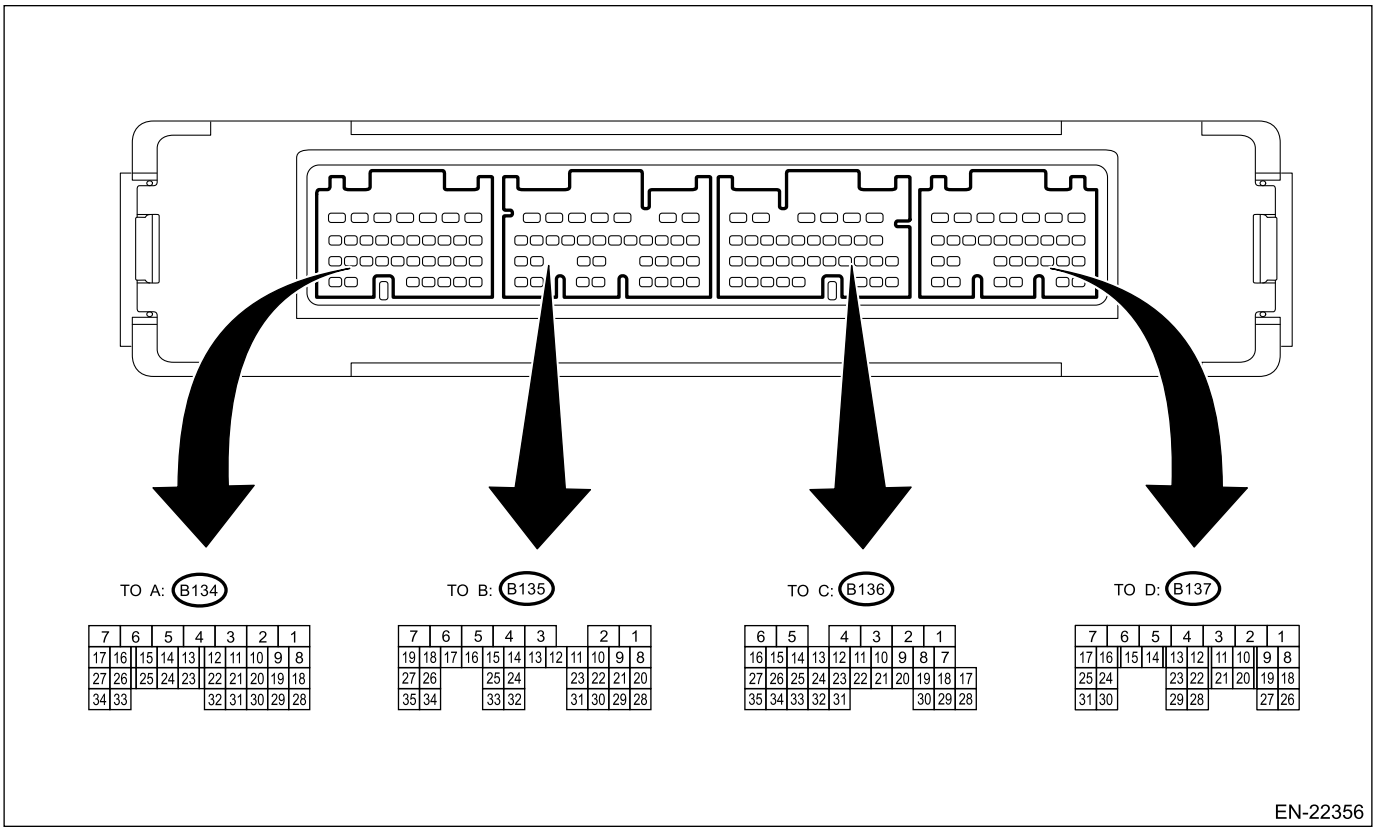


4. TRANSMISSION



(1) Neutral position switch

ELECTRICAL SPECIFICATION



Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Crankshaft position sensor	(+) signal	B137	17	0	−7 — +7	Waveform
	(−) signal	B137	25	0	0	—
	Shield	B137	31	0	0	—
Front oxygen (A/F) sensor	(+) signal	B136	19	2.8 — 3.2	2.8 — 3.2	—
	(−) signal	B136	18	2.4 — 2.7	2.4 — 2.7	—
	Heater signal 1	B136	6	Battery voltage	0 or battery voltage	—
	Heater signal 2	B136	5	Battery voltage	0 or battery voltage	—
Rear oxygen sensor	Signal	B136	20	0	0 — 0.9	—
	Heater signal	B135	6	Battery voltage	0 or battery voltage	—

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Oxygen sensor	Shield	B136	9	0	0	—
Engine coolant temperature sensor signal		B137	22	1 — 1.4	1 — 1.4	—
Air flow sensor	(+) signal	B136	22	—	0.3 — 4.5	—
	Shield	B136	10	0	0	—
	Ground	B136	11	0	0	—
Intake air temperature sensor signal		B136	31	0.3 — 4.6	0.3 — 4.6	—
Wastegate control solenoid valve		B134	33	0 or battery voltage	0 or battery voltage	—
Starter switch		B136	16	0	0	—
Accessory cut request		B135	32	Battery voltage	Battery voltage	Model with push button start Cranking: 0
Starter switch 2		B136	27	0	0	Model with push button start Cranking: Battery voltage
Starter cut relay		B135	34	0	0	Model with push button start Cranking: Battery voltage
Ignition switch		B136	30	Battery voltage	Battery voltage	—
Neutral position switch		B136	35	ON: 0 OFF: Battery voltage	ON: 0 OFF: Battery voltage	—
Delivery mode switch		B136	34	Battery voltage	Battery voltage	When connected: 0
Knock sensor	Signal	B137	2	2.45 — 2.55	2.45 — 2.55	—
	Shield	B137	8	0	0	—
Back-up power supply		B136	2	Battery voltage	Battery voltage	Ignition switch “OFF”: Battery voltage
Control module power supply		B136	1	Battery voltage	Battery voltage	—
		B137	7	Battery voltage	Battery voltage	—
Sensor power supply		B134	19	5	5	—

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
		B135	22	5	5	—
Ignition control	#1	B134	21	0	0 or 5	—
	#2	B134	22	0	0 or 5	—
	#3	B134	31	0	0 or 5	—
	#4	B134	32	0	0 or 5	—
Fuel injector	#1	B134	10	Battery voltage	0 or battery voltage	—
	#2	B134	11	Battery voltage	0 or battery voltage	—
	#3	B134	12	Battery voltage	0 or battery voltage	—
	#4	B134	13	Battery voltage	0 or battery voltage	—
Fuel pump control unit	Control	B136	33	0 or 5	0 or 5	—
	Diagnostic signal	B135	10	Battery voltage	Battery voltage	—
A/C relay control		B135	35	ON: 0.5 or less OFF: Battery voltage	ON: 0.5 or less OFF: Battery voltage	—
Main fan relay control		B135	12	ON: 0.5 or less OFF: Battery voltage	ON: 0.5 or less OFF: Battery voltage	—
Sub fan relay control		B135	11	ON: 0.5 or less OFF: Battery voltage	ON: 0.5 or less OFF: Battery voltage	—
Engine speed output		B135	15	—	0 or battery voltage	Model with push button start
Purge control solenoid valve 1		B137	6	ON: 1 or less OFF: Battery voltage	ON: 1 or less OFF: Battery voltage	—
Purge control solenoid valve 2		B137	15	ON: 1 or less OFF: Battery voltage	ON: 1 or less OFF: Battery voltage	—
Manifold absolute pressure sensor signal		B137	20	1.7 — 2.4	1.1 — 1.6	—
Power steering oil pressure switch		B137	28	Battery voltage	ON: 0 OFF: Battery voltage	—

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
SSM/GST communication line		B135	14	—	—	—
Intake camshaft position sensor	RH	B137	24	0 or 5	0 or 5	Waveform
	LH	B137	16	0 or 5	0 or 5	Waveform
Exhaust camshaft position sensor	RH	B137	23	0 or 5	0 or 5	Waveform
	LH	B137	29	0 or 5	0 or 5	Waveform
Camshaft position sensor ground		B137	30	0	0	—
Electronic throttle control	Main signal	B134	18	Approx. 0.9	Approx. 0.6 — 0.7	Fully closed: Approx. 0.6 Fully open: Approx. 4
	Sub signal	B134	28	Approx. 1.7	Approx. 1.5 — 1.6	Fully closed: Approx. 1.5 Fully open: Approx. 4.2
	Motor (+)	B134	2	Duty waveform	Duty waveform	Drive frequency: 500 Hz
	Motor (−)	B134	1	Duty waveform	Duty waveform	Drive frequency: 500 Hz
Electronic throttle control motor power supply		B135	7	Battery voltage	Battery voltage	—
Electronic throttle control motor relay		B135	17	0	0	—
Intake oil flow control solenoid valve	RH (+) signal	B134	34	0	0 or battery voltage	—
	RH (−) signal	B134	27	0	0	—
	LH (+) signal	B134	17	0	0 or battery voltage	—
	LH (−) signal	B134	16	0	0	—
Exhaust oil flow control	RH (+) signal	B134	7	0	0 or battery voltage	—

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
solenoid valve	RH (−) signal	B134	15	0	0	—
	LH (+) signal	B134	5	0	0 or battery voltage	—
	LH (−) signal	B134	14	0	0	—
Accelerator pedal position sensor	Main sensor signal	B135	23	Fully closed: 0.4 — 1 Fully opened: 2.4 — 3.7	Fully closed: 0.4 — 1 Fully opened: 2.4 — 3.7	—
	Main power supply	B135	21	5	5	—
	Ground (main sensor)	B135	29	0	0	—
	Sub sensor signal	B135	31	Fully closed: 0.3 — 1.1 Fully opened: 2.3 — 3.8	Fully closed: 0.3 — 1.1 Fully opened: 2.3 — 3.8	—
Starter relay		B135	26	ON: 0 OFF: Battery voltage	ON: 0 OFF: Battery voltage	ON: Cranking
A/C middle pressure switch		B136	7	ON: 0 OFF: Battery voltage	ON: 0 OFF: Battery voltage	—
Clutch switch		B135	9	When clutch pedal is depressed: 0 When clutch pedal is released: Battery voltage	When clutch pedal is depressed: 0 When clutch pedal is released: Battery voltage	—
Brake switch 1 (Brake switch)		B136	15	When brake pedal is depressed: 0 When brake pedal is released: Battery voltage	When brake pedal is depressed: 0 When brake pedal is released: Battery voltage	—

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
Brake switch 2 (Stop light switch)		B136	3	When brake pedal is depressed: Battery voltage When brake pedal is released: 0	When brake pedal is depressed: Battery voltage When brake pedal is released: 0	—
Cruise control command switch		B136	12	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	When operating nothing: 3.5 — 4.5 When operating RES/ACC: 2.5 — 3.5 When operating SET/COAST: 0.5 — 1.5 When operating CANCEL: 0 — 0.5	—
Cruise control main switch		B136	13	ON: 0 OFF: 5	ON: 0 OFF: 5	—
Immobilizer signal		B135	25	—	—	—
CAN communication (Hi)		B136	17	—	—	—
CAN communication (Lo)		B136	28	—	—	—
Blow-by leak diagnosis		B137	12	0	0	At the time of open circuit (fault): 5
Tumble generator valve RH	Position signal	B137	11	Fully closed: 0.4 — 1.2 Fully opened: 2.8 — 4.6	Fully closed: 0.4 — 1.2 Fully opened: 2.8 — 4.6	—
	Motor closed	B134	26	0 or battery voltage	0 or battery voltage	—
	Motor open	B134	25	0 or battery voltage	0 or battery voltage	—
Tumble generator valve LH	Position signal	B137	10	Fully closed: 0.4 — 1.2 Fully opened: 2.8 — 4.6	Fully closed: 0.4 — 1.2 Fully opened: 2.8 — 4.6	—

Description		Connector No.	Terminal No.	Signal (V)		Note
				Ignition SW ON (Engine OFF)	Engine ON (Idling)	
	Motor closed	B134	24	0 or battery voltage	0 or battery voltage	—
	Motor open	B134	23	0 or battery voltage	0 or battery voltage	—
Secondary air pipe pressure sensor signal		B137	9	2.2 — 2.8	2.2 — 2.8	When secondary air is inducted: 3.2 — 4.9
Secondary air combination valve relay 1		B135	8	ON: 0 OFF: Battery voltage	ON: 0 OFF: Battery voltage	—
Secondary air combination valve relay 2		B135	20	ON: 0 OFF: Battery voltage	ON: 0 OFF: Battery voltage	—
Secondary air pump relay		B135	27	ON: 0 OFF: Battery voltage	ON: 0 OFF: Battery voltage	—
Self-shutoff control		B135	13	0	0	—
Leak check valve assembly	Switching valve	B135	4	Battery voltage	Battery voltage	Operating: 0
	Pressure sensor	B136	21	1 — 4	1 — 4	When ignition switch is turned to ON: atmospheric pressure
	Vacuum pump	B137	27	Battery voltage	Battery voltage	Operating: 0
Ground	Sensor	B134	29	0	0	—
		B135	30	0	0	—
	Engine 1	B134	6	0	0	—
	Engine 2	B134	4	0	0	—
	Engine 3	B134	3	0	0	—
	Engine 4	B137	1	0	0	—
	Engine 5	B137	3	0	0	—
	Body	B136	4	0	0	—

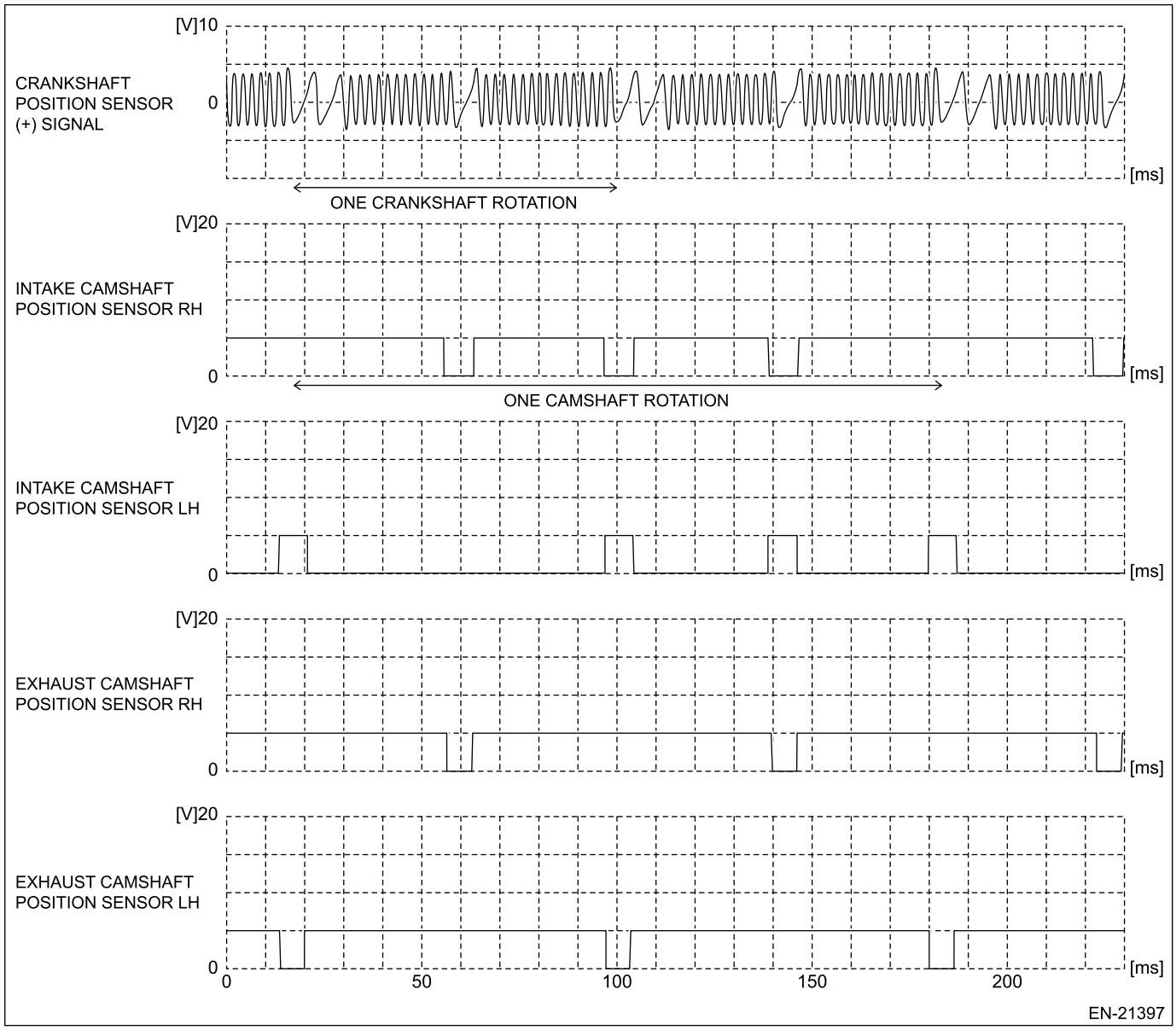
Measuring condition:

Note:

- **Perform measurement after warming up the engine.**
- **For measurement of the waveform of the crankshaft position sensor, we recommend using the DST-i oscilloscope function or a general oscilloscope.**

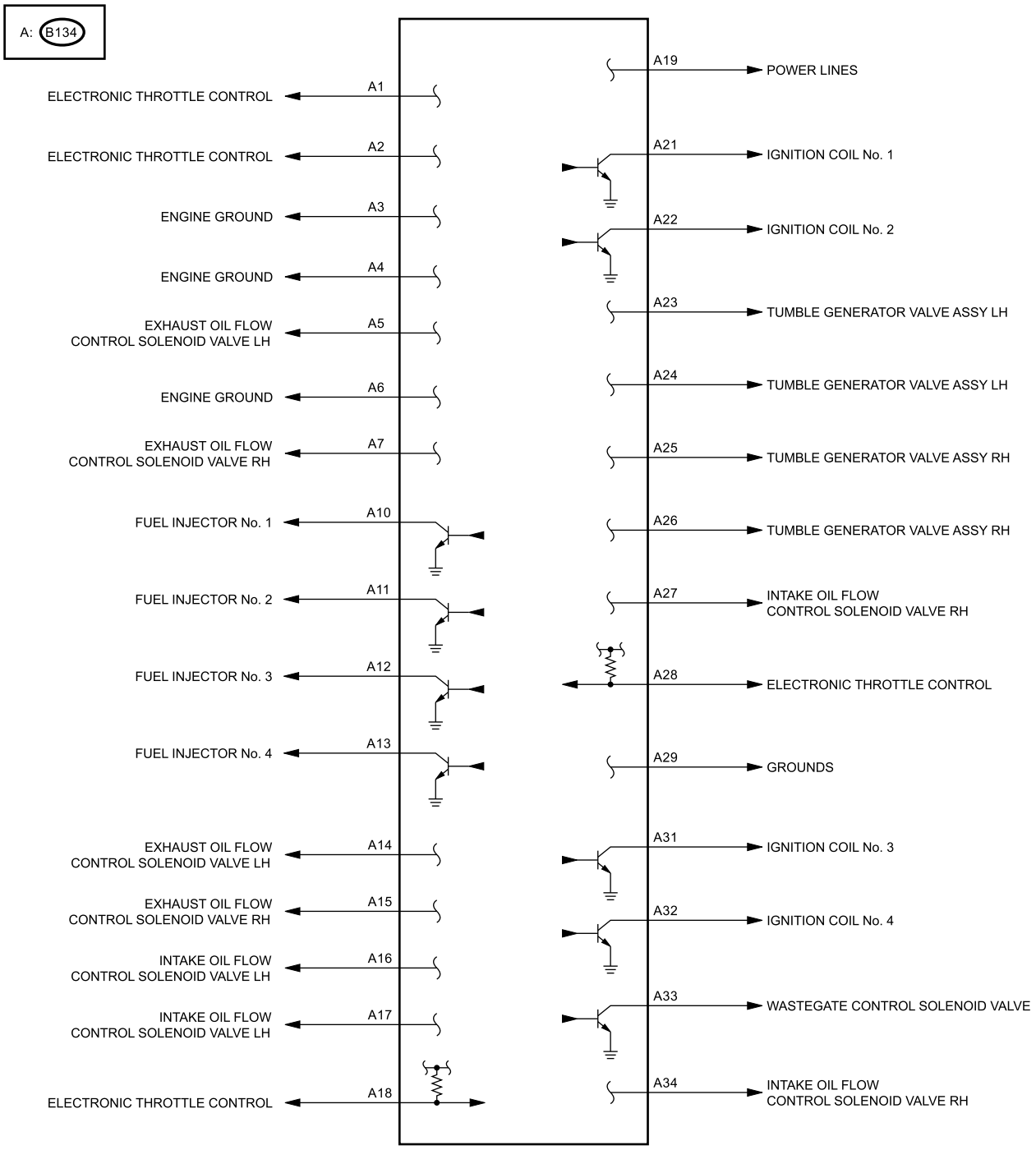
- Place the gear shift lever in the neutral position.
- Turn the A/C to OFF.
- Turn all the accessory switches to OFF.
- Waveforms vary depending on a measurement environment and vehicle condition.

Waveform

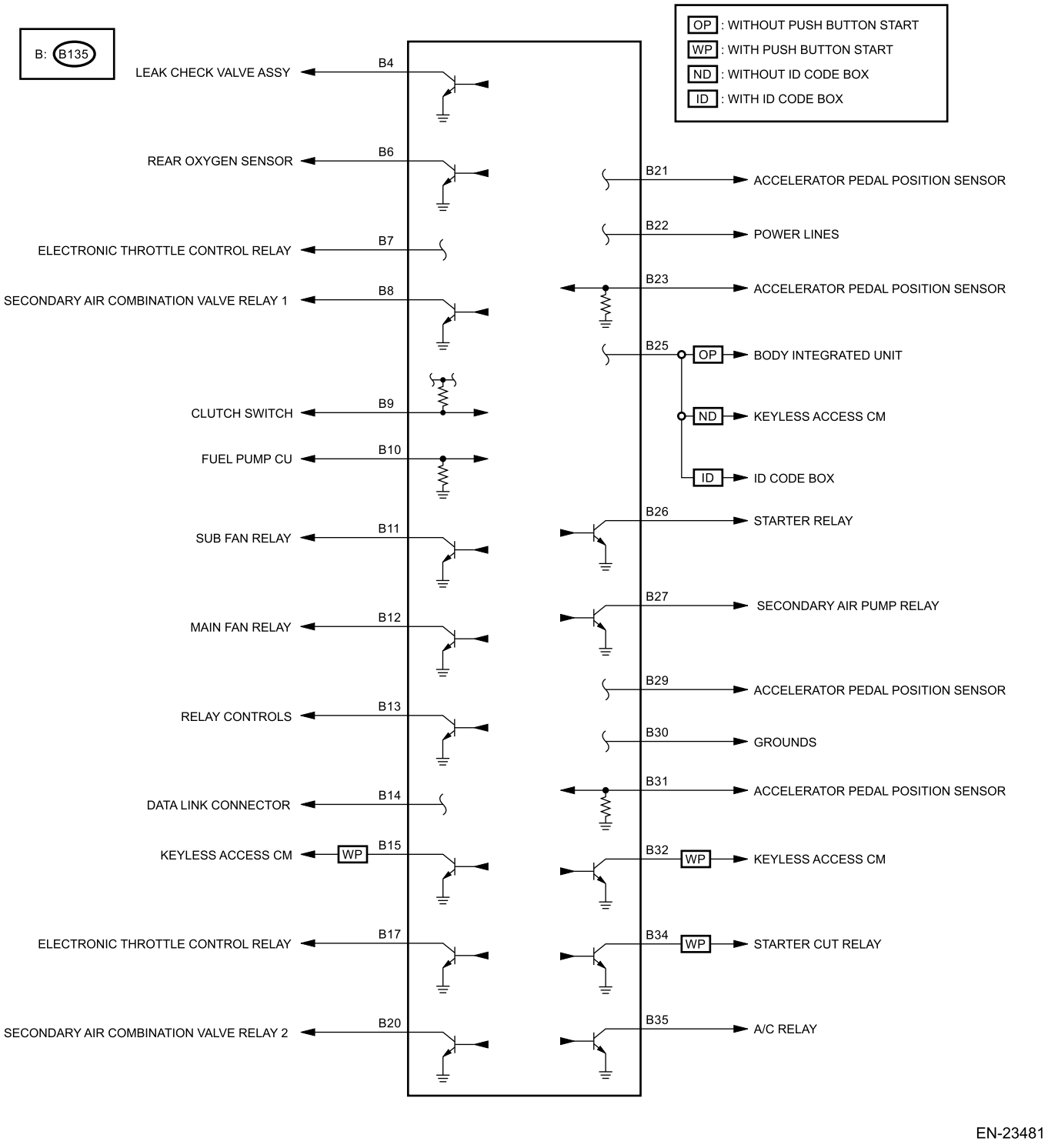


Measured terminal	Crankshaft position sensor (+) signal (B137) No. 17 (+) — Engine ground 3 (B134) No. 3 (−):
	Intake camshaft position sensor RH (B137) No. 24 (+) — Engine ground 3 (B134) No. 3 (−):
	Intake camshaft position sensor LH (B137) No. 16 (+) — Engine ground 3 (B134) No. 3 (−):
	Exhaust camshaft position sensor RH (B137) No. 23 (+) — Engine ground 3 (B134) No. 3 (−):
	Exhaust camshaft position sensor LH (B137) No. 29 (+) — Engine ground 3 (B134) No. 3 (−):

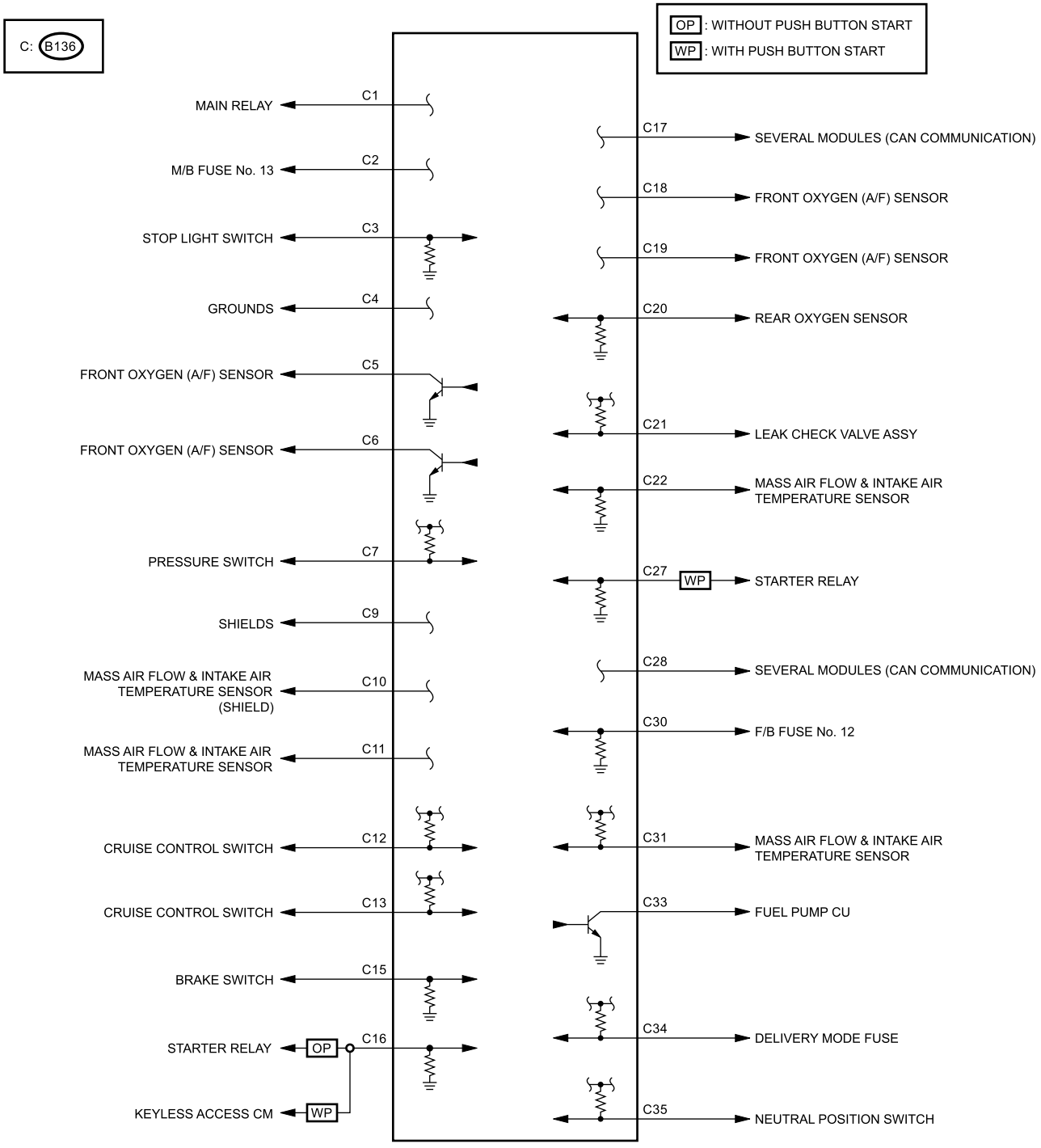
Measuring condition	While engine idling



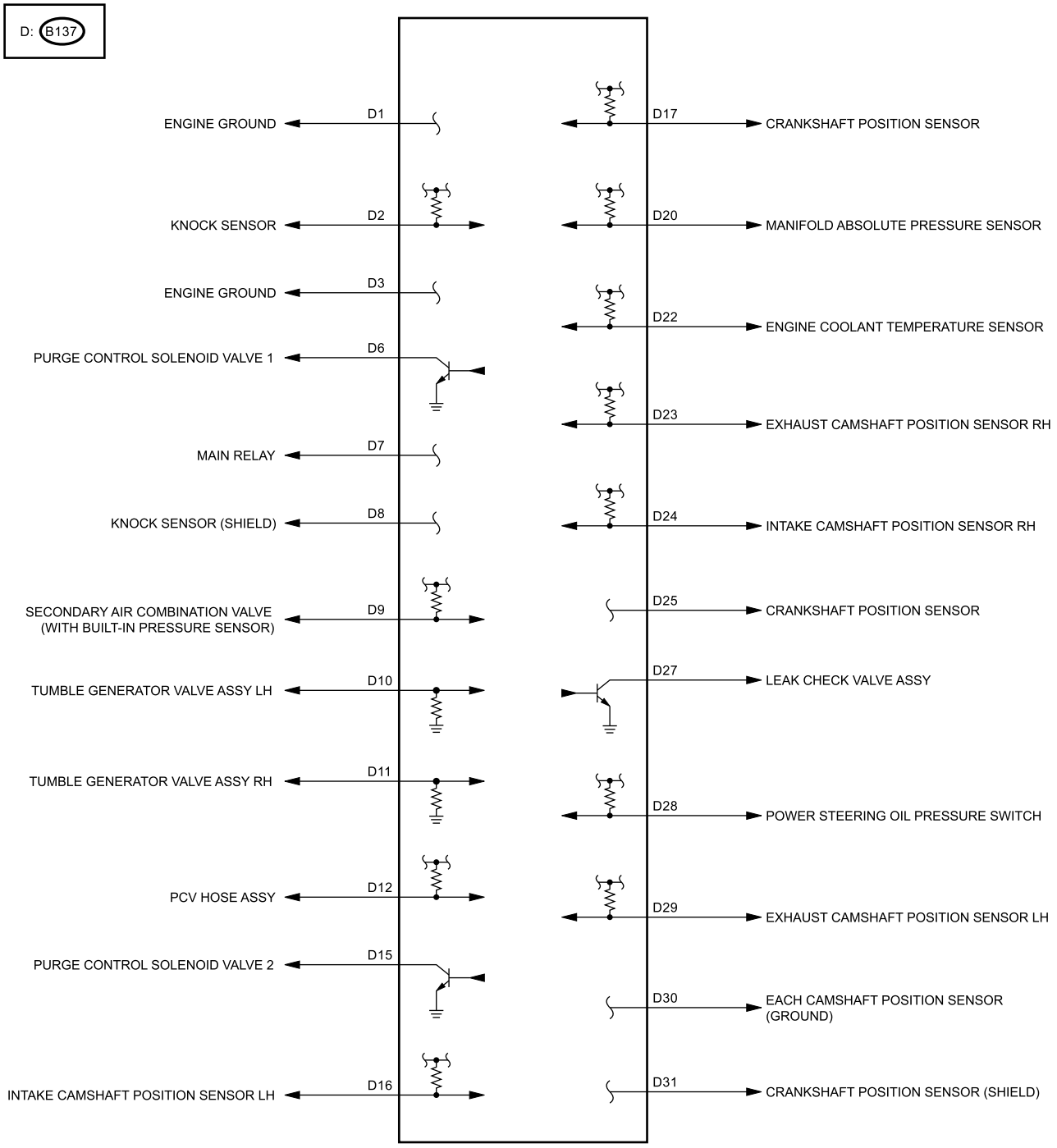
EN-10846


B: B135
OP : WITHOUT PUSH BUTTON START
WP : WITH PUSH BUTTON START
ND : WITHOUT ID CODE BOX
ID : WITH ID CODE BOX
LEAK CHECK VALVE ASSY
B4
REAR OXYGEN SENSOR
B6
ELECTRONIC THROTTLE CONTROL RELAY
B7
SECONDARY AIR COMBINATION VALVE RELAY 1
B8
CLUTCH SWITCH
B9
FUEL PUMP CU
B10
SUB FAN RELAY
B11
MAIN FAN RELAY
B12
RELAY CONTROLS
B13
DATA LINK CONNECTOR
B14
KEYLESS ACCESS CM
WP
B15
ELECTRONIC THROTTLE CONTROL RELAY
B17
SECONDARY AIR COMBINATION VALVE RELAY 2
B20
B21
ACCELERATOR PEDAL POSITION SENSOR
B22
POWER LINES
B23
ACCELERATOR PEDAL POSITION SENSOR
B25
OP
BODY INTEGRATED UNIT
ND
KEYLESS ACCESS CM
ID
ID CODE BOX
B26
STARTER RELAY
B27
SECONDARY AIR PUMP RELAY
B29
ACCELERATOR PEDAL POSITION SENSOR
B30
GROUNDS
B31
ACCELERATOR PEDAL POSITION SENSOR
B32
WP
KEYLESS ACCESS CM
B34
WP
STARTER CUT RELAY
B35
A/C RELAY

EN-23481


C: B136
OP : WITHOUT PUSH BUTTON START
WP : WITH PUSH BUTTON START
MAIN RELAY
C1
M/B FUSE No. 13
C2
STOP LIGHT SWITCH
C3
GROUNDS
C4
FRONT OXYGEN (A/F) SENSOR
C5
FRONT OXYGEN (A/F) SENSOR
C6
PRESSURE SWITCH
C7
SHIELDS
C9
MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR (SHIELD)
C10
MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR
C11
CRUISE CONTROL SWITCH
C12
CRUISE CONTROL SWITCH
C13
BRAKE SWITCH
C15
STARTER RELAY
OP
C16
KEYLESS ACCESS CM
WP
C17
SEVERAL MODULES (CAN COMMUNICATION)
C18
FRONT OXYGEN (A/F) SENSOR
C19
FRONT OXYGEN (A/F) SENSOR
C20
REAR OXYGEN SENSOR
C21
LEAK CHECK VALVE ASSY
C22
MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR
C27
WP
STARTER RELAY
C28
SEVERAL MODULES (CAN COMMUNICATION)
C30
F/B FUSE No. 12
C31
MASS AIR FLOW & INTAKE AIR TEMPERATURE SENSOR
C33
FUEL PUMP CU
C34
DELIVERY MODE FUSE
C35
NEUTRAL POSITION SWITCH

EN-23482


D: B137
ENGINE GROUND
D1
KNOCK SENSOR
D2
ENGINE GROUND
D3
PURGE CONTROL SOLENOID VALVE 1
D6
MAIN RELAY
D7
KNOCK SENSOR (SHIELD)
D8
SECONDARY AIR COMBINATION VALVE (WITH BUILT-IN PRESSURE SENSOR)
D9
TUMBLE GENERATOR VALVE ASSY LH
D10
TUMBLE GENERATOR VALVE ASSY RH
D11
PCV HOSE ASSY
D12
PURGE CONTROL SOLENOID VALVE 2
D15
INTAKE CAMSHAFT POSITION SENSOR LH
D16
D17
CRANKSHAFT POSITION SENSOR
D20
MANIFOLD ABSOLUTE PRESSURE SENSOR
D22
ENGINE COOLANT TEMPERATURE SENSOR
D23
EXHAUST CAMSHAFT POSITION SENSOR RH
D24
INTAKE CAMSHAFT POSITION SENSOR RH
D25
CRANKSHAFT POSITION SENSOR
D27
LEAK CHECK VALVE ASSY
D28
POWER STEERING OIL PRESSURE SWITCH
D29
EXHAUST CAMSHAFT POSITION SENSOR LH
D30
EACH CAMSHAFT POSITION SENSOR (GROUND)
D31
CRANKSHAFT POSITION SENSOR (SHIELD)

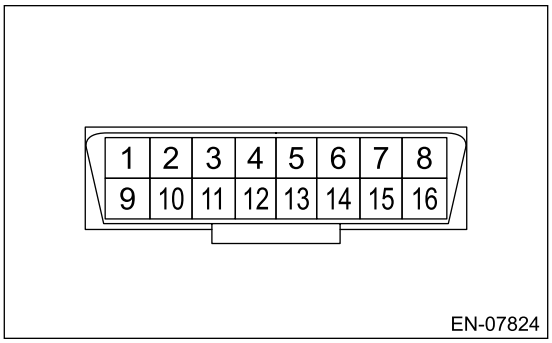
EN-10849

NOTE

This connector is used for Subaru Select Monitor.

Caution:

Do not connect any scan tools other than Subaru Select Monitor or general scan tool because the circuit for Subaru Select Monitor may be damaged.

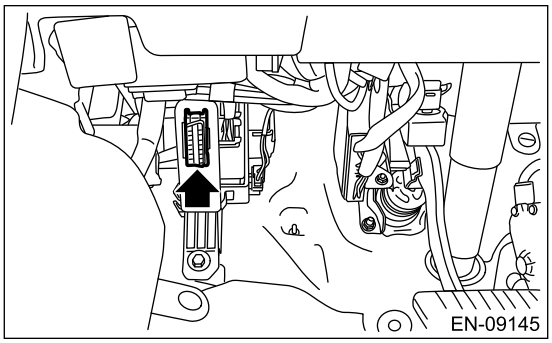


Terminal No.	Contents	Terminal No.	Contents
1	Blank	9	Blank
2	Blank	10	Blank
3	Blank	11	Blank
4	Ground	12	Blank
5	Ground	13	Blank
6	CAN communication (Hi)	14	CAN communication (Lo)
7	Subaru Select Monitor signal	15	A/B batch operation
8	IG	16	Power supply

OPERATION

1. HOW TO USE GENERAL SCAN TOOL

1. Prepare a scan tool (general scan tool) required by SAE J1978.
2. Connect the general scan tool to data link connector located in the lower portion of the instrument panel (on the driver's side).



3. Using the general scan tool, call up each data. General scan tool functions consist of:
   (1) MODE $01: Current powertrain diagnostic data
   (2) MODE $02: Powertrain freeze frame data
   (3) MODE $03: Emission-related powertrain DTC
   (4) MODE $04: Clear/Reset emission-related diagnostic information
   (5) MODE $06: Request on-board monitoring test results for intermittently monitored systems
   (6) MODE $07: Initial emission-related powertrain DTC
   (7) MODE $08: Request control for on-board system, test, and component
   (8) MODE $09: Request vehicle information
   (9) MODE $0A: Emission-related DTC (with Permanent Status)
4. Read out the data according to repair procedures. (For detailed operation procedures, refer to the general scan tool operation manual.)
   Note:
   For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).

2. MODE $01 (CURRENT POWERTRAIN DIAGNOSTIC DATA)

Refer to data denoting the current operating condition of analog input/output, digital input/output or the powertrain system.
A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit
$01	Number of emission-related powertrain DTC, and malfunction indicator light status and diagnosis support information	—
$03	Fuel system control status	—
$04	Calculated engine load value	%
$05	Engine coolant temperature	°C
$06	Short term fuel trim	%
$07	Long term fuel trim	%

PID	Data	Unit
$0B	Intake manifold absolute pressure	kPa
$0C	Engine speed	rpm
$0D	Vehicle speed	km/h
$0E	Ignition timing advance	°
$0F	Intake air temperature	°C
$10	Intake air amount	g/s
$11	Throttle valve absolute opening angle	%
$12	Secondary air control status	—
$13	Check whether oxygen sensor is installed.	—
$15	Oxygen sensor output voltage and short term fuel trim associated with oxygen sensor	V and %
$1C	Supporting OBD system	-
$1F	Elapsed time after starting the engine	sec
$21	Running distance after MIL turns on	km
$24	A/F value and A/F sensor output voltage	— and V
$2E	Evaporative purge	%
$2F	Fuel level	%
$30	Number of warm ups after DTC clear	Time
$31	Travel distance after DTC clear	km
$33	Barometric pressure	kPa
$34	A/F value and A/F sensor current (bank 1 sensor 1)	— and mA
$3C	Catalyst temperature #1	°C
$41	Diagnostic monitor of each drive cycle	—
$42	ECM power voltage	V
$43	Absolute load	%
$44	A/F target lambda	—
$45	Relative throttle opening angle	%
$46	Ambient temperature	°C
$47	Absolute throttle opening angle 2	%
$49	Absolute accelerator opening angle 1	%
$4A	Absolute accelerator opening angle 2	%
$4C	Target throttle opening angle	%
$4D	Engine operation time during MIL on	min
$4E	Elapsed time after DTC clear	min
$51	Fuel used	—
$53	ELCM pressure	kPa
$5A	Relative accelerator opening angle	%
$62	Actual engine illustrated torque	%
$63	Engine reference torque	Nm

PID	Data	Unit
$65	Neutral status	—
$8E	Engine friction torque	%
$9D	Engine fuel consumption and vehicle fuel consumption	g/s
$9E	Engine exhaust flow	kg/h
$A6	Vehicle Odometer	km

Note:
Refer to general scan tool manufacturer's operation manual to access current powertrain diagnostic data (MODE $01).

3. MODE $02 (POWERTRAIN FREEZE FRAME DATA)

Refer to data denoting the operating condition when trouble is detected by on-board diagnosis system. A list of the support data and PID (Parameter Identification) codes are shown in the following table.

PID	Data	Unit
$02	DTC that caused freeze frame data to be stored	—
$03	Fuel system control status	—
$04	Calculated engine load value	%
$05	Engine coolant temperature	°C
$06	Short term fuel trim	%
$07	Long term fuel trim	%
$0B	Intake manifold absolute pressure	kPa
$0C	Engine speed	rpm
$0D	Vehicle speed	km/h
$0E	Ignition timing advance	°
$0F	Intake air temperature	°C
$10	Intake air amount	g/s
$11	Throttle valve absolute opening angle	%
$12	Secondary air control status	—
$13	Air fuel ratio sensor	—
$15	Rear oxygen sensor voltage, compensation value	V and %
$1F	Elapsed time after starting the engine	sec
$2E	Evaporative purge	%
$2F	Fuel level	%
$33	Barometric pressure	kPa
$34	A/F value and A/F sensor current (bank 1 sensor 1)	— and mA
$3C	Catalyst temperature #1	°C
$42	ECM power voltage	V
$43	Absolute load	%
$44	A/F target lambda	—
$45	Relative throttle opening angle	%

PID	Data	Unit
$46	Ambient temperature	°C
$47	Absolute throttle opening angle 2	%
$49	Absolute accelerator opening angle 1	%
$4A	Absolute accelerator opening angle 2	%
$4C	Target throttle opening angle	%
$65	Neutral status	—

Note:
Refer to general scan tool manufacturer's operation manual to access freeze frame data (MODE $02).

4. MODE $03 (EMISSION-RELATED POWERTRAIN DTC)

Refer to "List of Diagnostic Trouble Code (DTC)" for information about data denoting emission-related powertrain DTC. Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).

5. MODE $04 (CLEAR/RESET EMISSION-RELATED DIAGNOSTIC INFORMATION)

Refer to the mode used to clear or reset emission-related diagnostic information.
Note:
Refer to the manufacturer's operation manual for the general scan tool to clear the emission-related diagnostic information (MODE $04).

6. MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS)

Refer to diagnostic value of troubleshooting and data of test limit indicated on the support data bit sequence table. A list of the support data is shown in the following table.
Note:

- **Subaru Select Monitor**
  For detailed operation procedures, refer to "Application help".
- **General scan tool**
  For detailed operation procedures, refer to the general scan tool operation manual.
- **Some items are not displayed according to the specifications.**
- **Measurement items for each DTC of "VVT Monitor Bank 1" and "VVT Monitor Bank 2"**
  A list of the measurement items is shown in List 2. (Used to check on-board monitor test results of DTC P000A, P000B, P000C, P000D, P0011, P0014, P0016, P0017, P0018, P0019, P0021 and P0024.)

List 1

OBDMID	TID	SID	Diagnostic item
$01	$84	$1E	A/F sensor range failure (Bank 1 Sensor 1)
	$85	$1E	
	$91	$20	A/F sensor response failure (Bank 1 Sensor 1)
	$92	$10	

OBDMID	TID	SID	Diagnostic item
	$A3	$20	
	$A4	$10	
	$AC	$10	
	$AD	$10	
	$AE	$10	
	$AF	$10	
	$CD	$20	
	$DF	$10	
$02	$07	$0B	Oxygen sensor drop failure (Bank 1 Sensor 2)
	$08	$0B	
	$05	$10	Oxygen sensor response failure (Bank 1 Sensor 2)
	$06	$10	
	$D1	$10	Oxygen sensor delay failure (Bank 1 Sensor 2)
	$D2	$10	
$21	$89	$3B	Catalyst deterioration diagnosis (Bank 1)
$35	$8B	$9D	VVT Monitor Bank 1
	$8C	$9D	
	$8D	$9D	
	$8E	$9D	
	$D5	$9D	
	$D6	$9D	
$36	$8B	$9D	VVT Monitor Bank 2
	$8C	$9D	
	$8D	$9D	
	$8E	$9D	
	$D5	$9D	
	$D6	$9D	
$3C	$C1	$FE	Evaporative emission control system (0.02 inch leak)
	$C2	$FE	
	$C3	$FE	
	$C4	$FE	
	$C5	$FE	
	$C6	$35	
	$C7	$FE	
	$C8	$FE	
	$C9	$FE	
	$CA	$FE	
	$E4	$FE	

OBDMID	TID	SID	Diagnostic item
$3D	$E2	$FE	Purge flow
	$E3	$FE	
$41	$9B	$14	A/F sensor heater characteristics failure (Bank 1 Sensor 1)
$42	$A2	$24	Oxygen sensor heater characteristics failure (Bank 1 Sensor 2)
$71	$9E	$17	Secondary air system (2 relay — 2 combination valve)
	$9F	$0B	
	$A1	$0B	
	$B0	$17	
	$B5	$0B	
	$B6	$0B	
	$B8	$0B	
	$B9	$31	
	$BA	$31	
$81	$DB	$24	Diagnosis of variation between cylinders (rich rotation fluctuation)
	$DC	$24	Diagnosis of variation between cylinders (diagnosis of lean rotation fluctuation)
	$DD	$03	Diagnosis of variation between cylinders (diagnosis of rich air fuel ratio fluctuation)
	$DE	$03	Diagnosis of variation between cylinders (diagnosis of lean air fuel ratio fluctuation)
$A1	$0B	$24	Misfire monitoring (all cylinders)
	$0C	$24	
$A2	$0B	$24	Misfire monitoring (#1 cylinder)
	$0C	$24	
$A3	$0B	$24	Misfire monitoring (#2 cylinder)
	$0C	$24	
$A4	$0B	$24	Misfire monitoring (#3 cylinder)
	$0C	$24	
$A5	$0B	$24	Misfire monitoring (#4 cylinder)
	$0C	$24	

List 2

OBDMID	TID	SID	Diagnostic item		
$35	$8B	$9D	+	Intake air	VVT Monitor Bank 1
	$8C	$9D	-		
	$8D	$9D	+	Exhaust	
	$8E	$9D	-		

OBDMID	TID	SID	Diagnostic item		
$36	$8B	$9D	+	Intake air	VVT Monitor Bank 2
	$8C	$9D	-		
	$8D	$9D	+	Exhaust	
	$8E	$9D	-		

7. MODE $07 (INITIAL EMISSION-RELATED POWERTRAIN DTC)

Refer to the data of DTC (pending code) for troubleshooting result about emission in the first time.

8. MODE $08 (REQUEST CONTROL FOR ON-BOARD SYSTEM, TEST, AND COMPONENT)

Perform “Active Test” of the on-board system.

9. MODE $09 (REQUEST VEHICLE INFORMATION)

Refer to the data of the vehicle specification.

10. MODE $0A (EMISSION-RELATED DTC (WITH PERMANENT STATUS))

Refer to “List of Diagnostic Trouble Code (DTC)” for information about data denoting emission-related DTC. Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).

OPERATION

1. HOW TO USE SUBARU SELECT MONITOR

Note:
For detailed operation procedures, refer to "Application help".

2. DISPLAY CURRENT ENGINE DATA (NORMAL MODE)

Note:

- **For detailed operation procedures, refer to "Application help".**
- **A list of the support data is shown in the following table.**
- **∗: For models without cruise control, the brake switch signal does not change.**

1. On «Start» display, select «Diagnosis».
2. On «Vehicle selection» display, input the vehicle information and select «Confirmed».
3. On «Main Menu» display, select «Each System».
4. On «Select System» display, select «Engine Control System» and then select «Enter».
5. On «Select Function» display, select «Data Monitor».

Display	Contents	Note (at idling)	Unit
Calculated LOAD Value	Current rate of air amount. Value assuming that the air amount at the current engine speed with the throttle fully open is 100%.	21	%
Coolant Temperature	Value calculated from engine coolant temperature sensor output value.	80 — 100 or 176 — 212	°C or °F
Short term fuel trim B1	Air fuel ratio correction control value for the front oxygen (A/F) sensor.	−10 — +10	%
Long term fuel trim B1	Air fuel ratio learning control value for the front oxygen (A/F) sensor.	−15 — +15	%
Intake Manifold Absolute Pressure	Value calculated from the manifold pressure sensor.	220 — 275, 29.5 — 37, 8.7 — 10 or 4.2 — 5.3	mmHg, kPa, inHg or psig
Engine RPM	Value calculated from crankshaft position sensor output value.	630 — 770 (agree with the tachometer indication)	rpm
Vehicle speed	Value calculated from vehicle speed sensor output value.	0 (when stopped)	km/h or MPH
Ignition timing adv. #1	Ignition timing control value for No. 1 cylinder. Calculated from rotation speed, manifold pressure, intake air temperature, water temperature, and data from knock sensor etc.	10 — 15	deg
Intake Air Temperature	Value calculated from the intake air temperature sensor output value.	20 — 50 or 68 — 122	°C or °F

Display	Contents	Note (at idling)	Unit
Mass Air Flow	Value calculated from air flow sensor output value.	2.1 — 3.1 or 0.35 — 0.4	g/s or lb/m
Throttle Opening Angle	Throttle valve opening angle (in percentage) calculated from throttle position sensor output value.	2 — 2.4	%
Rear O2 Sensor Voltage	Rear oxygen sensor output value. Input value to ECM.	0 — 1	V
ECU ACC	ECM input power supply voltage.	12 — 15 V	V
Air Flow Sensor Voltage	Air flow sensor output value. Input value to ECM.	1 — 1.7	V
Fuel Injection #1 Pulse	Control value of fuel injection time for the RH bank by ECM.	1.2 — 2.2	ms
Atmospheric Pressure	Value calculated from atmospheric pressure sensor output value.	—	mmHg, kPa, inHg or psig
Mani. Relative Pressure	Value calculated from manifold pressure sensor output value. (Absolute value) (Air intake absolute pressure - Atmospheric pressure)	Intake Manifold Absolute Pressure – Atmospheric Pressure	mmHg, kPa, inHg or psig
Learned Ignition Timing	Ignition timing learning value. Advance angle amount or retard angle amount when knocking occurs.	0	deg
Accelerator Opening Angle	Accelerator pedal opening angle (in percentage) calculated from accelerator pedal position sensor output value.	0	%
Primary Control	Boost pressure control value. Control duty ratio of the boost pressure control solenoid valve. ECM output value.	0	%
CPC Valve Duty Ratio	Control duty ratio of the purge control solenoid valve. ECM output value.	0 — 25	%
TGV Position Sensor R	Tumble generator valve position sensor RH output value. Input value to ECM.	0.81	V
TGV Position Sensor L	Tumble generator valve position sensor LH output value. Input value to ECM.	0.81	V
Fuel Pump Duty	Fuel pump duty ratio. Supply voltage to the fuel pump is under a duty control by the ECM. This value shows the duty ratio.	30 — 40	%

Display	Contents	Note (at idling)	Unit
	While the amount of fuel supply is small, such as during idling, the duty value is lowered to decrease the supply voltage.		
VVT Adv. Ang. Amount R	AVCS advance angle amount for the RH bank on the intake side.	±5	deg
VVT Adv. Ang. Amount L	AVCS advance angle amount for the LH bank on the intake side.	±5	deg
OCV Duty R	Control duty ratio of the intake side oil control solenoid on the RH bank. ECM output value.	0 — 20	%
OCV Duty L	Control duty ratio of the intake side oil control solenoid on the LH bank. ECM output value.	0 — 20	%
OCV Current R	Actual current value of the intake side oil control solenoid on the RH bank. Input value to ECM.	40 — 100	mA
OCV Current L	Actual current value of the intake side oil control solenoid on the LH bank. Input value to ECM.	40 — 100	mA
A/F Sensor #1 Current	Front oxygen (A/F) sensor output current value. Input value to ECM.	−20 — 20	mA
A/F Sensor #1 Resistance	Value calculated from the front oxygen (A/F) sensor output value.	27 — 35	Ω
A/F Sensor #1	Actual lambda value calculated from the front oxygen (A/F) sensor output value.	1	—
A/F Correction #3	Sub correction value of A/F feedback control.	0	%
A/F Learning #3	Sub learning value of A/F feedback control.	0	%
SI Drive mode(Display)	SI-DRIVE mode status. ECM output value. Displayed only on models with SI-DRIVE.	I, S or S#	—
Throttle Motor Duty	Throttle motor control duty ratio. ECM output value.	−5	%
Throttle Motor Voltage	Power supply voltage of the throttle motor. Input value to ECM.	12 — 15	V
Sub-Throttle Sensor	Voltage value of the sub throttle position sensor. Input value to ECM.	1.5	V
Main-Throttle Sensor	Voltage value of the main throttle position sensor. Input value to ECM.	0.6	V

Display	Contents	Note (at idling)	Unit
Sub-Accelerator Sensor	Voltage value of the sub accelerator pedal position sensor. Input value to ECM.	1.1	V
Main-Accelerator Sensor	Voltage value of the main accelerator pedal position sensor. Input value to ECM.	1	V
Sec. Air Piping Pressure	Secondary air supply piping pressure value.	765, 102, 30.1 or 14.8	mmHg, kPa, inHg or psig
Sec. Air Flow	Secondary airflow volume.	0	g/s or lb/m
Memorized Cruise Speed	Cruise control system target vehicle speed. (Set speed)	—	km/h or MPH
Fuel level resistance	Fuel level sensor resistance value. Input value to ECM.	20 — 400	Ω
Odometer	Value of the total cumulative travel distance that ECM calculates from the vehicle speed separately from the odometer in the combination meter. Small difference from the odometer will be possible, but if there is a big difference, ECM or the combination meter may need to be replaced.	—	km
Exh. VVT Retard Ang. R	AVCS actual retard angle amount for the RH bank on the exhaust side.	±5	deg
Exh. VVT Retard Ang. L	AVCS actual retard angle amount for the LH bank on the exhaust side.	±5	deg
Exh. OCV Duty R	Control duty ratio of the exhaust side oil control solenoid on the RH bank. ECM output value.	0 — 20	%
Exh. OCV Duty L	Control duty ratio of the exhaust side oil control solenoid on the LH bank. ECM output value.	0 — 20	%
Exh. OCV Current R	Actual current value of the exhaust side oil control solenoid on the RH bank. Input value to ECM.	40 — 100	mA
Exh. OCV Current L	Actual current value of the exhaust side oil control solenoid on the LH bank. Input value to ECM.	40 — 100	mA
Roughness Monitor #1	#1 cylinder roughness monitor count value.	0	—
Roughness Monitor #2	#2 cylinder roughness monitor count value.	0	—

Display	Contents	Note (at idling)	Unit
Roughness Monitor #3	#3 cylinder roughness monitor count value.	0	—
Roughness Monitor #4	#4 cylinder roughness monitor count value.	0	—
Ignition Control Check 1	Detailed status of the engine ignition control information.	0	—
VVT Initial Position Learning Value #1	AVCS initial position learning value for the RH bank on the intake side. Controls the angle against a standard angle. Deviation learning is performed based on this standard value.	30	°CA
VVT Initial Position Learning Value #2	AVCS initial position learning value for the LH bank on the intake side. Controls the angle against a standard angle. Deviation learning is performed based on this standard value.	31	°CA
VVT Ex Initial Position Learning Value #1	AVCS initial position learning value for the RH bank on the exhaust side. Controls the angle against a standard angle. Deviation learning is performed based on this standard value.	78.5	°CA
VVT Ex Initial Position Learning Value #2	AVCS initial position learning value for the LH bank on the exhaust side. Controls the angle against a standard angle. Deviation learning is performed based on this standard value.	77	°CA
D-check Require Flag	Forced operation of solenoid. Set to “ON” when an activation of compulsory adjusting function for engine speed or for A/F is requested.	OFF	—
Delivery Mode Connector	Delivery mode terminal fuse installation status. Shows the status of delivery mode.	OFF	—
Neutral switch	Neutral switch signal. Signal when in neutral (MT) or in P or N range (AT). Input value to ECM.	Neutral	—
Idle Switch Signal	Idle signal. Set to “Idle” while idling.	Idle	—
Ignition SW	Ignition switch signal. Set to “ON” when the ignition switch is ON.	ON	—
P/S Switch	Power steering switch signal.	OFF (when OFF)	—

Display	Contents	Note (at idling)	Unit
	Set to “ON” when the steering is operated. (Model without electric power steering)		
A/C Switch	Air conditioner switch signal. Set to “ON” when the air conditioner switch of the heater control is ON. Input value to ECM.	OFF (when OFF)	—
Starter Switch	Starter switch signal. Set to “ON” when the starter is ON. Input value to ECM.	OFF	—
Rear O2 Rich Signal	Rear oxygen sensor output value. Displays “Rich” when the air fuel ratio of rear oxygen sensor is rich. Displays “Lean” when the air fuel ratio of rear oxygen sensor is lean.	Rich/Lean	—
Knocking Signal	Knock sensor output signal. Judges if a knocking occurs or not. Input value to ECM.	OFF	—
Crankshaft Position Sig.	Crankshaft position sensor output signal. Set to “ON” when the engine is running. Input value to ECM.	ON	—
Camshaft Position Sig.	Camshaft position sensor output signal. Set to “ON” when the engine is running. Input value to ECM.	ON	—
Rear Defogger SW	Rear defogger switch input signal. Set to “ON” when the switch is ON. Input value to ECM.	OFF (when OFF)	—
Blower Fan SW	Blower fan switch input signal. Set to “ON” when the switch is ON. Input value to ECM.	OFF (when OFF)	—
Light Switch	Light switch input signal. Set to “ON” when the switch is ON. Input value to ECM.	OFF (when OFF)	—
Wiper Switch	Wiper switch input signal. Set to “ON” when the switch is ON. Input value to ECM.	OFF (when OFF)	—
A/C Mid Pressure Switch	Air conditioner middle pressure switch signal. Set to “ON” when the switch is ON. Input value to ECM.	OFF (when OFF)	—
A/C Compressor Signal	A/C compressor drive signal. Set to “ON” when the drive signal is output. ECM output value.	OFF (when OFF)	—
Radiator Fan Relay #1	Radiator fan relay drive signal. Set to “ON” when the drive signal is output.	OFF (when OFF)	—

Display	Contents	Note (at idling)	Unit
	ECM output value.		
Radiator Fan Relay #2	Radiator fan relay drive signal. Set to "ON" when the drive signal is output. ECM output value.	OFF (when OFF)	—
Blow-by leak Connector	PCV hose assembly diagnosis signal.	Connection	—
TGV Output	Drive signal to tumble generator valve motor. Set to "ON" when the tumble generator valve is activated (when the duty output is other than 0%). ECM output value.	OFF	—
TGV Drive	Tumble generator valve drive status. Set to "Open" when the tumble generator valve is open. ECM control status.	Close	—
CPC Solenoid 2	Drive status of the evaporative purge solenoid located upstream of the throttle, equipped with turbo models. ECM output value.	OFF (when OFF)	—
Ban of Torque Down VDC	Torque down prohibition notification signal to the vehicle dynamics control (VDC) module. Set to "OFF" when the prohibition signal is output. ECM output value.	Permit	—
Request Torque Down VDC	Torque down request signal transmitted from the vehicle dynamics control (VDC) module. Set to "ON" when the request signal is sent. Vehicle dynamics control (VDC) module input value.	OFF	—
ETC Motor Relay	Drive signal to the electronic throttle motor relay. Set to "ON" when the drive signal is output. ECM output value.	ON	—
Clutch Switch	Clutch switch signal. Set to "ON" when the clutch switch is ON. (MT model)	OFF (when OFF)	—
Stop Light Switch	Stop light switch signal. Set to "ON" when the stop light illuminates. Input value to ECM.	OFF (when OFF)	—
SET/COAST Switch	Cruise control system SET/COAST SW signal. Set to "ON" when the switch is operated. Input value to ECM.	OFF (when OFF)	—

Display	Contents	Note (at idling)	Unit
RESUME/ACCEL Switch	Cruise control system RESUME/ACCEL SW signal. Set to "ON" when the switch is operated. Input value to ECM.	OFF (when OFF)	—
Brake Switch	Brake switch signal. Set to "ON" when the brake pedal is depressed. Input value to ECM.	OFF (when OFF)	—
Main Switch	Cruise control system main switch signal. Set to "ON" when the switch is operated. Input value to ECM.	OFF (when OFF)	—
Sec. Air Combi V Relay 2	Secondary air combination valve relay 2 drive signal. Set to "ON" when the drive signal is output. ECM output value.	OFF (when OFF)	—
Secondary Air Pump Relay	Secondary air pump drive signal. Set to "ON" when the drive signal is output. ECM output value.	OFF (when OFF)	—
Sec. Air Combi V Relay 1	Secondary air combination valve relay 1 drive signal. Set to "ON" when the drive signal is output. ECM output value.	OFF (when OFF)	—
CC Cancel SW	Cruise control cancel switch signal of the cruise control system. Set to "ON" when the switch is operated. Input value to ECM.	OFF (when OFF)	—
MIL Status	Malfunction indicator light illumination status.	OFF (when light off)	—
ELCM switching valve	Leak check valve assembly switching valve drive signal. Set to "Close" when closing the switching valve. ECM output value.	Open	—
ELCM pump	Leak check valve assembly pump drive signal. Set to "ON" when the leak check valve assembly decompression pump is activated. ECM output value.	OFF	—
Target Engine Speed	ECM target engine speed.	700	rpm
Increasing Rate	Increase rate of injector injection amount.	0	%
Target No. of EGR steps	Number of EGR target steps.	0	STEP
Duty	Output duty value of the wastegate solenoid.	0	%

3. DISPLAY CURRENT ENGINE DATA (OBD MODE)

Note:

- **For detailed operation procedures, refer to "Application help".**
- **A list of the support data is shown in the following table.**

1. On «Start» display, select «Diagnosis».
2. On «Vehicle selection» display, input the vehicle information and select «Confirmed».
3. On «Main Menu» display, select «Each System» of «OBD System».
4. On «Select System» display, select «ECM-EngineControl» and then select «Enter».
5. On «Select Function» display, select «Data Monitor».

Display	Contents	Note (at idling)	Unit
Number of Diag. Code:	The number of trouble codes recorded in the ECM.	0	—
MIL Status	Malfunction indicator light illumination status.	OFF	—
Misfire monitoring(Supp)	Support status of the misfire diagnosis.	ON	—
Misfire monitoring(Rdy)	Status of the misfire diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	ON	—
Fuel system monitoring(Supp)	Support status of the fuel system diagnosis.	ON	—
Fuel system monitoring(Rdy)	Status of the fuel system diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	ON	—
Component monitoring(Supp)	Support status of the component diagnosis.	ON	—
Component monitoring(Rdy)	Status of the component diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	ON	—
Catalyst Diagnosis(Supp)	Support status of the catalyst diagnosis.	ON	—
Catalyst Diagnosis(Rdy)	Status of the catalyst diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	OFF	—
Heated catalyst(Supp)	Support status of the heated catalyst diagnosis.	OFF	—
Heated catalyst(Rdy)	Status of the heated catalyst diagnosis. YES or N/A: Diagnosis is completed or not supported.	N/A	—

Display	Contents	Note (at idling)	Unit
	NO: Diagnosis is not completed.		
Evaporative purge system(Supp)	Support status of the evaporative purge system diagnosis.	ON	—
Evaporative purge system(Rdy)	Status of the evaporative purge system diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	OFF	—
Secondary air system(Supp)	Support status of the secondary air system diagnosis.	ON	—
Secondary air system(Rdy)	Status of the secondary air system diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	OFF	—
A/C system refrigerant(Supp)	Support status of the A/C system refrigerant diagnosis.	OFF	—
A/C system refrigerant(Rdy)	Status of the A/C system refrigerant diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—
Oxygen sensor monitoring supported	Support status of the oxygen sensor diagnosis.	ON	—
Oxygen sensor(Rdy)	Status of the oxygen sensor diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	OFF	—
O2 Heater Diagnosis(Supp)	Support status of the oxygen sensor heater diagnosis.	ON	—
O2 Heater Diagnosis(Rdy)	Status of the oxygen sensor heater diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	ON	—
EGR system(Supp)	Support status of the EGR diagnosis.	OFF	—
EGR system(Rdy)	Status of the EGR diagnosis. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—
Fuel system for Bank 1	Feedback status of air fuel ratio. Open: Feedback is stopped	Cl_normal	—

Display	Contents	Note (at idling)	Unit
	Closed: Feedback control is being performed		
Calculated LOAD Value	Current rate of air amount. Value assuming that the air amount at the current engine speed with the throttle fully open is 100%.	15.3	%
Coolant Temperature	Value calculated from engine coolant temperature sensor output value.	96 or 204.8	°C or °F
Short term fuel trim B1	Air fuel ratio correction control value for the front oxygen (A/F) sensor.	0.8	%
Long Term Fuel Trim-Bank1	Air fuel ratio learning control value for the front oxygen (A/F) sensor.	1.6	%
Intake Manifold Absolute Pressure	Value calculated from the manifold pressure sensor.	32, 240.1, 9.5 or 4.6	kPa, mmHg, inHg or psig
Engine RPM	Value calculated from crankshaft position sensor output value.	675	rpm
Vehicle speed	Value calculated from vehicle speed sensor output value.	0	km/h or MPH
Ignition timing adv. #1	Ignition timing control value for No. 1 cylinder. Calculated from rotation speed, manifold pressure, intake air temperature, water temperature, and data from knock sensor etc.	5.5	deg
Intake Air Temperature	Value calculated from the intake air temperature sensor output value.	50 or 122	°C or °F
Mass Air Flow	Value calculated from air flow sensor output value.	2.5 or 0.3	g/s or lb/m
Throttle Opening Angle	Throttle valve opening angle (in percentage) calculated from throttle position sensor output value.	13	%
Secondary air system	Secondary air control status.	Stop	—
Oxygen sensor #12	Rear oxygen sensor output voltage value.	0.7	V
O2 Sensor #11	Installation status of the front oxygen (A/F) sensor.	Support	—
O2 Sensor #12	Installation status of the rear oxygen sensor.	Support	—
Short term fuel trim #12	Air fuel ratio correction control value of the rear oxygen sensor.	0	%
OBD System	Shows the OBD regulation to be followed.	OBD/OBD2	—

Display	Contents	Note (at idling)	Unit
	This is the information recorded in the ECM, and it does not mean that the unit automatically judges the compliance to the OBD regulations.		
Time Since Engine Start	Elapsed time after starting the engine.	—	sec
Lighted MI lamp history	Travel distance after the warning light illuminated.	—	km or mile
A/F Sensor #11	Air fuel ratio calculated from the front oxygen (A/F) sensor output value. (Lambda)	0.951	—
A/F Sensor #11	Front oxygen (A/F) sensor output voltage.	2.468	V
Commanded Evap Purge	Evaporative purge rate displayed by the OBD.	0	%
Fuel Level	Fuel level sensor output value. Input value to ECM. Total value of main and sub.	—	%
Number of Warm-ups since DTC(s) cleared	Number of warm ups after DTC clear. 1 cycle is the time from the cold start till warmed up and stop. (Engine start after a warm-up is not counted.)	—	times
Meter since DTC(s) cleared	Travel distance after DTC clear.	—	km or mile
Atmospheric Pressure	Value calculated from atmospheric pressure sensor output value.	101, 757.7, 29.8 or 14.6	kPa, mmHg, inHg or psig
A/F Sensor #11	Air fuel ratio calculated from the front oxygen (A/F) sensor output value. (Lambda)	1.001	—
A/F Sensor #11	Front oxygen (A/F) sensor current value.	2.193	V
Catalyst Temperature #11	Estimated temperature of the front catalytic converter.	305.1 or 581.2	°C or °F
Misfire monitoring(Enable)	Shows whether or not the execution condition of misfire diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	ON	—
Misfire monitoring(Comp)	Shows whether or not the continuous misfire diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	ON	—
Fuel system monitoring(Enable)	Shows whether or not the execution condition of fuel system diagnosis is met.	ON	—

Display	Contents	Note (at idling)	Unit
	YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.		
Fuel system monitoring(Comp)	Shows whether or not the fuel system diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	OFF	—
Component monitoring(Enable)	Shows whether or not the execution condition of component diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	OFF	—
Component monitoring(Comp)	Shows whether or not the component diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	OFF	—
Catalyst Diagnosis(Enable)	Shows whether or not the execution condition of catalyst diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	ON	—
Catalyst Diagnosis(Comp)	Shows whether or not the catalyst diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	OFF	—
Heated catalyst(Enable)	Shows whether or not the execution condition of heated catalyst diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	N/A	—
Heated catalyst(Comp)	Shows whether or not the heated catalyst diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—
Evaporative purge system(Enable)	Shows whether or not the execution condition of evaporative purge system diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	ON	—

Display	Contents	Note (at idling)	Unit
Evaporative purge system(Comp)	Shows whether or not the evaporative purge system diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	OFF	—
Secondary air system(Enable)	Shows whether or not the execution condition of the secondary air system diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	ON	—
Secondary air system(Comp)	Shows whether or not the secondary air system diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	OFF	—
A/C system refrigerant(Enable)	Shows whether or not the execution condition of A/C system refrigerant diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	N/A	—
A/C system refrigerant(Comp)	Shows whether or not the A/C system refrigerant diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—
Oxygen sensor(Enable)	Shows whether or not the execution condition of oxygen sensor diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	ON	—
Oxygen sensor(Comp)	Shows whether or not the oxygen sensor diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	OFF	—
O2 Heater Diagnosis(Enable)	Shows whether or not the execution condition of oxygen heater diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	ON	—
O2 Heater Diagnosis(Comp)	Shows whether or not the oxygen heater diagnosis is completed.	ON	—

Display	Contents	Note (at idling)	Unit
	YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.		
EGR system(Enable)	Shows whether or not the execution condition of EGR diagnosis is met. YES: Diagnosis can be executed. NO or N/A: Diagnosis cannot be executed or is not supported.	N/A	—
EGR system(Comp)	Shows whether or not the EGR diagnosis is completed. YES or N/A: Diagnosis is completed or not supported. NO: Diagnosis is not completed.	N/A	—
ECU ACC	ECM input power supply voltage.	14.176	V
Absolute Load Value	Percentage of current intake air amount against the maximum air intake amount of the engine. For non-turbo engine, the value can be close to 95%, but will never be 100%. For turbo engine, this value may exceed 100% due to a boost pressure.	21	%
Target Equivalence Ratio	Target air fuel ratio. (Lambda) It usually becomes 1.0 aiming at a theoretical air fuel ratio.	0.996	—
Relative Throttle Pos.	Current throttle opening angle in percentage against the throttle voltage (full range) that has reflected the full close point learning value. The value will be approx. 70% at full open.	1.6	%
Ambient temperature	Value that ECM estimates by using input values from the engine coolant temperature sensor or the intake air temperature sensor etc.	Ambient Temp	°C or °F
Absolute Throttle Pos.#2	Shows the sub throttle sensor voltage value in % against the full-range 5 V throttle sensor output voltage.	31	%
Accelerator Pedal Pos.#1	Shows the main accelerator sensor voltage value in % against the full-range 5 V throttle sensor output voltage.	13	%
Accelerator Pedal Pos.#2	Shows the sub accelerator sensor voltage value in % against the full-range 5 V throttle sensor output voltage.	13	%

Display	Contents	Note (at idling)	Unit
Target Throttle Opening Angle	Control value of the target throttle opening angle calculated by ECM. Target value of opening angle in percentage when 0% means fully closed and 100% means fully open.	0	%
Time while MIL lighted	Engine operating time from when the malfunction indicator light illuminated till when it went off.	—	min
Time since DTC(s) cleared	Elapsed time after DTC clear.	—	min
Type of fuel	Fuel information recorded in the ECM. Not the fuel information currently used.	GAS	—
Relative Accelerator Pos.	Accelerator opening angle with a full close point learning value taken into consideration.	0	%
MT gear status	Neutral condition. Information input from the neutral switch.	NEUT	—

4. DISPLAY OF FREEZE FRAME DATA (OBD MODE)

Note:

- **For detailed operation procedures, refer to "Application help".**
- **A list of the support data is shown in the following table.**

1. On «Start» display, select «Diagnosis».
2. On «Vehicle selection» display, input the vehicle information and select «Confirmed».
3. On «Main Menu» display, select «Each System» of «OBD System».
4. On «Select System» display, select «ECM-EngineControl» and then select «Enter».
5. On «Select Function» display, select «DTC».
6. Select «FFD» of the DTC displayed in «DTC».

Display	Contents	Unit
Freeze frame data	Trouble code when memorizing freeze frame data.	—
Fuel system for Bank 1	Feedback status of air fuel ratio. Open: Feedback is stopped Closed: Feedback control is being performed	—
Calculated LOAD Value	Current rate of air amount. Value assuming that the air amount at the current engine speed with the throttle fully open is 100%.	%
Coolant Temperature	Value calculated from engine coolant temperature sensor output value.	°C or °F
Short term fuel trim B1	Air fuel ratio correction control value for the front oxygen (A/F) sensor.	%
Long Term Fuel Trim-Bank1	Air fuel ratio learning control value for the front oxygen (A/F) sensor.	%

Display	Contents	Unit
Intake Manifold Absolute Pressure	Value calculated from the manifold pressure sensor.	mmHg, kPa, inHg or psig
Engine RPM	Value calculated from crankshaft position sensor output value.	rpm
Vehicle speed	Value calculated from vehicle speed sensor output value.	km/h or MPH
Ignition timing adv. #1	Ignition timing control value for No. 1 cylinder. Calculated from rotation speed, manifold pressure, intake air temperature, water temperature, and data from knock sensor etc.	deg
Intake Air Temperature	Value calculated from the intake air temperature sensor output value.	°C or °F
Mass Air Flow	Value calculated from air flow sensor output value.	g/s or lb/m
Throttle Opening Angle	Throttle valve opening angle (in percentage) calculated from throttle position sensor output value.	%
Secondary air system	Secondary air control status.	—
Oxygen sensor #12	Rear oxygen sensor output voltage value.	V
Short term fuel trim #12	Air fuel ratio correction control value of the rear oxygen sensor.	%
OBD System	Shows the OBD regulation to be followed. This is the information recorded in the ECM, and it does not mean that the unit automatically judges the compliance to the OBD regulations.	—
O2 Sensor #11	Installation status of the front oxygen (A/F) sensor.	—
O2 Sensor #12	Installation status of the rear oxygen sensor.	—
Time Since Engine Start	Elapsed time after starting the engine.	sec
Commanded Evap Purge	Evaporative purge rate displayed by the OBD.	%
Fuel Level	Fuel level sensor output value. Input value to ECM. Total value of main and sub.	%
Atmospheric Pressure	Value calculated from atmospheric pressure sensor output value.	mmHg, kPa, inHg or psig
ECU ACC	ECM input power supply voltage.	V
Absolute Load Value	Percentage of current intake air amount against the maximum air intake amount of the engine. For non-turbo engine, the value can be close to 95%, but will never be 100%. For turbo engine, this value may exceed 100% due to a boost pressure.	%
Target Equivalence Ratio	Target air fuel ratio. (Lambda) It usually becomes 1.0 aiming at a theoretical air fuel ratio.	—

Display	Contents	Unit
Relative Throttle Pos.	Current throttle opening angle in percentage against the throttle voltage (full range) that has reflected the full close point learning value. The value will be approx. 70% at full open.	%
Ambient temperature	Value that ECM estimates by using input values from the engine coolant temperature sensor or the intake air temperature sensor etc.	°C or °F
Absolute Throttle Pos.#2	Shows the sub throttle sensor voltage value in % against the full-range 5 V throttle sensor output voltage.	%
Accelerator Pedal Pos.#1	Shows the main accelerator sensor voltage value in % against the full-range 5 V throttle sensor output voltage.	%
Accelerator Pedal Pos.#2	Shows the sub accelerator sensor voltage value in % against the full-range 5 V throttle sensor output voltage.	%
Target Throttle Opening Angle	Control value of the target throttle opening angle calculated by ECM. Target value of opening angle in percentage when 0% means fully closed and 100% means fully open.	%
MT gear status	Neutral condition. Information input from the neutral switch.	—

5. V.I.N REGISTRATION

1. On «Start» display, select «Diagnosis».
2. On «Vehicle selection» display, input the target vehicle information and select «Confirmed».
3. On «Main Menu» display, select «Each System».
4. On «Select System» display, select «Engine Control System» and then «Enter».
5. On «Select Function» display, select «Work Support».
6. On «Work Support» display, select «Entry VIN».
7. Perform the procedures shown on the display screen.

OPERATION

1. SUBARU SELECT MONITOR

1. On «Start» display, select «Diagnosis».
2. On «Vehicle selection» display, input the target vehicle information and select «Confirmed».
3. On «Main Menu» display, select «Each System».
4. On «Select System» display, select «Engine Control System» and then «Enter».
5. On «Select Function» display, select «DTC».

Note:

- **For detailed operation procedures, refer to "Application help".**
- **For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).**

2. GENERAL SCAN TOOL

Note:

- **Refer to general scan tool manufacturer's instruction manual to access powertrain DTC (MODE $03).**
- **Refer to data denoting emission-related powertrain DTC.**
- **For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).**

PROCEDURE

Perform the diagnosis shown in the following DTC table.
When performing the diagnosis not listed in “List of Diagnostic Trouble Code (DTC)”, refer to the item on the drive cycle. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.

DTC	Item	Condition	Number of driving cycles on the detecting condition
B1571	REFERENCE CODE INCOMPATIBILITY (IMMOBILIZER CM TO ECM)	—	—
B1572	IMM CIRCUIT EXCEPT ANTENNA CIRCUIT	—	—
B1576	EGI CONTROL MODULE EEPROM	—	—
B1577	IMM CONTROL MODULE EEPROM	—	—
B1578	METER	—	—
P0031	A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 1	—	1
P0032	A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 1	—	1
P0037	A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 2	—	2
P0038	A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 2	—	2
P0072	AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" LOW	—	1
P0073	AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" HIGH	—	1
P0102	MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT LOW	—	1
P0103	MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT HIGH	—	1
P0107	MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT LOW	—	1
P0108	MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT HIGH	—	1
P0112	INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW BANK 1	—	1
P0113	INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH BANK 1	—	1

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0117	ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT LOW	—	1
P0118	ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT HIGH	—	1
P0122	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW	—	1
P0123	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH	—	1
P0131	A/F / O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 1	—	1
P0132	A/F / O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 1	—	1
P0201	CYLINDER 1 INJECTOR "A" CIRCUIT	—	1
P0202	CYLINDER 2 INJECTOR "A" CIRCUIT	—	1
P0203	CYLINDER 3 INJECTOR "A" CIRCUIT	—	1
P0204	CYLINDER 4 INJECTOR "A" CIRCUIT	—	1
P0222	THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW	—	1
P0223	THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH	—	1
P0230	FUEL PUMP PRIMARY CIRCUIT	—	2
P0245	TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID "A" LOW	—	1
P0327	KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT LOW BANK 1 OR SINGLE SENSOR	—	1
P0328	KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT HIGH BANK 1 OR SINGLE SENSOR	—	1
P0335	CRANKSHAFT POSITION SENSOR "A" CIRCUIT	—	1
P0336	CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE	—	2
P0340	CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR	—	1
P0341	CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 1 OR SINGLE SENSOR	—	1
P0345	CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 2	—	1
P0346	CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 2	—	1

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0351	IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN	—	1
P0352	IGNITION COIL "B" PRIMARY CONTROL CIRCUIT/OPEN	—	1
P0353	IGNITION COIL "C" PRIMARY CONTROL CIRCUIT/OPEN	—	1
P0354	IGNITION COIL "D" PRIMARY CONTROL CIRCUIT/OPEN	—	1
P0365	CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 1	—	1
P0366	CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 1	—	1
P0390	CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 2	—	1
P0391	CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 2	—	1
P0413	SECONDARY AIR SYSTEM SWITCHING VALVE "A" CIRCUIT OPEN	—	1
P0416	SECONDARY AIR SYSTEM SWITCHING VALVE "B" CIRCUIT OPEN	—	1
P0458	EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT LOW	—	2
P0462	FUEL LEVEL SENSOR "A" CIRCUIT LOW	—	2
P0463	FUEL LEVEL SENSOR "A" CIRCUIT HIGH	—	2
P04AC	EVAP SYSTEM (CPC) PURGE CONTROL VALVE "B" CIRCUIT LOW	—	2
P04DB	CRANKCASE VENTILATION SYSTEM (PCV) DISCONNECTED	—	1
P0512	STARTER (SWITCH) REQUEST CIRCUIT	—	1
P0560	SYSTEM VOLTAGE	—	1
P0604	INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR	—	1
P0605	INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR	—	1
P0606	CONTROL MODULE PROCESSOR	—	1
P060A	INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE	—	1
P060B	INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE	—	1
P0616	STARTER RELAY "A" CIRCUIT LOW	—	1
P0617	STARTER RELAY "A" CIRCUIT HIGH	—	1
P062F	INTERNAL CONTROL MODULE EEPROM ERROR	—	1

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0685	ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN	—	2
P081A	STARTER DISABLE CIRCUIT LOW	—	1
P1160	THROTTLE RETURN SPRING	—	1
P2008	TGV CONTROL CIRCUIT/OPEN BANK 1	—	1
P2009	TGV CONTROL CIRCUIT LOW BANK 1	—	1
P2011	TGV CONTROL CIRCUIT/OPEN BANK 2	—	1
P2012	TGV CONTROL CIRCUIT LOW BANK 2	—	1
P2016	TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 1	—	1
P2017	TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 1	—	1
P2021	TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 2	—	1
P2022	TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 2	—	1
P2088	"A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1	—	1
P2089	"A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1	—	1
P2090	"B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1	—	1
P2091	"B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1	—	1
P2092	"A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 2	—	1
P2093	"A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 2	—	1
P2094	"B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 2	—	1
P2095	"B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 2	—	1
P2101	THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE	—	1
P2102	THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT LOW	—	1
P2103	THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT HIGH	—	1

DTC	Item	Condition	Number of driving cycles on the detecting condition
P2109	THROTTLE/PEDAL POSITION SENSOR "A" MINIMUM STOP PERFORMANCE	—	1
P2119	THROTTLE ACTUATOR "A" CONTROL THROTTLE BODY RANGE/PERFORMANCE	—	1
P2122	THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW	—	1
P2123	THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH	—	1
P2127	THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW	—	1
P2128	THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH	—	1
P2135	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION	—	1
P2138	THROTTLE/PEDAL POSITION SENSOR/SWITCH "D"/"E" VOLTAGE CORRELATION	—	1
P2257	SECONDARY AIR SYSTEM CONTROL "A" CIRCUIT LOW	—	1
P2401	EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW	—	1
P2419	EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW	—	1
P2432	SECONDARY AIR SYSTEM AIR FLOW/PRESSURE SENSOR CIRCUIT LOW BANK 1	—	1
P2433	SECONDARY AIR SYSTEM AIR FLOW/PRESSURE SENSOR CIRCUIT HIGH BANK 1	—	1
P2444	SECONDARY AIR SYSTEM PUMP STUCK ON BANK 1	—	1
P24BA	EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT LOW	—	1
P24BB	EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT HIGH	—	1
P2530	IGNITION SWITCH RUN POSITION CIRCUIT	—	1
U0073	CONTROL MODULE COMMUNICATION BUS OFF	—	1
U0122	LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE	—	1
U0155	LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE	—	1

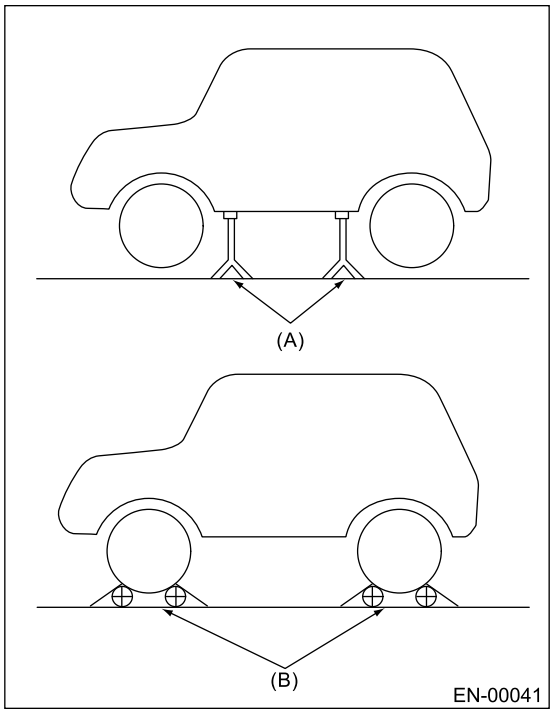
DTC	Item	Condition	Number of driving cycles on the detecting condition
U0416	INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE	—	1
U0423	INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE	—	1

1. PREPARATION FOR THE INSPECTION MODE

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Lift up the vehicle using a garage jack and place it on rigid racks, or drive the vehicle onto free rollers.

Warning:

- **Before lifting up the vehicle, ensure parking brake is applied.**
- **Do not use a pantograph jack in place of a rigid rack.**
- **Secure a rope or wire to the front or rear towing hooks to prevent the lateral runout of front wheels.**
- **Before rotating the wheels, make sure that there is no one in front of the vehicle. Besides while the wheels are rotating, make sure that no one approaches the vehicle front side.**
- **Make sure that there is nothing around the wheels. For AWD model, pay attention to all four wheels.**
- **While servicing, do not depress or release the clutch pedal or accelerator pedal quickly regardless of the engine speed. Quick operation may cause the vehicle to drop off the free roller.**
- **To prevent the vehicle from slipping due to vibration, do not place anything between rigid rack and the vehicle.**



(A) Rigid rack

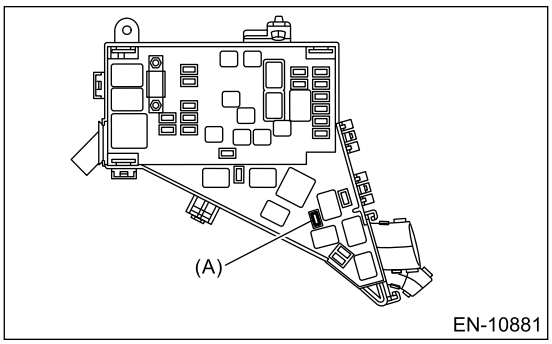
(B) Free roller

2. SUBARU SELECT MONITOR

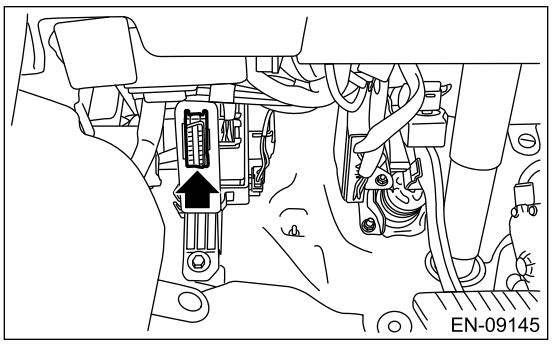
1. Check that no DTC remains after clearing memory. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Warm up the engine.
3. Prepare the Subaru Select Monitor 4. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Description>PREPARATION TOOL.
4. Prepare PC with Subaru Select Monitor installed.
5. Connect the USB cable to the DST-i and the USB port on the personal computer (dedicated port for the Subaru Select Monitor).

Note:
The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.

6. Connect the diagnosis cable to DST-i.
7. Install the delivery mode fuse (A).
   Caution:
   Do not use any fuses that are installed on the vehicle.



8. Connect the DST-i to the data link connector located in the lower portion of the instrument panel (on the driver's side).
   Caution:
   Do not connect the scan tools except for Subaru Select Monitor and general scan tool.



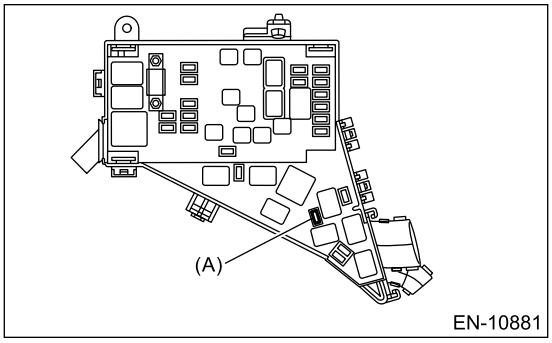
9. Start the PC.
10. Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".
11. On «Start» display, select «Diagnosis».
12. On «Vehicle selection» display, input the vehicle information and select «Confirmed».
13. On «Main Menu» display, select «Each System».
14. On «Select System» display, select «Engine Control System» and then select «Enter».
15. On «Select Function» display, select «Work Support».
16. On the «Work Support» display, select «Dealer Check Mode Procedure».
17. When the "Perform Inspection (Dealer Check) Mode ?" is shown on the screen, click the [Next] button.
18. Perform subsequent procedures as instructed on the display screen.
    - If trouble still remains in the memory, the corresponding DTC appears on the display screen.

Note:

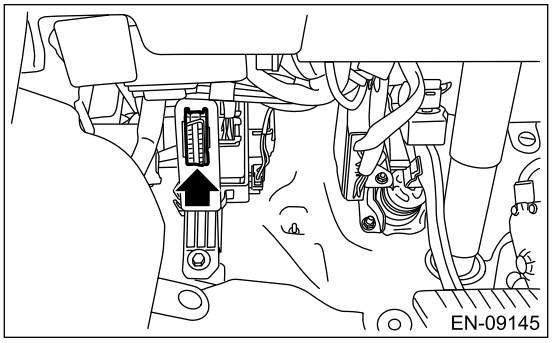
- **For detailed operation procedures, refer to "Application help".**
- **For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)".**
  Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
- **Release the parking brake.**
- **The rotating speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When engine control system diagnosis is finished, perform the VDC memory clearance procedure of self-diagnosis function. Ref. to VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)>Clear Memory Mode.**

3. GENERAL SCAN TOOL

1. Check that no DTC remains after clearing memory. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Warm up the engine.
3. Install the delivery mode fuse (A).
   Caution:
   Do not use any fuses that are installed on the vehicle.



4. Connect the general scan tool to data link connector located in the lower portion of the instrument panel (on the driver's side).
   Caution:
   Do not connect the scan tools except for Subaru Select Monitor and general scan tool.



5. Start the engine.
   Note:
   Depress the clutch pedal when starting engine.
6. Turn the neutral position switch to ON using gear shift lever.
7. Keep the engine speed in 2,500 — 3,000 rpm range for 40 seconds.
8. Place the gear shift lever in 1st gear and drive the vehicle at 5 to 10 km/h (3 to 6 MPH).

Note:

- **For AWD model, release the parking brake.**
- **The rotating speed difference between front and rear wheels may illuminate the ABS warning light, but this does not indicate a malfunction. When engine control system diagnosis is finished, perform the VDC memory clearance procedure of self-diagnosis function. Ref. to VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)>Clear Memory Mode.**

9. Using the general scan tool, check for DTC and record the result(s).

Note:

- **For detailed operation procedures, refer to the general scan tool operation manual.**
- **For details concerning DTC, refer to "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).**

PROCEDURE

It is necessary to perform the drive cycle listed below if DTC is not found in the Inspection Mode. It is possible to complete diagnosis of the DTC by performing the indicated drive cycle. After the repair for the DTC, perform a necessary drive cycle and make sure the function recovers and the DTC is recorded.

1. PREPARATION FOR DRIVE CYCLE

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. After performing the diagnostics and Clear Memory Mode, check that no DTC remains. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
3. Make sure that the delivery mode fuse is removed.
   Note:
   Perform the drive cycle after warming up the engine except when the engine coolant temperature at engine start is specified.

2. DRIVE CYCLE A

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0128	COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE)	—	2
P013A	O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2	—	2
P013E	O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 2	—	2
P0141	O2 SENSOR HEATER CIRCUIT BANK 1 SENSOR 2	—	2
P014C	A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1	—	2
P014D	A/F / O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 1	—	2
P015A	A/F / O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 1	—	2
P015B	A/F / O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 1	—	2
P0171	SYSTEM TOO LEAN BANK 1	Complete diagnosis with drive	2

DTC	Item	Condition	Number of driving cycles on the detecting condition
		cycle B as well.	
P0172	SYSTEM TOO RICH BANK 1	Complete diagnosis with drive cycle B as well.	2
P0300	RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED	Complete diagnosis with drive cycle B as well.	2
P0301	CYLINDER 1 MISFIRE DETECTED	Complete diagnosis with drive cycle B as well.	2
P0302	CYLINDER 2 MISFIRE DETECTED	Complete diagnosis with drive cycle B as well.	2
P0303	CYLINDER 3 MISFIRE DETECTED	Complete diagnosis with drive cycle B as well.	2
P0304	CYLINDER 4 MISFIRE DETECTED	Complete diagnosis with drive cycle B as well.	2
P0459	EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT HIGH	—	2
P2096	POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 1	Complete diagnosis with drive cycle B as well.	2

DTC	Item	Condition	Number of driving cycles on the detecting condition
P2097	POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 1	Complete diagnosis with drive cycle B as well.	2
P2195	A/F /O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 1	—	2
P2196	A/F /O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 1	—	2
P2270	O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 2	—	2
P2271	O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 2	—	2

1. Drive for 20 minutes or more at a constant speed of 80 km/h (50 MPH) or more.
2. Stop the vehicle and idle for one minute.
3. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

3. DRIVE CYCLE B

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0125	INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL	«Coolant Temp.» at engine start: Less than −15°C (5°F)	2
P0137	O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 2	—	2
P0138	O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 2	—	2

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0171	SYSTEM TOO LEAN BANK 1	Complete diagnosis with drive cycle A as well.	2
P0172	SYSTEM TOO RICH BANK 1	Complete diagnosis with drive cycle A as well.	2
P0300	RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED	Complete diagnosis with drive cycle A as well.	2
P0301	CYLINDER 1 MISFIRE DETECTED	Complete diagnosis with drive cycle A as well.	2
P0302	CYLINDER 2 MISFIRE DETECTED	Complete diagnosis with drive cycle A as well.	2
P0303	CYLINDER 3 MISFIRE DETECTED	Complete diagnosis with drive cycle A as well.	2
P0304	CYLINDER 4 MISFIRE DETECTED	Complete diagnosis with drive cycle A as well.	2
P0500	VEHICLE SPEED SENSOR "A" CIRCUIT	—	1
P0506	IDLE CONTROL SYSTEM RPM - LOWER THAN EXPECTED	—	2

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0507	IDLE CONTROL SYSTEM RPM - HIGHER THAN EXPECTED	—	2
P2096	POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 1	Complete diagnosis with drive cycle A as well.	2
P2097	POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 1	Complete diagnosis with drive cycle A as well.	2

1. Drive at 10 km/h (6 MPH) or more.
2. Stop the vehicle and idle for ten minutes.
3. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

4. DRIVE CYCLE E

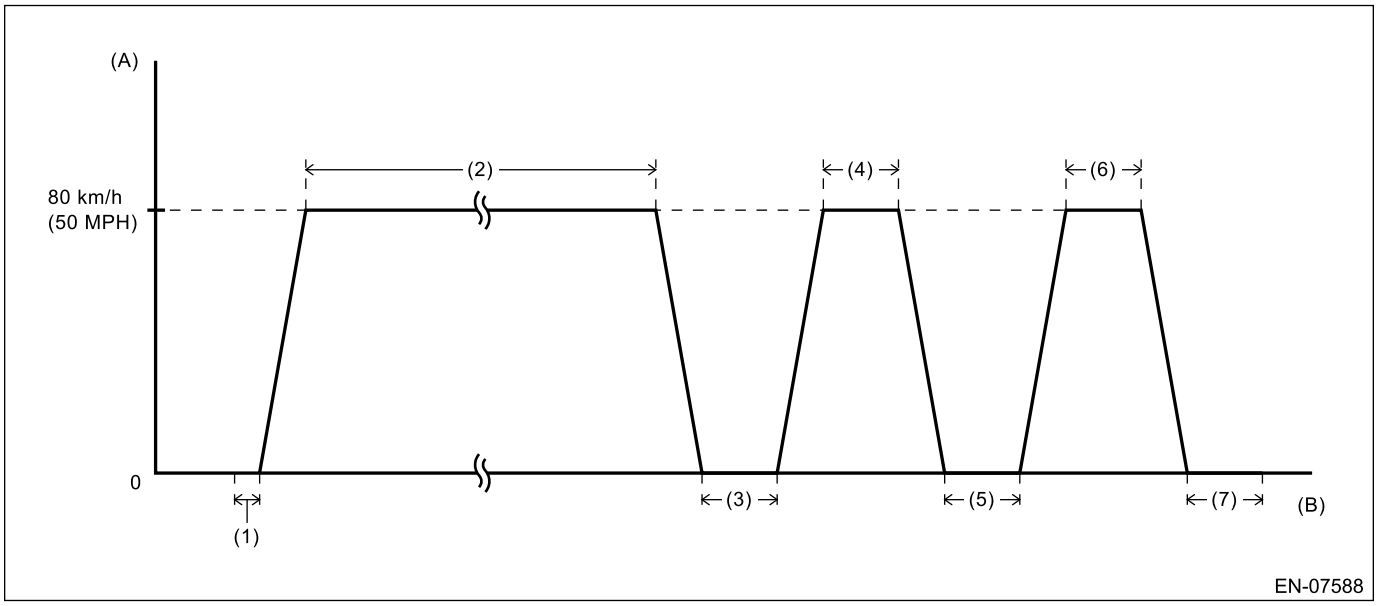
DTC	Item	Condition	Number of driving cycles on the detecting condition
P0461	FUEL LEVEL SENSOR "A" CIRCUIT RANGE/PERFORMANCE	—	2

1. Make sure that the battery voltage is 10.9 V or more.
2. Perform the Clear Memory Mode. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
3. Drive for approximately 30 L (7.9 US gal, 6.6 Imp gal) of fuel.
   Note:
   - **It is acceptable to drive the vehicle intermittently.**
   - **Do not disconnect the battery terminals while diagnosing. (Data will be cleared by disconnecting the battery terminals.)**
4. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

5. DRIVE CYCLE F

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0111	INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE BANK 1	• 6 hours have elapsed since ignition switch is OFF under a completely warmed up condition. • For models with block heater, at least 6 hours must have elapsed without operating the block heater.	2

1. With the ignition switch ON (engine stopped), read the value in «Coolant Temp.» and «Intake Air Temperature». Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA (NORMAL MODE).
2. If the values from step 1) satisfy the following conditions, idle the engine for two minutes or more.
   Condition:
   |Engine coolant temperature — Intake air temperature| ≤ 5°C (9°F)
   Note:
   - **If the conditions are not satisfied, turn the ignition switch to OFF and wait until the parameters are satisfied.**
   - **Do not move the gear shift lever from neutral position during idling.**
3. Drive according to the drive pattern described below.



(A) Vehicle speed

(B) Elapsed time

(1) Idle the engine for 2 minutes or more.

(2) Drive for a total period of 15 minutes or more at a speed of 80 km/h (50 MPH) or more.

(3) Stop the vehicle and idle for 30 seconds or more.

(4) Drive for 30 seconds or more at a constant speed of 80 km/h (50 MPH) or more.

(5) Stop the vehicle and idle for 30 seconds or more.

(6) Drive for 30 seconds or more at a constant speed of 80 km/h (50 MPH) or more.

(7) Stop the vehicle and idle for 30 seconds.

Note:

- **In pattern (2), it is acceptable to decelerate to less than 80 km/h (50 MPH) or to stop the vehicle depending on the traffic conditions. Drive the vehicle at 80 km/h (50 MPH) or more until the total driving time reaches or exceeds 15 minutes.**
- **There is no given transition time between idling and cruising.**
- **Driving at constant speed only on a downhill causes smaller engine load and may result in failure to obtain a right diagnostic result.**
- **If the ignition switch is turned to OFF during driving cycle F, perform this driving cycle again after satisfying the conditions listed in the table.**

4. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

6. DRIVE CYCLE G

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0410	SECONDARY AIR SYSTEM	—	2
P0411	SECONDARY AIR SYSTEM INCORRECT FLOW DETECTED	—	2
P0414	SECONDARY AIR SYSTEM SWITCHING VALVE "A" CIRCUIT SHORTED	—	1
P0417	SECONDARY AIR SYSTEM SWITCHING VALVE "B" CIRCUIT SHORTED	—	1
P1410	SECONDARY AIR INJECTION SYSTEM COMBINATION VALVE STUCK OPEN	—	1
P2258	SECONDARY AIR SYSTEM CONTROL "A" CIRCUIT HIGH	—	1
P2440	SECONDARY AIR SYSTEM SWITCHING VALVE STUCK OPEN BANK 1	—	2
P2441	SECONDARY AIR SYSTEM SWITCHING VALVE STUCK CLOSED BANK 1	—	2
P2442	SECONDARY AIR SYSTEM SWITCHING VALVE STUCK OPEN BANK 2	—	2
P2443	SECONDARY AIR SYSTEM SWITCHING VALVE STUCK CLOSED BANK 2	—	2

1. Disconnect the battery negative terminal, and reconnect after at least 10 seconds have passed.
2. Idle the engine until engine coolant temperature is 80°C (176°F) or more.
3. Stop the engine to decrease the engine coolant temperature down to 40°C (104°F) or less.
   Note:
   Do not let engine coolant temperature drop to 5°C (41°F) or less.
4. Idle the engine until engine coolant temperature is 80°C (176°F) or more.
5. Stop the engine to decrease the engine coolant temperature down to 40°C (104°F) or less.
   Note:
   Do not let engine coolant temperature drop to 5°C (41°F) or less.
6. Idle the engine.
7. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

7. DRIVE CYCLE H

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0071	AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE	• 6 hours have elapsed since ignition switch is OFF under a completely warmed up condition. • For models with block heater, at least 6 hours must have elapsed without operating the block heater.	2
P0116	ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE	• 6 hours have elapsed since ignition switch is OFF under a completely warmed up condition. • For models with block heater, at least 6 hours must have elapsed	2

DTC	Item	Condition	Number of driving cycles on the detecting condition
		without operating the block heater.	
P050A	COLD START IDLE CONTROL SYSTEM PERFORMANCE	—	2
P050B	COLD START IGNITION TIMING PERFORMANCE	—	2
P2431	SECONDARY AIR SYSTEM AIR FLOW/PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE BANK 1	—	2
P24B9	EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE	60 seconds have elapsed since ignition switch is OFF.	2

1. With the ignition switch ON (engine stopped), read the value in «Coolant Temp.» and «Intake Air Temperature». Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA (NORMAL MODE).
2. If the values from step 1) satisfy the following conditions, idle the engine for two minutes or more.
   Condition:
   |Engine coolant temperature — Intake air temperature| ≤ 5°C (9°F)
   Note:
   - **If the conditions are not satisfied, turn the ignition switch to OFF and wait until the parameters are satisfied.**
   - **Do not move the gear shift lever from neutral position during idling.**
3. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

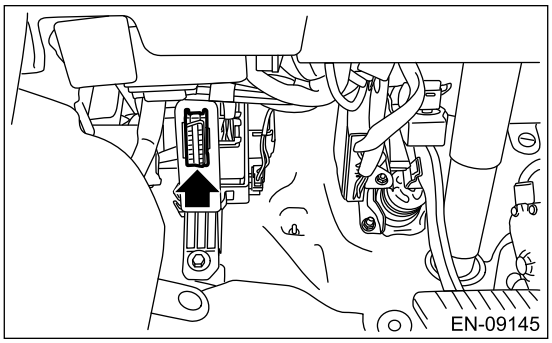
8. DRIVE CYCLE I

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0455	EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK)	«Coolant Temp.»: 5 — 45°C (41 — 113°F) «Intake Air Temp.»: 5 — 50°C (41 — 122°F)	2
P0456	EVAP SYSTEM (CPC) LEAK DETECTED (VERY SMALL LEAK)		2
P04AF	EVAP SYSTEM PURGE CONTROL VALVE (CPC) "B" STUCK CLOSED		2
P1451	EVAP SYSTEM CLOG DETECTED (PIPE)		2
P2402	EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH		1
P2404	EVAP SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE		2
P2420	EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH		1

Caution:
Be careful of the state of the battery when performing the drive cycle I consecutively. Performing the drive cycle I consecutively without the engine running may cause a low battery voltage and battery discharge.
Note:

- **If it is necessary to perform drive cycle I consecutively, drive the vehicle under the following conditions to release accumulated evaporating gas. Performing the drive cycle I consecutively without starting the engine causes a large amount of evaporating gas to accumulate in the canister, which hinders an accurate diagnosis.**
  - **After engine is warmed up**
  - **Drive for 10 minutes or more at a speed of 48 km/h (30 MPH) or more (duration of drive can be an accumulation)**
- **To obtain an accurate diagnostic result, perform the procedures according to the following points.**
  - **Do not refuel gas immediately before performing drive cycle I. There will be a large amount of evaporating gas immediately after refuel, which may cause a less accurate diagnostic performance.**
  - **Do not shake the vehicle while performing drive cycle I. Shaking the vehicle causes evaporating gas to increase inside the fuel tank, which may cause a less accurate diagnostic performance.**
  - **Do not perform any service operation including installation or removal of parts or connectors while performing drive cycle I. Performing service operation could affect on the functions of related parts, which may cause a less accurate diagnostic performance.**

1. Prepare the Subaru Select Monitor 4. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Description>PREPARATION TOOL.
2. Prepare PC with Subaru Select Monitor installed.
3. Connect the USB cable to the DST-i and the USB port on the personal computer (dedicated port for the Subaru Select Monitor).
   Note:
   The dedicated port for the Subaru Select Monitor means the USB port which was used to install the Subaru Select Monitor.
4. Connect the diagnosis cable to DST-i.
5. Connect the DST-i to the data link connector located in the lower portion of the instrument panel (on the driver's side).
   Caution:
   Do not connect the scan tools except for Subaru Select Monitor and general scan tool.



6. Start the PC.
7. Turn the ignition switch to ON (engine OFF) and run the "PC application for Subaru Select Monitor".
8. On «Start» display, select «OBD System» and then «Enter».
9. On «Select System» display, select «Engine Control System» and then select «Enter».
10. On «Select Function» display, select «Active Test».
11. On «Active Test» display, select «Evaporative System Leak Test».
12. On «Evaporative System Leak Test is running. Press Cancel to exit this function.» display, click the [OK] button to perform evaporative system leak test.
13. When «Conditions have been enabled to control this function. Turn the ignition switch off to terminate the test.» display appears, wait for 30 minutes without clicking the [OK] button.
    Caution:
    Do not leave the vehicle for an extended period of time after the test is complete. This may cause early deterioration of the battery or discharged battery.
    Note:
    - **Clicking the [OK] button bring the «Evaporative System Leak Test» display back, although the test is continuing.**
    - **The Subaru Select Monitor screen does not change after the evaporative system leak test is complete or when the test is aborted by turning off the ignition switch.**
    - **If «Test conditions are not correct» display appears, check that the values in «Coolant Temp.» and «Intake Air Temperature» are within the specified range using Subaru Select Monitor. If the conditions are satisfied, make the necessary preparation for the drive cycle again. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle>PROCEDURE > PREPARATION FOR DRIVE CYCLE.**

14. After 30 minutes passed from the start of step 14), click the [OK] button to return to the «Evaporative System Leak Test» display.
15. Click buttons until the «OBD System» display appears, then select {On-board monitor test result}.
16. In the {On-board monitor test result}, check TID $C1 — $CA of MID $3C.

Result of on-board monitor test

Display	Details	Remarks
$0000 is stored in all Val.	During the evaporative system leak test, the test conditions were not met and the test was canceled.	Once the test conditions are met, perform the test again.
All Val. are stored with values and OK is set to all the results.	Evaporative system leak test is completed correctly.	While the ignition switch is ON, read temporary codes using the Subaru Select Monitor.
Some results were no good.	The evaporative system leak test completed successfully but the results were faulty.	While the ignition switch is ON, read temporary codes using the Subaru Select Monitor.

17. When the evaporative system leak test is completed correctly, read the temporary codes with the ignition switch turned to ON position. If the DTC is recorded, check the appropriate DTC. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.
    Note:
    The temporary code will be cleared by turning ignition switch to OFF.

9. DRIVE CYCLE J

DTC	Item	Condition	Number of driving cycles on the detecting condition
P2610	ECM/PCM ENGINE OFF TIMER PERFORMANCE	—	2

1. Idle the engine for 15 minutes or more.
2. Turn the ignition switch to OFF.
3. After 10 hours passed from the start of step 2), read the temporary code using the Subaru Select Monitor. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

10. DRIVE CYCLE N

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0016	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR A	«Coolant Temp.»: 80°C (176°F) or more	2
P0017	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR B		2
P0018	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR A		2
P0019	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR B		2

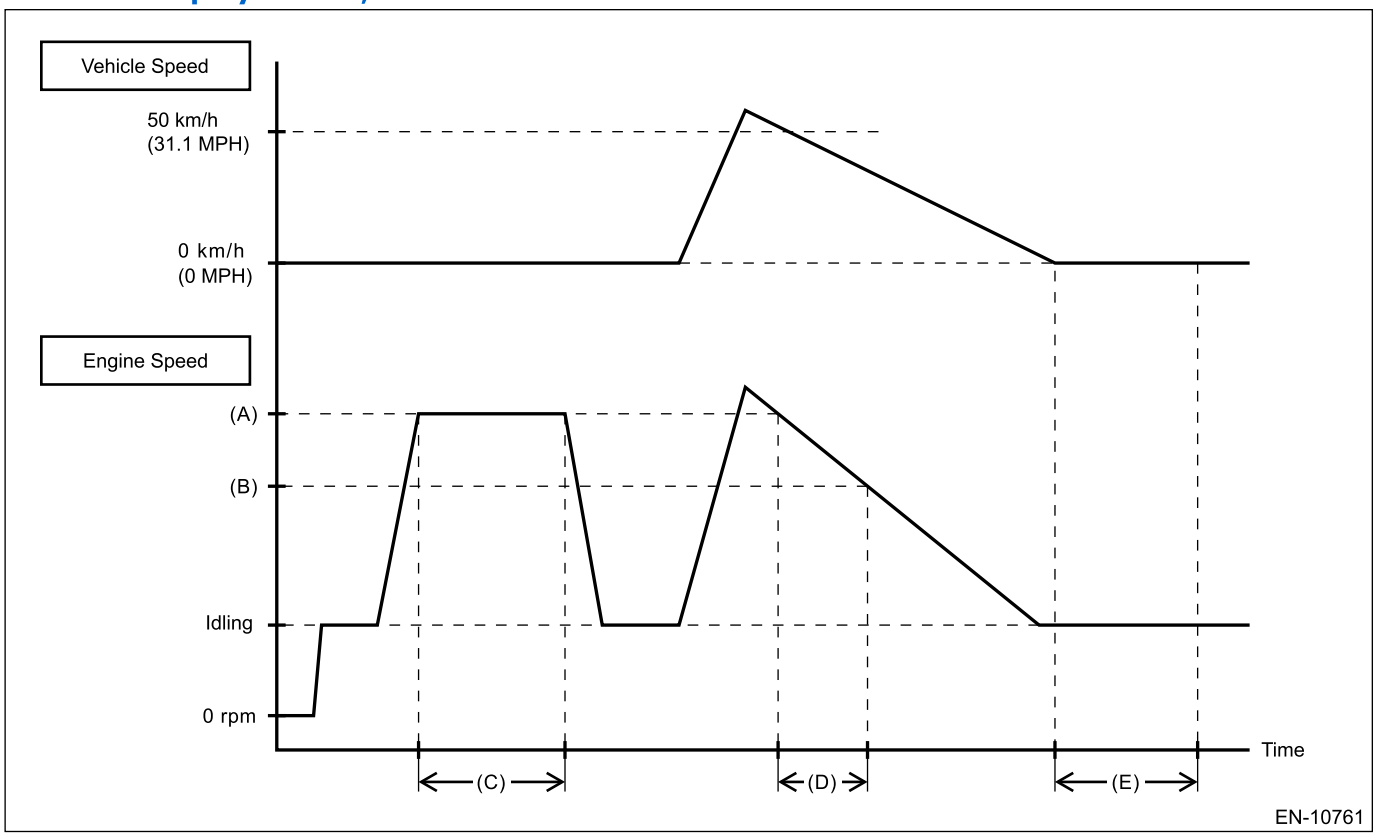
Warning:
When performing drive cycle N on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.

1. Check the data in condition column of table by using the Subaru Select Monitor or general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA (NORMAL MODE).
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.
2. While the conditions in the list are satisfied, race the engine at the speed of approx. 2,500 rpm for 40 seconds or more.
3. Start the vehicle, then accelerate the vehicle to 50 km/h (31.1 MPH) or more.
4. When the speed reaches 50 km/h (31.1 MPH) or more, release the accelerator pedal, brake pedal and clutch pedal to decelerate the vehicle without shifting the gear. At this time, select an appropriate gear beforehand so that the engine speed can decrease from 2,500 rpm to 1,900 rpm for 5 seconds or more.
   Note:
   - **The vehicle speed does not matter so long as the engine speed can maintain from 2,500 rpm to 1,900 rpm for 5 seconds or more.**
     Example: On a downhill grade, it can be performed with a low speed gear and at a low vehicle speed.
   - **When it is performed with the electrical load such as the air conditioner, etc. turned OFF or the vehicle driven on a downhill grade, the engine speed decreases slowly. Therefore, the continuous time can be maintained easily.**
5. Bring the vehicle to a stop in a safe place, and idle it for 5 minutes or more.
   Note:
   Driving method while vehicle is driven to a stop at safe place is not restricted.

6. With the vehicle idling, read the temporary diagnostic code of DTC using Subaru Select Monitor or general scan tool.

Note:

- **For detailed operation procedures, refer to "Read Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).**
- **In the step 6), if the DTC is not displayed on the Subaru Select Monitor or general scan tool display screen, the trouble is resolved.**



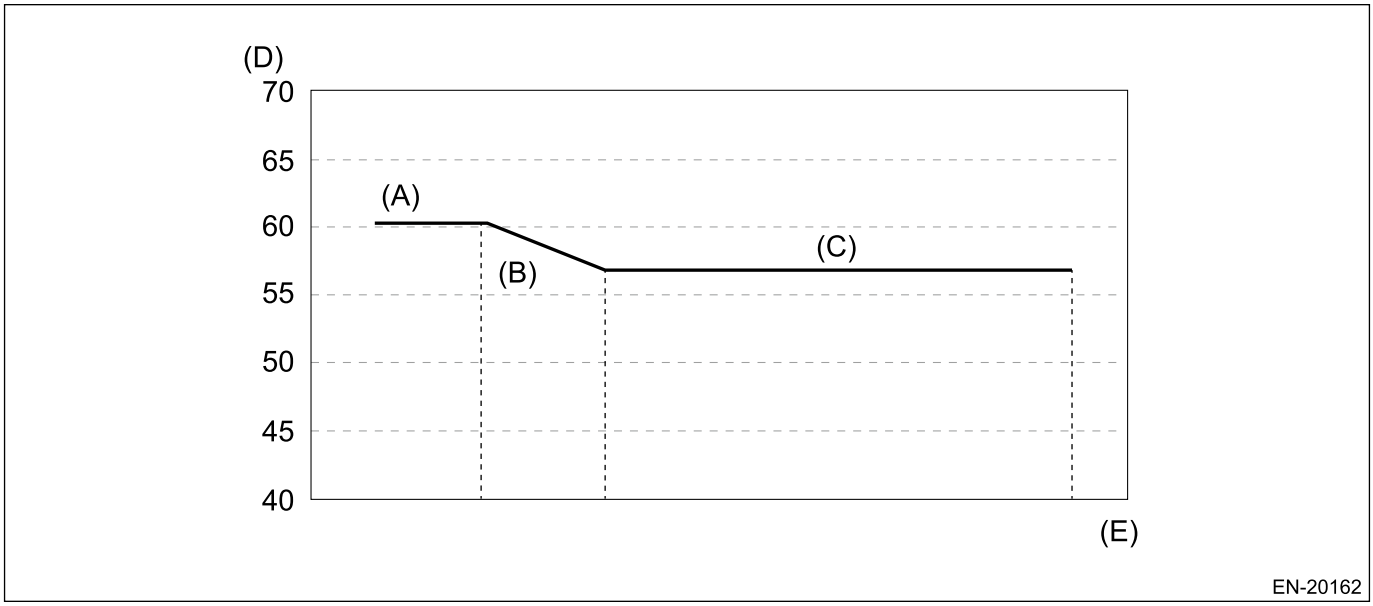
(A) 2500 rpm
(B) 1900 rpm
(C) 40 seconds or more
(D) 5 seconds or more
(E) 5 minutes or more

11. DRIVE CYCLE O

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0441	EVAP SYSTEM (CPC) INCORRECT PURGE FLOW	—	2

Warning:
When performing drive cycle O on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.

1. Drive according to the drive pattern described below.



(A) Drive the vehicle at 60 km/h (37 MPH) or faster for at least 5 minutes in fully warm-up condition.
(B) Decelerate with the throttle fully closed for at least 3 seconds.
(C) Drive the vehicle at a constant vehicle speed by depressing the accelerator pedal for at least 30 seconds.
(D) Vehicle speed km/h (MPH)
(E) Sec.

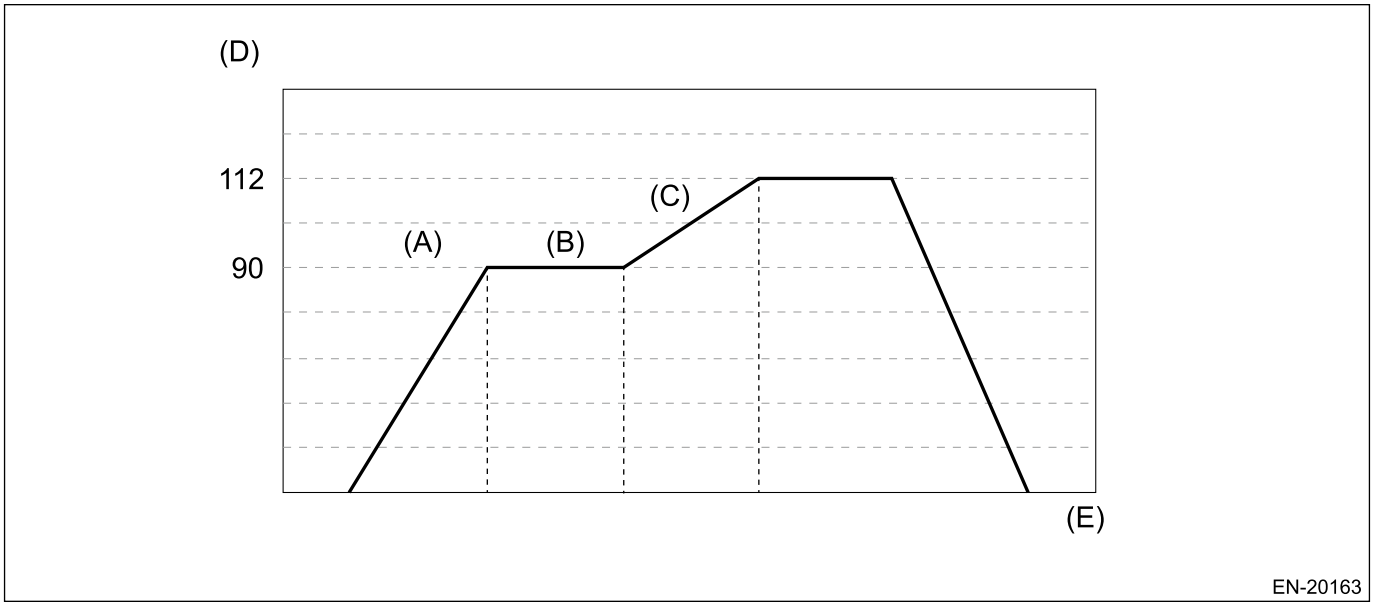
2. Park the vehicle on a safe place.
   Note:
   Driving method while vehicle is driven to a stop at safe place is not restricted.
3. With the vehicle idling, read the temporary diagnostic code of DTC using Subaru Select Monitor or general scan tool.
   Note:
   - **For detailed operation procedures, refer to "Read Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).**
   - **In the step 3), if the DTC is not displayed on the Subaru Select Monitor or general scan tool display screen, the trouble is resolved.**

12. DRIVE CYCLE P

DTC	Item	Condition	Number of driving cycles on the detecting condition
P04F0	EVAP SYSTEM HIGH PRESSURE PURGE LINE (CPC2) PERFORMANCE	Remaining fuel level 20 L or more	2

Warning:
When performing drive cycle P on a public road, pay sufficient attention to the traffic condition and give the highest priority to safe driving.

1. Drive according to the drive pattern described below.



(A) Accelerate the vehicle to 80 km/h (50 MPH) or more in a fully warm-up condition.

(B) Keep a constant vehicle speed of 50 km/h (31.1 MPH) or more for at least five minutes.

(C) While depressing the accelerator pedal without gear shifting, take at least 10 seconds to accelerate to 112 km/h (70 MPH) or more.

(D) Vehicle speed km/h (MPH)

(E) Sec.

2. Park the vehicle on a safe place.
Note:
Driving method while vehicle is driven to a stop at safe place is not restricted.

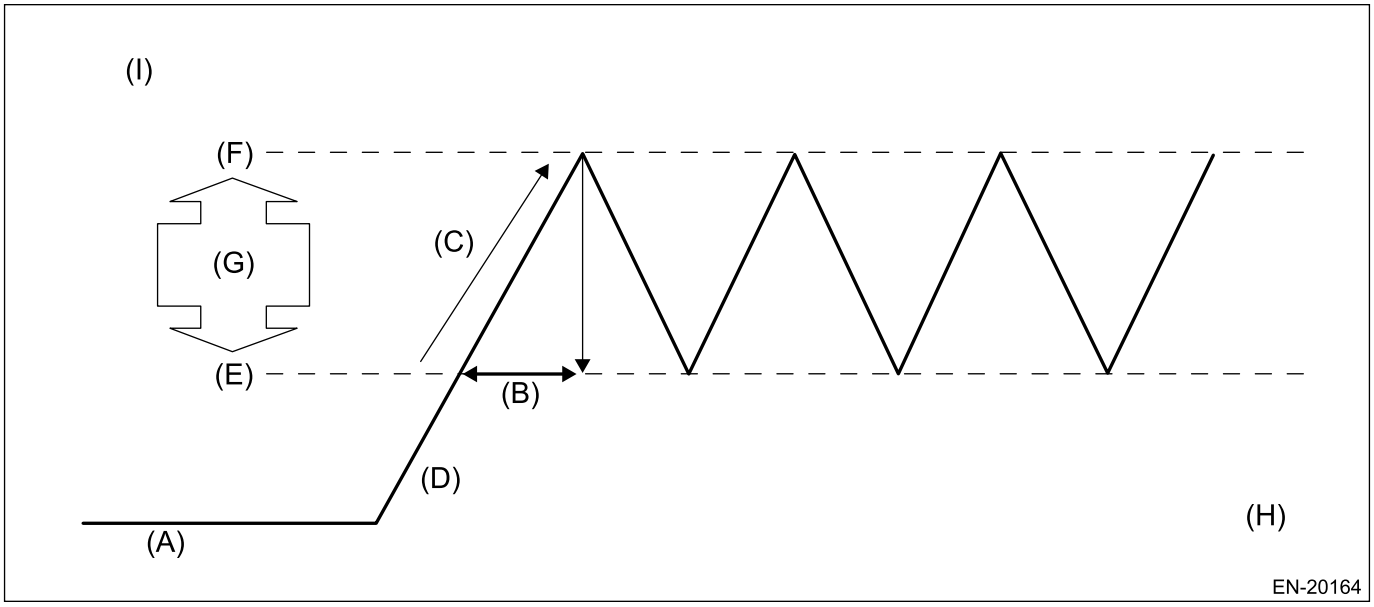
3. With the vehicle idling, read the temporary diagnostic code of DTC using Subaru Select Monitor or general scan tool.
Note:
- **For detailed operation procedures, refer to "Read Diagnostic Trouble Code (DTC)".** **Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).**
- **In the step 3), if the DTC is not displayed on the Subaru Select Monitor or general scan tool display screen, the trouble is resolved.**

13. DRIVE CYCLE R

DTC	Item	Condition	Number of driving cycles on the detecting condition
P219A	BANK 1 AIR-FUEL RATIO IMBALANCE	—	2

Warning:
When performing the drive cycle R on the public road, be very careful of the traffic condition and the safe driving must be the high priority.

1. Check the data in condition column of table by using the Subaru Select Monitor or general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA (NORMAL MODE).
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.
2. Keep the engine at idle for at least 30 seconds in a fully warm-up condition.
3. Start the driving.
4. With the gear position in the 4th, take 10 seconds to accelerate from 1600 rpm to 3200 rpm.
5. Decelerate to 1600 rpm in the 4th gear position. (There is no restrictions to the deceleration duration and how to use the brake.)
6. Repeat steps 4) and 5) 10 times (end when the temporary code is acquired).



(A) Idle the engine for at least 30 seconds in a fully warm-up condition.
(B) 10 seconds
(D) Engine speed
(E) 1600 rpm
(G) Accelerate and decelerate in the 4th gear position.
(H) Time

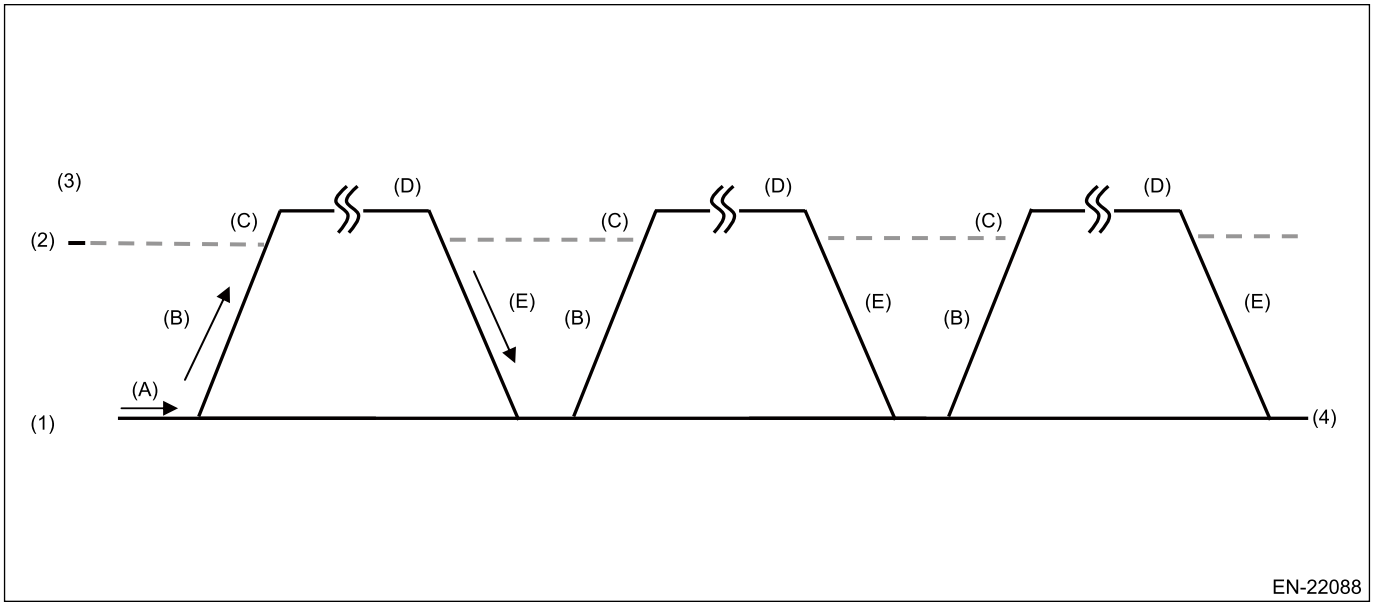
(C) Accelerating
(F) 3200 rpm
(I) Accelerating and decelerating

14. DRIVE CYCLE S

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0246	TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID "A" HIGH	—	1
P04AD	EVAP SYSTEM (CPC) PURGE CONTROL VALVE "B" CIRCUIT HIGH	—	2
P0851	PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW	—	2
P0852	PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH	—	2

Warning:
When performing the drive cycle S on the public road, be very careful of the traffic condition and the safe driving must be the high priority.

1. Using the Subaru Select Monitor, perform the clear memory for «Engine». Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION.
2. Drive three times according to the drive pattern described below.



(1) 0 km/h (0 MPH)
(2) 65 km/h (40 MPH)
(3) Vehicle speed
(4) Time
(A) Idle the engine for five seconds or more.
(B) Accelerating
(C) Vehicle speed exceeds 65 km/h (40 MPH) with 4th gear.
(D) Driving duration (no restriction for driving
(E) Deceleration (no restriction for deceleration method)

duration)

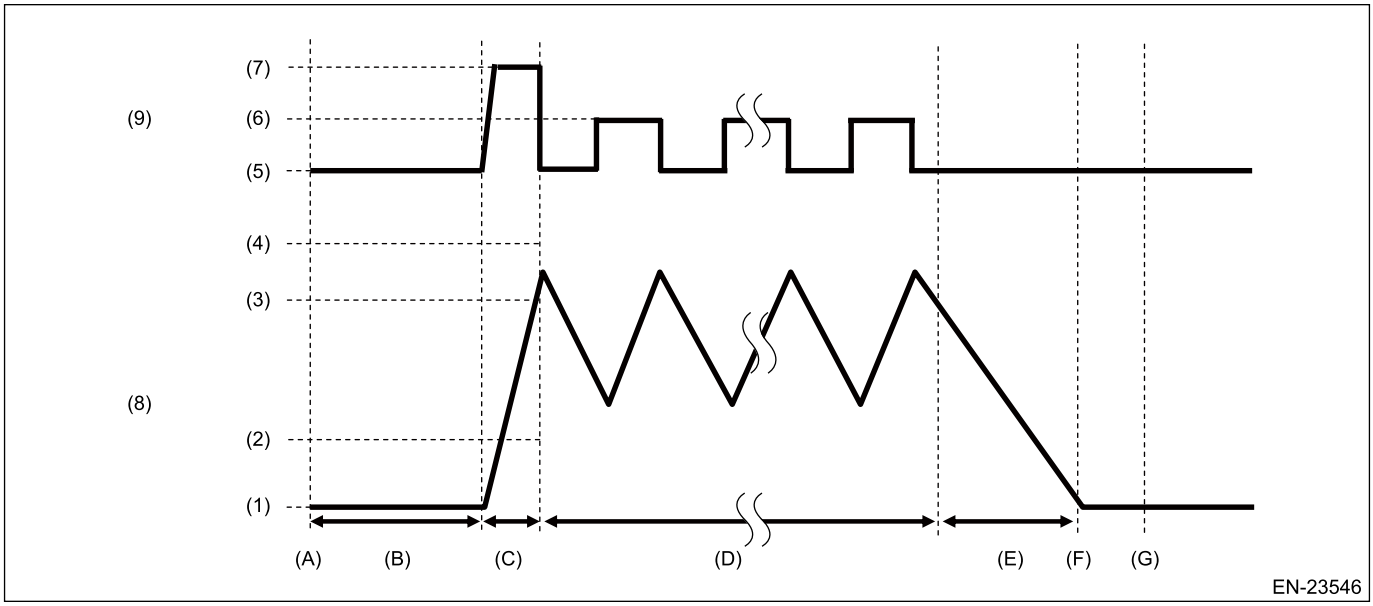
3. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

15. DRIVE CYCLE T

DTC	Item	Condition	Number of driving cycles on the detecting condition
P000A	"A" CAMSHAFT POSITION SLOW RESPONSE BANK 1	"Coolant Temp.": 80°C (176°F) or more	2
P000B	"B" CAMSHAFT POSITION SLOW RESPONSE BANK 1		2
P000C	"A" CAMSHAFT POSITION SLOW RESPONSE BANK 2		2
P000D	"B" CAMSHAFT POSITION SLOW RESPONSE BANK 2		2
P0011	"A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1		2
P0014	"B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1		2
P0021	"A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2		2
P0024	"B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2		2

Warning:
When performing the drive cycle T on the public road, be very careful of the traffic condition and the safe driving must be the high priority.

1. Using the Subaru Select Monitor, perform the clear memory for «Engine». Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION.
2. Drive according to the drive pattern described below.



(1) 0 km/h (0 MPH)
(2) 20 km/h (12.4 MPH)
(3) 60 km/h (37.3 MPH)
(4) 80 km/h (49.7 MPH)
(5) 0%
(6) 20%
(7) 30 — 60%
(8) Vehicle speed
(9) Accelerator pedal opening angle

(A) Start the engine.
(B) Idle the engine at least three minutes.
(C) Accelerate the vehicle to 60 km/h (37.3 MPH).
(D) With the vehicle speed of 60 km/h (37.3 MPH) as a reference, repeat accelerator pedal opening angle 0% (five seconds) ←→ 20% (five seconds) for 20 minutes or more.
(E) Decelerate with the accelerator pedal fully closed for at least five seconds.
(F) Park the vehicle. (Driving method while vehicle is driven to a stop at safe place is not restricted)
(G) Stop the engine.

Note:
In pattern (D), it is acceptable to stop the vehicle according to the traffic condition. Drive the vehicle until the total time of accelerator opening angle 0% (five seconds) ←→ 20% (five seconds) becomes 20 minutes or more.

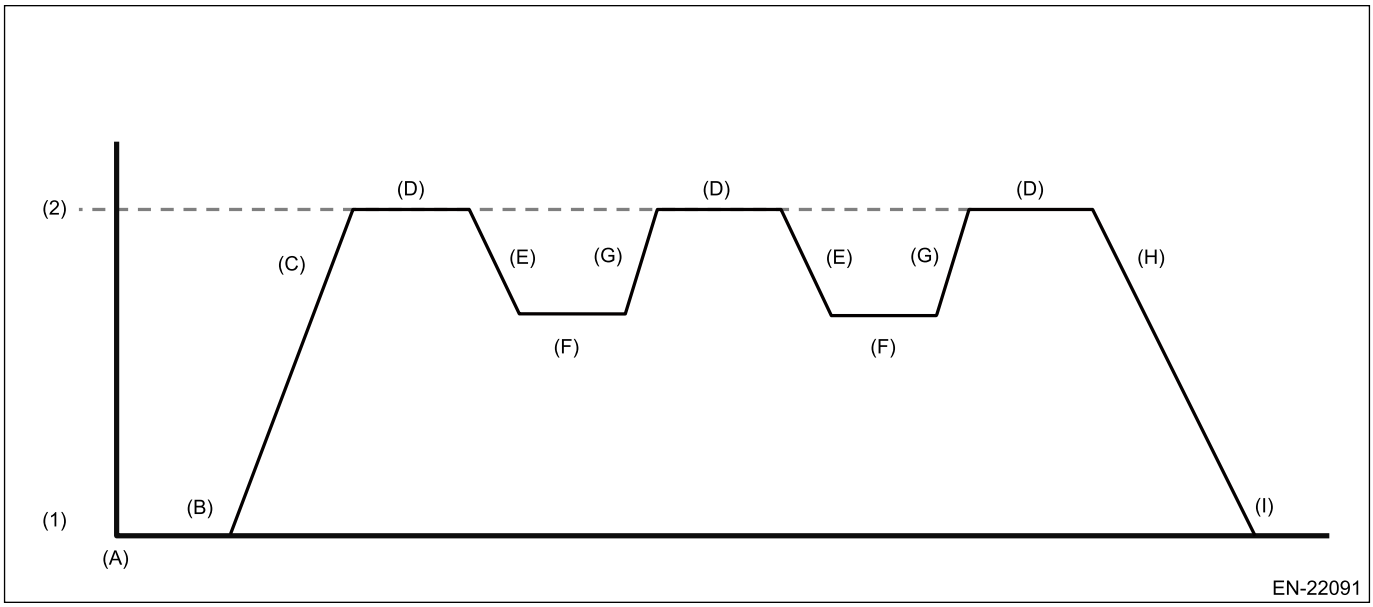
3. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

16. DRIVE CYCLE V

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0420	CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD BANK 1	—	2

Warning:
When performing the drive cycle V on the public road, be very careful of the traffic condition and the safe driving must be the high priority.

1. Drive according to the drive pattern described below.



(1) 0 km/h (0 MPH)
(2) 60 km/h (37 MPH)
(A) Start the engine.
(B) Idle the engine for five minutes or more.
(C) Accelerate the vehicle to 60 km/h (37.3 MPH).
(D) Drive for 10 seconds at a constant speed of 60 km/h (37.3 MPH).
(E) With the vehicle speed of 60 km/h (37.3 MPH) maintained, set accelerator opening angle to 0% and perform fuel cut for 5 seconds or more.
(F) Drive for 10 seconds or more with the accelerator opening angle 10 — 20%.
(G) Accelerate the vehicle to 60 km/h (37.3 MPH).
(H) With the vehicle speed of 60 km/h (37.3 MPH) maintained, set accelerator opening angle to 0% and take 5 seconds or more to slow down and stop the vehicle.
(I) Idle the engine for 20 seconds or more.

Note:

- **Acceleration and constant speed conditions may be adjusted depending on road conditions.**
- **If a diagnostic value is not input after driving, do not stop the engine and repeat the procedure (C) again.**

2. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

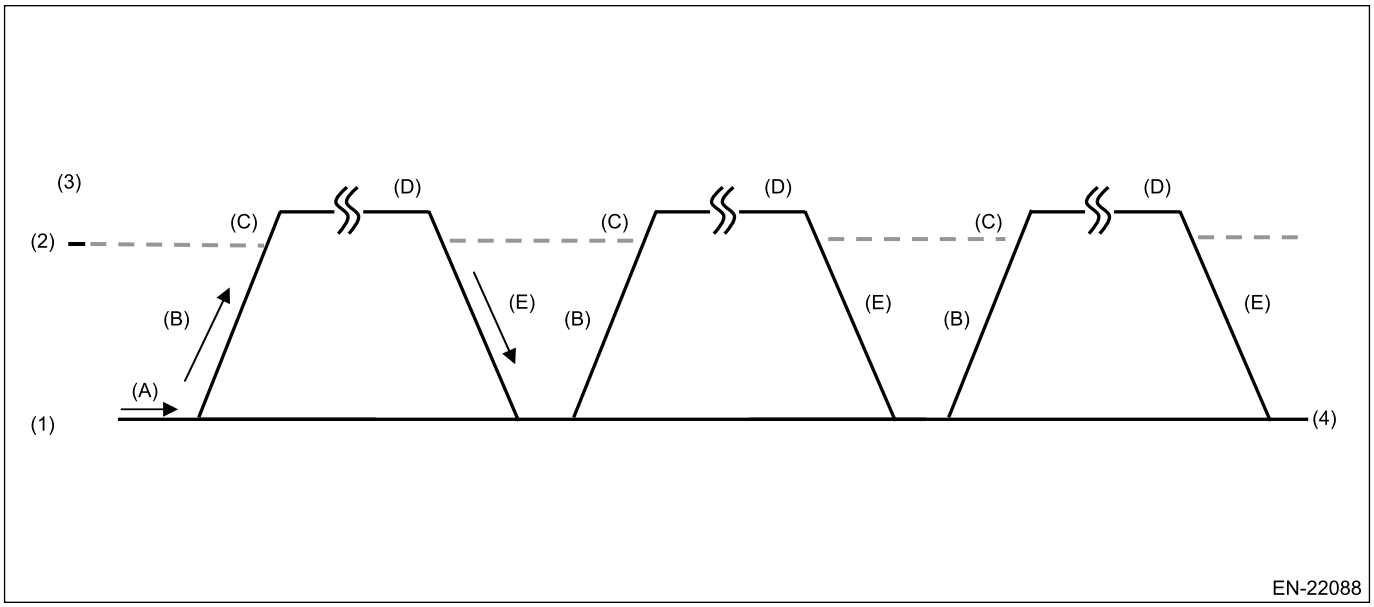
17. DRIVE CYCLE W

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0134	A/F / O2 SENSOR CIRCUIT NO ACTIVITY DETECTED BANK 1 SENSOR 1	—	1

Warning:
When performing the drive cycle W on the public road, be very careful of the traffic condition and the safe driving must be the high priority.

1. Using the Subaru Select Monitor, perform the clear memory for «Engine». Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION.

2. Drive according to the drive pattern described below.



(1) 0 km/h (0 MPH)
(2) 45 km/h (27 MPH)
(3) Vehicle speed
(4) Time
(A) Idle the engine for five seconds or more.
(C) Vehicle speed exceeds 45 km/h (27 MPH).
(E) Deceleration (no restriction for deceleration method)

(B) Accelerating

(D) Driving duration (no restriction for duration)

3. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

18. DRIVE CYCLE X

DTC	Item	Condition	Number of driving cycles on the detecting condition
P2004	TGV CONTROL STUCK OPEN BANK 1	—	1
P2005	TGV CONTROL STUCK OPEN BANK 2	—	1
P2006	TGV CONTROL STUCK CLOSED BANK 1	—	1
P2007	TGV CONTROL STUCK CLOSED BANK 2	—	1

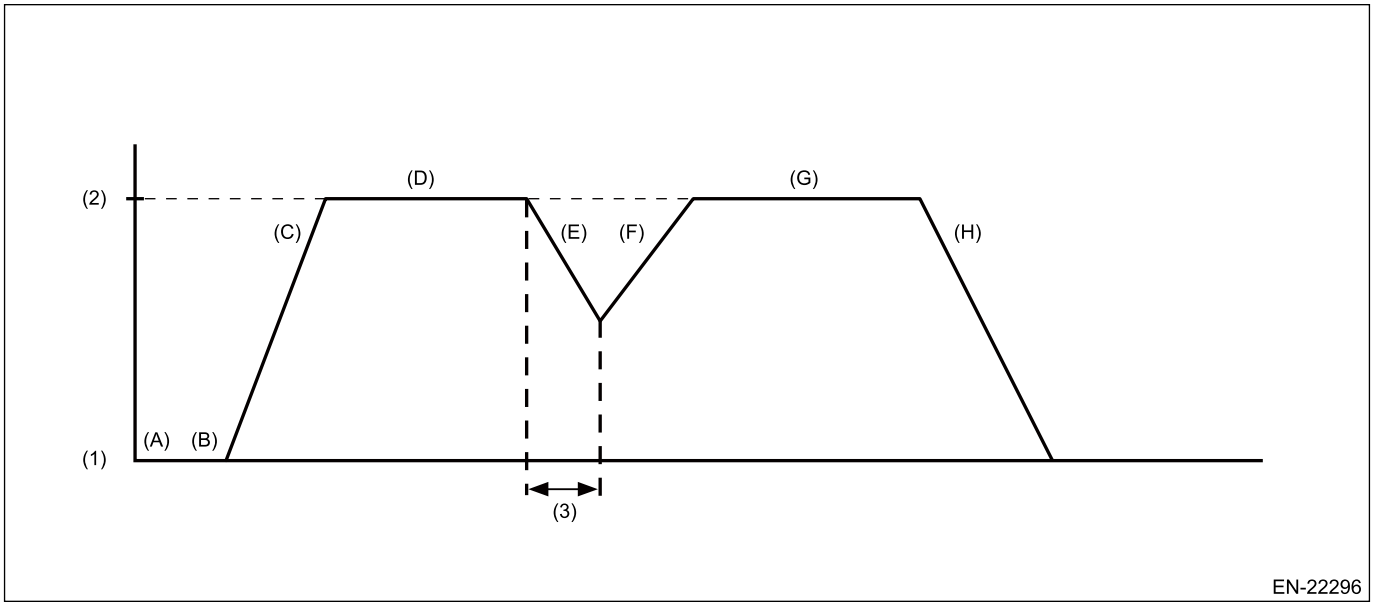
1. Using the Subaru Select Monitor, perform the clear memory for «Engine». Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION.
2. Start the engine.
3. Place the gear shift lever in neutral position, and race the engine for 10 seconds or more.
   Note:
   Keep the engine speed at 3500 rpm or more.
4. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

19. DRIVE CYCLE Y

DTC	Item	Condition	Number of driving cycles on the detecting condition
P013B	O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 2	—	2
P013F	O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 2	—	2

Warning:
When performing the drive cycle Y on the public road, be very careful of the traffic condition and the safe driving must be the high priority.

1. Perform the Clear Memory Mode. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Drive according to the drive pattern described below.



(1) 0 km/h (0 MPH)

(2) 60 km/h (37 MPH)

(3) 10 seconds

(A) Start the engine.

(D) Maintain the vehicle at 60 km/h (37 MPH) and drive at the constant speed.

(G) Maintain the vehicle at 60 km/h (37 MPH) and drive at the constant speed.

(B) Idle the engine at least five minutes.

(E) With the vehicle speed of 60 km/h (37 MPH) maintained, set accelerator pedal opening angle to 0% and perform fuel cut for 10 seconds.

(H) Decelerate and park the vehicle.

(C) Accelerate the vehicle to 60 km/h (37 MPH).

(F) Accelerate the vehicle to 60 km/h (37 MPH).

3. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

Note:

- **Acceleration and constant speed conditions may be adjusted depending on road conditions.**
- **If a diagnostic value is not input after driving, do not stop the engine and repeat the procedure (C) again.**
- **Do not use the cruise control.**

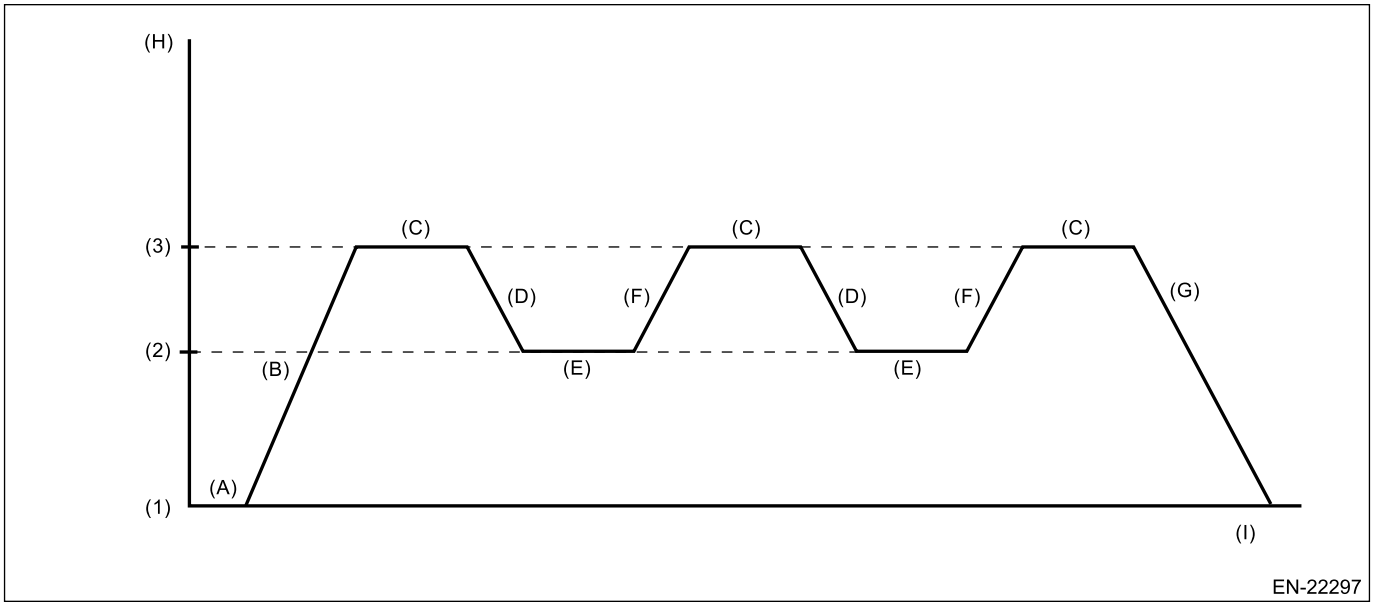
20. DRIVE CYCLE Z

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0030	A/F / O2 HEATER CONTROL CIRCUIT BANK 1 SENSOR 1	—	2

DTC	Item	Condition	Number of driving cycles on the detecting condition
P0068	MAP/MAF - THROTTLE POSITION CORRELATION	—	2
P0101	MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT RANGE/PERFORMANCE	—	2

Warning:
When performing the drive cycle Z on the public road, be very careful of the traffic condition and the safe driving must be the high priority.

1. Using the Subaru Select Monitor, perform the clear memory for «Engine». Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION.
2. Drive according to the drive pattern described below.



(1)	0 (km/h or second)	(2)	60 km/h (37 MPH)	(3)	88 km/h (55 MPH)
(A)	Shift the select lever to “P” range or the gear shift lever to the neutral position, and let the engine idle for 10 seconds or more.	(D)	Decelerate with fully closed throttle to 60 km/h (37 MPH).	(G)	Stop vehicle with the throttle fully closed.
(B)	Open the throttle half way, then accelerate the vehicle to 88 km/h (55 MPH) or more.	(E)	Drive for 20 seconds or more at 60 km/h (37 MPH) or less.	(H)	Vehicle speed km/h (MPH)
(C)	Drive for 20 seconds or more at 88 km/h (55 MPH) or more.	(F)	Open the throttle half way, then accelerate the vehicle to 88 km/h (55 MPH) or more.	(I)	Sec.

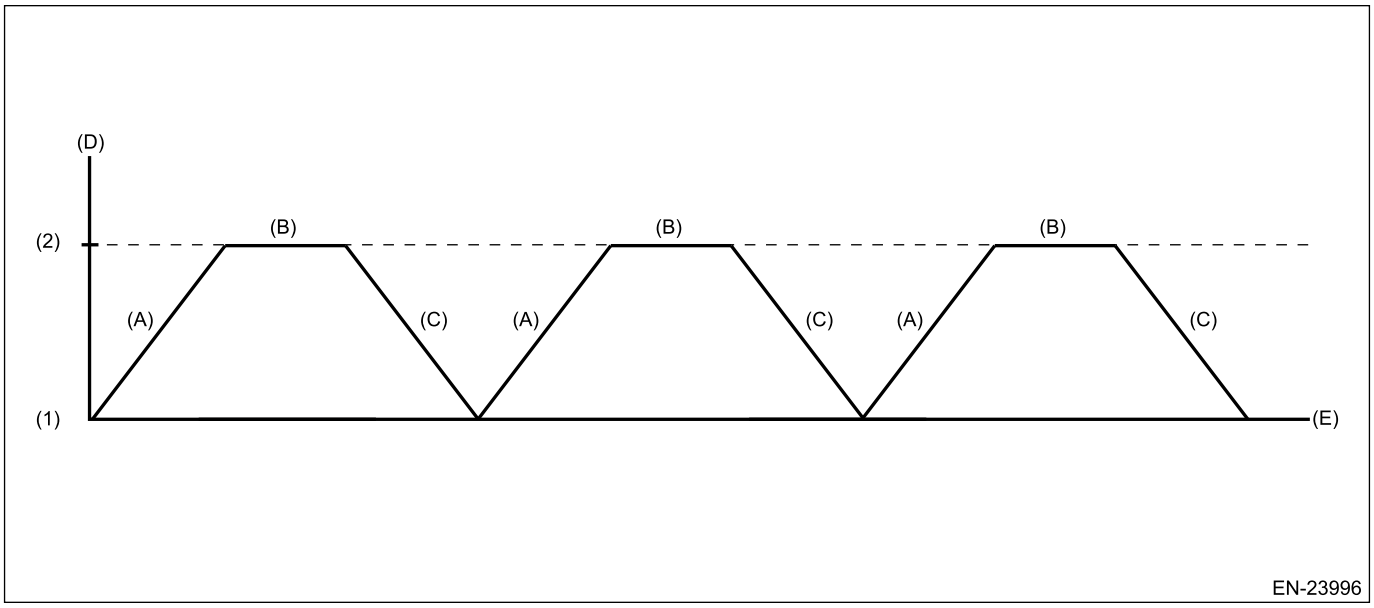
3. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

21. DRIVE CYCLE AA

DTC	Item	Condition	Number of driving cycles on the detecting condition
P1449	EVAP SYSTEM CLOG DETECTED (AIR FILTER)	—	2

Warning:
When performing the drive cycle AA on the public road, be very careful of the traffic condition and the safe driving must be the high priority.
Note:
Always perform the inspection mode after warming up the engine except when the engine coolant temperature at engine start is specified.

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory for [Engine]. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.
3. Drive according to the drive pattern described below.



(1) 0 km/h (0 MPH)
(2) 60 km/h (37 MPH)
(A) Accelerate the vehicle speed to 60 km/h or more. (Rapid acceleration not permitted)
(B) Three minute constant driving
(C) Deceleration
(D) Vehicle speed
(E) Driving duration

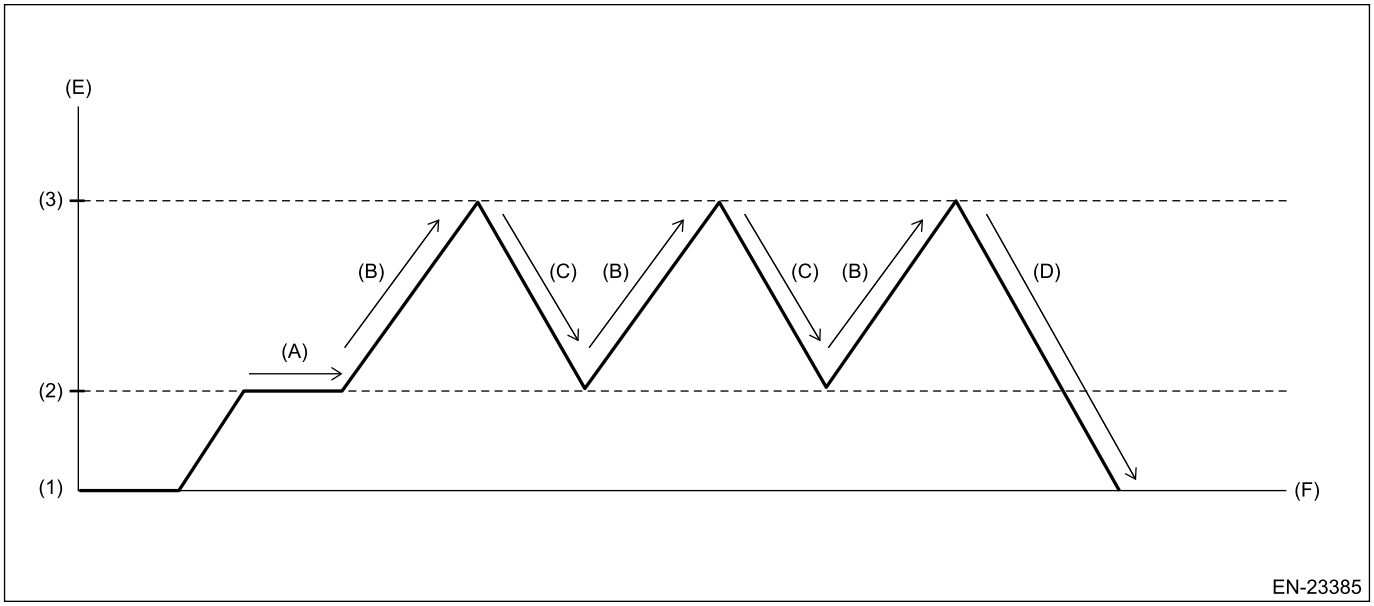
4. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

22. DRIVE CYCLE AB

DTC	Item	Condition	Number of driving cycles on the detecting condition
P226B	TURBOCHARGER/SUPERCHARGER BOOST PRESSURE TOO HIGH - MECHANICAL	—	1

Warning:
When performing the drive cycle AB on the public road, be very careful of the traffic condition and the safe driving must be the high priority.
Note:
Always perform the inspection mode after warming up the engine except when the engine coolant temperature at engine start is specified.

1. Check that the battery voltage is 12 V or more and fuel remains approx. half [20 — 40 L (5.3 — 10.6 US gal, 4.4 — 8.8 Imp gal)].
2. Using the Subaru Select Monitor, perform the clear memory for [Engine]. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.
3. Drive according to the drive pattern described below.



(1) 0 km/h (0 MPH)
(2) 30 km/h (18.6 MPH)
(2) 80 km/h (50 MPH)
(A) Accelerate and drive at a constant speed of 30 km/h (18.6 MPH) with the gear in
(C) Decrease the vehicle speed to 30 km/h (18.6 MPH) while holding in 3rd range.
(E) Vehicle speed

3rd range. (Using the manual mode, hold in 3rd range)

(B) Accelerate the vehicle with full open throttle to 80 km/h (50 MPH) without shifting.

(D) Decelerate and park the vehicle.

(F) Driving duration

4. Read the temporary code using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

OPERATION

1. SUBARU SELECT MONITOR

1. On «Start» display, select «Diagnosis».
2. On «Vehicle selection» display, input the target vehicle information and select «Confirmed».
3. On «Main Menu» display, select «Each System».
4. On «Select System» display, select «Engine Control System» and then «Enter».
5. On «Select Function» display, select «Work Support».
6. On «DTC» display, select «Clear Memory».

   Note:
   - **Initial diagnosis of electronic throttle control is performed after memory clearance. Wait for 10 seconds or more after turning the ignition switch to ON, and then start the engine.**
   - **For detailed operation procedures, refer to "Application help".**

2. GENERAL SCAN TOOL

For procedures clearing memory using the general scan tool, refer to the general scan tool operation manual.

Note:

Initial diagnosis of electronic throttle control is performed after memory clearance. Wait for 10 seconds or more after turning the ignition switch to ON, and then start the engine.

OPERATION

Caution:
After the active test is completed, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION..

1. ENGINE

Note:
For detailed operation procedures, refer to "Application help".

1. On «Start» display, select «Diagnosis».
2. On «Vehicle selection» display, input the vehicle information and select «Confirmed».
3. On «Main Menu» display, select «Each System».
4. On «Select System» display, select «Engine Control System» and then select «Enter».
5. On «Select Function» display, select «Active Test».

Active test items	Contents	Execution condition
Fuel Pump Relay	ON/OFF of the fuel pump can be set.	Ignition switch is ON (engine OFF)
CPC Solenoid Valve	ON/OFF of the purge control solenoid valve can be set.	
Radiator Fan Relay	ON/OFF of the radiator fan relay can be set.	
A/C Compressor Relay	ON/OFF of the A/C relay can be set.	
Turbocharger Wastegate Solenoid	ON/OFF of the wastegate control solenoid valve can be set.	
Secondary Air Combi Valve 1	ON/OFF of the secondary air combination valve relay 1 can be set.	
Secondary Air Combi Valve 2	ON/OFF of the secondary air combination valve relay 2 can be set.	
Secondary Air Pump Relay	ON/OFF of the secondary air pump relay can be set.	
CPC Solenoid 2	ON/OFF of the purge control solenoid valve 2 can be set.	
ELCM switching valve	ON/OFF of the leak check valve assembly switching valve can be set.	
ELCM pump	ON/OFF of the leak check valve assembly vacuum pump can be set.	
Fuel Pump Control (OFF Drive)	Fuel pump can be set to OFF.	At idling
Fuel Pump Control (ON/OFF Dr.)	ON/OFF of the fuel pump can be set.	
Fixed Idle Ignition Timing	Idle ignition timing can be set.	
Idle Speed Control	Idle speed can be set.	
Injection Stop Mode (Injector 1) Injection Stop Mode (Injector 2)	Injector of each cylinder can be set to stop the fuel injection.	

Active test items	Contents	Execution condition
Injection Stop Mode (Injector 3) Injection Stop Mode (Injector 4)		
Injection Quantity Control	The amount of fuel injection can be set.	

ENGINE (DIAGNOSTICS)(STI) > Malfunction Indicator Light

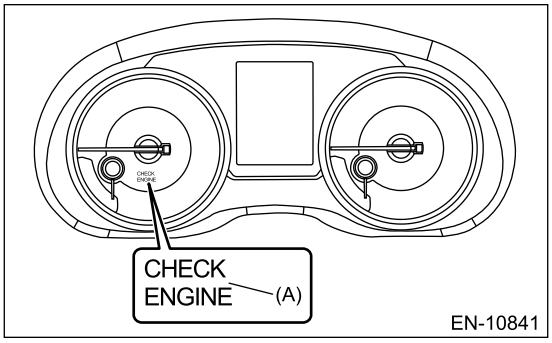
PROCEDURE

1. Activation of malfunction indicator light Ref. to ENGINE (DIAGNOSTICS)(STI)>Malfunction Indicator Light>ACTIVATION OF MALFUNCTION INDICATOR LIGHT.
↓
2. Malfunction indicator light does not come on Ref. to ENGINE (DIAGNOSTICS)(STI)>Malfunction Indicator Light>MALFUNCTION INDICATOR LIGHT DOES NOT COME ON.
↓
3. Malfunction indicator light does not go off Ref. to ENGINE (DIAGNOSTICS)(STI)>Malfunction Indicator Light>MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF.
↓
4. Malfunction indicator light does not blink Ref. to ENGINE (DIAGNOSTICS)(STI)>Malfunction Indicator Light>MALFUNCTION INDICATOR LIGHT DOES NOT BLINK.
↓
5. Malfunction indicator light remains blinking Ref. to ENGINE (DIAGNOSTICS)(STI)>Malfunction Indicator Light>MALFUNCTION INDICATOR LIGHT REMAINS BLINKING.

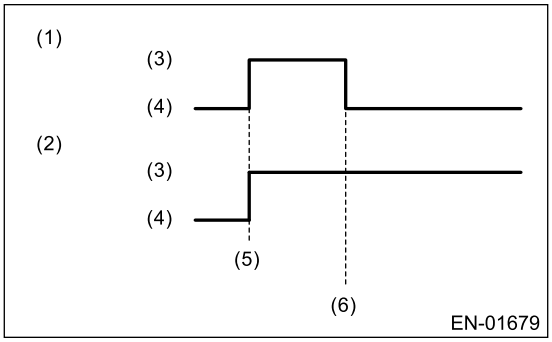
ENGINE (DIAGNOSTICS)(STI) > Malfunction Indicator Light

ACTIVATION OF MALFUNCTION INDICATOR LIGHT

1. When the ignition switch is turned to ON (engine OFF), the malfunction indicator light (A) in the combination meter illuminates.
   Note:
   If the malfunction indicator light does not illuminate, perform diagnostics of the malfunction indicator light circuit or the combination meter circuit. Ref. to ENGINE (DIAGNOSTICS)(STI)>Malfunction Indicator Light>MALFUNCTION INDICATOR LIGHT DOES NOT COME ON.

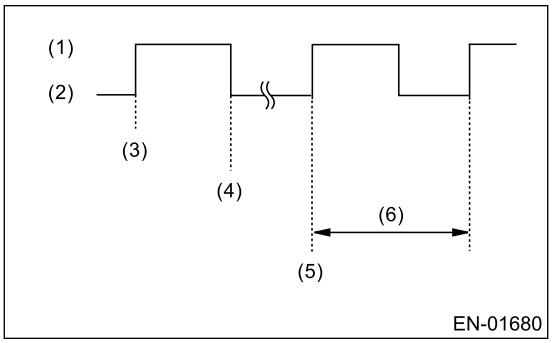


2. After starting the engine, the malfunction indicator light goes out. If it does not go off, any of the engine and emission control system has malfunction.



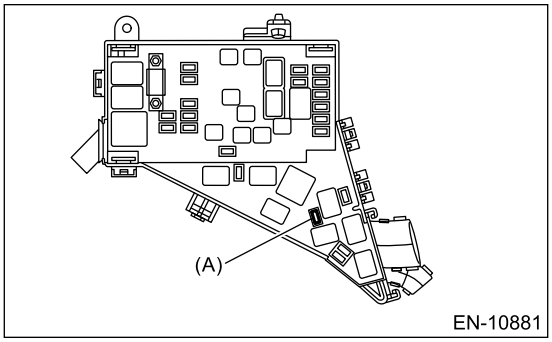
(1) No DTC
(2) Trouble occurs
(3) ON
(4) OFF
(5) Ignition switch ON
(6) Engine start

3. If the diagnostic system detects a misfire which could damage the catalyst, the malfunction indicator light will blink at a cycle of 1 Hz.

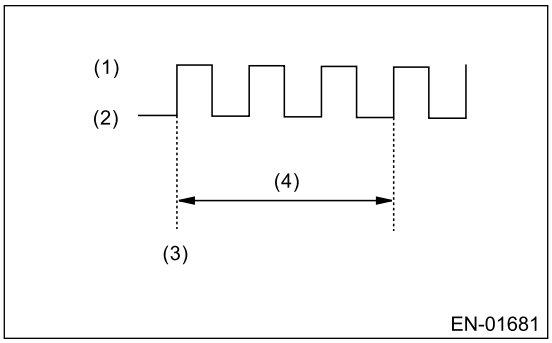


(1) ON
(2) OFF
(3) Ignition switch ON
(4) Engine start
(5) Misfire start
(6) 1 second

4. Turn the ignition switch to OFF and install the delivery mode fuse (A).
Caution:
Do not use any fuses that are installed on the vehicle.



(1) When the ignition switch is turned to ON (engine OFF), the malfunction indicator light illuminates.
(2) After the engine starts, malfunction indicator light blinks in a cycle of 0.5 Hz. (During diagnosis)
(3) Malfunction indicator light blinks at a cycle of 3 Hz after diagnosis if there is no trouble.
Malfunction indicator light illuminates if faulty.



(1) ON
(2) OFF
(3) Ignition switch ON
(4) 1 second

ENGINE (DIAGNOSTICS)(STI) > Malfunction Indicator Light

MALFUNCTION INDICATOR LIGHT DOES NOT COME ON

Trouble symptom:
When the ignition switch is turned to ON (engine OFF), malfunction indicator light does not illuminate.
Note:
For the diagnostic procedure, refer to the combination meter section. Ref. to COMBINATION METER (DIAGNOSTICS)>Basic Diagnostic Procedure.

ENGINE (DIAGNOSTICS)(STI) > Malfunction Indicator Light

MALFUNCTION INDICATOR LIGHT DOES NOT GO OFF

Trouble symptom:
Although malfunction indicator light comes on when the engine runs, DTC is not shown on the Subaru Select Monitor or general scan tool display.

1. CHECK DTC.

Read the DTCs for the engine and the LAN system using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC). Ref. to LAN SYSTEM (DIAGNOSTICS)>Read Diagnostic Trouble Code (DTC).

Is DTC of engine or LAN system displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC). Ref. to LAN SYSTEM (DIAGNOSTICS)>List of Diagnostic Trouble Code (DTC).
No	Check the combination meter system. Ref. to COMBINATION METER (DIAGNOSTICS)>Basic Diagnostic Procedure.

MALFUNCTION INDICATOR LIGHT DOES NOT BLINK

Diagnosis:

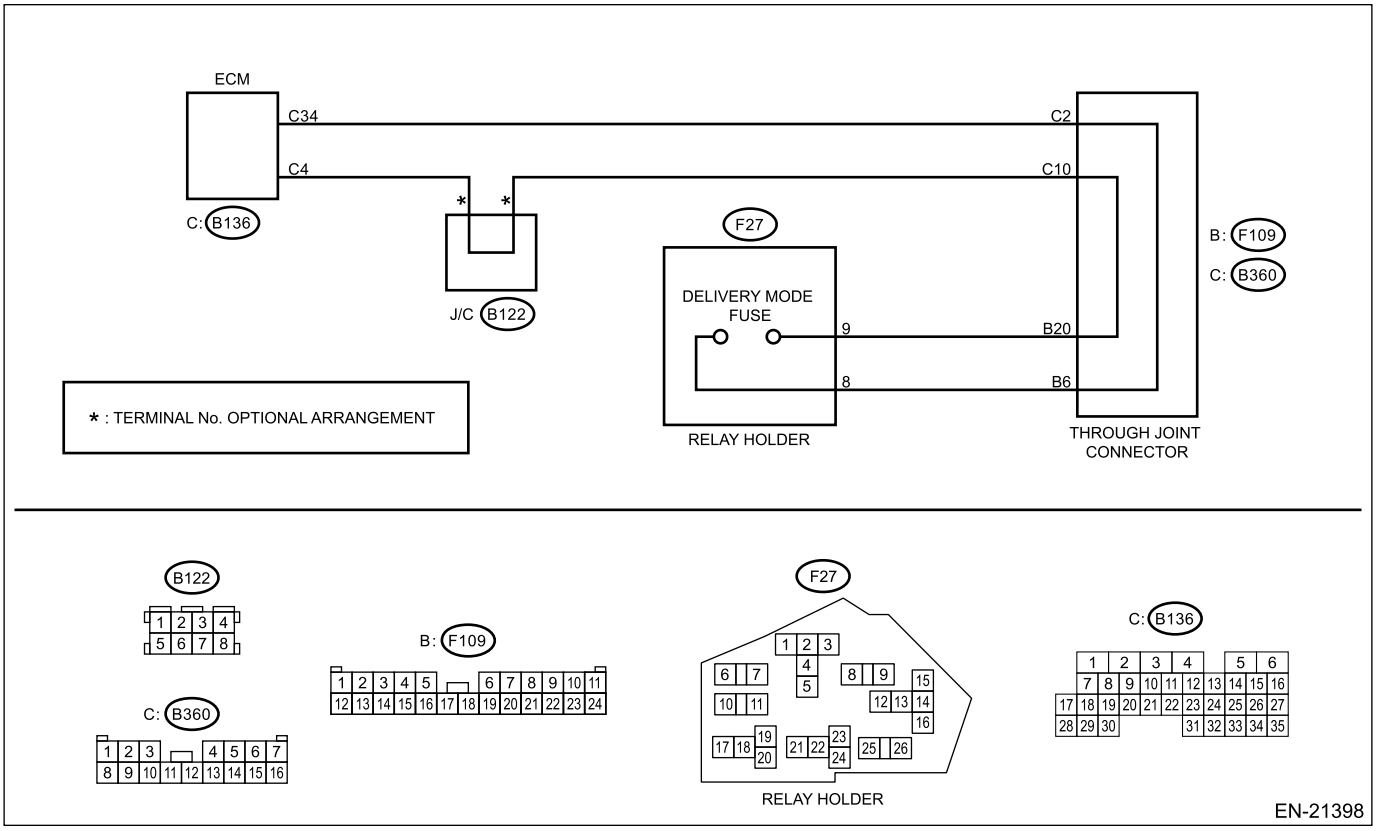
- The malfunction indicator light circuit is open or shorted.
- Delivery mode fuse circuit is open.

Trouble symptom:

Malfunction indicator light does not blink during Inspection Mode.

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.

1. Turn the ignition switch to OFF.
2. Make sure that the delivery mode fuse is removed.
3. Turn the ignition switch to ON. (Engine OFF)

Does the malfunction indicator light illuminate?

Yes	Go to 2.
No	Repair the malfunction indicator light circuit. Ref. to ENGINE (DIAGNOSTICS)(STI)>Malfunction Indicator Light>MALFUNCTION INDICATOR LIGHT DOES NOT COME ON.

2. CHECK HARNESS BETWEEN ECM AND DELIVERY MODE FUSE.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Install the delivery mode fuse.
4. Measure the resistance of harness between ECM connectors.
   Connector & terminal
   (B136) No. 34 — (B136) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector** • **Poor contact of each connector between ECM connector**

3. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

Yes	Repair the poor contact of ECM connector.
No	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

MALFUNCTION INDICATOR LIGHT REMAINS BLINKING

Diagnosis:

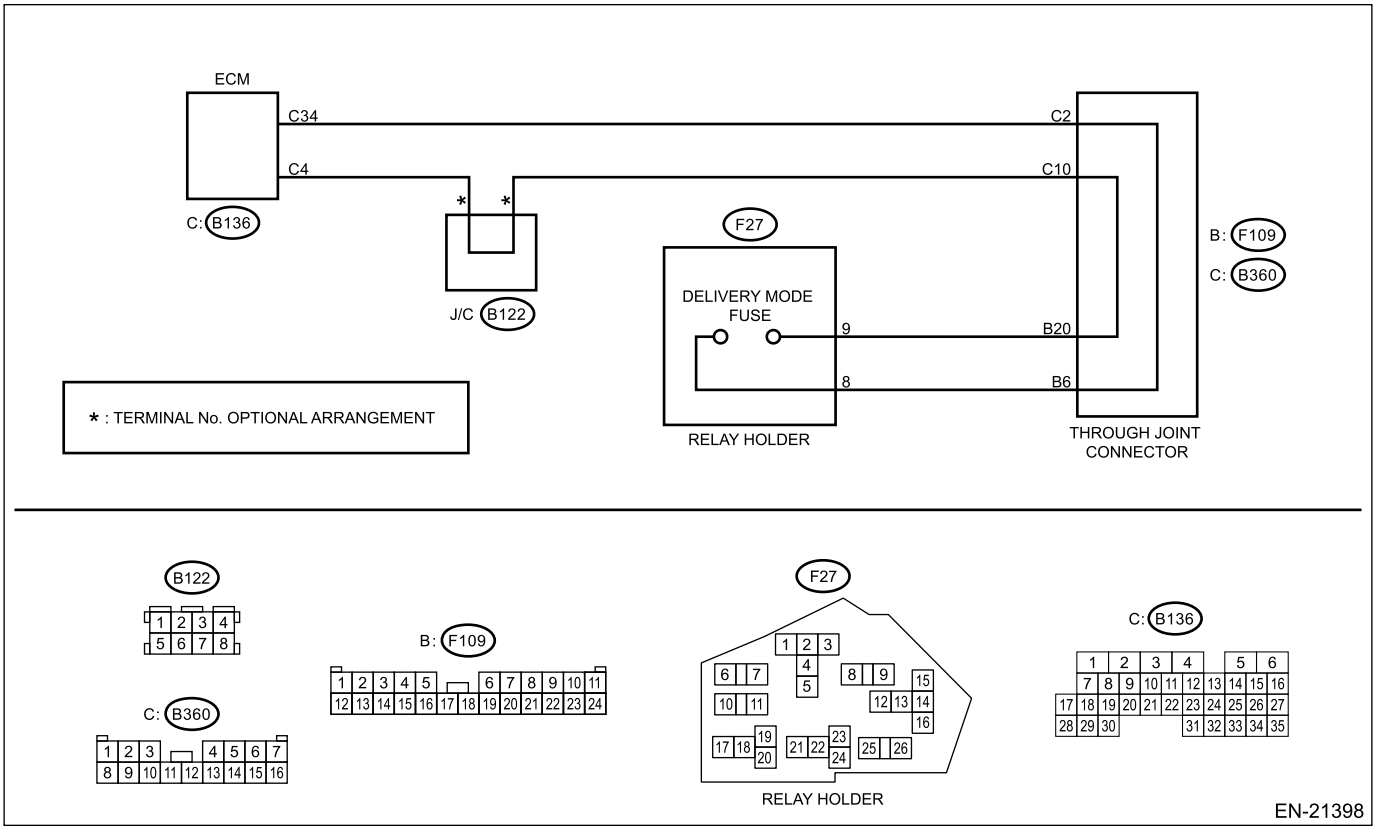
Delivery mode fuse circuit is shorted to ground.

Trouble symptom:

Malfunction indicator light blinks when delivery mode fuse is not installed.

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK DELIVERY MODE FUSE.

1. Make sure that the delivery mode fuse is removed.
2. Turn the ignition switch to ON.

Does the malfunction indicator light blink?

Yes	Go to 2.
No	System is normal. **Note:** **Malfunction indicator light blinks at a cycle of 3 Hz when delivery mode fuse is installed.**

2. CHECK HARNESS BETWEEN ECM AND DELIVERY MODE FUSE.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 34 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	Repair the short circuit to ground in harness between ECM connector and delivery mode fuse.

PROCEDURE

1. Check of the fuel amount
↓
2. CHECK IMMOBILIZER. • Model without push button start Ref. to IMMOBILIZER (DIAGNOSTICS)>Basic Diagnostic Procedure. • Model with push button start Ref. to KEYLESS ACCESS WITH PUSH BUTTON START SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.
↓
3. Inspection of starter motor circuit Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostics for Engine Starting Failure>STARTER MOTOR CIRCUIT.
↓
4. Inspection of ECM power supply and ground line Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostics for Engine Starting Failure>CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM).
↓
5. Inspection of ignition control system Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostics for Engine Starting Failure>IGNITION CONTROL SYSTEM.
↓
6. Inspection of fuel pump circuit Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostics for Engine Starting Failure>FUEL PUMP CIRCUIT.
↓
7. Inspection of fuel injector circuit Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostics for Engine Starting Failure>FUEL INJECTOR CIRCUIT.

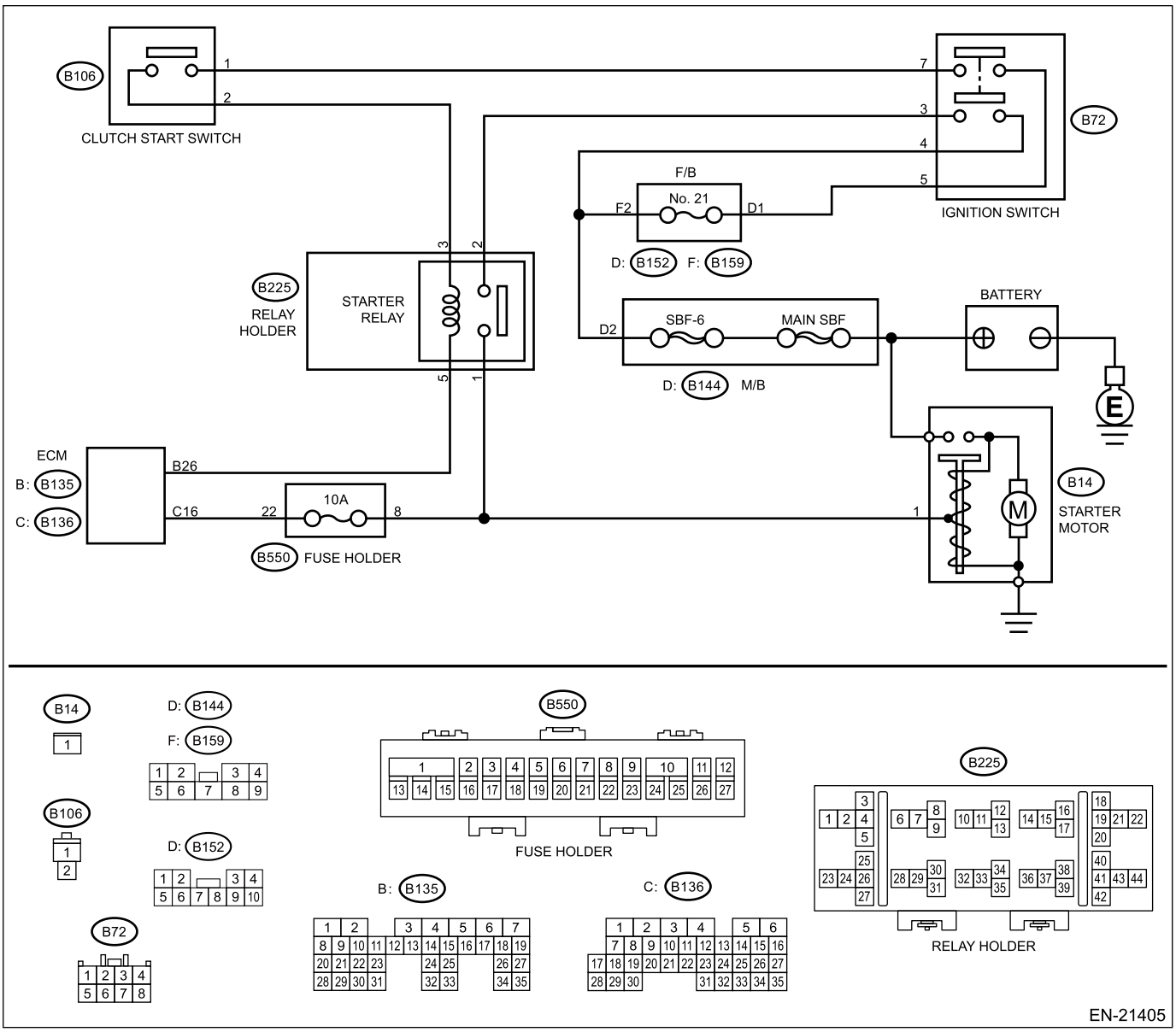
STARTER MOTOR CIRCUIT

1. MODEL WITHOUT PUSH BUTTON START

Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK BATTERY.

Check the battery. Ref. to STARTING/CHARGING SYSTEMS(STI)>Battery>INSPECTION.

Is the check result OK?

Yes	Go to 2.
No	Charge or replace the battery. Ref. to STARTING/CHARGING SYSTEMS(STI)>Battery.

2. CHECK OPERATION OF STARTER MOTOR.

Check the starter motor operation.

Does the starter motor operate?

Yes	Go to 3.
No	Go to 4.

3. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Are any DTCs displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Check ignition control system. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostics for Engine Starting Failure>IGNITION CONTROL SYSTEM.

4. CHECK INPUT SIGNAL FOR STARTER MOTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from starter motor.
3. Depress the clutch pedal.
4. Turn the ignition switch to START.
5. Measure the voltage between the starter motor connector and the engine ground.
   Connector & terminal
   (B14) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Check the starter motor. Ref. to STARTING/CHARGING SYSTEMS(STI)>Starter.
No	Go to 5.

5. CHECK INPUT SIGNAL FOR STARTER MOTOR.

1. Depress the clutch pedal.
2. Turn the ignition switch to START.
3. Measure the voltage between starter relay connector and chassis ground.
   Connector & terminal
   (B225) No. 1 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the open circuit of the harness between starter relay connector and starter motor.
No	Go to 6.

6. CHECK HARNESS BETWEEN BATTERY AND IGNITION SWITCH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ignition switch.
3. Measure the voltage between ignition switch connector and chassis ground.
   Connector & terminal
   (B72) No. 4 (+) — Chassis ground (−):
   (B72) No. 5 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 7.
No	Repair the power supply circuit.

7. CHECK IGNITION SWITCH.

Measure the resistance between ignition switch terminals after turning the ignition switch to START position.

Terminals

No. 3 — No. 4:

No. 5 — No. 7:

Is the resistance less than 1 Ω?

Yes	Go to 8.
No	Replace the ignition switch. Ref. to SECURITY AND LOCKS>Ignition Key Lock>REPLACEMENT.

8. CHECK INPUT VOLTAGE OF CLUTCH START SWITCH.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from clutch start switch.
3. Connect the connector to ignition switch.
4. Turn the ignition switch to START.
5. Measure the voltage between the clutch start switch connector and chassis ground.

Connector & terminal

(B106) No. 1 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 9.
No	Check the following item and repair if necessary. • Blown out of fuse (F/B No. 21) • Open or short circuit to ground in harness between ignition switch connector and clutch start switch connector

9. CHECK HARNESS BETWEEN STARTER RELAY CONNECTOR AND CLUTCH START SWITCH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Remove the starter relay.
3. Measure the resistance of harness between starter relay connector and clutch start switch connector.
   Connector & terminal
   (B225) No. 3 — (B106) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 10.
No	Repair the open circuit in harness between starter relay connector and clutch start switch connector.

10. CHECK INPUT VOLTAGE OF STARTER RELAY.

1. Connect the connector to the clutch start switch.
2. Depress the clutch pedal.
3. Turn the ignition switch to START.
4. Measure the voltage between starter relay connector and chassis ground.
   Connector & terminal
   (B225) No. 3 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 11.
No	Replace the clutch start switch. Ref. to CLUTCH SYSTEM>Clutch Switch.

11. CHECK INPUT VOLTAGE OF STARTER RELAY.

1. Turn the ignition switch to START.
2. Measure the voltage between starter relay connector and chassis ground.
   Connector & terminal
   (B225) No. 2 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 12.
No	Repair the open circuit of harness between starter relay connector and ignition switch connector.

12. CHECK STARTER RELAY.

1. Connect the battery to starter relay terminals No. 3 and No. 5.
2. Measure the resistance between starter relay terminals.
   Terminals
   No. 1 — No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 13.
No	Replace the starter relay.

13. CHECK HARNESS BETWEEN ECM AND STARTER RELAY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and starter relay connector.
   Connector & terminal
   (B136) No. 16 — (B225) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 14.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and starter relay connector** • **Blown out of fuse**

14. CHECK ECM INPUT VOLTAGE.

1. Install the starter relay.
2. Depress the clutch pedal.
3. Turn the ignition switch to START.
4. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B135) No. 26 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Check the ECM power supply and ground line. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostics for Engine Starting Failure>CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM).
No	Repair the open circuit of harness between ECM connector and starter relay connector.

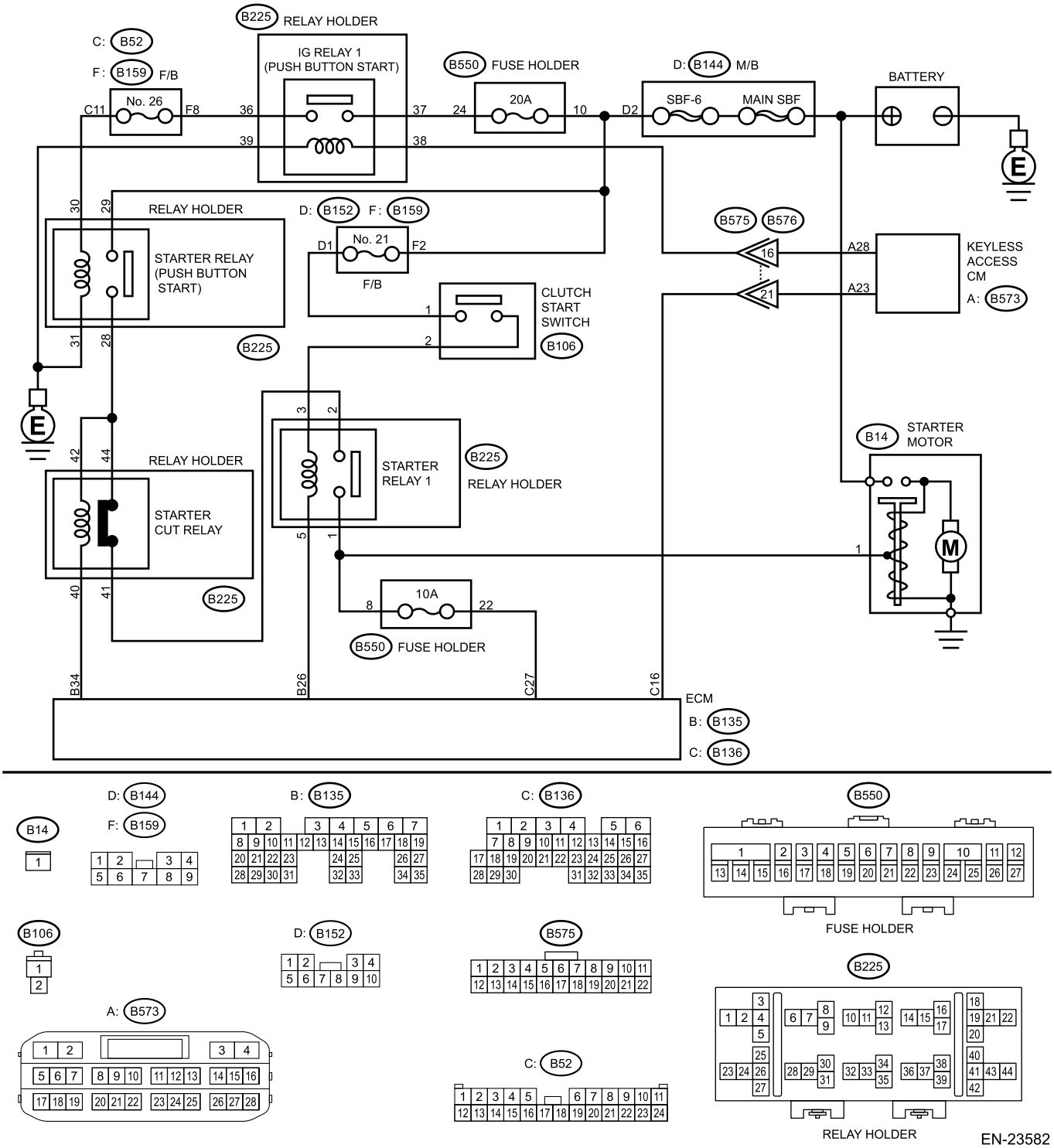
2. MODEL WITH PUSH BUTTON START

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



EN-23582

1. CHECK BATTERY.

Check the battery. Ref. to STARTING/CHARGING SYSTEMS(STI)>Battery>INSPECTION.

Is the check result OK?

Yes	Go to 2.
No	Charge or replace the battery. Ref. to STARTING/CHARGING SYSTEMS(STI)>Battery.

2. CHECK OPERATION OF STARTER MOTOR.

Check the starter motor operation.

Does the starter motor operate?

Yes	Go to 3.
No	Go to 4.

3. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Are any DTCs displayed? (Current malfunction)

Yes	Check the appropriate DTC using the “List of Diagnostic Trouble Code (DTC)”. Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Check ignition control system. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostics for Engine Starting Failure>IGNITION CONTROL SYSTEM.

4. CHECK PUSH BUTTON IGNITION SWITCH.

Press the push button ignition switch twice with the ignition OFF (ACC OFF).
Note:
Release the clutch pedal.

Does the ignition turn to ON?

Yes	Go to 5.
No	Check the push button start system. Ref. to KEYLESS ACCESS WITH PUSH BUTTON START SYSTEM (DIAGNOSTICS)>Diagnostics with Phenomenon>LIST > POWER SUPPLY SWITCHING SYSTEM.

5. CHECK PUSH BUTTON IGNITION SWITCH.

1. Depress the clutch pedal.
2. Check the push button ignition switch indicator light.

Does the indicator light turn to green?

Yes	Go to 6.
No	Check the push button start system. Ref. to KEYLESS ACCESS WITH PUSH BUTTON START SYSTEM (DIAGNOSTICS)>Diagnostics with Phenomenon>INSPECTION > ENGINE DOES NOT START.

6. CHECK START SWITCH SIGNAL.

1. Read the waveform of start switch signal using Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Current Data Display For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
2. While depressing the clutch pedal, press the push button ignition switch once.

Does waveform of the start switch signal occur?

Yes	Go to 10.
No	Go to 7.

7. CHECK HARNESS BETWEEN ECM AND KEYLESS ACCESS CM.

1. Turn the ignition to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the keyless access CM.
4. Measure the resistance of harness between ECM connector and keyless access CM.
   Connector & terminal
   (B136) No. 16 — (B573) No. 23:

Is the resistance less than 1 Ω?

Yes — Go to 8.

No — Repair the harness and connector.
Note:
In this case, repair the following item:
- **Open circuit of harness between ECM connector and keyless access CM connector**
- **Poor contact of coupling connector**

8. CHECK HARNESS BETWEEN ECM AND KEYLESS ACCESS CM.

Measure the resistance between ECM connector and chassis ground.
Connector & terminal
(B136) No. 16 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes — Go to 9.

No — Repair the short circuit to ground in harness between ECM connector and keyless access CM connector.

9. CHECK START SWITCH SIGNAL.

1. Connect the connector to ECM.
2. Connect the connector to the keyless access CM.
3. Read the waveform of start switch signal using an oscilloscope.
4. While depressing the clutch pedal, press the push button ignition switch once.

Connector & terminal

(B136) No. 16 (+) — Chassis ground (−):

Does waveform of the start switch signal occur?

Yes	Repair the poor contact of ECM connector.
No	Repair the poor contact of keyless access CM connector.

10. CHECK INPUT SIGNAL FOR STARTER MOTOR.

1. Turn the ignition to OFF.
2. Disconnect the connector from starter motor.
3. Place the gear shift lever in neutral.
4. While depressing the clutch pedal, press the push button ignition switch once.
5. Measure the voltage between the starter motor connector and the engine ground.

Connector & terminal

(B14) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Check the starter motor. Ref. to STARTING/CHARGING SYSTEMS(STI)>Starter.
No	Go to 11.

11. CHECK HARNESS BETWEEN STARTER RELAY 1 CONNECTOR AND STARTER MOTOR CONNECTOR.

1. Remove the starter relay 1.
2. Measure the resistance of harness between starter relay 1 connector and starter motor connector.
   Connector & terminal
   (B225) No. 1 — (B14) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 12.
No	Repair the open circuit of the harness between starter relay 1 connector and starter motor connector.

12. CHECK IG RELAY 1 (PUSH BUTTON START) POWER SUPPLY.

1. Remove the IG relay 1 (push button start).
2. Turn the ignition to ON.
3. Measure the voltage between the IG relay 1 (push button start) connector and chassis ground.
   Connector & terminal
   (B225) No. 37 (+) — Chassis ground (−):
   (B225) No. 38 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 13.
No	Check the following item and repair or replace if necessary. • Blown out of fuse • Open circuit or short circuit to ground in harness between IG relay 1 (push button start) connector and keyless access CM connector • Open circuit or short circuit to ground in harness between IG relay 1 (push button start) connector and battery

13. CHECK HARNESS BETWEEN IG RELAY 1 (PUSH BUTTON START) CONNECTOR AND CHASSIS GROUND.

1. Turn the ignition to OFF.
2. Measure the resistance of harness between the IG relay 1 (push button start) connector and chassis ground.
   Connector & terminal
   (B225) No. 39 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 14.
No	Repair the open circuit in harness between the IG relay 1 (push button start) connector and chassis ground.

14. CHECK IG RELAY 1 (PUSH BUTTON START).

1. Connect the battery to IG relay 1 (push button start) terminals No. 38 and No. 39.
2. Measure the resistance between IG relay 1 (push button start) terminals.
   Terminals
   No. 36 — No. 37:

Is the resistance less than 1 Ω?

Yes	Go to 15.
No	Replace the IG relay 1 (push button start). Ref. to SECURITY AND LOCKS>IG Relay1 (Push Button Start).

15. CHECK STARTER RELAY (PUSH BUTTON START) POWER SUPPLY.

1. Install the IG relay 1 (push button start).
2. Remove the starter relay (push button start).
3. Turn the ignition to ON.
4. Measure the voltage between starter relay (push button start) connector and chassis ground.
   Connector & terminal
   (B225) No. 29 (+) — Chassis ground (−):
   (B225) No. 30 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 16.
No	Check the following item and repair or replace if necessary. • Blown out of fuse (F/B No. 26) • Open circuit or short circuit to ground in harness between starter relay (push button start) connector and IG relay 1 (push button start) connector • Open circuit or short circuit to ground in harness between starter relay (push button start) connector and battery

16. CHECK HARNESS BETWEEN STARTER RELAY (PUSH BUTTON START) CONNECTOR AND CHASSIS GROUND.

1. Turn the ignition to OFF.
2. Measure the resistance of harness between starter relay (push button start) connector and chassis ground.
   Connector & terminal
   (B225) No. 31 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 17.
No	Repair the open circuit in harness between starter relay (push button start) connector and chassis ground.

17. CHECK STARTER RELAY (PUSH BUTTON START).

1. Connect the battery to starter relay (push button start) terminals No. 30 and No. 31.
2. Measure the resistance between starter relay (push button start) terminals.
   Terminals
   No. 28 — No. 29:

Is the resistance less than 1 Ω?

Yes	Go to 18.
No	Replace the starter relay (push button start). Ref. to SECURITY AND LOCKS>Starter Relay (Push Button Start).

18. CHECK HARNESS BETWEEN STARTER RELAY (PUSH BUTTON START) CONNECTOR AND STARTER CUT RELAY CONNECTOR.

1. Remove the starter cut relay.
2. Measure the resistance of harness between starter relay (push button start) connector and starter cut relay connector.
   Connector & terminal
   (B225) No. 28 — (B225) No. 42:
   (B225) No. 28 — (B225) No. 44:

Is the resistance less than 1 Ω?

Yes	Go to 19.
No	Repair the open circuit in harness between starter relay (push button start) connector and starter cut relay connector.

19. CHECK HARNESS BETWEEN ECM AND STARTER CUT RELAY CONNECTOR.

1. Disconnect the connector from ECM.
2. Measure the resistance between starter cut relay connector and chassis ground.
   Connector & terminal
   (B225) No. 40 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 20.
No	Repair the short circuit to ground in harness between ECM connector and starter cut relay connector.

20. CHECK STARTER CUT RELAY.

Measure the resistance between starter cut relay terminals.
Terminals
No. 41 — No. 44:

Is the resistance less than 1 Ω?

Yes	Go to 21.
No	Replace the starter cut relay. Ref. to SECURITY AND LOCKS>Starter Cut Relay.

21. CHECK HARNESS BETWEEN STARTER CUT RELAY CONNECTOR AND STARTER RELAY 1 CONNECTOR.

1. Remove the starter relay 1.
2. Measure the resistance of harness between starter cut relay connector and starter relay 1 connector.

Connector & terminal

(B225) No. 41 — (B225) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 22.
No	Repair the open circuit of harness between starter cut relay connector and starter relay 1 connector.

22. CHECK HARNESS BETWEEN STARTER RELAY 1 CONNECTOR AND CLUTCH START SWITCH CONNECTOR.

Measure the resistance of harness between starter relay 1 connector and clutch start switch connector.

Connector & terminal

(B225) No. 3 — (B106) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 23.
No	Repair the open circuit in harness between starter relay 1 connector and clutch start switch connector.

23. CHECK HARNESS BETWEEN ECM AND STARTER RELAY 1 CONNECTOR.

Measure the resistance of harness between ECM connector and starter relay 1 connector.

Connector & terminal

(B135) No. 26 — (B225) No. 5:

(B136) No. 27 — (B225) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 24.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and starter relay 1 connector** • **Blown out of fuse**

24. CHECK STARTER RELAY 1.

1. Connect the battery to starter relay 1 terminals No. 3 and No. 5.
2. Measure the resistance between starter relay 1 terminals.

Terminals

No. 1 — No. 2:

Is the resistance less than 1 Ω?

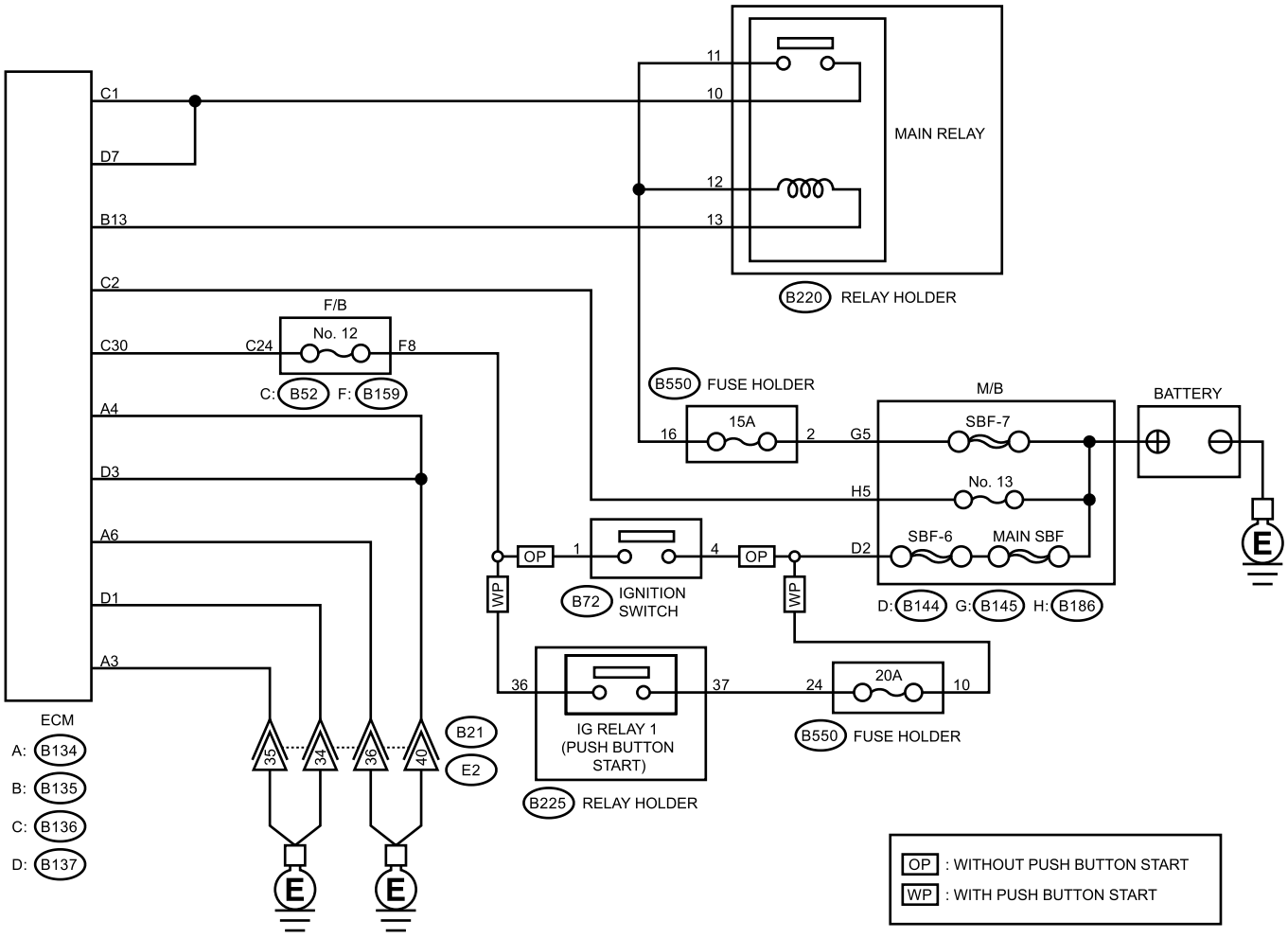
Yes	Check the ECM power supply and ground line. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostics for Engine Starting Failure>CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM).
No	Replace the starter relay 1. Ref. to ENGINE (DIAGNOSTICS)(STI)>Electrical Component Location>LOCATION.

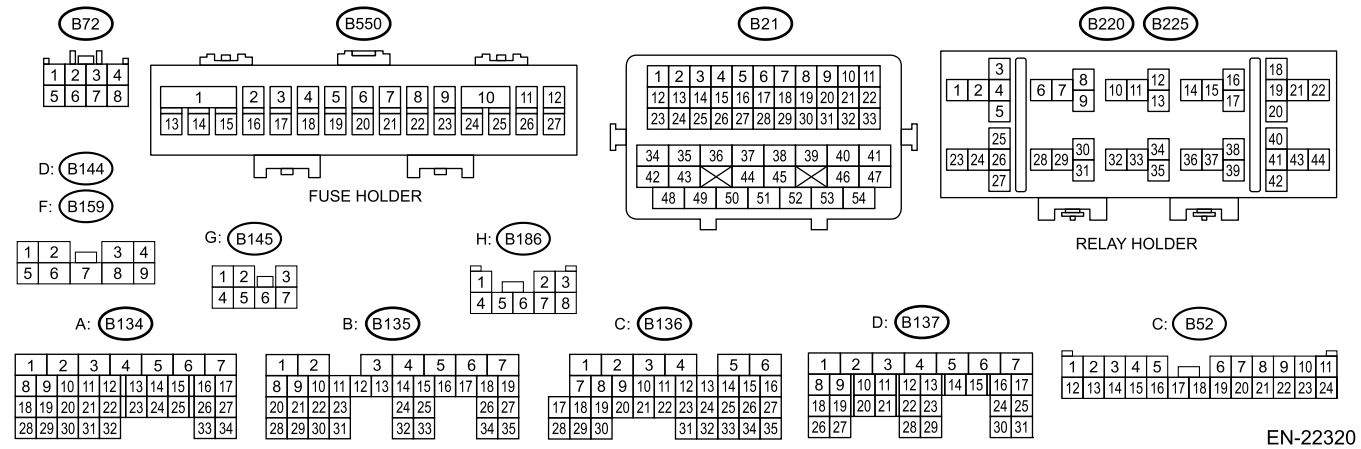
CHECK POWER SUPPLY AND GROUND LINE OF ENGINE CONTROL MODULE (ECM)

Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


C1
D7
B13
C2
C30
A4
D3
A6
D1
A3
ECM
A: B134
B: B135
C: B136
D: B137
11
10
12
13
MAIN RELAY
B220 RELAY HOLDER
F/B
No. 12
C24
F8
C: B52 F: B159
B550 FUSE HOLDER
16
15A
2
G5
M/B
SBF-7
BATTERY
H5
No. 13
OP
1
4
D2
SBF-6
MAIN SBF
WP
B72 IGNITION SWITCH
D: B144 G: B145 H: B186
36
37
24
20A
10
IG RELAY 1 (PUSH BUTTON START)
B550 FUSE HOLDER
B225 RELAY HOLDER
35
34
36
40
B21
E2
OP : WITHOUT PUSH BUTTON START
WP : WITH PUSH BUTTON START


B72
B550
B21
B220
B225
D: B144
F: B159
FUSE HOLDER
G: B145
H: B186
RELAY HOLDER
A: B134
B: B135
C: B136
D: B137
C: B52

EN-22320

1. CHECK MAIN RELAY.

1. Turn the ignition switch to OFF.
2. Remove the main relay.
3. Check the main relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Main Relay>INSPECTION.

Is the check result OK?

Yes	Go to 2.
No	Replace the main relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Main Relay.

2. CHECK GROUND CIRCUIT FOR ECM.

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B134) No. 3 — Chassis ground:
(B134) No. 4 — Chassis ground:
(B134) No. 6 — Chassis ground:
(B137) No. 1 — Chassis ground:
(B137) No. 3 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of coupling connector**

3. CHECK INPUT VOLTAGE OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 2 (+) — Chassis ground (−):
   (B136) No. 30 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 4.
No	Repair the open or ground short in the harness of power supply circuit.

4. CHECK INPUT VOLTAGE OF MAIN RELAY.

Measure the voltage between main relay connector and chassis ground.
Connector & terminal
(B220) No. 11 (+) — Chassis ground (−):
(B220) No. 12 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 5.
No	Repair the open or ground short in the harness of power supply circuit.

5. CHECK INPUT VOLTAGE OF ECM.

1. Turn the ignition switch to OFF.
2. Install the main relay.
3. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B135) No. 13 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 6.
No	Repair the open or ground short circuit of harness between ECM connector and main relay connector.

6. CHECK INPUT VOLTAGE OF ECM.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 1 (+) — Chassis ground (−):
   (B137) No. 7 (+) — Chassis ground (−):

Is the voltage 10 V or more?

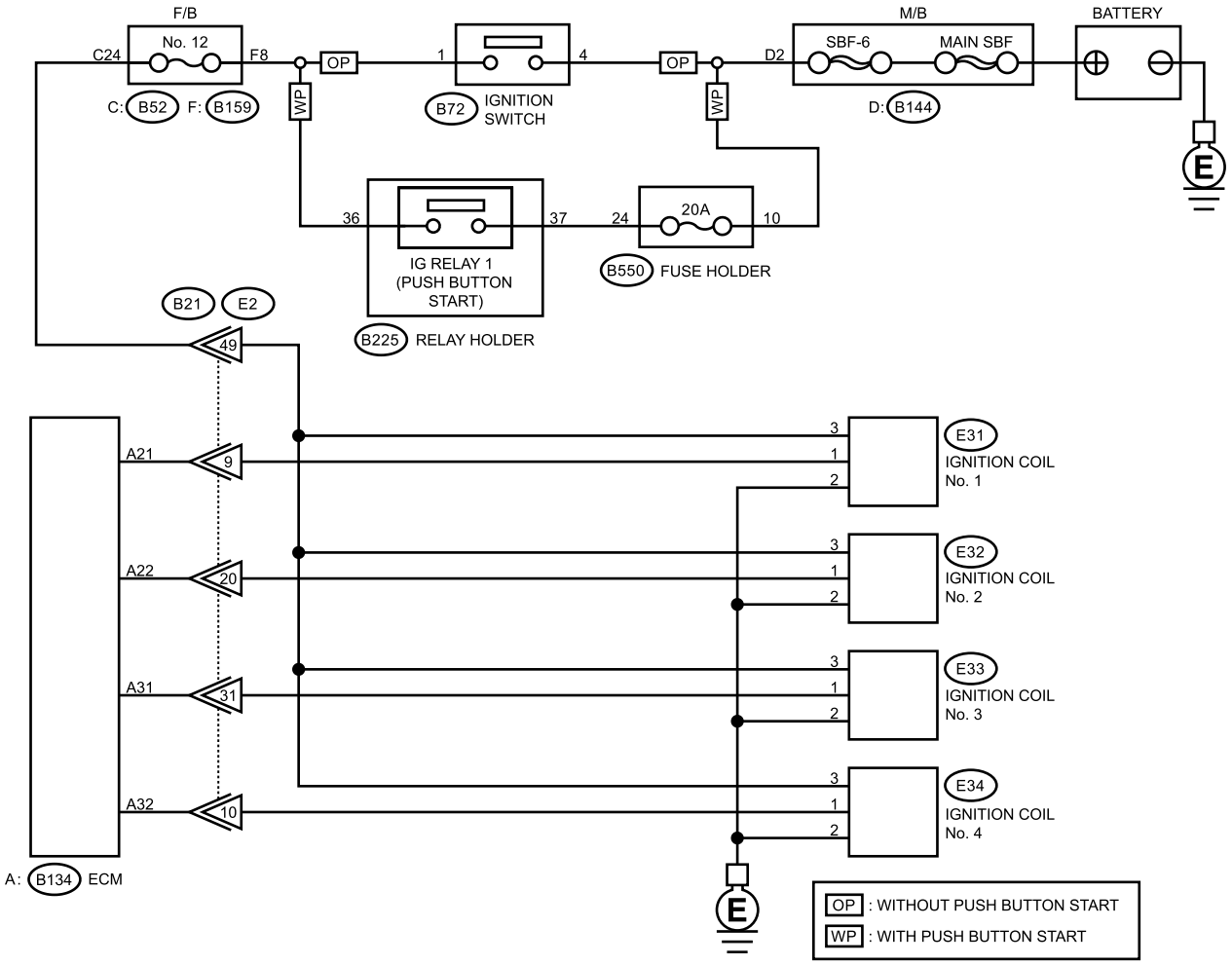
Yes	Check ignition control system. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostics for Engine Starting Failure>IGNITION CONTROL SYSTEM.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and main relay connector** • **Poor contact of main relay connector** • **Poor contact of ECM connector**

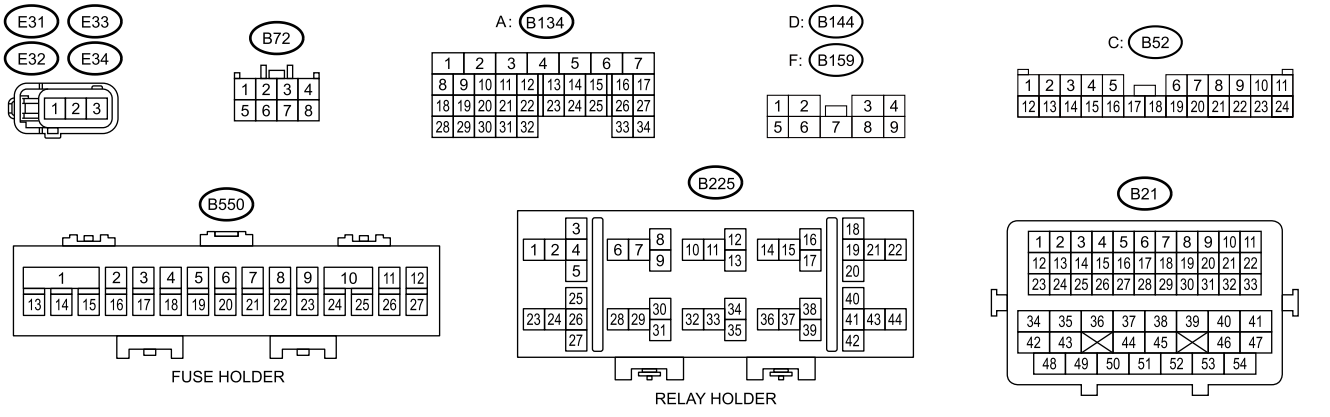
IGNITION CONTROL SYSTEM

Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


F/B
No. 12
C24
F8
C: B52
F: B159
OP
WP
1
4
B72
IGNITION SWITCH
M/B
SBF-6
MAIN SBF
D2
D: B144
BATTERY
36
37
IG RELAY 1
(PUSH BUTTON START)
B225 RELAY HOLDER
24
20A
10
B550 FUSE HOLDER
B21
E2
49
A21
9
A22
20
A31
31
A32
10
A: B134 ECM
3
1
2
E31
IGNITION COIL No. 1
E32
IGNITION COIL No. 2
E33
IGNITION COIL No. 3
E34
IGNITION COIL No. 4
OP : WITHOUT PUSH BUTTON START
WP : WITH PUSH BUTTON START


E31
E33
E32
E34
B72
A: B134
D: B144
F: B159
C: B52
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-21427

1. CHECK SPARK PLUG CONDITION.

1. Remove the spark plug. Ref. to IGNITION(STI)>Spark Plug>REMOVAL.
2. Check the spark plug condition. Ref. to IGNITION(STI)>Spark Plug>INSPECTION.

Is the check result OK?

Yes	Go to 2.
No	Replace the spark plug. Ref. to IGNITION(STI)>Spark Plug.

2. CHECK IGNITION SYSTEM FOR SPARKS.

1. Connect the spark plug to ignition coil.
2. Release the fuel pressure. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Fuel>PROCEDURE > RELEASING OF FUEL PRESSURE.
3. Contact the spark plug thread portion to engine.
4. While opening the throttle valve fully, crank the engine to check that spark occurs at each cylinder.

Does spark occur at each cylinder?

Yes	Check fuel pump system. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostics for Engine Starting Failure>FUEL PUMP CIRCUIT.
No	Go to 3.

3. CHECK IGNITION COIL POWER SUPPLY CIRCUIT.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ignition coil.
3. Turn the ignition switch to ON.
4. Measure the power supply voltage between ignition coil connector and engine ground.
   Connector & terminal
   (E31) No. 3 (+) — Engine ground (−):
   (E32) No. 3 (+) — Engine ground (−):
   (E33) No. 3 (+) — Engine ground (−):
   (E34) No. 3 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open or short to ground in power supply circuit** • **Poor contact of coupling connector** • **Blown out of fuse**

4. CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT.

1. Turn the ignition switch to OFF.
2. Measure the resistance between ignition coil connector and engine ground.
   Connector & terminal
   (E31) No. 2 — Engine ground:
   (E32) No. 2 — Engine ground:
   (E33) No. 2 — Engine ground:
   (E34) No. 2 — Engine ground:

Is the resistance less than 1 Ω?

Yes	Go to 5.
No	Repair the open circuit in harness between ignition coil connector and engine ground.

5. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from ignition coil.
4. Measure the resistance of harness between ECM connector and ignition coil connector.
   Connector & terminal
   (B134) No. 21 — (E31) No. 1:
   (B134) No. 22 — (E32) No. 1:
   (B134) No. 31 — (E33) No. 1:
   (B134) No. 32 — (E34) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 6.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and the ignition coil connector** • **Poor contact of coupling connector**

6. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.

Measure the resistance of harness between ECM connector and engine ground.
Connector & terminal
(B134) No. 21 — Engine ground:
(B134) No. 22 — Engine ground:
(B134) No. 31 — Engine ground:
(B134) No. 32 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 7.
No	Repair the ground short circuit of harness between ECM connector and ignition coil connector.

7. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

Yes	Repair the poor contact of ECM connector.
No	Replace the ignition coil. Ref. to IGNITION(STI)>Ignition Coil.

FUEL PUMP CIRCUIT

Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK OPERATING SOUND OF FUEL PUMP.

Make sure that the fuel pump operates for two seconds when turning the ignition switch to ON.
Note:
Fuel pump operation can be executed using the Subaru Select Monitor.
Refer to "Active Test" for the procedures. Ref. to ENGINE (DIAGNOSTICS)(STI)>Active Test.

Does the fuel pump emit operating sound?

Yes	Check the fuel injector circuit. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostics for Engine Starting Failure>FUEL INJECTOR CIRCUIT.
No	Display the DTC. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION.

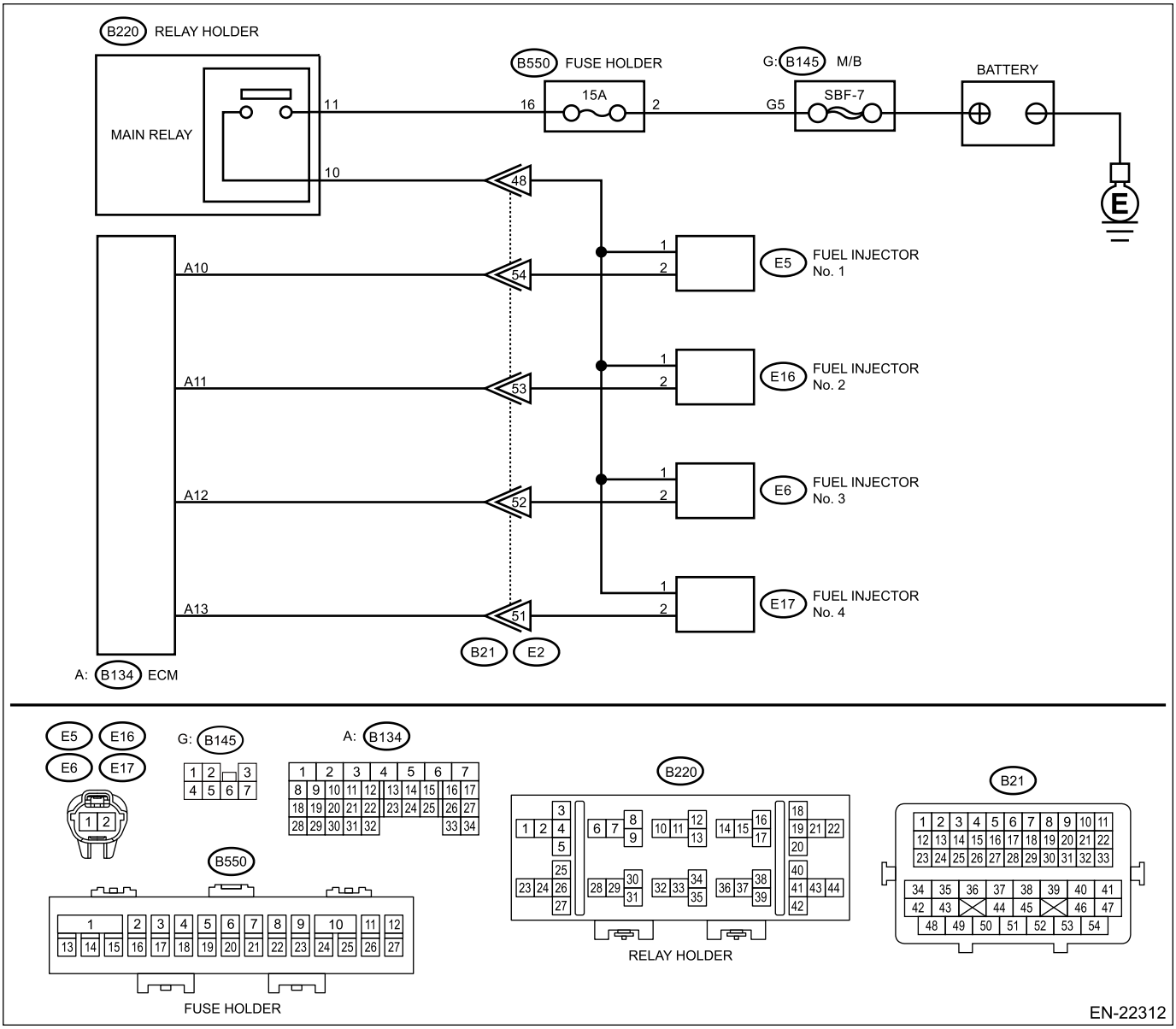
FUEL INJECTOR CIRCUIT

Caution:

- **Check or repair only faulty parts.**
- **After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..**

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK OPERATION OF EACH FUEL INJECTOR.

While cranking the engine, check each fuel injector emits operating sound. Use a sound scope or attach a screwdriver to the injector for this check.

Does the fuel injector emit operating sound?

Yes	Check the fuel pressure. Ref. to MECHANICAL(STI)>Fuel Pressure>INSPECTION.
No	Go to 2.

2. CHECK POWER SUPPLY TO EACH FUEL INJECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from fuel injector.
3. Turn the ignition switch to ON.
4. Measure the power supply voltage between fuel injector connector and the engine ground.

Connector & terminal

#1 (E5) No. 1 (+) — Engine ground (−):
#2 (E16) No. 1 (+) — Engine ground (−):
#3 (E6) No. 1 (+) — Engine ground (−):
#4 (E17) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between main relay connector and fuel injector connector** • **Poor contact of main relay connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and fuel injector connector.

Connector & terminal

#1 (B134) No. 10 — (E5) No. 2:
#2 (B134) No. 11 — (E16) No. 2:
#3 (B134) No. 12 — (E6) No. 2:
#4 (B134) No. 13 — (E17) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and fuel injector connector** • **Poor contact of coupling connector**

4. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

Measure the resistance of harness between ECM connector and chassis ground.

Connector & terminal

#1 (B134) No. 10 — Chassis ground:
#2 (B134) No. 11 — Chassis ground:
#3 (B134) No. 12 — Chassis ground:
#4 (B134) No. 13 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

5. CHECK EACH FUEL INJECTOR.

Check all fuel injectors. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes	Go to 6.
No	Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector.

6. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

Yes	Repair the poor contact of ECM connector.
No	Inspection using “General Diagnostic Table”. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Diagnostic Table>INSPECTION.

COMMUNICATION FOR INITIALIZING IMPOSSIBLE

Diagnosis:

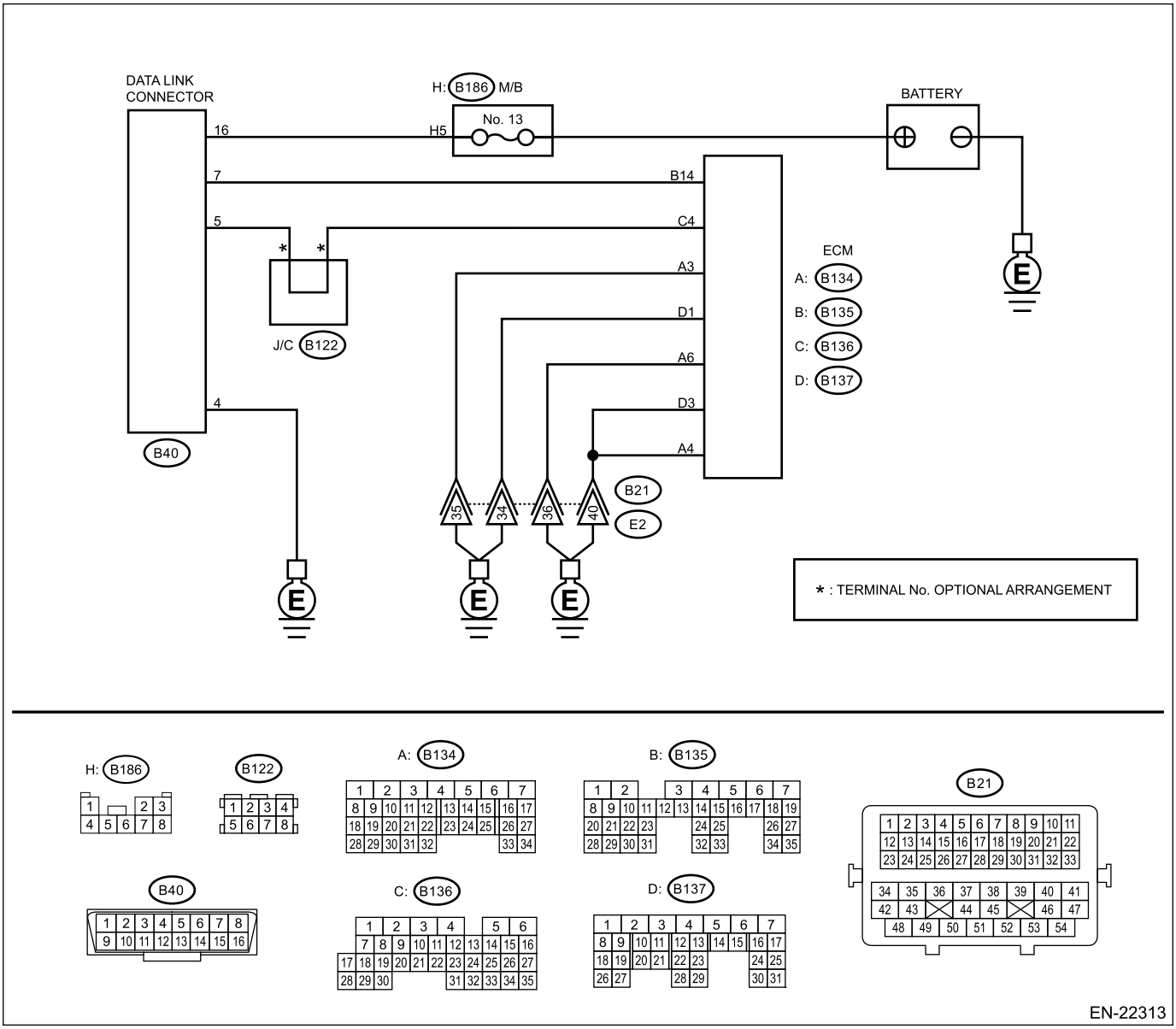
Open or short circuit in data link connector

Trouble symptom:

Subaru Select Monitor communication failure

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK POWER SUPPLY CIRCUIT.

Connect DST-i or a general scan tool to the data link connector.

Is the DST-i or the general scan tool turned to ON?

Yes	Go to 4.
No	Go to 2.

2. CHECK POWER SUPPLY CIRCUIT.

Measure the voltage between data link connector and chassis ground.

Connector & terminal

(B40) No. 16 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 3.
No	Repair the power supply circuit. **Note:** **In this case, repair the following item:** • **Open or ground short circuit of harness between battery and data link connector** • **Blown out of fuse (M/B No. 13)**

3. CHECK HARNESS BETWEEN DATA LINK CONNECTOR AND CHASSIS GROUND.

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between data link connector and chassis ground.
   Connector & terminal
   (B40) No. 4 — Chassis ground:
   (B40) No. 5 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Repair the poor contact of data link connector.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and data link connector** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of ECM connector** • **Poor contact of joint connector**

4. CHECK HARNESS BETWEEN ECM AND DATA LINK CONNECTOR.

1. Disconnect the connectors from ECM, DCCD CM, VDC CM, airbag CM, impact sensor, TPMS & keyless entry CM, and body integrated unit.
   Caution:
   When disconnecting the connector from airbag CM, always follow the precautions on AB section. **Ref. to AIRBAG SYSTEM>General Description>CAUTION.**
2. Measure the resistance of harness between ECM connector and data link connector.
   Connector & terminal
   (B135) No. 14 — (B40) No. 7:

Is the resistance less than 1 Ω?

Yes	Go to 5.
No	Repair the open circuit of harness between ECM connector and data link connector.

5. CHECK HARNESS BETWEEN ECM AND DATA LINK CONNECTOR.

Measure the resistance between data link connector and chassis ground.

Connector & terminal

(B40) No. 7 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Repair the poor contact of ECM connector or data link connector.
No	Repair the short circuit to ground in harness between ECM connector and data link connector.

LIST

DTC	Item	Note
B1571	REFERENCE CODE INCOMPATIBILITY	Ref. to IMMOBILIZER (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1571 REFERENCE CODE INCOMPATIBILITY. Ref. to KEYLESS ACCESS WITH PUSH BUTTON START SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1571 REFERENCE CODE INCOMPATIBILITY (IMMOBILIZER CM TO ECM).
B1572	IMM CIRCUIT EXCEPT ANTENNA CIRCUIT	Ref. to IMMOBILIZER (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1572 IMM CIRCUIT EXCEPT ANTENNA CIRCUIT. Ref. to KEYLESS ACCESS WITH PUSH BUTTON START SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1572 IMM CIRCUIT EXCEPT ANTENNA CIRCUIT.
B1576	EGI CONTROL MODULE EEPROM	Ref. to IMMOBILIZER (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1576 EGI CONTROL MODULE EEPROM. Ref. to KEYLESS ACCESS WITH PUSH BUTTON START SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1576 EGI CONTROL MODULE EEPROM.
B1577	IMM CONTROL MODULE EEPROM	Ref. to IMMOBILIZER (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1577 IMM CONTROL MODULE EEPROM. Ref. to KEYLESS ACCESS WITH PUSH BUTTON START SYSTEM (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1577 IMM CONTROL MODULE EEPROM.
B1578	METER	Ref. to IMMOBILIZER (DIAGNOSTICS)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC B1578 METER.
P000A	"A" CAMSHAFT POSITION SLOW RESPONSE BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000A "A" CAMSHAFT POSITION SLOW RESPONSE BANK 1.
P000B	"B" CAMSHAFT POSITION SLOW RESPONSE BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000B "B" CAMSHAFT POSITION SLOW RESPONSE BANK 1.
P000C	"A" CAMSHAFT POSITION SLOW RESPONSE BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000C "A" CAMSHAFT POSITION SLOW RESPONSE BANK 2.

DTC	Item	Note
P000D	"B" CAMSHAFT POSITION SLOW RESPONSE BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000D "B" CAMSHAFT POSITION SLOW RESPONSE BANK 2.
P0011	"A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0011 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.
P0014	"B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0014 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.
P0016	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR A	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR A.
P0017	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR B	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0017 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR B.
P0018	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR A	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR A.
P0019	CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR B	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0019 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR B.
P0021	"A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0021 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2.
P0024	"B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0024 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2.
P0030	A/F / O2 HEATER CONTROL CIRCUIT BANK 1 SENSOR 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0030 A/F / O2 HEATER CONTROL CIRCUIT BANK 1 SENSOR 1.
P0031	A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0031 A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 1.

DTC	Item	Note
P0032	A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0032 A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 1.
P0037	A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0037 A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 2.
P0038	A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0038 A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 2.
P0068	MAP/MAF - THROTTLE POSITION CORRELATION	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION.
P0071	AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0071 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE.
P0072	AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0072 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" LOW.
P0073	AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0073 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" HIGH.
P0101	MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT RANGE/PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0101 MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT RANGE/PERFORMANCE.
P0102	MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0102 MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT LOW.
P0103	MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0103 MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT HIGH.
P0107	MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT LOW.
P0108	MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT HIGH.

DTC	Item	Note
P0111	INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0111 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE BANK 1.
P0112	INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW BANK 1.
P0113	INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH BANK 1.
P0116	ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0116 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE.
P0117	ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0117 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT LOW.
P0118	ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0118 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT HIGH.
P0122	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW.
P0123	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH.
P0125	INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL.
P0128	COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE)	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE).
P0131	A/F / O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0131 A/F / O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 1.

DTC	Item	Note
P0132	A/F / O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0132 A/F / O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 1.
P0134	A/F / O2 SENSOR CIRCUIT NO ACTIVITY DETECTED BANK 1 SENSOR 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0134 A/F / O2 SENSOR CIRCUIT NO ACTIVITY DETECTED BANK 1 SENSOR 1.
P0137	O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 2.
P0138	O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 2.
P013A	O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2.
P013B	O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 2.
P013E	O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 2.
P013F	O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 2.
P0141	O2 SENSOR HEATER CIRCUIT BANK 1 SENSOR 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0141 O2 SENSOR HEATER CIRCUIT BANK 1 SENSOR 2.
P014C	A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P014C A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1.
P014D	A/F / O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P014D A/F / O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 1.
P015A	A/F / O2 SENSOR DELAYED RESPONSE - RICH TO LEAN	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P015A

DTC	Item	Note
	BANK 1 SENSOR 1	A/F / O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 1.
P015B	A/F / O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P015B A/F / O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 1.
P0171	SYSTEM TOO LEAN BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1.
P0172	SYSTEM TOO RICH BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0172 SYSTEM TOO RICH BANK 1.
P0201	CYLINDER 1 INJECTOR "A" CIRCUIT	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0201 CYLINDER 1 INJECTOR "A" CIRCUIT.
P0202	CYLINDER 2 INJECTOR "A" CIRCUIT	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0202 CYLINDER 2 INJECTOR "A" CIRCUIT.
P0203	CYLINDER 3 INJECTOR "A" CIRCUIT	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0203 CYLINDER 3 INJECTOR "A" CIRCUIT.
P0204	CYLINDER 4 INJECTOR "A" CIRCUIT	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0204 CYLINDER 4 INJECTOR "A" CIRCUIT.
P0222	THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW.
P0223	THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH.
P0230	FUEL PUMP PRIMARY CIRCUIT	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0230 FUEL PUMP PRIMARY CIRCUIT.
P0245	TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID "A" LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0245 TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID "A" LOW.
P0246	TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID "A" HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0246 TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID "A" HIGH.

DTC	Item	Note
P0300	RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0300 RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED.
P0301	CYLINDER 1 MISFIRE DETECTED	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0301 CYLINDER 1 MISFIRE DETECTED.
P0302	CYLINDER 2 MISFIRE DETECTED	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0302 CYLINDER 2 MISFIRE DETECTED.
P0303	CYLINDER 3 MISFIRE DETECTED	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0303 CYLINDER 3 MISFIRE DETECTED.
P0304	CYLINDER 4 MISFIRE DETECTED	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0304 CYLINDER 4 MISFIRE DETECTED.
P0327	KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT LOW BANK 1 OR SINGLE SENSOR	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0327 KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT LOW BANK 1 OR SINGLE SENSOR.
P0328	KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT HIGH BANK 1 OR SINGLE SENSOR	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0328 KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT HIGH BANK 1 OR SINGLE SENSOR.
P0335	CRANKSHAFT POSITION SENSOR "A" CIRCUIT	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT.
P0336	CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0336 CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE.
P0340	CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR.
P0341	CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 1 OR SINGLE SENSOR	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0341 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 1 OR SINGLE SENSOR.
P0345	CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0345 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 2.

DTC	Item	Note
P0346	CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0346 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 2.
P0351	IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN.
P0352	IGNITION COIL "B" PRIMARY CONTROL CIRCUIT/OPEN	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0352 IGNITION COIL "B" PRIMARY CONTROL CIRCUIT/OPEN.
P0353	IGNITION COIL "C" PRIMARY CONTROL CIRCUIT/OPEN	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0353 IGNITION COIL "C" PRIMARY CONTROL CIRCUIT/OPEN.
P0354	IGNITION COIL "D" PRIMARY CONTROL CIRCUIT/OPEN	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0354 IGNITION COIL "D" PRIMARY CONTROL CIRCUIT/OPEN.
P0365	CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0365 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 1.
P0366	CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0366 CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 1.
P0390	CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0390 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 2.
P0391	CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0391 CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 2.
P0410	SECONDARY AIR SYSTEM	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0410 SECONDARY AIR SYSTEM.
P0411	SECONDARY AIR SYSTEM INCORRECT FLOW DETECTED	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0411 SECONDARY AIR SYSTEM INCORRECT FLOW DETECTED.
P0413	SECONDARY AIR SYSTEM SWITCHING VALVE "A" CIRCUIT OPEN	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0413 SECONDARY AIR SYSTEM SWITCHING VALVE "A" CIRCUIT OPEN.
P0414	SECONDARY AIR SYSTEM SWITCHING VALVE "A" CIRCUIT SHORTED	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0414

DTC	Item	Note
		SECONDARY AIR SYSTEM SWITCHING VALVE "A" CIRCUIT SHORTED.
P0416	SECONDARY AIR SYSTEM SWITCHING VALVE "B" CIRCUIT OPEN	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0416 SECONDARY AIR SYSTEM SWITCHING VALVE "B" CIRCUIT OPEN.
P0417	SECONDARY AIR SYSTEM SWITCHING VALVE "B" CIRCUIT SHORTED	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0417 SECONDARY AIR SYSTEM SWITCHING VALVE "B" CIRCUIT SHORTED.
P0420	CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD BANK 1.
P0441	EVAP SYSTEM (CPC) INCORRECT PURGE FLOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0441 EVAP SYSTEM (CPC) INCORRECT PURGE FLOW.
P0455	EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK)	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK).
P0456	EVAP SYSTEM (CPC) LEAK DETECTED (VERY SMALL LEAK)	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0456 EVAP SYSTEM (CPC) LEAK DETECTED (VERY SMALL LEAK).
P0458	EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0458 EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT LOW.
P0459	EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0459 EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT HIGH.
P0461	FUEL LEVEL SENSOR "A" CIRCUIT RANGE/PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0461 FUEL LEVEL SENSOR "A" CIRCUIT RANGE/PERFORMANCE.
P0462	FUEL LEVEL SENSOR "A" CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0462 FUEL LEVEL SENSOR "A" CIRCUIT LOW.
P0463	FUEL LEVEL SENSOR "A" CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0463 FUEL LEVEL SENSOR "A" CIRCUIT HIGH.
P04AC	EVAP SYSTEM (CPC) PURGE CONTROL VALVE "B" CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P04AC

DTC	Item	Note
		EVAP SYSTEM (CPC) PURGE CONTROL VALVE "B" CIRCUIT LOW.
P04AD	EVAP SYSTEM (CPC) PURGE CONTROL VALVE "B" CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P04AD EVAP SYSTEM (CPC) PURGE CONTROL VALVE "B" CIRCUIT HIGH.
P04AF	EVAP SYSTEM PURGE CONTROL VALVE (CPC) "B" STUCK CLOSED	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P04AF EVAP SYSTEM PURGE CONTROL VALVE (CPC) "B" STUCK CLOSED.
P04DB	CRANKCASE VENTILATION SYSTEM (PCV) DISCONNECTED	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P04DB CRANKCASE VENTILATION SYSTEM (PCV) DISCONNECTED.
P04F0	EVAP SYSTEM HIGH PRESSURE PURGE LINE (CPC2) PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P04F0 EVAP SYSTEM HIGH PRESSURE PURGE LINE (CPC2) PERFORMANCE.
P0500	VEHICLE SPEED SENSOR "A" CIRCUIT	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0500 VEHICLE SPEED SENSOR "A" CIRCUIT.
P0506	IDLE CONTROL SYSTEM RPM - LOWER THAN EXPECTED	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0506 IDLE CONTROL SYSTEM RPM - LOWER THAN EXPECTED.
P0507	IDLE CONTROL SYSTEM RPM - HIGHER THAN EXPECTED	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0507 IDLE CONTROL SYSTEM RPM - HIGHER THAN EXPECTED.
P050A	COLD START IDLE CONTROL SYSTEM PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P050A COLD START IDLE CONTROL SYSTEM PERFORMANCE.
P050B	COLD START IGNITION TIMING PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P050B COLD START IGNITION TIMING PERFORMANCE.
P0512	STARTER (SWITCH) REQUEST CIRCUIT	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0512 STARTER (SWITCH) REQUEST CIRCUIT.
P0560	SYSTEM VOLTAGE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0560 SYSTEM VOLTAGE.
P0604	INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR.

DTC	Item	Note
P0605	INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR.
P0606	CONTROL MODULE PROCESSOR	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0606 CONTROL MODULE PROCESSOR.
P060A	INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P060A INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE.
P060B	INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P060B INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE.
P0616	STARTER RELAY "A" CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0616 STARTER RELAY "A" CIRCUIT LOW.
P0617	STARTER RELAY "A" CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0617 STARTER RELAY "A" CIRCUIT HIGH.
P062F	INTERNAL CONTROL MODULE EEPROM ERROR	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P062F INTERNAL CONTROL MODULE EEPROM ERROR.
P0685	ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0685 ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN.
P081A	STARTER DISABLE CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P081A STARTER DISABLE CIRCUIT LOW.
P0851	PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW.
P0852	PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH.
P1160	THROTTLE RETURN SPRING	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1160 THROTTLE RETURN SPRING.
P1410	SECONDARY AIR INJECTION SYSTEM COMBINATION VALVE STUCK OPEN	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1410 SECONDARY AIR INJECTION SYSTEM COMBINATION VALVE STUCK OPEN.

DTC	Item	Note
P1449	EVAP SYSTEM CLOG DETECTED (AIR FILTER)	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1449 EVAP SYSTEM CLOG DETECTED (AIR FILTER).
P1451	EVAP SYSTEM CLOG DETECTED (PIPE)	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P1451 EVAP SYSTEM CLOG DETECTED (PIPE).
P2004	TGV CONTROL STUCK OPEN BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2004 TGV CONTROL STUCK OPEN BANK 1.
P2005	TGV CONTROL STUCK OPEN BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2005 TGV CONTROL STUCK OPEN BANK 2.
P2006	TGV CONTROL STUCK CLOSED BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2006 TGV CONTROL STUCK CLOSED BANK 1.
P2007	TGV CONTROL STUCK CLOSED BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2007 TGV CONTROL STUCK CLOSED BANK 2.
P2008	TGV CONTROL CIRCUIT/OPEN BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2008 TGV CONTROL CIRCUIT/OPEN BANK 1.
P2009	TGV CONTROL CIRCUIT LOW BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2009 TGV CONTROL CIRCUIT LOW BANK 1.
P2011	TGV CONTROL CIRCUIT/OPEN BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2011 TGV CONTROL CIRCUIT/OPEN BANK 2.
P2012	TGV CONTROL CIRCUIT LOW BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2012 TGV CONTROL CIRCUIT LOW BANK 2.
P2016	TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2016 TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 1.
P2017	TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2017 TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 1.
P2021	TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2021 TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 2.
P2022	TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2022 TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 2.

DTC	Item	Note
P2088	"A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2088 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1.
P2089	"A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2089 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1.
P2090	"B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2090 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1.
P2091	"B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2091 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1.
P2092	"A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2092 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 2.
P2093	"A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2093 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 2.
P2094	"B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2094 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 2.
P2095	"B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2095 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 2.
P2096	POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 1.
P2097	POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 1.
P2101	THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE.

DTC	Item	Note
P2102	THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2102 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT LOW.
P2103	THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2103 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT HIGH.
P2109	THROTTLE/PEDAL POSITION SENSOR "A" MINIMUM STOP PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2109 THROTTLE/PEDAL POSITION SENSOR "A" MINIMUM STOP PERFORMANCE.
P2119	THROTTLE ACTUATOR "A" CONTROL THROTTLE BODY RANGE/PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2119 THROTTLE ACTUATOR "A" CONTROL THROTTLE BODY RANGE/PERFORMANCE.
P2122	THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW.
P2123	THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH.
P2127	THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW.
P2128	THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH.
P2135	THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION.
P2138	THROTTLE/PEDAL POSITION SENSOR/SWITCH "D"/"E" VOLTAGE CORRELATION	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D"/"E" VOLTAGE CORRELATION.
P2195	A/F /O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2195 A/F /O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 1.

DTC	Item	Note
P2196	A/F /O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2196 A/F /O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 1.
P219A	BANK 1 AIR-FUEL RATIO IMBALANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE.
P2257	SECONDARY AIR SYSTEM CONTROL "A" CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2257 SECONDARY AIR SYSTEM CONTROL "A" CIRCUIT LOW.
P2258	SECONDARY AIR SYSTEM CONTROL "A" CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2258 SECONDARY AIR SYSTEM CONTROL "A" CIRCUIT HIGH.
P226B	TURBOCHARGER/SUPERCHARGER BOOST PRESSURE TOO HIGH - MECHANICAL	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P226B TURBOCHARGER/SUPERCHARGER BOOST PRESSURE TOO HIGH - MECHANICAL.
P2270	O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2270 O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 2.
P2271	O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2271 O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 2.
P2401	EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2401 EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW.
P2402	EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2402 EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH.
P2404	EVAP SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2404 EVAP SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE.
P2419	EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2419 EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW.
P2420	EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2420 EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH.

DTC	Item	Note
P2431	SECONDARY AIR SYSTEM AIR FLOW/PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2431 SECONDARY AIR SYSTEM AIR FLOW/PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE BANK 1.
P2432	SECONDARY AIR SYSTEM AIR FLOW/PRESSURE SENSOR CIRCUIT LOW BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2432 SECONDARY AIR SYSTEM AIR FLOW/PRESSURE SENSOR CIRCUIT LOW BANK 1.
P2433	SECONDARY AIR SYSTEM AIR FLOW/PRESSURE SENSOR CIRCUIT HIGH BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2433 SECONDARY AIR SYSTEM AIR FLOW/PRESSURE SENSOR CIRCUIT HIGH BANK 1.
P2440	SECONDARY AIR SYSTEM SWITCHING VALVE STUCK OPEN BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2440 SECONDARY AIR SYSTEM SWITCHING VALVE STUCK OPEN BANK 1.
P2441	SECONDARY AIR SYSTEM SWITCHING VALVE STUCK CLOSED BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2441 SECONDARY AIR SYSTEM SWITCHING VALVE STUCK CLOSED BANK 1.
P2442	SECONDARY AIR SYSTEM SWITCHING VALVE STUCK OPEN BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2442 SECONDARY AIR SYSTEM SWITCHING VALVE STUCK OPEN BANK 2.
P2443	SECONDARY AIR SYSTEM SWITCHING VALVE STUCK CLOSED BANK 2	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2443 SECONDARY AIR SYSTEM SWITCHING VALVE STUCK CLOSED BANK 2.
P2444	SECONDARY AIR SYSTEM PUMP STUCK ON BANK 1	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2444 SECONDARY AIR SYSTEM PUMP STUCK ON BANK 1.
P24B9	EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P24B9 EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE.
P24BA	EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT LOW	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P24BA EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT LOW.
P24BB	EVAP SYSTEM LEAK DETECTION PUMP	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P24BB

DTC	Item	Note
	PRESSURE SENSOR CIRCUIT HIGH	EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT HIGH.
P2530	IGNITION SWITCH RUN POSITION CIRCUIT	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2530 IGNITION SWITCH RUN POSITION CIRCUIT.
P2610	ECM/PCM ENGINE OFF TIMER PERFORMANCE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2610 ECM/PCM ENGINE OFF TIMER PERFORMANCE.
U0073	CONTROL MODULE COMMUNICATION BUS OFF	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF.
U0122	LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE.
U0155	LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0155 LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE.
U0416	INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE.
U0423	INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0423 INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE.

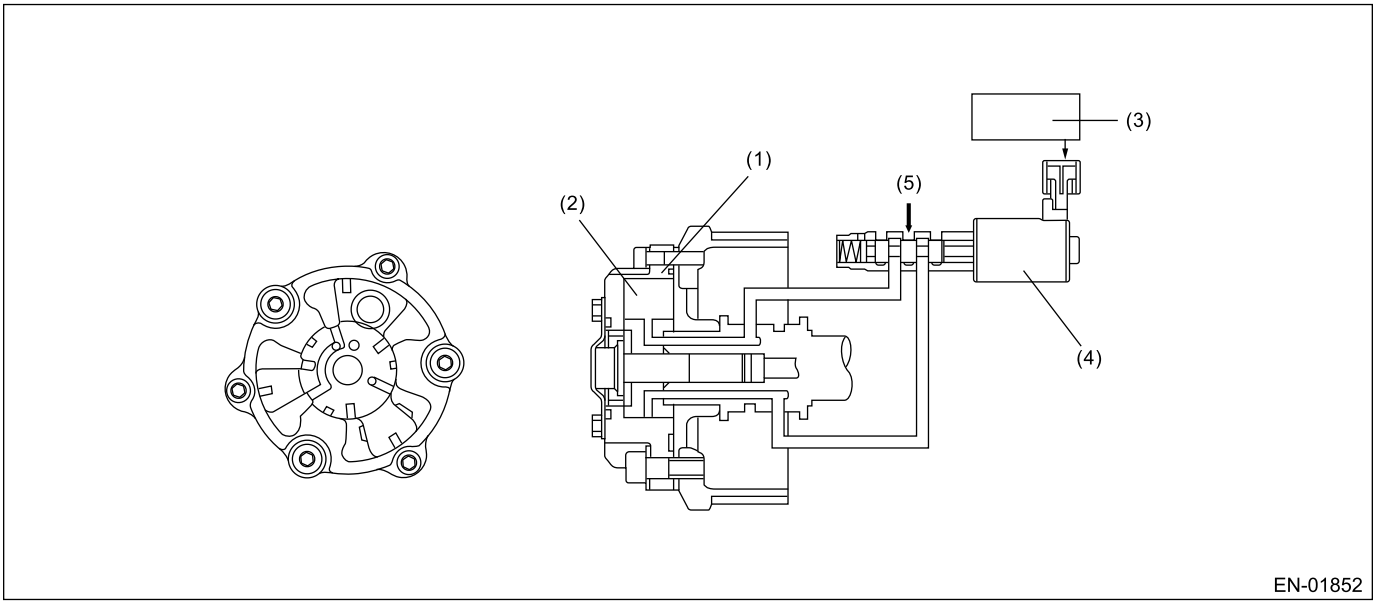
DTC P000A "A" CAMSHAFT POSITION SLOW RESPONSE BANK 1

Note:
For the diagnostic procedure, refer to DTC P0011. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0011 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.

1. OUTLINE OF DIAGNOSIS

- Intake side
  Detect the AVCS system malfunction.
  Judge NG when the amount of AVCS actual timing advance does not approach to the amount of AVCS target timing advance.
- Exhaust side
  Detect the exhaust AVCS system malfunction.
  Judge NG when the amount of exhaust AVCS actual timing advance does not approach the amount of exhaust AVCS target timing advance.

2. COMPONENT DESCRIPTION



(1) AVCS timing controller
(2) Vane
(3) Engine control module (ECM)
(4) Oil flow control solenoid valve
(5) Hydraulic

3. EXECUTION CONDITION

Secondary parameters	Execution condition	DTC
Intake side Battery voltage AVCS control	 ≥ 10.9 V In operation	 P000A P000C

Secondary parameters	Execution condition	DTC
|Target timing advance change amount (per 64 ms)|	< 10°CA	
|VVT target angle|	> 10°CA	
Exhaust side Battery voltage Exhaust AVCS control |Target timing advance change amount (per 64 ms)| |VVT target angle|	 ≥ 10.9 V In operation < 10°CA > 10°CA	 P000B P000D

4. GENERAL DRIVING CYCLE

- Intake side
  Perform the diagnosis continuously while AVCS is operating.
- Exhaust side
  Perform the diagnosis continuously while exhaust AVCS is operating.

5. DIAGNOSTIC METHOD

- Intake side
  When the differences of target timing advance amount and actual timing advance amount is calculated during AVCS control, and the difference per predetermined time is the specified value or larger.
  Judge as NG when the following conditions are established within the predetermined time.
- Exhaust side
  When the differences of target timing advance amount and actual timing advance amount is calculated during exhaust AVCS control, and the difference per predetermined time is the specified value or larger.
  Judge as NG when the following conditions are established within the predetermined time.

Judgment value

Malfunction Criteria	Threshold Value	DTC
Intake side		
Σ(Target position − Actual position)	> 4000°CA or < −4000°CA	P000A P000C
Exhaust side Σ(Target position − Actual position)	 > 4000°CA or < −4000°CA	 P000B P000D

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P000B "B" CAMSHAFT POSITION SLOW RESPONSE BANK 1

Note:
For the diagnostic procedure, refer to DTC P0014. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0014 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to the exhaust side of P000A. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000A "A" CAMSHAFT POSITION SLOW RESPONSE BANK 1.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P000C "A" CAMSHAFT POSITION SLOW RESPONSE BANK 2

Note:
For the diagnostic procedure, refer to DTC P0021. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0021 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to the intake side of P000A. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000A "A" CAMSHAFT POSITION SLOW RESPONSE BANK 1.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P000D "B" CAMSHAFT POSITION SLOW RESPONSE BANK 2

Note:
For the diagnostic procedure, refer to DTC P0024. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0024 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to the exhaust side of P000B. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P000B "B" CAMSHAFT POSITION SLOW RESPONSE BANK 1.

DTC P0011 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

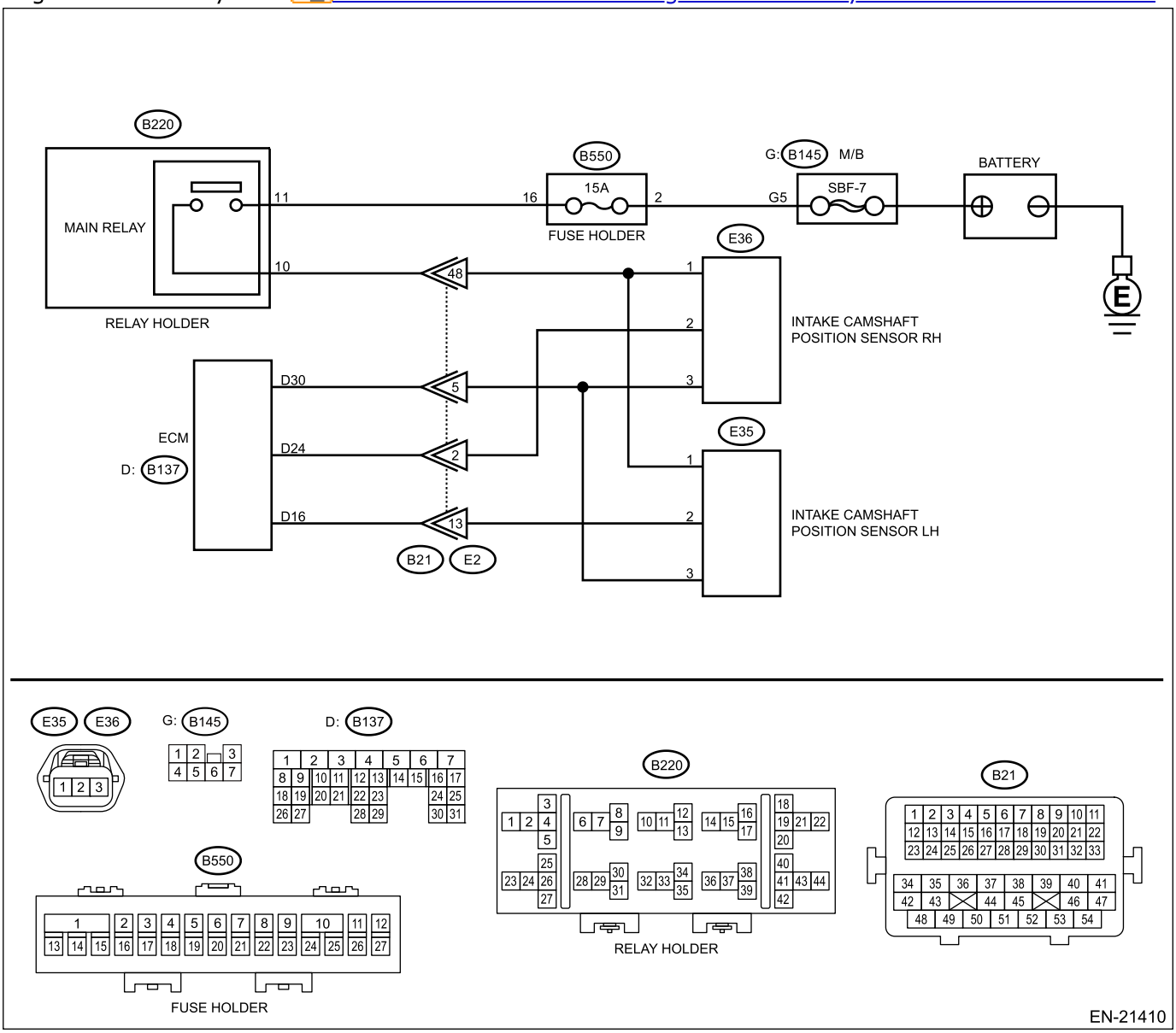
- Engine stalls.
- Improper idling

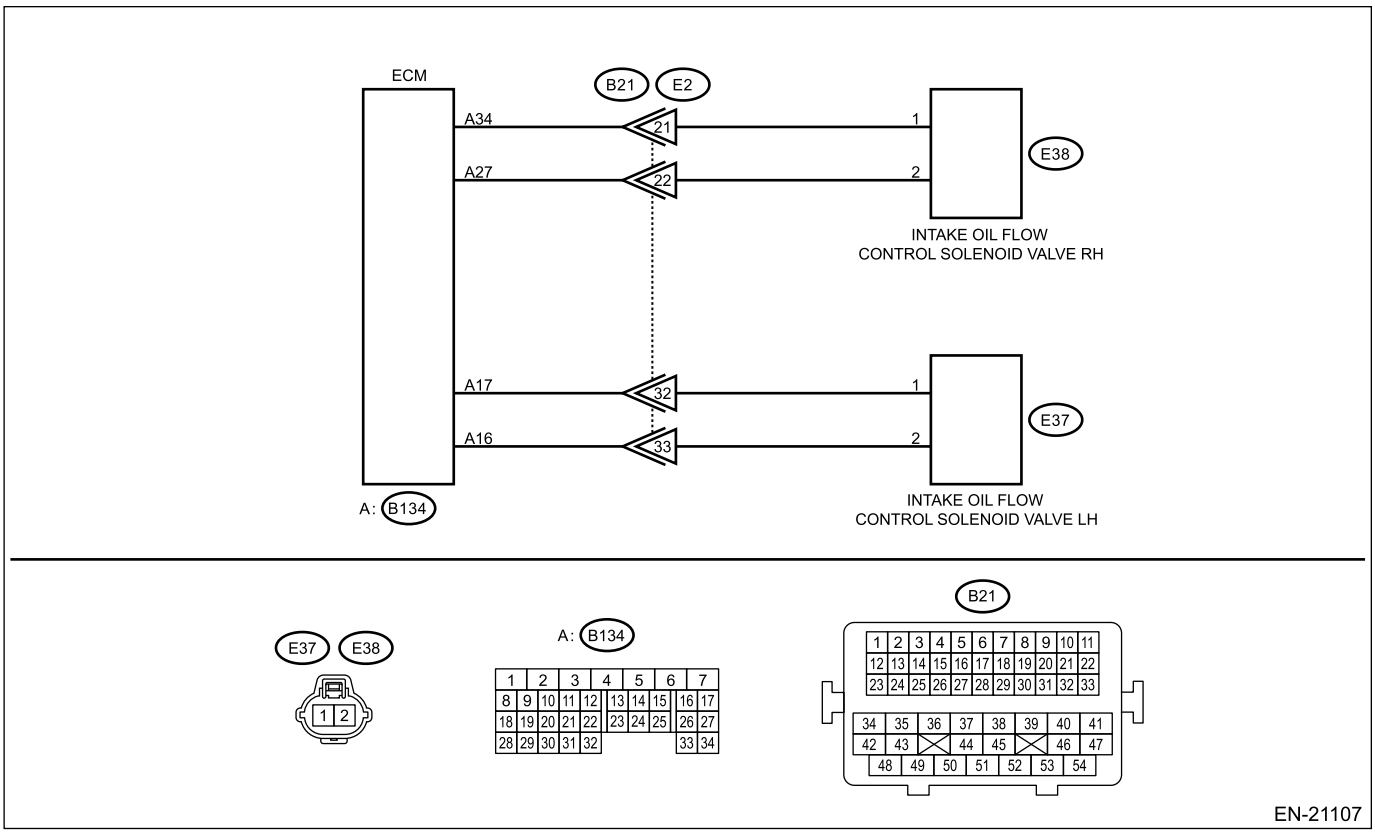
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

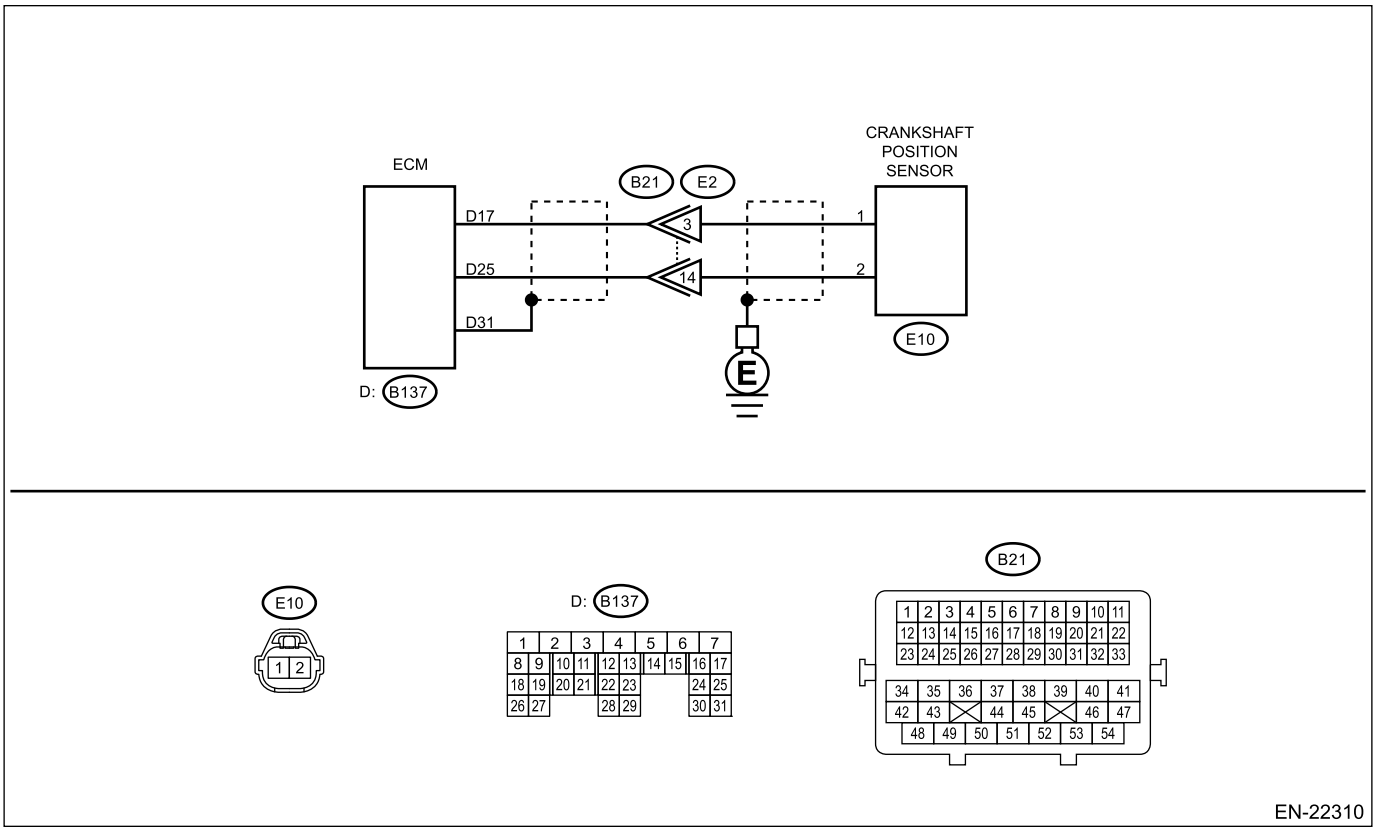
Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.





EN-21107



EN-22310

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Are DTCs other than P000A and P0011 displayed? (Current malfunction)

Yes	Check the appropriate DTC using "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Save the freeze frame data. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY OF FREEZE FRAME DATA (OBD MODE). Go to 2.

2. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

Note:

Check the following items.

- **Oil amount is within the specified range**
- **Occurrence of abnormal dirt**
- **Coagulation due to additives**
- **Use of oil with specified viscosity**

Is the check result OK?

Yes	Go to 3.
No	Adjust oil amount or replace the engine oil and oil filter. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 3.

3. CHECK ON-BOARD MONITOR TEST RESULTS.

1. Replace the intake oil flow control solenoid valve RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.
2. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
3. Perform drive cycle T. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.
4. Read values of "VVT Monitor Bank 1" and "VVT Monitor Bank 2" according to MODE$06 reading procedures using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS).

   Caution:
   - **When performing driving cycle, there should be 2 persons (driver and checker) and the checker should perform the data check.**
   - **When performing the drive cycle on the public road, be very careful of the traffic condition and the safe driving must be the high priority.**

   Note:
   - **When the diagnostic value is 0, the diagnosis is incomplete. Therefore, do not stop the engine and perform the drive cycle again.**
   - **Diagnostic values are updated repeatedly, and therefore, always check the data while diagnostic values are being read.**
5. Record the read values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2".

Is the value in "VVT Monitor Bank 1" of the replaced oil flow control solenoid valve 1000 or more?

Yes	Go to 5.
No	Go to 4.

4. CHECK ON-BOARD MONITOR TEST RESULTS.

Compare the values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2" recorded in step 3.

Is the value in "VVT Monitor Bank 1" 1000 or less, and also larger than the value (value in "VVT Monitor Bank 2" ×1.5+100) compared to the value in "VVT Monitor Bank 2"?

Yes	Go to 5.
No	Idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 13.

5. CHECK HARNESS AND CONNECTOR.

Check the harness and connector for bending, damage and poor contact.

Note:

Check the following items.

- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM)>INSPECTION.**
- **Oil flow control solenoid valve Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor>INSPECTION.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor>INSPECTION.**

Is the check result OK?

Yes	Go to 6.
No	Repair or replace faulty parts. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM). Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor. Go to 6.

6. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake oil flow control solenoid valve RH.
4. Measure the resistance of harness between ECM connector and intake oil flow control solenoid valve RH connector.

   Connector & terminal

   (B134) No. 27 — (E38) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 7.
No	Repair or replace faulty parts. Go to 13.

7. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake camshaft position sensor RH.
4. Measure the resistance between intake camshaft position sensor RH connector and ECM connector.
   Connector & terminal
   (B137) No. 24 — (E36) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 8.
No	Repair or replace faulty parts. Go to 13.

8. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the crankshaft position sensor.
4. Measure the resistance between crankshaft position sensor connector and ECM connector.
   Connector & terminal
   (B137) No. 17 — (E10) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 9.
No	Repair or replace faulty parts. Go to 13.

9. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(STI)>Engine Oil Pressure.

Is the engine oil pressure normal?

Yes — Go to 11.

No — Go to 10.

10. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer.

Are there any foreign matter mixed in oil strainer in the oil pan?

Yes — Check and clean inside the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer. Go to 11.

No — Go to 11.

11. CHECK THE CONDITION OF CAMSHAFT.

1. Remove the engine from the vehicle. Ref. to MECHANICAL(STI)>Engine Assembly.
2. Remove the timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
3. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

Note:

Compare rotational resistance with the camshaft in bank 2 and check the following items to see if there is any obvious fault such as unsmoothness of the camshaft in bank 1 and rotational resistance.

- **Foreign matter adhered to the camshaft**
- **Damage to camshaft (scratch, scuffed, wear, etc.)**
- **Check of influence of cam journal bearing not rotating properly**

Is the check result OK?

Yes — Go to 12.

No — Replace the camshaft. Ref. to MECHANICAL(STI)>Camshaft.
Go to 12.

12. CHECK OIL PASSAGES BETWEEN OIL PUMP AND OIL FLOW CONTROL SOLENOID VALVE.

Visually check the following portions of oil passages connecting oil pump to oil flow control solenoid valve to see if there is any obvious fault such as adherence of foreign matter and clogging.

- Oil passage of the camshaft cap
- Oil passage of the cylinder head side
- Oil passage from cam sprocket to camshaft connecting section
- Oil passage of the sprocket back side with the sprocket removed, and the camshaft end
- Oil passage of the oil pipe
- Oil passage of the union bolt

Is the check result OK?

Yes	Replace the sprocket. Ref. to MECHANICAL(STI)>Cam Sprocket>REMOVAL. Go to 13.
No	Remove the foreign matter. Replace the union bolt with filter (with protrusion). Ref. to MECHANICAL(STI)>Camshaft. **Note:** **After the procedure is finished, idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter.** **Go to 13.**

13. CHECK ON-BOARD MONITOR TEST RESULTS.

1. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Perform drive cycle T. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.
3. Read values of "VVT Monitor Bank 1" and "VVT Monitor Bank 2" according to MODE$06 reading procedures using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS).

   Caution:
   - **When performing driving cycle, there should be 2 persons (driver and checker) and the checker should perform the data check.**
   - **When performing the drive cycle on the public road, be very careful of the traffic condition and the safe driving must be the high priority.**

   Note:
   - **When the diagnostic value is 0, the diagnosis is incomplete. Therefore, do not stop the engine and perform the drive cycle again.**
   - **Diagnostic values are updated repeatedly, and therefore, always check the data while diagnostic values are being read.**
4. Record the read values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2".

Is the value in "VVT Monitor Bank 1" 1000 or more?

Yes	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	Go to 14.

14. CHECK CURRENT DATA.

Compare the values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2" recorded in step 13.

Is the value in "VVT Monitor Bank 1" 1000 or less, and also larger than the value (value in "VVT Monitor Bank 2" ×1.5+100) compared to the value in "VVT Monitor Bank 2"?

Yes	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	End.

1. OUTLINE OF DIAGNOSIS

Detect the AVCS system malfunction.

Judge as NG when the conditions during which the differences of AVCS target timing advance amount and AVCS actual timing advance amount is large continues.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
AVCS control	In operation
|VVT target angle|	> 10°CA

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously while AVCS is operating.

4. DIAGNOSTIC METHOD

When the conditions during which the differences of AVCS target timing advance amount and AVCS actual timing advance amount is large continues for certain amount of time.
Judge as NG when the following conditions are established within the predetermined time.

Judgment value

Malfunction Criteria	Threshold Value
|(Target position - Actual position)|	> 10°CA

time needed for diagnosis:5000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0014 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

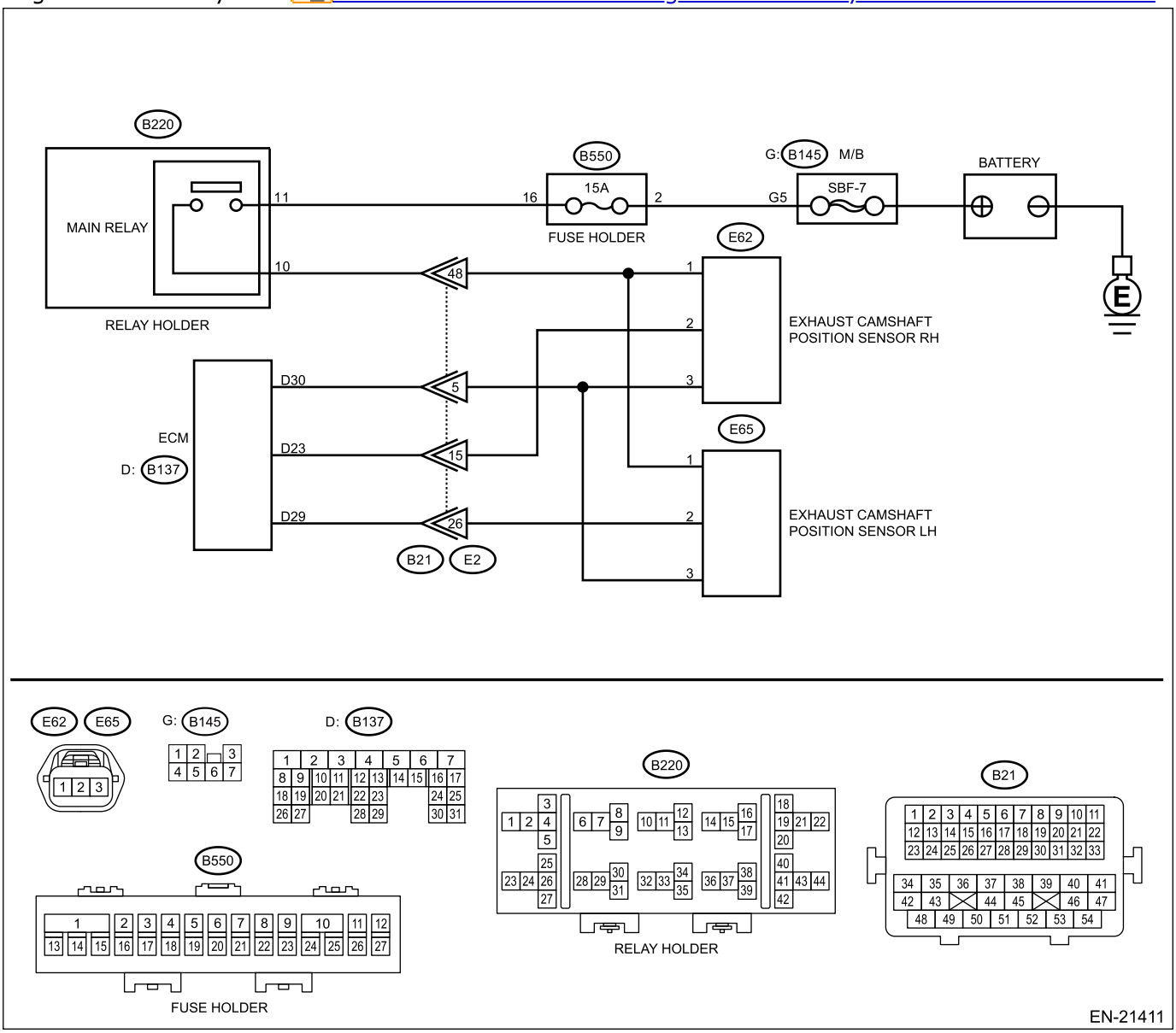
- Engine stalls.
- Improper idling

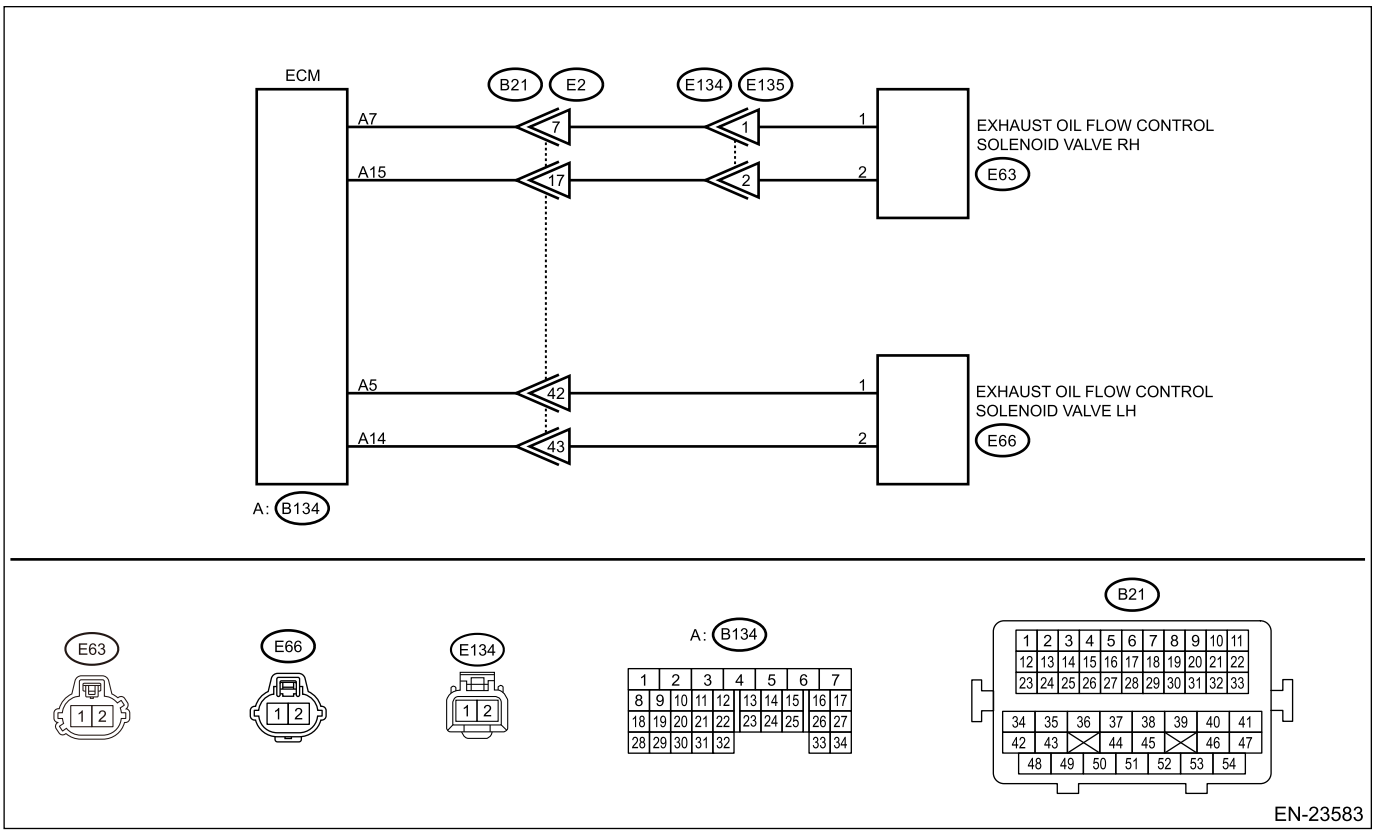
Caution:

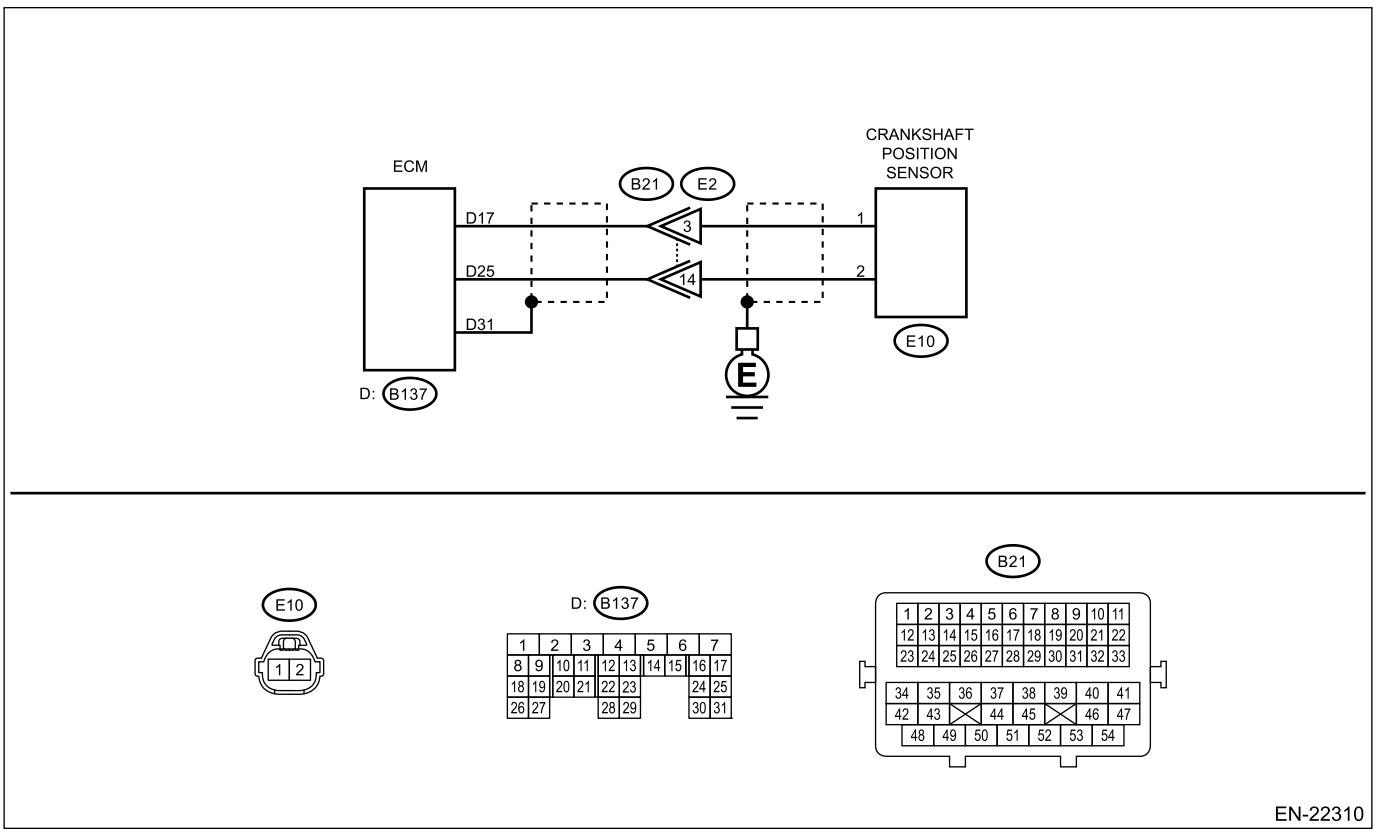
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.




ECM
B21
E2
E134
E135
A7
7
1
1
EXHAUST OIL FLOW CONTROL SOLENOID VALVE RH
A15
17
2
2
E63
A5
42
1
EXHAUST OIL FLOW CONTROL SOLENOID VALVE LH
A14
43
2
E66
A: B134
E63
1 2
E66
1 2
E134
1 2
A: B134
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34
B21
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54
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ECM
B21
E2
CRANKSHAFT POSITION SENSOR
D17
3
1
D25
14
2
D31
E10
E
D: B137
E10
1 2
D: B137
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31
B21
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54
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1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Are DTCs other than P000B and P0014 displayed? (Current malfunction)

Yes	Check the appropriate DTC using "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Save the freeze frame data. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY OF FREEZE FRAME DATA (OBD MODE). Go to 2.

2. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

Note:

Check the following items.

- **Oil amount is within the specified range**
- **Occurrence of abnormal dirt**
- **Coagulation due to additives**
- **Use of oil with specified viscosity**

Is the check result OK?

Yes	Go to 3.
No	Adjust oil amount or replace the engine oil and oil filter. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 3.

3. CHECK ON-BOARD MONITOR TEST RESULTS.

1. Replace the exhaust oil flow control solenoid valve RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.
2. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
3. Perform drive cycle T. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.
4. Read values of "VVT Monitor Bank 1" and "VVT Monitor Bank 2" according to MODE$06 reading procedures using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS).

   Caution:
   - **When performing driving cycle, there should be 2 persons (driver and checker) and the checker should perform the data check.**
   - **When performing the drive cycle on the public road, be very careful of the traffic condition and the safe driving must be the high priority.**

   Note:
   - **When the diagnostic value is 0, the diagnosis is incomplete. Therefore, do not stop the engine and perform the drive cycle again.**
   - **Diagnostic values are updated repeatedly, and therefore, always check the data while diagnostic values are being read.**
5. Record the read values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2".

Is the value in "VVT Monitor Bank 1" of the replaced oil flow control solenoid valve 1000 or more?

Yes	Go to 5.
No	Go to 4.

4. CHECK ON-BOARD MONITOR TEST RESULTS.

Compare the values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2" recorded in step 3.

Is the value in "VVT Monitor Bank 1" 1000 or less, and also larger than the value (value in "VVT Monitor Bank 2" ×1.5+100) compared to the value in "VVT Monitor Bank 2"?

Yes	Go to 5.
No	Idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 13.

5. CHECK HARNESS AND CONNECTOR.

Check the harness and connector for bending, damage and poor contact.

Note:

Check the following items.

- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM)>INSPECTION.**
- **Oil flow control solenoid valve Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor>INSPECTION.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor>INSPECTION.**

Is the check result OK?

Yes	Go to 6.
No	Repair or replace faulty parts. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM). Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor. Go to 6.

6. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust oil flow control solenoid valve RH.
4. Measure the resistance of harness between ECM connector and exhaust oil flow control solenoid valve RH connector.

   Connector & terminal

   (B134) No. 15 — (E63) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 7.
No	Repair or replace faulty parts. Go to 13.

7. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust camshaft position sensor RH.
4. Measure the resistance between exhaust camshaft position sensor RH connector and ECM connector.
   Connector & terminal
   (B137) No. 23 — (E62) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 8.
No	Repair or replace faulty parts. Go to 13.

8. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the crankshaft position sensor.
4. Measure the resistance between crankshaft position sensor connector and ECM connector.
   Connector & terminal
   (B137) No. 17 — (E10) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 9.
No	Repair or replace faulty parts. Go to 13.

9. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(STI)>Engine Oil Pressure.

Is the engine oil pressure normal?

Yes — Go to 11.

No — Go to 10.

10. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer.

Are there any foreign matter mixed in oil strainer in the oil pan?

Yes — Check and clean inside the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer. Go to 11.

No — Go to 11.

11. CHECK THE CONDITION OF CAMSHAFT.

1. Remove the engine from the vehicle. Ref. to MECHANICAL(STI)>Engine Assembly.
2. Remove the timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
3. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

Note:

Compare rotational resistance with the camshaft in bank 2 and check the following items to see if there is any obvious fault such as unsmoothness of the camshaft in bank 1 and rotational resistance.

- **Foreign matter adhered to the camshaft**
- **Damage to camshaft (scratch, scuffed, wear, etc.)**
- **Check of influence of cam journal bearing not rotating properly**

Is the check result OK?

Yes — Go to 12.

No — Replace the camshaft. Ref. to MECHANICAL(STI)>Camshaft.
Go to 12.

12. CHECK OIL PASSAGES BETWEEN OIL PUMP AND OIL FLOW CONTROL SOLENOID VALVE.

Visually check the following portions of oil passages connecting oil pump to oil flow control solenoid valve to see if there is any obvious fault such as adherence of foreign matter and clogging.

- Oil passage of the camshaft cap
- Oil passage of the cylinder head side
- Oil passage from cam sprocket to camshaft connecting section
- Oil passage of the sprocket back side with the sprocket removed, and the camshaft end
- Oil passage of the oil pipe
- Oil passage of the union bolt

Is the check result OK?

Yes	Replace the sprocket. Ref. to MECHANICAL(STI)>Cam Sprocket>REMOVAL. Go to 13.
No	Remove the foreign matter. Replace the union bolt with filter (with protrusion). Ref. to MECHANICAL(STI)>Camshaft. **Note:** **After the procedure is finished, idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter.** **Go to 13.**

13. CHECK ON-BOARD MONITOR TEST RESULTS.

1. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Perform drive cycle T. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.
3. Read values of "VVT Monitor Bank 1" and "VVT Monitor Bank 2" according to MODE$06 reading procedures using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS).

   Caution:
   - **When performing driving cycle, there should be 2 persons (driver and checker) and the checker should perform the data check.**
   - **When performing the drive cycle on the public road, be very careful of the traffic condition and the safe driving must be the high priority.**

   Note:
   - **When the diagnostic value is 0, the diagnosis is incomplete. Therefore, do not stop the engine and perform the drive cycle again.**
   - **Diagnostic values are updated repeatedly, and therefore, always check the data while diagnostic values are being read.**
4. Record the read values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2".

Is the value in "VVT Monitor Bank 1" 1000 or more?

Yes	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	Go to 14.

14. CHECK CURRENT DATA.

Compare the values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2" recorded in step 13.

Is the value in "VVT Monitor Bank 1" 1000 or less, and also larger than the value (value in "VVT Monitor Bank 2" ×1.5+100) compared to the value in "VVT Monitor Bank 2"?

Yes	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	End.

1. OUTLINE OF DIAGNOSIS

Detect the exhaust AVCS system malfunction.

Judge as NG when the conditions during which the differences of exhaust AVCS target timing advance amount and exhaust AVCS actual timing advance amount is large continues.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Exhaust AVCS control	In operation
|VVT target angle|	> 20°CA

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously while exhaust AVCS is operating.

4. DIAGNOSTIC METHOD

When the conditions during which the differences of exhaust AVCS target timing advance amount and exhaust AVCS actual timing advance amount is large continues for certain amount of time.
Judge as NG when the following conditions are established within the predetermined time.

Judgment value

Malfunction Criteria	Threshold Value
|(Target position - Actual position)|	> 20°CA

time needed for diagnosis: 5000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR A

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

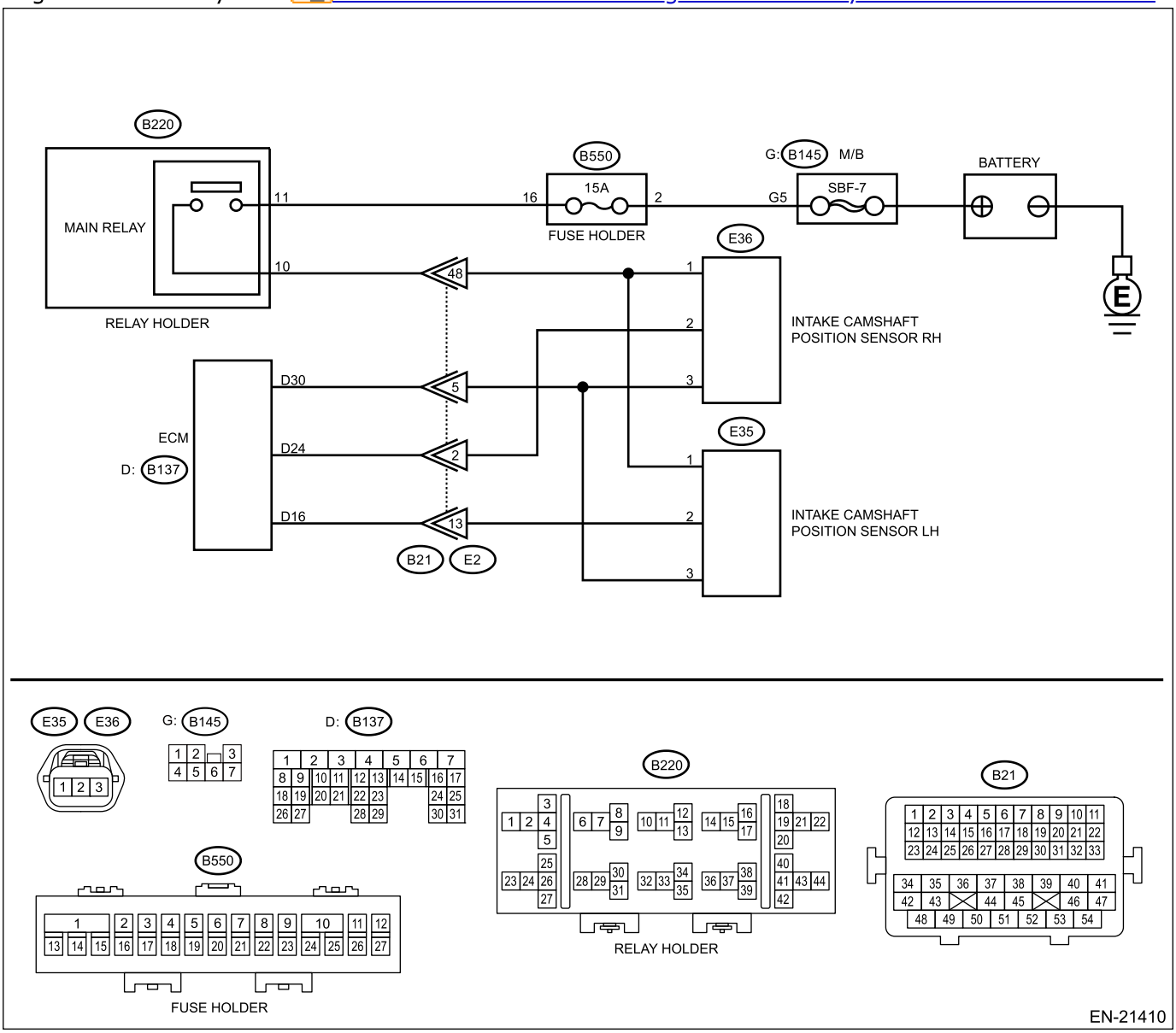
- Engine stalls.
- Improper idling

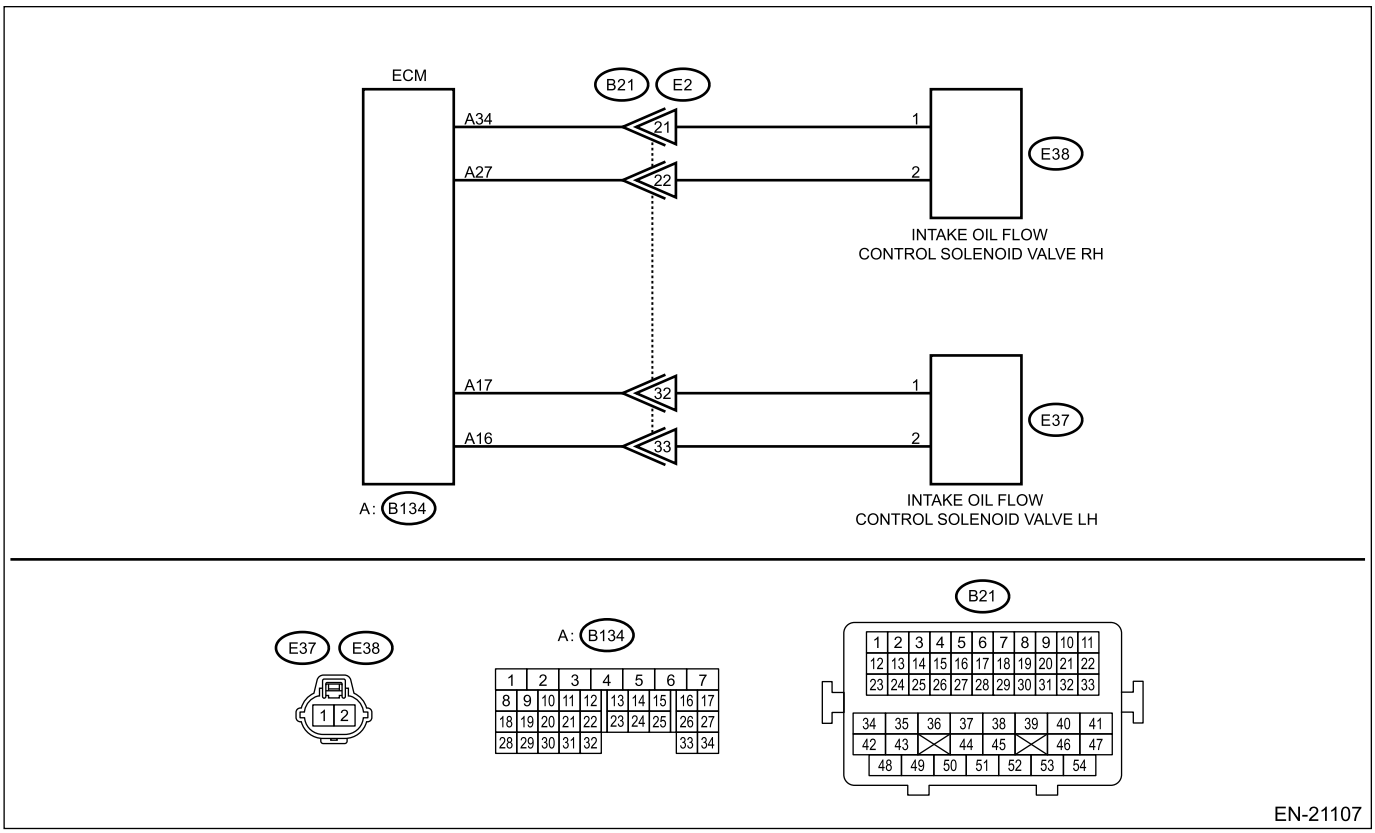
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

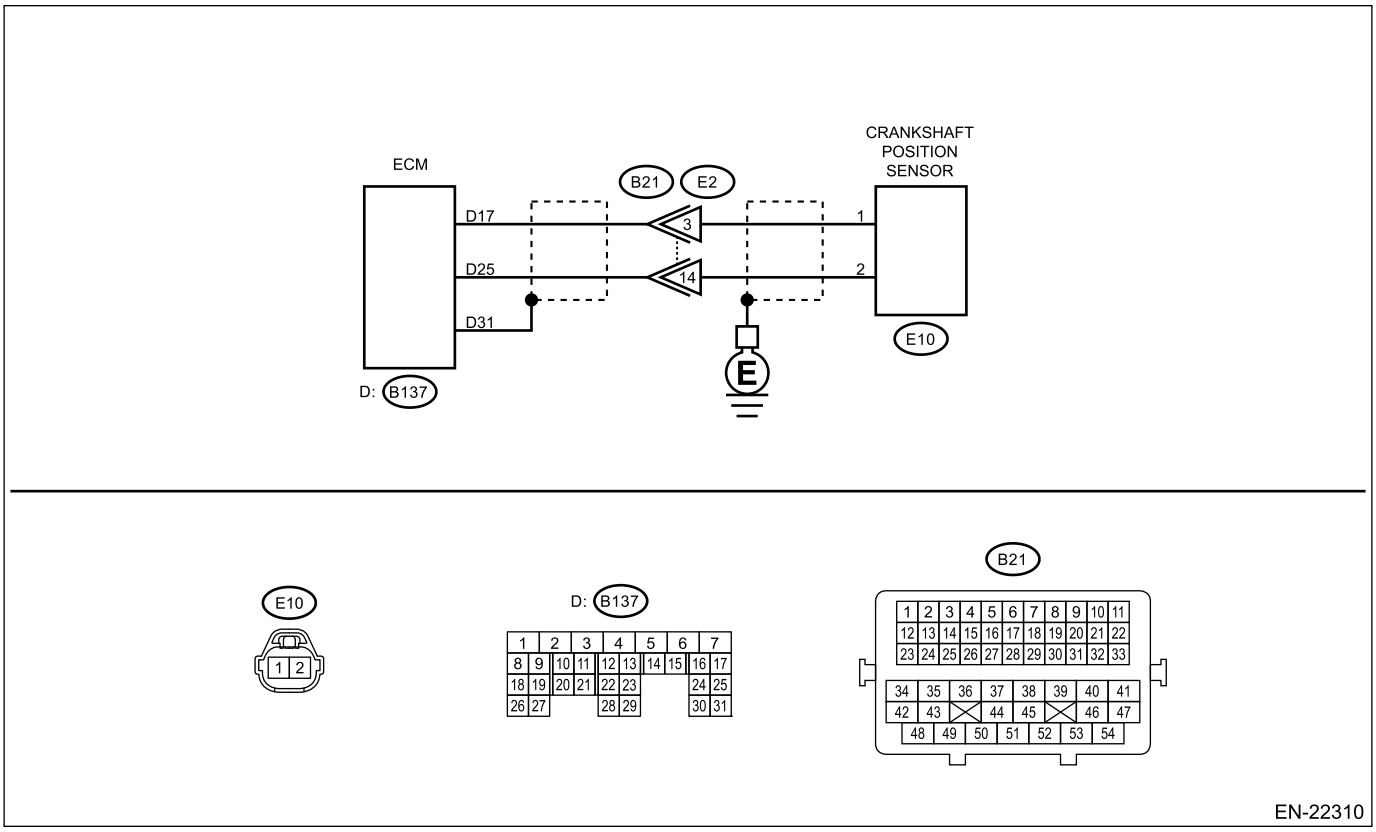
Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.





EN-21107



EN-22310

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is other than DTC P0016 displayed? (Current malfunction)

Yes	Check the appropriate DTC using "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Save the freeze frame data. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY OF FREEZE FRAME DATA (OBD MODE). Go to 2.

2. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

Note:

Check the following items.

- **Oil amount is within the specified range**
- **Occurrence of abnormal dirt**
- **Coagulation due to additives**
- **Use of oil with specified viscosity**

Is the check result OK?

Yes	Go to 3.
No	Adjust oil amount or replace the engine oil and oil filter. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 3.

3. CHECK BELT TIMING.

1. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Turn the ignition switch to OFF.
3. Disconnect the connector of the intake oil flow control solenoid valve RH. (DTC is included, but it does not affect the inspection.)
4. Start monitoring «VVT Adv. Ang. Amount R» of the current data display. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA (NORMAL MODE).
5. Turn the ignition switch to ON.
6. Start the engine.
7. Read «VVT Adv. Ang. Amount R» within 10 seconds after starting the engine.
   Note:
   If 10 seconds or more elapses after the engine is started, the position after the elapse is judged as the reference and [0] will be displayed.
8. Record the read value in «VVT Adv. Ang. Amount R».
9. Stop the engine.

Is «VVT Adv. Ang. Amount R» within 10 seconds after starting the engine ±10 deg. or more apart from the reference value (0 deg)?

Yes	Repair the belt timing. Ref. to MECHANICAL(STI)>Timing Belt. Go to 14.
No	Go to 4.

4. CHECK ON-BOARD MONITOR TEST RESULTS.

1. Replace the intake oil flow control solenoid valve RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.
2. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
3. Perform drive cycle T. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.
4. Read values of "VVT Monitor Bank 1" and "VVT Monitor Bank 2" according to MODE$06 reading procedures using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS).

   Caution:
   - **When performing driving cycle, there should be 2 persons (driver and checker) and the checker should perform the data check.**
   - **When performing the drive cycle on the public road, be very careful of the traffic condition and the safe driving must be the high priority.**

   Note:
   - **When the diagnostic value is 0, the diagnosis is incomplete. Therefore, do not stop the engine and perform the drive cycle again.**
   - **Diagnostic values are updated repeatedly, and therefore, always check the data while diagnostic values are being read.**
5. Record the read values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2".

Is the value in "VVT Monitor Bank 1" of the replaced oil flow control solenoid valve 1000 or more?

Yes	Go to 6.
No	Go to 5.

5. CHECK ON-BOARD MONITOR TEST RESULTS.

Compare the values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2" recorded in step 4.

Is the value in "VVT Monitor Bank 1" 1000 or less, and also larger than the value (value in "VVT Monitor Bank 2" ×1.5+100) compared to the value in "VVT Monitor Bank 2"?

Yes	Go to 6.
No	Idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 14.

6. CHECK HARNESS AND CONNECTOR.

Check the harness and connector for bending, damage and poor contact.

Note:

Check the following items.

- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM)>INSPECTION.**
- **Oil flow control solenoid valve Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor>INSPECTION.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor>INSPECTION.**

Is the check result OK?

Yes	Go to 7.
No	Repair or replace faulty parts. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM). Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor. Go to 7.

7. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake oil flow control solenoid valve RH.
4. Measure the resistance of harness between ECM connector and intake oil flow control solenoid valve RH connector.

   Connector & terminal

   (B134) No. 27 — (E38) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 8.
No	Repair or replace faulty parts. Go to 14.

8. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake camshaft position sensor RH.
4. Measure the resistance between intake camshaft position sensor RH connector and ECM connector.
   Connector & terminal
   (B137) No. 24 — (E36) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 9.
No	Repair or replace faulty parts. Go to 14.

9. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the crankshaft position sensor.
4. Measure the resistance between crankshaft position sensor connector and ECM connector.
   Connector & terminal
   (B137) No. 17 — (E10) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 10.
No	Repair or replace faulty parts. Go to 14.

10. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(STI)>Engine Oil Pressure.

Is the engine oil pressure normal?

Yes — Go to 12.

No — Go to 11.

11. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer.

Are there any foreign matter mixed in oil strainer in the oil pan?

Yes — Check and clean inside the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer. Go to 12.

No — Go to 12.

12. CHECK THE CONDITION OF CAMSHAFT.

1. Remove the engine from the vehicle. Ref. to MECHANICAL(STI)>Engine Assembly.
2. Remove the timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
3. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

Note:

Compare rotational resistance with the camshaft in bank 2 and check the following items to see if there is any obvious fault such as unsmoothness of the camshaft in bank 1 and rotational resistance.

- **Foreign matter adhered to the camshaft**
- **Damage to camshaft (scratch, scuffed, wear, etc.)**
- **Check of influence of cam journal bearing not rotating properly**

Is the check result OK?

Yes — Go to 13.

No — Replace the camshaft. Ref. to MECHANICAL(STI)>Camshaft. Go to 13.

13. CHECK OIL PASSAGES BETWEEN OIL PUMP AND OIL FLOW CONTROL SOLENOID VALVE.

Visually check the following portions of oil passages connecting oil pump to oil flow control solenoid valve to see if there is any obvious fault such as adherence of foreign matter and clogging.

- Oil passage of the camshaft cap
- Oil passage of the cylinder head side
- Oil passage from cam sprocket to camshaft connecting section
- Oil passage of the sprocket back side with the sprocket removed, and the camshaft end
- Oil passage of the oil pipe
- Oil passage of the union bolt

Is the check result OK?

Yes	Replace the sprocket. Ref. to MECHANICAL(STI)>Cam Sprocket>REMOVAL. Go to 14.
No	Remove the foreign matter. Replace the union bolt with filter (with protrusion). Ref. to MECHANICAL(STI)>Camshaft. **Note:** **After the procedure is finished, idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter.** Go to 14.

14. CHECK CURRENT DATA.

1. Perform the clear memory for the engine using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Turn the ignition switch to ON.
3. Read the current data indication using Subaru Select Monitor. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA (NORMAL MODE).
4. Read the current value in «VVT Initial Position Learning Value #1».
5. Calculate sum of the read value in «VVT Initial Position Learning Value #1» and the value in «VVT Adv. Ang. Amount R» recorded in step 3.

Is the summed value within the specified range?
Standard:
17 — 43

Yes	ECM is normal. End the diagnosis.
No	Replace the ECM and perform drive cycle N. If the DTC is not displayed, finish the diagnosis. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

1. OUTLINE OF DIAGNOSIS

Detect the AVCS system malfunction.
Judge as NG when standard timing advance amount is far from learning angle.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
AVCS position learning	In operation

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting engine and while AVCS is not operating.

4. DIAGNOSTIC METHOD

Judge as NG when the absolute value of the difference between cam signal input position and learning value is out of specification.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
Diagnosis 1
Judgment value

Malfunction Criteria	Threshold Value
|Crankshaft position when camshaft position sensor signal is input − Learning value|	> 8.5°CA

Diagnosis 2
Judgment value

Malfunction Criteria	Threshold Value
Camshaft position sensor signal input position (Bank 1)	< 13°CA or > 55°CA
Camshaft position sensor signal input position (Bank 2)	< 13°CA or > 55°CA

Time needed for diagnosis: 5 seconds
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.
Note:
Initial standard learning value is the value of crank angle initially input at the production plant. And then it will be updated every time normal judgment has been completed. Learning value will not be updated if NG judgment occurs because timing belt or chain derails suddenly in process or because wrong assembly occurs during servicing.

DTC P0017 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR B

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

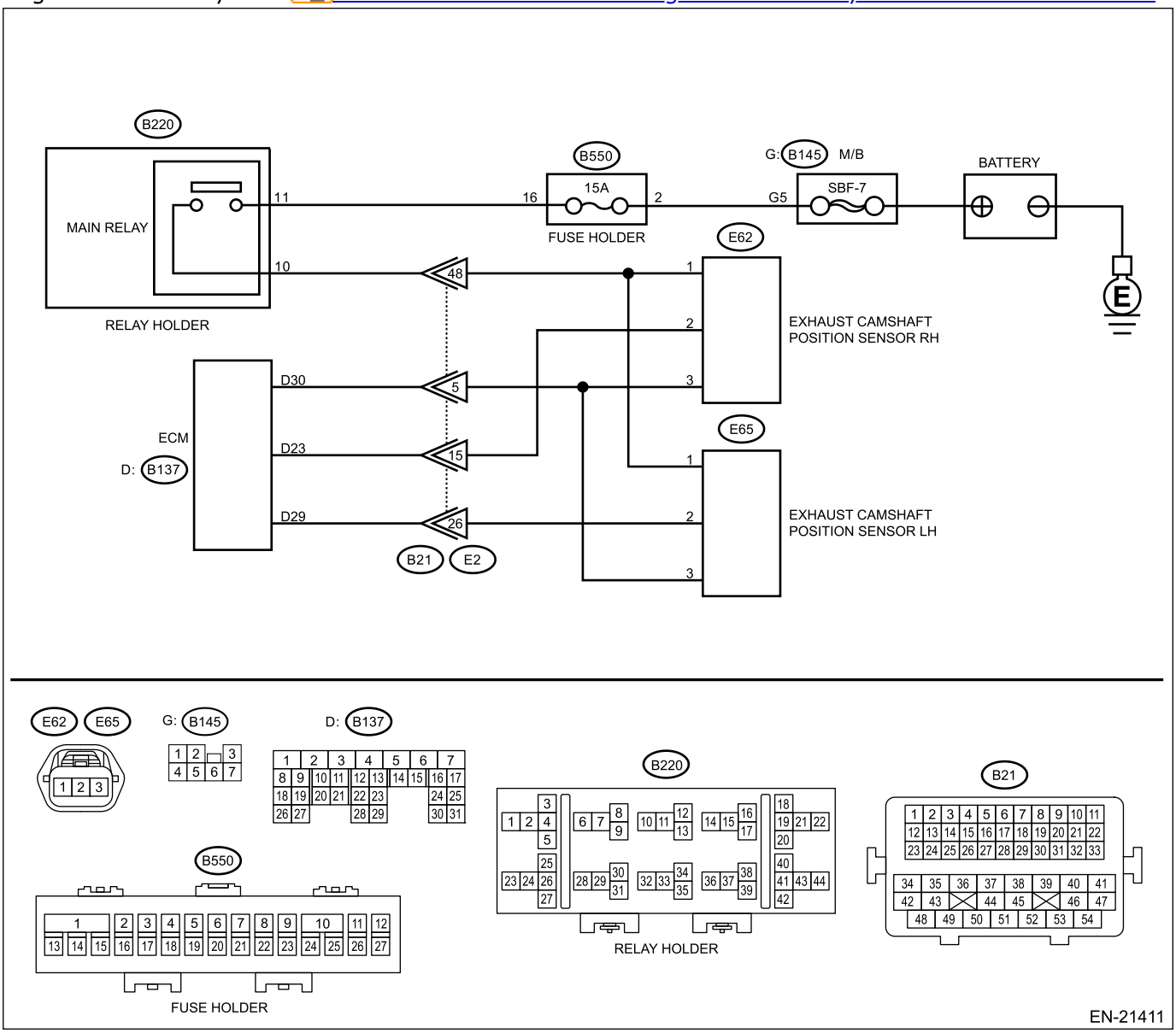
- Engine stalls.
- Improper idling

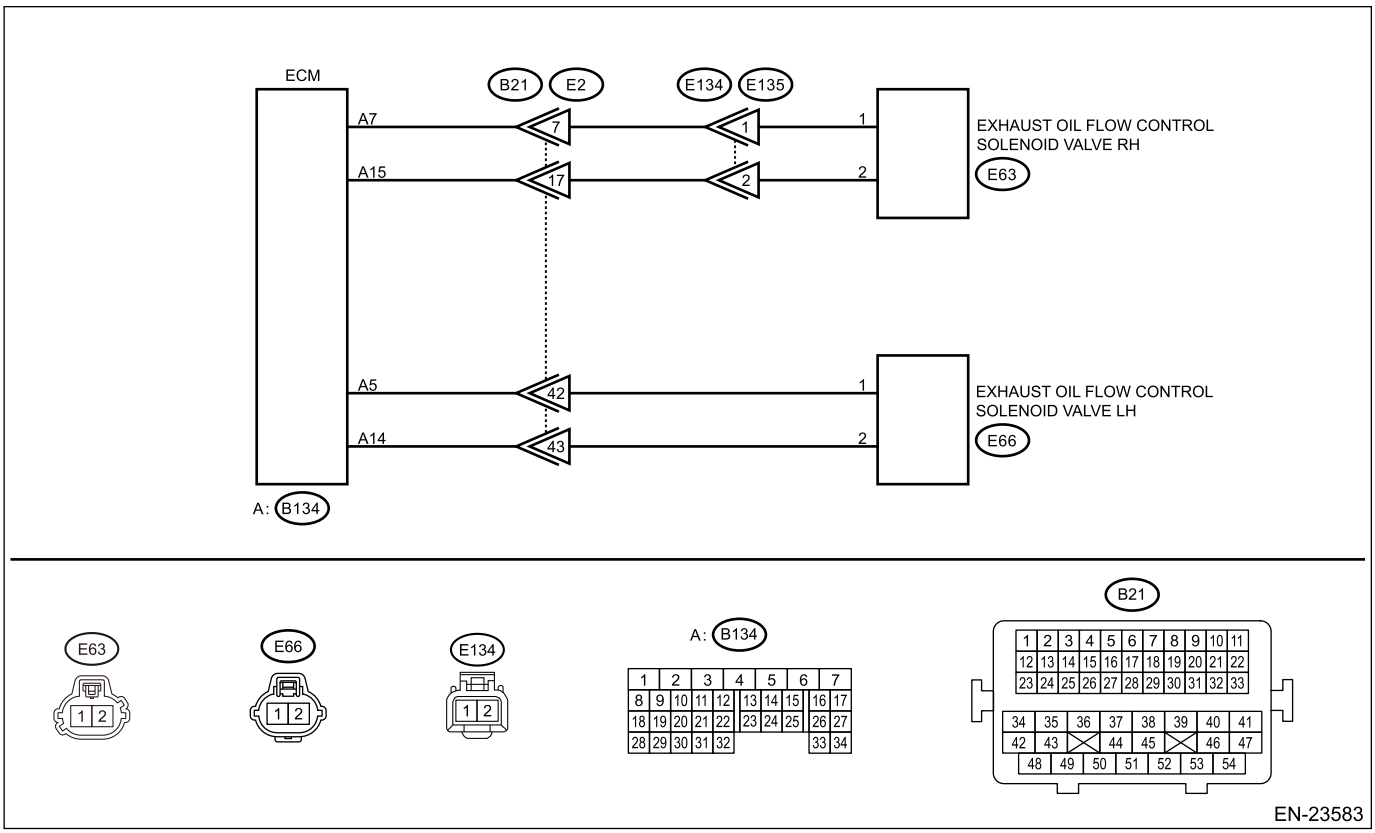
Caution:

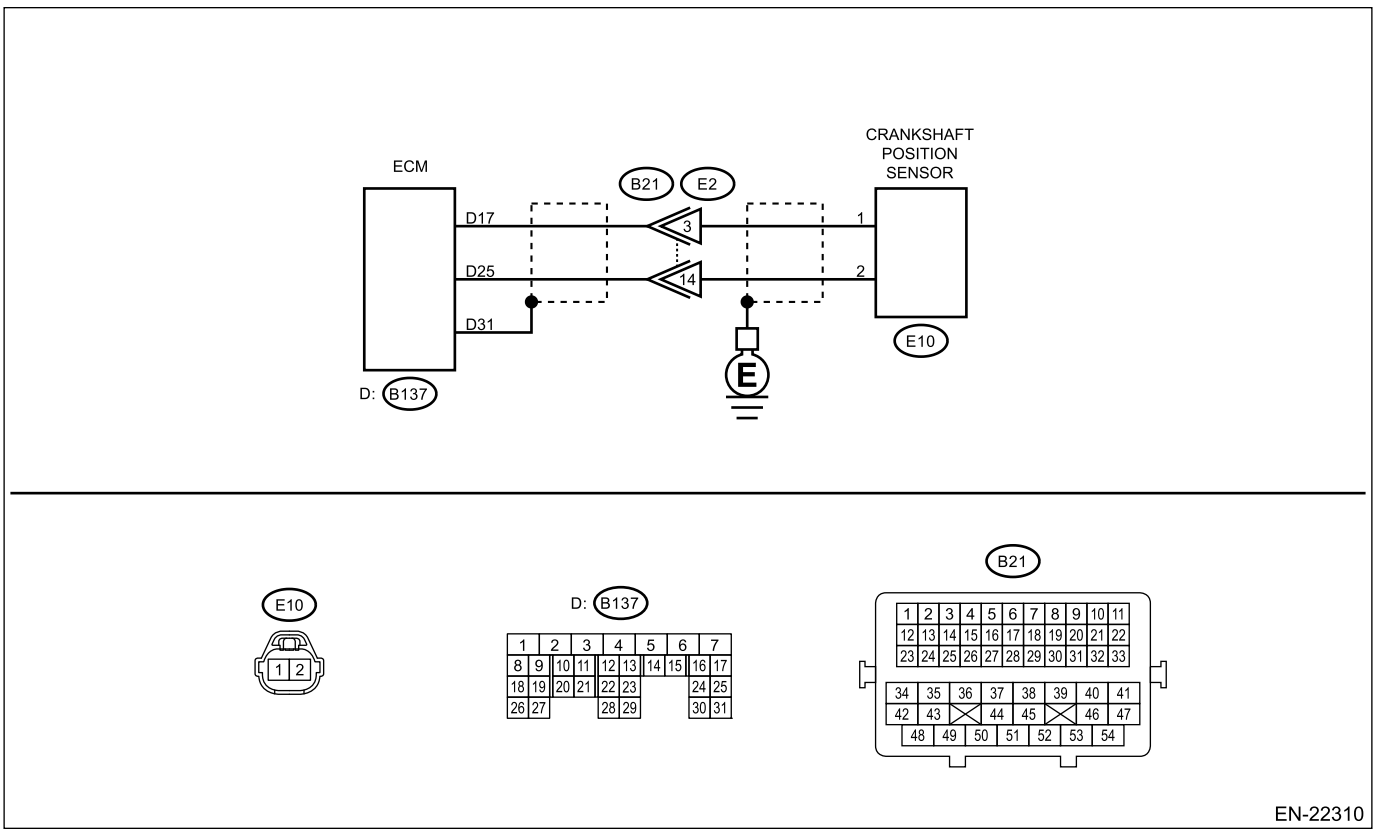
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.




ECM
B21
E2
E134
E135
A7
7
1
1
EXHAUST OIL FLOW CONTROL SOLENOID VALVE RH
A15
17
2
2
E63
A5
42
1
EXHAUST OIL FLOW CONTROL SOLENOID VALVE LH
A14
43
2
E66
A: B134
E63
1 2
E66
1 2
E134
1 2
A: B134
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34
B21
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54
EN-23583


ECM
B21
E2
CRANKSHAFT POSITION SENSOR
D17
3
1
D25
14
2
D31
E10
E
D: B137
E10
1 2
D: B137
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31
B21
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54
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1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is other than DTC P0017 displayed? (Current malfunction)

Yes	Check the appropriate DTC using "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Save the freeze frame data. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY OF FREEZE FRAME DATA (OBD MODE). Go to 2.

2. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

Note:

Check the following items.

- **Oil amount is within the specified range**
- **Occurrence of abnormal dirt**
- **Coagulation due to additives**
- **Use of oil with specified viscosity**

Is the check result OK?

Yes	Go to 3.
No	Adjust oil amount or replace the engine oil and oil filter. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 3.

3. CHECK BELT TIMING.

1. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Turn the ignition switch to OFF.
3. Disconnect the connector of the exhaust oil flow control solenoid valve RH. (DTC is included, but it does not affect the inspection.)
4. Start monitoring «Exh. VVT Retard Ang. R» of the current data display. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA (NORMAL MODE).
5. Turn the ignition switch to ON.
6. Start the engine.
7. Read «Exh. VVT Retard Ang. R» within 10 seconds after starting the engine.
   Note:
   If 10 seconds or more elapses after the engine is started, the position after the elapse is judged as the reference and [0] will be displayed.
8. Record the read value in «Exh. VVT Retard Ang. R».
9. Stop the engine.

Is «Exh. VVT Retard Ang. R» within 10 seconds after starting the engine ±10 deg. or more apart from the reference value (0 deg)?

Yes	Repair the belt timing. Ref. to MECHANICAL(STI)>Timing Belt. Go to 14.
No	Go to 4.

4. CHECK ON-BOARD MONITOR TEST RESULTS.

1. Replace the exhaust oil flow control solenoid valve RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.
2. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
3. Perform drive cycle T. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.
4. Read values of "VVT Monitor Bank 1" and "VVT Monitor Bank 2" according to MODE$06 reading procedures using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS).

   Caution:
   - **When performing driving cycle, there should be 2 persons (driver and checker) and the checker should perform the data check.**
   - **When performing the drive cycle on the public road, be very careful of the traffic condition and the safe driving must be the high priority.**

   Note:
   - **When the diagnostic value is 0, the diagnosis is incomplete. Therefore, do not stop the engine and perform the drive cycle again.**
   - **Diagnostic values are updated repeatedly, and therefore, always check the data while diagnostic values are being read.**
5. Record the read values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2".

Is the value in "VVT Monitor Bank 1" of the replaced oil flow control solenoid valve 1000 or more?

Yes	Go to 6.
No	Go to 5.

5. CHECK ON-BOARD MONITOR TEST RESULTS.

Compare the values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2" recorded in step 4.

Is the value in "VVT Monitor Bank 1" 1000 or less, and also larger than the value (value in "VVT Monitor Bank 2" ×1.5+100) compared to the value in "VVT Monitor Bank 2"?

Yes	Go to 6.
No	Idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 14.

6. CHECK HARNESS AND CONNECTOR.

Check the harness and connector for bending, damage and poor contact.

Note:

Check the following items.

- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM)>INSPECTION.**
- **Oil flow control solenoid valve Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor>INSPECTION.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor>INSPECTION.**

Is the check result OK?

Yes	Go to 7.
No	Repair or replace faulty parts. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM). Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor. Go to 7.

7. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust oil flow control solenoid valve RH.
4. Measure the resistance of harness between ECM connector and exhaust oil flow control solenoid valve RH connector.

   Connector & terminal

   (B134) No. 15 — (E63) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 8.
No	Repair or replace faulty parts. Go to 14.

8. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust camshaft position sensor RH.
4. Measure the resistance between exhaust camshaft position sensor RH connector and ECM connector.
   Connector & terminal
   (B137) No. 23 — (E62) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 9.
No	Repair or replace faulty parts. Go to 14.

9. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the crankshaft position sensor.
4. Measure the resistance between crankshaft position sensor connector and ECM connector.
   Connector & terminal
   (B137) No. 17 — (E10) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 10.
No	Repair or replace faulty parts. Go to 14.

10. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(STI)>Engine Oil Pressure.

Is the engine oil pressure normal?

Yes — Go to 12.

No — Go to 11.

11. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer.

Are there any foreign matter mixed in oil strainer in the oil pan?

Yes — Check and clean inside the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer. Go to 12.

No — Go to 12.

12. CHECK THE CONDITION OF CAMSHAFT.

1. Remove the engine from the vehicle. Ref. to MECHANICAL(STI)>Engine Assembly.
2. Remove the timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
3. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

Note:

Compare rotational resistance with the camshaft in bank 2 and check the following items to see if there is any obvious fault such as unsmoothness of the camshaft in bank 1 and rotational resistance.

- **Foreign matter adhered to the camshaft**
- **Damage to camshaft (scratch, scuffed, wear, etc.)**
- **Check of influence of cam journal bearing not rotating properly**

Is the check result OK?

Yes — Go to 13.

No — Replace the camshaft. Ref. to MECHANICAL(STI)>Camshaft. Go to 13.

13. CHECK OIL PASSAGES BETWEEN OIL PUMP AND OIL FLOW CONTROL SOLENOID VALVE.

Visually check the following portions of oil passages connecting oil pump to oil flow control solenoid valve to see if there is any obvious fault such as adherence of foreign matter and clogging.

- Oil passage of the camshaft cap
- Oil passage of the cylinder head side
- Oil passage from cam sprocket to camshaft connecting section
- Oil passage of the sprocket back side with the sprocket removed, and the camshaft end
- Oil passage of the oil pipe
- Oil passage of the union bolt

Is the check result OK?

Yes	Replace the sprocket. Ref. to MECHANICAL(STI)>Cam Sprocket>REMOVAL. Go to 14.
No	Remove the foreign matter. Replace the union bolt with filter (with protrusion). Ref. to MECHANICAL(STI)>Camshaft. **Note:** **After the procedure is finished, idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter.** Go to 14.

14. CHECK CURRENT DATA.

1. Perform the clear memory for the engine using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Turn the ignition switch to ON.
3. Read the current data indication using Subaru Select Monitor. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA (NORMAL MODE).
4. Read the current value in «VVT Ex Initial Position Learning Value #1».
5. Calculate sum of the read value in «VVT Ex Initial Position Learning Value #1» and the value in «Exh. VVT Retard Ang. R» recorded in step 3.

Is the summed value within the specified range?
Standard:
61 — 96

Yes	ECM is normal. End the diagnosis.
No	Replace the ECM and perform drive cycle N. If the DTC is not displayed, finish the diagnosis. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

1. OUTLINE OF DIAGNOSIS

Detect the exhaust AVCS system malfunction.
Judge as NG when standard timing advance amount is far from learning angle.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Exhaust AVCS position learning	In operation

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously while the exhaust AVCS is not operating after warming up.

4. DIAGNOSTIC METHOD

Judge as NG when the absolute value of the difference between cam signal input position and learning value is out of specification.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
Diagnosis 1
Judgment value

Malfunction Criteria	Threshold Value
|Crankshaft position when camshaft position sensor signal is input − Learning value|	> 8.5°CA

Diagnosis 2
Judgment value

Malfunction Criteria	Threshold Value
Camshaft position sensor signal input position (Bank 1)	< 55°CA or > 105°CA
Camshaft position sensor signal input position (Bank 2)	< 55°CA or > 105°CA

Time needed for diagnosis: 5 seconds
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.
Note:
Initial standard learning value is the value of crank angle initially input at the production plant. And then it will be updated every time normal judgment has been completed. Learning value will not be updated if NG judgment occurs because timing belt or chain derails suddenly in process or because wrong assembly occurs during servicing.

DTC P0018 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR A

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

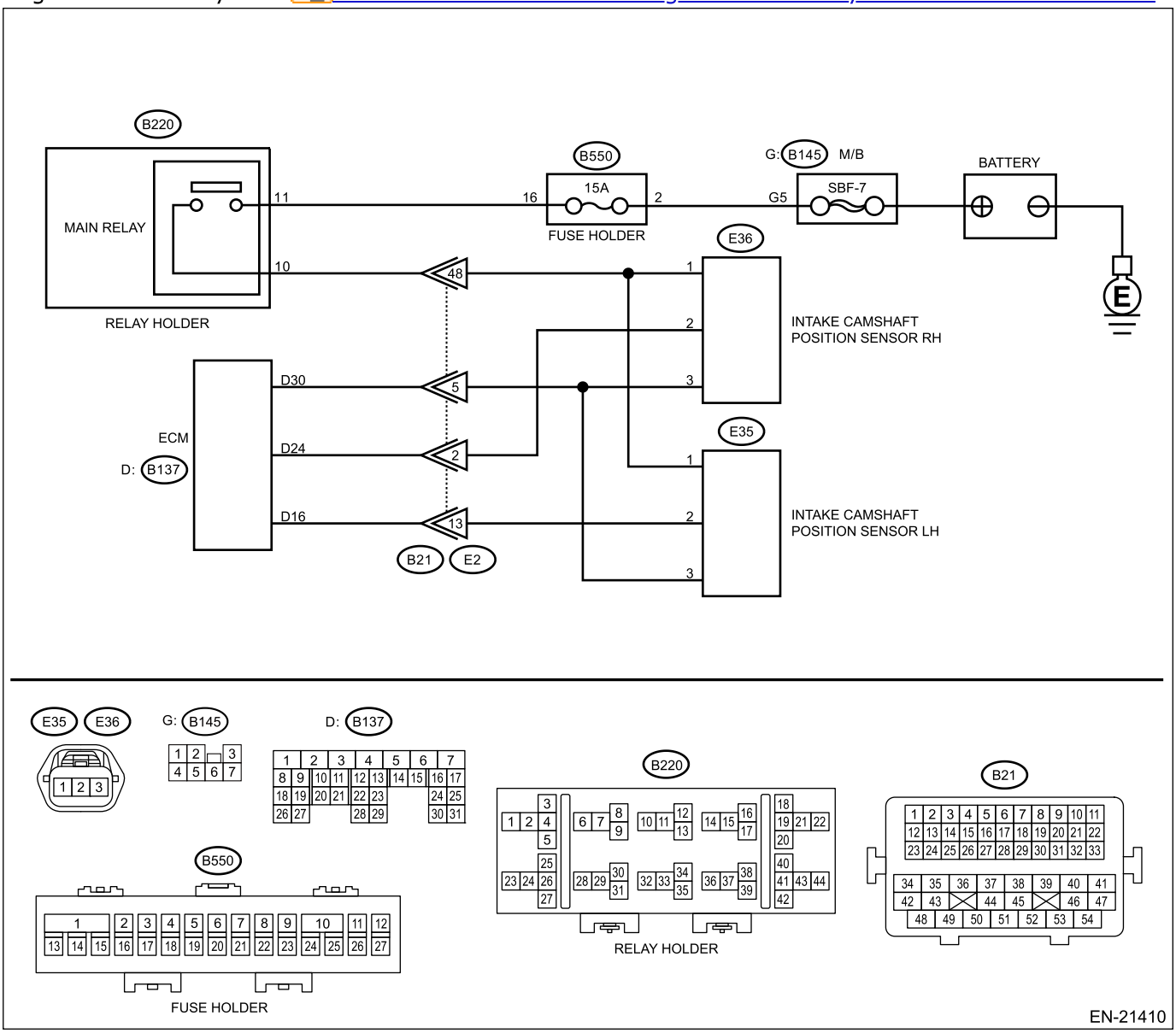
- Engine stalls.
- Improper idling

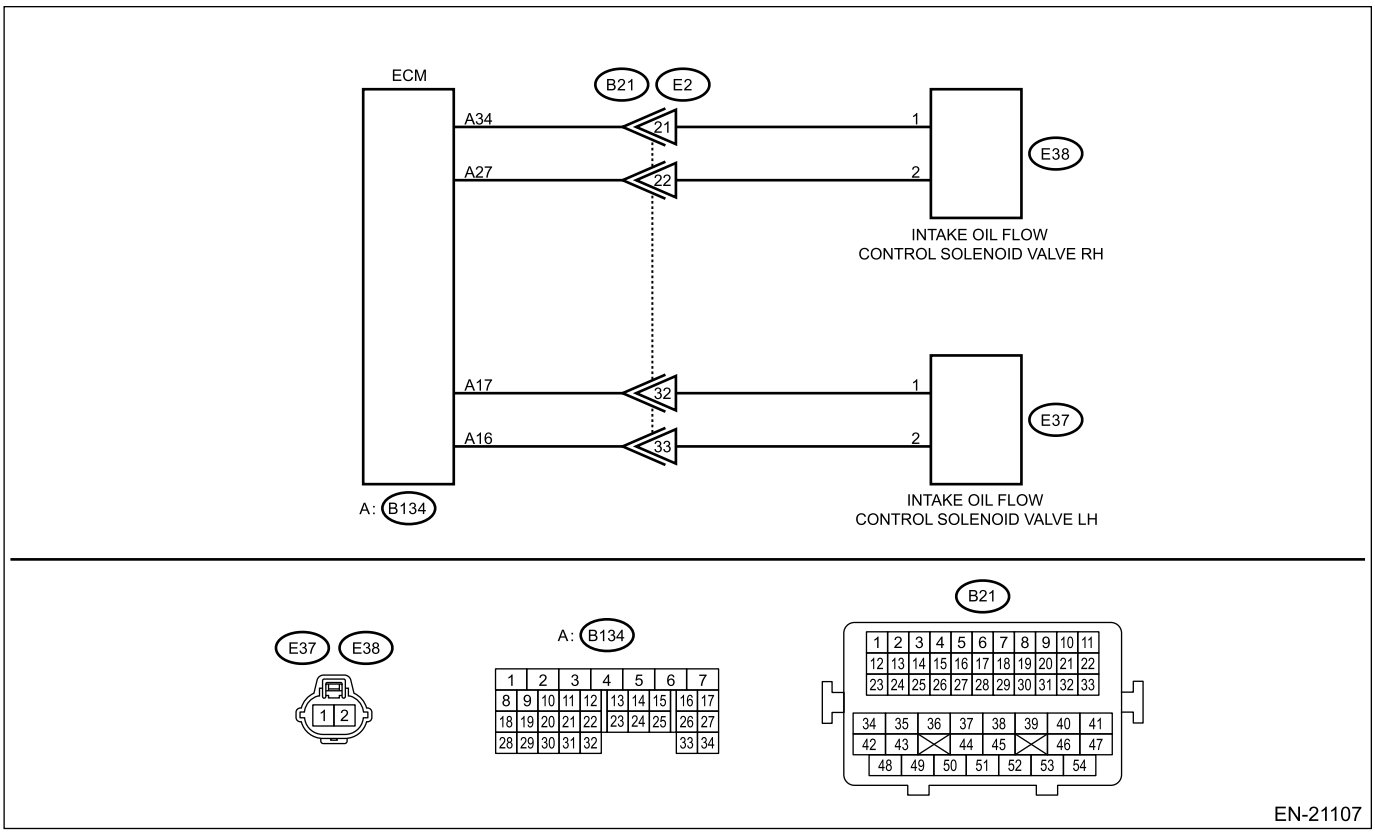
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

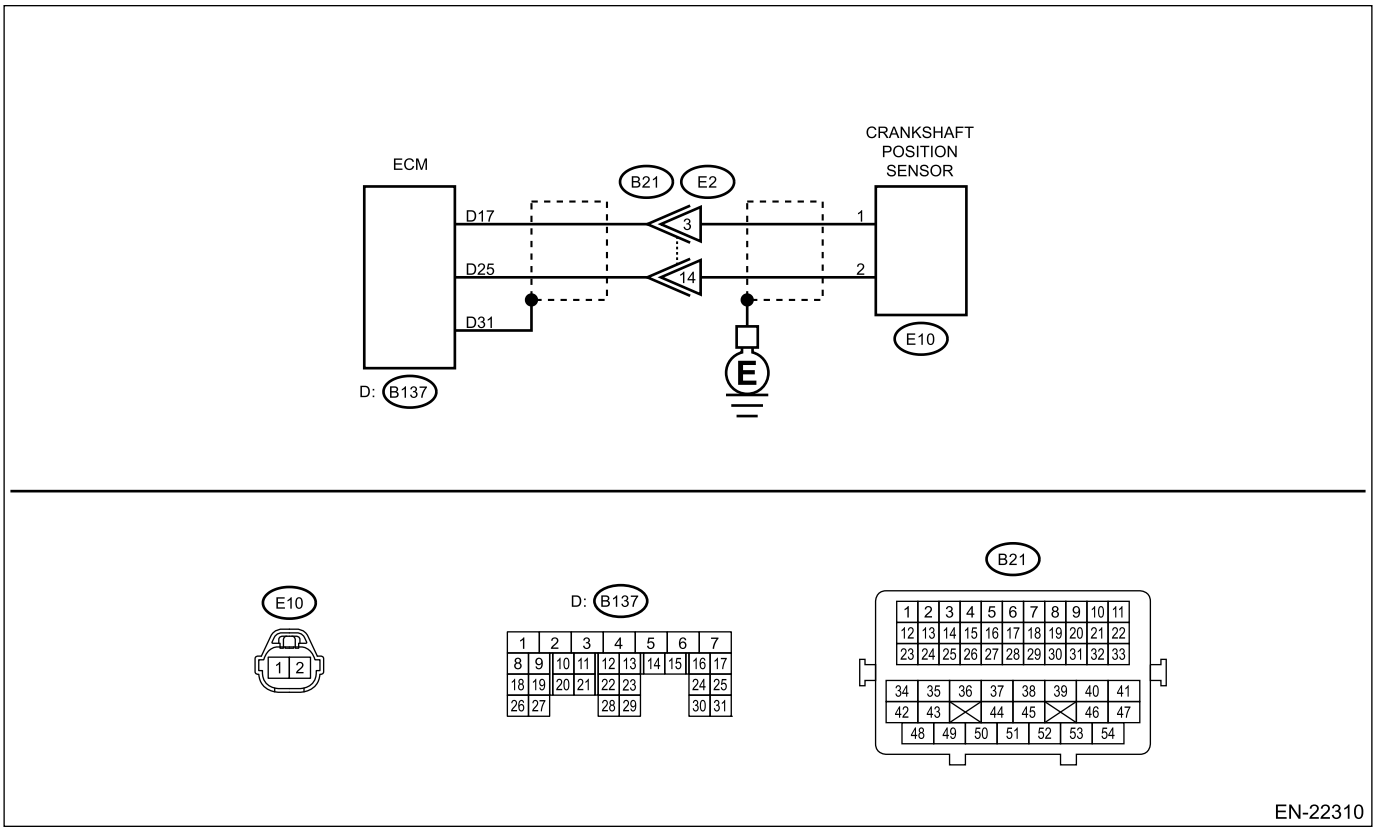
Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.





EN-21107



EN-22310

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is other than DTC P0018 displayed? (Current malfunction)

Yes	Check the appropriate DTC using "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Save the freeze frame data. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY OF FREEZE FRAME DATA (OBD MODE). Go to 2.

2. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

Note:

Check the following items.

- **Oil amount is within the specified range**
- **Occurrence of abnormal dirt**
- **Coagulation due to additives**
- **Use of oil with specified viscosity**

Is the check result OK?

Yes	Go to 3.
No	Adjust oil amount or replace the engine oil and oil filter. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 3.

3. CHECK BELT TIMING.

1. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Turn the ignition switch to OFF.
3. Disconnect the connector of the intake oil flow control solenoid valve LH. (DTC is included, but it does not affect the inspection.)
4. Start monitoring «VVT Adv. Ang. Amount L» of the current data display. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA (NORMAL MODE).
5. Turn the ignition switch to ON.
6. Start the engine.
7. Read «VVT Adv. Ang. Amount L» within 10 seconds after starting the engine.
   Note:
   If 10 seconds or more elapses after the engine is started, the position after the elapse is judged as the reference and [0] will be displayed.
8. Record the read value in «VVT Adv. Ang. Amount L».
9. Stop the engine.

Is «VVT Adv. Ang. Amount L» within 10 seconds after starting the engine ±10 deg. or more apart from the reference value (0 deg)?

Yes	Repair the belt timing. Ref. to MECHANICAL(STI)>Timing Belt. Go to 14.
No	Go to 4.

4. CHECK ON-BOARD MONITOR TEST RESULTS.

1. Replace the intake oil flow control solenoid valve LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.
2. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
3. Perform drive cycle T. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.
4. Read values of "VVT Monitor Bank 1" and "VVT Monitor Bank 2" according to MODE$06 reading procedures using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS).

   Caution:
   - **When performing driving cycle, there should be 2 persons (driver and checker) and the checker should perform the data check.**
   - **When performing the drive cycle on the public road, be very careful of the traffic condition and the safe driving must be the high priority.**

   Note:
   - **When the diagnostic value is 0, the diagnosis is incomplete. Therefore, do not stop the engine and perform the drive cycle again.**
   - **Diagnostic values are updated repeatedly, and therefore, always check the data while diagnostic values are being read.**
5. Record the read values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2".

Is the value in "VVT Monitor Bank 1" of the replaced oil flow control solenoid valve 1000 or more?

Yes	Go to 6.
No	Go to 5.

5. CHECK ON-BOARD MONITOR TEST RESULTS.

Compare the values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2" recorded in step 4.

Is the value in "VVT Monitor Bank 1" 1000 or less, and also larger than the value (value in "VVT Monitor Bank 2" ×1.5+100) compared to the value in "VVT Monitor Bank 2"?

Yes	Go to 6.
No	Idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 14.

6. CHECK HARNESS AND CONNECTOR.

Check the harness and connector for bending, damage and poor contact.

Note:

Check the following items.

- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM)>INSPECTION.**
- **Oil flow control solenoid valve Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor>INSPECTION.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor>INSPECTION.**

Is the check result OK?

Yes	Go to 7.
No	Repair or replace faulty parts. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM). Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor. Go to 7.

7. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake oil flow control solenoid valve LH.
4. Measure the resistance of harness between ECM connector and intake oil flow control solenoid valve LH connector.

   Connector & terminal

   (B134) No. 16 — (E37) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 8.
No	Repair or replace faulty parts. Go to 14.

8. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from intake camshaft position sensor LH.
4. Measure the resistance between intake camshaft position sensor LH connector and ECM connector.
   Connector & terminal
   (B137) No. 16 — (E35) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 9.
No	Repair or replace faulty parts. Go to 14.

9. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the crankshaft position sensor.
4. Measure the resistance between crankshaft position sensor connector and ECM connector.
   Connector & terminal
   (B137) No. 17 — (E10) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 10.
No	Repair or replace faulty parts. Go to 14.

10. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(STI)>Engine Oil Pressure.

Is the engine oil pressure normal?

Yes — Go to 12.

No — Go to 11.

11. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer.

Are there any foreign matter mixed in oil strainer in the oil pan?

Yes — Check and clean inside the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer. Go to 12.

No — Go to 12.

12. CHECK THE CONDITION OF CAMSHAFT.

1. Remove the engine from the vehicle. Ref. to MECHANICAL(STI)>Engine Assembly.
2. Remove the timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
3. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

Note:

Compare rotational resistance with the camshaft in bank 1 and check the following items to see if there is any obvious fault such as unsmoothness of the camshaft in bank 2 and rotational resistance.

- **Foreign matter adhered to the camshaft**
- **Damage to camshaft (scratch, scuffed, wear, etc.)**
- **Check of influence of cam journal bearing not rotating properly**

Is the check result OK?

Yes — Go to 13.

No — Replace the camshaft. Ref. to MECHANICAL(STI)>Camshaft. Go to 13.

13. CHECK OIL PASSAGES BETWEEN OIL PUMP AND OIL FLOW CONTROL SOLENOID VALVE.

Visually check the following portions of oil passages connecting oil pump to oil flow control solenoid valve to see if there is any obvious fault such as adherence of foreign matter and clogging.

- Oil passage of the camshaft cap
- Oil passage of the cylinder head side
- Oil passage from cam sprocket to camshaft connecting section
- Oil passage of the sprocket back side with the sprocket removed, and the camshaft end
- Oil passage of the oil pipe
- Oil passage of the union bolt

Is the check result OK?

Yes	Replace the sprocket. Ref. to MECHANICAL(STI)>Cam Sprocket>REMOVAL. Go to 14.
No	Remove the foreign matter. Replace the union bolt with filter (with protrusion). Ref. to MECHANICAL(STI)>Camshaft. **Note:** **After the procedure is finished, idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter.** Go to 14.

14. CHECK CURRENT DATA.

1. Perform the clear memory for the engine using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Turn the ignition switch to ON.
3. Read the current data indication using Subaru Select Monitor. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA (NORMAL MODE).
4. Read the current value in «VVT Initial Position Learning Value #2».
5. Calculate sum of the read value in «VVT Initial Position Learning Value #2» and the value in «VVT Adv. Ang. Amount L» recorded in step 3.

Is the summed value within the specified range?
Standard:
13 — 49

Yes	ECM is normal. End the diagnosis.
No	Replace the ECM and perform drive cycle N. If the DTC is not displayed, finish the diagnosis. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0016. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0016 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR A.

DTC P0019 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 2 SENSOR B

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

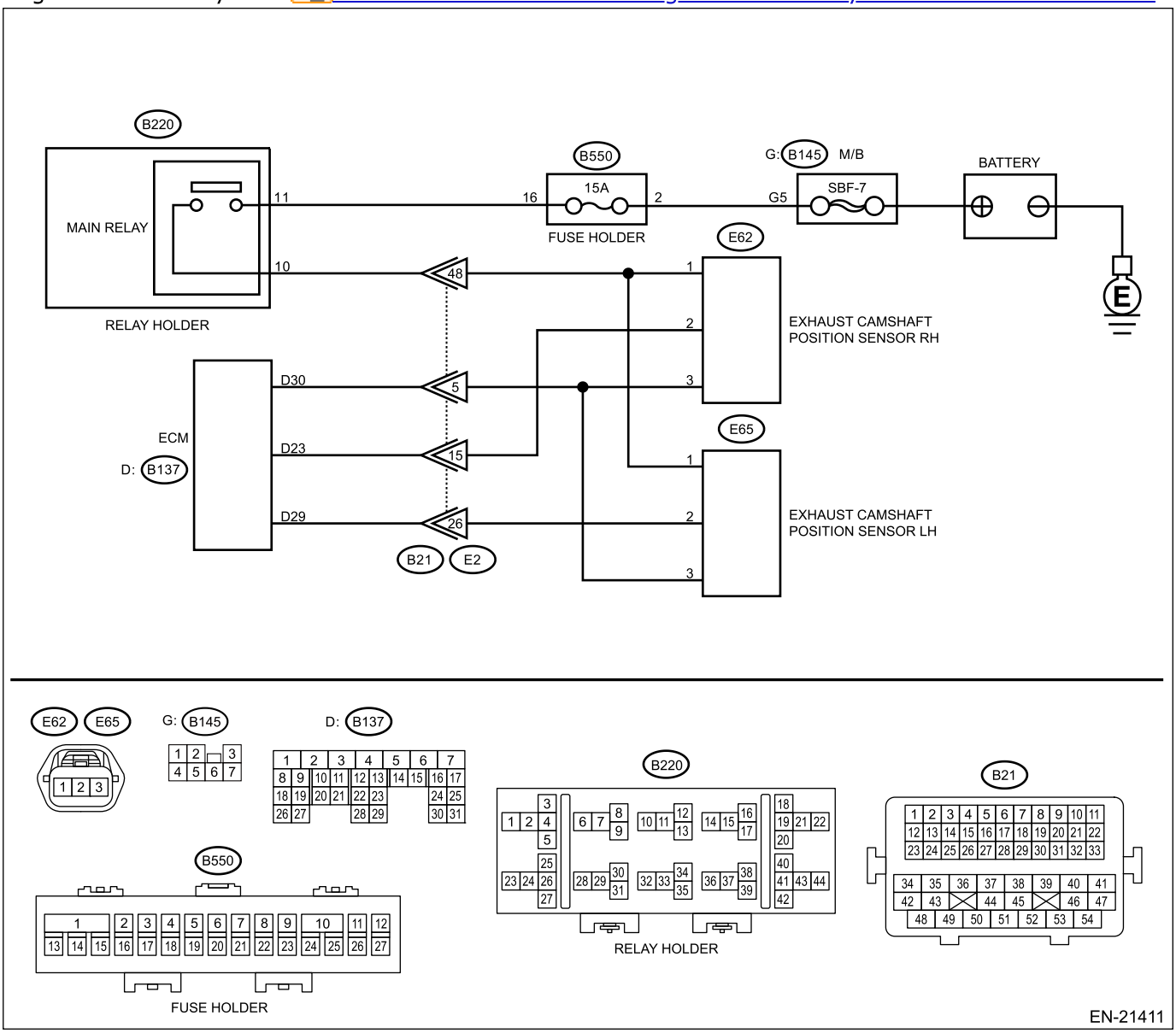
- Engine stalls.
- Improper idling

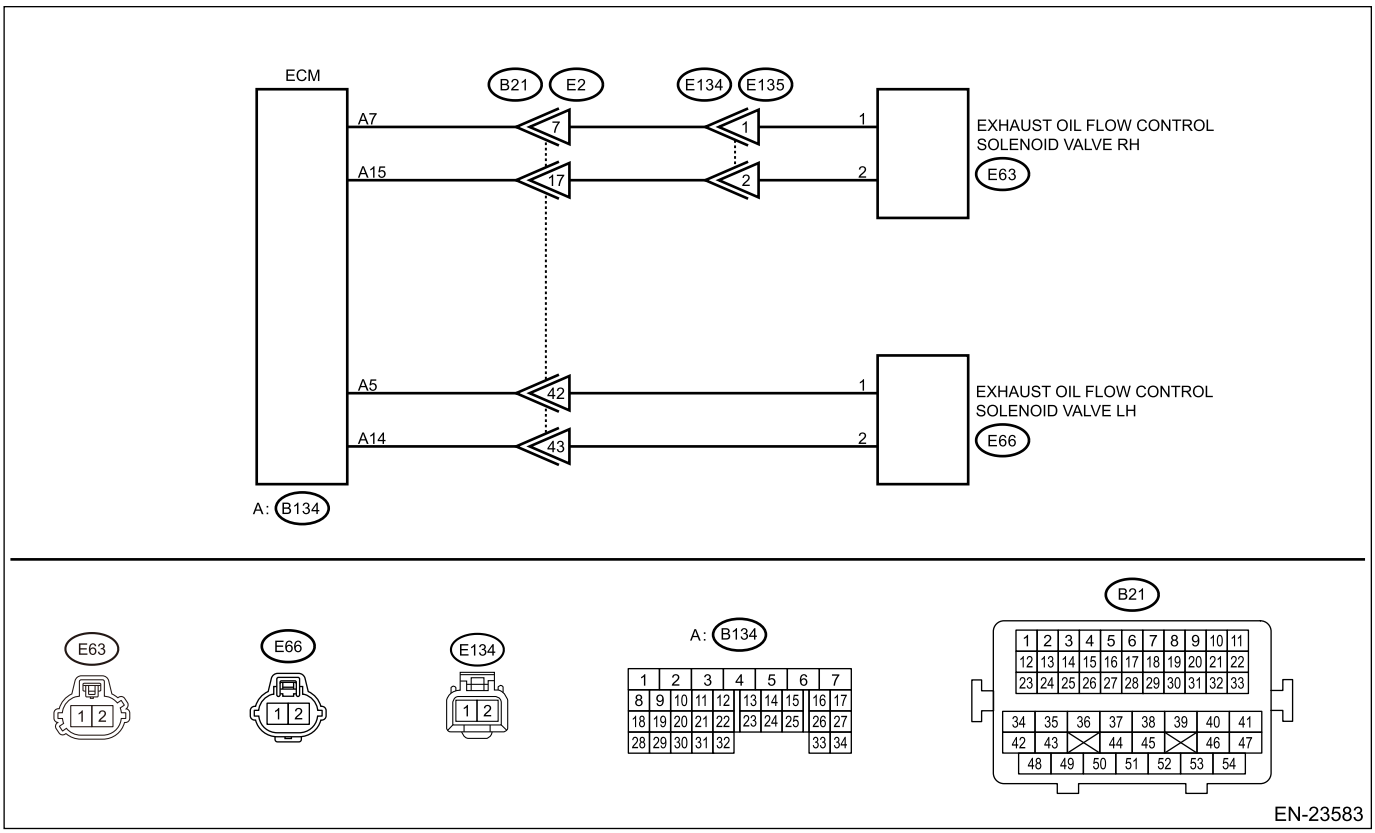
Caution:

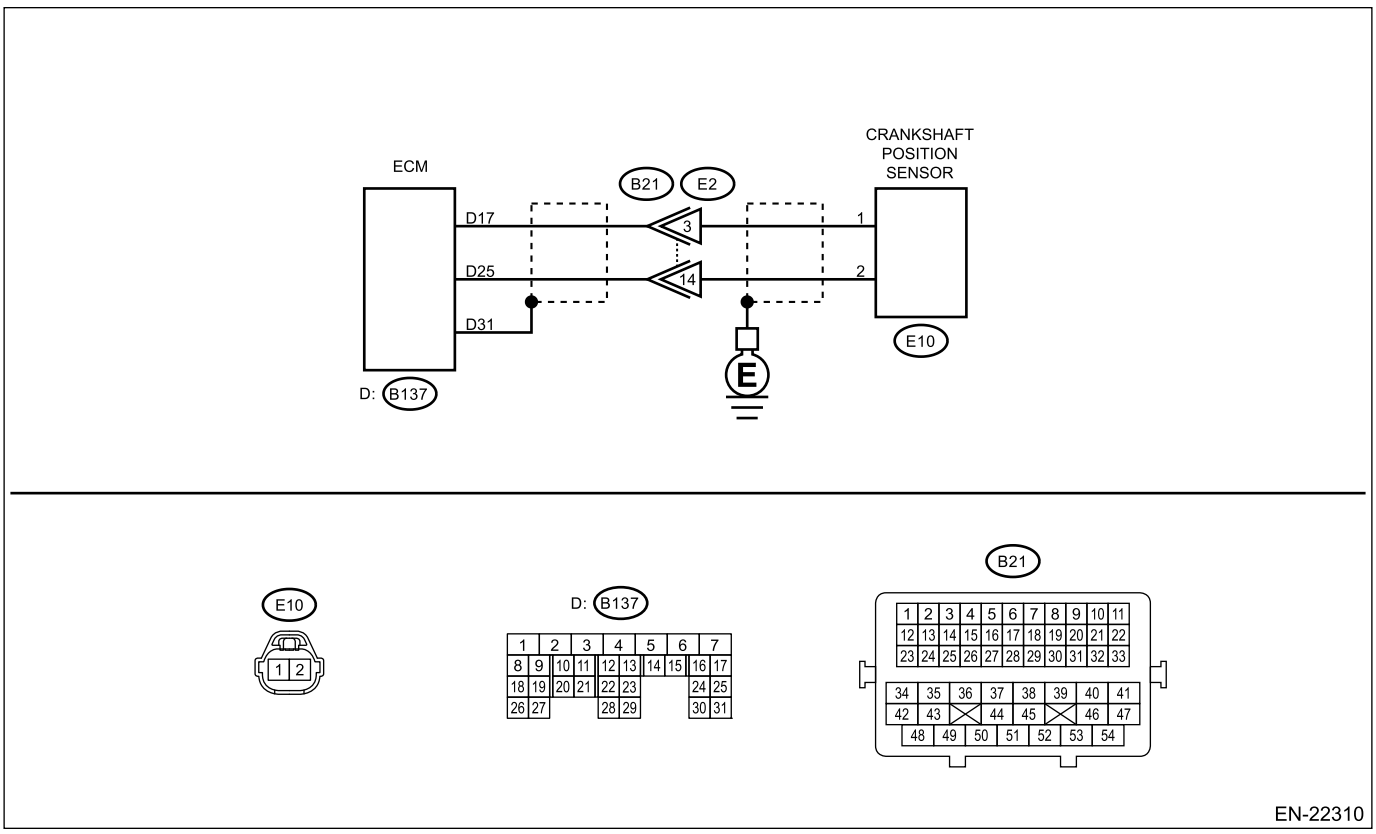
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.




ECM
B21
E2
E134
E135
A7
7
1
1
EXHAUST OIL FLOW CONTROL SOLENOID VALVE RH
A15
17
2
2
E63
A5
42
1
EXHAUST OIL FLOW CONTROL SOLENOID VALVE LH
A14
43
2
E66
A: B134
E63
1 2
E66
1 2
E134
1 2
A: B134
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34
B21
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54
EN-23583


ECM
B21
E2
CRANKSHAFT POSITION SENSOR
D17
3
1
D25
14
2
D31
E10
E
D: B137
E10
1 2
D: B137
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31
B21
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54
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1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is other than DTC P0019 displayed? (Current malfunction)

Yes	Check the appropriate DTC using "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Save the freeze frame data. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY OF FREEZE FRAME DATA (OBD MODE). Go to 2.

2. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

Note:

Check the following items.

- **Oil amount is within the specified range**
- **Occurrence of abnormal dirt**
- **Coagulation due to additives**
- **Use of oil with specified viscosity**

Is the check result OK?

Yes	Go to 3.
No	Adjust oil amount or replace the engine oil and oil filter. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 3.

3. CHECK BELT TIMING.

1. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Turn the ignition switch to OFF.
3. Disconnect the connector of the exhaust oil flow control solenoid valve LH. (DTC is included, but it does not affect the inspection.)
4. Start monitoring «Exh. VVT Retard Ang. L» of the current data display. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA (NORMAL MODE).
5. Turn the ignition switch to ON.
6. Start the engine.
7. Read «Exh. VVT Retard Ang. L» within 10 seconds after starting the engine.
   Note:
   If 10 seconds or more elapses after the engine is started, the position after the elapse is judged as the reference and [0] will be displayed.
8. Record the read value in «Exh. VVT Retard Ang. L».
9. Stop the engine.

Is «Exh. VVT Retard Ang. L» within 10 seconds after starting the engine ±10 deg. or more apart from the reference value (0 deg)?

Yes	Repair the belt timing. Ref. to MECHANICAL(STI)>Timing Belt. Go to 14.
No	Go to 4.

4. CHECK ON-BOARD MONITOR TEST RESULTS.

1. Replace the exhaust oil flow control solenoid valve LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.
2. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
3. Perform drive cycle T. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.
4. Read values of "VVT Monitor Bank 1" and "VVT Monitor Bank 2" according to MODE$06 reading procedures using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS).

   Caution:
   - **When performing driving cycle, there should be 2 persons (driver and checker) and the checker should perform the data check.**
   - **When performing the drive cycle on the public road, be very careful of the traffic condition and the safe driving must be the high priority.**

   Note:
   - **When the diagnostic value is 0, the diagnosis is incomplete. Therefore, do not stop the engine and perform the drive cycle again.**
   - **Diagnostic values are updated repeatedly, and therefore, always check the data while diagnostic values are being read.**
5. Record the read values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2".

Is the value in "VVT Monitor Bank 1" of the replaced oil flow control solenoid valve 1000 or more?

Yes	Go to 6.
No	Go to 5.

5. CHECK ON-BOARD MONITOR TEST RESULTS.

Compare the values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2" recorded in step 4.

Is the value in "VVT Monitor Bank 2" 1000 or less, and also larger than the value (value in "VVT Monitor Bank 1" × 1.5+100) compared to the value in "VVT Monitor Bank 1"?

Yes	Go to 6.
No	Idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 14.

6. CHECK HARNESS AND CONNECTOR.

Check the harness and connector for bending, damage and poor contact.

Note:

Check the following items.

- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM)>INSPECTION.**
- **Oil flow control solenoid valve Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor>INSPECTION.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor>INSPECTION.**

Is the check result OK?

Yes	Go to 7.
No	Repair or replace faulty parts. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM). Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor. Go to 7.

7. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust oil flow control solenoid valve LH.
4. Measure the resistance of harness between ECM connector and exhaust oil flow control solenoid valve LH connector.

   Connector & terminal

   (B134) No. 14 — (E66) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 8.
No	Repair or replace faulty parts. Go to 14.

8. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from exhaust camshaft position sensor LH.
4. Measure the resistance between exhaust camshaft position sensor LH connector and ECM connector.
   Connector & terminal
   (B137) No. 29 — (E65) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 9.
No	Repair or replace faulty parts. Go to 14.

9. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the crankshaft position sensor.
4. Measure the resistance between crankshaft position sensor connector and ECM connector.
   Connector & terminal
   (B137) No. 17 — (E10) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 10.
No	Repair or replace faulty parts. Go to 14.

10. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(STI)>Engine Oil Pressure.

Is the engine oil pressure normal?

Yes — Go to 12.

No — Go to 11.

11. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer.

Are there any foreign matter mixed in oil strainer in the oil pan?

Yes — Check and clean inside the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer. Go to 12.

No — Go to 12.

12. CHECK THE CONDITION OF CAMSHAFT.

1. Remove the engine from the vehicle. Ref. to MECHANICAL(STI)>Engine Assembly.
2. Remove the timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
3. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

Note:

Compare rotational resistance with the camshaft in bank 1 and check the following items to see if there is any obvious fault such as unsmoothness of the camshaft in bank 2 and rotational resistance.

- **Foreign matter adhered to the camshaft**
- **Damage to camshaft (scratch, scuffed, wear, etc.)**
- **Check of influence of cam journal bearing not rotating properly**

Is the check result OK?

Yes — Go to 13.

No — Replace the camshaft. Ref. to MECHANICAL(STI)>Camshaft. Go to 13.

13. CHECK OIL PASSAGES BETWEEN OIL PUMP AND OIL FLOW CONTROL SOLENOID VALVE.

Visually check the following portions of oil passages connecting oil pump to oil flow control solenoid valve to see if there is any obvious fault such as adherence of foreign matter and clogging.

- Oil passage of the camshaft cap
- Oil passage of the cylinder head side
- Oil passage from cam sprocket to camshaft connecting section
- Oil passage of the sprocket back side with the sprocket removed, and the camshaft end
- Oil passage of the oil pipe
- Oil passage of the union bolt

Is the check result OK?

Yes	Replace the sprocket. Ref. to MECHANICAL(STI)>Cam Sprocket>REMOVAL. Go to 14.
No	Remove the foreign matter. Replace the union bolt with filter (with protrusion). Ref. to MECHANICAL(STI)>Camshaft. **Note:** **After the procedure is finished, idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter.** Go to 14.

14. CHECK CURRENT DATA.

1. Perform the clear memory for the engine using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Turn the ignition switch to ON.
3. Read the current data indication using Subaru Select Monitor. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY CURRENT ENGINE DATA (NORMAL MODE).
4. Read the current value in «VVT Ex Initial Position Learning Value #2».
5. Calculate sum of the read value in «VVT Ex Initial Position Learning Value #2» and the value in «Exh. VVT Retard Ang. L» recorded in step 3.

Is the summed value within the specified range?
Standard:
61 — 93

Yes	ECM is normal. End the diagnosis.
No	Replace the ECM and perform drive cycle N. If the DTC is not displayed, finish the diagnosis. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0017. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0017 CRANKSHAFT POSITION - CAMSHAFT POSITION CORRELATION BANK 1 SENSOR B.

DTC P0021 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

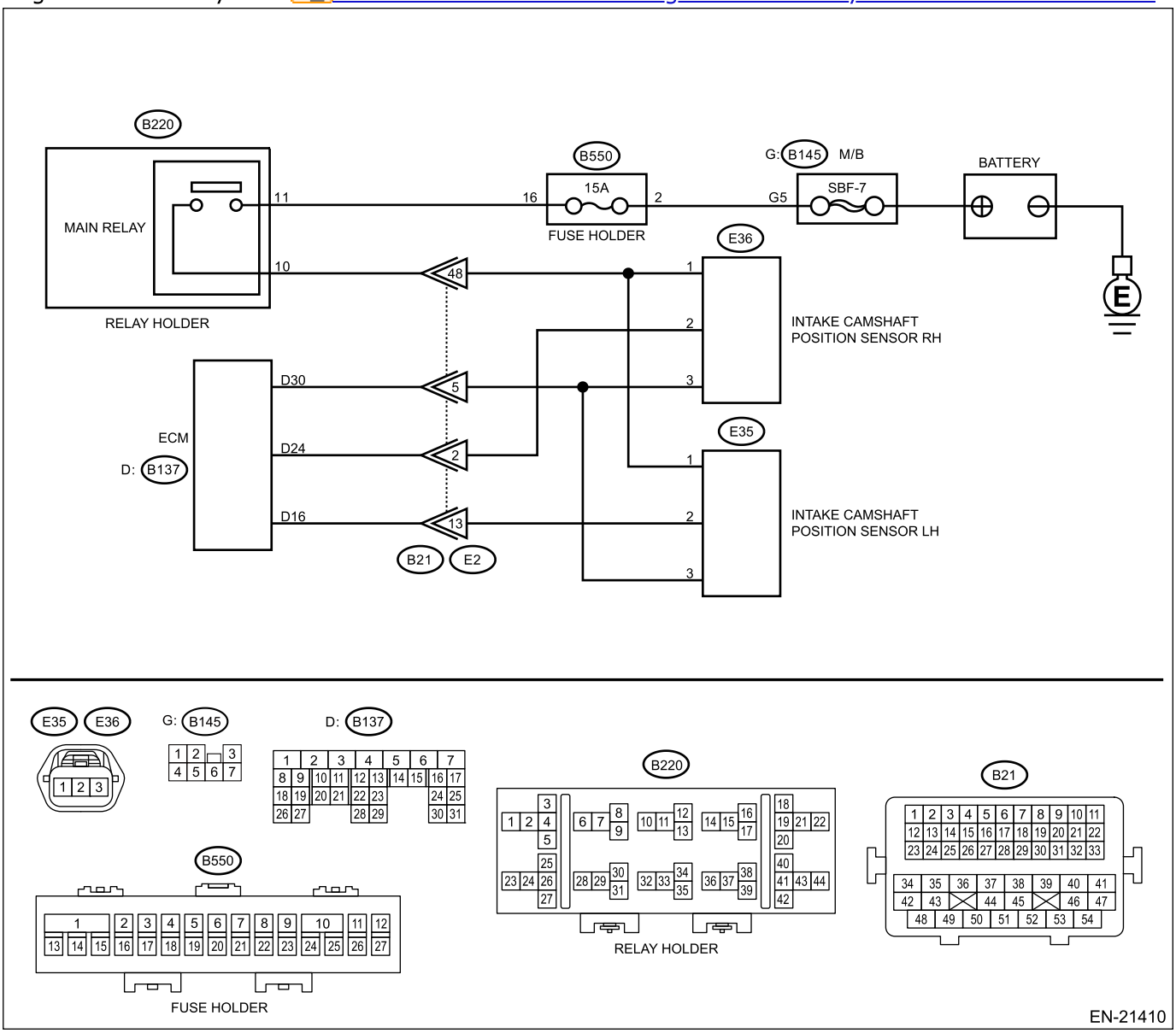
- Engine stalls.
- Improper idling

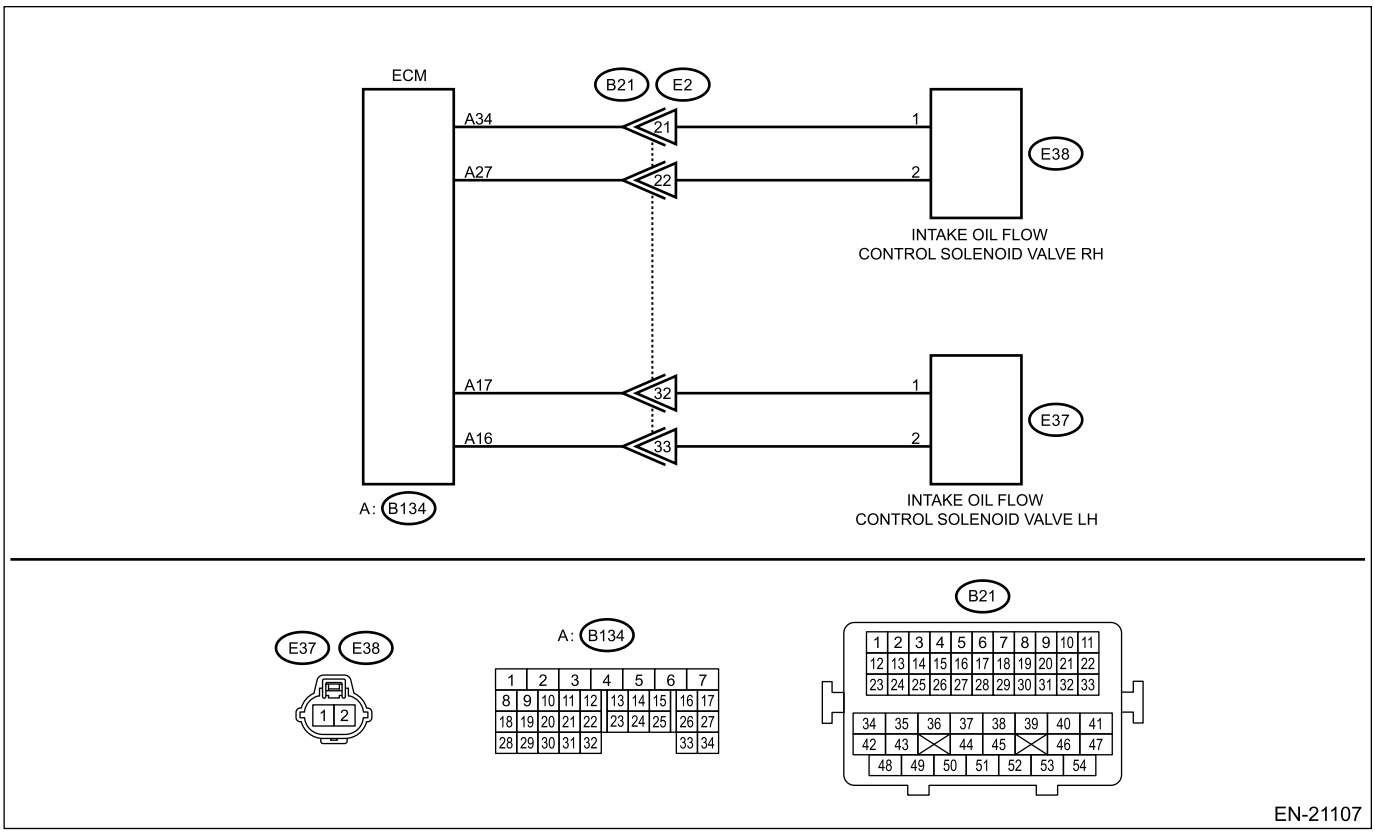
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

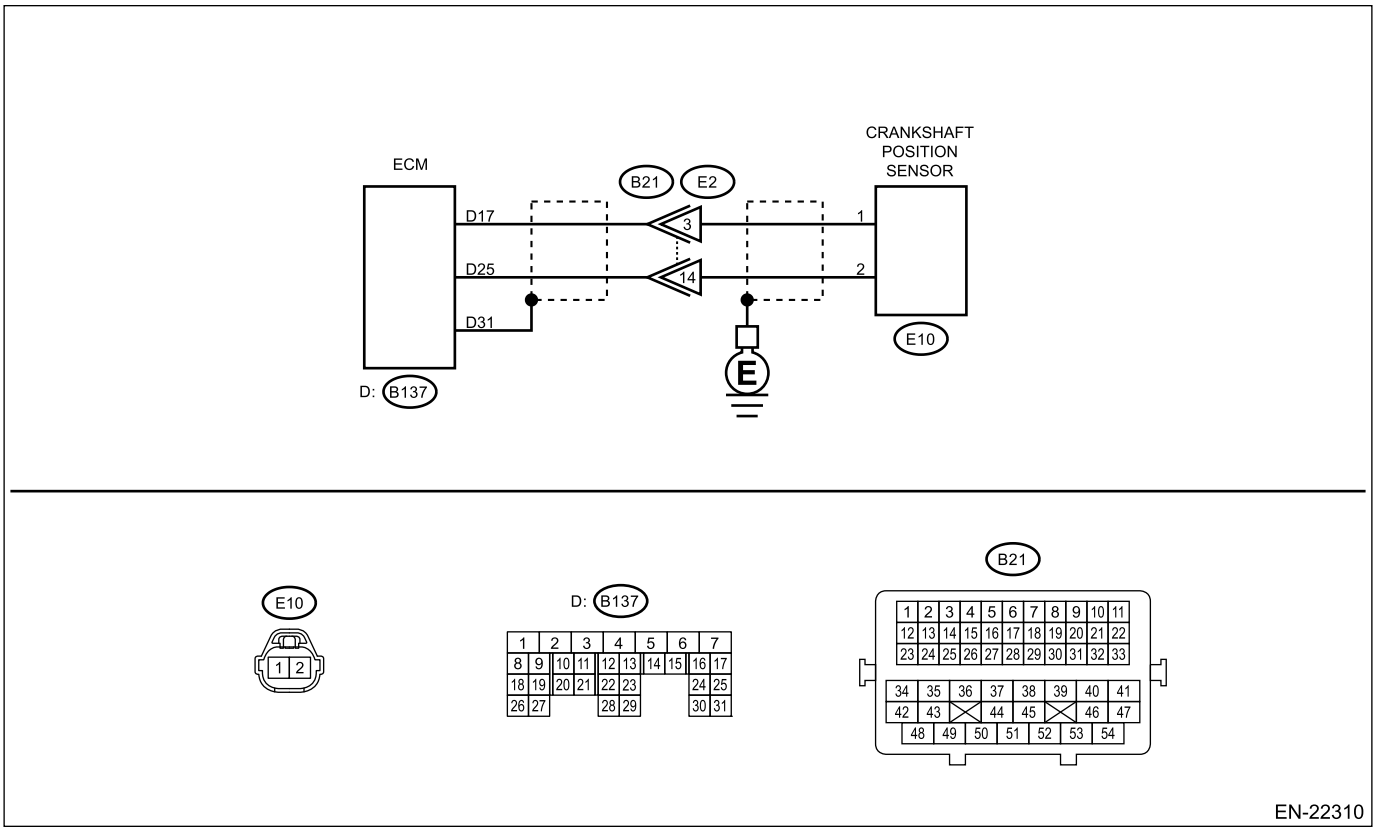
Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.





EN-21107



EN-22310

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Are DTCs other than P000C and P0021 displayed? (Current malfunction)

Yes	Check the appropriate DTC using "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Save the freeze frame data. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY OF FREEZE FRAME DATA (OBD MODE). Go to 2.

2. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

Note:

Check the following items.

- **Oil amount is within the specified range**
- **Occurrence of abnormal dirt**
- **Coagulation due to additives**
- **Use of oil with specified viscosity**

Is the check result OK?

Yes	Go to 3.
No	Adjust oil amount or replace the engine oil and oil filter. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 3.

3. CHECK ON-BOARD MONITOR TEST RESULTS.

1. Replace the intake oil flow control solenoid valve LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.
2. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
3. Perform drive cycle T. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.
4. Read values of "VVT Monitor Bank 1" and "VVT Monitor Bank 2" according to MODE$06 reading procedures using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS).

   Caution:
   - **When performing driving cycle, there should be 2 persons (driver and checker) and the checker should perform the data check.**
   - **When performing the drive cycle on the public road, be very careful of the traffic condition and the safe driving must be the high priority.**

   Note:
   - **When the diagnostic value is 0, the diagnosis is incomplete. Therefore, do not stop the engine and perform the drive cycle again.**
   - **Diagnostic values are updated repeatedly, and therefore, always check the data while diagnostic values are being read.**
5. Record the read values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2".

Is the value in "VVT Monitor Bank 1" of the replaced oil flow control solenoid valve 1000 or more?

Yes	Go to 5.
No	Go to 4.

4. CHECK ON-BOARD MONITOR TEST RESULTS.

Compare the values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2" recorded in step 3.

Is the value in "VVT Monitor Bank 1" 1000 or less, and also larger than the value (value in "VVT Monitor Bank 2" ×1.5+100) compared to the value in "VVT Monitor Bank 2"?

Yes	Go to 5.
No	Idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 13.

5. CHECK HARNESS AND CONNECTOR.

Check the harness and connector for bending, damage and poor contact.

Note:

Check the following items.

- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM)>INSPECTION.**
- **Oil flow control solenoid valve Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor>INSPECTION.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor>INSPECTION.**

Is the check result OK?

Yes	Go to 6.
No	Repair or replace faulty parts. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM). Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor. Go to 6.

6. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the intake oil flow control solenoid valve LH.
4. Measure the resistance of harness between ECM connector and intake oil flow control solenoid valve LH connector.

   Connector & terminal

   (B134) No. 16 — (E37) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 7.
No	Repair or replace faulty parts. Go to 13.

7. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from intake camshaft position sensor LH.
4. Measure the resistance between intake camshaft position sensor LH connector and ECM connector.
   Connector & terminal
   (B137) No. 16 — (E35) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 8.
No	Repair or replace faulty parts. Go to 13.

8. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the crankshaft position sensor.
4. Measure the resistance between crankshaft position sensor connector and ECM connector.
   Connector & terminal
   (B137) No. 17 — (E10) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 9.
No	Repair or replace faulty parts. Go to 13.

9. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(STI)>Engine Oil Pressure.

Is the engine oil pressure normal?

Yes — Go to 11.

No — Go to 10.

10. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer.

Are there any foreign matter mixed in oil strainer in the oil pan?

Yes — Check and clean inside the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer. Go to 11.

No — Go to 11.

11. CHECK THE CONDITION OF CAMSHAFT.

1. Remove the engine from the vehicle. Ref. to MECHANICAL(STI)>Engine Assembly.
2. Remove the timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
3. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

Note:

Compare rotational resistance with the camshaft in bank 1 and check the following items to see if there is any obvious fault such as unsmoothness of the camshaft in bank 2 and rotational resistance.

- **Foreign matter adhered to the camshaft**
- **Damage to camshaft (scratch, scuffed, wear, etc.)**
- **Check of influence of cam journal bearing not rotating properly**

Is the check result OK?

Yes — Go to 12.

No — Replace the camshaft. Ref. to MECHANICAL(STI)>Camshaft.
Go to 12.

12. CHECK OIL PASSAGES BETWEEN OIL PUMP AND OIL FLOW CONTROL SOLENOID VALVE.

Visually check the following portions of oil passages connecting oil pump to oil flow control solenoid valve to see if there is any obvious fault such as adherence of foreign matter and clogging.

- Oil passage of the camshaft cap
- Oil passage of the cylinder head side
- Oil passage from cam sprocket to camshaft connecting section
- Oil passage of the sprocket back side with the sprocket removed, and the camshaft end
- Oil passage of the oil pipe
- Oil passage of the union bolt

Is the check result OK?

Yes	Replace the sprocket. Ref. to MECHANICAL(STI)>Cam Sprocket>REMOVAL. Go to 13.
No	Remove the foreign matter. Replace the union bolt with filter (with protrusion). Ref. to MECHANICAL(STI)>Camshaft. **Note:** **After the procedure is finished, idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter.** **Go to 13.**

13. CHECK ON-BOARD MONITOR TEST RESULTS.

1. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Perform drive cycle T. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.
3. Read values of "VVT Monitor Bank 1" and "VVT Monitor Bank 2" according to MODE$06 reading procedures using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS).

   Caution:
   - **When performing driving cycle, there should be 2 persons (driver and checker) and the checker should perform the data check.**
   - **When performing the drive cycle on the public road, be very careful of the traffic condition and the safe driving must be the high priority.**

   Note:
   - **When the diagnostic value is 0, the diagnosis is incomplete. Therefore, do not stop the engine and perform the drive cycle again.**
   - **Diagnostic values are updated repeatedly, and therefore, always check the data while diagnostic values are being read.**
4. Record the read values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2".

Is the value in "VVT Monitor Bank 1" 1000 or more?

Yes	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	Go to 14.

14. CHECK CURRENT DATA.

Compare the values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2" recorded in step 13.

Is the value in "VVT Monitor Bank 1" 1000 or less, and also larger than the value (value in "VVT Monitor Bank 2" ×1.5+100) compared to the value in "VVT Monitor Bank 2"?

Yes	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	End.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0011. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0011 "A" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.

DTC P0024 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 2

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

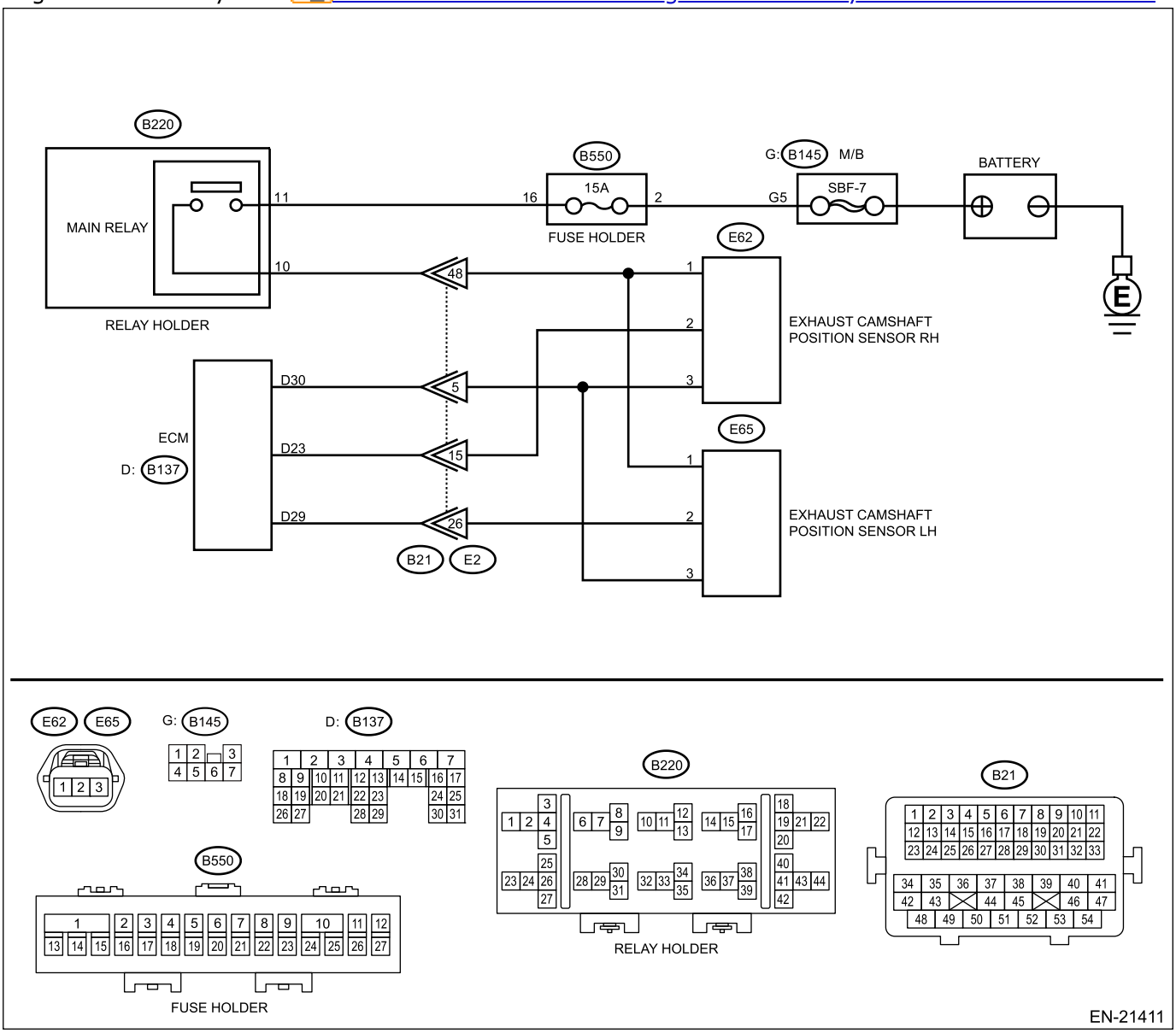
- Engine stalls.
- Improper idling

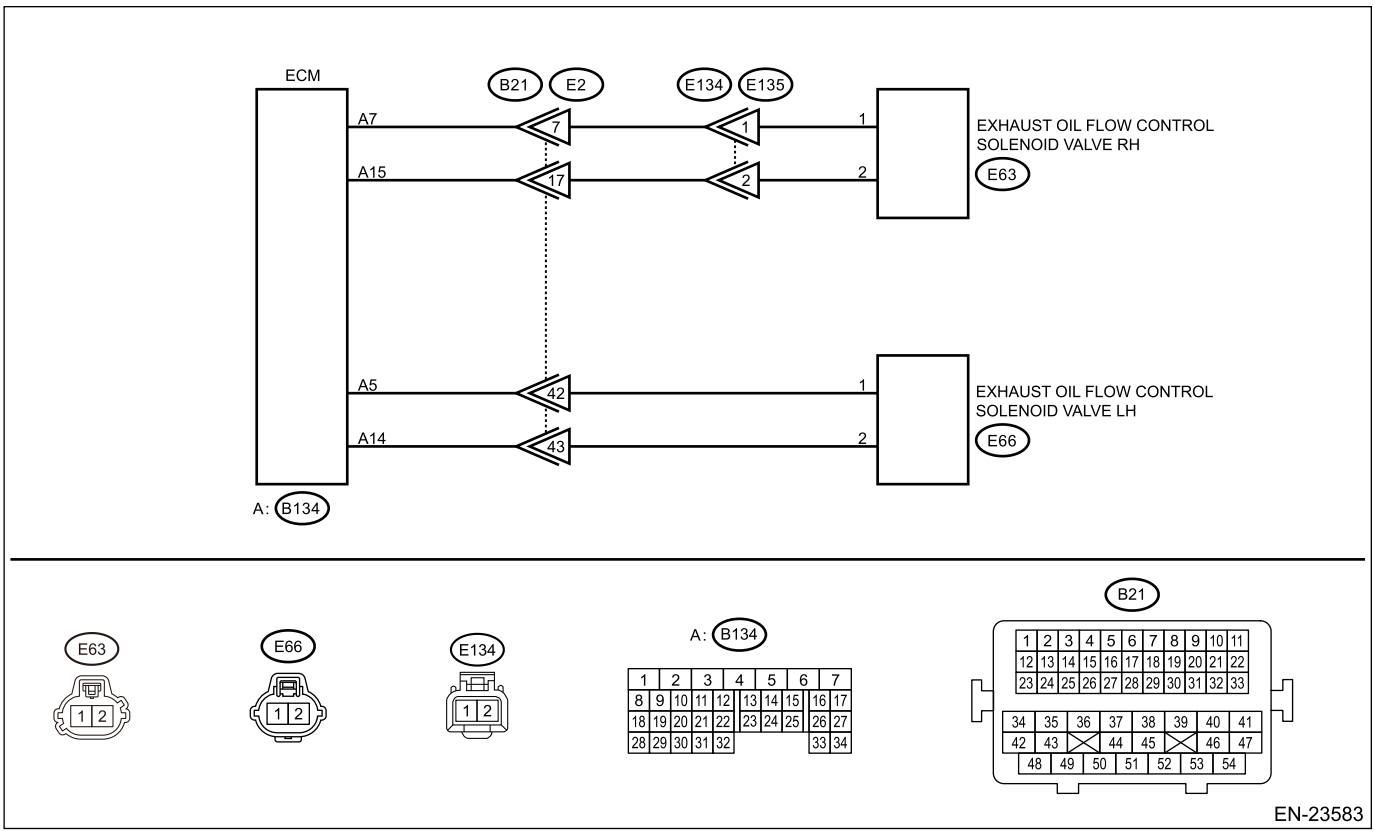
Caution:

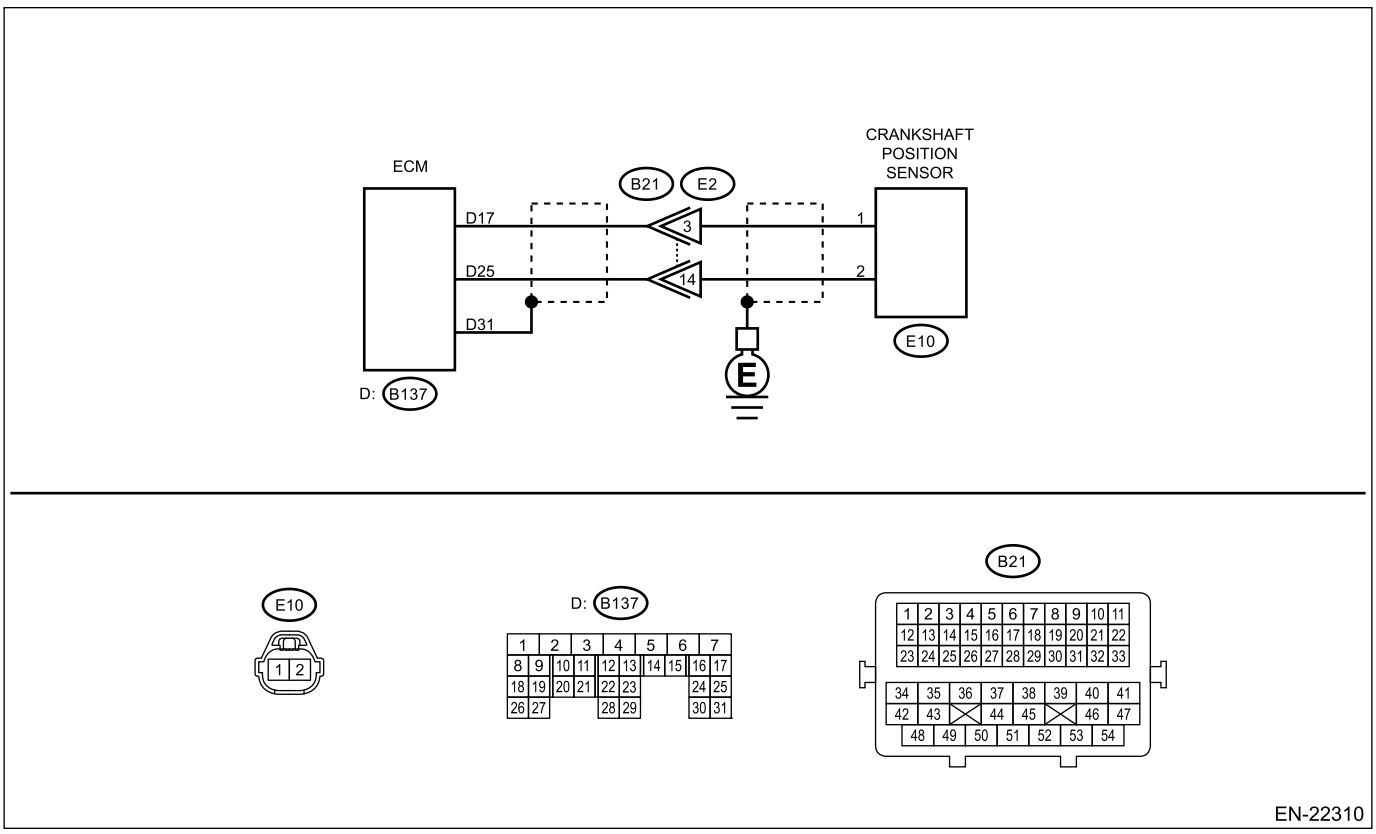
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.




ECM
B21
E2
E134
E135
A7
7
1
1
EXHAUST OIL FLOW CONTROL SOLENOID VALVE RH
A15
17
2
2
E63
A5
42
1
EXHAUST OIL FLOW CONTROL SOLENOID VALVE LH
A14
43
2
E66
A: B134
E63
1 2
E66
1 2
E134
1 2
A: B134
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25 26 27
28 29 30 31 32 33 34
B21
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54
EN-23583


ECM
B21
E2
CRANKSHAFT POSITION SENSOR
D17
3
1
D25
14
2
D31
E10
E
D: B137
E10
1 2
D: B137
1 2 3 4 5 6 7
8 9 10 11 12 13 14 15 16 17
18 19 20 21 22 23 24 25
26 27 28 29 30 31
B21
1 2 3 4 5 6 7 8 9 10 11
12 13 14 15 16 17 18 19 20 21 22
23 24 25 26 27 28 29 30 31 32 33
34 35 36 37 38 39 40 41
42 43 44 45 46 47
48 49 50 51 52 53 54
EN-22310

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Are DTCs other than P000D and P0024 displayed? (Current malfunction)

Yes	Check the appropriate DTC using "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Save the freeze frame data. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY OF FREEZE FRAME DATA (OBD MODE). Go to 2.

2. CHECK ENGINE OIL CONDITION.

Check the engine oil condition.

Note:

Check the following items.

- **Oil amount is within the specified range**
- **Occurrence of abnormal dirt**
- **Coagulation due to additives**
- **Use of oil with specified viscosity**

Is the check result OK?

Yes	Go to 3.
No	Adjust oil amount or replace the engine oil and oil filter. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 3.

3. CHECK ON-BOARD MONITOR TEST RESULTS.

1. Replace the exhaust oil flow control solenoid valve LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.
2. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
3. Perform drive cycle T. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.
4. Read values of "VVT Monitor Bank 1" and "VVT Monitor Bank 2" according to MODE$06 reading procedures using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS).

   Caution:
   - **When performing driving cycle, there should be 2 persons (driver and checker) and the checker should perform the data check.**
   - **When performing the drive cycle on the public road, be very careful of the traffic condition and the safe driving must be the high priority.**

   Note:
   - **When the diagnostic value is 0, the diagnosis is incomplete. Therefore, do not stop the engine and perform the drive cycle again.**
   - **Diagnostic values are updated repeatedly, and therefore, always check the data while diagnostic values are being read.**
5. Record the read values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2".

Is the value in "VVT Monitor Bank 1" of the replaced oil flow control solenoid valve 1000 or more?

Yes	Go to 5.
No	Go to 4.

4. CHECK ON-BOARD MONITOR TEST RESULTS.

Compare the values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2" recorded in step 3.

Is the value in "VVT Monitor Bank 1" 1000 or less, and also larger than the value (value in "VVT Monitor Bank 2" ×1.5+100) compared to the value in "VVT Monitor Bank 2"?

Yes	Go to 5.
No	Idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter. Go to 13.

5. CHECK HARNESS AND CONNECTOR.

Check the harness and connector for bending, damage and poor contact.

Note:

Check the following items.

- **ECM Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM)>INSPECTION.**
- **Oil flow control solenoid valve Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.**
- **Camshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor>INSPECTION.**
- **Crankshaft position sensor Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor>INSPECTION.**

Is the check result OK?

Yes	Go to 6.
No	Repair or replace faulty parts. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM). Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor. Go to 6.

6. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the exhaust oil flow control solenoid valve LH.
4. Measure the resistance of harness between ECM connector and exhaust oil flow control solenoid valve LH connector.

   Connector & terminal

   (B134) No. 14 — (E66) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 7.
No	Repair or replace faulty parts. Go to 13.

7. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from exhaust camshaft position sensor LH.
4. Measure the resistance between exhaust camshaft position sensor LH connector and ECM connector.
   Connector & terminal
   (B137) No. 29 — (E65) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 8.
No	Repair or replace faulty parts. Go to 13.

8. CHECK HARNESS AND CONNECTOR (OPEN CIRCUIT).

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the crankshaft position sensor.
4. Measure the resistance between crankshaft position sensor connector and ECM connector.
   Connector & terminal
   (B137) No. 17 — (E10) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 9.
No	Repair or replace faulty parts. Go to 13.

9. CHECK ENGINE OIL PRESSURE.

Check the engine oil pressure. Ref. to MECHANICAL(STI)>Engine Oil Pressure.

Is the engine oil pressure normal?

Yes — Go to 11.

No — Go to 10.

10. CHECK OIL STRAINER.

Check the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer.

Are there any foreign matter mixed in oil strainer in the oil pan?

Yes — Check and clean inside the oil strainer. Ref. to LUBRICATION(STI)>Oil Pan and Strainer. Go to 11.

No — Go to 11.

11. CHECK THE CONDITION OF CAMSHAFT.

1. Remove the engine from the vehicle. Ref. to MECHANICAL(STI)>Engine Assembly.
2. Remove the timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
3. Rotate the camshaft by hand to compare the rotational resistances of the four shafts.

Note:

Compare rotational resistance with the camshaft in bank 1 and check the following items to see if there is any obvious fault such as unsmoothness of the camshaft in bank 2 and rotational resistance.

- **Foreign matter adhered to the camshaft**
- **Damage to camshaft (scratch, scuffed, wear, etc.)**
- **Check of influence of cam journal bearing not rotating properly**

Is the check result OK?

Yes — Go to 12.

No — Replace the camshaft. Ref. to MECHANICAL(STI)>Camshaft.
Go to 12.

12. CHECK OIL PASSAGES BETWEEN OIL PUMP AND OIL FLOW CONTROL SOLENOID VALVE.

Visually check the following portions of oil passages connecting oil pump to oil flow control solenoid valve to see if there is any obvious fault such as adherence of foreign matter and clogging.

- Oil passage of the camshaft cap
- Oil passage of the cylinder head side
- Oil passage from cam sprocket to camshaft connecting section
- Oil passage of the sprocket back side with the sprocket removed, and the camshaft end
- Oil passage of the oil pipe
- Oil passage of the union bolt

Is the check result OK?

Yes	Replace the sprocket. Ref. to MECHANICAL(STI)>Cam Sprocket>REMOVAL. Go to 13.
No	Remove the foreign matter. Replace the union bolt with filter (with protrusion). Ref. to MECHANICAL(STI)>Camshaft. **Note:** **After the procedure is finished, idle the engine for five minutes, and then replace (flush) the oil filter and engine oil. Ref. to LUBRICATION(STI)>Engine Oil. Ref. to LUBRICATION(STI)>Engine Oil Filter.** **Go to 13.**

13. CHECK ON-BOARD MONITOR TEST RESULTS.

1. Perform the Clear Memory Mode for the engine using the Subaru Select Monitor or a general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Perform drive cycle T. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle.
3. Read values of "VVT Monitor Bank 1" and "VVT Monitor Bank 2" according to MODE$06 reading procedures using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>General Scan Tool>OPERATION > MODE $06 (REQUEST ON-BOARD MONITORING TEST RESULTS FOR CONTINUOUSLY MONITORED SYSTEMS).

   Caution:
   - **When performing driving cycle, there should be 2 persons (driver and checker) and the checker should perform the data check.**
   - **When performing the drive cycle on the public road, be very careful of the traffic condition and the safe driving must be the high priority.**

   Note:
   - **When the diagnostic value is 0, the diagnosis is incomplete. Therefore, do not stop the engine and perform the drive cycle again.**
   - **Diagnostic values are updated repeatedly, and therefore, always check the data while diagnostic values are being read.**
4. Record the read values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2".

Is the value in "VVT Monitor Bank 1" 1000 or more?

Yes	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	Go to 14.

14. CHECK CURRENT DATA.

Compare the values in "VVT Monitor Bank 1" and "VVT Monitor Bank 2" recorded in step 13.

Is the value in "VVT Monitor Bank 1" 1000 or less, and also larger than the value (value in "VVT Monitor Bank 2" ×1.5+100) compared to the value in "VVT Monitor Bank 2"?

Yes	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	End.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0014. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0014 "B" CAMSHAFT POSITION - TIMING OVER-ADVANCED OR SYSTEM PERFORMANCE BANK 1.

DTC P0030 A/F / O2 HEATER CONTROL CIRCUIT BANK 1 SENSOR 1

DTC detecting condition:

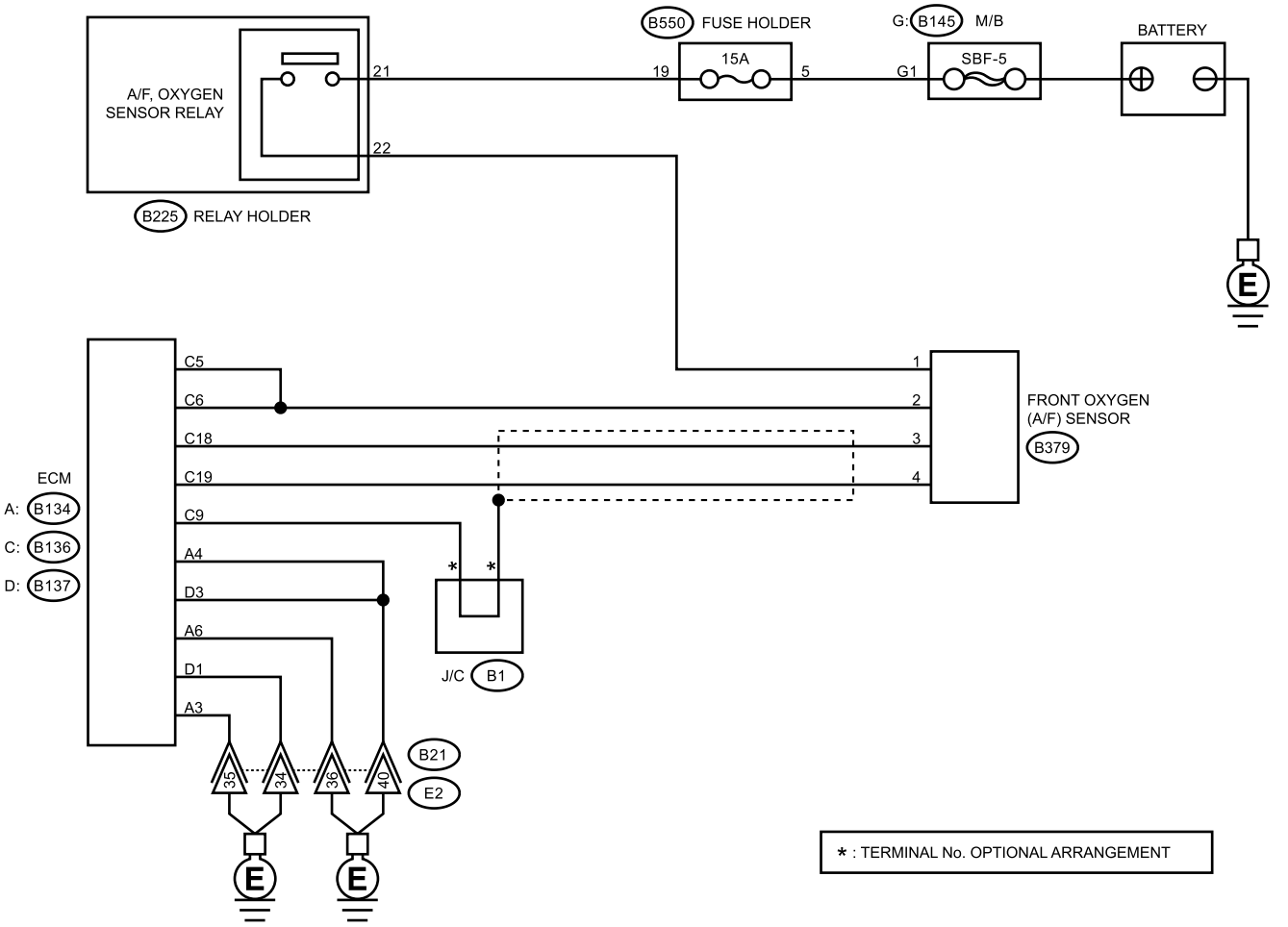
Detected when two consecutive driving cycles with fault occur.

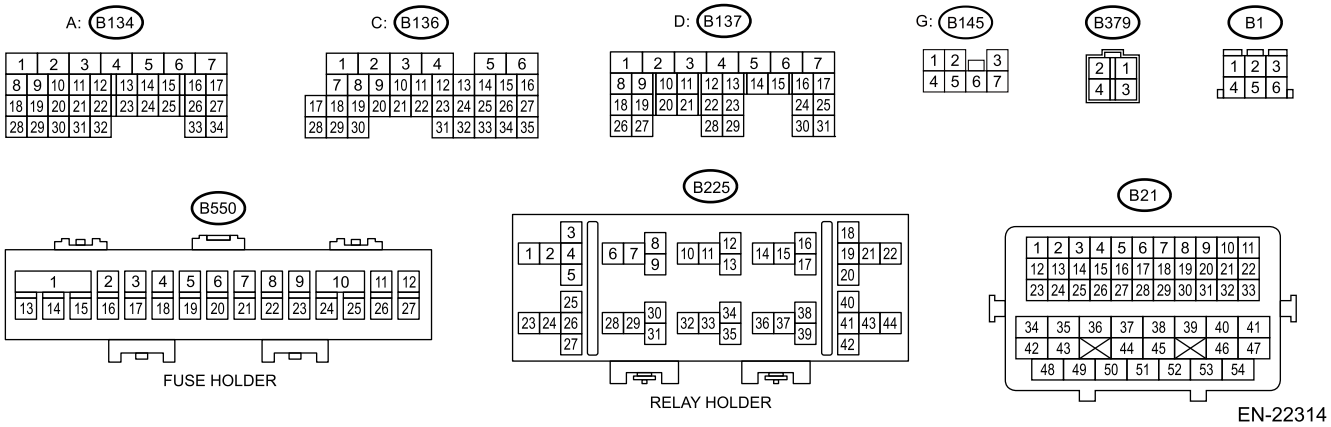
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


A/F, OXYGEN SENSOR RELAY
21
22
B225 RELAY HOLDER
B550 FUSE HOLDER
19
15A
5
G: B145 M/B
G1
SBF-5
BATTERY
E
ECM
A: B134
C: B136
D: B137
C5
C6
C18
C19
C9
A4
D3
A6
D1
A3
J/C B1
1
2
3
4
FRONT OXYGEN (A/F) SENSOR
B379
B21
E2
35
34
36
40
* : TERMINAL No. OPTIONAL ARRANGEMENT


A: B134
C: B136
D: B137
G: B145
B379
B1
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-22314

1. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Start and warm up the engine.
2. Turn the ignition switch to OFF.
3. Disconnect the connector from ECM.
4. Check the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Front Oxygen (A/F) Sensor>INSPECTION.

Is the check result OK?

Yes	Go to 2.
No	Repair the open circuit of harness between ECM connector and front oxygen (A/F) sensor connector.

2. CHECK FRONT OXYGEN (A/F) SENSOR.

Check the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Front Oxygen (A/F) Sensor>INSPECTION.

Is the check result OK?

Yes	Go to 3.
No	Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Front Oxygen (A/F) Sensor.

3. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and front oxygen (A/F) sensor connector.

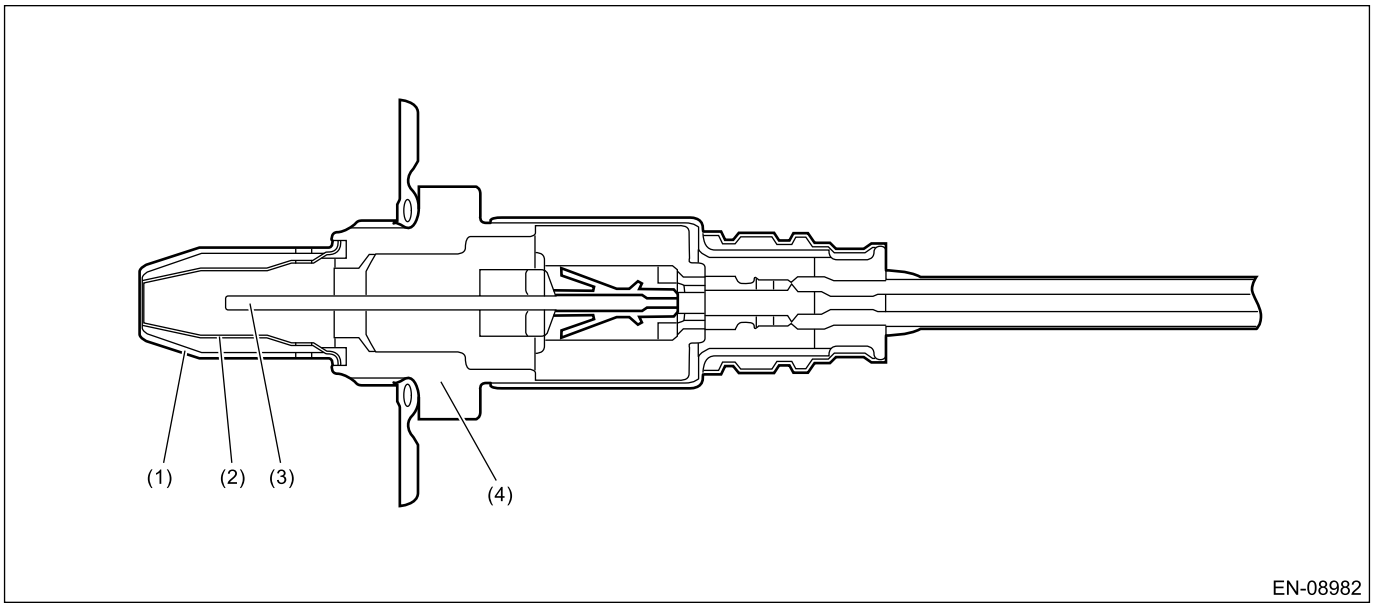
Is there poor contact of ECM or front oxygen (A/F) sensor connector?

Yes	Repair the poor contact of ECM or front oxygen (A/F) sensor connector.
No	Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Front Oxygen (A/F) Sensor.

1. OUTLINE OF DIAGNOSIS

Detect functional errors of the front oxygen (A/F) sensor heater.
Judge as NG when it is determined that the front oxygen (A/F) sensor impedance is large when looking at engine status such as deceleration fuel cut.

2. COMPONENT DESCRIPTION



(1) Element cover (outer)
(2) Element cover (inner)
(3) Sensor element
(4) Sensor housing

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
(A/F sensor heater control duty	> 30%
Elapsed time from above)	≥ 42000ms
Non-operating time of fuel shut-off	≥ 20000ms

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when 20000 ms have elapsed since the fuel cut was initiated after starting the heater control.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Front oxygen (A/F) sensor impedance	> 38Ω

time needed for diagnosis: 10000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0031 A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 1

DTC detecting condition:

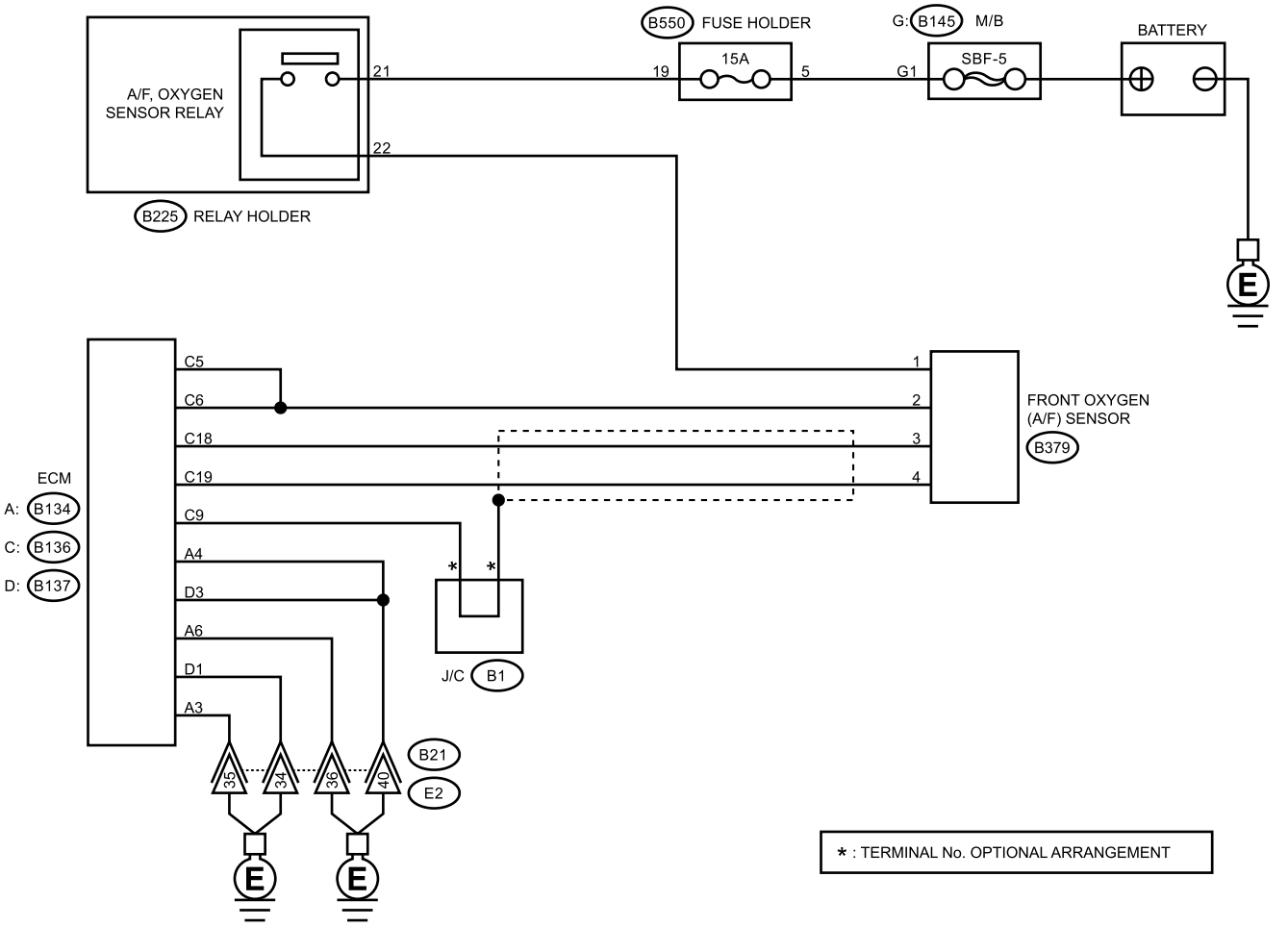
Immediately at fault recognition

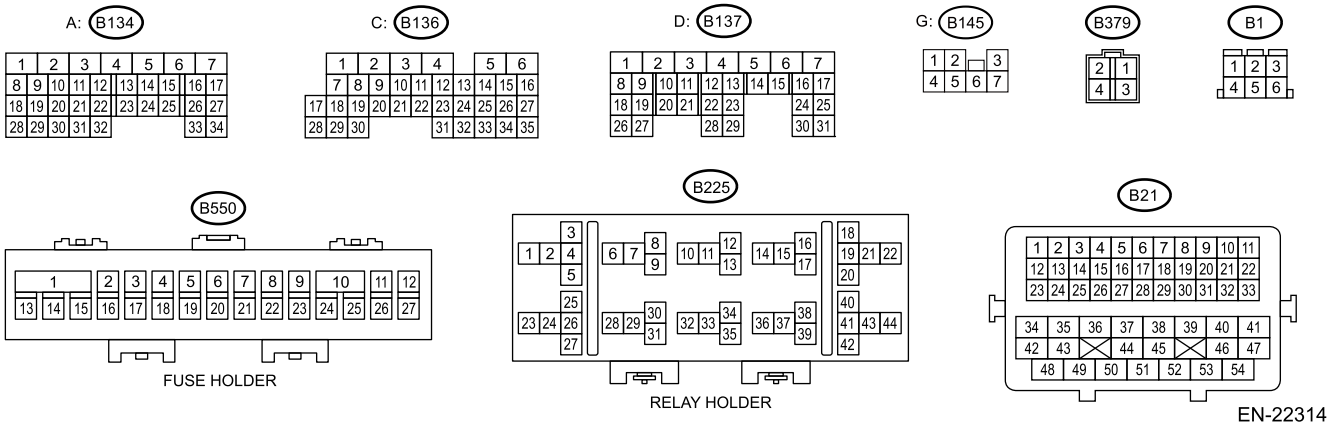
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


A/F, OXYGEN SENSOR RELAY
21
22
B225 RELAY HOLDER
B550 FUSE HOLDER
19
15A
5
G: B145 M/B
G1
SBF-5
BATTERY
E
ECM
A: B134
C: B136
D: B137
C5
C6
C18
C19
C9
A4
D3
A6
D1
A3
J/C B1
1
2
3
4
FRONT OXYGEN (A/F) SENSOR
B379
B21
E2
35
34
36
40
* : TERMINAL No. OPTIONAL ARRANGEMENT


A: B134
C: B136
D: B137
G: B145
B379
B1
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-22314

1. CHECK POWER SUPPLY TO FRONT OXYGEN (A/F) SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connectors from front oxygen (A/F) sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between front oxygen (A/F) sensor connector and engine ground.
   Connector & terminal
   (B379) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Repair the power supply line. **Note:** **In this case, repair the following item:** • **Open circuit in harness between A/F, oxygen sensor relay and front oxygen (A/F) sensor connector** • **Poor contact of A/F, oxygen sensor relay connector** • **Malfunction of A/F, oxygen sensor relay**

2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and front oxygen (A/F) sensor connector.
   Connector & terminal
   (B136) No. 5 — (B379) No. 2:
   (B136) No. 6 — (B379) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the open circuit of harness between ECM connector and front oxygen (A/F) sensor connector.

3. CHECK GROUND CIRCUIT FOR ECM.

Measure the resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B134) No. 3 — Chassis ground:
(B134) No. 4 — Chassis ground:
(B134) No. 6 — Chassis ground:
(B137) No. 1 — Chassis ground:
(B137) No. 3 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of coupling connector**

4. CHECK FRONT OXYGEN (A/F) SENSOR.

Check the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Front Oxygen (A/F) Sensor>INSPECTION.

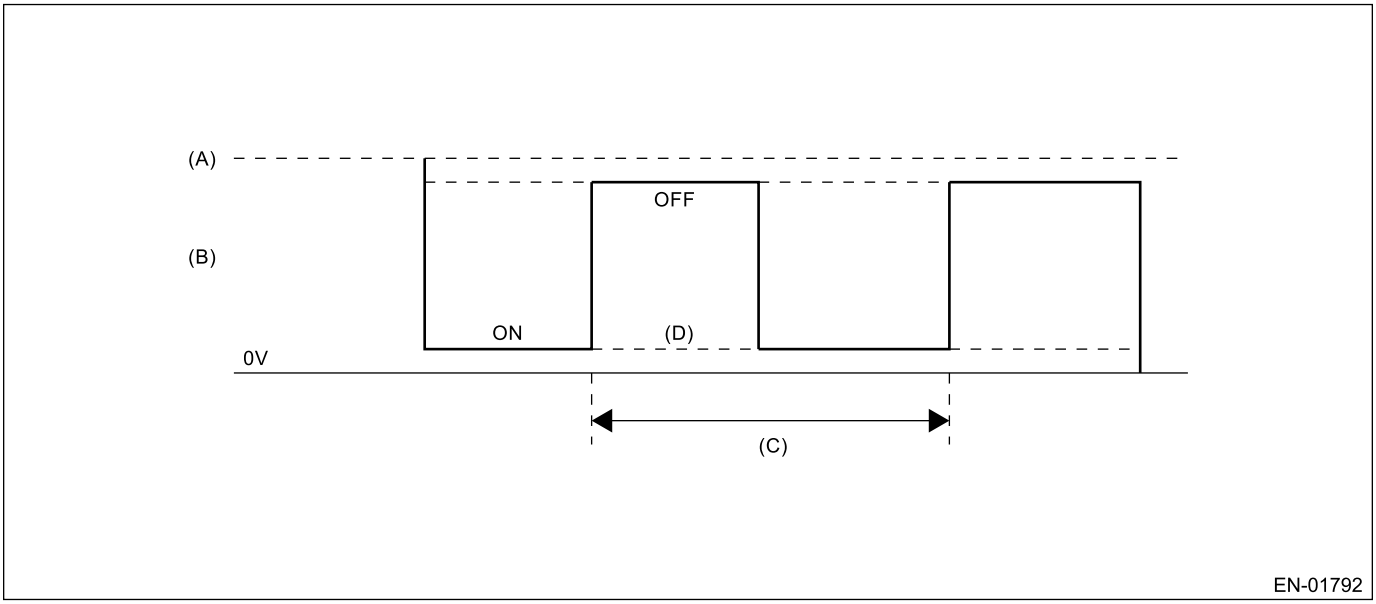
Is the check result OK?

Yes	Repair the poor contact of ECM connector.
No	Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Front Oxygen (A/F) Sensor.

1. OUTLINE OF DIAGNOSIS

Detect front oxygen (A/F) sensor heater open or short circuit.
The front oxygen (A/F) sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.
Judge as NG when the terminal voltage remains Low.

2. COMPONENT DESCRIPTION



(A) Battery voltage

(B) Front oxygen (A/F) sensor heater output voltage

(C) 128 ms

(D) Low error

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Front oxygen (A/F) sensor heater control duty	< 87.5%

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< 1.9 V

time needed for diagnosis: 4 ms × 250time(s)

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0032 A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 1

DTC detecting condition:

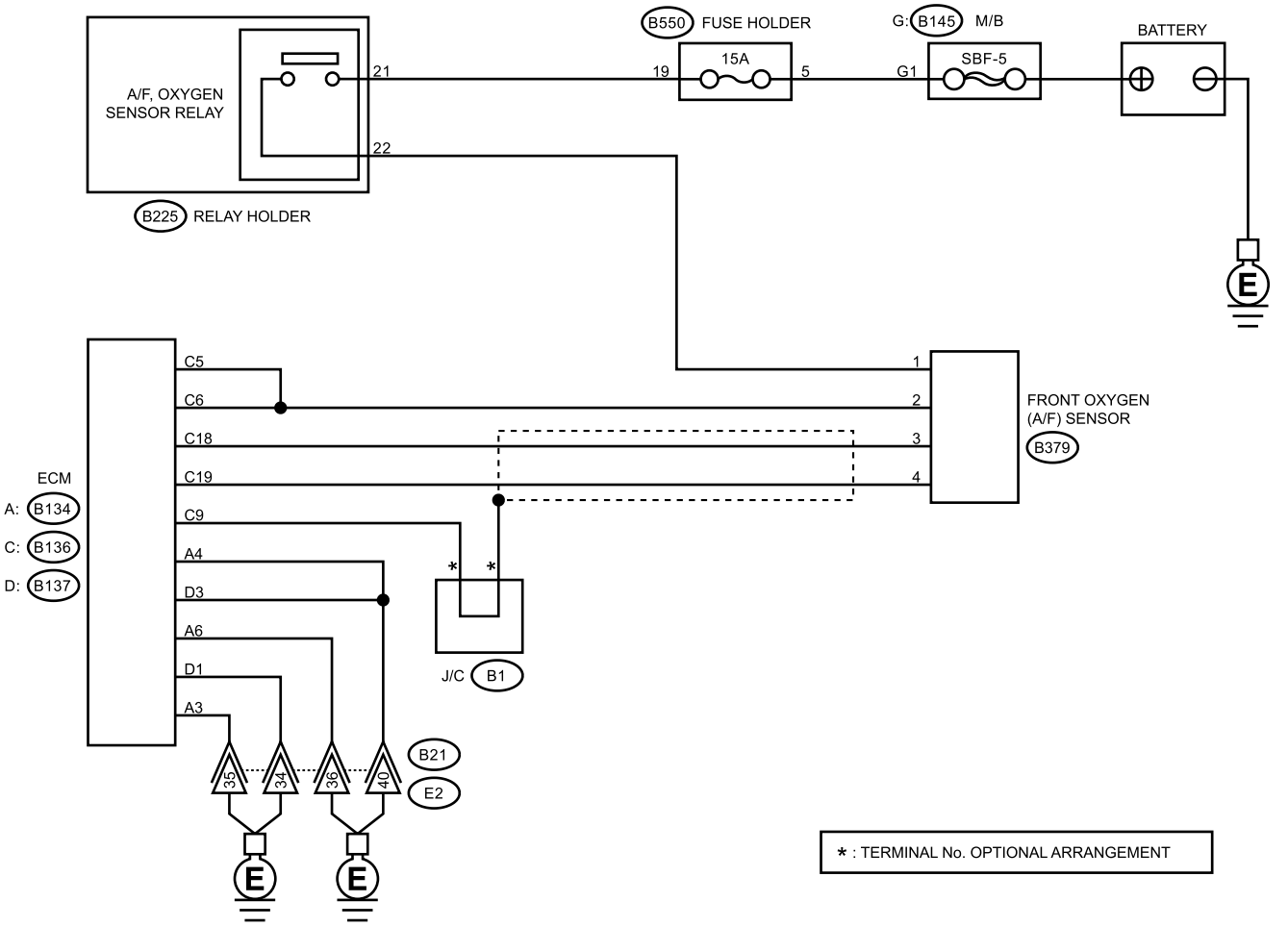
Immediately at fault recognition

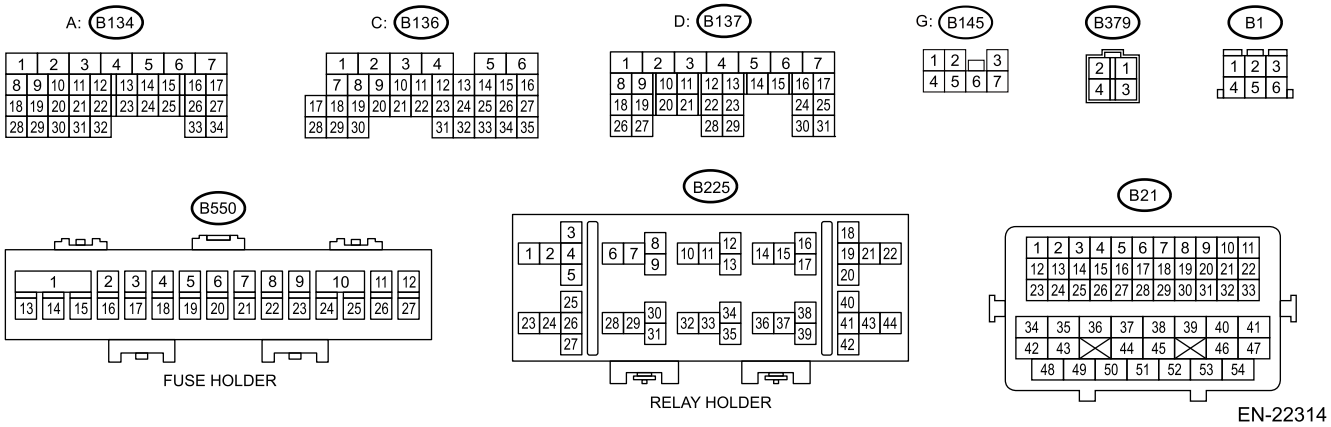
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


A/F, OXYGEN SENSOR RELAY
21
22
B225 RELAY HOLDER
B550 FUSE HOLDER
19
15A
5
G: B145 M/B
G1
SBF-5
BATTERY
E
ECM
A: B134
C: B136
D: B137
C5
C6
C18
C19
C9
A4
D3
A6
D1
A3
J/C B1
1
2
3
4
FRONT OXYGEN (A/F) SENSOR
B379
B21
E2
35
34
36
40
* : TERMINAL No. OPTIONAL ARRANGEMENT


A: B134
C: B136
D: B137
G: B145
B379
B1
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-22314

1. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 5 (+) — Chassis ground (−):
   (B136) No. 6 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector.
No	Go to 2.

2. CHECK GROUND CIRCUIT FOR ECM.

1. Disconnect the connector from ECM.
2. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B134) No. 3 — Chassis ground:
   (B134) No. 4 — Chassis ground:
   (B134) No. 6 — Chassis ground:
   (B137) No. 1 — Chassis ground:
   (B137) No. 3 — Chassis ground:

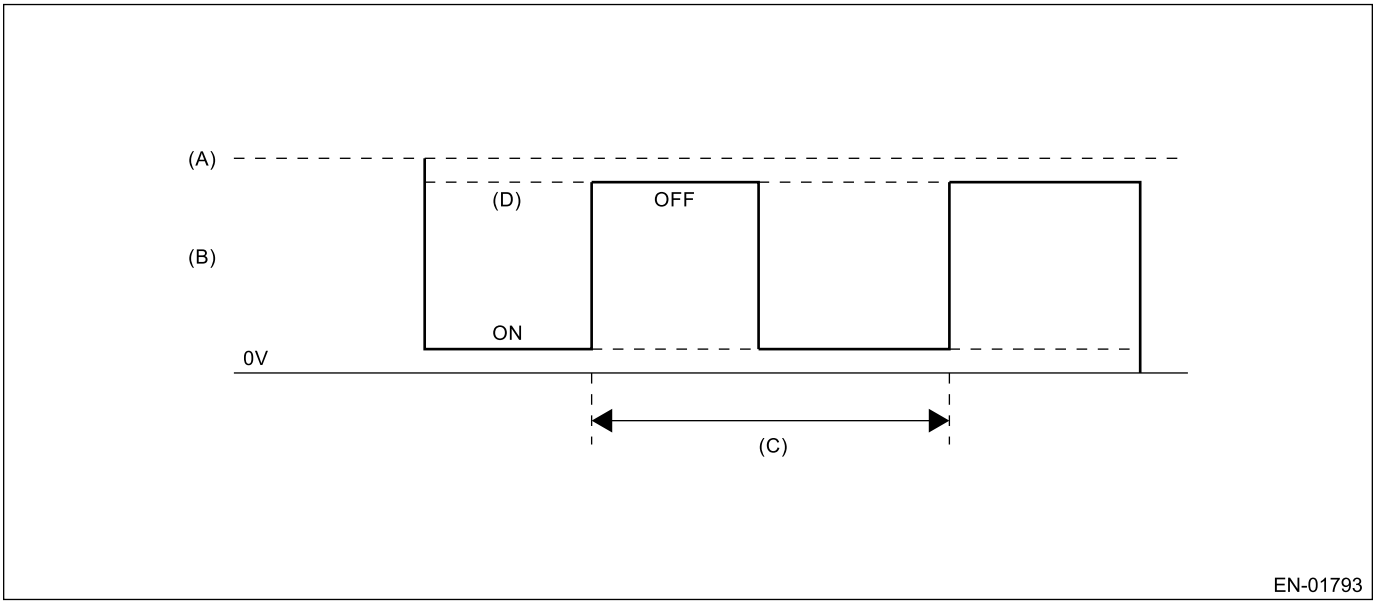
Is the resistance less than 5 Ω?

Yes	Repair the poor contact of ECM connector.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of coupling connector**

1. OUTLINE OF DIAGNOSIS

Detect front oxygen (A/F) sensor heater open or short circuit.
The front oxygen (A/F) sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.
Judge as NG when the terminal voltage remains High.

2. COMPONENT DESCRIPTION



(A) Battery voltage

(B) Front oxygen (A/F) sensor heater output voltage

(C) 128 ms

(D) High error

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Front oxygen (A/F) sensor heater control duty	> 12.5%

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≥ 1.9 V

time needed for diagnosis: 4 ms × 500time(s)

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0037 A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 2

DTC detecting condition:

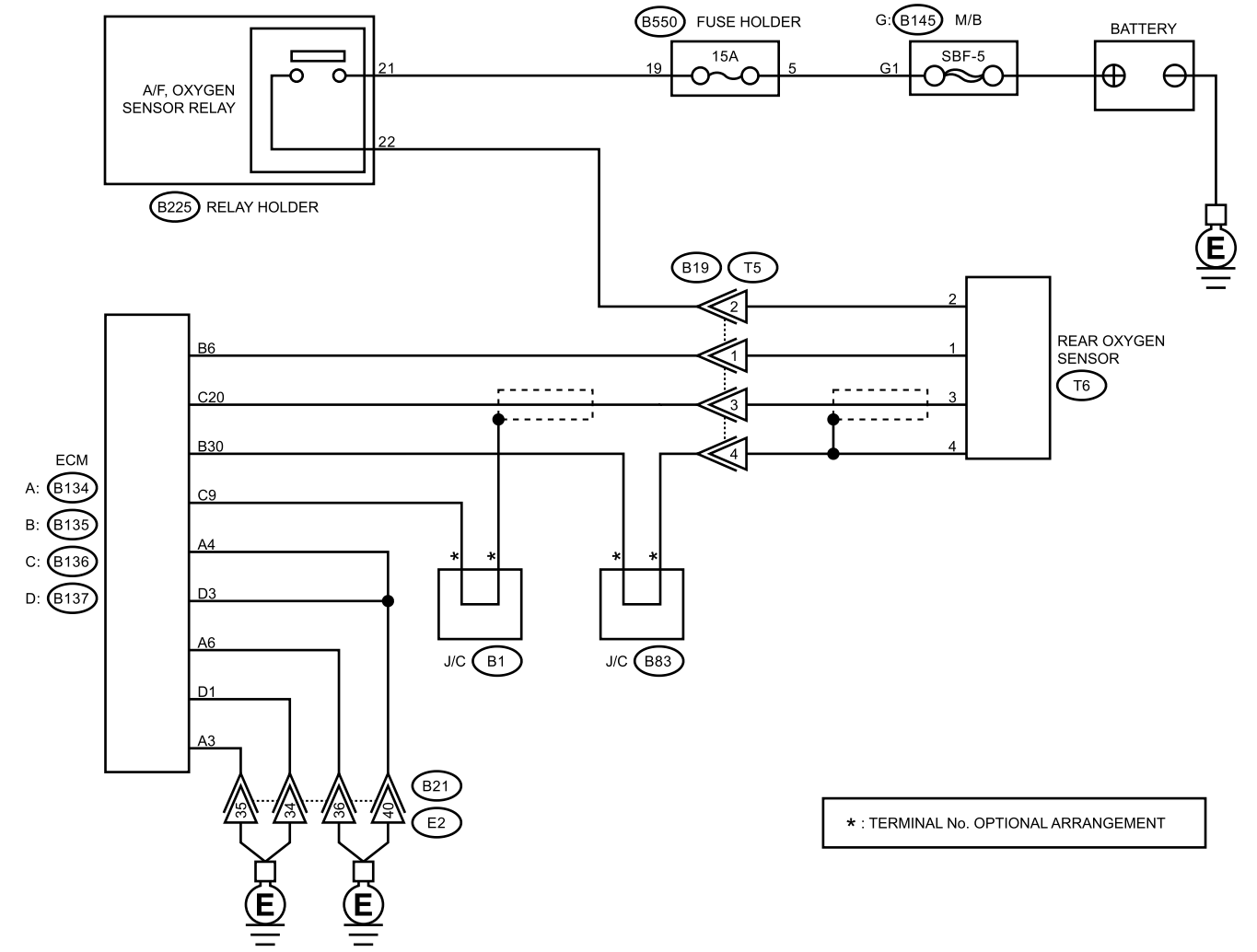
Detected when two consecutive driving cycles with fault occur.

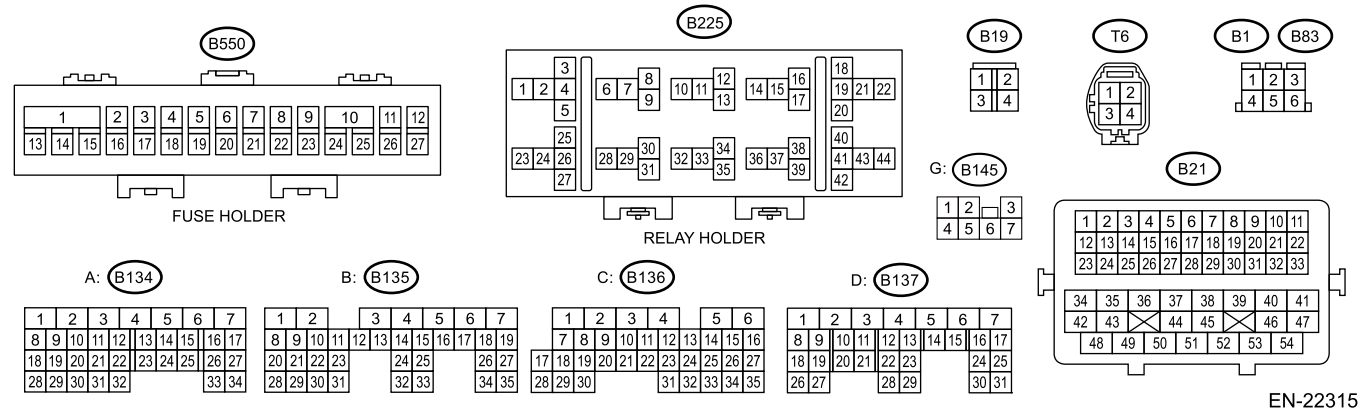
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B550 FUSE HOLDER
G: B145 M/B
BATTERY
A/F, OXYGEN SENSOR RELAY
21
22
19
15A
5
G1
SBF-5
B225 RELAY HOLDER
B19
T5
REAR OXYGEN SENSOR
T6
ECM
A: B134
B: B135
C: B136
D: B137
B6
C20
B30
C9
A4
D3
A6
D1
A3
J/C B1
J/C B83
B21
E2
* : TERMINAL No. OPTIONAL ARRANGEMENT


B550
FUSE HOLDER
B225
RELAY HOLDER
B19
T6
B1
B83
G: B145
B21
A: B134
B: B135
C: B136
D: B137

EN-22315

1. CHECK POWER SUPPLY TO REAR OXYGEN SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from rear oxygen sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between rear oxygen sensor connector and engine ground.
   Connector & terminal
   (T6) No. 2 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Repair the power supply line. **Note:** **In this case, repair the following item:** • **Open circuit in harness between A/F, oxygen sensor relay and rear oxygen sensor connector** • **Poor contact of A/F, oxygen sensor relay connector** • **Poor contact of coupling connector** • **Malfunction of A/F, oxygen sensor relay**

2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and rear oxygen sensor connector.
   Connector & terminal
   (B135) No. 6 — (T6) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and rear oxygen sensor connector** • **Poor contact of coupling connector**

3. CHECK GROUND CIRCUIT FOR ECM.

Measure the resistance of harness between ECM connector and chassis ground.

Connector & terminal

(B134) No. 3 — Chassis ground:
(B134) No. 4 — Chassis ground:
(B134) No. 6 — Chassis ground:
(B137) No. 1 — Chassis ground:
(B137) No. 3 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

4. CHECK REAR OXYGEN SENSOR.

Check the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Rear Oxygen Sensor>INSPECTION.

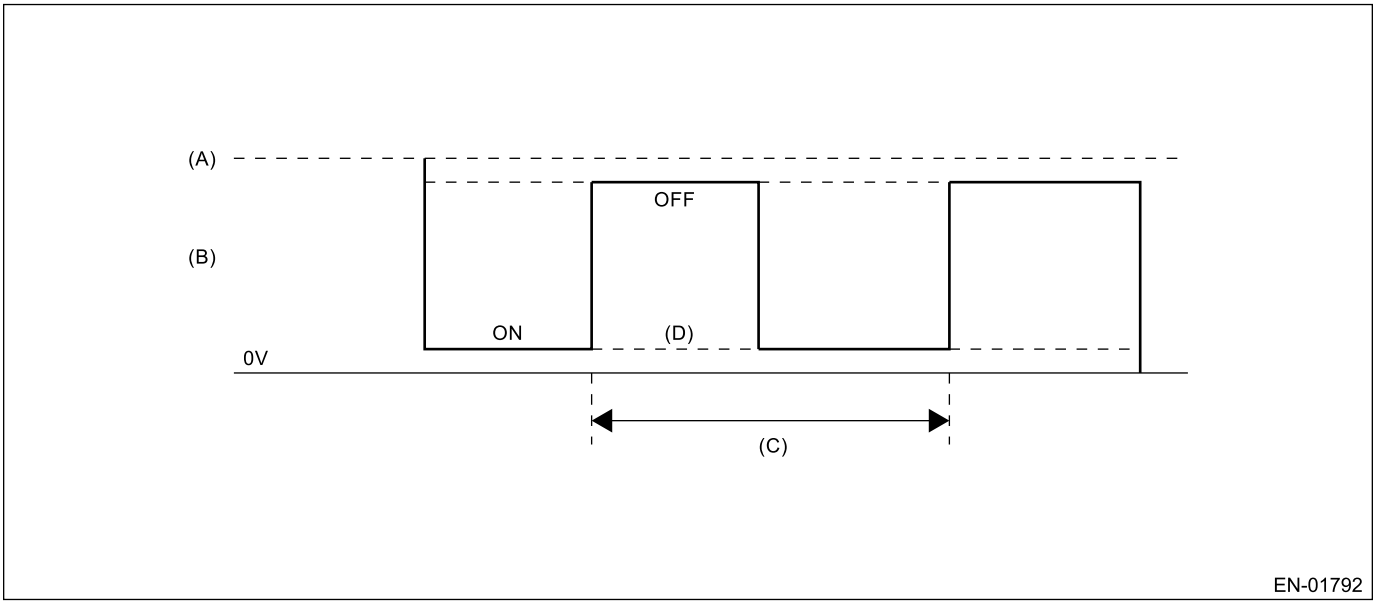
Is the check result OK?

Yes	Repair the poor contact of ECM connector.
No	Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Rear Oxygen Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the rear oxygen sensor heater open or short circuit.
The rear oxygen sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.
Judge as NG when the terminal voltage remains Low.

2. COMPONENT DESCRIPTION



(A) Battery voltage

(B) Output voltage of the rear oxygen sensor heater

(C) 256 ms (cycles)

(D) Low error

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Rear oxygen sensor heater control duty	< 75%

4. GENERAL DRIVING CYCLE

After starting the engine, perform the diagnosis continuously when engine is low speed.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< Battery voltage × 0.2 V

time needed for diagnosis: 8 ms × 1250time(s)

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0038 A/F / O2 HEATER CONTROL CIRCUIT HIGH BANK 1 SENSOR 2

DTC detecting condition:

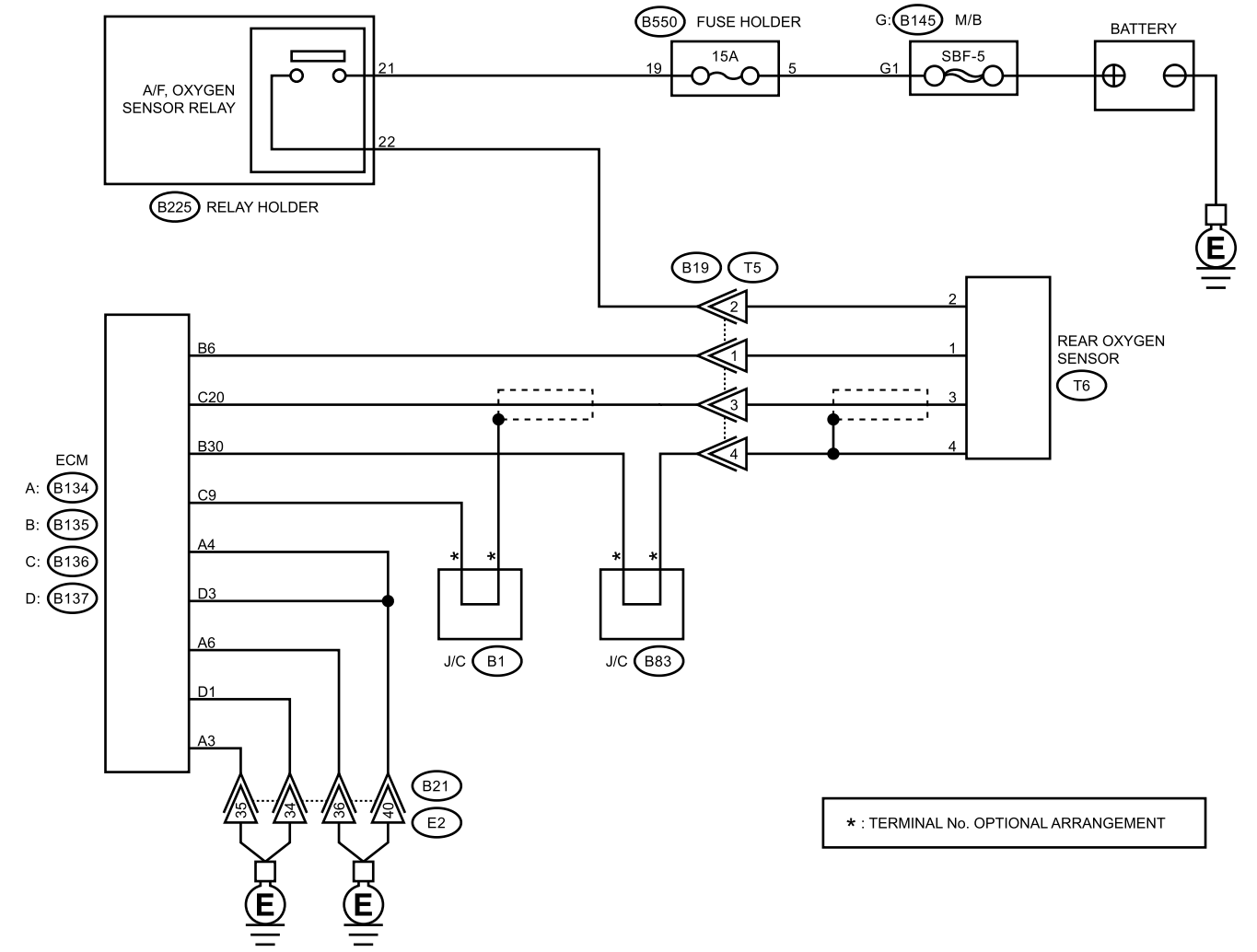
Detected when two consecutive driving cycles with fault occur.

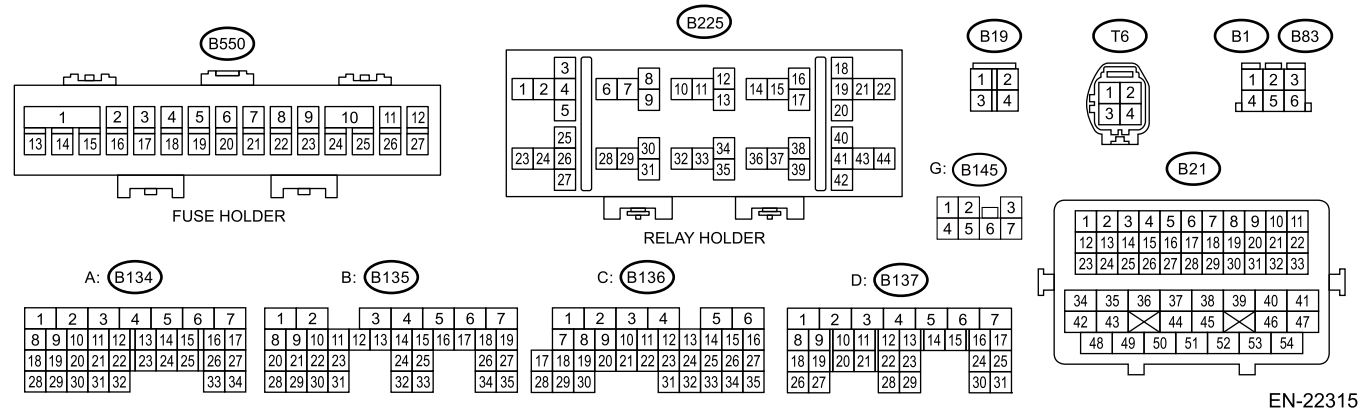
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B550 FUSE HOLDER
G: B145 M/B
BATTERY
A/F, OXYGEN SENSOR RELAY
21
22
19
15A
5
G1
SBF-5
B225 RELAY HOLDER
B19
T5
REAR OXYGEN SENSOR
T6
ECM
A: B134
B: B135
C: B136
D: B137
B6
C20
B30
C9
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D3
A6
D1
A3
J/C B1
J/C B83
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E2
* : TERMINAL No. OPTIONAL ARRANGEMENT


B550
FUSE HOLDER
B225
RELAY HOLDER
B19
T6
B1
B83
G: B145
B21
A: B134
B: B135
C: B136
D: B137

EN-22315

1. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B135) No. 6 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and rear oxygen sensor connector.
No	Go to 2.

2. CHECK GROUND CIRCUIT FOR ECM.

1. Disconnect the connector from ECM.
2. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B134) No. 3 — Chassis ground:
   (B134) No. 4 — Chassis ground:
   (B134) No. 6 — Chassis ground:
   (B137) No. 1 — Chassis ground:
   (B137) No. 3 — Chassis ground:

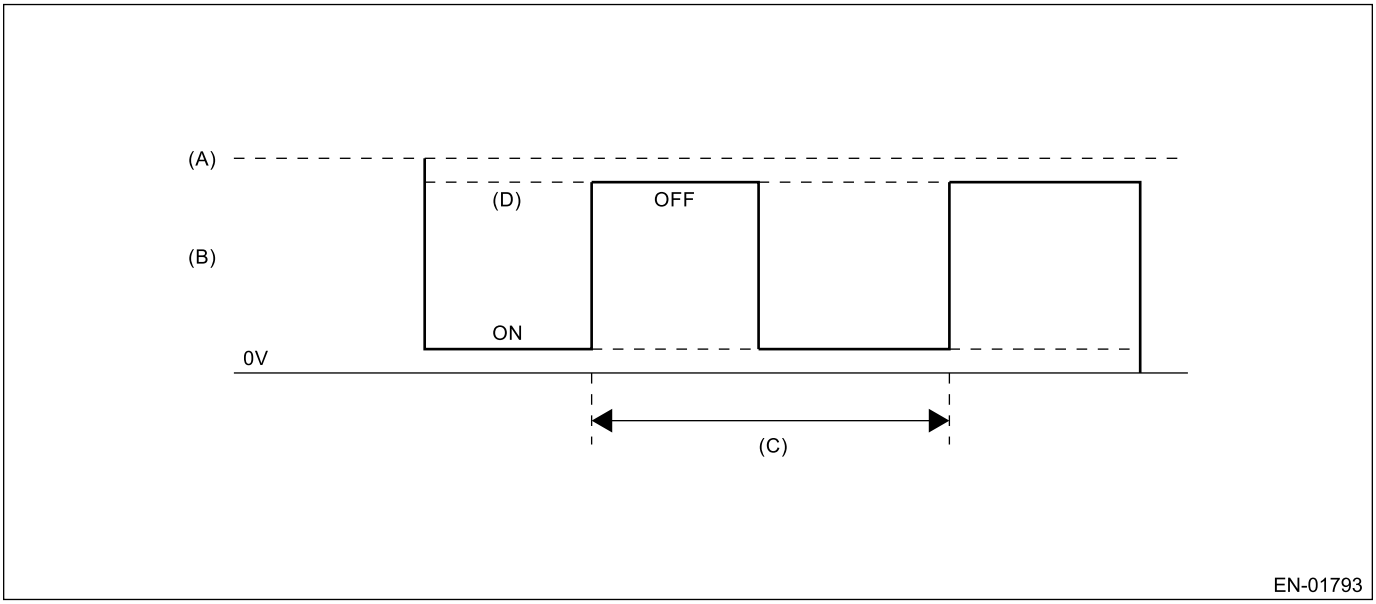
Is the resistance less than 5 Ω?

Yes	Repair the poor contact of ECM connector.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of coupling connector**

1. OUTLINE OF DIAGNOSIS

Detect the rear oxygen sensor heater open or short circuit.
The rear oxygen sensor heater performs duty control, and the output terminal voltage at ON is 0 V, and the output terminal voltage at OFF is the battery voltage.
Judge as NG when the terminal voltage remains High.

2. COMPONENT DESCRIPTION



(A) Battery voltage

(B) Output voltage of the rear oxygen sensor heater

(C) 256 ms (cycles)

(D) High error

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Rear oxygen sensor heater control duty	≥ 25%

4. GENERAL DRIVING CYCLE

After starting the engine, perform the diagnosis continuously when engine is low speed.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	> Battery voltage × 0.3 V

time needed for diagnosis: 8 ms × 320time(s)

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0068 MAP/MAF - THROTTLE POSITION CORRELATION

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK AIR INTAKE SYSTEM.

Check the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

Yes	Repair the air intake system.
No	Go to 2.

2. CHECK MANIFOLD ABSOLUTE PRESSURE SENSOR.

1. Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).
2. Place the gear shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

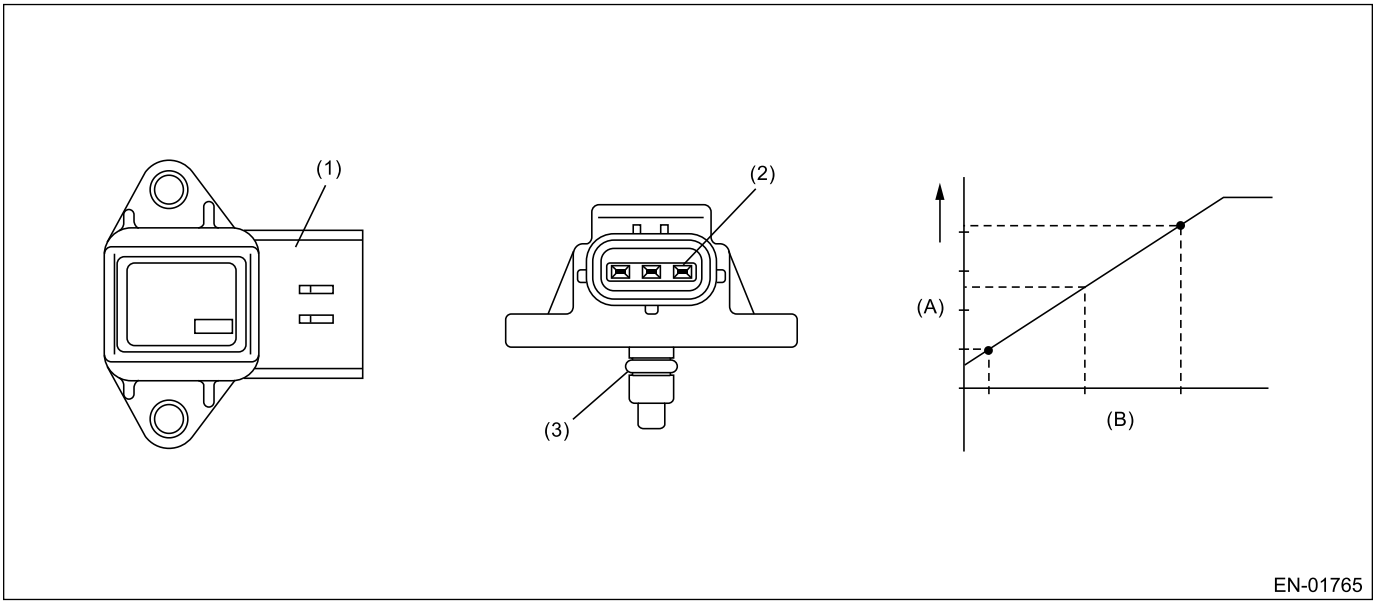
Is the value in «Mani. Absolute Pressure» 73.3 — 106.6 kPa (550 — 800 mmHg, 21.65 — 31.5 inHg) when the ignition is turned ON, and 20 — 46.7 kPa (150 — 350 mmHg, 5.91 — 13.78 inHg) during idling?

Yes	Repair the poor contact of ECM connector.
No	Replace the manifold absolute pressure sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Manifold Absolute Pressure Sensor.

1. OUTLINE OF DIAGNOSIS

Detect problems in the intake manifold pressure sensor output properties.
Judge as NG when the intake air pressure AD value is Low whereas it seemed to be High from the viewpoint of engine condition, or when it is High whereas it seemed to be Low from the engine condition.

2. COMPONENT DESCRIPTION



(A) Output voltage
(B) Absolute pressure
(1) Connector
(2) Terminals
(3) O-ring

3. EXECUTION CONDITION

Low

Secondary parameters	Execution condition
Engine speed	< 3000rpm
Charging efficiency (with atmospheric pressure compensation)	> 0.85g/rev (0.03oz/rev)
Throttle position	≥ 12°

High

Secondary parameters	Execution condition
Engine speed	≥ 600rpm and < 6700rpm
Charging efficiency (with atmospheric pressure compensation)	≤ 0.25g/rev (0.01oz/rev)
Throttle position	< 8°

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after idling.

5. DIAGNOSTIC METHOD

Judge as NG when Low side or High side becomes NG.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Low	
Output voltage	< 1.22V
High	
Output voltage	≥ 1.22V

Time needed for diagnosis:
Low side: 5000ms
High side: 5000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0071 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" RANGE/PERFORMANCE

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and Inspection Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P0071 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK CURRENT DATA.

1. Turn the ignition switch to ON.
2. Read the value of «Ambient Air Temperature» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For HVAC System". Ref. to HVAC SYSTEM (AUTO A/C) (DIAGNOSTICS)>Read Current Data.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.
3. Read the change of the value in «Ambient Air Temperature» while heating and cooling the ambient sensor using a hair dryer.
   Caution:
   Do not heat the part to the temperature where you cannot touch it with your bare hand in order to prevent burning yourself and protect the part.

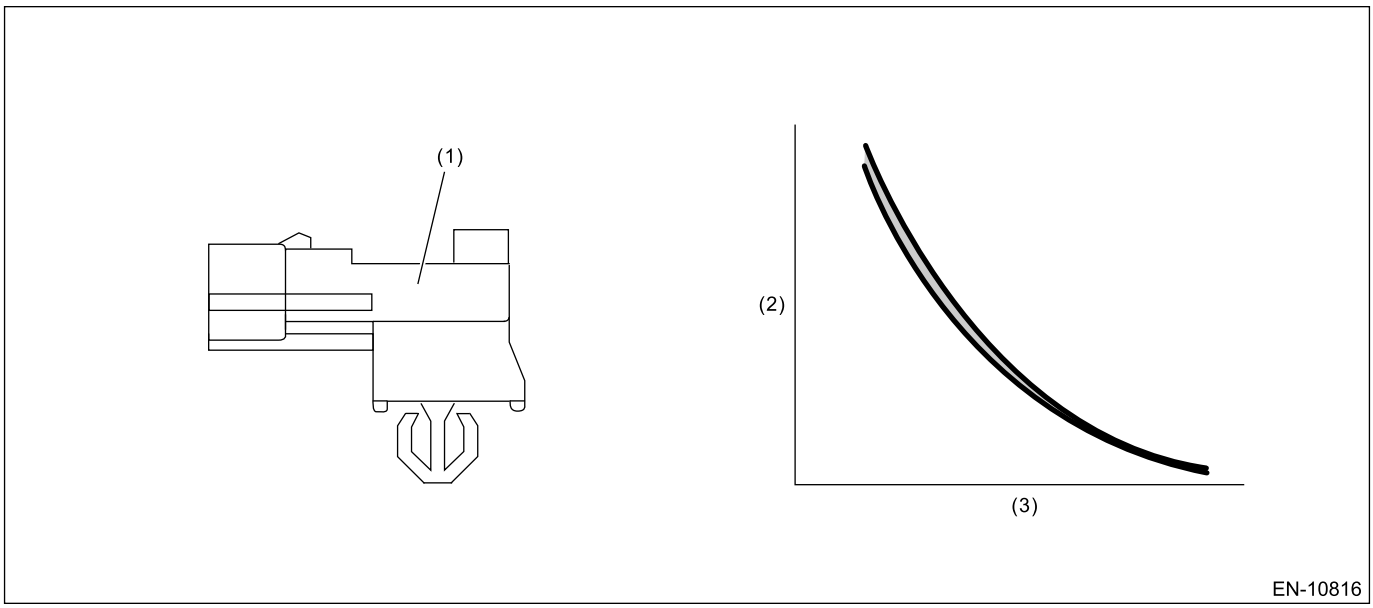
Does the value of «Ambient Air Temperature» change between heating and cooling?

Yes	Repair the poor contact of ECM connector.
No	Replace the ambient sensor. Ref. to HVAC SYSTEM (HEATER, VENTILATOR AND A/C)>Ambient Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of ambient temperature sensor characteristics.
After the engine starts after the specified period of soaking time has elapsed, judge by correlation between ambient temperature sensor value, intake air temperature sensor value and engine coolant temperature sensor value. Judge as NG when the differences are both above the specified value by comparing between ambient air temperature and intake air temperature, ambient air temperature and engine coolant temperature.

2. COMPONENT DESCRIPTION



(1) Ambient sensor
(2) Resistance value (kΩ)
(3) Ambient air temperature (°C (°F))

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Soaking time	≥ 21600s
Block heater judgment	Completed
Block heater operation	Not in operation

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after the engine starts after a certain period of soaking time.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
|Ambient temperature when 21568ms elapses after engine start − intake air temperature when 21568ms elapses after engine start|	> Value from Map
|Ambient air temperature at engine start − Engine coolant temperature at engine start|	> 25°C (77°F)

Map

Intake air temperature (°C (°F))	**−30 (−22)**	**45 (113)**	**60 (140)**	**80 (176)**
|Ambient temperature when 21568 ms elapses after engine start − intake air temperature when 21568 ms elapses after engine start| (°C (°F))	20 (68)	20 (68)	32 (89.6)	32 (89.6)

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0072 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" LOW

DTC detecting condition:
Immediately at fault recognition

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC P0072 or P0073 displayed? (Current malfunction)

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK COMBINATION METER.

Check the combination meter system. Ref. to COMBINATION METER (DIAGNOSTICS)>Basic Diagnostic Procedure.

Is the check result OK?

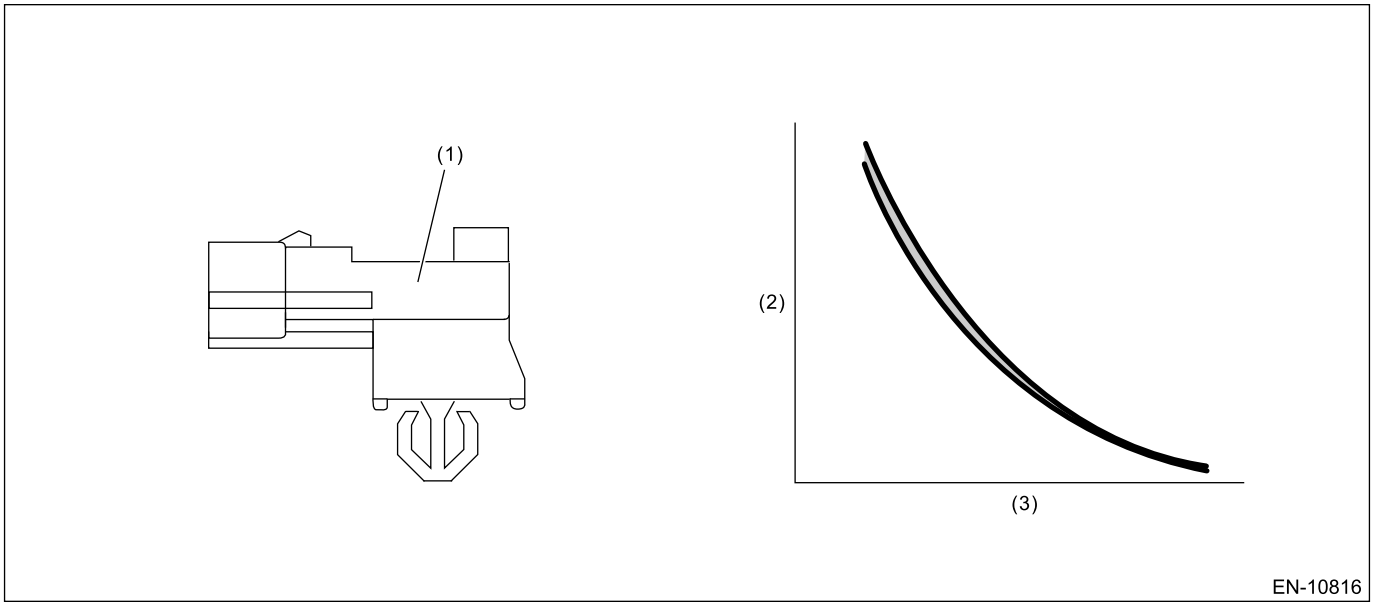
Yes	Repair the poor contact of ECM connector.
No	Repair the combination meter system. Ref. to COMBINATION METER (DIAGNOSTICS)>Basic Diagnostic Procedure.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of ambient temperature sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION

Ambient temperature signals are taken into the instrument/driver information control module, and the data of ambient temperature sensor is received from the instrument/driver information control module via CAN communication.



(1) Ambient sensor (2) Resistance value (kΩ) (3) Ambient air temperature (°C (°F))

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< 0.42 V

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P0073 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" HIGH

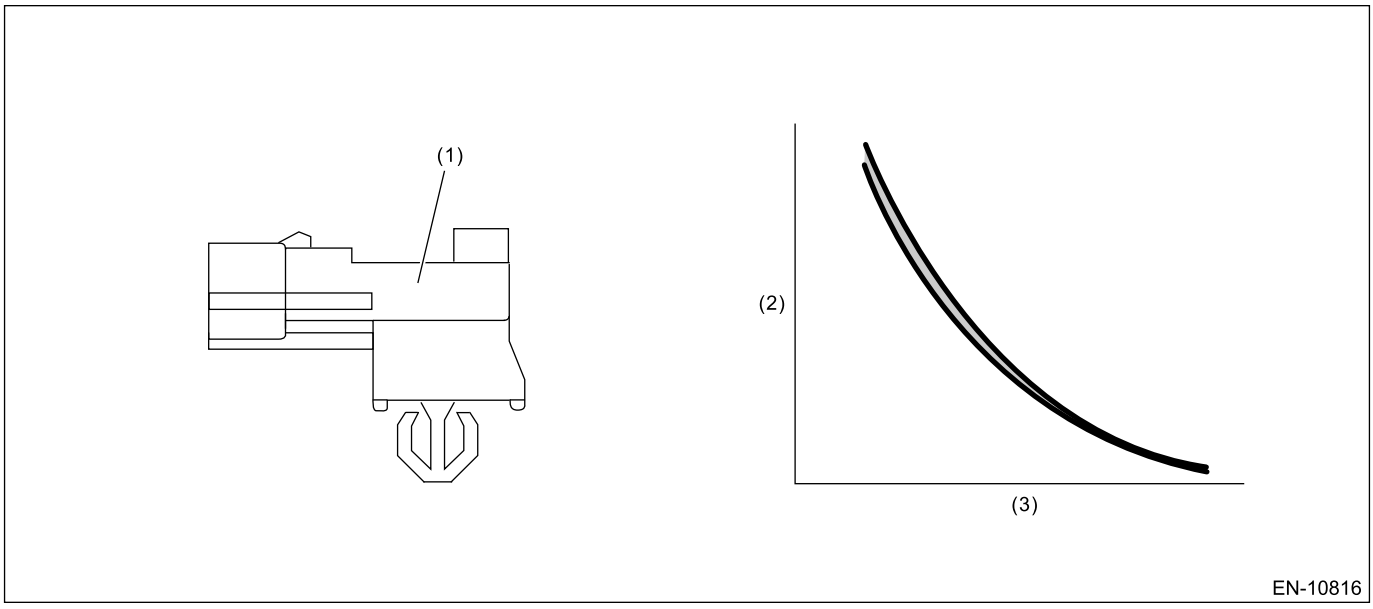
Note:
For the diagnostic procedure, refer to DTC P0072. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0072 AMBIENT AIR TEMPERATURE SENSOR CIRCUIT "A" LOW.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of ambient temperature sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION

Ambient temperature signals are taken into the instrument/driver information control module, and the data of ambient temperature sensor is received from the instrument/driver information control module via CAN communication.



(1) Ambient sensor (2) Resistance value (kΩ) (3) Ambient air temperature (°C (°F))

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	> 4.88 V

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0101 MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT RANGE/PERFORMANCE

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Trouble symptom:

- Improper idling
- Engine stalls.
- Poor driving performance

Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

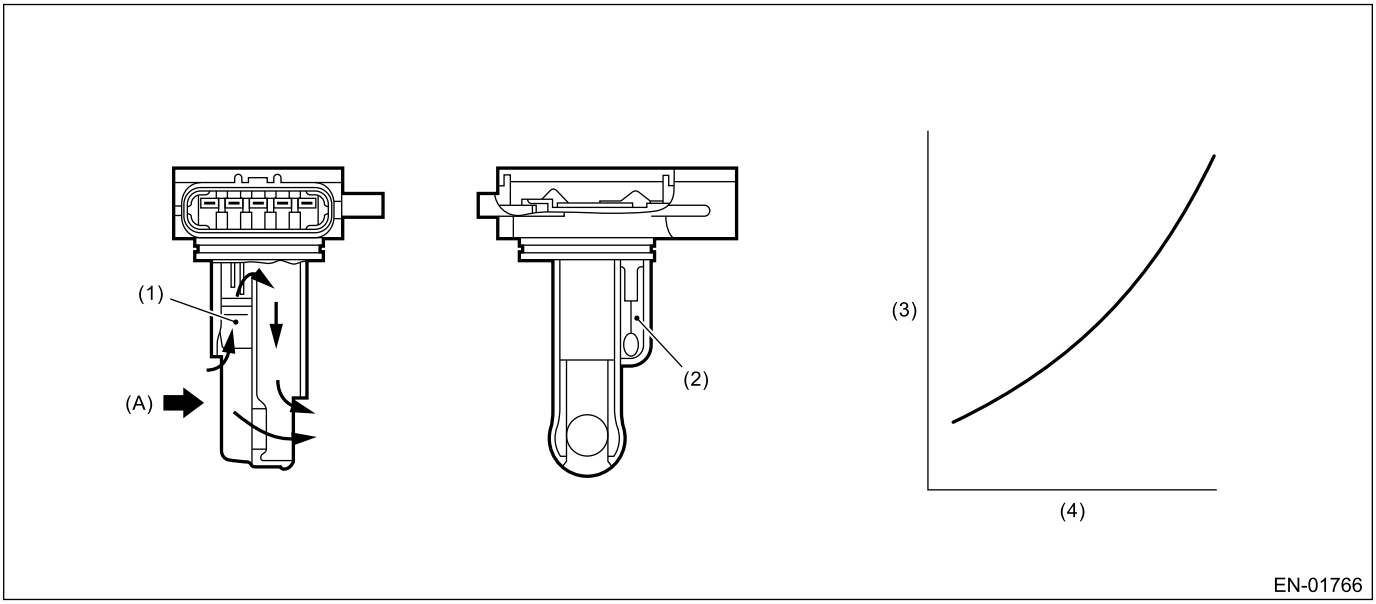
Is DTC other than P0101 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of air flow sensor output properties.
Judge as NG on the Low side when the displayed value of air flow voltage is small even in a driving condition where it should be large. Judge as NG on the High side when the displayed value of air flow voltage is large even in a driving condition where it should be small. Judge as NG in the air flow sensor property when either the Low side or High side becomes NG.

2. COMPONENT DESCRIPTION



(A) Air
(1) Air flow sensor
(2) Intake air temperature sensor
(3) Voltage (V)
(4) Intake air amount (kg (lb)/s)

3. EXECUTION CONDITION

Low

Secondary parameters	Execution condition
Engine speed Throttle position	≥ 1600rpm ≥ 12°
Intake manifold pressure (with atmospheric pressure compensation)	≥ 73.3kPa (550mmHg, 21.7inHg)

High

Secondary parameters	Execution condition
Engine speed Throttle position	≥ 600 rpm and < 900 rpm < 5°
Intake manifold pressure (with atmospheric pressure compensation)	< 49.3kPa (370 mmHg, 14.6inHg)

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after idling.

5. DIAGNOSTIC METHOD

Judge as NG when Low side or High side becomes NG.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Low	
Output voltage	< MAP1
High	
Output voltage	≥ MAP2

Map 1

Engine speed (rpm)	**1600**	**2000**	**3000**	**4000**	**5000**	**6000**	**7000**
Output voltage (V)	1.848	1.970	2.220	2.420	2.580	2.730	2.850

Map 2

Engine speed (rpm)	**600**	**700**	**800**	**900**
Output voltage (V)	1.640	1.720	1.790	1.845

Time Needed for Diagnosis:
Low: 5000ms
High: 5000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0102 MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT LOW

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

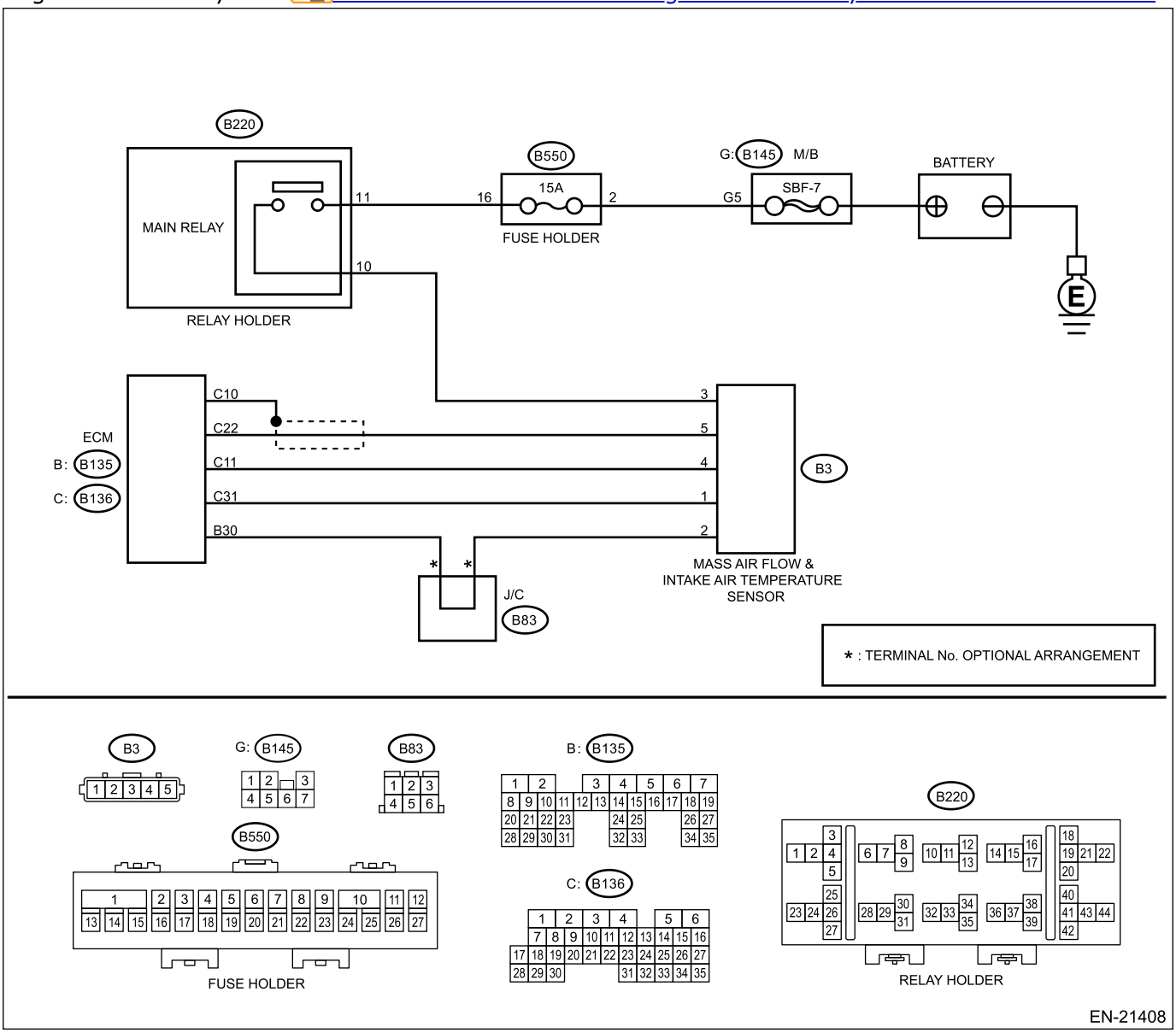
- Improper idling
- Engine stalls.
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CURRENT DATA.

1. Start the engine.
2. Read the value of «Air Flow Sensor Voltage» using Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Current Data Display For Engine".
   Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «Air Flow Sensor Voltage» less than 0.2 V?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK POWER SUPPLY OF MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connectors from the mass air flow and intake air temperature sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between mass air flow and intake air temperature sensor connector and engine ground.
   Connector & terminal
   (B3) No. 3 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between main relay connector and mass air flow and intake air temperature sensor connector** • **Poor contact of main relay connector**

3. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and the mass air flow and intake air temperature sensor connector.
   Connector & terminal
   (B136) No. 22 — (B3) No. 5:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the open circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector.

4. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B136) No. 22 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the ground short circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector.

5. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and mass air flow and intake air temperature sensor connector.

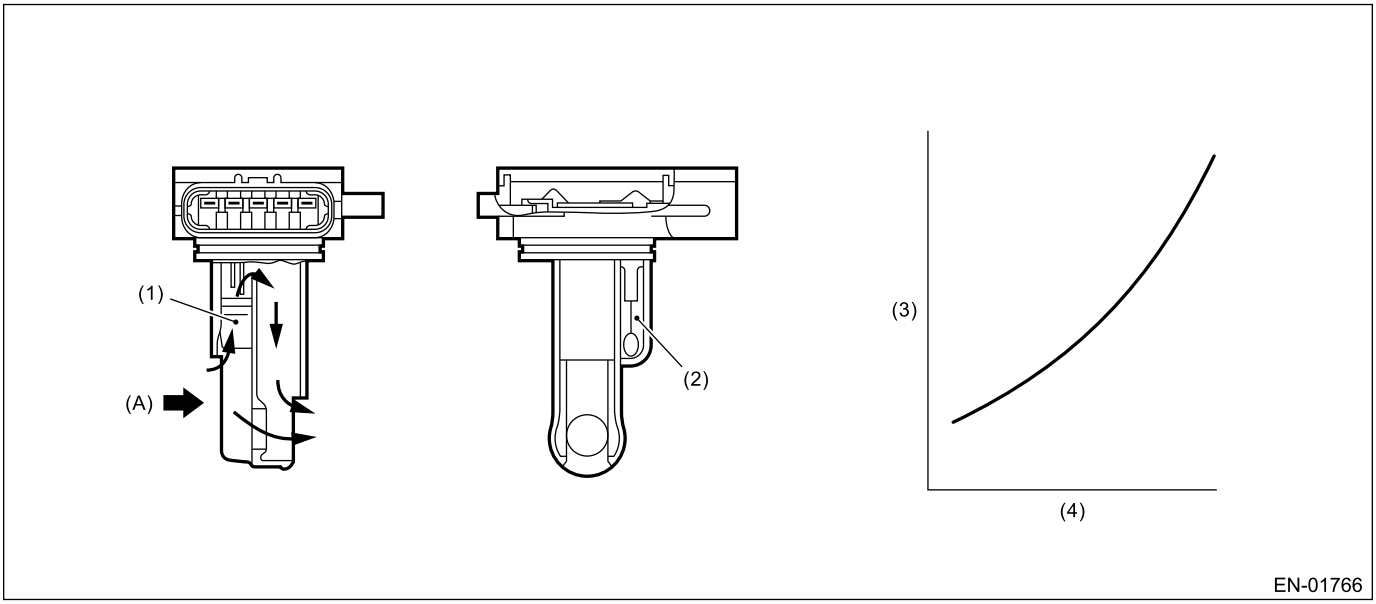
Is there poor contact of ECM or mass air flow and intake air temperature sensor connector?

Yes	Repair the poor contact of ECM or mass air flow and intake air temperature sensor connector.
No	Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuits of the air flow sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Air
(1) Air flow sensor
(2) Intake air temperature sensor
(3) Voltage (V)
(4) Intake air amount (kg (lb)/s)

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< 0.22V

time needed for diagnosis: 500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0103 MASS OR VOLUME AIR FLOW SENSOR "A" CIRCUIT HIGH

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

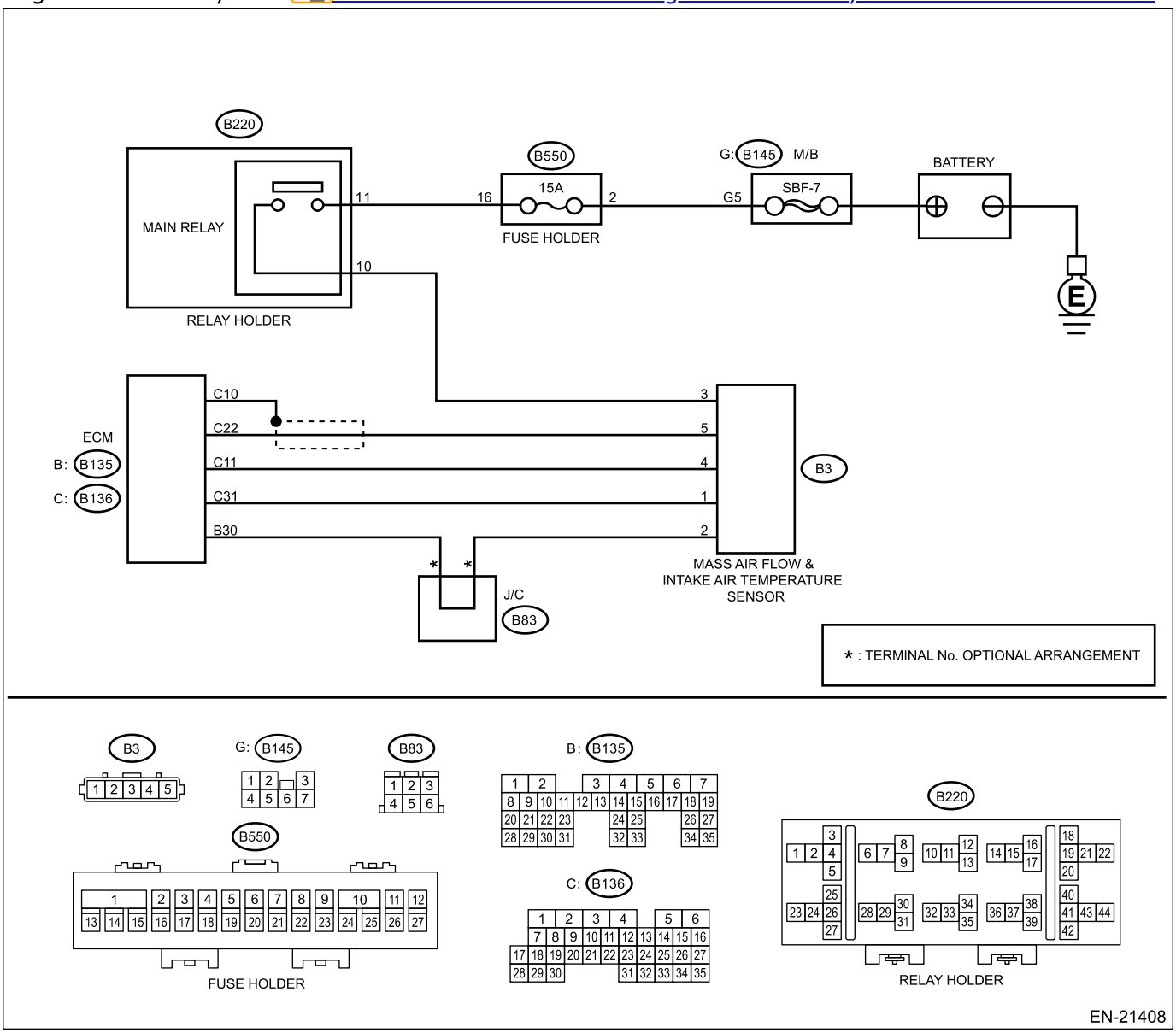
- Improper idling
- Engine stalls.
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CURRENT DATA.

1. Start the engine.
2. Read the value of «Air Flow Sensor Voltage» using Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Current Data Display For Engine".
   Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «Air Flow Sensor Voltage» 5 V or more?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connectors from the mass air flow and intake air temperature sensor.
3. Start the engine.
4. Read the value of «Air Flow Sensor Voltage» using Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Current Data Display For Engine".
   Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «Air Flow Sensor Voltage» 5 V or more?

Yes	Repair the short circuit of harness to power supply between ECM connector and the mass air flow and intake air temperature sensor connector.
No	Go to 3.

3. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between mass air flow and intake air temperature sensor connector and engine ground.
   Connector & terminal
   (B3) No. 4 — Engine ground:

Is the resistance less than 5 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and the mass air flow and intake air temperature sensor connector** • **Poor contact of ECM connector**

4. CHECK FOR POOR CONTACT.

Check for poor contact of mass air flow and intake air temperature sensor connector.

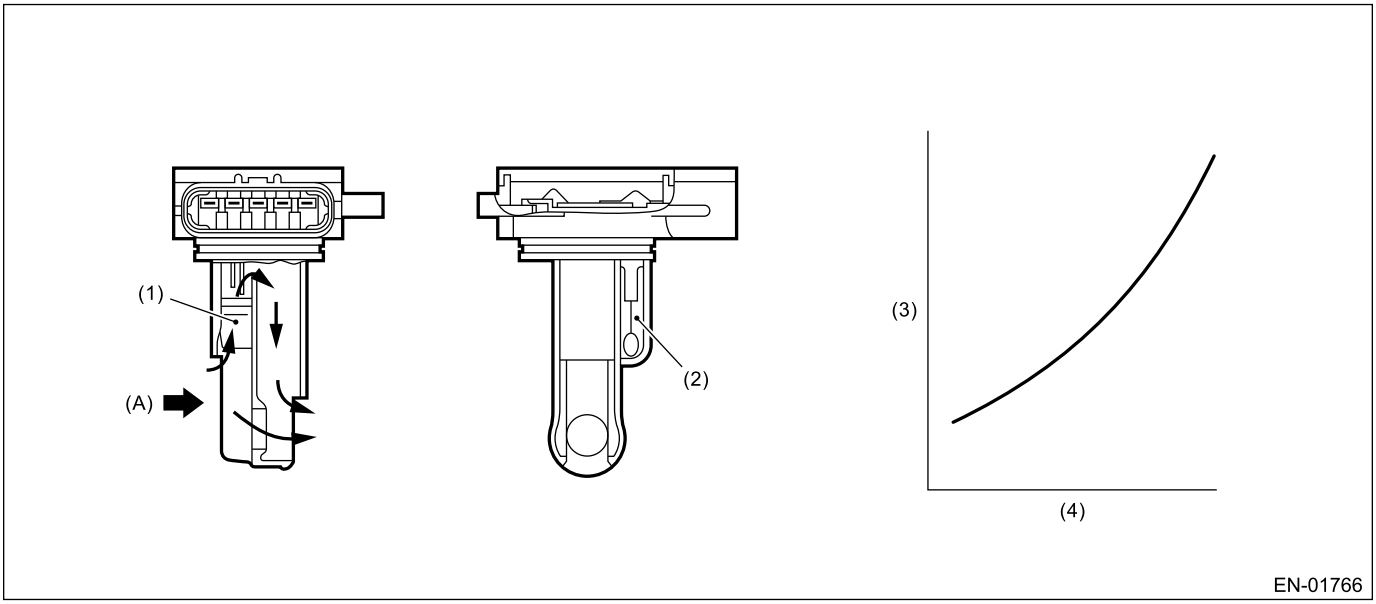
Is there poor contact of mass air flow and intake air temperature sensor connector?

Yes	Repair the poor contact of mass air flow and intake air temperature sensor connector.
No	Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuits of the air flow sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Air
(1) Air flow sensor
(2) Intake air temperature sensor
(3) Voltage (V)
(4) Intake air amount (kg (lb)/s)

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.952V

time needed for diagnosis: 500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0107 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT LOW

DTC detecting condition:

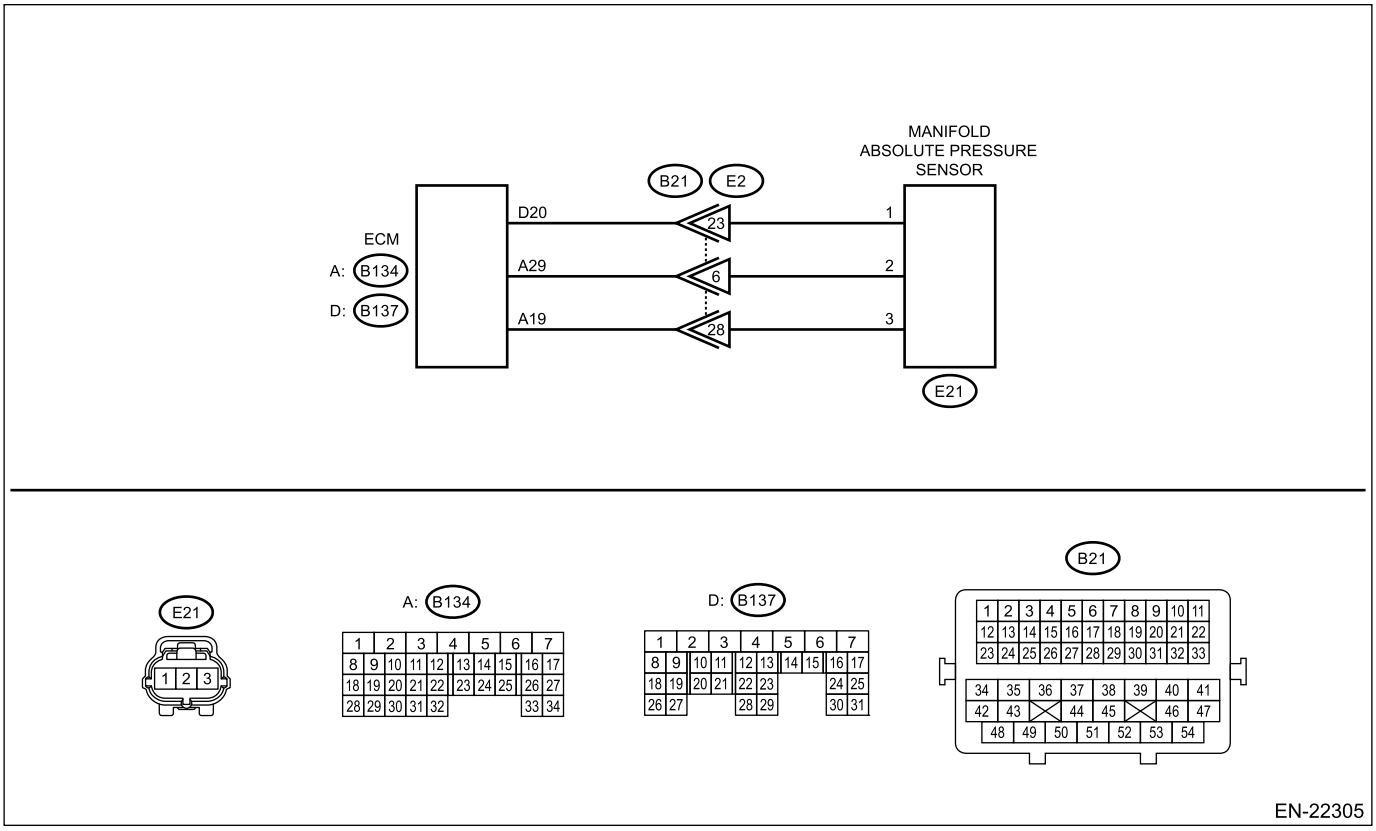
Immediately at fault recognition

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CURRENT DATA.

1. Start the engine.
2. Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Mani. Absolute Pressure» less than 13.3 kPa (100 mmHg, 3.94 inHg)?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK POWER SUPPLY OF MANIFOLD ABSOLUTE PRESSURE SENSOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from manifold absolute pressure sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between manifold absolute pressure sensor connector and engine ground.

   Connector & terminal

   (E21) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and manifold absolute pressure sensor connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and manifold absolute pressure sensor connector.
   Connector & terminal
   (B137) No. 20 — (E21) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and manifold absolute pressure sensor connector** • **Poor contact of coupling connector**

4. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.

Measure the resistance between ECM connector and chassis ground.
Connector & terminal
(B137) No. 20 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair short circuit to ground in harness between ECM connector and manifold absolute pressure sensor connector.

5. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and manifold absolute pressure sensor connector.

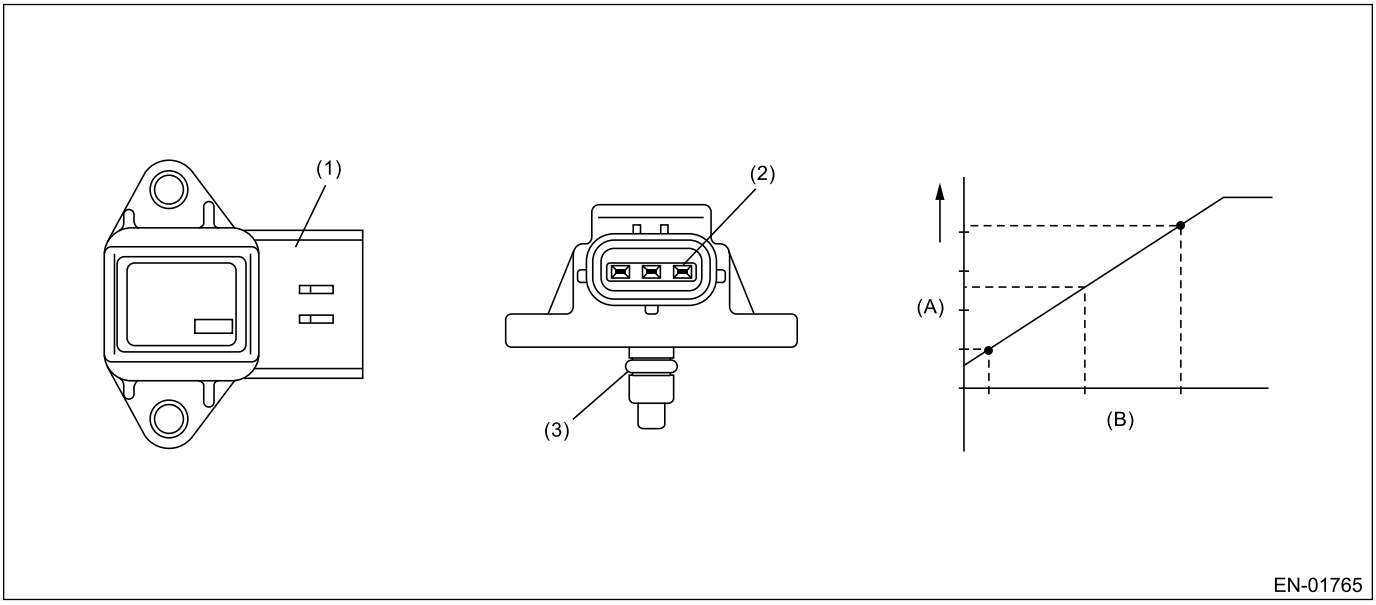
Is there poor contact of ECM or manifold absolute pressure sensor connector?

Yes	Repair the poor contact of ECM or manifold absolute pressure sensor connector.
No	Replace the manifold absolute pressure sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Manifold Absolute Pressure Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of intake manifold pressure sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Output voltage
(B) Absolute pressure
(1) Connector
(2) Terminals
(3) O-ring

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< 0.581V

time needed for diagnosis: 2000ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0108 MANIFOLD ABSOLUTE PRESSURE/BAROMETRIC PRESSURE SENSOR CIRCUIT HIGH

DTC detecting condition:

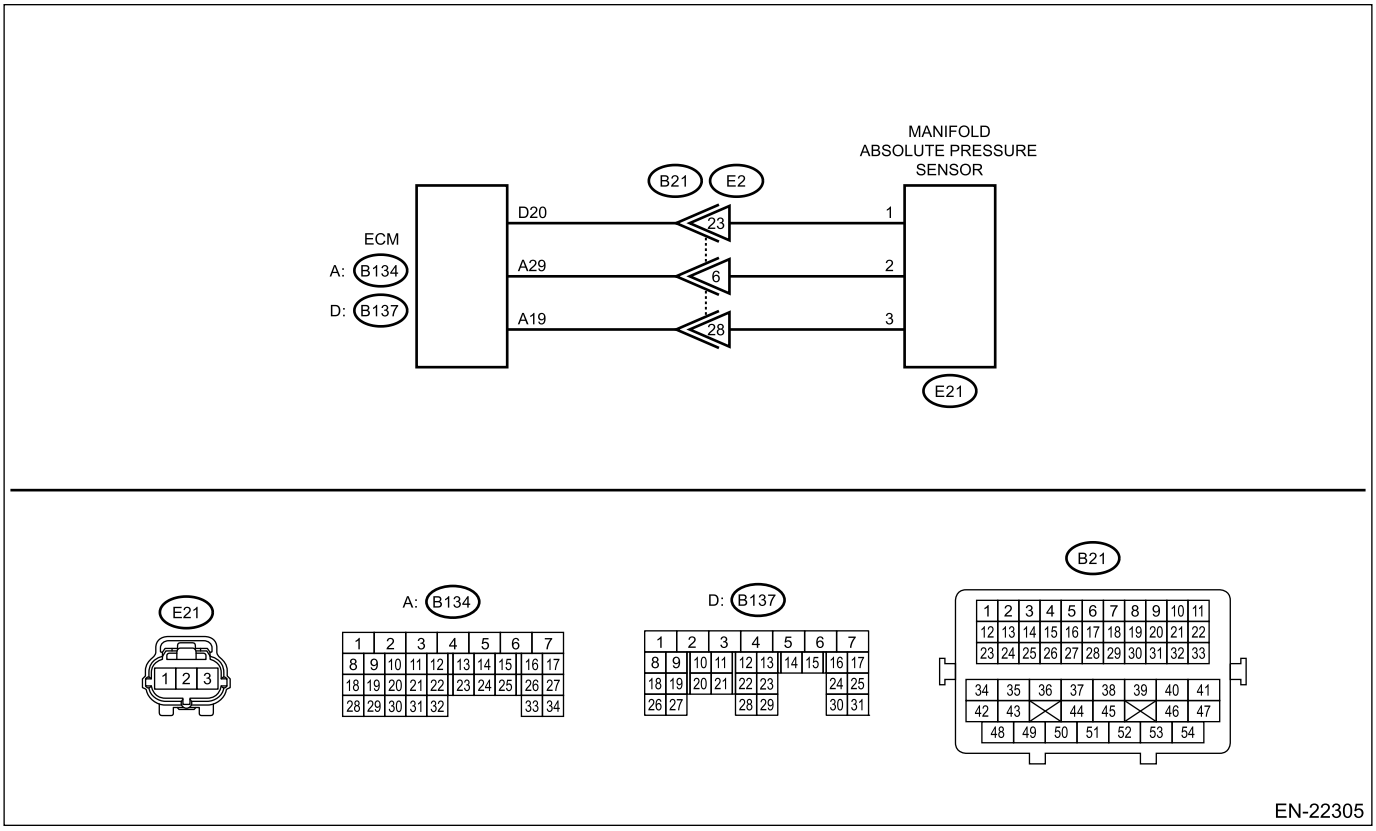
Immediately at fault recognition

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CURRENT DATA.

1. Start the engine.
2. Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Mani. Absolute Pressure» 119.5 kPa (896.5 mmHg, 35.29 inHg) or more?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from manifold absolute pressure sensor.
3. Start the engine.
4. Read the value of «Mani. Absolute Pressure» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Mani. Absolute Pressure» 119.5 kPa (896.5 mmHg, 35.29 inHg) or more?

Yes	Repair the short circuit to power in harness between ECM connector and manifold absolute pressure sensor connector.
No	Go to 3.

3. CHECK HARNESS BETWEEN ECM AND MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between manifold absolute pressure sensor connector and engine ground.
   Connector & terminal
   (E21) No. 2 — Engine ground:

Is the resistance less than 5 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and manifold absolute pressure sensor connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

4. CHECK FOR POOR CONTACT.

Check for poor contact of manifold absolute pressure sensor connector.

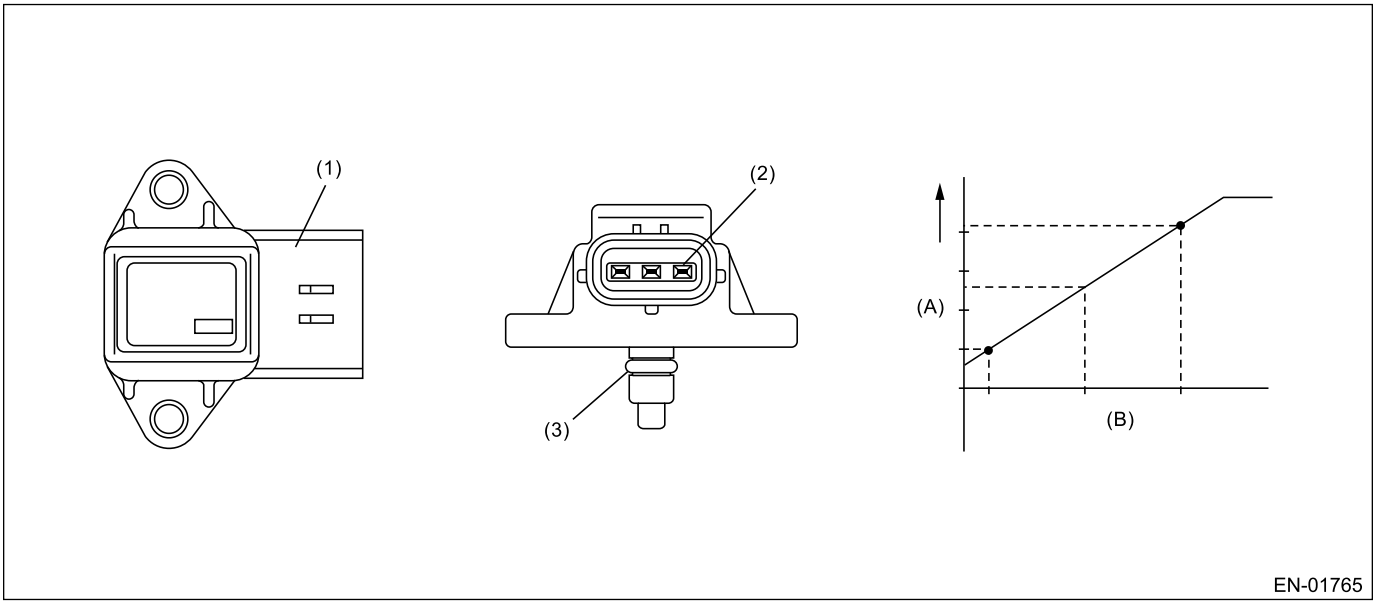
Is there poor contact of manifold absolute pressure sensor connector?

Yes	Repair the poor contact of manifold absolute pressure sensor connector.
No	Replace the manifold absolute pressure sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Manifold Absolute Pressure Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of intake manifold pressure sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Output voltage
(B) Absolute pressure
(1) Connector
(2) Terminals
(3) O-ring

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.681V

time needed for diagnosis: 2000ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0111 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE BANK 1

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

- Improper idling
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P0111 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK CURRENT DATA.

1. Turn the ignition switch to ON.
2. Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.
3. Read the change of the value in «Intake Air Temp.» while heating and cooling the mass air flow and intake air temperature sensor using a hair dryer.
   Caution:
   Do not heat the part to the temperature where you cannot touch it with your bare hand in order to prevent burning yourself and protect the part.

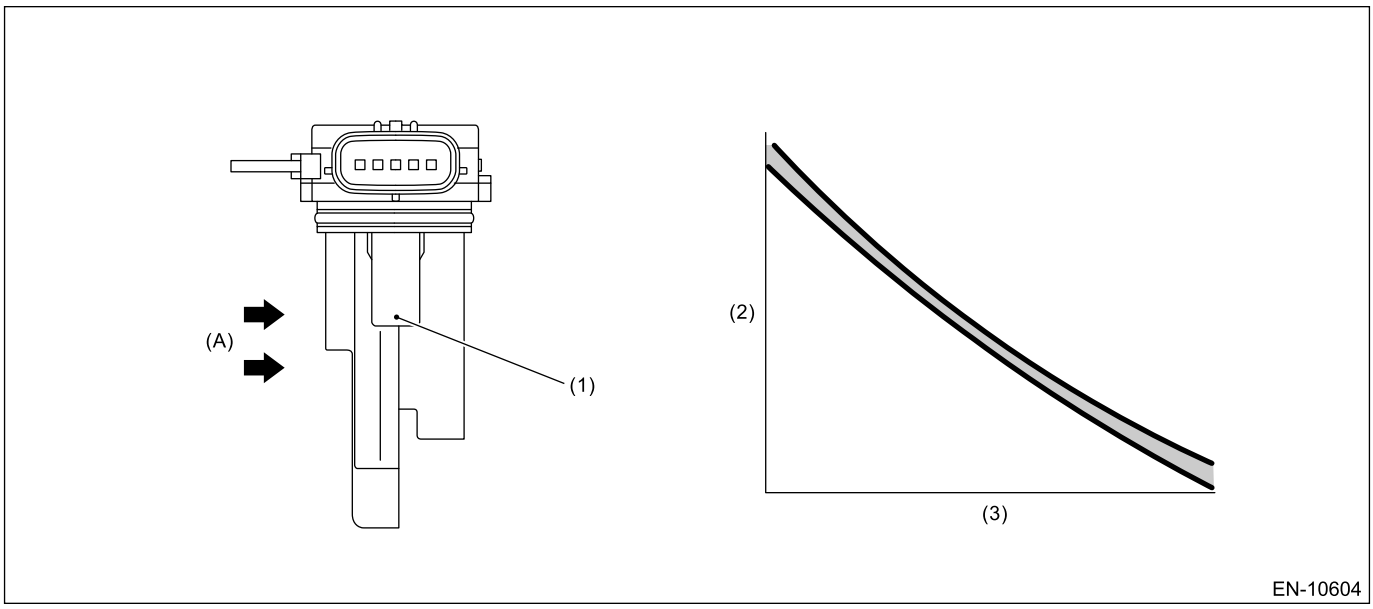
Does the value of «Intake Air Temp.» change between heating and cooling?

Yes	Repair the poor contact of ECM connector.
No	Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of the intake air temperature sensor output properties.
After the engine starts after the specified period of soaking time has elapsed, diagnose by correlation between intake air temperature sensor value, engine coolant temperature sensor value and ambient temperature sensor value. Judge as NG when the differences are both above the specified value by comparing between intake air temperature and engine coolant temperature, intake air temperature and ambient air temperature.

2. COMPONENT DESCRIPTION



(A) Air

(1) Intake air temperature sensor (2) Resistance value (Ω) (3) Intake air temperature (°C (°F))

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Soaking time	≥21600s
Block heater judgment	Completed
Block heater operation	Not in operation

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after the engine starts after a certain period of soaking time.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
|Intake air temperature when 21568ms elapses after engine start − Engine coolant temperature at engine start|	> Value of Map 1
|Intake air temperature when 21568ms elapses after engine start − ambient temperature	> Value of Map 2

Malfunction Criteria	Threshold Value
when 21568ms elapses after engine start|	

Map 1

Ambient temperature (°C (°F))	**−30 (−22)**	**30 (86)**	**45 (113)**	**60 (140)**
|Intake air temperature when 21568 ms elapses after engine start − Engine coolant temperature at engine start| (°C (°F))	12 (53.6)	12 (53.6)	22 (71.6)	22 (71.6)

Map 2

Ambient temperature (°C (°F))	**−30 (−22)**	**30 (86)**	**45 (113)**	**60 (140)**
|Intake air temperature when 21568 ms elapses after engine start − ambient temperature when 21568 ms elapses after engine start| (°C (°F))	20 (68)	20 (68)	32 (89.6)	32 (89.6)

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0112 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT LOW BANK 1

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

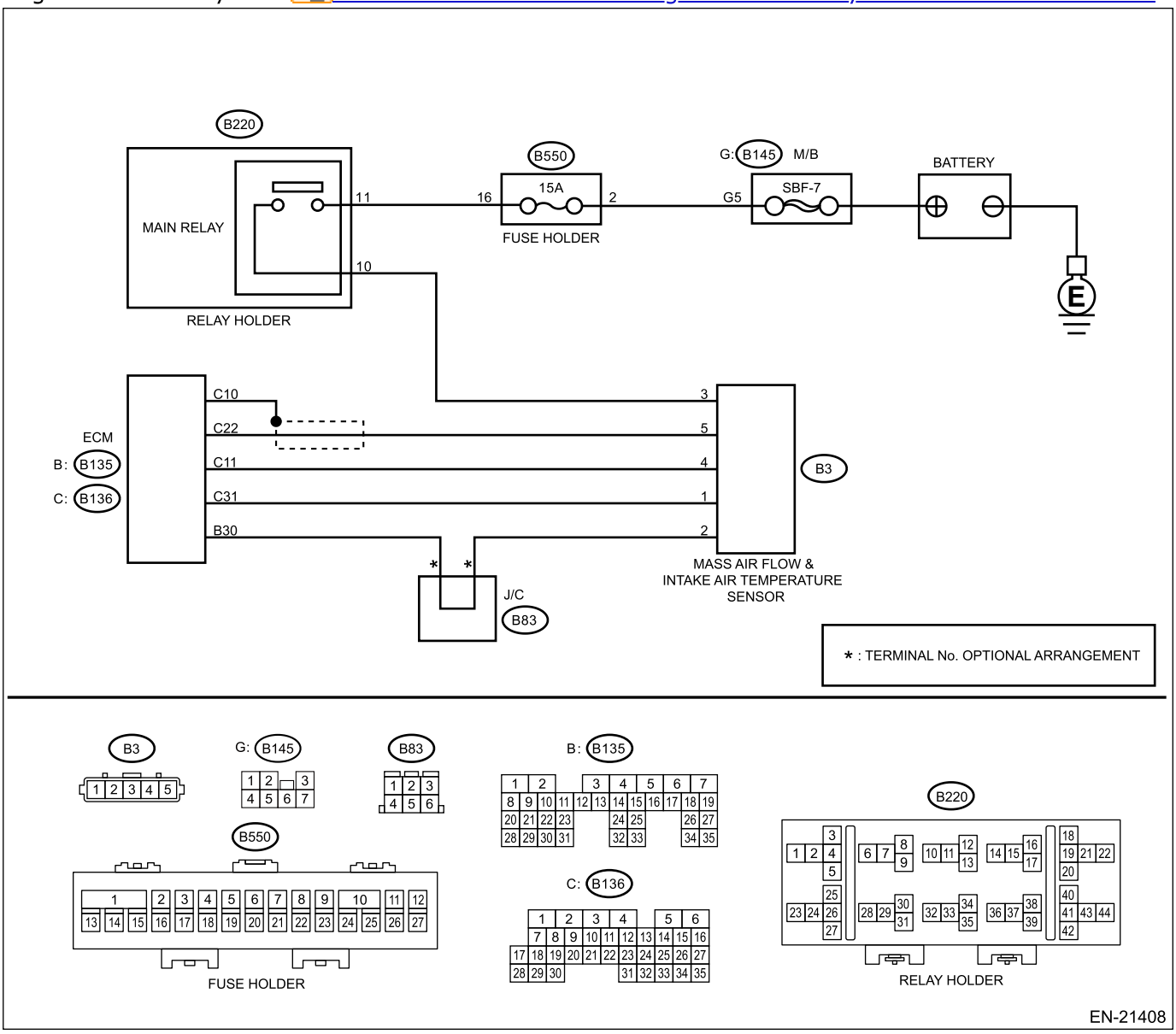
- Improper idling
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CURRENT DATA.

1. Start the engine.
2. Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Intake Air Temp.» 120°C (248°F) or more?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the mass air flow and intake air temperature sensor.
4. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 31 — Chassis ground:

Is the resistance 1 MΩ or more?

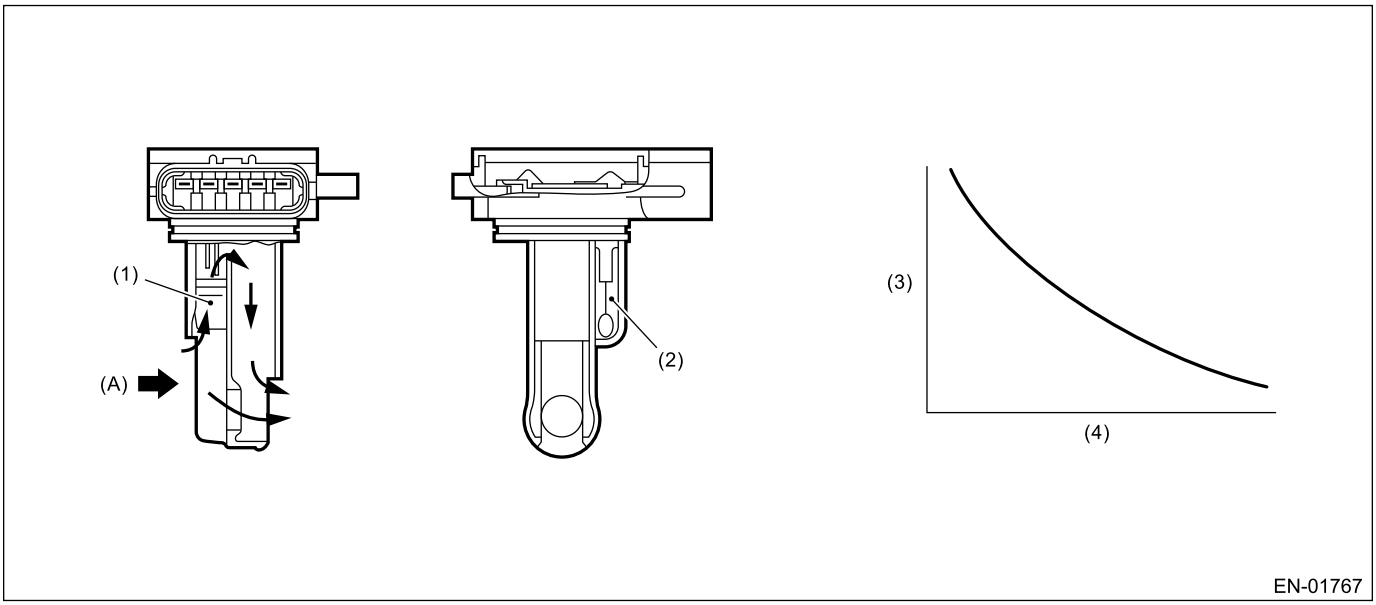
Yes	Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.
No	Repair the ground short circuit of harness between ECM connector and the mass air flow and intake air temperature sensor connector.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the intake air temperature sensor.

Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Air

(1) Air flow sensor

(2) Intake air temperature sensor

(3) Resistance value (Ω)

(4) Intake air temperature (°C (°F))

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< 0.395V

time needed for diagnosis: 500ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0113 INTAKE AIR TEMPERATURE SENSOR 1 CIRCUIT HIGH BANK 1

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

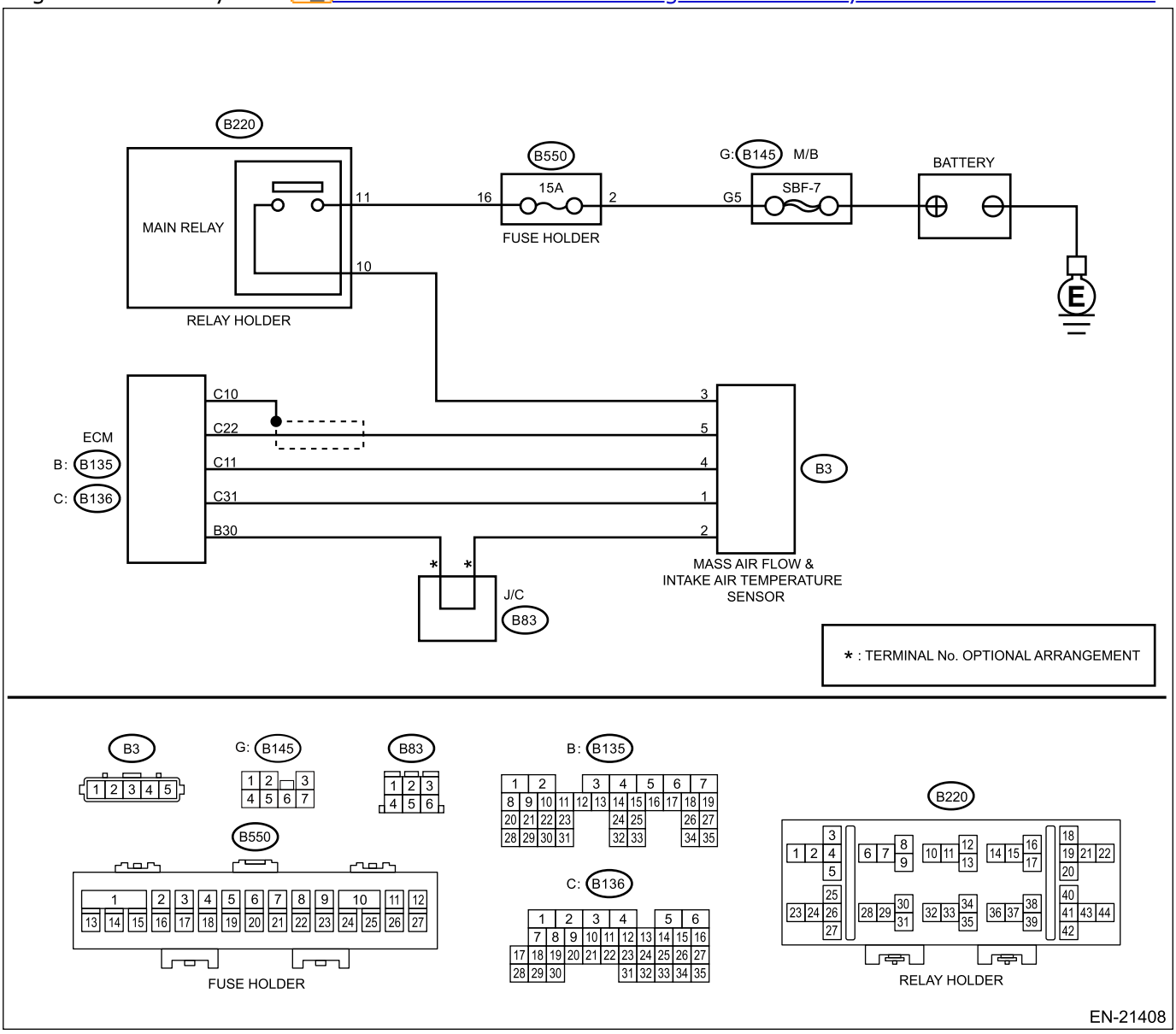
- Improper idling
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CURRENT DATA.

1. Start the engine.
2. Read the value of «Intake Air Temp.» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Intake Air Temp.» less than −40°C (−40°F)?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and mass air flow and intake air temperature sensor connector.

Is there poor contact of ECM or mass air flow and intake air temperature sensor connector?

Yes	Repair the poor contact of ECM or mass air flow and intake air temperature sensor connector.
No	Go to 3.

3. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the mass air flow and intake air temperature sensor.
4. Measure the resistance of harness between ECM connector and the mass air flow and intake air temperature sensor connector.
   Connector & terminal
   (B136) No. 31 — (B3) No. 1:
   (B135) No. 30 — (B3) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and the mass air flow and intake air temperature sensor connector** • **Poor contact of joint connector**

4. CHECK HARNESS BETWEEN ECM AND MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR CONNECTOR.

1. Connect all connectors.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 31 (+) — Chassis ground (−):

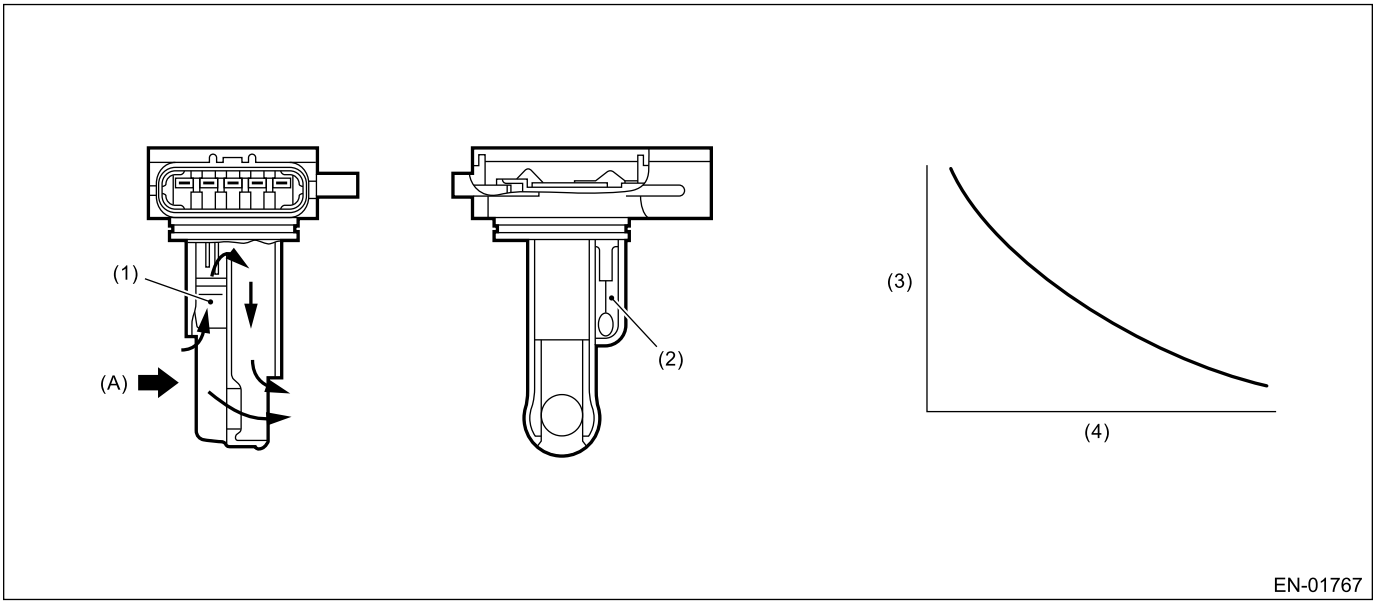
Is the voltage 5 V or more?

Yes	Repair the short circuit of harness to power supply between ECM connector and the mass air flow and intake air temperature sensor connector.
No	Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the intake air temperature sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Air

(1) Air flow sensor

(2) Intake air temperature sensor

(3) Resistance value (Ω)

(4) Intake air temperature (°C (°F))

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.712V

time needed for diagnosis: 500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0116 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT RANGE/PERFORMANCE

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Trouble symptom:

- Hard to start
- Improper idling
- Poor driving performance

Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P0116 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

1. Disconnect the connectors from the engine coolant temperature sensor.
2. Measure the resistance between engine coolant temperature sensor terminals when the engine coolant is cold and after warmed up.
   Terminals
   No. 1 — No. 2:

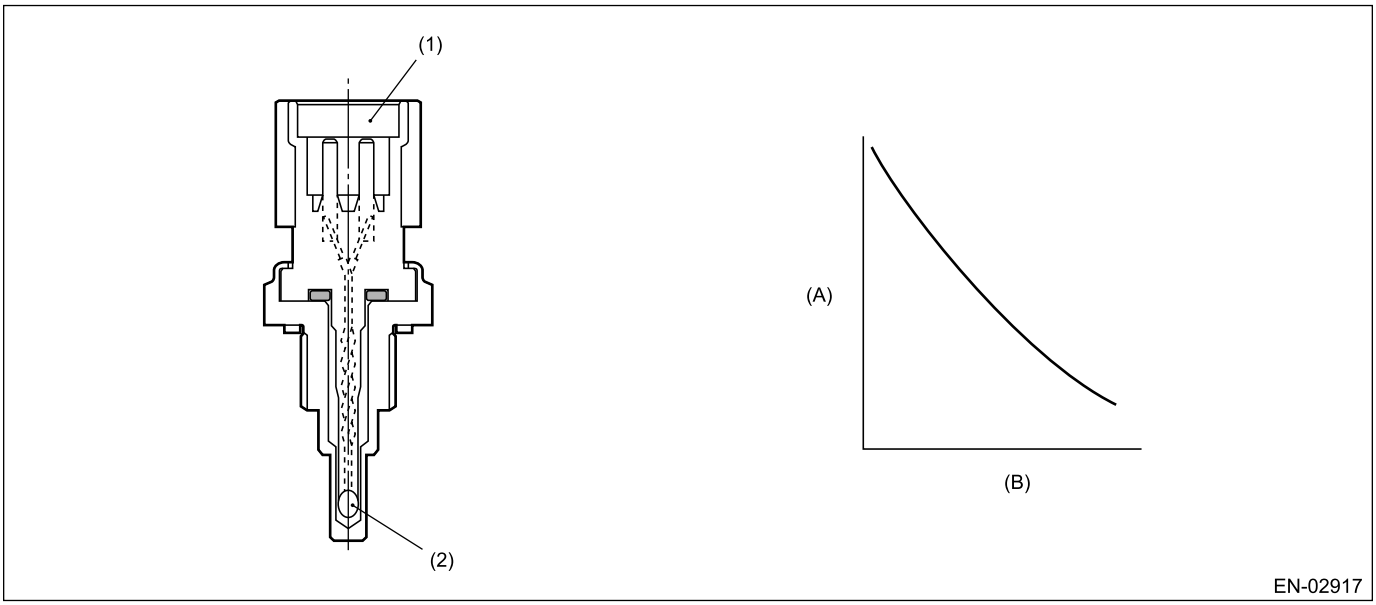
Is the resistance of engine coolant temperature sensor different between when engine coolant is cold and after warmed up?

Yes	Repair the poor contact of ECM connector.
No	Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Coolant Temperature Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of the engine coolant temperature sensor characteristics.
After the engine starts after the specified period of soaking time has elapsed, diagnose by correlation between engine coolant temperature sensor value, intake air temperature sensor value and ambient temperature sensor value. Judge as NG when the differences are both above the specified value by comparing between engine coolant temperature and ambient air temperature, engine coolant temperature and intake air temperature.

2. COMPONENT DESCRIPTION



(A) Resistance value (kΩ)
(B) Temperature (°C (°F))
(1) Connector
(2) Thermistor element

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Soaking time	≥ 21600s
Block heater judgment	Completed
Block heater operation	Not in operation

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after the engine starts after a certain period of soaking time.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
|Engine coolant temperature at engine start − Intake air temperature when 21568ms elapses after engine start|	> Value from Map
|Engine coolant temperature at engine start − Ambient air temperature at engine start|	> 25°C (77°F)

Map

Ambient temperature (°C (°F))	**−30 (−22)**	**30 (86)**	**45 (113)**	**60 (140)**
|Engine coolant temperature at engine start − Intake air temperature when 21568 ms elapses after engine start| (°C (°F))	12 (53.6)	12 (53.6)	22 (71.6)	22 (71.6)

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0117 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT LOW

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

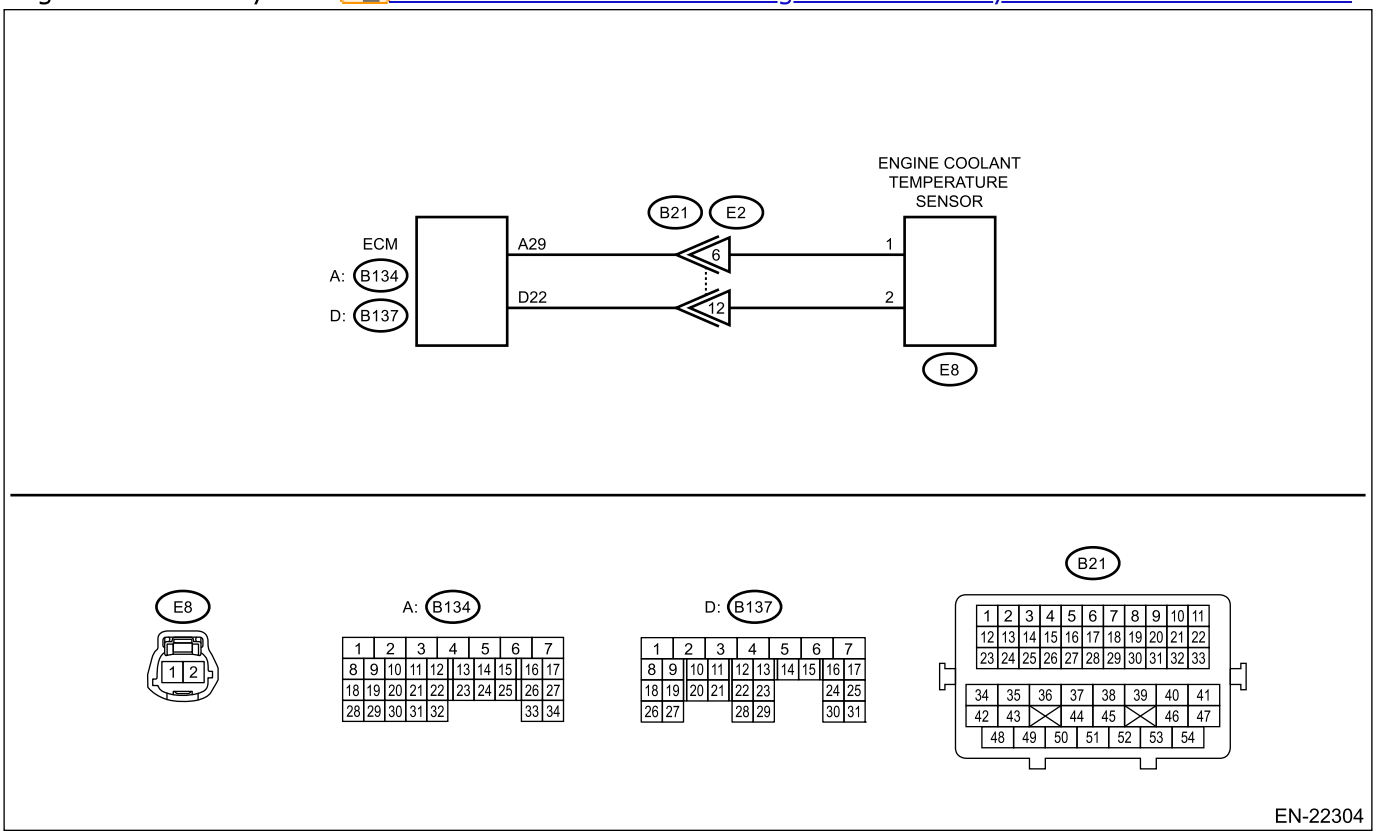
- Hard to start
- Improper idling
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CURRENT DATA.

1. Start the engine.
2. Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine". **Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.**
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Coolant Temp.» 150°C (302°F) or more?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the engine coolant temperature sensor.
4. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B137) No. 22 — Chassis ground:

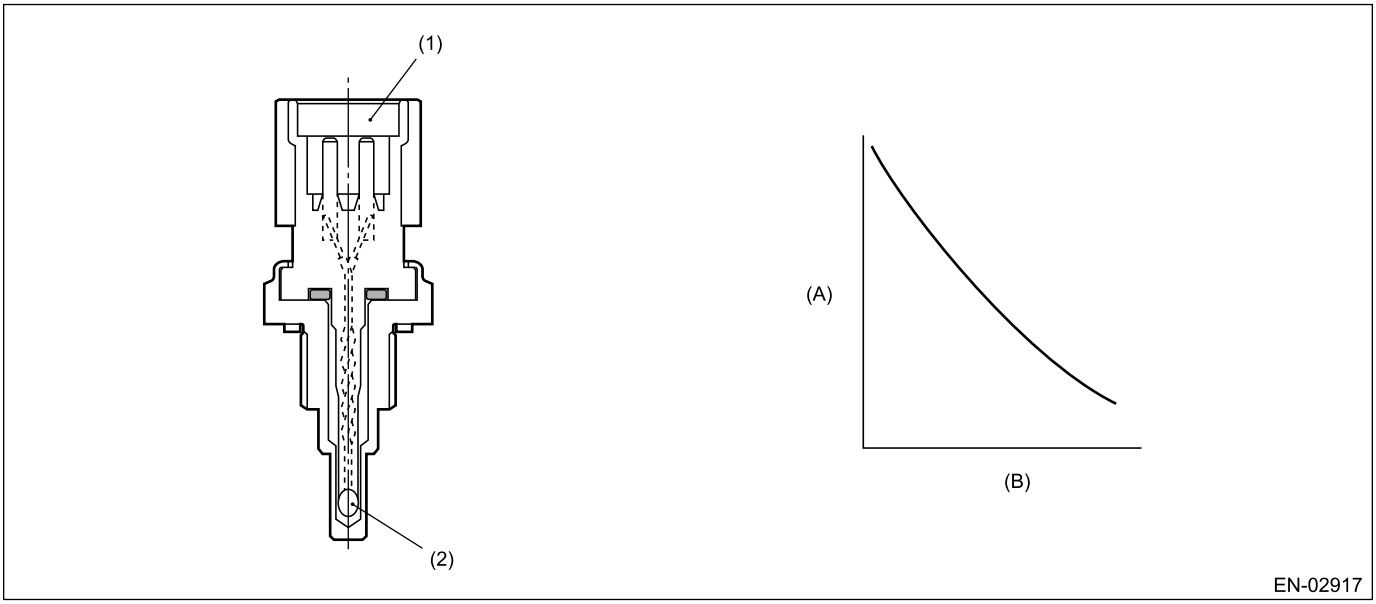
Is the resistance 1 MΩ or more?

Yes	Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Coolant Temperature Sensor.
No	Repair the short circuit to ground in harness between ECM connector and engine coolant temperature sensor connector.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the engine coolant temperature sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Resistance value (kΩ)
(B) Temperature (°C (°F))
(1) Connector
(2) Thermistor element

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< 0.343V

time needed for diagnosis: 500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0118 ENGINE COOLANT TEMPERATURE SENSOR 1 CIRCUIT HIGH

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

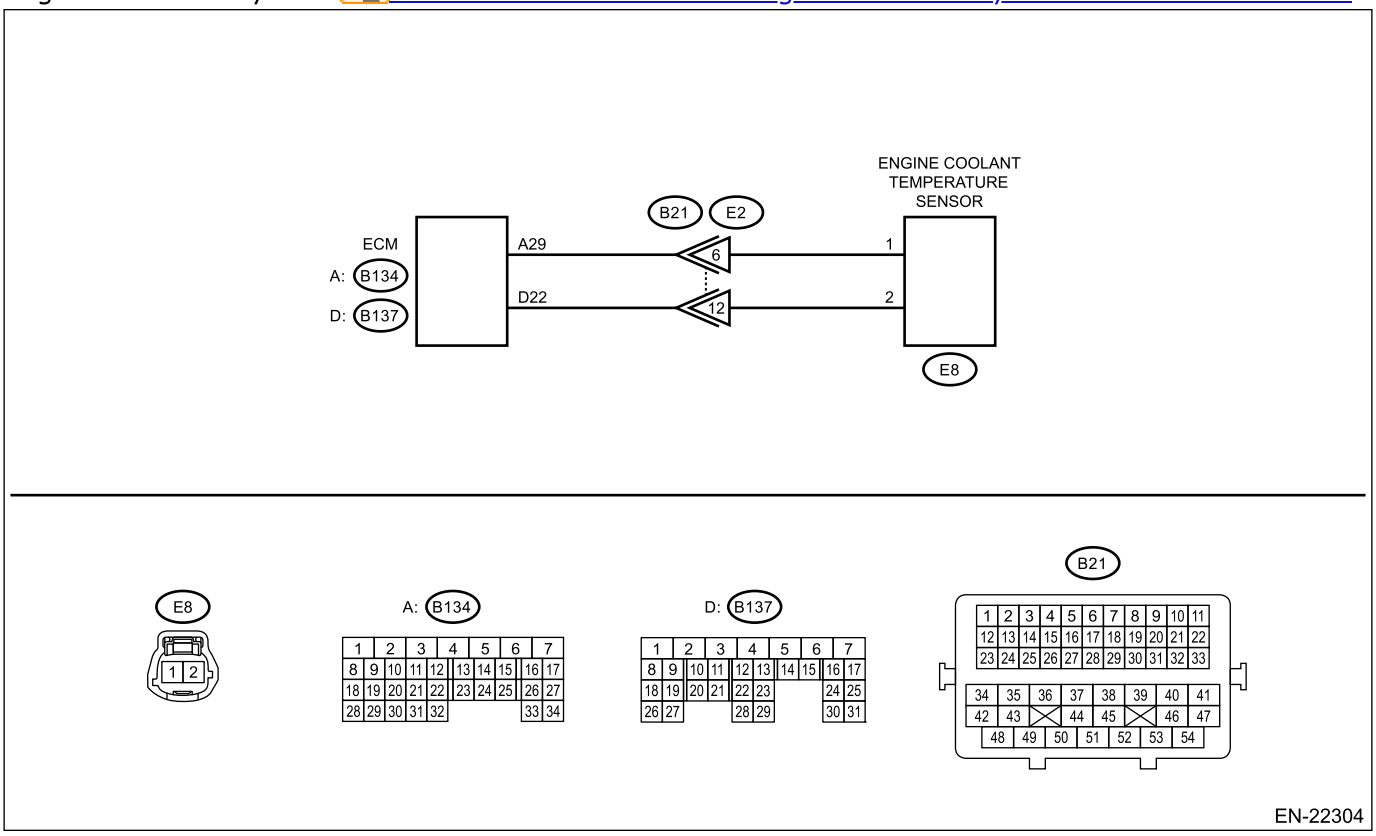
- Hard to start
- Improper idling
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CURRENT DATA.

1. Start the engine.
2. Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Coolant Temp.» less than −40°C (−40°F)?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and engine coolant temperature sensor connector.

Is there poor contact of ECM or engine coolant temperature sensor connector?

Yes	Repair the poor contact of ECM or engine coolant temperature sensor connector.
No	Go to 3.

3. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from the engine coolant temperature sensor.
4. Measure the resistance of harness between ECM connector and engine coolant temperature sensor connector.
   Connector & terminal
   (B134) No. 29 — (E8) No. 1:
   (B137) No. 22 — (E8) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and engine coolant temperature sensor connector** • **Poor contact of coupling connector**

4. CHECK HARNESS BETWEEN ECM AND ENGINE COOLANT TEMPERATURE SENSOR CONNECTOR.

1. Connect all connectors.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B137) No. 22 (+) — Chassis ground (−):

Is the voltage 5 V or more?

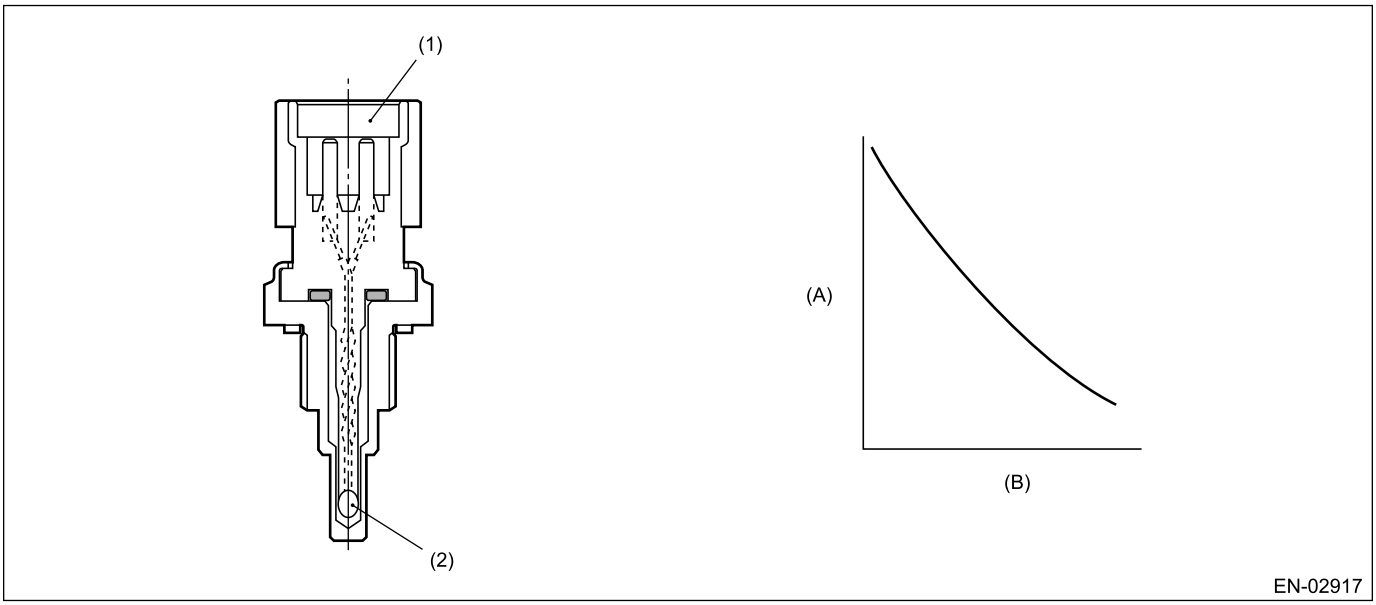
Yes	Repair the short circuit of harness to power supply between ECM connector and engine coolant temperature sensor connector.
No	Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Coolant Temperature Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the engine coolant temperature sensor.

Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) Resistance value (kΩ)
(B) Temperature (°C (°F))
(1) Connector
(2) Thermistor element

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.702V

time needed for diagnosis: 500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT LOW

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

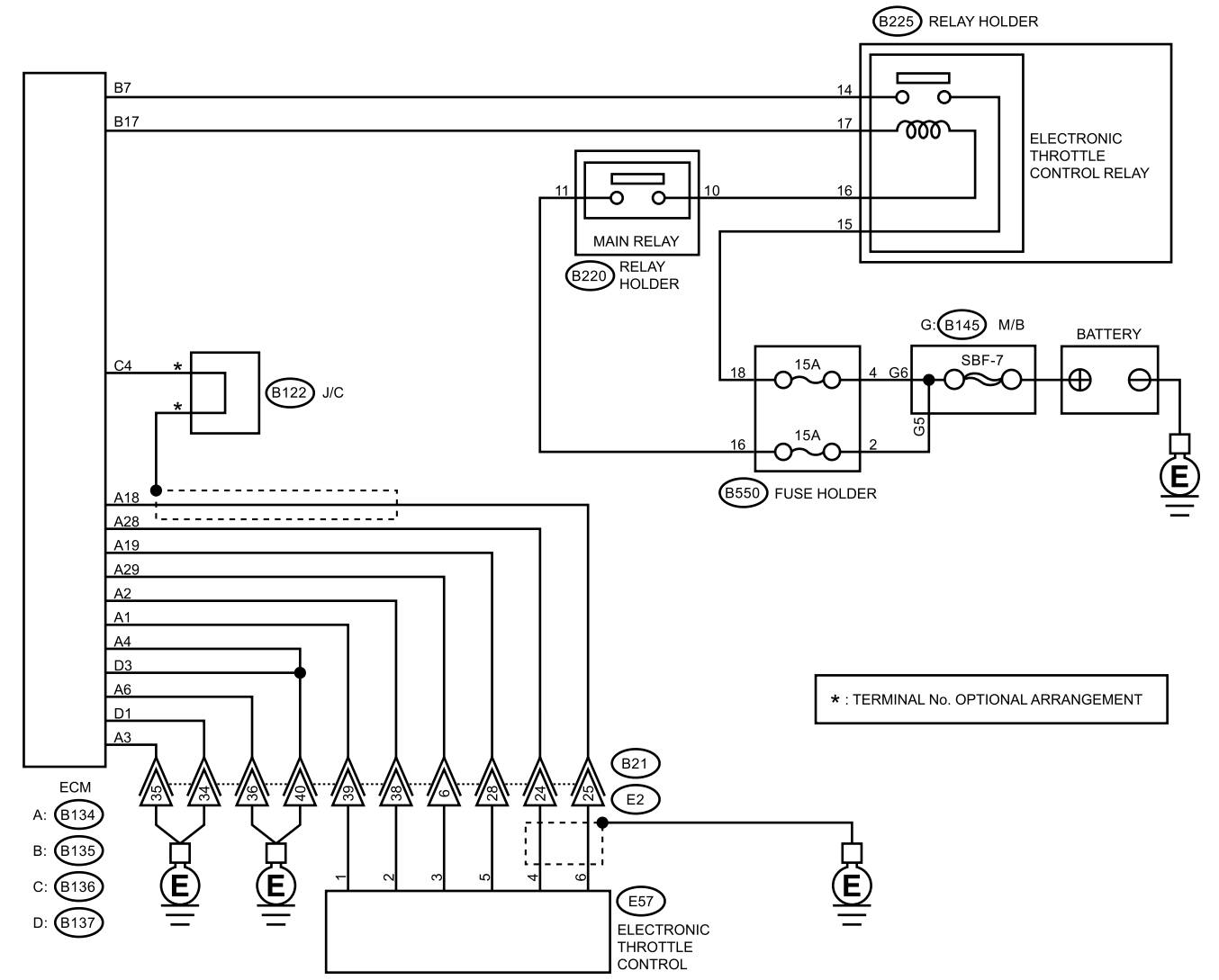
- Improper idling
- Engine stalls.
- Poor driving performance

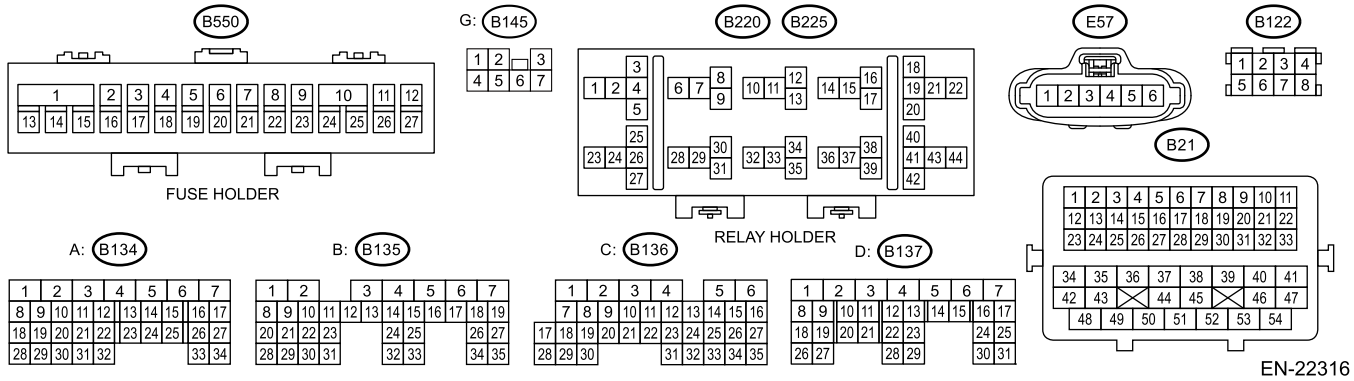
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B225 RELAY HOLDER
B7
B17
14
17
16
15
ELECTRONIC THROTTLE CONTROL RELAY
11
10
MAIN RELAY
B220 RELAY HOLDER
G: B145 M/B
BATTERY
SBF-7
18
15A
4
G6
G5
16
15A
2
B550 FUSE HOLDER
C4
*
*
B122 J/C
A18
A28
A19
A29
A2
A1
A4
D3
A6
D1
A3
* : TERMINAL No. OPTIONAL ARRANGEMENT
ECM
A: B134
B: B135
C: B136
D: B137
35
34
36
40
39
38
6
28
24
25
B21
E2
1
2
3
5
4
6
E57
ELECTRONIC THROTTLE CONTROL


B550
FUSE HOLDER
G: B145
B220
B225
RELAY HOLDER
E57
B122
B21
A: B134
B: B135
C: B136
D: B137

EN-22316

1. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B134) No. 19 — Chassis ground:
   (B134) No. 18 — Chassis ground:
   (B134) No. 18 — (B136) No. 4:

Is the resistance 1 MΩ or more?

Yes	Go to 2.
No	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

2. CHECK SHORT CIRCUIT INSIDE THE ECM.

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 6 — Engine ground:

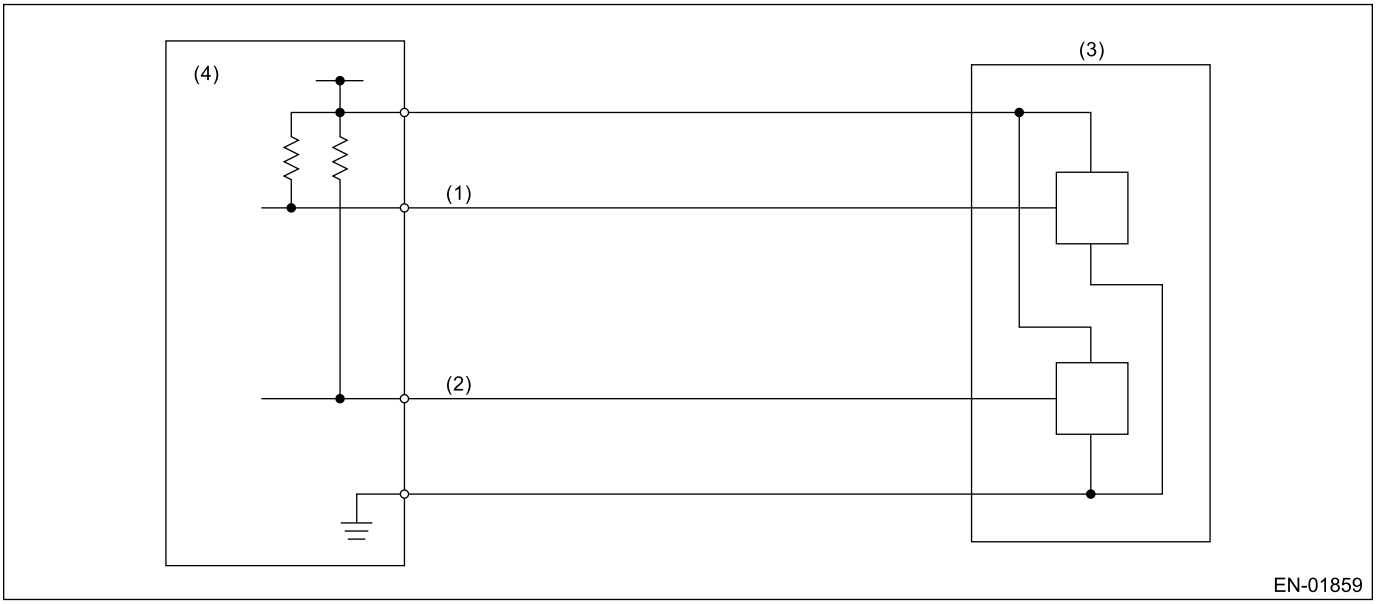
Is the resistance 1 MΩ or more?

Yes	Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Throttle Body.
No	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. Replace the ECM if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 1.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥6V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	≤0.27V

time needed for diagnosis: 24ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A" CIRCUIT HIGH

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

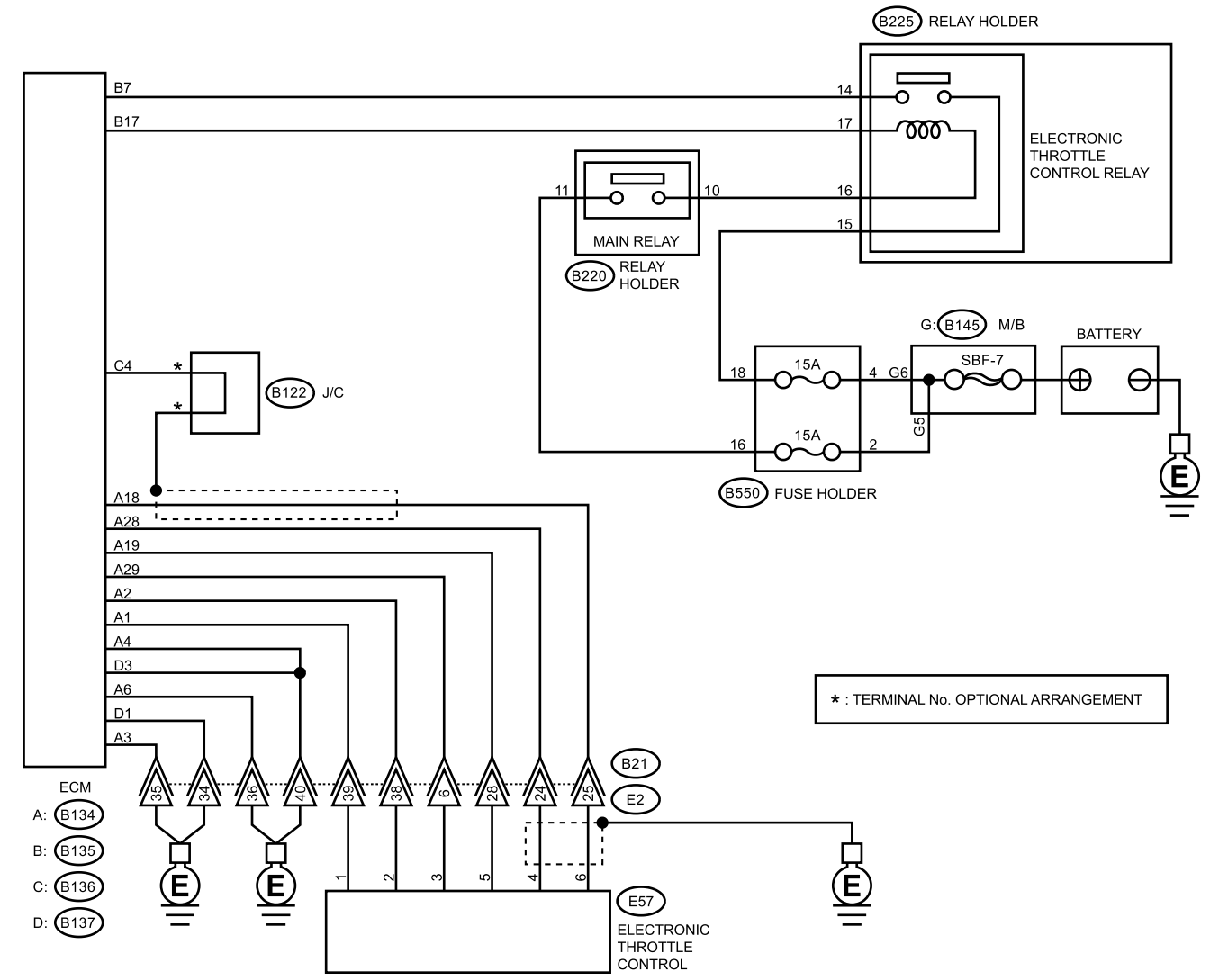
- Improper idling
- Engine stalls.
- Poor driving performance

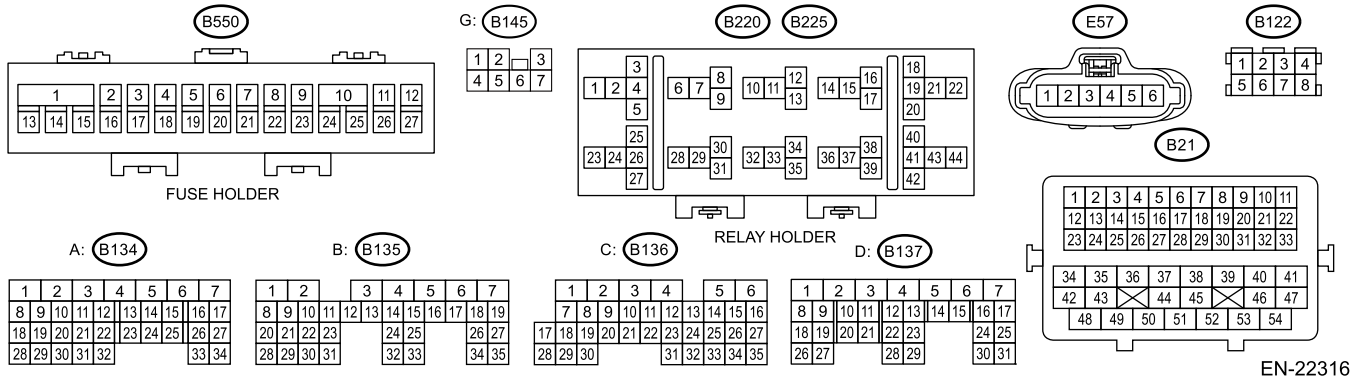
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B225 RELAY HOLDER
B7
B17
14
17
16
15
ELECTRONIC THROTTLE CONTROL RELAY
11
10
MAIN RELAY
B220 RELAY HOLDER
G: B145 M/B
BATTERY
SBF-7
18
15A
4
G6
G5
16
15A
2
B550 FUSE HOLDER
C4
*
*
B122 J/C
A18
A28
A19
A29
A2
A1
A4
D3
A6
D1
A3
* : TERMINAL No. OPTIONAL ARRANGEMENT
ECM
A: B134
B: B135
C: B136
D: B137
35
34
36
40
39
38
6
28
24
25
B21
E2
1
2
3
5
4
6
E57
ELECTRONIC THROTTLE CONTROL


B550
FUSE HOLDER
G: B145
B220
B225
RELAY HOLDER
E57
B122
B21
A: B134
B: B135
C: B136
D: B137

EN-22316

1. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance of harness between ECM connector and electronic throttle control connector.
   Connector & terminal
   (B134) No. 18 — (E57) No. 6:
   (B134) No. 29 — (E57) No. 3:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and electronic throttle control connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to ON.
2. Measure the voltage between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 6 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.
No	Go to 4.

4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   Connector & terminal
   (B134) No. 19 — (B134) No. 18:

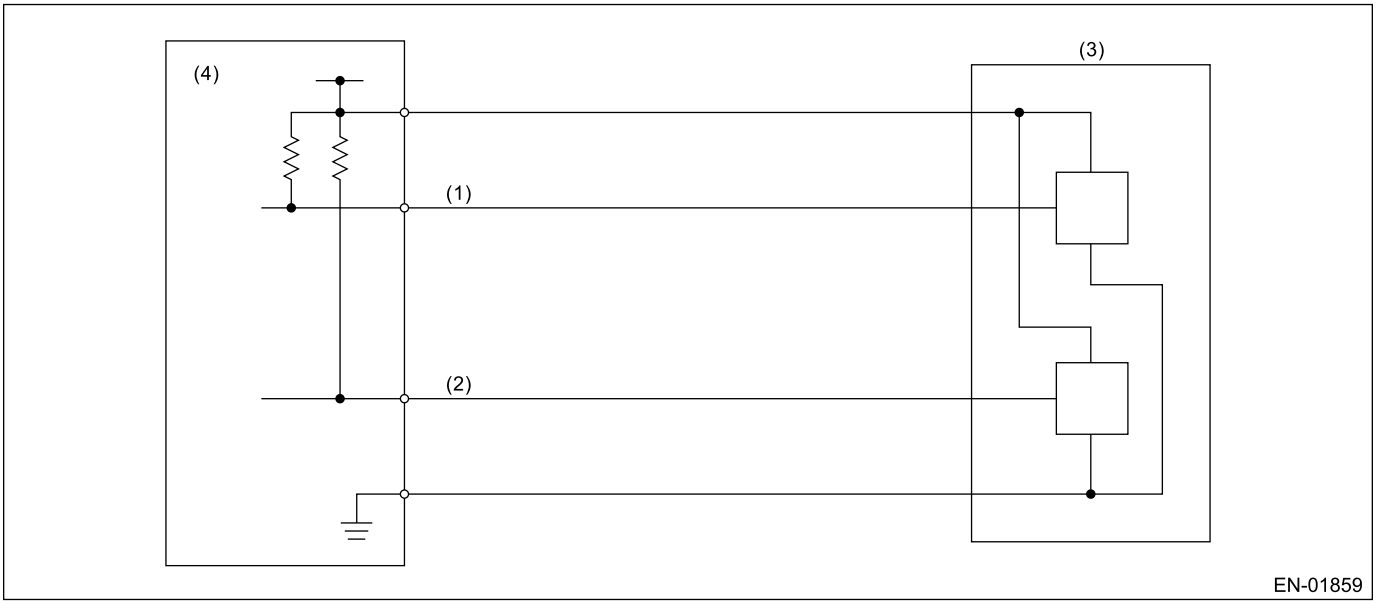
Is the resistance 1 MΩ or more?

Yes	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Throttle Body.
No	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 1.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥6V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	≥4.858V

time needed for diagnosis: 24ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0125 INSUFFICIENT COOLANT TEMPERATURE FOR CLOSED LOOP FUEL CONTROL

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Trouble symptom:
Engine does not return to idle.
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK ENGINE COOLANT.

Check the following items:
- Amount of engine coolant
- Engine coolant freeze
- Contamination of engine coolant

Is the check result OK?

Yes	Go to 2.
No	Fill or replace the engine coolant. Ref. to COOLING(STI)>Engine Coolant.

2. CHECK THERMOSTAT.

Check the thermostat. Ref. to COOLING(STI)>Thermostat>INSPECTION.

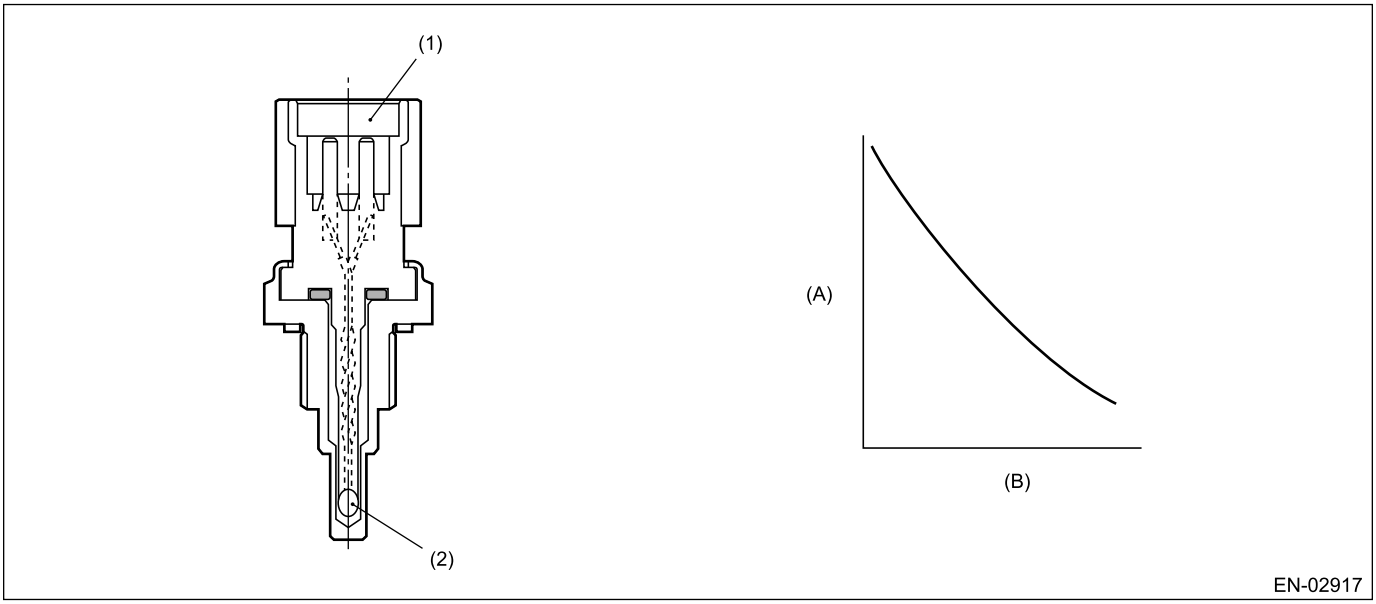
Does the thermostat remain opened?

Yes	Replace the thermostat. Ref. to COOLING(STI)>Thermostat.
No	Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Coolant Temperature Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of engine coolant temperature output property.
Judge as NG when engine coolant temperature does not rise to the specified value after predetermined time has elapsed since engine start.

2. COMPONENT DESCRIPTION



(A) Resistance value (kΩ)
(B) Temperature (°C (°F))
(1) Connector
(2) Thermistor element

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Engine speed	≥ 600 rpm
Reference engine coolant temperature	> 80°C (176°F)
Engine coolant temperature at engine start	< 80°C (176°F)
Perform the following condition A or B	
Condition A:	
Coolant temperature drop judgment	Completed
Coolant temperature drop	Not detected
Condition B:	
Coolant temperature drop judgment	Completed
Coolant temperature drop	Detected
Engine speed integrated value	> 1131rev (Depending on the ambient temperature)

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after starting the engine from cold condition.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Actual engine coolant temperature	< 80°C
Σ (Reference engine coolant temperature - Actual engine coolant temperature)	> 1731.6 °C (3116.9°F)

Time needed for diagnosis: Less than 1 second

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0128 COOLANT THERMOSTAT (ENGINE COOLANT TEMPERATURE BELOW THERMOSTAT REGULATING TEMPERATURE)

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

- Thermostat remains open.
- Coolant temperature rises slowly.

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P0128 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK ENGINE COOLANT.

Check the engine coolant amount.

Is the check result OK?

Yes	Go to 3.
No	Refill the engine coolant. Ref. to COOLING(STI)>Engine Coolant.

3. CHECK RADIATOR FAN.

1. Start the engine.
2. Idle for approximately three minutes. (Accelerator OFF condition)
3. Check the radiator fan operation.

Does the radiator fan continuously rotate for 3 minutes or more during idling?

Yes	Repair radiator fan circuit. Ref. to COOLING(STI)>Radiator Main Fan and Fan Motor. Ref. to COOLING(STI)>Radiator Sub Fan and Fan Motor.
No	Go to 4.

4. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

Check the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Coolant Temperature Sensor>INSPECTION.

Is the check result OK?

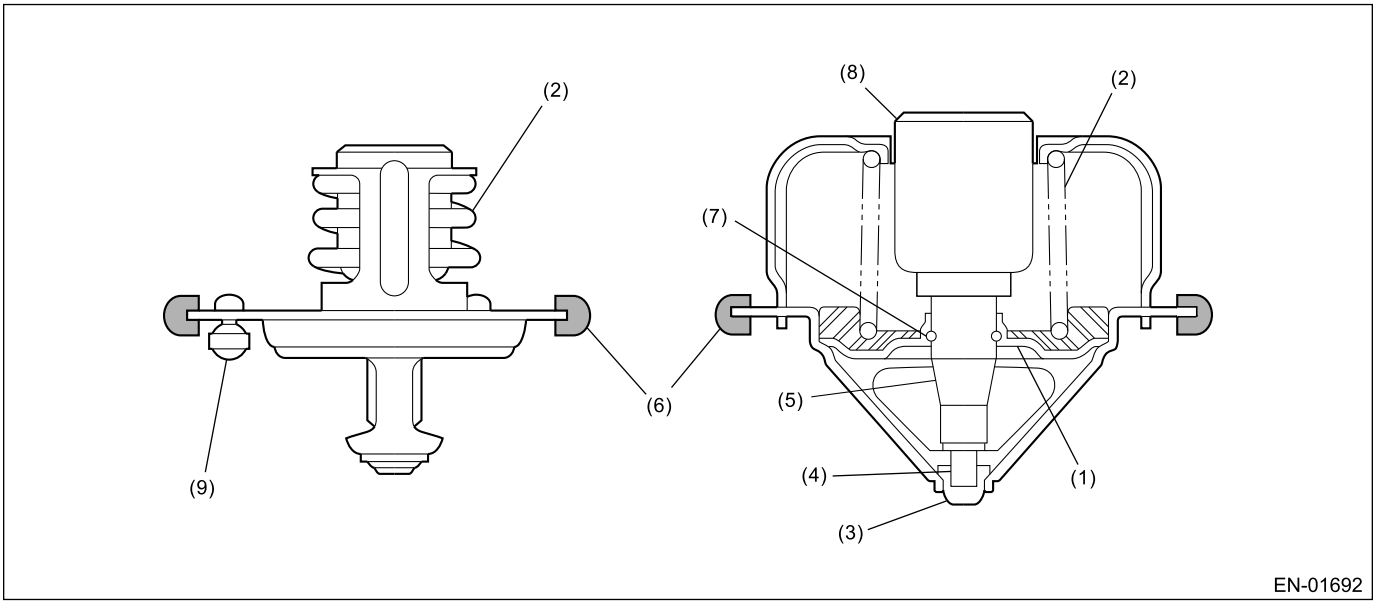
Yes	Replace the thermostat. Ref. to COOLING(STI)>Thermostat.
No	Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Coolant Temperature Sensor.

1. OUTLINE OF DIAGNOSIS

Detect malfunctions of the thermostat function.
Judge as NG when any one of the following conditions is established.

- When the actual engine coolant temperature does not reach the maximum temperature necessary to perform other OBDII diagnosis and Σ (Estimated engine coolant temperature − actual engine coolant temperature) exceeded the predetermined value. (Judgment 1)
- When the actual engine coolant temperature does not reach the range within −11°C (−19.8°F) from the regulated temperature and Σ (Estimated engine coolant temperature − actual engine coolant temperature) exceeded the predetermined value. (Judgment 2)
- When the actual engine coolant temperature becomes equal to or less than the specified value after it reached -11.1°C (-19.98°F). (Judgment 3)

2. COMPONENT DESCRIPTION



(1) Valve
(2) Spring
(3) Stopper
(4) Piston
(5) Guide
(6) Rubber seal
(7) Stop ring
(8) Wax element
(9) Jiggle valve

3. EXECUTION CONDITION

Secondary parameters	Execution condition
<Judgment 1>	
Battery voltage Ambient air temperature	≥ 10.9 V ≥ −7°C (19.4°F)
Engine coolant temperature at engine start	< 60°C (140°F)
<Judgment 2>	
Battery voltage Ambient air temperature	≥ 10.9 V ≥ −7°C (19.4°F)
Engine coolant temperature at engine start	< 60°C (140°F)
<Judgment 3>	
Battery voltage Ambient air temperature Actual engine coolant temperature	≥ 10.9 V ≥ −7°C (19.4°F) ≥ 77.5°C (171.5°F) (Experienced)
Diagnostic mask conditions	Not completed

4. GENERAL DRIVING CYCLE

- Judgment 1 and judgment 2: Perform the diagnosis only once after the engine starts.
- Judgment 3: Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
When any one of the followings is established:	
<Judgment 1>	
Actual engine coolant temperature Σ (Estimated engine coolant temperature − actual engine coolant temperature)	< 60°C (140°F) > Value of Map 1
Estimated coolant temperature	> 60°C (140°F)
<Judgment 2>	
Actual engine coolant temperature Σ (Estimated engine coolant temperature − actual engine coolant temperature)	< 77.5°C (171.5°F) > Value of Map 2
Estimated coolant temperature	> 77.5°C (171.5°F)
<Judgment 3>	
Actual engine coolant temperature	< 60°C (140°F)

Map 1

Engine coolant temperature at engine starting (°C (°F))	**−7 (19.4)**	**0 (32)**	**8 (46.4)**	**10 (50)**	**25 (77)**	**35 (95)**
Threshold Value (°C (°F))	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (2160)

Map 2

Engine coolant temperature at engine starting (°C (°F))	**−7 (19.4)**	**0 (32)**	**8 (46.4)**	**10 (50)**	**25 (77)**	**30 (86)**	**35 (95)**
Threshold Value (°C (°F))	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (3116.9)	1731.6 (2160)

Time needed for diagnosis:
Judgment 1: Less than 1 second
Judgment 2: Less than 1 second
Judgment 3**:** 10000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0131 A/F / O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 1

DTC detecting condition:

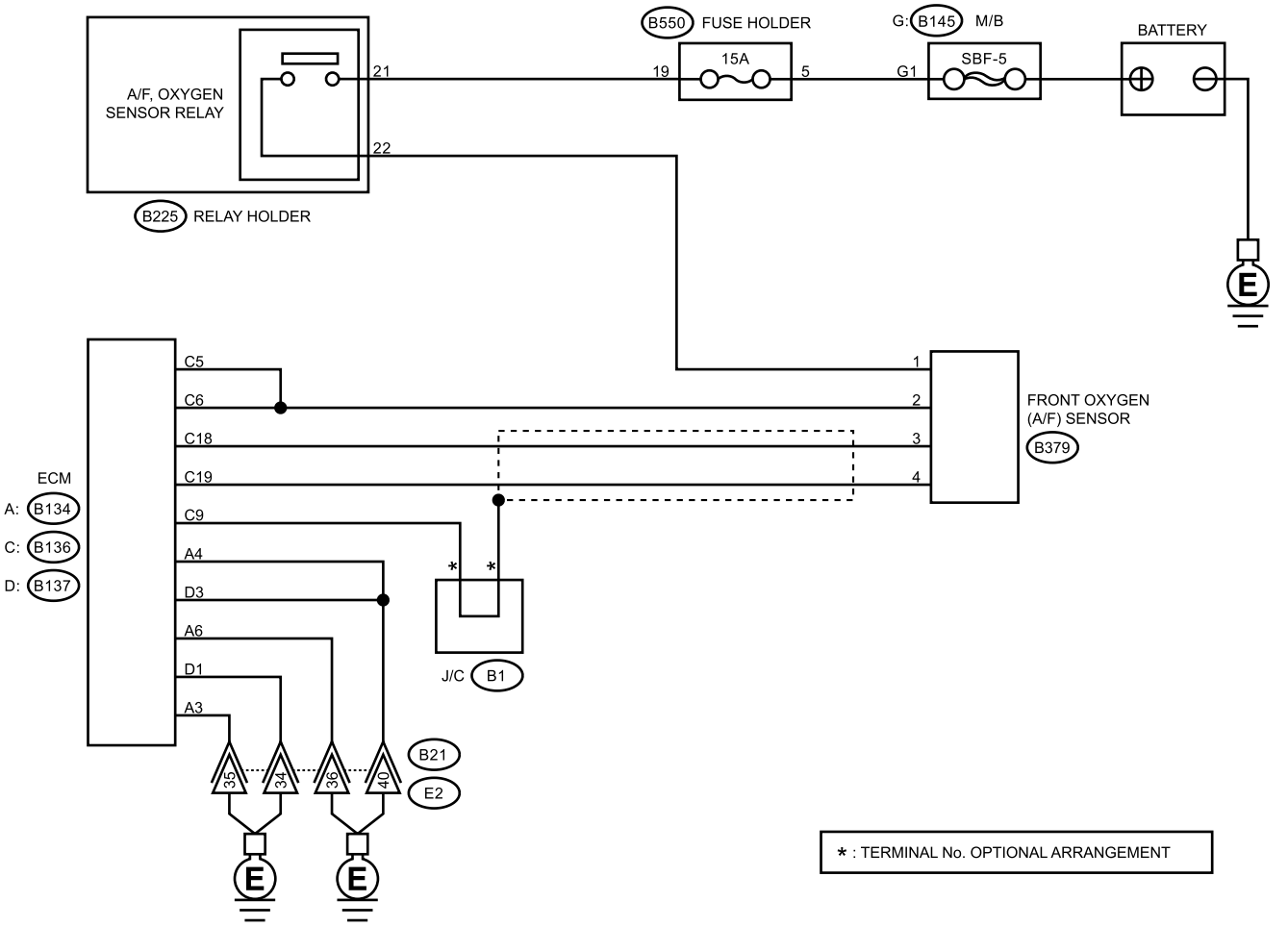
Immediately at fault recognition

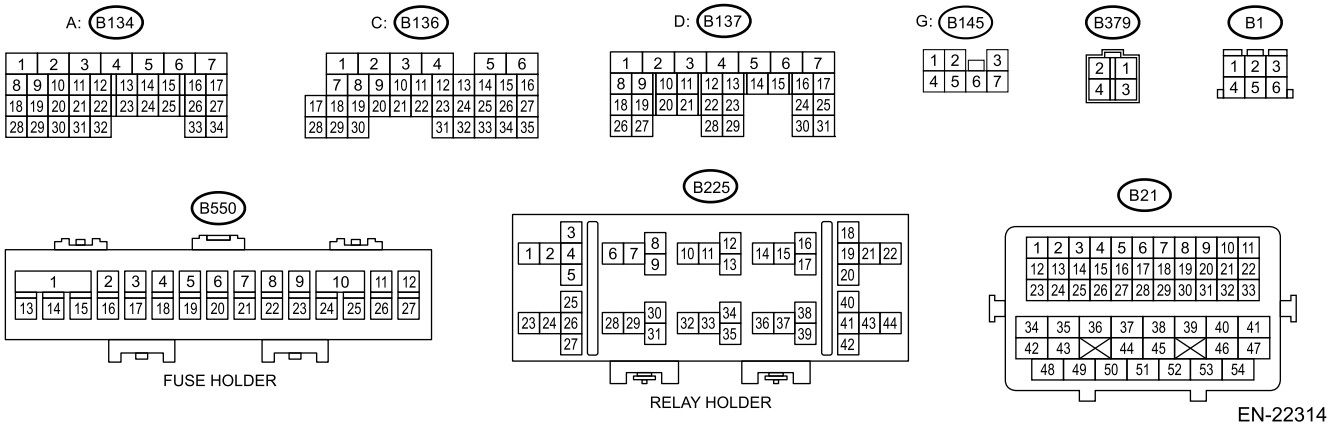
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


A/F, OXYGEN SENSOR RELAY
21
22
B225 RELAY HOLDER
B550 FUSE HOLDER
19
15A
5
G: B145 M/B
G1
SBF-5
BATTERY
E
ECM
A: B134
C: B136
D: B137
C5
C6
C18
C19
C9
A4
D3
A6
D1
A3
J/C B1
1
2
3
4
FRONT OXYGEN (A/F) SENSOR
B379
B21
E2
35
34
36
40
* : TERMINAL No. OPTIONAL ARRANGEMENT


A: B134
C: B136
D: B137
G: B145
B379
B1
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-22314

1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR.

Check the front oxygen (A/F) sensor connector.

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from front oxygen (A/F) sensor.
4. Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B136) No. 18 — Chassis ground:

(B136) No. 19 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.

3. CHECK FOR POOR CONTACT.

Check for poor contact of the front oxygen (A/F) sensor connector.

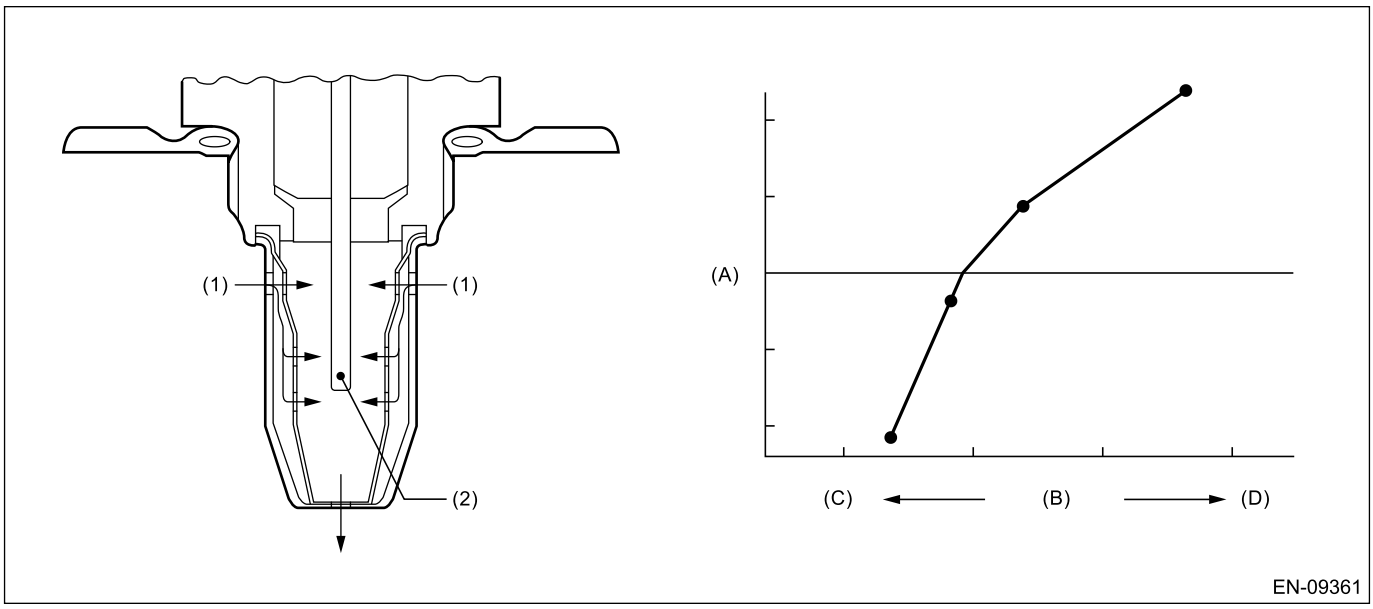
Is there poor contact of front oxygen (A/F) sensor connector?

Yes	Repair the poor contact of front oxygen (A/F) sensor connector.
No	Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Front Oxygen (A/F) Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of sensor.
Judge as NG, when the element voltage is out of the specified range.

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean
(1) Exhaust gas (2) Zirconia element oxygen

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Input voltage (+) or Input voltage (−) or |Input voltage (+) − Input voltage (−)|	< 1.128V < 0.644V < 0.23V

time needed for diagnosis: 1000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0132 A/F / O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 1

DTC detecting condition:

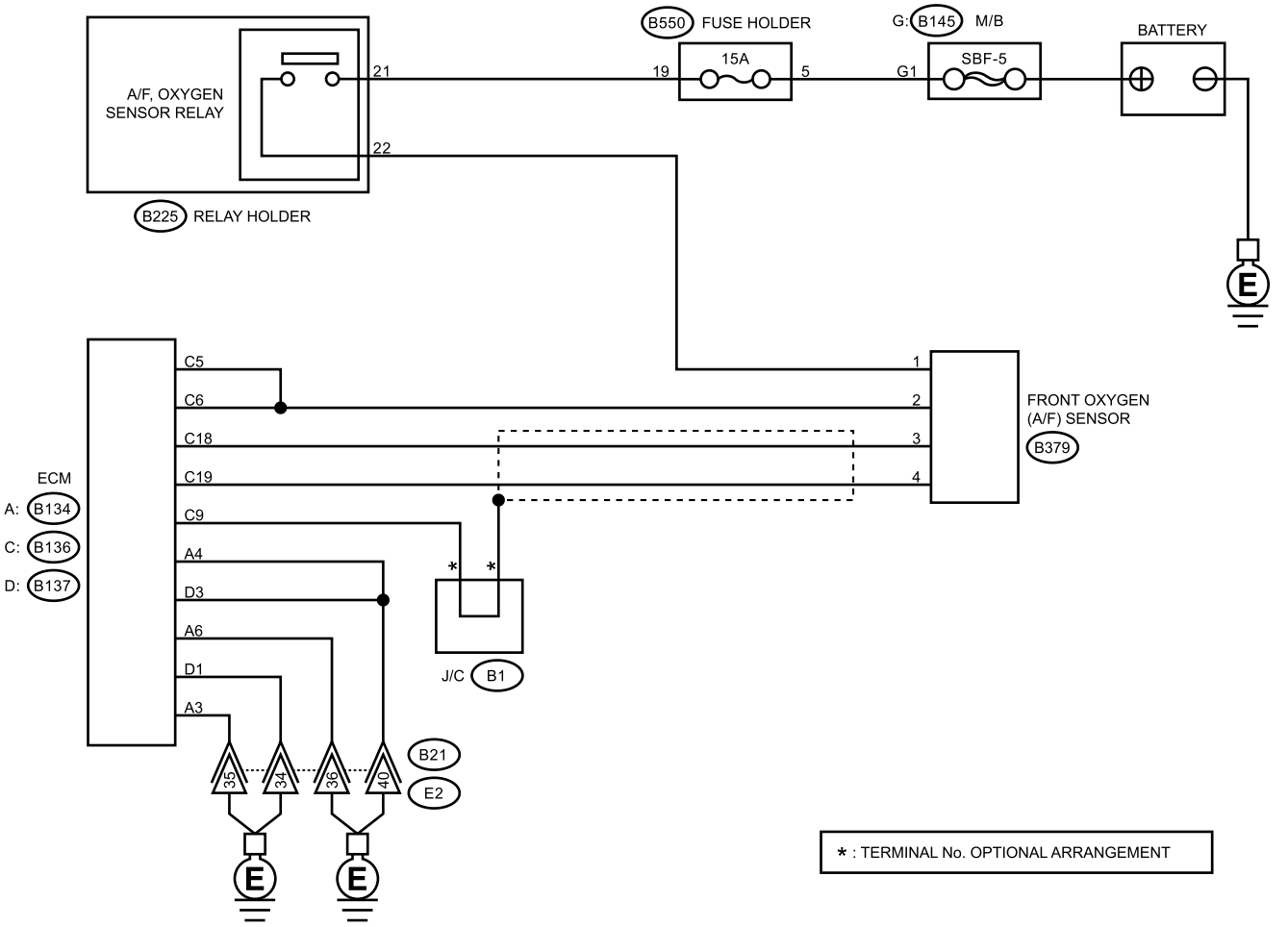
Immediately at fault recognition

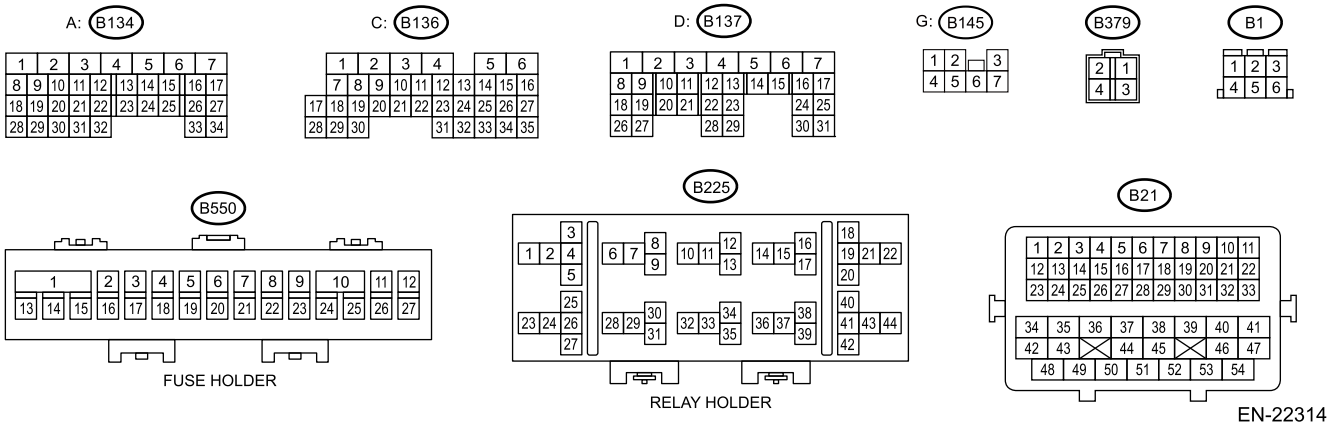
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


A/F, OXYGEN SENSOR RELAY
21
22
B225 RELAY HOLDER
B550 FUSE HOLDER
19
15A
5
G: B145 M/B
G1
SBF-5
BATTERY
E
ECM
A: B134
C: B136
D: B137
C5
C6
C18
C19
C9
A4
D3
A6
D1
A3
J/C B1
1
2
3
4
FRONT OXYGEN (A/F) SENSOR
B379
B21
E2
35
34
36
40
* : TERMINAL No. OPTIONAL ARRANGEMENT


A: B134
C: B136
D: B137
G: B145
B379
B1
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-22314

1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR.

Check the front oxygen (A/F) sensor connector.

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connectors from front oxygen (A/F) sensor.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 18 (+) — Chassis ground (−):

(B136) No. 19 (+) — Chassis ground (−):

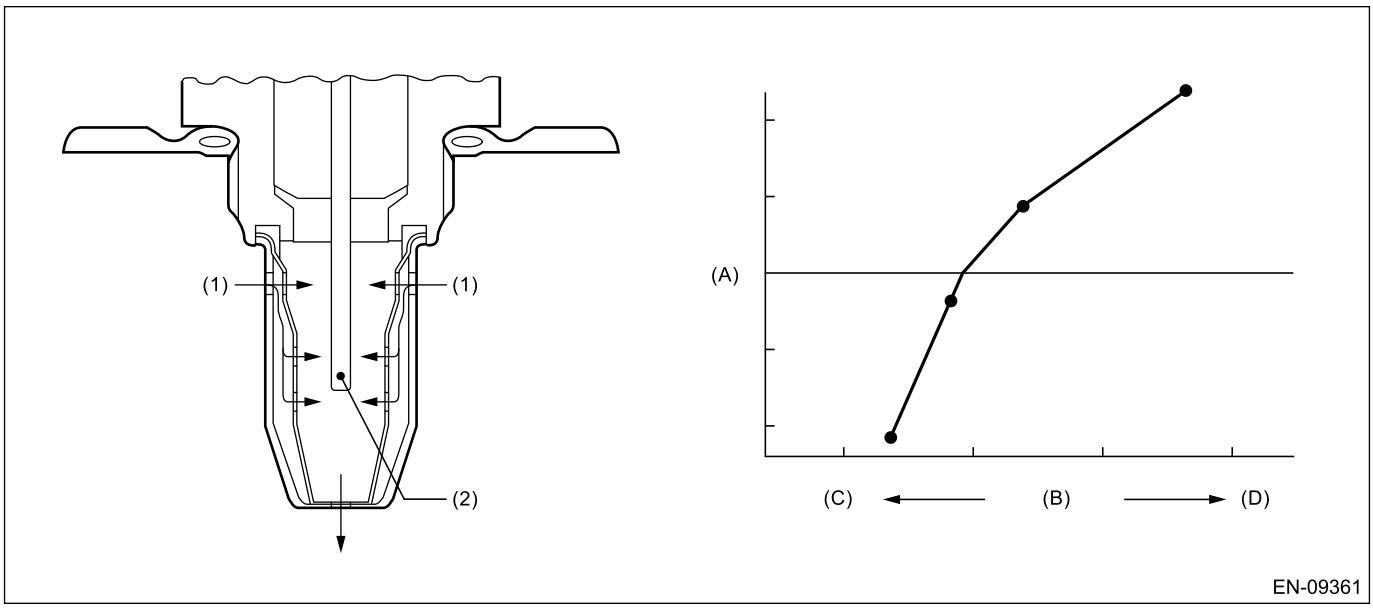
Is the voltage 8 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector.
No	Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Front Oxygen (A/F) Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of sensor.
Judge as NG, when the element voltage is out of the specified range.

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich

(D) Lean

(1) Exhaust gas (2) Zirconia element oxygen

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Input voltage (+) or Input voltage (−)	> 3.589V > 3.541V

time needed for diagnosis: 1000ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0134 A/F / O2 SENSOR CIRCUIT NO ACTIVITY DETECTED BANK 1 SENSOR 1

DTC detecting condition:

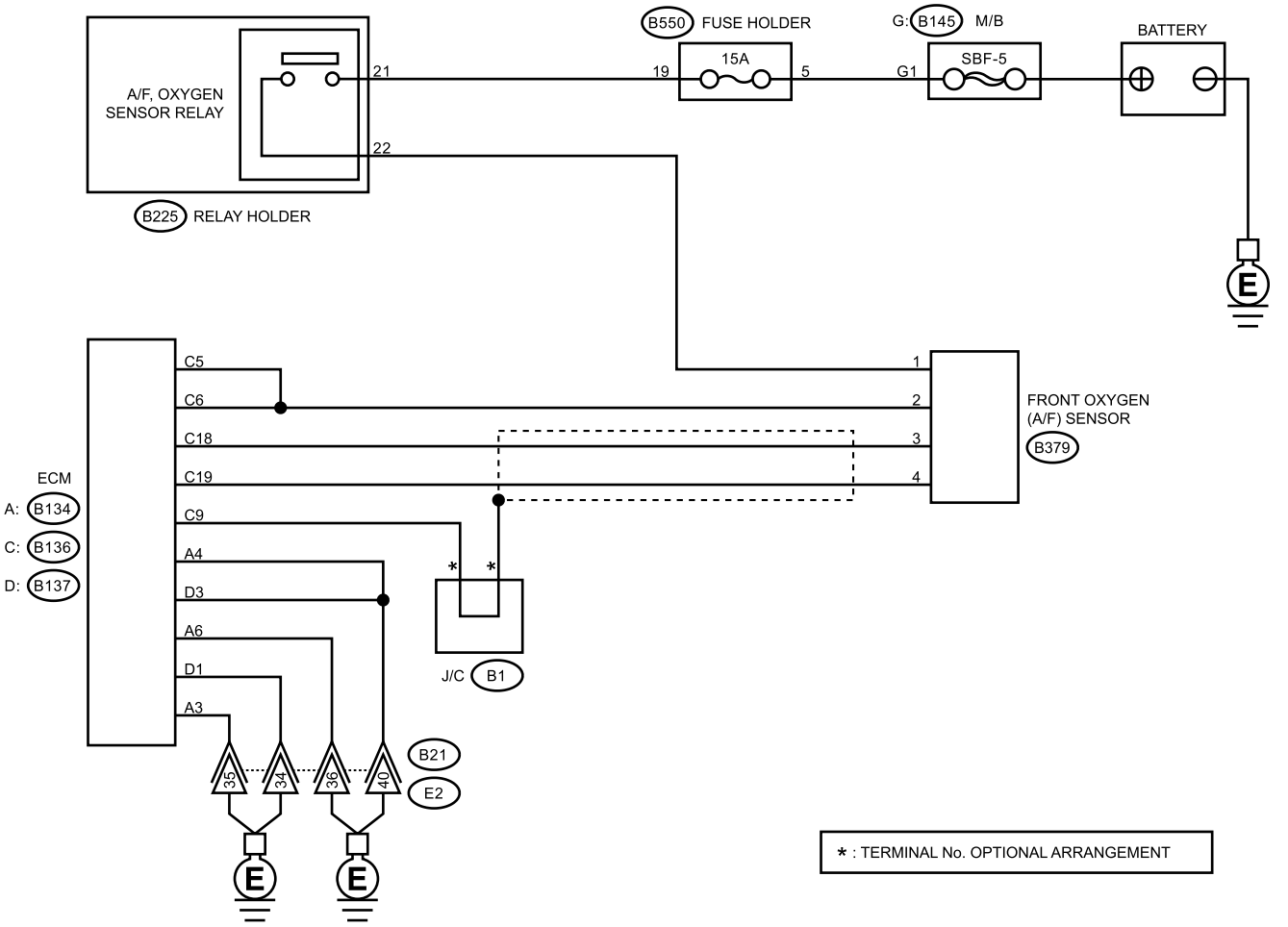
Immediately at fault recognition

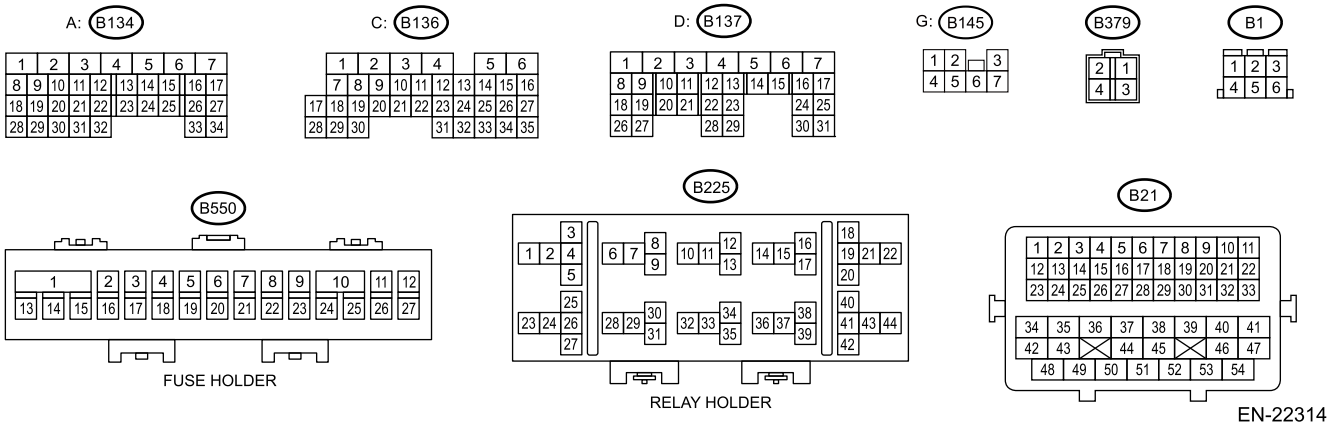
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


A/F, OXYGEN SENSOR RELAY
21
22
B225 RELAY HOLDER
B550 FUSE HOLDER
19
15A
5
G: B145 M/B
G1
SBF-5
BATTERY
E
ECM
A: B134
C: B136
D: B137
C5
C6
C18
C19
C9
A4
D3
A6
D1
A3
J/C B1
1
2
3
4
FRONT OXYGEN (A/F) SENSOR
B379
B21
E2
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* : TERMINAL No. OPTIONAL ARRANGEMENT


A: B134
C: B136
D: B137
G: B145
B379
B1
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-22314

1. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from front oxygen (A/F) sensor.
4. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.
   Connector & terminal
   (B136) No. 18 — (B379) No. 3:
   (B136) No. 19 — (B379) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the open circuit of harness between ECM connector and front oxygen (A/F) sensor connector.

2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and front oxygen (A/F) sensor connector.

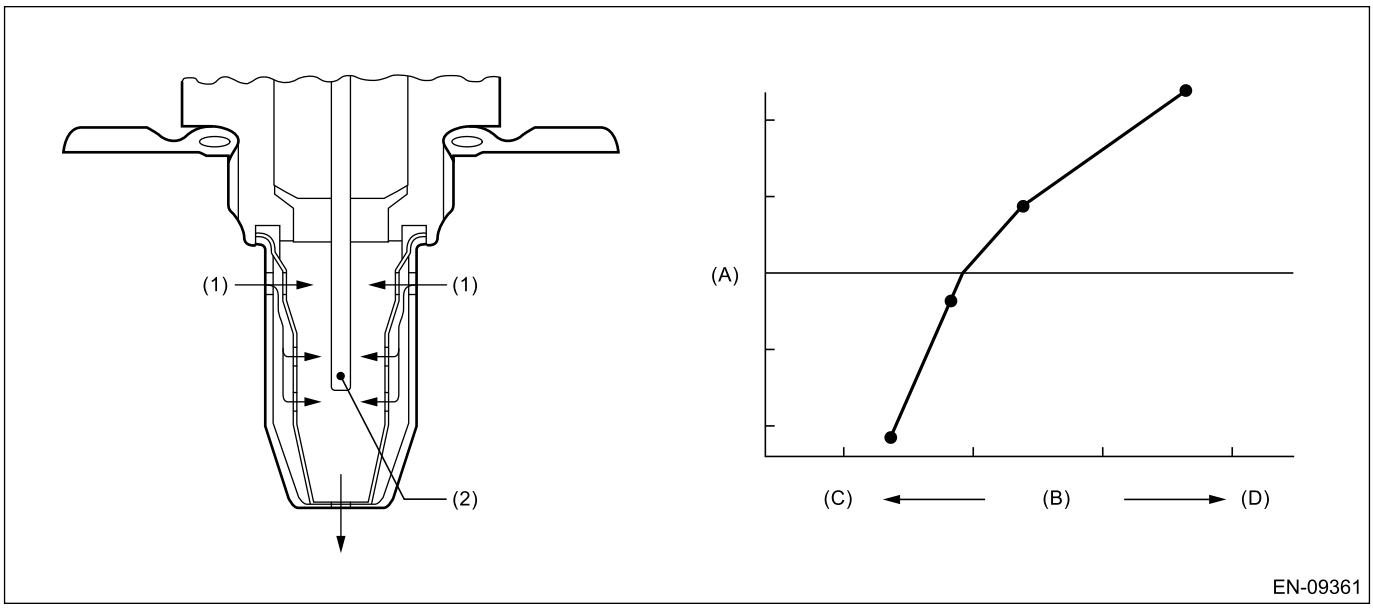
Is there poor contact of ECM or front oxygen (A/F) sensor connector?

Yes	Repair the poor contact of ECM or front oxygen (A/F) sensor connector.
No	Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Front Oxygen (A/F) Sensor.

1. OUTLINE OF DIAGNOSIS

Detect open circuits of the sensor.
Judge as NG when the impedance of the element is large.

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich

(D) Lean

(1) Exhaust gas (2) Zirconia element oxygen

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Time of heater control duty at 70% or more	≥ 36000ms

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Front oxygen (A/F) sensor impedance	> 500Ω

time needed for diagnosis: 5000ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 2

DTC detecting condition:

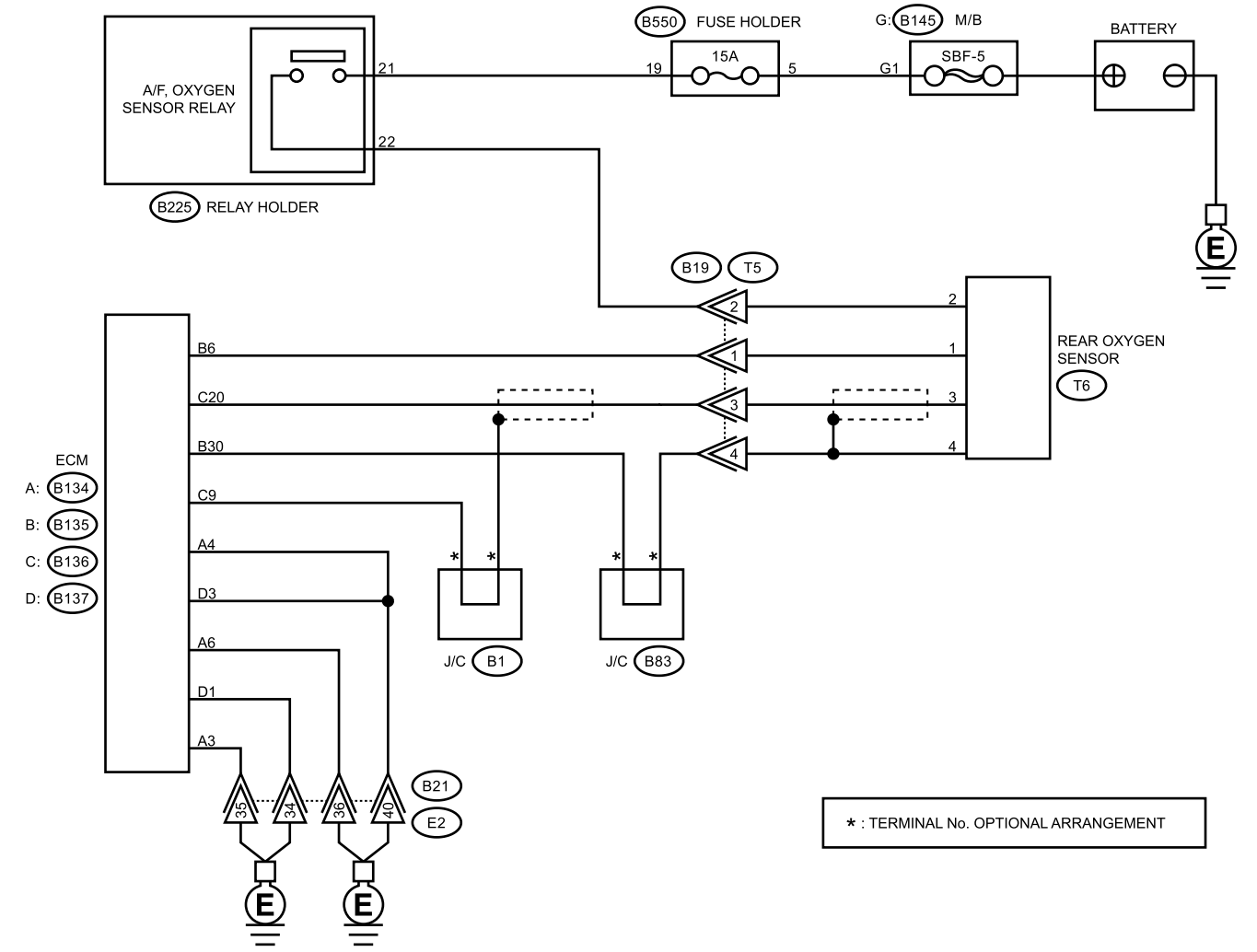
Detected when two consecutive driving cycles with fault occur.

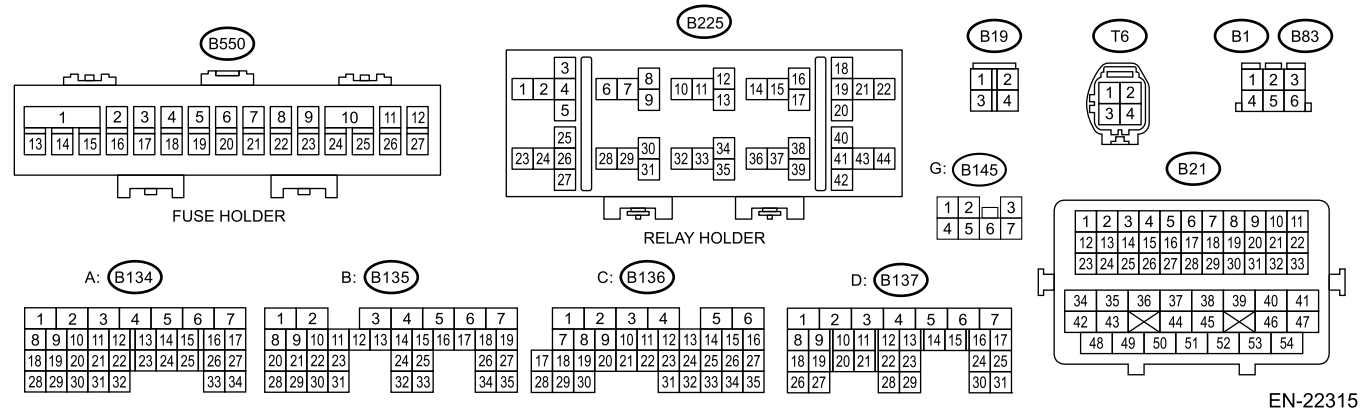
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B550 FUSE HOLDER
G: B145 M/B
BATTERY
A/F, OXYGEN SENSOR RELAY
21
22
19
15A
5
G1
SBF-5
B225 RELAY HOLDER
B19
T5
REAR OXYGEN SENSOR
T6
ECM
A: B134
B: B135
C: B136
D: B137
B6
C20
B30
C9
A4
D3
A6
D1
A3
J/C B1
J/C B83
B21
E2
* : TERMINAL No. OPTIONAL ARRANGEMENT


B550
FUSE HOLDER
B225
RELAY HOLDER
B19
T6
B1
B83
G: B145
B21
A: B134
B: B135
C: B136
D: B137

EN-22315

1. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)
2. Read the value of «Rear O2 Sensor Voltage» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Rear O2 Sensor Voltage» 0.490 V or more?

Yes	Go to 6.
No	Go to 2.

2. CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.

Check the rear oxygen sensor connector and coupling connector.

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 3.

3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
   Connector & terminal
   (B136) No. 20 — (T6) No. 3:
   (B135) No. 30 — (T6) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the open circuit of harness between ECM connector and rear oxygen sensor connector.

4. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
Connector & terminal
(E136) No. 20 — Engine ground
(E135) No. 30 — Engine ground

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between ECM connector and rear oxygen sensor connector.

5. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between rear oxygen sensor connector and engine ground.
   Connector & terminal
   (T6) No. 3 (+) — Engine ground (−):

Is the voltage 0.2 — 0.5 V?

Yes	Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Rear Oxygen Sensor.
No	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

6. CHECK EXHAUST SYSTEM.

Check exhaust system parts.
Note:
Check the following items.
- **Looseness and improper fitting of exhaust system parts**
- **Damage (crack, hole etc.) of parts**
- **Loose part and improper installation between front oxygen (A/F) sensor and rear oxygen sensor**

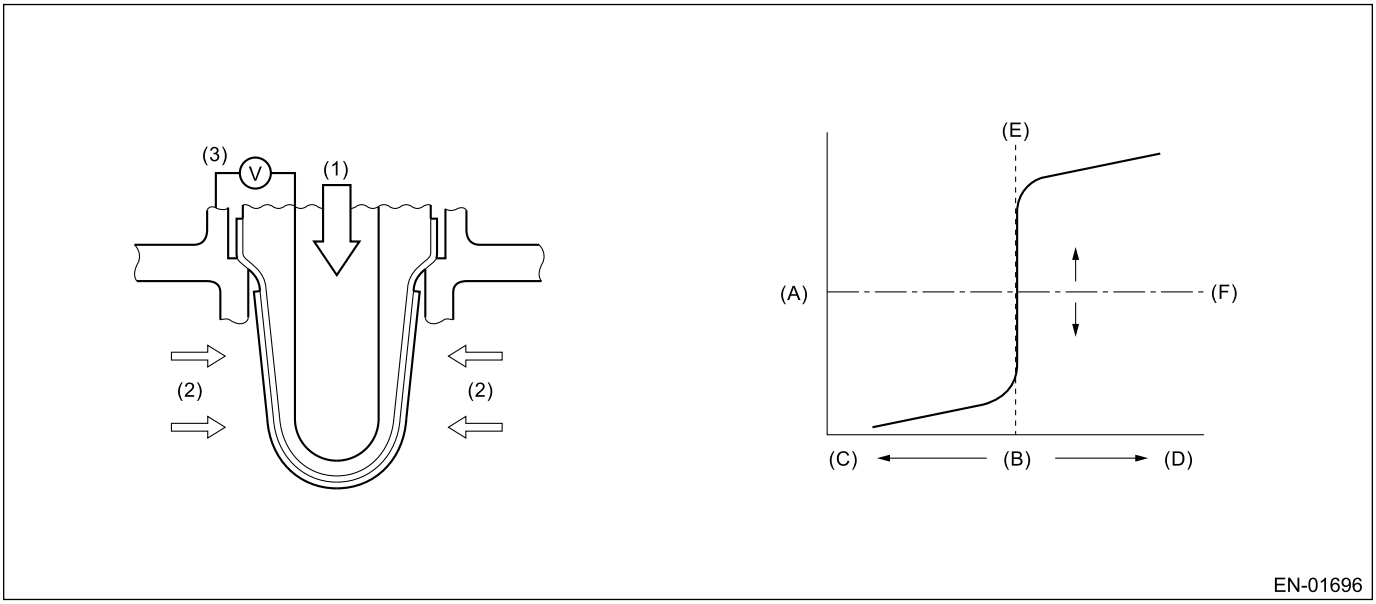
Is there any fault in exhaust system?

Yes	Repair or replace faulty parts.
No	Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Rear Oxygen Sensor.

1. OUTLINE OF DIAGNOSIS

Detect continuity NG of the oxygen sensor. If the oxygen sensor voltage reading is not within the probable range considering the operating conditions, judge as NG.

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage
(1) Atmosphere
(2) Exhaust gas
(3) Electromotive force

3. EXECUTION CONDITION

Secondary parameters	Execution condition
High	
Battery voltage	≥ 10.9 V
Low (1) Battery voltage Main feedback Amount of intake air Secondary air system	 ≥ 10.9 V In operation ≥ 10g/s (0.35oz/s) Not in operation
Estimated temperature of the rear oxygen sensor element	≥ 500°C (932°F)
Low (2) Battery voltage Main feedback Amount of intake air Secondary air system	 ≥ 10.9 V In operation < 10g/s (0.35oz/s) Not in operation
Estimated temperature of the rear oxygen sensor element	≥ 500°C (932°F)

4. GENERAL DRIVING CYCLE

After starting the engine, continuously perform the diagnosis with the same engine condition.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value	DTC
High		P0138
Sensor output voltage	> 1.2V	
Low Sensor output voltage	< 0.03V	P0137

Time needed for diagnosis

High: 2500ms

Low (1): 5000ms

Low (2): 10000ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0138 O2 SENSOR CIRCUIT HIGH VOLTAGE BANK 1 SENSOR 2

DTC detecting condition:

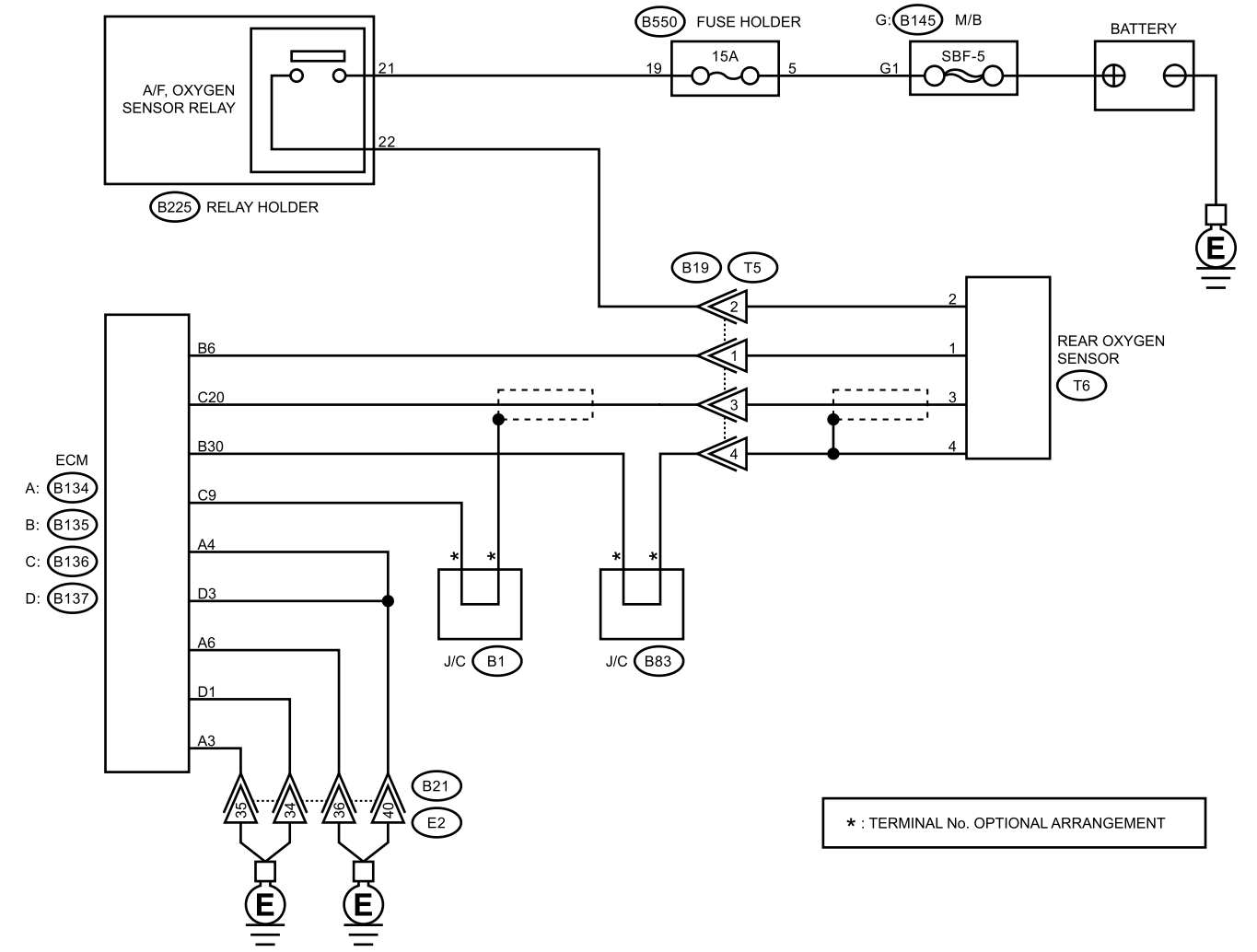
Detected when two consecutive driving cycles with fault occur.

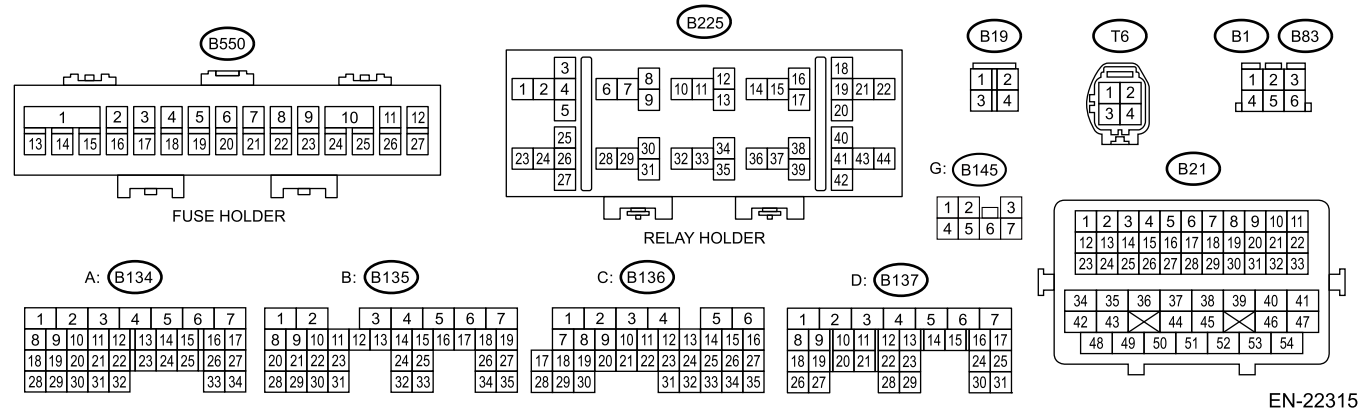
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B550 FUSE HOLDER
G: B145 M/B
BATTERY
A/F, OXYGEN SENSOR RELAY
21
22
19
15A
5
G1
SBF-5
B225 RELAY HOLDER
B19
T5
REAR OXYGEN SENSOR
T6
ECM
A: B134
B: B135
C: B136
D: B137
B6
C20
B30
C9
A4
D3
A6
D1
A3
J/C B1
J/C B83
B21
E2
* : TERMINAL No. OPTIONAL ARRANGEMENT


B550
FUSE HOLDER
B225
RELAY HOLDER
B19
T6
B1
B83
G: B145
B21
A: B134
B: B135
C: B136
D: B137

EN-22315

1. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm.
2. Read the value of «Rear O2 Sensor Voltage» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Current Data Display For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Rear O2 Sensor Voltage» 0.250 V or less?

Yes	Go to 5.
No	Go to 2.

2. CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.

Check the rear oxygen sensor connector and coupling connector.

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 3.

3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
   Connector & terminal
   (B136) No. 20 — (T6) No. 3:
   (B135) No. 30 — (T6) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and rear oxygen sensor connector** • **Poor contact of coupling connector**

4. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between rear oxygen sensor connector and chassis ground.
   Connector & terminal
   (T6) No. 3 (+) — Chassis ground (−):

Is the voltage 0.2 — 0.5 V?

Yes	Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Rear Oxygen Sensor.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and rear oxygen sensor connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

5. CHECK EXHAUST SYSTEM.

Check exhaust system parts.
Note:
Check the following items.
- **Looseness and improper fitting of exhaust system parts**
- **Damage (crack, hole etc.) of parts**
- **Loose part and improper installation between front oxygen (A/F) sensor and rear oxygen sensor**

Is there any fault in exhaust system?

Yes	Repair or replace faulty parts.
No	Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Rear Oxygen Sensor.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0137. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0137 O2 SENSOR CIRCUIT LOW VOLTAGE BANK 1 SENSOR 2.

DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2

DTC detecting condition:

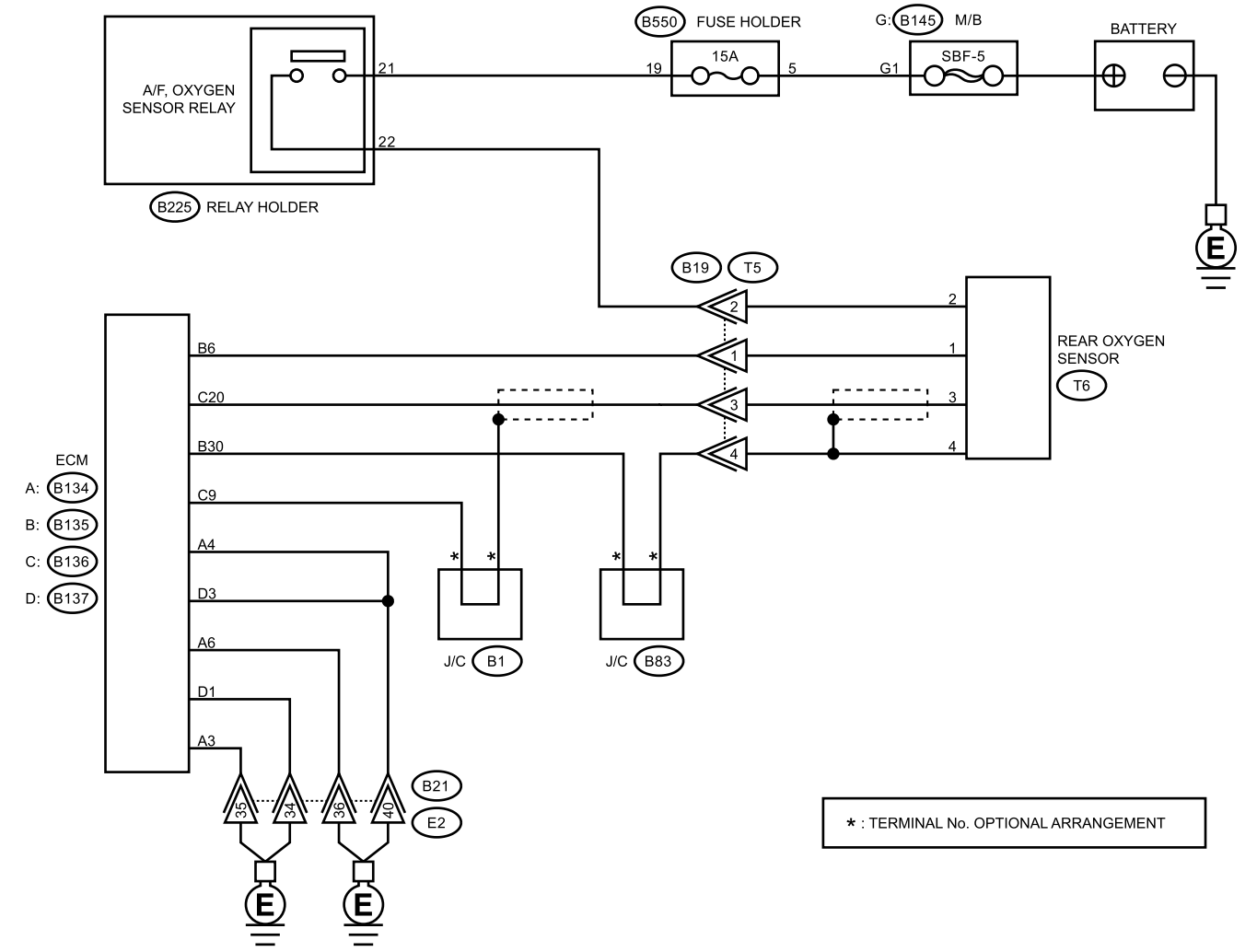
Detected when two consecutive driving cycles with fault occur.

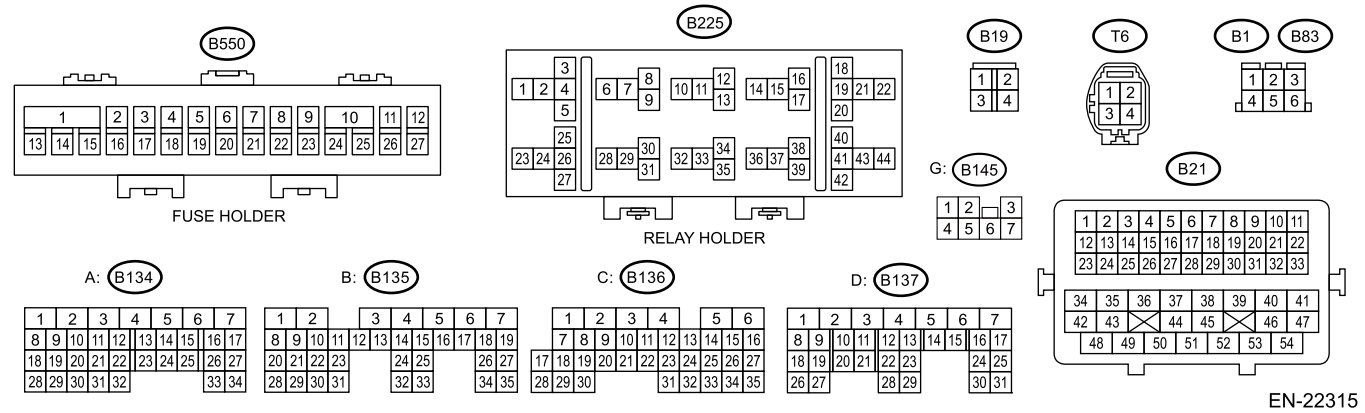
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


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REAR OXYGEN SENSOR
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A: B134
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D: B137
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B550
FUSE HOLDER
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RELAY HOLDER
B19
T6
B1
B83
G: B145
B21
A: B134
B: B135
C: B136
D: B137

EN-22315

1. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
   Connector & terminal
   (B136) No. 20 — (T6) No. 3:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and rear oxygen sensor connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

Measure the resistance between rear oxygen sensor connector and chassis ground.
Connector & terminal
(T6) No. 3 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and rear oxygen sensor connector.

3. CHECK REAR OXYGEN SENSOR.

Measure the resistance between rear oxygen sensor terminals.

Terminals

No. 3 — No. 4

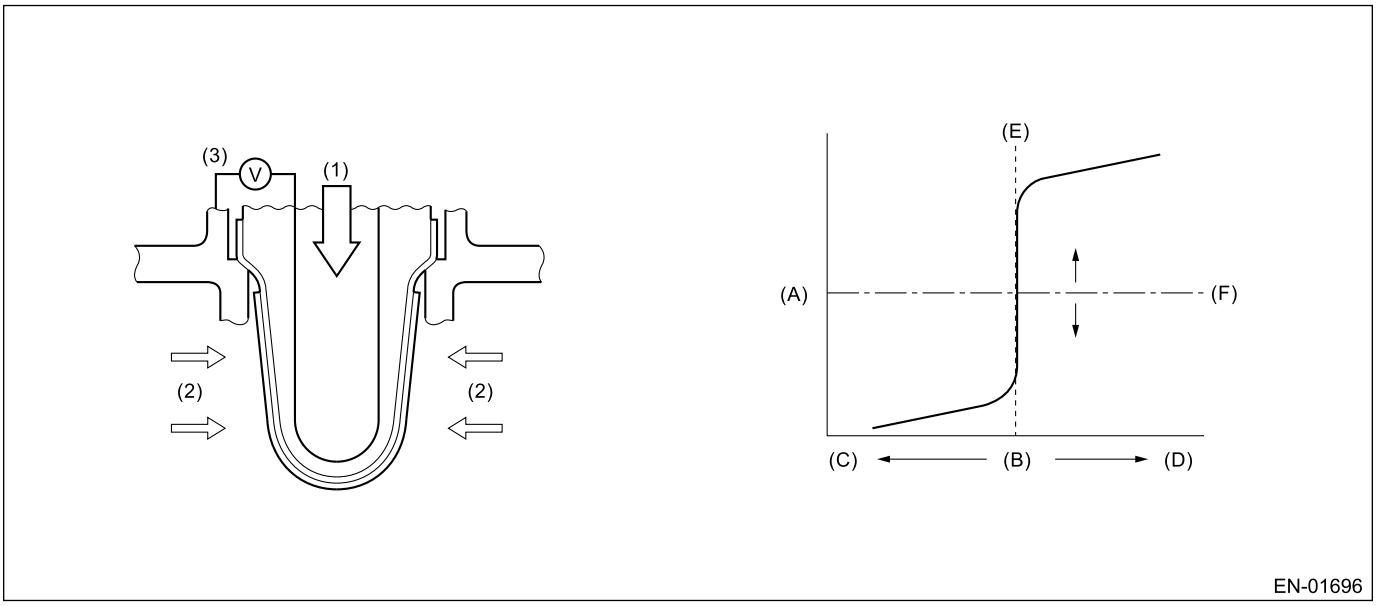
Is the resistance less than 1 Ω?

Yes	Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Rear Oxygen Sensor.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

1. OUTLINE OF DIAGNOSIS

Detect the slow response of rich → lean for rear oxygen sensor output.
When the deceleration fuel cut has occurred, detect the trouble by calculating the time when the rear oxygen sensor output passes through the predetermined range of voltages.
Judge as NG when the response time is larger than the threshold value.

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage
(1) Atmosphere
(2) Exhaust gas
(3) Electromotive force

3. EXECUTION CONDITION

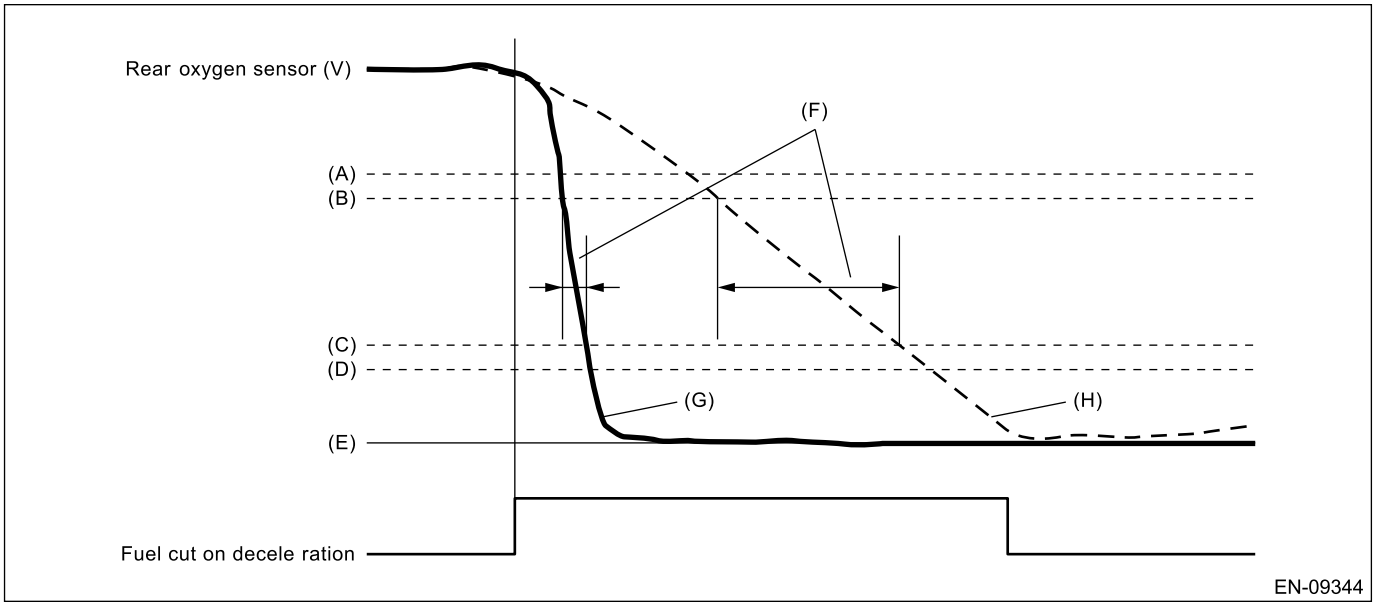
Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Current calculation time of the rear oxygen sensor heater after starting	≥ 180000ms
Rear oxygen sensor voltage when fuel cut starts	≥ 0.55V
Time of fuel shut-off operation	≥ 5000ms
Estimated temperature of rear oxygen sensor element when fuel cut starts	≥ 500°C (932°F)

4. GENERAL DRIVING CYCLE

Perform diagnosis once during deceleration fuel cut from a constant and high speed driving, when rear oxygen sensor is warmed up sufficiently.

5. DIAGNOSTIC METHOD

Detect the trouble by calculating the response time of the rear oxygen sensor during fuel cut.



(A) 0.55 V
(B) 0.5 V
(C) 0.2 V
(D) 0.15 V
(E) 0 V
(F) Diagnostic parameter
(G) Normal
(H) Malfunction

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Time needed for rear oxygen sensor voltage to change from	> 2000ms

Malfunction Criteria	Threshold Value
0.5 V to 0.2 V	

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

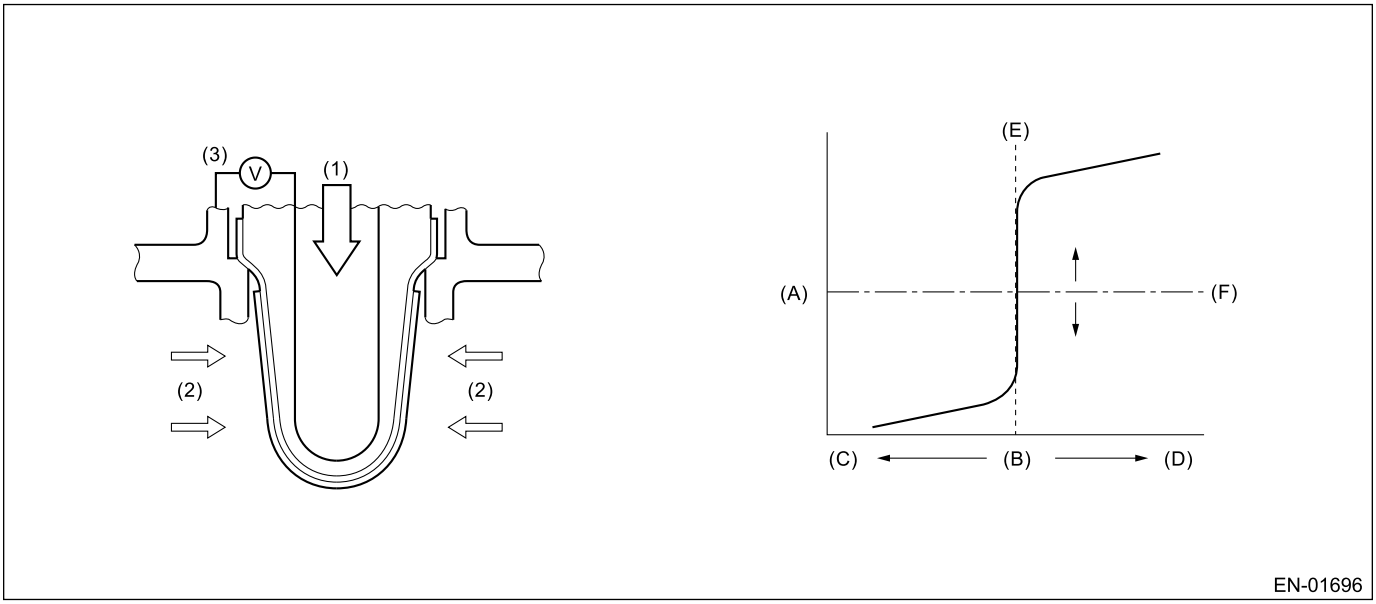
DTC P013B O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 2

Note:
For the diagnostic procedure, refer to DTC P013A. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2.

1. OUTLINE OF DIAGNOSIS

Detect the slow response of lean → rich for rear oxygen sensor output.
After the deceleration fuel cut has occurred, detect the trouble by calculating the time when the rear oxygen sensor output passes through the predetermined range of voltages.
Judge as NG when the response time is larger than the threshold value.

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage
(1) Atmosphere
(2) Exhaust gas
(3) Electromotive force

3. EXECUTION CONDITION

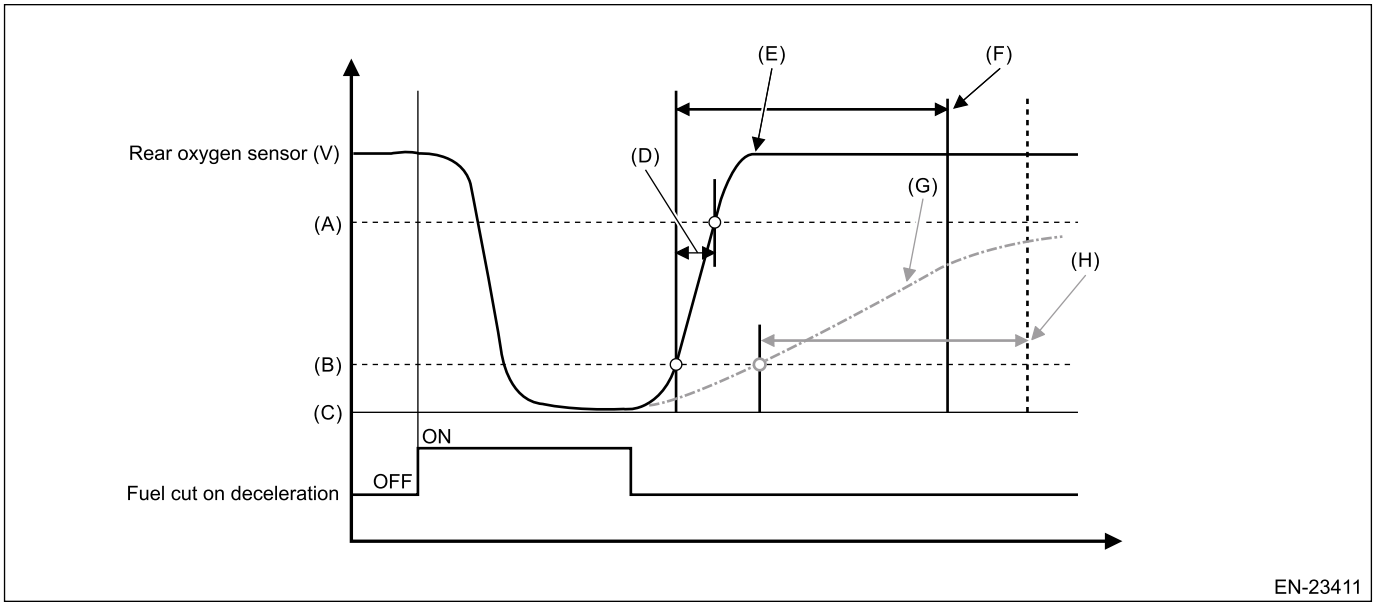
Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Main feedback	In operation
(Duration of fuel cut	≥ 3000ms
Fuel shut-off function from above)	Not in operation
Output voltage value of rear oxygen sensor	≥ 0.2V
Compensation to rich	Rich
Amount of intake air	≥ 10g/s (0.35oz/s)
Estimated temperature of the rear oxygen sensor element	≥ 500°C (932°F)

4. GENERAL DRIVING CYCLE

Perform diagnosis only once after recovering from a deceleration fuel cut continued for more than predetermined time.

5. DIAGNOSTIC METHOD

Detect the trouble by calculating the response time of the rear oxygen sensor after fuel cut.



(A) 0.5 V
(B) 0.2 V
(C) 0 V
(D) Diagnostic parameter
(E) Voltage in normal condition
(F) Response time in normal condition
(G) Voltage in abnormal condition
(H) Response time in abnormal condition

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage value of rear oxygen sensor	< 0.5V
Elapsed time	> 3000ms

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

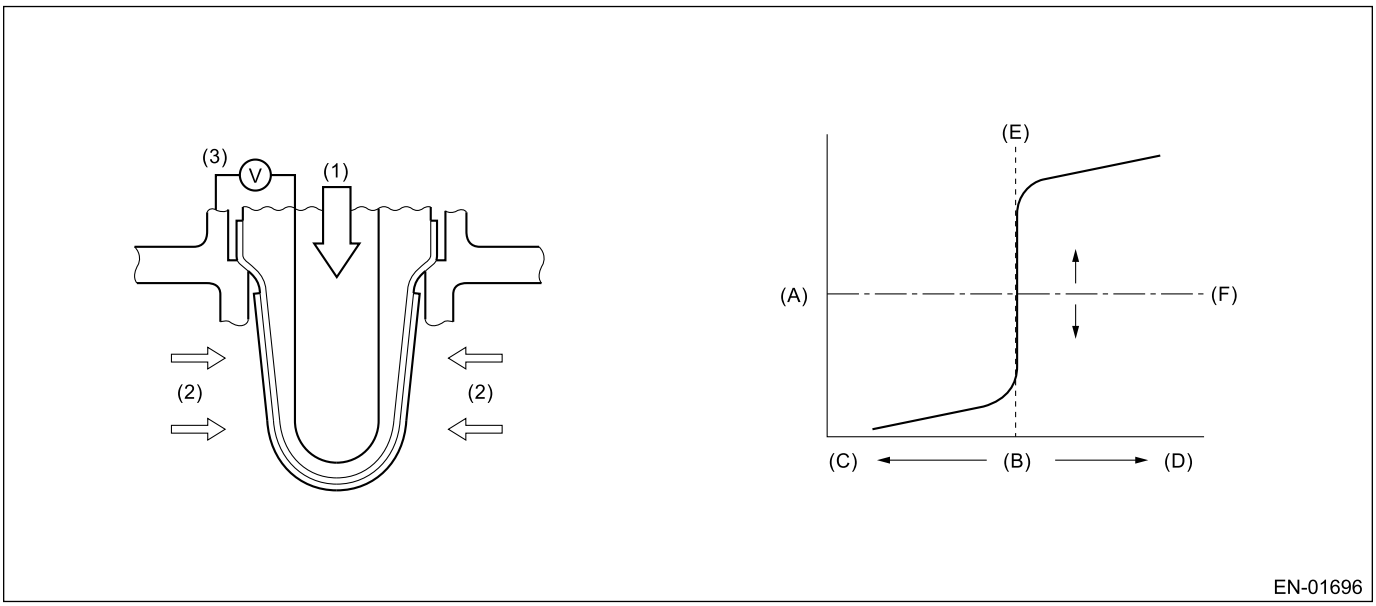
DTC P013E O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 2

Note:
For the diagnostic procedure, refer to DTC P013A. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2.

1. OUTLINE OF DIAGNOSIS

Detect the delayed response of rear oxygen sensor output for rich → lean.
After the deceleration fuel cut has started, detect the trouble by calculating the time when the rear oxygen sensor output decreases to the predetermined voltages.
Judge as NG when the response time is larger than the threshold value.

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage
(1) Atmosphere
(2) Exhaust gas
(3) Electromotive force

3. EXECUTION CONDITION

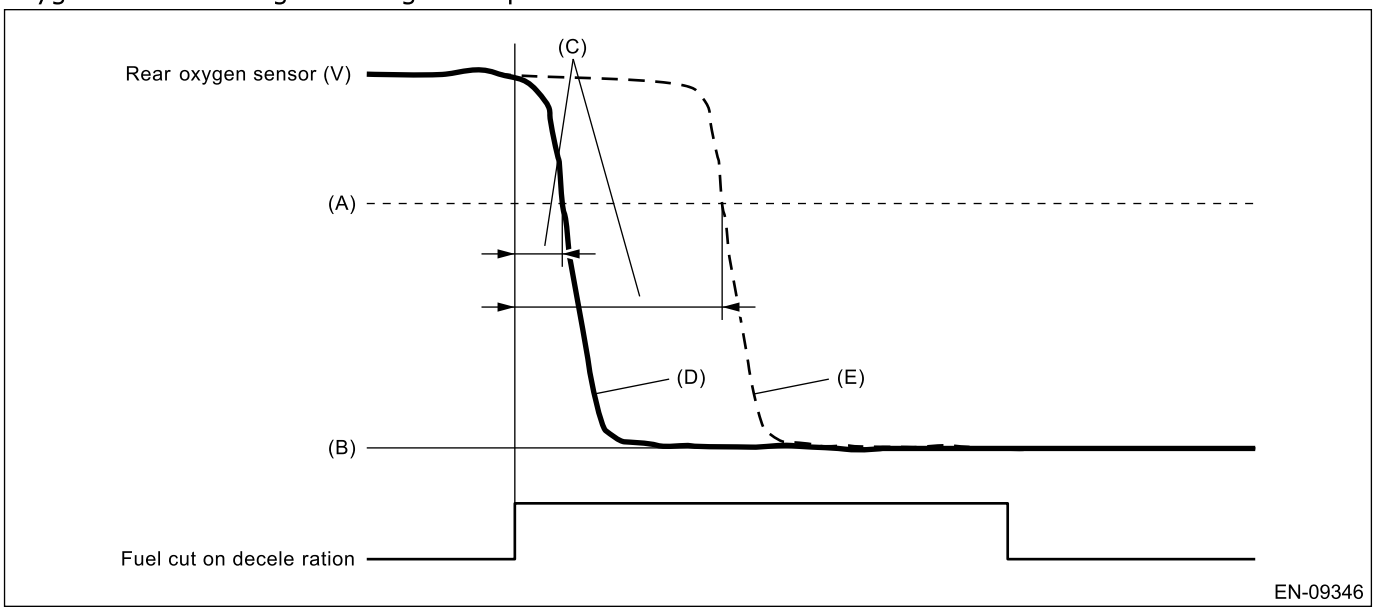
Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Rear oxygen sensor voltage when fuel cut starts	> 0.55V
(Time of fuel shut-off operation	> 5000ms
Fuel shut-off function after the experience above)	Not in operation
Estimated temperature of the rear oxygen sensor element	≥ 500°C (932°F)

4. GENERAL DRIVING CYCLE

Perform diagnosis once during deceleration fuel cut from a constant and high speed driving, when rear oxygen sensor is warmed up sufficiently.

5. DIAGNOSTIC METHOD

Detect the trouble by calculating the time from the beginning of the fuel cut to the beginning of the rear oxygen sensor voltage starting to drop.



(A) 0.5 V (B) 0 V (C) Diagnostic parameter
(D) Normal (E) Malfunction

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Time when rear oxygen sensor voltage changed to 0.5 V after the fuel cut started	>3700ms

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

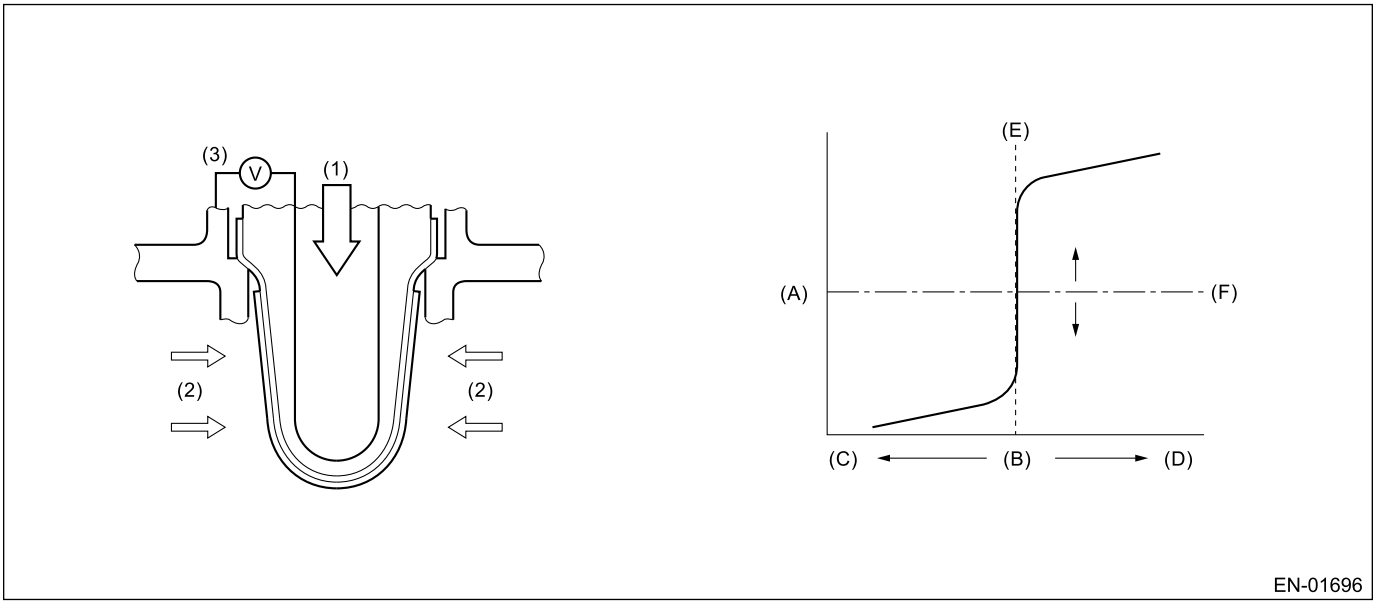
DTC P013F O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 2

Note:
For the diagnostic procedure, refer to DTC P013A. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P013A O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 2.

1. OUTLINE OF DIAGNOSIS

Detect the delayed response of rear oxygen sensor output for lean → rich.
After the deceleration fuel cut has completed, detect the trouble by calculating the time when the rear oxygen sensor output increases to the predetermined voltages.
Judge as NG when the response time is larger than the threshold value.

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage
(1) Atmosphere
(2) Exhaust gas
(3) Electromotive force

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Main feedback	In operation
Rear oxygen sensor voltage when fuel cut has completed	< 0.15V
(Time of fuel shut-off operation	> 3000ms

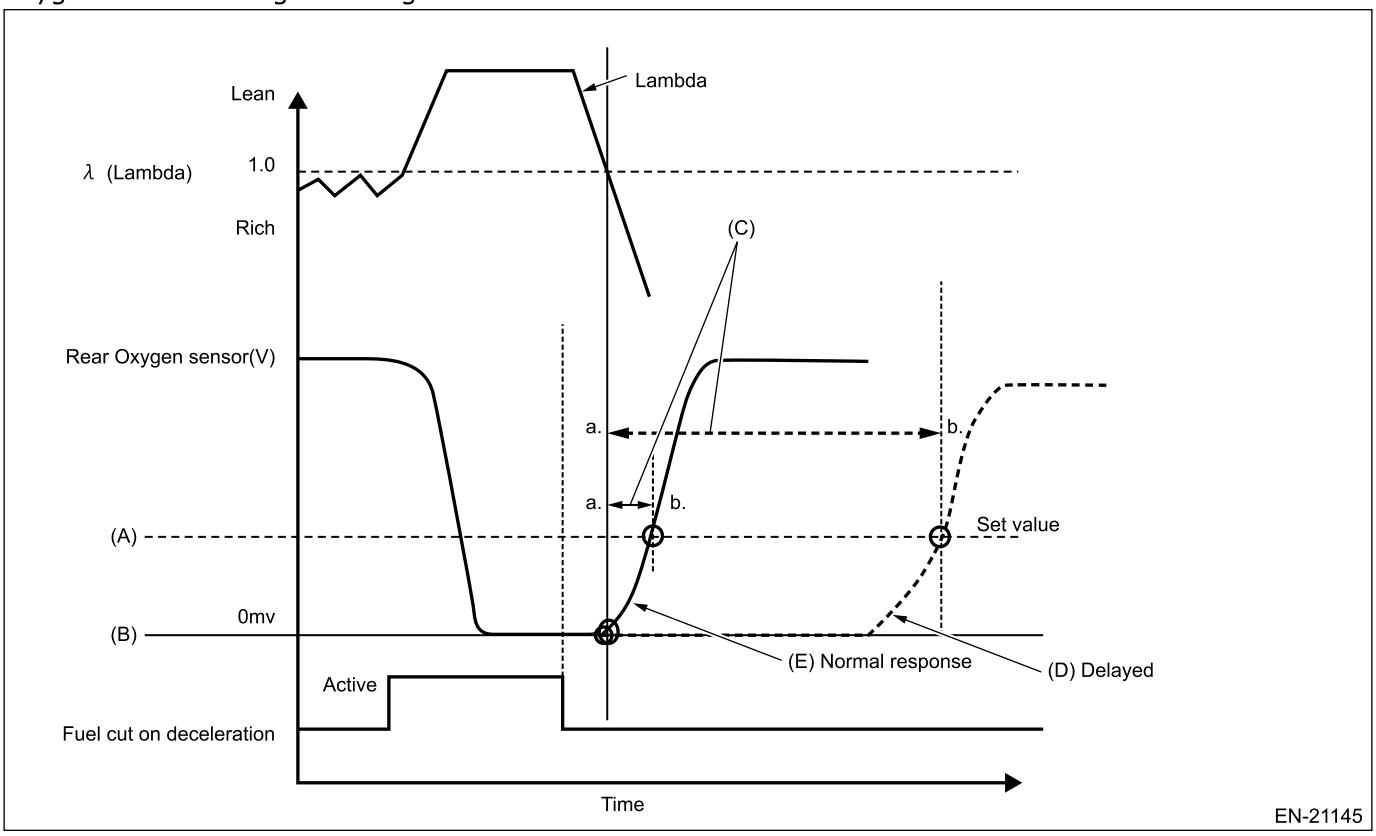
Secondary parameters	Execution condition
Fuel shut-off function after the experience above)	Not in operation
Estimated temperature of the rear oxygen sensor element	≥ 500°C (932°F)
Compensation to rich	Rich
Amount of intake air	≥ 28g/s (0.99oz/s)

4. GENERAL DRIVING CYCLE

Perform diagnosis only once when recovering from the deceleration fuel cut continued for more than predetermined time with the rear oxygen sensor warmed up sufficiently.

5. DIAGNOSTIC METHOD

Detect the trouble by calculating the time from the completion of the fuel cut to the beginning of the rear oxygen sensor voltage starting to rise.



(A) 0.3 V (B) 0 V (C) Diagnostic parameter

(D) Malfunction (E) Normal

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage value of rear oxygen sensor	< 0.2 V
Elapsed time*	> Value from Map

*Elapsed time: The time since the λ became less than 1 after the end of fuel cut

Map

Intake air amount average (g/s (oz/s))	**27 (0.95)**	**28 (0.99)**	**40 (1.41)**	**50 (1.76)**	**60 (2.12)**
Elapsed time (ms)	5096	5000	5000	5000	5000

Time needed for diagnosis: Less than 1 s
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

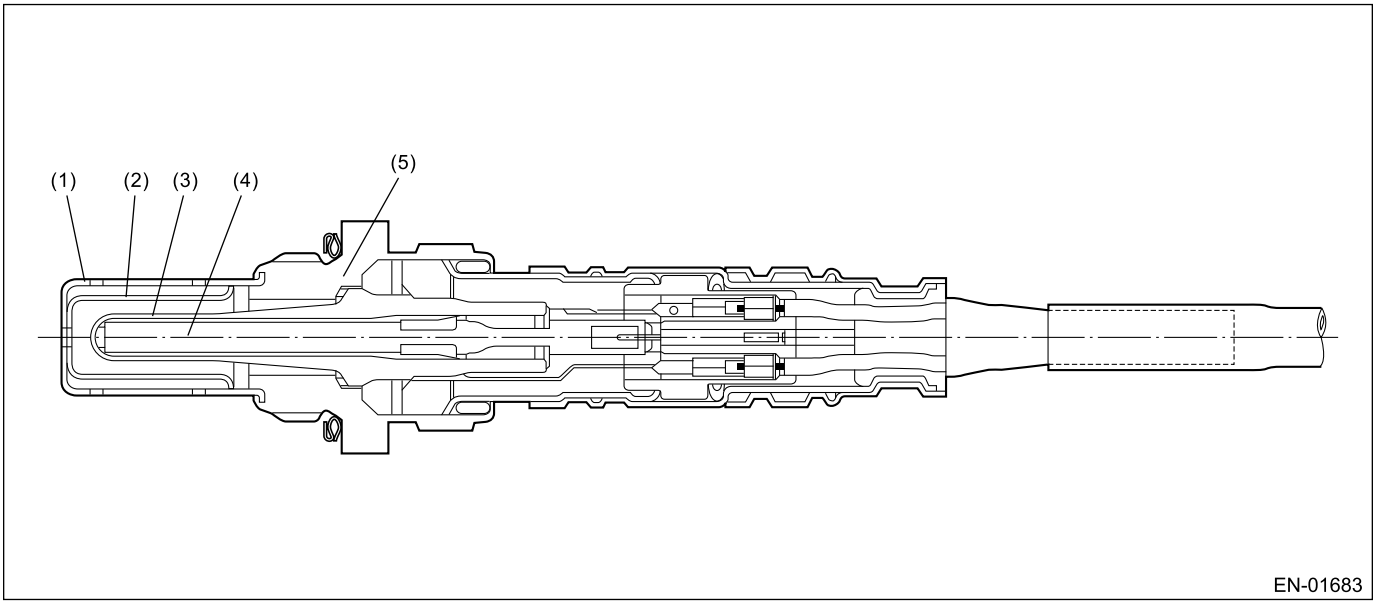
DTC P0141 O2 SENSOR HEATER CIRCUIT BANK 1 SENSOR 2

Note:
For the diagnostic procedure, refer to DTC P0037. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0037 A/F / O2 HEATER CONTROL CIRCUIT LOW BANK 1 SENSOR 2.

1. OUTLINE OF DIAGNOSIS

Detect malfunction of the rear oxygen sensor heater.
Judge as NG if it is determined that the rear oxygen sensor impedance is large by observing the engine conditions.

2. COMPONENT DESCRIPTION



(1) Element cover (outer)
(2) Element cover (inner)
(3) Sensor element
(4) Ceramic heater
(5) Sensor housing

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	≥ 1000ms
A/F sensor element impedance	≤ 35Ω
A/F sensor heater control duty	≤ 75%
Rear oxygen sensor heater control duty	< 75%

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after 1000ms seconds or more have passed since the engine started.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< Battery voltage × 0.88

time needed for diagnosis: 4 ms × 2500time(s)

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P014C A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK EXHAUST SYSTEM.

Note:
Check the following items.
- **Loose installation of front portion of exhaust pipe onto cylinder heads**
- **Loose connection between front exhaust pipe and front catalytic converter**
- **Damage of exhaust pipe resulting in a hole**

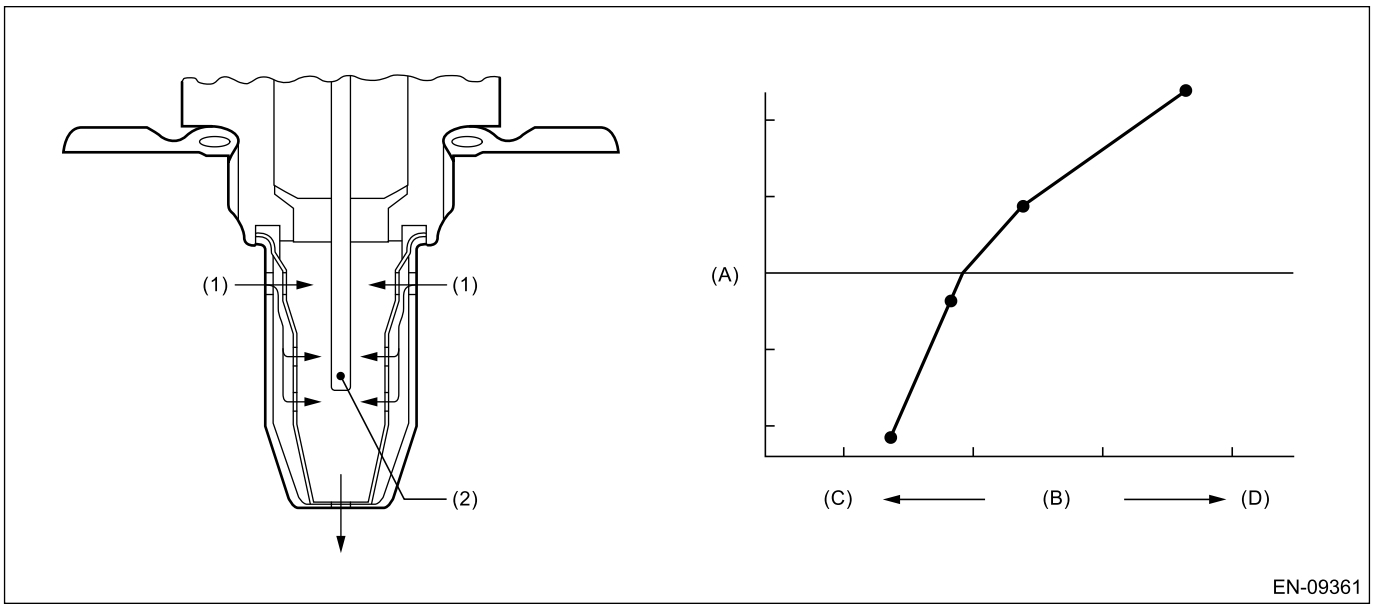
Is there any fault in exhaust system?

Yes	Repair the exhaust system.
No	Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Front Oxygen (A/F) Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the slow response of front oxygen (A/F) sensor.
For diagnosis, detect the trouble by processing the λ waveform in normal driving without forcibly changing the target air fuel ratio.

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean
(1) Exhaust gas (2) Zirconia element oxygen

3. EXECUTION CONDITION

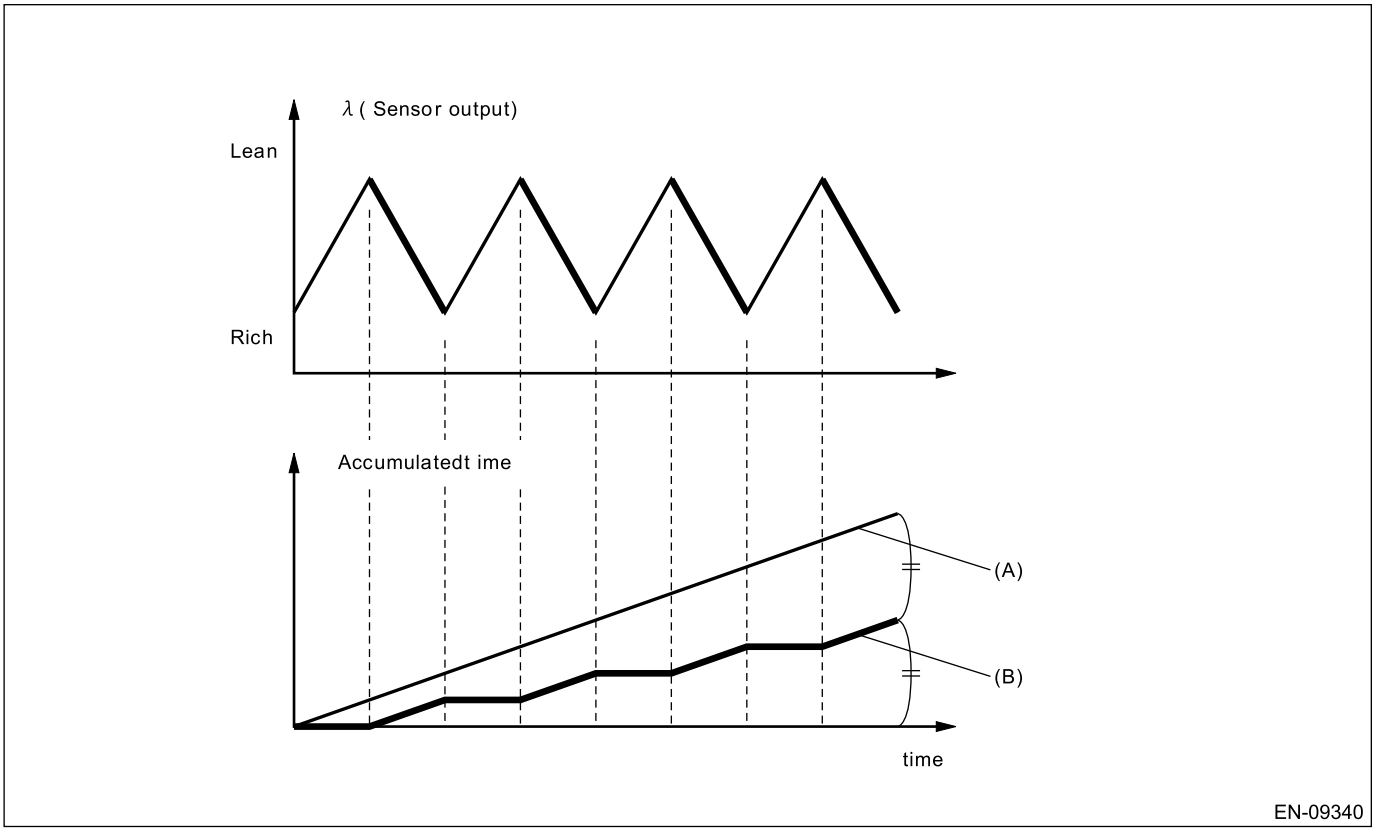
Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Barometric pressure	≥ 75.1kPa (563mmHg, 22.2inHg)
Time of main feedback operation	≥ 3000ms
Engine speed	≥ 1000rpm
Amount of intake air	≥ 10g/s (0.35oz/s)

4. GENERAL DRIVING CYCLE

Perform diagnosis only once in a city driving including normal acceleration and deceleration.

5. DIAGNOSTIC METHOD 1

Detect the malfunction by checking “Cumulative value of time when λ changes from lean → rich” in comparison to “Time during which diagnosis is in progress”.



(A) Time during which diagnosis is in progress

(B) Cumulative value of time when λ changes from lean → rich

Judge as NG when the following conditions are established.

Judgment value

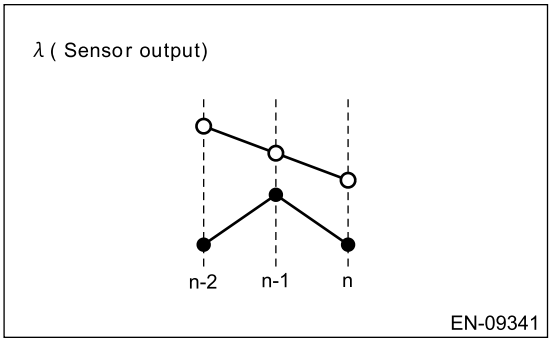
Malfunction Criteria	Threshold Value	DTC
(Cumulative value of time when λ changes from lean → rich) / (Time during which diagnosis is in progress)	< 0.45	P014C
and		
Average value of time necessary for λ to inverse the air fuel ratio to Lean → Rich → Lean	> 60ms	
(Cumulative value of time when λ changes from lean → rich) / (Time during which diagnosis is in progress)	> 0.61	P014D
and		
Average value of time necessary for λ to inverse the air fuel ratio to Rich → Lean → Rich	> 20ms	

time needed for diagnosis:90000ms

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

6. DIAGNOSTIC METHOD 2

Detect the malfunction by the cumulative value obtained from the amount of variation in λ change.



Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value	DTC
Cumulative value obtained from the amount of variation in λ change	< Value from Map	P014C and P014D

Map

Cumulative value obtained from the amount of variation in λ	**1.00**	**2.20**	**6.00**
Cumulative value obtained from the amount of variation in λ change	0.00	2.00	6.00

time needed for diagnosis:90000ms

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P014D A/F / O2 SENSOR SLOW RESPONSE - LEAN TO RICH BANK 1 SENSOR 1

Note:
For the diagnostic procedure, refer to DTC P014C. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P014C A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P014C. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P014C A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

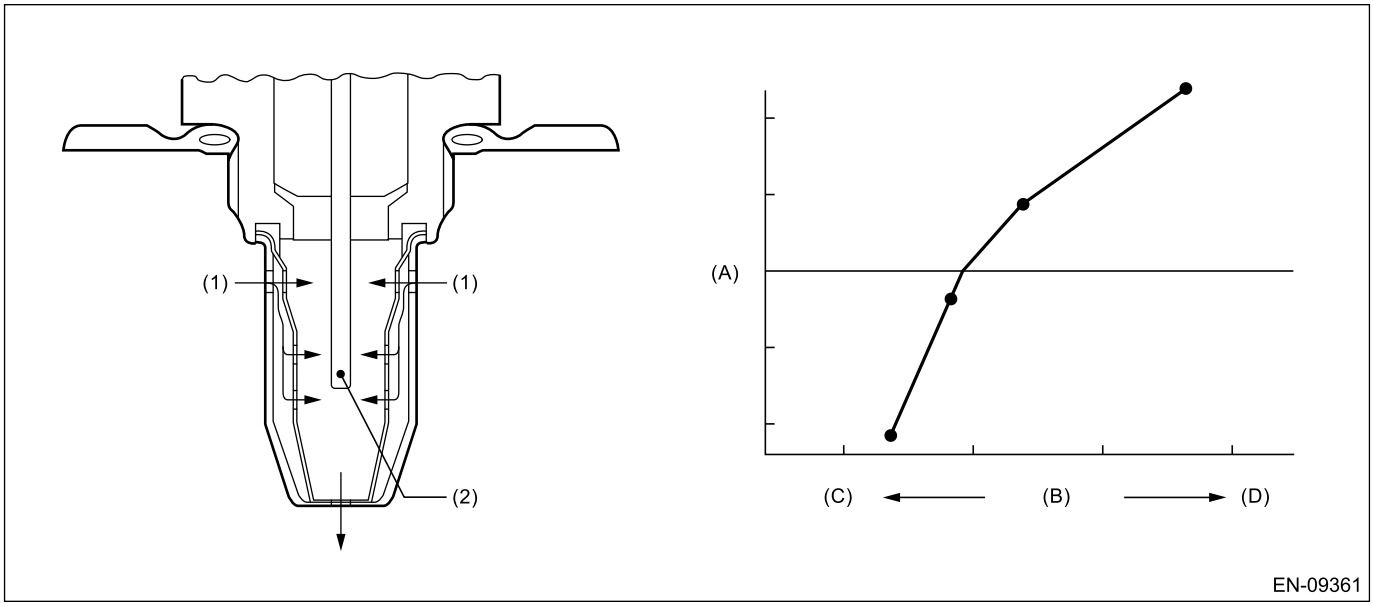
DTC P015A A/F / O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 1

Note:
For the diagnostic procedure, refer to DTC P014C. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P014C A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1.

1. OUTLINE OF DIAGNOSIS

Detect the slow response of front oxygen (A/F) sensor.
For diagnosis, detect the trouble by processing the λ waveform in normal driving without forcibly changing the target air fuel ratio.

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean
(1) Exhaust gas (2) Zirconia element oxygen

3. EXECUTION CONDITION

Diagnostic method 1

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Barometric pressure	> 75.1kPa (563mmHg, 22.2inHg)
Time of main feedback operation	≥ 3000ms
Engine speed	≥ 1000rpm

Secondary parameters	Execution condition
Amount of intake air	≥ 10g/s (0.35oz/s)

Diagnostic method 2

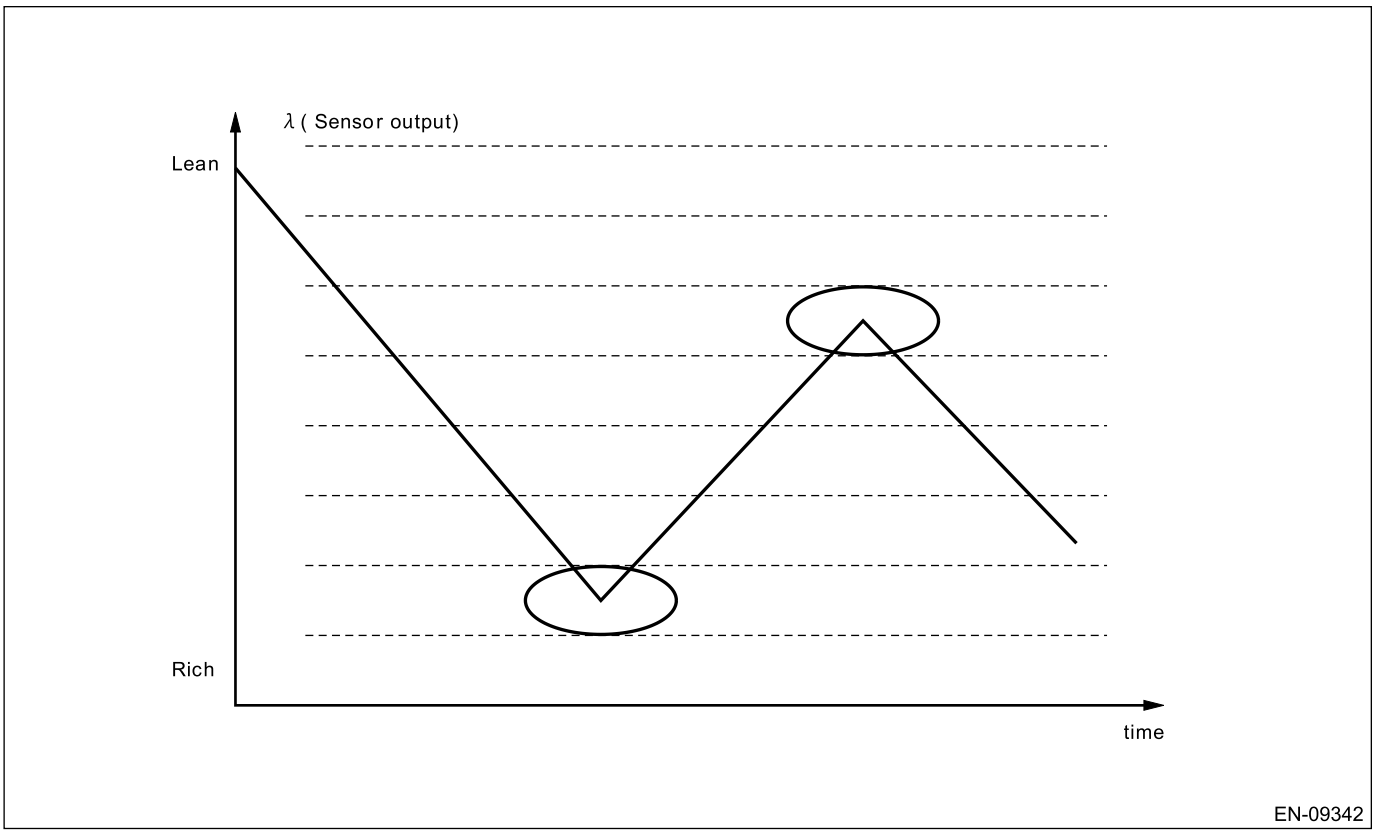
Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Barometric pressure	> 75.1kPa (563mmHg, 22.2inHg)
Main feedback	In operation
Vehicle speed	> 40km/h (24.9MPH)
Engine speed	≥ 1000rpm and < 3200rpm
Amount of intake air	≥ 10g/s (0.35oz/s) and < 30g/s (1.06oz/s)
Status of catalytic converter monitor	Not under diagnosis

4. GENERAL DRIVING CYCLE

Perform diagnosis only once in a city driving including normal acceleration and deceleration.

5. DIAGNOSTIC METHOD 1

Detect the malfunction depending on the average value of time necessary for λ to inverse the air fuel ratio from “Lean → Rich → Lean” to “Rich → Lean → Rich”.



Judge as NG when the following conditions are established.

Judgment value

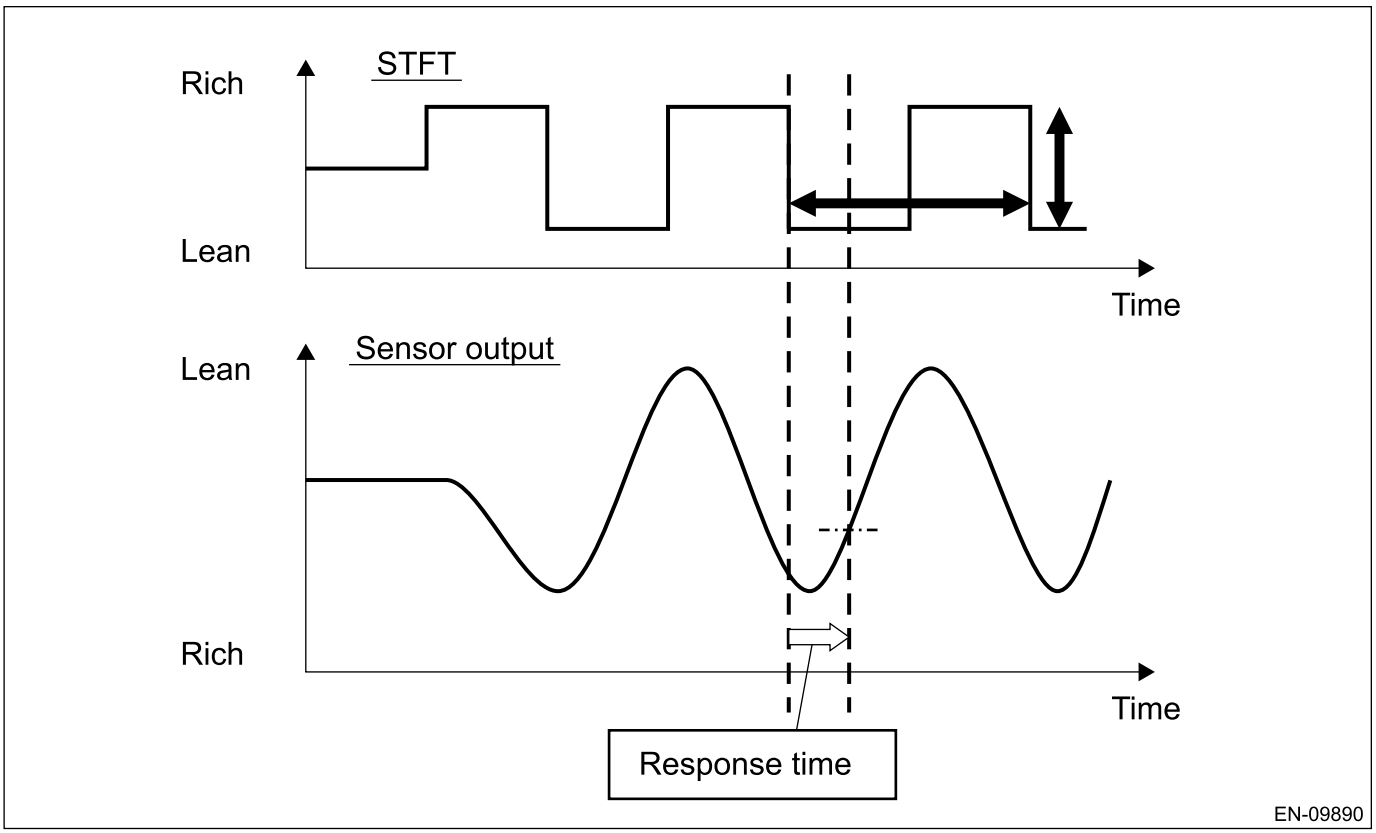
Malfunction Criteria	Threshold Value	DTC
Average value of time necessary for λ to inverse the air fuel ratio to Lean → Rich → Lean and	> 190ms	P015A
Average value when λ is lean	> 250ms	
Average value of time necessary for λ to inverse the air fuel ratio to Rich → Lean → Rich and	> 250ms	P015B
Average value when λ is rich	> 300ms	

Time needed for diagnosis: 90 seconds

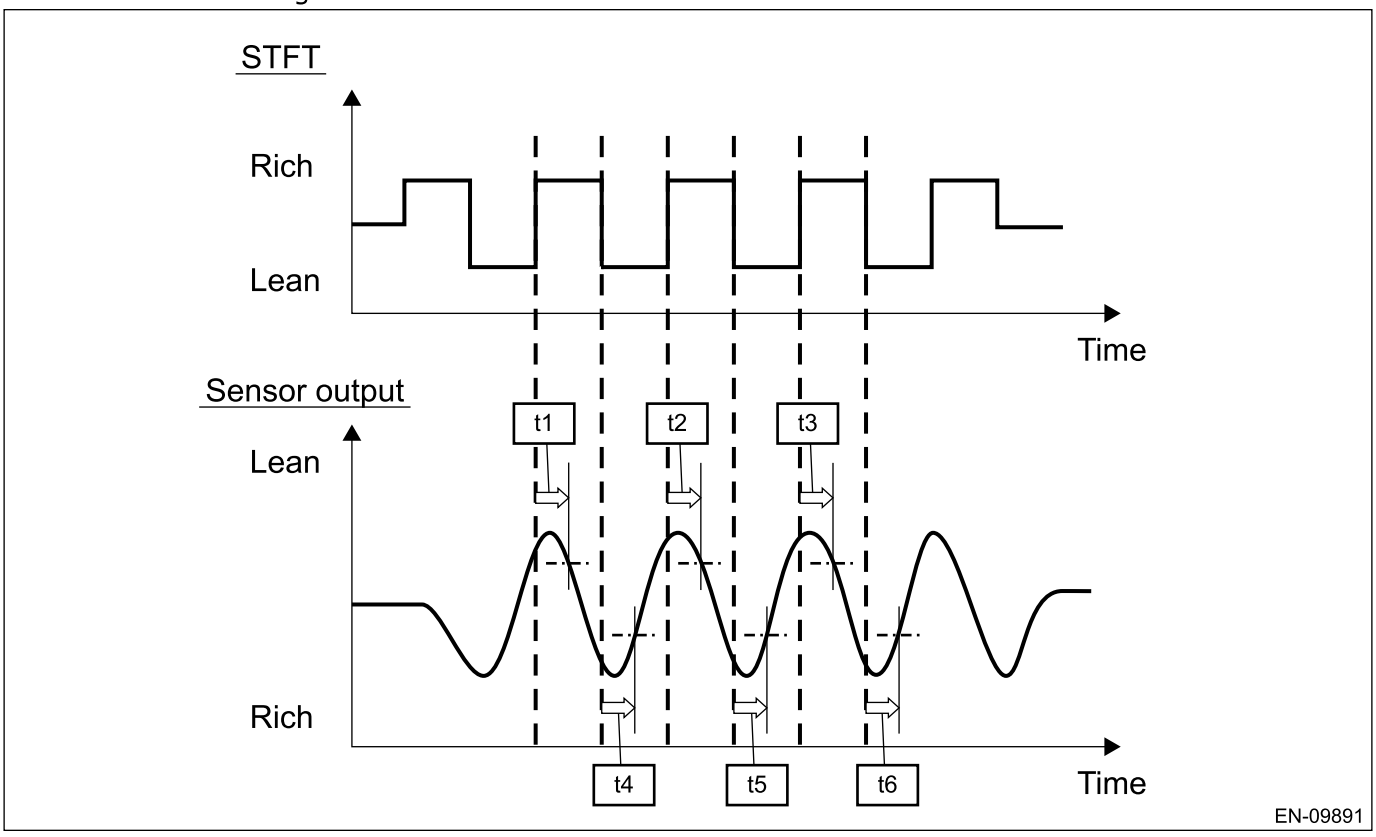
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

6. DIAGNOSTIC METHOD 2

Change STFT (A/F compensation value) by interruption, and measure the reaction time of λ value. When A/F sensor malfunctions, the reaction time takes longer than at normal condition. In this case, judge as abnormal.



Measure reaction time (t1, t2, t3) and reaction time (t4, t5, t6). Use the average value of the reaction time to obtain the diagnostic value.



Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value	DTC
(t1 + t2 + t3)/3 and	> 500ms	P015A and P015B
(t4 + t5 + t6)/3	> 500ms	

Time needed for diagnosis: 4500 ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P015B A/F / O2 SENSOR DELAYED RESPONSE - LEAN TO RICH BANK 1 SENSOR 1

Note:
For the diagnostic procedure, refer to DTC P014C. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P014C A/F / O2 SENSOR SLOW RESPONSE - RICH TO LEAN BANK 1 SENSOR 1.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P015A. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P015A A/F / O2 SENSOR DELAYED RESPONSE - RICH TO LEAN BANK 1 SENSOR 1.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P0171 SYSTEM TOO LEAN BANK 1

Note:
For the diagnostic procedure, refer to DTC P0172. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0172 SYSTEM TOO RICH BANK 1.

1. OUTLINE OF DIAGNOSIS

Detect fuel system malfunction by the amount of main feedback control.
Fuel system is diagnosed by comparing the target air fuel ratio calculated by ECM with the actual air fuel ratio measured by sensor.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Main feedback	In operation

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously at idling or at a constant speed after warming up the engine.

4. DIAGNOSTIC METHOD

Compare the diagnostic value with the threshold value, and if a condition meeting the malfunction criteria listed below continues for 10s × 3time(s) or more, judge that there is a fault in the fuel system.

Judgment value

Malfunction Criteria	Threshold Value
Offset amount of main feedback compensation	≥ 1.35

time needed for diagnosis: 10s × 3time(s)

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0172 SYSTEM TOO RICH BANK 1

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

- Improper idling
- Engine stalls.
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK EXHAUST SYSTEM.

Check the installation condition of exhaust system.

Are there holes or loose bolts on exhaust system?

Yes	Repair the exhaust system.
No	Go to 2.

2. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

Yes	Repair the air intake system.
No	Go to 3.

3. CHECK FUEL PRESSURE.

Warning:
Place "NO OPEN FLAMES" signs near the working area.
Caution:
- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Check the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.
Ref. to MECHANICAL(STI)>Fuel Pressure>INSPECTION.
Note:
If fuel pressure does not increase, squeeze the fuel return hose 2 to 3 times, then check fuel pressure again.

Is the check result OK?

Yes	Go to 4.
No	Check the fuel pump and fuel delivery line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Pump>INSPECTION. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Delivery, Return and Evaporation Lines>INSPECTION.

4. CHECK FUEL PRESSURE.

After connecting the pressure regulator vacuum hose, check fuel pressure. Ref. to MECHANICAL(STI)>Fuel Pressure>INSPECTION.
Note:
- **If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then check fuel pressure again.**
- **If the measured value at this step is out of specification, check or replace pressure regulator and pressure regulator vacuum hose.**

Is the check result OK?

Yes	Go to 5.
No	Check the fuel pump and fuel delivery line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Pump>INSPECTION. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Delivery, Return and Evaporation Lines>INSPECTION.

5. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

1. Start the engine and warm up completely.
2. Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Coolant Temp.» 75°C (167°F) or more?

Yes	Go to 6.
No	Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Coolant Temperature Sensor.

6. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).
2. Place the gear shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Mass Air Flow» 2 — 5 g/s (0.26 — 0.66 lb/m)?

Yes	Go to 7.
No	Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

7. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).
2. Place the gear shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Open the front hood.
6. Measure the ambient temperature.
7. Read the value of «Intake Air Temperature» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Subtract ambient temperature from «Intake Air Temperature». Is the obtained value −10 — 50°C (−18 — 90°F)?

Yes	Go to 8.
No	Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

8. CHECK PCV VALVE.

Check the PCV valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Valve>INSPECTION.

Is the check result OK?

Yes	Go to 9.
No	Repair or replace the PCV valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Valve.

9. CHECK PCV HOSE ASSEMBLY.

Check the PCV hose assembly.

Is the PCV hose assembly deformed, cracked or damaged?

Yes	Repair or replace the PCV hose assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Hose Assembly.
No	Go to 10.

10. CHECK PCV HOSE ASSEMBLY.

Check the clamp of PCV hose assembly.

Is the clamp of PCV hose assembly damaged or loose?

Yes	Repair or replace the clamp of PCV hose assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Hose Assembly.
No	Repair the poor contact of ECM connector.

1. OUTLINE OF DIAGNOSIS

Detect fuel system malfunction by the amount of main feedback control.
Fuel system is diagnosed by comparing the target air fuel ratio calculated by ECM with the actual air fuel ratio measured by sensor.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Main feedback	In operation

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously at idling or at a constant speed after warming up the engine.

4. DIAGNOSTIC METHOD

Compare the diagnostic value with the threshold value, and if a condition meeting the malfunction criteria listed below continues for 10s × 3time(s) or more, judge that there is a fault in the fuel system.
Judgment value

Malfunction Criteria	Threshold Value
Offset amount of main feedback compensation	< Value from Map

Map

Warm-up increase compensation coefficient	**0.00**	**0.10**	**0.20**	**0.30**
Threshold Value	0.650	0.547	0.476	0.414

Warm-up increase compensation coefficient	**0.39**	**0.50**	**0.60**
Threshold Value	0.360	0.312	0.301

Perform the diagnosis using the threshold value produced by subtraction.
time needed for diagnosis: 10s × 3time(s)
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0201 CYLINDER 1 INJECTOR "A" CIRCUIT

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

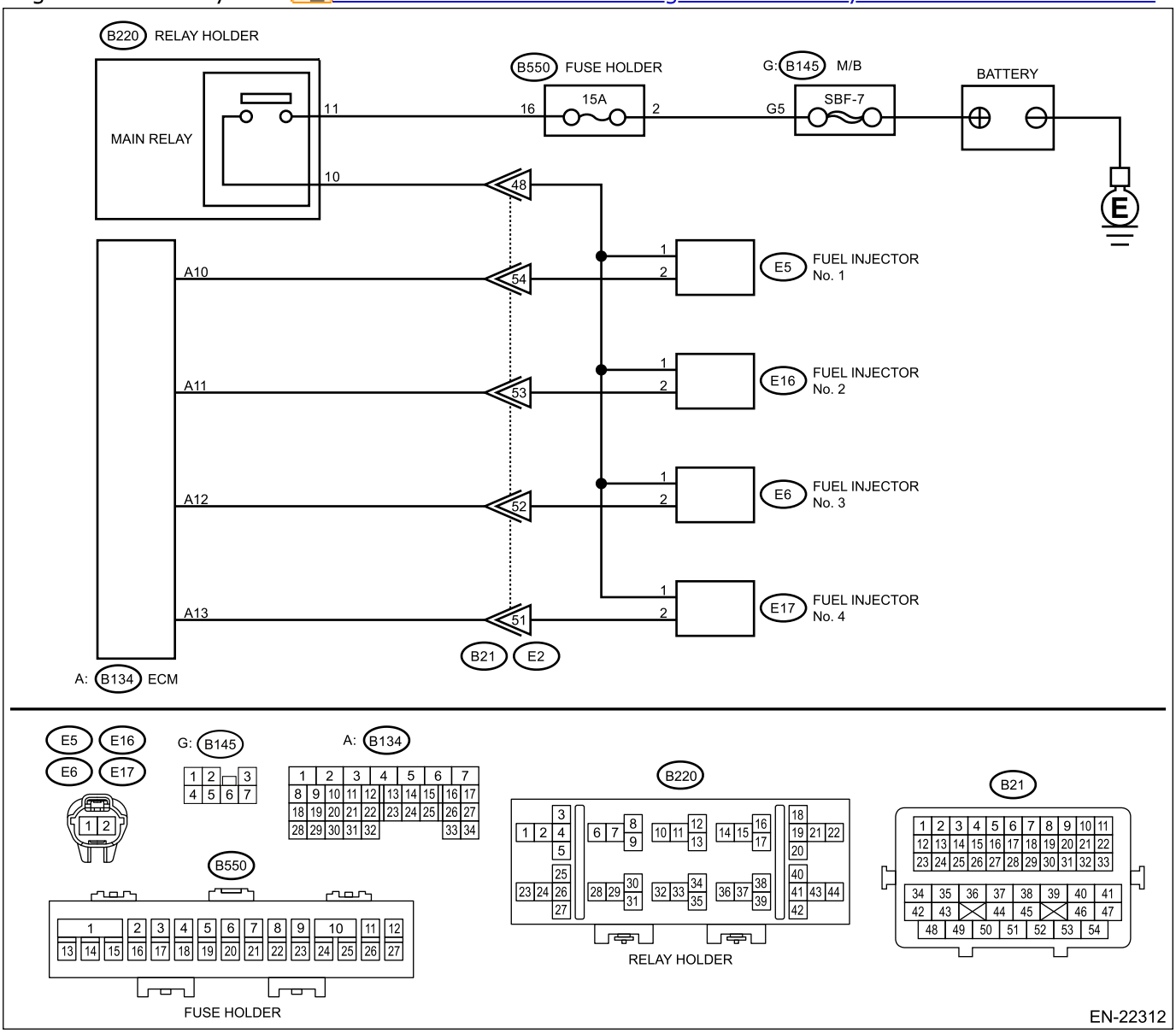
- Improper idling
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK POWER SUPPLY TO FUEL INJECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from fuel injector.
3. Turn the ignition switch to ON.
4. Measure the voltage between fuel injector connector and the engine ground.

Connector & terminal

DTC P0201; (E5) No. 1 (+) — Engine ground (−):
DTC P0202; (E16) No. 1 (+) — Engine ground (−):
DTC P0203; (E6) No. 1 (+) — Engine ground (−):
DTC P0204; (E17) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between main relay and fuel injector connector** • **Poor contact of main relay connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between fuel injector connector and engine ground.

Connector & terminal

DTC P0201; (E5) No. 2 — Engine ground:
DTC P0202; (E16) No. 2 — Engine ground:
DTC P0203; (E6) No. 2 — Engine ground:
DTC P0204; (E17) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

3. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

Measure the resistance of harness between ECM connector and fuel injector connector.

Connector & terminal

DTC P0201; (B134) No. 10 — (E5) No. 2:
DTC P0202; (B134) No. 11 — (E16) No. 2:
DTC P0203; (B134) No. 12 — (E6) No. 2:
DTC P0204; (B134) No. 13 — (E17) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and fuel injector connector** • **Poor contact of coupling connector**

4. CHECK FUEL INJECTOR.

Check the fuel injector on faulty cylinder. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes	Go to 5.
No	Replace the fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector.

5. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

Yes	Repair the poor contact of ECM connector.
No	Go to 6.

6. CHECK FUEL INJECTOR OPERATION.

1. Connect all connectors.
2. Start the engine.
3. Check if the corresponding fuel injector emits operating sound.
   Note:
   Use a sound scope to check the operating sound.

Does the fuel injector emit operating sound?

Yes	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**
No	Repair the poor contact of fuel injector connector.

1. OUTLINE OF DIAGNOSIS

Based on the self-diagnostic result of the injector driving IC, judge the injector driving circuit as normal or abnormal.
Injector driving IC detects the status of “fuel remains injected” or “fuel is not injected” as a malfunction.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	> 1 s
Engine speed	≥ 500 rpm

Secondary parameters	Execution condition
Injection status	Not during fuel cut

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Injector driving IC information	Trouble

time needed for diagnosis: 10time(s) × 256/1000 s
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P0202 CYLINDER 2 INJECTOR "A" CIRCUIT

Note:
For the diagnostic procedure, refer to DTC P0201. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0201 CYLINDER 1 INJECTOR "A" CIRCUIT.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0201. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0201 CYLINDER 1 INJECTOR "A" CIRCUIT.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P0203 CYLINDER 3 INJECTOR "A" CIRCUIT

Note:
For the diagnostic procedure, refer to DTC P0201. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0201 CYLINDER 1 INJECTOR "A" CIRCUIT.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0201. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0201 CYLINDER 1 INJECTOR "A" CIRCUIT.

DTC P0204 CYLINDER 4 INJECTOR "A" CIRCUIT

Note:
For the diagnostic procedure, refer to DTC P0201. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0201 CYLINDER 1 INJECTOR "A" CIRCUIT.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0201. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0201 CYLINDER 1 INJECTOR "A" CIRCUIT.

DTC P0222 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT LOW

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

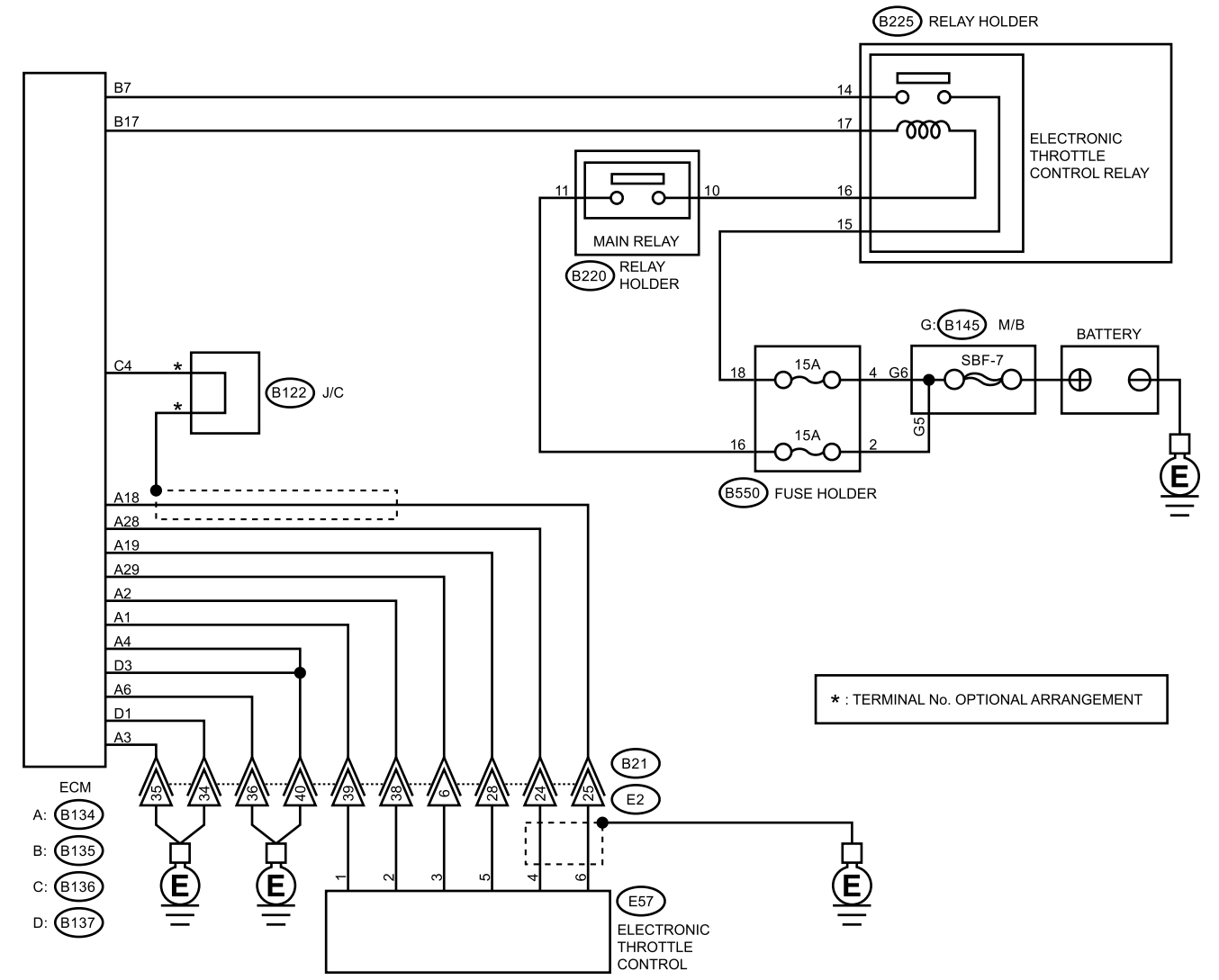
- Improper idling
- Poor driving performance
- Engine stalls.

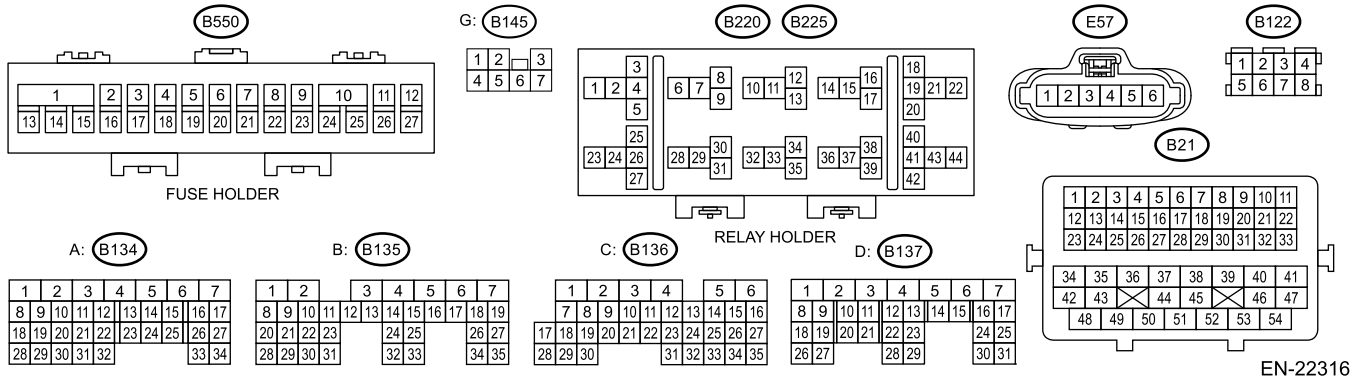
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B225 RELAY HOLDER
B7
B17
14
17
16
15
ELECTRONIC THROTTLE CONTROL RELAY
11
10
MAIN RELAY
B220 RELAY HOLDER
G: B145 M/B
BATTERY
SBF-7
18
15A
4
G6
G5
16
15A
2
B550 FUSE HOLDER
C4
*
*
B122 J/C
A18
A28
A19
A29
A2
A1
A4
D3
A6
D1
A3
* : TERMINAL No. OPTIONAL ARRANGEMENT
ECM
A: B134
B: B135
C: B136
D: B137
35
34
36
40
39
38
6
28
24
25
B21
E2
1
2
3
5
4
6
E57
ELECTRONIC THROTTLE CONTROL


B550
FUSE HOLDER
G: B145
B220
B225
RELAY HOLDER
E57
B122
B21
A: B134
B: B135
C: B136
D: B137

EN-22316

1. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B134) No. 19 — Chassis ground:
   (B134) No. 28 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 2.
No	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

2. CHECK SHORT CIRCUIT INSIDE THE ECM.

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 4 — Engine ground:

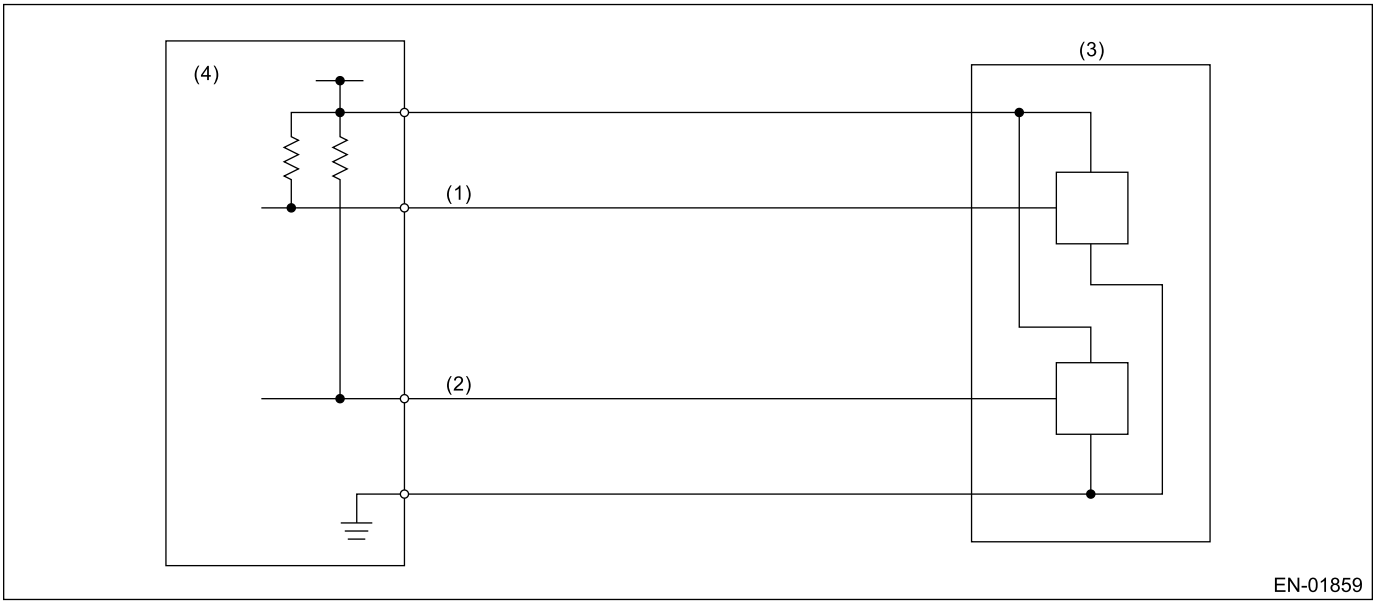
Is the resistance 1 MΩ or more?

Yes	Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Throttle Body.
No	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. Replace the ECM if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 2.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 6V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	≤ 1.15V

time needed for diagnosis: 24ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0223 THROTTLE/PEDAL POSITION SENSOR/SWITCH "B" CIRCUIT HIGH

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

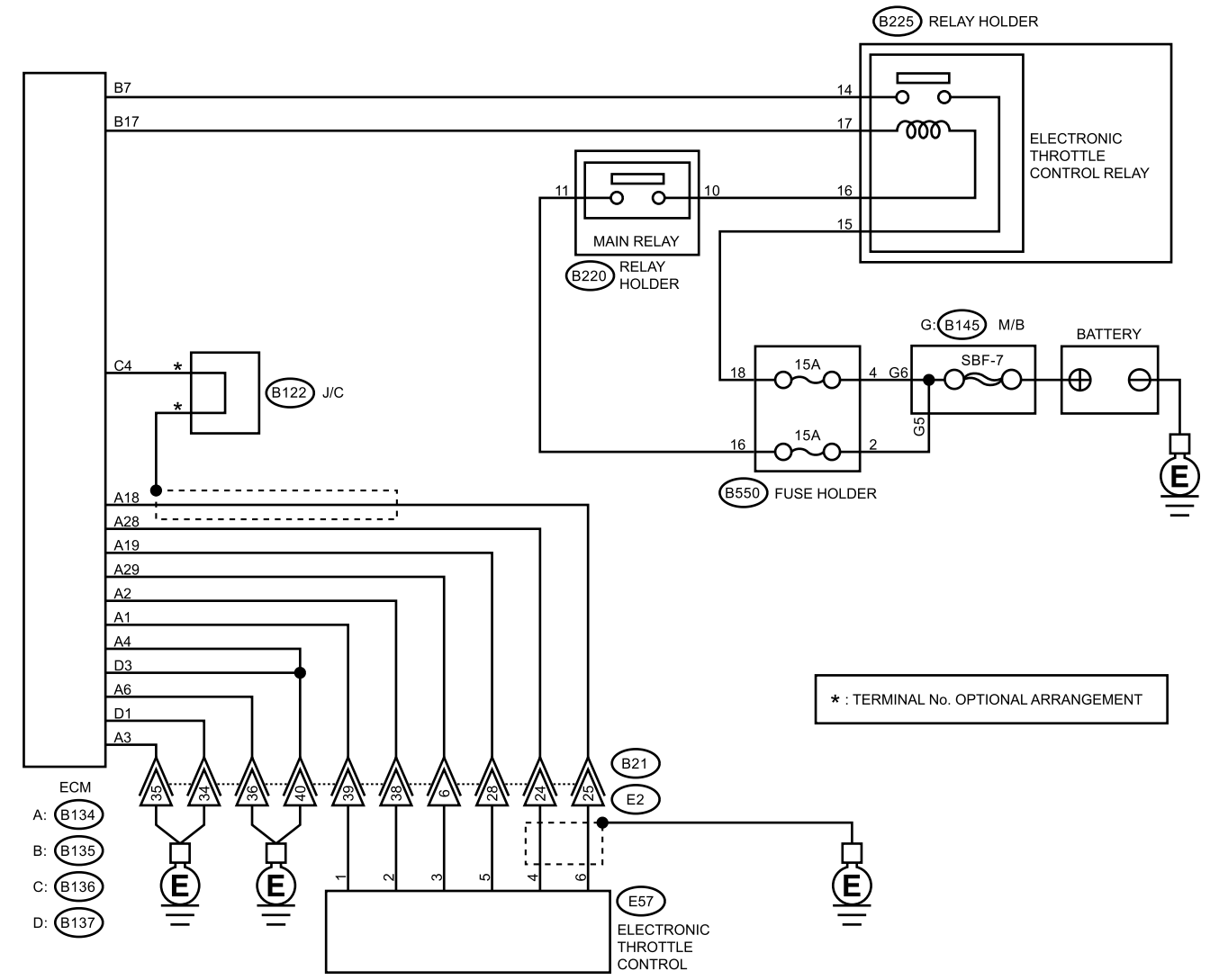
- Improper idling
- Poor driving performance
- Engine stalls.

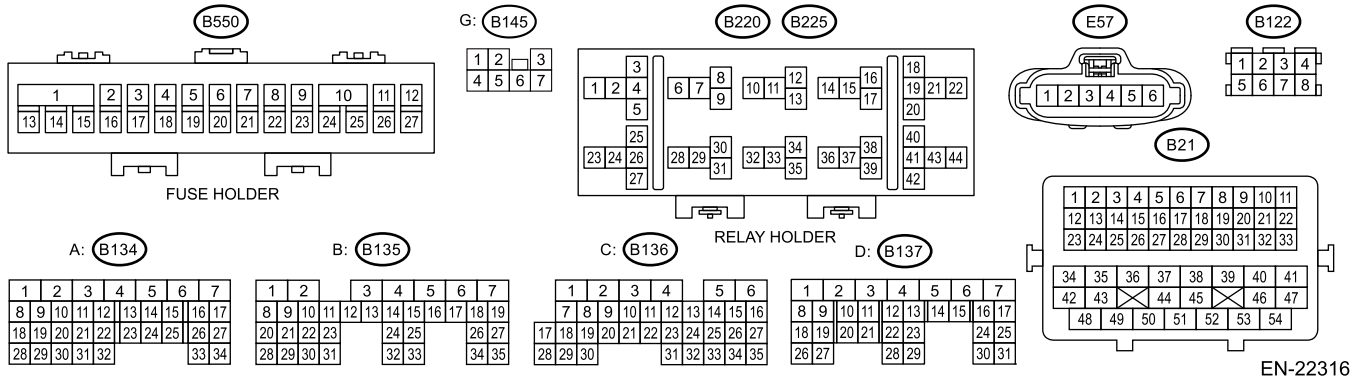
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B225 RELAY HOLDER
B7
B17
14
17
16
15
ELECTRONIC THROTTLE CONTROL RELAY
11
10
MAIN RELAY
B220 RELAY HOLDER
G: B145 M/B
BATTERY
SBF-7
18
15A
4
G6
G5
16
15A
2
B550 FUSE HOLDER
C4
*
*
B122 J/C
A18
A28
A19
A29
A2
A1
A4
D3
A6
D1
A3
* : TERMINAL No. OPTIONAL ARRANGEMENT
ECM
A: B134
B: B135
C: B136
D: B137
35
34
36
40
39
38
6
28
24
25
B21
E2
1
2
3
5
4
6
E57
ELECTRONIC THROTTLE CONTROL


B550
FUSE HOLDER
G: B145
B220
B225
RELAY HOLDER
E57
B122
B21
A: B134
B: B135
C: B136
D: B137

EN-22316

1. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance of harness between ECM connector and electronic throttle control connector.
   Connector & terminal
   (B134) No. 28 — (E57) No. 4:
   (B134) No. 29 — (E57) No. 3:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and electronic throttle control connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to ON.
2. Measure the voltage between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 4 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.
No	Go to 4.

4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   Connector & terminal
   (B134) No. 19 — (B134) No. 28:

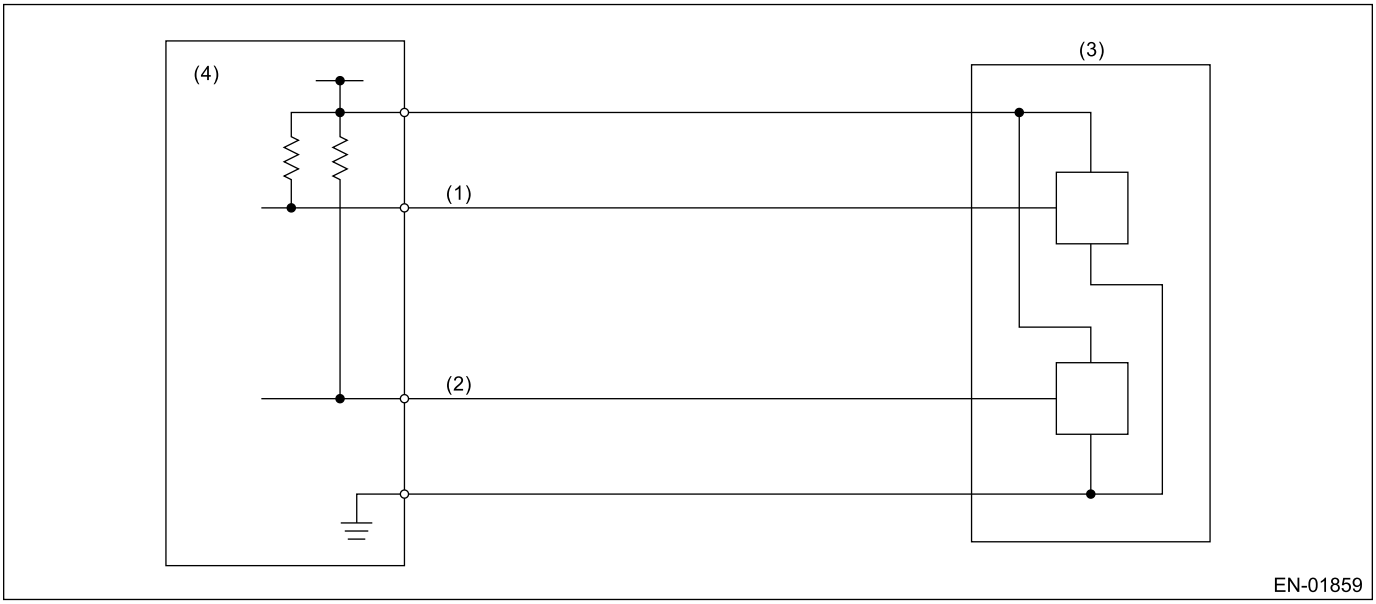
Is the resistance 1 MΩ or more?

Yes	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Throttle Body.
No	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of throttle position sensor 2.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 6V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	≥ 4.858V

time needed for diagnosis: 24ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0230 FUEL PUMP PRIMARY CIRCUIT

DTC detecting condition:

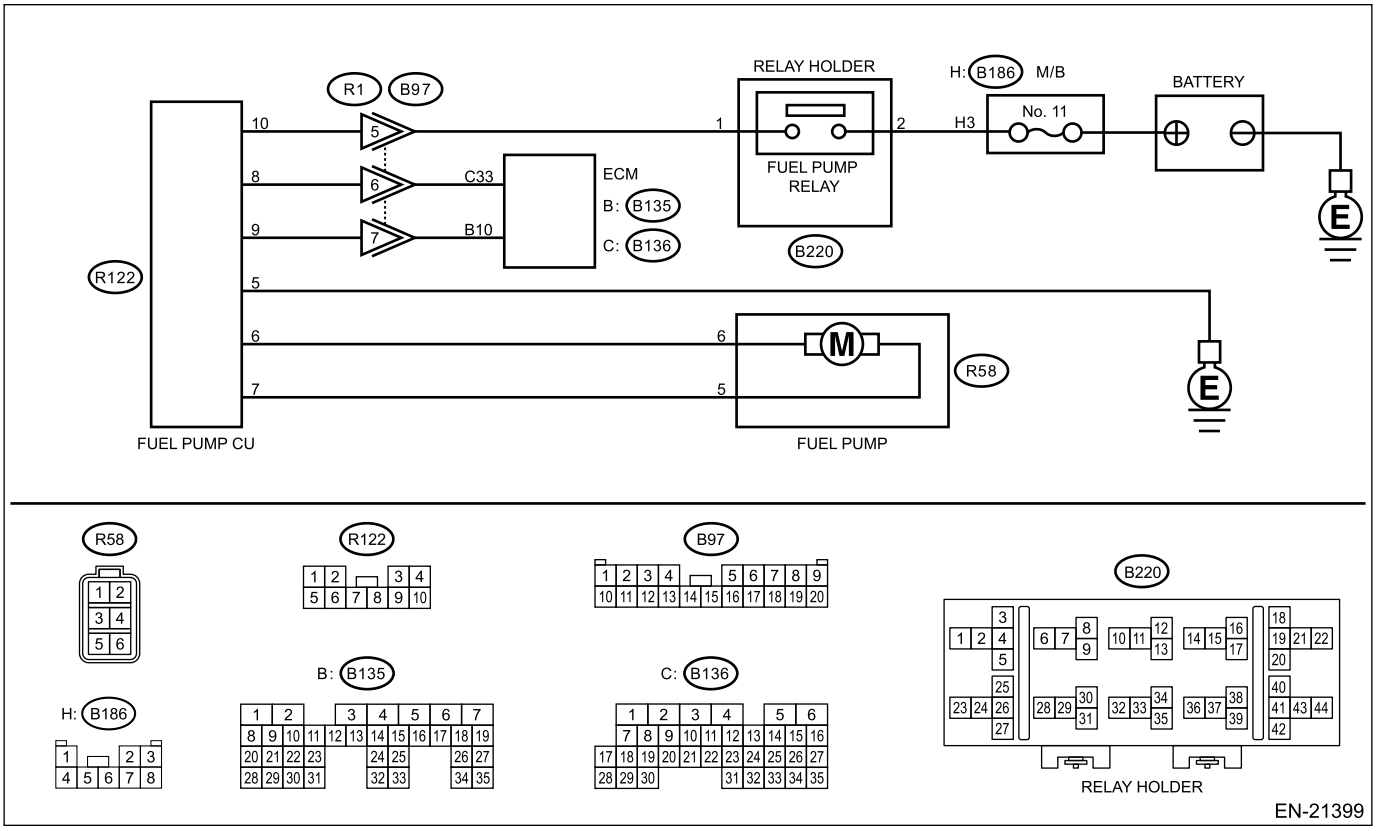
Detected when two consecutive driving cycles with fault occur.

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK POWER SUPPLY CIRCUIT TO FUEL PUMP CONTROL UNIT.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from fuel pump control unit.
3. Turn the ignition switch to ON.
4. Measure the voltage between fuel pump control unit connector and chassis ground.
   Connector & terminal
   (R122) No. 10 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Repair the power supply circuit. **Note:** **In this case, repair the following item:** • **Open circuit or short circuit to ground in harness between fuel pump relay connector and fuel pump control unit connector** • **Poor contact of fuel pump relay connector** • **Poor contact of coupling connector**

2. CHECK GROUND CIRCUIT OF FUEL PUMP CONTROL UNIT.

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between fuel pump control unit connector and chassis ground.
   Connector & terminal
   (R122) No. 5 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 3.
No	Repair the open circuit in harness between fuel pump control unit connector and chassis ground.

3. CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR.

1. Disconnect the connector from fuel pump.
2. Measure the resistance of harness between fuel pump control unit and fuel pump connector.

Connector & terminal

(R122) No. 7 — (R58) No. 5:

(R122) No. 6 — (R58) No. 6:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between fuel pump control unit connector and fuel pump connector** • **Poor contact of coupling connector**

4. CHECK HARNESS BETWEEN FUEL PUMP CONTROL UNIT AND FUEL PUMP CONNECTOR.

Measure the resistance between fuel pump control unit connector and chassis ground.

Connector & terminal

(R122) No. 7 — Chassis ground:

(R122) No. 6 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between fuel pump control unit connector and fuel pump connector.

5. CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONTROL UNIT CONNECTOR.

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and fuel pump control unit connector.

Connector & terminal

(B135) No. 10 — (R122) No. 9:

(B136) No. 33 — (R122) No. 8:

Is the resistance less than 1 Ω?

Yes	Go to 6.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and fuel pump control unit connector** • **Poor contact of coupling connector**

6. CHECK HARNESS BETWEEN ECM AND FUEL PUMP CONTROL UNIT CONNECTOR.

Measure the resistance between fuel pump control unit connector and chassis ground.

Connector & terminal

(R122) No. 9 — Chassis ground:

(R122) No. 8 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 7.
No	Repair the short circuit to ground in harness between ECM connector and fuel pump control unit connector.

7. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and fuel pump control unit connector.

Is there poor contact of ECM or fuel pump control unit connector?

Yes	Repair the poor contact of ECM or fuel pump control unit connector.
No	Go to 8.

8. CHECK EXPERIENCE OF RUNNING OUT OF FUEL.

Check “Check List for Interview”.

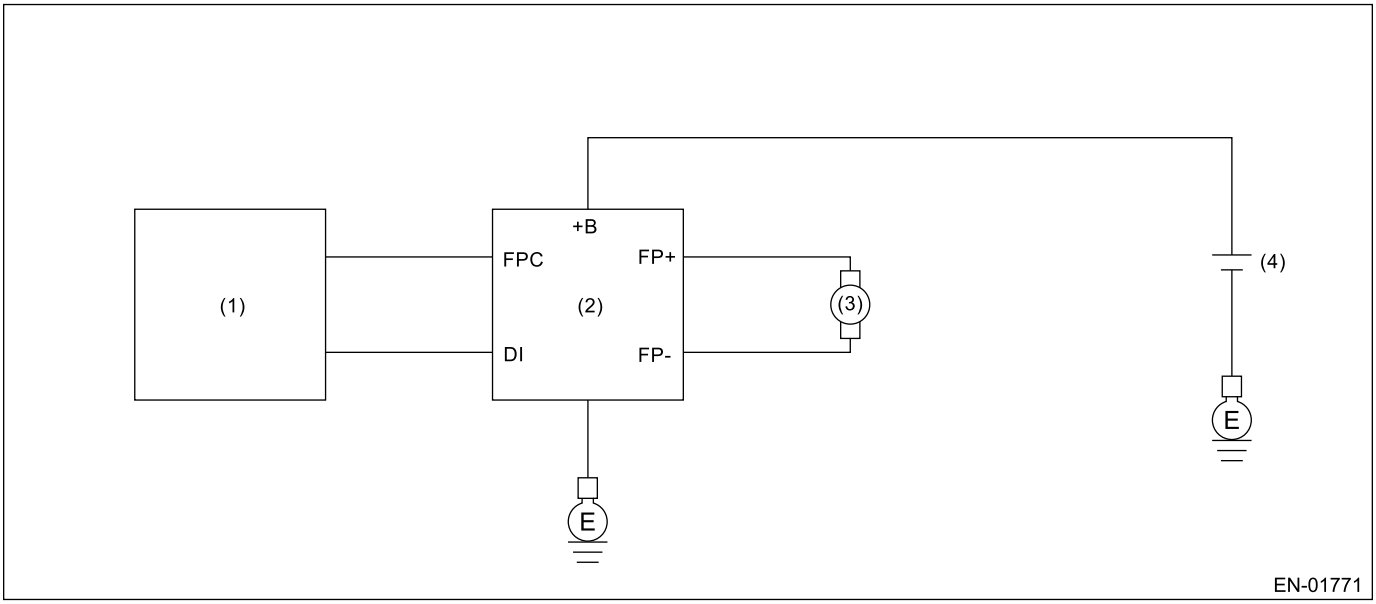
Has the vehicle experienced running out of fuel?

Yes	Finish the diagnosis. **Note:** **DTC may be recorded as a result of fuel pump idling while running out of fuel.**
No	Replace the fuel pump control unit. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Fuel Pump Control Unit.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of fuel pump control unit.
Judge as NG when the NG signal is sent through a diagnostic line coming from the fuel pump control unit.
Fuel pump control unit detects the open or short circuit malfunction for each line, and then sends NG signals if one of them is found NG.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM) (3) Fuel pump (4) Battery
(2) Fuel pump control unit

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 8 V
Remaining fuel level	≥ 9L (2.38US gal, 1.98Imp gal)
Elapsed time after starting the engine	≥ 180000ms

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≤ Battery voltage × 0.35 V

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0245 TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID "A" LOW

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

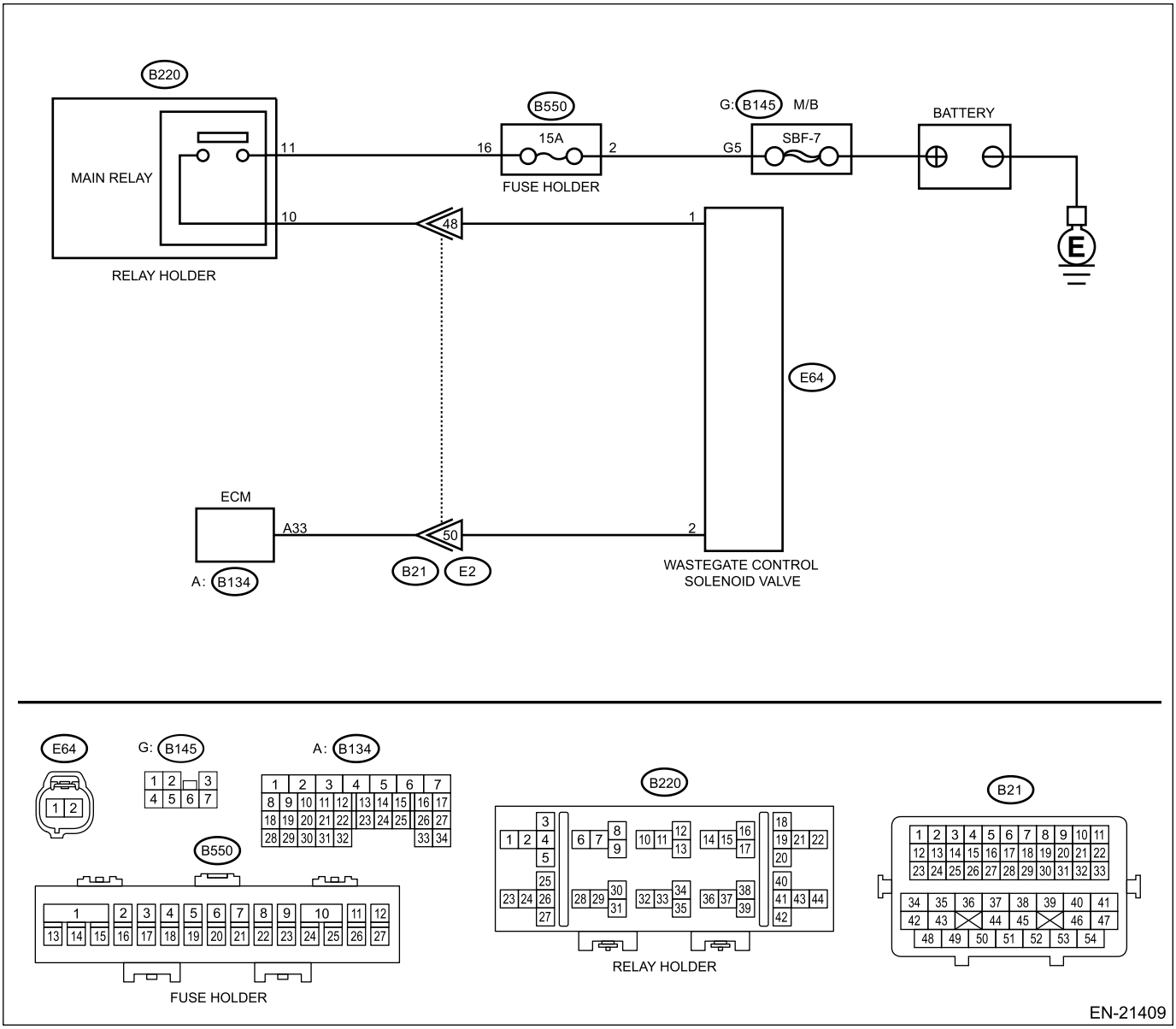
Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK OUTPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B134) No. 33 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Go to 3.

2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

Yes	Repair the poor contact of ECM connector.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary open or short circuit of harness or temporary poor contact of connector may be the cause.**

3. CHECK POWER SUPPLY TO WASTEGATE CONTROL SOLENOID VALVE.

Measure the voltage between wastegate control solenoid valve connector and engine ground.
Connector & terminal
(E64) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 4.
No	Repair the power supply circuit.

4. CHECK HARNESS BETWEEN ECM AND WASTEGATE CONTROL SOLENOID VALVE CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the wastegate control solenoid valve.
4. Measure the resistance between wastegate control solenoid valve connector and engine ground.
   Connector & terminal
   (E64) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair ground short circuit of harness between ECM connector and wastegate control solenoid valve connector.

5. CHECK HARNESS BETWEEN ECM AND WASTEGATE CONTROL SOLENOID VALVE CONNECTOR.

Measure the resistance of harness between ECM connector and wastegate control solenoid valve connector.

Connector & terminal
(B134) No. 33 — (E64) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 6.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and wastegate control solenoid valve connector** • **Poor contact of coupling connector**

6. CHECK WASTEGATE CONTROL SOLENOID VALVE.

1. Remove the wastegate control solenoid valve.
2. Check the wastegate control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Wastegate Control Solenoid Valve>INSPECTION.

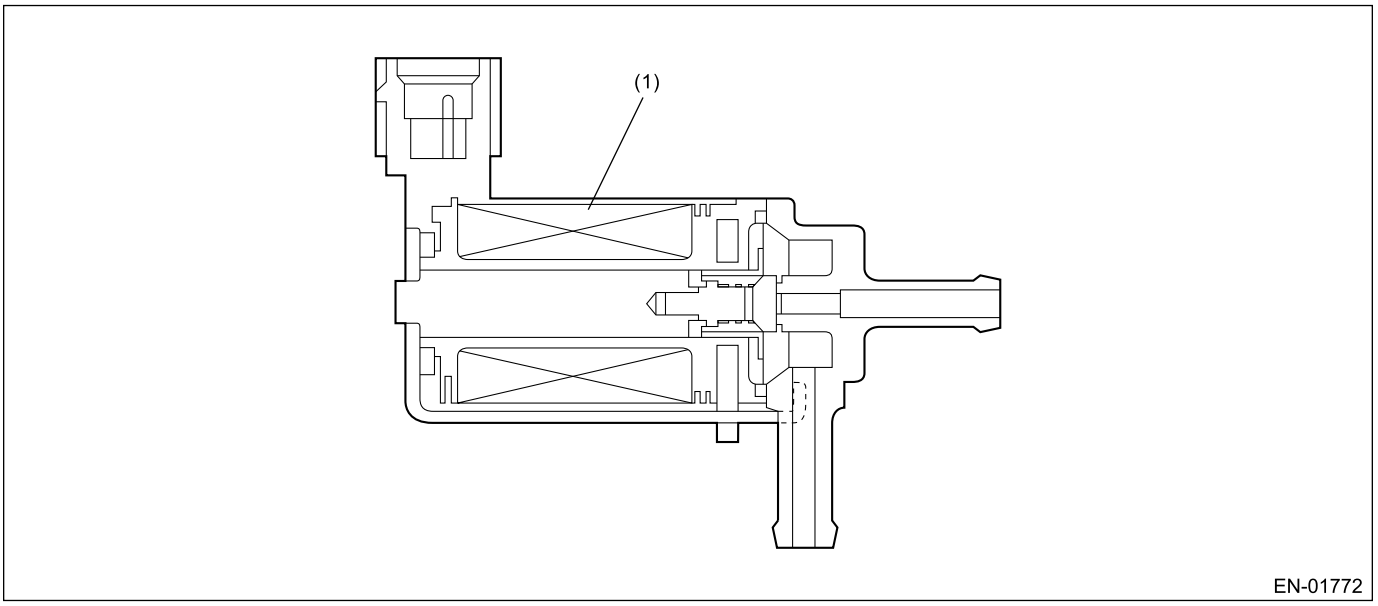
Is the check result OK?

Yes	Repair poor contact of wastegate control solenoid valve connector.
No	Replace the wastegate control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Wastegate Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the wastegate control solenoid valve.
Judge as NG when the terminal output voltage remains Low during outputting the duty signal.

2. COMPONENT DESCRIPTION



(1) Coil

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Duty ratio of wastegate control	< 75%

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≤ Battery voltage × 0.34 V

time needed for diagnosis: 640ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0246 TURBOCHARGER/SUPERCHARGER WASTEGATE SOLENOID "A" HIGH

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

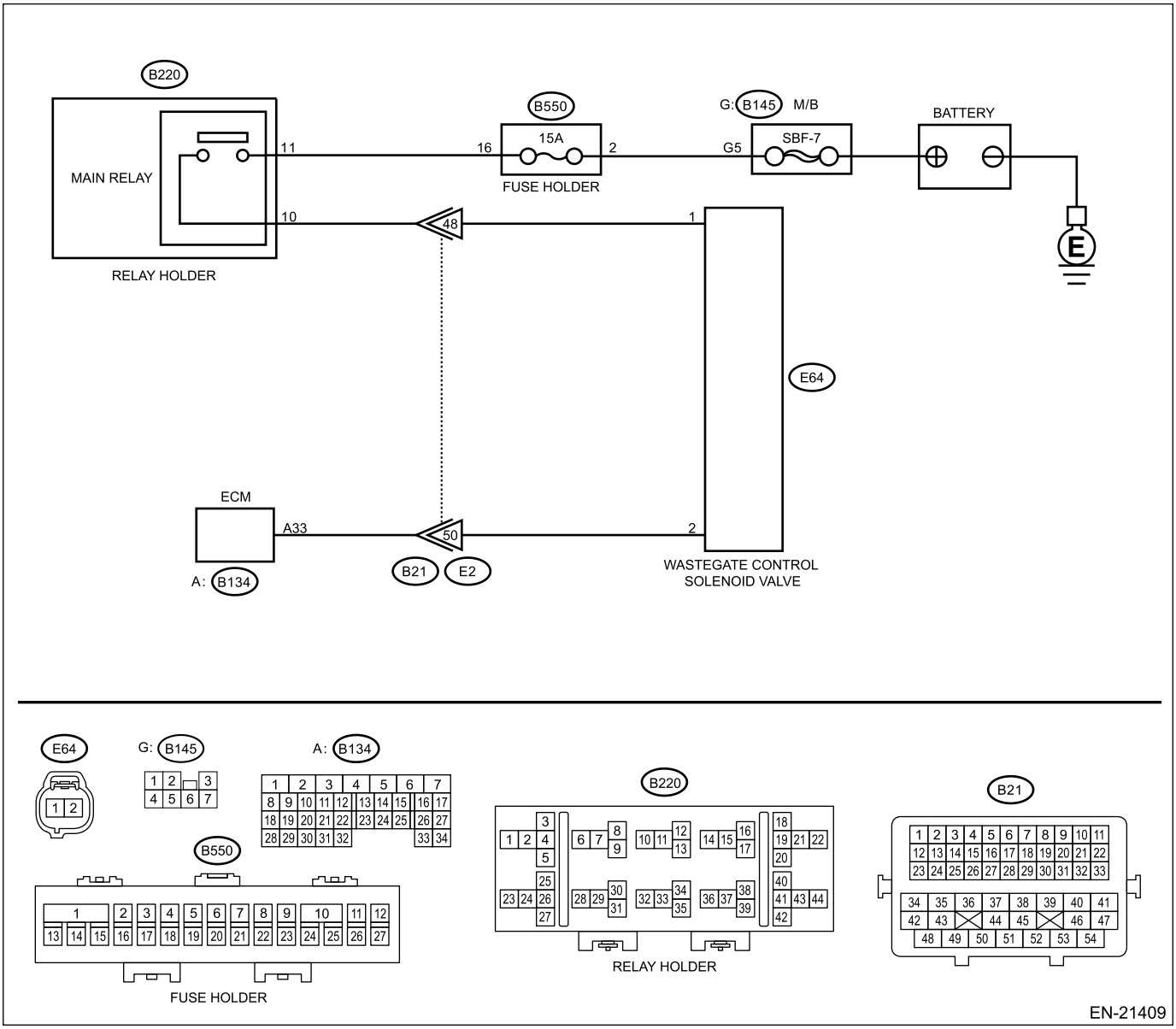
Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND WASTEGATE CONTROL SOLENOID VALVE CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the wastegate control solenoid valve.
4. Turn the ignition switch to ON.
5. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B134) No. 33 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair short circuit to power in harness between ECM connector and wastegate control solenoid valve connector.
No	Go to 2.

2. CHECK WASTEGATE CONTROL SOLENOID VALVE.

1. Turn the ignition switch to OFF.
2. Check the wastegate control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Wastegate Control Solenoid Valve>INSPECTION.

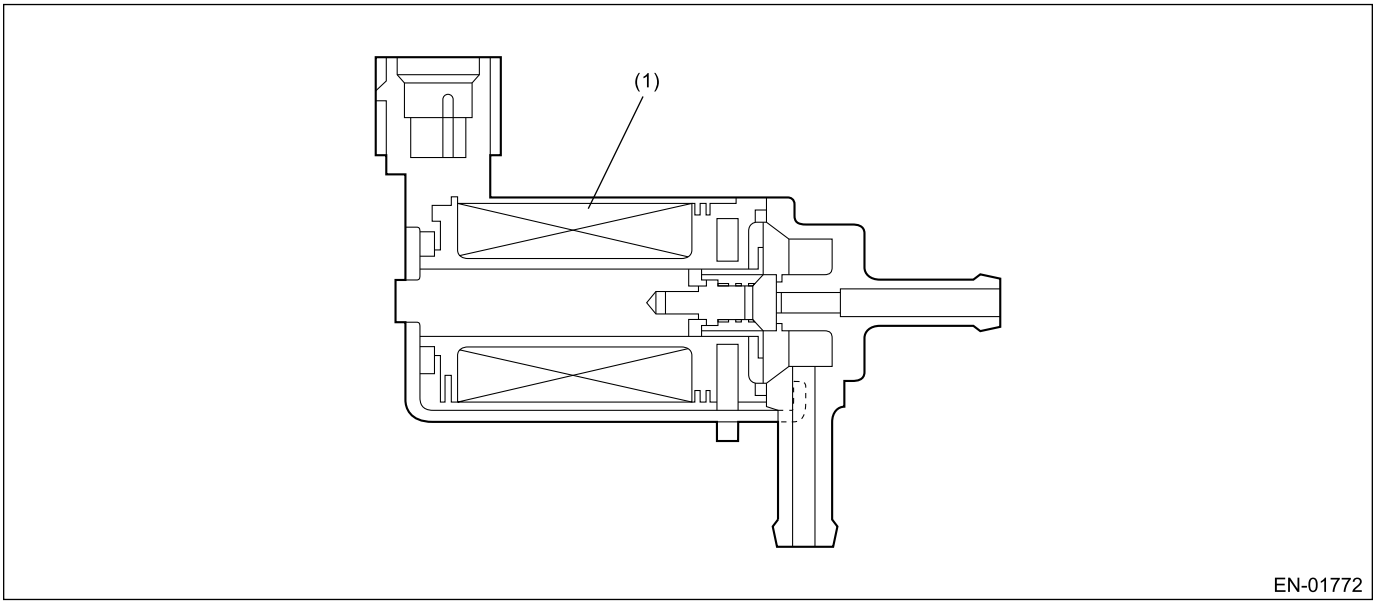
Is the check result OK?

Yes	Repair the poor contact of ECM connector.
No	Replace the wastegate control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Wastegate Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the wastegate control solenoid valve.
Judge as NG when the terminal output voltage remains Low or High during outputting the duty signal.

2. COMPONENT DESCRIPTION



(1) Coil

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Duty ratio of wastegate control	> 25%

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output current	≥ 12 A

time needed for diagnosis: 640ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0300 RANDOM/MULTIPLE CYLINDER MISFIRE DETECTED

DTC detecting condition:

- Detected when two consecutive driving cycles with fault occur.
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)

Trouble symptom:

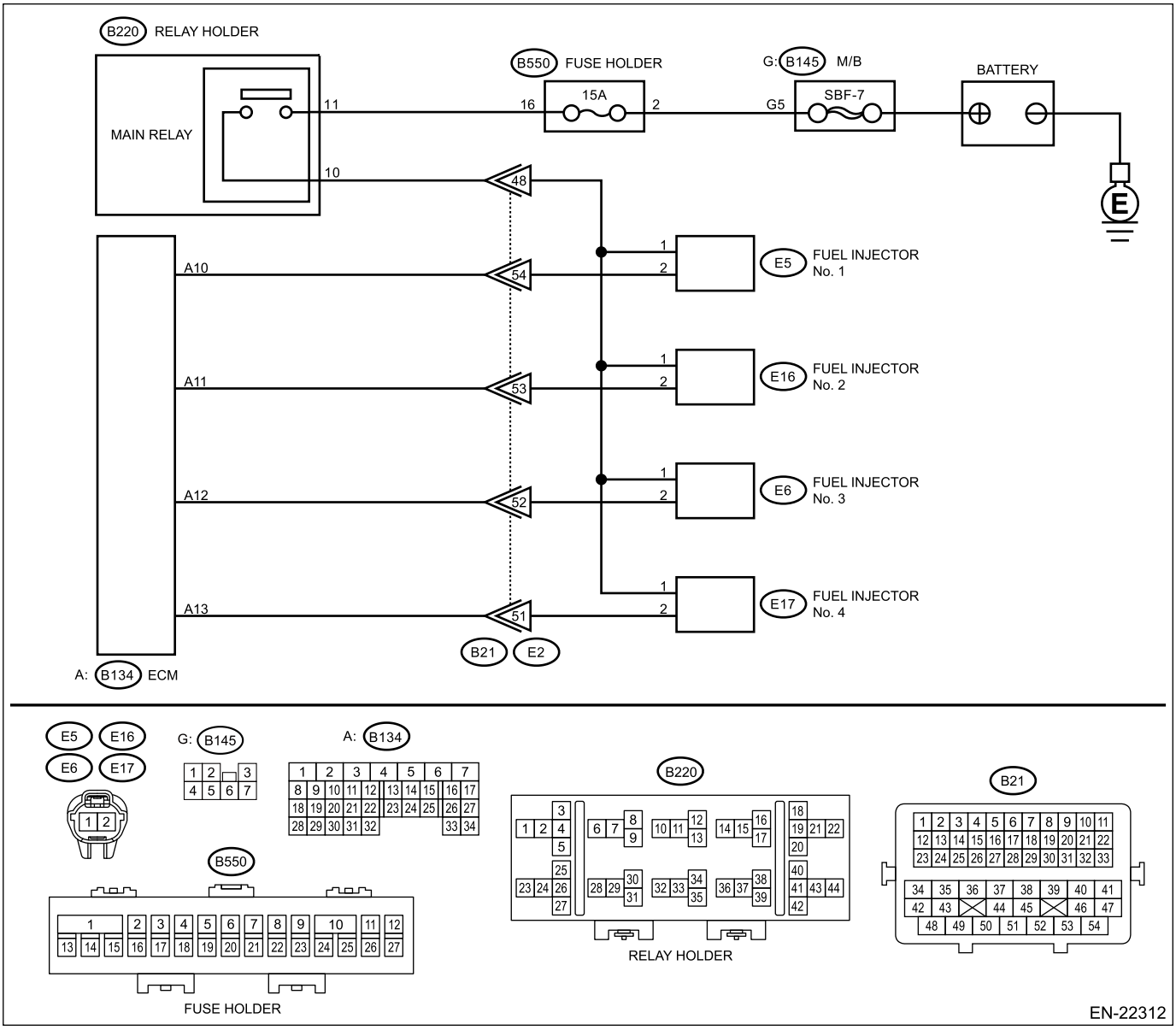
- Engine stalls.
- Improper idling
- Rough driving

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK OUTPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground on all cylinders.

Connector & terminal

#1 (B134) No. 10 (+) — Chassis ground (−):
#2 (B134) No. 11 (+) — Chassis ground (−):
#3 (B134) No. 12 (+) — Chassis ground (−):
#4 (B134) No. 13 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 6.
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from all fuel injectors.
3. Measure the resistance between all fuel injector connectors and engine ground.

Connector & terminal

#1 (E5) No. 2 — Engine ground:
#2 (E16) No. 2 — Engine ground:
#3 (E6) No. 2 — Engine ground:
#4 (E17) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

3. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

Measure the resistance of harness between ECM connector and fuel injector connector on all cylinders.

Connector & terminal

#1 (B134) No. 10 — (E5) No. 2:
#2 (B134) No. 11 — (E16) No. 2:
#3 (B134) No. 12 — (E6) No. 2:
#4 (B134) No. 13 — (E17) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and fuel injector connector** • **Poor contact of coupling connector**

4. CHECK FUEL INJECTOR.

Check all fuel injectors. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes	Go to 5.
No	Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector.

5. CHECK POWER SUPPLY LINE.

1. Turn the ignition switch to ON.
2. Measure the voltage between all fuel injector connectors and the engine ground.
   Connector & terminal
   #1 (E5) No. 1 (+) — Engine ground (−):
   #2 (E16) No. 1 (+) — Engine ground (−):
   #3 (E6) No. 1 (+) — Engine ground (−):
   #4 (E17) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Repair the poor contact of all connectors in fuel injector circuit.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between the main relay connector and fuel injector connector on faulty cylinders** • **Poor contact of coupling connector** • **Poor contact of main relay connector**

6. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from all fuel injectors.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and chassis ground on all cylinders.
   Connector & terminal
   #1 (B134) No. 10 (+) — Chassis ground (−):
   #2 (B134) No. 11 (+) — Chassis ground (−):
   #3 (B134) No. 12 (+) — Chassis ground (−):
   #4 (B134) No. 13 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and fuel injector connectors.
No	Go to 7.

7. CHECK FUEL INJECTOR.

1. Turn the ignition switch to OFF.
2. Check all fuel injectors. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes	Go to 8.
No	Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector.

8. CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.

Check installation condition of the camshaft position sensor/crankshaft position sensor.

Is the camshaft position sensor or crankshaft position sensor loosely installed?

Yes	Tighten the camshaft position sensor or crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor.
No	Go to 9.

9. CHECK CRANK SPROCKET.

1. Remove the timing belt cover. Ref. to MECHANICAL(STI)>Timing Belt Cover>REMOVAL.
2. Check the crank sprocket.

Is the crank sprocket rusted or does it have broken teeth?

Yes	Replace the crank sprocket. Ref. to MECHANICAL(STI)>Crank Sprocket.
No	Go to 10.

10. CHECK INSTALLATION CONDITION OF TIMING BELT.

Turn the crankshaft, and align alignment mark on crank sprocket with alignment mark on cylinder block.

ST 499987500 CRANKSHAFT SOCKET

Is the timing belt dislocated from its proper position?

Yes	Repair the installation condition of timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
No	Go to 11.

11. CHECK FUEL LEVEL.

Check remaining amount of fuel.

Is the fuel meter indication higher than the “Lower” level?

Yes	Go to 12.
No	Refill the fuel so that the fuel meter indication is higher than the “Lower” level, and proceed to the next step. Go to 12.

12. CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.

1. Clear the memory using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Start the engine, and drive the vehicle for 10 minutes or more at 60 km/h.

Does the malfunction indicator light illuminate or blink?

Yes	Go to 13.
No	Repair the poor contact of connector. **Note:** **In this case, repair the following item:** • **Poor contact of ignition coil connector** • **Poor contact of fuel injector connector on faulty cylinders** • **Poor contact of ECM connector** • **Poor contact of coupling connector** **Go to 13.**

13. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Is there any fault in air intake system?

Yes	Repair the air intake system. **Note:** **Check the following items.** • **Are there air leaks or air suction caused by loose or dislocated nuts and bolts?** • **Are there cracks or any disconnection of hoses?**
No	Go to 14.

14. CHECK PCV VALVE.

Check the PCV valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Valve>INSPECTION.

Is the check result OK?

Yes	Go to 15.
No	Repair or replace the PCV valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Valve.

15. CHECK PCV HOSE ASSEMBLY.

Check the PCV hose assembly.

Is the PCV hose assembly deformed, cracked or damaged?

Yes	Repair or replace the PCV hose assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Hose Assembly.
No	Go to 16.

16. CHECK PCV HOSE ASSEMBLY.

Check the clamp of PCV hose assembly.

Is the clamp of PCV hose assembly damaged or loose?

Yes	Repair or replace the clamp of PCV hose assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Hose Assembly.
No	Go to 17.

17. CHECK ALL CYLINDERS.

Check the following items for the cylinders.

- Spark plug
- Ignition coil
- Fuel injector
- Compression
- Skipping timing chain teeth

Is there a fault in any cylinder?

Yes	Repair or replace the faulty part of the faulty cylinder. **Note:** **Check the following items.** • **Spark plug** • **Fuel injector** • **Ignition coil** • **Compression** • **Skipping timing belt teeth**
No	Go to DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0301. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0301 CYLINDER 1 MISFIRE DETECTED.

DTC P0301 CYLINDER 1 MISFIRE DETECTED

Note:
For the diagnostic procedure, refer to DTC P0304. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0304 CYLINDER 4 MISFIRE DETECTED.

1. OUTLINE OF DIAGNOSIS

Detect the presence of misfire occurrence. (Revolution fluctuation method)
Monitoring (exhaust gas) misfire that adversely affects exhaust gas and monitoring misfire that damages the catalyst are made obligatory by the law. Misfire affecting these two has two patterns below:

- Intermittent misfire (a single cylinder misfires at random times, or different cylinders misfire at random): Exhaust gas misfire
- Every-time misfire (a single cylinder misfires every time): Exhaust gas misfire, catalyst-damaging misfire

The following detecting methods are adopted for these detection.

1. Intermittent misfire: Exhaust gas misfire
   - 180° Interval Difference Method
   - 360° Interval Difference Method
   - 720° Interval Difference Method
2. Every-time misfire: Exhaust gas misfire, catalyst-damaging misfire
   - 180° Interval Difference Method
   - 360° Interval Difference Method

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥8V
Throttle position change during 16 milliseconds	< 14°
Fuel shut-off function	≠ Fuel cut
Engine speed	≥550rpm to ≤6700rpm
Intake manifold pressure	> Value of Map 1
Elapsed time after starting the engine	≥ 2 crankshaft revolutions
Following condition A or B is met	
A: Engine coolant temperature at engine starting	> −7°C (19.4°F)
B: Following conditions (b1) and (b2) are met	

Secondary parameters	Execution condition
(b1) Engine coolant temperature at engine starting	≤−7°C (19.4°F)
(b2) Engine coolant temperature	≥ 21°C (69.8°F)

Map 1

- Normal ignition

		Barometric pressure (kPa (mmHg, inHg))						
		66 (495, 19.5)	**69.3 (520 , 20.5)**	**73.3 (550 , 21.7)**	**75.5 (566, 22.3)**	**84.7 (635, 25)**	**93.3 (700, 27.6)**	**100.8 (756, 29.8)**
Engine speed (rpm)	700	25.6 (192, 7.6)	25.6 (192, 7.6)	25.6 (192, 7.6)	25.6 (192, 7.6)	27.3 (205, 8.1)	29.3 (220, 8.7)	29.9 (224, 8.8)
	1000	23.1 (173, 6.8)	23.1 (173, 6.8)	23.1 (173, 6.8)	23.1 (173, 6.8)	24.9 (187, 7.4)	26.3 (197, 7.8)	27.2 (204, 8)
	1200	22 (165, 6.5)	22 (165, 6.5)	22 (165, 6.5)	22 (165, 6.5)	23.9 (179, 7)	25.6 (192, 7.6)	26.1 (196, 7.7)
	1600	21.3 (160, 6.3)	21.3 (160, 6.3)	21.3 (160, 6.3)	21.3 (160, 6.3)	23.5 (176, 6.9)	25.3 (190, 7.5)	25.3 (190, 7.5)
	2000	20.8 (156, 6.1)	20.8 (156, 6.1)	20.8 (156, 6.1)	20.8 (156, 6.1)	22.7 (170, 6.7)	24 (180, 7.1)	24.7 (185, 7.3)
	2400	20.1 (151, 5.9)	20.1 (151, 5.9)	20.1 (151, 5.9)	20.1 (151, 5.9)	21.5 (161, 6.3)	23.3 (175, 6.9)	24 (180, 7.1)
	2800	21.5 (161, 6.3)	21.5 (161, 6.3)	21.5 (161, 6.3)	21.5 (161, 6.3)	22.8 (171, 6.7)	22.9 (172, 6.8)	24.5 (184, 7.2)
	3000	21.7 (163, 6.4)	21.7 (163, 6.4)	21.7 (163, 6.4)	21.7 (163, 6.4)	23.1 (173, 6.8)	24 (180, 7.1)	24.8 (186, 7.3)
	3200	22.1 (166, 6.5)	22.1 (166, 6.5)	22.1 (166, 6.5)	22.1 (166, 6.5)	24.1 (181, 7.1)	25.2 (189, 7.4)	26.1 (196, 7.7)
	3600	24.3 (182, 7.2)	24.3 (182, 7.2)	24.3 (182, 7.2)	24.3 (182, 7.2)	25.7 (193, 7.6)	27.5 (206, 8.1)	27.9 (209, 8.2)

		Barometric pressure (kPa (mmHg, inHg))						
		66 (495, 19.5)	**69.3 (520 , 20.5)**	**73.3 (550 , 21.7)**	**75.5 (566, 22.3)**	**84.7 (635, 25)**	**93.3 (700, 27.6)**	**100.8 (756, 29.8)**
	4000	25.6 (192, 7.6)	25.6 (192, 7.6)	25.6 (192, 7.6)	25.6 (192, 7.6)	26.9 (202, 8)	28.1 (211, 8.3)	28.5 (214, 8.4)
	4400	27.2 (204, 8)	27.2 (204, 8)	27.2 (204, 8)	27.2 (204, 8)	28 (210, 8.3)	29.2 (219, 8.6)	29.2 (219, 8.6)
	4800	28 (210, 8.3)	28 (210, 8.3)	28 (210, 8.3)	28 (210, 8.3)	28.9 (217, 8.5)	29.6 (222, 8.7)	29.7 (223, 8.8)
	5200	29.3 (220, 8.7)	29.3 (220, 8.7)	29.3 (220, 8.7)	29.3 (220, 8.7)	30.4 (228, 9)	31.1 (233, 9.2)	31.1 (233, 9.2)
	5600	32 (240, 9.4)	32 (240, 9.4)	32 (240, 9.4)	32 (240, 9.4)	33.5 (251, 9.9)	34.1 (256, 10.1)	34.8 (261, 10.3)
	6000	35.3 (265, 10.4)	35.3 (265, 10.4)	35.3 (265, 10.4)	35.3 (265, 10.4)	36.7 (275, 10.8)	38.3 (287, 11.3)	38.3 (287, 11.3)
	6400	39.1 (293, 11.5)	39.1 (293, 11.5)	39.1 (293, 11.5)	39.1 (293, 11.5)	40.9 (307, 12.1)	41.7 (313, 12.3)	42.5 (319, 12.6)
	6700	40.1 (301, 11.9)	40.1 (301, 11.9)	40.1 (301, 11.9)	40.1 (301, 11.9)	42 (315, 12.4)	42.8 (321, 12.6)	43.6 (327, 12.9)
(kPa (mmHg, inHg))								

- Idling ignition

		Barometric pressure (kPa (mmHg, inHg))						
		66 (495, 19.5)	**69.3 (520 , 20.5)**	**73.3 (550 , 21.7)**	**75.5 (566 , 22.3)**	**84.7 (635 , 25)**	**93.3 (700 , 27.6)**	**100.8 (756 , 29.8)**
Engine speed (rpm)	700	25.6 (192, 7.6)	25.6 (192, 7.6)	25.6 (192, 7.6)	25.6 (192, 7.6)	27.3 (205, 8.1)	29.3 (220, 8.7)	29.9 (224, 8.8)
	1000	24.7 (185, 7.3)	24.7 (185, 7.3)	24.7 (185, 7.3)	24.7 (185, 7.3)	26.7 (200, 7.9)	27.6 (207, 8.1)	28.8 (216, 8.5)
	1200	24.3 (182, 7.2)	24.3 (182, 7.2)	24.3 (182, 7.2)	24.3 (182, 7.2)	26.5 (199, 7.8)	27.6 (207, 8.1)	28.7 (215, 8.5)

		Barometric pressure (kPa (mmHg, inHg))						
		66 (495, 19.5)	**69.3 (520 , 20.5)**	**73.3 (550 , 21.7)**	**75.5 (566 , 22.3)**	**84.7 (635 , 25)**	**93.3 (700 , 27.6)**	**100.8 (756 , 29.8)**
	1600	23.3 (175, 6.9)	23.3 (175, 6.9)	23.3 (175, 6.9)	23.3 (175, 6.9)	24.7 (185, 7.3)	25.6 (192, 7.6)	26.5 (199, 7.8)
	2000	22.1 (166, 6.5)	22.1 (166, 6.5)	22.1 (166, 6.5)	22.1 (166, 6.5)	23.5 (176, 6.9)	24.7 (185, 7.3)	25.3 (190, 7.5)
	2400	21.3 (160, 6.3)	21.3 (160, 6.3)	21.3 (160, 6.3)	21.3 (160, 6.3)	21.5 (161, 6.3)	23.3 (175, 6.9)	24.1 (181, 7.1)
	2800	21.6 (162, 6.4)	21.6 (162, 6.4)	21.6 (162, 6.4)	21.6 (162, 6.4)	22.8 (171, 6.7)	23.1 (173, 6.8)	24.5 (184, 7.2)
	3000	21.7 (163, 6.4)	21.7 (163, 6.4)	21.7 (163, 6.4)	21.7 (163, 6.4)	23.3 (175, 6.9)	24.1 (181, 7.1)	24.8 (186, 7.3)
	3200	22.8 (171, 6.7)	22.8 (171, 6.7)	22.8 (171, 6.7)	22.8 (171, 6.7)	24.5 (184, 7.2)	25.5 (191, 7.5)	26.4 (198, 7.8)
	3600	28.4 (213, 8.4)	28.4 (213, 8.4)	28.4 (213, 8.4)	28.4 (213, 8.4)	30.9 (232, 9.1)	32.4 (243, 9.6)	32.4 (243, 9.6)
	4000	28.4 (213, 8.4)	28.4 (213, 8.4)	28.4 (213, 8.4)	28.4 (213, 8.4)	30.9 (232, 9.1)	32.4 (243, 9.6)	32.4 (243, 9.6)
	4400	29.5 (221, 8.7)	29.5 (221, 8.7)	29.5 (221, 8.7)	29.5 (221, 8.7)	31.3 (235, 9.3)	32.7 (245, 9.6)	32.7 (245, 9.6)
	4800	31.3 (235, 9.3)	31.3 (235, 9.3)	31.3 (235, 9.3)	31.3 (235, 9.3)	32.7 (245, 9.6)	34.3 (257, 10.1)	34.3 (257, 10.1)
	5200	33.7 (253, 10)	33.7 (253, 10)	33.7 (253, 10)	33.7 (253, 10)	35.5 (266, 10.5)	37.1 (278, 10.9)	37.1 (278, 10.9)
	5600	36.8 (276, 10.9)	36.8 (276, 10.9)	36.8 (276, 10.9)	36.8 (276, 10.9)	37.3 (280, 11)	39.5 (296, 11.7)	39.9 (299, 11.8)
	6000	40.3 (302, 11.9)	40.3 (302, 11.9)	40.3 (302, 11.9)	40.3 (302, 11.9)	41.3 (310, 12.2)	43.2 (324, 12.8)	43.2 (324, 12.8)

		Barometric pressure (kPa (mmHg, inHg))						
		66 (495, 19.5)	**69.3 (520 , 20.5)**	**73.3 (550 , 21.7)**	**75.5 (566 , 22.3)**	**84.7 (635 , 25)**	**93.3 (700 , 27.6)**	**100.8 (756 , 29.8)**
	6400	43.1 (323, 12.7)	43.1 (323, 12.7)	43.1 (323, 12.7)	43.1 (323, 12.7)	44.5 (334, 13.1)	46.3 (347, 13.7)	46.3 (347, 13.7)
	6700	44.1 (331, 13)	44.1 (331, 13)	44.1 (331, 13)	44.1 (331, 13)	45.7 (343, 13.5)	47.3 (355, 14)	47.3 (355, 14)
(kPa (mmHg, inHg))								

3. GENERAL DRIVING CYCLE

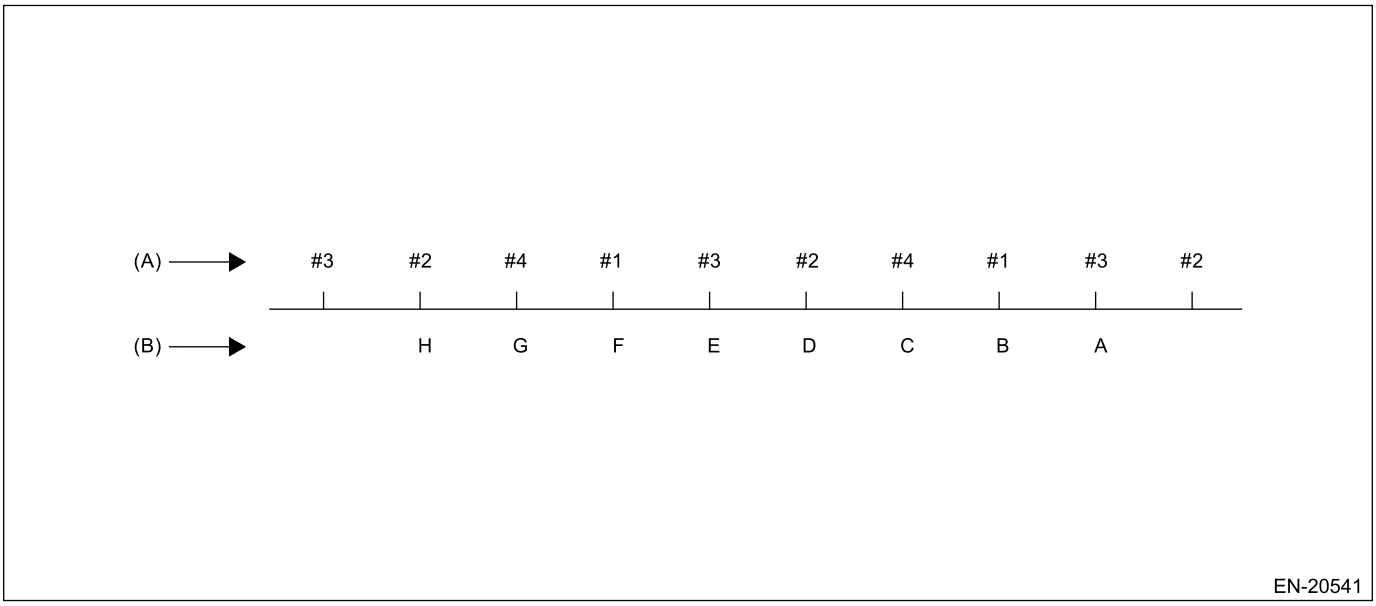
- If conditions are met, it is possible to detect the misfires from idling to high engine speed. However, in case any engine load or breakage occurs, perform with the engine at idle.
- Perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

When a misfire occurs, the engine speed will decrease and the crankshaft position speed will change. Calculate the interval difference value (diagnostic value) from crankshaft position speed by the following formula, and judge whether a misfire is occurring or not comparing the calculated result with judgment value. Count the number of misfires, if the misfire ratio is higher during 1000 revs. or 200 revs., judge corresponding cylinders as NG.

Diagnostic value calculation (Calculate from angle speed) →	**Misfire detection in every single ignition (Compare diagnostic value with judgment value) →**	**NG judgment (Misfire occurrence judgment required by the law) (Compare number of misfire with judgment value)**
	• 180 Degree Interval Difference Method • 360 Degree Interval Difference Method • 720 Degree Interval Difference Method	• NG judgment for exhaust gas misfire • NG judgment for catalyst-damaging misfire

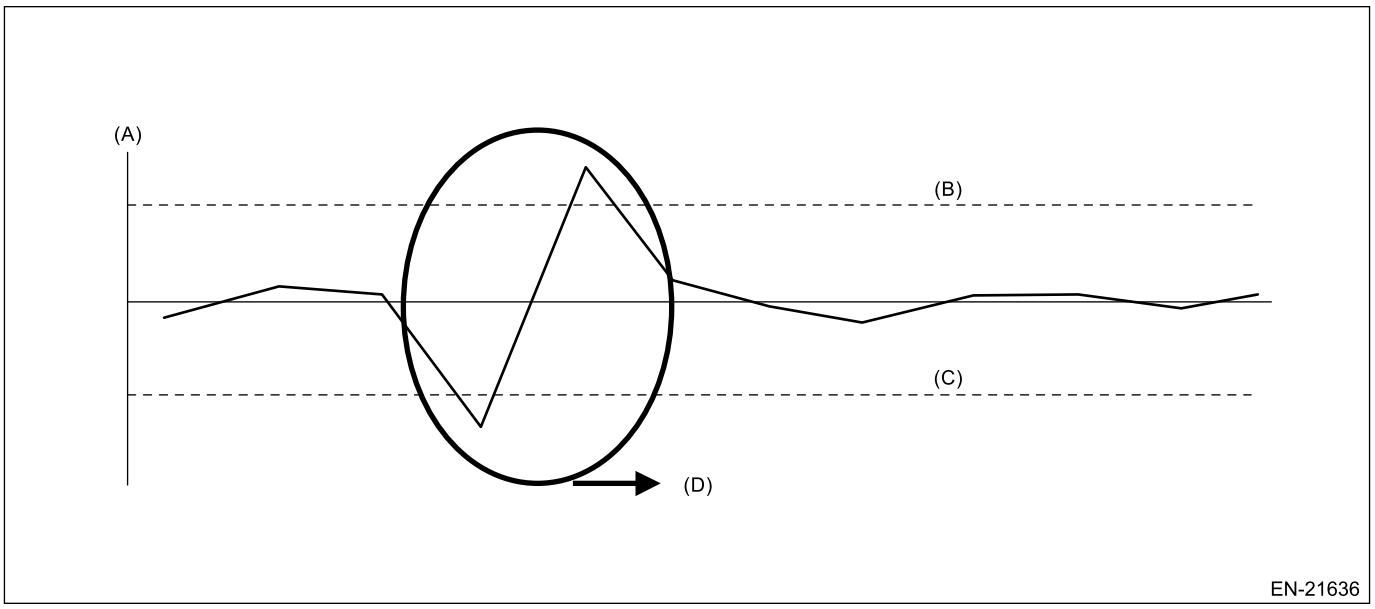
As shown in the following figure, pick a cylinder as the standard and name it A. And the former crankshaft position speed is named B, the second former crankshaft position speed is named C, the third is named D, etc.



(A) Ignition order (B) Crankshaft position speed

180° Interval Difference Method

Diagnostic value	180 degree interval difference = (B − A) − (F − B)/4
Judge as a misfire in the following cases. • 180 degree interval difference > Judgment value of positive side • 180 degree interval difference ≤ Judgment value of negative side (Diagnostic value before 180° CA)	

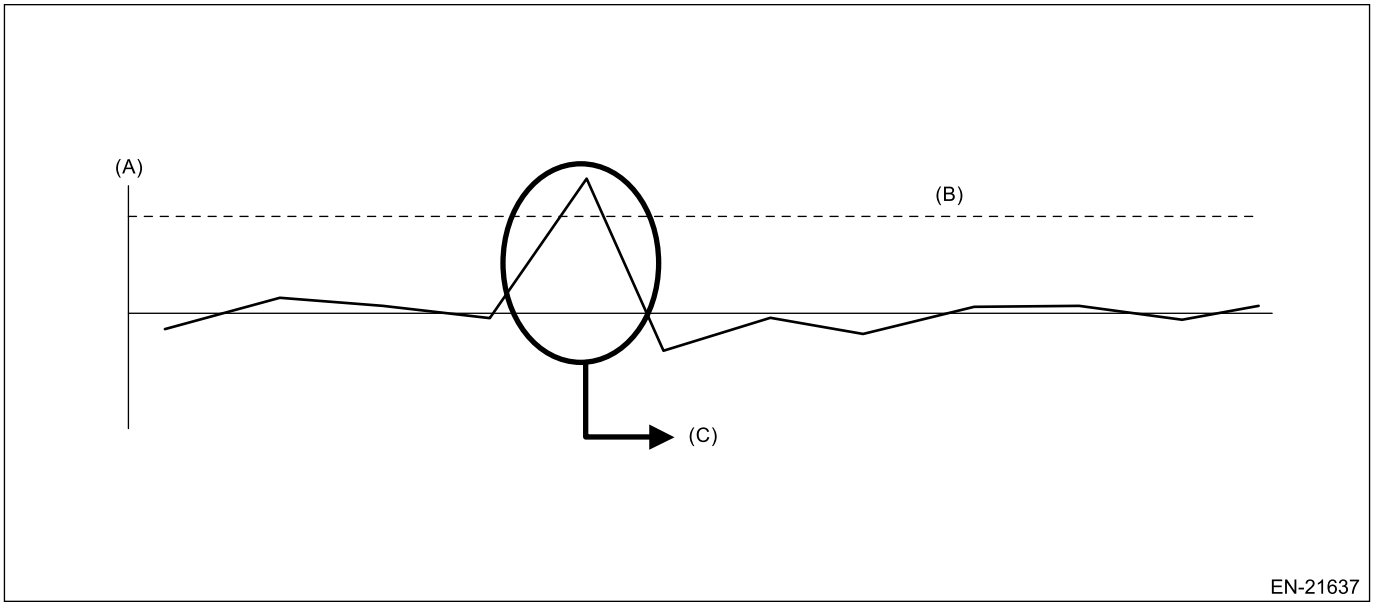


(A) 180 degree interval difference (C) Threshold value (negative number) (D) Judged as misfire

(B) Threshold value (positive number)

360° Interval Difference Method

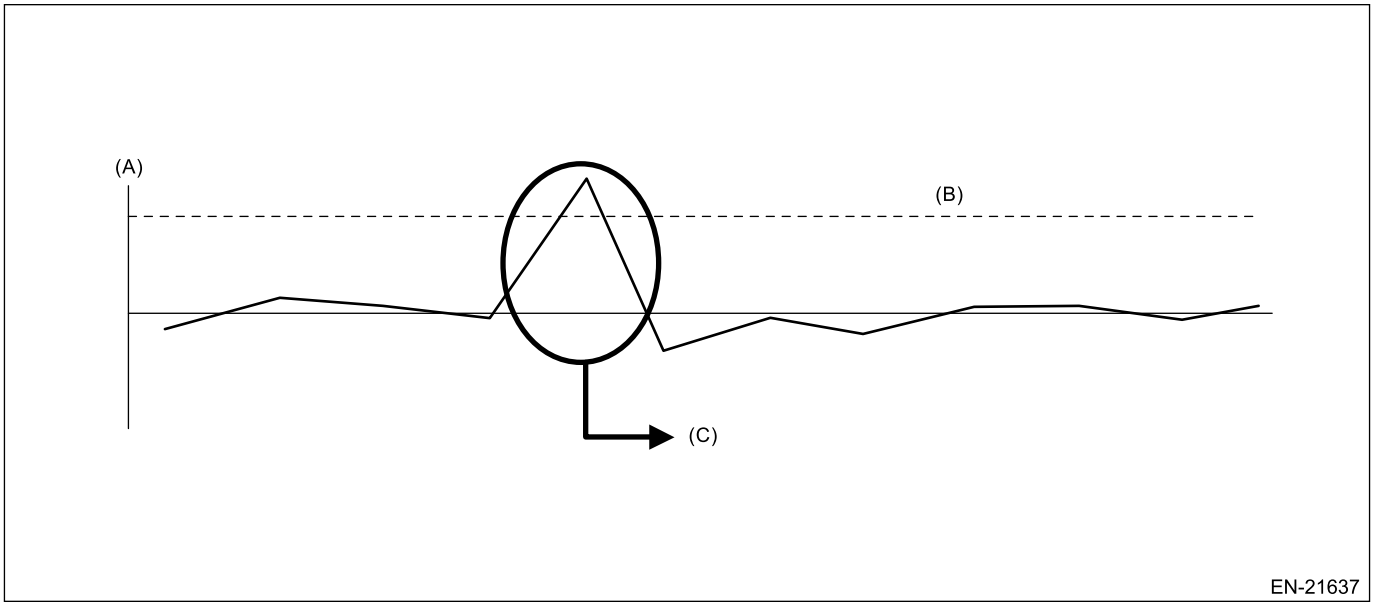
Diagnostic value	360 degree interval difference = (B − A) − (D − C)
Misfire judgment	360 degree interval difference > Judgment value → Judged as misfire



(A) 360 degree interval difference (B) Threshold value (C) Judged as misfire

720° Interval Difference Method

Diagnostic value	720 degree interval difference = (B − A) − (F − E)
Misfire judgment	720 degree interval difference > Judgment value → Judged as misfire



(A) 720 degree interval difference (B) Threshold value (C) Judged as misfire

- **Exhaust gas misfire (misfire occurrence level which influences exhaust gas)**
  Judgment value (Judge that malfunction occurs when the misfire ratio is high in 1000 engine revs.)

Malfunction Criteria	Threshold Value
Diagnostic value of exhaust gas misfire	≥51× 100/2000% in 1000 revs.

Time needed for diagnosis: 1000 engine revs.
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

- **Catalyst-damaging misfire (misfire occurrence level that will damage catalyst)**
  Judgment value

Malfunction Criteria	Threshold Value
Catalyst-damaging misfire diagnostic value	≥ Value of Map 2

Map 2

		Intake air (g/rev (oz/rev.))									
		0.2 (0.01)	0.4 (0.01)	0.6 (0.02)	0.8 (0.03)	1 (0.04)	1.2 (0.04)	1.4 (0.05)	1.6 (0.06)	1.8 (0.06)	2 (0.07)
Engine speed (rpm)	700	148	128	116	106	100	90	90	90	90	90
	1000	148	128	114	104	92	85	85	85	85	85
	1500	140	118	102	90	85	85	85	72	72	72
	2000	128	90	90	73	58	43	40	36	32	20
	2500	116	87	57	45	39	36	34	32	30	20
	3000	108	87	58	39	36	36	32	30	28	20
	3500	74	74	43	27	23	22	20	20	20	20

		Intake air (g/rev (oz/rev.))									
		0.2 (0.01)	0.4 (0.01)	0.6 (0.02)	0.8 (0.03)	1 (0.04)	1.2 (0.04)	1.4 (0.05)	1.6 (0.06)	1.8 (0.06)	2 (0.07)
	4000	61	61	40	27	22	20	20	20	20	20
	4500	55	55	34	25	20	20	20	20	20	20
	5000	55	55	34	23	20	20	20	20	20	20
	5500	54	54	33	22	20	20	20	20	20	20
	6000	52	52	32	21	20	20	20	20	20	20
	6500	50	50	30	20	20	20	20	20	20	20
	6700	50	50	30	20	20	20	20	20	20	20

Time needed for diagnosis: 200 engine revs.
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P0302 CYLINDER 2 MISFIRE DETECTED

Note:
For the diagnostic procedure, refer to DTC P0304. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0304 CYLINDER 4 MISFIRE DETECTED.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0301. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0301 CYLINDER 1 MISFIRE DETECTED.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P0303 CYLINDER 3 MISFIRE DETECTED

Note:
For the diagnostic procedure, refer to DTC P0304. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0304 CYLINDER 4 MISFIRE DETECTED.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0301. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0301 CYLINDER 1 MISFIRE DETECTED.

DTC P0304 CYLINDER 4 MISFIRE DETECTED

DTC detecting condition:

- Detected when two consecutive driving cycles with fault occur.
- Immediately at fault recognition (A misfire which could damage catalyst occurs.)

Trouble symptom:

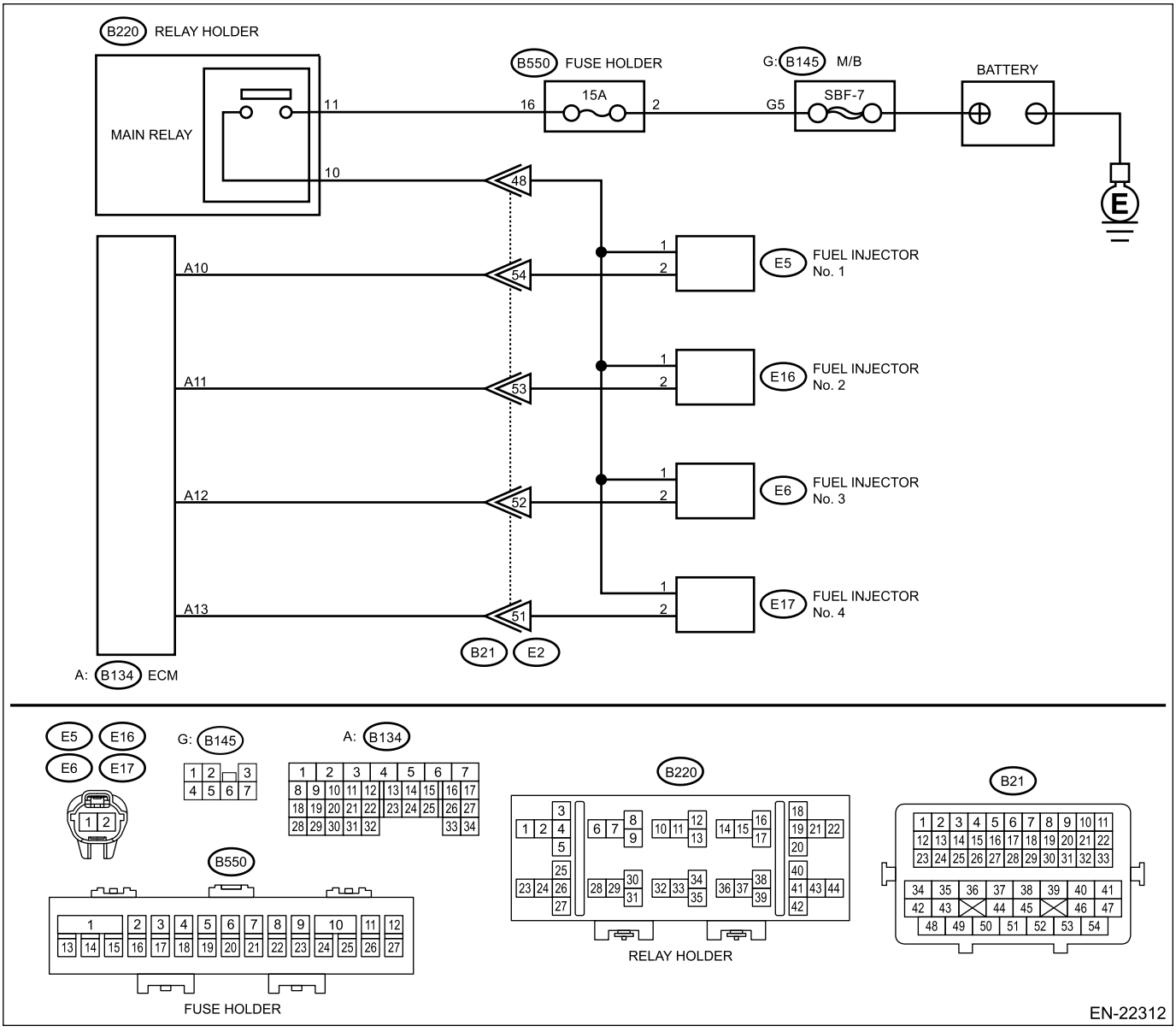
- Engine stalls.
- Improper idling
- Rough driving

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK OUTPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground on faulty cylinders.

Connector & terminal

#1 (B134) No. 10 (+) — Chassis ground (−):
#2 (B134) No. 11 (+) — Chassis ground (−):
#3 (B134) No. 12 (+) — Chassis ground (−):
#4 (B134) No. 13 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 6.
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from fuel injector on faulty cylinders.
3. Measure the resistance between fuel injector connector and engine ground on faulty cylinders.

Connector & terminal

#1 (E5) No. 2 — Engine ground:
#2 (E16) No. 2 — Engine ground:
#3 (E6) No. 2 — Engine ground:
#4 (E17) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

3. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

Measure the resistance of harness between ECM connector and fuel injector connector on faulty cylinders.

Connector & terminal

#1 (B134) No. 10 — (E5) No. 2:
#2 (B134) No. 11 — (E16) No. 2:
#3 (B134) No. 12 — (E6) No. 2:
#4 (B134) No. 13 — (E17) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and fuel injector connector** • **Poor contact of coupling connector**

4. CHECK FUEL INJECTOR.

Check the fuel injector on faulty cylinder. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes	Go to 5.
No	Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector.

5. CHECK POWER SUPPLY LINE.

1. Turn the ignition switch to ON.
2. Measure the voltage between fuel injector connector of faulty cylinders and engine ground.
   Connector & terminal
   #1 (E5) No. 1 (+) — Engine ground (−):
   #2 (E16) No. 1 (+) — Engine ground (−):
   #3 (E6) No. 1 (+) — Engine ground (−):
   #4 (E17) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Repair the poor contact of all connectors in fuel injector circuit.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between the main relay connector and fuel injector connector on faulty cylinders** • **Poor contact of coupling connector** • **Poor contact of main relay connector**

6. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from fuel injector on faulty cylinders.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and chassis ground on faulty cylinders.
   Connector & terminal
   #1 (B134) No. 10 (+) — Chassis ground (−):
   #2 (B134) No. 11 (+) — Chassis ground (−):
   #3 (B134) No. 12 (+) — Chassis ground (−):
   #4 (B134) No. 13 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and fuel injector connectors.
No	Go to 7.

7. CHECK FUEL INJECTOR.

1. Turn the ignition switch to OFF.
2. Check the fuel injector on faulty cylinder. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes	Go to 8.
No	Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector.

8. CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.

Check installation condition of the camshaft position sensor and crankshaft position sensor.

Is the camshaft position sensor or crankshaft position sensor loosely installed?

Yes	Tighten the camshaft position sensor or crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor.
No	Go to 9.

9. CHECK CRANK SPROCKET.

1. Remove the timing belt cover. Ref. to MECHANICAL(STI)>Timing Belt Cover>REMOVAL.
2. Check the crank sprocket.

Is the crank sprocket rusted or does it have broken teeth?

Yes	Replace the crank sprocket. Ref. to MECHANICAL(STI)>Crank Sprocket.
No	Go to 10.

10. CHECK INSTALLATION CONDITION OF TIMING BELT.

Turn the crankshaft, and align alignment mark on crank sprocket with alignment mark on cylinder block.

ST 499987500 CRANKSHAFT SOCKET

Is the timing belt dislocated from its proper position?

Yes	Repair the installation condition of timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
No	Go to 11.

11. CHECK FUEL LEVEL.

Inspect the fuel level.

Is the fuel meter indication higher than the “Lower” level?

Yes	Go to 12.
No	Refill the fuel so that the fuel meter indication is higher than the “Lower” level, and proceed to the next step. Go to 12.

12. CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.

1. Clear the memory using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Start the engine, and drive the vehicle for 10 minutes or more at 60 km/h (37.3 MPH) or more.

Does the malfunction indicator light illuminate or blink?

Yes	Go to 13.
No	Repair the poor contact of connector. **Note:** **In this case, repair the following item:** • **Poor contact of ignition coil connector** • **Poor contact of fuel injector connector on faulty cylinders** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

13. CHECK AIR INTAKE SYSTEM.

Check the intake system.

Is there any fault in air intake system?

Yes	Repair the air intake system. **Note:** **Check the following items.** • **Are there air leaks or air suction caused by loose or dislocated nuts and bolts?** • **Are there cracks or any disconnection of hoses?**
No	Go to 14.

14. CHECK PCV VALVE.

Check the PCV valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Valve>INSPECTION.

Is the check result OK?

Yes	Go to 15.
No	Repair or replace the PCV valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Valve.

15. CHECK PCV HOSE ASSEMBLY.

Check the PCV hose assembly.

Is the PCV hose assembly deformed, cracked or damaged?

Yes	Repair or replace the PCV hose assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Hose Assembly.
No	Go to 16.

16. CHECK PCV HOSE ASSEMBLY.

Check the clamp of PCV hose assembly.

Is the clamp of PCV hose assembly damaged or loose?

Yes	Repair or replace the clamp of PCV hose assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Hose Assembly.
No	Go to 17.

17. CHECK MISFIRE SYMPTOM.

1. Turn the ignition switch to ON.
2. Check for DTC. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Does the Subaru Select Monitor or general scan tool indicate only one DTC?

Yes — Go to 20.

No — Go to 18.

18. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Are DTC P0301 and P0303 displayed? (Current malfunction)

Yes — Go to 21.

No — Go to 19.

19. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Are DTC P0302 and P0304 displayed? (Current malfunction)

Yes — Go to 22.

No — Go to 23.

20. ONLY ONE CYLINDER.

Check the following items for one cylinder only.
- Spark plug
- Ignition coil
- Fuel injector
- Compression

Is there any fault in the cylinder?

Yes	Repair or replace faulty parts. **Note:** **Check the following items.** • **Spark plug** • **Ignition coil** • **Fuel injector** • **Compression**
No	Go to DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1.

21. GROUP OF #1 AND #3 CYLINDERS.

Check the following items for the #1 and #3 cylinders.
- Spark plug
- Ignition coil
- Fuel injector
- Compression
- Skipping timing belt teeth

Are there any faults in #1 and #3 cylinders?

Yes	Repair or replace faulty parts. **Note:** **Check the following items.** • **Spark plug** • **Ignition coil** • **Fuel injector** • **Compression** • **Skipping timing belt teeth**
No	Go to DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1.

22. GROUP OF #2 AND #4 CYLINDERS.

Check the following items for the #2 and #4 cylinders.

- Spark plug
- Ignition coil
- Fuel injector
- Compression
- Skipping timing belt teeth

Are there any faults in #2 and #4 cylinders?

Yes	Repair or replace faulty parts. **Note:** **Check the following items.** • **Spark plug** • **Ignition coil** • **Fuel injector** • **Compression** • **Skipping timing belt teeth**
No	Go to DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1.

23. CYLINDER AT RANDOM.

1. Start the engine.
2. Check the idling.

Is the engine idle rough?

Yes	Go to DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1.
No	Repair or replace faulty parts. **Note:** **Check the following items.** • **Spark plug** • **Ignition coil** • **Fuel injector** • **Compression**

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0301. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0301 CYLINDER 1 MISFIRE DETECTED.

DTC P0327 KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT LOW BANK 1 OR SINGLE SENSOR

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

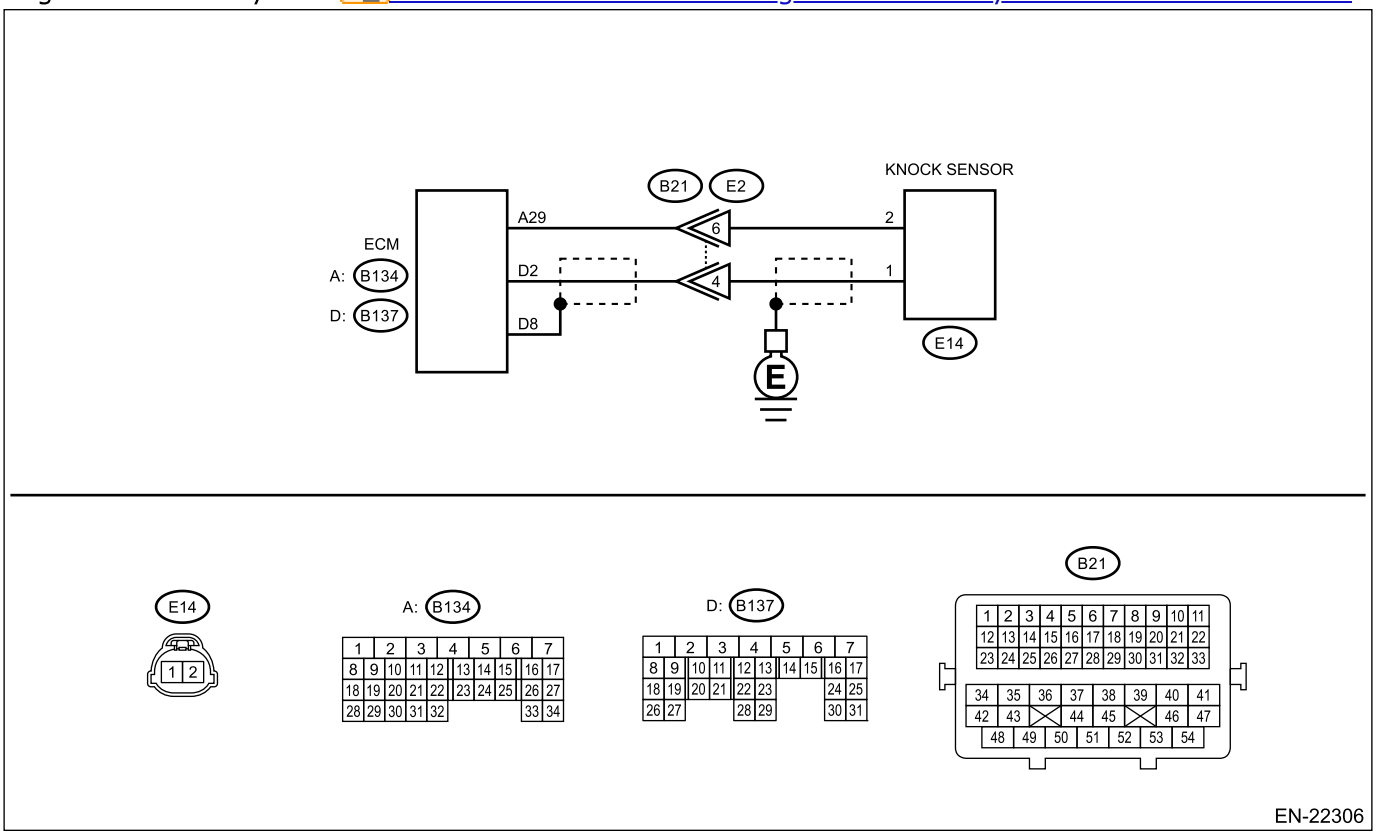
- Poor driving performance
- Knocking occurs

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   Connector & terminal
   (B137) No. 2 — (B134) No. 29:

Is the resistance less than 500 kΩ?

Yes	Go to 2.
No	Go to 3.

2. CHECK KNOCK SENSOR.

1. Disconnect the connector from the knock sensor.
2. Measure the resistance between knock sensor connectors.
   Terminals
   No. 1 — No. 2:

Is the resistance less than 500 kΩ?

Yes	Replace the knock sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Knock Sensor.
No	Repair the short circuit to ground in harness between ECM connector and knock sensor connector. **Note:** **The harness between both connectors are shielded. Remove the shield and repair the short circuit of harness.**

3. CHECK INPUT SIGNAL OF ECM.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B137) No. 2 (+) — Chassis ground (−):

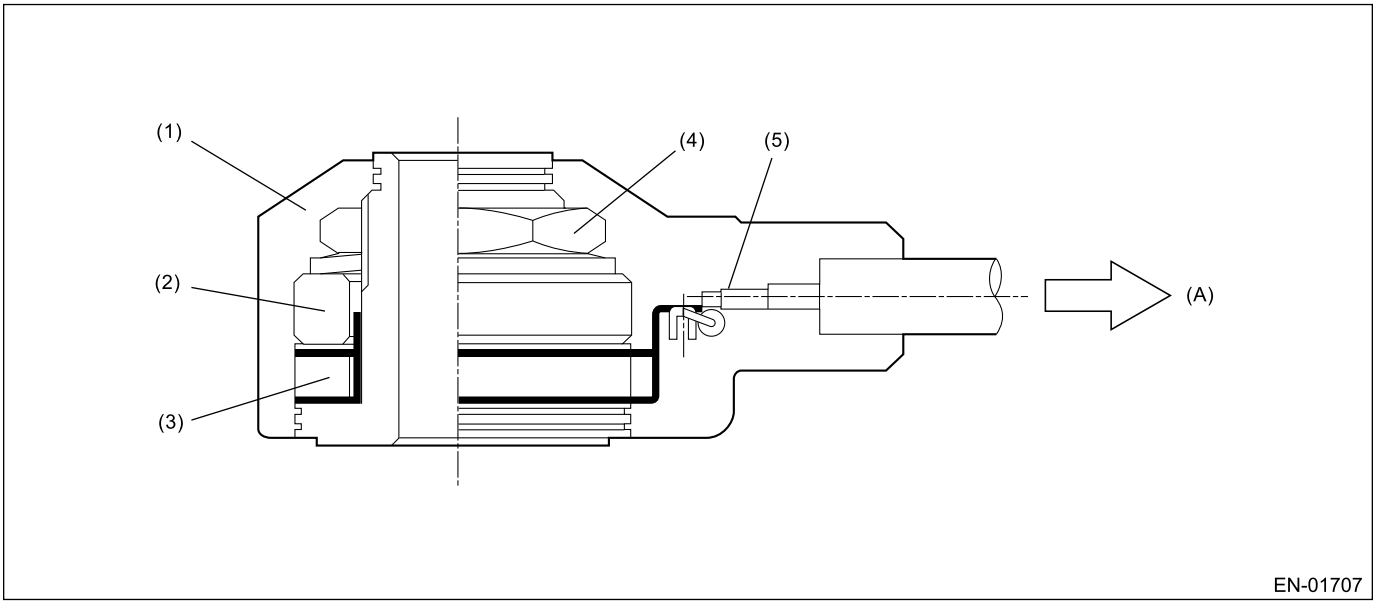
Is the voltage 2 V or more?

Yes	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**
No	Repair the short circuit to ground in harness between ECM connector and knock sensor connector. **Note:** **The harness between both connectors are shielded. Remove the shield and repair the short circuit of harness.**

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of knock sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) To knock sensor harness

(1) Case
(2) Weight
(3) Piezoelectric element
(4) Nut
(5) Resistance

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< 0.243V

time needed for diagnosis: 1000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0328 KNOCK/COMBUSTION VIBRATION SENSOR 1 CIRCUIT HIGH BANK 1 OR SINGLE SENSOR

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

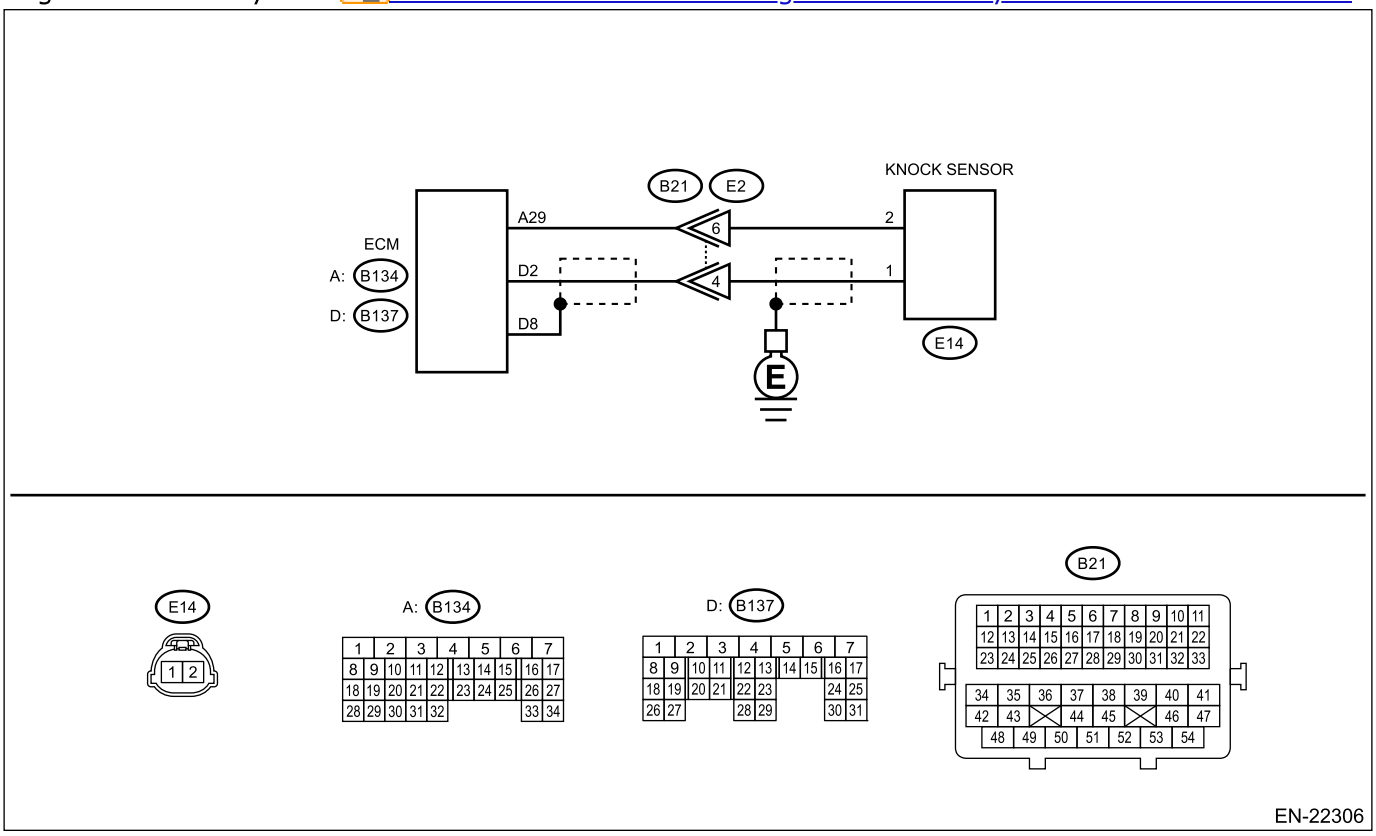
- Poor driving performance
- Knocking occurs

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND KNOCK SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   Connector & terminal
   (B137) No. 2 — (B134) No. 29:

Is the resistance 600 kΩ or more?

Yes	Go to 2.
No	Repair the poor contact of ECM connector.

2. CHECK KNOCK SENSOR.

1. Disconnect the connector from the knock sensor.
2. Measure the resistance between knock sensor terminals.
   Terminals
   No. 1 — No. 2:

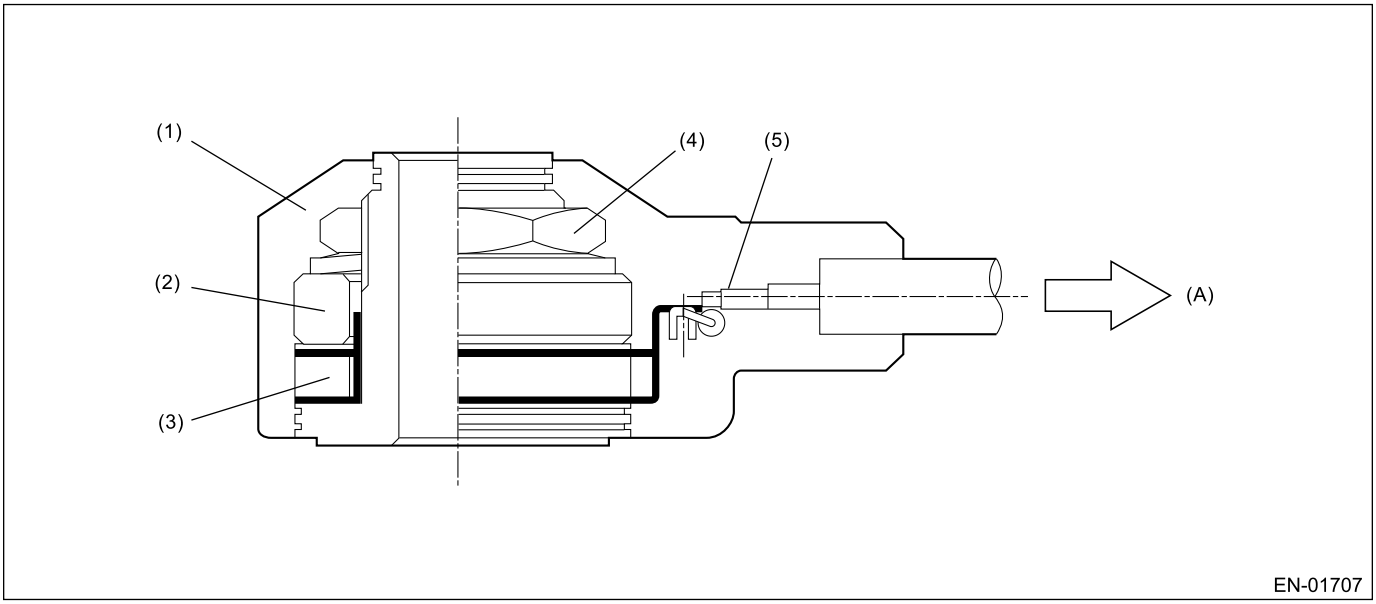
Is the resistance 600 kΩ or more?

Yes	Replace the knock sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Knock Sensor.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and knock sensor connector** • **Poor contact of knock sensor connector** • **Poor contact of coupling connector**

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of knock sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(A) To knock sensor harness

(1) Case
(2) Weight
(3) Piezoelectric element
(4) Nut
(5) Resistance

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.709V

time needed for diagnosis: 1000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0335 CRANKSHAFT POSITION SENSOR "A" CIRCUIT

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

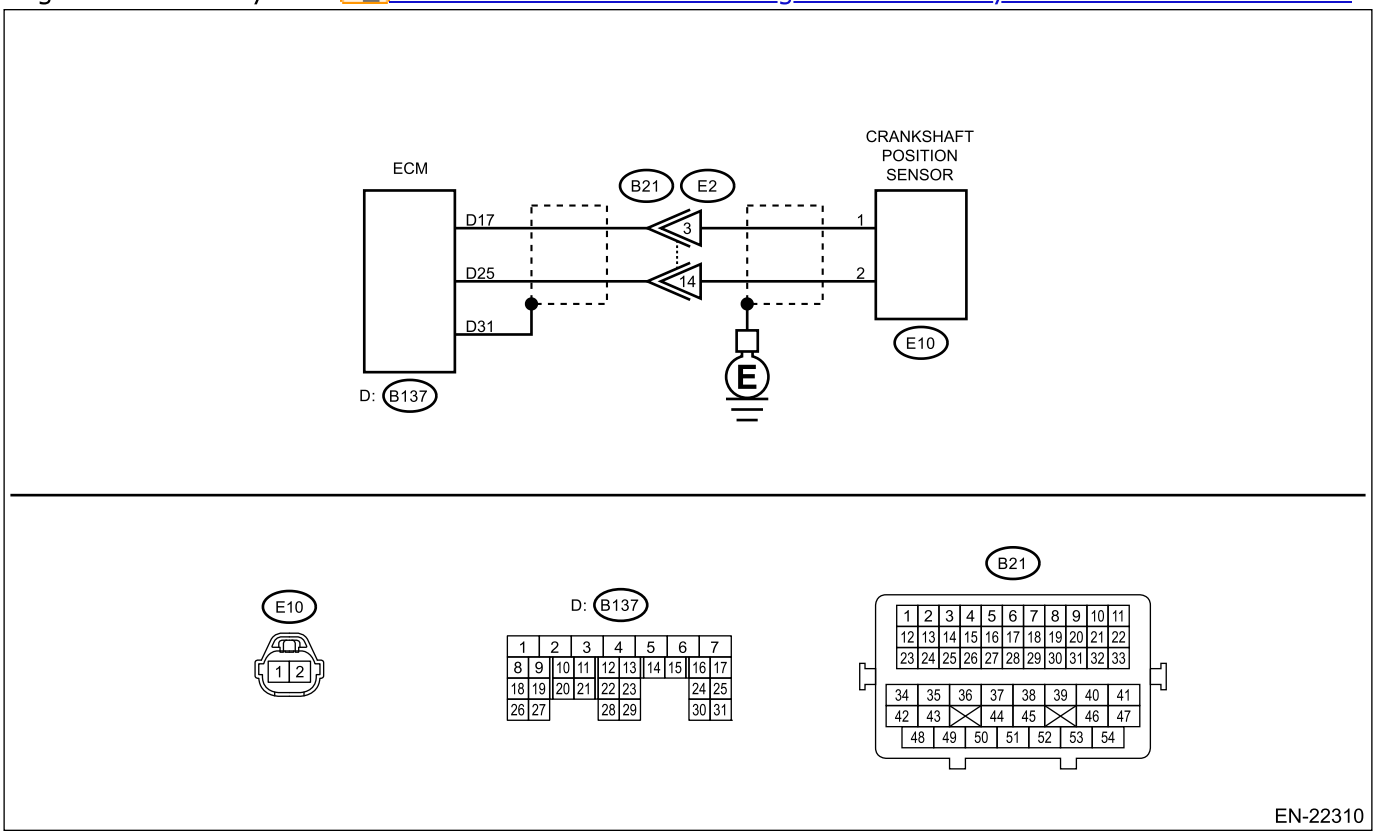
- Engine stalls.
- Failure of engine to start

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.

Check the crankshaft position sensor.

Is the crankshaft position sensor installation bolt tightened securely?

Yes	Go to 2.
No	Tighten the crankshaft position sensor installation bolt securely. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor.

2. CHECK CRANKSHAFT POSITION SENSOR.

1. Turn the ignition switch to OFF.
2. Remove the crankshaft position sensor.
3. Check the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor>INSPECTION.

Is the check result OK?

Yes	Go to 3.
No	Replace the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor.

3. CHECK HARNESS BETWEEN ECM AND CRANKSHAFT POSITION SENSOR CONNECTOR.

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and crankshaft position sensor connector.

Connector & terminal

(B137) No. 17 — (E10) No. 1:
(B137) No. 25 — (E10) No. 2:

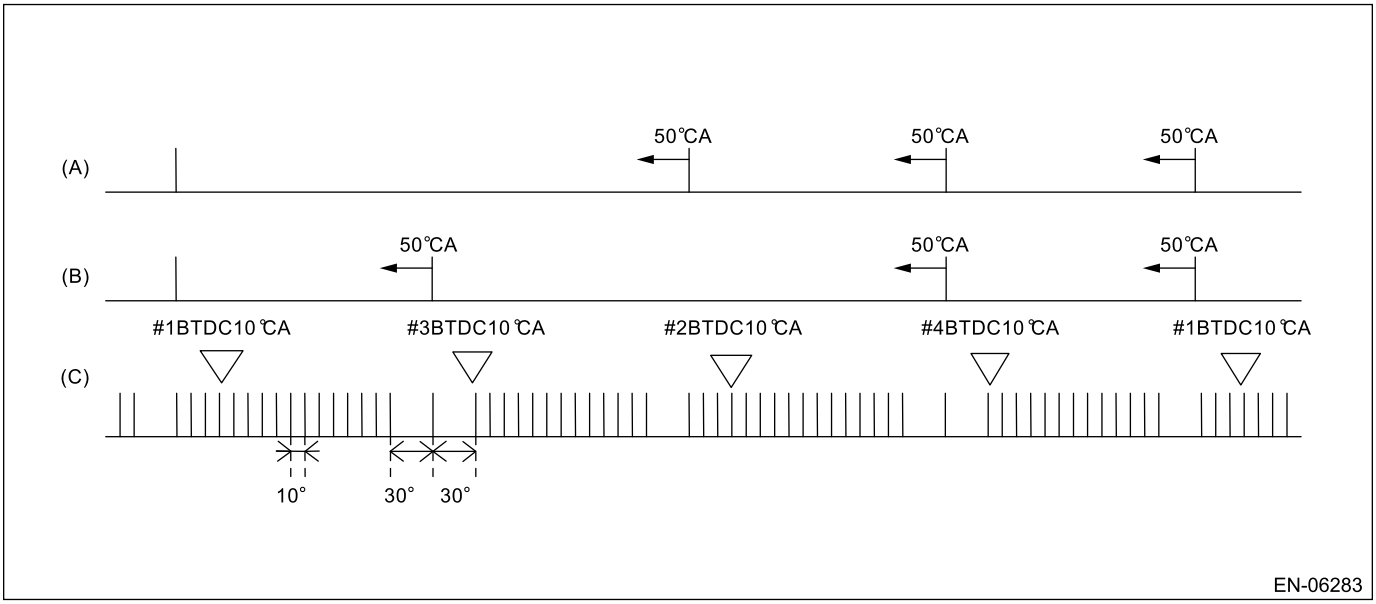
Is the resistance less than 1 Ω?

Yes	Repair the poor contact of ECM and crankshaft position sensor connector.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and crankshaft position sensor connector** • **Poor contact of coupling connector**

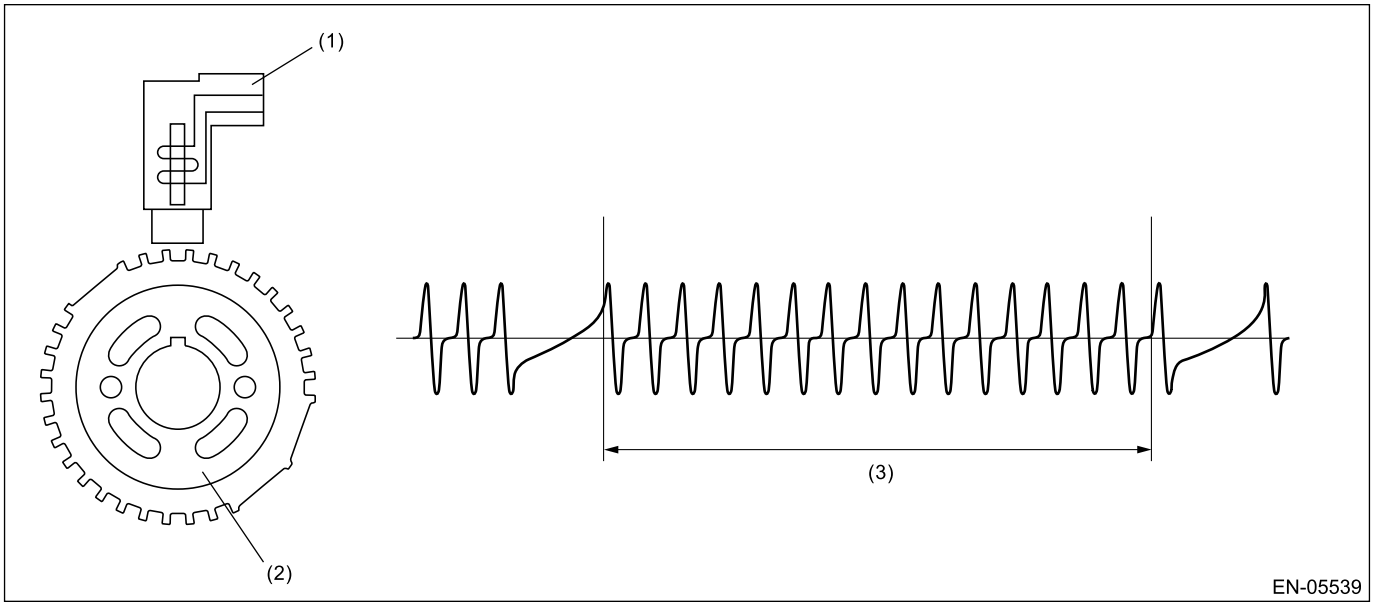
1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the crankshaft position sensor.
Judge as NG when the crank signal is not input even though the starter was rotated.

2. COMPONENT DESCRIPTION



(A) Camshaft signal (RH) (B) Camshaft signal (LH) (C) Crankshaft signal



(1) Crankshaft position sensor (2) Crank sprocket (3) Crankshaft half-turn

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 8V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Number of crankshaft position sensor signals during cranking	= 0

time needed for diagnosis: 3000ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0336 CRANKSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Trouble symptom:

- Engine stalls.
- Failure of engine to start

Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK CONDITION OF CRANKSHAFT POSITION SENSOR.

Check installation condition of the crankshaft position sensor.

Is the crankshaft position sensor installation bolt tightened securely?

Yes	Go to 2.
No	Tighten the crankshaft position sensor installation bolt securely. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor.

2. CHECK CRANK SPROCKET.

1. Remove the timing belt cover. Ref. to MECHANICAL(STI)>Timing Belt Cover>REMOVAL.
2. Check the crank sprocket.

Are crank sprocket teeth cracked or damaged?

Yes	Replace the crank sprocket. Ref. to MECHANICAL(STI)>Crank Sprocket.
No	Go to 3.

3. CHECK INSTALLATION CONDITION OF TIMING BELT.

Turn the crankshaft, and align alignment mark on crank sprocket with alignment mark on cylinder block.

ST 499987500 CRANKSHAFT SOCKET

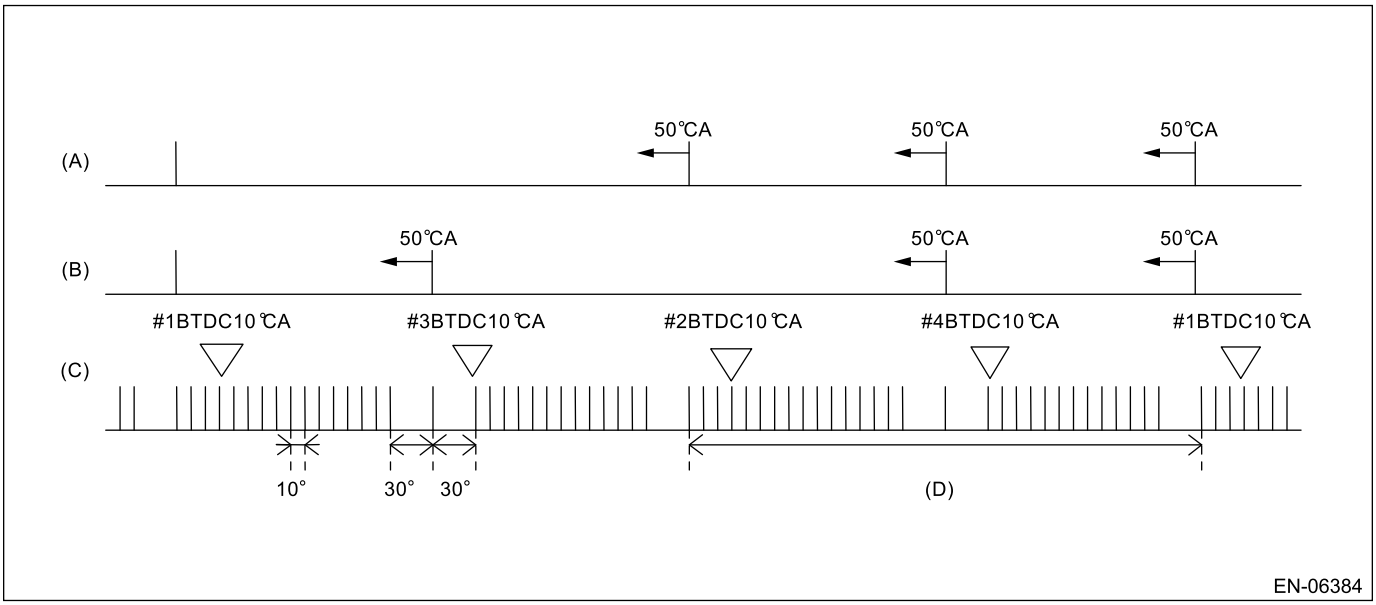
Is the timing belt dislocated from its proper position?

Yes	Repair the installation condition of timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
No	Replace the crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor.

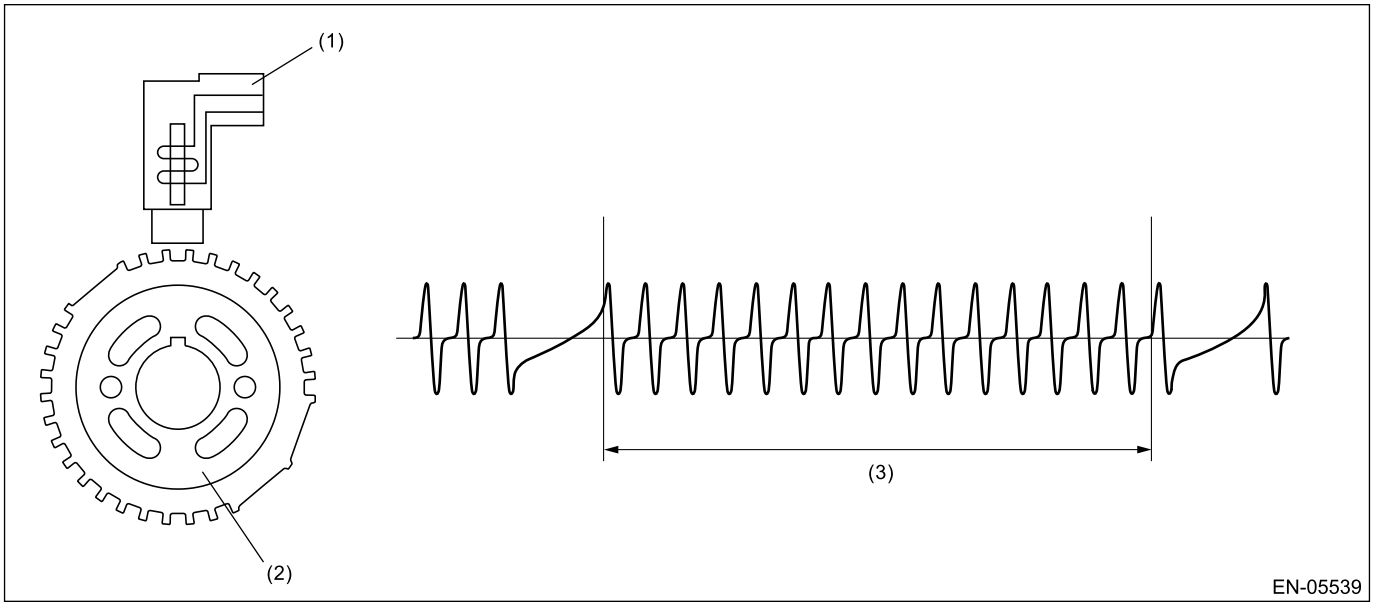
1. OUTLINE OF DIAGNOSIS

Detect for faults in crankshaft position sensor output properties.
Judge as NG when there is a problem in the number of crankshaft signals for every revolution.

2. COMPONENT DESCRIPTION



(A) Camshaft signal (RH)
(B) Camshaft signal (LH)
(C) Crankshaft signal
(D) Normal: Number of crankshaft signals = 30



(1) Crankshaft position sensor (2) Crank sprocket (3) Crankshaft half-turn

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 8V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Amount of crank sensor signal during 1 rev.	≠ 30

time needed for diagnosis: 10engine revs.

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

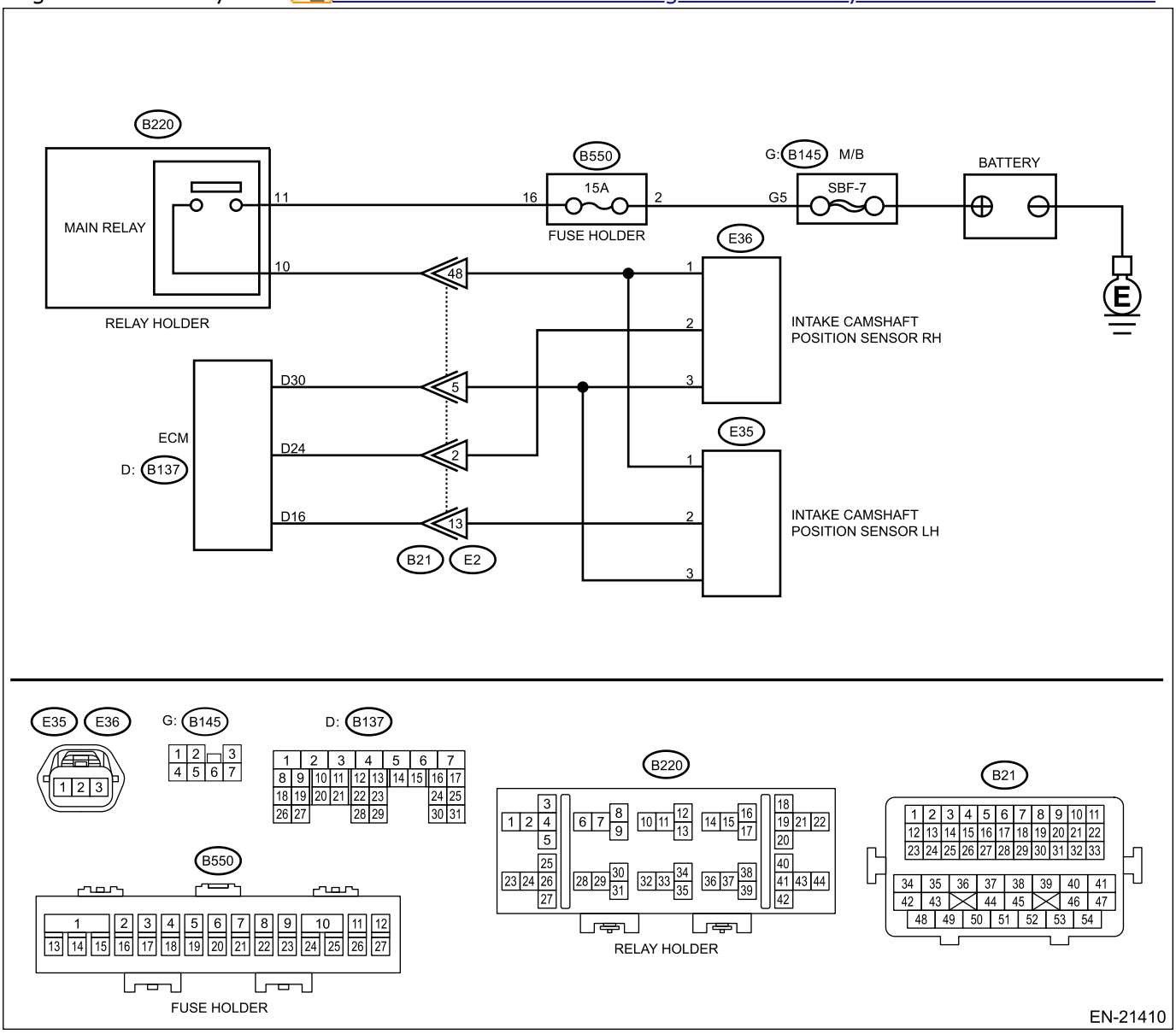
- Engine stalls.
- Failure of engine to start

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR RH.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from camshaft position sensor RH.
3. Turn the ignition switch to ON.
4. Measure the voltage between camshaft position sensor RH connector and engine ground.
   Connector & terminal
   (E36) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit or short circuit to ground in harness between main relay connector and camshaft position sensor RH connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR RH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and camshaft position sensor RH connector.
   Connector & terminal
   (B137) No. 24 — (E36) No. 2:
   (B137) No. 30 — (E36) No. 3:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and camshaft position sensor RH connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR RH CONNECTOR.

Measure the resistance between camshaft position sensor RH connector and engine ground.

Connector & terminal

(E36) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 4.
No	Repair the short circuit to ground in the harness between the ECM connector and camshaft position sensor RH connector.

4. CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR RH CONNECTOR.

Measure the voltage between camshaft position sensor RH connector and engine ground.

Connector & terminal

(E36) No. 2 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power supply in the harness between the ECM connector and camshaft position sensor RH connector.
No	Go to 5.

5. CHECK CONDITION OF CAMSHAFT POSITION SENSOR RH.

Check the camshaft position sensor RH.

Is the camshaft position sensor RH installation bolt tightened securely?

Yes	Go to 6.
No	Tighten the camshaft position sensor RH installation bolt securely. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor.

6. CHECK CAMSHAFT POSITION SENSOR RH.

Check the waveform of the camshaft position sensor RH. Ref. to ENGINE (DIAGNOSTICS)(STI)>Engine Control Module (ECM) I/O Signal.

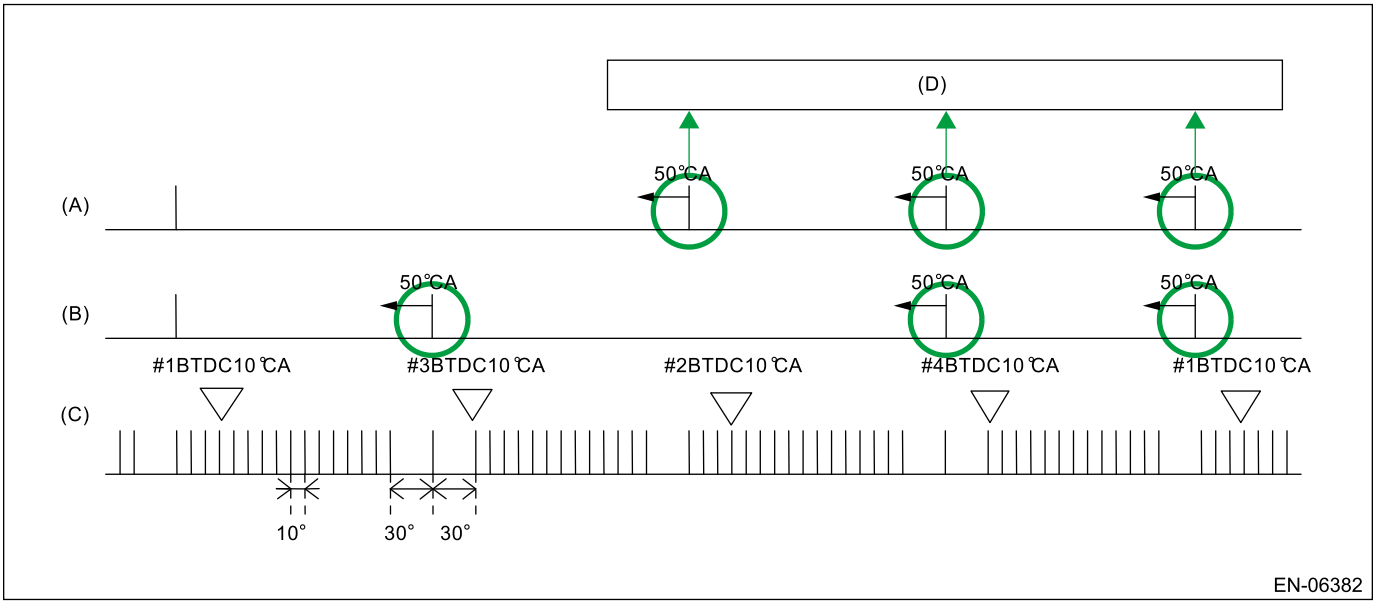
Is there any abnormality in waveform?

Yes	Replace the camshaft position sensor RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor.
No	Repair the following item. • Poor contact of ECM connector • Poor contact of camshaft position sensor RH connector • Poor contact of coupling connector

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the camshaft position sensor.
When there is no camshaft position signal input continuously, judge as NG.

2. COMPONENT DESCRIPTION



(A) Camshaft signal (RH)
(B) Camshaft signal (LH)
(C) Crankshaft signal
(D) Camshaft position signal: When normal, there will be 3 camshaft position signals for every 2 crankshaft revolutions.

3. EXECUTION CONDITION

Diagnosis 1

Secondary parameters	Execution condition
Battery voltage	≥ 8V

Diagnosis 2

Secondary parameters	Execution condition
Battery voltage Elapsed time after starting the engine	≥ 8V ≥ 200ms

4. GENERAL DRIVING CYCLE

Diagnosis 1: Perform the diagnosis only once.
Diagnosis 2: Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Diagnosis 1
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
Judgment value

Malfunction Criteria	Threshold Value
Number of camshaft position sensor signals during cranking	= 0

time needed for diagnosis: 3000ms
Diagnosis 2
Judge as NG when no input status of camshaft position sensor signal continues for (10time(s) +2)/2 revs.
Judgment value

Malfunction Criteria	Threshold Value
Amount of camshaft sensor signal during 0.5 revs of crankshaft	= 0

time needed for diagnosis: (10time(s) +2)/2 engine revs.
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

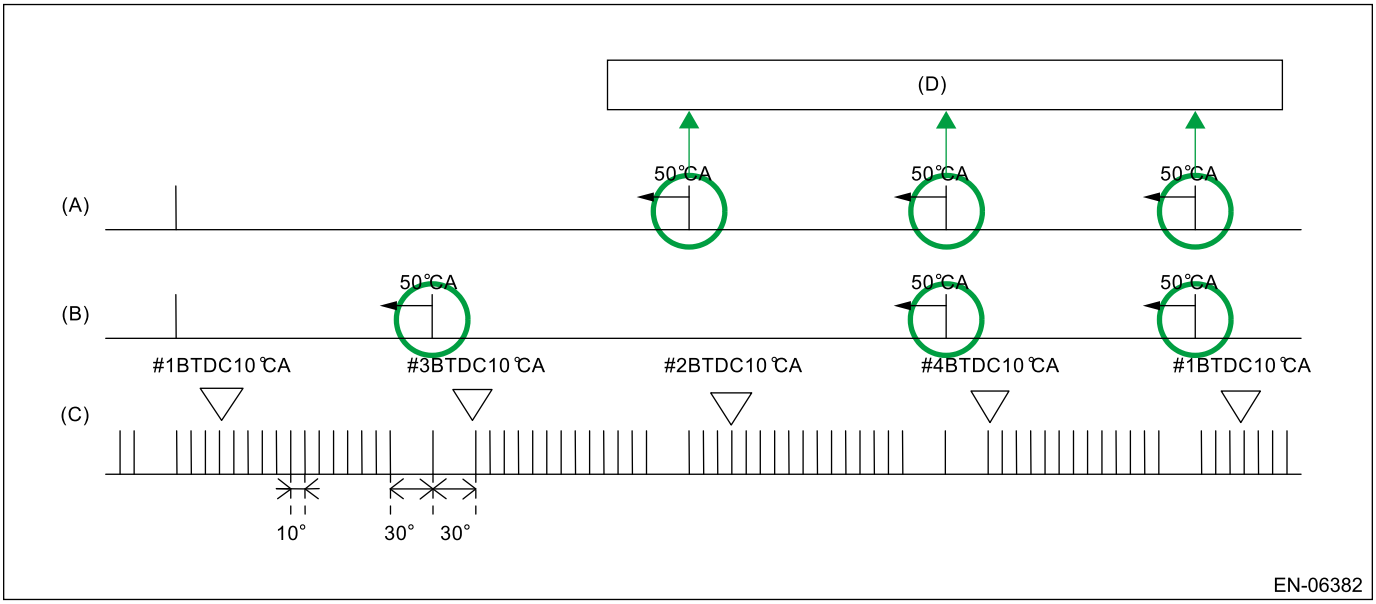
DTC P0341 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 1 OR SINGLE SENSOR

Note:
For the diagnostic procedure, refer to DTC P0340. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of camshaft position sensor property.
Judge as NG when the number of camshaft signals remains abnormal.

2. COMPONENT DESCRIPTION



(A) Camshaft signal (RH)
(B) Camshaft signal (LH)
(C) Crankshaft signal
(D) Camshaft position signal: When normal, there will be 3 camshaft position signals for every 2 crankshaft revolutions.

3. EXECUTION CONDITION

Diagnosis 1

Secondary parameters	Execution condition
Battery voltage	≥ 8V
Elapsed time after starting the engine	≥ 200ms

Diagnosis 2

Secondary parameters	Execution condition
Battery voltage	≥ 8V
Elapsed time after starting the engine	≥ 200ms
Engine speed	< 5000rpm

Diagnosis 3

Secondary parameters	Execution condition
Battery voltage	≥ 8V
Elapsed time after starting the engine	≥ 200ms
Engine speed	≥ 5000rpm

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

diagnosis 1: judge as ng when the number of camshaft position sensor signals in two crankshaft revolutions is less than 3time(s).

Judgment value

Malfunction Criteria	Threshold Value
Amount of camshaft sensor signal during 2 revs of crankshaft	< 3time(s)

diagnosis 2: judge as ng when the number of camshaft position sensor signals in two crankshaft revolutions is more than 3time(s).

Judgment value

Malfunction Criteria	Threshold Value
Amount of camshaft sensor signal during 2 revs of crankshaft	> 3time(s)

diagnosis 3: judge as ng when the number of camshaft position sensor signals in two crankshaft revolutions is more than 12time(s).

Judgment value

Malfunction Criteria	Threshold Value
Amount of camshaft sensor signal during 2 revs of crankshaft	> 12time(s)

time needed for diagnosis: two engine revs. × 4time(s)

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0345 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 2

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

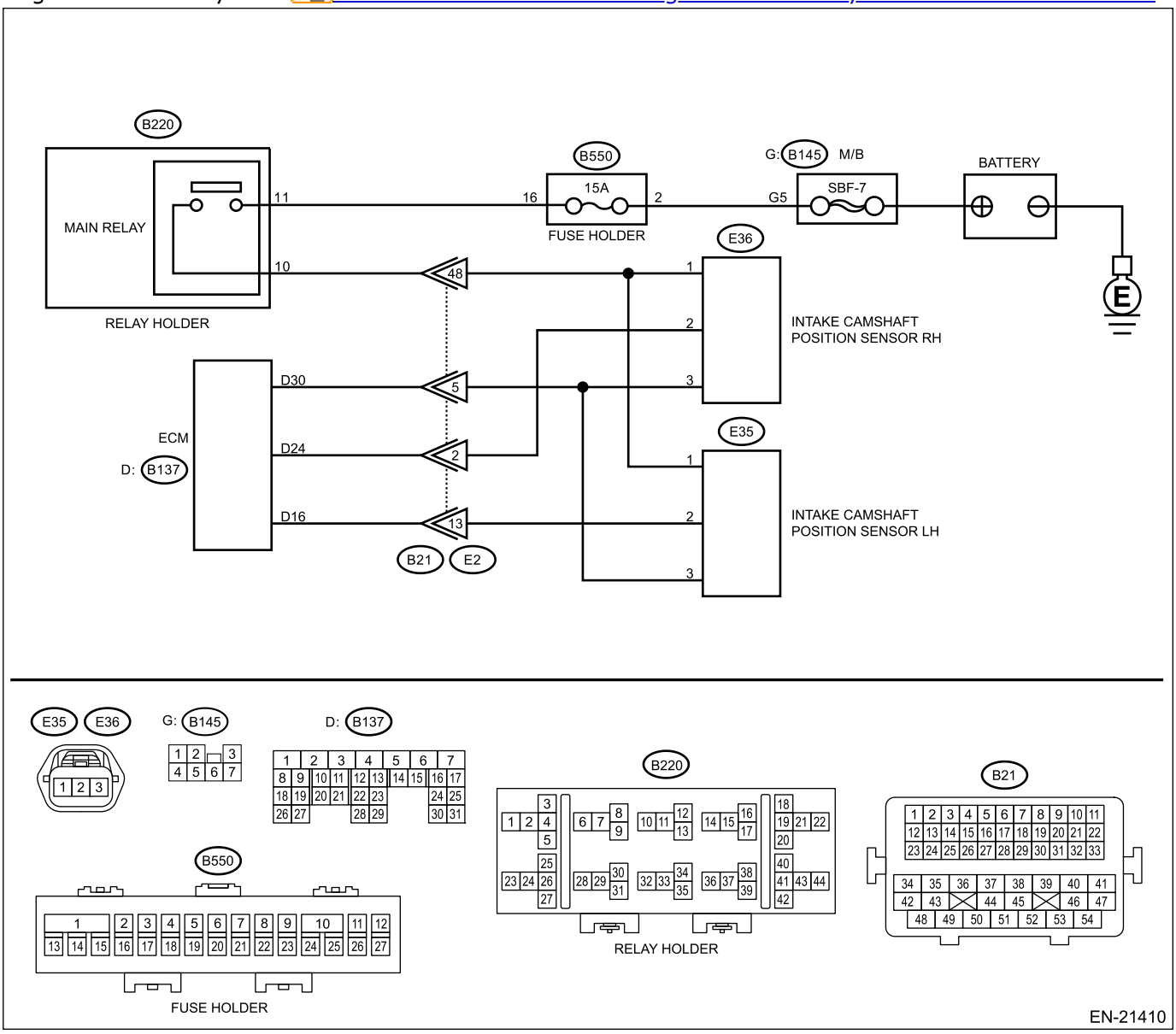
- Engine stalls.
- Failure of engine to start

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR LH.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from camshaft position sensor LH.
3. Turn the ignition switch to ON.
4. Measure the voltage between camshaft position sensor LH connector and engine ground.
   Connector & terminal
   (E35) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit or short circuit to ground in harness between main relay connector and camshaft position sensor LH connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR LH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and camshaft position sensor LH connector.
   Connector & terminal
   (B137) No. 16 — (E35) No. 2:
   (B137) No. 30 — (E35) No. 3:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and camshaft position sensor LH connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR LH CONNECTOR.

Measure the resistance between camshaft position sensor LH connector and engine ground.

Connector & terminal

(E35) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 4.
No	Repair the short circuit to ground in the harness between the ECM connector and camshaft position sensor LH connector.

4. CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR LH CONNECTOR.

Measure the voltage between camshaft position sensor LH connector and engine ground.

Connector & terminal

(E35) No. 2 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power supply in the harness between the ECM connector and camshaft position sensor LH connector.
No	Go to 5.

5. CHECK CONDITION OF CAMSHAFT POSITION SENSOR LH.

Check the camshaft position sensor LH.

Is the camshaft position sensor LH installation bolt tightened securely?

Yes	Go to 6.
No	Tighten the camshaft position sensor LH installation bolt securely. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor.

6. CHECK CAMSHAFT POSITION SENSOR LH.

Check the waveform of the camshaft position sensor LH. Ref. to ENGINE (DIAGNOSTICS)(STI)>Engine Control Module (ECM) I/O Signal.

Is there any abnormality in waveform?

Yes	Replace the camshaft position sensor LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor.
No	Repair the following item. • Poor contact of ECM connector • Poor contact of camshaft position sensor LH connector • Poor contact of coupling connector

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0340. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0340 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 1 OR SINGLE SENSOR.

DTC P0346 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 2

Note:
For the diagnostic procedure, refer to DTC P0345. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0345 CAMSHAFT POSITION SENSOR "A" CIRCUIT BANK 2.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0341. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0341 CAMSHAFT POSITION SENSOR "A" CIRCUIT RANGE/PERFORMANCE BANK 1 OR SINGLE SENSOR.

DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

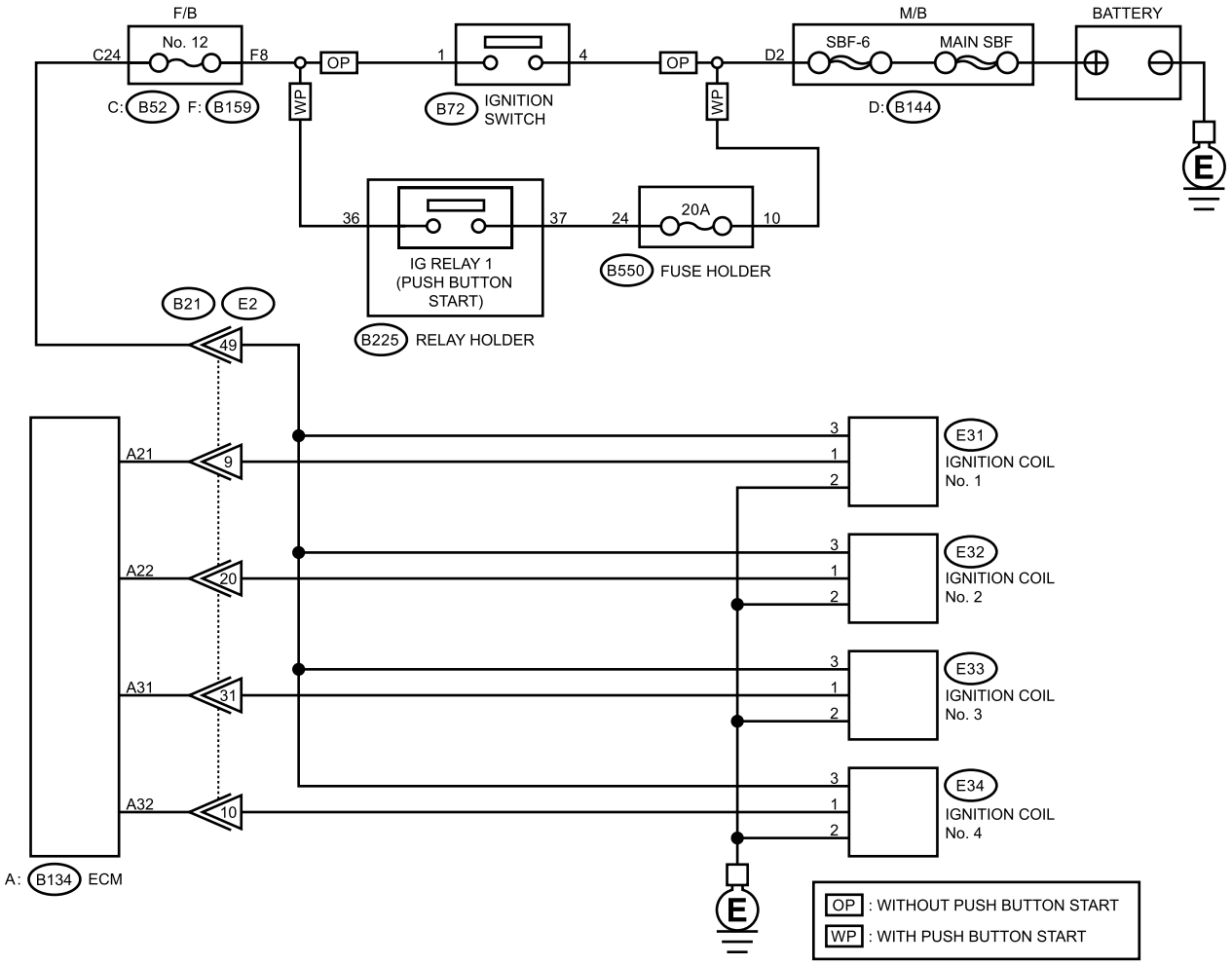
- Improper idling
- Poor driving performance

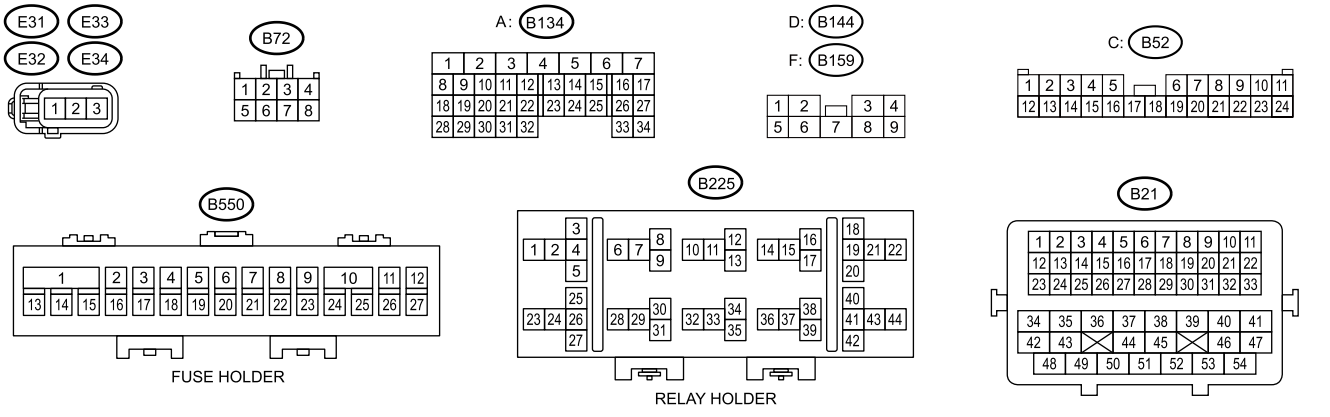
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


F/B
No. 12
C24
F8
C: B52
F: B159
OP
WP
1
4
B72
IGNITION SWITCH
M/B
SBF-6
MAIN SBF
D2
D: B144
BATTERY
36
37
IG RELAY 1
(PUSH BUTTON START)
B225 RELAY HOLDER
24
20A
10
B550 FUSE HOLDER
B21
E2
49
A21
9
A22
20
A31
31
A32
10
A: B134 ECM
3
1
2
E31
IGNITION COIL No. 1
E32
IGNITION COIL No. 2
E33
IGNITION COIL No. 3
E34
IGNITION COIL No. 4
OP : WITHOUT PUSH BUTTON START
WP : WITH PUSH BUTTON START


E31
E33
E32
E34
B72
A: B134
D: B144
F: B159
C: B52
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-21427

1. CHECK IGNITION COIL POWER SUPPLY CIRCUIT.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ignition coil.
3. Turn the ignition switch to ON.
4. Measure the voltage between ignition coil connector and engine ground.

Connector & terminal

DTC P0351; (E31) No. 3 (+) — Engine ground (−):
DTC P0352; (E32) No. 3 (+) — Engine ground (−):
DTC P0353; (E33) No. 3 (+) — Engine ground (−):
DTC P0354; (E34) No. 3 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open or short to ground in harness of power supply circuit** • **Blown out of fuse** • **Poor contact of coupling connector**

2. CHECK HARNESS OF IGNITION COIL GROUND CIRCUIT.

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between ignition coil connector and engine ground.

Connector & terminal

DTC P0351; (E31) No. 2 — Engine ground:
DTC P0352; (E32) No. 2 — Engine ground:
DTC P0353; (E33) No. 2 — Engine ground:
DTC P0354; (E34) No. 2 — Engine ground:

Is the resistance less than 5 Ω?

Yes	Go to 3.
No	Repair the open circuit in harness between ignition coil connector and engine grounding terminal.

3. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.

1. Disconnect the connector from ECM.
2. Measure the resistance between ignition coil connector and engine ground.

Connector & terminal

DTC P0351; (E31) No. 1 — Engine ground:
DTC P0352; (E32) No. 1 — Engine ground:
DTC P0353; (E33) No. 1 — Engine ground:
DTC P0354; (E34) No. 1 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 4.
No	Repair the ground short circuit of harness between ECM connector and ignition coil connector.

4. CHECK HARNESS BETWEEN ECM AND IGNITION COIL CONNECTOR.

Measure the resistance of harness between ECM connector and ignition coil connector.

Connector & terminal

DTC P0351; (B134) No. 21 — (E31) No. 1:
DTC P0352; (B134) No. 22 — (E32) No. 1:
DTC P0353; (B134) No. 31 — (E33) No. 1:
DTC P0354; (B134) No. 32 — (E34) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 5.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and the ignition coil connector** • **Poor contact of coupling connector**

5. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

Yes	Repair the poor contact of ECM connector.
No	Go to 6.

6. CHECK SPARK PLUG CONDITION.

1. Remove the spark plug of the corresponding cylinder. Ref. to IGNITION(STI)>Spark Plug>REMOVAL.
2. Check the spark plug condition. Ref. to IGNITION(STI)>Spark Plug>INSPECTION.

Is the check result OK?

Yes	Replace the ignition coil. Ref. to IGNITION(STI)>Ignition Coil.
No	Replace the spark plug. Ref. to IGNITION(STI)>Spark Plug.

1. OUTLINE OF DIAGNOSIS

Based on the self-diagnostic result of the ignition coil driving IC, judge the ignition coil driving circuit as normal or abnormal.
The ignition coil driving IC detects “no ignition” status as a malfunction.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	> 1 s
Engine speed	≥ 500 rpm

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Ignition driving IC information	Trouble

time needed for diagnosis: 10time(s) × 256/1000 s
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P0352 IGNITION COIL "B" PRIMARY CONTROL CIRCUIT/OPEN

Note:
For the diagnostic procedure, refer to DTC P0351. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0351. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P0353 IGNITION COIL "C" PRIMARY CONTROL CIRCUIT/OPEN

Note:
For the diagnostic procedure, refer to DTC P0351. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0351. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P0354 IGNITION COIL "D" PRIMARY CONTROL CIRCUIT/OPEN

Note:
For the diagnostic procedure, refer to DTC P0351. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0351. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0351 IGNITION COIL "A" PRIMARY CONTROL CIRCUIT/OPEN.

DTC P0365 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 1

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

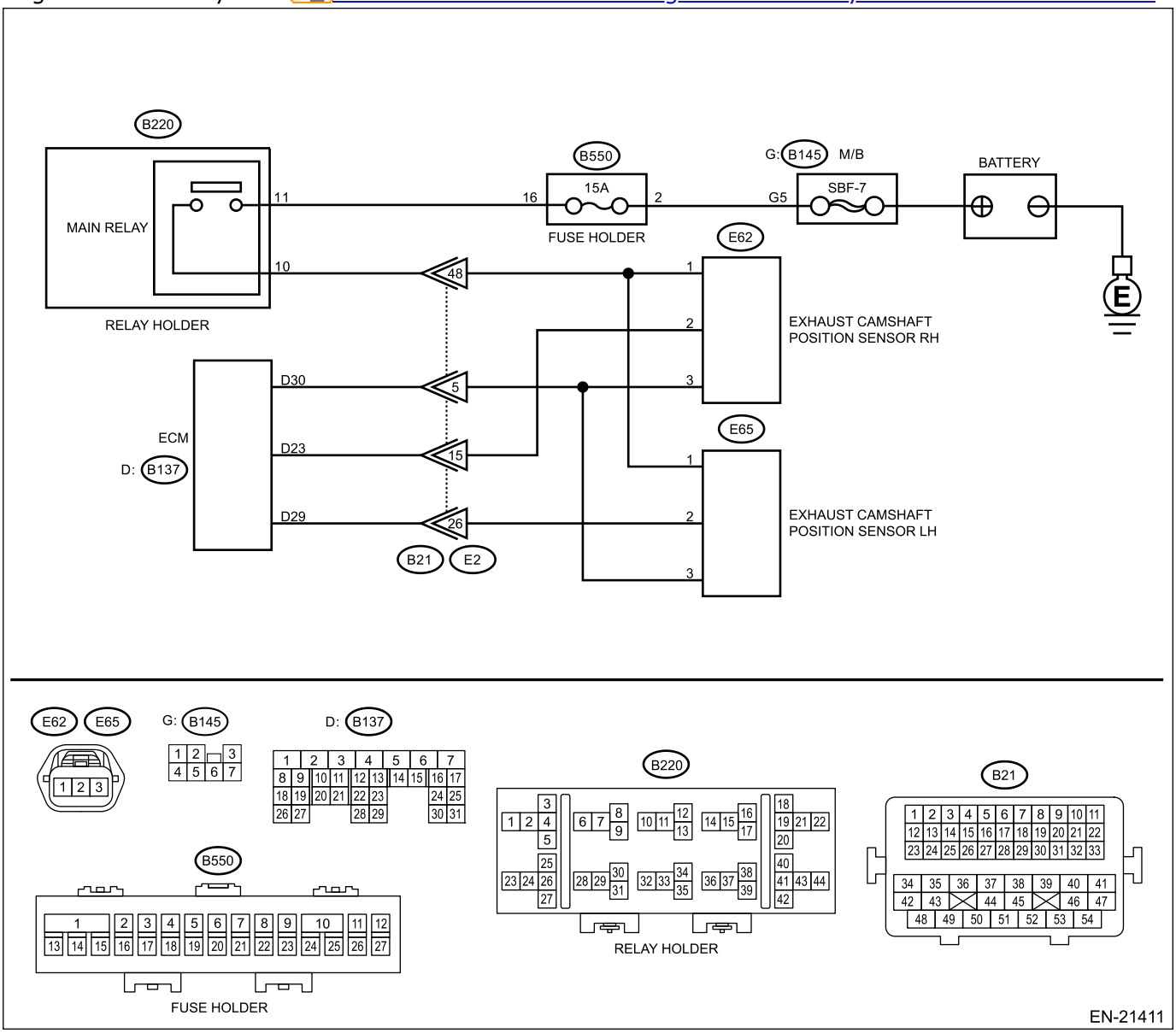
- Engine stalls.
- Failure of engine to start

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR RH.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from camshaft position sensor RH.
3. Turn the ignition switch to ON.
4. Measure the voltage between camshaft position sensor RH connector and engine ground.
   Connector & terminal
   (E62) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes — Go to 2.

No — Repair the harness and connector.
Note:
In this case, repair the following item:
- **Open circuit or short circuit to ground in harness between main relay connector and camshaft position sensor RH connector**
- **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR RH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and camshaft position sensor RH connector.
   Connector & terminal
   (B137) No. 23 — (E62) No. 2:
   (B137) No. 30 — (E62) No. 3:

Is the resistance less than 1 Ω?

Yes — Go to 3.

No — Repair the harness and connector.
Note:
In this case, repair the following item:
- **Open circuit in harness between ECM connector and camshaft position sensor RH connector**
- **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR RH CONNECTOR.

Measure the resistance between camshaft position sensor RH connector and engine ground.

Connector & terminal

(E62) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 4.
No	Repair the short circuit to ground in the harness between the ECM connector and camshaft position sensor RH connector.

4. CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR RH CONNECTOR.

Measure the voltage between camshaft position sensor RH connector and engine ground.

Connector & terminal

(E62) No. 2 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power supply in the harness between the ECM connector and camshaft position sensor RH connector.
No	Go to 5.

5. CHECK CONDITION OF CAMSHAFT POSITION SENSOR RH.

Check the camshaft position sensor RH.

Is the camshaft position sensor RH installation bolt tightened securely?

Yes	Go to 6.
No	Tighten the camshaft position sensor RH installation bolt securely. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor.

6. CHECK CAMSHAFT POSITION SENSOR RH.

Check the waveform of the camshaft position sensor RH. Ref. to ENGINE (DIAGNOSTICS)(STI)>Engine Control Module (ECM) I/O Signal.

Is there any abnormality in waveform?

Yes	Replace the camshaft position sensor RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor.
No	Repair the following item. • Poor contact of ECM connector • Poor contact of camshaft position sensor RH connector • Poor contact of coupling connector

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of the camshaft position sensor.
When there is no camshaft position signal input continuously, judge as NG.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage Elapsed time after starting the engine	≥ 10.9 V ≥ 200ms

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as NG when no input status of camshaft position sensor signal continues for (10time(s) +2)/2 revs.

Judgment value

Malfunction Criteria	Threshold Value
Amount of camshaft sensor signal during 0.5 revs of crankshaft	= 0

time needed for diagnosis: (10time(s) +2)/2 engine revs.
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0366 CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 1

Note:
For the diagnostic procedure, refer to DTC P0365. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0365 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 1.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of camshaft position sensor property.
Judge as NG when the number of camshaft signals remains abnormal.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage Elapsed time after starting the engine	≥ 10.9 V ≥ 200ms

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as NG when the status continues where the number of camshaft position sensor signals in two crankshaft revolutions is other than 2time(s).

Judgment value

Malfunction Criteria	Threshold Value
Amount of camshaft sensor signal during 2 revs of crankshaft	≠ 2time(s)

time needed for diagnosis: two engine revs. × 4time(s)
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0390 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 2

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

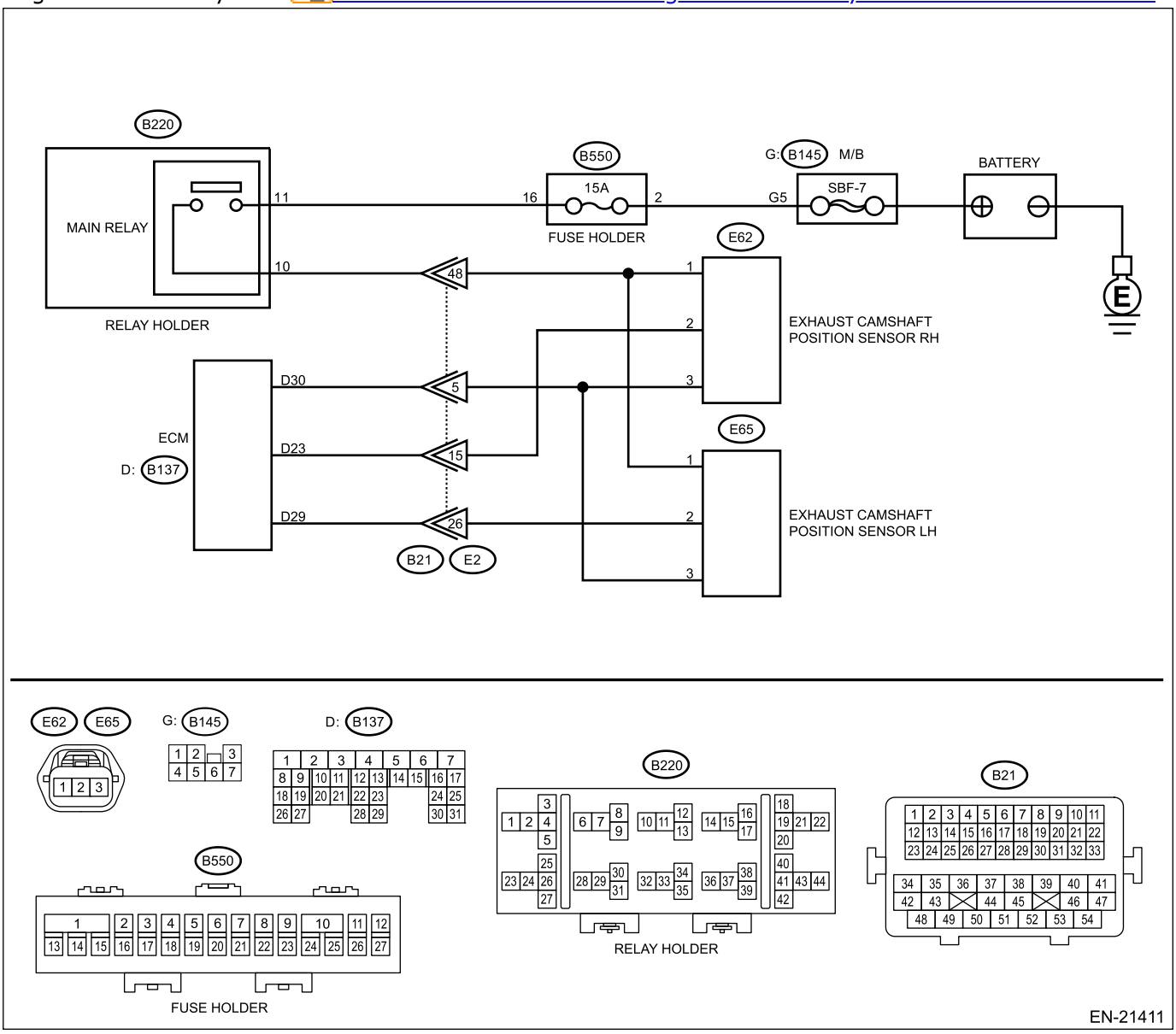
- Engine stalls.
- Failure of engine to start

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK POWER SUPPLY OF CAMSHAFT POSITION SENSOR LH.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from camshaft position sensor LH.
3. Turn the ignition switch to ON.
4. Measure the voltage between camshaft position sensor LH connector and engine ground.
   Connector & terminal
   (E65) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit or short circuit to ground in harness between main relay connector and camshaft position sensor LH connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR LH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and camshaft position sensor LH connector.
   Connector & terminal
   (B137) No. 29 — (E65) No. 2:
   (B137) No. 30 — (E65) No. 3:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and camshaft position sensor LH connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR LH CONNECTOR.

Measure the resistance between camshaft position sensor LH connector and engine ground.

Connector & terminal

(E65) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 4.
No	Repair the short circuit to ground in the harness between the ECM connector and camshaft position sensor LH connector.

4. CHECK HARNESS BETWEEN ECM AND CAMSHAFT POSITION SENSOR LH CONNECTOR.

Measure the voltage between camshaft position sensor LH connector and engine ground.

Connector & terminal

(E65) No. 2 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power supply in the harness between the ECM connector and camshaft position sensor LH connector.
No	Go to 5.

5. CHECK CONDITION OF CAMSHAFT POSITION SENSOR LH.

Check the camshaft position sensor LH.

Is the camshaft position sensor LH installation bolt tightened securely?

Yes	Go to 6.
No	Tighten the camshaft position sensor LH installation bolt securely. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor.

6. CHECK CAMSHAFT POSITION SENSOR LH.

Check the waveform of the camshaft position sensor LH. Ref. to ENGINE (DIAGNOSTICS)(STI)>Engine Control Module (ECM) I/O Signal.

Is there any abnormality in waveform?

Yes	Replace the camshaft position sensor LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor.
No	Repair the following item. • Poor contact of ECM connector • Poor contact of camshaft position sensor LH connector • Poor contact of coupling connector

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0365. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0365 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 1.

DTC P0391 CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 2

Note:
For the diagnostic procedure, refer to DTC P0390. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0390 CAMSHAFT POSITION SENSOR "B" CIRCUIT BANK 2.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0366. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0366 CAMSHAFT POSITION SENSOR "B" CIRCUIT RANGE/PERFORMANCE BANK 1.

DTC P0410 SECONDARY AIR SYSTEM

DTC detecting condition:

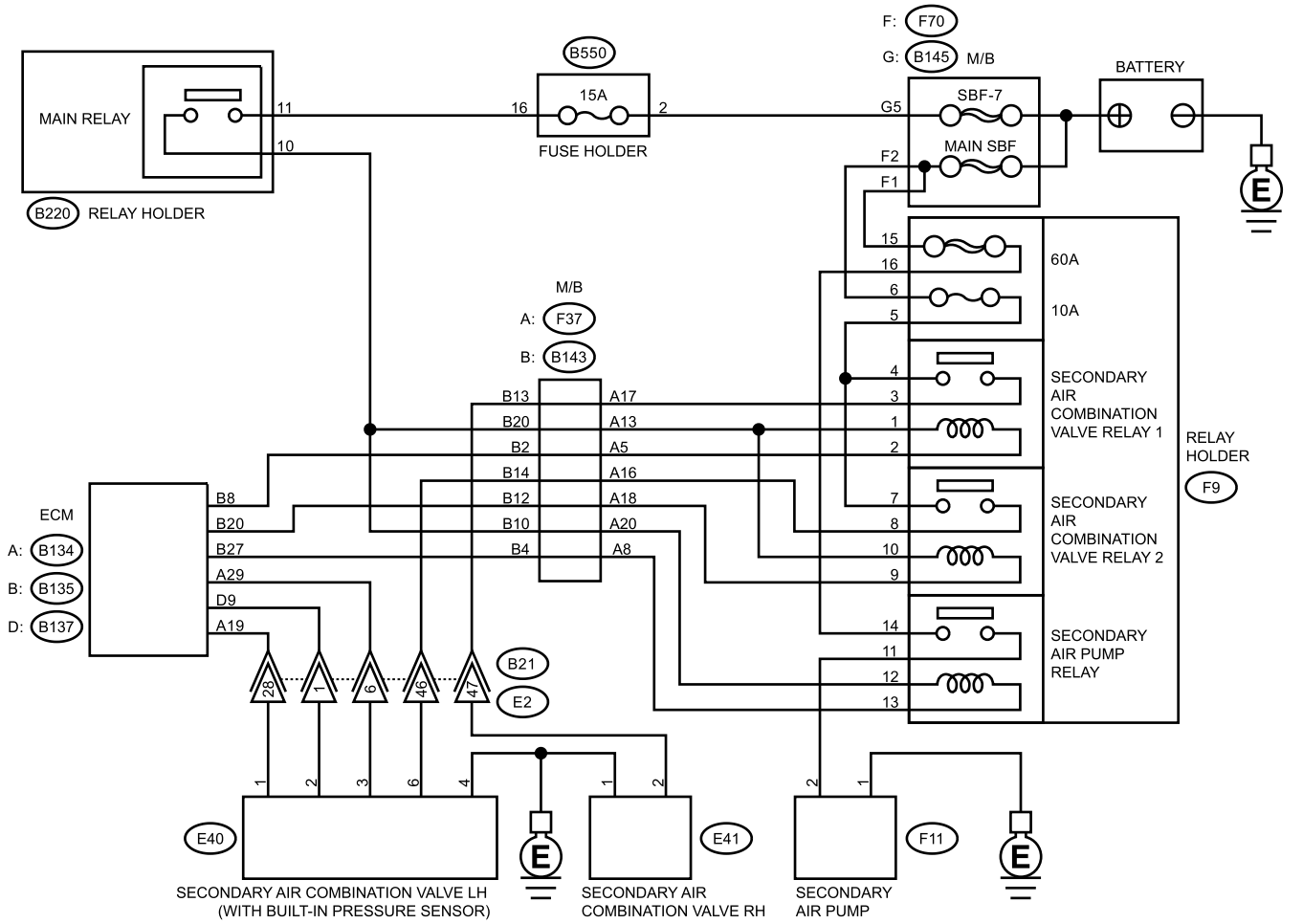
Detected when two consecutive driving cycles with fault occur.

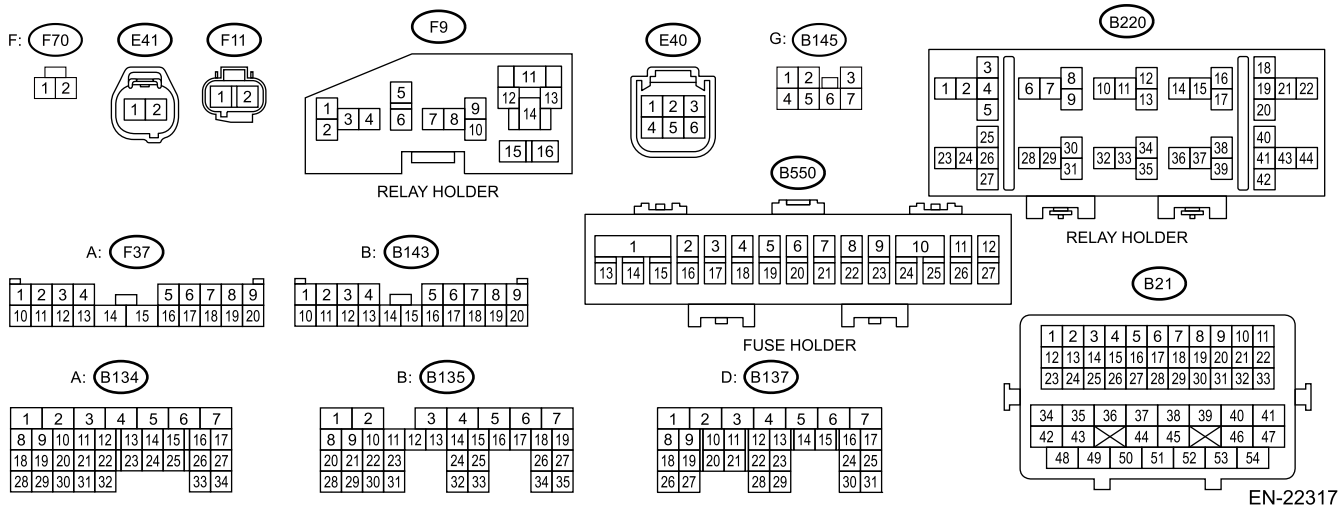
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


F: F70
G: B145 M/B
B550
15A
FUSE HOLDER
BATTERY
MAIN RELAY
11
10
16
2
G5
SBF-7
MAIN SBF
F2
F1
B220 RELAY HOLDER
M/B
A: F37
B: B143
60A
10A
SECONDARY AIR COMBINATION VALVE RELAY 1
SECONDARY AIR COMBINATION VALVE RELAY 2
SECONDARY AIR PUMP RELAY
RELAY HOLDER
F9
ECM
A: B134
B: B135
D: B137
B8
B20
B27
A29
D9
A19
B13
B20
B2
B14
B12
B10
B4
A17
A13
A5
A16
A18
A20
A8
28
1
6
46
47
B21
E2
E40
E41
F11
SECONDARY AIR COMBINATION VALVE LH (WITH BUILT-IN PRESSURE SENSOR)
SECONDARY AIR COMBINATION VALVE RH
SECONDARY AIR PUMP


F: F70
E41
F11
F9
RELAY HOLDER
E40
G: B145
B220
RELAY HOLDER
B550
FUSE HOLDER
A: F37
B: B143
A: B134
B: B135
D: B137
B21
EN-22317

1. CHECK SECONDARY AIR PUMP FUSE.

Check if the secondary air pump fuse (60 A) is blown out.

Is the fuse blown out?

Yes	Go to 2.
No	Go to 3.

2. CHECK HARNESS BETWEEN FUSE BOX AND SECONDARY AIR PUMP CONNECTOR.

1. Remove the secondary air pump fuse from the fuse box.
2. Disconnect the secondary air pump connector.
3. Measure the resistance between the secondary air pump fuse and secondary air pump connector, and chassis ground.

Connector & terminal

(F9) No. 16 — Chassis ground:

(F11) No. 2 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Replace the fuse with a new part, and connect the secondary air pump connector. Go to 3.
No	Repair ground short of the harness between the fuse box and the secondary air pump connector.

3. CHECK SECONDARY AIR PUMP OPERATION.

Caution:
Complete the inspection of secondary air pump operation in one try. This inspection will put a heavy workload on the secondary air pump, so the continuous operation may cause damage to the pump. Do not operate the pump continuously for more than three times. If you need to operate the pump further, turn the ignition switch to OFF and wait for at least two hours.

1. Install the delivery mode fuse.
2. Turn the ignition switch to ON.
3. Perform operation check for the secondary air pump using the Subaru Select Monitor.
   Note:
   - **Activation by the active test stops in 10 seconds in order to protect the secondary air pump.**
   - **When performing the active test again, disconnect the ground cable from battery, wait at least one minute, and perform the clear memory operation of ECM.**
   - **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(STI)>Active Test.**

Does the secondary air pump operate?

Yes	Go to 4.
No	Go to 5.

4. CHECK DUCT BETWEEN SECONDARY AIR PUMP AND COMBINATION VALVE.

Check the duct between secondary air pump and combination valve.

Is there damage, clog or disconnection of the duct?

Yes	Replace, clean or connect the duct.
No	Replace the secondary air combination valve LH. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve.

5. CHECK POWER SUPPLY TO SECONDARY AIR PUMP.

1. Turn the ignition switch to OFF.
2. Disconnect the battery negative terminal, wait for 1 minute, and connect it again.
3. Disconnect the secondary air pump connector.
4. Install the delivery mode fuse.
5. Turn the ignition switch to ON.
6. Using the Subaru Select Monitor, measure the voltage between the secondary air pump connector and chassis ground while the secondary air pump is operating.
   Note:
   - **Activation by the active test stops in 10 seconds in order to protect the secondary air pump.**
   - **When performing the active test again, disconnect the ground cable from battery, wait at least one minute, and perform the clear memory operation of ECM.**
   - **For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(STI)>Active Test.**

   Connector & terminal
   (F11) No. 2 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Replace the secondary air pump. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Pump.
No	Go to 6.

6. CHECK HARNESS BETWEEN SECONDARY AIR PUMP RELAY AND SECONDARY AIR PUMP CONNECTOR.

1. Turn the ignition switch to OFF.
2. Remove the secondary air pump relay.
3. Measure the resistance of harness between secondary air pump relay connector and secondary air pump connector.
   Connector & terminal
   (F9) No. 11 — (F11) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 7.
No	Repair the open circuit in harness between secondary air pump relay connector and secondary air pump connector.

7. CHECK HARNESS BETWEEN SECONDARY AIR PUMP CONNECTOR AND CHASSIS GROUND.

Measure the resistance of the harness between secondary air pump connector and chassis ground.

Connector & terminal

(F11) No. 1 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 8.
No	Repair the open circuit of the harness between secondary air pump connector and chassis ground.

8. CHECK SECONDARY AIR PUMP RELAY.

1. Connect the battery to terminals No. 12 and No. 13 of the secondary air pump relay.
2. Measure the resistance between secondary air pump relay terminals.

Terminals

No. 14 — No. 11:

Is the resistance less than 1 Ω?

Yes	Go to 9.
No	Replace the secondary air pump relay. Ref. to ENGINE (DIAGNOSTICS)(STI)>Electrical Component Location.

9. CHECK SECONDARY AIR PUMP RELAY POWER SUPPLY.

1. Turn the ignition switch to ON.
2. Measure the voltage between the secondary air pump relay connector and chassis ground.
   Connector & terminal
   (F9) No. 14 (+) — Chassis ground (−):
   (F9) No. 12 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 10.
No	Repair the open or short to ground in the power supply circuit.

10. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR PUMP RELAY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the ECM connector.
3. Measure the resistance of harness between ECM connector and secondary air pump relay connector.
   Connector & terminal
   (B135) No. 27 — (F9) No. 13:

Is the resistance less than 1 Ω?

Yes	Repair the poor contact of ECM connector.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and secondary air pump relay connector** • **Poor contact of coupling connector**

1. OUTLINE OF DIAGNOSIS

Detect NG judging from secondary air delivery pipe pressure, pulse of secondary air delivery pipe pressure and secondary air pipe airflow amount.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Pump supply pressure check	
Battery voltage	≥10.9V
Barometric pressure	≥75.1kPa (563mmHg, 22.2inHg)
Ambient air temperature	≥4.4°C (39.9°F)
Secondary air pump	Operating
Combination valve both closed pulse diagnosis	
Battery voltage	≥10.9V
Barometric pressure	≥75.1kPa (563mmHg, 22.2inHg)/1000
Ambient air temperature	≥4.4°C (39.9°F)
Secondary air pump	Operating
Engine load	≥0.2g/rev (0.01oz/rev)
Elapsed time after fuel cut	≥1000ms
Pressure at switching RH combination valve (P2440)	≤ Pressure at switching LH combination valve
Pressure at switching LH combination valve (P2442)	< Pressure at switching RH combination valve
Combination valve changeover pressure diagnosis	
Battery voltage	≥10.9V
Barometric pressure	≥75.1kPa (563mmHg, 22.2inHg)/1000
Ambient air temperature	≥4.4°C (39.9°F)
Secondary air pump	= ON
Amount of intake air	< 25g/s (0.88oz/s)
Elapsed time after fuel cut	≥1000ms
Overflow diagnosis	
Battery voltage	≥10.9V
Barometric pressure	≥75.1kPa (563mmHg, 22.2inHg)/1000

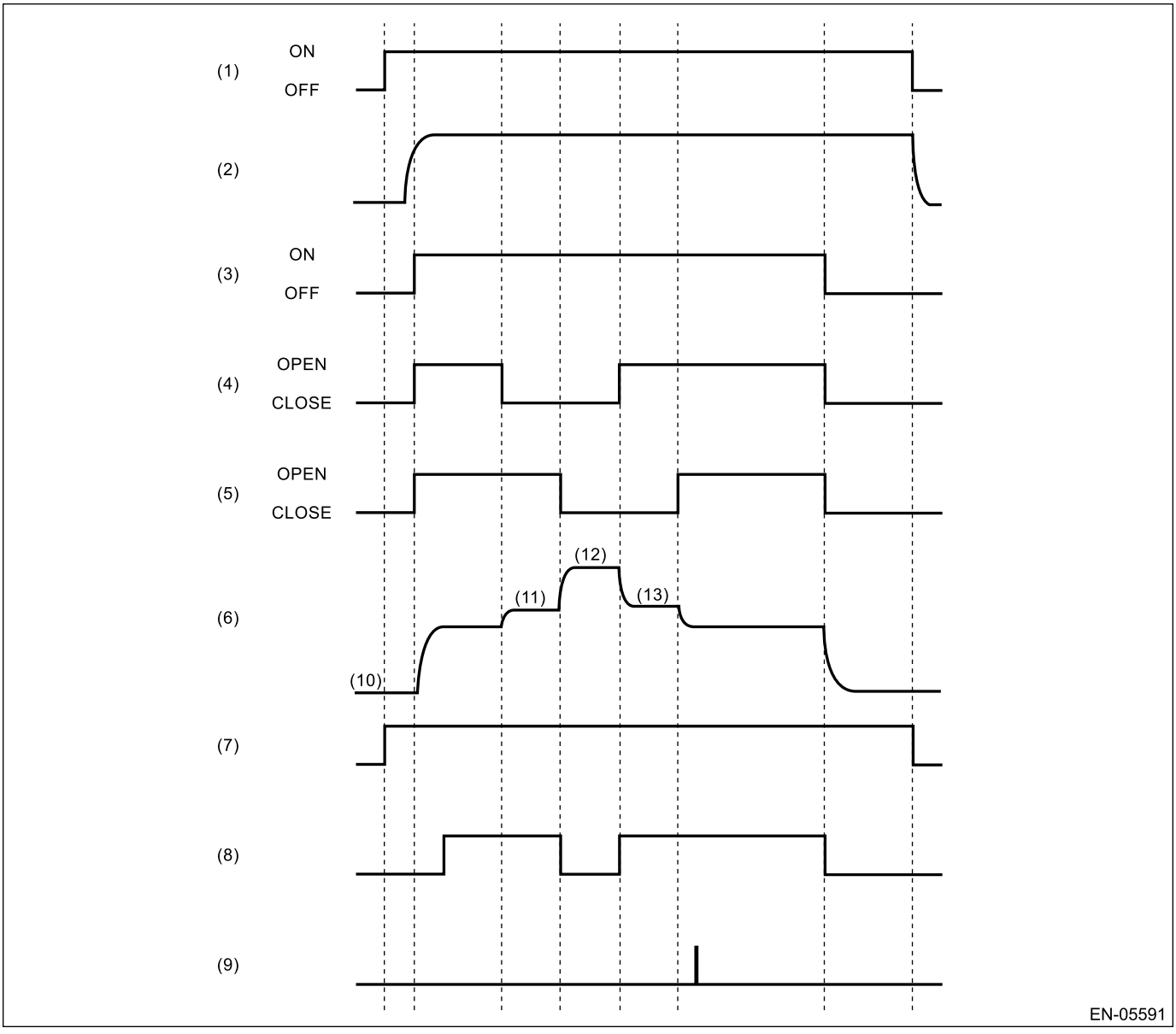
Secondary parameters	Execution condition
Ambient air temperature Secondary air pump Amount of intake air	≥4.4°C (39.9°F) = ON < 25g/s (0.88oz/s)
Elapsed time after fuel cut	≥1000ms

3. GENERAL DRIVING CYCLE

Perform diagnosis during secondary air pump operation.

4. DIAGNOSTIC METHOD

Measure secondary air delivery pipe pressure, pulse of secondary air delivery pipe pressure and secondary air pipe airflow amount.



(1) Ignition switch
(2) Engine speed
(3) Secondary air pump operating status
(4) E-COMB valve (right hand) status
(5) E-COMB valve (left hand) status
(6) Secondary air delivery pipe pressure (psi)
(7) Diagnosis enable condition
(8) Pump supply pressure check (judgment)
(9) Flow amount check (judgment)
(10) Barometric pressure (Pas) measurement before secondary air control
(11) Right bank all closed pressure (P0R) measurement
(12) Both banks all closed pressure (P0RL) measurement
(13) Left bank all closed pressure (P0L) measurement

Pump supply pressure check

Perform the system function diagnosis with how much the pressure rises when the secondary air pump is turned from OFF to ON.

Judge as NG if delivery pipe pressure does not rise though it should when the secondary air pump turns OFF → ON.

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value	DTC
Secondary air supply pipe pressure (after barometric pressure compensation)	< 0.9kPa (7mmHg, 0.3inHg)	P0410

time needed for diagnosis:4000ms

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

Combination valve both closed pulse diagnosis

Perform open stuck diagnosis of both combination valves using delivery pipe pressure pulse when both combination valves are closed. Determine which side of valves is stuck open by comparing the secondary air flow amount when RH combination valve is closed with that when LH combination valve is closed.

Calculate voltage pulse of the pump delivery pipe pressure when both combination valves are closed. The calculation should be small because there is no pulse from supply pipe pressure with both combination valves closed. When the calculation is large, determine that either of the combination valves is stuck open.

Determine which side of valves is stuck open by comparing the secondary air flow amount when RH combination valve is closed with that when LH combination valve is closed. Air flow amount is larger on the open stuck valve.

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value	DTC
Pulse calculation value when both combination valves are	> Value of Map 8	P2440

Malfunction Criteria	Threshold Value	DTC
closed		
Air flow amount when the right bank is closed		
Pulse calculation value when both combination valves are closed	> Value of Map 9	P2442
Air flow amount when the left bank is closed		

time needed for diagnosis:992ms+992ms+992ms+4000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

Combination valve changeover pressure diagnosis
Perform the RH combination valve stuck closed diagnosis with the variation of delivery pipe pressure when the RH combination valve turns closed → open.
Delivery pipe pressure should vary when the RH combination valve turns closed → open. When the variation is small, determine that the RH combination valve is stuck closed.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
Judgment value

Malfunction Criteria	Threshold Value	DTC
Pressure variation value when the RH combination valve is switched	< Value of Map 4	P2441

time needed for diagnosis:992ms+992ms+992ms+4000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.
Perform the LH combination valve stuck closed diagnosis with the variation of delivery pipe pressure when the LH combination valve turns open → closed.
Delivery pipe pressure should vary when the LH combination valve turns open → closed. When the variation is small, determine that the LH combination valve is stuck closed.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
Judgment value

Malfunction Criteria	Threshold Value	DTC
Pressure variation value when the LH combination valve is switched	< Value of Map 5	P2443

time needed for diagnosis:992ms+992ms+992ms+4000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

Overflow diagnosis

Perform secondary air system flow abnormality diagnosis using both sides of combination valves secondary air amount when both are closed.
Judge as secondary air system flow abnormality either if there is excessive secondary air flow amount with the RH combination valve closed, or if there is excessive secondary air flow amount with the LH combination valve closed.
If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value	DTC
Air flow amount when the right bank is closed (value from Map 4) or Air flow amount when the left bank is closed (value from Map 5)	> Value of Map 6 > Value of Map 7	P0411

time needed for diagnosis:992ms+992ms+992ms+4000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

Map 4

Amount of intake air when RH comb. valve switches (g/s (oz/s)) Battery voltage when RH comb. valve switches (V)	**10 (0.35)**	**15 (0.53)**	**20 (0.71)**	**25 (0.88)**	**26 (0.92)**
11	0.025	0.025	0.025	0.005	0
12	0.035	0.035	0.035	0.015	0
13	0.05	0.05	0.05	0.025	0
14	0.05	0.05	0.05	0.025	0
(V)					

Map 5

Amount of intake air when LH comb. valve switches (g/s (oz/s)) Battery voltage when LH comb. valve switches (V)	**10 (0.35)**	**15 (0.53)**	**20 (0.71)**	**25 (0.88)**	**26 (0.92)**
11	0.025	0.025	0.025	0.005	0
12	0.035	0.035	0.035	0.015	0
13	0.05	0.05	0.05	0.025	0
14	0.05	0.05	0.05	0.025	0

Amount of intake air when LH comb. valve switches (g/s (oz/s)) Battery voltage when LH comb. valve switches (V)	**10 (0.35)**	**15 (0.53)**	**20 (0.71)**	**25 (0.88)**	**26 (0.92)**
(V)					

Map 6

Amount of intake air when P0R is measuring (g/s (oz/s)) Battery voltage when P0R measuring (V)	**2 (0.07)**	**25 (0.88)**
11.5	345	345
12.5	345	345
13.5	345	345
14.5	390	390
15.5	420	420
(L/min)		

Map 7

Amount of intake air when P0L is measuring (g/s (oz/s)) Battery voltage when P0L measuring (V)	**2 (0.07)**	**25 (0.88)**
11.5	345	345
12.5	345	345
13.5	345	345
14.5	390	390
15.5	420	420
(L/min)		

Map 8

Pressure at switching RH combination valve (kPa (mmHg, inHg))	**0.53 (4, 0.2)**	**0.67 (5, 0.2)**
Pulse calculation value when both combination valves are closed	4.5	45

Pressure at switching RH combination valve (kPa (mmHg, inHg))	**0.53 (4, 0.2)**	**0.67 (5, 0.2)**
Air flow amount when the right bank is closed (V)		

Map 9

Pressure at switching LH combination valve (kPa (mmHg, inHg))	**0.53 (4, 0.2)**	**0.67 (5, 0.2)**
Pulse calculation value when both combination valves are closed Air flow amount when the left bank is closed (V)	4.5	45

DTC P0411 SECONDARY AIR SYSTEM INCORRECT FLOW DETECTED

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.

Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK SECONDARY AIR COMBINATION VALVE.

Check the pipe between the secondary air combination valve and cylinder head.

Is there damage or disconnection of the pipe?

Yes	Replace the pipe between secondary air combination valve and cylinder head. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve.
No	Go to 2.

2. CHECK SECONDARY AIR COMBINATION VALVE.

Race the engine at 2,000 rpm to check whether or not the exhaust leak is heard.

Is there any exhaust leak?

Yes	Replace the pipe between secondary air combination valve and cylinder head. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve.
No	Repair the poor contact of ECM connector.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0410. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0410 SECONDARY AIR SYSTEM.

DTC P0413 SECONDARY AIR SYSTEM SWITCHING VALVE "A" CIRCUIT OPEN

DTC detecting condition:

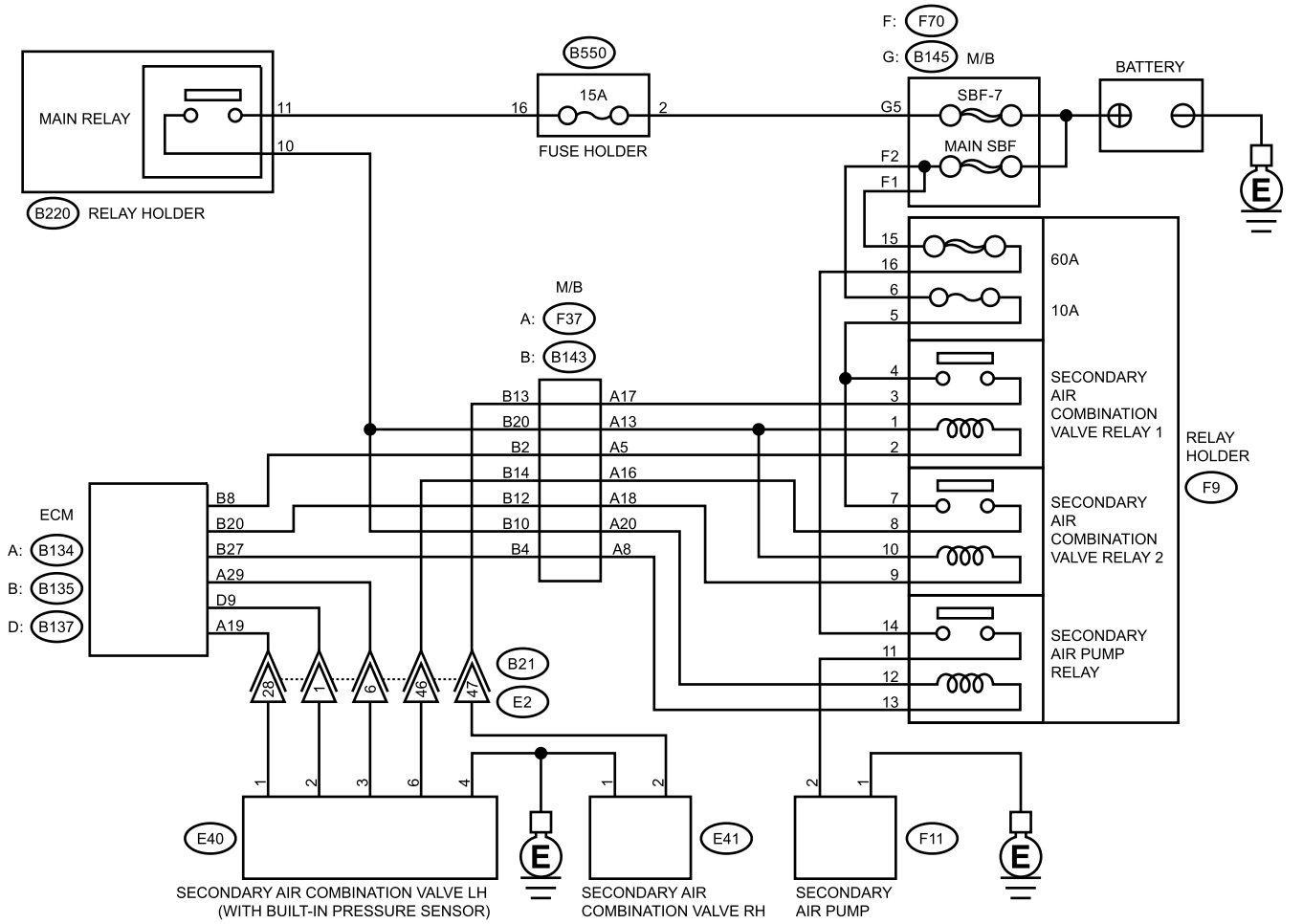
Immediately at fault recognition

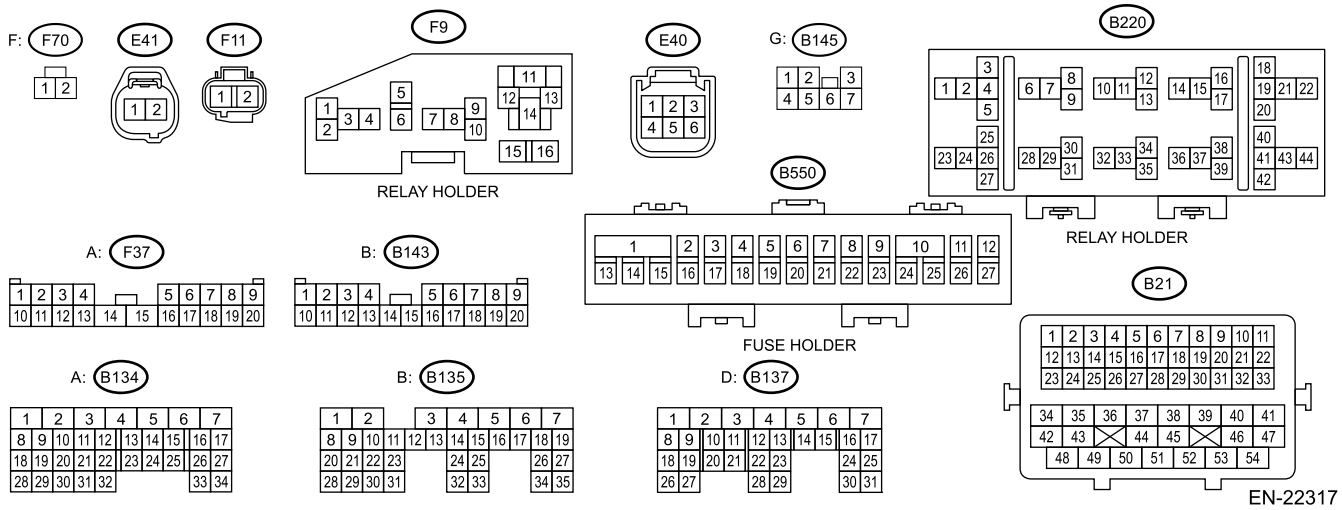
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


F: F70
G: B145 M/B
B550
15A
FUSE HOLDER
BATTERY
MAIN RELAY
11
10
16
2
G5
SBF-7
MAIN SBF
F2
F1
B220 RELAY HOLDER
M/B
A: F37
B: B143
60A
10A
SECONDARY AIR COMBINATION VALVE RELAY 1
SECONDARY AIR COMBINATION VALVE RELAY 2
SECONDARY AIR PUMP RELAY
RELAY HOLDER
F9
ECM
A: B134
B: B135
D: B137
B8
B20
B27
A29
D9
A19
B13
B20
B2
B14
B12
B10
B4
A17
A13
A5
A16
A18
A20
A8
28
1
6
46
47
B21
E2
E40
E41
F11
SECONDARY AIR COMBINATION VALVE LH (WITH BUILT-IN PRESSURE SENSOR)
SECONDARY AIR COMBINATION VALVE RH
SECONDARY AIR PUMP


F: F70
E41
F11
F9
RELAY HOLDER
E40
G: B145
B220
RELAY HOLDER
B550
FUSE HOLDER
A: F37
B: B143
A: B134
B: B135
D: B137
B21
EN-22317

1. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE RELAY 1 CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Remove the secondary air combination valve relay 1.
4. Measure the resistance of harness between ECM connector and secondary air combination valve relay 1 connector.
   Connector & terminal
   (B135) No. 8 — (F9) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and secondary air combination valve relay 1 connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE RELAY 1 CONNECTOR.

Measure the resistance between ECM connector and chassis ground.
Connector & terminal
(B135) No. 8 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**
No	Repair the short circuit to ground in harness between ECM connector and secondary air combination valve relay 1 connector.

1. OUTLINE OF DIAGNOSIS

Judge as NG when the ECM output level differs from the actual terminal level.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Secondary air combination valve relay output	OFF

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≤ Battery voltage × 0.34 V

time needed for diagnosis: 2500ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0414 SECONDARY AIR SYSTEM SWITCHING VALVE "A" CIRCUIT SHORTED

DTC detecting condition:

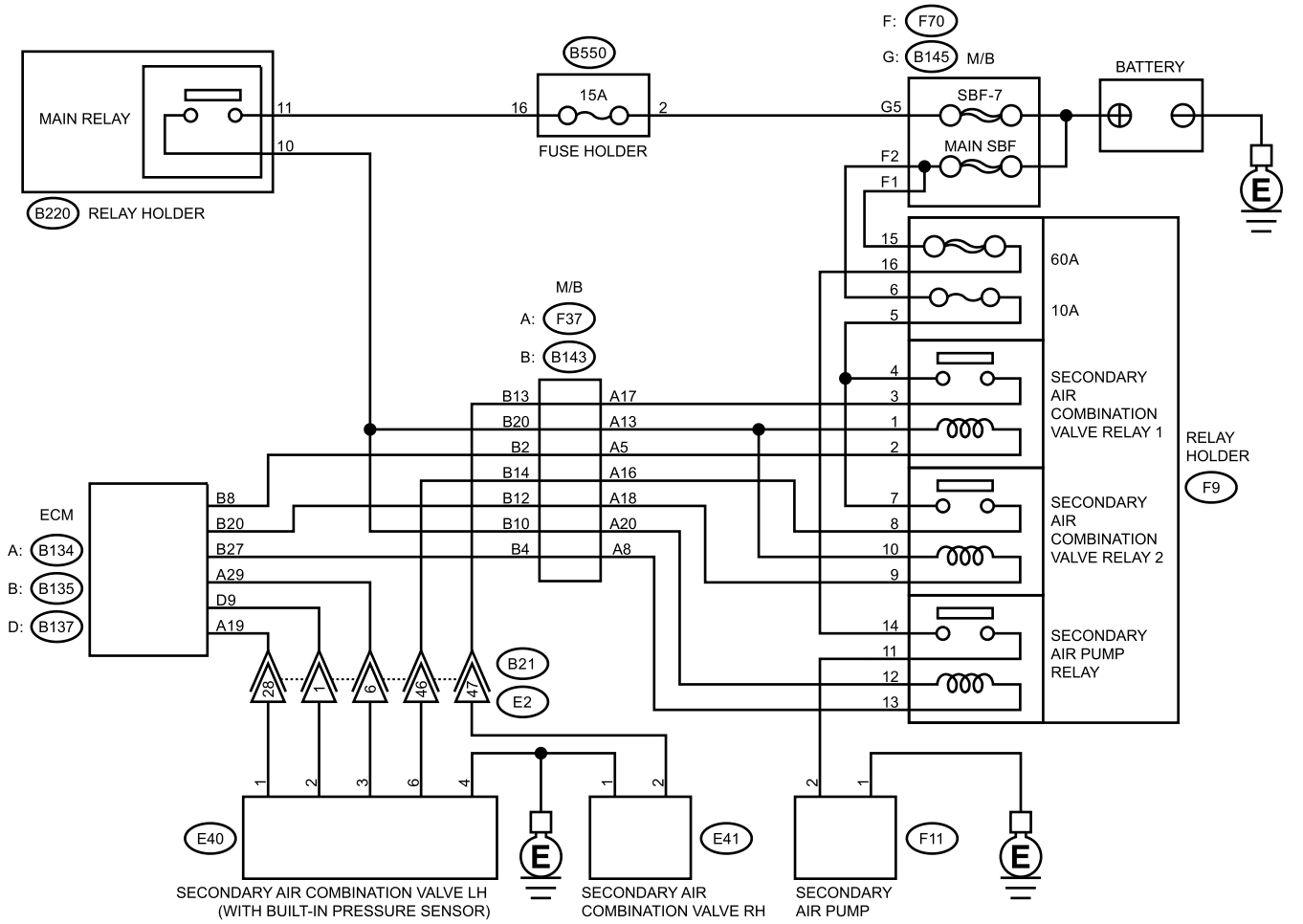
Immediately at fault recognition

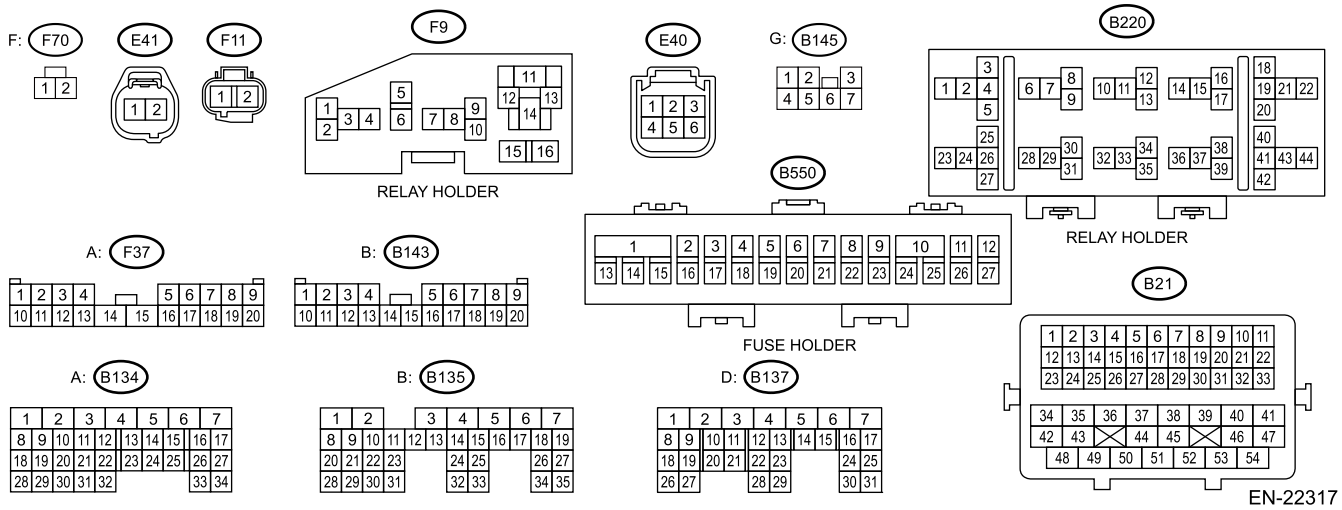
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


F: F70
G: B145 M/B
B550
15A
FUSE HOLDER
BATTERY
MAIN RELAY
11
10
16
2
G5
SBF-7
MAIN SBF
F2
F1
B220 RELAY HOLDER
M/B
A: F37
B: B143
60A
10A
SECONDARY AIR COMBINATION VALVE RELAY 1
SECONDARY AIR COMBINATION VALVE RELAY 2
SECONDARY AIR PUMP RELAY
RELAY HOLDER
F9
ECM
A: B134
B: B135
D: B137
B8
B20
B27
A29
D9
A19
B13
B20
B2
B14
B12
B10
B4
A17
A13
A5
A16
A18
A20
A8
28
1
6
46
47
B21
E2
E40
E41
F11
SECONDARY AIR COMBINATION VALVE LH (WITH BUILT-IN PRESSURE SENSOR)
SECONDARY AIR COMBINATION VALVE RH
SECONDARY AIR PUMP


F: F70
E41
F11
F9
RELAY HOLDER
E40
G: B145
B220
RELAY HOLDER
B550
FUSE HOLDER
A: F37
B: B143
A: B134
B: B135
D: B137
B21
EN-22317

1. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE RELAY 1 CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Remove the secondary air combination valve relay 1.
4. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B135) No. 8 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and secondary air combination valve relay 1 connector.
No	Repair the poor contact of ECM connector.

1. OUTLINE OF DIAGNOSIS

Judge as NG when the ECM output level differs from the actual terminal level.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage Secondary air combination valve relay output	≥ 10.9 V ON

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output current	≥ 6 A

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0416 SECONDARY AIR SYSTEM SWITCHING VALVE "B" CIRCUIT OPEN

DTC detecting condition:

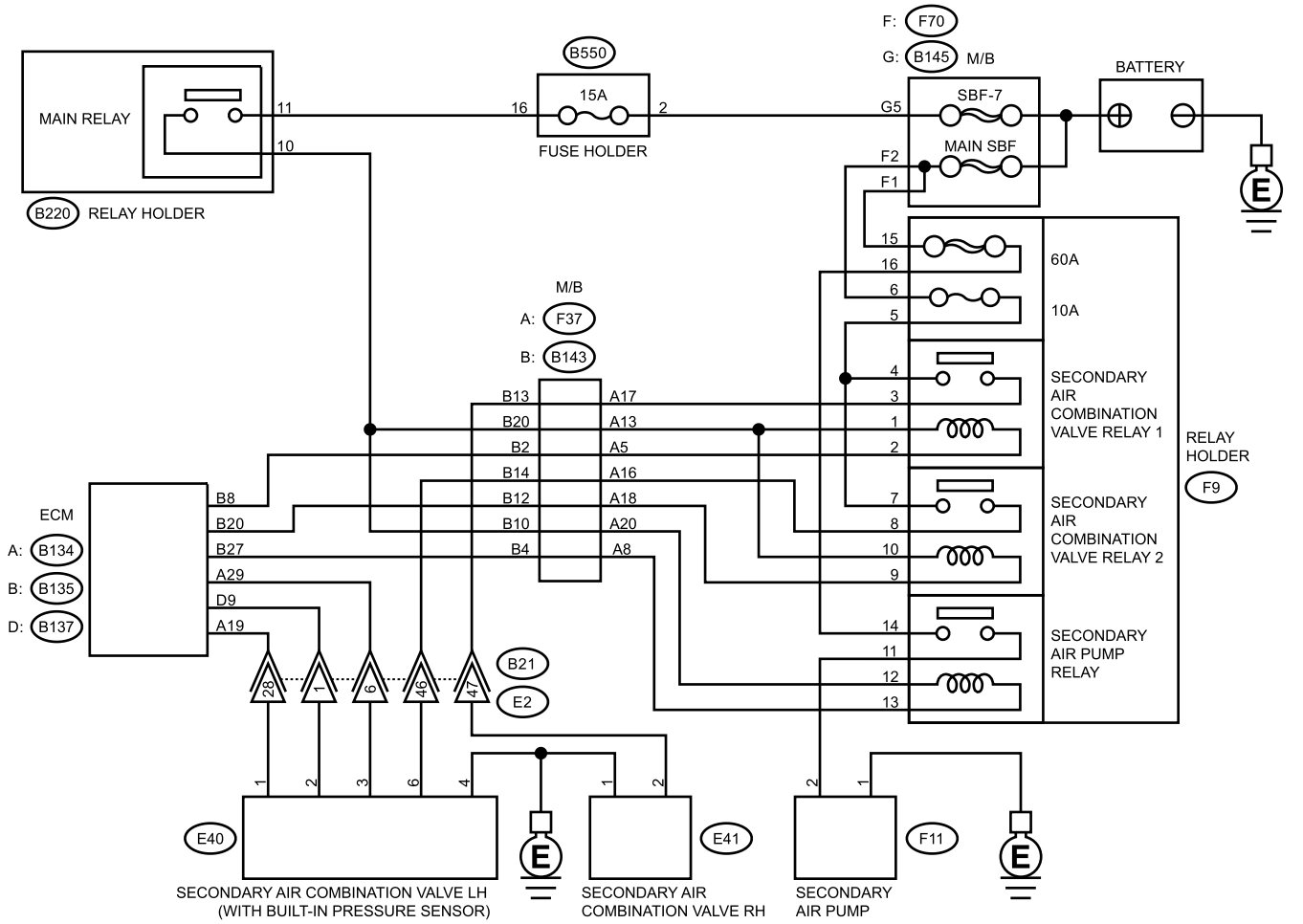
Immediately at fault recognition

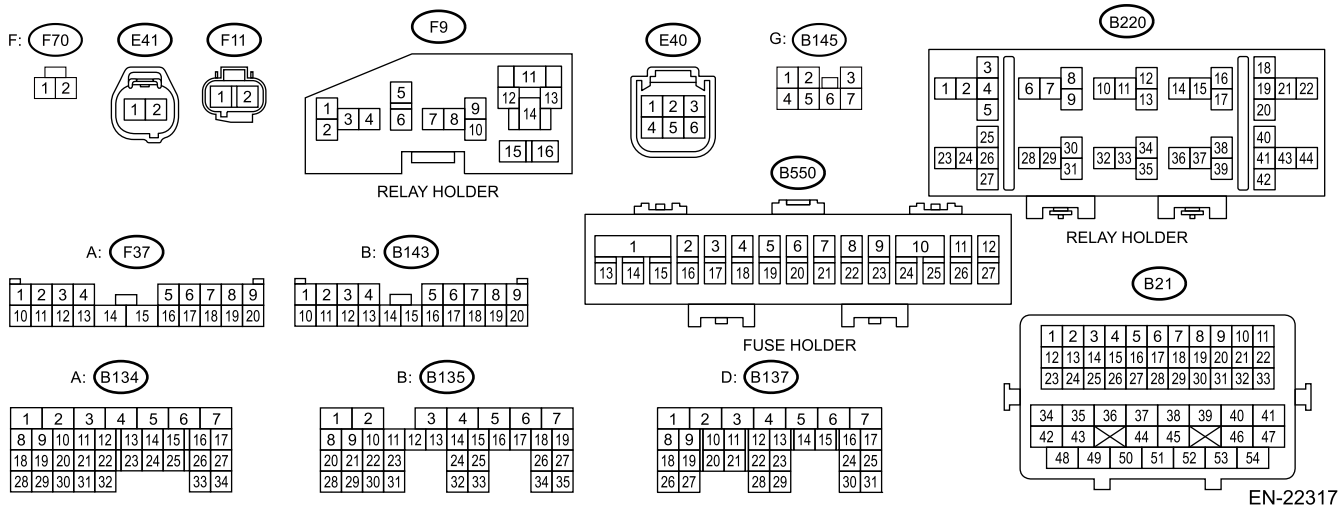
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


F: F70
G: B145 M/B
B550
15A
FUSE HOLDER
BATTERY
MAIN RELAY
11
10
16
2
G5
SBF-7
MAIN SBF
F2
F1
B220 RELAY HOLDER
M/B
A: F37
B: B143
60A
10A
SECONDARY AIR COMBINATION VALVE RELAY 1
SECONDARY AIR COMBINATION VALVE RELAY 2
SECONDARY AIR PUMP RELAY
RELAY HOLDER
F9
ECM
A: B134
B: B135
D: B137
B8
B20
B27
A29
D9
A19
B13
B20
B2
B14
B12
B10
B4
A17
A13
A5
A16
A18
A20
A8
28
1
6
46
47
B21
E2
E40
E41
F11
SECONDARY AIR COMBINATION VALVE LH (WITH BUILT-IN PRESSURE SENSOR)
SECONDARY AIR COMBINATION VALVE RH
SECONDARY AIR PUMP


F: F70
E41
F11
F9
RELAY HOLDER
E40
G: B145
B220
RELAY HOLDER
B550
FUSE HOLDER
A: F37
B: B143
A: B134
B: B135
D: B137
B21
EN-22317

1. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE RELAY 2 CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Remove the secondary air combination valve relay 2.
4. Measure the resistance of harness between ECM connector and secondary air combination valve relay 2 connector.
   Connector & terminal
   (B135) No. 20 — (F9) No. 9:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and secondary air combination valve relay 2 connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE RELAY 2 CONNECTOR.

Measure the resistance between ECM connector and chassis ground.
Connector & terminal
(B135) No. 20 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**
No	Repair the short circuit to ground in harness between ECM connector and secondary air combination valve relay 2 connector.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0413. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0413 SECONDARY AIR SYSTEM SWITCHING VALVE "A" CIRCUIT OPEN.

DTC P0417 SECONDARY AIR SYSTEM SWITCHING VALVE "B" CIRCUIT SHORTED

DTC detecting condition:

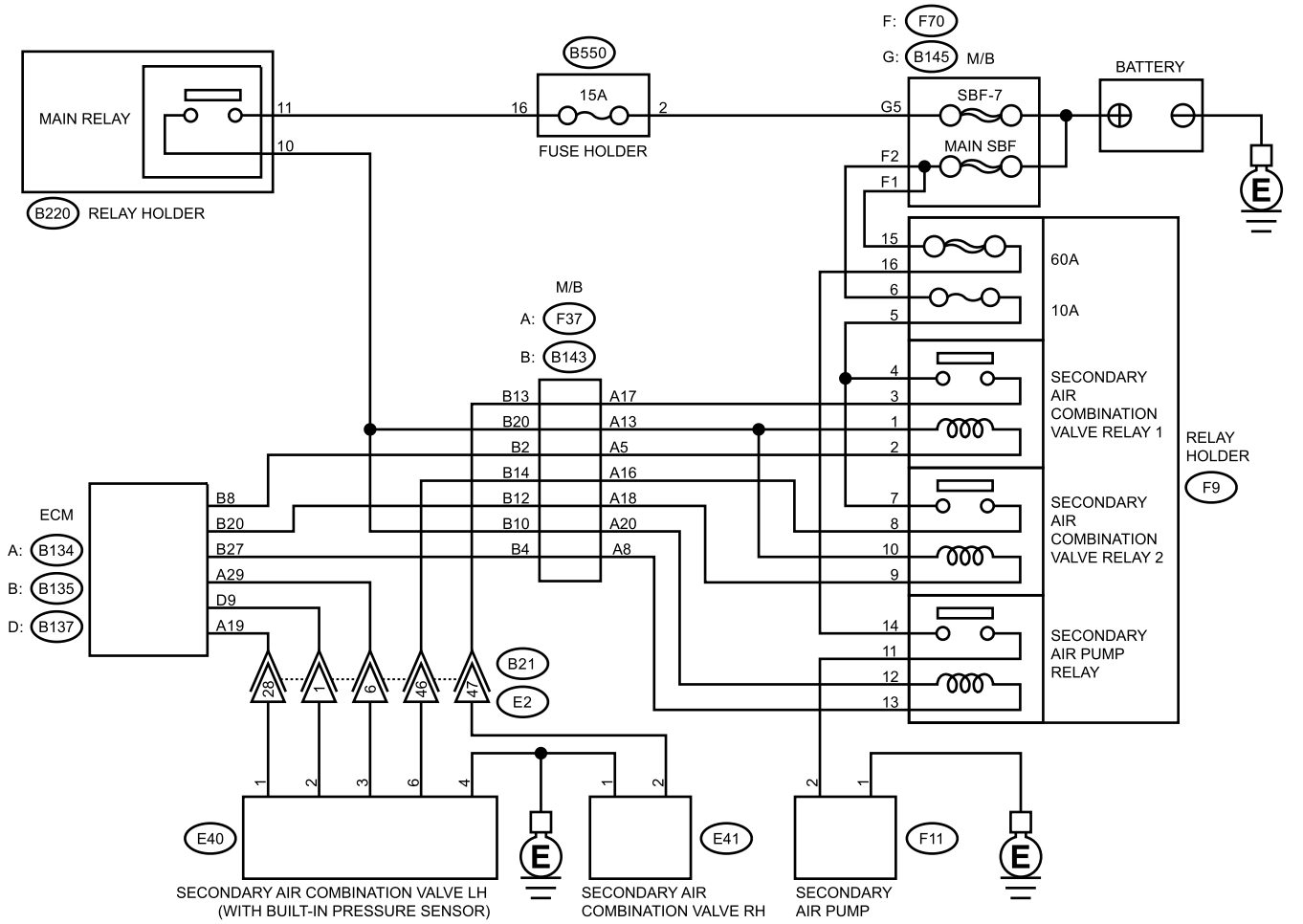
Immediately at fault recognition

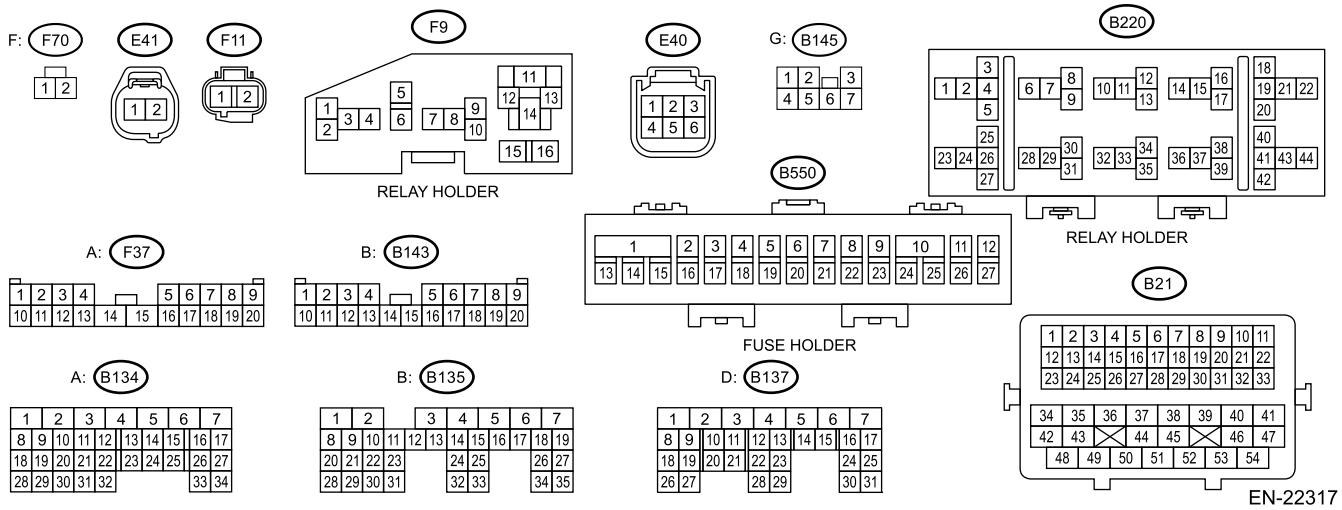
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


F: F70
G: B145 M/B
B550
15A
FUSE HOLDER
BATTERY
MAIN RELAY
11
10
16
2
G5
SBF-7
MAIN SBF
F2
F1
B220 RELAY HOLDER
M/B
A: F37
B: B143
60A
10A
SECONDARY AIR COMBINATION VALVE RELAY 1
SECONDARY AIR COMBINATION VALVE RELAY 2
SECONDARY AIR PUMP RELAY
RELAY HOLDER
F9
ECM
A: B134
B: B135
D: B137
B8
B20
B27
A29
D9
A19
B13
B20
B2
B14
B12
B10
B4
A17
A13
A5
A16
A18
A20
A8
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1
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SECONDARY AIR COMBINATION VALVE LH (WITH BUILT-IN PRESSURE SENSOR)
SECONDARY AIR COMBINATION VALVE RH
SECONDARY AIR PUMP


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RELAY HOLDER
E40
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B220
RELAY HOLDER
B550
FUSE HOLDER
A: F37
B: B143
A: B134
B: B135
D: B137
B21
EN-22317

1. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE RELAY 2 CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Remove the secondary air combination valve relay 2.
4. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B135) No. 20 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and secondary air combination valve relay 2 connector.
No	Repair the poor contact of ECM connector.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0414. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0414 SECONDARY AIR SYSTEM SWITCHING VALVE "A" CIRCUIT SHORTED.

DTC P0420 CATALYST SYSTEM EFFICIENCY BELOW THRESHOLD BANK 1

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

- Engine stalls.
- Idle mixture is out of specifications.

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC AND FREEZE FRAME DATA.

1. Read «Engine» DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC)>OPERATION > SUBARU SELECT MONITOR.
2. Read the freeze frame data. Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor>OPERATION > DISPLAY OF FREEZE FRAME DATA (OBD MODE).
3. Store the displayed DTC and freeze frame data.

Is other than DTC P0420 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK ENGINE OIL CONSUMPTION.

Check the engine oil amount. Ref. to LUBRICATION(STI)>Engine Oil>INSPECTION.

Is white smoke emitted from muffler?

Yes	Check the engine, and repair the defective part. Ref. to MECHANICAL(STI)>Symptoms and causes. After repairing the engine, replace all the catalytic converters. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Front Catalytic Converter. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Rear Catalytic Converter.
No	Go to 3.

3. CHECK EXHAUST SYSTEM.

Check the following items for the exhaust system.

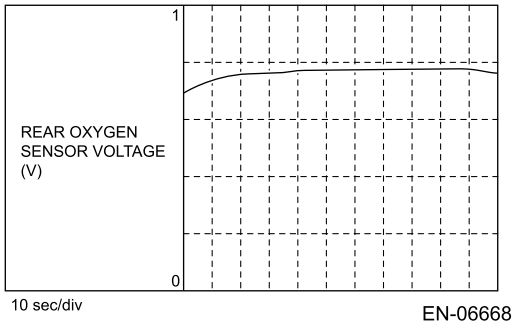
- Looseness and disconnection of nut and bolt
- Exhaust gas leakage
- Air suction
- Hole in exhaust pipe

Is there any trouble?

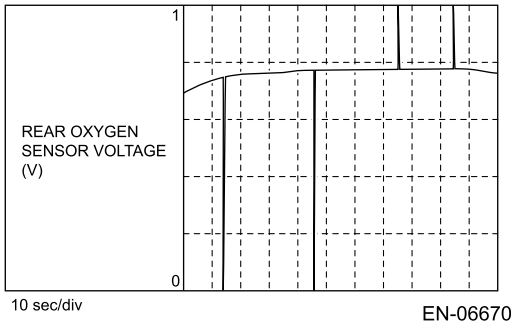
Yes	Repair or replace the exhaust system. Ref. to EXHAUST(STI)>General Description.
No	Go to 4.

4. CHECK CATALYTIC CONVERTER.

1. Start the engine and warm up completely.
2. Using the Subaru Select Monitor, read the waveform data of rear oxygen sensor during idling.
3. Shake the connector between ECM and rear oxygen sensor and check the waveform.
   - At normal condition



   - At abnormal condition (noise input)



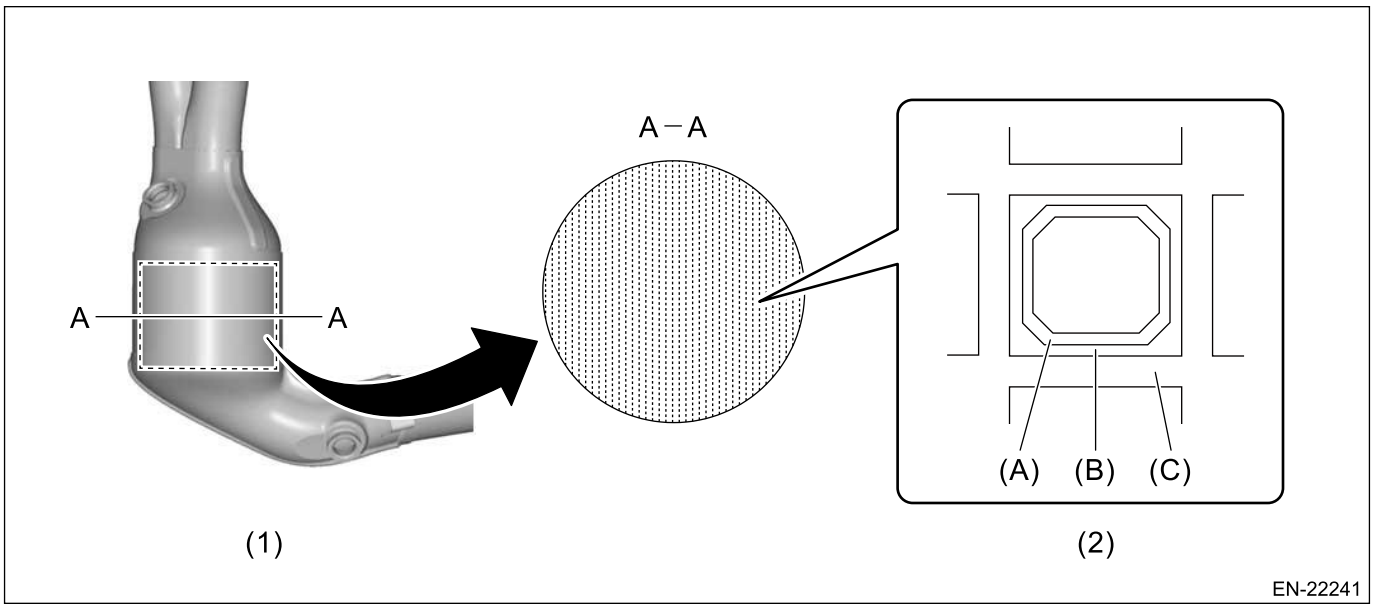
Is an abnormal waveform displayed?

Yes	Connect the connector after checking the following items, and check the waveform again while shaking the connector. • Check the connector connection condition of the section where waveform is abnormal, and repair or replace them if faulty. • When abnormality is not found, temporary poor contact of connector may be the cause.
No	Replace all the catalytic converters. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Front Catalytic Converter. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Rear Catalytic Converter.

1. OUTLINE OF DIAGNOSIS

To observe the performance of the Three-way Catalytic Converter (TWC), measure Oxygen Storage Capacity (OSC) using the front oxygen (A/F) sensor and the rear oxygen sensor.

2. COMPONENT DESCRIPTION



(1) Catalytic converter outer diagram
(2) Enlarged view of catalytic converter honeycomb cell
(A) Catalytic converter layer 1
(B) Catalytic converter layer 2
(C) Support

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Barometric pressure	≥ 75.06 kPa (563 mmHg, 22.2 inHg)
Amount of intake air	< 8.5g/s (0.3oz/s)
Accelerator pedal position	= While idling
Rear oxygen output voltage after fuel cut	≤ 0.15V
Estimated catalyst temperature	≥ 480°C (896°F)
Estimated temperature of the rear oxygen sensor element	≥ 500°C (932°F)
(∗Fuel shut-off function from the integrated intake air amount during fuel cut)	> 28g (0.99oz)
Fuel shut-off function from above	Not in operation

∗ Five seconds or more of fuel cut.

4. GENERAL DRIVING CYCLE

Perform diagnosis when each of the following conditions is experienced once while TWC, front oxygen (A/F) sensor and rear oxygen sensor are sufficiently warmed up: 10-second idling after more than

predetermined time of deceleration fuel cut has passed, and 10-second driving with the accelerator ON after more than predetermined time of deceleration fuel cut has passed.

5. DIAGNOSTIC METHOD

When TWC performance falls, OSC performance also falls. In the diagnosis, malfunction will be detected with estimation of OSC performance by observing the time and air amount, etc. until the rear oxygen sensor voltage starts to rise after more than predetermined time of deceleration fuel cut has passed.
If the duration of time while the following conditions are met is within the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Oxygen Storage Capacity (OSC) of Catalytic	< 0.2g (0.01oz)

Time needed for diagnosis: Less than 1 second

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0441 EVAP SYSTEM (CPC) INCORRECT PURGE FLOW

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Trouble symptom:
Improper idling
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P0441 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK PURGE CONTROL SOLENOID VALVE.

Operate the purge control solenoid valve using the Subaru Select Monitor.
Note:
For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(STI)>Active Test.

Does the purge control solenoid valve operate?

Yes	Go to 3.
No	Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve.

3. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.

1. Turn the ignition switch to OFF.
2. Make sure that the delivery mode fuse is removed.

Are there holes, cracks, clogging, or disconnection, misconnection of hoses or pipes in evaporative emission control system?

Yes	Repair or replace the hoses or pipes.
No	Repair the poor contact of ECM connector.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of purge flow by the change of Evaporative Leak Check Module pressure sensor output value before/after purge introduction.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9V
Barometric pressure	≥ 75.06 kPa (563 mmHg, 22.2 inHg)
Integrated purge gas amount since engine starting	≥ 10 g (0.35 oz)*
(Duration time of the purge control duty ratio = 0%	≥ 1500ms
Purge control duty ratio from above)	≠ 0%
Ambient air temperature	> −25°C (−13°F)
Time when the second purge valve control is OFF	≥ 1500ms
Time when the evaporative system leak check module switching valve is closed	< 25000ms

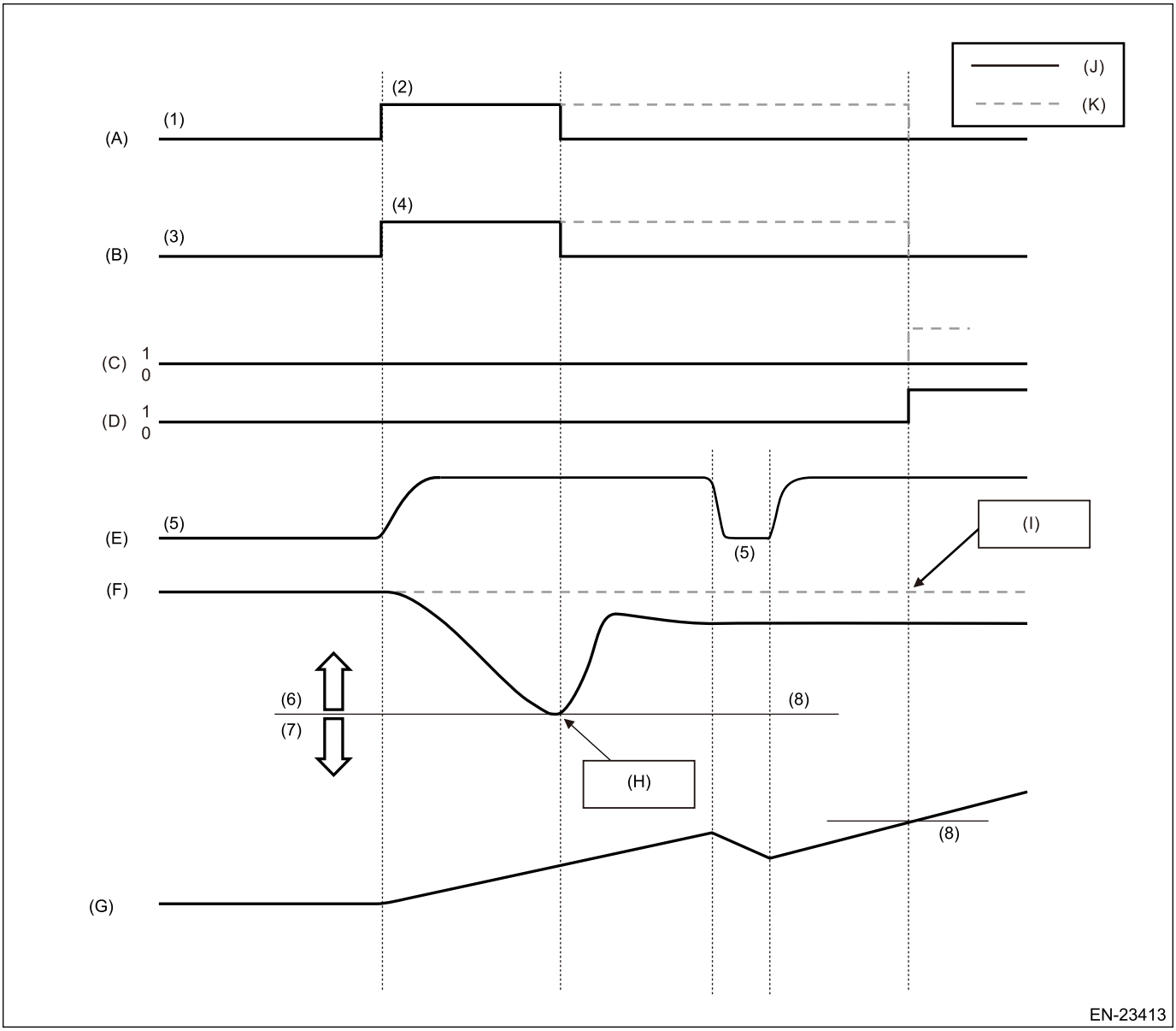
* It is approximately 2 sec per the integration of purge to reach 1g at vehicle speed of 40 MPH.

3. GENERAL DRIVING CYCLE

Perform the diagnosis only once after engine start.

4. DIAGNOSTIC METHOD

Close the Evaporative Leak Check Module switching valve, and close the fuel tank completely, and perform the forced purging. If pressure change amount is −0.4kPa (−3mmHg, −0.1inHg) or less, judge as malfunction of purge flow.



(1) Disable
(2) Enable
(3) Open
(4) Close
(5) 0%
(6) Fail
(7) Pass
(8) Threshold
(A) Monitoring
(B) Evaporative Leak Check Module switching valve
(C) FAIL flag
(D) Numerator
(E) Purge control duty ratio
(F) Evaporative Leak Check Module pressure (gauge)
(G) Integrated value of (purge gas∗1 - the generated evaporative gas∗2)
(H) Pass Judgment
(I) Fail Judgment
(J) Normal
(K) Malfunction

∗1: The purge gas is calculated from the Manifold Absolute Pressure (MAP) and Commanded purge control duty ratio.
∗2: The generated evaporative gas is the value calibrated under the high temperature in which the largest amount of evaporative gas is generated.
Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Evaporative system leak check module pressure (gauge)	> −0.4kPa (−3mmHg, −0.1inHg)
Integrated purge gas amount	≥ 3g (0.11oz)∗

∗ It is approximately 2 sec per the integration of purge to reach 1g at vehicle speed of 40 MPH.

Time needed for diagnosis: Less than 1 second

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK)

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

- Fuel odor
- There is a hole of more than 1 mm (0.04 in) dia. in evaporation system or fuel tank.
- Fuel filler cap loose or lost

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK FUEL FILLER CAP.

Check the fuel filler cap.

1. Turn the ignition switch to OFF.
2. Check the fuel filler cap.

   Note:

   The DTC is stored in memory if fuel filler cap is or was loose or if the cap chain has caught while tightening.

Is the fuel filler cap tightened securely?

Yes	Go to 2.
No	Tighten fuel filler cap securely.

2. CHECK FUEL FILLER CAP.

Check the fuel filler cap.

Is the fuel filler cap genuine?

Yes	Go to 3.
No	Replace with a genuine fuel filler cap.

3. CHECK FUEL FILLER PIPE GASKET.

Check the fuel filler pipe gasket.

Is there any damage to the seal between fuel filler cap and fuel filler pipe?

Yes	Repair or replace the fuel filler cap and fuel filler pipe. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Filler Pipe.
No	Go to 4.

4. CHECK PURGE CONTROL SOLENOID VALVE.

Check air-tightness of the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve>INSPECTION.

Is the check result OK?

Yes	Go to 5.
No	Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve.

5. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.

Check the line of evaporative emission control system.

Are there holes on the evaporation line?

Yes	Repair or replace the evaporation line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Delivery, Return and Evaporation Lines.
No	Go to 6.

6. CHECK CANISTER.

Check the canister.

Are there holes on the canister?

Yes	Replace the canister. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Canister.
No	Go to 7.

7. CHECK LEAK CHECK VALVE ASSEMBLY.

Check the leak check valve assembly.

Are there damage or holes on the leak check valve assembly?

Yes	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.
No	Go to 8.

8. CHECK FUEL TANK.

Warning:
Place "NO OPEN FLAMES" signs near the working area.

1. Remove the fuel tank. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Tank.
2. Check the fuel tank condition.

Are there damage or holes on the fuel tank?

Yes	Repair or replace the fuel tank. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Tank.
No	Go to 9.

9. CHECK ANY OTHER MECHANICAL TROUBLE IN EVAPORATIVE EMISSION CONTROL SYSTEM.

Are there holes, cracks, clogging, or disconnection, misconnection of hoses or pipes in evaporative emission control system?

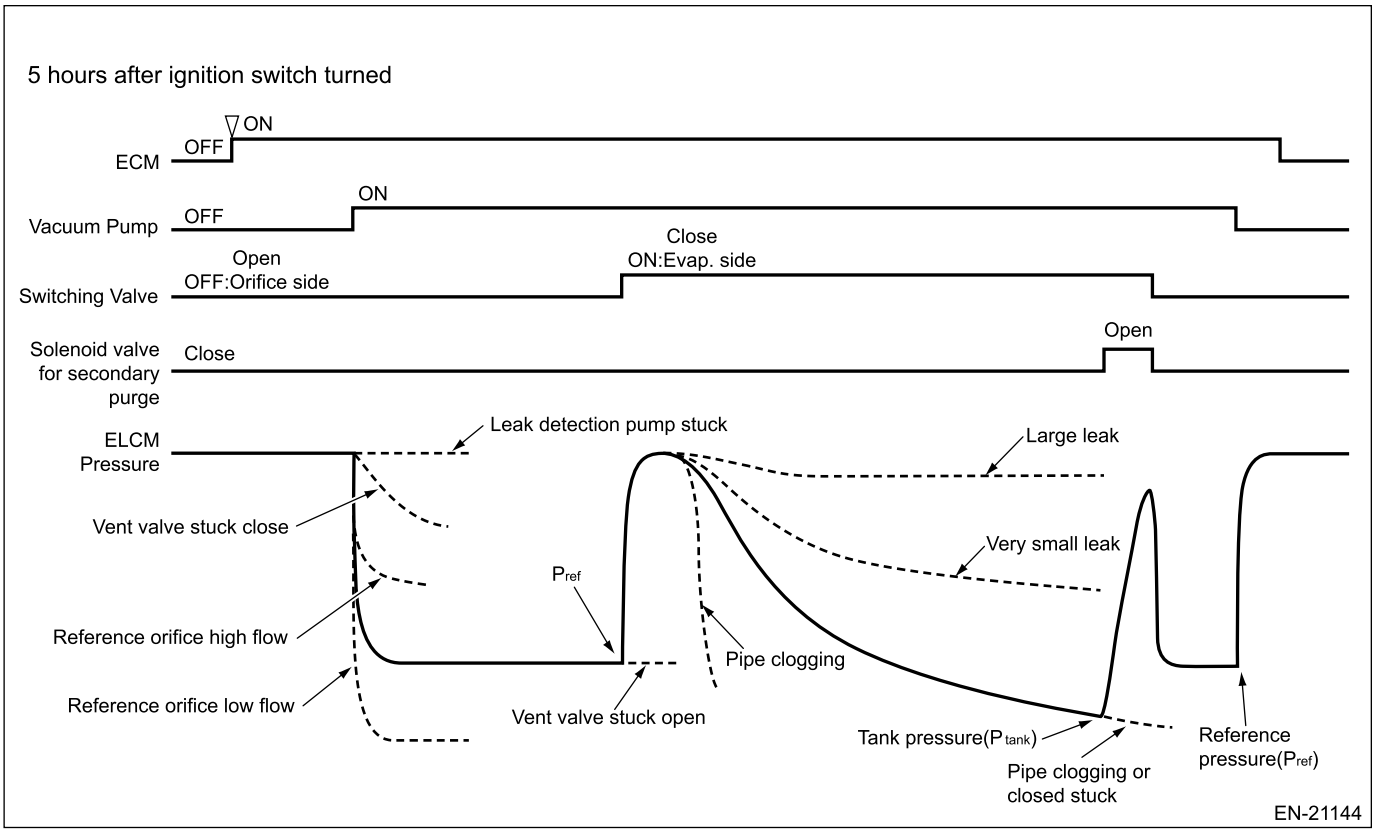
Yes	Repair or replace the hoses or pipes.
No	Repair the poor contact of ECM connector.

1. OUTLINE OF DIAGNOSIS

This diagnosis judges whether the Evaporative Leak Check Module operation is normal or not, and whether the evaporative emission system has leak and clogging or not.
To purge the canister, after driving, perform the five hours soaking after ignition switch OFF in order to stabilize the evaporative gas status. ∗ After 5 or 7 or 9.5 hours passed, ECM is activated by soaking timer, and the leak check is started.
Judges whether the Evaporative Leak Check Module operation is normal or not, by measuring the reference pressure status via reference orifice (0.02 inch orifice). Judge as malfunction if the reference pressure is out of specified range. Then, judge whether there is a leak or not, by comparing the pressure (leak pressure) when the reference pressure and the evaporative emission system are in negative pressure condition. Judge as system leak in the evaporative emission system if the leak pressure is higher than reference pressure. Judge as clogging of pipe if the leak pressure becomes lower than the reference pressure within the specified amount of time.
0.02 inch leak and 0.04 inch leak can be distinguished by measuring the leak pressure.
The diagnosis results are stored inside ECM until the engine is started again.
∗: When the test conditions are not met in 5 hours, perform diagnosis at elapsed time of 7 hours. When the test conditions are not met in 7 hours, perform diagnosis at elapsed time of 9.5 hours.

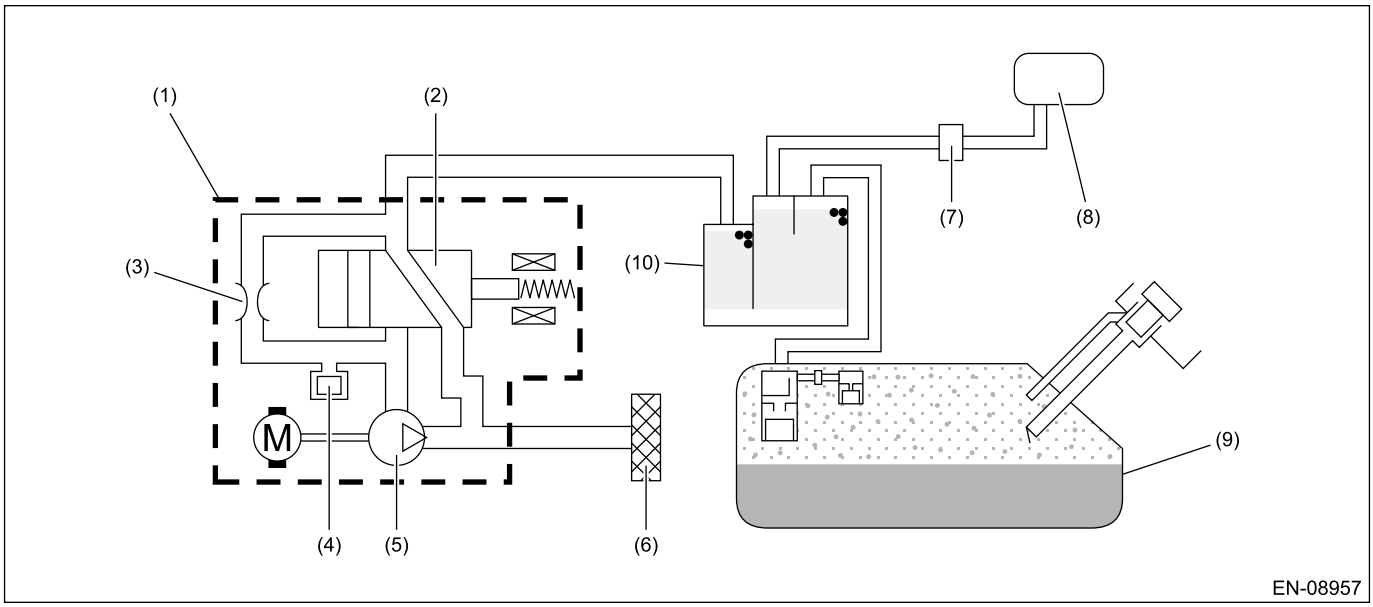
Diagnostic item	
Evaporative Leak Check Module system (Evaporative Leak Check Module main body)	Vacuum pump stuck Switching valve stuck to open Switching valve stuck to close Reference orifice flow large Reference orifice flow small
Leak check	Large leak • 0.04 inch leak • Fuel cap loose • Fuel cap off • System malfunction
	Very small leak • 0.02 inch leak
Clogging of pipe	—

OUTLINE OF DIAGNOSIS



2. COMPONENT DESCRIPTION

Evaporative Leak Check Module consists of the pressure sensor, the reference orifice (diameter of 0.02 inch), the vacuum pump which introduces the negative pressure into evaporative emission system, and the switching valve which switches the passage to introduce the negative pressure.



(1) Evaporative Leak Check Module
(2) Switching valve
(5) Vacuum pump
(6) Drain filter
(9) Fuel tank
(10) Canister

(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(7) Purge control solenoid valve
(8) Intake manifold

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥10.9V
Barometric pressure	≥75.1kPa (563mmHg, 22.2inHg)
Activation of soaking timer	Completed
Intake air temperature	≥4.4°C (39.9°F)
Engine coolant temperature	≥4.4°C (39.9°F) and < 45°C (113°F)
Accumulated purge amount during previous driving cycle	≥ Value of Map 1

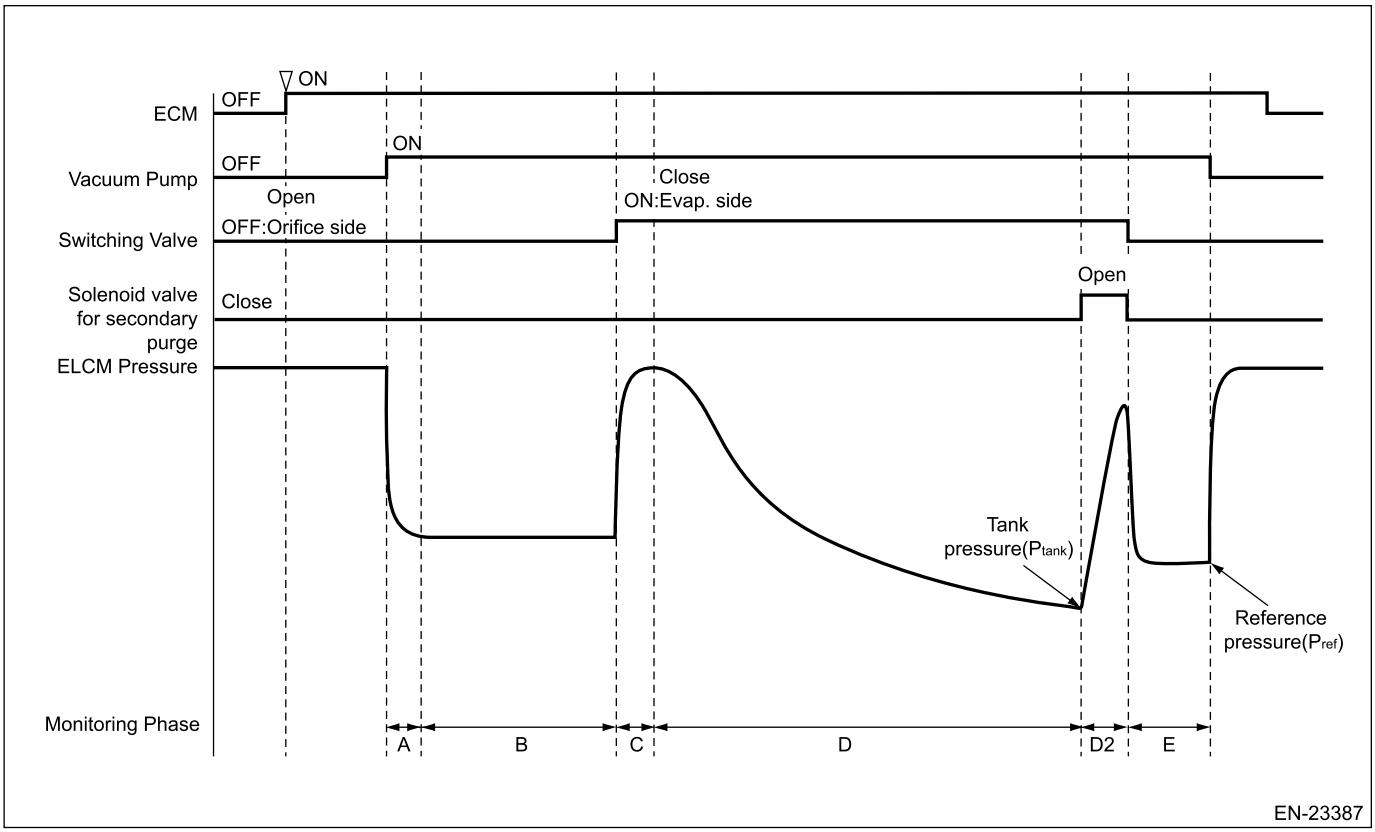
Map 1

Engine coolant temperature when ECM is activated after soak time °C (°F)	0 (32)	30 (86)	35 (95)	40 (104)	45 (113)
Accumulated purge amount during previous driving cycle (g (oz))	128 (4.51)	128 (4.51)	384 (13.54)	640 (22.57)	896 (31.6)

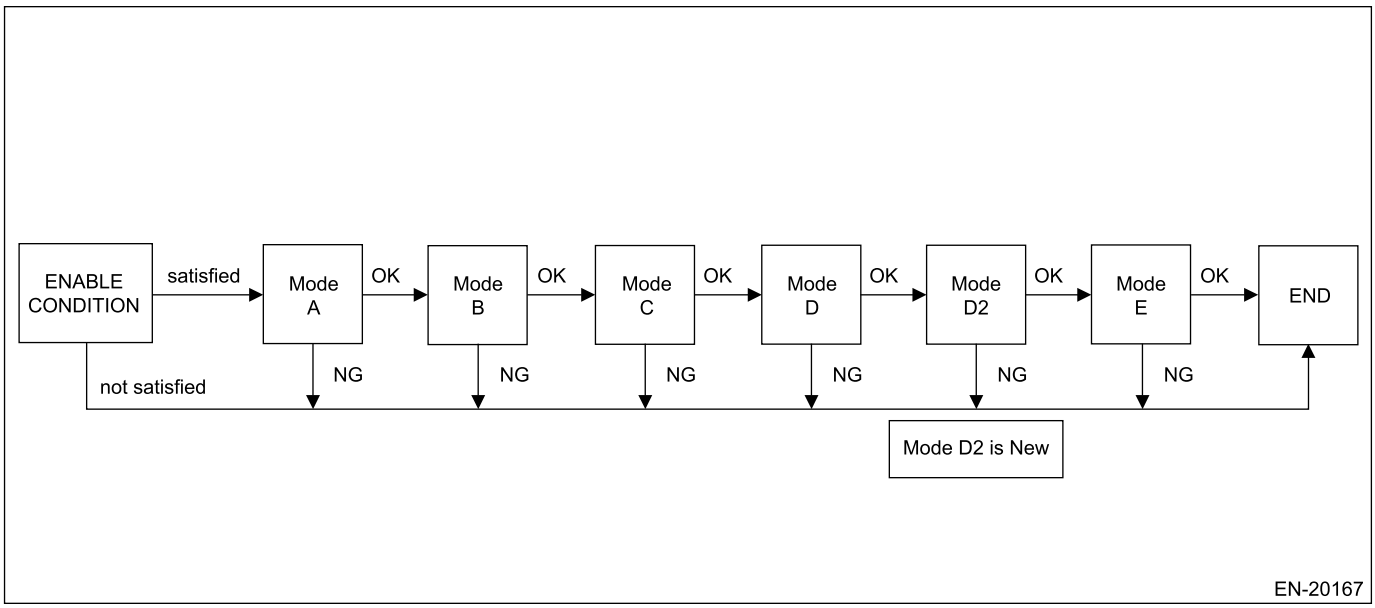
4. GENERAL DRIVING CYCLE

Perform the diagnosis only once when 5 or 7 or 9.5 hours has passed after ignition switch is OFF. For more detail, refer to "OUTLINE OF DIAGNOSIS". Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK) > OUTLINE OF DIAGNOSIS.

5. DIAGNOSTIC METHOD



Mode	Explanation of Mode	Diagnosis Period
A	Vacuum pump operation confirmation and characteristics stability	7 s
B	Measurement of reference pressure for setting the target negative pressure	350 s
C	Switching valve operation confirmation	12 s
D	Pipe clogging diagnosis and leak pressure measurement	900 s
D2	Pipe clogging diagnosis of high-pressure line	60 s
E	Reference pressure measurement for judgment	50 s



Mode A (Vacuum pump operation confirmation and characteristics stability)

Purpose: Detect the vacuum pump operation trouble.

Judge as NG when the following conditions are established.

Judge as OK if the following conditions are not established, and warm up for five minutes to stabilize the vacuum pump characteristics.

Judgment value

Malfunction Criteria	Threshold Value	DTC
Pressure sensor output value	> −224Pa (−1.68mmHg, −0.1inHg)	P2404

Mode B (Measurement of reference pressure for setting the target negative pressure)

Judgment 1

Purpose: Judge the reference pressure stability.

Judgment 2

Purpose: Judge whether the reference pressure is within the normal range, and detect the vacuum pump and orifice malfunctions.

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value	DTC
Judgment 1 |Pressure sensor maximum output value − Pressure sensor minimum output value| or Judgment 2 Reference pressure for setting the target negative pressure or Judgment 3	 > 314Pa (2.355mmHg, 0.1inHg) < Value of Map 2	P2404

Malfunction Criteria	Threshold Value	DTC
Reference pressure for judgment	> Value of Map 3	

Map 2

Barometric pressure (kPa (mmHg, inHg))	70 (525, 20.7)	80 (600, 23.6)	90 (675, 26.6)	100 (750, 29.5)
Reference pressure for setting the target negative pressure (kPa (mmHg, inHg))	−4 (−29.79, −1.2)	−4.1 (−30.593, −1.2)	−4.2 (−31.395, −1.2)	−4.3 (−32.19, −1.3)

Map 3

Barometric pressure (kPa (mmHg, inHg))	70 (525, 20.7)	80 (600, 23.6)	90 (675, 26.6)	100 (750, 29.5)
Reference pressure for setting the target negative pressure (kPa (mmHg, inHg))	−0.9 (−7.065, −0.3)	−1 (−7.86, −0.3)	−1.2 (−8.663, −0.3)	−1.3 (−9.465, −0.4)

Mode C (Switching valve operation confirmation)

Purpose: Measure the pressure increase when switching valve is changed from open to close, and detect the stuck to open/close malfunctions of the switching valve.

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value	DTC
Pressure sensor output value − Reference pressure for setting the target negative pressure	< 224Pa (1.68mmHg, 0.1inHg)	P2404

Mode D (Clogging of pipe diagnosis and leak pressure measurement)

1. **Clogging of pipe**

   Purpose: Measure the time required for the evaporative emission system to reach the target negative pressure by the vacuum pump, and detect the clogging of pipe trouble.

   Judge as clogging of pipe malfunction if the evaporative emission system reaches to the target negative pressure within the specified time.

2. **Leak pressure measurement**

   Purpose: Measure the pressure (leak pressure) when the evaporative emission system becomes the negative pressure by the vacuum pump.

   Store the pressure as a leak pressure while the following conditions are met.

Phase D

Judgment value

Malfunction Criteria	Threshold Value	DTC
Phase D		
Time for reaching the target	≤27000ms	P1451
Phase D2		

Malfunction Criteria	Threshold Value	DTC
Reference pressure for setting the target negative pressure	< −0.7kPa (−5mmHg, −0.2inHg)	P04AF
<Large leak (0.04 inch)>		P0455
Leak pressure	≥ Value of Map 6	
<Very small leak (0.02 inch)> Leak pressure	> Reference pressure of 0.018 inch (Pa) and < Value of Map 6	P0456

Map 6

Reference pressure (Pa)	**−4856**	**−4000**	**−2750**	**−1500**	**−824**
Threshold Value (Pa)	−1785	−1463	−991	−520	−265

Formula for threshold value = Reference pressure ×0.377−−0.341mmHg
Time needed for diagnosis: 24 min

Mode E (Measurement of reference pressure for judgment)
Judgment 1
Purpose: Judge the reference pressure stability.
Judge as NG when the following conditions are established.
Judgment 2
Purpose: Judge whether the reference pressure is within the normal range, and detect the vacuum pump and orifice malfunctions.
Judge the vacuum pump performance stability.
Judge as NG when the following conditions are established.
Judgment 3
Purpose: Judge the presence of evaporative emission system leak.
Judge as NG when the following conditions are established.
Judgment value

Malfunction Criteria	Threshold Value	DTC
Judgment 1 |Pressure sensor maximum output value − Pressure sensor minimum output value| or Judgment 2	> 314Pa (2.355mmHg, 0.1inHg)	P2404
Reference pressure for judgment	< Value of Map 4 or > Value of Map 5	P2404

Malfunction Criteria	Threshold Value	DTC
or Judgment 3 |Reference pressure for setting the target negative pressure − Reference pressure for judgment|	> 941Pa (7.058mmHg, 0.3inHg)	P2404

Map 4

Barometric pressure (kPa (mmHg, inHg)	**70 (525, 20.7)**	**80 (600, 23.6)**	**90 (675, 26.6)**	**100 (750, 29.5)**
Reference pressure for judgment (kPa (mmHg, inHg))	−4.5 (−34.02, −1.3)	−4.6 (−34.815, −1.4)	−4.7 (−35.618, −1.4)	−4.9 (−36.42, −1.4)

Map 5

Barometric pressure (kPa (mmHg, inHg))	**70 (525, 20.7)**	**80 (600, 23.6)**	**90 (675, 26.6)**	**100 (750, 29.5)**
Reference pressure for judgment (kPa (mmHg, inHg))	−0.8 (−6.18, −0.2)	−0.9 (−6.983, −0.3)	−1 (−7.785, −0.3)	−1.1 (−8.58, −0.3)

Time needed for diagnosis: Approx. 24 min

Malfunction will be confirmed at next engine start.

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0456 EVAP SYSTEM (CPC) LEAK DETECTED (VERY SMALL LEAK)

Note:
For the diagnostic procedure, refer to DTC P0455. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK).

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0455. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK).

DTC P0458 EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT LOW

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

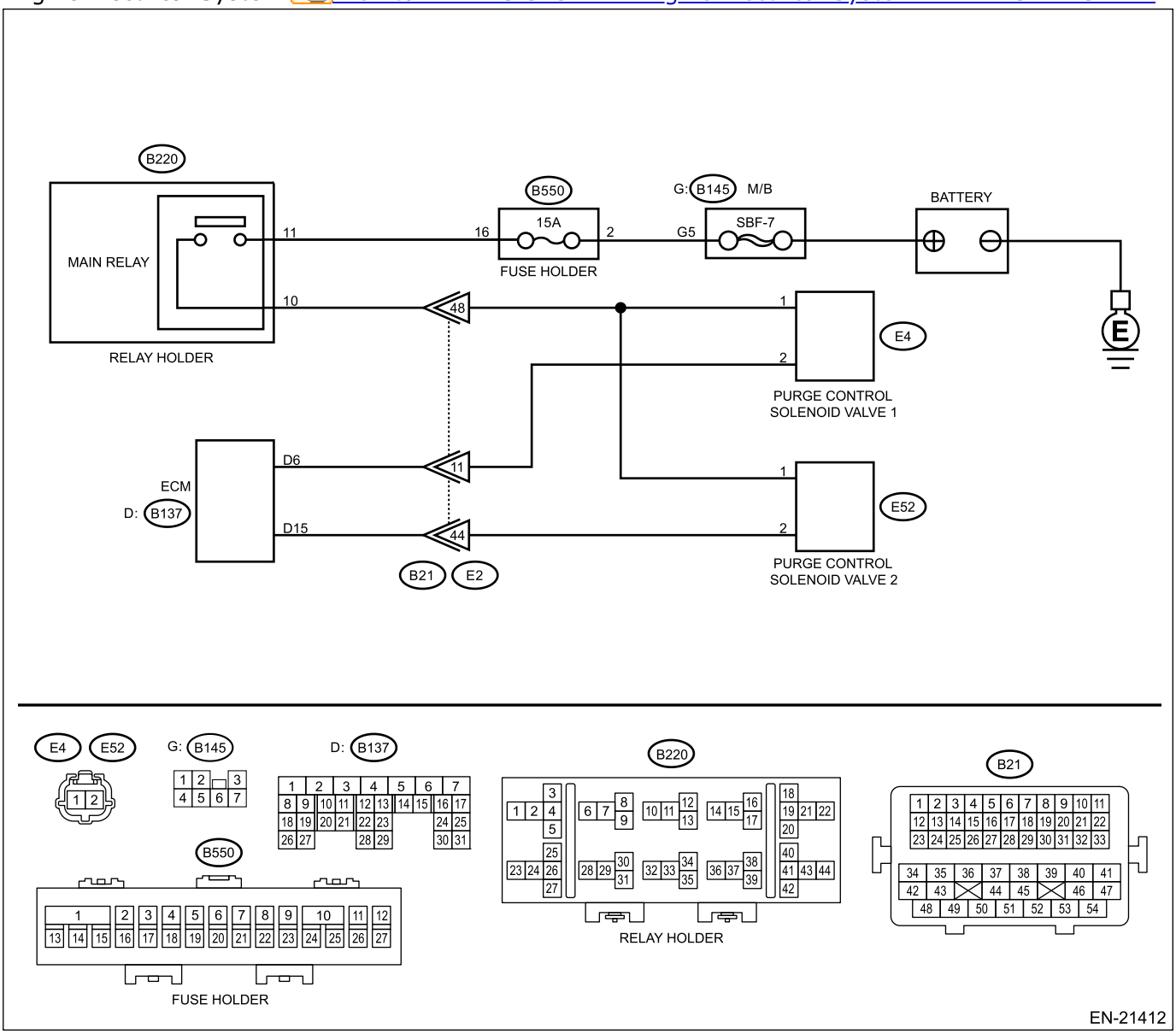
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK OUTPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B137) No. 6 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Go to 3.

2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

Yes	Repair the poor contact of ECM connector.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary open or short circuit of harness or temporary poor contact of connector may be the cause.**

3. CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE CONNECTOR.

Measure the voltage between purge control solenoid valve connector and engine ground.
Connector & terminal
(E4) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 4.
No	Repair the power supply circuit.

4. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the purge control solenoid valve.
4. Measure the resistance between the purge control solenoid valve connector and engine ground.
   Connector & terminal
   (E4) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between ECM connector and purge control solenoid valve connector.

5. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR.

Measure the resistance of harness between ECM connector and purge control solenoid valve connector.

Connector & terminal
(B137) No. 6 — (E4) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 6.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and purge control solenoid valve connector** • **Poor contact of coupling connector**

6. CHECK PURGE CONTROL SOLENOID VALVE.

1. Remove the purge control solenoid valve.
2. Check the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve>INSPECTION.

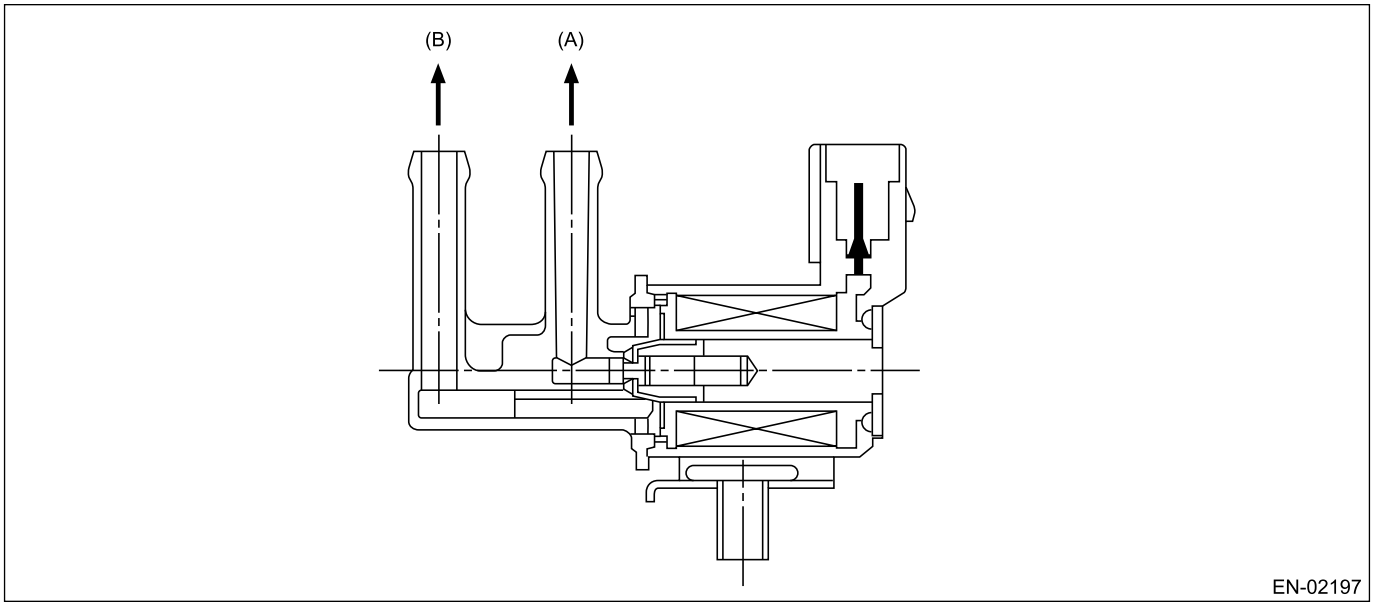
Is the check result OK?

Yes	Repair the poor contact of purge control solenoid valve connector.
No	Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the purge control solenoid valve.
Judge as NG when the ECM output level differs from the actual terminal level.

2. COMPONENT DESCRIPTION



(A) To canister (B) To intake manifold

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Duty ratio of "ON"	< 0.75

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after the conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≤ Battery voltage × 0.34

time needed for diagnosis: 2500ms

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0459 EVAP SYSTEM (CPC) PURGE CONTROL VALVE "A" CIRCUIT HIGH

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

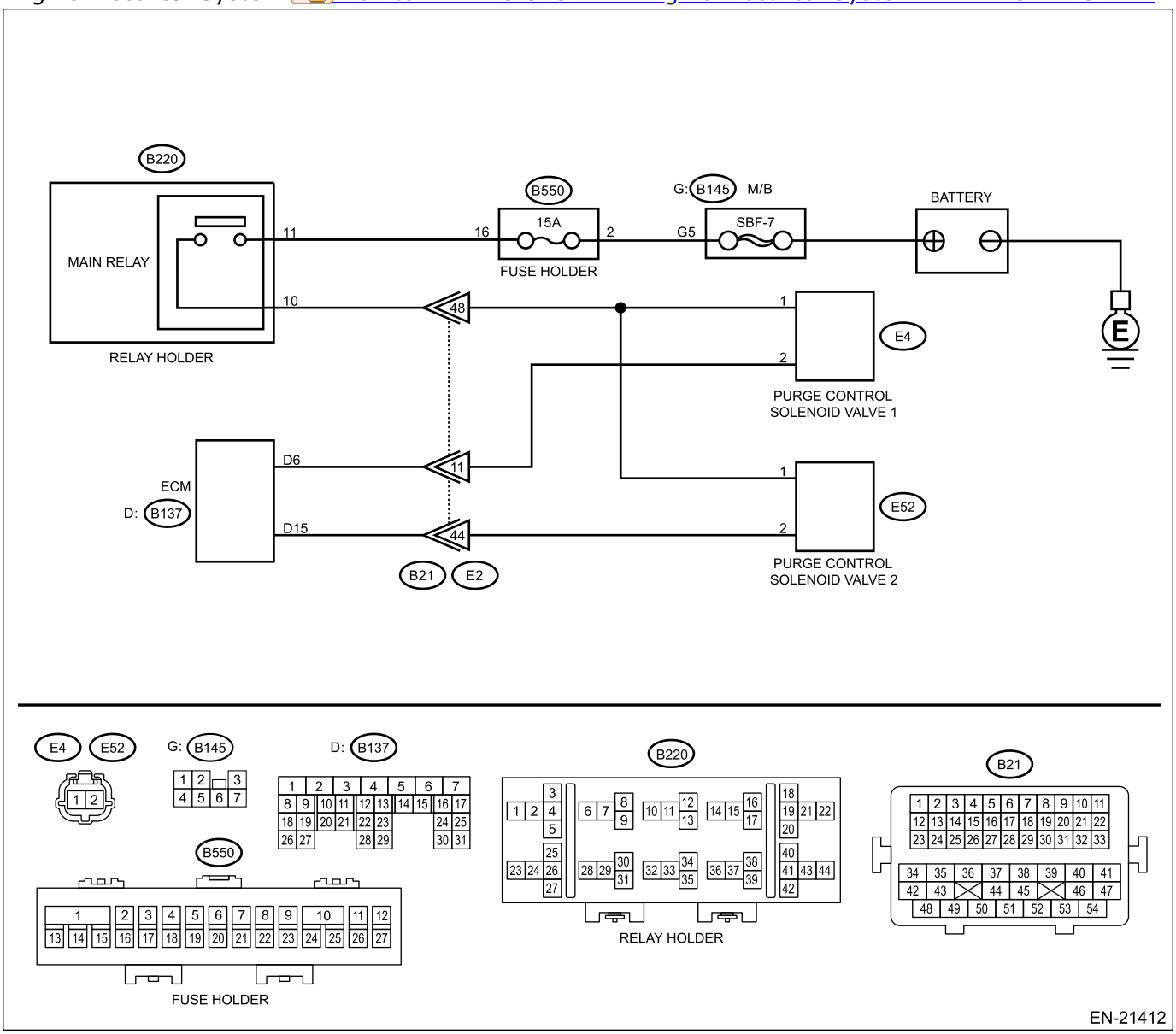
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the purge control solenoid valve.
4. Turn the ignition switch to ON.
5. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B137) No. 6 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and purge control solenoid valve connector.
No	Go to 2.

2. CHECK PURGE CONTROL SOLENOID VALVE.

1. Turn the ignition switch to OFF.
2. Check the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve>INSPECTION.

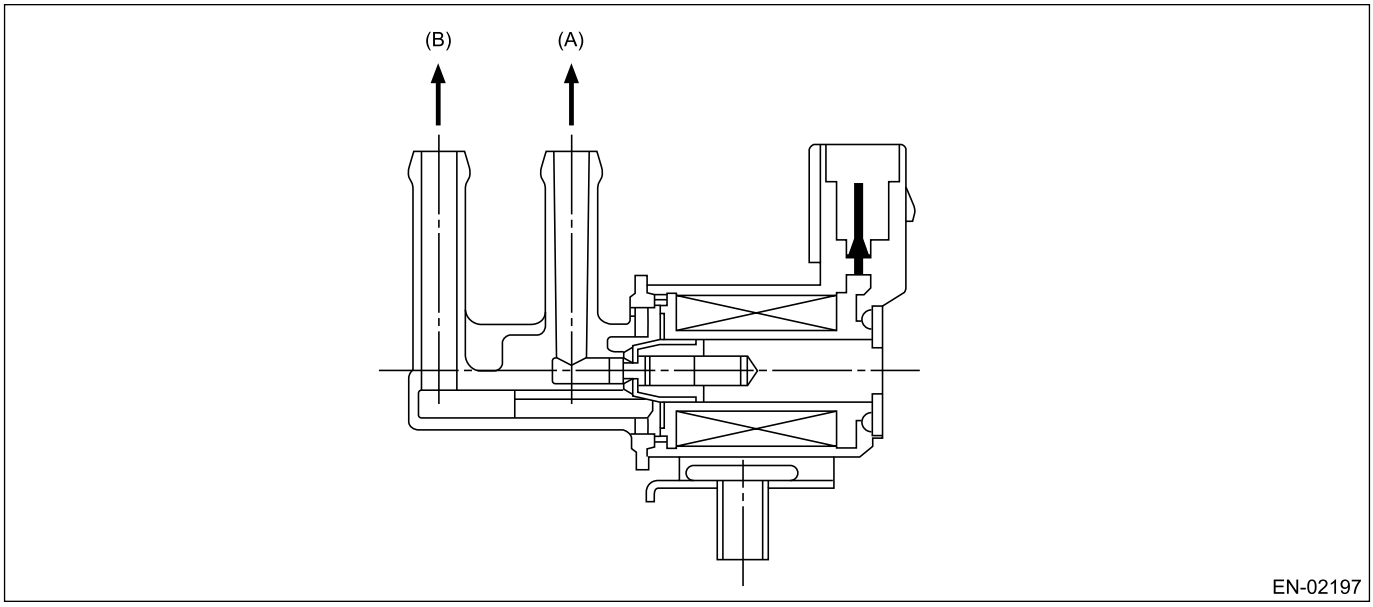
Is the check result OK?

Yes	Repair the poor contact of ECM connector.
No	Replace the purge control solenoid valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the purge control solenoid valve.
Judge as NG when the ECM output level differs from the actual terminal level.

2. COMPONENT DESCRIPTION



(A) To canister (B) To intake manifold

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Duty ratio of "ON"	≥ 0.25

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after the conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output current	≥ 12 A

time needed for diagnosis: 2500ms

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0461 FUEL LEVEL SENSOR "A" CIRCUIT RANGE/PERFORMANCE

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

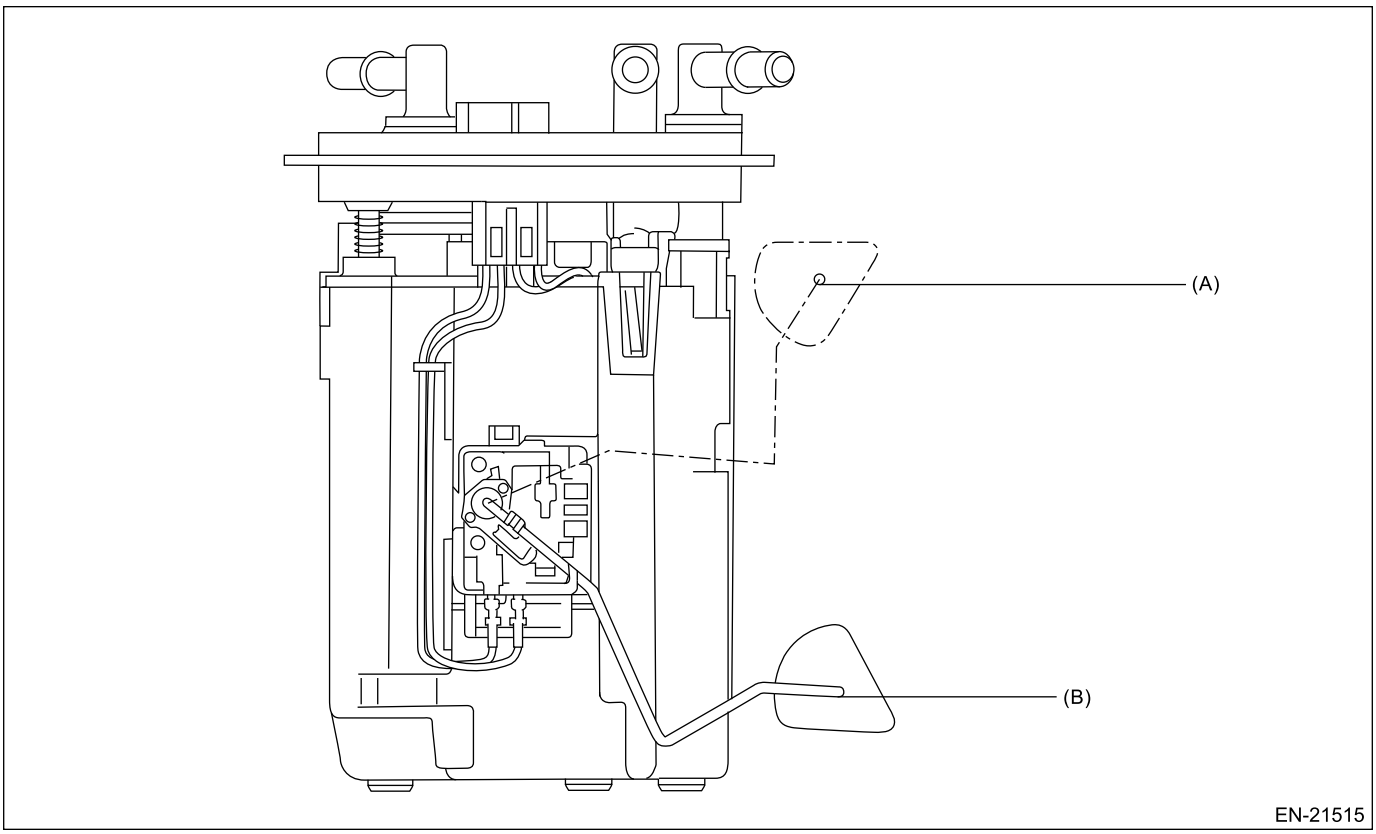
Is DTC other than P0461 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Replace the fuel level sensor and fuel sub level sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Level Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Sub Level Sensor.

1. OUTLINE OF DIAGNOSIS

Detect malfunctions of the fuel level sensor output property.
If the fuel level does not vary in a particular driving condition / engine condition where it should, judge as NG.

2. COMPONENT DESCRIPTION



(A) FULL 8.7 Ω (B) EMPTY 139.1 Ω

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	≥ 5000ms
Accumulated amount of intake air	≥ 82687.5g (2916.39oz)

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Max. − min. values of fuel level output	< 2.6L (0.69US gal, 0.57Imp gal)

Time needed for diagnosis: Less than 1 second

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

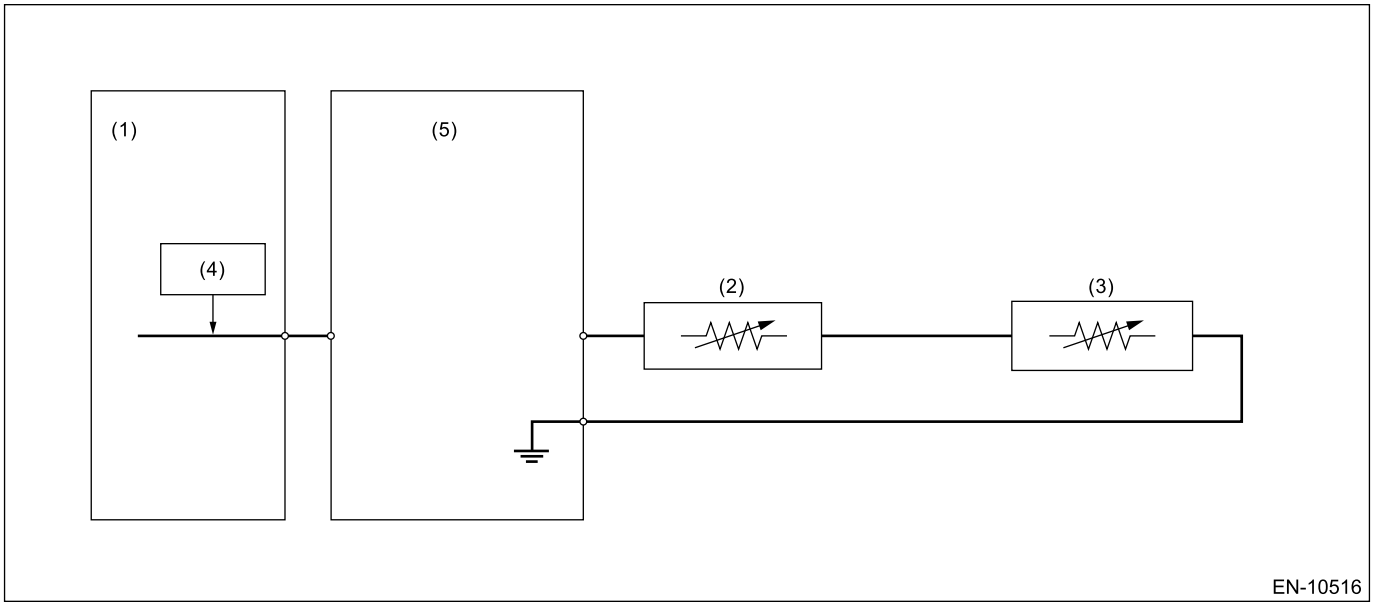
DTC P0462 FUEL LEVEL SENSOR "A" CIRCUIT LOW

Note:
For the diagnostic procedure, refer to DTC P0463. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0463 FUEL LEVEL SENSOR "A" CIRCUIT HIGH.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of fuel level sensor. Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Fuel sub level sensor
(3) Fuel level sensor
(4) Detecting circuit
(5) Combination meter

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	≥ 3000ms

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< 2.211V

time needed for diagnosis: 2500ms

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0463 FUEL LEVEL SENSOR "A" CIRCUIT HIGH

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

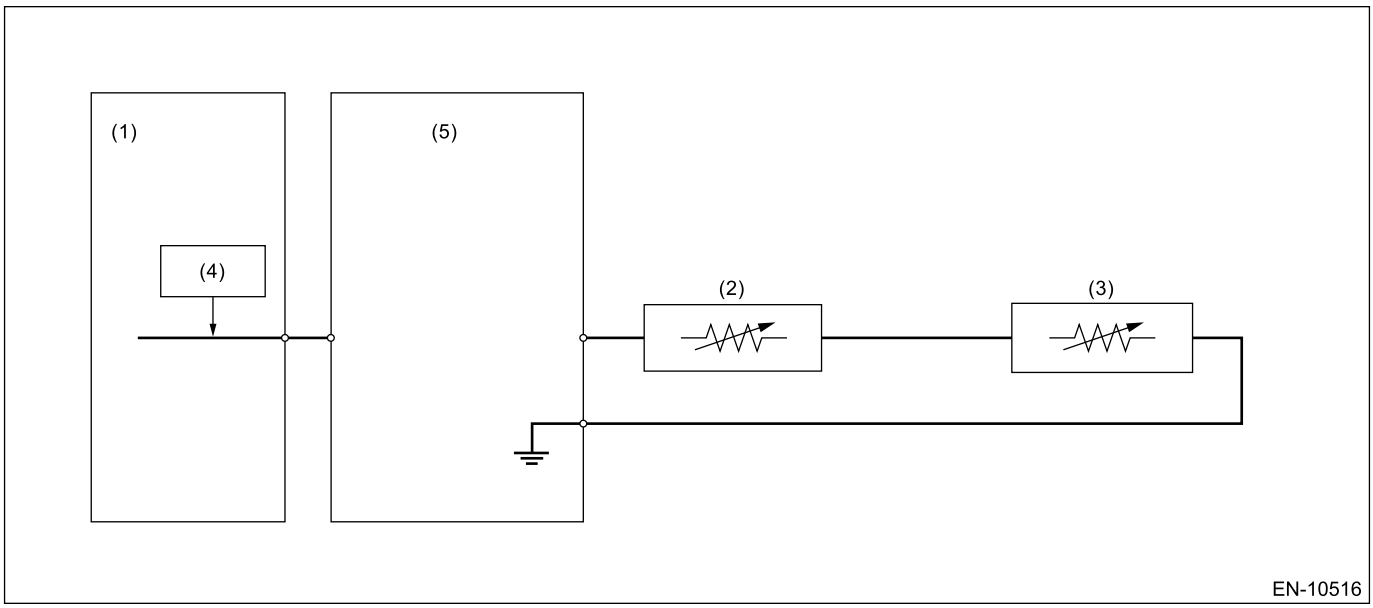
Are DTC P0462 or P0463 displayed? (Current malfunction)

Yes	Check the combination meter. Ref. to COMBINATION METER (DIAGNOSTICS)>Basic Diagnostic Procedure.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of fuel level sensor. Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Fuel sub level sensor
(3) Fuel level sensor
(4) Detecting circuit
(5) Combination meter

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≥ 12V

time needed for diagnosis: 1000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P04AC EVAP SYSTEM (CPC) PURGE CONTROL VALVE "B" CIRCUIT LOW

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

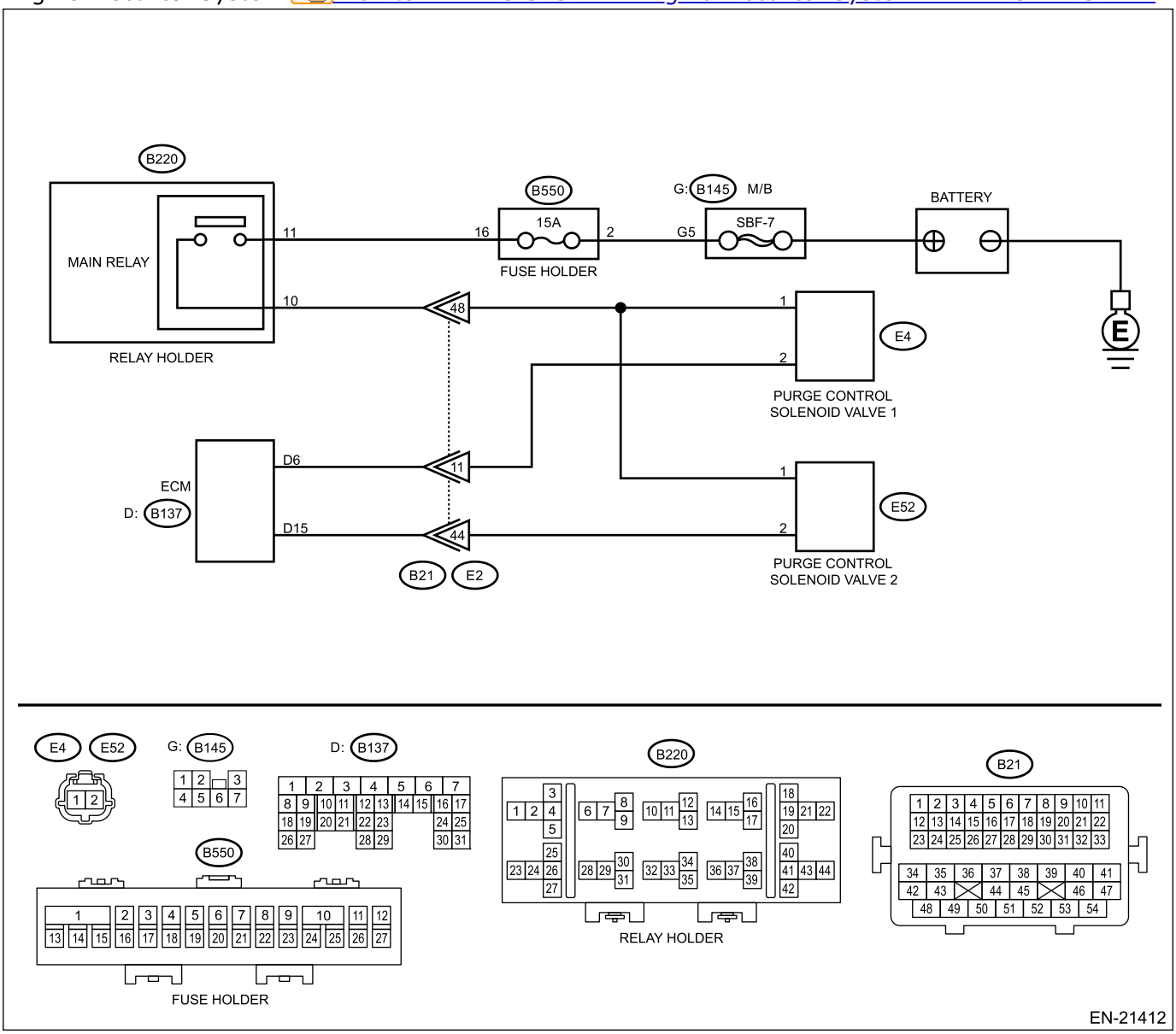
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK OUTPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B137) No. 15 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Go to 3.

2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

Yes	Repair the poor contact of ECM connector.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary open or short circuit of harness or temporary poor contact of connector may be the cause.**

3. CHECK POWER SUPPLY TO PURGE CONTROL SOLENOID VALVE 2 CONNECTOR.

Measure the voltage between purge control solenoid valve 2 connector and engine ground.
Connector & terminal
(E52) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 4.
No	Repair the power supply circuit.

4. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE 2 CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from purge control solenoid valve 2.
4. Measure the resistance between the purge control solenoid valve 2 connector and engine ground.

Connector & terminal

(E52) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the ground short circuit of harness between ECM connector and purge control solenoid valve 2 connector.

5. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE 2 CONNECTOR.

Measure the resistance of harness between ECM connector and purge control solenoid valve 2 connector.

Connector & terminal

(B137) No. 15 — (E52) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 6.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and purge control solenoid valve 2 connector** • **Poor contact of coupling connector**

6. CHECK PURGE CONTROL SOLENOID VALVE 2.

1. Remove the purge control solenoid valve 2.
2. Check the purge control solenoid valve 2. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve>INSPECTION.

Is the check result OK?

Yes	Repair the poor contact of the purge control solenoid valve 2 connector.
No	Replace the purge control solenoid valve 2. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the purge control solenoid valve 2.
Judge as NG when the ECM output level differs from the actual terminal level.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage Purge control solenoid valve 2 drive signal	≥ 10.9 V OFF

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≤ Battery voltage × 0.34 V

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P04AD EVAP SYSTEM (CPC) PURGE CONTROL VALVE "B" CIRCUIT HIGH

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

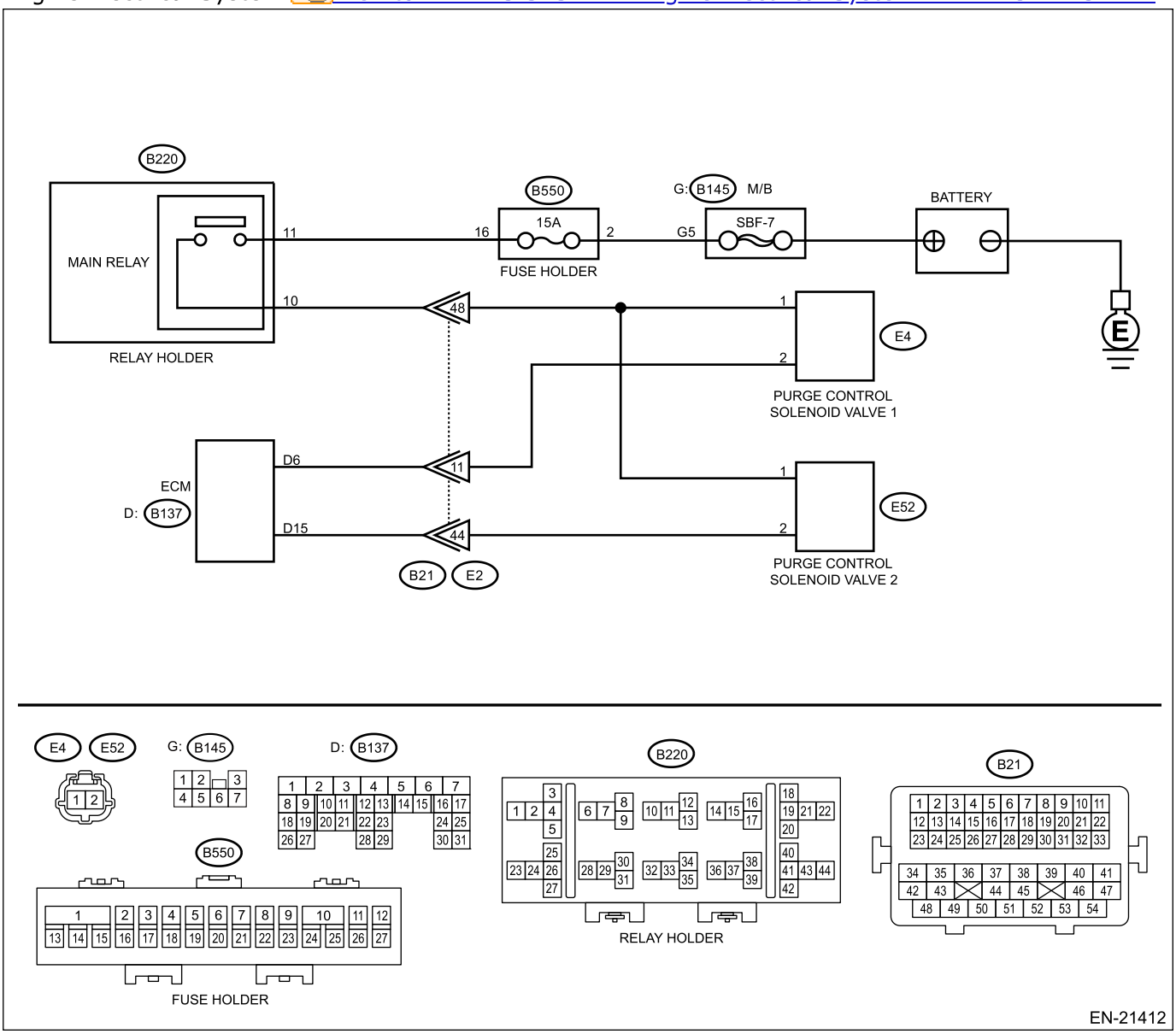
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND PURGE CONTROL SOLENOID VALVE 2 CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from purge control solenoid valve 2.
4. Turn the ignition switch to ON.
5. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B137) No. 15 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and purge control solenoid valve 2 connector.
No	Go to 2.

2. CHECK PURGE CONTROL SOLENOID VALVE 2.

1. Turn the ignition switch to OFF.
2. Check the purge control solenoid valve 2. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve>INSPECTION.

Is the check result OK?

Yes	Repair the poor contact of ECM connector.
No	Replace the purge control solenoid valve 2. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the purge control solenoid valve 2.
Judge as NG when the ECM output level differs from the actual terminal level.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage Purge control solenoid valve 2 drive signal	≥ 10.9 V ON

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output current	≥ 12 A

time needed for diagnosis: 2500ms

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P04AF EVAP SYSTEM PURGE CONTROL VALVE (CPC) "B" STUCK CLOSED

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK BETWEEN CANISTER AND PURGE CONTROL VALVE 2.

Check the piping between the canister and the purge control valve 2.

Is there clogging in the piping between the canister and the purge control valve 2?

Yes	Repair or replace the piping between the canister and the purge control valve 2. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Delivery, Return and Evaporation Lines.
No	Go to 2.

2. CHECK BETWEEN CANISTER AND PURGE CONTROL VALVE 2.

Check the piping between the canister and the purge control valve 2.

Is there closed stuck state in the piping between the canister and the purge control valve 2?

Yes	Repair or replace the purge control valve 2. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve.
No	Go to 3.

3. CHECK PIPING BETWEEN PURGE CONTROL VALVE 2 AND TURBOCHARGER.

Check the piping between the purge control valve 2 and the turbocharger.

Is there clogging in the piping between the purge control valve 2 and the turbocharger?

Yes	Repair or replace the piping between the purge control valve 2 and the turbocharger. Ref. to INTAKE (INDUCTION)(STI)>Turbocharger.
No	Go to 4.

4. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM.

Perform drive cycle I. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle>PROCEDURE > DRIVE CYCLE I.

Is DTC P04AF displayed on the display?

Yes	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.
No	End.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0455. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK).

DTC P04DB CRANKCASE VENTILATION SYSTEM (PCV) DISCONNECTED

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

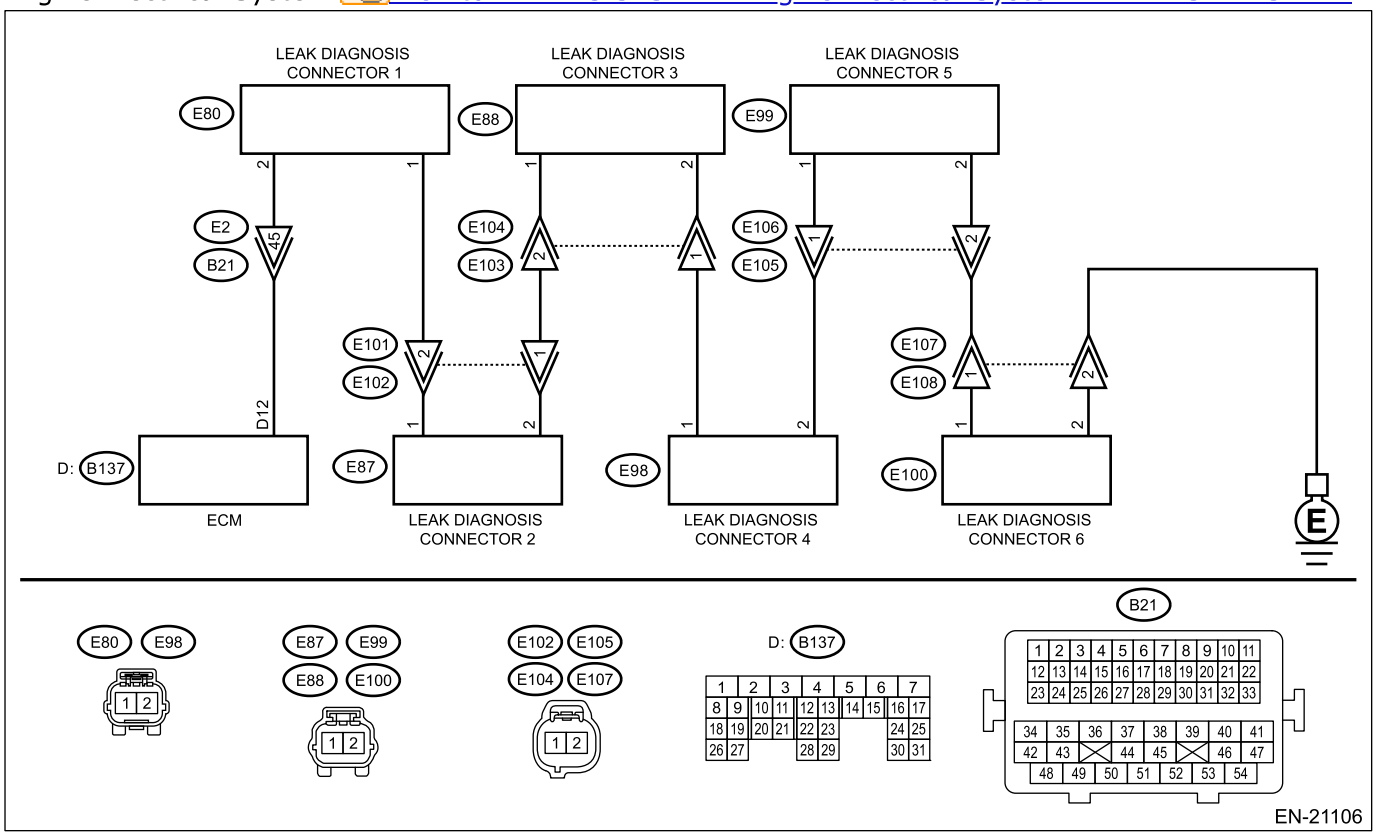
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK BLOW-BY HOSE.

Check the blow-by hose condition.

Is there any disconnection or crack in blow-by hose?

Yes	Install or replace the blow-by hose.
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND PCV HOSE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the PCV hose assembly.
4. Measure the resistance of harness between ECM connector and PCV hose assembly connector.

Connector & terminal

(B137) No. 12 — (E80) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and PCV hose assembly connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND PCV HOSE ASSEMBLY CONNECTOR.

Measure the resistance between PCV hose assembly connector and chassis ground.

Connector & terminal

(B137) No. 12 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 4.
No	Repair the short circuit to ground in harness between ECM connector and PCV hose assembly connector.

4. CHECK HARNESS BETWEEN LEAK DIAGNOSIS CONNECTORS.

Measure the resistance of harness between each of leak diagnosis connector.

Connector & terminal

(E80) No. 1 — (E87) No. 1:
(E87) No. 2 — (E88) No. 1:
(E88) No. 2 — (E98) No. 1:
(E98) No. 2 — (E99) No. 1:
(E99) No. 2 — (E100) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 5.
No	Repair the open circuit in the wiring harness between leak diagnosis connectors.

5. CHECK GROUND CIRCUIT OF PCV HOSE ASSEMBLY.

Measure the resistance of harness between PCV hose assembly connector and engine ground.

Connector & terminal

(E87) No. 2 — Engine ground:

Is the resistance less than 5 Ω?

Yes	Go to 6.
No	Repair the open circuit in harness between PCV hose assembly connector and engine ground.

6. CHECK PCV HOSE ASSEMBLY.

Measure the resistance between terminals of each leak diagnosis connector.

Terminals

No. 1 — No. 2:

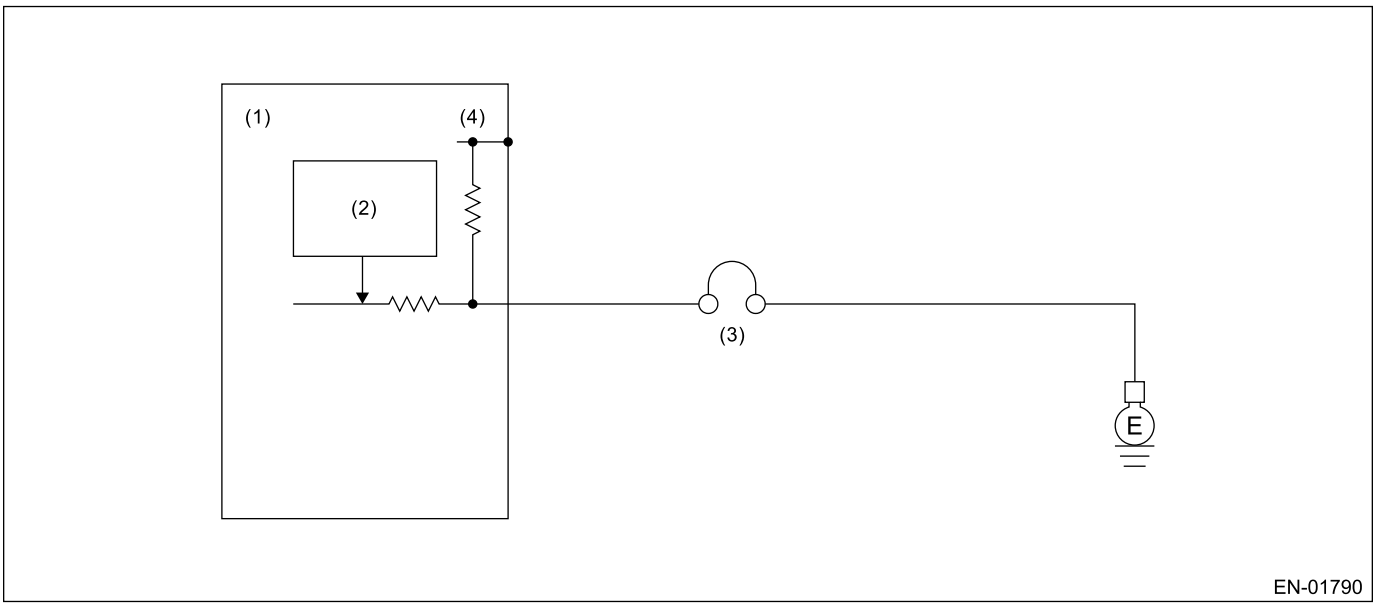
Is the resistance less than 1 Ω at all measurement?

Yes	Repair the poor contact of ECM and PCV hose assembly connector.
No	Replace the PCV hose assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>PCV Hose Assembly.

1. OUTLINE OF DIAGNOSIS

Detect the blow-by hose disconnection abnormality.
Judge as NG when the diagnosis terminal voltage is high.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM) (3) PCV diagnosis connector (4) 5 V
(2) Detecting circuit

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Positive crankcase ventilation diagnosis voltage	≥ 5.9 V

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P04F0 EVAP SYSTEM HIGH PRESSURE PURGE LINE (CPC2) PERFORMANCE

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Trouble symptom:
Improper idling
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P04F0 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK PIPING BETWEEN PURGE CONTROL VALVE 2 AND TURBOCHARGER.

Check the piping between the purge control valve 2 and the turbocharger.

Is there dislocation of the piping between the purge control valve 2 and the turbocharger?

Yes	Repair or replace the piping between the purge control valve 2 and the turbocharger. Ref. to INTAKE (INDUCTION)(STI)>Turbocharger.
No	Go to 3.

3. CHECK PIPING BETWEEN PURGE CONTROL VALVE 2 AND TURBOCHARGER.

Check the piping between the purge control valve 2 and the turbocharger.

Is there clogging in the piping between the purge control valve 2 and the turbocharger?

Yes	Repair or replace the piping between the purge control valve 2 and the turbocharger. Ref. to INTAKE (INDUCTION)(STI)>Turbocharger.
No	Go to 4.

4. CHECK PURGE CONTROL VALVE 2.

Check the purge control valve 2.

Is there closed or open stuck state in the purge control valve 2?

Yes	Repair or replace the purge control valve 2 or leak check valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.
No	Go to 5.

5. CHECK PURGE CONTROL VALVE 1.

Check the main body of the purge control valve 1.

Is there any leakage in the main body of the purge control valve 1?

Yes	Repair or replace the purge control valve 1. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Purge Control Solenoid Valve.
No	Go to 6.

6. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM LINE.

1. Turn the ignition switch to OFF.
2. Make sure that the delivery mode fuse is removed.

Are there holes, cracks, clogging, or disconnection, misconnection of hoses or pipes in evaporative emission control system?

Yes	Repair or replace the hoses or pipes.
No	Go to 7.

7. CHECK VACUUM PUMP OPERATION OF LEAK CHECK VALVE ASSEMBLY.

Check the vacuum pump operation of the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly>INSPECTION.

Does the vacuum pump operate?

Yes	Go to 8.
No	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.

8. CHECK SWITCHING VALVE OPERATION OF LEAK CHECK VALVE ASSEMBLY.

Check the switching valve operation of the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly>INSPECTION.

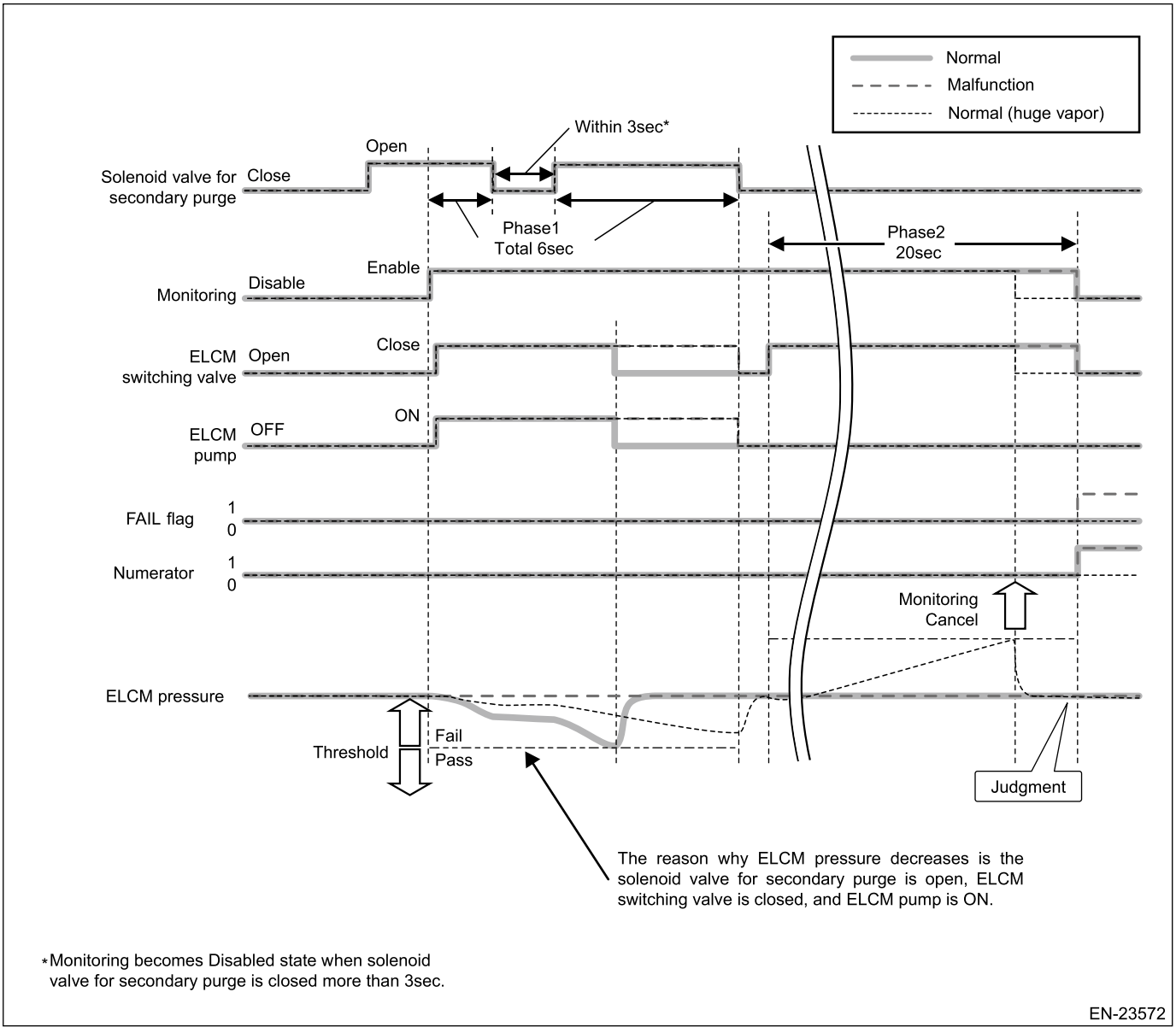
Does the switching valve operate?

Yes	End.
No	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.

1. OUTLINE OF DIAGNOSIS

Monitor Method

This monitor intrusively performs a functional check to detect incorrect purge flow when the engine is running in very high boost conditions.
Theory of operation: At very high boost conditions, the pressure drop caused by the air filter creates a slight vacuum in the high pressure purge line. Refer to following Figure 1.
Phase 1: The monitor removes the air in EVAP system by closing the Evaporative Leak Check Module switching valve and Evaporative Leak Check Module pump is intrusively activated when the solenoid valve for high pressure purge is open and all enable conditions are satisfied. In the case of normal condition, Evaporative Leak Check Module pressure (gauge) will decrease to reach the threshold value. However, if the hose is disconnected, the Evaporative Leak Check Module pressure will remain above the threshold value.
Phase 2: Since there is a possibility that a large amount of EVAP vapor is generated during Phase 1, the monitor may determine a false fail. To prevent this condition, the EVAP system is sealed and the pressure is measured again after a predetermined time (following Phase 1). If the measured pressure exceeds a second threshold value, the monitor is cancelled. If the pressure does not reach the second threshold value, the monitor determines a malfunction (disconnection).



2. EXECUTION CONDITION

Secondary parameters	Execution condition
<Phase1>	
Battery voltage	≥ 10.9 V
Barometric pressure	≥ 75.1kPa (563mmHg, 22.2inHg)
Integrated purge air amount since engine starting	≥ 72 g (2.54 oz)*
Purge control duty ratio = 0% duration time	≥ 1000ms
Ambient air temperature	> 4.4°C (39.9°F) and < 35°C (95°F)
Fuel level	≥ 9L (2.38US gal, 1.98Imp gal)
Cumulative time for establishment of the following conditions	≥ 6016ms
· Intake air amount per 1 second	> Map
· Commanded solenoid valve for secondary purge	Open
<Phase2>	
Establishing time for following conditions	≥ 20 s
· Battery voltage	≥ 10.9 V
· Barometric pressure	≥ 75.1kPa (563mmHg, 22.2inHg)
· Fuel level	≥ 9L (2.38US gal, 1.98Imp gal)

* It is approximately 2 sec per the integration of purge to reach 1g at vehicle speed of 40 MPH.

Map

Fuel level (L (US gal))	0 (0)	10 (2.64)	20 (5.28)	30 (7.93)	40 (10.57)	50 (13.21)	60 (15.85)
Intake air amount per 1 second (g/s)	80	80	60	60	60	60	60

3. GENERAL DRIVING CYCLE

Perform the diagnosis only once after starting the engine.

4. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
<Phase1>	
Evaporative Leak Check Module pressure (gauge)	> −266.6Pa(2mmHg, 0.1inHg)
<Phase2>	
Evaporative Leak Check Module pressure (gauge)	< 266.6Pa(2mmHg, 0.1inHg)

Phase1

Time needed for diagnosis: Less than 1 second

Phase2

Time needed for diagnosis: Less than 1 second

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0500 VEHICLE SPEED SENSOR "A" CIRCUIT

DTC detecting condition:
Immediately at fault recognition
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC OF VDC.

Read the VDC DTC using the Subaru Select Monitor or general scan tool. Ref. to VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)>Read Diagnostic Trouble Code (DTC).

Is DTC of VDC displayed? (Current malfunction)

Yes	Perform the diagnosis according to DTC. Ref. to VEHICLE DYNAMICS CONTROL (VDC) (DIAGNOSTICS)>List of Diagnostic Trouble Code (DTC).
No	Repair the poor contact of ECM connector.

1. OUTLINE OF DIAGNOSIS

Judge as NG when outside of the judgment value.
Judge NG when the received data from VDCCM&H/U is abnormal vehicle speed, and the vehicle speed data is impossible.

2. COMPONENT DESCRIPTION

Vehicle speed signals are taken in to the VDC control module and hydraulic control unit, and normal/erroneous data of the ABS wheel speed sensor is received by CAN communication from the VDC control module and hydraulic control unit.

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Speed of front wheels received from VDC control module & hydraulic control unit	≥ 300km/h (186.4MPH)

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0506 IDLE CONTROL SYSTEM RPM - LOWER THAN EXPECTED

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

- Hard to start the engine.
- Engine does not start.
- Improper idling
- Engine stalls.

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P0506 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK AIR CLEANER ELEMENT.

1. Turn the ignition switch to OFF.
2. Check the air cleaner element.

Is there excessive clogging on air cleaner element?

Yes	Replace the air cleaner element. Ref. to INTAKE (INDUCTION)(STI)>Air Cleaner Element.
No	Go to 3.

3. CHECK ELECTRONIC THROTTLE CONTROL.

1. Remove the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Throttle Body>REMOVAL.
2. Check the electronic throttle control.

Are foreign matter found inside electronic throttle control?

Yes	Remove foreign matter from electronic throttle control.
No	Perform the diagnosis of DTC P2101. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction that actual engine speed is not close to target engine speed during idling. Judge as NG when actual engine speed is not close to target engine speed during idling.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Barometric pressure	≥ 75.1kPa (563mmHg, 22.2inHg)
Lambda value (left and right)	≥ 0.85 and < 1.151
Vehicle speed	= 0 km/h (0 MPH)
Engine coolant temperature	≥ 60°C (140°F)
Elapsed time after starting the engine	≥ 10s
Time of no change in park/neutral position switch	≥ 5s
Cold start diagnosis	Not in operation
Main feedback	In operation
Idle speed control feedback	In operation

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously at idling after warming up engine.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Actual engine speed − Targeted engine speed	< −100rpm

time needed for diagnosis: 15s × 1time(s)

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0507 IDLE CONTROL SYSTEM RPM - HIGHER THAN EXPECTED

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Trouble symptom:
Engine keeps running at higher speed than specified idle speed.
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P0507 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK AIR INTAKE SYSTEM.

1. Start and idle the engine.
2. Check the following items.
   - Loose installation of intake manifold and throttle body
   - Cracks of intake manifold gasket and throttle body gasket
   - Disconnection of vacuum hoses

Is there any fault in air intake system?

Yes	Repair air suction and leaks.
No	Go to 3.

3. CHECK ELECTRONIC THROTTLE CONTROL.

1. Turn the ignition switch to OFF.
2. Remove the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Throttle Body>REMOVAL.
3. Check the electronic throttle control.

Are foreign matter found inside electronic throttle control?

Yes	Remove foreign matter from electronic throttle control.
No	Perform the diagnosis of DTC P2101. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction that actual engine speed is not close to target engine speed during idling. Judge as NG when actual engine speed is not close to target engine speed during idling.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Barometric pressure	≥ 75.1kPa (563mmHg, 22.2inHg)
Lambda value (left and right)	≥ 0.85 and < 1.151
Vehicle speed	= 0 km/h (0 MPH)
Engine coolant temperature	≥ 60°C (140°F)
Elapsed time after starting the engine	≥ 10s
Time of no change in park/neutral position switch	≥ 5s
Cold start diagnosis	Not in operation
Main feedback	In operation
Idle speed control feedback	In operation

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously at idling after warming up engine.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Actual engine speed − Targeted engine speed	> 200rpm

time needed for diagnosis: 15s × 1time(s)
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P050A COLD START IDLE CONTROL SYSTEM PERFORMANCE

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

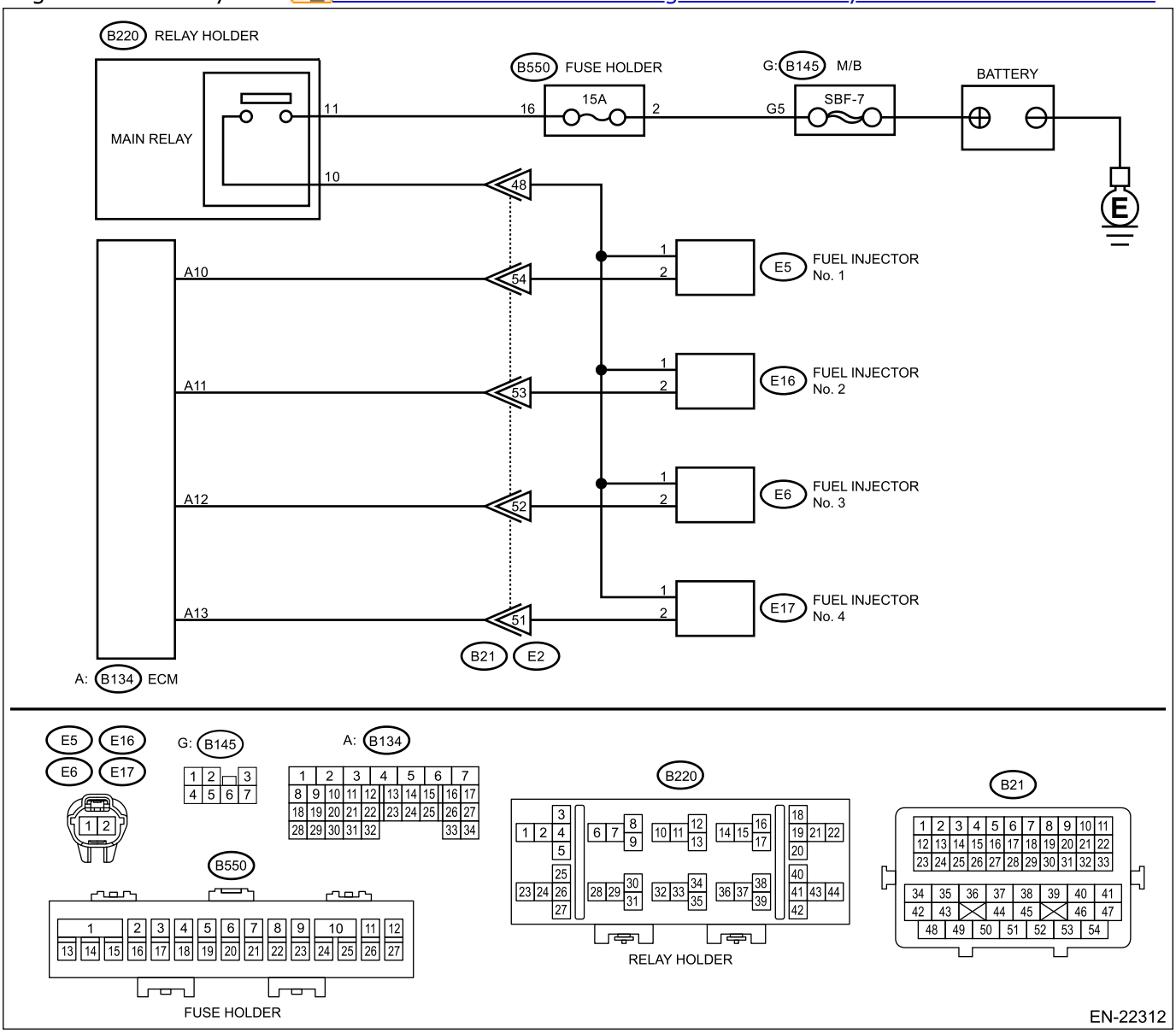
- Engine keeps running at higher speed than specified idle speed.
- Engine keeps running at a lower speed than the specified idle speed.
- Engine stalls.

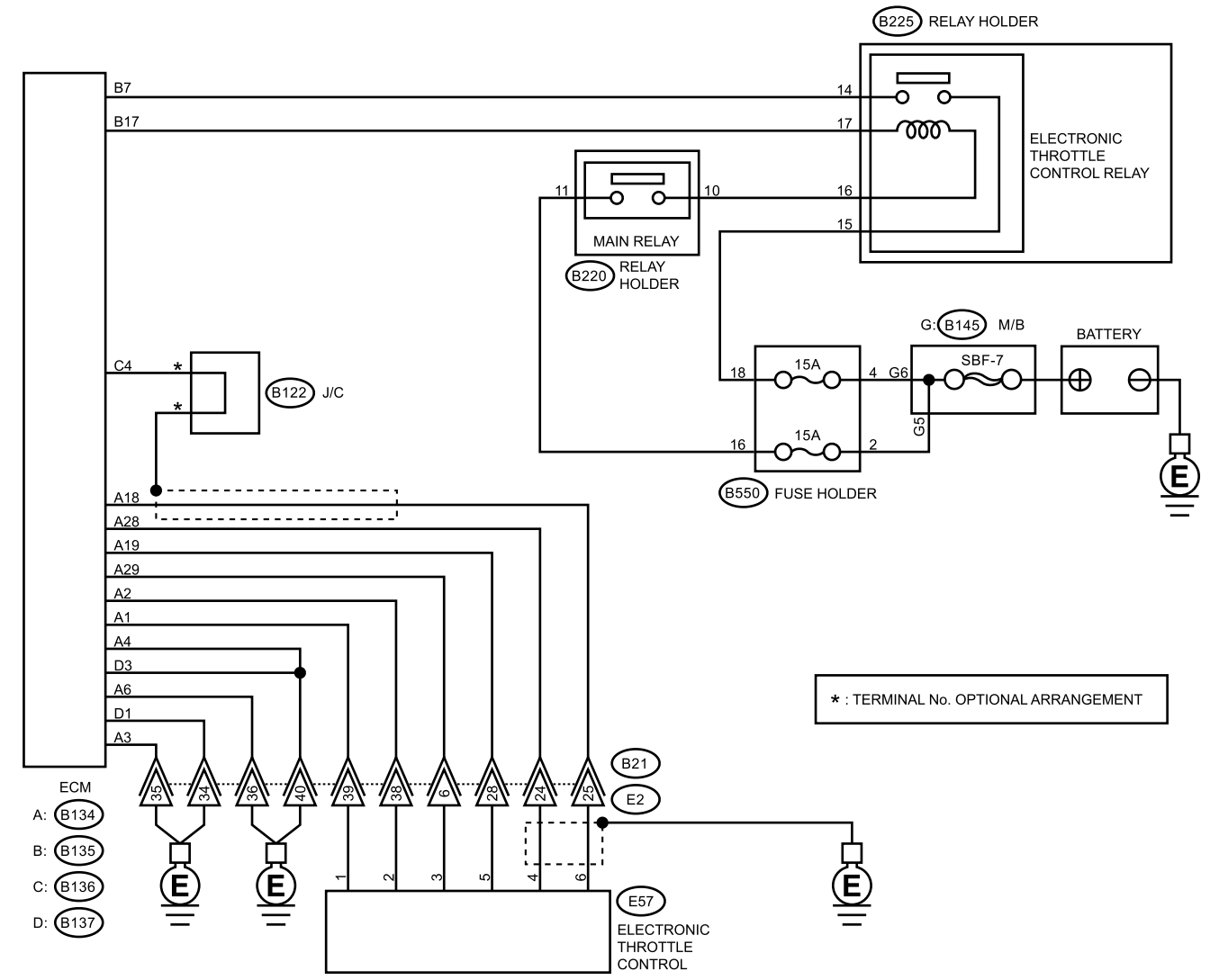
Caution:

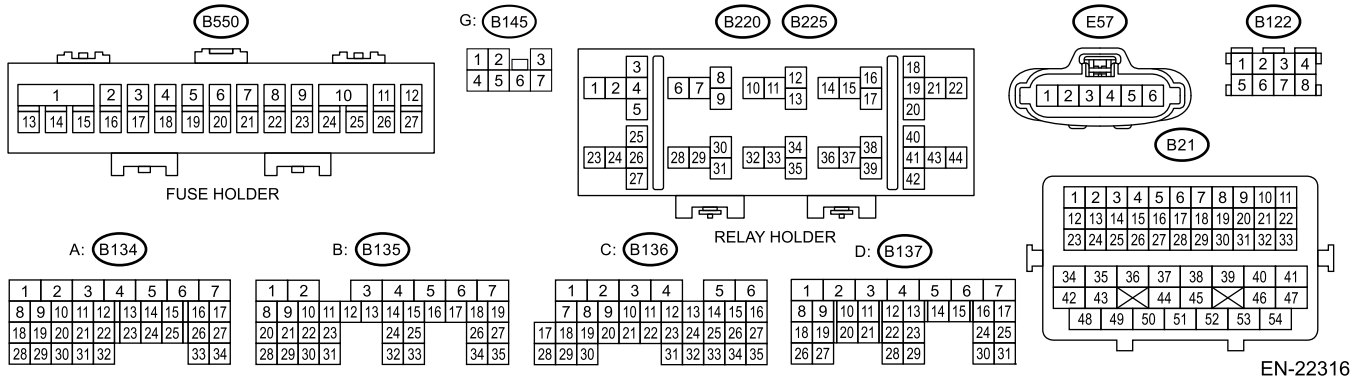
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.




B225 RELAY HOLDER
B7
B17
14
17
16
15
ELECTRONIC THROTTLE CONTROL RELAY
11
10
MAIN RELAY
B220 RELAY HOLDER
G: B145 M/B
BATTERY
SBF-7
18
15A
4
G6
G5
16
15A
2
B550 FUSE HOLDER
C4
*
*
B122 J/C
A18
A28
A19
A29
A2
A1
A4
D3
A6
D1
A3
* : TERMINAL No. OPTIONAL ARRANGEMENT
ECM
A: B134
B: B135
C: B136
D: B137
35
34
36
40
39
38
6
28
24
25
B21
E2
1
2
3
5
4
6
E57
ELECTRONIC THROTTLE CONTROL


B550
FUSE HOLDER
G: B145
B220
B225
RELAY HOLDER
E57
B122
B21
A: B134
B: B135
C: B136
D: B137

EN-22316

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is other than DTC P050A displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK ENGINE OIL.

Check the engine oil.

Is there a proper amount of engine oil?

Yes	Go to 3.
No	Replace engine oil. Ref. to LUBRICATION(STI)>Engine Oil>REPLACEMENT.

3. CHECK EXHAUST SYSTEM.

Check the exhaust system.

Are there holes or loose bolts on exhaust system?

Yes	Repair the exhaust system.
No	Go to 4.

4. CHECK AIR INTAKE SYSTEM.

Check the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

Yes	Repair the air intake system.
No	Go to 5.

5. CHECK FUEL PRESSURE.

Warning:
Place "NO OPEN FLAMES" signs near the working area.
Caution:

- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

Check the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold.
Ref. to MECHANICAL(STI)>Fuel Pressure>INSPECTION.
Note:
If fuel pressure does not increase, squeeze the fuel return hose 2 to 3 times, then check fuel pressure again.

Is the check result OK?

Yes	Go to 6.
No	Check the fuel pump and fuel delivery line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Pump>INSPECTION. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Delivery, Return and Evaporation Lines>INSPECTION.

6. CHECK FUEL PRESSURE.

After connecting the pressure regulator vacuum hose, check fuel pressure. Ref. to MECHANICAL(STI)>Fuel Pressure>INSPECTION.

Note:

- **If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then check fuel pressure again.**
- **If the measured value at this step is out of specification, check or replace pressure regulator and pressure regulator vacuum hose.**

Is the check result OK?

Yes	Go to 7.
No	Check the fuel pump and fuel delivery line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Pump>INSPECTION. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Delivery, Return and Evaporation Lines>INSPECTION.

7. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

1. Start the engine and warm up completely.
2. Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Coolant Temp.» 75°C (167°F) or more?

Yes	Go to 8.
No	Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Coolant Temperature Sensor.

8. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).
2. Place the gear shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Mass Air Flow» 2 — 5 g/s (0.26 — 0.66 lb/m)?

Yes	Go to 9.
No	Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

9. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).
2. Place the gear shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Open the front hood.
6. Measure the ambient temperature.
7. Read the value of «Intake Air Temperature» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Subtract ambient temperature from «Intake Air Temperature». Is the obtained value −10 — 50°C (−18 — 90°F)?

Yes	Go to 10.
No	Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

10. CHECK OUTPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground on faulty cylinders.
   Connector & terminal
   #1 (B134) No. 10 (+) — Chassis ground (−):
   #2 (B134) No. 11 (+) — Chassis ground (−):
   #3 (B134) No. 12 (+) — Chassis ground (−):
   #4 (B134) No. 13 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 15.
No	Go to 11.

11. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from fuel injector on faulty cylinders.
3. Measure the resistance between fuel injector connector and engine ground on faulty cylinders.

Connector & terminal

#1 (E5) No. 2 — Engine ground:
#2 (E16) No. 2 — Engine ground:
#3 (E6) No. 2 — Engine ground:
#4 (E17) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 12.
No	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

12. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

Measure the resistance of harness between ECM connector and fuel injector connector on faulty cylinders.

Connector & terminal

#1 (B134) No. 10 — (E5) No. 2:
#2 (B134) No. 11 — (E16) No. 2:
#3 (B134) No. 12 — (E6) No. 2:
#4 (B134) No. 13 — (E17) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 13.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and fuel injector connector** • **Poor contact of coupling connector**

13. CHECK FUEL INJECTOR.

Check the fuel injector on faulty cylinder. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes	Go to 14.
No	Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector.

14. CHECK POWER SUPPLY LINE.

1. Turn the ignition switch to ON.
2. Measure the voltage between fuel injector and engine ground on faulty cylinders.

Connector & terminal

#1 (E5) No. 1 (+) — Engine ground (−):
#2 (E16) No. 1 (+) — Engine ground (−):
#3 (E6) No. 1 (+) — Engine ground (−):
#4 (E17) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Repair the poor contact of all connectors in fuel injector circuit.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between the main relay connector and fuel injector connector on faulty cylinders** • **Poor contact of coupling connector** • **Poor contact of main relay connector**

15. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from fuel injector on faulty cylinders.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and chassis ground on faulty cylinders.
   Connector & terminal
   #1 (B134) No. 10 (+) — Chassis ground (−):
   #2 (B134) No. 11 (+) — Chassis ground (−):
   #3 (B134) No. 12 (+) — Chassis ground (−):
   #4 (B134) No. 13 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and fuel injector connectors.
No	Go to 16.

16. CHECK FUEL INJECTOR.

1. Turn the ignition switch to OFF.
2. Check the fuel injector on faulty cylinder. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes	Go to 17.
No	Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Fuel Injector.

17. CHECK INSTALLATION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.

Check installation condition of the camshaft position sensor and crankshaft position sensor.

Is the camshaft position sensor or crankshaft position sensor loosely installed?

Yes	Tighten the camshaft position sensor or crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor.
No	Go to 18.

18. CHECK CRANK SPROCKET.

1. Remove the timing belt cover. Ref. to MECHANICAL(STI)>Timing Belt Cover>REMOVAL.
2. Check the crank sprocket.

Is the crank sprocket rusted or does it have broken teeth?

Yes	Replace the crank sprocket. Ref. to MECHANICAL(STI)>Crank Sprocket.
No	Go to 19.

19. CHECK INSTALLATION CONDITION OF TIMING BELT.

Turn the crankshaft, and align alignment mark on crank sprocket with alignment mark on cylinder block.

ST 499987500 CRANKSHAFT SOCKET

Is the timing belt dislocated from its proper position?

Yes	Repair the installation condition of timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
No	Go to 20.

20. CHECK ELECTRONIC THROTTLE CONTROL RELAY.

1. Turn the ignition switch to OFF.
2. Remove the electronic throttle control relay.
3. Connect the battery to terminals No. 16 and No. 17 of electronic throttle control relay.
4. Measure the resistance between electronic throttle control relay terminals.

Terminals

No. 14 — No. 15:

Is the resistance less than 1 Ω?

Yes	Go to 21.
No	Replace the electronic throttle control relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Electronic Throttle Control Relay.

21. CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.

Measure the voltage between electronic throttle control relay connector and chassis ground.

Connector & terminal

(B225) No. 15 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 22.
No	Repair the open or short to ground in the power supply circuit.

22. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.

1. Disconnect the connector from ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between electronic throttle control relay connector and chassis ground.
   Connector & terminal
   (B225) No. 17 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and electronic throttle control relay connector.
No	Go to 23.

23. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Measure the resistance between electronic throttle control relay connector and chassis ground.
   Connector & terminal
   (B225) No. 14 — Chassis ground:
   (B225) No. 17 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 24.
No	Repair the short circuit to ground in harness between ECM connector and electronic throttle control relay connector.

24. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.

Measure the resistance between ECM connector and electronic throttle control relay connector.

Connector & terminal

(B135) No. 7 — (B225) No. 14:

(B135) No. 17 — (B225) No. 17:

Is the resistance less than 1 Ω?

Yes	Go to 25.
No	Repair the open circuit in harness between ECM connector and electronic throttle control relay connector.

25. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance between ECM connector and chassis ground.

   Connector & terminal

   (B134) No. 19 — Chassis ground:

   (B134) No. 18 — Chassis ground:

   (B134) No. 18 — (B136) No. 4:

   (B134) No. 28 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 26.
No	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

26. CHECK SHORT CIRCUIT INSIDE THE ECM.

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 6 — Engine ground:
   (E57) No. 4 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 27.
No	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. Replace the ECM if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

27. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and electronic throttle control connector.
   Connector & terminal
   (B134) No. 18 — (E57) No. 6:
   (B134) No. 28 — (E57) No. 4:
   (B134) No. 29 — (E57) No. 3:

Is the resistance less than 1 Ω?

Yes	Go to 28.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and electronic throttle control connector** • **Poor contact of coupling connector**

28. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes	Go to 29.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

29. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to ON.
2. Measure the voltage between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 6 (+) — Engine ground (−):
   (E57) No. 4 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.
No	Go to 30.

30. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   Connector & terminal
   (B134) No. 19 — (B134) No. 18:
   (B134) No. 19 — (B134) No. 28:

Is the resistance 1 MΩ or more?

Yes	Go to 31.
No	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.

31. CHECK SENSOR OUTPUT.

1. Connect all connectors.
2. Turn the ignition switch to ON.
3. Read the value of «Main-Throttle Sensor» using Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «Main-Throttle Sensor» 0.81 — 0.87 V?

Yes	Go to 32.
No	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Throttle Body.

32. CHECK SENSOR OUTPUT.

Read the value of «Sub-Throttle Sensor» using Subaru Select Monitor.
Note:
For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «Sub-Throttle Sensor» 1.64 — 1.7 V?

Yes	Go to 33.
No	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Throttle Body.

33. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance between ECM connector and electronic throttle control connector.
   Connector & terminal
   (B134) No. 1 — (E57) No. 1:
   (B134) No. 2 — (E57) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 34.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and electronic throttle control connector** • **Poor contact of coupling connector**

34. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 1 (+) — Engine ground (−):
   (E57) No. 2 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.
No	Go to 35.

35. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 1 — Engine ground:
   (E57) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 36.
No	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

36. CHECK ELECTRONIC THROTTLE CONTROL MOTOR HARNESS.

Measure the resistance between electronic throttle control connectors.

Connector & terminal

(E57) No. 1 — (E57) No. 2:

Is the resistance 1 MΩ or more?

Yes	Go to 37.
No	Repair the short circuit in harness between ECM connector and electronic throttle control connector.

37. CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B134) No. 3 — Chassis ground:
(B134) No. 4 — Chassis ground:
(B134) No. 6 — Chassis ground:
(B137) No. 1 — Chassis ground:
(B137) No. 3 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 38.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of coupling connector**

38. CHECK ELECTRONIC THROTTLE CONTROL.

Measure the resistance between electronic throttle control terminals.
Terminals
No. 1 — No. 2:

Is the resistance 50 Ω or less?

Yes	Go to 39.
No	Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Throttle Body.

39. CHECK ELECTRONIC THROTTLE CONTROL.

Move the throttle valve to the fully opened and fully closed positions with fingers.
Check that the valve returns to the specified position when releasing fingers.

Does the valve return to the specified position? Specified value: 3 mm (0.12 in) from fully closed position

Yes	Repair the poor contact of ECM connector.
No	Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Throttle Body.

1. OUTLINE OF DIAGNOSIS

- **When cold, the abnormality in the control of target engine speed increase is detected. (P050A)**
  - Idle speed diagnosis
    Judge as NG when actual engine speed is not close to target engine speed at cold start.
- **Detect malfunctions of the catalyst advanced idling retard angle control. (P050B)**
  Judge as NG when ECM is not controlling the angle properly during catalyst advanced idling retard angle control.
  - Final ignition timing diagnosis
    Judge as NG when actual retard amount is under the specified value at cold start.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
<Idle speed diagnosis>	

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Barometric pressure	≥75.1kPa (563mmHg, 22.2inHg)
Vehicle speed	≤2km/h (1.2MPH)
Throttle position	< 0.37°
Integrated value of intake air amount	< Value of Map 1
Elapsed time after starting the engine	≥2000ms
<Final ignition timing diagnosis>	
Battery voltage	≥ 10.9 V
Barometric pressure	≥75.1kPa (563mmHg, 22.2inHg)
Throttle position	< 0.37°
Integrated value of intake air amount	< Value of Map 2
Target retard amount	≥6°CA

Map 1

Engine coolant temperature at engine starting (°C (°F))	**−40 (−40)**	**−30 (−22)**	**−20 (−4)**	**−10 (14)**	**0 (32)**	**10 (50)**	**20 (68)**	**30 (86)**
Integrated value of intake air amount (g (oz))	1447 (51.04)	1358.5 (47.91)	1270 (44.79)	1181.5 (41.67)	1093 (38.55)	620 (21.87)	569 (20.07)	547 (19.29)

Engine coolant temperature at engine starting (°C (°F))	**40 (104)**	**50 (122)**	**60 (140)**	**70 (158)**	**80 (176)**	**90 (194)**	**100 (212)**	**110 (230)**
Integrated value of intake air amount (g (oz))	489 (17.25)	350 (12.34)	350 (12.34)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

Map 2

Engine coolant temperature at engine starting (°C (°F))	−40 (−40)	−30 (−22)	−20 (−4)	−10 (14)	0 (32)	10 (50)	20 (68)	30 (86)
Integrated value of intake air amount (g (oz))	1447 (51.04)	1358.5 (47.91)	1270 (44.79)	1181.5 (41.67)	1093 (38.55)	620 (21.87)	569 (20.07)	547 (19.29)

Engine coolant temperature at engine starting (°C (°F))	40 (104)	50 (122)	60 (140)	70 (158)	80 (176)	90 (194)	100 (212)	110 (230)
Integrated value of intake air amount (g (oz))	489 (17.25)	350 (12.34)	350 (12.34)	0 (0)	0 (0)	0 (0)	0 (0)	0 (0)

3. GENERAL DRIVING CYCLE

Perform the diagnosis at cold start.

4. DIAGNOSTIC METHOD

- **Idle speed diagnosis**
  Judge as NG when the following conditions are established.
  Judgment value

Malfunction Criteria	Threshold Value
Actual engine speed − Target engine speed	< Value of Map 3

Map 3

Engine coolant temperature (°C (°F))	−40 (−40)	−30 (−22)	−20 (−4)	−10 (14)	0 (32)	10 (50)	20 (68)	30 (86)	40 (104)	50 (122)	60 (140)
Actual engine speed - Target engine speed (rpm)	−150	−150	−150	−150	−150	−150	−300	−300	−300	−300	−300

time needed for diagnosis:6000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

- **Final ignition timing diagnosis**
  Judge as NG when the following conditions are established.
  Judgment value

Malfunction Criteria	Threshold Value
Final ignition timing − ignition timing during CSERS∗ ∗: Ignition timing during CSERS (Cold Start Emission Reduction Strategy) = Base ignition timing − retard amount	> 6°CA

time needed for diagnosis:6000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P050B COLD START IGNITION TIMING PERFORMANCE

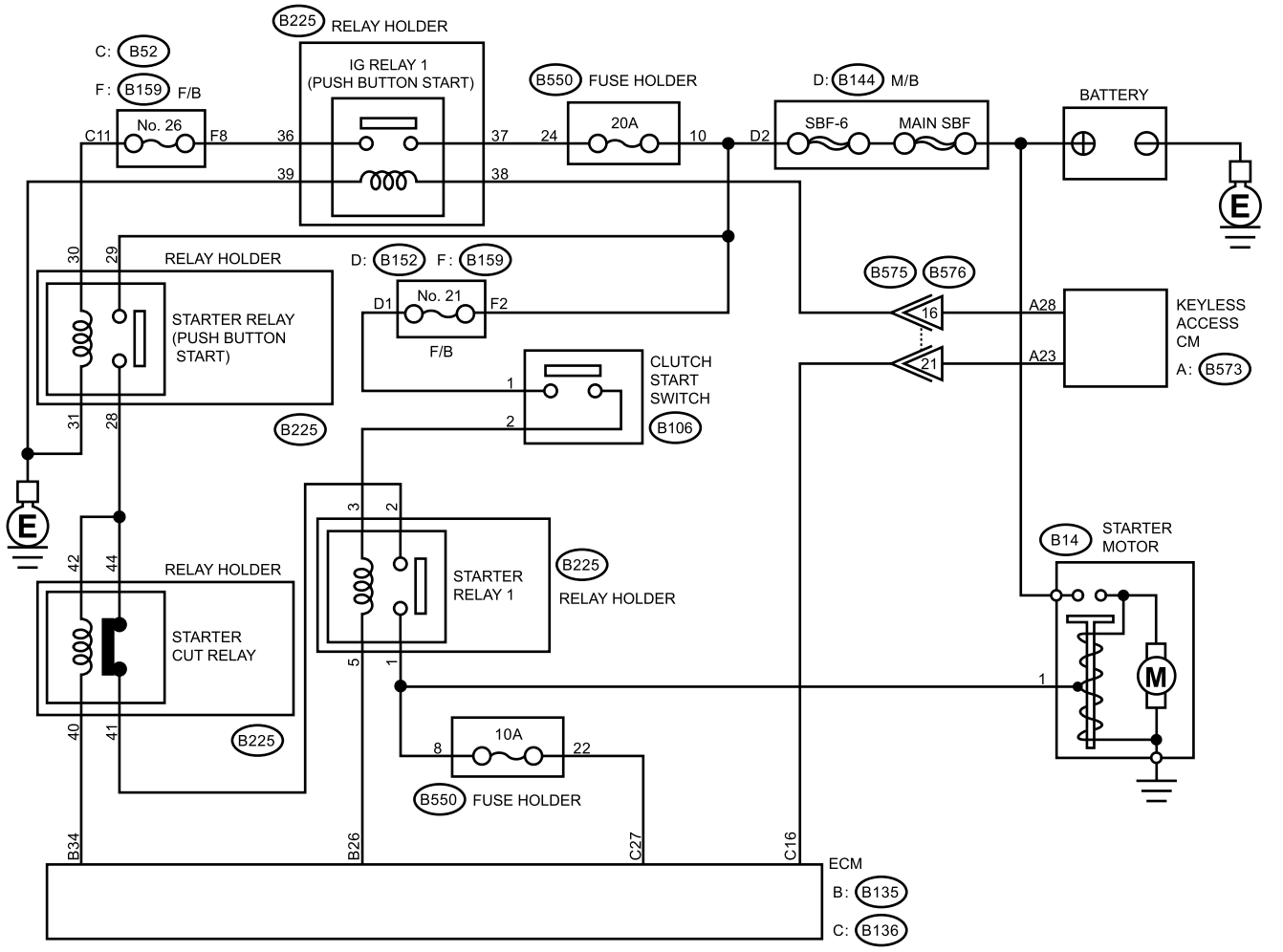
Note:
For the diagnostic procedure, refer to DTC P050A. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P050A COLD START IDLE CONTROL SYSTEM PERFORMANCE.

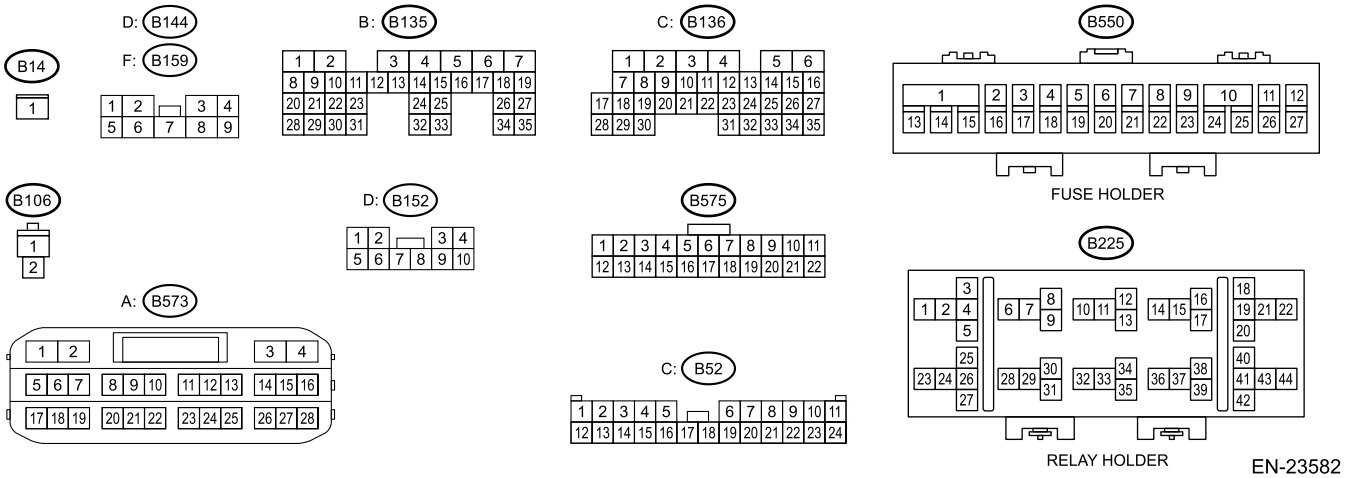
1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P050A. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P050A COLD START IDLE CONTROL SYSTEM PERFORMANCE.

DTC P0512 STARTER (SWITCH) REQUEST CIRCUIT

DTC detecting condition:
Immediately at fault recognition
Trouble symptom:
Failure of engine to start
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..
Wiring diagram:
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B225 RELAY HOLDER
C: B52
F: B159 F/B
IG RELAY 1
(PUSH BUTTON START)
B550 FUSE HOLDER
D: B144 M/B
BATTERY
C11
No. 26
F8
36
37
24
20A
10
D2
SBF-6
MAIN SBF
39
38
E
30
29
RELAY HOLDER
STARTER RELAY
(PUSH BUTTON
START)
D: B152 F: B159
D1
No. 21
F2
F/B
B575 B576
16
21
A28
A23
KEYLESS
ACCESS
CM
A: B573
1
2
CLUTCH
START
SWITCH
B106
31
28
B225
E
3
2
B14 STARTER
MOTOR
42
44
RELAY HOLDER
STARTER
CUT RELAY
STARTER
RELAY 1
B225
RELAY HOLDER
5
1
1
M
40
41
B225
8
10A
22
B550 FUSE HOLDER
B34
B26
C27
C16
ECM
B: B135
C: B136


D: B144
F: B159
B14
1
B: B135
C: B136
B550
FUSE HOLDER
B106
1
2
D: B152
B575
A: B573
B225
C: B52
RELAY HOLDER

EN-23582

1. CHECK PUSH BUTTON IGNITION SWITCH.

Operate the push button ignition switch.

Does it operate smoothly without catch?

Yes	Go to 2.
No	Replace the push button ignition switch. Ref. to SECURITY AND LOCKS>Push Button Ignition Switch.

2. CHECK DTC.

1. Clear the memory using the Subaru Select Monitor. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Start and idle the engine for three minutes or more.

Is DTC P0512 displayed? (Current malfunction)

Yes	Go to 3.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

3. CHECK HARNESS BETWEEN ECM AND KEYLESS ACCESS CM.

1. Turn the ignition to OFF.
2. Disconnect the connector from ECM.
3. Turn the ignition to ON.
4. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 16 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power supply in harness between ECM connector and keyless access CM connector.
No	Repair the poor contact of ECM connector.

1. OUTLINE OF DIAGNOSIS

Detect abnormal continuity in the starter SW1.
Judge as ON NG when the starter SW 1 signal remains ON.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 8V
Engine speed	≥ 500 rpm

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Starter SW1 voltage	≥ Battery voltage × 0.85 V

time needed for diagnosis: 30000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0560 SYSTEM VOLTAGE

DTC detecting condition:

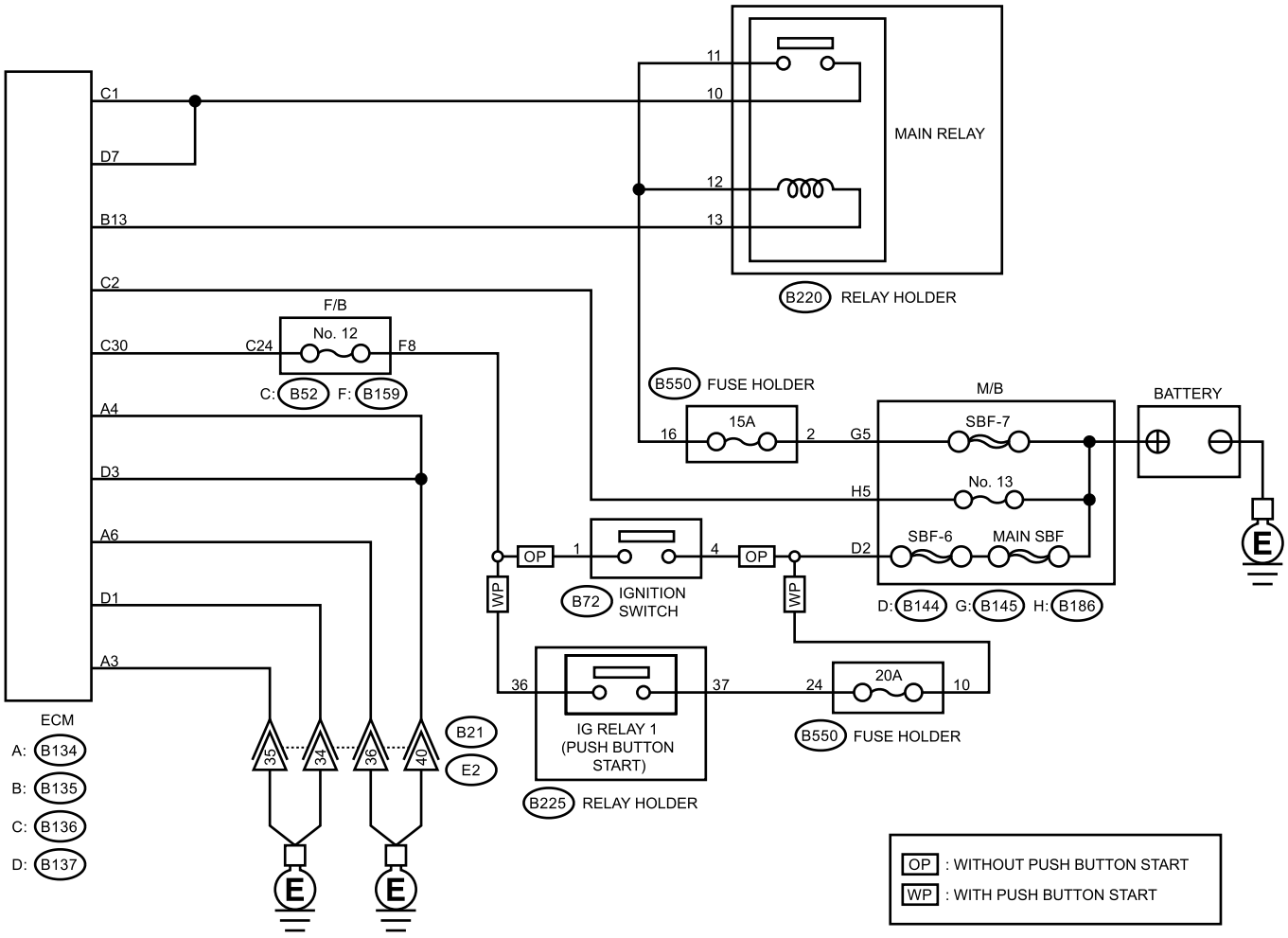
Immediately at fault recognition

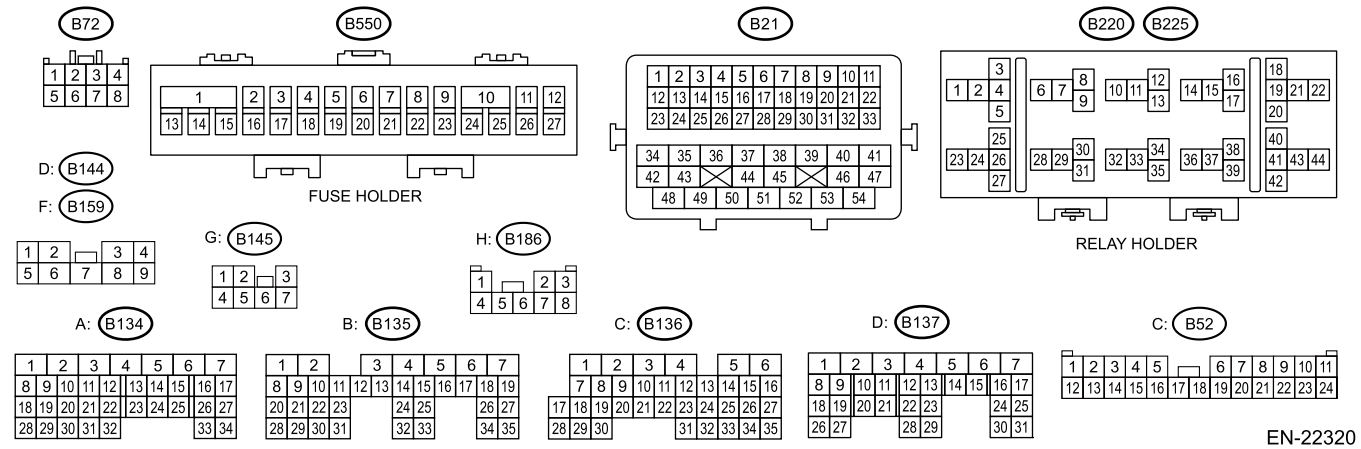
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


C1
D7
B13
C2
C30
A4
D3
A6
D1
A3
ECM
A: B134
B: B135
C: B136
D: B137
11
10
12
13
MAIN RELAY
B220 RELAY HOLDER
F/B
No. 12
C24
F8
C: B52 F: B159
B550 FUSE HOLDER
16
15A
2
G5
M/B
SBF-7
BATTERY
H5
No. 13
OP
1
4
D2
SBF-6
MAIN SBF
WP
B72 IGNITION SWITCH
D: B144 G: B145 H: B186
36
37
24
20A
10
IG RELAY 1 (PUSH BUTTON START)
B550 FUSE HOLDER
B225 RELAY HOLDER
35
34
36
40
B21
E2
OP : WITHOUT PUSH BUTTON START
WP : WITH PUSH BUTTON START


B72
B550
B21
B220
B225
D: B144
F: B159
FUSE HOLDER
G: B145
H: B186
RELAY HOLDER
A: B134
B: B135
C: B136
D: B137
C: B52

EN-22320

1. CHECK INPUT SIGNAL OF ECM.

1. Turn the ignition switch to OFF.
2. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 2 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the poor contact of ECM connector.
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND MAIN FUSE BOX CONNECTOR.

1. Disconnect the connector from ECM.
2. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 2 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and battery terminal.

3. CHECK FUSE NO. 13.

Check the fuse No. 13.

Is the fuse blown out?

Yes	Replace the fuse.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and battery** • **Poor contact of ECM connector** • **Poor contact of battery terminal**

1. OUTLINE OF DIAGNOSIS

Detect the open/short circuit of back-up power supply circuit.
Judge as NG when the backup power voltage is low.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Voltage of back-up power supply	≤ 2.5 V

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0604 INTERNAL CONTROL MODULE RANDOM ACCESS MEMORY (RAM) ERROR

DTC detecting condition:
Immediately at fault recognition
Trouble symptom:

- Engine does not start.
- Engine stalls.

Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P0604 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of microcomputer (RAM).
If it is possible to write data to the whole area of RAM in the initial routine, and is possible to read the same data, it is judged as OK, and if not, NG.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
ECM initialization	Execution

Diagnosis with the initial routine.

3. GENERAL DRIVING CYCLE

Perform the diagnosis immediately after the ignition switch is to ON.

4. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Write the specified value into the RAM.	Different from written value

Time needed for diagnosis: 512 ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0605 INTERNAL CONTROL MODULE READ ONLY MEMORY (ROM) ERROR

Note:
For the diagnostic procedure, refer to DTC P0606. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0606 CONTROL MODULE PROCESSOR.

1. OUTLINE OF DIAGNOSIS

Judge as NG when SUM value of ROM is outside the standard value.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
ECM initialization	Execution

3. GENERAL DRIVING CYCLE

Perform the diagnosis immediately after the ignition switch is to ON.

4. DIAGNOSTIC METHOD

Judge as NG if the criteria below are met.

Judgment value

Malfunction Criteria	Threshold Value
SUM value of ROM	Malfunction

Time needed for diagnosis: 512 ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0606 CONTROL MODULE PROCESSOR

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

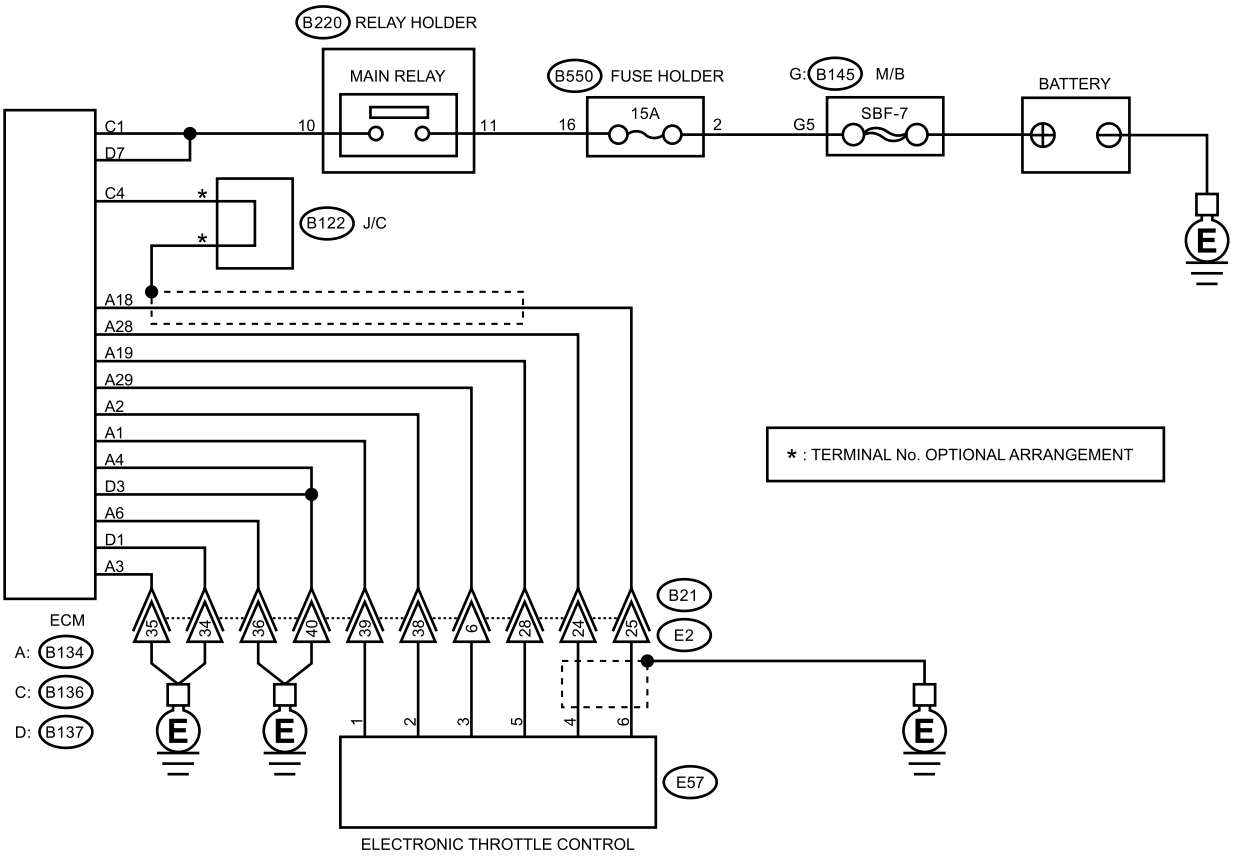
- Improper idling
- Poor driving performance

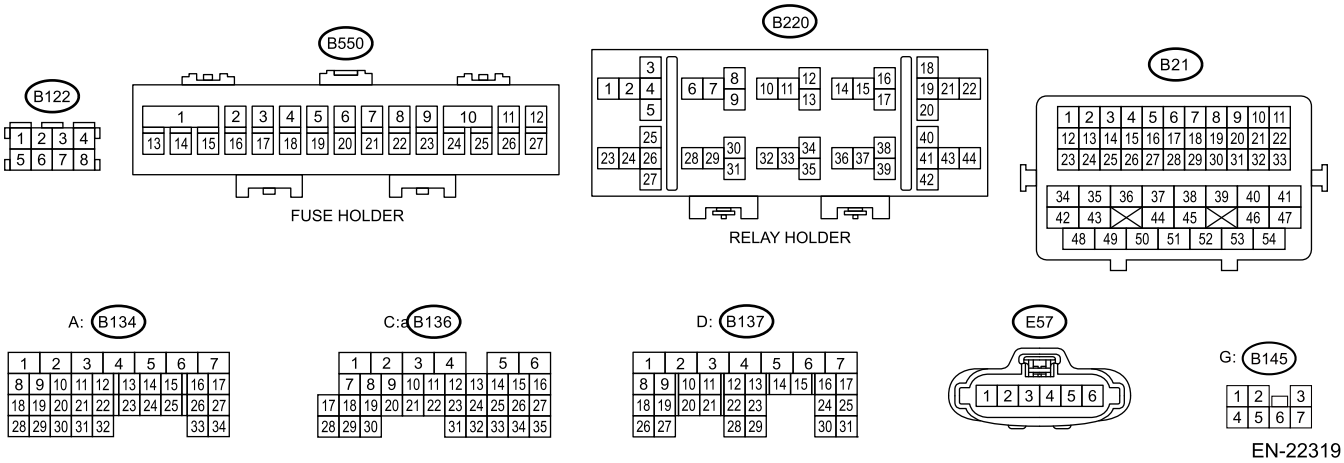
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B220 RELAY HOLDER
MAIN RELAY
B550 FUSE HOLDER
15A
G: B145 M/B
SBF-7
BATTERY
C1
D7
C4
B122 J/C
A18
A28
A19
A29
A2
A1
A4
D3
A6
D1
A3
* : TERMINAL No. OPTIONAL ARRANGEMENT
ECM
A: B134
C: B136
D: B137
B21
E2
E57
ELECTRONIC THROTTLE CONTROL


B122
B550
FUSE HOLDER
B220
RELAY HOLDER
B21
A: B134
C: B136
D: B137
E57
G: B145

EN-22319

1. CHECK INPUT VOLTAGE OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 1 (+) — Chassis ground (−):
   (B137) No. 7 (+) — Chassis ground (−):

Is the voltage 10 — 13 V?

Yes	Go to 2.
No	Repair the open or short to ground in the power supply circuit.

2. CHECK INPUT VOLTAGE OF ECM.

1. Start the engine.
2. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 1 (+) — Chassis ground (−):
   (B137) No. 7 (+) — Chassis ground (−):

Is the voltage 13 — 15 V?

Yes	Go to 3.
No	Repair the open or short to ground in the power supply circuit.

3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance of harness between ECM connector and electronic throttle control connector.

   Connector & terminal

   (B134) No. 19 — (E57) No. 5:

   (B134) No. 29 — (E57) No. 3:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and electronic throttle control connector** • **Poor contact of coupling connector**

4. CHECK ECM GROUND HARNESS.

1. Connect all connectors.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 3 (+) — Chassis ground (−):
(B134) No. 4 (+) — Chassis ground (−):
(B134) No. 6 (+) — Chassis ground (−):
(B137) No. 1 (+) — Chassis ground (−):
(B137) No. 3 (+) — Chassis ground (−):

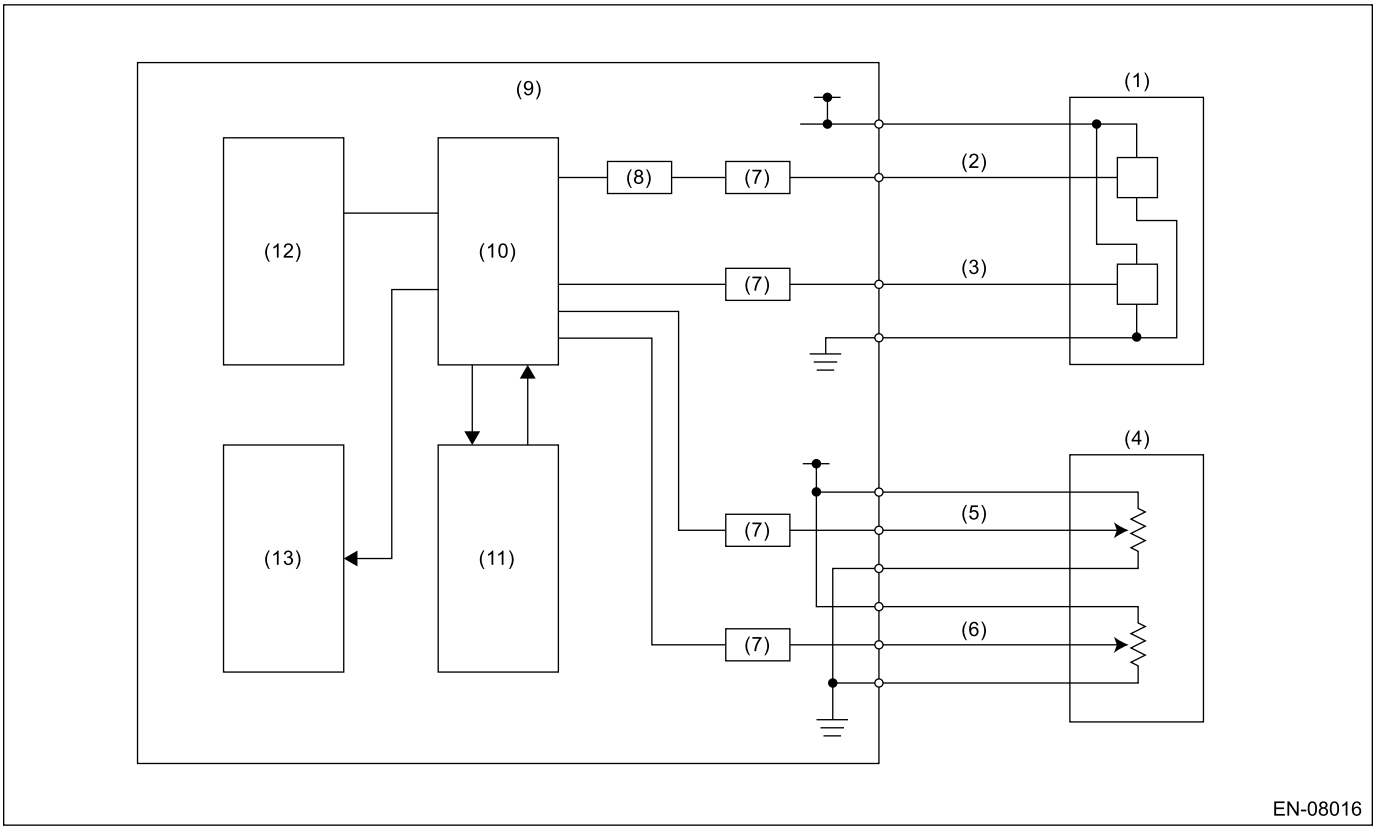
Is the voltage less than 1 V?

Yes	Check the connector for poor contact and check the harness. Replace the ECM if no fault is found. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Engine Control Module (ECM).
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in ground circuit** • **Further tightening of the engine ground terminal** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

1. OUTLINE OF DIAGNOSIS

Judge as NG when the CPU operation is abnormal.
Judgment1: Instruction check
Judgment2: Soft flow check
Judgment3: Soft monitor check
Judgment4: If the output IC operation is abnormal
Judgment5: CAN register check

2. COMPONENT DESCRIPTION



(1) Throttle position sensor
(2) Throttle position sensor 1
(3) Throttle position sensor 2
(4) Accelerator pedal position sensor
(5) Accelerator pedal position sensor 1
(6) Accelerator pedal position sensor 2
(7) I/F circuit
(8) Amplifier circuit
(9) Engine control module (ECM)
(10) CPU
(11) Monitoring IC
(12) EEPROM
(13) Output IC

3. EXECUTION CONDITION

Judgment1: Instruction check (a)

Secondary parameters	Execution condition
Initial routine Main CPU	Execution in progress

Judgment1: Instruction check (b)

Secondary parameters	Execution condition
Ignition switch Battery voltage	ON ≥ 6.2V

Secondary parameters	Execution condition
Electronic throttle control relay	ON

Judgment2: Soft flow check

Secondary parameters	Execution condition
(2) Ignition switch	ON

Judgment3: Soft monitor check

Secondary parameters	Execution condition
Ignition switch	ON
Battery voltage	≥ 6.2V
Electronic throttle control relay	ON

Judgment4: If the output IC operation is abnormal

Secondary parameters	Execution condition
Ignition switch	ON

Judgment5: CAN register check

Secondary parameters	Execution condition
(5) Initial routine	Execution in progress

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment1: Instruction check (a)

Judgment value

Malfunction Criteria	Threshold Value
Instruction value	Different from expected value

Judgment1: Instruction check (b)

Judgment value

Malfunction Criteria	Threshold Value
Calculated result from CPU and FPU	Different from expected value

Judgment2: Soft flow check

Judgment value

Malfunction Criteria	Threshold Value
Process flow result	The result and expected value do not match.

Judgment3: Soft monitor check
Judgment value

Malfunction Criteria	Threshold Value
High integrated IC motor continuity cut demand	Exist

Judgment4: If the output IC operation is abnormal
Judgment value

Malfunction Criteria	Threshold Value
Communication between output driver ICs	Communication failure

Judgment5: CAN register check
Judgment value

Malfunction Criteria	Threshold Value
Writing value to CAN register	≠ Read out value

Time needed for diagnosis:
Judgment1 — (a): 2time(s)
Judgment1 — (b): 512ms
Judgment2: 504ms
Judgment3: 48ms
Judgment4: 2500ms
Judgment5: Less than 1 s
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

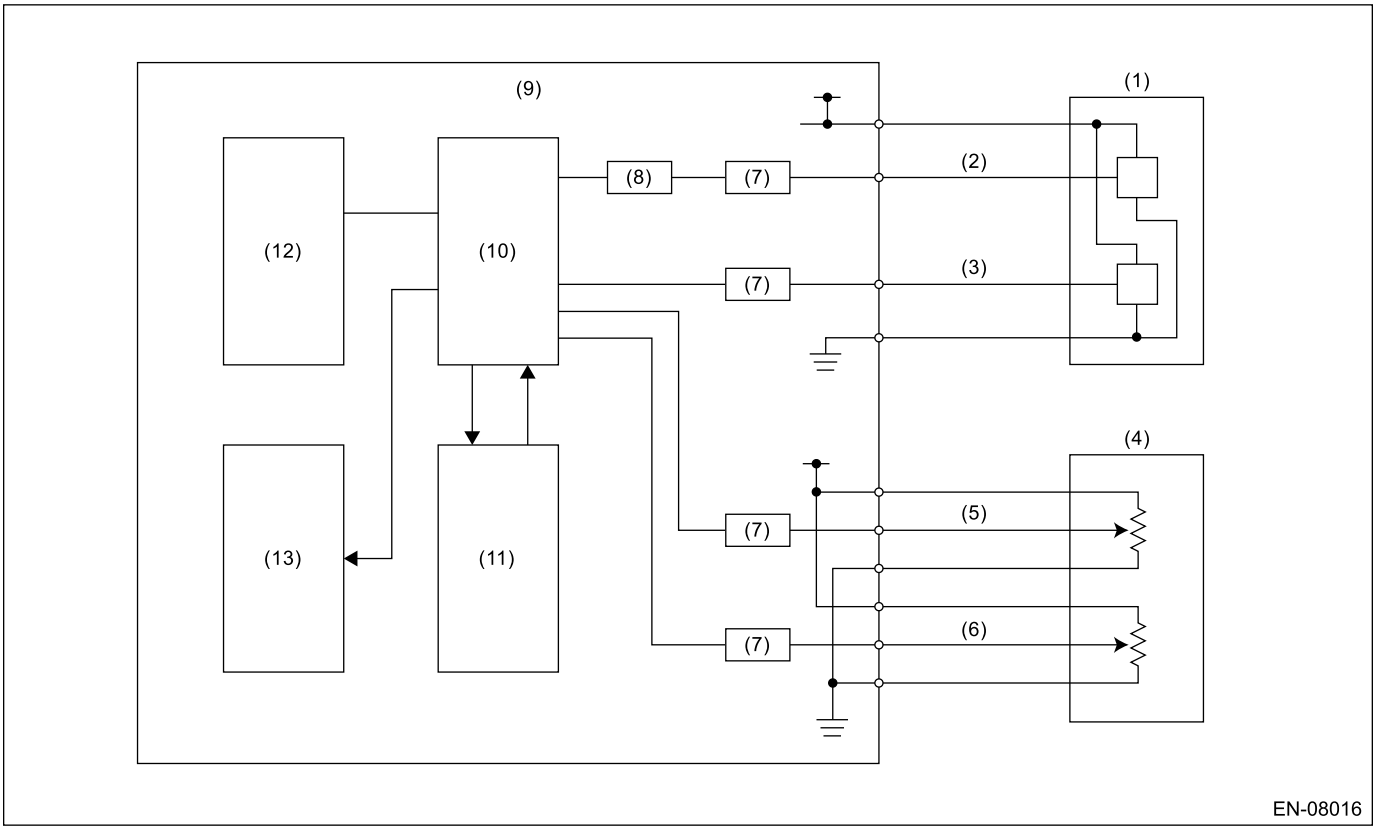
DTC P060A INTERNAL CONTROL MODULE MONITORING PROCESSOR PERFORMANCE

Note:
For the diagnostic procedure, refer to DTC P0606. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0606 CONTROL MODULE PROCESSOR.

1. OUTLINE OF DIAGNOSIS

Judge as NG when the monitoring IC operation is abnormal. (Monitoring IC malfunction)
Judgment1: Monitoring IC invalidation function
Judgment2: Monitoring IC calculation malfunction
Judgment3: Monitoring IC register observation
Judgment4: Count up timer monitoring

2. COMPONENT DESCRIPTION



(1) Throttle position sensor
(2) Throttle position sensor 1
(3) Throttle position sensor 2
(4) Accelerator pedal position sensor
(5) Accelerator pedal position sensor 1
(6) Accelerator pedal position sensor 2
(7) I/F circuit
(8) Amplifier circuit
(9) Engine control module (ECM)
(10) CPU
(11) Monitoring IC
(12) EEPROM
(13) Output IC

3. EXECUTION CONDITION

Judgment1:

Secondary parameters	Execution condition
• Battery voltage • When CPU intentionally sends motor continuity cut demand	≥ 6V

Judgment2:

Secondary parameters	Execution condition
• Battery voltage	≥ 6V

Secondary parameters	Execution condition
• CPU intentionally sends incorrect data	

Judgment3, 4:

Secondary parameters	Execution condition
Battery voltage	≥ 6V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when one of the following conditions is established.

Judgment1:

Judgment value

Malfunction Criteria	Threshold Value
(1) Main throttle position − Main throttle position when monitoring starts	≥ 2°

Judgment2:

Judgment value

Malfunction Criteria	Threshold Value
(2) Monitoring IC motor continuity cut demand	Not detected

Judgment3:

Judgment value

Malfunction Criteria	Threshold Value
(3) Monitoring IC register writing value	≠ Reading value

Judgment4:

Judgment value

Malfunction Criteria	Threshold Value
(4) Monitoring IC count up timer	Does not change

Time needed for diagnosis:

Judgment1: 24ms
Judgment2: 2192 ms
Judgment3: 8time(s)
Judgment4: 200ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P060B INTERNAL CONTROL MODULE A/D PROCESSING PERFORMANCE

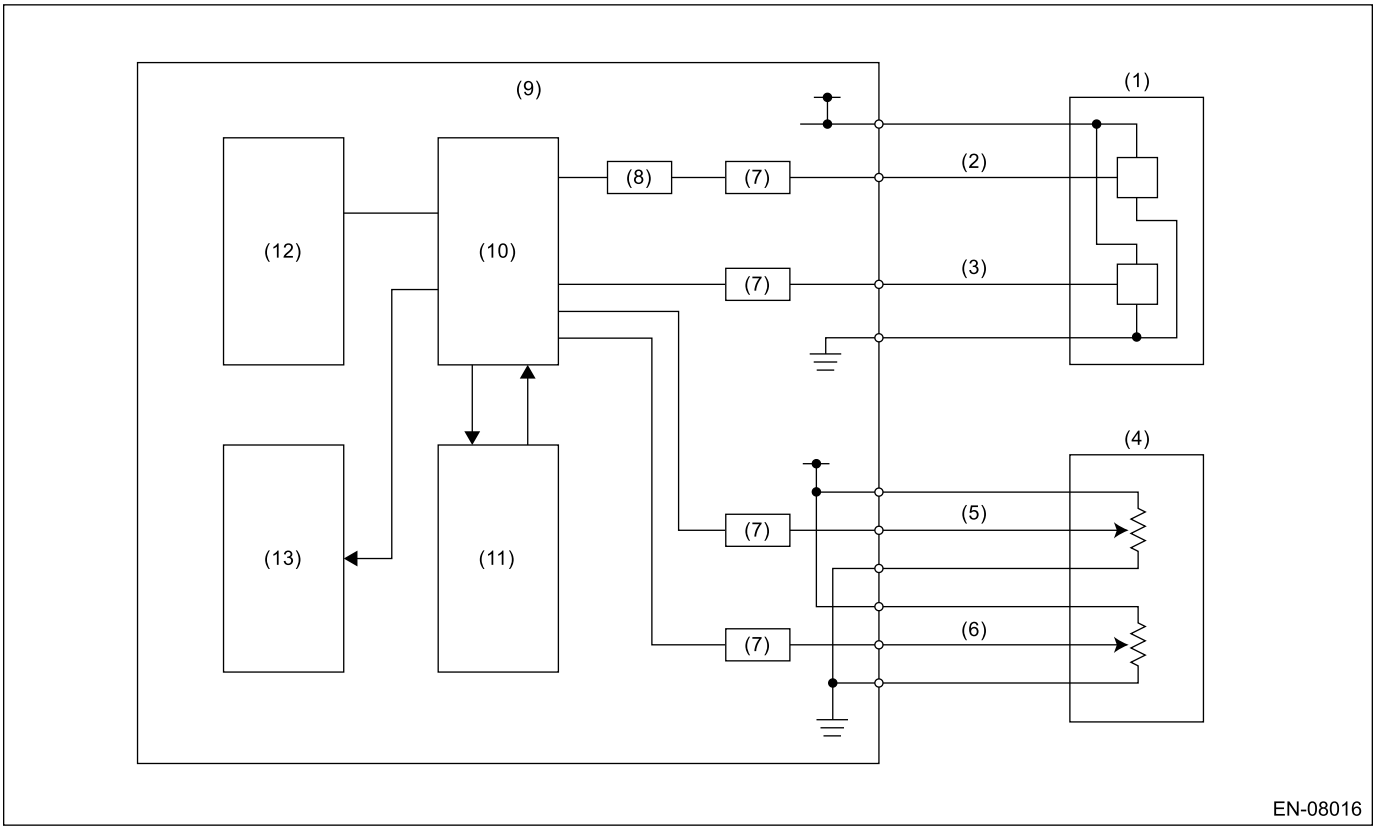
Note:
For the diagnostic procedure, refer to DTC P0606. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0606 CONTROL MODULE PROCESSOR.

1. OUTLINE OF DIAGNOSIS

Judge as NG when the A/D converter operation is abnormal.

- When the A/D converter operation is abnormal (ADC malfunction)
- When the input amplifier circuit of throttle position sensor 1 is abnormal (quadruple amplification problem).

2. COMPONENT DESCRIPTION



(1) Throttle position sensor
(2) Throttle position sensor 1
(3) Throttle position sensor 2
(4) Accelerator pedal position sensor
(5) Accelerator pedal position sensor 1
(6) Accelerator pedal position sensor 2
(7) I/F circuit
(8) Amplifier circuit
(9) Engine control module (ECM)
(10) CPU
(11) Monitoring IC
(12) EEPROM
(13) Output IC

3. EXECUTION CONDITION

Secondary parameters	Execution condition
(1), (2) and (3) Battery voltage	≥ 6V
(4) • Battery voltage • Main throttle position	≥ 6V < Value from Map
(5) • Battery voltage • Main throttle position	≥ 6V ≥ Value from Map

Map

Battery voltage	7.5V	8V
Main throttle position	27.5°	31°

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when one of the following conditions is established.

Judgment value

Malfunction Criteria	Threshold Value
(1) Absolute value monitoring	
A/D voltages for monitoring or	> 2.7 V
A/D voltages for monitoring	< 2.5 V
(2) A/D/ changes monitoring	
|(Buffer voltage of AD changes − base voltage of A/D changes)|	> 0.029296875V
(3) A/D voltages for monitoring	Did not change
(4) |(Throttle position sensor (Main) − (amplified throttle position sensor (Main)) / 4)|	≥ 3°
(5) (Amplified throttle position sensor (Main))/4	≤ 23.8235°

Time needed for diagnosis:

(1): 200ms
(2): 200ms
(3): 200ms
(4): 24ms
(5): 24ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0616 STARTER RELAY "A" CIRCUIT LOW

1. MODEL WITHOUT PUSH BUTTON START

DTC detecting condition:

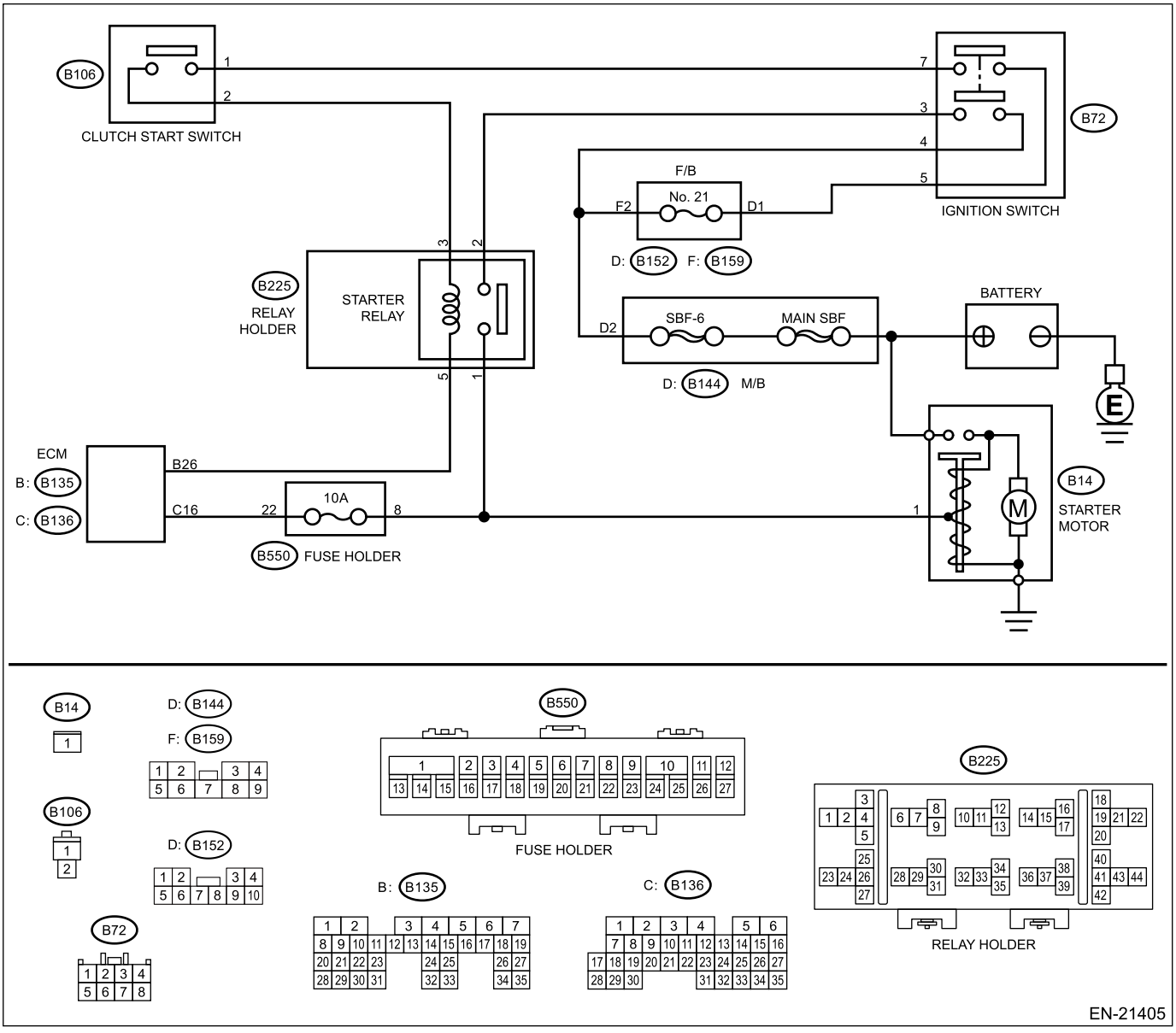
Immediately at fault recognition

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P0616 displayed? (Current malfunction)

Yes	Check DTC using "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND STARTER RELAY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Remove the starter relay.
3. Disconnect the connector from ECM.
4. Disconnect the connector from starter motor.
5. Measure the resistance of harness between ECM connector and starter relay connector.
   Connector & terminal
   (B136) No. 16 — (B225) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	**Note:** **Check the following item and repair or replace if necessary.** • **Open circuit of harness between ECM connector and starter relay connector** • **Blown out of fuse**

3. CHECK HARNESS BETWEEN ECM AND STARTER RELAY CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B136) No. 16 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Repair the poor contact of ECM connector.
No	Repair the short circuit to ground in harness between ECM connector and starter relay connector.

2. MODEL WITH PUSH BUTTON START

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

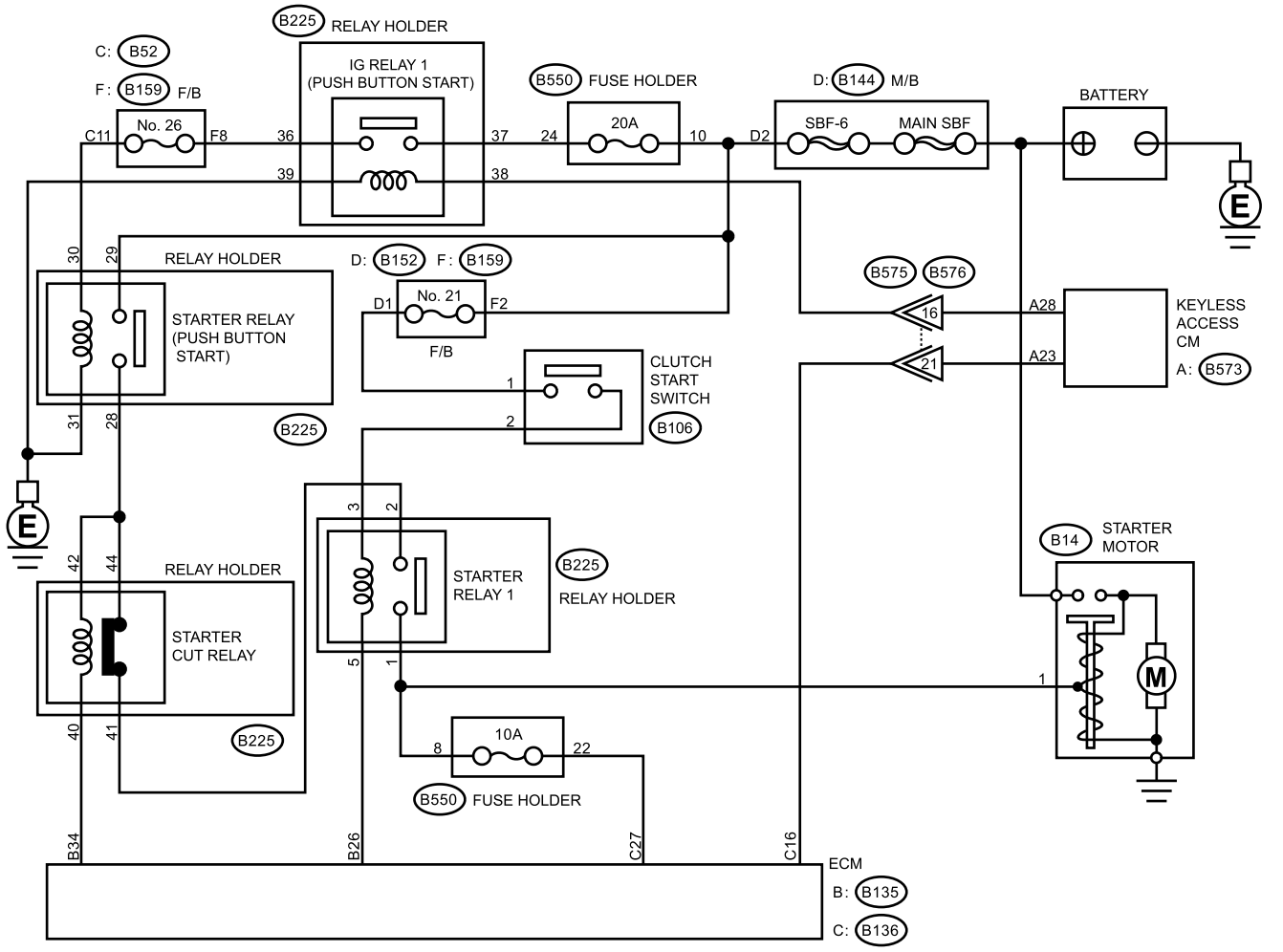
Failure of engine to start

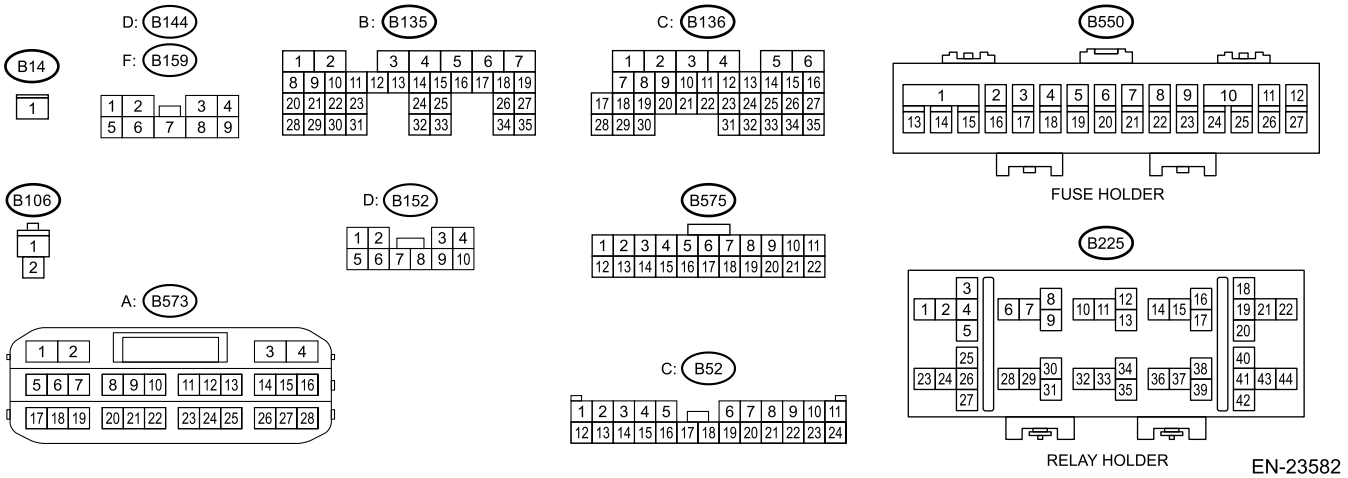
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B225 RELAY HOLDER
C: B52
F: B159 F/B
IG RELAY 1
(PUSH BUTTON START)
B550 FUSE HOLDER
D: B144 M/B
BATTERY
C11
No. 26
F8
36
37
24
20A
10
D2
SBF-6
MAIN SBF
39
38
E
30
29
RELAY HOLDER
STARTER RELAY
(PUSH BUTTON
START)
D: B152 F: B159
D1
No. 21
F2
F/B
B575 B576
16
21
A28
A23
KEYLESS
ACCESS
CM
A: B573
1
2
CLUTCH
START
SWITCH
B106
31
28
B225
E
3
2
B14 STARTER
MOTOR
42
44
RELAY HOLDER
STARTER
CUT RELAY
STARTER
RELAY 1
B225
RELAY HOLDER
5
1
1
M
40
41
B225
8
10A
22
B550 FUSE HOLDER
B34
B26
C27
C16
ECM
B: B135
C: B136


D: B144
F: B159
B14
1
B: B135
C: B136
B550
FUSE HOLDER
B106
1
2
D: B152
B575
A: B573
B225
C: B52
RELAY HOLDER

EN-23582

1. CHECK HARNESS BETWEEN ECM AND STARTER RELAY 1 CONNECTOR.

1. Turn the ignition to OFF.
2. Disconnect the connector from ECM.
3. Remove the starter relay 1.
4. Measure the resistance of harness between ECM connector and starter relay 1 connector.
   Connector & terminal
   (B136) No. 27 — (B225) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and starter relay 1 connector** • **Blown out of fuse**

2. CHECK HARNESS BETWEEN ECM AND STARTER RELAY 1 CONNECTOR.

1. Disconnect the connector from starter motor.
2. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 27 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Repair the poor contact of ECM connector.
No	Repair the short circuit to ground in harness between ECM connector and starter relay 1 connector.

3. OUTLINE OF DIAGNOSIS

- Model without push button start
  Detect abnormal continuity in the starter SW1.
  Judge as OFF NG when the starter SW 1 signal remains OFF.
- Model with push button start

Detect abnormal continuity in the starter SW 2.
Judge as OFF NG when the starter SW 2 signal remains OFF.

4. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 8V
Engine speed	Changes from 0 rpm to 500 rpm or more
Vehicle speed	< 1km/h (0.6MPH)
Starter relay drive	ON

5. GENERAL DRIVING CYCLE

Perform the diagnosis only once at engine start.

6. DIAGNOSTIC METHOD

Judge as OFF NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Starter SW1 signal (models without push button start) with battery voltage × 0.85 V or more Starter SW2 signal (models with push button start) with battery voltage × 0.85 V or more	Not detected

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0617 STARTER RELAY "A" CIRCUIT HIGH

1. MODEL WITHOUT PUSH BUTTON START

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

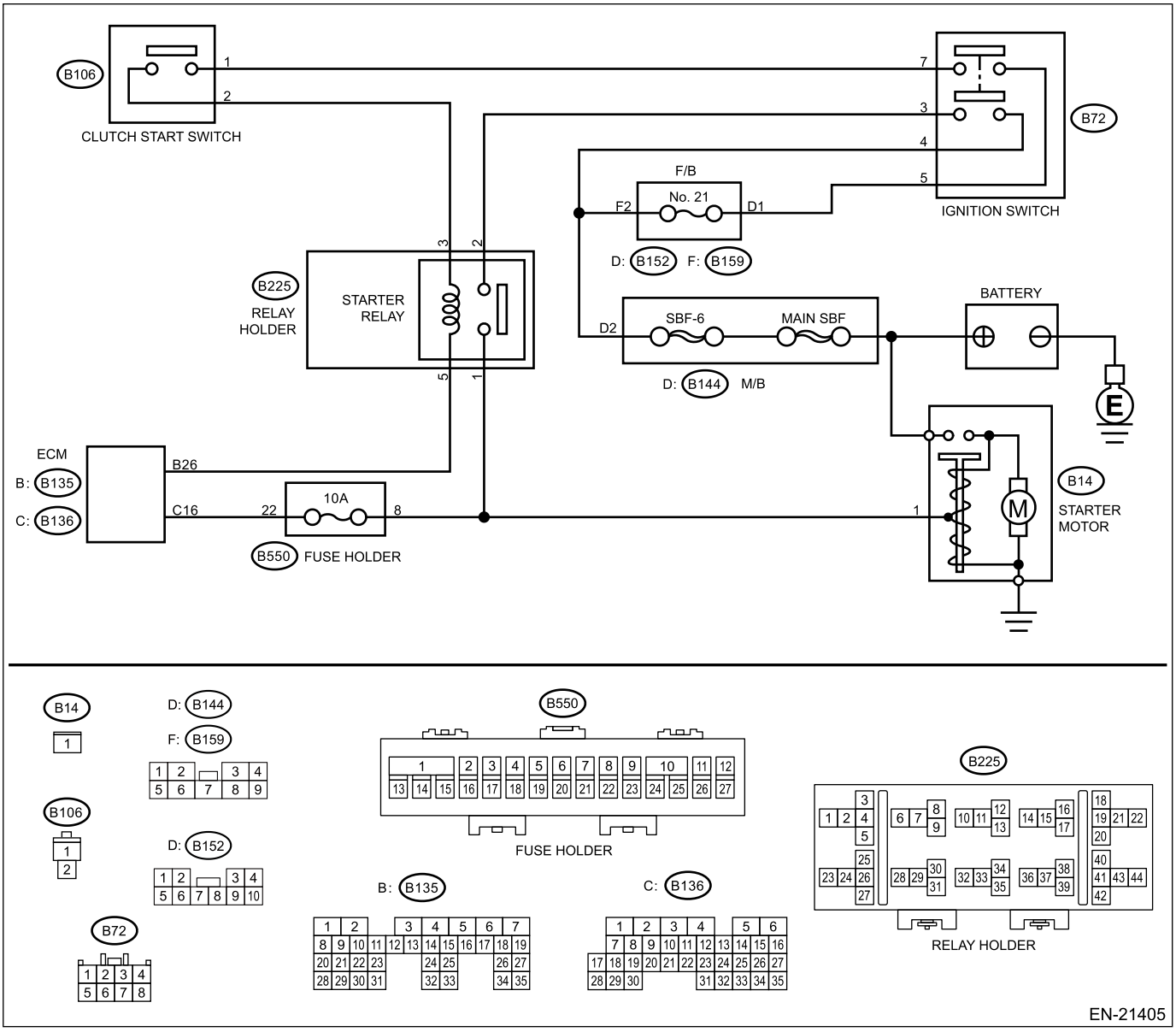
Failure of engine to start

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P0617 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND STARTER RELAY CONNECTOR.

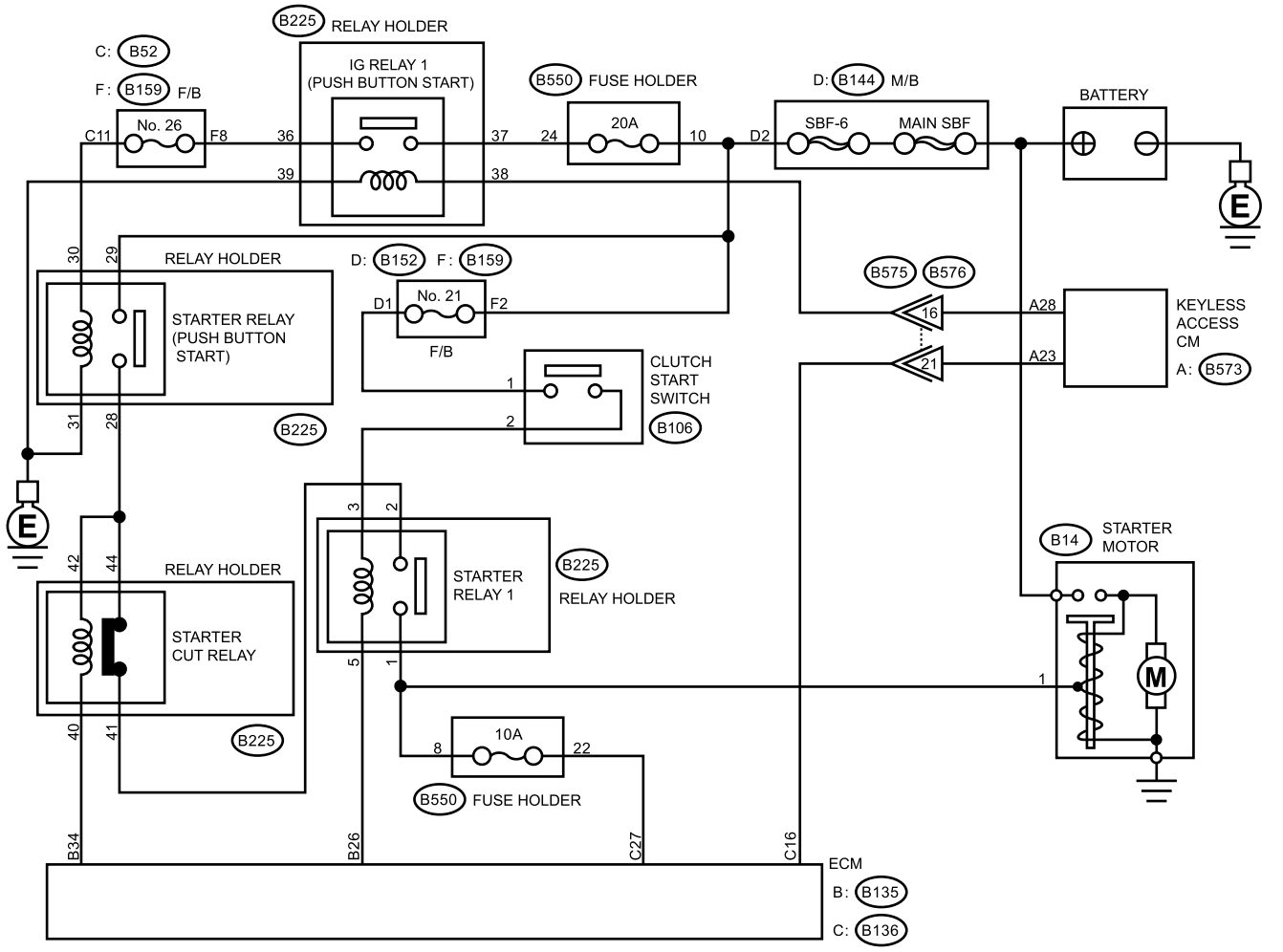
1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 16 (+) — Chassis ground (−):

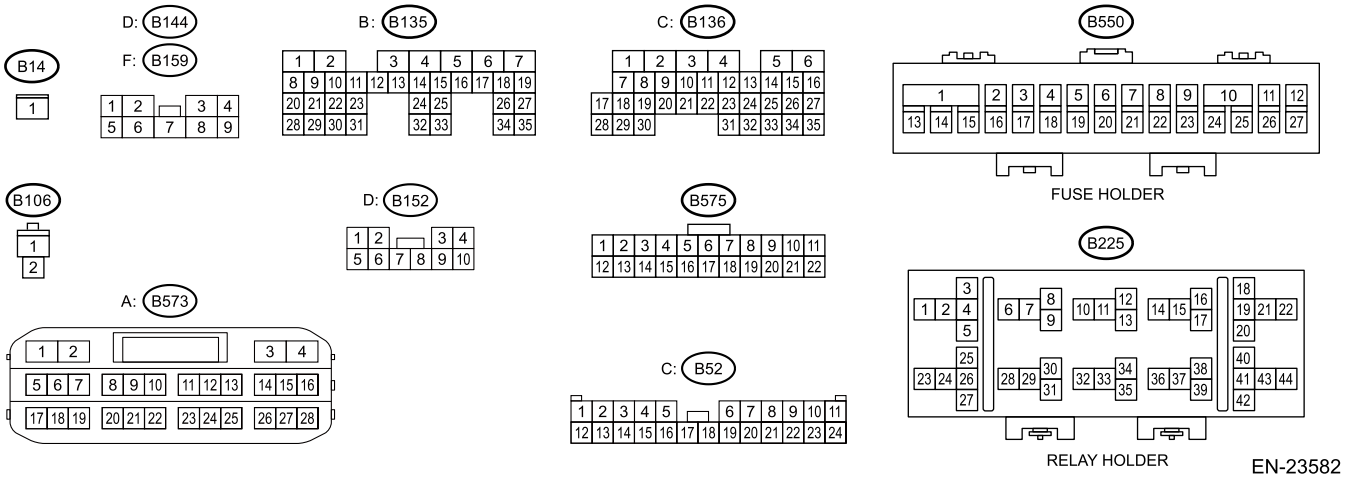
Is the voltage 10 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and starter relay connector.
No	Repair the poor contact of ECM connector.

2. MODEL WITH PUSH BUTTON START

DTC detecting condition:
Immediately at fault recognition
Trouble symptom:
Failure of engine to start
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..
Wiring diagram:
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B225 RELAY HOLDER
C: B52
F: B159 F/B
IG RELAY 1
(PUSH BUTTON START)
B550 FUSE HOLDER
D: B144 M/B
BATTERY
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No. 26
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MAIN SBF
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38
E
30
29
RELAY HOLDER
STARTER RELAY
(PUSH BUTTON
START)
D: B152 F: B159
D1
No. 21
F2
F/B
B575 B576
16
21
A28
A23
KEYLESS
ACCESS
CM
A: B573
1
2
CLUTCH
START
SWITCH
B106
31
28
B225
E
3
2
B14 STARTER
MOTOR
42
44
RELAY HOLDER
STARTER
CUT RELAY
STARTER
RELAY 1
B225
RELAY HOLDER
5
1
1
M
40
41
B225
8
10A
22
B550 FUSE HOLDER
B34
B26
C27
C16
ECM
B: B135
C: B136


D: B144
F: B159
B14
1
B: B135
C: B136
B550
FUSE HOLDER
B106
1
2
D: B152
B575
A: B573
B225
C: B52
RELAY HOLDER

EN-23582

1. CHECK STARTER MOTOR.

1. Turn the ignition to ON.
2. Check the starter motor condition.

Is the starter motor rotating?

Yes	Go to 2.
No	Repair the short circuit to power supply in harness. **Note:** **In this case, repair the following harnesses:** • **Short circuit to power supply in harness between ECM connector and starter relay 1 connector** • **Short circuit to power supply in harness between ECM connector and starter motor** • **Short circuit to power supply in harness between starter relay 1 connector and starter motor**

2. CHECK HARNESS BETWEEN STARTER CUT RELAY CONNECTOR AND STARTER RELAY 1 CONNECTOR.

1. Turn the ignition to OFF.
2. Disconnect the connector from starter motor.
3. Remove the starter cut relay.
4. Remove the starter relay 1.
5. Turn the ignition to ON.
6. Measure the voltage between starter relay 1 connector and chassis ground.
   Connector & terminal
   (B225) No. 2 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in harness between starter cut relay connector and starter relay 1 connector.
No	Go to 3.

3. CHECK STARTER CUT RELAY.

1. Connect the battery to starter cut relay terminals No. 40 and No. 42.
2. Measure the resistance between starter cut relay terminals.
   Terminals
   No. 41 — No. 44:

Is the resistance 1 MΩ or more?

Yes	Go to 6.
No	Replace the starter cut relay. Ref. to SECURITY AND LOCKS>Starter Cut Relay. Go to 4.

4. CHECK HARNESS BETWEEN ECM AND STARTER RELAY 1 CONNECTOR.

1. Disconnect the connector from ECM.
2. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B135) No. 26 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between ECM connector and starter relay 1 connector.

5. CHECK STARTER RELAY 1.

Measure the resistance between starter relay 1 terminals.

Terminals

No. 1 — No. 2:

Is the resistance 1 MΩ or more?

Yes	Go to 6.
No	Replace the starter relay 1. Ref. to ENGINE (DIAGNOSTICS)(STI)>Electrical Component Location>LOCATION.

6. CHECK HARNESS BETWEEN ECM, STARTER RELAY 1 CONNECTOR AND STARTER MOTOR.

1. Disconnect the connector from ECM.
2. Turn the ignition to ON.
3. Measure the voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 27 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power supply in harness. **Note:** **In this case, repair the following harnesses:** • **Short circuit to power supply in harness between ECM connector and starter relay 1 connector** • **Short circuit to power supply in harness between ECM connector and starter motor** • **Short circuit to power supply in harness between starter relay 1 connector and starter motor**
No	Repair the poor contact of ECM connector.

3. OUTLINE OF DIAGNOSIS

- Model without push button start
  Detect abnormal continuity in the starter SW1.
  Judge as ON NG when the starter SW 1 signal remains ON.
- Model with push button start
  Detect abnormal continuity in the starter SW 2.

Judge as ON NG when the starter SW 2 signal remains ON.

4. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 8V
Engine speed	≥ 500 rpm
Starter relay drive	OFF

5. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

6. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Starter SW 1 signal (model without push button start) Starter SW 2 signal (model with push button start)	≥ Battery voltage × 0.85 V

time needed for diagnosis: 30000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

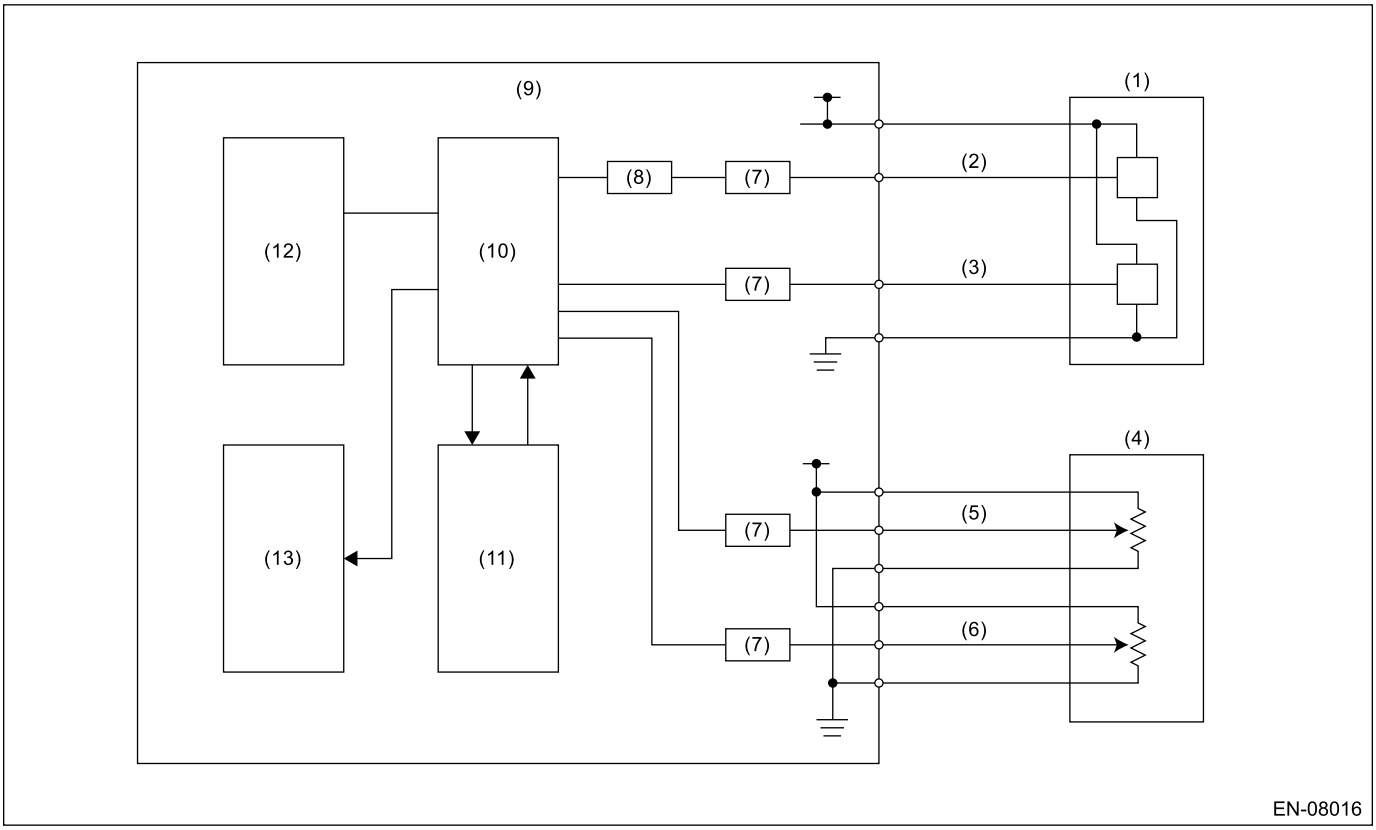
DTC P062F INTERNAL CONTROL MODULE EEPROM ERROR

Note:
For the diagnostic procedure, refer to DTC P0606. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0606 CONTROL MODULE PROCESSOR.

1. OUTLINE OF DIAGNOSIS

Judge as NG when the EEPROM operation is abnormal. (EEPROM malfunction)

2. COMPONENT DESCRIPTION



(1) Throttle position sensor
(2) Throttle position sensor 1
(3) Throttle position sensor 2
(4) Accelerator pedal position sensor
(5) Accelerator pedal position sensor 1
(6) Accelerator pedal position sensor 2
(7) I/F circuit
(8) Amplifier circuit
(9) Engine control module (ECM)
(10) CPU
(11) Monitoring IC
(12) EEPROM
(13) Output IC

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Ignition switch	ON
Battery voltage	≥ 6 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Diagnosis 1

Judgment value

Malfunction Criteria	Threshold Value
Time needed for storing data in EEPROM	≥ 48 ms

Diagnosis 2

Judgment value

Malfunction Criteria	Threshold Value
EEPROM writing	Error

Time needed for diagnosis:

- **Diagnosis 1:** 48 ms
- **Diagnosis 2:** 2 times

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0685 ECM/PCM POWER RELAY CONTROL CIRCUIT/OPEN

DTC detecting condition:

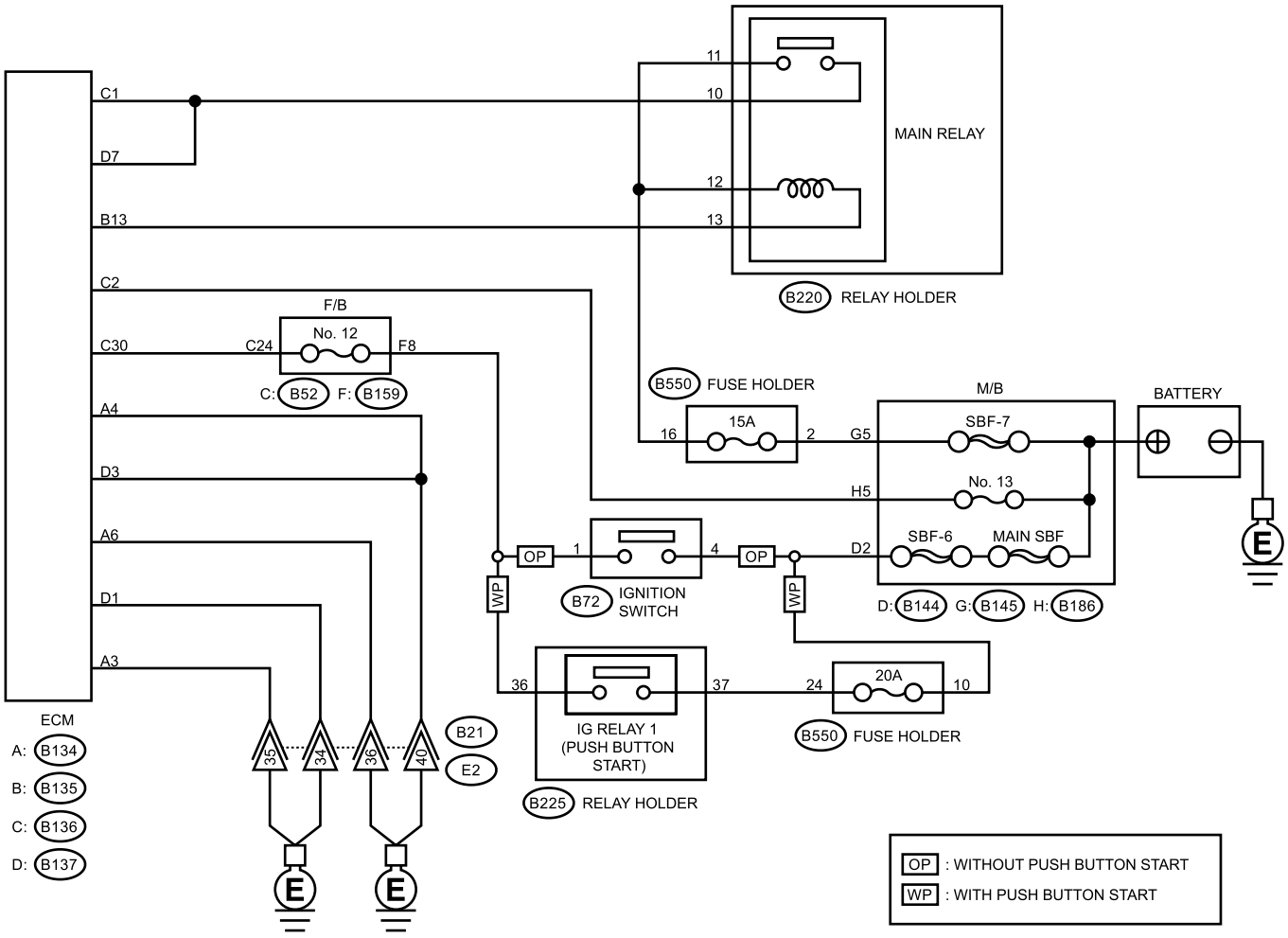
Detected when two consecutive driving cycles with fault occur.

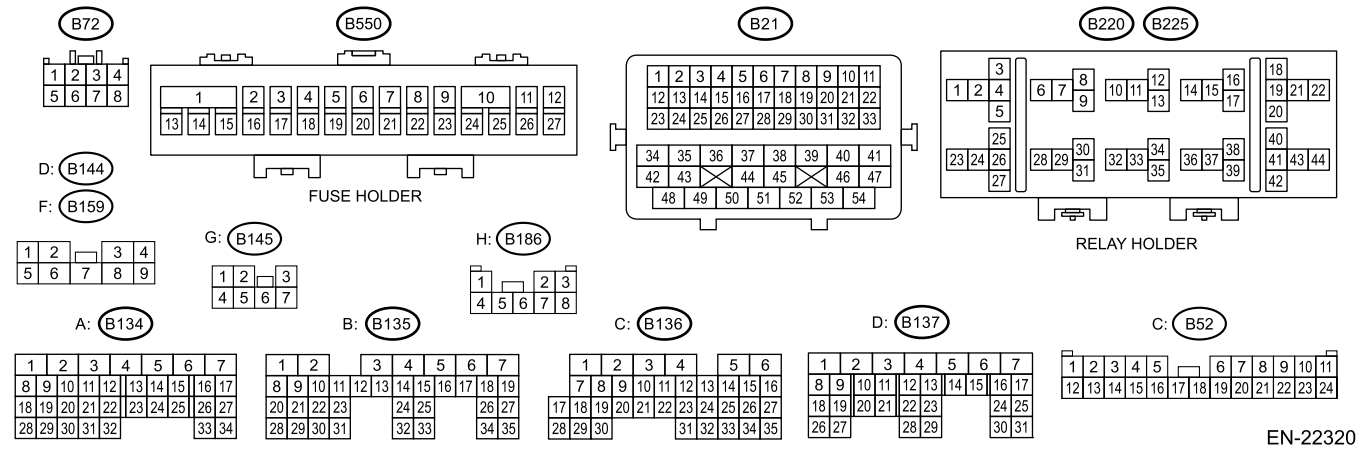
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and Inspection Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


C1
D7
B13
C2
C30
A4
D3
A6
D1
A3
ECM
A: B134
B: B135
C: B136
D: B137
11
10
12
13
MAIN RELAY
B220 RELAY HOLDER
F/B
No. 12
C24
F8
C: B52 F: B159
B550 FUSE HOLDER
16
15A
2
G5
M/B
SBF-7
BATTERY
H5
No. 13
OP
1
4
D2
SBF-6
MAIN SBF
WP
B72 IGNITION SWITCH
D: B144 G: B145 H: B186
36
37
24
20A
10
IG RELAY 1 (PUSH BUTTON START)
B550 FUSE HOLDER
B225 RELAY HOLDER
35
34
36
40
B21
E2
OP : WITHOUT PUSH BUTTON START
WP : WITH PUSH BUTTON START


B72
B550
B21
B220
B225
D: B144
F: B159
FUSE HOLDER
G: B145
H: B186
RELAY HOLDER
A: B134
B: B135
C: B136
D: B137
C: B52

EN-22320

1. CHECK ECM CONNECTOR.

Check the connecting condition of ECM connector.

Is the ECM connector correctly connected?

Yes	Go to 2.
No	Connect the ECM connector correctly.

2. CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Remove the main relay.
3. Disconnect the connector from ECM.
4. Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B135) No. 13 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and main relay connector.

3. CHECK HARNESS BETWEEN ECM AND MAIN RELAY CONNECTOR.

1. Install the main relay.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 1 (+) — Chassis ground (−):
   (B137) No. 7 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Short circuit to power supply in harness between ECM connector and main relay connector** • **Defective main relay**
No	Repair the poor contact of ECM connector.

1. OUTLINE OF DIAGNOSIS

Detect the main relay stuck to ON.
Judge as NG when ECM keeps operating for more than predetermined time although the main relay does not turn to OFF after ignition switch is turned to OFF.

2. COMPONENT DESCRIPTION

The main relay controls the current in the coil section to switch ON/OFF the ECM by receiving instructions from the ignition switch and Evaporative Leak Check Module.

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Main relay	OFF instruction

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once when the enable conditions are established with the ignition switch OFF → ON.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.
Judgment value

Malfunction Criteria	Threshold Value
ECM status	In operation

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P081A STARTER DISABLE CIRCUIT LOW

Immediately at fault recognition

Trouble symptom:

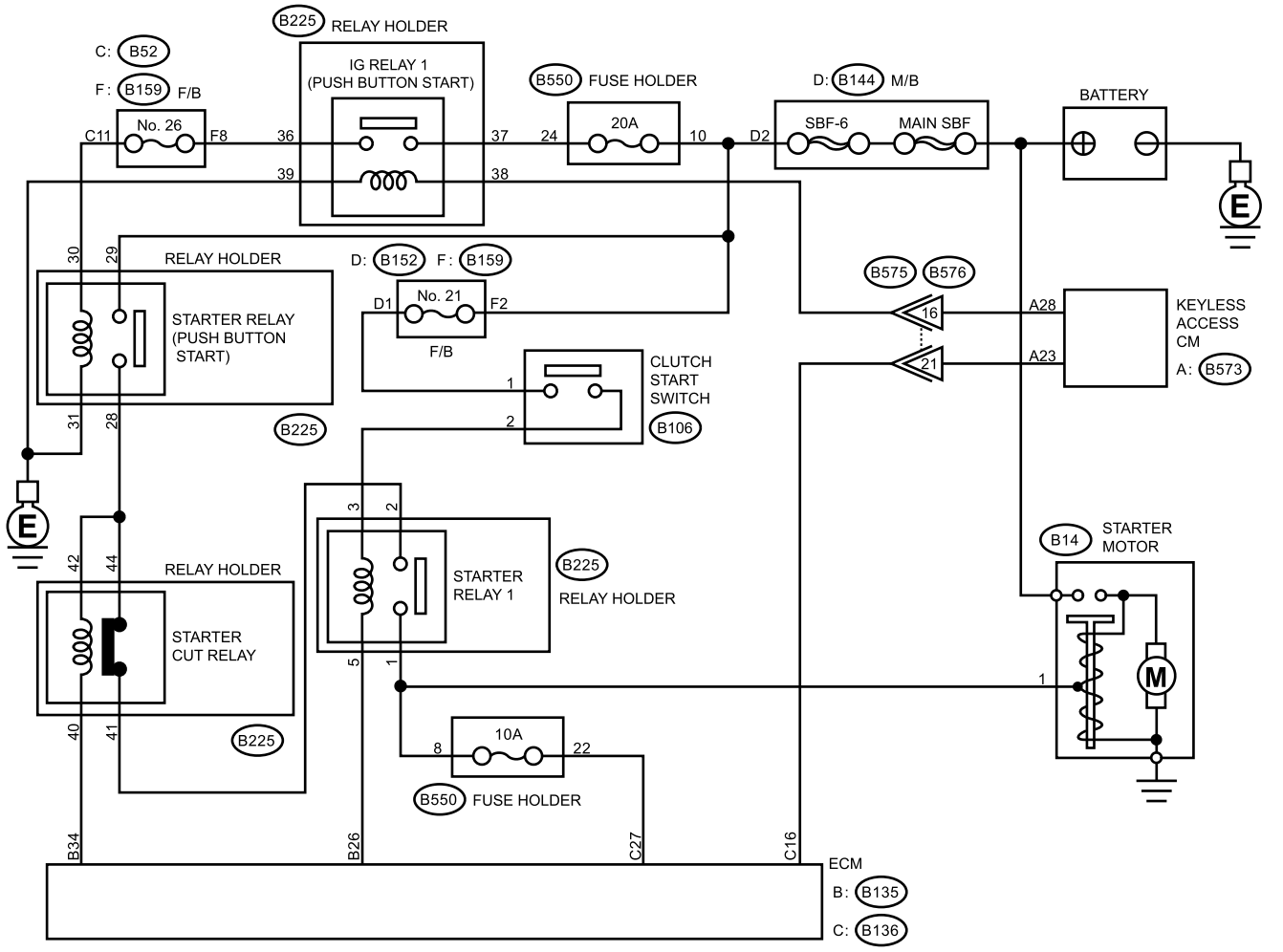
Failure of engine to start

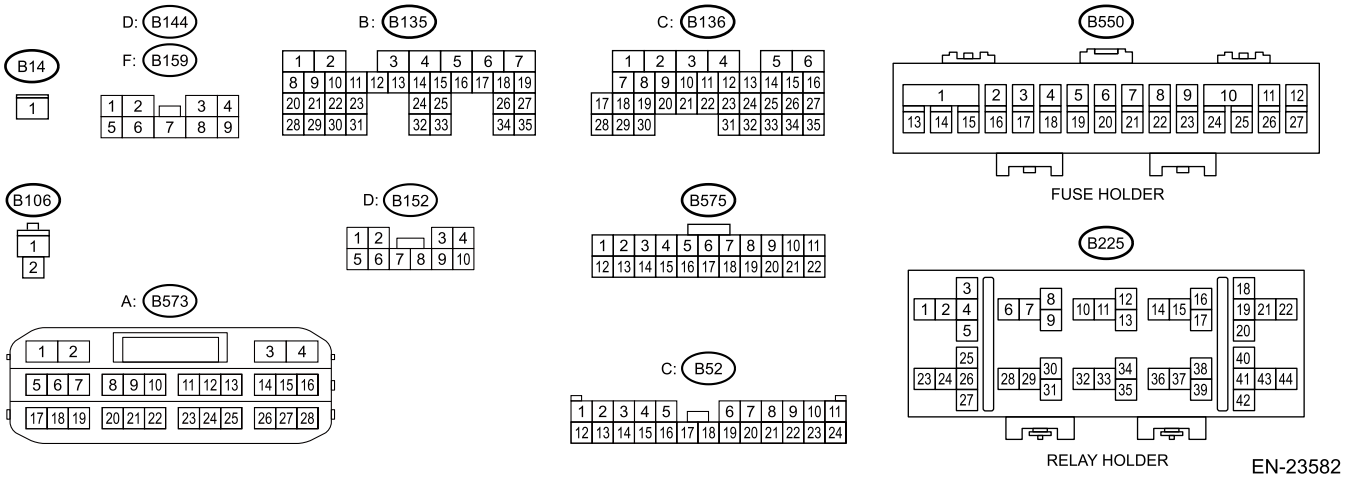
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B225 RELAY HOLDER
C: B52
F: B159 F/B
IG RELAY 1
(PUSH BUTTON START)
B550 FUSE HOLDER
D: B144 M/B
BATTERY
C11
No. 26
F8
36
37
24
20A
10
D2
SBF-6
MAIN SBF
39
38
E
30
29
RELAY HOLDER
STARTER RELAY
(PUSH BUTTON
START)
D: B152 F: B159
D1
No. 21
F2
F/B
B575 B576
16
21
A28
A23
KEYLESS
ACCESS
CM
A: B573
1
2
CLUTCH
START
SWITCH
B106
31
28
B225
E
3
2
B14 STARTER
MOTOR
42
44
RELAY HOLDER
STARTER
CUT RELAY
STARTER
RELAY 1
B225
RELAY HOLDER
5
1
1
M
40
41
B225
8
10A
22
B550 FUSE HOLDER
B34
B26
C27
C16
ECM
B: B135
C: B136


D: B144
F: B159
B14
1
B: B135
C: B136
B550
FUSE HOLDER
B106
1
2
D: B152
B575
A: B573
B225
C: B52
RELAY HOLDER

EN-23582

1. CHECK HARNESS BETWEEN STARTER RELAY (PUSH BUTTON START) CONNECTOR AND STARTER CUT RELAY CONNECTOR.

1. Turn the ignition to OFF.
2. Remove the starter relay (push button start).
3. Remove the starter cut relay.
4. Measure the resistance of harness between starter relay (push button start) connector and starter cut relay connector.
   Connector & terminal
   (B225) No. 28 — (B225) No. 42:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the open circuit in harness between starter relay (push button start) connector and starter cut relay connector.

2. CHECK HARNESS BETWEEN ECM AND STARTER CUT RELAY CONNECTOR.

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and starter cut relay connector.
   Connector & terminal
   (B135) No. 34 — (B225) No. 40:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the open circuit of harness between ECM connector and starter cut relay connector.

3. CHECK STARTER CUT RELAY.

1. Connect the battery to starter cut relay terminals No. 40 and No. 42.
2. Measure the resistance between starter cut relay terminals.
   Terminals
   No. 41 — No. 44:

Is the resistance 1 MΩ or more?

Yes	Repair the poor contact of ECM connector.
No	Replace the starter cut relay. Ref. to SECURITY AND LOCKS>Starter Cut Relay.

1. OUTLINE OF DIAGNOSIS

Detect abnormal continuity in the starter cut relay.
Judge as NG when the starter cut relay output line is open.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 8V
Engine speed	Changes from 0 rpm to 500 rpm or more
Vehicle speed	< 1km/h (0.6MPH)
Starter cut relay drive	OFF

3. GENERAL DRIVING CYCLE

Perform the diagnosis only once at engine start.

4. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.
Judgment value

Malfunction Criteria	Threshold Value
Starter cut relay control signal that exceeds battery voltage × 0.34 V	Not detected

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P0851 PARK/NEUTRAL SWITCH INPUT CIRCUIT LOW

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

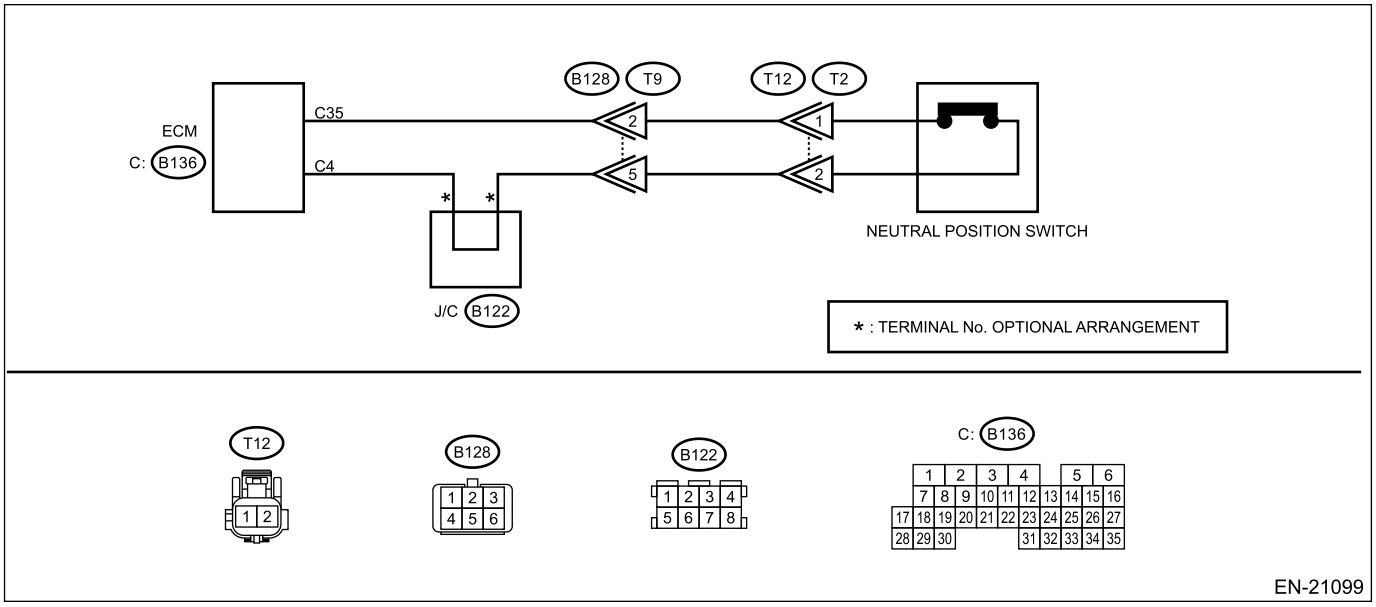
Trouble symptom:

Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK INPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Place the gear shift lever in a position other than neutral.
3. Measure the voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 35 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the poor contact of ECM connector.
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the neutral position switch.
4. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 35 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Replace the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch.
No	Repair the short circuit to ground harness between ECM connector and neutral position switch connector.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of neutral SW.
Judge as NG when there is no change in the neutral SW regardless of driving condition with shift changes (there should be neutral SW ON/OFF inversion considering the vehicle speed and engine speed).

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
The number of driving condition change from a) to b)	= 1time(s)
a)	
Vehicle speed	≤0km/h (0MPH)
and	
Engine speed	≥600rpm and ≤900rpm
b)	
Vehicle speed	≥64km/h (39.8MPH)
and	
Engine speed	≥1400rpm and ≤2200rpm

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously in 2 seconds after starting the engine.

4. DIAGNOSTIC METHOD

Judge NG when the malfunction criteria below are completed determined times or more after the neutral SW change.

Judgment value

Malfunction Criteria	Threshold Value
Neutral switch output voltage	≤ Battery voltage × 0.19 V

time needed for diagnosis:1time(s)

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P0852 PARK/NEUTRAL SWITCH INPUT CIRCUIT HIGH

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

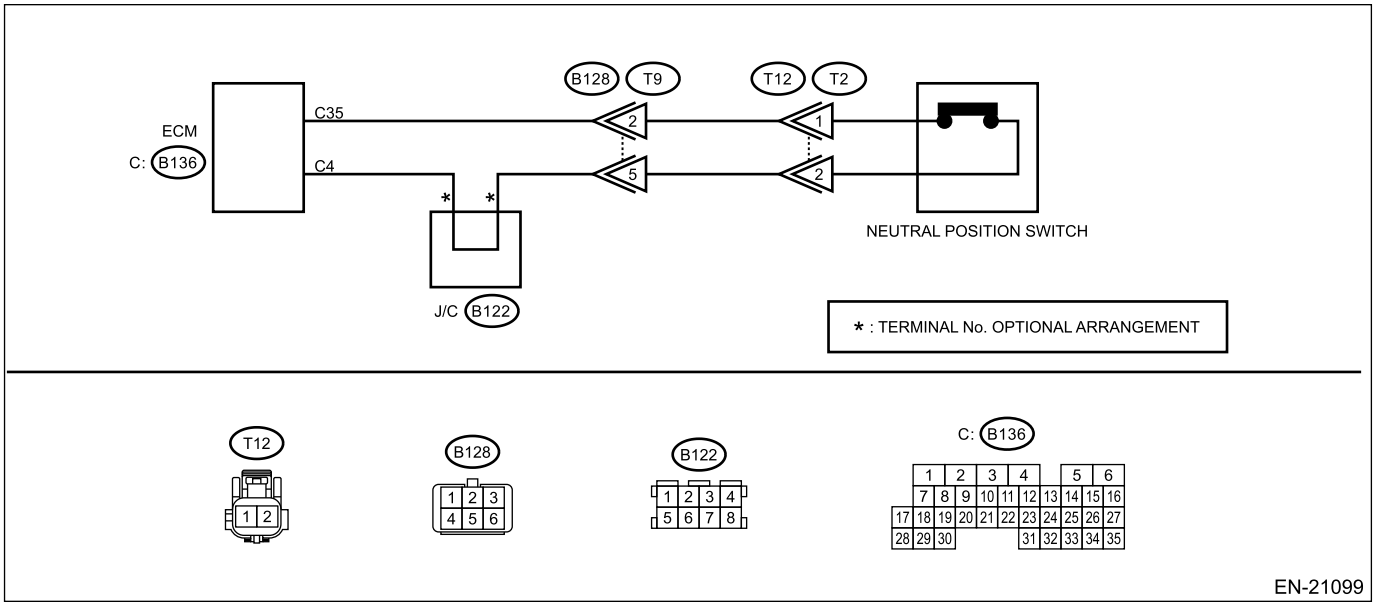
Trouble symptom:

Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK INPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Place the gear shift lever in neutral.
3. Measure the voltage between ECM connector and chassis ground.

   Connector & terminal

   (B136) No. 35 (+) — Chassis ground (−):

Is the voltage less than 1 V?

Yes	Repair the poor contact of ECM connector.
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND NEUTRAL POSITION SWITCH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the neutral position switch.
4. Measure the resistance of harness between ECM connector and transmission harness connector.
   Connector & terminal
   (B136) No. 35 — (T12) No. 1:
   (B136) No. 4 — (T12) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and transmission harness connector** • **Poor contact of coupling connector**

3. CHECK NEUTRAL POSITION SWITCH.

1. Place the gear shift lever in neutral.
2. Measure the resistance between transmission harness connector terminals.
   Connector & terminal
   (T2) No. 1 — (T2) No. 2:

Is the resistance less than 1 Ω?

Yes	Repair the poor contact of transmission harness connector.
No	Replace the neutral position switch. Ref. to MANUAL TRANSMISSION AND DIFFERENTIAL(6MT)(TY85)>Neutral Position Switch.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of neutral SW.
Judge as NG when there is no change in the neutral SW regardless of driving condition with shift changes (there should be neutral SW ON/OFF inversion considering the vehicle speed and engine speed).

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
The number of driving condition change from a) to b)	= 1time(s)
a)	
Vehicle speed	≤0km/h (0MPH)
and	
Engine speed	≥600rpm and ≤900rpm
b)	
Vehicle speed	≥64km/h (39.8MPH)
and	
Engine speed	≥1400rpm and ≤2200rpm

3. GENERAL DRIVING CYCLE

Perform the diagnosis continuously in 2 seconds after starting the engine.

4. DIAGNOSTIC METHOD

Judge NG when the malfunction criteria below are completed determined times or more after the neutral SW change.

Judgment value

Malfunction Criteria	Threshold Value
Neutral switch output voltage	≥ Battery voltage × 0.6 V

time needed for diagnosis:1time(s)
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

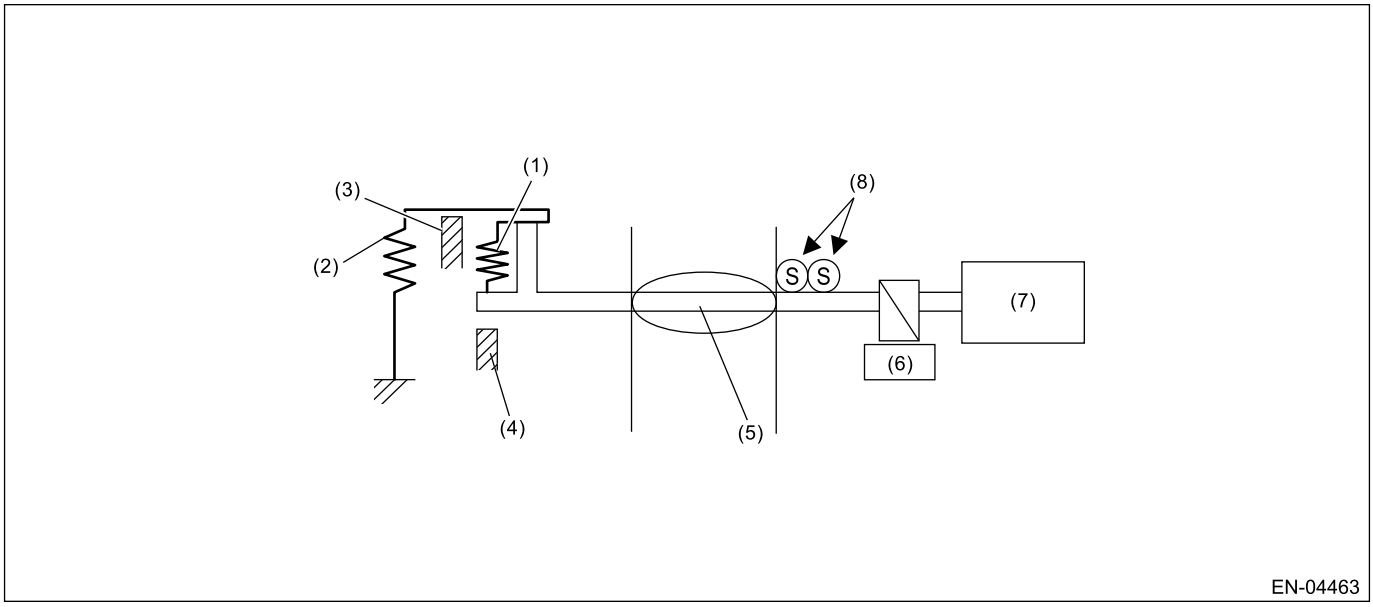
DTC P1160 THROTTLE RETURN SPRING

Note:
For the diagnostic procedure, refer to DTC P2101. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE.

1. OUTLINE OF DIAGNOSIS

Judge as NG when the valve is opened more than the default opening angle, but does not move to the close direction with the motor power stopped.

2. COMPONENT DESCRIPTION



(1) Opener spring
(2) Return spring
(3) Intermediate stopper
(4) Full closed stopper
(5) Throttle valve
(6) Gear
(7) DC motor
(8) Main and sub throttle position sensor

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 6V
Ignition switch	OFF
Elapsed time after motor continuity OFF	= 1.6 s

4. GENERAL DRIVING CYCLE

- Ignition switch ON → OFF
- Ignition switch OFF → ON (Only after clearing memory)

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Sensor 1 opening angle with power OFF − Sensor 1 opening angle	< 2°

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P1410 SECONDARY AIR INJECTION SYSTEM COMBINATION VALVE STUCK OPEN

DTC detecting condition:
Immediately at fault recognition
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK SECONDARY AIR COMBINATION VALVE.

1. Remove the secondary air combination valve. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve.
2. Blow in air from the secondary air combination valve air inlet, and check whether there are leaks at the pipe connections.

Are there air leaks from the pipe connections?

Yes	Replace the secondary air combination valve on the side with the air leak. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve.
No	Perform the diagnostic procedure of DTC P2440. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2440 SECONDARY AIR SYSTEM SWITCHING VALVE STUCK OPEN BANK 1.

1. OUTLINE OF DIAGNOSIS

Always detect abnormality that both combination valve electromagnetic valve and the reed valve are open failure.
Calculate the integrated value of Max./Min. value and output voltage deviation of the secondary air delivery pipe pressure sensor output voltage in a given time after engine start. Judge as NG if the integrated value and the difference between Max. and Min. values are large.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Engine speed	≥ 500rpm
Elapsed time after starting the engine	≥ 9000ms

Secondary parameters	Execution condition
After secondary air system stops	≥ 9000ms
After fuel cut	≥ 1000ms

3. GENERAL DRIVING CYCLE

Perform continuous diagnosis when air flow amount is large during the secondary air pump stop after engine start.

4. DIAGNOSTIC METHOD

When both combination valve electromagnetic valve and the reed valve are open failure, the failure appears as pulses in the secondary air delivery pipe pressure sensor output. Detect abnormality by capturing these pulses using the following method.
Calculate Max./Min. value of the secondary air delivery pipe pressure sensor output voltage and the sum of the output voltage deviation for the given time. Compare the difference between Max. and Min. values with threshold value and also compare the sum value with the threshold value. If both values exceed the threshold value, count up NG counter and then judge as NG if the counter reaches the given times.

Judgment value

Malfunction Criteria	Threshold Value
Difference between maximum and minimum values of pipe inner pressure (value at 40 s)	≥ 0.05V
Sum of the pipe inner pressure variation value every 4 ms	≥ 5V

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P1449 EVAP SYSTEM CLOG DETECTED (AIR FILTER)

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is other than DTC P1449 displayed? (Current malfunction)

Yes — Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).

No — Go to 2.

2. CHECK DRAIN TUBE A AND DRAIN PIPE BETWEEN LEAK CHECK VALVE ASSEMBLY AND DRAIN FILTER.

2 Check the drain tube A or the drain pipe between leak check valve assembly and drain filter.

Is the drain tube A or the drain pipe between leak check valve assembly and drain filter clogged?

Yes — Replace the drain tube A or the drain pipe between leak check valve assembly and drain filter. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Drain Filter.

No — Go to 3.

3. CHECK DRAIN FILTER.

Check the drain filter.

Is the drain filter clogged?

Yes	Replace the drain filter. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Drain Filter.
No	Go to 4.

4. CHECK LEAK CHECK VALVE ASSEMBLY (PRESSURE SENSOR).

1. Turn the ignition switch to ON.
2. Start monitoring «Evap System Absolute Pressure» using «OBD System» on Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Application help".
3. Read the value of «Evap System Absolute Pressure» while wiggling the harness and connector between the leak check valve assembly and ECM.

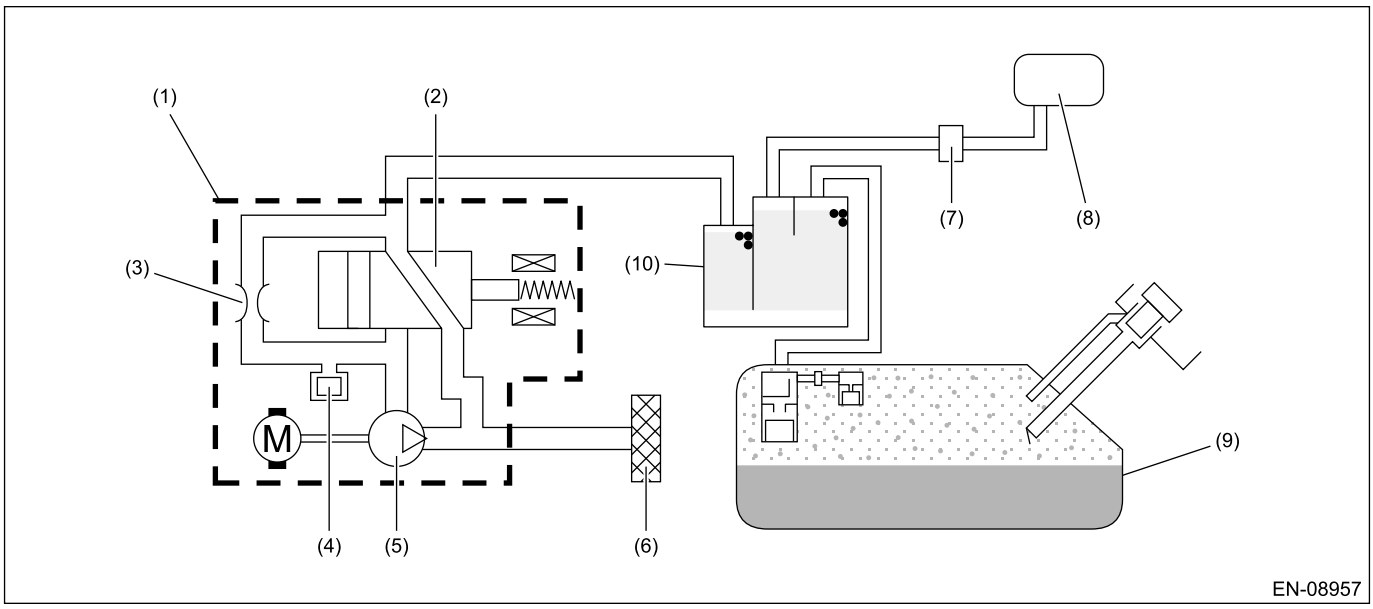
Does the value of «Evap System Absolute Pressure» change?

Yes	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and the leak check valve assembly connector** • **Poor contact of coupling connector** • **Poor contact of joint connector**
No	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.

1. OUTLINE OF DIAGNOSIS

Detect the drain filter clogging by the pressure change during purge introduction.
Judge as drain filter clogging malfunction if the pressure in the evaporative emission system piping suddenly decreases by the purging.

2. COMPONENT DESCRIPTION



(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

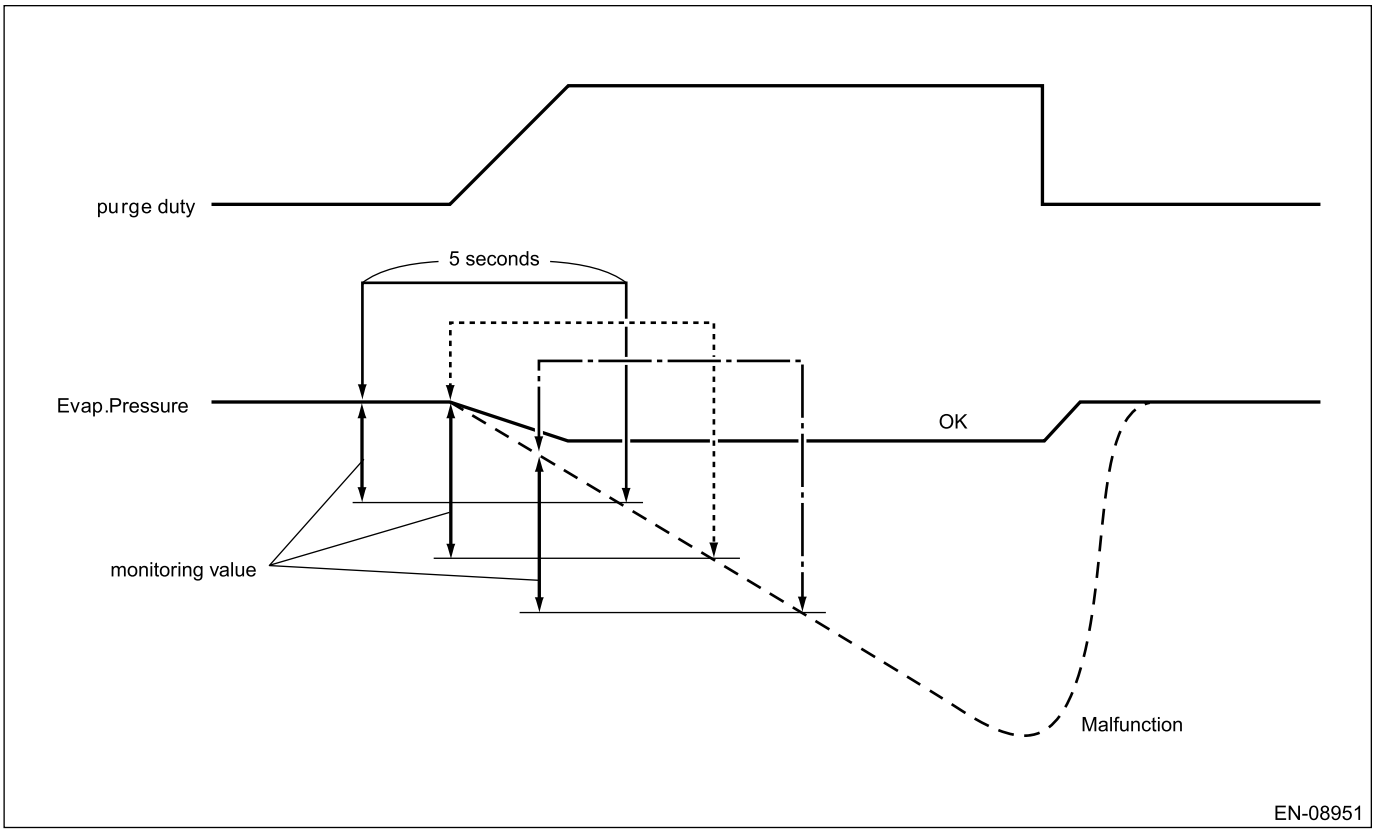
3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Elapsed time after starting the engine	≥ 20000ms
Evaporative Leak Check Module vacuum pump	Not in operation
Evaporative Leak Check Module switching valve	Open

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when purging is performed after 20000ms have passed since the engine started.

5. DIAGNOSTIC METHOD



Calculate the difference between the Evaporative Leak Check Module pressure sensor output value of 5 seconds ago and the value at the present moment, and if the value is greater than the judgment value, detect as filter clogging trouble and judge as malfunction.
Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
|Pressure sensor output value as of 5 seconds ago − Current pressure sensor output value|	> 969.3Pa (7.27mmHg, 0.3inHg)

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P1451 EVAP SYSTEM CLOG DETECTED (PIPE)

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DRAIN TUBE BETWEEN CANISTER AND LEAK CHECK VALVE ASSEMBLY.

Check the drain tube between the canister and leak check valve assembly.

Is the drain tube between canister and leak check valve assembly clogged?

Yes	Replace the drain tube between the canister and leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.
No	Go to 2.

2. CHECK HOSE AND TUBE BETWEEN CANISTER AND FUEL TANK.

Check the hose or tube between the canister and fuel tank.

Are the hose and tube between the canister and fuel tank clogged?

Yes	Replace the hose or tube between the canister and fuel tank. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Canister. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Tank.
No	Replace the canister. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Canister. After the operation is complete, go to the next step. Go to 3.

3. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM.

Perform drive cycle I. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle>PROCEDURE > DRIVE CYCLE I.

Is DTC P1451 displayed on the display?

Yes	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.
No	End.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0455. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK).

DTC P2004 TGV CONTROL STUCK OPEN BANK 1

DTC detecting condition:
Immediately at fault recognition
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P2004 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK TUMBLE GENERATOR VALVE RH.

1. Remove the tumble generator valve assembly RH.
2. Check the tumble generator valve body.

Is there any dirt or clogging with foreign objects in the tumble generator valve?

Yes	Clean the tumble generator valve.
No	Replace the tumble generator valve assembly RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Tumble Generator Valve Assembly.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of tumble generator valve motor function.
Judge open fixing malfunction when the opening degree is large even after finishing the tumble generator valve closing driving.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage Elapsed time after tumble generator valve “closed” signal output	≥ 10.9 V ≥ 3200ms

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Tumble generator valve opening angle	≥ 71.4°

time needed for diagnosis: 3000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2005 TGV CONTROL STUCK OPEN BANK 2

DTC detecting condition:
Immediately at fault recognition
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P2005 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK TUMBLE GENERATOR VALVE LH.

1. Remove the tumble generator valve assembly LH.
2. Check the tumble generator valve body.

Is there any dirt or clogging with foreign objects in the tumble generator valve?

Yes	Clean the tumble generator valve.
No	Replace the tumble generator valve assembly LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Tumble Generator Valve Assembly.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of tumble generator valve motor function.
Judge open fixing malfunction when the opening degree is large even after finishing the tumble generator valve closing driving.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage Elapsed time after tumble generator valve “closed” signal output	≥ 10.9 V ≥ 3200ms

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Tumble generator valve opening angle	≥ 71.4°

time needed for diagnosis: 3000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2006 TGV CONTROL STUCK CLOSED BANK 1

DTC detecting condition:
Immediately at fault recognition
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P2006 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK TUMBLE GENERATOR VALVE RH.

1. Remove the tumble generator valve assembly RH.
2. Check the tumble generator valve body.

Is there any dirt or clogging with foreign objects in the tumble generator valve?

Yes	Clean the tumble generator valve.
No	Replace the tumble generator valve assembly RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Tumble Generator Valve Assembly.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of tumble generator valve motor function.
Judge close fixing malfunction when the opening degree is small even after finishing the tumble generator valve open driving.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Elapsed time after tumble generator valve “open” signal output	≥ 4600ms

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Tumble generator valve opening angle	< 71.4°

time needed for diagnosis: 3000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2007 TGV CONTROL STUCK CLOSED BANK 2

DTC detecting condition:
Immediately at fault recognition
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P2007 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK TUMBLE GENERATOR VALVE LH.

1. Remove the tumble generator valve assembly LH.
2. Check the tumble generator valve body.

Is there any dirt or clogging with foreign objects in the tumble generator valve?

Yes	Clean the tumble generator valve.
No	Replace the tumble generator valve assembly LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Tumble Generator Valve Assembly.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of tumble generator valve motor function.
Judge close fixing malfunction when the opening degree is small even after finishing the tumble generator valve open driving.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage Elapsed time after tumble generator valve “open” signal output	≥ 10.9 V ≥ 4600ms

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Tumble generator valve opening angle	< 71.4°

time needed for diagnosis: 3000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2008 TGV CONTROL CIRCUIT/OPEN BANK 1

DTC detecting condition:

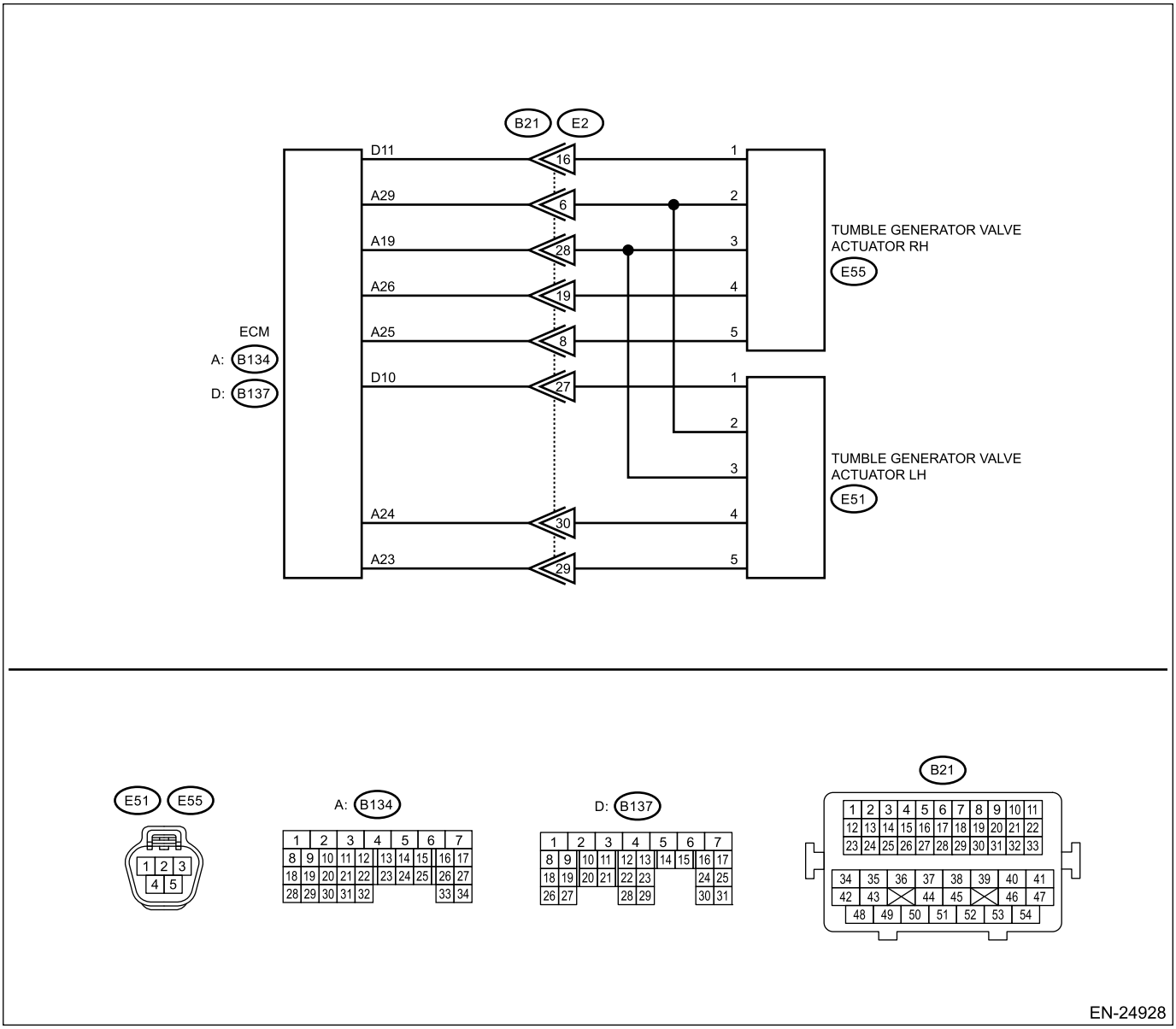
Immediately at fault recognition

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from tumble generator valve actuator RH.
4. Measure the resistance of harness between ECM connector and tumble generator valve actuator RH connector.

   Connector & terminal

   (B134) No. 25 — (E55) No. 5:

   (B134) No. 26 — (E55) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and tumble generator valve actuator RH connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B134) No. 25 — Chassis ground:

(B134) No. 26 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and tumble generator valve actuator RH connector.

3. CHECK FOR POOR CONTACT.

Check for poor contact of tumble generator valve actuator RH connector.

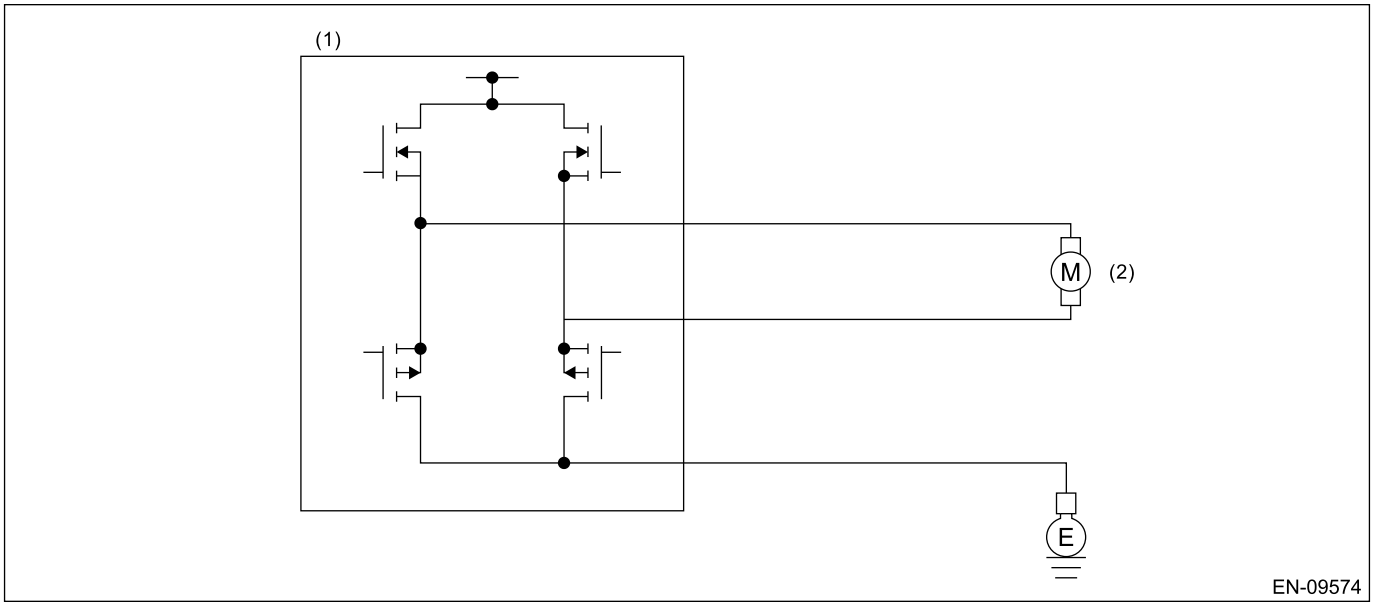
Is there poor contact of the tumble generator valve actuator RH connector?

Yes	Repair the poor contact of tumble generator valve actuator RH connector.
No	Replace the tumble generator valve actuator RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Tumble Generator Valve Actuator. **Note:** **The tumble generator valve actuator cannot be disassembled.**

1. OUTLINE OF DIAGNOSIS

Detect the open circuit of tumble generator valve motor.
Judge as NG when the output voltage remains high when the tumble generator valve motor is not energized.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM) (2) Tumble generator valve

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Tumble generator valve drive duty	≤ 79.17%

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≥ Battery voltage × 0.55 V

time needed for diagnosis: 32 ms × 20time(s)
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2009 TGV CONTROL CIRCUIT LOW BANK 1

DTC detecting condition:

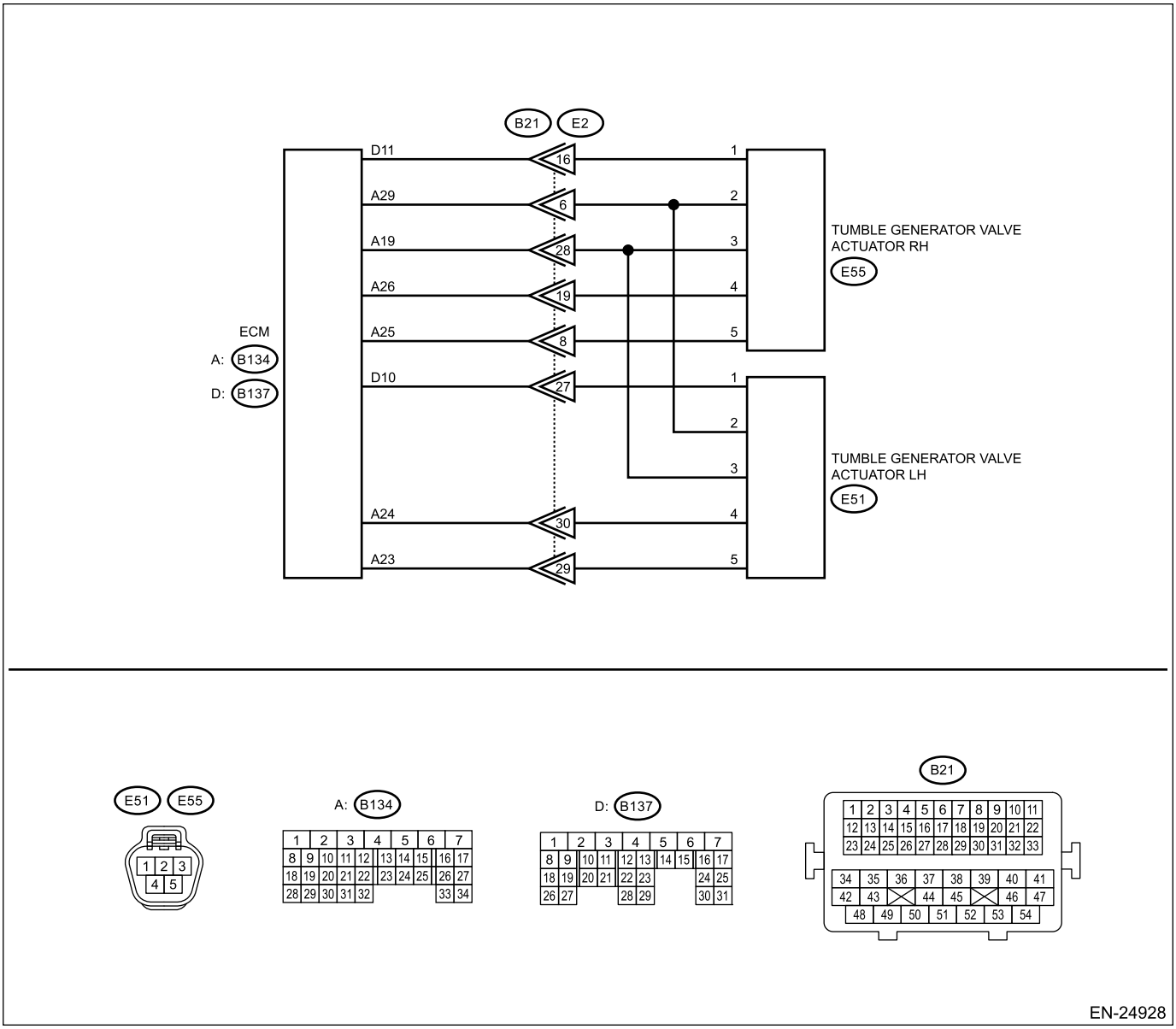
Immediately at fault recognition

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B134) No. 25 (+) — Chassis ground (−):
   (B134) No. 26 (+) — Chassis ground (−):

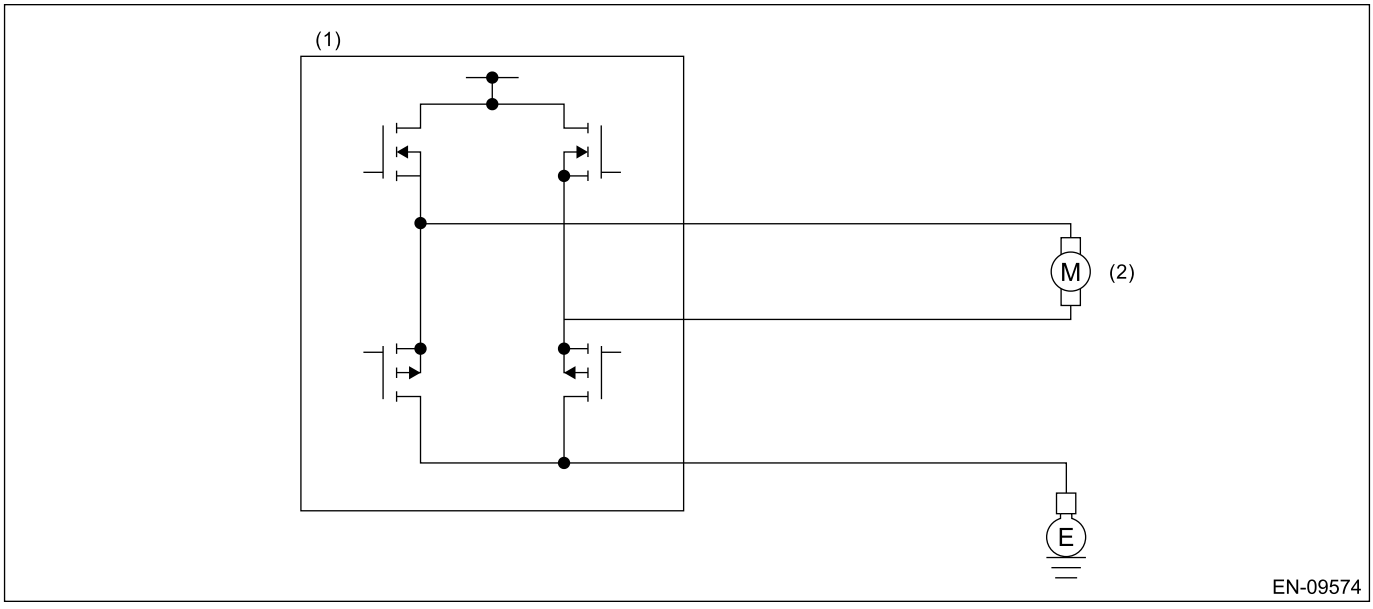
Is the voltage 5 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and tumble generator valve actuator RH connector.
No	Replace the tumble generator valve actuator RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Tumble Generator Valve Actuator. **Note:** **The tumble generator valve actuator cannot be disassembled.**

1. OUTLINE OF DIAGNOSIS

Detect the short circuit of tumble generator valve motor.
Judge as NG when the overcurrent signal is sent from IC after tumble generator valve driving IC diagnosis.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM) (2) Tumble generator valve

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Tumble generator valve instruction	Open or Closed

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Overcurrent signal from driver	ON

time needed for diagnosis: 96ms × 10time(s)
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2011 TGV CONTROL CIRCUIT/OPEN BANK 2

DTC detecting condition:

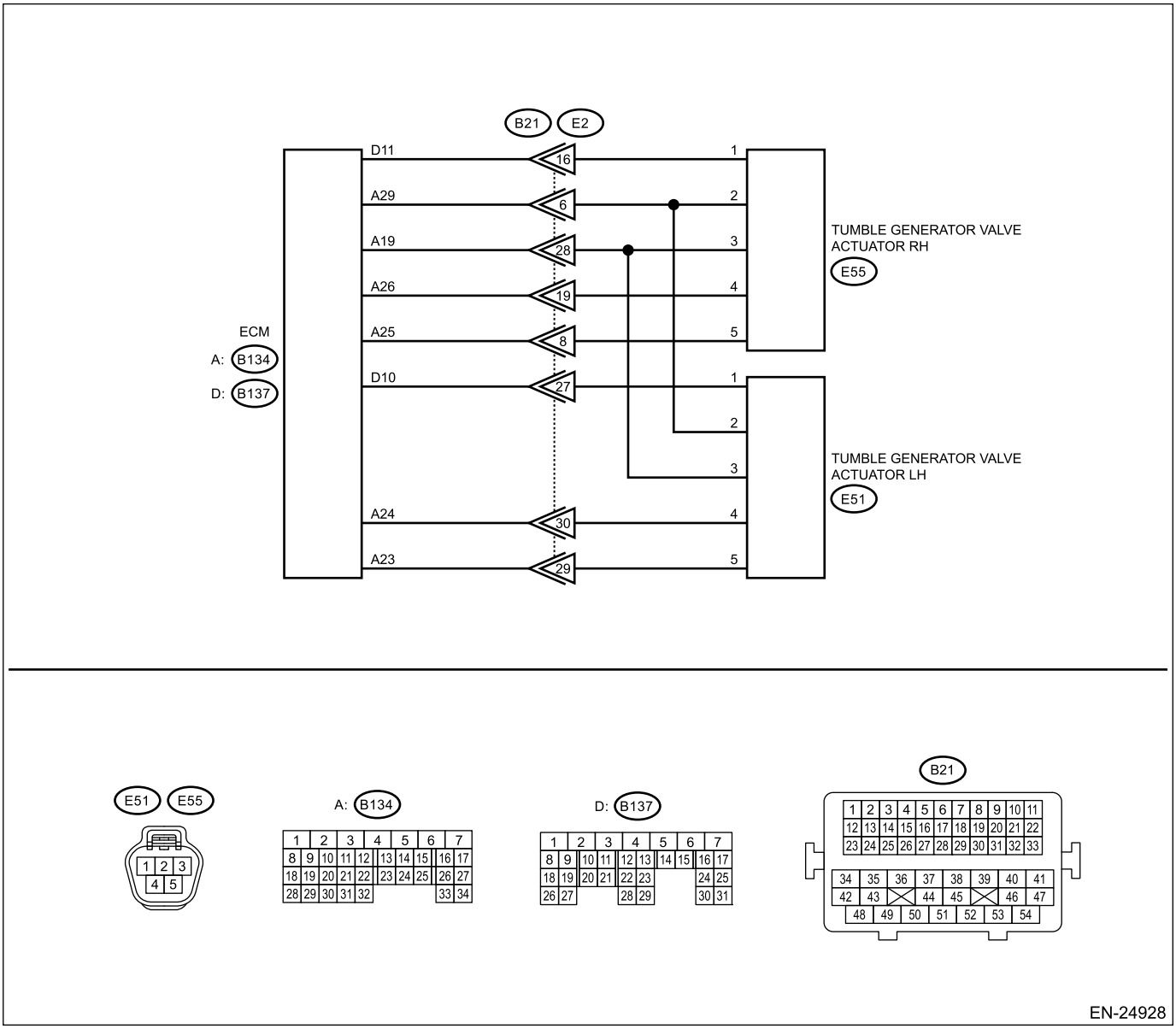
Immediately at fault recognition

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from tumble generator valve actuator LH.
4. Measure the resistance of harness between ECM connector and tumble generator valve actuator LH connector.

   Connector & terminal

   (B134) No. 23 — (E51) No. 5:

   (B134) No. 24 — (E51) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and tumble generator valve actuator LH connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B134) No. 23 — Chassis ground:

(B134) No. 24 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and tumble generator valve actuator LH connector.

3. CHECK FOR POOR CONTACT.

Check for poor contact of tumble generator valve actuator LH connector.

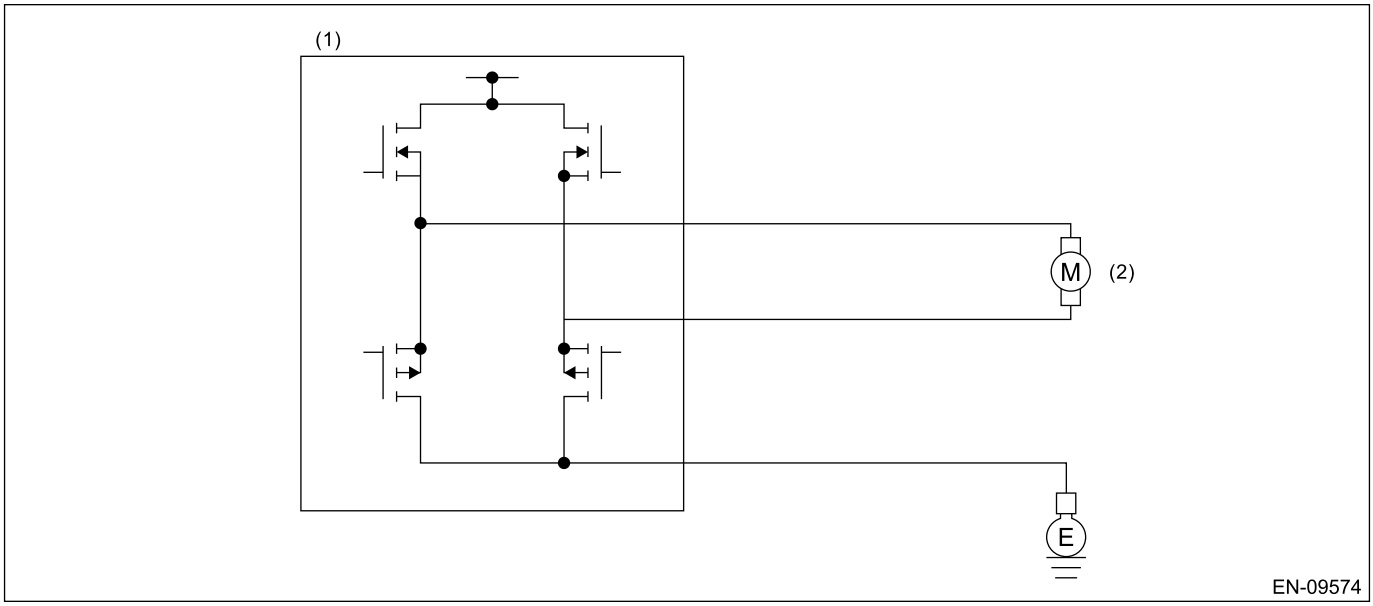
Is there poor contact of the tumble generator valve actuator LH connector?

Yes	Repair the poor contact of tumble generator valve actuator LH connector.
No	Replace the tumble generator valve actuator LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Tumble Generator Valve Actuator. **Note:** **The tumble generator valve actuator cannot be disassembled.**

1. OUTLINE OF DIAGNOSIS

Detect the open circuit of tumble generator valve motor.
Judge as NG when the output voltage remains high when the tumble generator valve motor is not energized.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM) (2) Tumble generator valve

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage Tumble generator valve drive duty	≥ 10.9 V ≤ 79.17%

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≥ Battery voltage × 0.55 V

time needed for diagnosis: 32 ms × 20time(s)
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2012 TGV CONTROL CIRCUIT LOW BANK 2

DTC detecting condition:

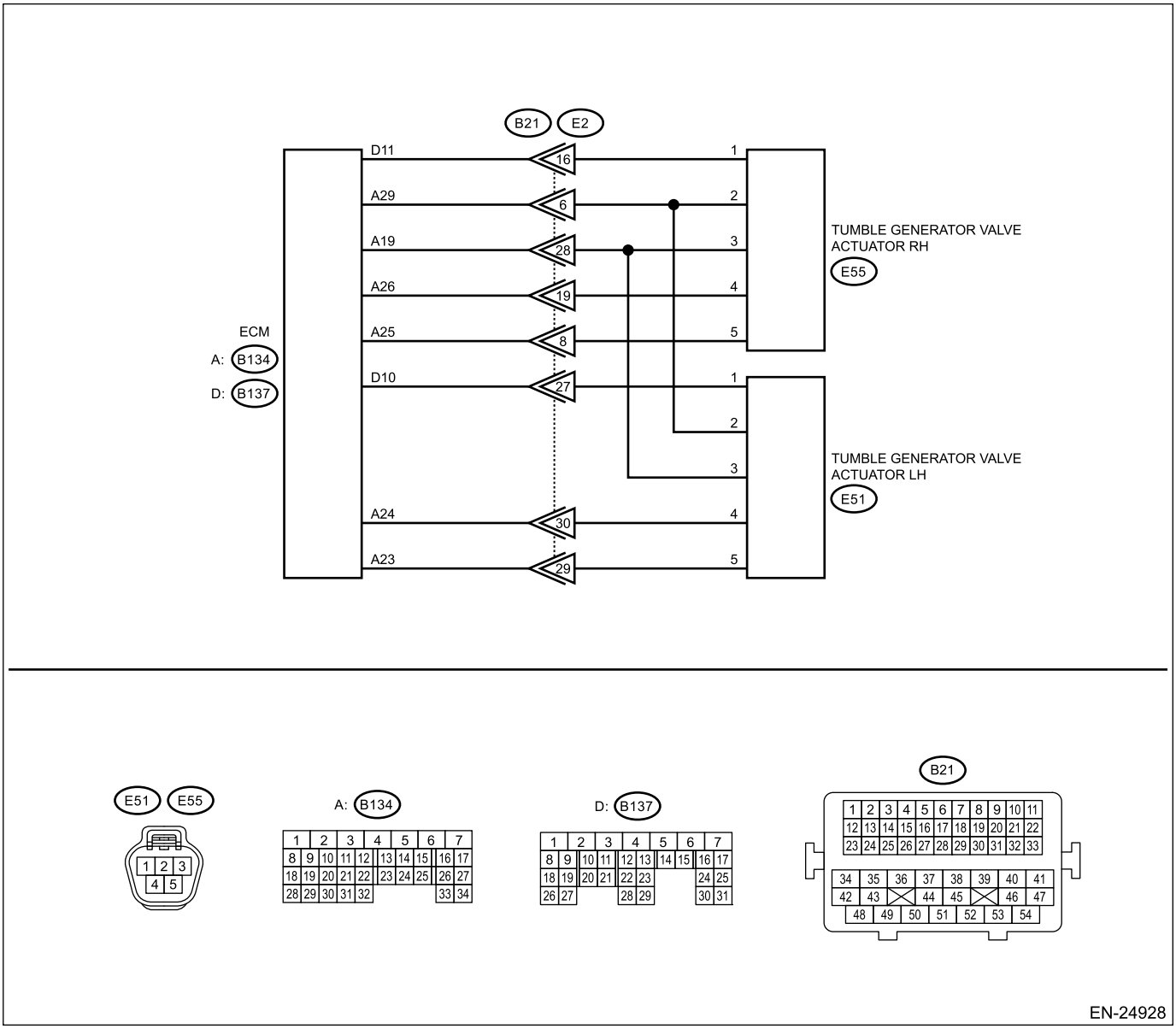
Immediately at fault recognition

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B134) No. 23 (+) — Chassis ground (−):
   (B134) No. 24 (+) — Chassis ground (−):

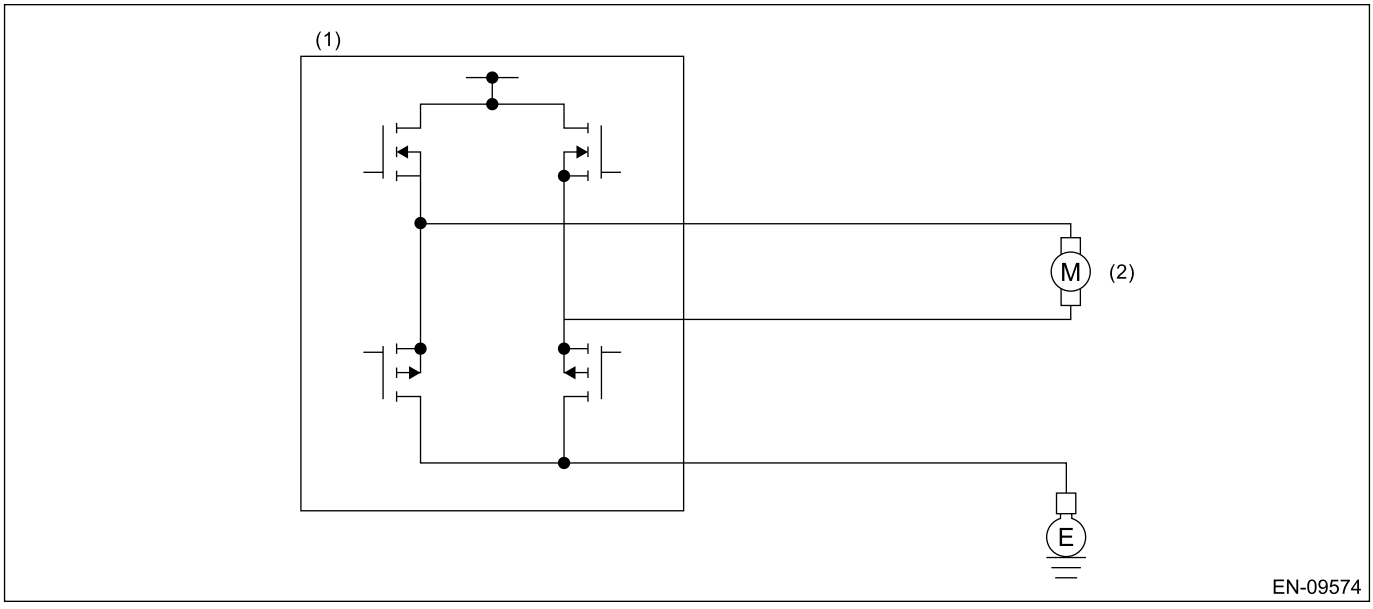
Is the voltage 5 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and tumble generator valve actuator LH connector.
No	Replace the tumble generator valve actuator LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Tumble Generator Valve Actuator. **Note:** **The tumble generator valve actuator cannot be disassembled.**

1. OUTLINE OF DIAGNOSIS

Detect the short circuit of tumble generator valve motor.
Judge as NG when the overcurrent signal is sent from IC after tumble generator valve driving IC diagnosis.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM) (2) Tumble generator valve

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Tumble generator valve instruction	Open or Closed

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Overcurrent signal from driver	ON

time needed for diagnosis: 96ms × 10time(s)
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2016 TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 1

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

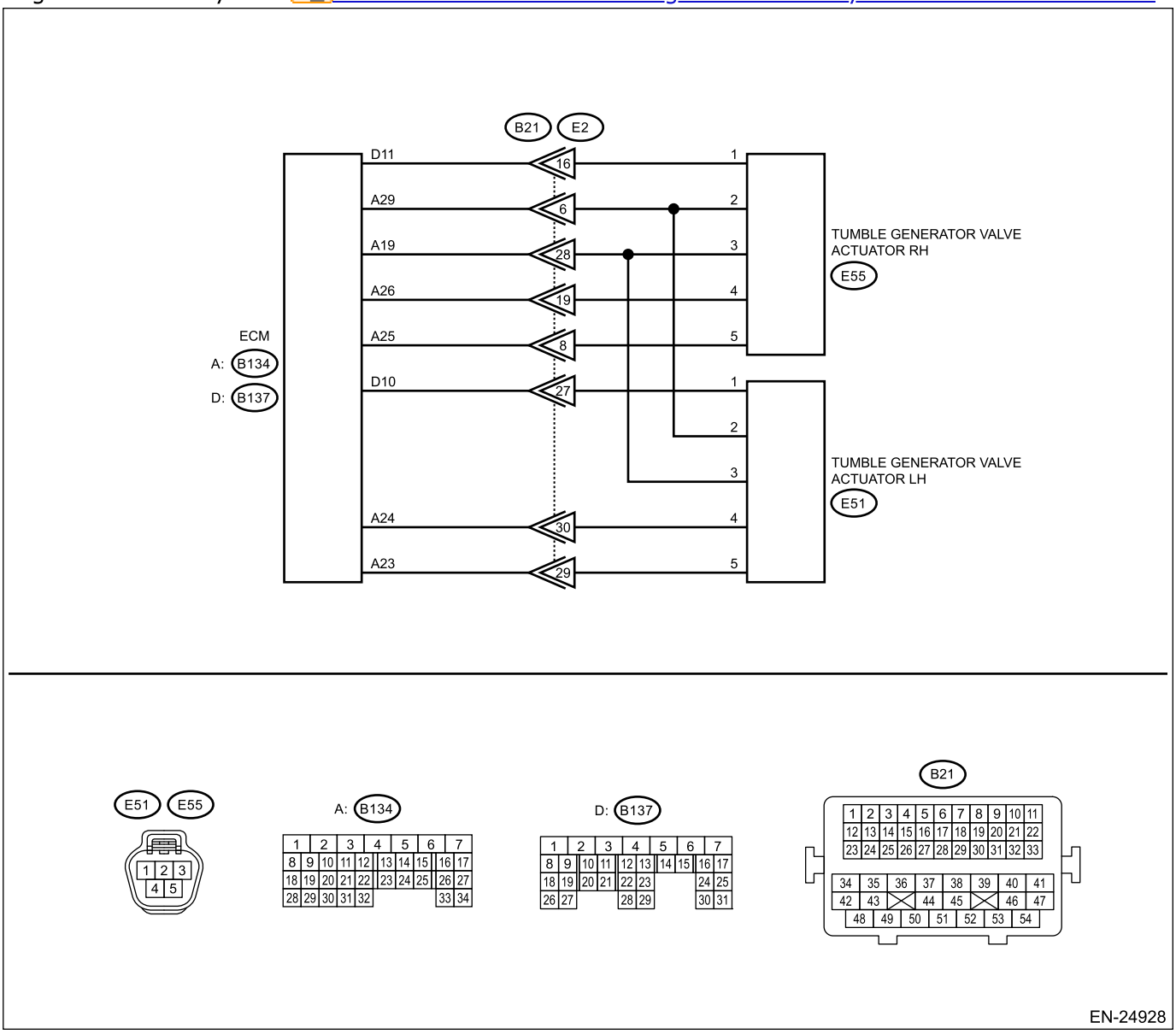
- Improper idling
- Engine stalls.
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CURRENT DATA.

1. Start the engine.
2. Read the value of «TGV Position Sensor R» using the Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «TGV Position Sensor R» less than 0.2 V?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK POWER SUPPLY OF TUMBLE GENERATOR VALVE ACTUATOR RH.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from tumble generator valve actuator RH.
3. Turn the ignition switch to ON.
4. Measure the voltage between tumble generator valve actuator RH connector and engine ground.
   Connector & terminal
   (E55) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and tumble generator valve actuator RH connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and tumble generator valve actuator RH connector.
   Connector & terminal
   (B137) No. 11 — (E55) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and tumble generator valve actuator RH connector** • **Poor contact of coupling connector**

4. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR.

Measure the resistance between ECM connector and chassis ground.
Connector & terminal
(B137) No. 11 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between ECM connector and tumble generator valve actuator RH connector.

5. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and tumble generator valve actuator RH connector.

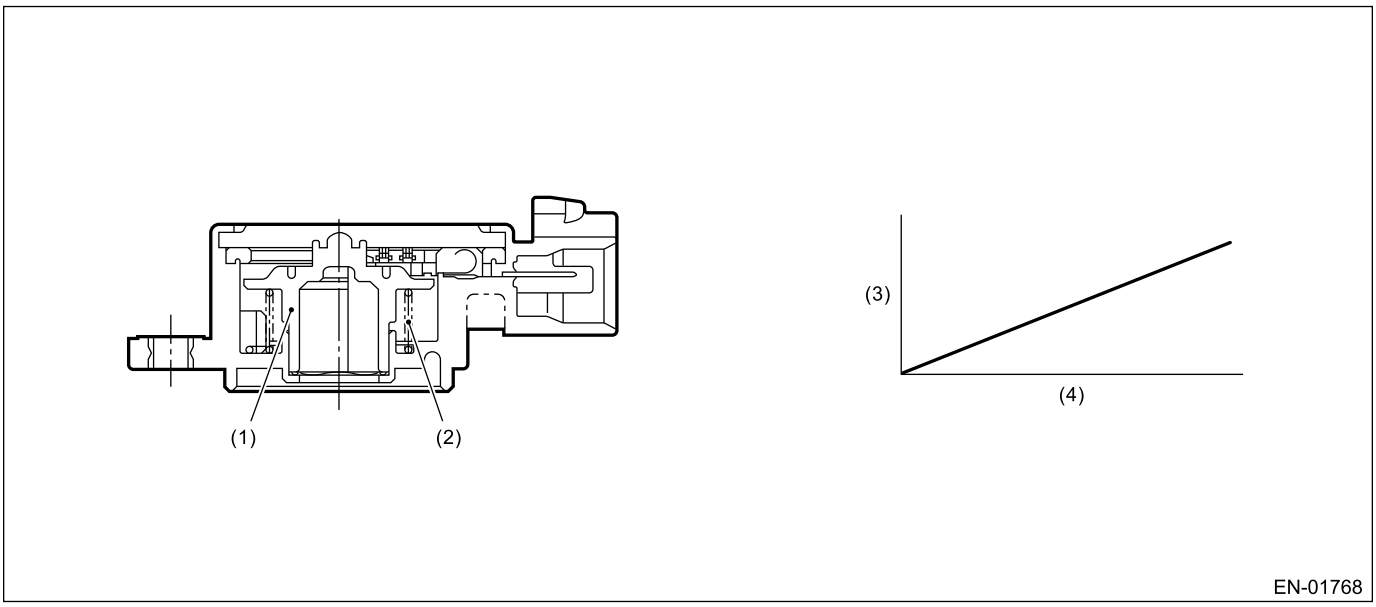
Is there poor contact of ECM or the tumble generator valve actuator RH connector?

Yes	Repair the poor contact of ECM or tumble generator valve actuator RH connector.
No	Replace the tumble generator valve actuator RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Tumble Generator Valve Actuator. **Note:** **The tumble generator valve actuator cannot be disassembled.**

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of tumble generator valve position sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Rotor

(2) Return spring

(3) Voltage (V)

(4) Tumble generator valve opening angle (°)

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< 0.264V

time needed for diagnosis: 500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2017 TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 1

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

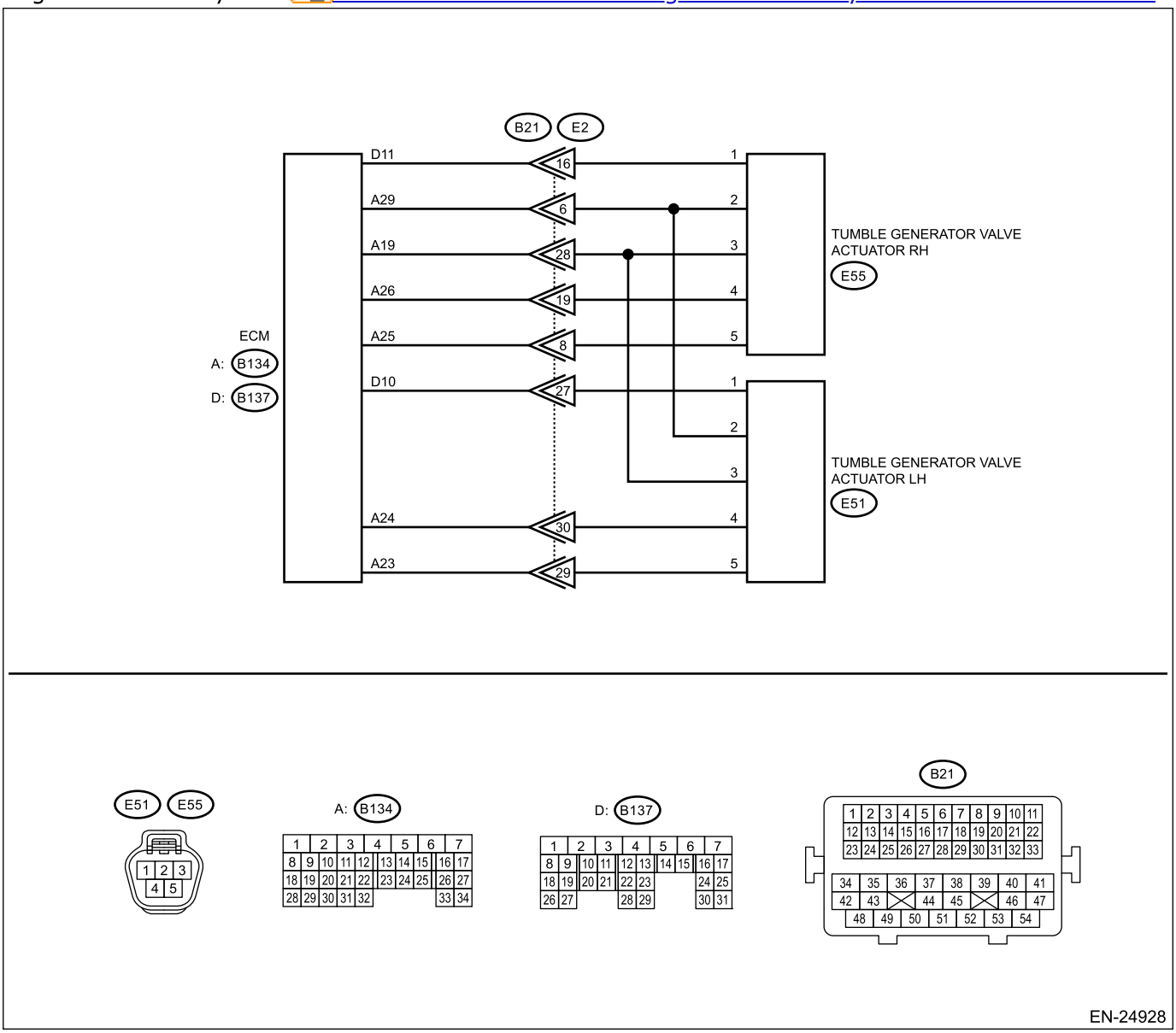
- Improper idling
- Engine stalls.
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CURRENT DATA.

1. Start the engine.
2. Read the value of «TGV Position Sensor R» using the Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «TGV Position Sensor R» 5 V or more?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from tumble generator valve actuator RH.
3. Start the engine.
4. Read the value of «TGV Position Sensor R» using the Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «TGV Position Sensor R» 5 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and tumble generator valve actuator RH connector.
No	Go to 3.

3. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR RH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between tumble generator valve actuator RH connector and engine ground.
   Connector & terminal
   (E55) No. 2 — Engine ground:

Is the resistance less than 5 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and tumble generator valve actuator RH connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

4. CHECK FOR POOR CONTACT.

Check for poor contact of tumble generator valve actuator RH connector.

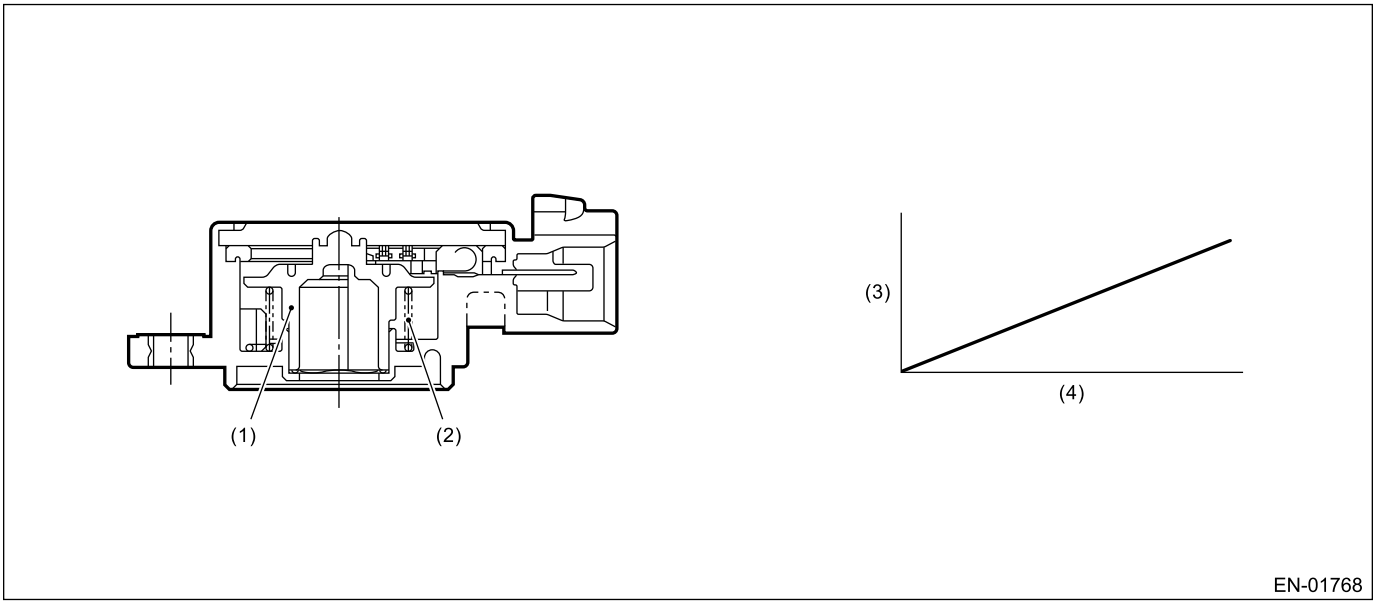
Is there poor contact of the tumble generator valve actuator RH connector?

Yes	Repair the poor contact of tumble generator valve actuator RH connector.
No	Replace the tumble generator valve actuator RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Tumble Generator Valve Actuator. **Note:** **The tumble generator valve actuator cannot be disassembled.**

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of tumble generator valve position sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Rotor

(2) Return spring

(3) Voltage (V)

(4) Tumble generator valve opening angle (°)

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.783V

time needed for diagnosis: 500ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2021 TGV POSITION SENSOR/SWITCH CIRCUIT LOW BANK 2

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

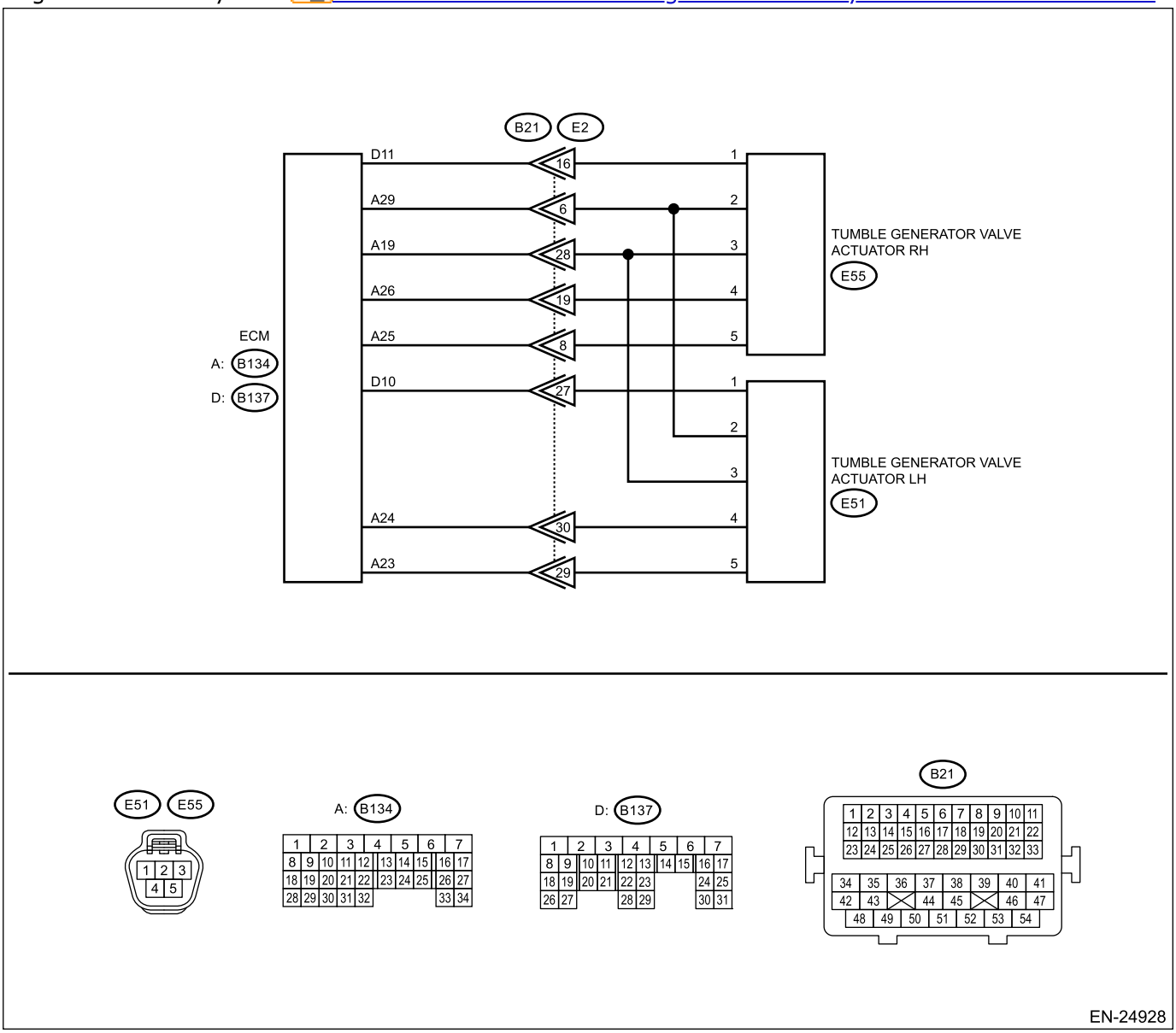
- Improper idling
- Engine stalls.
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CURRENT DATA.

1. Start the engine.
2. Read the value of «TGV Position Sensor L» using the Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «TGV Position Sensor L» less than 0.2 V?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK POWER SUPPLY OF TUMBLE GENERATOR VALVE ACTUATOR LH.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from tumble generator valve actuator LH.
3. Turn the ignition switch to ON.
4. Measure the voltage between tumble generator valve actuator LH connector and engine ground.
   Connector & terminal
   (E51) No. 3 (+) — Engine ground (−):

Is the voltage 4.5 V or more?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and tumble generator valve actuator LH connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and tumble generator valve actuator LH connector.
   Connector & terminal
   (B137) No. 10 — (E51) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and tumble generator valve actuator LH connector** • **Poor contact of coupling connector**

4. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR.

Measure the resistance between ECM connector and chassis ground.
Connector & terminal
(B137) No. 10 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between ECM connector and tumble generator valve actuator LH connector.

5. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and tumble generator valve actuator LH connector.

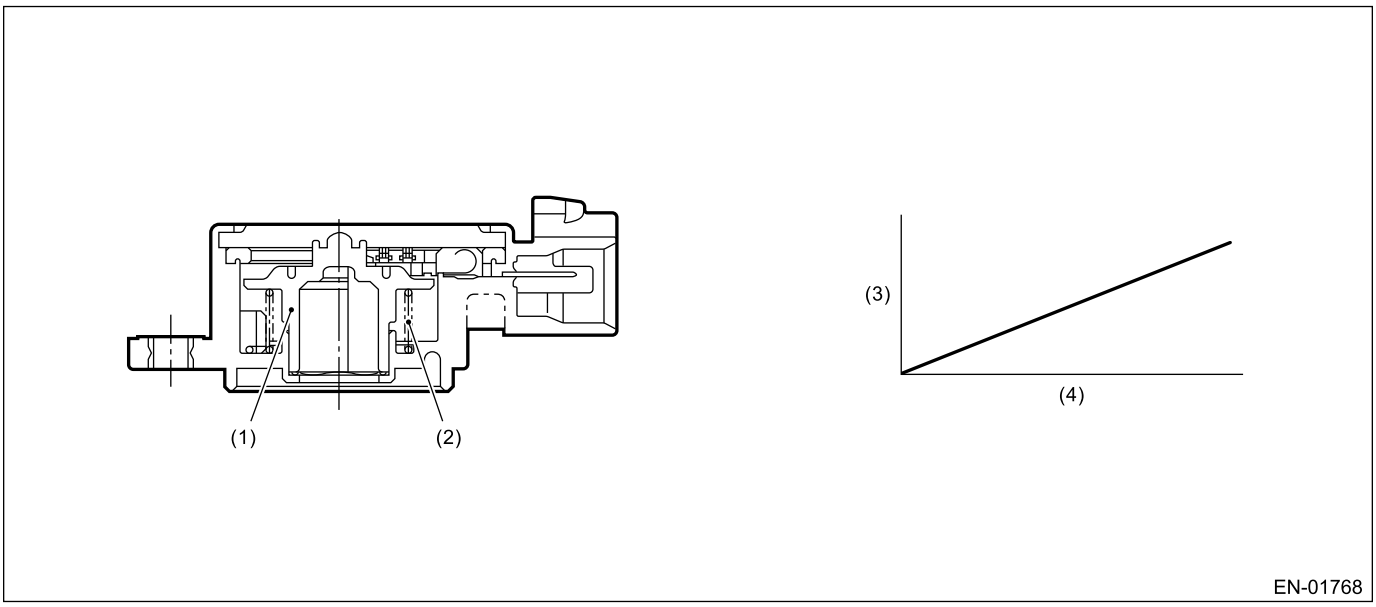
Is there poor contact of ECM or the tumble generator valve actuator LH connector?

Yes	Repair the poor contact of ECM or tumble generator valve actuator LH connector.
No	Replace the tumble generator valve actuator RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Tumble Generator Valve Actuator. **Note:** **The tumble generator valve actuator cannot be disassembled.**

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of tumble generator valve position sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Rotor

(2) Return spring

(3) Voltage (V)

(4) Tumble generator valve opening angle (°)

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< 0.264V

time needed for diagnosis: 500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2022 TGV POSITION SENSOR/SWITCH CIRCUIT HIGH BANK 2

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

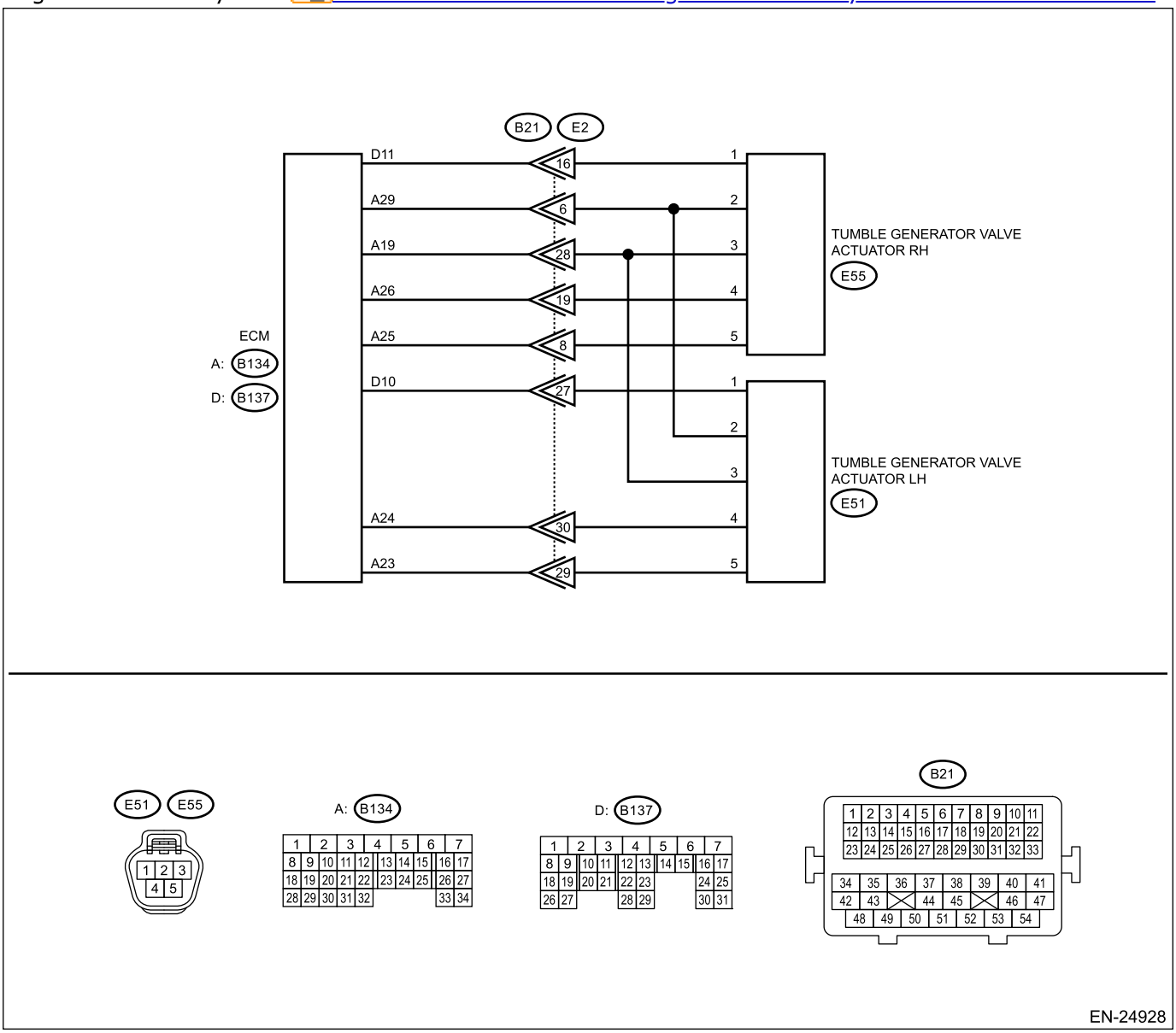
- Improper idling
- Engine stalls.
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK CURRENT DATA.

1. Start the engine.
2. Read the value of «TGV Position Sensor L» using the Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «TGV Position Sensor L» 5 V or more?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from tumble generator valve actuator LH.
3. Start the engine.
4. Read the value of «TGV Position Sensor L» using the Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «TGV Position Sensor L» 5 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and tumble generator valve actuator LH connector.
No	Go to 3.

3. CHECK HARNESS BETWEEN ECM AND TUMBLE GENERATOR VALVE ACTUATOR LH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Measure the resistance of harness between tumble generator valve actuator LH connector and engine ground.
   Connector & terminal
   (E51) No. 2 — Engine ground:

Is the resistance less than 5 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and tumble generator valve actuator LH connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

4. CHECK FOR POOR CONTACT.

Check for poor contact of tumble generator valve actuator LH connector.

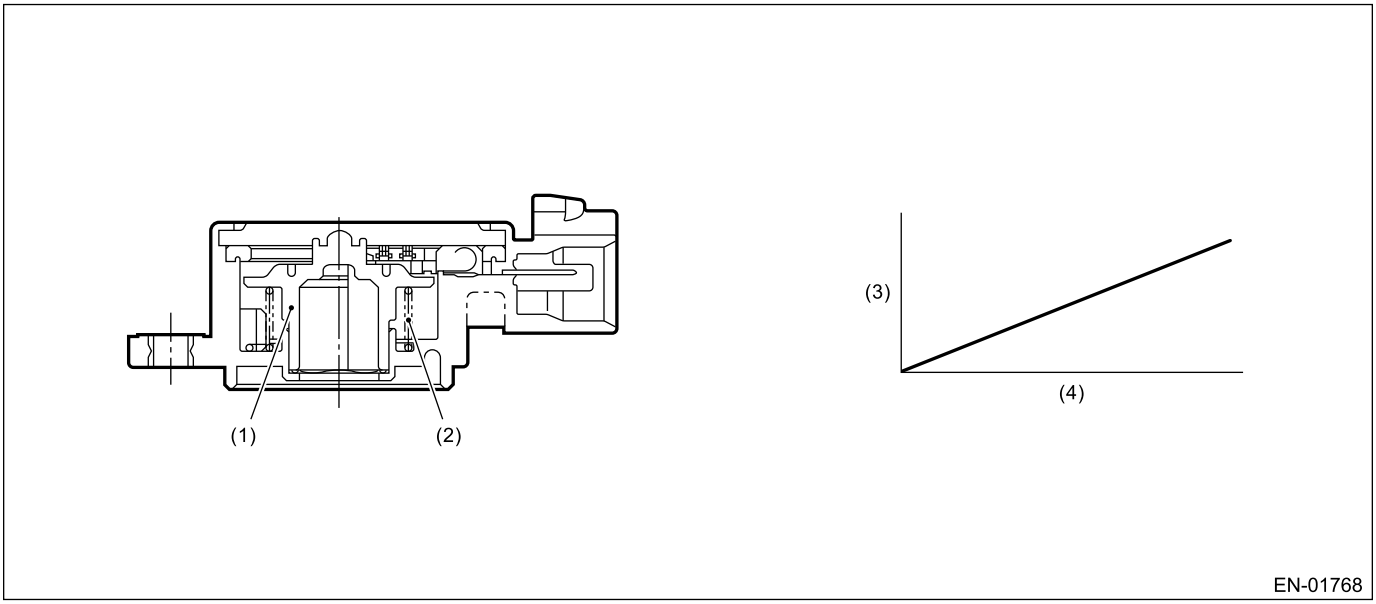
Is there poor contact of the tumble generator valve actuator LH connector?

Yes	Repair the poor contact of tumble generator valve actuator LH connector.
No	Replace the tumble generator valve actuator LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Tumble Generator Valve Actuator. **Note:** **The tumble generator valve actuator cannot be disassembled.**

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of tumble generator valve position sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Rotor

(2) Return spring

(3) Voltage (V)

(4) Tumble generator valve opening angle (°)

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≥ 4.783V

time needed for diagnosis: 500ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2088 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

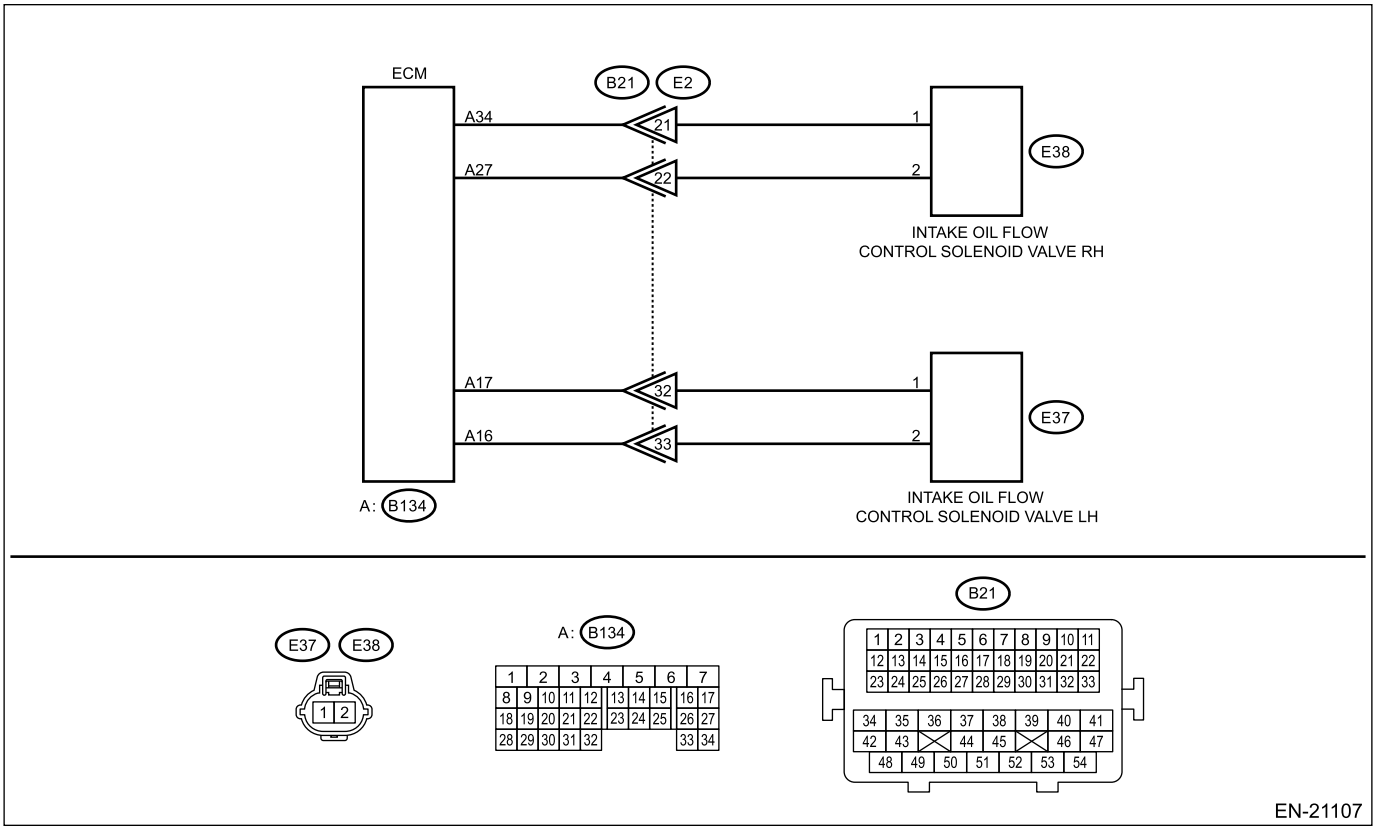
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the oil flow control solenoid valve RH.
4. Measure the resistance of harness between ECM connector and oil flow control solenoid valve RH connector.

   Connector & terminal

   (B134) No. 34 — (E38) No. 1:

   (B134) No. 27 — (E38) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and oil flow control solenoid valve RH connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B134) No. 34 — Chassis ground:

(B134) No. 27 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and oil flow control solenoid valve RH connector.

3. CHECK OIL FLOW CONTROL SOLENOID VALVE.

Check the oil flow control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.

Is the check result OK?

Yes	Repair the poor contact of ECM and oil flow control solenoid valve RH connector.
No	Replace the oil flow control solenoid valve RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the oil flow control solenoid valve.
Judge as NG when the current is small even though the duty signal is large.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Oil flow control solenoid valve control duty	≥ 99.61%

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Oil control solenoid valve control present current	< 0.306A

time needed for diagnosis: 2000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2089 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

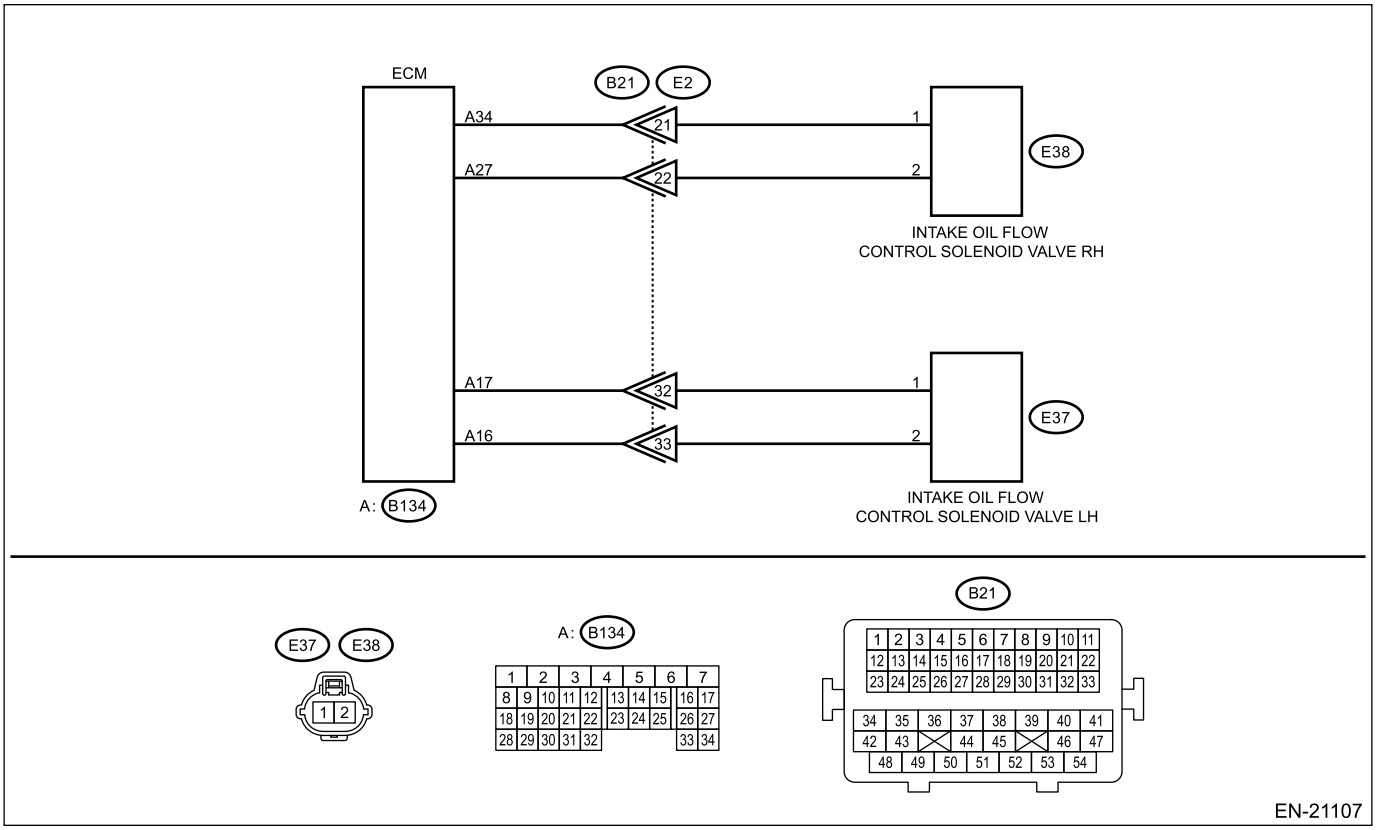
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the oil flow control solenoid valve RH.
4. Measure the voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 34 (+) — Chassis ground (−):

(B134) No. 27 (+) — Chassis ground (−):

Is the voltage less than 1 V?

Yes	Go to 2.
No	Repair the short circuit to power in harness between ECM connector and oil flow control solenoid valve RH connector.

2. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.

Measure the resistance of harness between ECM connector and oil flow control solenoid valve RH connector.

Connector & terminal

(B134) No. 34 — (E38) No. 1:

(B134) No. 27 — (E38) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and oil flow control solenoid valve RH connector** • **Poor contact of coupling connector**

3. CHECK OIL FLOW CONTROL SOLENOID VALVE.

Check the oil flow control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.

Is the check result OK?

Yes	Repair the poor contact of ECM and oil flow control solenoid valve RH connector.
No	Replace the oil flow control solenoid valve RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of oil flow control solenoid valve.
Judge as NG when the current is large even though the duty signal is small.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Oil flow control solenoid valve control duty	< 0.39%

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Oil control solenoid valve control present current	≥ 0.306A

time needed for diagnosis: 2000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2090 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

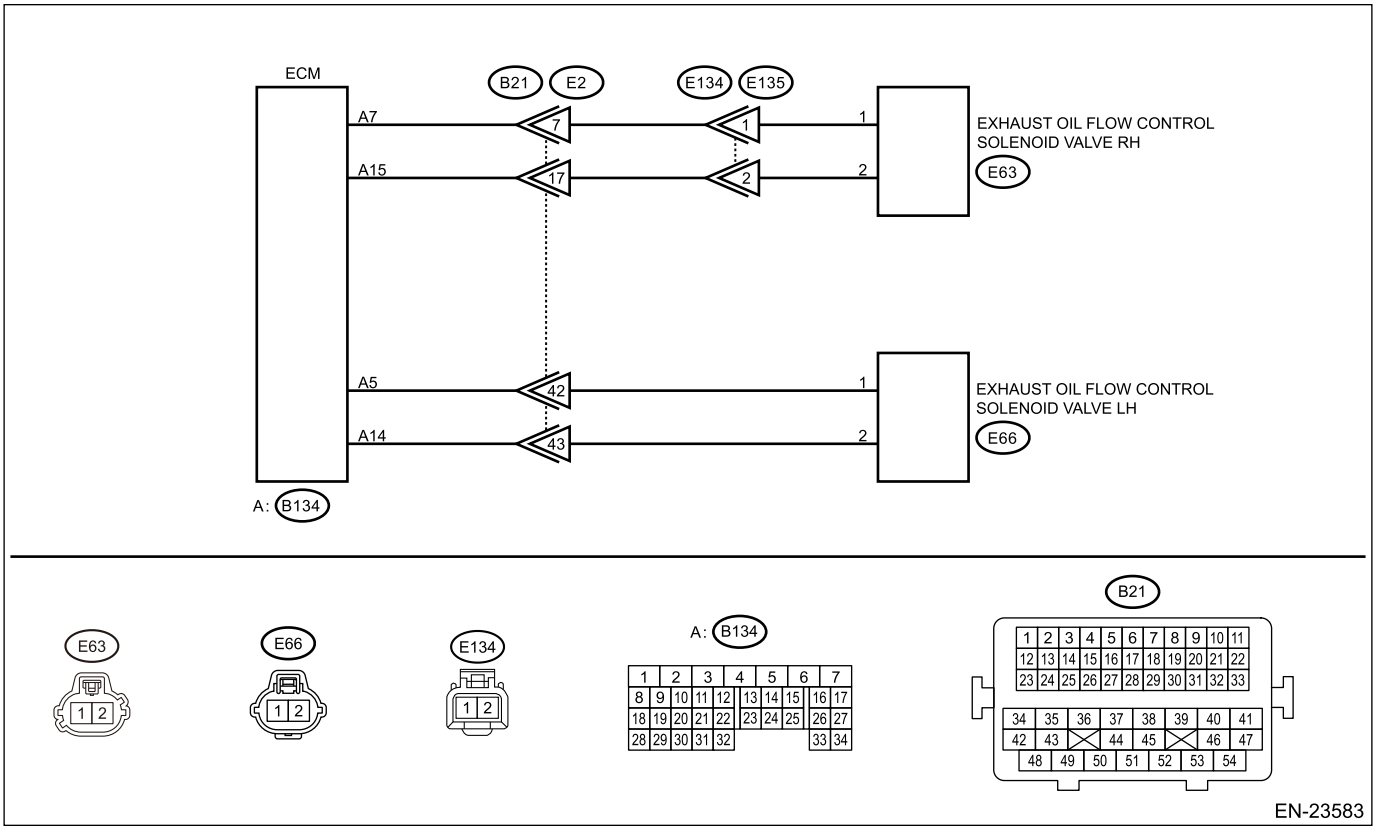
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the oil flow control solenoid valve RH.
4. Measure the resistance of harness between ECM connector and oil flow control solenoid valve RH connector.

   Connector & terminal

   (B134) No. 7 — (E63) No. 1:

   (B134) No. 15 — (E63) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and oil flow control solenoid valve RH connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B134) No. 7 — Chassis ground:

(B134) No. 15 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and oil flow control solenoid valve RH connector.

3. CHECK OIL FLOW CONTROL SOLENOID VALVE.

Check the oil flow control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.

Is the check result OK?

Yes	Repair the poor contact of ECM and oil flow control solenoid valve RH connector.
No	Replace the oil flow control solenoid valve RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of the oil flow control solenoid valve.
Judge as NG when the current is small even though the duty signal is large.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Oil flow control solenoid valve control duty	≥ 99.61%

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Oil control solenoid valve control present current	< 0.306A

time needed for diagnosis: 2000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2091 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

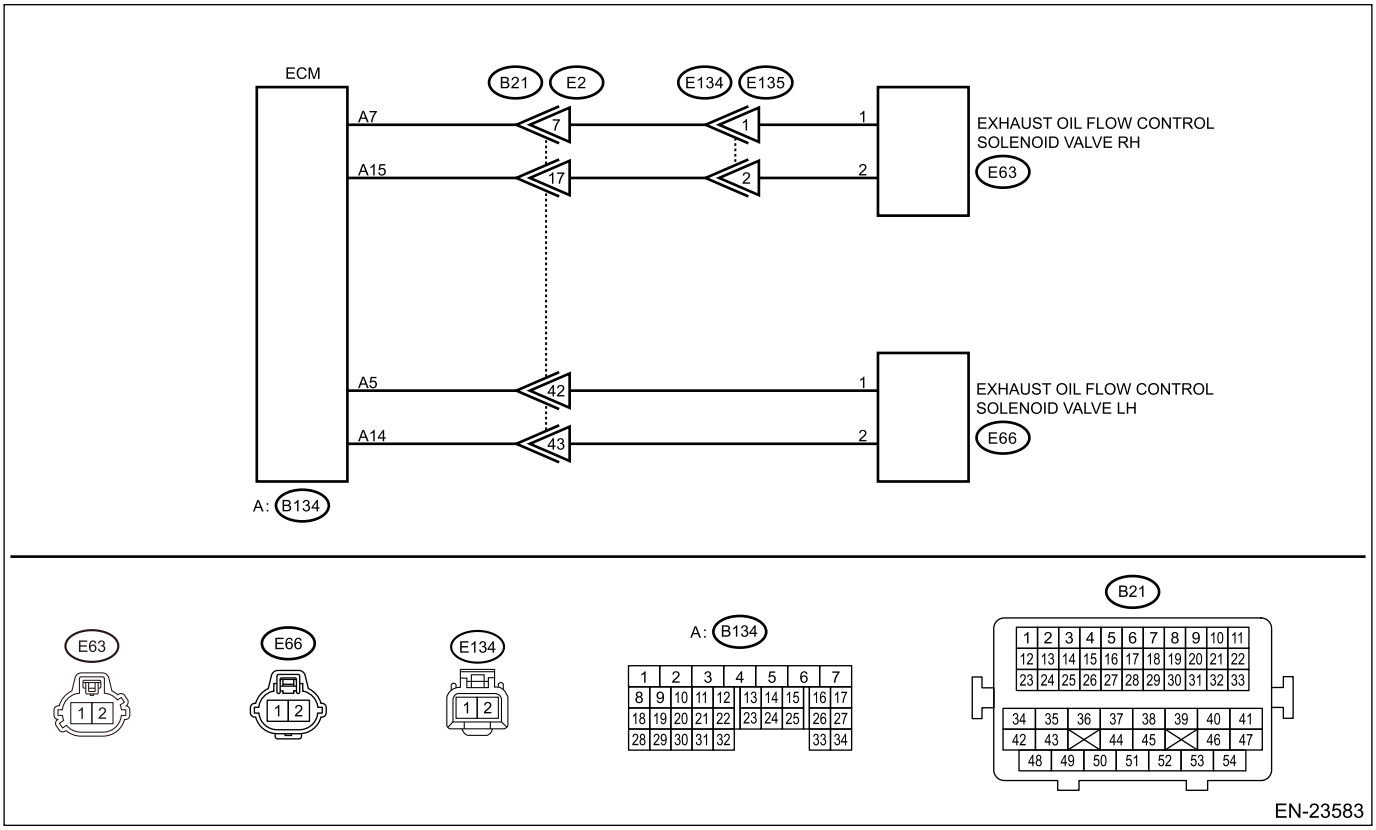
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the oil flow control solenoid valve RH.
4. Measure the voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 7 (+) — Chassis ground (−):

(B134) No. 15 (+) — Chassis ground (−):

Is the voltage less than 1 V?

Yes	Go to 2.
No	Repair the short circuit to power in harness between ECM connector and oil flow control solenoid valve RH connector.

2. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE RH CONNECTOR.

Measure the resistance of harness between ECM connector and oil flow control solenoid valve RH connector.

Connector & terminal

(B134) No. 7 — (E63) No. 1:

(B134) No. 15 — (E63) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and oil flow control solenoid valve RH connector** • **Poor contact of coupling connector**

3. CHECK OIL FLOW CONTROL SOLENOID VALVE.

Check the oil flow control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.

Is the check result OK?

Yes	Repair the poor contact of ECM and oil flow control solenoid valve RH connector.
No	Replace the oil flow control solenoid valve RH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Detect open or short circuit of oil flow control solenoid valve.
Judge as NG when the current is large even though the duty signal is small.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Oil flow control solenoid valve control duty	< 0.39%

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Oil control solenoid valve control present current	≥ 0.306A

time needed for diagnosis: 2000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2092 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 2

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

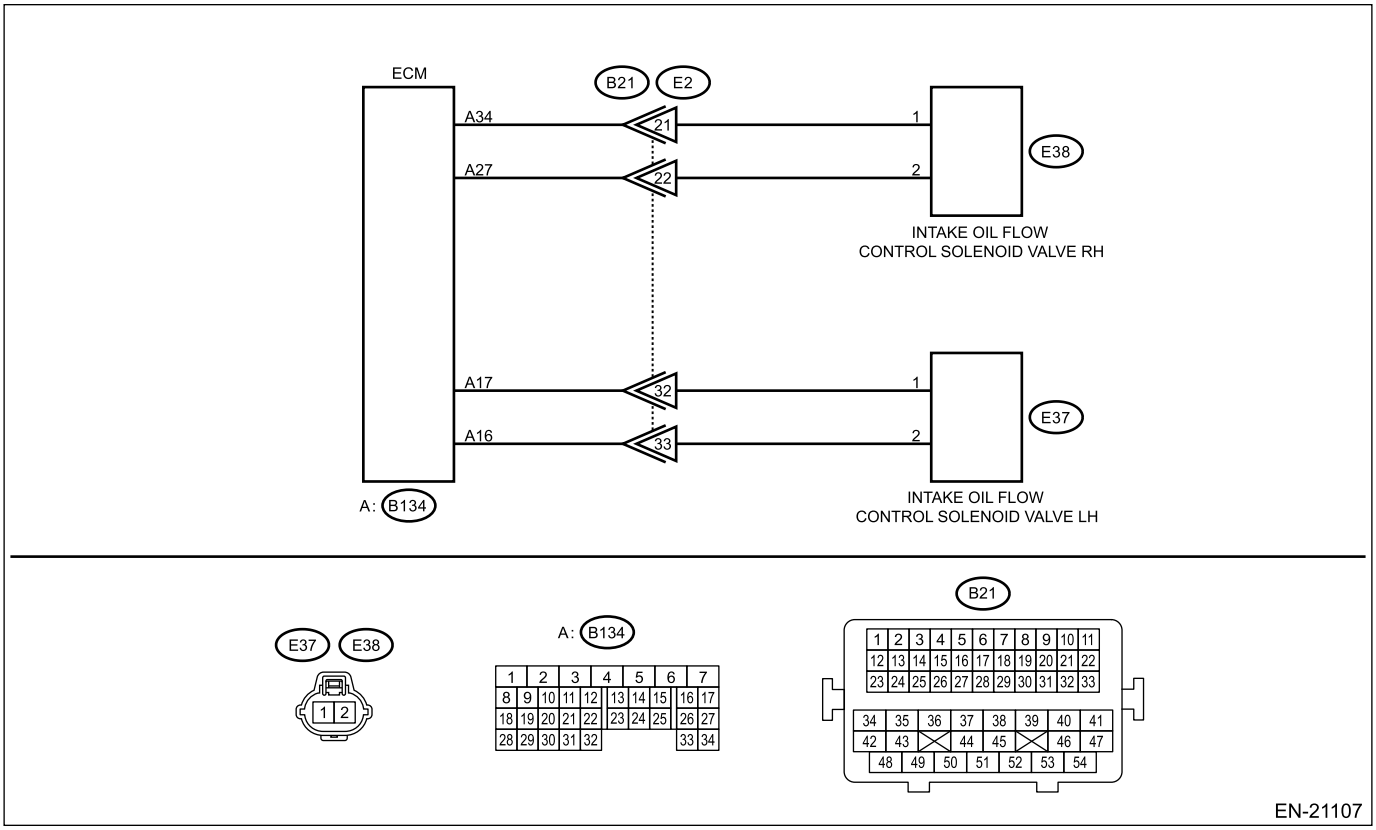
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the oil flow control solenoid valve LH.
4. Measure the resistance of harness between ECM connector and oil flow control solenoid valve LH connector.

   Connector & terminal

   (B134) No. 17 — (E37) No. 1:

   (B134) No. 16 — (E37) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and oil flow control solenoid valve LH connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B134) No. 17 — Chassis ground:

(B134) No. 16 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and oil flow control solenoid valve LH connector.

3. CHECK OIL FLOW CONTROL SOLENOID VALVE.

Check the oil flow control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.

Is the check result OK?

Yes	Repair the poor contact of ECM and oil flow control solenoid valve LH connector.
No	Replace the oil flow control solenoid valve LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P2088. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2088 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1.

DTC P2093 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 2

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

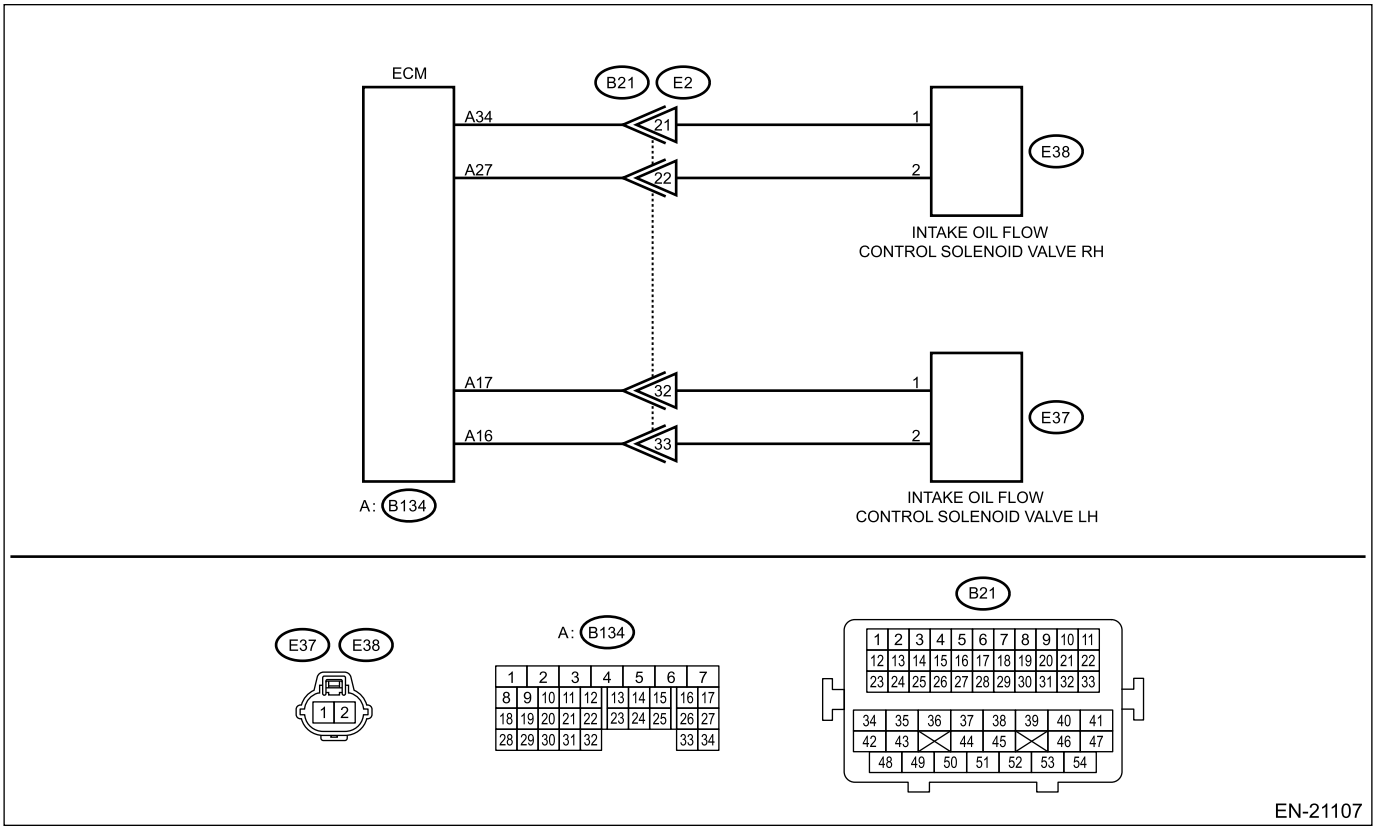
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the ECM connector.
3. Disconnect the connector from the oil flow control solenoid valve LH.
4. Measure the voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 17 (+) — Chassis ground (−):

(B134) No. 16 (+) — Chassis ground (−):

Is the voltage less than 1 V?

Yes	Go to 2.
No	Repair the short circuit to power in harness between ECM connector and oil flow control solenoid valve LH connector.

2. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.

Measure the resistance of harness between ECM connector and oil flow control solenoid valve LH connector.

Connector & terminal

(B134) No. 17 — (E37) No. 1:

(B134) No. 16 — (E37) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and oil flow control solenoid valve LH connector** • **Poor contact of coupling connector**

3. CHECK OIL FLOW CONTROL SOLENOID VALVE.

Check the oil flow control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.

Is the check result OK?

Yes	Repair the poor contact of ECM and oil flow control solenoid valve LH connector.
No	Replace the oil flow control solenoid valve LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P2089. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2089 "A" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1.

DTC P2094 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 2

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

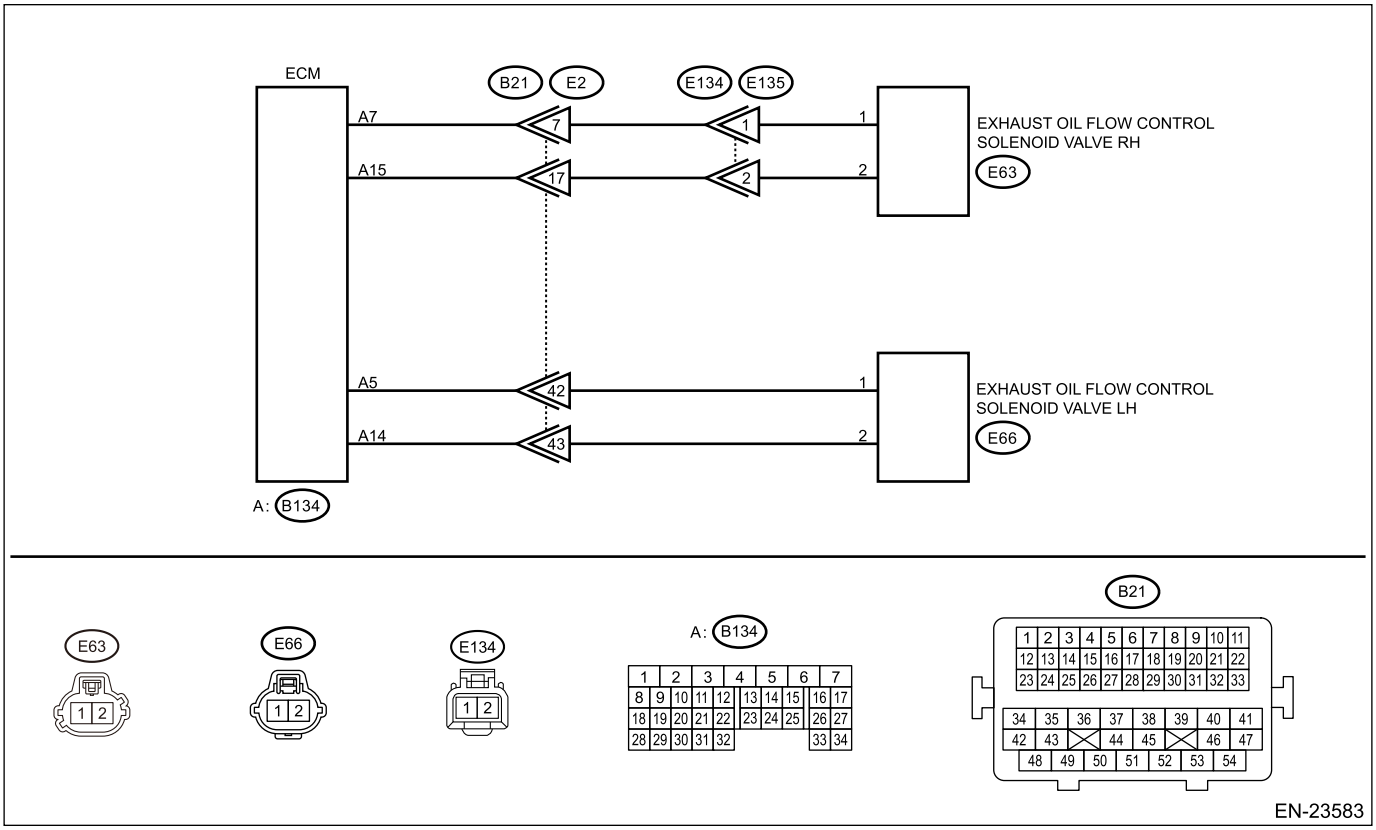
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the oil flow control solenoid valve LH.
4. Measure the resistance of harness between ECM connector and oil flow control solenoid valve LH connector.

   Connector & terminal

   (B134) No. 5 — (E66) No. 1:

   (B134) No. 14 — (E66) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and oil flow control solenoid valve LH connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B134) No. 5 — Chassis ground:

(B134) No. 14 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and oil flow control solenoid valve LH connector.

3. CHECK OIL FLOW CONTROL SOLENOID VALVE.

Check the oil flow control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.

Is the check result OK?

Yes	Repair the poor contact of ECM and oil flow control solenoid valve LH connector.
No	Replace the oil flow control solenoid valve LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P2090. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2090 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT LOW BANK 1.

DTC P2095 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 2

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

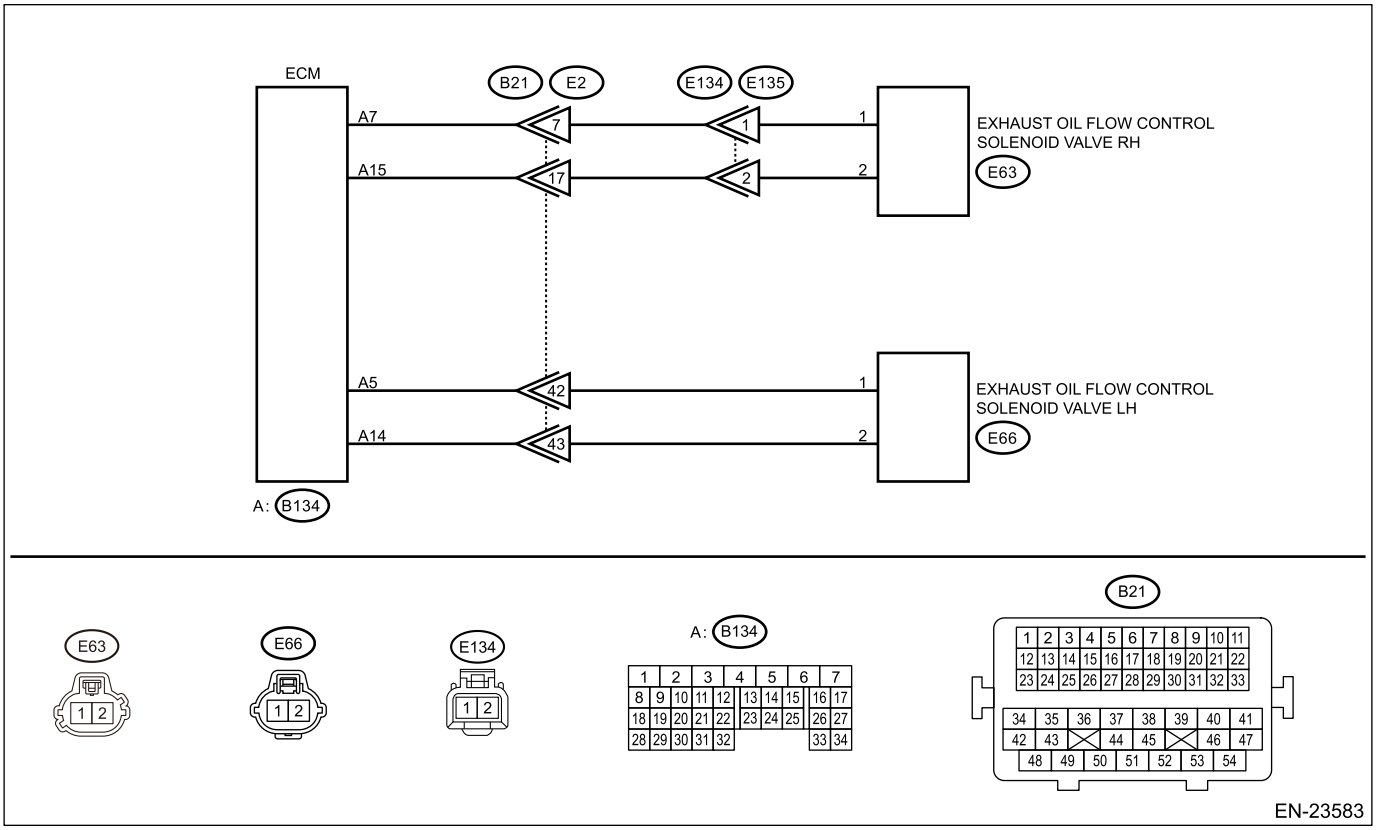
Improper idling

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the oil flow control solenoid valve LH.
4. Measure the voltage between ECM connector and chassis ground.

Connector & terminal

(B134) No. 5 (+) — Chassis ground (−):

(B134) No. 14 (+) — Chassis ground (−):

Is the voltage less than 1 V?

Yes	Go to 2.
No	Repair the short circuit to power in harness between ECM connector and oil flow control solenoid valve LH connector.

2. CHECK HARNESS BETWEEN ECM AND OIL FLOW CONTROL SOLENOID VALVE LH CONNECTOR.

Measure the resistance of harness between ECM connector and oil flow control solenoid valve LH connector.

Connector & terminal

(B134) No. 5 — (E66) No. 1:

(B134) No. 14 — (E66) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and oil flow control solenoid valve LH connector** • **Poor contact of coupling connector**

3. CHECK OIL FLOW CONTROL SOLENOID VALVE.

Check the oil flow control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve>INSPECTION.

Is the check result OK?

Yes	Repair the poor contact of ECM and oil flow control solenoid valve LH connector.
No	Replace the oil flow control solenoid valve LH. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Oil Flow Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P2091. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2091 "B" CAMSHAFT POSITION ACTUATOR CONTROL CIRCUIT HIGH BANK 1.

DTC P2096 POST CATALYST FUEL TRIM SYSTEM TOO LEAN BANK 1

DTC detecting condition:

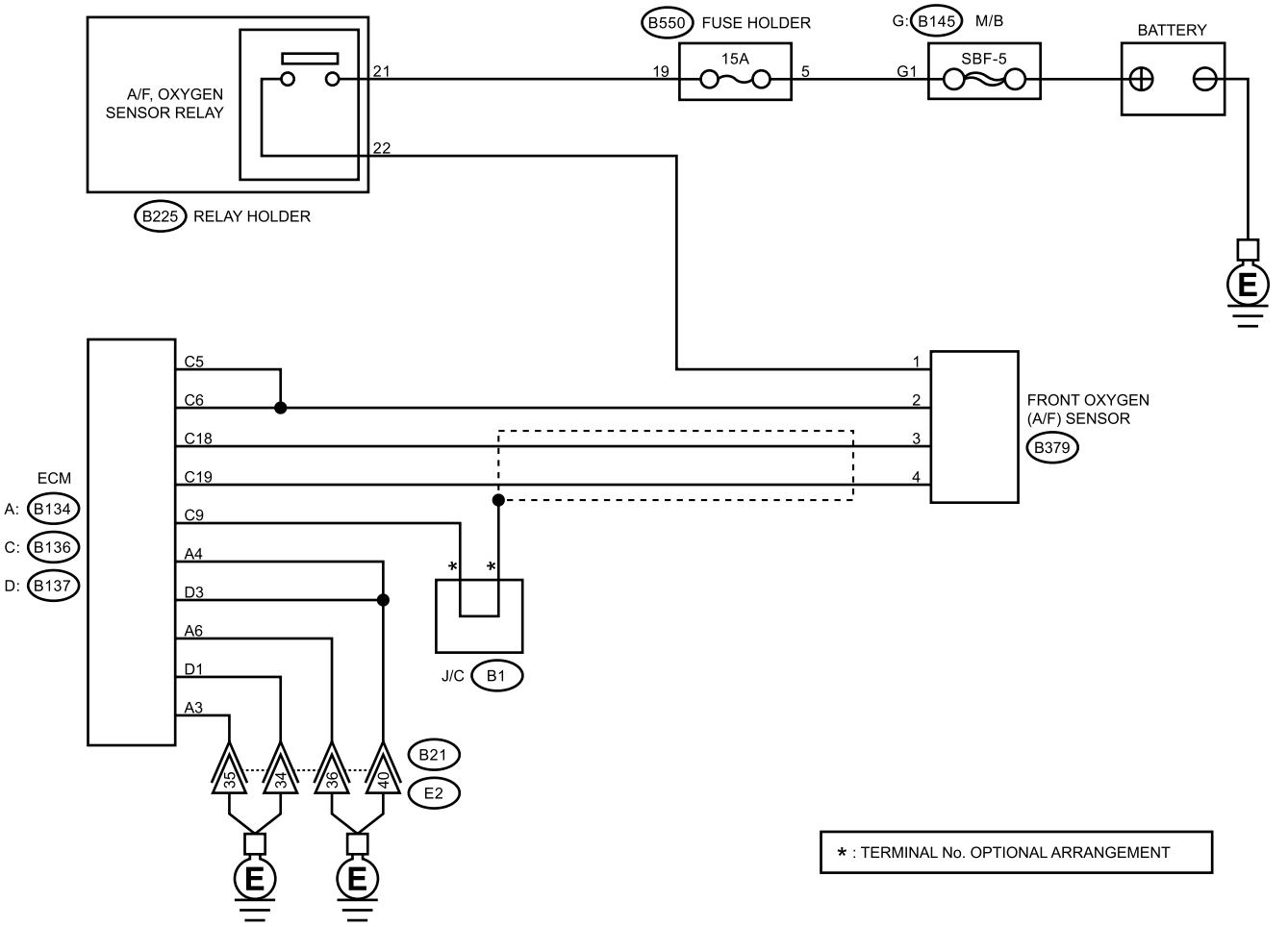
Detected when two consecutive driving cycles with fault occur.

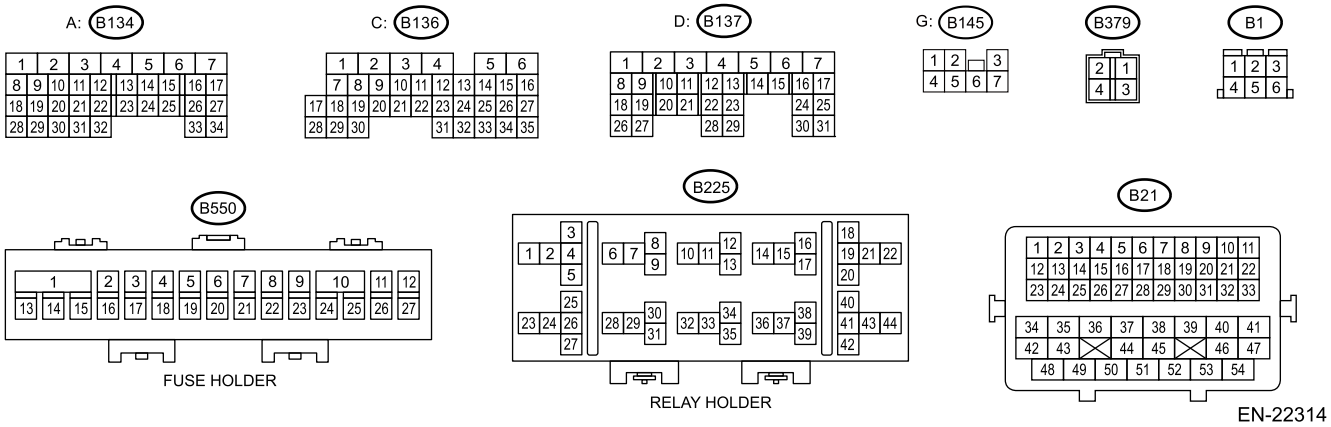
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

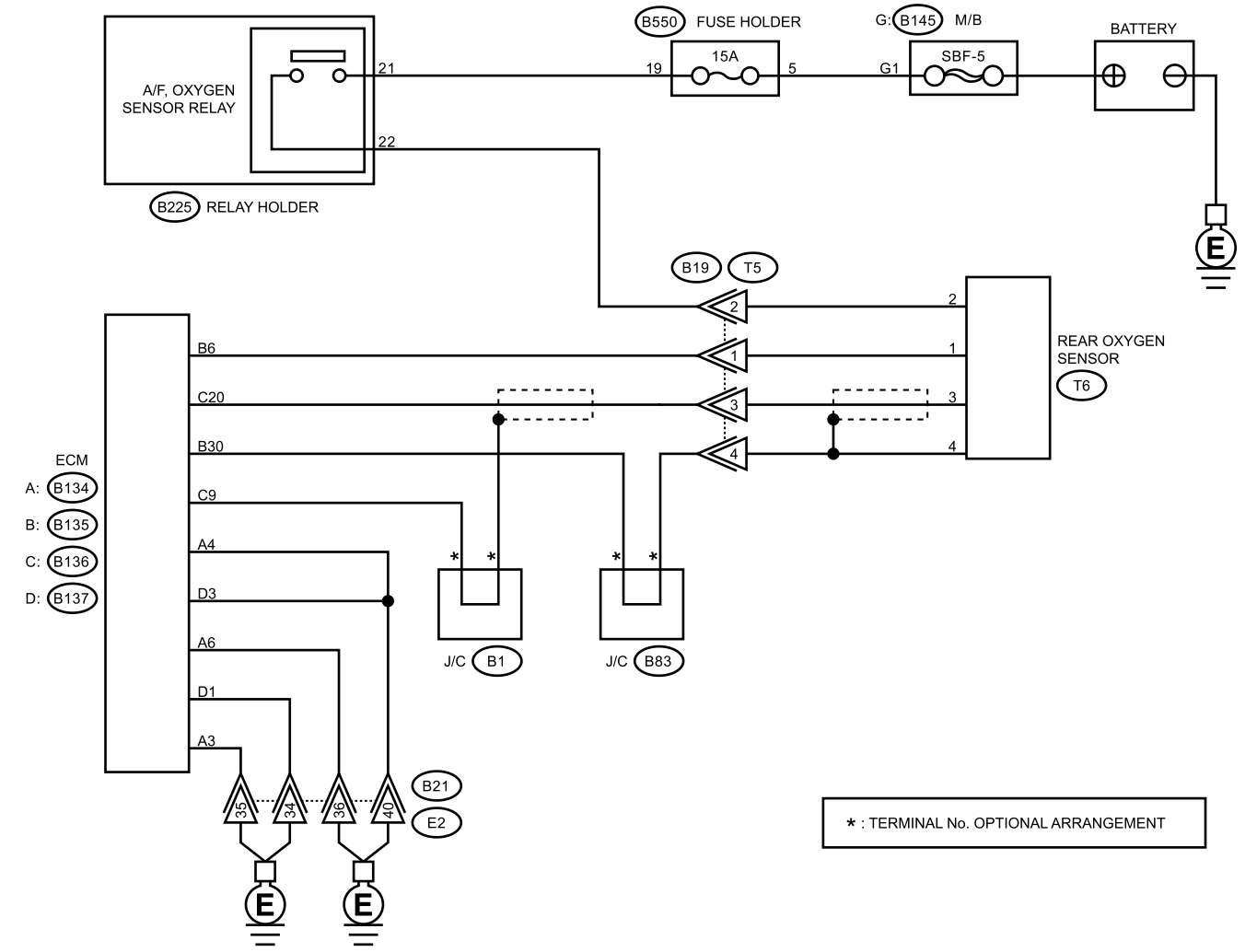
Wiring diagram:

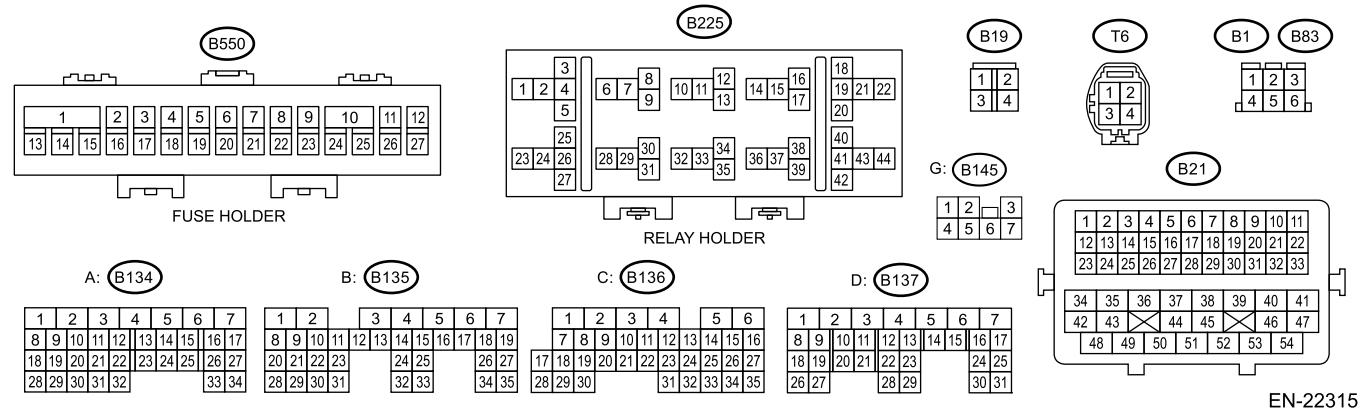
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


A/F, OXYGEN SENSOR RELAY
21
22
B225 RELAY HOLDER
B550 FUSE HOLDER
19
15A
5
G: B145 M/B
G1
SBF-5
BATTERY
E
ECM
A: B134
C: B136
D: B137
C5
C6
C18
C19
C9
A4
D3
A6
D1
A3
J/C B1
1
2
3
4
FRONT OXYGEN (A/F) SENSOR
B379
B21
E2
35
34
36
40
* : TERMINAL No. OPTIONAL ARRANGEMENT


A: B134
C: B136
D: B137
G: B145
B379
B1
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-22314


B550 FUSE HOLDER
G: B145 M/B
BATTERY
A/F, OXYGEN SENSOR RELAY
21
22
19
15A
5
G1
SBF-5
B225 RELAY HOLDER
B19
T5
REAR OXYGEN SENSOR
T6
ECM
A: B134
B: B135
C: B136
D: B137
B6
C20
B30
C9
A4
D3
A6
D1
A3
J/C B1
J/C B83
B21
E2
* : TERMINAL No. OPTIONAL ARRANGEMENT


B550
FUSE HOLDER
B225
RELAY HOLDER
B19
T6
B1
B83
G: B145
B21
A: B134
B: B135
C: B136
D: B137

EN-22315

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is other than DTC P2096 displayed? (Current malfunction)

Yes	Check DTC using “List of Diagnostic Trouble Code (DTC)”. Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.

Check the following items of front oxygen (A/F) sensor.

- Front oxygen (A/F) sensor connector
- Coupling connector

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 3.

3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from front oxygen (A/F) sensor.
4. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.

   Connector & terminal

   (B136) No. 18 — (B379) No. 3:

   (B136) No. 19 — (B379) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and front oxygen (A/F) sensor connector** • **Poor contact of front oxygen (A/F) sensor connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

4. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B136) No. 18 — Chassis ground:

(B136) No. 19 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.

5. CHECK OUTPUT SIGNAL FOR ECM.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between front oxygen (A/F) sensor connector and chassis ground.
   Connector & terminal
   (B379) No. 4 (+) — Chassis ground (−):

Is the voltage 4.5 V or more?

Yes	Go to 7.
No	Go to 6.

6. CHECK OUTPUT SIGNAL FOR ECM.

Measure the voltage between front oxygen (A/F) sensor connector and chassis ground.
Connector & terminal
(B379) No. 3 (+) — Chassis ground (−):

Is the voltage 4.95 V or more?

Yes	Go to 7.
No	Go to 8.

7. CHECK OUTPUT SIGNAL FOR ECM.

Measure the voltage between front oxygen (A/F) sensor connector and chassis ground.

Connector & terminal

(B379) No. 3 (+) — Chassis ground (−):

(B379) No. 4 (+) — Chassis ground (−):

Is the voltage 8 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. After repair, replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	Repair the poor contact of ECM connector.

8. CHECK EXHAUST SYSTEM.

Check the exhaust system.

Are there holes or loose bolts on exhaust system?

Yes	Repair the exhaust system.
No	Go to 9.

9. CHECK AIR INTAKE SYSTEM.

Check the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

Yes	Repair the air intake system.
No	Go to 10.

10. CHECK FUEL PRESSURE.

Warning:
Place "NO OPEN FLAMES" signs near the working area.
Caution:

- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

1. Connect the front oxygen (A/F) sensor connector.
2. Check the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. Ref. to MECHANICAL(STI)>Fuel Pressure>INSPECTION.
   Note:
   If fuel pressure does not increase, squeeze the fuel return hose 2 to 3 times, then check fuel pressure again.

Is the check result OK?

Yes	Go to 11.
No	Check the fuel pump and fuel delivery line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Pump>INSPECTION. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Delivery, Return and Evaporation Lines>INSPECTION.

11. CHECK FUEL PRESSURE.

After connecting the pressure regulator vacuum hose, check fuel pressure. Ref. to MECHANICAL(STI)>Fuel Pressure>INSPECTION.
Note:

- **If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then check fuel pressure again.**
- **If the measured value at this step is out of specification, check or replace pressure regulator and pressure regulator vacuum hose.**

Is the check result OK?

Yes	Go to 12.
No	Check the fuel pump and fuel delivery line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Pump>INSPECTION. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Delivery, Return and Evaporation Lines>INSPECTION.

12. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

1. Start the engine and warm up completely.
2. Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Coolant Temp.» 75°C (167°F) or more?

Yes	Go to 13.
No	Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Coolant Temperature Sensor.

13. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).
2. Place the gear shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Mass Air Flow» 2 — 5 g/s (0.26 — 0.66 lb/m)?

Yes	Go to 14.
No	Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

14. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).
2. Place the gear shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Open the front hood.
6. Measure the ambient temperature.
7. Read the value of «Intake Air Temperature» using the Subaru Select Monitor or a general scan tool.

   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Subtract ambient temperature from «Intake Air Temperature». Is the obtained value −10 — 50°C (−18 — 90°F)?

Yes	Go to 15.
No	Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

15. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)
2. Read the value of «Rear O2 Sensor Voltage» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Depress the clutch pedal.**
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Rear O2 Sensor Voltage» 0.490 V or more?

Yes — Go to 16.

No — Go to 17.

16. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm.
2. Read the value of «Rear O2 Sensor Voltage» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Depress the clutch pedal.**
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Rear O2 Sensor Voltage» 0.250 V or less?

Yes — Go to 18.

No — Go to 17.

17. CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.

Check the following items of rear oxygen sensor.
- Rear oxygen sensor connector
- Coupling connector

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 19.

18. CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), then keep the engine idling for 5 minutes or more.
2. Read the value of «Rear O2 Sensor Voltage» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value in «Rear O2 Sensor Voltage» kept at 0.250 V or less for 5 minutes or more?

Yes	Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Front Oxygen (A/F) Sensor.
No	Go to 19.

19. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
   Connector & terminal
   (B136) No. 20 — (T6) No. 3:
   (B135) No. 30 — (T6) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 20.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and rear oxygen sensor connector** • **Poor contact of coupling connector**

20. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between rear oxygen sensor connector and chassis ground.
   Connector & terminal
   (T6) No. 3 (+) — Chassis ground (−):

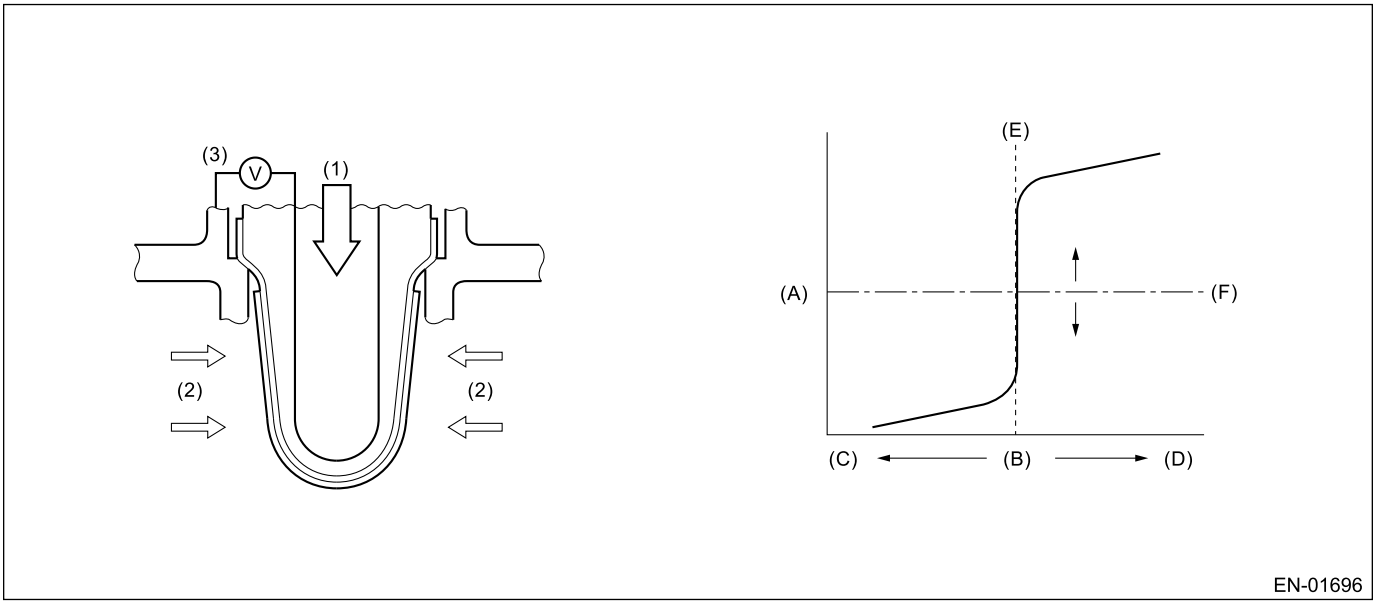
Is the voltage 0.2 — 0.5 V?

Yes	Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Rear Oxygen Sensor.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and rear oxygen sensor connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of fuel system from the size of the sub feedback learning value.
Control the sub feedback learning and judge as NG when the learning value is in the lean zone.

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage
(1) Atmosphere
(2) Exhaust gas
(3) Electromotive force

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Sub feedback	In operation
Amount of intake air	≥ 10g/s (0.35oz/s)
Engine load change every 0.5 engine revs.	< 0.02g/rev (0oz/rev)
Estimated temperature of the rear oxygen sensor element	≥ 500°C (932°F)
Integrated intake air amount in stoichiometric combustion	≥ 750 g (26.5 oz)
Fuel level increase	Not in operation

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when the vehicle is idling or running at a constant speed of 80 km/h (50 MPH) or more.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Sub feedback learning value	≤ −0.042

time needed for diagnosis:1s
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P2097 POST CATALYST FUEL TRIM SYSTEM TOO RICH BANK 1

DTC detecting condition:

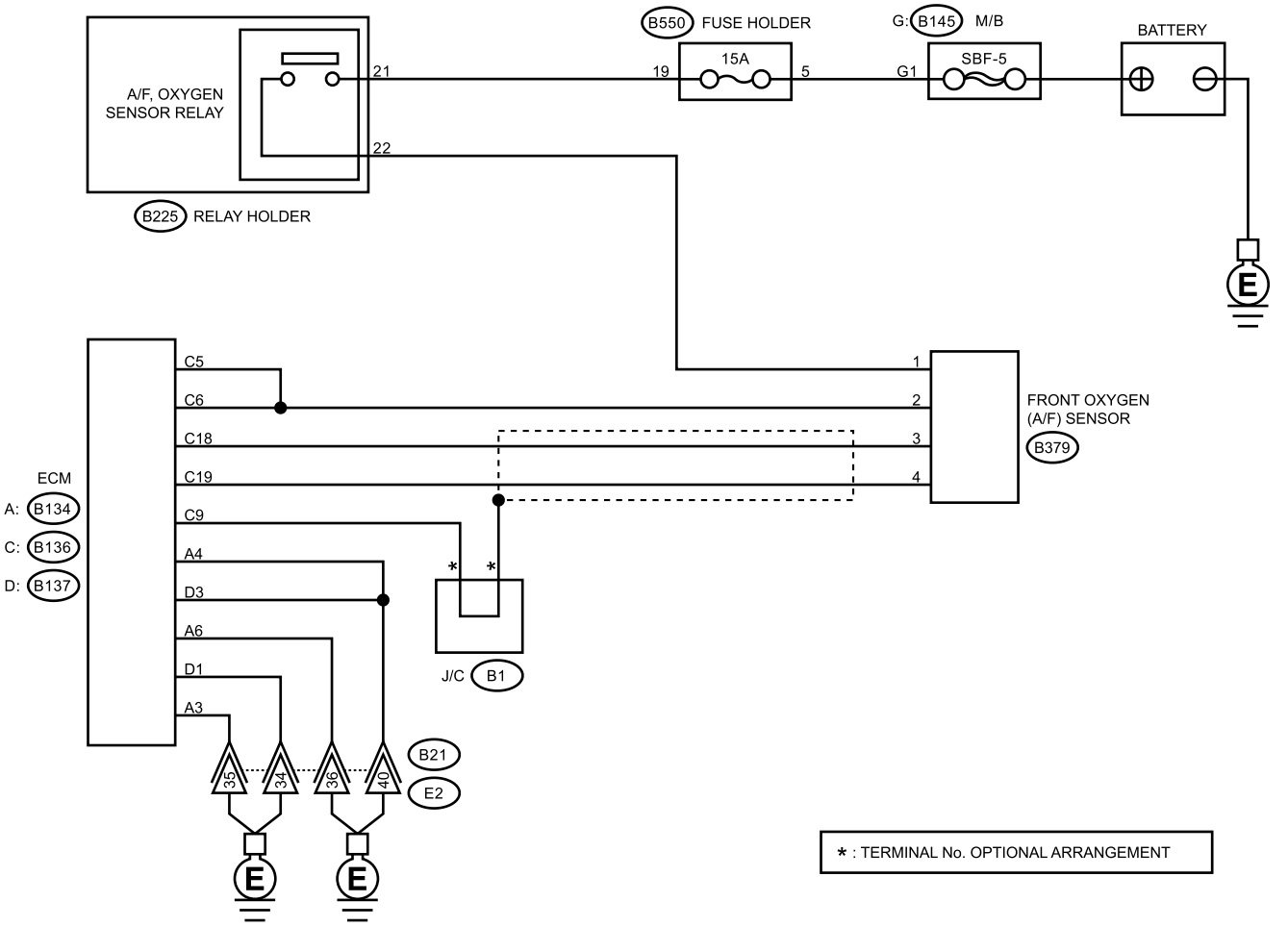
Detected when two consecutive driving cycles with fault occur.

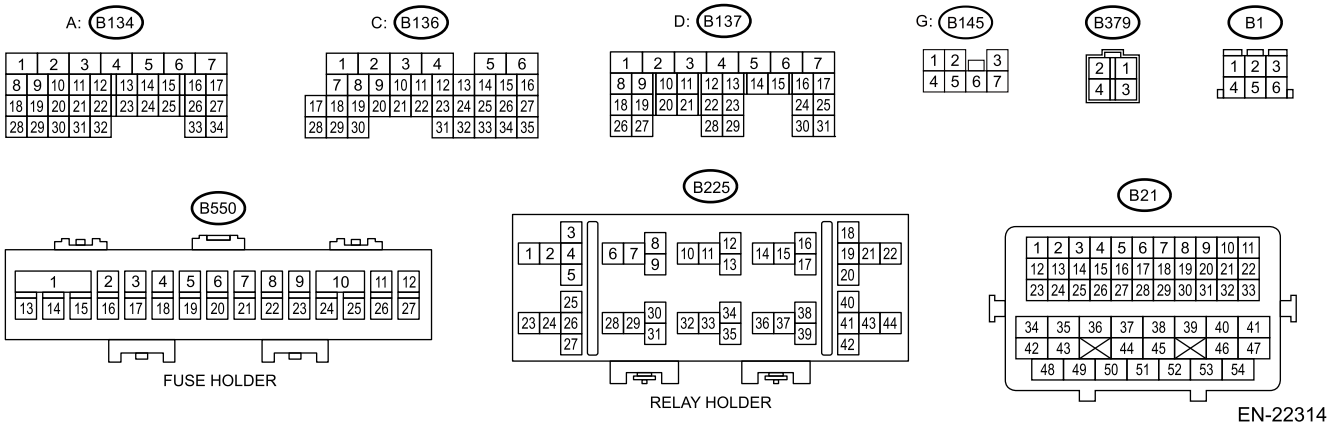
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

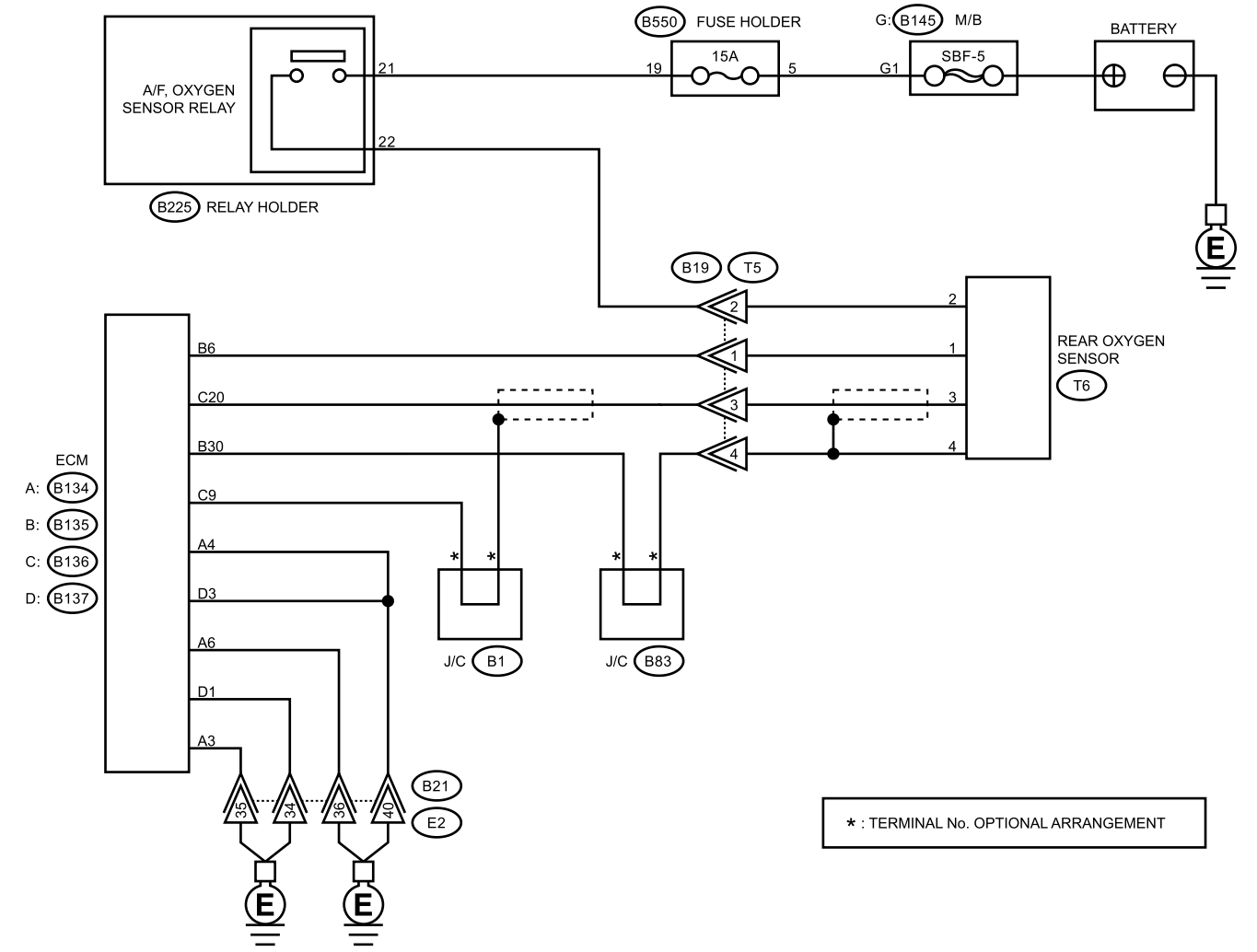
Wiring diagram:

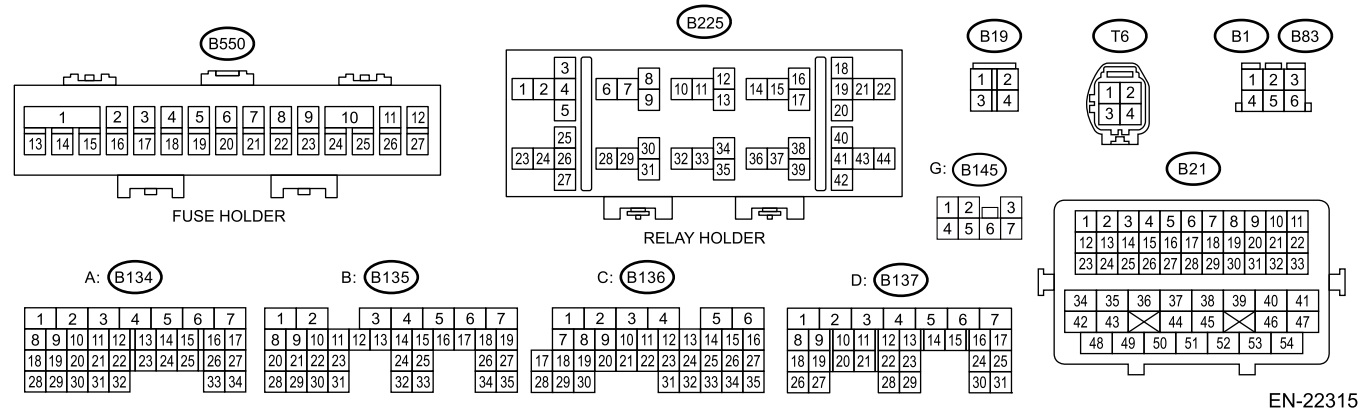
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


A/F, OXYGEN SENSOR RELAY
21
22
B225 RELAY HOLDER
B550 FUSE HOLDER
19
15A
5
G: B145 M/B
G1
SBF-5
BATTERY
E
ECM
A: B134
C: B136
D: B137
C5
C6
C18
C19
C9
A4
D3
A6
D1
A3
J/C B1
1
2
3
4
FRONT OXYGEN (A/F) SENSOR
B379
B21
E2
35
34
36
40
* : TERMINAL No. OPTIONAL ARRANGEMENT


A: B134
C: B136
D: B137
G: B145
B379
B1
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-22314


B550 FUSE HOLDER
G: B145 M/B
BATTERY
A/F, OXYGEN SENSOR RELAY
21
22
19
15A
5
G1
SBF-5
B225 RELAY HOLDER
B19
T5
REAR OXYGEN SENSOR
T6
ECM
A: B134
B: B135
C: B136
D: B137
B6
C20
B30
C9
A4
D3
A6
D1
A3
J/C B1
J/C B83
B21
E2
* : TERMINAL No. OPTIONAL ARRANGEMENT


B550
FUSE HOLDER
B225
RELAY HOLDER
B19
T6
B1
B83
G: B145
B21
A: B134
B: B135
C: B136
D: B137

EN-22315

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is other than DTC P2097 displayed? (Current malfunction)

Yes	Check DTC using “List of Diagnostic Trouble Code (DTC)”. Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.

Check the following items of front oxygen (A/F) sensor.

- Front oxygen (A/F) sensor connector
- Coupling connector

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 3.

3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from front oxygen (A/F) sensor.
4. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.

Connector & terminal

(B136) No. 18 — (B379) No. 3:

(B136) No. 19 — (B379) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the open circuit of harness between ECM connector and front oxygen (A/F) sensor connector.

4. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B136) No. 18 — Chassis ground:

(B136) No. 19 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.

5. CHECK OUTPUT SIGNAL FOR ECM.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between front oxygen (A/F) sensor connector and chassis ground.
   Connector & terminal
   (B379) No. 4 (+) — Chassis ground (−):

Is the voltage 4.5 V or more?

Yes	Go to 7.
No	Go to 6.

6. CHECK OUTPUT SIGNAL FOR ECM.

Measure the voltage between front oxygen (A/F) sensor connector and chassis ground.
Connector & terminal
(B379) No. 3 (+) — Chassis ground (−):

Is the voltage 4.95 V or more?

Yes	Go to 7.
No	Go to 8.

7. CHECK OUTPUT SIGNAL FOR ECM.

Measure the voltage between front oxygen (A/F) sensor connector and chassis ground.

Connector & terminal

(B379) No. 3 (+) — Chassis ground (−):

(B379) No. 4 (+) — Chassis ground (−):

Is the voltage 8 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. After repair, replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	Repair the poor contact of ECM connector.

8. CHECK EXHAUST SYSTEM.

Check the exhaust system.

Are there holes or loose bolts on exhaust system?

Yes	Repair the exhaust system.
No	Go to 9.

9. CHECK AIR INTAKE SYSTEM.

Check the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

Yes	Repair the air intake system.
No	Go to 10.

10. CHECK FUEL PRESSURE.

Warning:
Place "NO OPEN FLAMES" signs near the working area.
Caution:

- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

1. Connect the front oxygen (A/F) sensor connector.
2. Check the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. Ref. to MECHANICAL(STI)>Fuel Pressure>INSPECTION.
   Note:
   If fuel pressure does not increase, squeeze the fuel return hose 2 to 3 times, then check fuel pressure again.

Is the check result OK?

Yes	Go to 11.
No	Check the fuel pump and fuel delivery line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Pump>INSPECTION. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Delivery, Return and Evaporation Lines>INSPECTION.

11. CHECK FUEL PRESSURE.

After connecting the pressure regulator vacuum hose, check fuel pressure. Ref. to MECHANICAL(STI)>Fuel Pressure>INSPECTION.
Note:

- **If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then check fuel pressure again.**
- **If the measured value at this step is out of specification, check or replace pressure regulator and pressure regulator vacuum hose.**

Is the check result OK?

Yes	Go to 12.
No	Check the fuel pump and fuel delivery line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Pump>INSPECTION. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Delivery, Return and Evaporation Lines>INSPECTION.

12. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

1. Start the engine and warm up completely.
2. Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Coolant Temp.» 75°C (167°F) or more?

Yes	Go to 13.
No	Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Coolant Temperature Sensor.

13. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).
2. Place the gear shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Mass Air Flow» 2 — 5 g/s (0.26 — 0.66 lb/m)?

Yes	Go to 14.
No	Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

14. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).
2. Place the gear shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Open the front hood.
6. Measure the ambient temperature.
7. Read the value of «Intake Air Temperature» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Subtract ambient temperature from «Intake Air Temperature». Is the obtained value −10 — 50°C (−18 — 90°F)?

Yes	Go to 15.
No	Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

15. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)
2. Read the value of «Rear O2 Sensor Voltage» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Depress the clutch pedal.**
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Rear O2 Sensor Voltage» 0.490 V or more?

Yes — Go to 16.

No — Go to 17.

16. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm.
2. Read the value of «Rear O2 Sensor Voltage» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Depress the clutch pedal.**
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Rear O2 Sensor Voltage» 0.250 V or less?

Yes — Go to 18.

No — Go to 17.

17. CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.

Check the rear oxygen sensor connector and coupling connector.

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 19.

18. CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), then keep the engine idling for 5 minutes or more.
2. Read the value of «Rear O2 Sensor Voltage» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value in «Rear O2 Sensor Voltage» kept at 0.8 V or more for 5 minutes or more?

Yes	Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Front Oxygen (A/F) Sensor.
No	Go to 19.

19. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
   Connector & terminal
   (B136) No. 20 — (T6) No. 3:
   (B135) No. 30 — (T6) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 20.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and rear oxygen sensor connector** • **Poor contact of coupling connector**

20. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between rear oxygen sensor connector and chassis ground.
   Connector & terminal
   (T6) No. 3 (+) — Chassis ground (−):

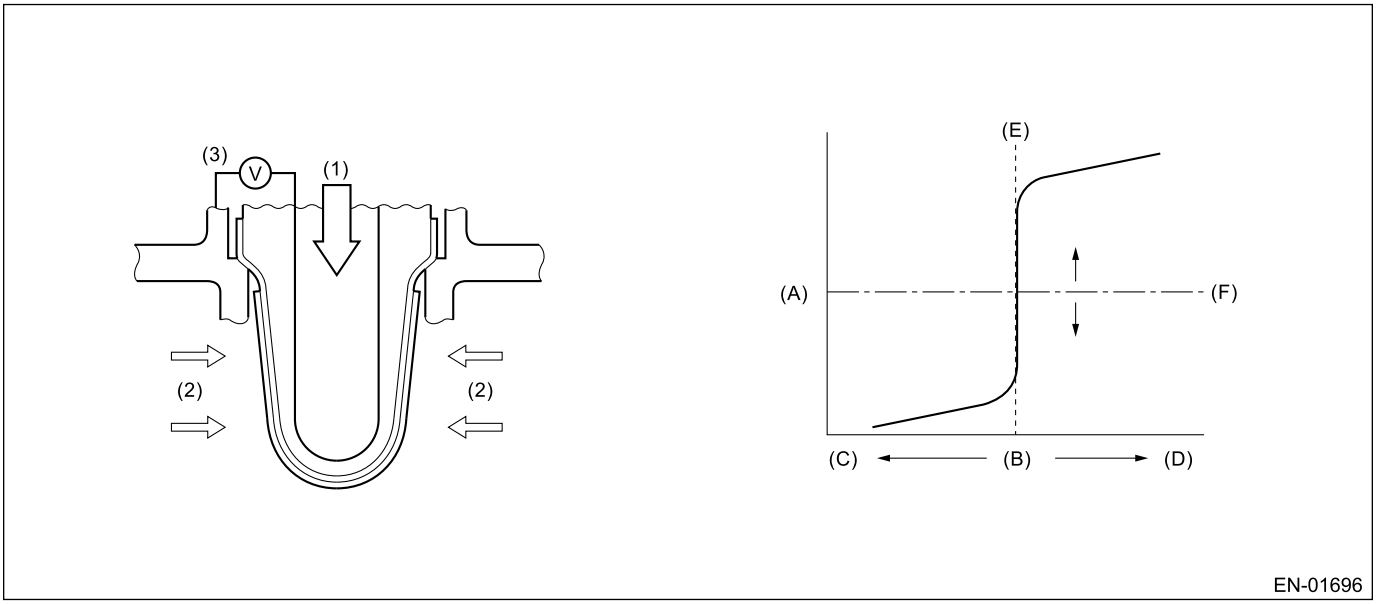
Is the voltage 0.2 — 0.5 V?

Yes	Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Rear Oxygen Sensor.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and rear oxygen sensor connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of fuel system from the size of the sub feedback learning value.
Sub feedback learning is being performed. When the learning value goes to the rich side, judge as NG.

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage
(1) Atmosphere
(2) Exhaust gas
(3) Electromotive force

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Sub feedback	In operation
Amount of intake air	≥ 10g/s (0.35oz/s)
Engine load change every 0.5 engine revs.	< 0.02g/rev (0oz/rev)
Estimated temperature of the rear oxygen sensor element	≥ 500°C (932°F)
Integrated intake air amount in stoichiometric combustion	≥ 750 g (26.5 oz)
Fuel level increase	Not in operation

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously when the vehicle is idling or running at a constant speed of 80 km/h (50 MPH) or more.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Sub feedback learning value	≥ 0.028

time needed for diagnosis: 1s
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

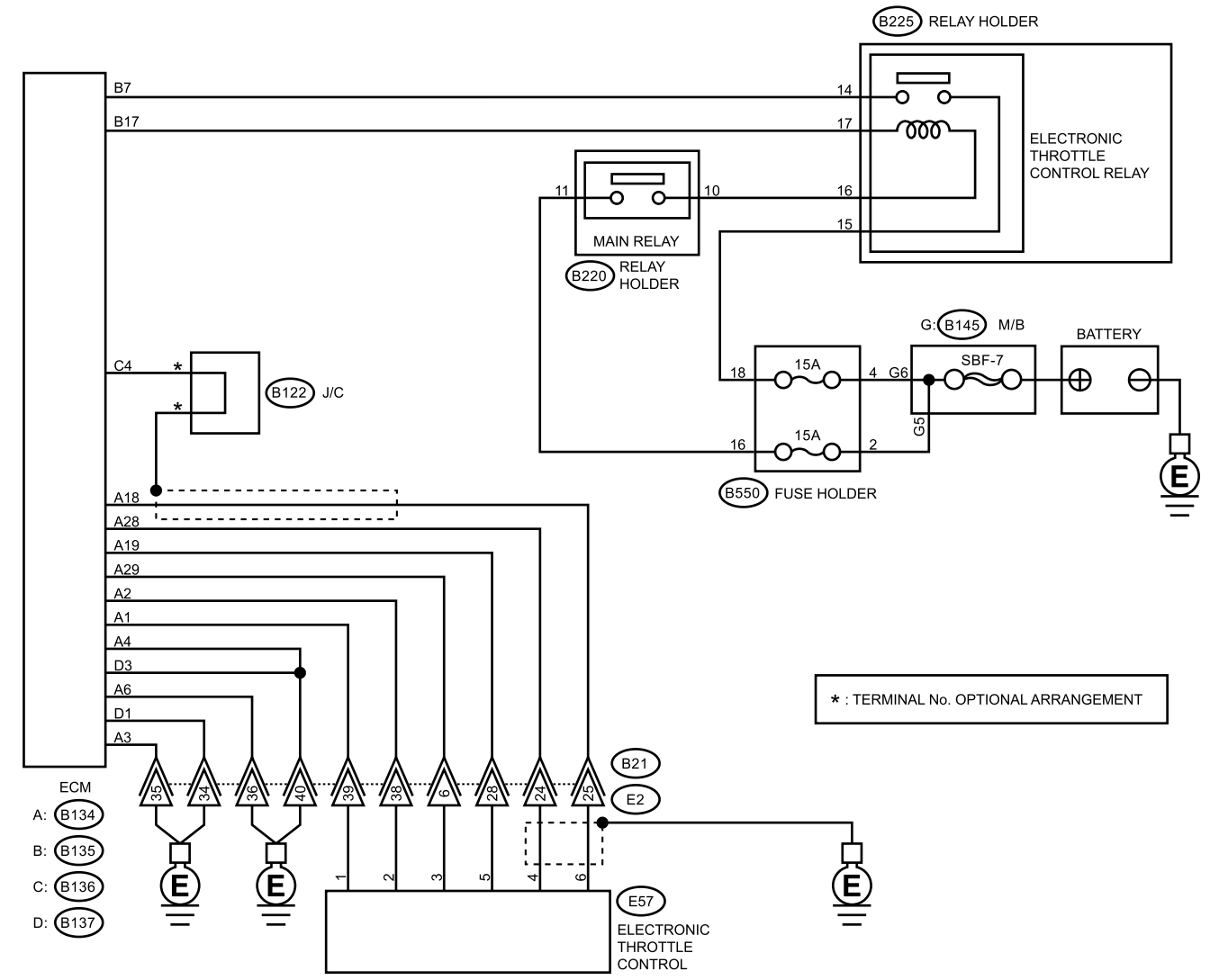
- Improper idling
- Poor driving performance
- Engine stalls.

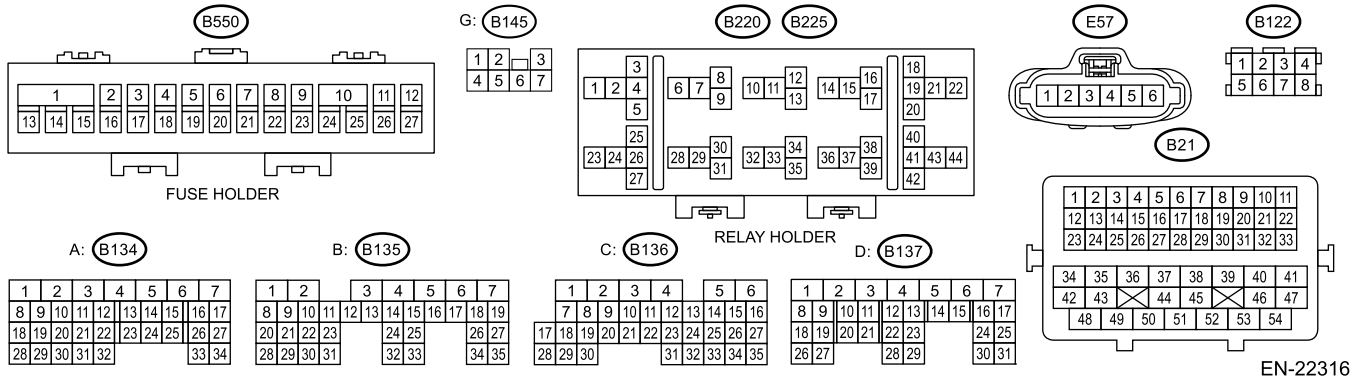
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B225 RELAY HOLDER
B7
B17
14
17
16
15
ELECTRONIC THROTTLE CONTROL RELAY
11
10
MAIN RELAY
B220 RELAY HOLDER
G: B145 M/B
BATTERY
SBF-7
18
15A
4
G6
G5
16
15A
2
B550 FUSE HOLDER
C4
*
*
B122 J/C
A18
A28
A19
A29
A2
A1
A4
D3
A6
D1
A3
* : TERMINAL No. OPTIONAL ARRANGEMENT
ECM
A: B134
B: B135
C: B136
D: B137
35
34
36
40
39
38
6
28
24
25
B21
E2
1
2
3
5
4
6
E57
ELECTRONIC THROTTLE CONTROL


B550
FUSE HOLDER
G: B145
B220
B225
RELAY HOLDER
E57
B122
B21
A: B134
B: B135
C: B136
D: B137

EN-22316

1. CHECK ELECTRONIC THROTTLE CONTROL RELAY.

1. Turn the ignition switch to OFF.
2. Remove the electronic throttle control relay.
3. Connect the battery to terminals No. 16 and No. 17 of electronic throttle control relay.
4. Measure the resistance between electronic throttle control relay terminals.

Terminals

No. 14 — No. 15:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Replace the electronic throttle control relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Electronic Throttle Control Relay.

2. CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.

Measure the voltage between electronic throttle control relay connector and chassis ground.

Connector & terminal

(B225) No. 15 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 3.
No	Repair the open or short to ground in the power supply circuit.

3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.

1. Disconnect the connector from ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between electronic throttle control relay connector and chassis ground.
   Connector & terminal
   (B225) No. 17 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and electronic throttle control relay connector.
No	Go to 4.

4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Measure the resistance between electronic throttle control relay connector and chassis ground.
   Connector & terminal
   (B225) No. 14 — Chassis ground:
   (B225) No. 17 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between ECM connector and electronic throttle control relay connector.

5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.

Measure the resistance between ECM connector and electronic throttle control relay connector.

Connector & terminal

(B135) No. 7 — (B225) No. 14:

(B135) No. 17 — (B225) No. 17:

Is the resistance less than 1 Ω?

Yes	Go to 6.
No	Repair the open circuit in harness between ECM connector and electronic throttle control relay connector.

6. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connectors from electronic throttle control.
3. Measure the resistance between ECM connector and chassis ground.

   Connector & terminal

   (B134) No. 19 — Chassis ground:

   (B134) No. 18 — Chassis ground:

   (B134) No. 18 — (B136) No. 4:

   (B134) No. 28 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 7.
No	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

7. CHECK SHORT CIRCUIT INSIDE THE ECM.

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 6 — Engine ground:
   (E57) No. 4 — Engine ground:

Is the resistance 200 kΩ or more?

Yes	Go to 8.
No	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. Replace the ECM if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

8. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and electronic throttle control connector.
   Connector & terminal
   (B134) No. 18 — (E57) No. 6:
   (B134) No. 28 — (E57) No. 4:
   (B134) No. 29 — (E57) No. 3:

Is the resistance less than 1 Ω?

Yes	Go to 9.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and electronic throttle control connector** • **Poor contact of coupling connector**

9. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes	Go to 10.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

10. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to ON.
2. Measure the voltage between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 4 (+) — Engine ground (−):
   (E57) No. 6 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.
No	Go to 11.

11. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   Connector & terminal
   (B134) No. 19 — (B134) No. 18:
   (B134) No. 19 — (B134) No. 28:

Is the resistance 1 MΩ or more?

Yes	Go to 12.
No	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.

12. CHECK SENSOR OUTPUT.

1. Connect all connectors.
2. Start the engine and warm up completely.
3. Stop the engine, and then turn the ignition switch to ON (engine OFF).
4. Read the value of «Main-Throttle Sensor» using Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «Main-Throttle Sensor» 0.81 — 0.87 V?

Yes	Go to 13.
No	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Throttle Body.

13. CHECK SENSOR OUTPUT.

Read the value of «Sub-Throttle Sensor» using Subaru Select Monitor.
Note:
For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «Sub-Throttle Sensor» 1.64 — 1.7 V?

Yes	Go to 14.
No	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Throttle Body.

14. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance between ECM connector and electronic throttle control connector.
   Connector & terminal
   (B134) No. 1 — (E57) No. 1:
   (B134) No. 2 — (E57) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 15.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and electronic throttle control connector** • **Poor contact of coupling connector**

15. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 1 (+) — Engine ground (−):
   (E57) No. 2 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.
No	Go to 16.

16. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL MOTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 1 — Engine ground:
   (E57) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 17.
No	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

17. CHECK ELECTRONIC THROTTLE CONTROL MOTOR HARNESS.

Measure the resistance between electronic throttle control connectors.

Connector & terminal

(E57) No. 1 — (E57) No. 2:

Is the resistance 1 MΩ or more?

Yes	Go to 18.
No	Repair the short circuit in harness between ECM connector and electronic throttle control connector.

18. CHECK ELECTRONIC THROTTLE CONTROL GROUND CIRCUIT.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B134) No. 3 — Chassis ground:
(B134) No. 4 — Chassis ground:
(B134) No. 6 — Chassis ground:
(B137) No. 1 — Chassis ground:
(B137) No. 3 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 19.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of coupling connector**

19. CHECK ELECTRONIC THROTTLE CONTROL.

Measure the resistance between electronic throttle control terminals.
Terminals
No. 1 — No. 2:

Is the resistance 50 Ω or less?

Yes	Go to 20.
No	Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Throttle Body.

20. CHECK ELECTRONIC THROTTLE CONTROL.

Move the throttle valve to the fully opened and fully closed positions with fingers.
Check that the valve returns to the specified position when releasing fingers.

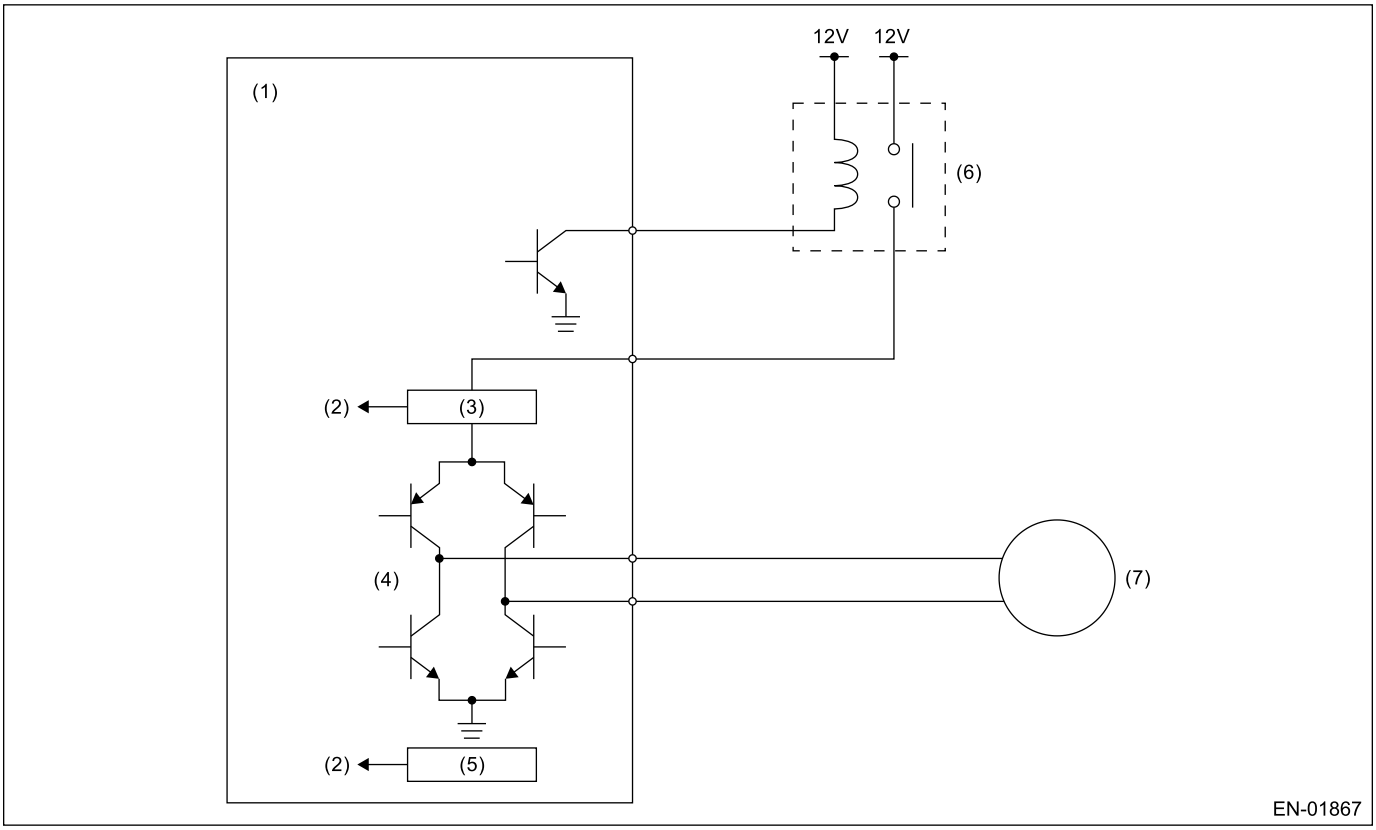
Does the valve return to the specified position? Standard value: 3 mm (0.12 in) from fully closed position

Yes	Repair the poor contact of ECM connector.
No	Replace the electronic throttle control. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Throttle Body.

1. OUTLINE OF DIAGNOSIS

Judge as NG when the motor current becomes large or drive circuit is heated.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Detecting circuit
(3) Overcurrent detection circuit
(4) Drive circuit
(5) Temperature detection circuit
(6) Electronic throttle control relay
(7) Motor

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage Electronic throttle control relay output	≥ 6.2V ON

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Overcurrent signal from driver	ON

time needed for diagnosis: 512ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2102 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT LOW

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

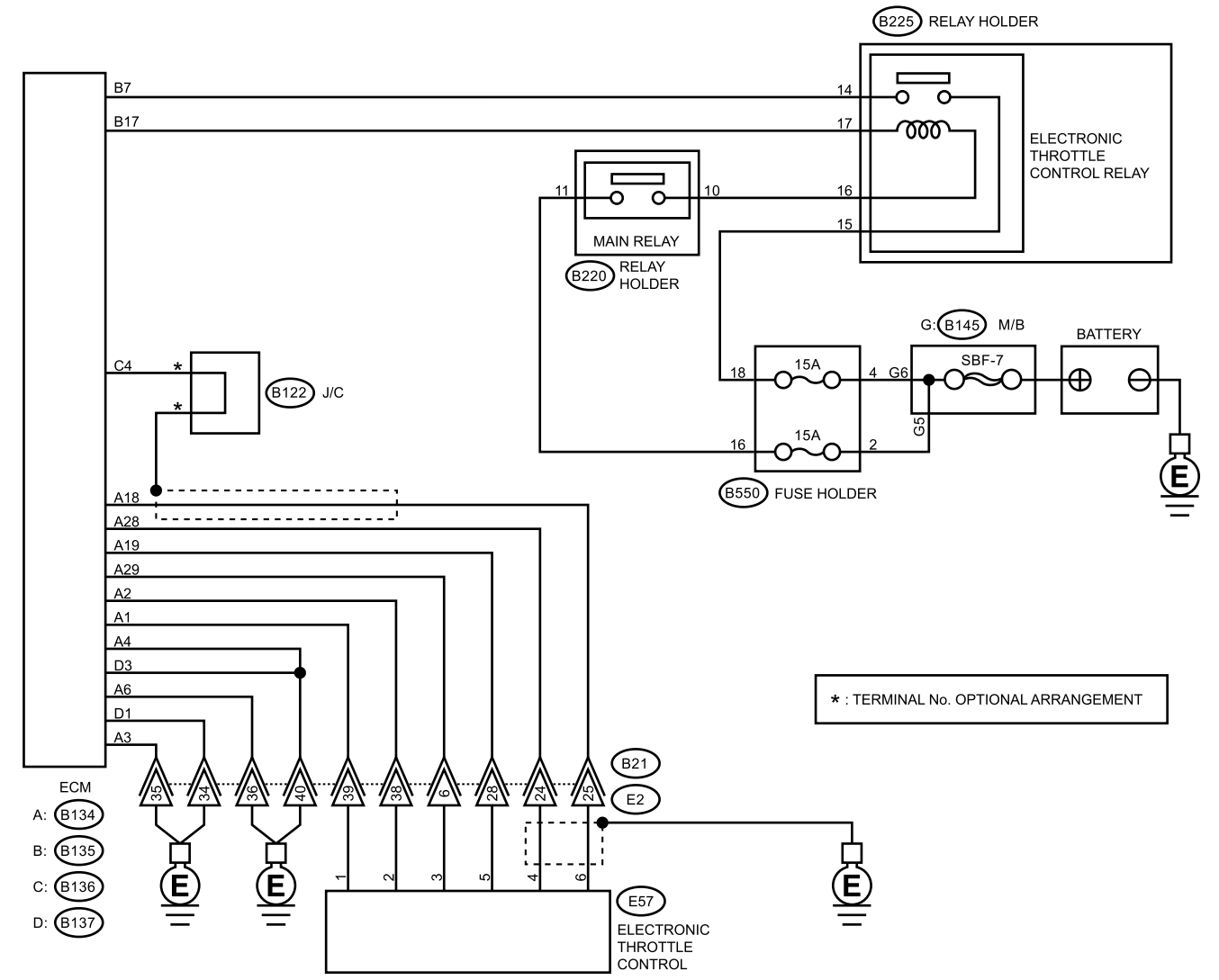
- Improper idling
- Poor driving performance
- Engine stalls.

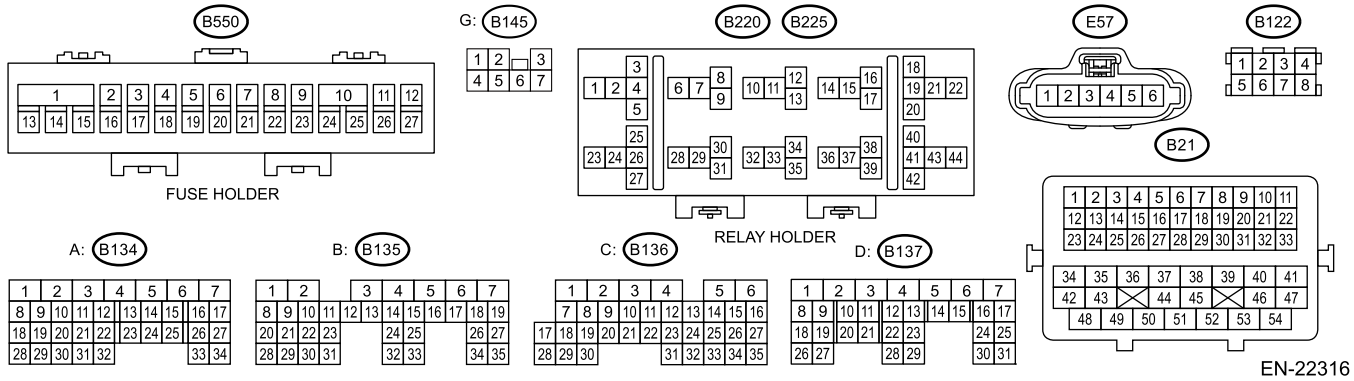
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B225 RELAY HOLDER
B7
B17
14
17
16
15
ELECTRONIC THROTTLE CONTROL RELAY
11
10
MAIN RELAY
B220 RELAY HOLDER
G: B145 M/B
BATTERY
SBF-7
18
15A
4
G6
G5
16
15A
2
B550 FUSE HOLDER
C4
*
*
B122 J/C
A18
A28
A19
A29
A2
A1
A4
D3
A6
D1
A3
* : TERMINAL No. OPTIONAL ARRANGEMENT
ECM
A: B134
B: B135
C: B136
D: B137
35
34
36
40
39
38
6
28
24
25
B21
E2
1
2
3
5
4
6
E57
ELECTRONIC THROTTLE CONTROL


B550
FUSE HOLDER
G: B145
B220
B225
RELAY HOLDER
E57
B122
B21
A: B134
B: B135
C: B136
D: B137

EN-22316

1. CHECK ELECTRONIC THROTTLE CONTROL RELAY.

1. Turn the ignition switch to OFF.
2. Remove the electronic throttle control relay.
3. Connect the battery to terminals No. 16 and No. 17 of electronic throttle control relay.
4. Measure the resistance between electronic throttle control relay terminals.

Terminals

No. 14 — No. 15:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Replace the electronic throttle control relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Electronic Throttle Control Relay.

2. CHECK POWER SUPPLY OF ELECTRONIC THROTTLE CONTROL RELAY.

Measure the voltage between electronic throttle control relay connector and chassis ground.

Connector & terminal

(B225) No. 15 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 3.
No	Repair the open or short to ground in the power supply circuit.

3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.

1. Disconnect the connector from ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between electronic throttle control relay connector and chassis ground.
   Connector & terminal
   (B225) No. 17 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and electronic throttle control relay connector.
No	Go to 4.

4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Measure the resistance between electronic throttle control relay connector and chassis ground.
   Connector & terminal
   (B225) No. 14 — Chassis ground:
   (B225) No. 17 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between ECM connector and electronic throttle control relay connector.

5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.

Measure the resistance between ECM connector and electronic throttle control relay connector.

Connector & terminal

(B135) No. 7 — (B225) No. 14:

(B135) No. 17 — (B225) No. 17:

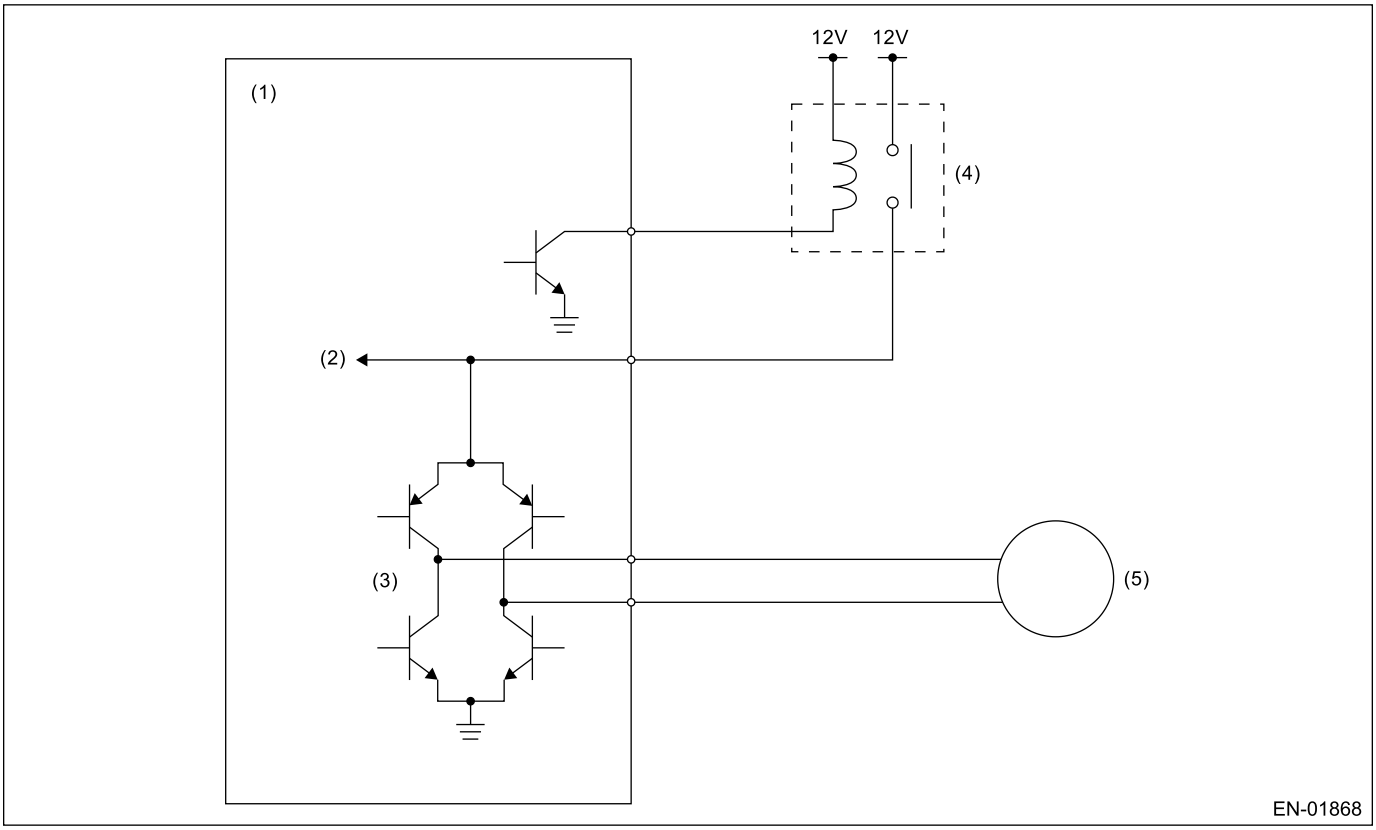
Is the resistance less than 1 Ω?

Yes	Repair the poor contact of ECM connector.
No	Repair the open circuit in harness between ECM connector and electronic throttle control relay connector.

1. OUTLINE OF DIAGNOSIS

Judge as NG when the electronic throttle control power is not supplied even when ECM sets the electric control throttle relay to ON.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Voltage detection circuit
(3) Drive circuit
(4) Electronic throttle control relay
(5) Motor

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage Electronic throttle control relay output	≥ 11V ON

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Motor power voltage	≤ 5V

time needed for diagnosis: 352ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2103 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT HIGH

DTC detecting condition:

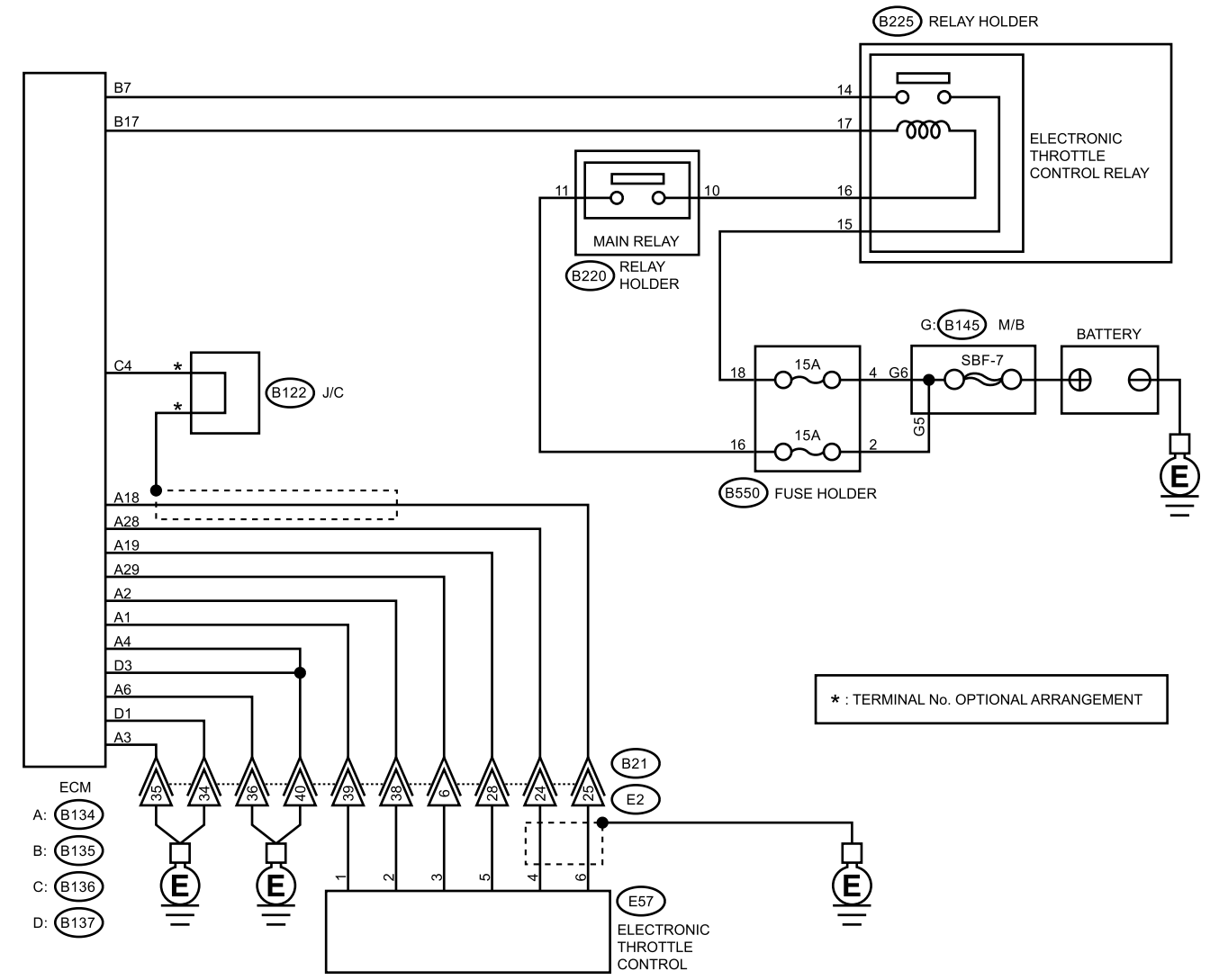
Immediately at fault recognition

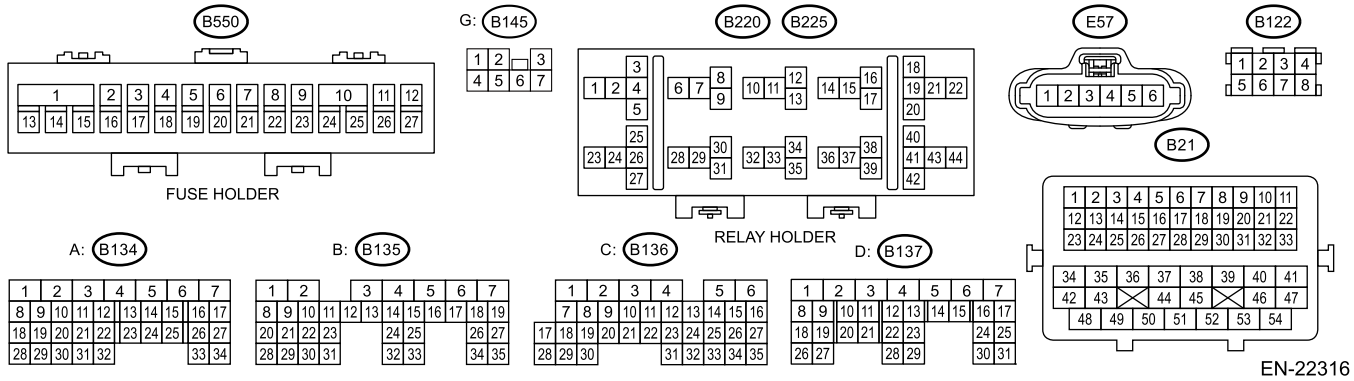
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B225 RELAY HOLDER
B7
B17
14
17
16
15
ELECTRONIC THROTTLE CONTROL RELAY
11
10
MAIN RELAY
B220 RELAY HOLDER
G: B145 M/B
BATTERY
SBF-7
18
15A
4
G6
G5
16
15A
2
B550 FUSE HOLDER
C4
*
*
B122 J/C
A18
A28
A19
A29
A2
A1
A4
D3
A6
D1
A3
* : TERMINAL No. OPTIONAL ARRANGEMENT
ECM
A: B134
B: B135
C: B136
D: B137
35
34
36
40
39
38
6
28
24
25
B21
E2
1
2
3
5
4
6
E57
ELECTRONIC THROTTLE CONTROL


B550
FUSE HOLDER
G: B145
B220
B225
RELAY HOLDER
E57
B122
B21
A: B134
B: B135
C: B136
D: B137

EN-22316

1. CHECK ELECTRONIC THROTTLE CONTROL RELAY.

1. Turn the ignition switch to OFF.
2. Remove the electronic throttle control relay.
3. Measure the resistance between electronic throttle control relay terminals.
   Terminals
   No. 14 — No. 15:

Is the resistance 1 MΩ or more?

Yes	Go to 2.
No	Replace the electronic throttle control relay. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Electronic Throttle Control Relay.

2. CHECK SHORT CIRCUIT OF ELECTRONIC THROTTLE CONTROL RELAY POWER SUPPLY.

1. Turn the ignition switch to ON.
2. Measure the voltage between electronic throttle control relay connector and chassis ground.
   Connector & terminal
   (B225) No. 14 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and electronic throttle control relay connector.
No	Go to 3.

3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL RELAY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B135) No. 17 — Chassis ground:

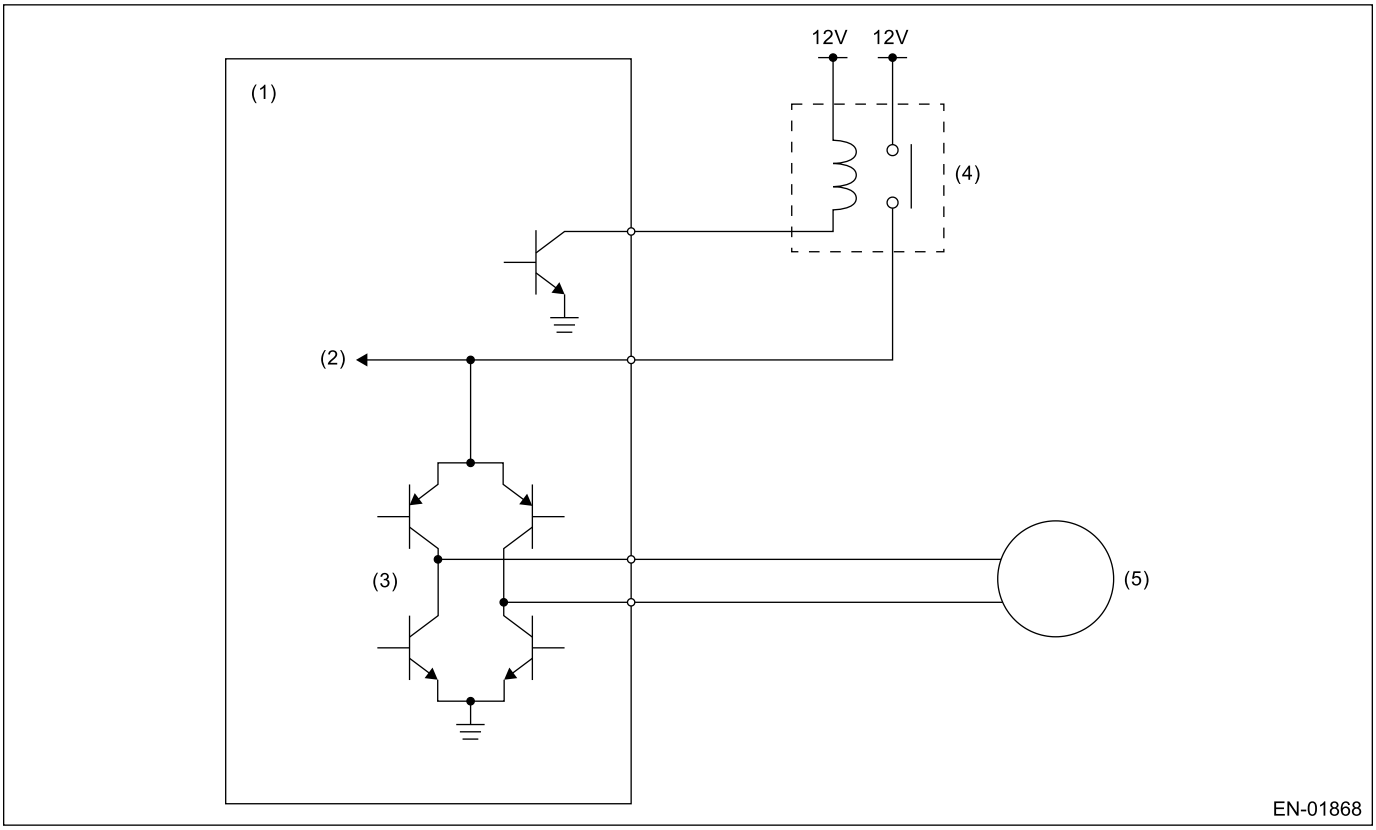
Is the resistance 1 MΩ or more?

Yes	Repair the poor contact of ECM connector.
No	Repair the short circuit to ground in harness between ECM connector and electronic throttle control relay connector.

1. OUTLINE OF DIAGNOSIS

Judge as NG when the electronic throttle control power is supplied even when ECM sets the electronic throttle control relay to OFF.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Voltage detection circuit
(3) Drive circuit
(4) Electronic throttle control relay
(5) Motor

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 6V
Electronic throttle control relay output	OFF

4. GENERAL DRIVING CYCLE

- When ignition switch ON → OFF
- Ignition switch OFF → ON (Only after clearing memory)

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Motor power voltage	≥ 5V

time needed for diagnosis: 600ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

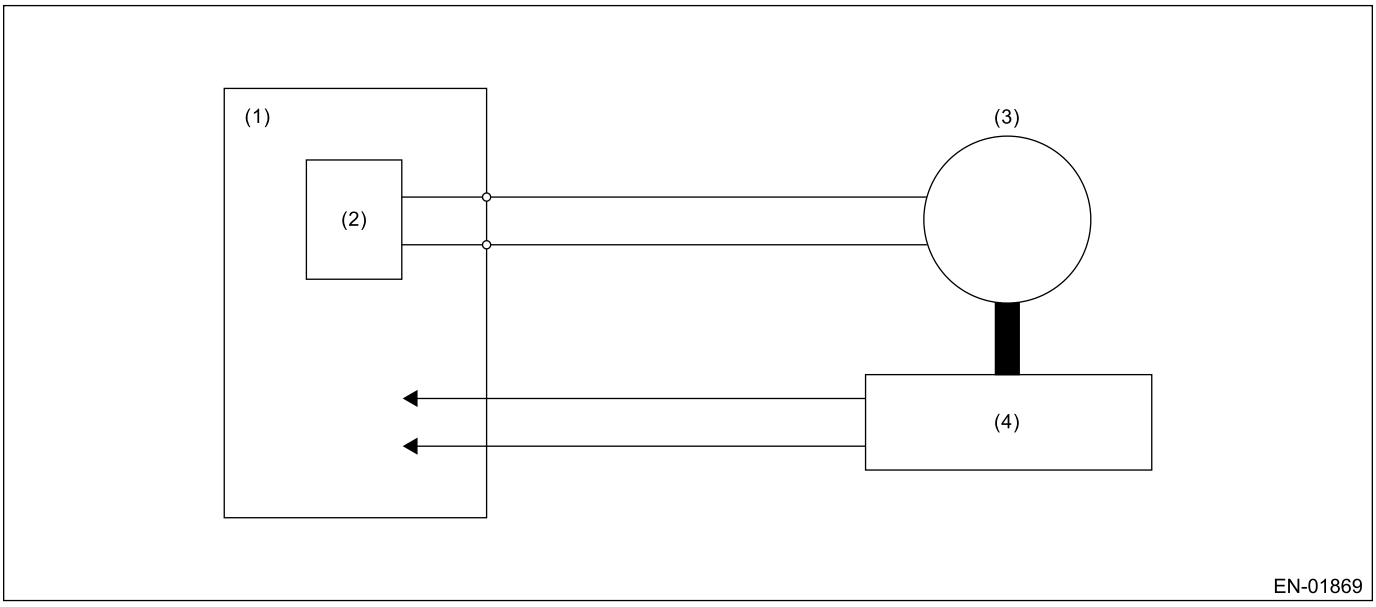
DTC P2109 THROTTLE/PEDAL POSITION SENSOR "A" MINIMUM STOP PERFORMANCE

Note:
For the diagnostic procedure, refer to DTC P2101. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE.

1. OUTLINE OF DIAGNOSIS

Judge as NG when full close point learning cannot conducted or abnormal value is detected.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM) (3) Motor (4) Throttle position sensor
(2) Drive circuit

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 6V

4. GENERAL DRIVING CYCLE

Perform the diagnosis at full closed point learning.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Throttle sensor opening angle at full close point learning or |(Throttle default position − Minimum throttle halt position)|	< 9.884° or > 20.116° < 1.637°

time needed for diagnosis: 8ms — 80ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

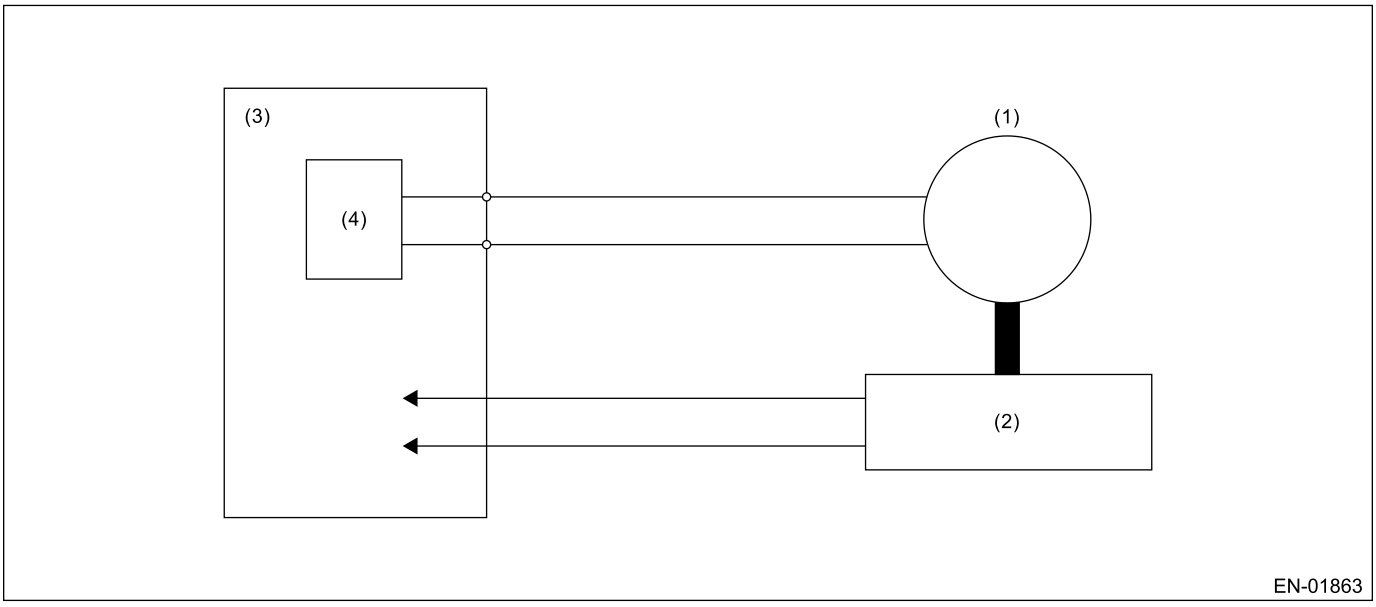
DTC P2119 THROTTLE ACTUATOR "A" CONTROL THROTTLE BODY RANGE/PERFORMANCE

Note:
For the diagnostic procedure, refer to DTC P2101. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2101 THROTTLE ACTUATOR "A" CONTROL MOTOR CIRCUIT RANGE/PERFORMANCE.

1. OUTLINE OF DIAGNOSIS

Judge as NG when the target opening angle and actual opening angle is mismatched or the current to motor is the specified duty or more for specified time continuously.

2. COMPONENT DESCRIPTION



(1) Motor
(2) Throttle position sensor
(3) Engine control module (ECM)
(4) Drive circuit

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 6.2V
Electronic throttle control relay	ON

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously when the electronic throttle control is operating.

5. DIAGNOSTIC METHOD

Judge as NG if the criteria below are met.

Judgment1

Judgment value

Malfunction Criteria	Threshold Value
Output duty to drive circuit	≥ 95%

Time needed for diagnosis:

- Engine speed ≥ 500rpm: 2000ms
- Engine speed < 500rpm: 5000ms

Judgment2

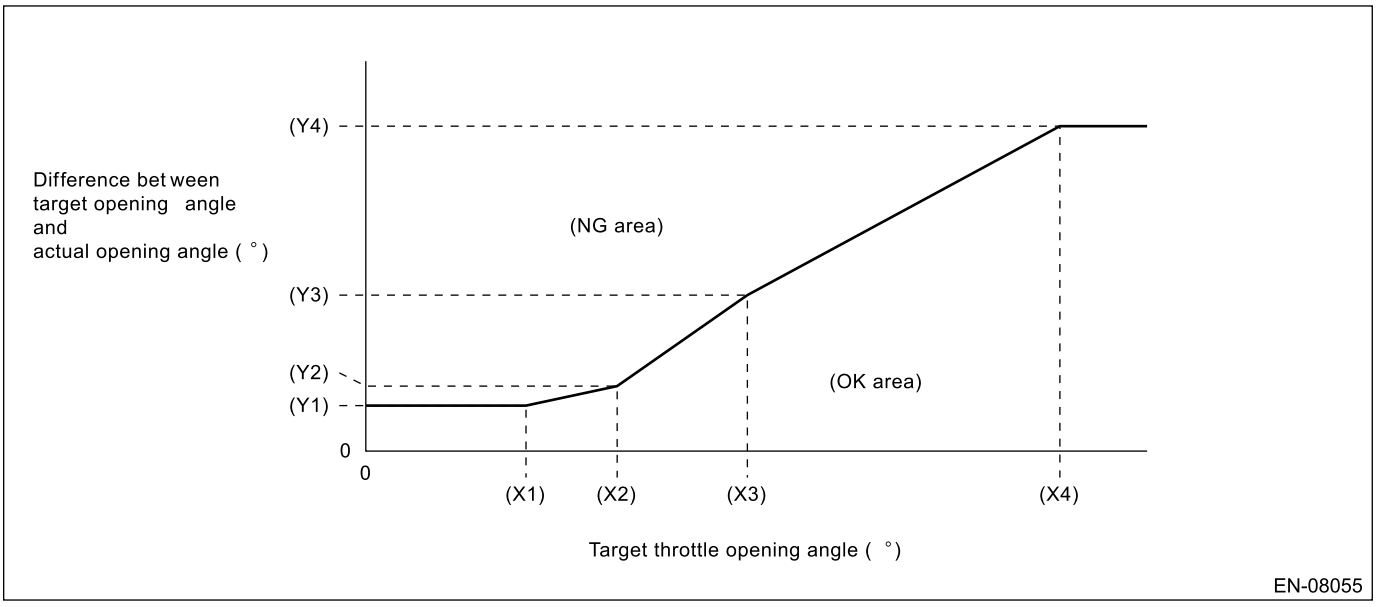
Judgment value

Malfunction Criteria	Threshold Value
|(Target throttle position - Actual throttle position (Main Sensor))|	Within NG range of **Details of judgment value**

Time needed for diagnosis:

- Engine speed ≥ 500rpm: refer to **Details of Judgment time**.
- Engine speed < 500rpm: 5000ms

Details of judgment value



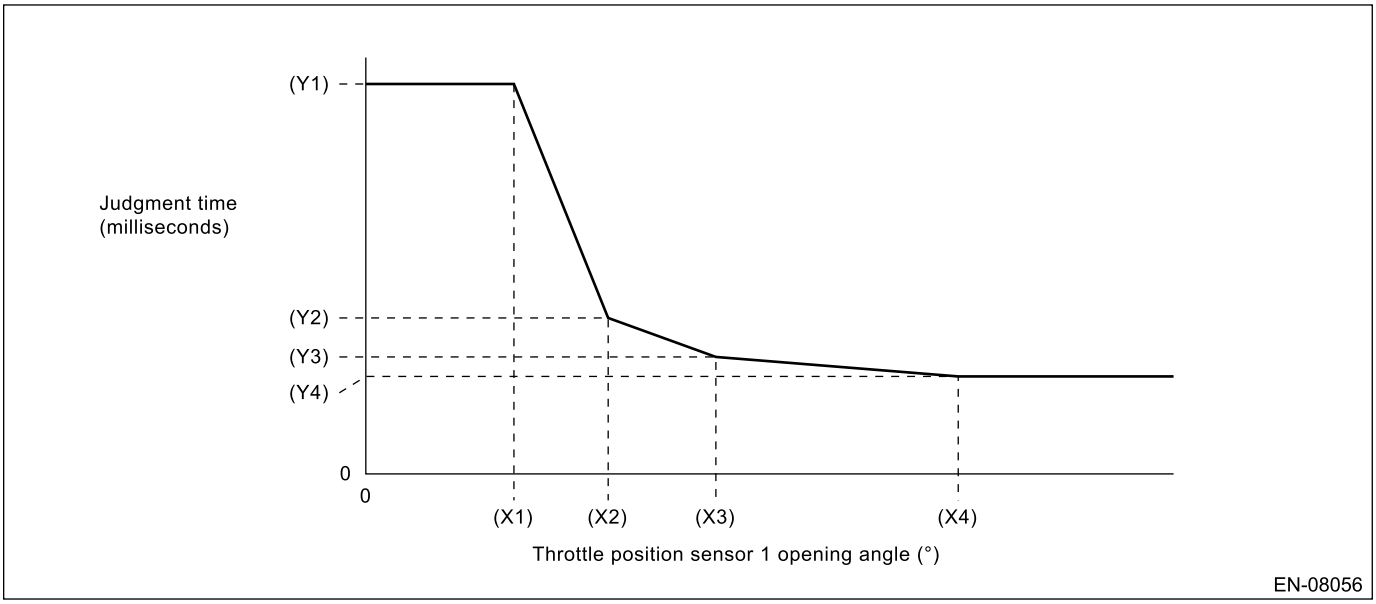
(X1) 6.15°　　(X2) 9.65°　　(X3) 14.65°

(X4) 26.65°

(Y1) 3.5° (Y2) 5° (Y3) 12°

(Y4) 25°

Details of Judgment time



(X1) 5.5°
(X2) 9°
(X3) 13°
(X4) 22°
(Y1) 1000ms
(Y2) 400ms
(Y3) 300ms
(Y4) 250ms

Note:
Judgment time is always 1000 milliseconds when actual opening angle < target opening angle.
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2122 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT LOW

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

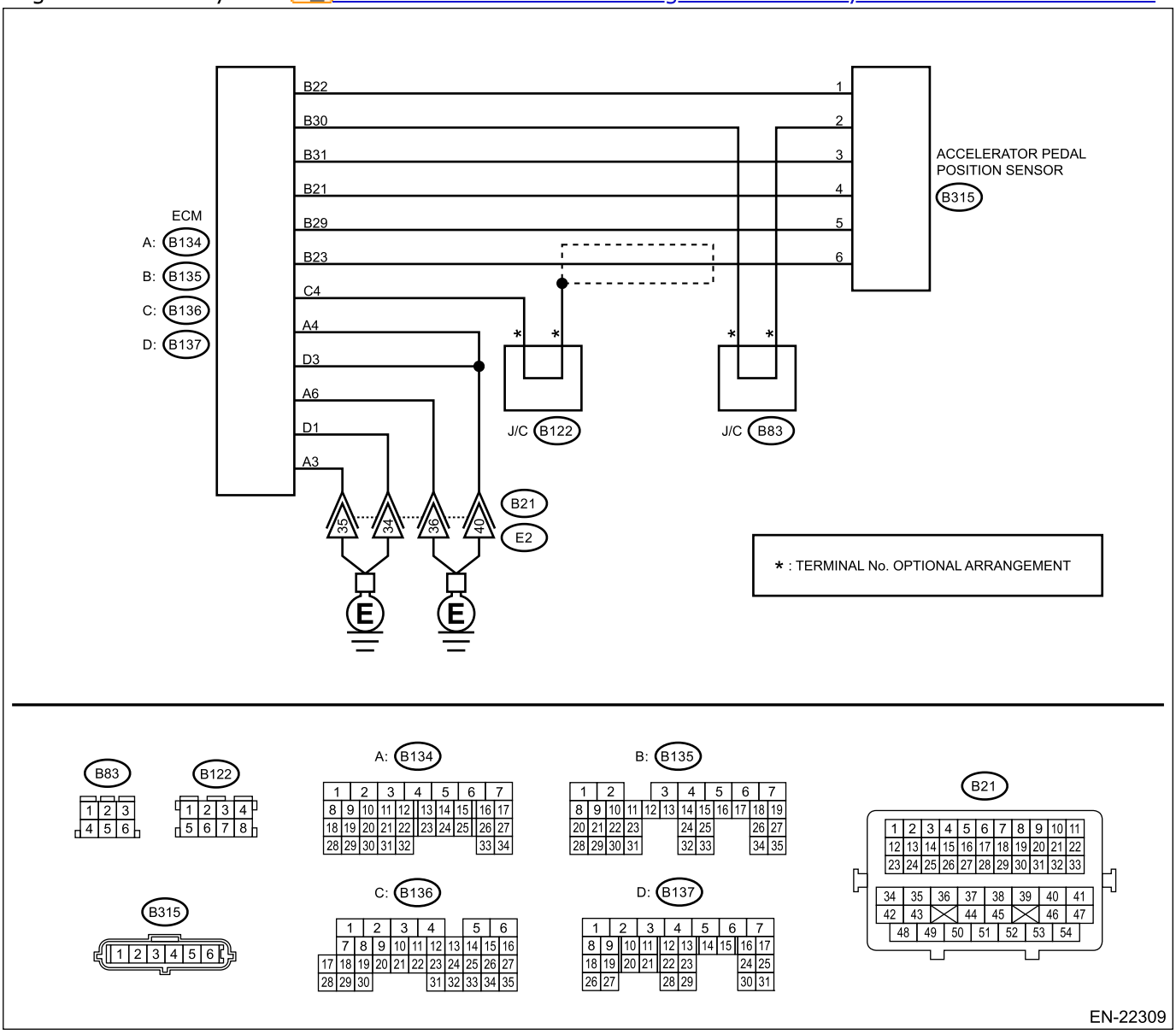
- Improper idling
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the accelerator pedal position sensor.
4. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B135) No. 21 — Chassis ground:
   (B135) No. 23 — Chassis ground:
   (B135) No. 23 — (B136) No. 4:

Is the resistance 1 MΩ or more?

Yes	Go to 2.
No	Repair the short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector.

2. CHECK SHORT CIRCUIT INSIDE THE ECM.

1. Connect the connector to ECM.
2. Measure the resistance between accelerator pedal position sensor connector and chassis ground.
   Connector & terminal
   (B315) No. 6 — Chassis ground:

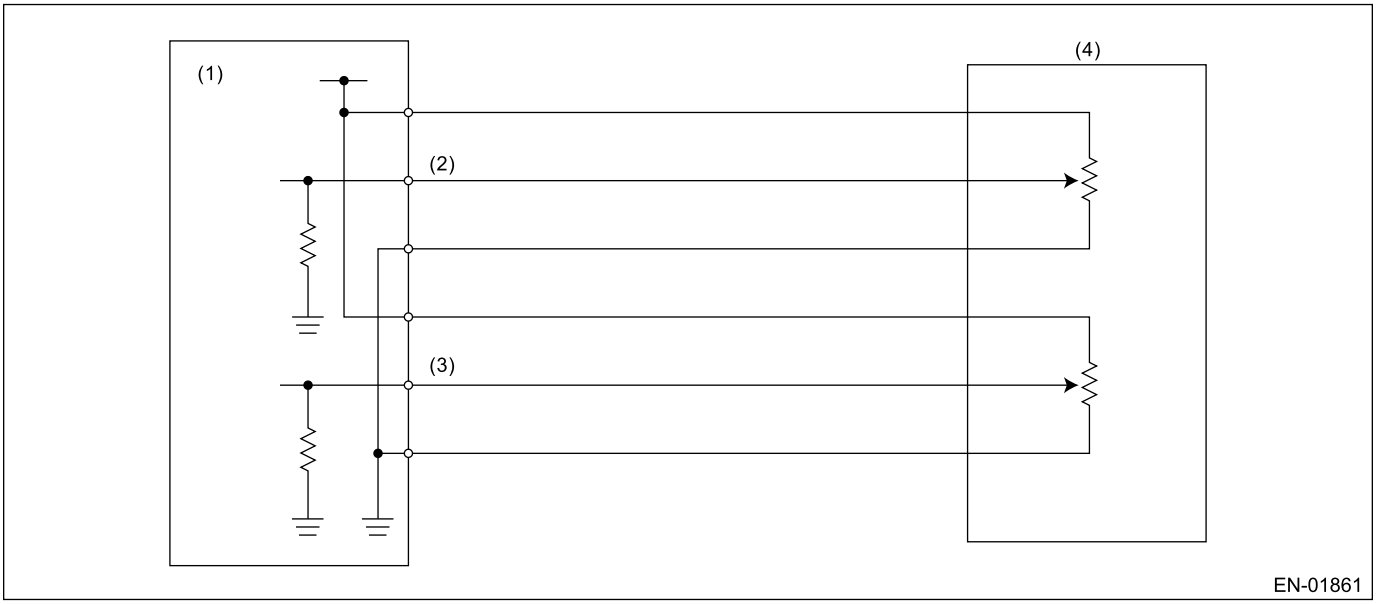
Is the resistance 1 MΩ or more?

Yes	Replace the accelerator pedal. Ref. to SPEED CONTROL SYSTEMS(STI)>Accelerator Pedal.
No	Repair the short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector. Replace the ECM if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of accelerator pedal position sensor 1.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 6V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	< 0.301V

time needed for diagnosis: 100ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2123 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D" CIRCUIT HIGH

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

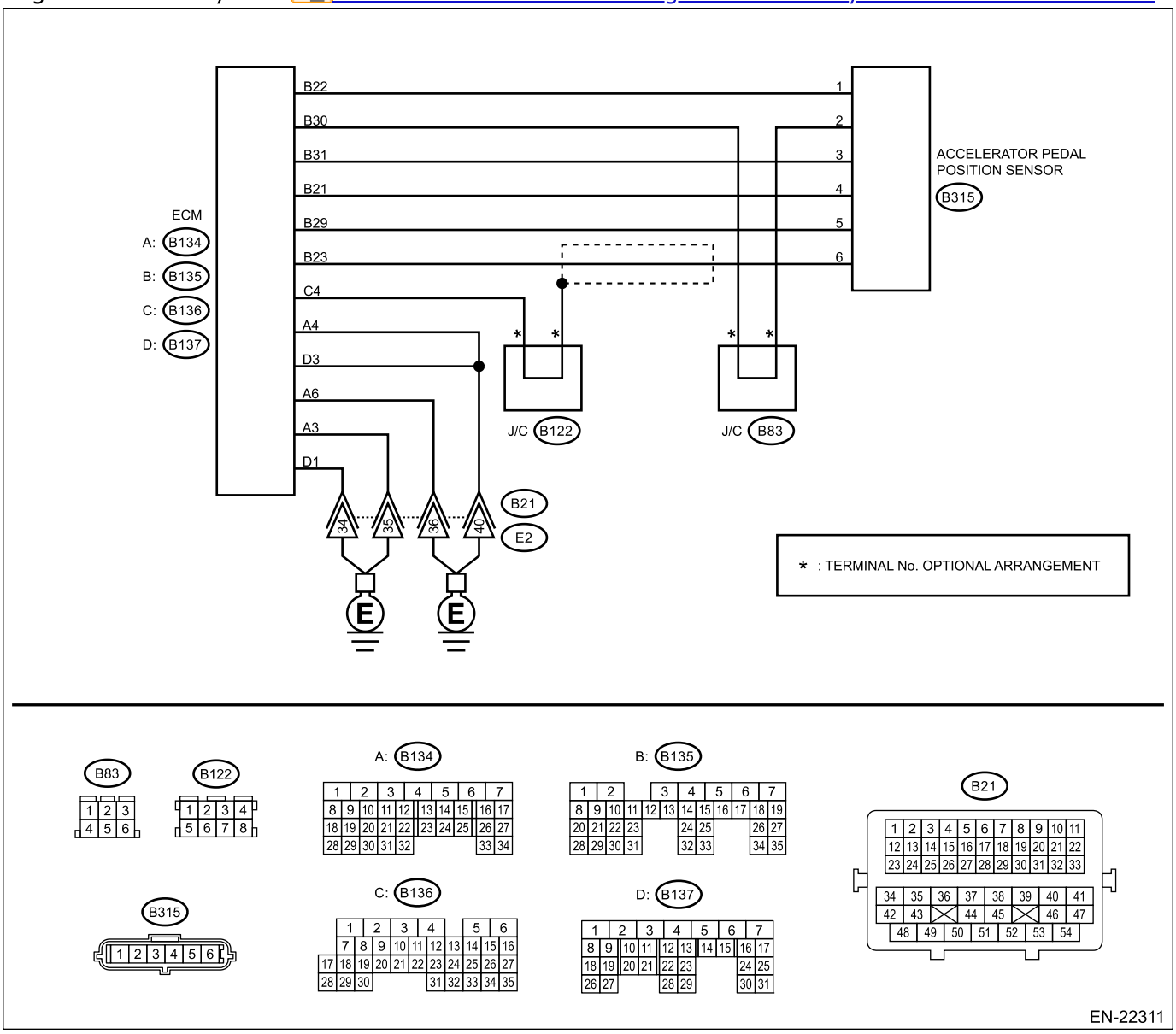
- Improper idling
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the accelerator pedal position sensor.
4. Measure the resistance of harness between ECM connector and accelerator pedal position sensor connector.
   Connector & terminal
   (B135) No. 23 — (B315) No. 6:
   (B135) No. 29 — (B315) No. 5:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the open circuit of harness between ECM connector and accelerator pedal position sensor connector.

2. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Measure the resistance between accelerator pedal position sensor connector and chassis ground.
   Connector & terminal
   (B315) No. 5 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.

1. Turn the ignition switch to ON.
2. Measure the voltage between accelerator pedal position sensor connector and chassis ground.
   Connector & terminal
   (B315) No. 6 (+) — Chassis ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power supply in harness between ECM connector and accelerator pedal position sensor connector.
No	Go to 4.

4. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   Connector & terminal
   (B135) No. 21 — (B135) No. 23:

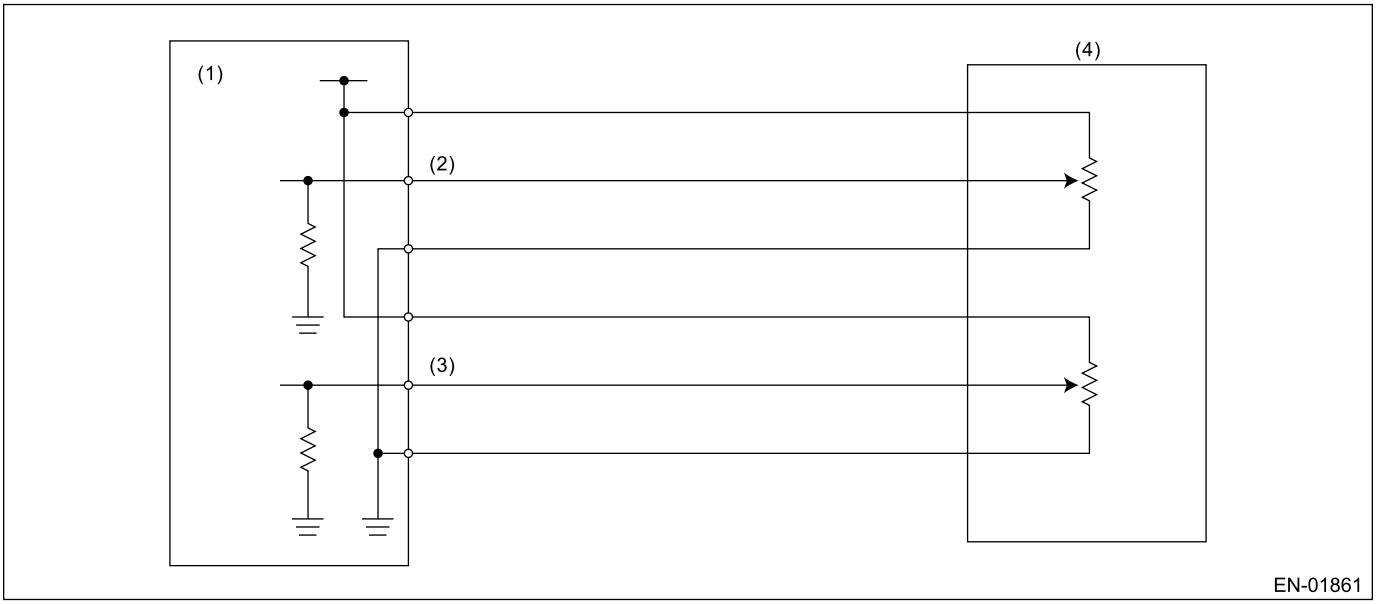
Is the resistance 1 MΩ or more?

Yes	Repair the poor contact of accelerator pedal position sensor connector. Replace the accelerator pedal assembly if defective. Ref. to SPEED CONTROL SYSTEMS(STI)>Accelerator Pedal.
No	Repair the short circuit to power supply in harness between ECM connector and accelerator pedal position sensor connector.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of accelerator pedal position sensor 1.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 6V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Sensor 1 input voltage	≥ 4.783V

time needed for diagnosis: 32ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2127 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT LOW

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

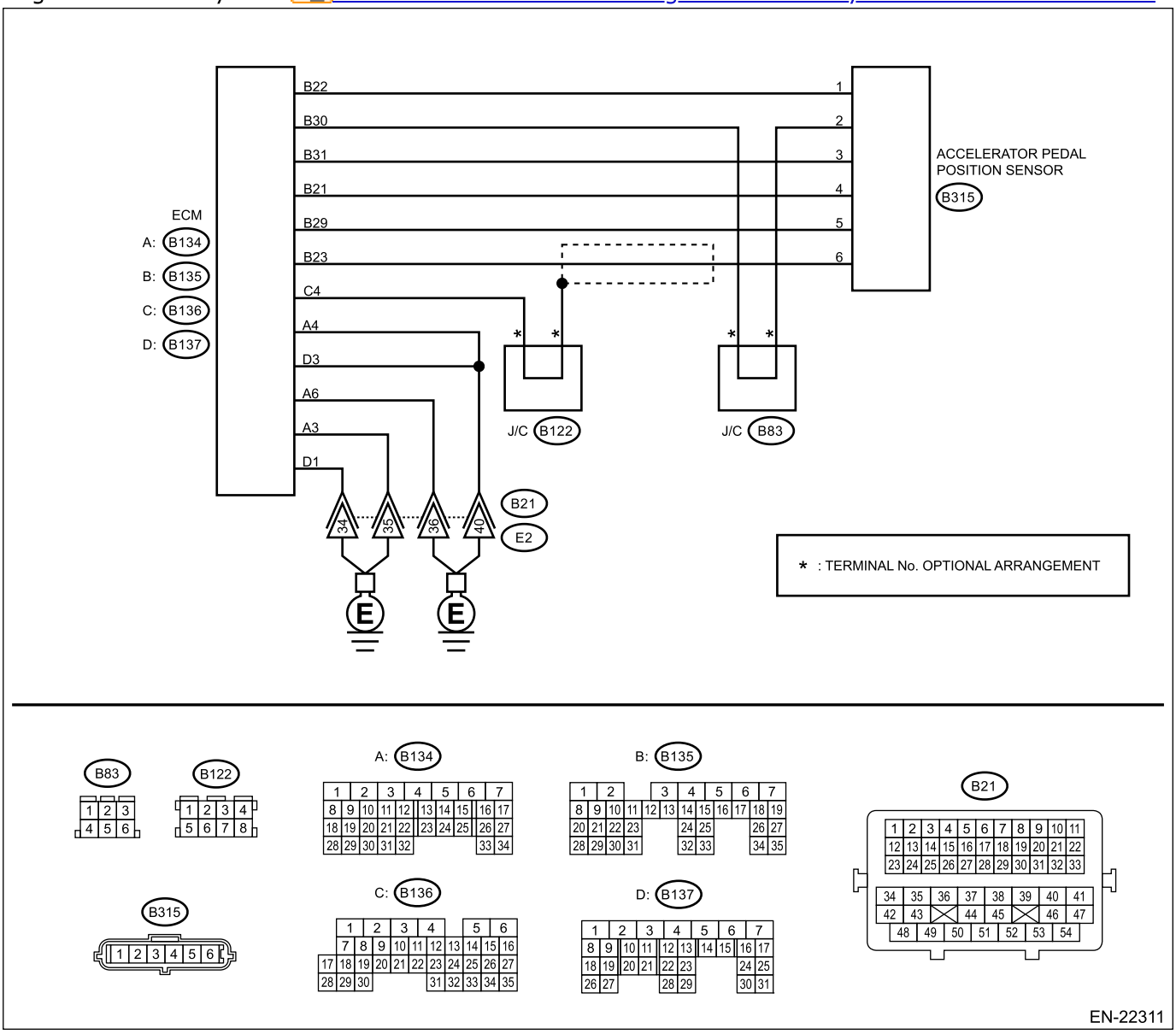
- Improper idling
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the accelerator pedal position sensor.
4. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B135) No. 22 — Chassis ground:
   (B135) No. 31 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 2.
No	Repair the short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector.

2. CHECK SHORT CIRCUIT INSIDE THE ECM.

1. Connect the connector to ECM.
2. Measure the resistance between accelerator pedal position sensor connector and chassis ground.
   Connector & terminal
   (B315) No. 3 — Chassis ground:

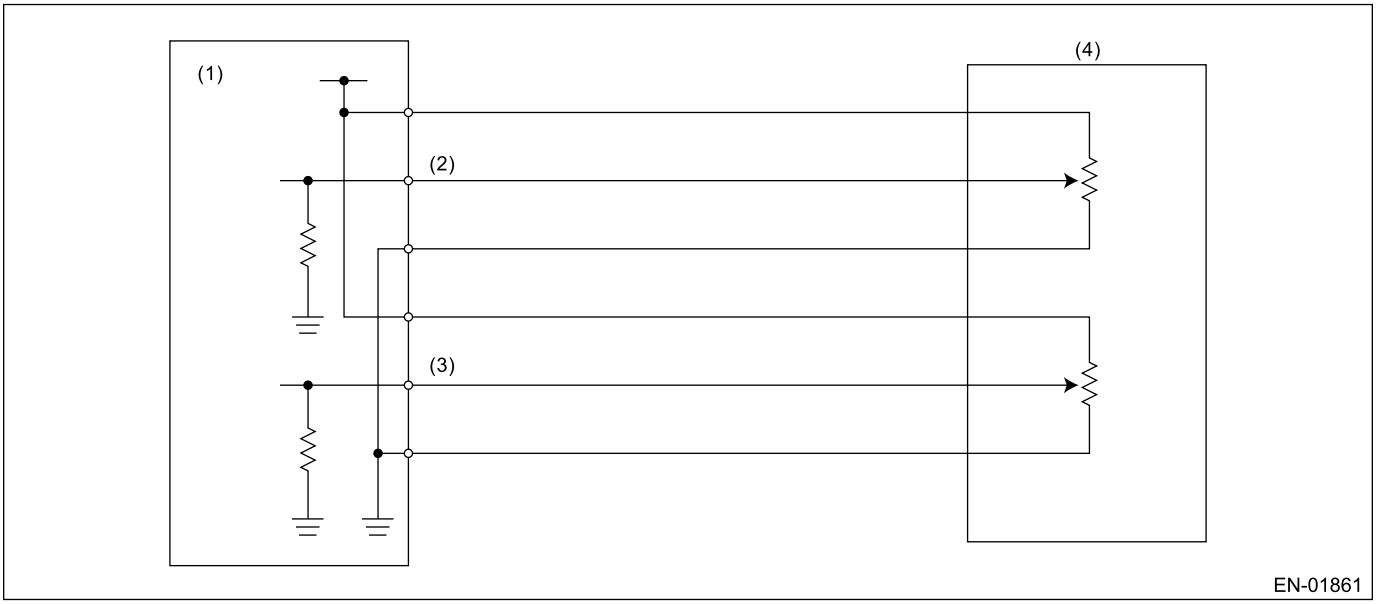
Is the resistance 1 MΩ or more?

Yes	Replace the accelerator pedal. Ref. to SPEED CONTROL SYSTEMS(STI)>Accelerator Pedal.
No	Repair the short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector. Replace the ECM if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of accelerator pedal position sensor 2.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 6V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	< 0.301V

time needed for diagnosis: 100ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2128 THROTTLE/PEDAL POSITION SENSOR/SWITCH "E" CIRCUIT HIGH

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

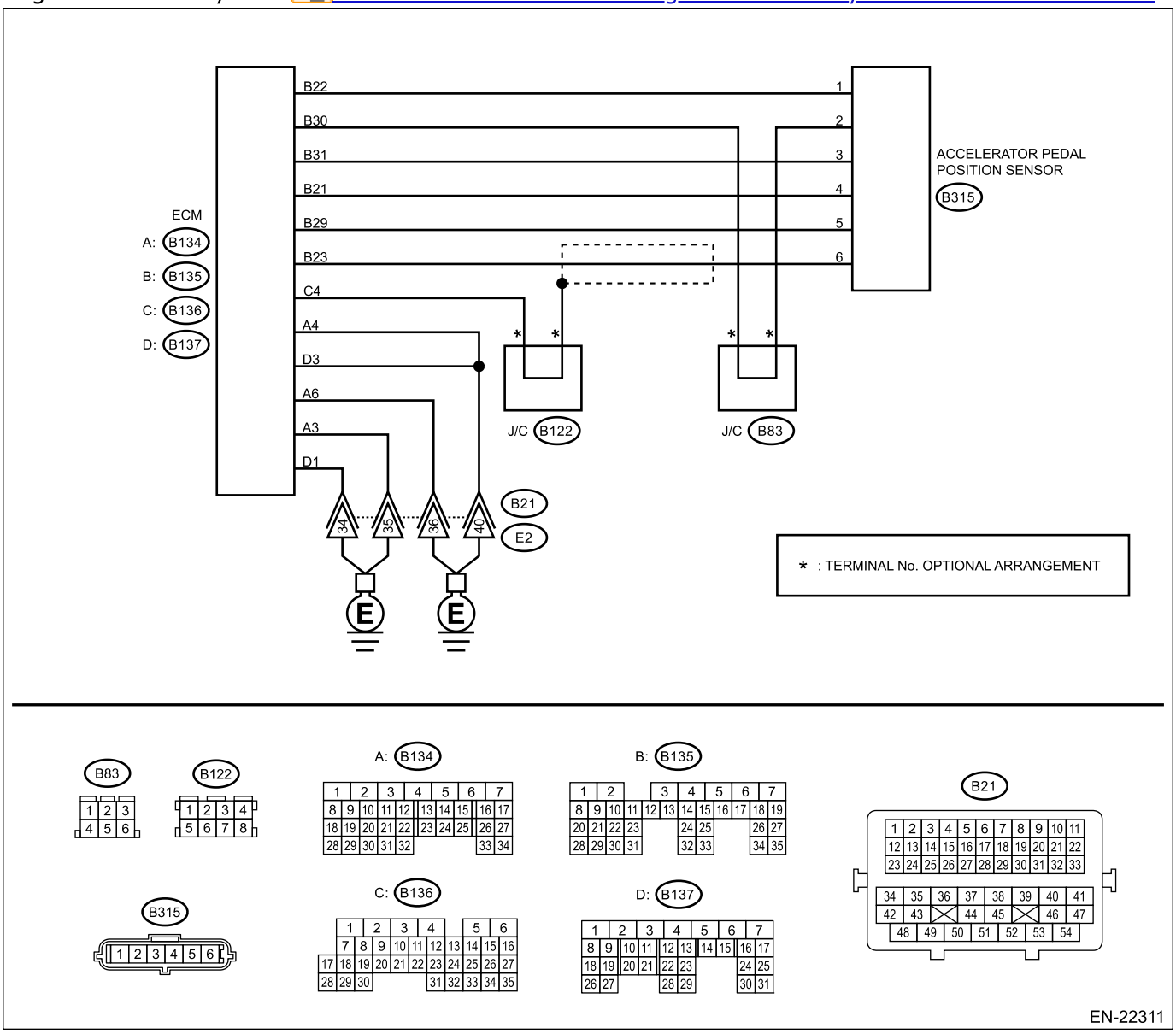
- Improper idling
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the accelerator pedal position sensor.
4. Measure the resistance of harness between ECM connector and accelerator pedal position sensor connector.

   Connector & terminal

   (B135) No. 31 — (B315) No. 3:

   (B135) No. 30 — (B315) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and accelerator pedal position sensor connector** • **Poor contact of joint connector**

2. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Measure the resistance between accelerator pedal position sensor connector and chassis ground.

   Connector & terminal

   (B315) No. 2 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.

1. Turn the ignition switch to ON.
2. Measure the voltage between accelerator pedal position sensor connector and chassis ground.
   Connector & terminal
   (B315) No. 3 (+) — Chassis ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power supply in harness between ECM connector and accelerator pedal position sensor connector.
No	Go to 4.

4. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   Connector & terminal
   (B135) No. 22 — (B135) No. 31:

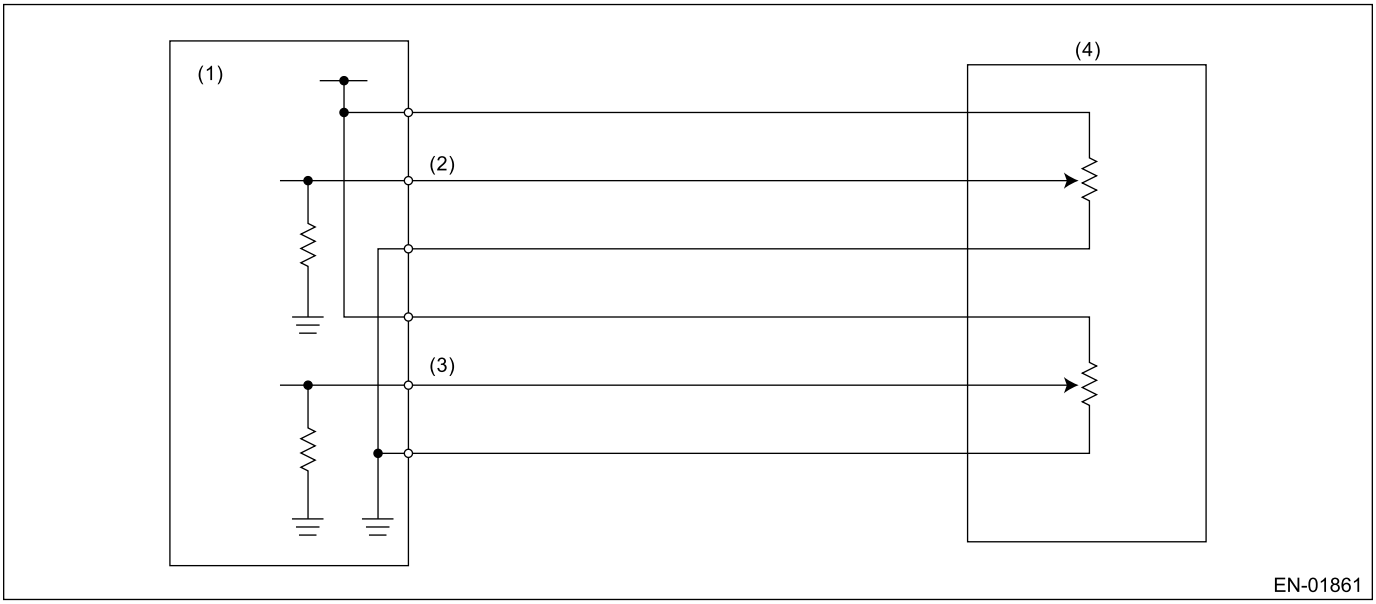
Is the resistance 1 MΩ or more?

Yes	Repair the poor contact of accelerator pedal position sensor connector. Replace the accelerator pedal assembly if defective. Ref. to SPEED CONTROL SYSTEMS(STI)>Accelerator Pedal.
No	Repair the short circuit to power supply in harness between ECM connector and accelerator pedal position sensor connector.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit of accelerator pedal position sensor 2.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 6V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Sensor 2 input voltage	≥ 4.783V

time needed for diagnosis: 100ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2135 THROTTLE/PEDAL POSITION SENSOR/SWITCH "A"/"B" VOLTAGE CORRELATION

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

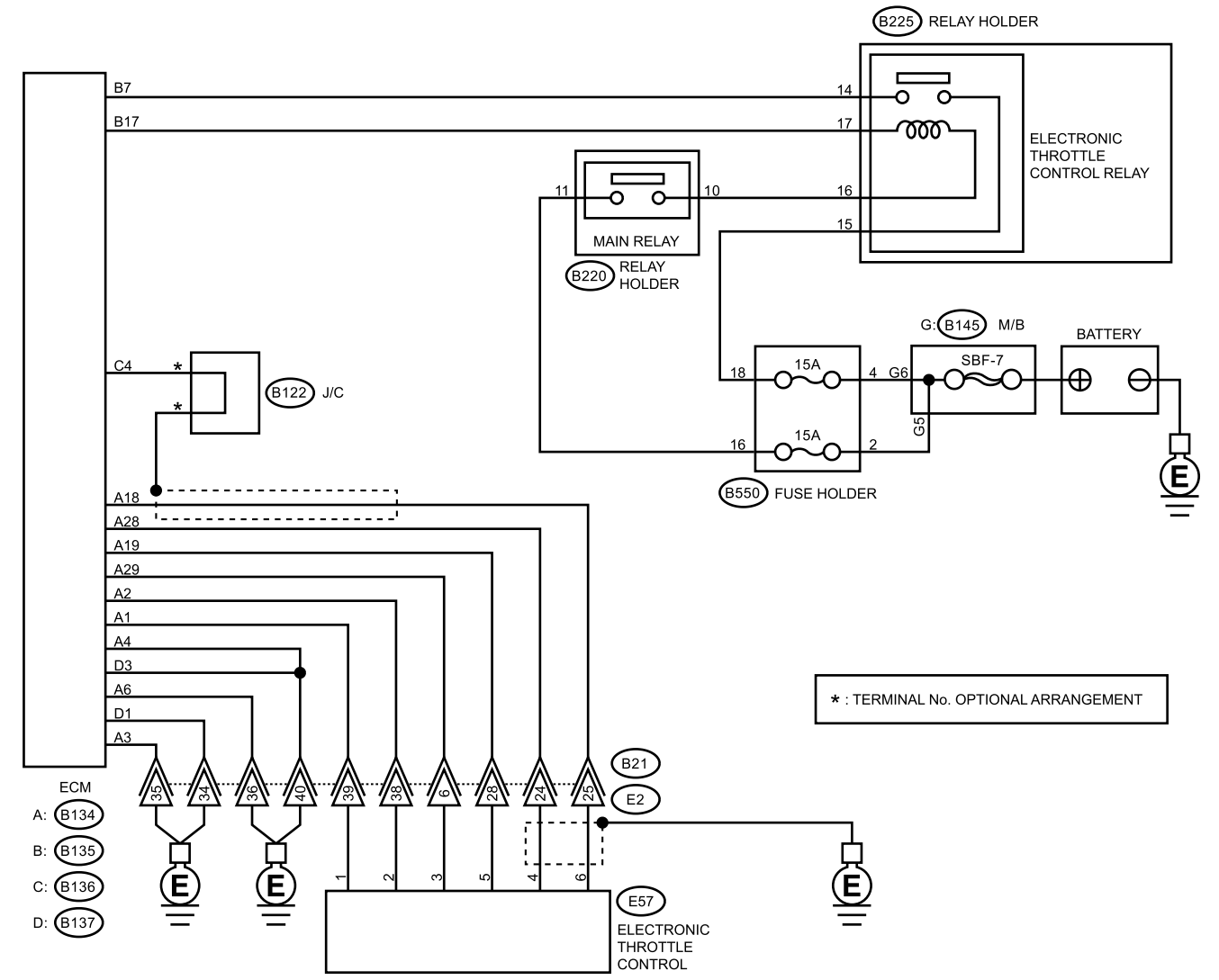
- Improper idling
- Poor driving performance

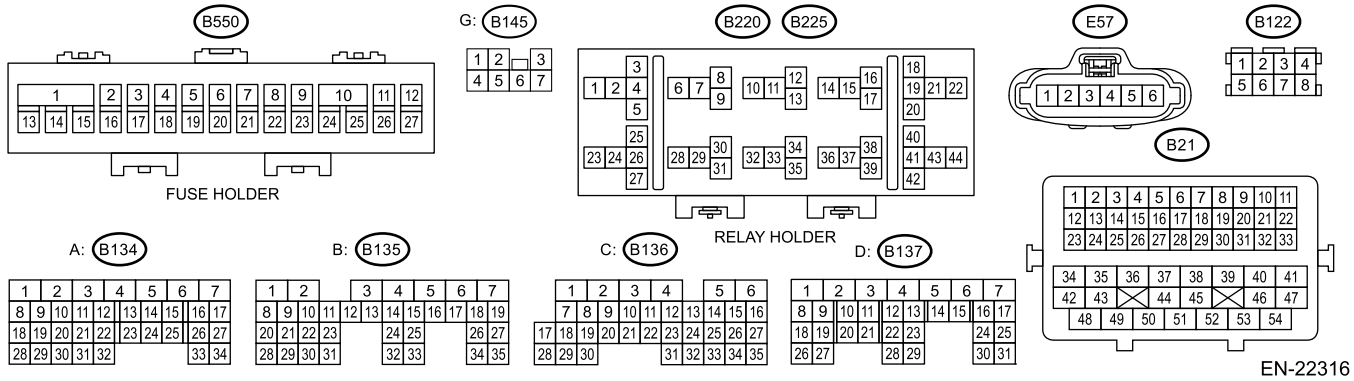
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B225 RELAY HOLDER
B7
B17
14
17
16
15
ELECTRONIC THROTTLE CONTROL RELAY
11
10
MAIN RELAY
B220 RELAY HOLDER
G: B145 M/B
BATTERY
SBF-7
18
15A
4
G6
G5
16
15A
2
B550 FUSE HOLDER
C4
*
*
B122 J/C
A18
A28
A19
A29
A2
A1
A4
D3
A6
D1
A3
* : TERMINAL No. OPTIONAL ARRANGEMENT
ECM
A: B134
B: B135
C: B136
D: B137
35
34
36
40
39
38
6
28
24
25
B21
E2
1
2
3
5
4
6
E57
ELECTRONIC THROTTLE CONTROL


B550
FUSE HOLDER
G: B145
B220
B225
RELAY HOLDER
E57
B122
B21
A: B134
B: B135
C: B136
D: B137

EN-22316

1. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from electronic throttle control.
4. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B134) No. 19 — Chassis ground:
   (B134) No. 18 — Chassis ground:
   (B134) No. 18 — (B136) No. 4:
   (B134) No. 28 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 2.
No	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector.

2. CHECK SHORT CIRCUIT INSIDE THE ECM.

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 4 — Engine ground:
   (E57) No. 6 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the ground short circuit of harness between ECM connector and electronic throttle control connector. Replace the ECM if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).

3. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Disconnect the connector from ECM.
2. Measure the resistance of harness between ECM connector and electronic throttle control connector.

Connector & terminal

(B134) No. 18 — (E57) No. 6:
(B134) No. 28 — (E57) No. 4:
(B134) No. 29 — (E57) No. 3:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and electronic throttle control connector** • **Poor contact of coupling connector**

4. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Connect the connector to ECM.
2. Measure the resistance between electronic throttle control connector and engine ground.

Connector & terminal

(E57) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes	Go to 5.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

5. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to ON.
2. Measure the voltage between electronic throttle control connector and engine ground.
   Connector & terminal
   (E57) No. 4 (+) — Engine ground (−):
   (E57) No. 6 (+) — Engine ground (−):

Is the voltage 5 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.
No	Go to 6.

6. CHECK HARNESS BETWEEN ECM AND ELECTRONIC THROTTLE CONTROL CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connectors.
   Connector & terminal
   (B134) No. 19 — (B134) No. 18:
   (B134) No. 19 — (B134) No. 28:

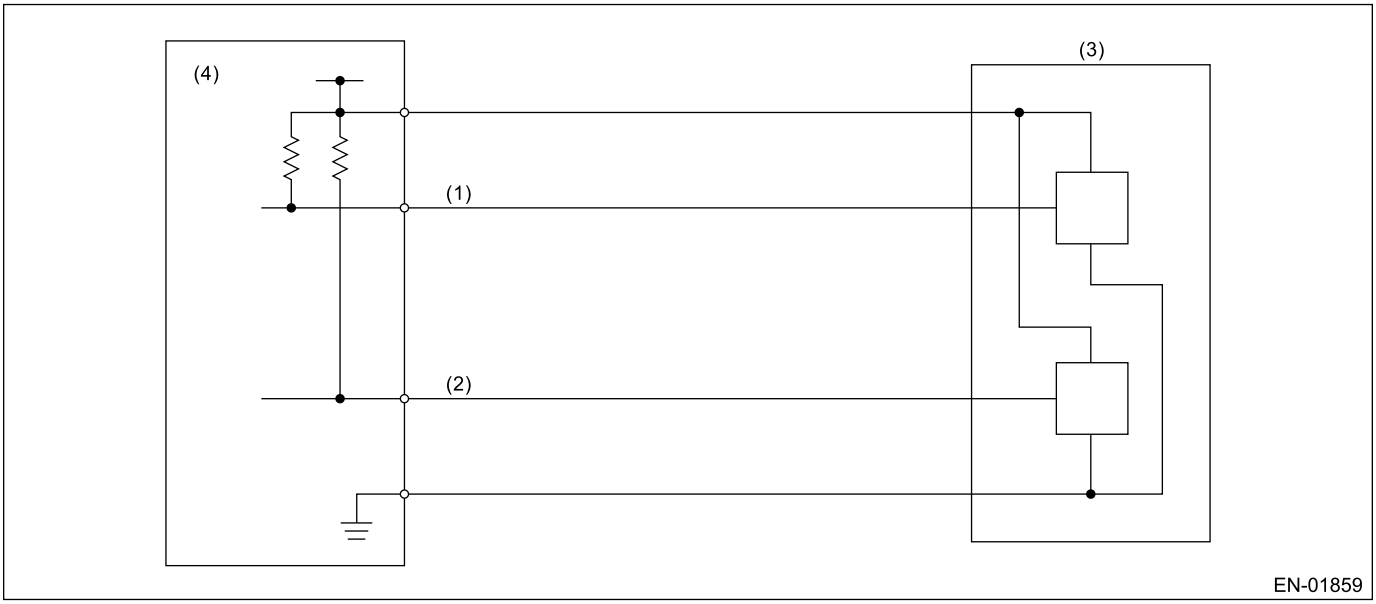
Is the resistance 1 MΩ or more?

Yes	Repair the poor contact of electronic throttle control connector. Replace the electronic throttle control if defective. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Throttle Body.
No	Repair the short circuit to power in the harness between ECM connector and electronic throttle control connector.

1. OUTLINE OF DIAGNOSIS

Judge as NG when the signal level of throttle position sensor 1 is different from the throttle position sensor 2.

2. COMPONENT DESCRIPTION



(1) Throttle position sensor 1 signal
(2) Throttle position sensor 2 signal
(3) Throttle position sensor
(4) Engine control module (ECM)

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 6V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

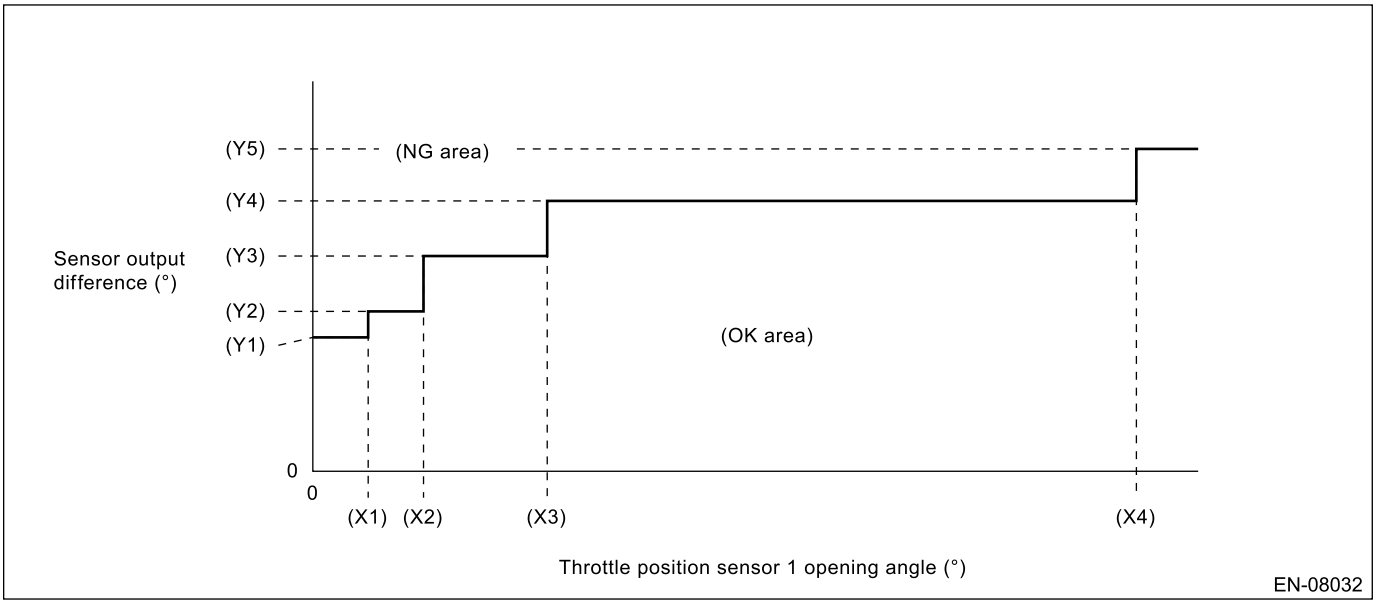
5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Signal difference between two sensors |(TPS (main sensor) − TPS (sub sensor))|	Within NG range of **Details of judgment value**

Details of judgment value



(X1) 2.125°
(X2) 4.25°
(X3) 9°
(X4) 31.625°
(Y1) 5.15°
(Y2) 6.15°
(Y3) 8.28°
(Y4) 10.4°
(Y5) 12.4°

time needed for diagnosis: 212ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2138 THROTTLE/PEDAL POSITION SENSOR/SWITCH "D"/"E" VOLTAGE CORRELATION

DTC detecting condition:

Immediately at fault recognition

Trouble symptom:

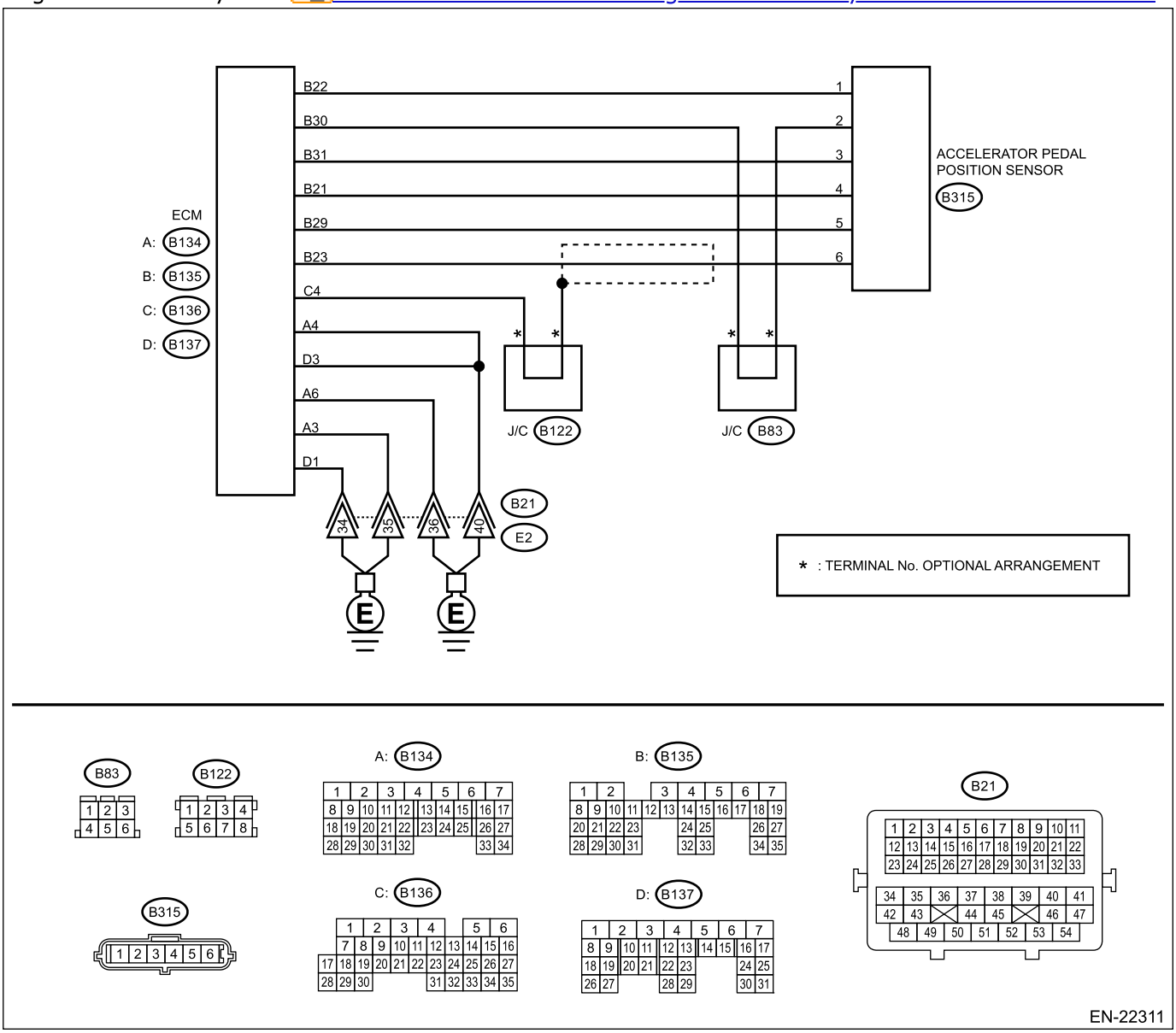
- Improper idling
- Poor driving performance

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.



1. CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   Main accelerator pedal position sensor signal
   (B135) No. 23 (+) — Chassis ground (−):
   Sub accelerator pedal position sensor signal
   (B135) No. 31 (+) — Chassis ground (−):

Is the difference in measured values for the main accelerator pedal position sensor signal and the sub accelerator pedal position sensor signal 0 V?

Yes	Go to 3.
No	Go to 2.

2. CHECK ACCELERATOR PEDAL POSITION SENSOR OUTPUT.

1. Measure the voltage between accelerator pedal position sensor connector and chassis ground.
   Connector & terminal
   (B315) No. 6 (+) — Chassis ground (−):
   (B315) No. 3 (+) — Chassis ground (−):

Is the difference in measured values for the main accelerator pedal position sensor signal and the sub accelerator pedal position sensor signal 0 V?

Yes	Replace the accelerator pedal assembly. Ref. to SPEED CONTROL SYSTEMS(STI)>Accelerator Pedal.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and accelerator pedal position sensor connector** • **Short circuit to ground in harness between ECM connector and accelerator pedal position sensor connector**

3. CHECK HARNESS BETWEEN ECM AND ACCELERATOR PEDAL POSITION SENSOR CONNECTOR.

Measure the resistance of harness between accelerator pedal position sensor connector and chassis ground.

Connector & terminal

(B315) No. 5 — Chassis ground:

(B315) No. 2 — Chassis ground:

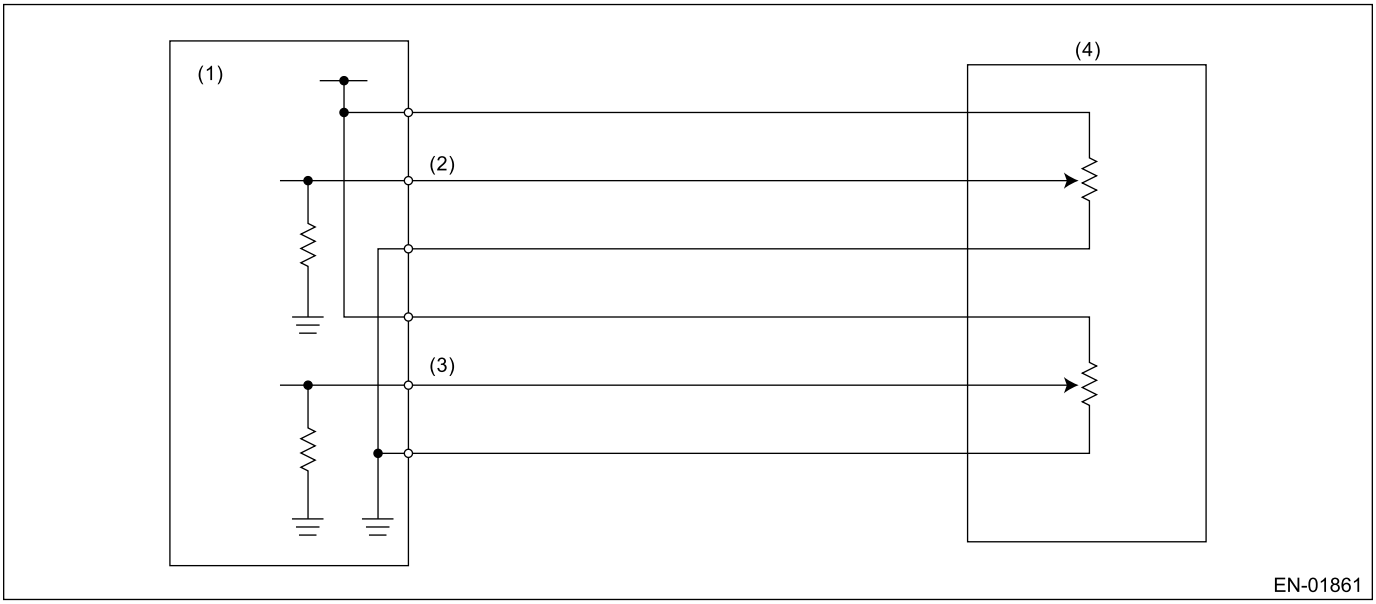
Is the resistance less than 5 Ω?

Yes	Repair the poor contact of ECM connector.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit of harness between ECM connector and accelerator pedal position sensor connector** • **Open circuit of harness between ECM connector and engine ground** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

1. OUTLINE OF DIAGNOSIS

Judge as NG when the signal level of accelerator pedal position sensor 1 is different from the accelerator pedal position sensor 2.

2. COMPONENT DESCRIPTION



(1) Engine control module (ECM)
(2) Accelerator pedal position sensor 1 signal
(3) Accelerator pedal position sensor 2 signal
(4) Accelerator pedal position sensor

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 6V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

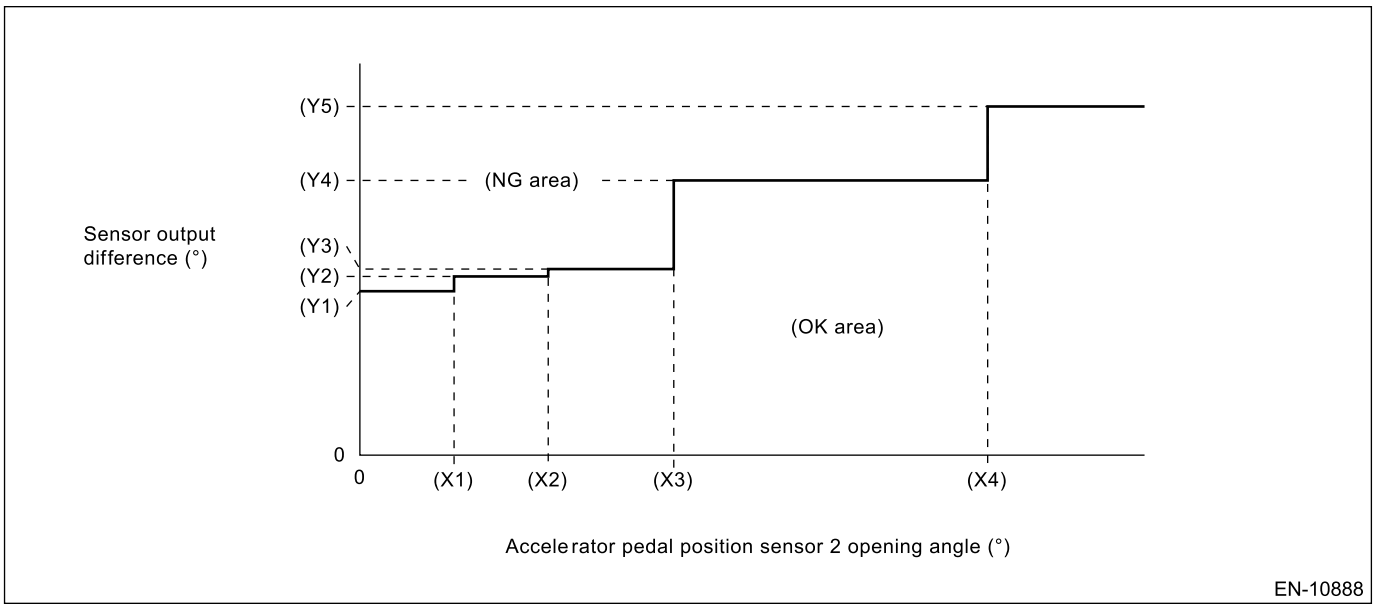
5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
|Signal difference between two sensors|	Within NG range of **Details of judgment value**

Details of judgment value



(X1) 0.6°
(X2) 1.2°
(X3) 2°
(X4) 4°
(Y1) 1.465°
(Y2) 1.597°
(Y3) 1.663°
(Y4) 2.455°
(Y5) 3.116°

time needed for diagnosis: 116ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2195 A/F /O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 1

DTC detecting condition:

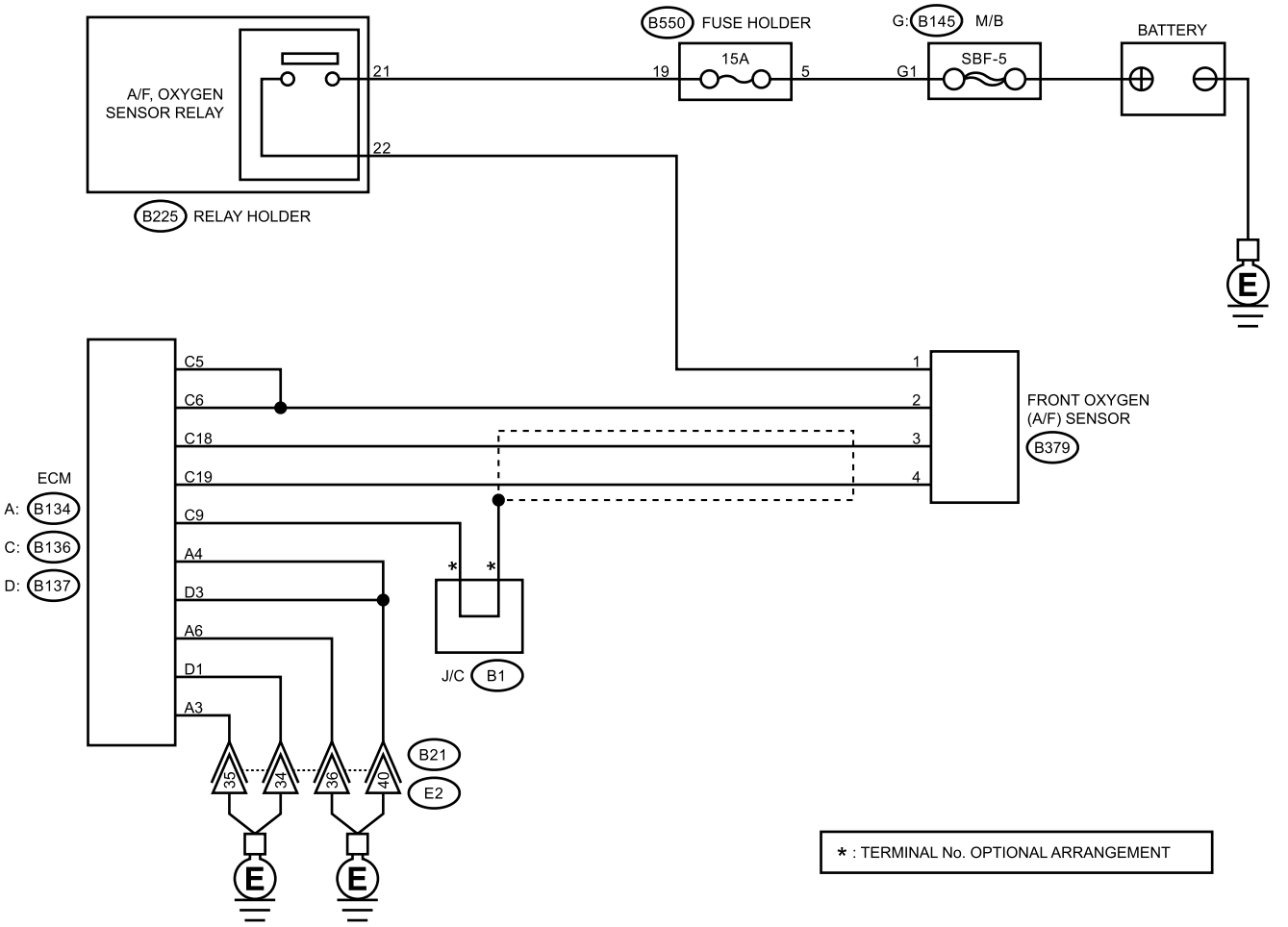
Detected when two consecutive driving cycles with fault occur.

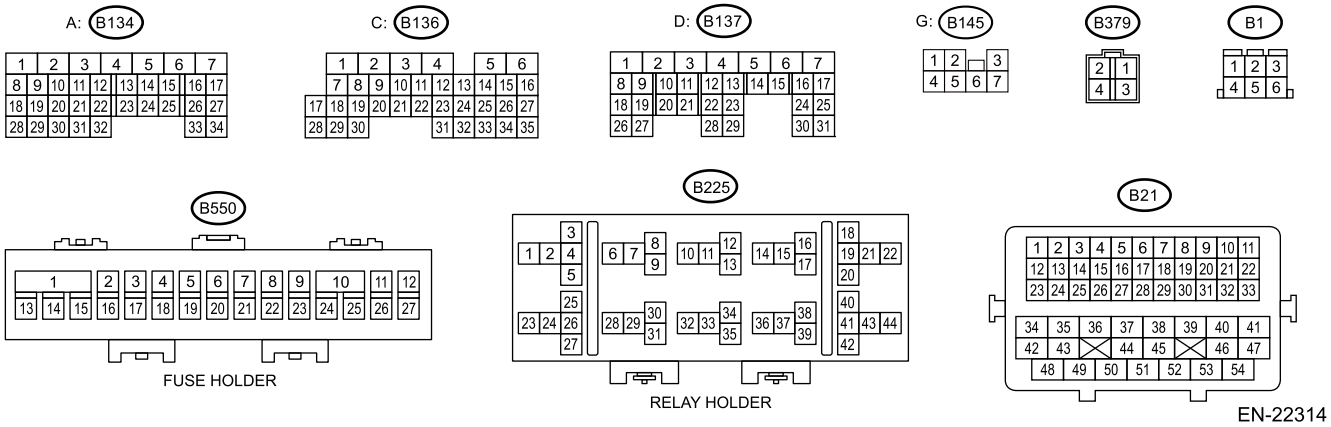
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


A/F, OXYGEN SENSOR RELAY
21
22
B225 RELAY HOLDER
B550 FUSE HOLDER
19
15A
5
G: B145 M/B
G1
SBF-5
BATTERY
E
ECM
A: B134
C: B136
D: B137
C5
C6
C18
C19
C9
A4
D3
A6
D1
A3
J/C B1
1
2
3
4
FRONT OXYGEN (A/F) SENSOR
B379
B21
E2
35
34
36
40
* : TERMINAL No. OPTIONAL ARRANGEMENT


A: B134
C: B136
D: B137
G: B145
B379
B1
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-22314

1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.

Check the following items of front oxygen (A/F) sensor.

- Front oxygen (A/F) sensor connector
- Coupling connector

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B136) No. 18 — Chassis ground:

(B136) No. 19 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.

3. CHECK OUTPUT SIGNAL FOR ECM.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 19 (+) — Chassis ground (−):

Is the voltage 4.5 V or more?

Yes	Go to 5.
No	Go to 4.

4. CHECK OUTPUT SIGNAL FOR ECM.

Measure the voltage between ECM connector and chassis ground.
Connector & terminal
(B136) No. 18 (+) — Chassis ground (−):

Is the voltage 4.95 V or more?

Yes	Go to 5.
No	Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Front Oxygen (A/F) Sensor.

5. CHECK OUTPUT SIGNAL FOR ECM.

Measure the voltage between ECM connector and chassis ground.

Connector & terminal

(B136) No. 18 (+) — Chassis ground (−):

(B136) No. 19 (+) — Chassis ground (−):

Is the voltage 8 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. After repair, replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	Repair the poor contact of ECM connector.

1. OUTLINE OF DIAGNOSIS

Detect that λ value remains lean.

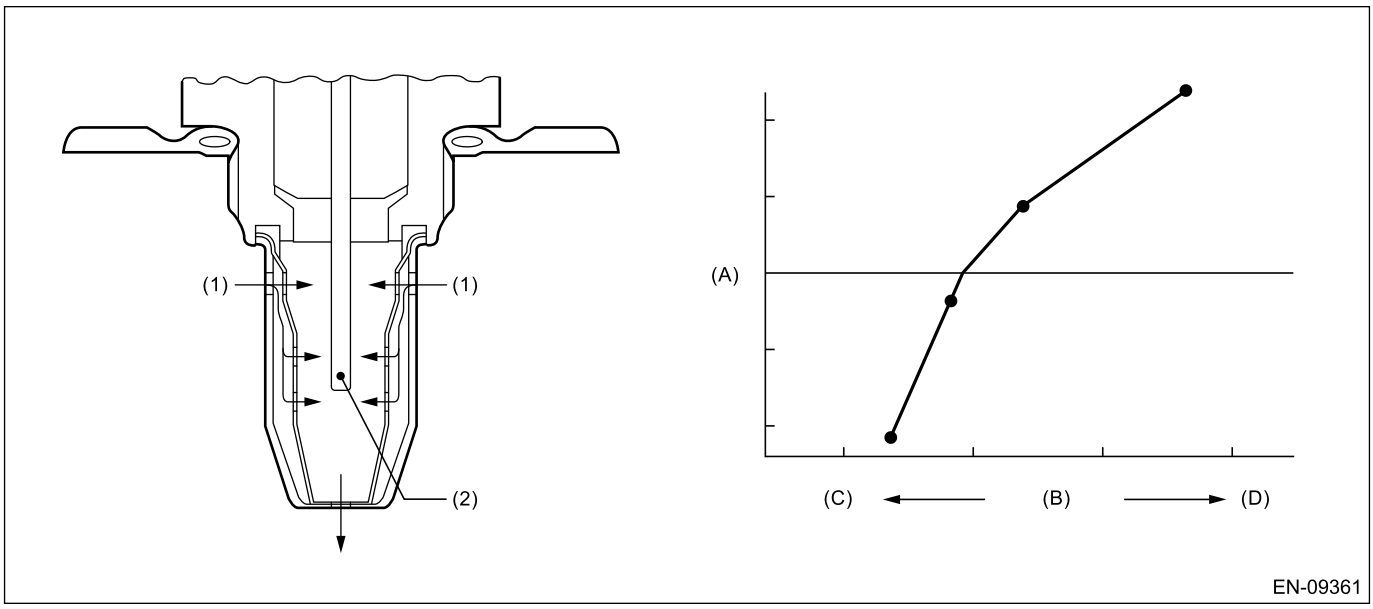
Judge as NG when lambda value is abnormal in accordance with λ value of front oxygen (A/F) sensor and driving conditions such as amount of intake air, main feedback control, etc.

λ value = Actual air fuel ratio/Theoretical air fuel ratio

λ > 1: Lean

λ < 1: Rich

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Rich
(D) Lean
(1) Exhaust gas (2) Zirconia element oxygen

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Main feedback	In operation
Amount of intake air	≥ 6g/s (0.21oz/s)
Estimated temperature of the rear oxygen sensor element	≥ 500°C (932°F)

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
λ value	> 1.15
Output voltage value of rear oxygen sensor	> 0.55V

time needed for diagnosis:10000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P2196 A/F /O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 1

DTC detecting condition:

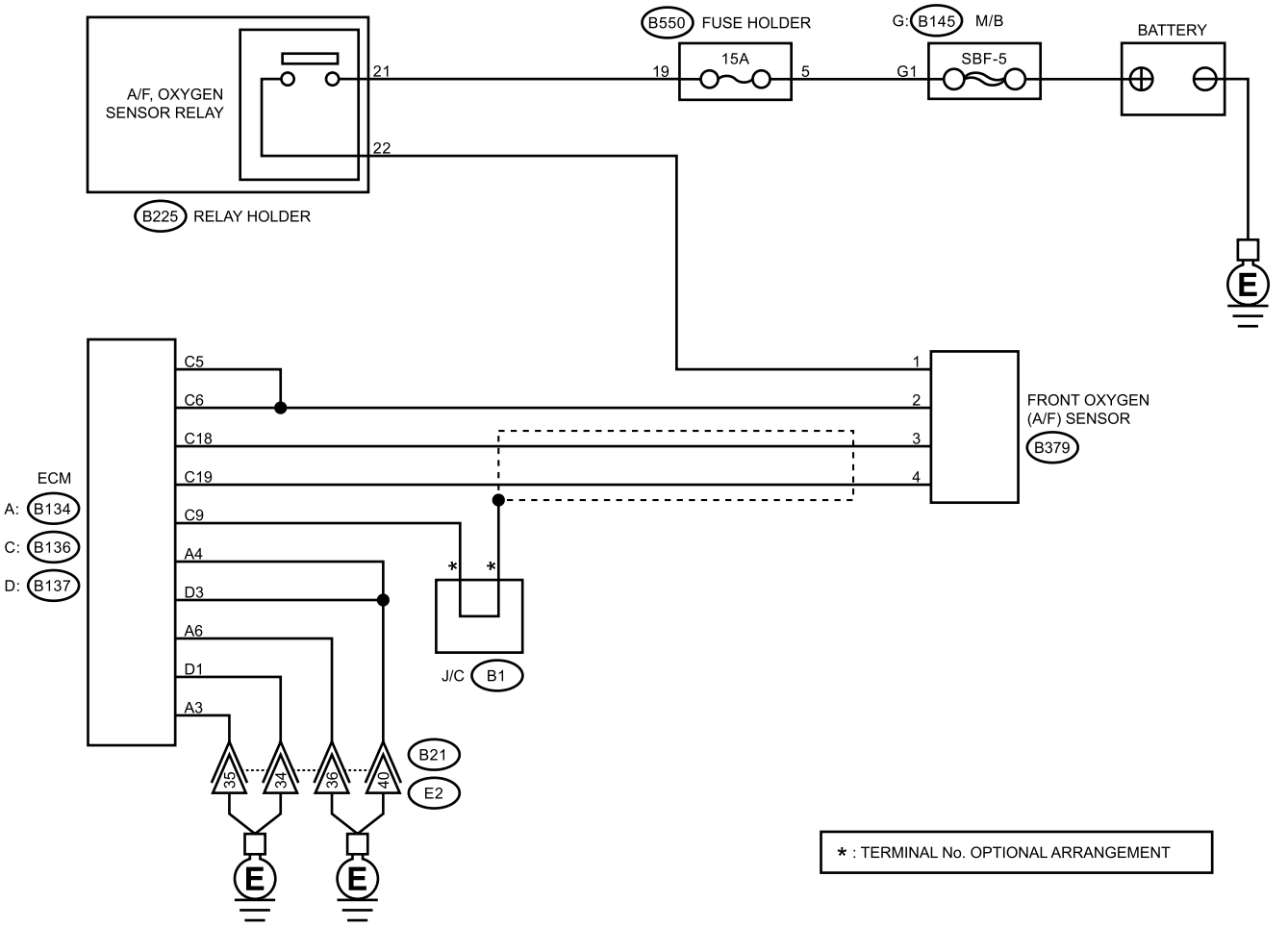
Detected when two consecutive driving cycles with fault occur.

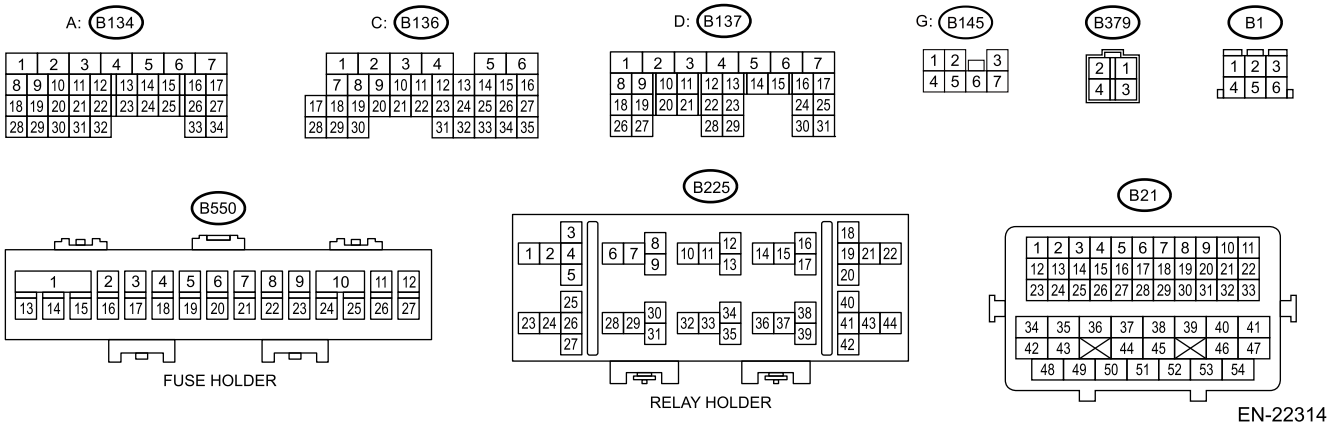
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


A/F, OXYGEN SENSOR RELAY
21
22
B225 RELAY HOLDER
B550 FUSE HOLDER
19
15A
5
G: B145 M/B
G1
SBF-5
BATTERY
E
ECM
A: B134
C: B136
D: B137
C5
C6
C18
C19
C9
A4
D3
A6
D1
A3
J/C B1
1
2
3
4
FRONT OXYGEN (A/F) SENSOR
B379
B21
E2
35
34
36
40
* : TERMINAL No. OPTIONAL ARRANGEMENT


A: B134
C: B136
D: B137
G: B145
B379
B1
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-22314

1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.

Check the following items of front oxygen (A/F) sensor.

- Front oxygen (A/F) sensor connector
- Coupling connector

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from front oxygen (A/F) sensor.
4. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.

   Connector & terminal

   (B136) No. 18 — (B379) No. 3:

   (B136) No. 19 — (B379) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the open circuit of harness between ECM connector and front oxygen (A/F) sensor connector.

3. CHECK FOR POOR CONTACT.

Check for poor contact of the front oxygen (A/F) sensor connector.

Is there poor contact of front oxygen (A/F) sensor connector?

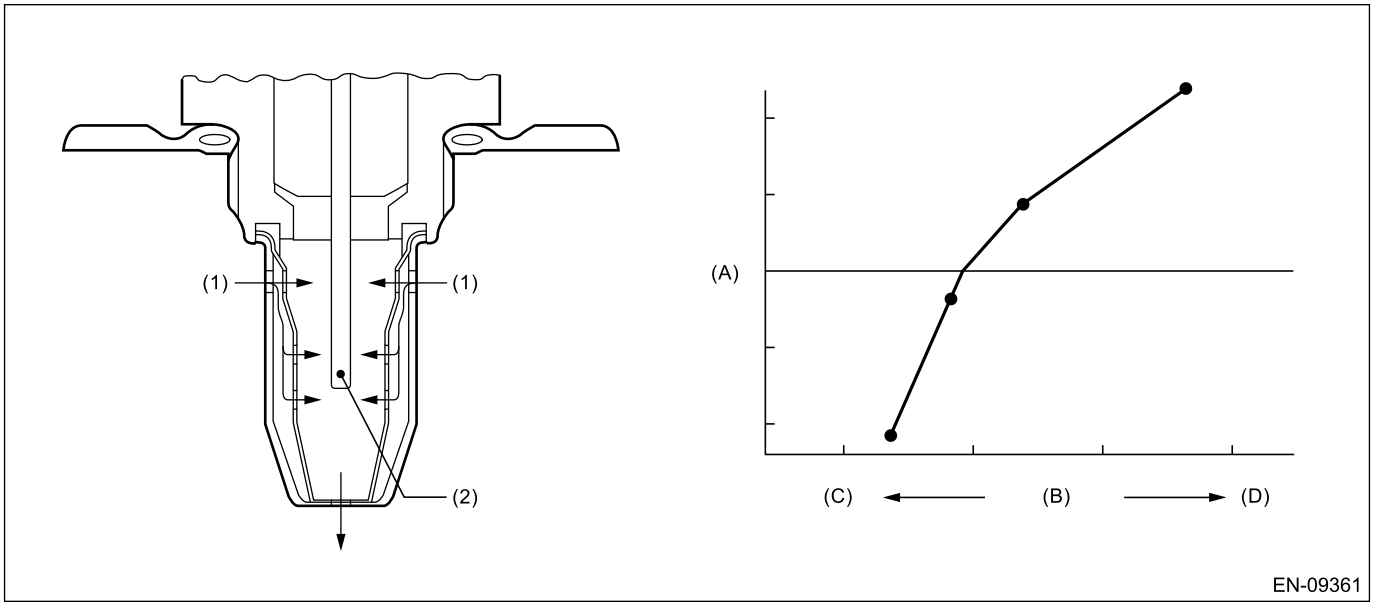
Yes	Repair the poor contact of front oxygen (A/F) sensor connector.
No	Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Front Oxygen (A/F) Sensor.

1. OUTLINE OF DIAGNOSIS

Detect that λ value remains rich.
Judge as NG when lambda value is abnormal in accordance with λ value of front oxygen (A/F) sensor and driving conditions such as amount of intake air, main feedback control, etc.

λ value = Actual air fuel ratio/Theoretical air fuel ratio
λ > 1: Lean
λ < 1: Rich

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Rich
(D) Lean
(1) Exhaust gas
(2) Zirconia element oxygen

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Main feedback	Execution
Amount of intake air	≥ 6g/s (0.21oz/s)
Estimated temperature of the rear oxygen sensor element	≥ 500°C (932°F)

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
λ value	< 0.85
Output voltage value of rear oxygen sensor	< 0.15 V

time needed for diagnosis:10000ms

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P219A BANK 1 AIR-FUEL RATIO IMBALANCE

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Trouble symptom:

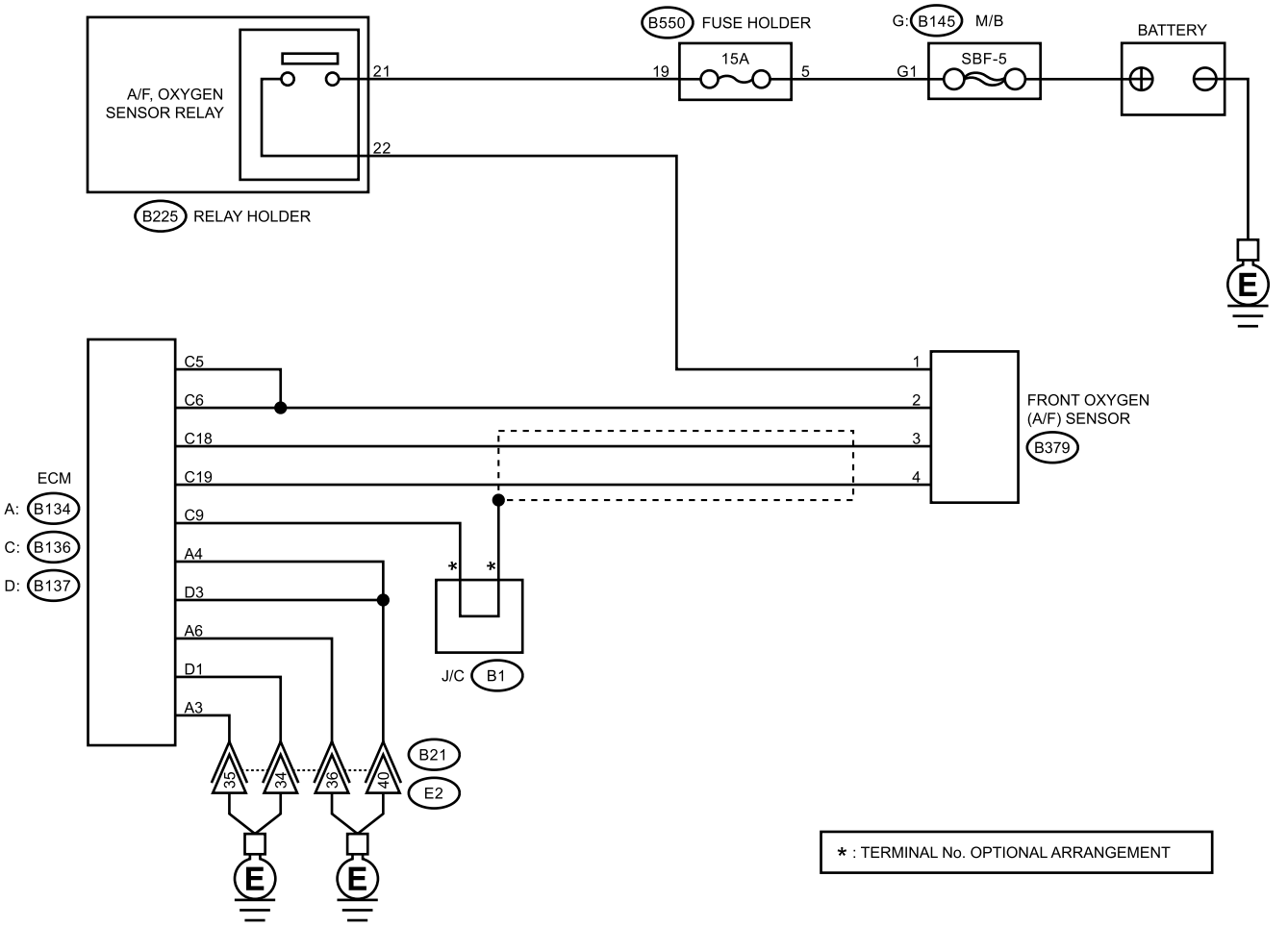
- Engine stalls.
- Improper idling

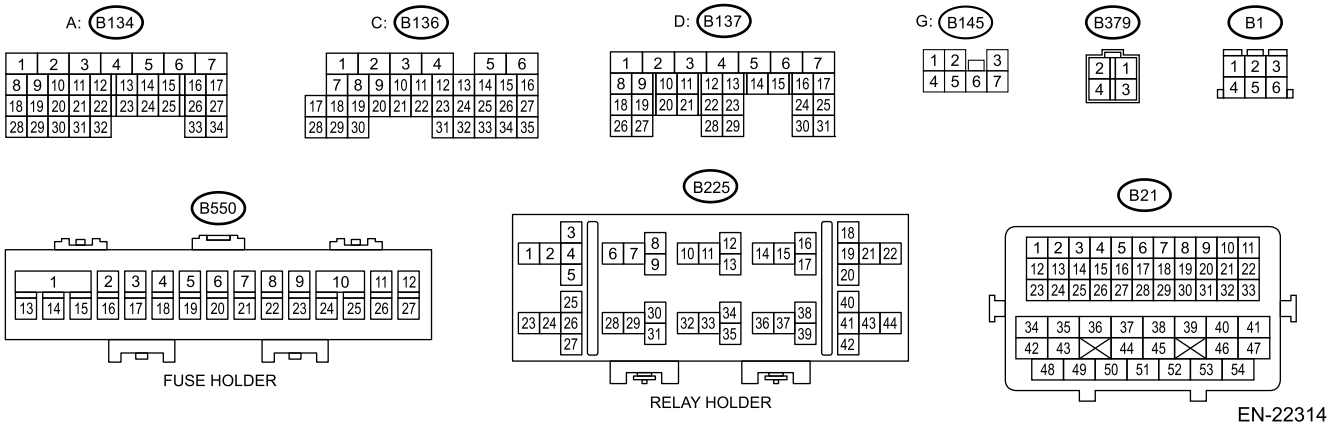
Caution:

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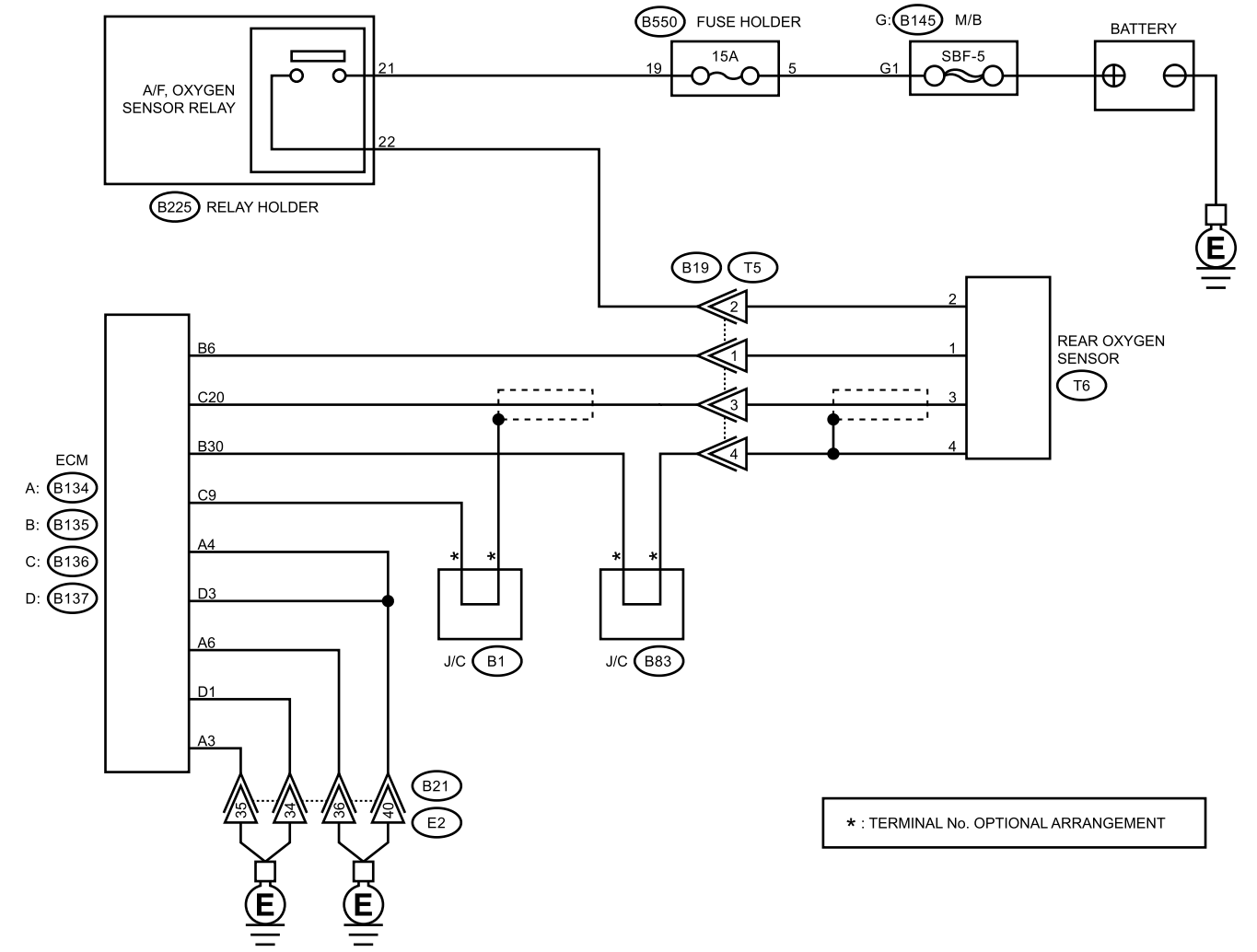
Wiring diagram:

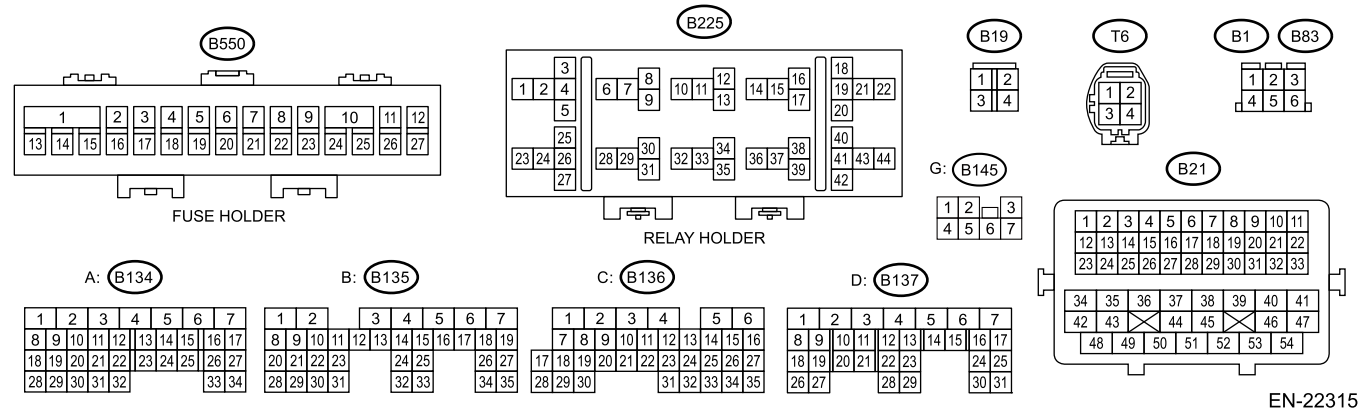
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


A/F, OXYGEN SENSOR RELAY
21
22
B225 RELAY HOLDER
B550 FUSE HOLDER
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15A
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G: B145 M/B
G1
SBF-5
BATTERY
E
ECM
A: B134
C: B136
D: B137
C5
C6
C18
C19
C9
A4
D3
A6
D1
A3
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1
2
3
4
FRONT OXYGEN (A/F) SENSOR
B379
B21
E2
35
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* : TERMINAL No. OPTIONAL ARRANGEMENT

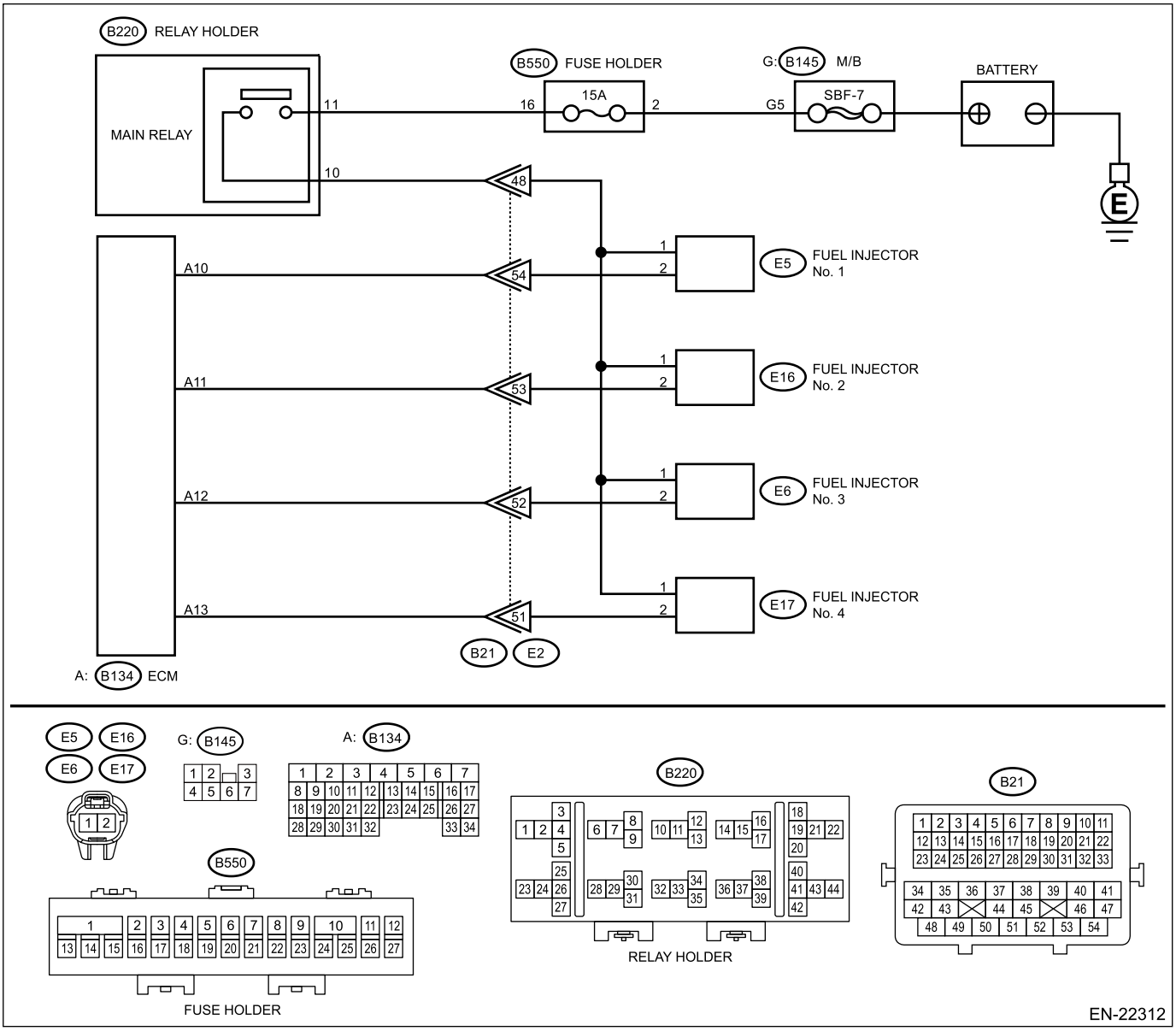

A: B134
C: B136
D: B137
G: B145
B379
B1
B550
FUSE HOLDER
B225
RELAY HOLDER
B21

EN-22314


B550 FUSE HOLDER
G: B145 M/B
BATTERY
A/F, OXYGEN SENSOR RELAY
21
22
19
15A
5
G1
SBF-5
B225 RELAY HOLDER
B19
T5
REAR OXYGEN SENSOR
T6
ECM
A: B134
B: B135
C: B136
D: B137
B6
C20
B30
C9
A4
D3
A6
D1
A3
J/C B1
J/C B83
B21
E2
* : TERMINAL No. OPTIONAL ARRANGEMENT


B550
FUSE HOLDER
B225
RELAY HOLDER
B19
T6
B1
B83
G: B145
B21
A: B134
B: B135
C: B136
D: B137

EN-22315



1. CHECK FRONT OXYGEN (A/F) SENSOR CONNECTOR AND COUPLING CONNECTOR.

Check the following items of front oxygen (A/F) sensor.

- Front oxygen (A/F) sensor connector
- Coupling connector

Has water entered the connector?

Yes — Completely remove any water inside.

No — Go to 2.

2. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connectors from front oxygen (A/F) sensor.
4. Measure the resistance of harness between ECM connector and front oxygen (A/F) sensor connector.

   Connector & terminal

   (B136) No. 18 — (B379) No. 3:

   (B136) No. 19 — (B379) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and front oxygen (A/F) sensor connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND FRONT OXYGEN (A/F) SENSOR CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B136) No. 18 — Chassis ground:

(B136) No. 19 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 4.
No	Repair the short circuit to ground in harness between ECM connector and front oxygen (A/F) sensor connector.

4. CHECK OUTPUT SIGNAL FOR ECM.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between front oxygen (A/F) sensor connector and chassis ground.
   Connector & terminal
   (B379) No. 4 (+) — Chassis ground (−):

Is the voltage 4.5 V or more?

Yes	Go to 6.
No	Go to 5.

5. CHECK OUTPUT SIGNAL FOR ECM.

Measure the voltage between front oxygen (A/F) sensor connector and chassis ground.
Connector & terminal
(B379) No. 3 (+) — Chassis ground (−):

Is the voltage 4.95 V or more?

Yes	Go to 6.
No	Go to 7.

6. CHECK OUTPUT SIGNAL FOR ECM.

Measure the voltage between front oxygen (A/F) sensor connector and chassis ground.

Connector & terminal

(B379) No. 3 (+) — Chassis ground (−):

(B379) No. 4 (+) — Chassis ground (−):

Is the voltage 8 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and front oxygen (A/F) sensor connector. After repair, replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM).
No	Repair the poor contact of ECM connector.

7. CHECK EXHAUST SYSTEM.

Check the exhaust system.

Are there holes or loose bolts on exhaust system?

Yes	Repair the exhaust system.
No	Go to 8.

8. CHECK AIR INTAKE SYSTEM.

Check the air intake system.

Are there holes, loose bolts or disconnection of hose on air intake system?

Yes	Repair the air intake system.
No	Go to 9.

9. CHECK FUEL PRESSURE.

Warning:
Place "NO OPEN FLAMES" signs near the working area.
Caution:

- **Be careful not to spill fuel.**
- **Before attaching/detaching a fuel pressure gauge, release the fuel pressure.**

1. Connect the front oxygen (A/F) sensor connector.
2. Check the fuel pressure while disconnecting pressure regulator vacuum hose from intake manifold. Ref. to MECHANICAL(STI)>Fuel Pressure>INSPECTION.
   Note:
   If fuel pressure does not increase, squeeze the fuel return hose 2 to 3 times, then check fuel pressure again.

Is the check result OK?

Yes	Go to 10.
No	Check the fuel pump and fuel delivery line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Pump>INSPECTION. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Delivery, Return and Evaporation Lines>INSPECTION.

10. CHECK FUEL PRESSURE.

After connecting the pressure regulator vacuum hose, check fuel pressure. Ref. to MECHANICAL(STI)>Fuel Pressure>INSPECTION.
Note:

- **If fuel pressure does not increase, squeeze fuel return hose 2 to 3 times, then check fuel pressure again.**
- **If the measured value at this step is out of specification, check or replace pressure regulator vacuum hose.**

Is the check result OK?

Yes	Go to 11.
No	Check the fuel pump and fuel delivery line. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Pump>INSPECTION. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Delivery, Return and Evaporation Lines>INSPECTION.

11. CHECK ENGINE COOLANT TEMPERATURE SENSOR.

1. Start the engine and warm up completely.
2. Read the value of «Coolant Temp.» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Coolant Temp.» 75°C (167°F) or more?

Yes	Go to 12.
No	Replace the engine coolant temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Coolant Temperature Sensor.

12. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).
2. Place the gear shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Read the value of «Mass Air Flow» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Mass Air Flow» 2 — 5 g/s (0.26 — 0.66 lb/m)?

Yes	Go to 13.
No	Replace the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

13. CHECK MASS AIR FLOW AND INTAKE AIR TEMPERATURE SENSOR.

1. Start the engine and warm up engine until coolant temperature is higher than 75°C (167°F).
2. Place the gear shift lever in the neutral position.
3. Turn the A/C switch to OFF.
4. Turn all the accessory switches to OFF.
5. Open the front hood.
6. Measure the ambient temperature.
7. Read the value of «Intake Air Temperature» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Subtract ambient temperature from «Intake Air Temperature». Is the obtained value −10 — 50°C (−18 — 90°F)?

Yes	Go to 14.
No	Check the mass air flow and intake air temperature sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Mass Air Flow and Intake Air Temperature Sensor.

14. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and keep the engine speed at 3,000 rpm. (2 minutes maximum)
2. Read the value of «Rear O2 Sensor Voltage» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Depress the clutch pedal.**
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Rear O2 Sensor Voltage» 0.490 V or more?

Yes — Go to 15.

No — Go to 16.

15. CHECK REAR OXYGEN SENSOR DATA.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), and rapidly reduce the engine speed from 3,000 rpm.
2. Read the value of «Rear O2 Sensor Voltage» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Depress the clutch pedal.**
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value of «Rear O2 Sensor Voltage» 0.250 V or less?

Yes — Go to 17.

No — Go to 16.

16. CHECK REAR OXYGEN SENSOR CONNECTOR AND COUPLING CONNECTOR.

Check the rear oxygen sensor connector and coupling connector.

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 18.

17. CHECK FRONT OXYGEN (A/F) SENSOR USING REAR OXYGEN SENSOR SIGNAL.

1. Warm up the engine until engine coolant temperature is higher than 75°C (167°F), then keep the engine idling for 5 minutes or more.
2. Read the value of «Rear O2 Sensor Voltage» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value in «Rear O2 Sensor Voltage» kept at 0.250 V or less for 5 minutes or more?

Yes	Replace the front oxygen (A/F) sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Front Oxygen (A/F) Sensor.
No	Go to 18.

18. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the ECM connector.
3. Disconnect the connector from rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.
   Connector & terminal
   (B136) No. 20 — (T6) No. 3:
   (B135) No. 30 — (T6) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 19.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and rear oxygen sensor connector** • **Poor contact of coupling connector**

19. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between rear oxygen sensor connector and chassis ground.
   Connector & terminal
   (T6) No. 3 (+) — Chassis ground (−):

Is the voltage 0.2 — 0.5 V?

Yes	Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Rear Oxygen Sensor.
No	Go to 20.

20. CHECK OUTPUT SIGNAL OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground on faulty cylinders.
   Connector & terminal
   #1 (B134) No. 10 (+) — Chassis ground (−):
   #2 (B134) No. 11 (+) — Chassis ground (−):
   #3 (B134) No. 12 (+) — Chassis ground (−):
   #4 (B134) No. 13 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 25.
No	Go to 21.

21. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from fuel injector on faulty cylinders.
3. Measure the resistance between fuel injector connector and engine ground on faulty cylinders.
   Connector & terminal
   #1 (E5) No. 2 — Engine ground:
   #2 (E16) No. 2 — Engine ground:
   #3 (E6) No. 2 — Engine ground:
   #4 (E17) No. 2 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 22.
No	Repair the short circuit to ground in harness between ECM connector and fuel injector connector.

22. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

Measure the resistance of harness between ECM connector and fuel injector connector on faulty cylinders.

Connector & terminal

#1 (B134) No. 10 — (E5) No. 2:
#2 (B134) No. 11 — (E16) No. 2:
#3 (B134) No. 12 — (E6) No. 2:
#4 (B134) No. 13 — (E17) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 23.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and fuel injector connector** • **Poor contact of coupling connector**

23. CHECK FUEL INJECTOR.

Check the fuel injector on faulty cylinder. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes	Go to 24.
No	Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector.

24. CHECK POWER SUPPLY LINE.

1. Turn the ignition switch to ON.
2. Measure the voltage between fuel injector connector of faulty cylinders and engine ground.
   Connector & terminal
   #1 (E5) No. 1 (+) — Engine ground (−):
   #2 (E16) No. 1 (+) — Engine ground (−):
   #3 (E6) No. 1 (+) — Engine ground (−):
   #4 (E17) No. 1 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Repair the poor contact of all connectors in fuel injector circuit.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between the main relay and fuel injector connector on faulty cylinders** • **Poor contact of coupling connector** • **Poor contact of main relay connector**

25. CHECK HARNESS BETWEEN ECM AND FUEL INJECTOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from fuel injector on faulty cylinders.
3. Turn the ignition switch to ON.
4. Measure the voltage between ECM connector and chassis ground on faulty cylinders.
   Connector & terminal
   #1 (B134) No. 10 (+) — Chassis ground (−):
   #2 (B134) No. 11 (+) — Chassis ground (−):
   #3 (B134) No. 12 (+) — Chassis ground (−):
   #4 (B134) No. 13 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and fuel injector connectors.
No	Go to 26.

26. CHECK FUEL INJECTOR.

1. Turn the ignition switch to OFF.
2. Check the fuel injector on faulty cylinder. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector>INSPECTION.

Is the check result OK?

Yes	Go to 27.
No	Replace the faulty fuel injector. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Fuel Injector.

27. CHECK INSTALLATION CONDITION OF CAMSHAFT POSITION SENSOR/CRANKSHAFT POSITION SENSOR.

Check installation condition of the camshaft position sensor and crankshaft position sensor.

Is the camshaft position sensor or crankshaft position sensor loosely installed?

Yes	Tighten the camshaft position sensor or crankshaft position sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Camshaft Position Sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Crankshaft Position Sensor.
No	Go to 28.

28. CHECK CRANK SPROCKET.

1. Remove the timing belt cover. Ref. to MECHANICAL(STI)>Timing Belt Cover>REMOVAL.
2. Check the crank sprocket.

Is there rust or defective teeth on the crank sprocket?

Yes	Replace the crank sprocket. Ref. to MECHANICAL(STI)>Crank Sprocket.
No	Go to 29.

29. CHECK INSTALLATION CONDITION OF TIMING BELT.

Turn the crankshaft using ST, and align the alignment mark on crank sprocket with alignment mark on cylinder block.

ST 499987500 CRANKSHAFT SOCKET

Is the timing belt dislocated from its proper position?

Yes	Repair the installation condition of timing belt. Ref. to MECHANICAL(STI)>Timing Belt.
No	Go to 30.

30. CHECK FUEL LEVEL.

Check display of fuel gauge.

Is the fuel meter indication higher than the “Lower” level?

Yes	Go to 31.
No	Refill the fuel so that the fuel meter indication is higher than the “Lower” level, and proceed to the next step. Go to 31.

31. CHECK STATUS OF MALFUNCTION INDICATOR LIGHT.

1. Clear the memory using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode.
2. Start the engine, and drive the vehicle for 10 minutes or more at 60 km/h (37 MPH).

Does the malfunction indicator light illuminate or blink?

Yes — Go to 32.

No — Repair the poor contact of connector.

Note:
In this case, repair the following item:

- **Poor contact of ignition coil connector**
- **Poor contact of fuel injector connector on faulty cylinders**
- **Poor contact of ECM connector**
- **Poor contact of coupling connector**

32. CHECK AIR INTAKE SYSTEM.

Check the installing condition of the air intake system.

Is there any fault in air intake system?

Yes — Repair the air intake system.

Note:
Check the following items.

- **Are there air leaks or air suction caused by loose or dislocated nuts and bolts?**
- **Are there cracks or any disconnection of hoses?**

No — Go to 33.

33. CHECK MISFIRE SYMPTOM.

1. Turn the ignition switch to ON.
2. Check for DTC. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Does the Subaru Select Monitor or general scan tool indicate only one DTC?

Yes — Go to 36.

No — Go to 34.

34. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Are DTC P0301 and P0303 displayed? (Current malfunction)

Yes — Go to 37.

No — Go to 35.

35. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Are DTC P0302 and P0304 displayed? (Current malfunction)

Yes — Go to 38.

No — Go to 39.

36. ONLY ONE CYLINDER.

Check the following items for one cylinder only.
- Spark plug
- Ignition coil
- Fuel injector
- Compression

Is there any fault in the cylinder?

Yes	Repair or replace faulty parts. **Note:** **Check the following items.** • **Spark plug** • **Ignition coil** • **Fuel injector** • **Compression**
No	Go to DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1.

37. GROUP OF #1 AND #3 CYLINDERS.

Check the items for groups of #1 and #3 cylinders.
- Spark plug
- Ignition coil
- Fuel injector
- Compression
- Skipping timing chain teeth

Are there any faults in #1 and #3 cylinders?

Yes	Repair or replace faulty parts. **Note:** **Check the following items.** • **Spark plug** • **Ignition coil** • **Fuel injector** • **Compression** • **Skipping timing belt teeth**
No	Go to DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1.

38. GROUP OF #2 AND #4 CYLINDERS.

Check the items for groups of #2 and #4 cylinders.

- Spark plug
- Ignition coil
- Fuel injector
- Compression
- Skipping timing chain teeth

Are there any faults in #2 and #4 cylinders?

Yes

Repair or replace faulty parts.

Note:

Check the following items.

- **Spark plug**
- **Ignition coil**
- **Fuel injector**
- **Compression**
- **Skipping timing belt teeth**

No

Go to DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1.

39. CYLINDER AT RANDOM.

1. Start the engine.
2. Check the idling.

Is the engine idle rough?

Yes

Go to DTC P0171. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0171 SYSTEM TOO LEAN BANK 1.

No

Repair or replace faulty parts.

Note:

Check the following items.

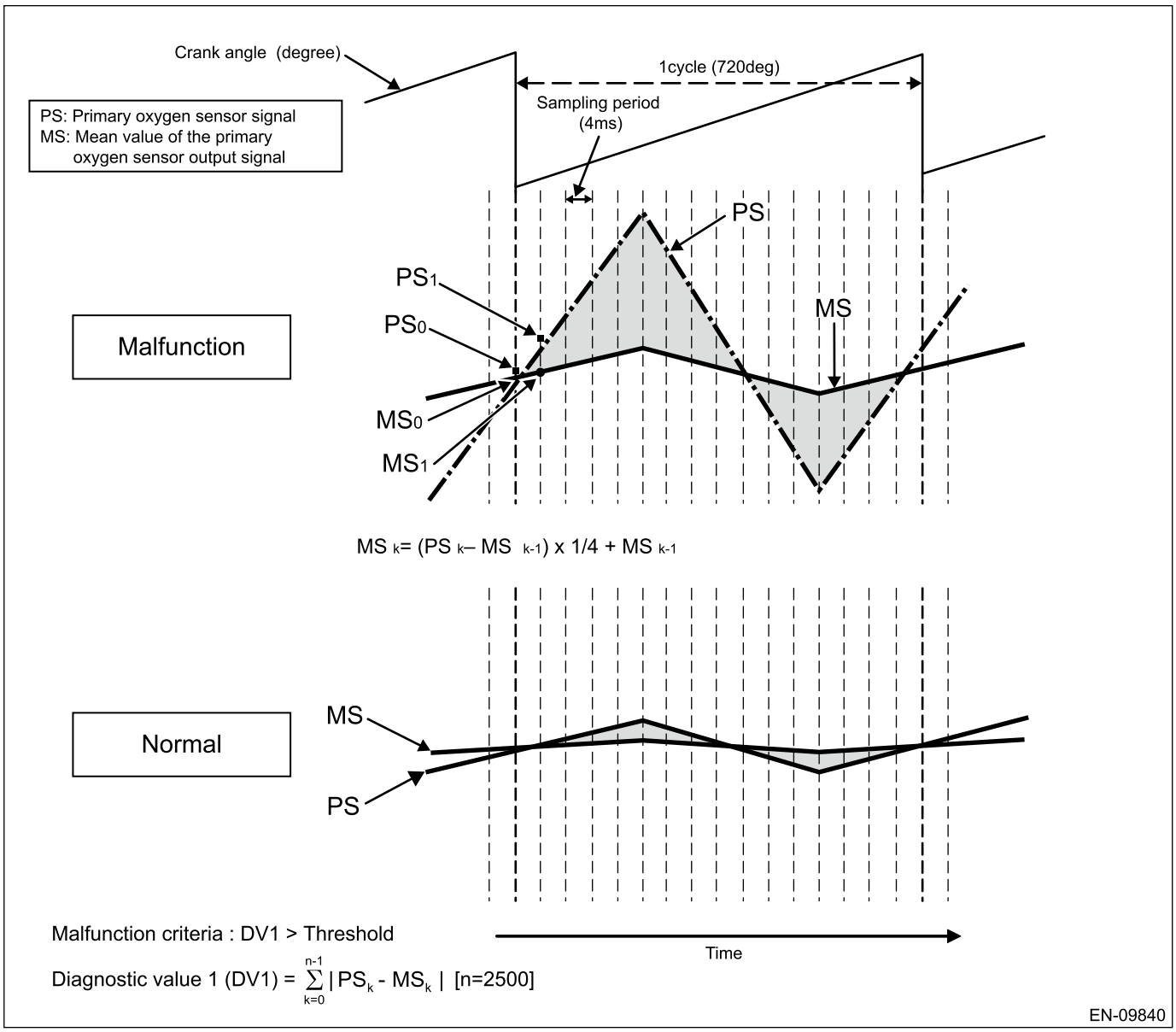
- **Spark plug**
- **Ignition coil**
- **Fuel injector**
- **Compression**

1. OUTLINE OF DIAGNOSIS

This diagnostic monitor performs a functional check of the fuel system to determine an air-fuel ratio cylinder imbalance.
This diagnosis is composed of two monitors.
The outline of “monitor A1” is as follows. When an air-fuel ratio cylinder imbalance occurs, the primary oxygen sensor output signal will oscillate with increased amplitude. This monitor utilizes this behavior to make a diagnosis. The monitor integrates the difference between the amplification value and the mean value of the first oxygen sensor output signal and compares it to a threshold to make a judgment.
The outline of “monitor B1” is as follows. Similarly, when an imbalance occurs, the engine speed also fluctuates with increased amplitude. This monitor utilizes this behavior to make a diagnosis. For reference, it should be noted that this imbalance monitor method is actually similar to the current misfire diagnostic monitor, and the parameter “domg360” (units: degrees CA) is shared between the imbalance and misfire monitors. The imbalance monitor is performed during idle condition when the engine is warm. The monitor integrates the count of “domg360” which exceeds a threshold in 1000 revolution.
When both the “monitor A1” value and the “monitor B1” value exceed a predetermined threshold, this monitor determines a malfunction and stores a fault code.
And then the strategy above is adapted to the rich and the lean side. It means the different malfunction criteria are set up on the both sides because the “Imbalance Diagnostic A1” value and the “Imbalance Diagnostic B1” value show the different behavior according to the A/F of the malfunction cylinder. In addition, the same fault code is used for both sides.

Monitor A1

When there is an air-fuel ratio cylinder imbalance malfunction, the primary oxygen sensor output fluctuates widely compared with a normal sensor, as shown by the chain line in Figure 1 below. This monitor makes a diagnosis based on this phenomenon. Each primary oxygen sensor signal (PS) and mean value of the primary oxygen sensor signal (MS) is calculated from the primary oxygen sensor signal. The absolute values of (PS - MS) are sampled every 4 ms as shown in the figure. Diagnostic value 1 (DV1) is obtained by integrating the absolute value of (PS - MS) for 2500 times. A malfunction is determined when DV1 exceeds the threshold. The judgment values are determined experimentally.
Figure 1. Compare malfunctioned primary oxygen sensor output with a normal sensor



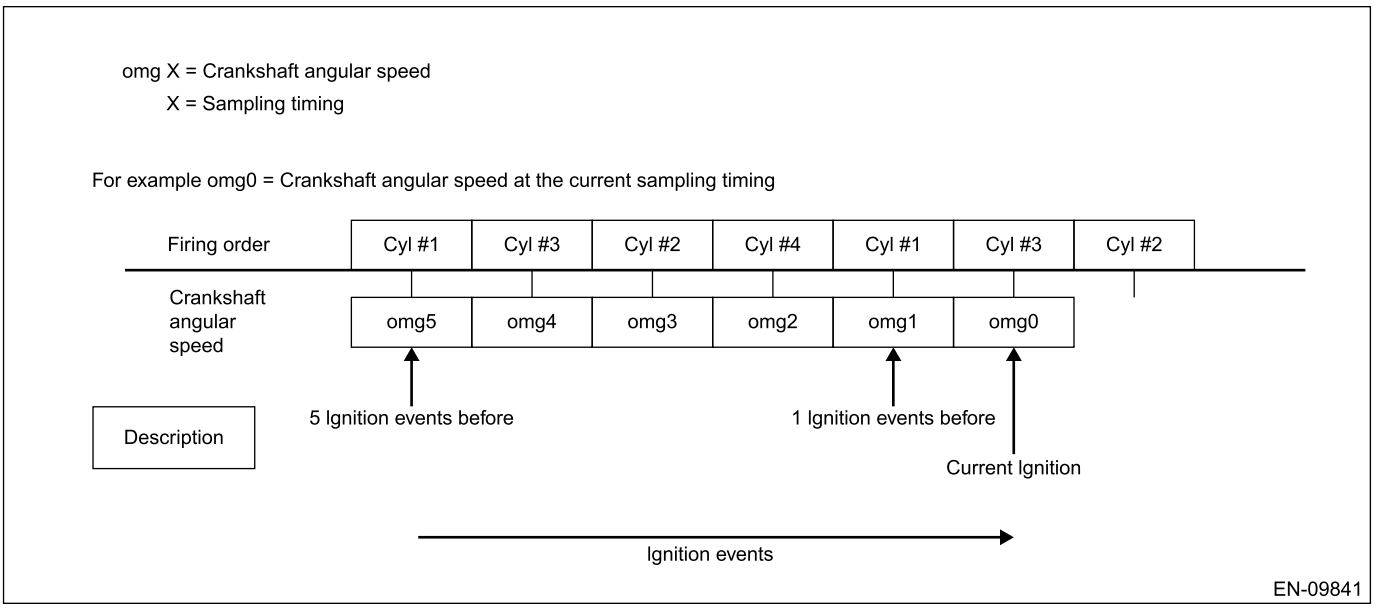
Monitor B1

Method used: Difference method of 360 degrees CA

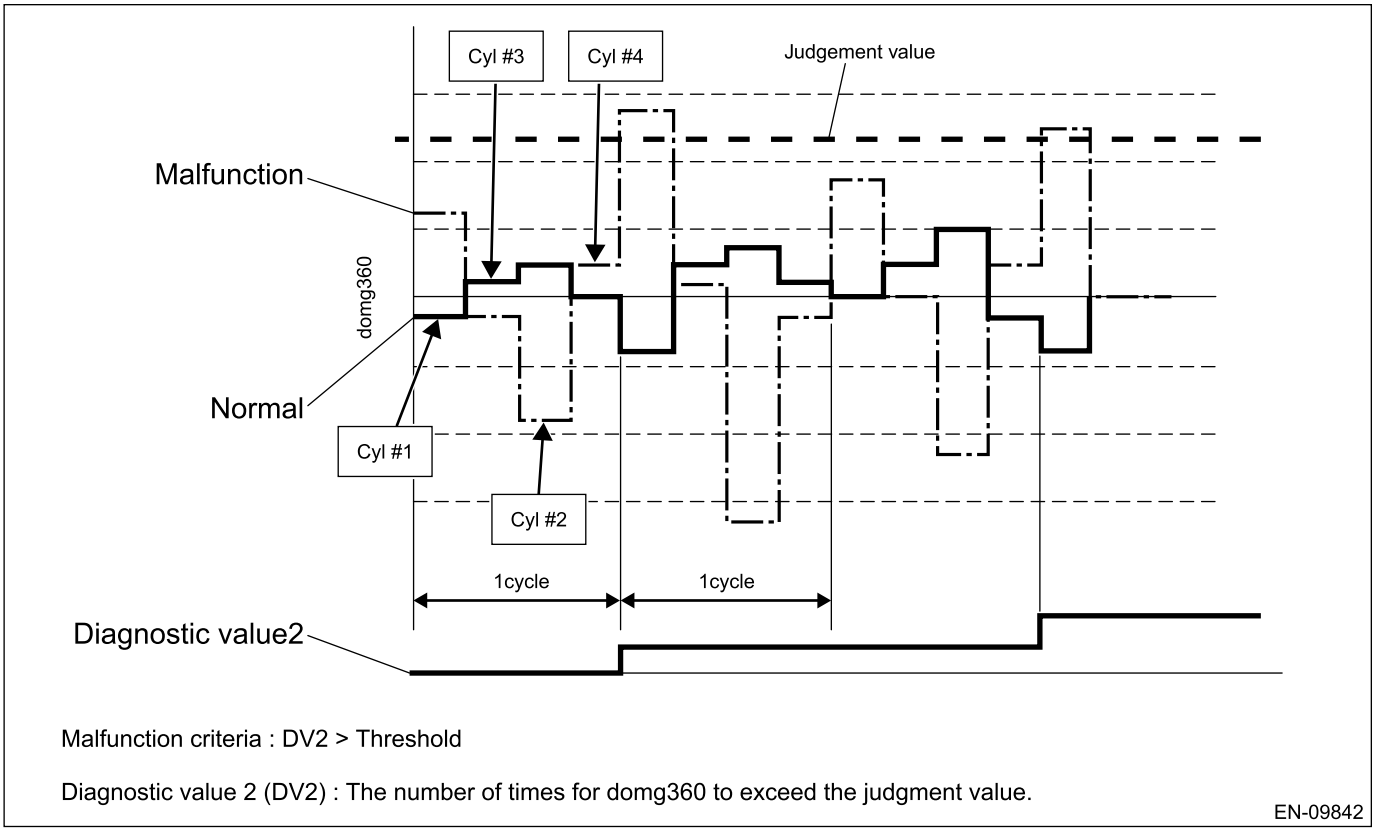
Monitor value: domg360 = (omg 1 − omg 0) − (omg 3 − omg 2) = angular speed

Each crankshaft angular speed is defined as Figure 2 below.

Figure 2. Description of domg360 output



This method uses the fact that the domg360 of lean conditioned cylinder caused by imbalance malfunction indicates big value, as shown by the chain line in Figure 3 below.
The number of times for domg360 to exceed the judgment value in 1000 revolutions (500 cycles) is calculated as diagnostic value 2 (DV2). A malfunction is determined when DV2 exceeds the threshold.
Figure 3. Compare malfunctioned domg360 output with a normal output



2. EXECUTION CONDITION

Monitor A1: Primary oxygen sensor fluctuation

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Barometric pressure	≥75.1kPa (563mmHg, 22.2inHg)
Main feedback	In operation
Engine speed	> 1600rpm and < 3200rpm
Amount of intake air	> 0.80g/rev (0.03oz/rev)
Time when not under catalyst neutralization control as well as not under a gradual change	≥500ms
Fuel control for short-term fuel trim by A/F sensor response monitoring	≠ Intrusively changed

Monitor B1: Crankshaft speed fluctuation

Secondary parameters	Execution condition
Misfiring diagnosis monitoring	In operation
Accelerator pedal position	≠ 0%
Main feedback	In operation
Engine speed	> 1800rpm and < 2800rpm
Amount of intake air	> 0.8g/rev (0.03oz/rev) and < 1.5g/rev (0.05oz/rev)

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

Judge as NG when Monitor A1 and Monitor B1 are both NG, and when either is OK, judge as OK.

Monitor A1

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Diagnostic value 1 (DV1)	> Threshold value 1 (TV1)

Threshold value 1 (TV1):

$$\sum_{k=0}^{n-1} Map_k \quad [n=2500]$$

EN-09888

Map (Lean side)

		Engine load (g/rev (oz/rev))							
		0.8 (0.03)	0.9 (0.03)	1 (0.04)	1.1 (0.04)	1.2 (0.04)	1.3 (0.05)	1.4 (0.05)	1.5 (0.05)
Engine speed (rpm)	1800	0.007	0.009	0.007	0.007	0.008	0.008	0.008	0.008
	2000	0.004	0.005	0.004	0.004	0.004	0.005	0.005	0.005
	2200	0.003	0.003	0.003	0.004	0.004	0.005	0.006	0.006
	2400	0.005	0.005	0.006	0.006	0.007	0.007	0.008	0.009
	2600	0.004	0.004	0.004	0.006	0.008	0.009	0.011	0.011
	2800	0.005	0.006	0.009	0.009	0.009	0.009	0.011	0.011

Map (Rich side)

		Engine load (g/rev (oz/rev))							
		0.8 (0.03)	0.9 (0.03)	1 (0.04)	1.1 (0.04)	1.2 (0.04)	1.3 (0.05)	1.4 (0.05)	1.5 (0.05)
Engine speed (rpm)	1800	0.010	0.011	0.013	0.013	0.013	0.012	0.012	0.012
	2000	0.008	0.009	0.011	0.012	0.012	0.011	0.011	0.011
	2200	0.008	0.008	0.008	0.008	0.008	0.009	0.008	0.007
	2400	0.009	0.009	0.011	0.012	0.012	0.013	0.012	0.012

		Engine load (g/rev (oz/rev))							
	2600	0.009	0.009	0.009	0.012	0.014	0.014	0.014	0.013
	2800	0.010	0.010	0.011	0.014	0.014	0.014	0.014	0.014

Time needed for diagnosis: 4 ms × 2500 time(s)

Monitor B1

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Diagnostic Value2 (DV2)	
(Lean side)	> 72 count
(Rich side)	> 22 count

Time needed for diagnosis: 1000 engine revs.

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P2257 SECONDARY AIR SYSTEM CONTROL "A" CIRCUIT LOW

DTC detecting condition:

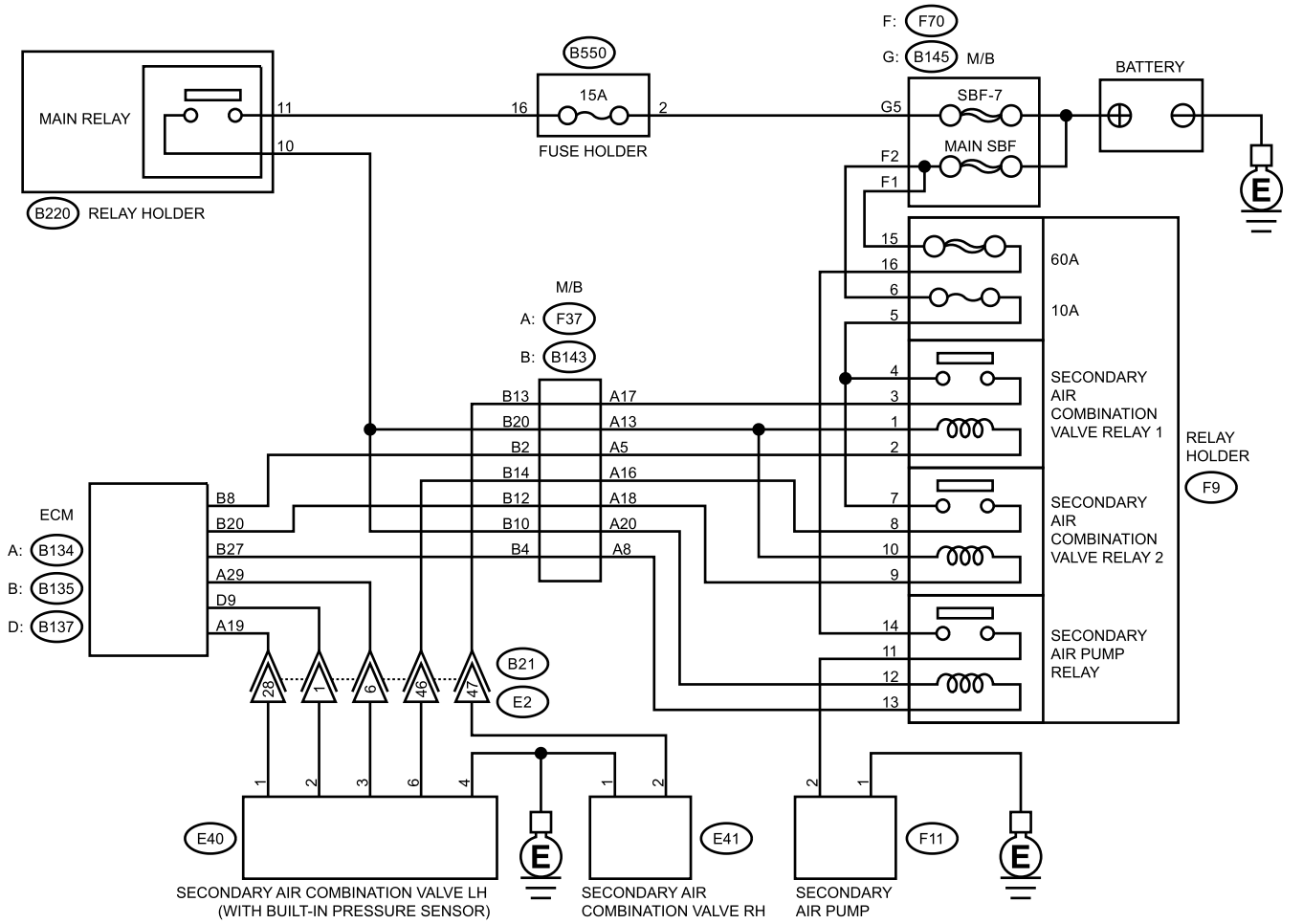
Immediately at fault recognition

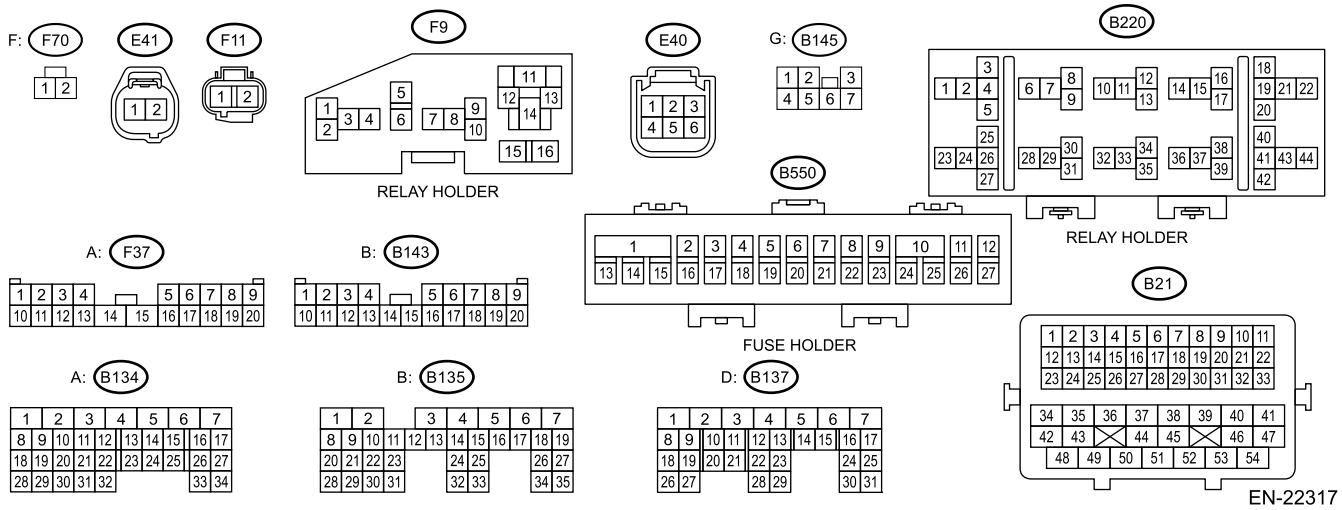
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


F: F70
G: B145 M/B
B550
15A
FUSE HOLDER
BATTERY
MAIN RELAY
11
10
16
2
G5
SBF-7
MAIN SBF
F2
F1
B220 RELAY HOLDER
M/B
A: F37
B: B143
60A
10A
SECONDARY AIR COMBINATION VALVE RELAY 1
SECONDARY AIR COMBINATION VALVE RELAY 2
SECONDARY AIR PUMP RELAY
RELAY HOLDER
F9
ECM
A: B134
B: B135
D: B137
B8
B20
B27
A29
D9
A19
B13
B20
B2
B14
B12
B10
B4
A17
A13
A5
A16
A18
A20
A8
28
1
6
46
47
B21
E2
E40
E41
F11
SECONDARY AIR COMBINATION VALVE LH (WITH BUILT-IN PRESSURE SENSOR)
SECONDARY AIR COMBINATION VALVE RH
SECONDARY AIR PUMP


F: F70
E41
F11
F9
RELAY HOLDER
E40
G: B145
B220
RELAY HOLDER
B550
FUSE HOLDER
A: F37
B: B143
A: B134
B: B135
D: B137
B21
EN-22317

1. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR PUMP RELAY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Remove the secondary air pump relay.
4. Measure the resistance of harness between ECM connector and secondary air pump relay connector.

Connector & terminal

(B135) No. 27 — (F9) No. 13:

Is the resistance less than 1 Ω?

Yes	Go to 2.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and secondary air pump relay connector** • **Poor contact of coupling connector**

2. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR PUMP RELAY CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B135) No. 27 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**
No	Repair the short circuit to ground in harness between ECM connector and secondary air pump relay connector.

1. OUTLINE OF DIAGNOSIS

Judge as NG when the ECM output level differs from the actual terminal level.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Secondary air pump drive signal	OFF

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≤ Battery voltage × 0.34 V

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2258 SECONDARY AIR SYSTEM CONTROL "A" CIRCUIT HIGH

DTC detecting condition:

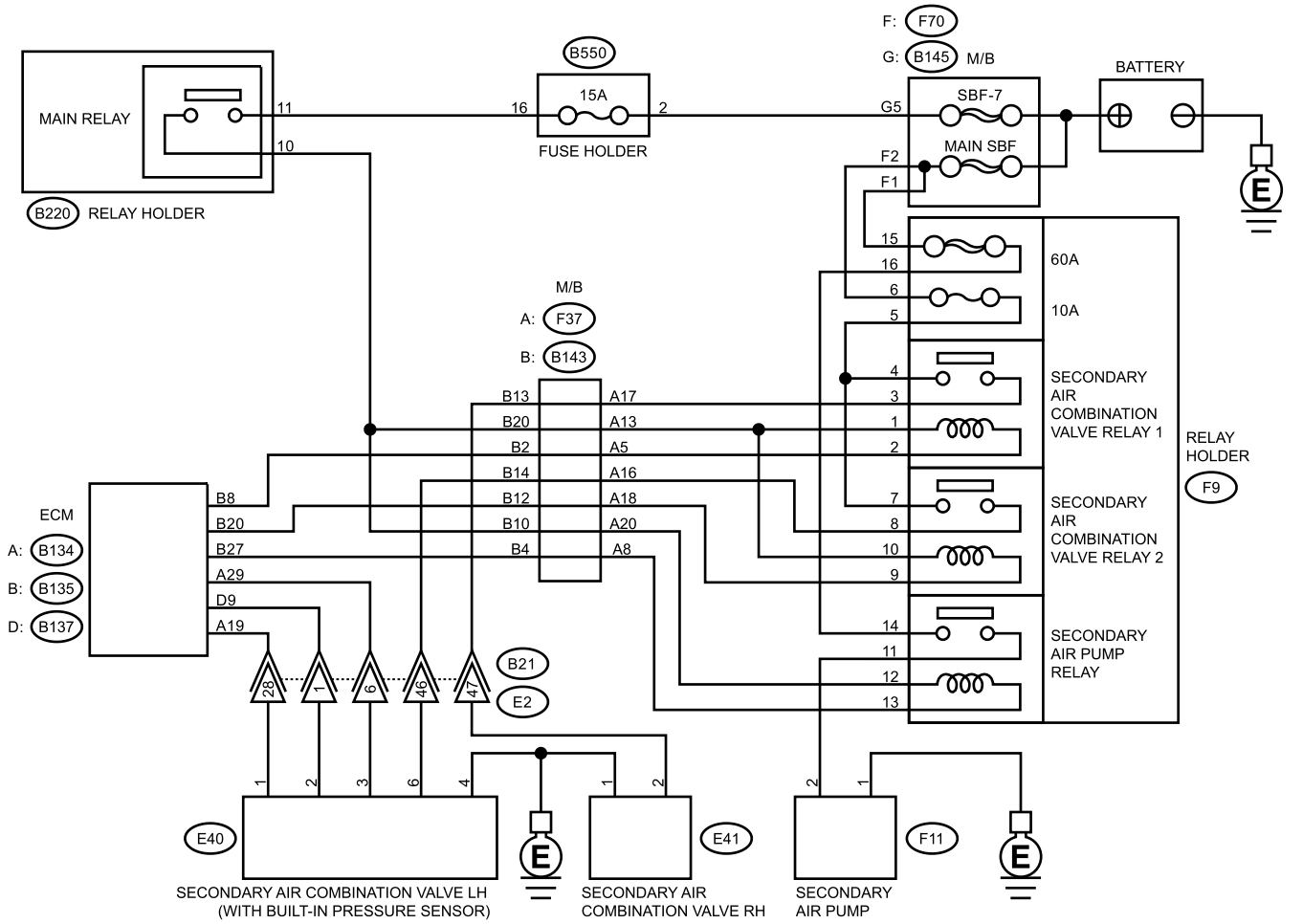
Immediately at fault recognition

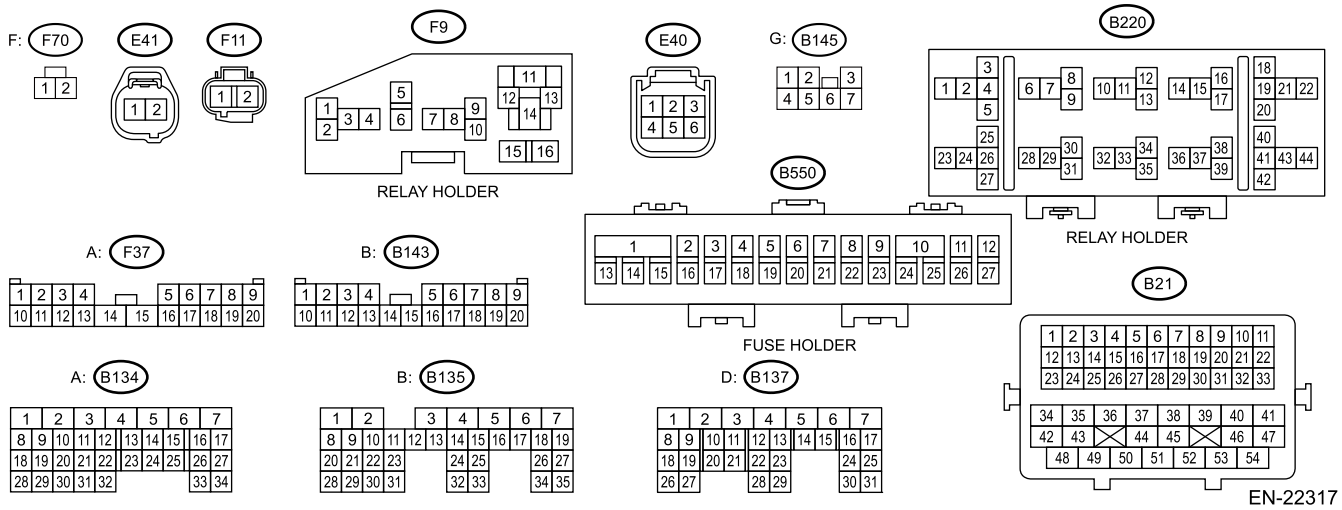
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


F: F70
G: B145 M/B
B550
15A
FUSE HOLDER
BATTERY
MAIN RELAY
11
10
16
2
G5
SBF-7
MAIN SBF
F2
F1
B220 RELAY HOLDER
M/B
A: F37
B: B143
60A
10A
SECONDARY AIR COMBINATION VALVE RELAY 1
SECONDARY AIR COMBINATION VALVE RELAY 2
SECONDARY AIR PUMP RELAY
RELAY HOLDER
F9
ECM
A: B134
B: B135
D: B137
B8
B20
B27
A29
D9
A19
B13
B20
B2
B14
B12
B10
B4
A17
A13
A5
A16
A18
A20
A8
28
1
6
46
47
B21
E2
E40
E41
F11
SECONDARY AIR COMBINATION VALVE LH (WITH BUILT-IN PRESSURE SENSOR)
SECONDARY AIR COMBINATION VALVE RH
SECONDARY AIR PUMP


F: F70
E41
F11
F9
RELAY HOLDER
E40
G: B145
B220
RELAY HOLDER
B550
FUSE HOLDER
A: F37
B: B143
A: B134
B: B135
D: B137
B21
EN-22317

1. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR PUMP RELAY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Remove the secondary air pump relay.
4. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B135) No. 27 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and secondary air pump relay connector.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

1. OUTLINE OF DIAGNOSIS

Judge as NG when the ECM output level differs from the actual terminal level.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Secondary air pump drive signal	ON

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output current	≥ 12 A

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P226B TURBOCHARGER/SUPERCHARGER BOOST PRESSURE TOO HIGH - MECHANICAL

DTC detecting condition:
Immediately at fault recognition
Trouble symptom:
Poor driving performance
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is other than DTC P226B displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK WASTEGATE ACTUATOR PIPING AND WASTEGATE CONTROL SOLENOID VALVE PIPING.

Check the wastegate actuator pipe and wastegate control solenoid valve pipe.

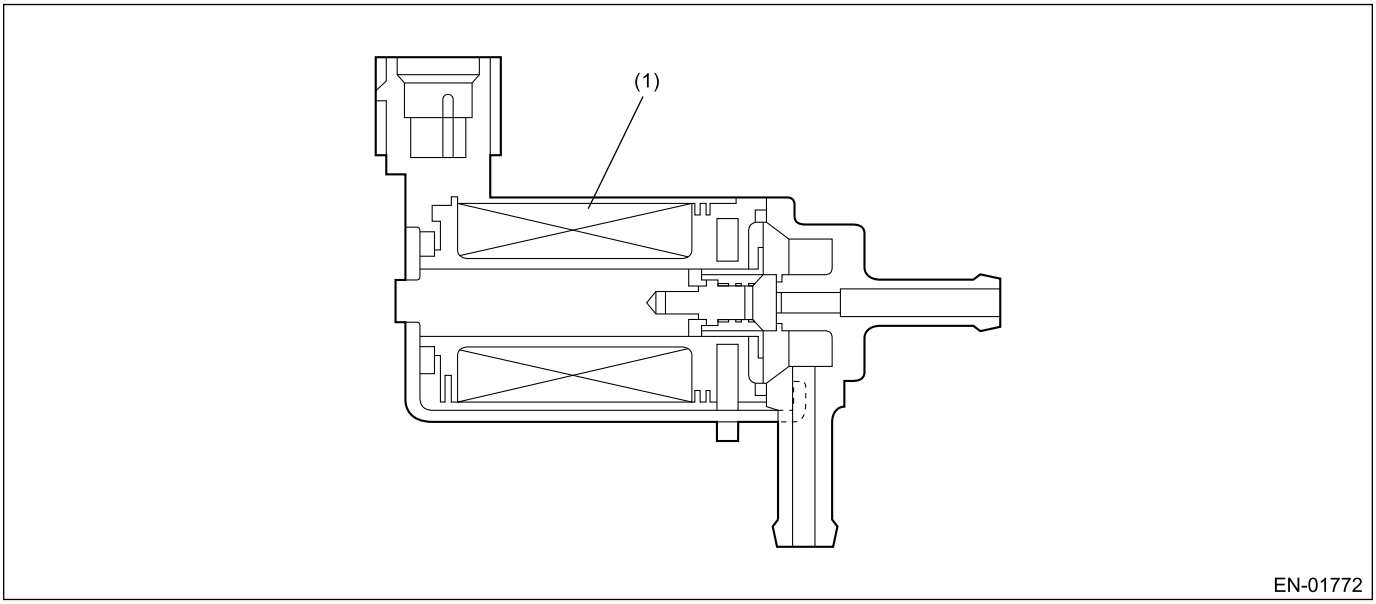
Are there any damage or disconnection of hose in wastegate actuator piping or wastegate control solenoid valve piping?

Yes	Connect the wastegate actuator pipe or wastegate control solenoid valve pipe properly. If defective, replace the hose.
No	Replace the wastegate control solenoid valve. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Wastegate Control Solenoid Valve.

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of wastegate control solenoid valve function.
Judge as NG when becoming high wastegate pressure.

2. COMPONENT DESCRIPTION



(1) Coil

3. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Mani. Absolute Pressure	> Value from Map

∗Map is shown as a representative value.
(Intake manifold absolute pressure value changes based on intake air temperature, and the Map value also changes.)

Map: When intake air temperature is at 25°C (77°F)

		Barometric pressure Barometric pressure (kPa (mmHg, inHg))					
		59.3 (445, 17.5)	68.7 (515, 20.3)	78 (585, 23)	92 (690, 27.2)	96 (720, 28.3)	98.7 (740, 29.1)
Engine speed	1000	143.7 (1078,	156.7 (1176,	156.7 (1176,	156.7 (1176,	156.7 (1176,	156.7 (1176,

		Barometric pressure **Barometric pressure (kPa (mmHg, inHg))**					
		59.3 (445, 17.5)	**68.7 (515, 20.3)**	**78 (585, 23)**	**92 (690, 27.2)**	**96 (720, 28.3)**	**98.7 (740, 29.1)**
(rpm)		42.4)	46.3)	46.3)	46.3)	46.3)	46.3)
	2000	143.7 (1078, 42.4)	206.6 (1550, 61)	206.6 (1550, 61)	206.6 (1550, 61)	206.6 (1550, 61)	206.6 (1550, 61)
	3000	151.1 (1134, 44.6)	197.2 (1479, 58.2)	207.2 (1554, 61.2)	227.3 (1705, 67.1)	227.3 (1705, 67.1)	227.3 (1705, 67.1)
	4000	156.7 (1176, 46.3)	170.6 (1280, 50.4)	186.6 (1400, 55.1)	216.6 (1625, 64)	226.6 (1700, 66.9)	226.6 (1700, 66.9)
	5000	144.3 (1083, 42.6)	160.8 (1206, 47.5)	177.3 (1330, 52.4)	215.4 (1616, 63.6)	225.8 (1694, 66.7)	223 (1673, 65.9)
	6000	142.7 (1071, 42.1)	160.1 (1201, 47.3)	175.5 (1317, 51.8)	196.8 (1476, 58.1)	206.4 (1548, 61)	220 (1650, 65)
							(kPa (mmHg, inHg))

time needed for diagnosis:2000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2270 O2 SENSOR SIGNAL BIASED/STUCK LEAN BANK 1 SENSOR 2

DTC detecting condition:

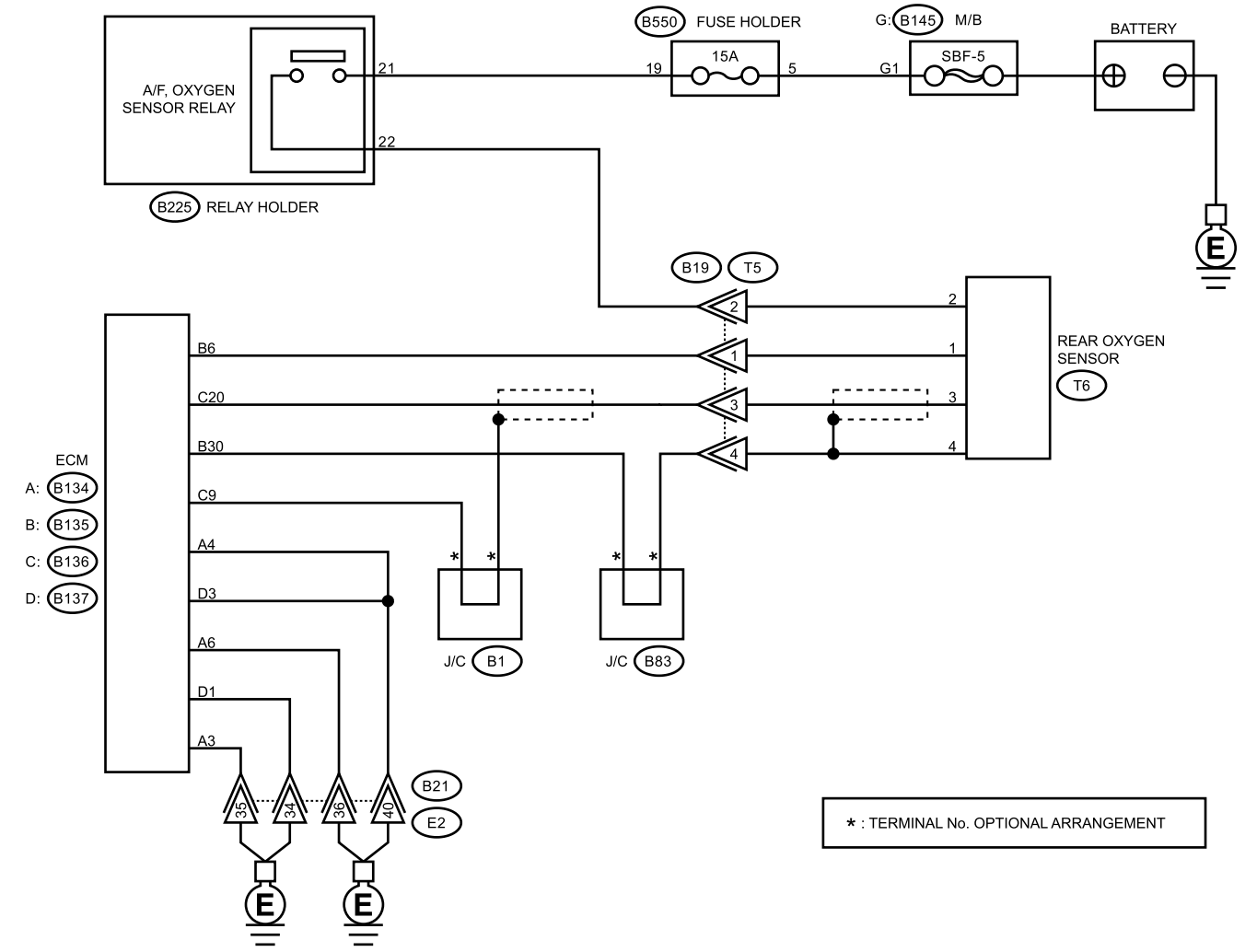
Detected when two consecutive driving cycles with fault occur.

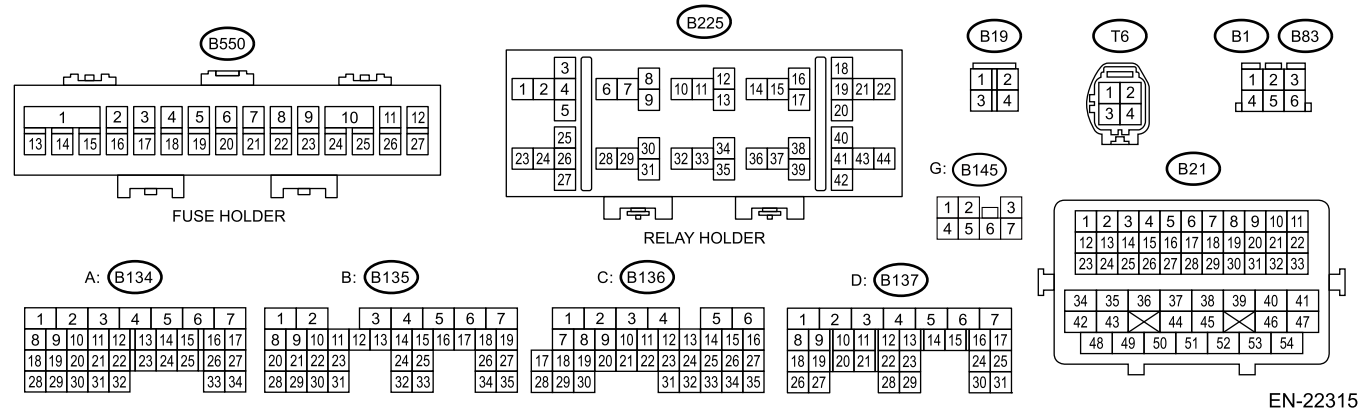
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B550 FUSE HOLDER
G: B145 M/B
BATTERY
A/F, OXYGEN SENSOR RELAY
21
22
19
15A
5
G1
SBF-5
B225 RELAY HOLDER
B19
T5
REAR OXYGEN SENSOR
T6
ECM
A: B134
B: B135
C: B136
D: B137
B6
C20
B30
C9
A4
D3
A6
D1
A3
J/C B1
J/C B83
B21
E2
* : TERMINAL No. OPTIONAL ARRANGEMENT


B550
FUSE HOLDER
B225
RELAY HOLDER
B19
T6
B1
B83
G: B145
B21
A: B134
B: B135
C: B136
D: B137

EN-22315

1. CHECK REAR OXYGEN SENSOR CONNECTOR.

Check the rear oxygen sensor connector.

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.

Connector & terminal

(B136) No. 20 — (T6) No. 3:

(B135) No. 30 — (T6) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and rear oxygen sensor connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Connect the connector to ECM.
2. Turn the ignition switch to ON.
3. Measure the voltage between rear oxygen sensor connector and chassis ground.
   Connector & terminal
   (T6) No. 4 (+) — Chassis ground (−):

Is the voltage 0.15 V or more?

Yes	Repair the short circuit to power in the harness between ECM connector and rear oxygen sensor connector.
No	Go to 4.

4. CHECK EXHAUST SYSTEM.

Check exhaust system parts.
Note:
Check the following items.
- **Looseness and improper fitting of exhaust system parts**
- **Damage (crack, hole etc.) of parts**
- **Damage (crack, hole etc.) between front oxygen (A/F) sensor and rear oxygen sensor**

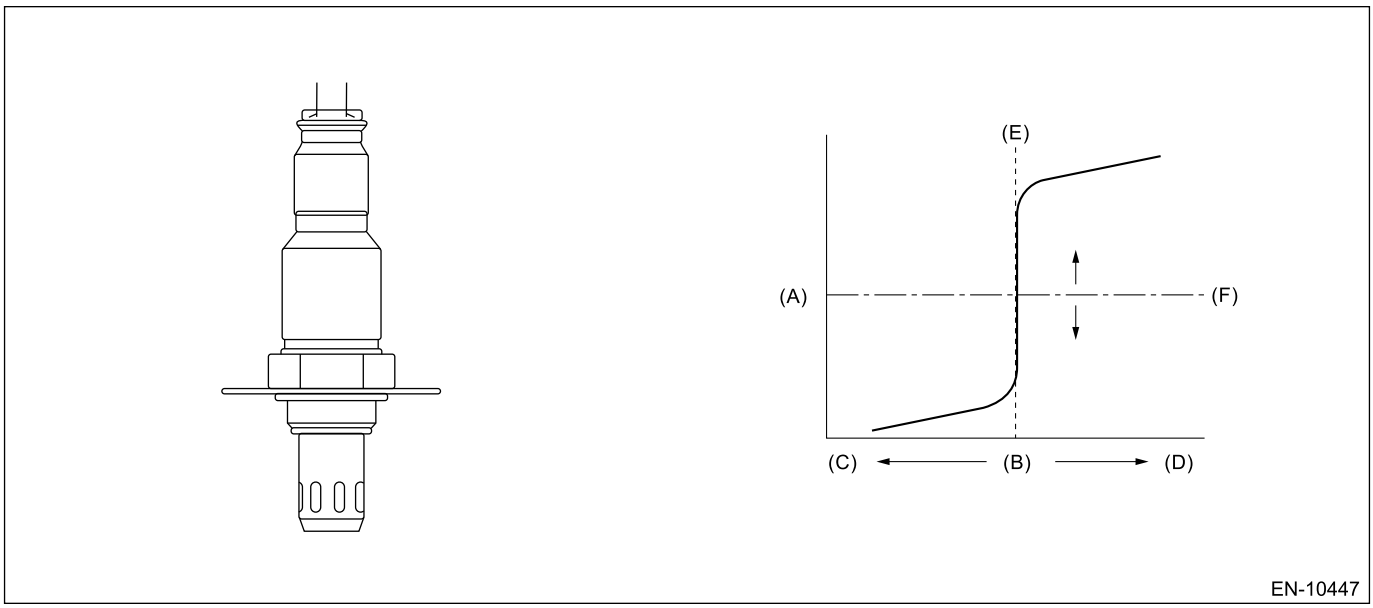
Is there any fault in exhaust system?

Yes	Repair or replace faulty parts.
No	Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Rear Oxygen Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the stuck of rear oxygen sensor voltage in lean state.
When rear oxygen sensor voltage remains below the threshold value for predetermined time, diagnosis interrupts target air fuel ratio for control and raises output voltage.
Judge as NG detecting the stuck in lean state when rear oxygen sensor voltage remains below the threshold value even after the interrupt control.

2. COMPONENT DESCRIPTION



(A) Electromotive force (B) Air fuel ratio (C) Lean
(D) Rich (E) Theoretical air fuel ratio (F) Comparative voltage

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Sub feedback	In operation
Amount of intake air	≥ 10g/s (0.35oz/s)
Estimated temperature of the rear oxygen sensor element	≥ 500°C (932°F)
Enable conditions at interrupt control are as follows	
Continuous time when rear oxygen sensor output voltage is less than 0.55V	≥ 15000ms
Air fuel ratio reduced from target air fuel ratio	= Value of Map

Map

Output voltage of rear oxygen sensor (V)	**0.00**	**0.10**	**0.20**	**0.40**	**0.60**
Air fuel ratio reduced from target air fuel ratio (%)	11	11	4	4	4

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage of rear oxygen sensor	< 0.55V

time needed for diagnosis: 25000ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P2271 O2 SENSOR SIGNAL BIASED/STUCK RICH BANK 1 SENSOR 2

DTC detecting condition:

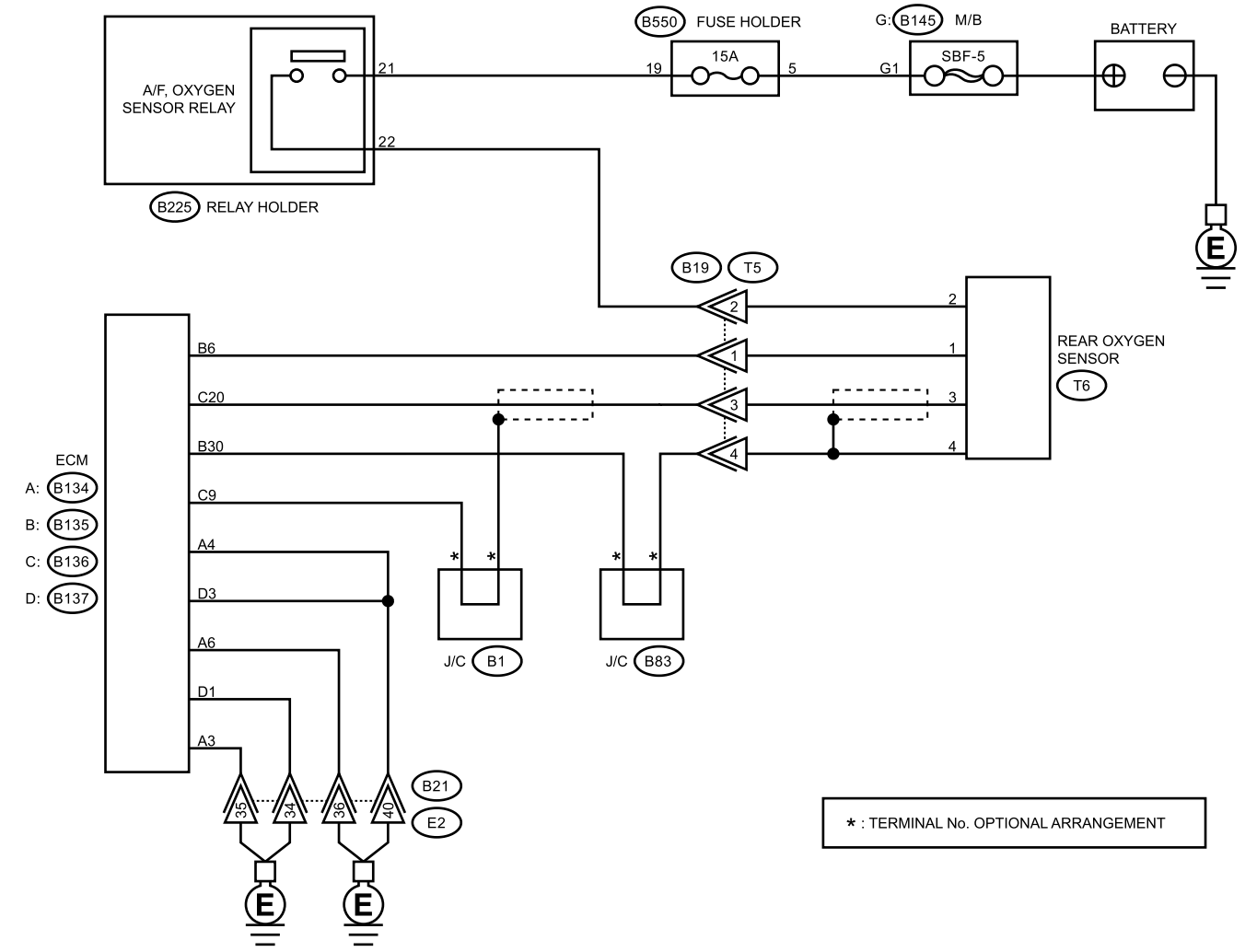
Detected when two consecutive driving cycles with fault occur.

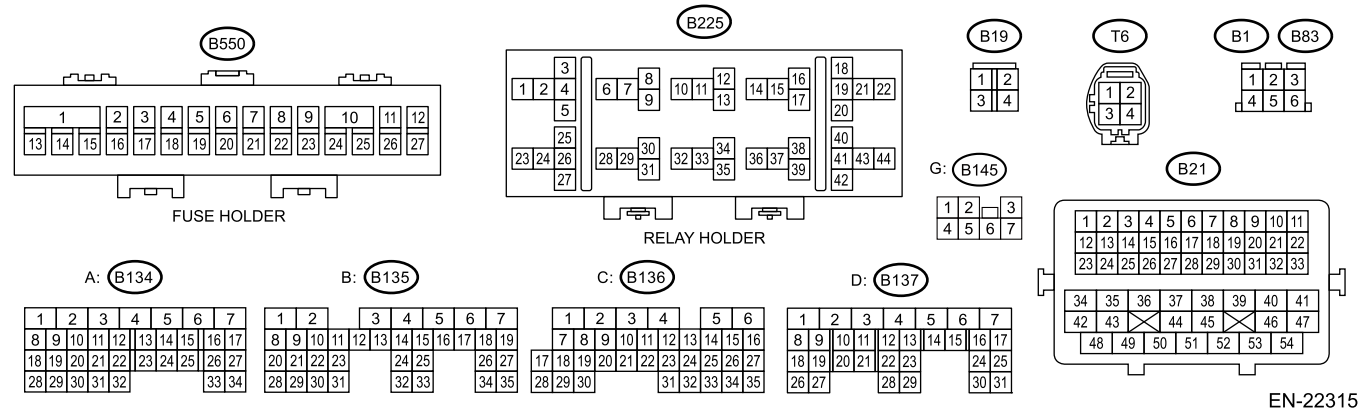
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B550 FUSE HOLDER
G: B145 M/B
BATTERY
A/F, OXYGEN SENSOR RELAY
21
22
19
15A
5
G1
SBF-5
B225 RELAY HOLDER
B19
T5
REAR OXYGEN SENSOR
T6
ECM
A: B134
B: B135
C: B136
D: B137
B6
C20
B30
C9
A4
D3
A6
D1
A3
J/C B1
J/C B83
B21
E2
* : TERMINAL No. OPTIONAL ARRANGEMENT


B550
FUSE HOLDER
B225
RELAY HOLDER
B19
T6
B1
B83
G: B145
B21
A: B134
B: B135
C: B136
D: B137

EN-22315

1. CHECK REAR OXYGEN SENSOR CONNECTOR.

Check the rear oxygen sensor connector.

Has water entered the connector?

Yes	Completely remove any water inside.
No	Go to 2.

2. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from rear oxygen sensor.
4. Measure the resistance of harness between ECM connector and rear oxygen sensor connector.

Connector & terminal

(B136) No. 20 — (T6) No. 3:

(B135) No. 30 — (T6) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and rear oxygen sensor connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND REAR OXYGEN SENSOR CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B136) No. 20 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 4.
No	Repair the short circuit to ground in harness between ECM connector and rear oxygen sensor connector.

4. CHECK EXHAUST SYSTEM.

Check exhaust system parts.

Note:

Check the following items.

- **Looseness and improper fitting of exhaust system parts**
- **Damage (crack, hole etc.) of parts**
- **Damage (crack, hole etc.) between front oxygen (A/F) sensor and rear oxygen sensor**

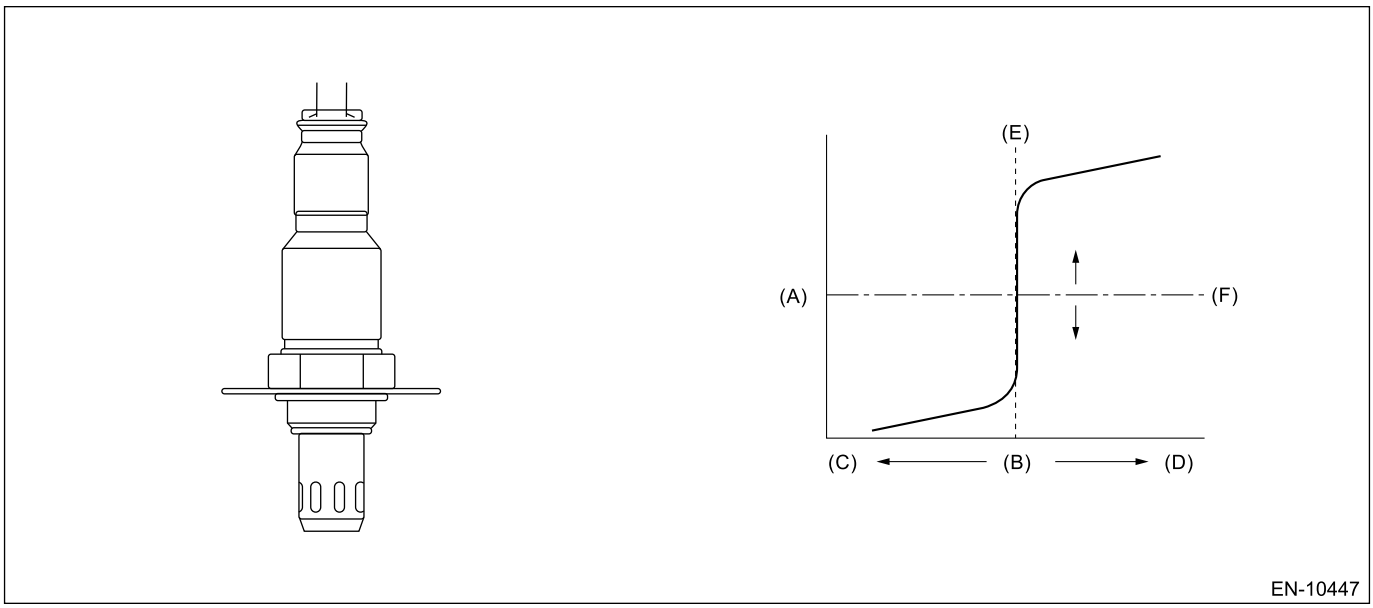
Is there any fault in exhaust system?

Yes	Repair or replace faulty parts.
No	Replace the rear oxygen sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS) (STI)>Rear Oxygen Sensor.

1. OUTLINE OF DIAGNOSIS

Detect the stuck of rear oxygen sensor voltage in rich state.
Detect the stuck in rich state and judge as NG if rear oxygen sensor voltage remains above the threshold value for predetermined time.

2. COMPONENT DESCRIPTION



(A) Electromotive force
(B) Air fuel ratio
(C) Lean
(D) Rich
(E) Theoretical air fuel ratio
(F) Comparative voltage

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Time of fuel shut-off operation	≥ 5000ms
Estimated temperature of the rear oxygen sensor element	≥ 500°C (932°F)

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage of rear oxygen sensor	> 0.15V

time needed for diagnosis: 500ms
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P2401 EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT LOW

DTC detecting condition:

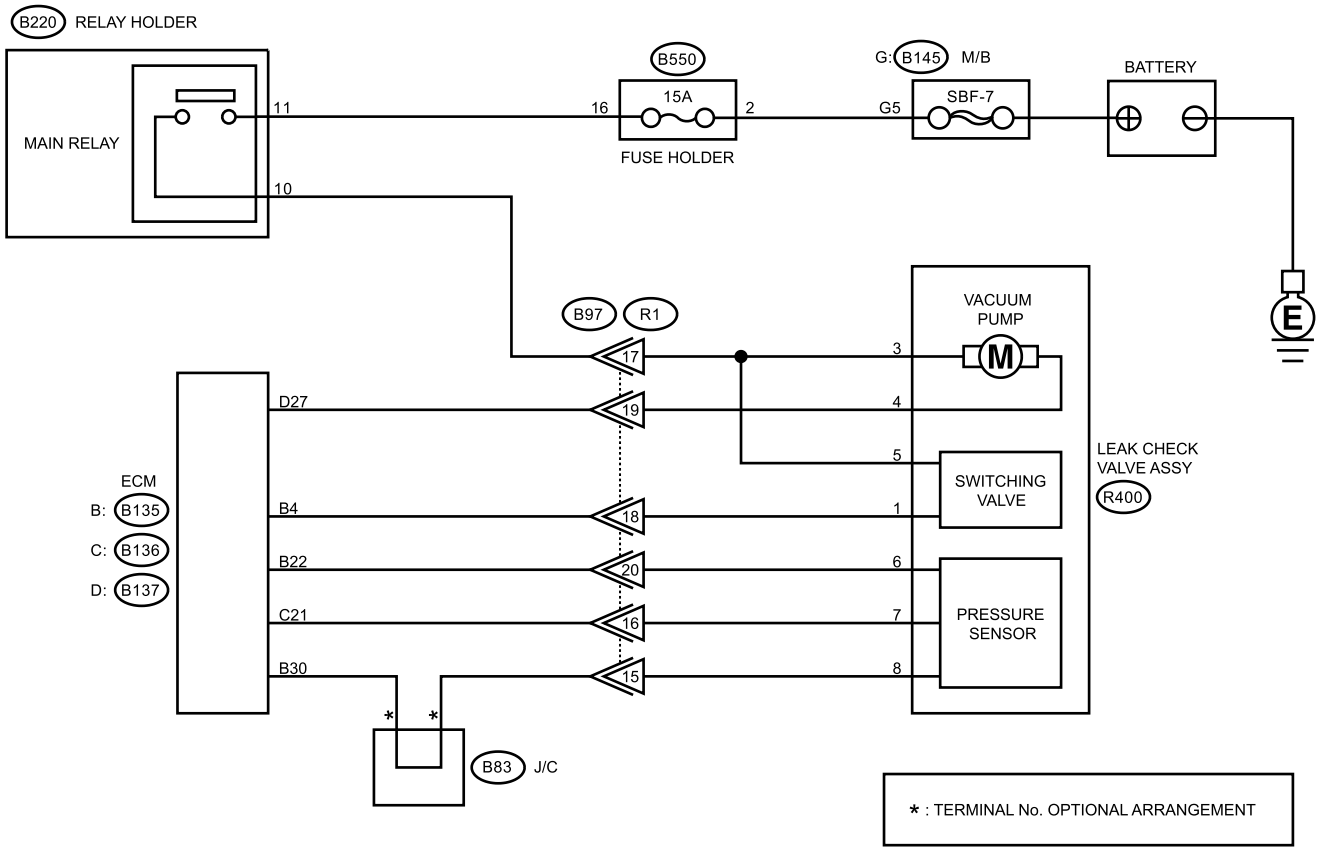
Immediately at fault recognition

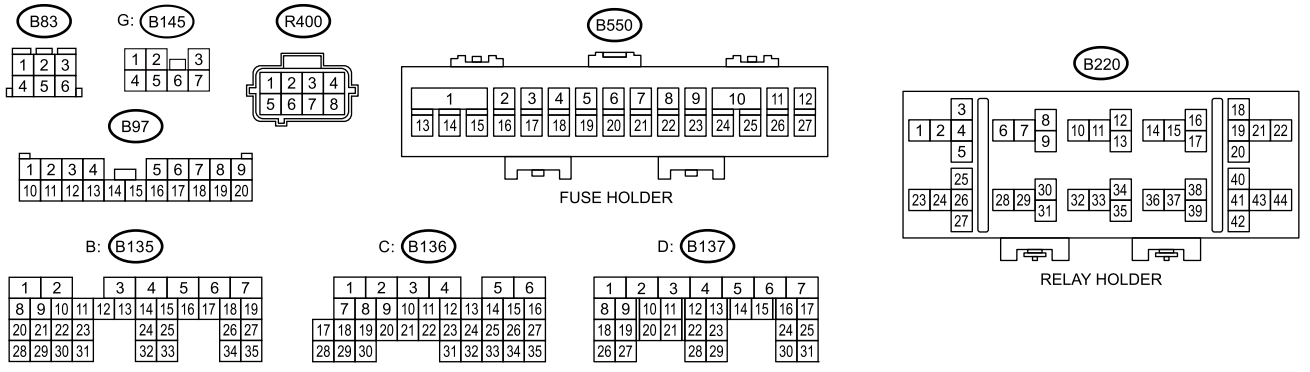
Caution:

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Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B220 RELAY HOLDER
MAIN RELAY
11
10
B550
16
15A
2
FUSE HOLDER
G: B145 M/B
G5
SBF-7
BATTERY
E
B97
R1
17
19
18
20
16
15
D27
B4
B22
C21
B30
ECM
B: B135
C: B136
D: B137
VACUUM PUMP
M
3
4
5
1
6
7
8
SWITCHING VALVE
PRESSURE SENSOR
LEAK CHECK VALVE ASSY
R400
*
B83 J/C
* : TERMINAL No. OPTIONAL ARRANGEMENT


B83
G: B145
R400
B550
B97
FUSE HOLDER
B220
B: B135
C: B136
D: B137
RELAY HOLDER

EN-22318

1. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B137) No. 27 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Go to 3.

2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

Yes	Repair the poor contact of ECM connector.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary open or short circuit of harness or temporary poor contact of connector may be the cause.**

3. CHECK POWER SUPPLY TO LEAK CHECK VALVE ASSEMBLY.

Measure the voltage between the leak check valve assembly connector and engine ground.
Connector & terminal
(R400) No. 3 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 4.
No	Repair the power supply circuit.

4. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the leak check valve assembly.
4. Measure the resistance between leak check valve assembly and chassis ground.
   Connector & terminal
   (R400) No. 4 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.

5. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

Measure the resistance of harness between ECM connector and the leak check valve assembly connector.

Connector & terminal
(B137) No. 27 — (R400) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 6.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and the leak check valve assembly connector** • **Poor contact of coupling connector**

6. CHECK LEAK CHECK VALVE ASSEMBLY.

Check the vacuum pump of the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly>INSPECTION > CHECK VACUUM PUMP.

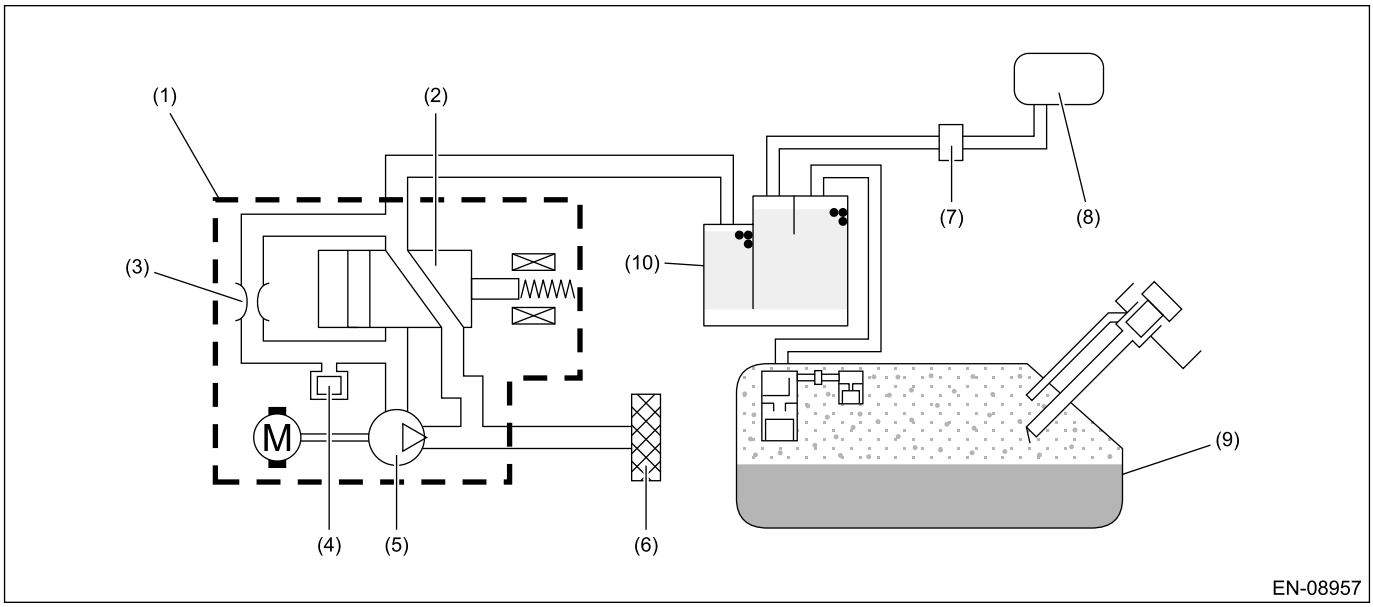
Is the check result OK?

Yes	Repair the poor contact in the leak check valve assembly connector.
No	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit in Evaporative Leak Check Module vacuum pump.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Evaporative Leak Check Module vacuum pump drive signal	OFF

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≤ Battery voltage × 0.34 V

time needed for diagnosis: 2500ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2402 EVAP SYSTEM LEAK DETECTION PUMP CONTROL CIRCUIT HIGH

DTC detecting condition:

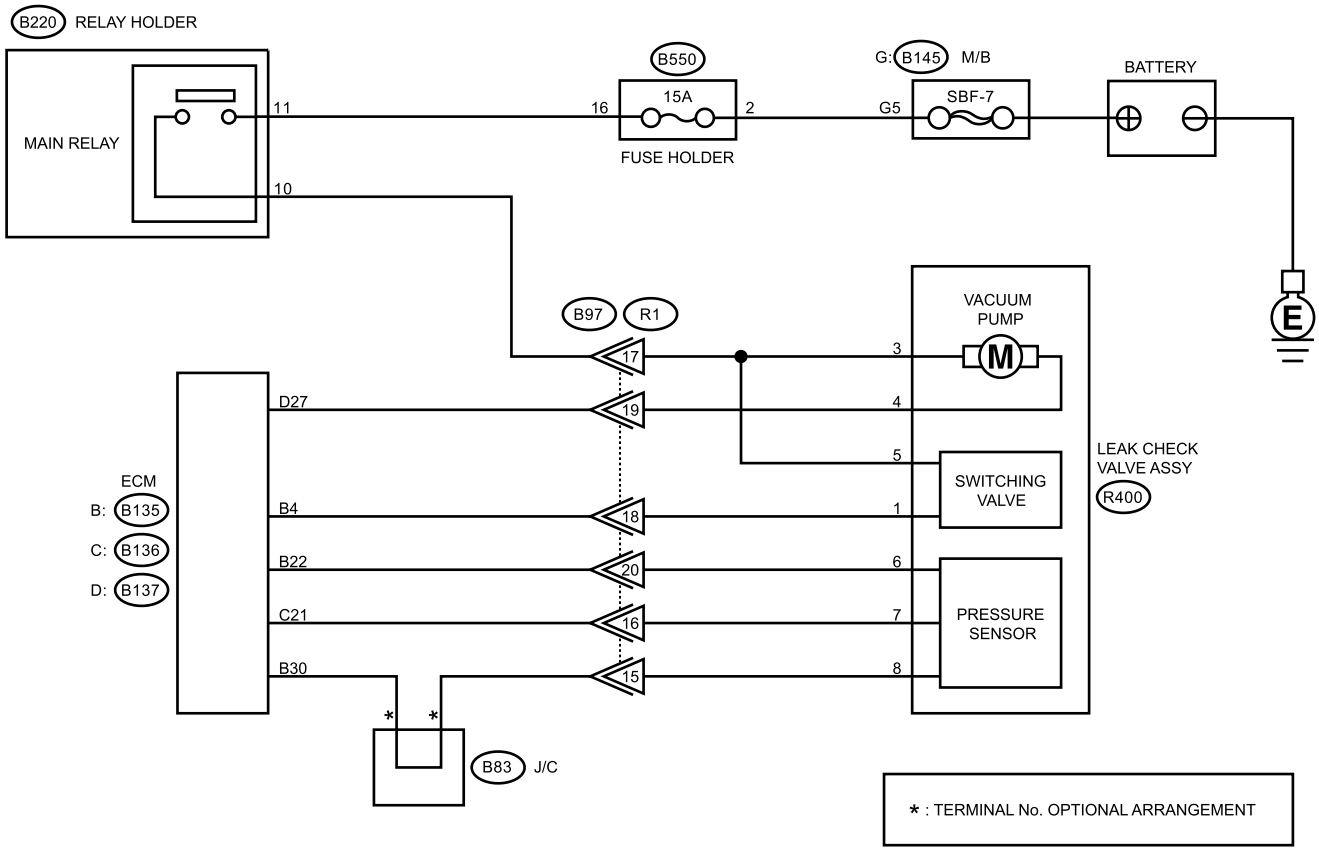
Immediately at fault recognition

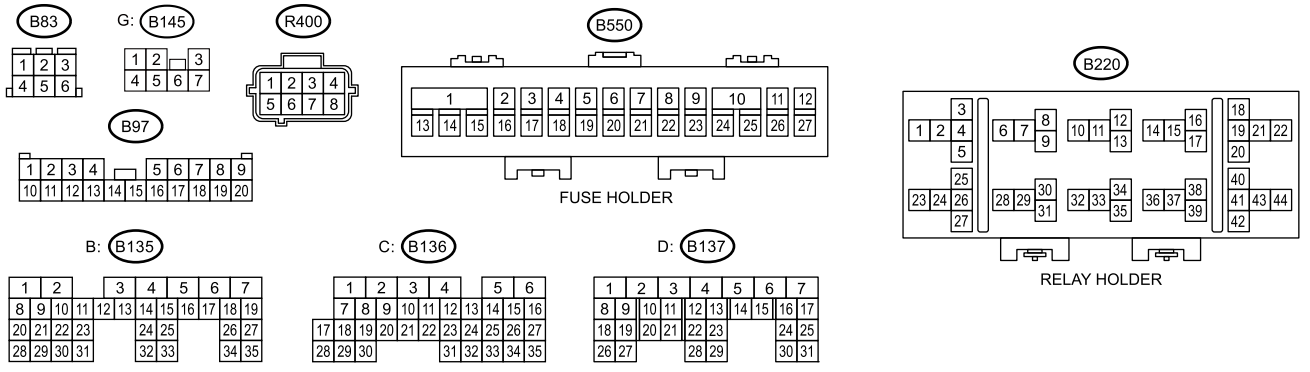
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B220 RELAY HOLDER
MAIN RELAY
11
10
B550
16
15A
2
FUSE HOLDER
G: B145 M/B
G5
SBF-7
BATTERY
E
B97
R1
17
19
18
20
16
15
D27
B4
B22
C21
B30
ECM
B: B135
C: B136
D: B137
VACUUM PUMP
M
3
4
5
1
6
7
8
SWITCHING VALVE
PRESSURE SENSOR
LEAK CHECK VALVE ASSY
R400
*
B83 J/C
* : TERMINAL No. OPTIONAL ARRANGEMENT


B83
G: B145
R400
B550
B97
FUSE HOLDER
B220
B: B135
C: B136
D: B137
RELAY HOLDER

EN-22318

1. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the leak check valve assembly.
3. Turn the ignition switch to ON.
4. Measure the voltage between leak check valve assembly and chassis ground.
   Connector & terminal
   (R400) No. 4 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and leak check valve assembly connector.
No	Go to 2.

2. CHECK LEAK CHECK VALVE ASSEMBLY.

1. Turn the ignition switch to OFF.
2. Check the vacuum pump of the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly>INSPECTION > CHECK VACUUM PUMP.

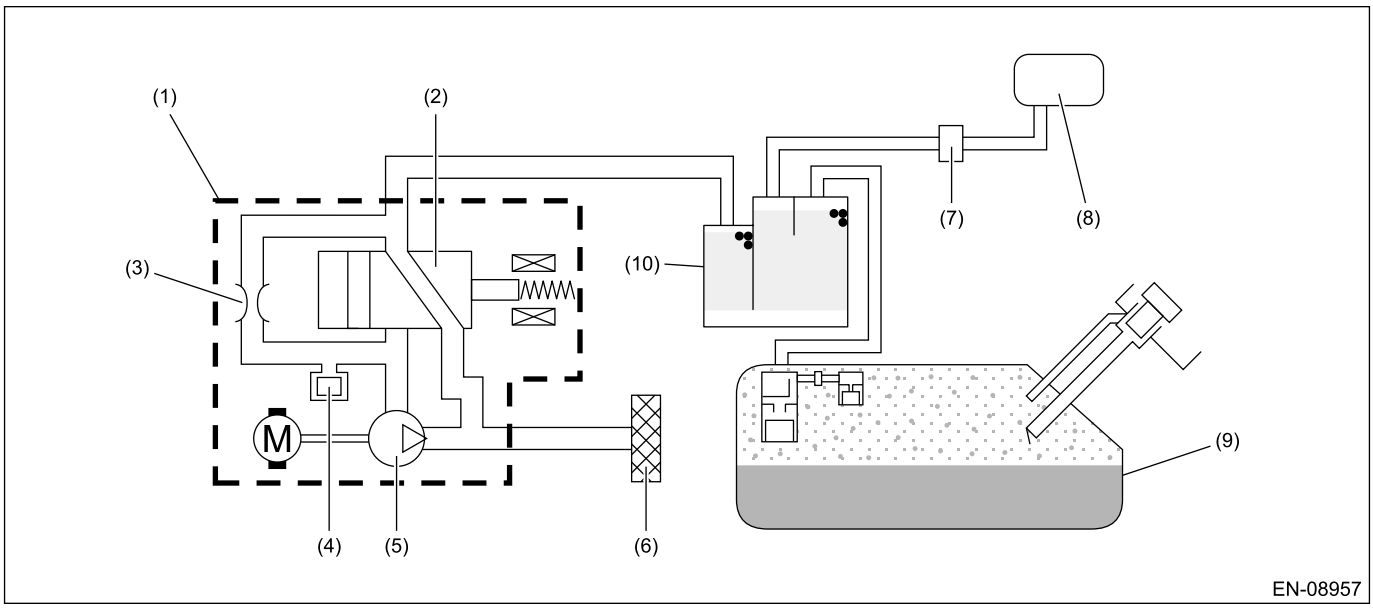
Is the check result OK?

Yes	Repair the poor contact in the leak check valve assembly connector.
No	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit in Evaporative Leak Check Module vacuum pump.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Evaporative Leak Check Module vacuum pump drive signal	ON

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output current	≥ 12 A

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2404 EVAP SYSTEM LEAK DETECTION PUMP SENSE CIRCUIT RANGE/PERFORMANCE

DTC detecting condition:

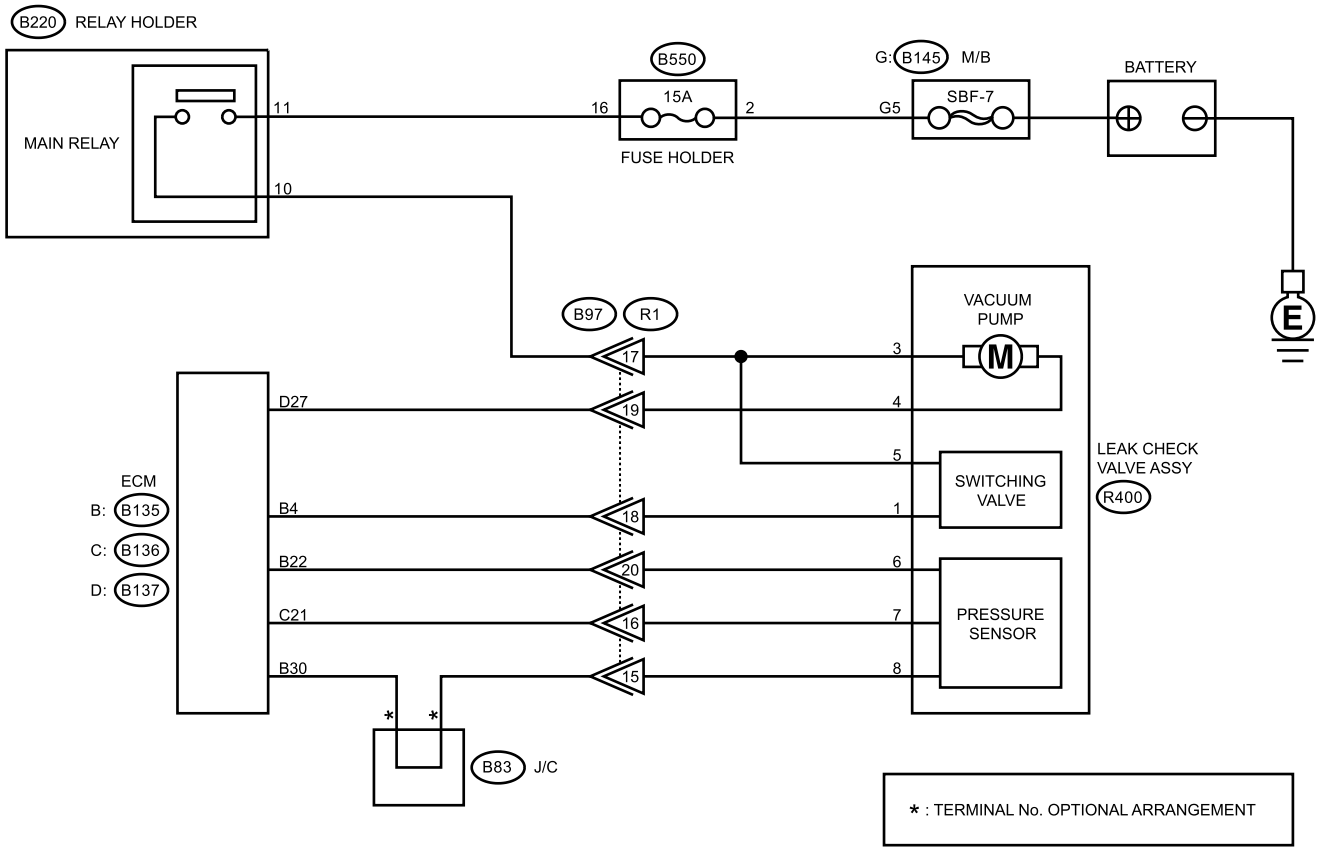
Detected when two consecutive driving cycles with fault occur.

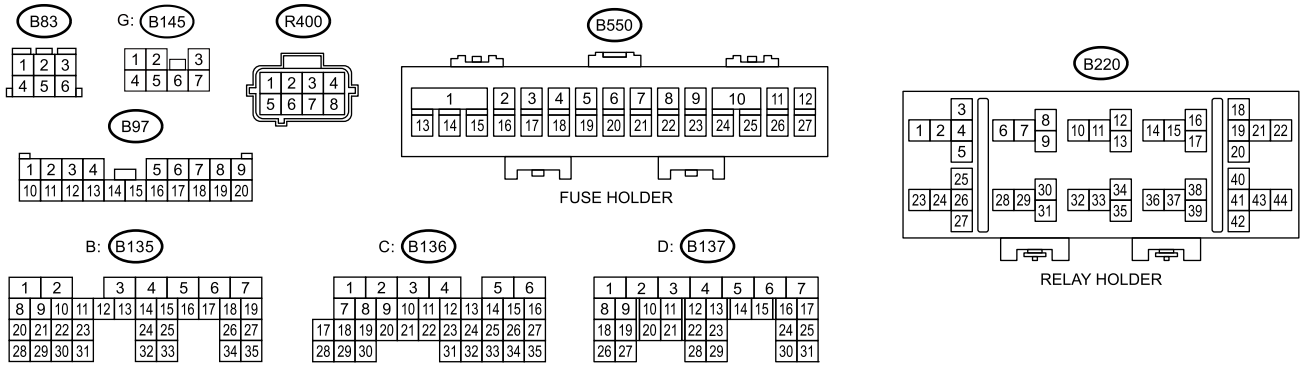
Caution:

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Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B220 RELAY HOLDER
MAIN RELAY
11
10
B550
16
15A
2
FUSE HOLDER
G: B145 M/B
G5
SBF-7
BATTERY
E
B97
R1
17
19
18
20
16
15
D27
B4
B22
C21
B30
ECM
B: B135
C: B136
D: B137
VACUUM PUMP
M
3
4
5
1
6
7
8
SWITCHING VALVE
PRESSURE SENSOR
LEAK CHECK VALVE ASSY
R400
*
B83 J/C
* : TERMINAL No. OPTIONAL ARRANGEMENT


B83
G: B145
R400
B550
B97
FUSE HOLDER
B220
B: B135
C: B136
D: B137
RELAY HOLDER

EN-22318

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P2404 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK LEAK CHECK VALVE ASSEMBLY PUMP.

Using the Subaru Select Monitor, operate the leak check valve assembly pump.

Note:
For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(STI)>Active Test.

Does the leak check valve assembly pump operate?

Yes	Go to 6.
No	Go to 3.

3. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the leak check valve assembly.
3. Turn the ignition switch to ON.
4. Measure the voltage between the leak check valve assembly connector and chassis ground.
   Connector & terminal
   (R400) No. 3 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between the main relay and the leak check valve assembly connector** • **Poor contact of main relay connector** • **Poor contact of coupling connector**

4. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and the leak check valve assembly connector.
   Connector & terminal
   (B137) No. 27 — (R400) No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 5.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and the leak check valve assembly connector** • **Poor contact of coupling connector**

5. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Measure the resistance of harness between ECM connector and chassis ground.
   Connector & terminal
   (B137) No. 27 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.
No	Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.

6. CHECK LEAK CHECK VALVE ASSEMBLY SWITCHING VALVE.

Using the Subaru Select Monitor, operate the leak check valve assembly switching valve.
Note:
For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(STI)>Active Test.

Does the leak check valve assembly switching valve operate?

Yes	Go to 10.
No	Go to 7.

7. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the leak check valve assembly.
3. Turn the ignition switch to ON.
4. Measure the voltage between the leak check valve assembly connector and chassis ground.
   Connector & terminal
   (R400) No. 5 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes — Go to 8.

No — Repair the harness and connector.
Note:
In this case, repair the following item:
- **Open circuit in harness between the main relay and the leak check valve assembly connector**
- **Poor contact of main relay connector**
- **Poor contact of coupling connector**

8. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and the leak check valve assembly connector.
   Connector & terminal
   (B135) No. 4 — (R400) No. 1:

Is the resistance less than 1 Ω?

Yes — Go to 9.

No — Repair the harness and connector.
Note:
In this case, repair the following item:
- **Open circuit in harness between ECM connector and the leak check valve assembly connector**
- **Poor contact of coupling connector**

9. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Measure the resistance of harness between ECM connector and chassis ground.
   Connector & terminal
   (B135) No. 4 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.
No	Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.

10. CHECK EVAPORATIVE EMISSION CONTROL SYSTEM.

Perform drive cycle I. Ref. to ENGINE (DIAGNOSTICS)(STI)>Drive Cycle>PROCEDURE > DRIVE CYCLE I.

Is DTC P2404 displayed? (Current malfunction)

Yes	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0455. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0455 EVAP SYSTEM (CPC) LEAK DETECTED (LARGE LEAK).

DTC P2419 EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT LOW

DTC detecting condition:

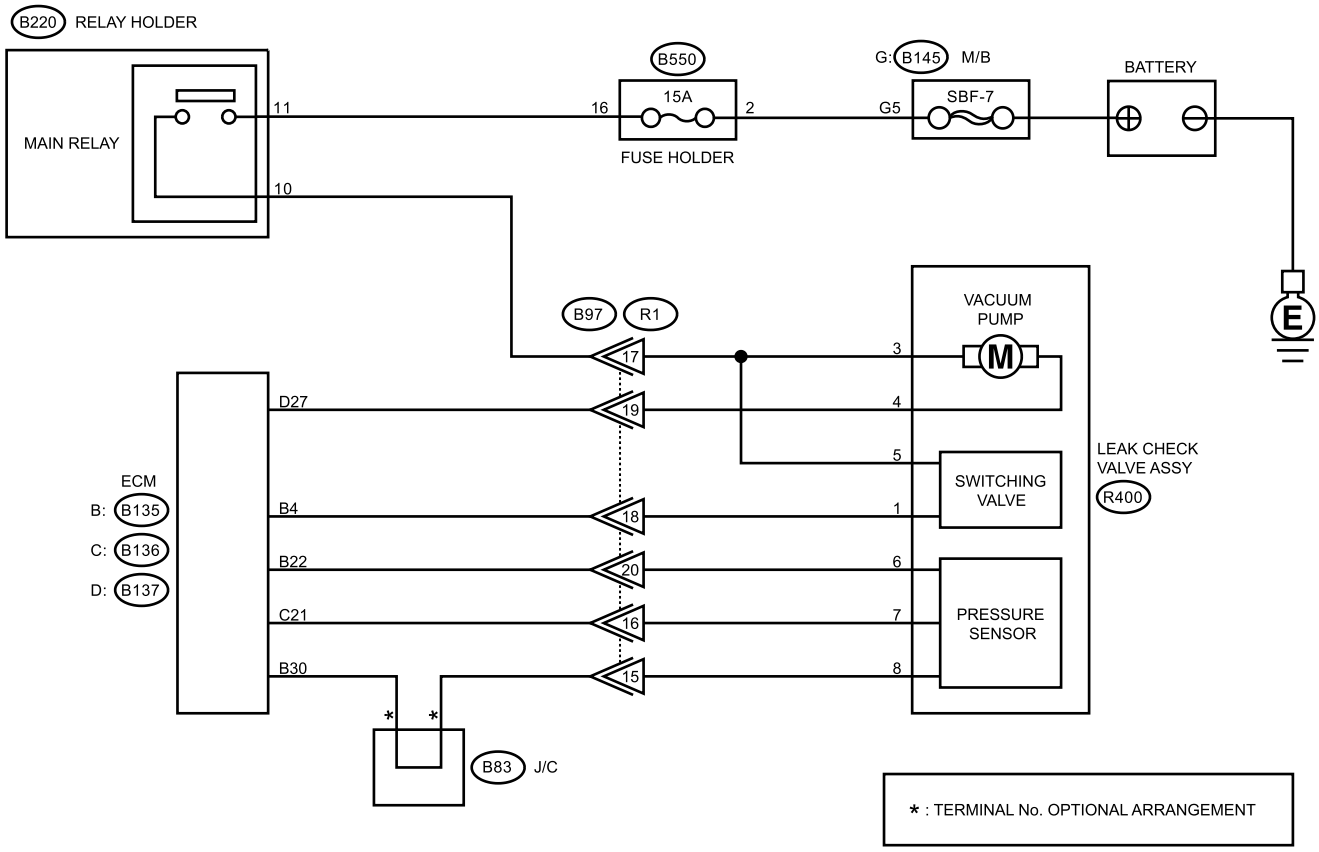
Immediately at fault recognition

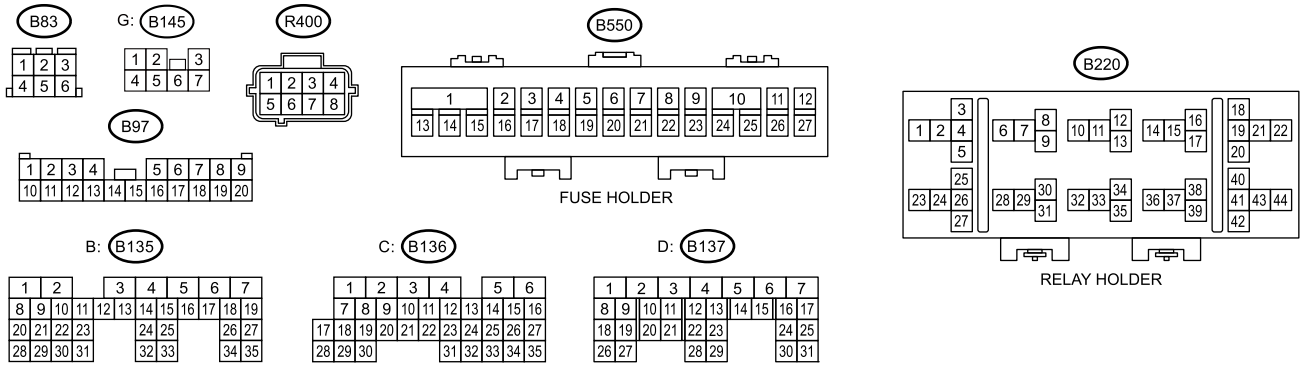
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Wiring diagram:

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MAIN RELAY
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B550
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15A
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FUSE HOLDER
G: B145 M/B
G5
SBF-7
BATTERY
E
B97
R1
17
19
18
20
16
15
D27
B4
B22
C21
B30
ECM
B: B135
C: B136
D: B137
VACUUM PUMP
M
3
4
5
1
6
7
8
SWITCHING VALVE
PRESSURE SENSOR
LEAK CHECK VALVE ASSY
R400
*
B83 J/C
* : TERMINAL No. OPTIONAL ARRANGEMENT


B83
G: B145
R400
B550
B97
FUSE HOLDER
B220
B: B135
C: B136
D: B137
RELAY HOLDER

EN-22318

1. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground.
   Connector & terminal
   (B135) No. 4 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 2.
No	Go to 3.

2. CHECK FOR POOR CONTACT.

Check for poor contact of ECM connector.

Is there poor contact of ECM connector?

Yes	Repair the poor contact of ECM connector.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary open or short circuit of harness or temporary poor contact of connector may be the cause.**

3. CHECK POWER SUPPLY TO LEAK CHECK VALVE ASSEMBLY.

Measure the voltage between the leak check valve assembly connector and engine ground.
Connector & terminal
(R400) No. 5 (+) — Engine ground (−):

Is the voltage 10 V or more?

Yes	Go to 4.
No	Repair the power supply circuit.

4. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the leak check valve assembly.
4. Measure the resistance between leak check valve assembly and chassis ground.
   Connector & terminal
   (R400) No. 1 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.

5. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

Measure the resistance of harness between ECM connector and the leak check valve assembly connector.

Connector & terminal
(B135) No. 4 — (R400) No. 1:

Is the resistance less than 1 Ω?

Yes	Go to 6.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and the leak check valve assembly connector** • **Poor contact of coupling connector**

6. CHECK LEAK CHECK VALVE ASSEMBLY.

Check the switching valve of the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly>INSPECTION > CHECK SWITCHING VALVE.

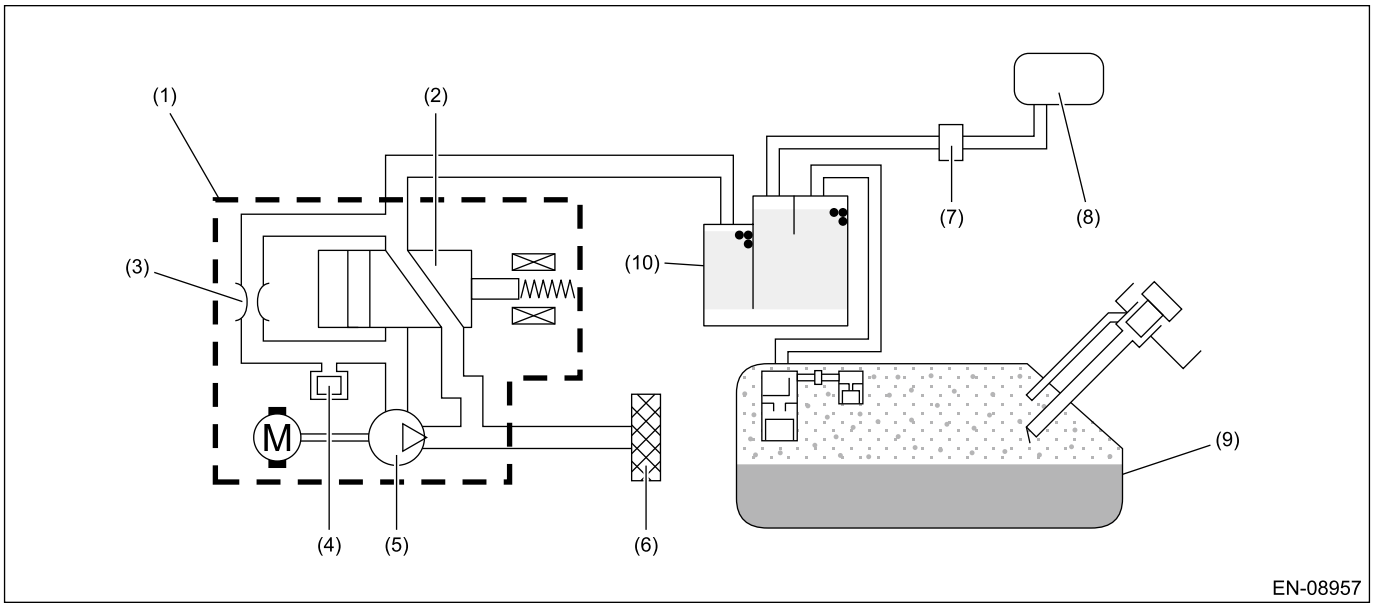
Is the check result OK?

Yes	Repair the poor contact in the leak check valve assembly connector.
No	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit in Evaporative Leak Check Module switching valve.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Evaporative Leak Check Module switching valve drive signal	OFF

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	≤ Battery voltage × 0.34 V

time needed for diagnosis: 2500ms

Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2420 EVAP SYSTEM SWITCHING VALVE CONTROL CIRCUIT HIGH

DTC detecting condition:

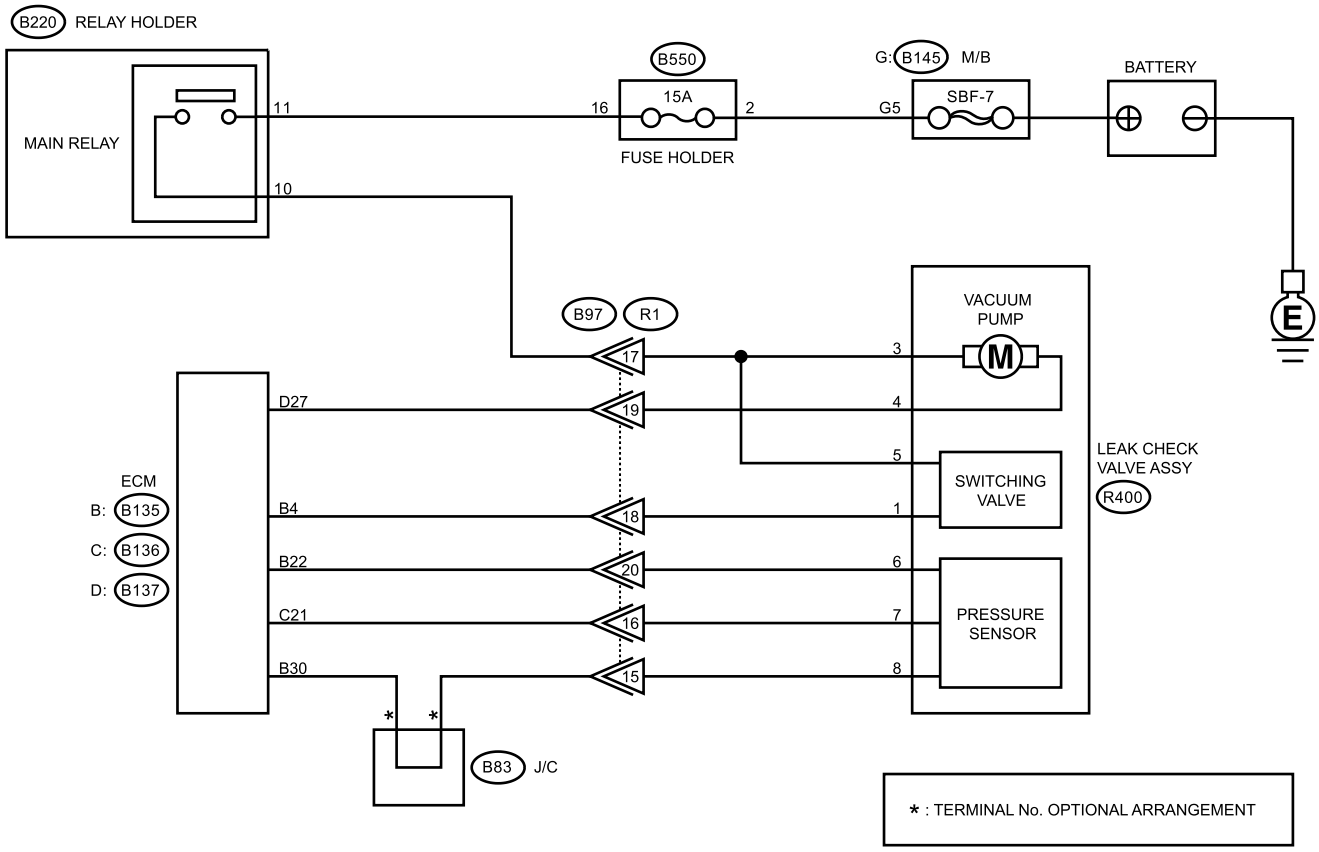
Immediately at fault recognition

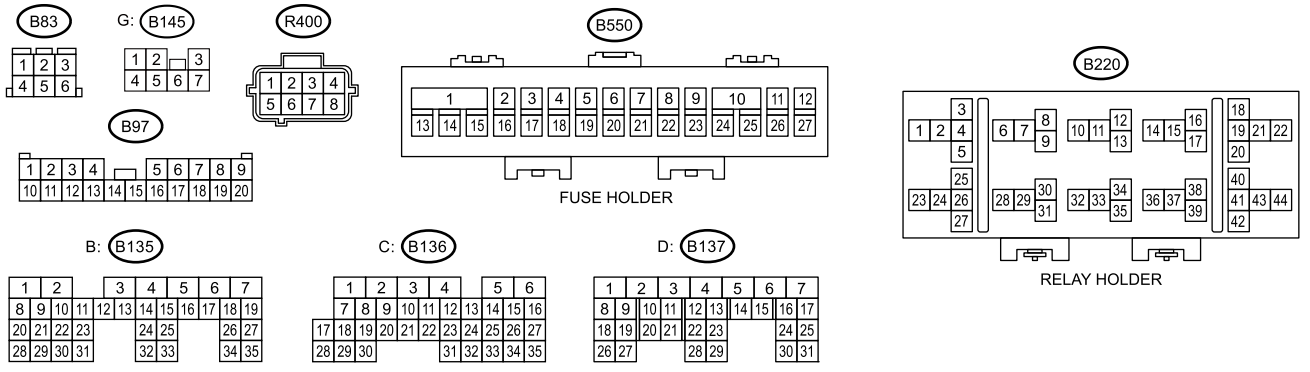
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B220 RELAY HOLDER
MAIN RELAY
11
10
B550
16
15A
2
FUSE HOLDER
G: B145 M/B
G5
SBF-7
BATTERY
E
B97
R1
17
19
18
20
16
15
D27
B4
B22
C21
B30
ECM
B: B135
C: B136
D: B137
VACUUM PUMP
M
3
4
5
1
6
7
8
SWITCHING VALVE
PRESSURE SENSOR
LEAK CHECK VALVE ASSY
R400
*
B83 J/C
* : TERMINAL No. OPTIONAL ARRANGEMENT


B83
G: B145
R400
B550
B97
FUSE HOLDER
B220
B: B135
C: B136
D: B137
RELAY HOLDER

EN-22318

1. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the leak check valve assembly.
3. Turn the ignition switch to ON.
4. Measure the voltage between leak check valve assembly and chassis ground.
   Connector & terminal
   (R400) No. 1 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Repair the short circuit to power in harness between ECM connector and leak check valve assembly connector.
No	Go to 2.

2. CHECK LEAK CHECK VALVE ASSEMBLY.

1. Turn the ignition switch to OFF.
2. Check the switching valve of the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly>INSPECTION > CHECK SWITCHING VALVE.

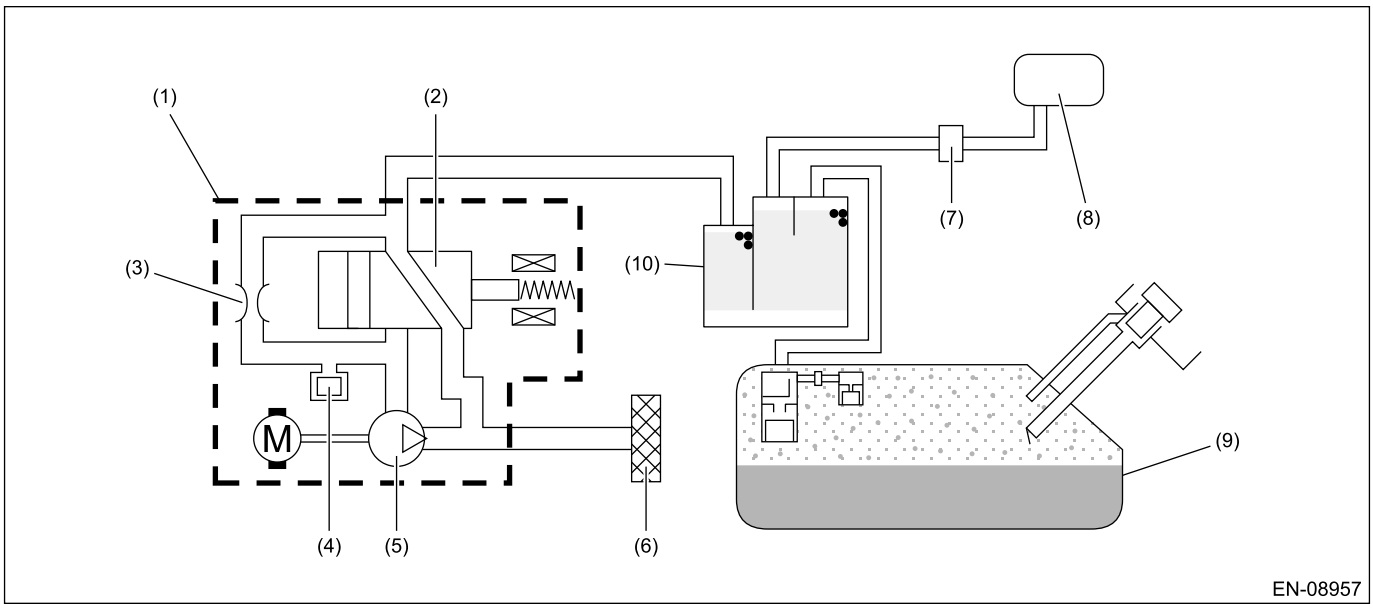
Is the check result OK?

Yes	Repair the poor contact in the leak check valve assembly connector.
No	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit in Evaporative Leak Check Module switching valve.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Evaporative Leak Check Module switching valve drive signal	ON

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after the enable conditions have been established.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output current	≥ 12 A

time needed for diagnosis: 2500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2431 SECONDARY AIR SYSTEM AIR FLOW/PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE BANK 1

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is DTC other than P2431 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK CURRENT DATA.

1. Turn the ignition switch to ON (engine OFF).
2. Using the Subaru Select Monitor, read the values in «Sec. Air Piping Pressure», «Mani. Absolute Pressure» and «Atmosphere Pressure», and compare them with actual atmospheric pressure.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Does the displayed value differ from the actual atmospheric pressure by 200 mmHg (27 kPa, 8 inHg, 3.9 psig) or more?

Yes	Replace the secondary air combination valve (with built-in pressure sensor). Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

1. OUTLINE OF DIAGNOSIS

Detect the malfunction of secondary air pressure sensor output property.
Judge as NG when the secondary air pressure sensor output is largely different from the intake manifold pressure at engine start.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Elapsed time after ignition switch to OFF	< 60000ms
Soaking time	≥ 60s
After secondary air system stops	≥ 3000ms

3. GENERAL DRIVING CYCLE

Perform the diagnosis with ignition switch ON.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
|Secondary air pipe pressure − Intake manifold pressure|	> 7.9kPa (59.44mmHg, 2.3inHg)

Time needed for diagnosis: Less than 1 second
Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P2432 SECONDARY AIR SYSTEM AIR FLOW/PRESSURE SENSOR CIRCUIT LOW BANK 1

DTC detecting condition:

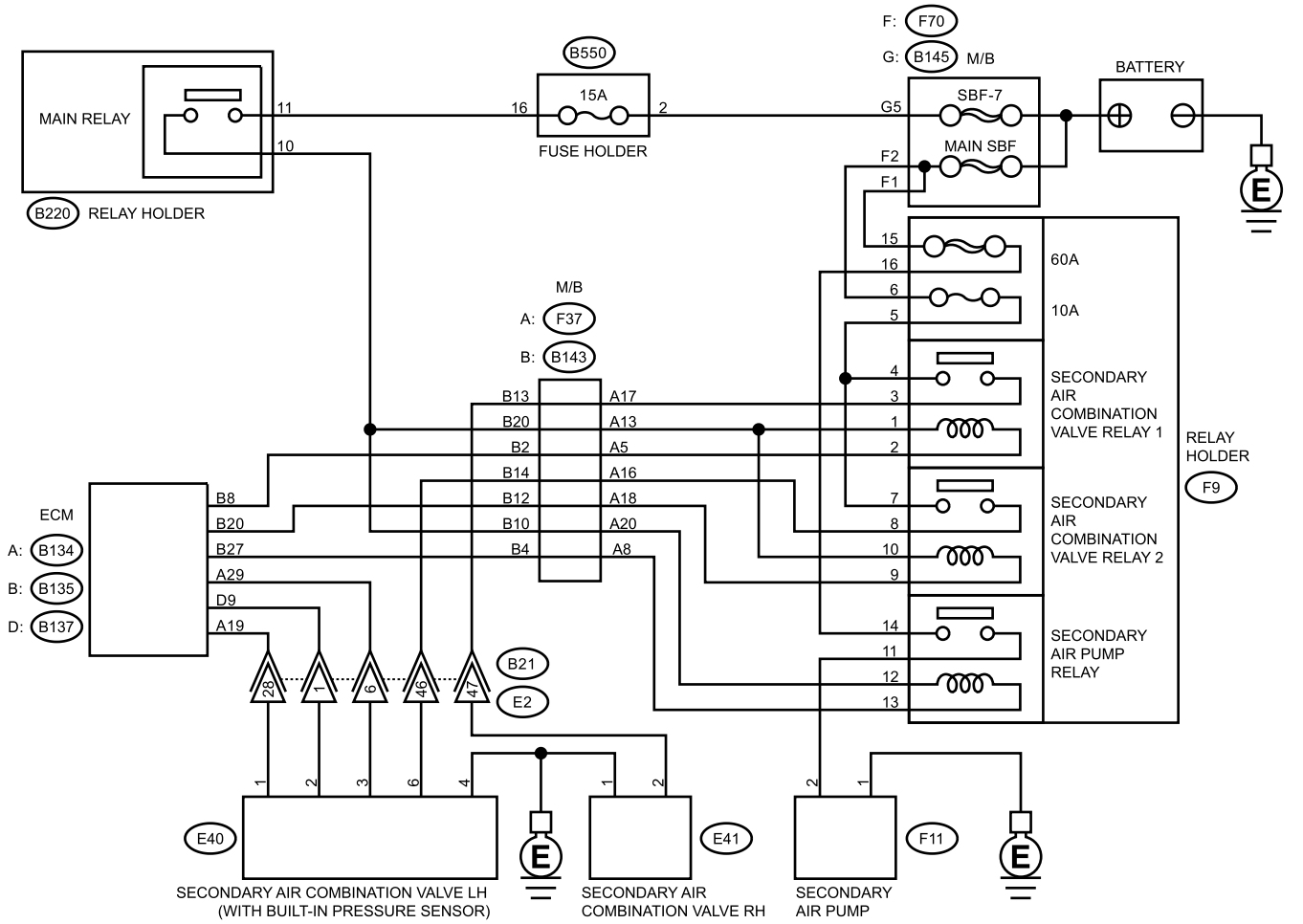
Immediately at fault recognition

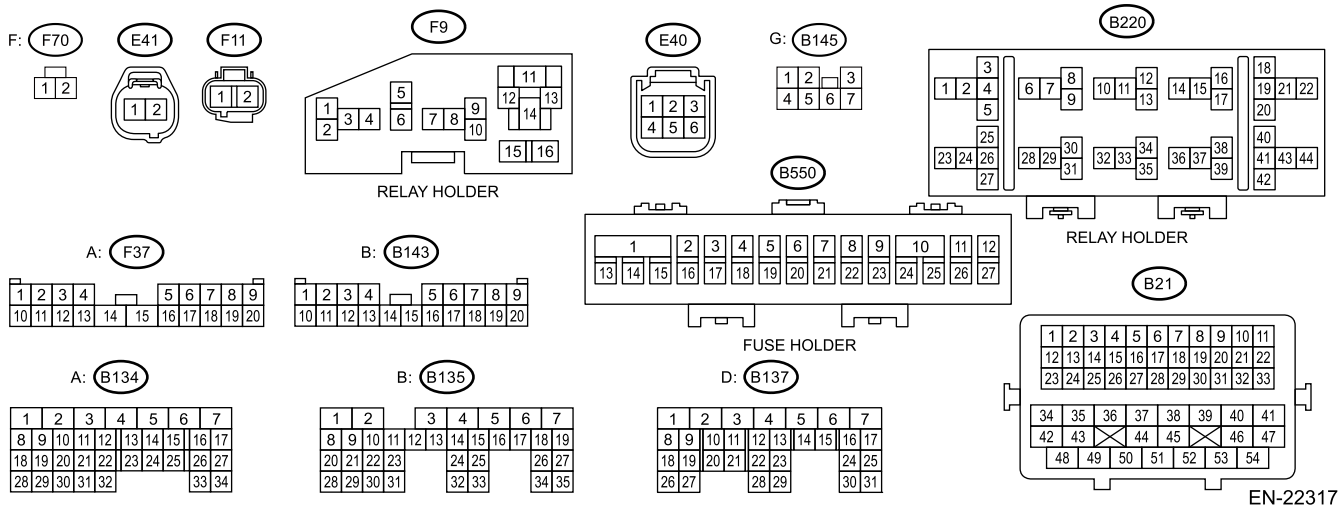
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


F: F70
G: B145 M/B
B550
15A
FUSE HOLDER
BATTERY
MAIN RELAY
11
10
16
2
G5
SBF-7
MAIN SBF
F2
F1
B220 RELAY HOLDER
M/B
A: F37
B: B143
60A
10A
SECONDARY AIR COMBINATION VALVE RELAY 1
SECONDARY AIR COMBINATION VALVE RELAY 2
SECONDARY AIR PUMP RELAY
RELAY HOLDER
F9
ECM
A: B134
B: B135
D: B137
B8
B20
B27
A29
D9
A19
B13
B20
B2
B14
B12
B10
B4
A17
A13
A5
A16
A18
A20
A8
28
1
6
46
47
B21
E2
E40
E41
F11
SECONDARY AIR COMBINATION VALVE LH (WITH BUILT-IN PRESSURE SENSOR)
SECONDARY AIR COMBINATION VALVE RH
SECONDARY AIR PUMP


F: F70
E41
F11
F9
RELAY HOLDER
E40
G: B145
B220
RELAY HOLDER
B550
FUSE HOLDER
A: F37
B: B143
A: B134
B: B135
D: B137
B21
EN-22317

1. CHECK CURRENT DATA.

1. Turn the ignition switch to ON.
2. Read the value of «Sec. Air Piping Pressure» using Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «Sec. Air Piping Pressure» less than 53.3 kPa (400 mmHg, 15.8 inHg)?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK POWER SUPPLY OF SECONDARY AIR COMBINATION VALVE.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the secondary air combination valve LH.
3. Turn the ignition switch to ON.
4. Measure the voltage between the secondary air combination valve LH connector and chassis ground.
   Connector & terminal
   (E40) No. 1 (+) — Chassis ground (−):

Is the voltage 4.5 V or more?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and secondary air combination valve LH connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance of harness between ECM connector and secondary air combination valve LH connector.
   Connector & terminal
   (B137) No. 9 — (E40) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and secondary air combination valve LH connector** • **Poor contact of coupling connector**

4. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE CONNECTOR.

Measure the resistance between ECM connector and chassis ground.

Connector & terminal

(B137) No. 9 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 5.
No	Repair the ground short circuit in harness between ECM connector and secondary air combination valve LH connector.

5. CHECK FOR POOR CONTACT.

Check for poor contact of the ECM and secondary air combination valve LH connector.

Is there poor contact of the ECM or secondary air combination valve LH connector?

Yes	Repair the poor contact of the ECM or secondary air combination valve LH connector.
No	Replace the secondary air combination valve LH. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve.

1. OUTLINE OF DIAGNOSIS

Judge as NG if out of specification.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< 0.573V

time needed for diagnosis: 500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2433 SECONDARY AIR SYSTEM AIR FLOW/PRESSURE SENSOR CIRCUIT HIGH BANK 1

DTC detecting condition:

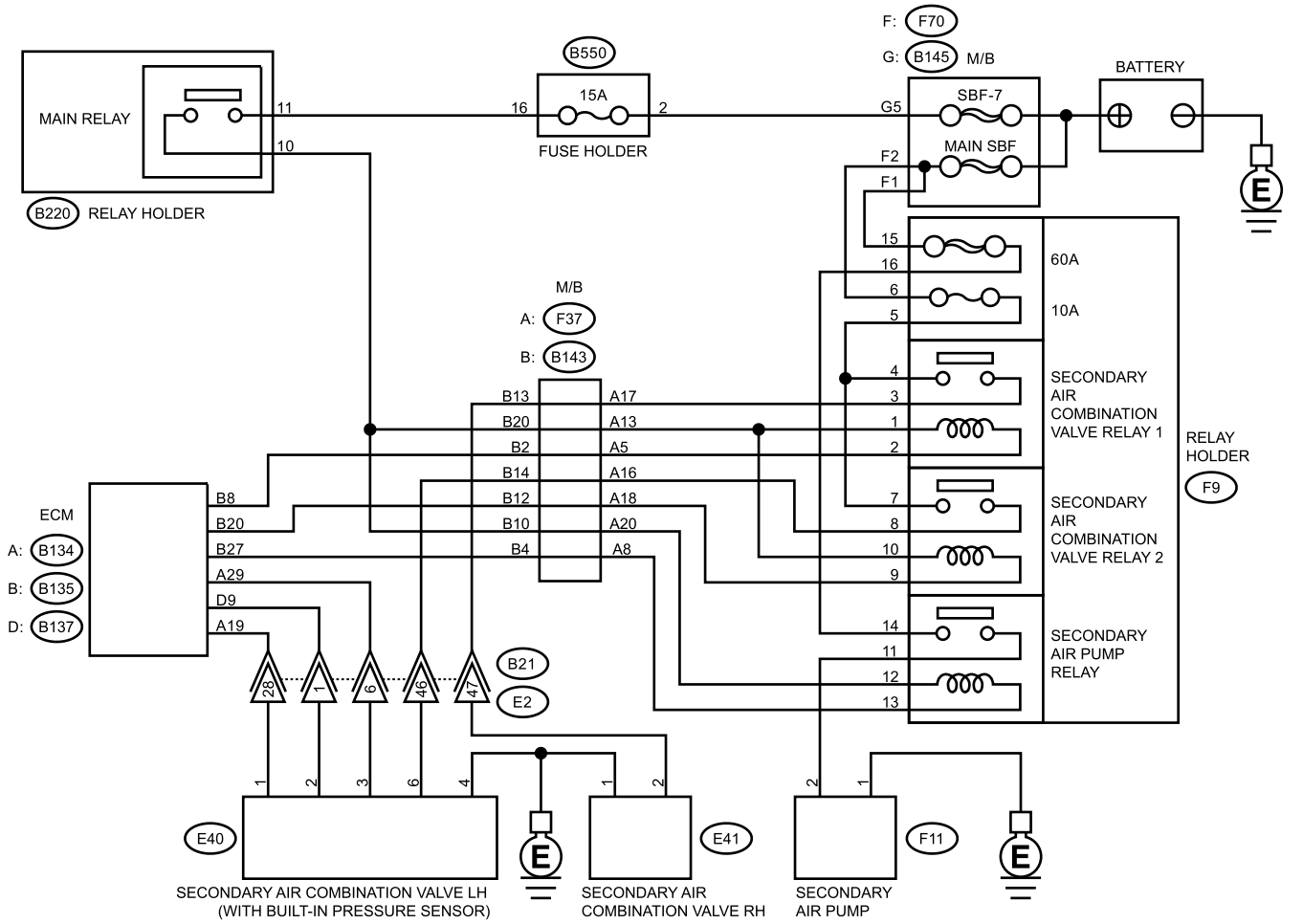
Immediately at fault recognition

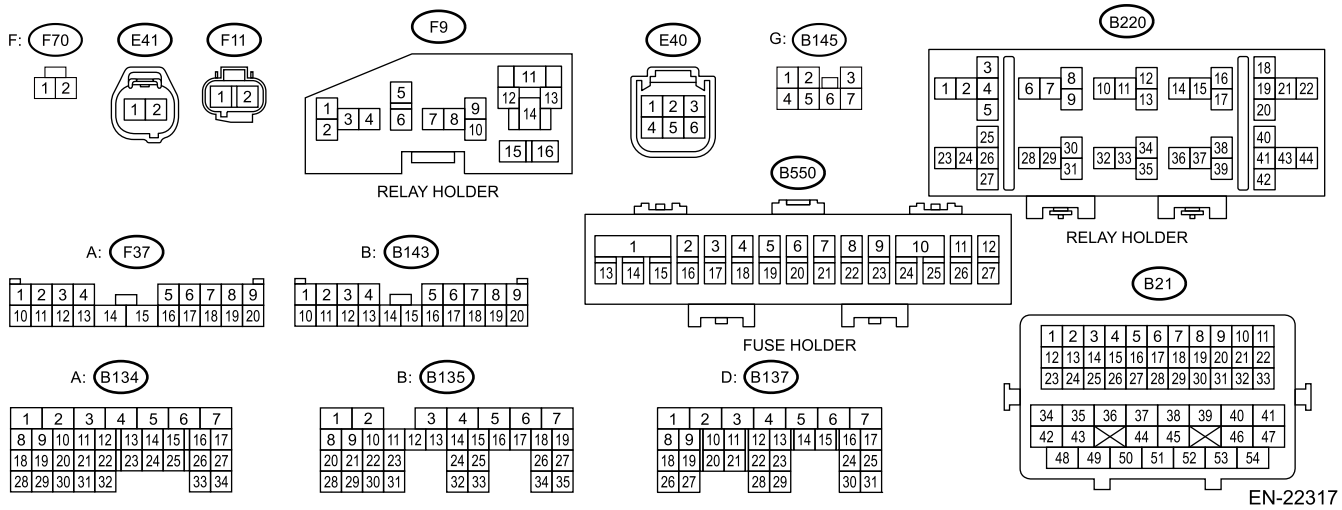
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


F: F70
G: B145 M/B
B550
15A
FUSE HOLDER
BATTERY
MAIN RELAY
11
10
16
2
G5
SBF-7
MAIN SBF
F2
F1
B220 RELAY HOLDER
M/B
A: F37
B: B143
60A
10A
SECONDARY AIR COMBINATION VALVE RELAY 1
SECONDARY AIR COMBINATION VALVE RELAY 2
SECONDARY AIR PUMP RELAY
RELAY HOLDER
F9
ECM
A: B134
B: B135
D: B137
B8
B20
B27
A29
D9
A19
B13
B20
B2
B14
B12
B10
B4
A17
A13
A5
A16
A18
A20
A8
28
1
6
46
47
B21
E2
E40
E41
F11
SECONDARY AIR COMBINATION VALVE LH (WITH BUILT-IN PRESSURE SENSOR)
SECONDARY AIR COMBINATION VALVE RH
SECONDARY AIR PUMP


F: F70
E41
F11
F9
RELAY HOLDER
E40
G: B145
B220
RELAY HOLDER
B550
FUSE HOLDER
A: F37
B: B143
A: B134
B: B135
D: B137
B21
EN-22317

1. CHECK CURRENT DATA.

1. Turn the ignition switch to ON.
2. Read the value of «Sec. Air Piping Pressure» using Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «Sec. Air Piping Pressure» 133.3 kPa (1,000 mmHg, 39.4 inHg) or more?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the secondary air combination valve LH.
3. Turn the ignition switch to ON.
4. Read the value of «Sec. Air Piping Pressure» using Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the value of «Sec. Air Piping Pressure» 133.3 kPa (1,000 mmHg, 39.4 inHg) or more?

Yes	Repair the short circuit to power in harness between ECM connector and secondary air combination valve LH connector.
No	Go to 3.

3. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE CONNECTOR.

1. Turn the ignition switch to OFF.
2. Measure the resistance of the harness between the secondary air combination valve LH connector and engine ground.
   Connector & terminal
   (E40) No. 3 — Engine ground:

Is the resistance less than 5 Ω?

Yes	Go to 4.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and secondary air combination valve LH connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

4. CHECK FOR POOR CONTACT.

Check for poor contact of the secondary air combination valve LH connector.

Is there poor contact of the secondary air combination valve LH connector?

Yes	Repair the poor contact of the secondary air combination valve LH connector.
No	Replace the secondary air combination valve LH. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve.

1. OUTLINE OF DIAGNOSIS

Judge as NG if out of specification.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
None	

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	> 4.916V

time needed for diagnosis: 500ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2440 SECONDARY AIR SYSTEM SWITCHING VALVE STUCK OPEN BANK 1

DTC detecting condition:

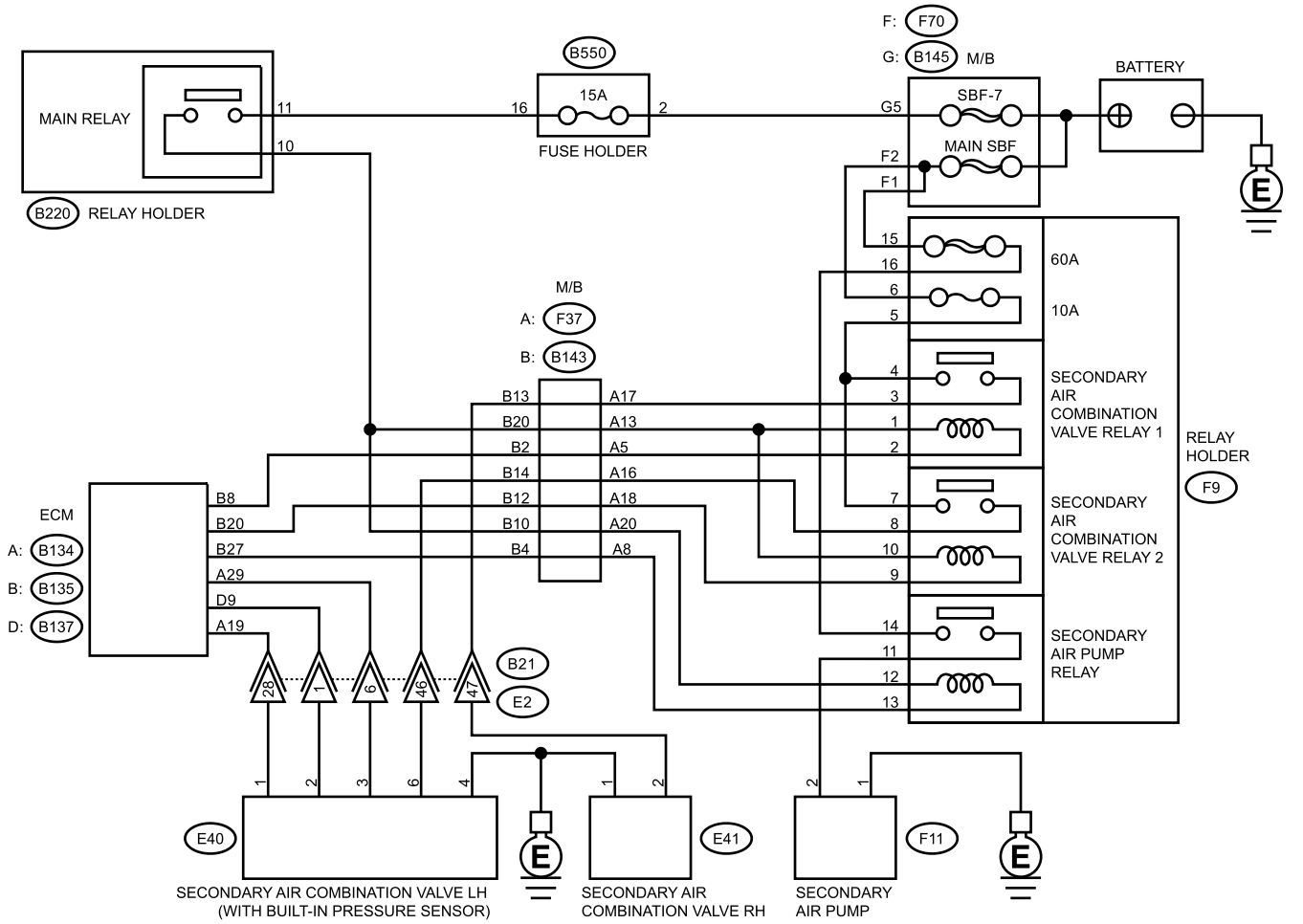
Detected when two consecutive driving cycles with fault occur.

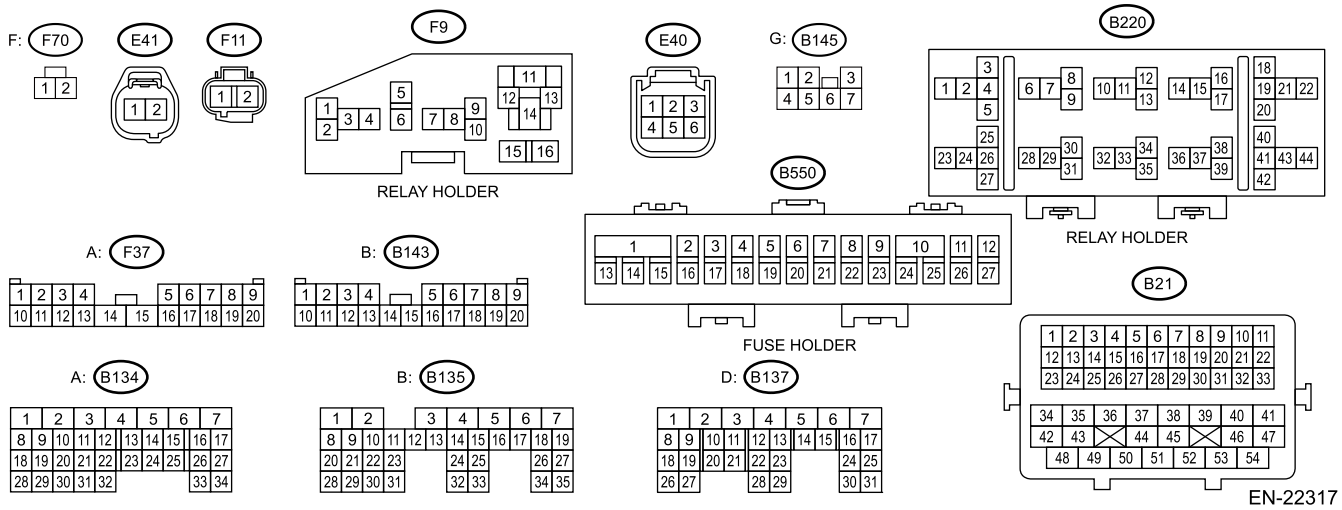
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


F: F70
G: B145 M/B
B550
15A
FUSE HOLDER
BATTERY
MAIN RELAY
11
10
16
2
G5
SBF-7
MAIN SBF
F2
F1
B220 RELAY HOLDER
M/B
A: F37
B: B143
60A
10A
SECONDARY AIR COMBINATION VALVE RELAY 1
SECONDARY AIR COMBINATION VALVE RELAY 2
SECONDARY AIR PUMP RELAY
RELAY HOLDER
F9
ECM
A: B134
B: B135
D: B137
B8
B20
B27
A29
D9
A19
B13
B20
B2
B14
B12
B10
B4
A17
A13
A5
A16
A18
A20
A8
28
1
6
46
47
B21
E2
E40
E41
F11
SECONDARY AIR COMBINATION VALVE LH (WITH BUILT-IN PRESSURE SENSOR)
SECONDARY AIR COMBINATION VALVE RH
SECONDARY AIR PUMP


F: F70
E41
F11
F9
RELAY HOLDER
E40
G: B145
B220
RELAY HOLDER
B550
FUSE HOLDER
A: F37
B: B143
A: B134
B: B135
D: B137
B21
EN-22317

1. CHECK SECONDARY AIR COMBINATION VALVE FUSE.

Check if the secondary air combination valve fuse (10 A) is blown out.

Is the fuse blown out?

Yes	Go to 2.
No	Go to 3.

2. CHECK HARNESS BETWEEN FUSE BOX AND SECONDARY AIR COMBINATION VALVE RH CONNECTOR.

1. Remove the secondary air combination valve fuse (10 A) from the fuse box.
2. Disconnect the connector from the secondary air combination valve RH.
3. Measure the resistance between the secondary air combination valve fuse and secondary air combination valve RH connector, and chassis ground.

Connector & terminal

(F9) No. 5 — Chassis ground:

(E41) No. 2 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Replace the fuse with a new part, and connect the secondary air combination valve RH connector. Go to 3.
No	Repair the short circuit to ground in harness between the fuse box and the secondary air combination valve RH connector.

3. CHECK SECONDARY AIR COMBINATION VALVE RH OPERATION.

1. Install the delivery mode fuse.
2. Turn the ignition switch to ON.
3. Perform operation check for the secondary air combination valve RH using the Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(STI)>Active Test.

Does the secondary air combination valve RH repeatedly switch to ON and OFF?

Yes	Go to 4.
No	Go to 6.

4. CHECK DUCT BETWEEN SECONDARY AIR PUMP AND SECONDARY AIR COMBINATION VALVE RH.

Check the duct between the secondary air pump and secondary air combination valve RH.

Is there damage, clog or disconnection of the duct?

Yes	Replace, clean or connect the duct.
No	Go to 5.

5. CHECK PIPE BETWEEN SECONDARY AIR COMBINATION VALVE RH AND CYLINDER HEAD.

Check the pipe between the secondary air combination valve RH and cylinder head.

Is there damage, clog or disconnection of the pipe?

Yes	Replace, clean or connect the pipe.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

6. CHECK POWER SUPPLY TO SECONDARY AIR COMBINATION VALVE RH.

1. Disconnect the connector from the secondary air combination valve RH.
2. In the condition of step 3, measure the voltage between secondary air combination valve RH connector and chassis ground.
   Connector & terminal
   (E41) No. 2 (+) — Chassis ground (−):

Does the voltage repeatedly change between 10 V and 0 V?

Yes	Replace the secondary air combination valve RH. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve.
No	Go to 7.

7. CHECK HARNESS BETWEEN SECONDARY AIR COMBINATION VALVE RH AND CHASSIS GROUND.

Measure the resistance between the secondary air combination valve RH connector and chassis ground.

Connector & terminal

(E41) No. 1 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 8.
No	Repair the open circuit in harness between secondary air combination valve RH connector and chassis ground.

8. CHECK HARNESS BETWEEN SECONDARY AIR COMBINATION VALVE RELAY 2 AND SECONDARY AIR COMBINATION VALVE RH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Remove the secondary air combination valve relay 2 from the relay box.
3. Measure the resistance of the harness between secondary air combination valve relay 2 connector and secondary air combination valve RH connector.

   Connector & terminal

   (F9) No. 8 — (E41) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 9.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between secondary air combination valve relay 2 connector and secondary air combination valve RH connector** • **Poor contact of coupling connector**

9. CHECK SECONDARY AIR COMBINATION VALVE RELAY 2.

1. Connect the battery to terminals No. 9 and No. 10 of the secondary air combination valve relay 2.
2. Measure the resistance between the secondary air combination valve relay 2 terminals.
   Terminals
   No. 7 — No. 8:

Is the resistance less than 1 Ω?

Yes	Go to 10.
No	Replace the secondary air combination valve relay 2. Ref. to ENGINE (DIAGNOSTICS)(STI)>Electrical Component Location.

10. CHECK SECONDARY AIR COMBINATION VALVE RELAY 2.

Measure the resistance between the secondary air combination valve relay 2 terminals with the battery disconnected.

Terminals

No. 7 — No. 8:

Is the resistance 1 MΩ or more?

Yes	Go to 11.
No	Replace the secondary air combination valve relay 2. Ref. to ENGINE (DIAGNOSTICS)(STI)>Electrical Component Location.

11. CHECK SECONDARY AIR COMBINATION VALVE RELAY 2 POWER SUPPLY.

1. Turn the ignition switch to ON.
2. Measure the voltage between the secondary air combination valve relay 2 connector and chassis ground.
   Connector & terminal
   (F9) No. 7 (+) — Chassis ground (−):
   (F9) No. 10 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 12.
No	Repair the open or short to ground in the power supply circuit.

12. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE RELAY 2 CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the ECM connector.
3. Measure the resistance of harness between ECM connector and secondary air combination valve relay 2 connector.
   Connector & terminal
   (B135) No. 20 — (F9) No. 9:

Is the resistance less than 1 Ω?

Yes	Go to 13.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and secondary air combination valve relay 2 connector** • **Poor contact of coupling connector**

13. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE RELAY 2 CONNECTOR.

Measure the resistance between the secondary air combination valve relay 2 connector and chassis ground.

Connector & terminal

(F9) No. 9 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Repair the poor contact of ECM connector.
No	Repair the short circuit to ground in harness between ECM connector and secondary air combination valve relay 2 connector.

1. OUTLINE OF DIAGNOSIS

Note:

For the detection standard, refer to DTC P0410. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0410 SECONDARY AIR SYSTEM.

DTC P2441 SECONDARY AIR SYSTEM SWITCHING VALVE STUCK CLOSED BANK 1

Note:
For the diagnostic procedure, refer to DTC P2440. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2440 SECONDARY AIR SYSTEM SWITCHING VALVE STUCK OPEN BANK 1.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0410. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0410 SECONDARY AIR SYSTEM.

DTC P2442 SECONDARY AIR SYSTEM SWITCHING VALVE STUCK OPEN BANK 2

DTC detecting condition:

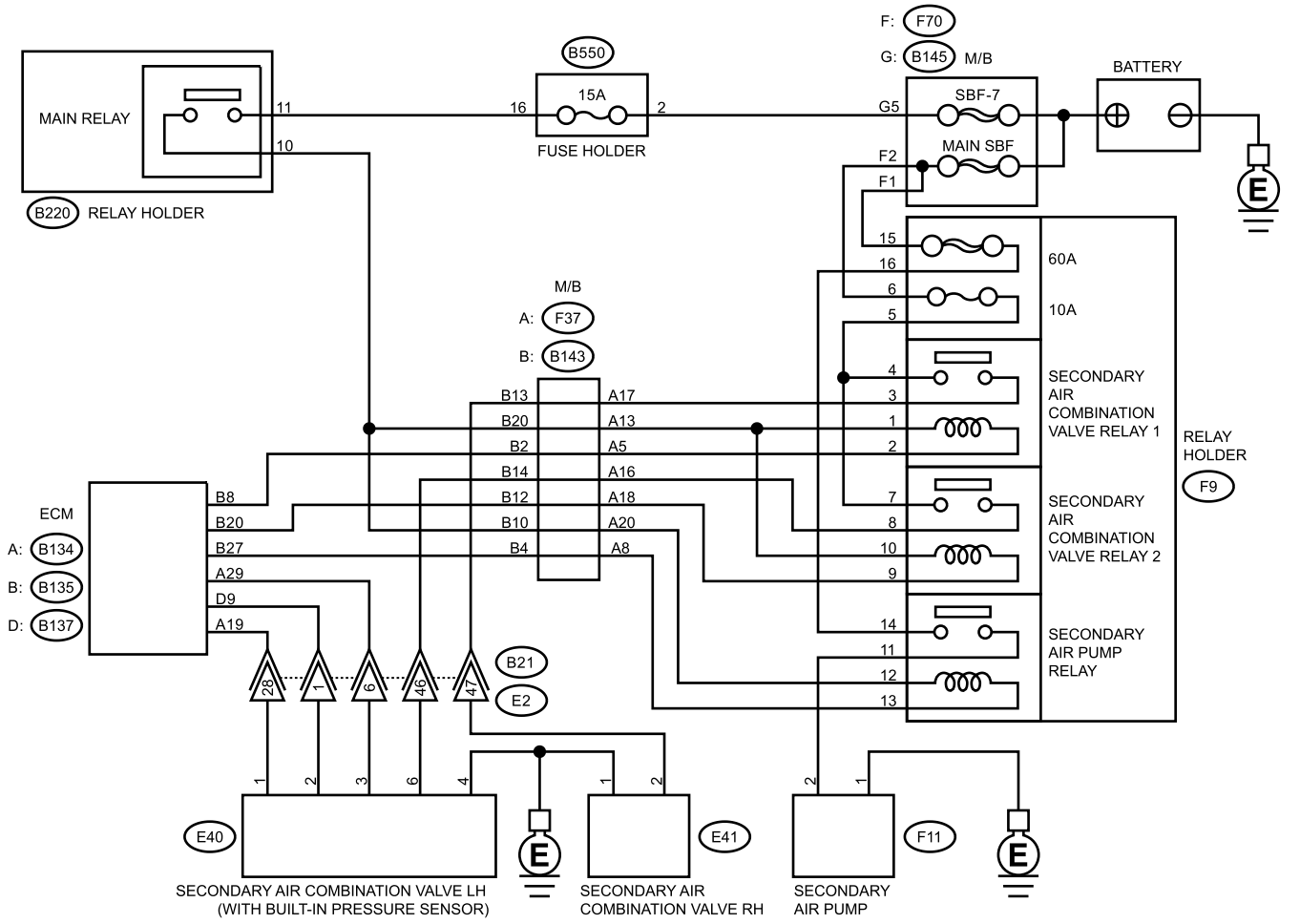
Detected when two consecutive driving cycles with fault occur.

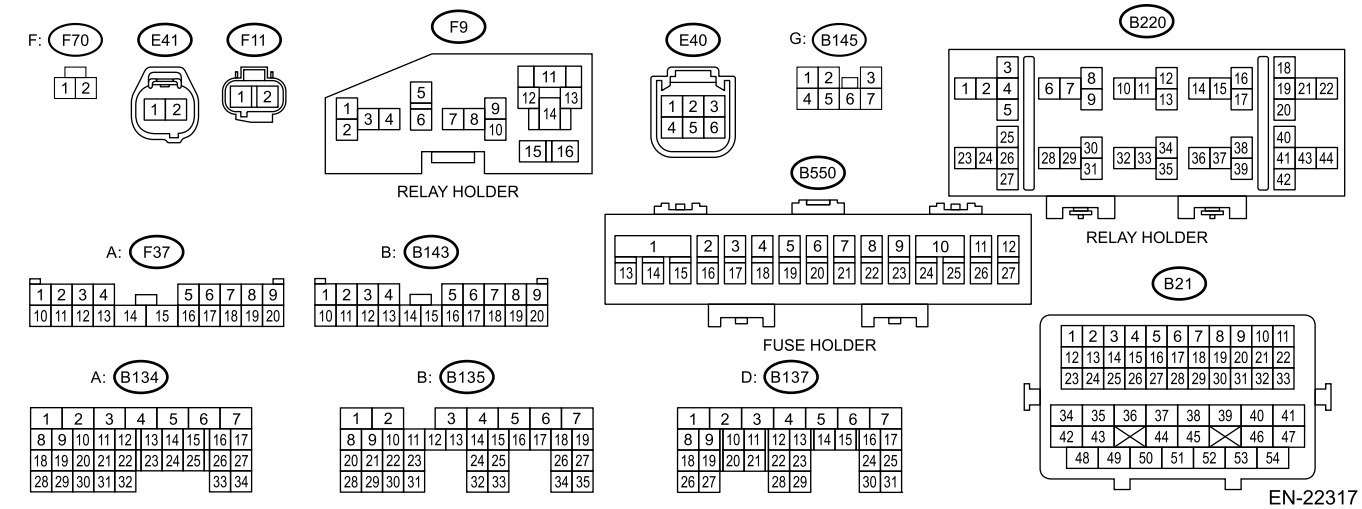
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.





1. CHECK SECONDARY AIR COMBINATION VALVE FUSE.

Check if the secondary air combination valve fuse (10 A) is blown out.

Is the fuse blown out?

Yes — Go to 2.

No — Go to 3.

2. CHECK HARNESS BETWEEN FUSE BOX AND SECONDARY AIR COMBINATION VALVE LH CONNECTOR.

1. Remove the secondary air combination valve fuse (10 A) from the fuse box.
2. Disconnect the connector from the secondary air combination valve LH.
3. Measure the resistance between the secondary air combination valve fuse and secondary air combination valve LH connector, and chassis ground.

Connector & terminal

(F9) No. 5 — Chassis ground:

(E40) No. 6 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes — Replace the fuse with a new part, and connect the secondary air combination valve LH connector.
Go to 3.

No — Repair the ground short circuit of harness between the fuse box and the secondary air combination valve LH connector.

3. CHECK SECONDARY AIR COMBINATION VALVE LH OPERATION.

1. Install the delivery mode fuse.
2. Turn the ignition switch to ON.
3. Perform operation check for the secondary air combination valve LH using the Subaru Select Monitor.
   Note:
   For detailed operation procedures, refer to the "Active Test". Ref. to ENGINE (DIAGNOSTICS)(STI)>Active Test.

Does the secondary air combination valve LH repeatedly switch to ON and OFF?

Yes	Go to 4.
No	Go to 6.

4. CHECK DUCT BETWEEN SECONDARY AIR PUMP AND SECONDARY AIR COMBINATION VALVE LH.

Check the duct between the secondary air pump and secondary air combination valve LH.

Is there damage, clog or disconnection of the duct?

Yes	Replace, clean or connect the duct.
No	Go to 5.

5. CHECK PIPE BETWEEN SECONDARY AIR COMBINATION VALVE LH AND CYLINDER HEAD.

Check the pipe between the secondary air combination valve LH and cylinder head.

Is there damage, clog or disconnection of the pipe?

Yes	Replace, clean or connect the pipe.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

6. CHECK POWER SUPPLY TO SECONDARY AIR COMBINATION VALVE LH.

1. Disconnect the connector from the secondary air combination valve LH.
2. In the condition of step 3, measure the voltage between secondary air combination valve LH connector and chassis ground.
   Connector & terminal
   (E40) No. 6 (+) — Chassis ground (−):

Does the voltage repeatedly change between 10 V and 0 V?

Yes	Replace the secondary air combination valve LH. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve.
No	Go to 7.

7. CHECK HARNESS BETWEEN SECONDARY AIR COMBINATION VALVE LH AND CHASSIS GROUND.

Measure the resistance between the secondary air combination valve LH connector and chassis ground.

Connector & terminal

(E40) No. 4 — Chassis ground:

Is the resistance less than 5 Ω?

Yes	Go to 8.
No	Repair the open circuit in harness between secondary air combination valve LH connector and chassis ground.

8. CHECK HARNESS BETWEEN SECONDARY AIR COMBINATION VALVE RELAY 1 AND SECONDARY AIR COMBINATION VALVE LH CONNECTOR.

1. Turn the ignition switch to OFF.
2. Remove the secondary air combination valve relay 1 from the relay box.
3. Measure the resistance of the harness between the secondary air combination valve relay 1 and secondary air combination valve LH connector.

   Connector & terminal

   (F9) No. 3 — (E40) No. 6:

Is the resistance less than 1 Ω?

Yes	Go to 9.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between secondary air combination valve relay 1 connector and secondary air combination valve LH connector** • **Poor contact of coupling connector**

9. CHECK SECONDARY AIR COMBINATION VALVE RELAY 1.

1. Connect the battery to terminals No. 1 and No. 2 of the secondary air combination valve relay 1.
2. Measure the resistance between the secondary air combination valve relay 1 terminals.
   Terminals
   No. 3 — No. 4:

Is the resistance less than 1 Ω?

Yes	Go to 10.
No	Replace the secondary air combination valve relay 1. Ref. to ENGINE (DIAGNOSTICS)(STI)>Electrical Component Location.

10. CHECK SECONDARY AIR COMBINATION VALVE RELAY 1.

Measure the resistance between the secondary air combination valve relay 1 terminals with the battery disconnected.

Terminals

No. 3 — No. 4:

Is the resistance 1 MΩ or more?

Yes	Go to 11.
No	Replace the secondary air combination valve relay 1. Ref. to ENGINE (DIAGNOSTICS)(STI)>Electrical Component Location.

11. CHECK SECONDARY AIR COMBINATION VALVE RELAY 1 POWER SUPPLY.

1. Turn the ignition switch to ON.
2. Measure the voltage between the secondary air combination valve relay 1 connector and chassis ground.
   Connector & terminal
   (F9) No. 4 (+) — Chassis ground (−):
   (F9) No. 1 (+) — Chassis ground (−):

Is the voltage 10 V or more?

Yes	Go to 12.
No	Repair the open or short to ground in the power supply circuit.

12. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE RELAY 1 CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the ECM connector.
3. Measure the resistance of harness between ECM connector and secondary air combination valve relay 1 connector.
   Connector & terminal
   (B135) No. 8 — (F9) No. 2:

Is the resistance less than 1 Ω?

Yes	Go to 13.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and secondary air combination valve relay 1 connector** • **Poor contact of coupling connector**

13. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR COMBINATION VALVE RELAY 1 CONNECTOR.

Measure the resistance between the secondary air combination valve relay 1 connector and chassis ground.

Connector & terminal

(F9) No. 2 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Repair the poor contact of ECM connector.
No	Repair the short circuit to ground in harness between ECM connector and secondary air combination valve relay 1 connector.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0410. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0410 SECONDARY AIR SYSTEM.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P2443 SECONDARY AIR SYSTEM SWITCHING VALVE STUCK CLOSED BANK 2

Note:
For the diagnostic procedure, refer to DTC P2442. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P2442 SECONDARY AIR SYSTEM SWITCHING VALVE STUCK OPEN BANK 2.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC P0410. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC P0410 SECONDARY AIR SYSTEM.

DTC P2444 SECONDARY AIR SYSTEM PUMP STUCK ON BANK 1

DTC detecting condition:

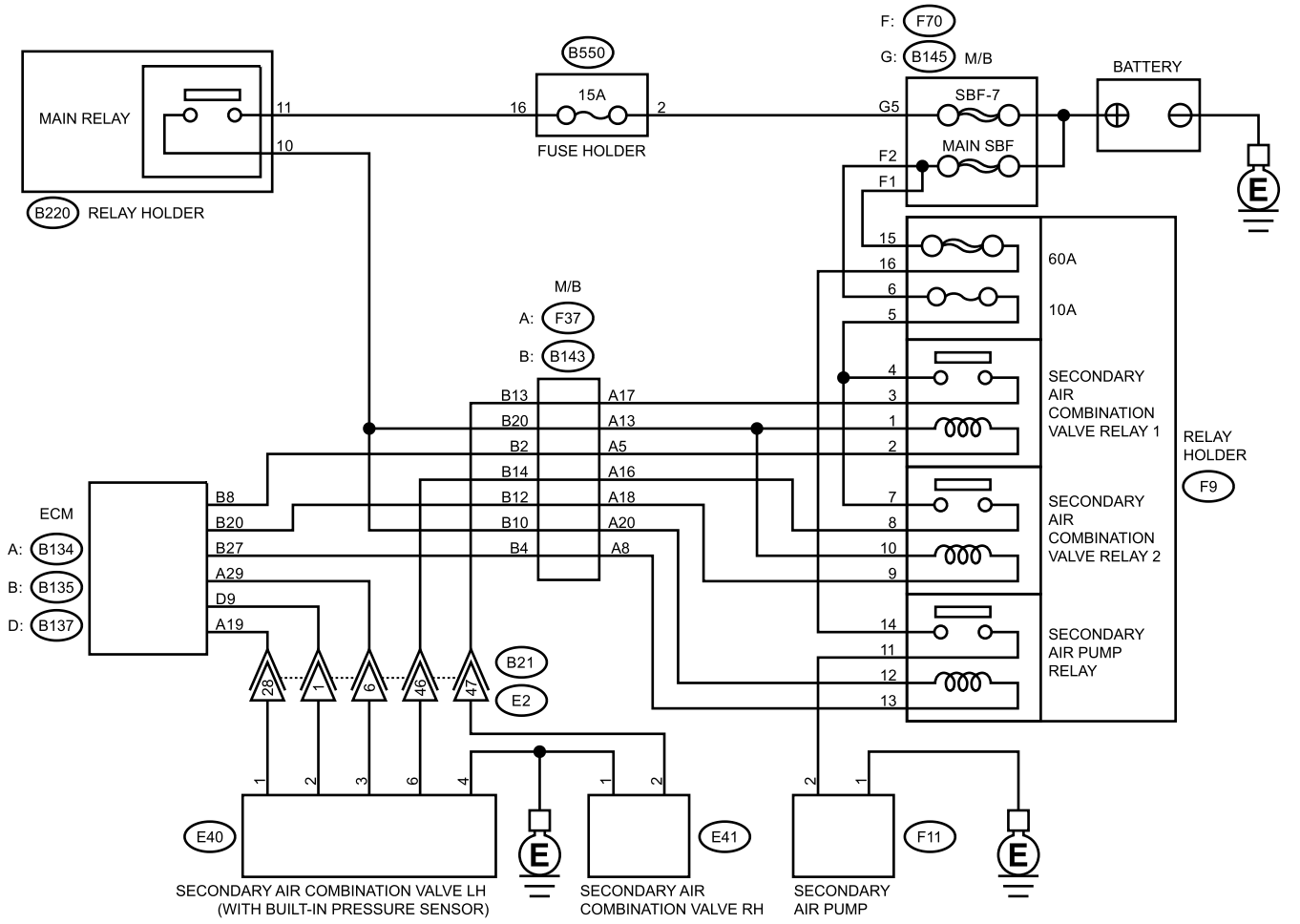
Immediately at fault recognition

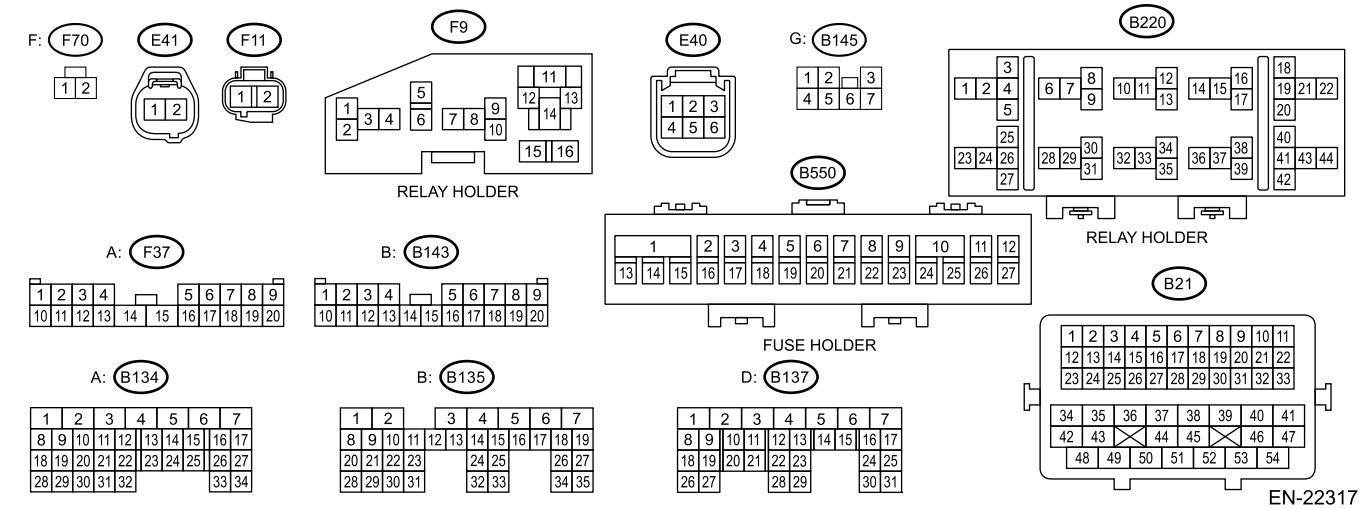
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.





1. CHECK SECONDARY AIR PIPING PRESSURE.

1. Turn the ignition switch to ON.
2. Using the Subaru Select Monitor, read the value of «Sec. Air Piping Pressure», and compare with the actual atmospheric pressure.
   Note:
   For detailed operation procedures, refer to "Read Current Data For Engine". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Is the difference between «Sec. Air Piping Pressure» and atmospheric pressure 50 mmHg (6.7 kPa, 2 inHg, 0.97 psig) or less?

Yes	Go to 2.
No	Replace the secondary air combination valve LH. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Combination Valve.

2. CHECK HARNESS BETWEEN ECM AND SECONDARY AIR PUMP RELAY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Remove the secondary air pump relay from the relay holder.
3. Measure the resistance between secondary air pump relay connector and engine ground.
   Connector & terminal
   (F9) No. 13 — Engine ground:

Is the resistance 1 MΩ or more?

Yes	Go to 3.
No	Repair the short circuit to ground in harness between ECM connector and secondary air pump relay connector, and go to the next step. Go to 3.

3. CHECK SECONDARY AIR PUMP FUSE.

1. Disconnect the secondary air pump connector.
2. Install the secondary air pump relay to the relay holder.
3. Check the MAIN SBF and the secondary air pump fuse (60 A) for blown out.

Is the fuse blown out?

Yes	Replace the fuse with a new part, and go to the next step. Go to 4.
No	Go to 4.

4. CHECK SECONDARY AIR PUMP POWER SUPPLY.

1. Disconnect the positive (+) terminal after disconnecting the negative (-) terminal of battery.
2. Measure the resistance between secondary air pump connector and battery cable positive terminal.

   Connector & terminal

   (F11) No. 2 — battery cable positive terminal:

Is the resistance 1 MΩ or more?

Yes	Go to 6.
No	Go to 5.

5. CHECK SECONDARY AIR PUMP RELAY.

1. Remove the secondary air pump relay from the relay holder.
2. Measure the resistance between the secondary air pump relay terminals.
   Terminals
   No. 11 — No. 14:

Is the resistance 1 MΩ or more?

Yes	Repair the short circuit to power of the secondary air pump, and go to the next step. Go to 6.
No	Replace the secondary air pump relay. Ref. to ENGINE (DIAGNOSTICS)(STI)>Electrical Component Location>LOCATION. After replacement, go to the next step. Go to 6.

6. CHECK SECONDARY AIR PUMP.

Check the appearance of secondary air pump and the condition of impeller.

Is the secondary air pump free from deformation, cracks and other damages? And does the impeller rotate smoothly?

Yes	End.
No	Replace the secondary air pump. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Secondary Air Pump.

1. OUTLINE OF DIAGNOSIS

Detect the secondary air pump malfunction (always ON).
After the secondary air pump turns to OFF, judge as NG if the secondary air pipe pressure is higher than that before the secondary air pump operation.

2. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 7V
Time since secondary air control completion	≥ 3000ms and ≤ 8000ms

3. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

4. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Secondary air pipe pressure – Secondary air pipe pressure before operation	> 6.7kPa (50mmHg, 2inHg)

time needed for diagnosis:8000ms

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC P24B9 EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT RANGE/PERFORMANCE

DTC detecting condition:

Detected when two consecutive driving cycles with fault occur.

Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

Is other than DTC P24B9 displayed? (Current malfunction)

Yes	Check the appropriate DTC using the "List of Diagnostic Trouble Code (DTC)". Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Go to 2.

2. CHECK CURRENT DATA.

1. Turn the ignition switch to ON (engine OFF).
2. Using the Subaru Select Monitor or general scan tool, read the value in «Atmosphere Pressure» and «Mani. Absolute Pressure», and compare them with the actual atmospheric pressure.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.
   - **To read the actual atmospheric pressure, connect the Subaru Select Monitor or general scan tool to the other known good vehicle.**

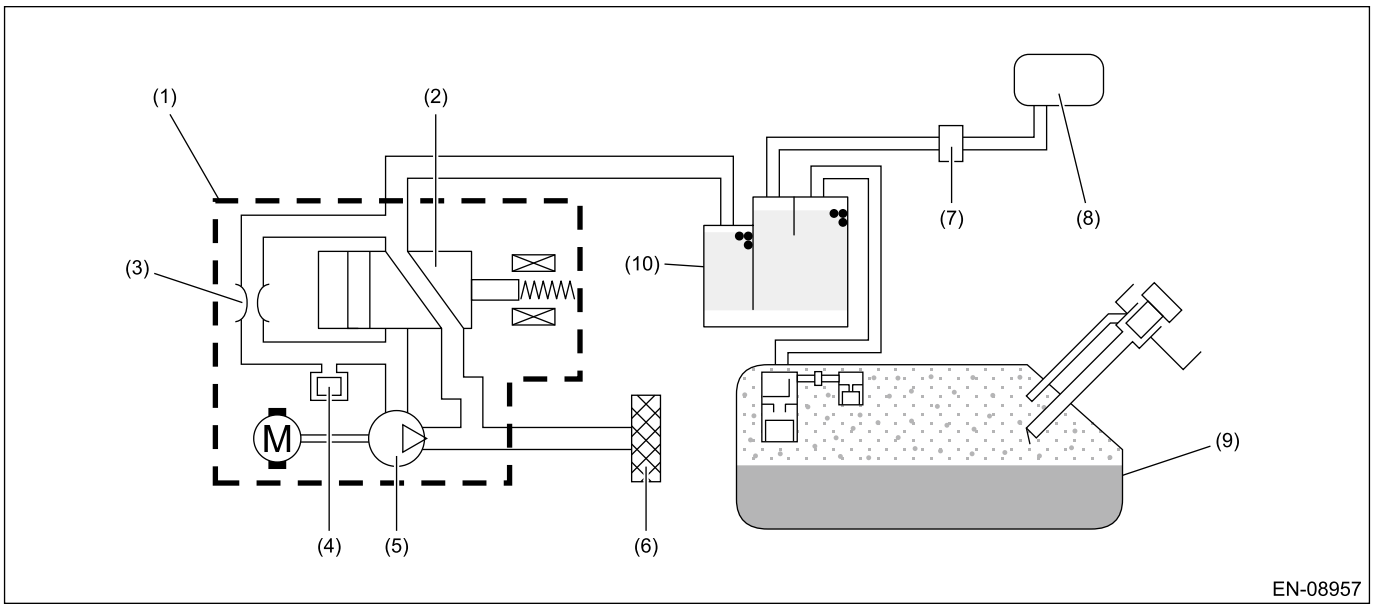
Is the difference with the actual atmospheric pressure 3.3 kPa (24.8 mmHg, 1 inHg) or more?

Yes	Replace the part that showed larger deviation from the actual atmospheric pressure than the other. • If deviations in value for «Atmosphere Pressure» is larger: Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly. • If deviations in value for «Mani. Absolute Pressure» is larger: Replace the manifold absolute pressure sensor. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Manifold Absolute Pressure Sensor.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

1. OUTLINE OF DIAGNOSIS

Detect the output characteristics malfunction of Evaporative Leak Check Module pressure sensor.
Judge as NG when the Evaporative Leak Check Module pressure sensor output value is largely different from the intake manifold pressure when the ignition switch is ON.

2. COMPONENT DESCRIPTION



(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Elapsed time after ignition switch is turned to ON	≥ 500ms and < 60000ms
Soaking time	≥ 60s
Evaporative Leak Check Module vacuum pump	Not in operation
Evaporative Leak Check Module switching valve	Open
Purge control	Not in operation

4. GENERAL DRIVING CYCLE

Perform the diagnosis once at ignition ON.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
|Evaporative Leak Check Module pressure sensor output value − intake manifold pressure (absolute pressure) when ignition switch is ON|	≥ 6532.8Pa (49mmHg, 1.9inHg)

time needed for diagnosis:320ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P24BA EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT LOW

DTC detecting condition:

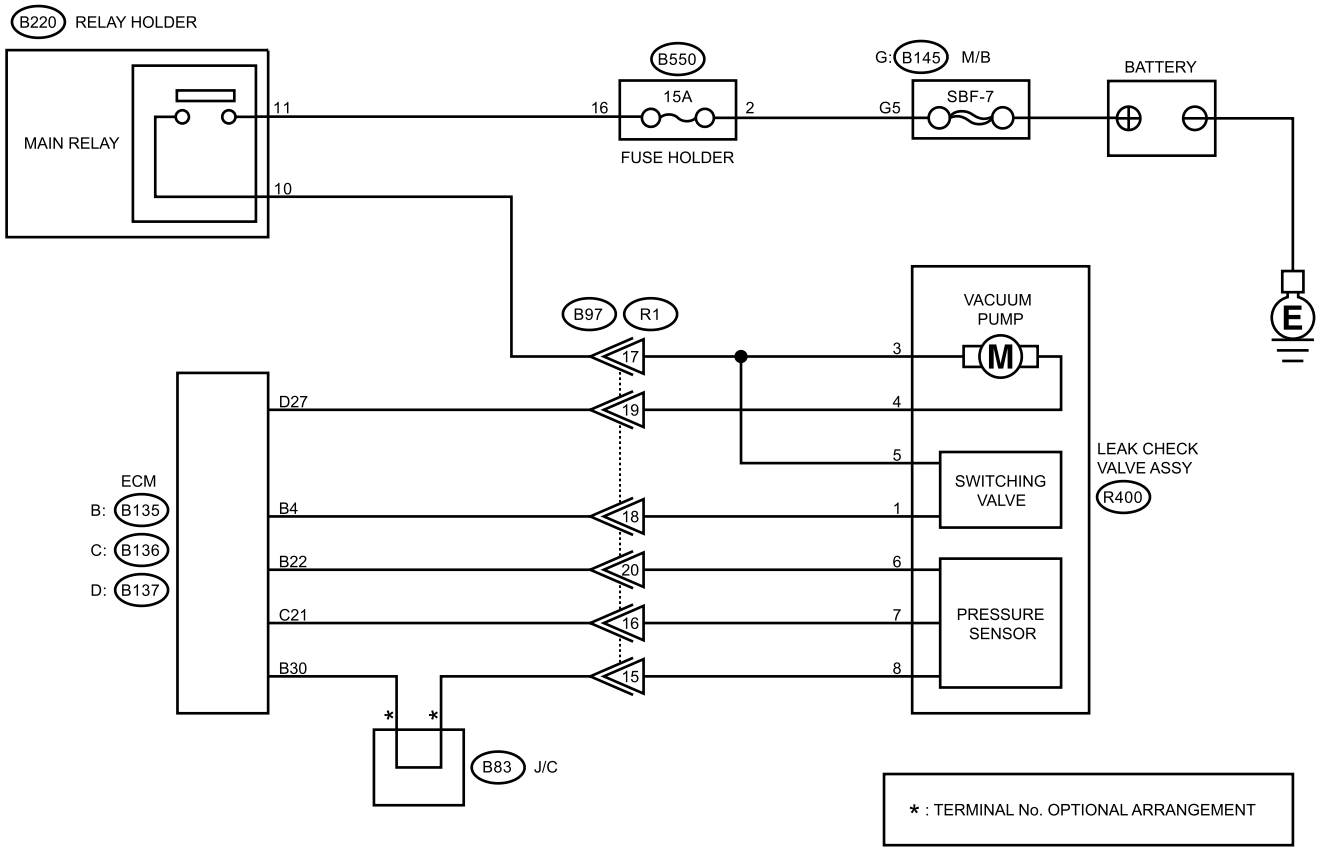
Immediately at fault recognition

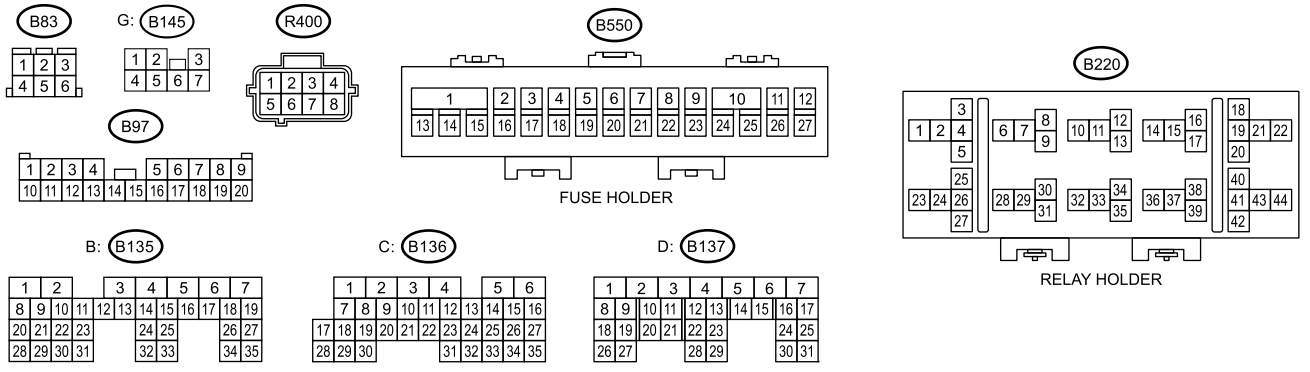
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B220 RELAY HOLDER
MAIN RELAY
11
10
B550
16
15A
2
FUSE HOLDER
G: B145 M/B
G5
SBF-7
BATTERY
E
B97
R1
17
19
18
20
16
15
D27
B4
B22
C21
B30
ECM
B: B135
C: B136
D: B137
VACUUM PUMP
M
3
4
5
1
6
7
8
SWITCHING VALVE
PRESSURE SENSOR
LEAK CHECK VALVE ASSY
R400
*
B83 J/C
* : TERMINAL No. OPTIONAL ARRANGEMENT


B83
G: B145
R400
B550
B97
FUSE HOLDER
B220
B: B135
C: B136
D: B137
RELAY HOLDER

EN-22318

1. CHECK CURRENT DATA.

1. Turn the ignition switch to ON.
2. Read the value of «Atmosphere Pressure» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value in «Atmosphere Pressure» 34 kPa (255 mmHg, 10 inHg) or less?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK POWER SUPPLY OF LEAK CHECK VALVE ASSEMBLY.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from the leak check valve assembly.
3. Turn the ignition switch to ON.
4. Measure the voltage between the leak check valve assembly connector and chassis ground.
   Connector & terminal
   (R400) No. 6 (+) — Chassis ground (−):

Is the voltage 4.5 V or more?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and the leak check valve assembly connector** • **Poor contact of ECM connector** • **Poor contact of coupling connector**

3. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Measure the resistance between ECM connector and chassis ground.
   Connector & terminal
   (B136) No. 21 — Chassis ground:

Is the resistance 1 MΩ or more?

Yes	Go to 4.
No	Repair the short circuit to ground in harness between ECM connector and leak check valve assembly connector.

4. CHECK FOR POOR CONTACT.

Check for poor contact of leak check valve assembly connector.

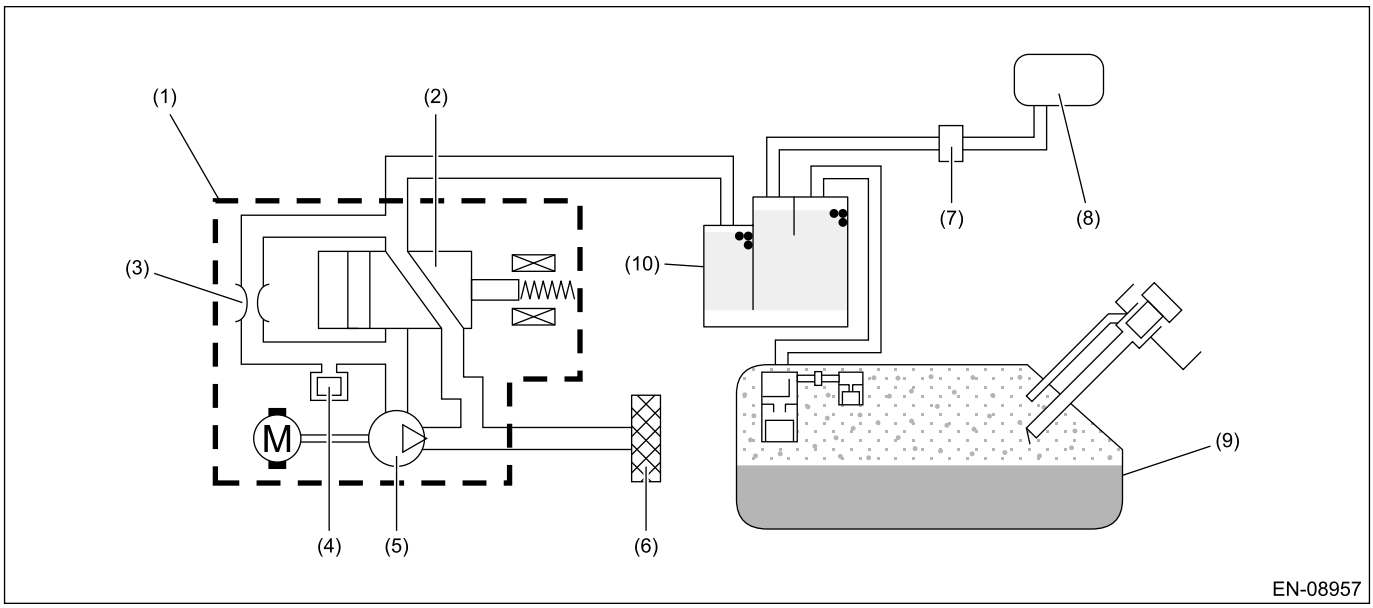
Is there poor contact in the leak check valve assembly connector?

Yes	Repair the poor contact in the leak check valve assembly connector.
No	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit in Evaporative Leak Check Module pressure sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

Judgment value

Malfunction Criteria	Threshold Value
Output voltage	< 0.973V

time needed for diagnosis:1000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P24BB EVAP SYSTEM LEAK DETECTION PUMP PRESSURE SENSOR CIRCUIT HIGH

DTC detecting condition:

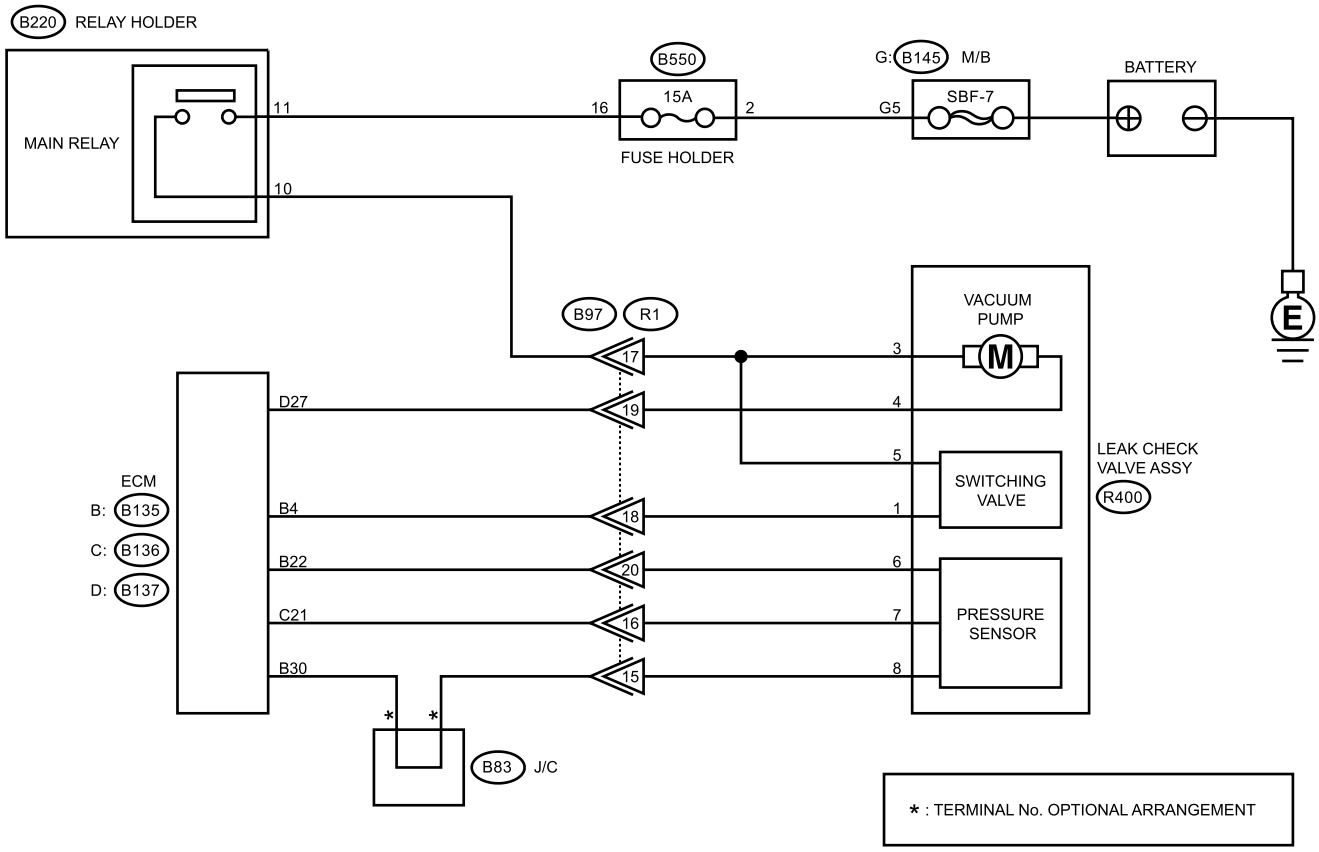
Immediately at fault recognition

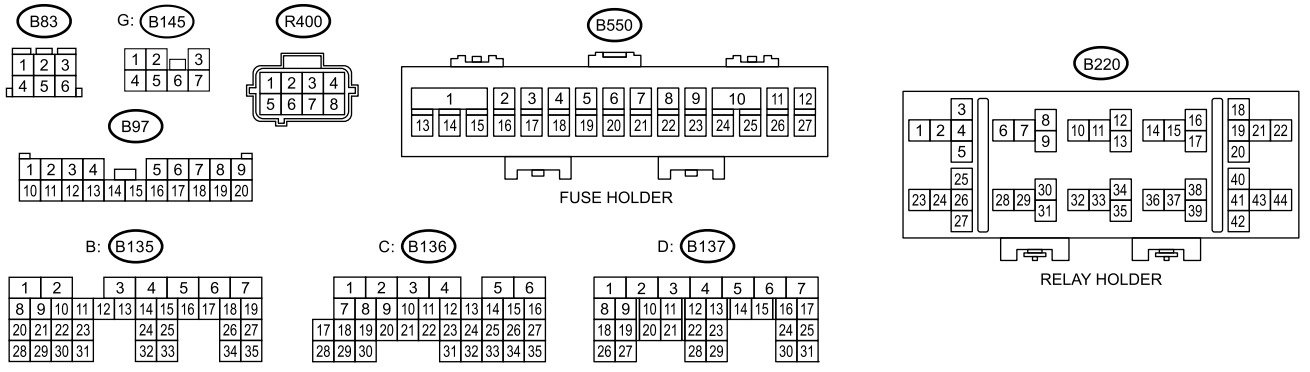
Caution:

After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

Wiring diagram:

Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


B220 RELAY HOLDER
MAIN RELAY
11
10
B550
16
15A
2
FUSE HOLDER
G: B145 M/B
G5
SBF-7
BATTERY
E
B97
R1
17
19
18
20
16
15
D27
B4
B22
C21
B30
ECM
B: B135
C: B136
D: B137
VACUUM PUMP
M
3
4
5
1
6
7
8
SWITCHING VALVE
PRESSURE SENSOR
LEAK CHECK VALVE ASSY
R400
*
B83 J/C
* : TERMINAL No. OPTIONAL ARRANGEMENT


B83
G: B145
R400
B550
B97
FUSE HOLDER
B220
B: B135
C: B136
D: B137
RELAY HOLDER

EN-22318

1. CHECK CURRENT DATA.

1. Turn the ignition switch to ON.
2. Read the value of «Atmosphere Pressure» using the Subaru Select Monitor or a general scan tool.
   Note:
   - **Subaru Select Monitor**
     For detailed operation procedures, refer to "Read Current Data For Engine".
     Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.
   - **General scan tool**
     For detailed operation procedures, refer to the general scan tool operation manual.

Is the value in «Atmosphere Pressure» 125 kPa (938 mmHg, 36.9 inHg) or more?

Yes	Go to 2.
No	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.**

2. CHECK HARNESS BETWEEN ECM AND LEAK CHECK VALVE ASSEMBLY CONNECTOR.

1. Turn the ignition switch to OFF.
2. Disconnect the connector from ECM.
3. Disconnect the connector from the leak check valve assembly.
4. Measure the resistance of harness between ECM connector and the leak check valve assembly connector.

   Connector & terminal

   (B136) No. 21 — (R400) No. 7:

   (B135) No. 30 — (R400) No. 8:

Is the resistance less than 1 Ω?

Yes	Go to 3.
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** • **Open circuit in harness between ECM connector and the leak check valve assembly connector** • **Poor contact of coupling connector** • **Poor contact of joint connector**

3. CHECK FOR POOR CONTACT.

Check for poor contact of ECM and the leak check valve assembly connector.

Is there poor contact in ECM and the leak check valve assembly connector?

Yes	Repair the poor contact of ECM and the leak check valve assembly connector.
No	Go to 4.

4. CHECK LEAK CHECK VALVE ASSEMBLY.

Check the pressure sensor of the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly>INSPECTION > CHECK PRESSURE SENSOR.

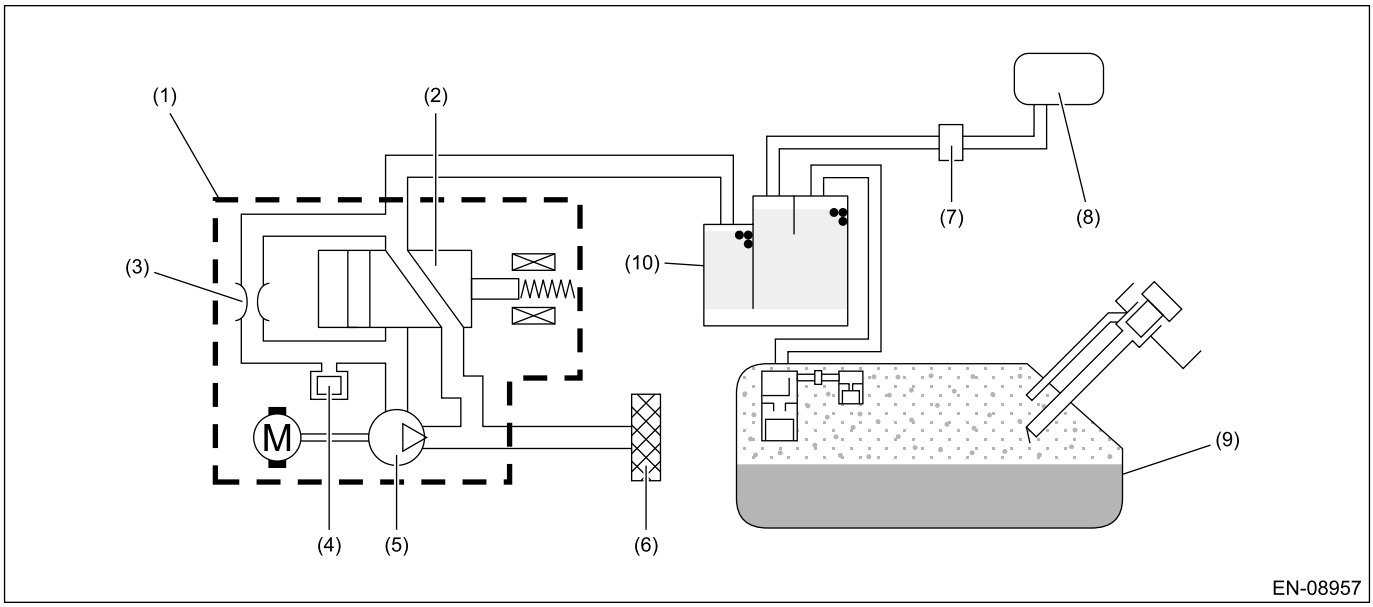
Is the check result OK?

Yes	Repair the short circuit to power in harness between ECM connector and leak check valve assembly connector.
No	Replace the leak check valve assembly. Ref. to EMISSION CONTROL (AUX. EMISSION CONTROL DEVICES)(STI)>Leak Check Valve Assembly.

1. OUTLINE OF DIAGNOSIS

Detect the open or short circuit in Evaporative Leak Check Module pressure sensor.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION



(1) Leak check valve ASSY
(2) Switching valve
(3) Reference orifice (0.02 inch orifice)
(4) Pressure sensor
(5) Vacuum pump
(6) Drain filter
(7) Purge control solenoid valve
(8) Intake manifold
(9) Fuel tank
(10) Canister

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously.

5. DIAGNOSTIC METHOD

If the duration of time while the following conditions are met is longer than the time indicated, judge as NG.

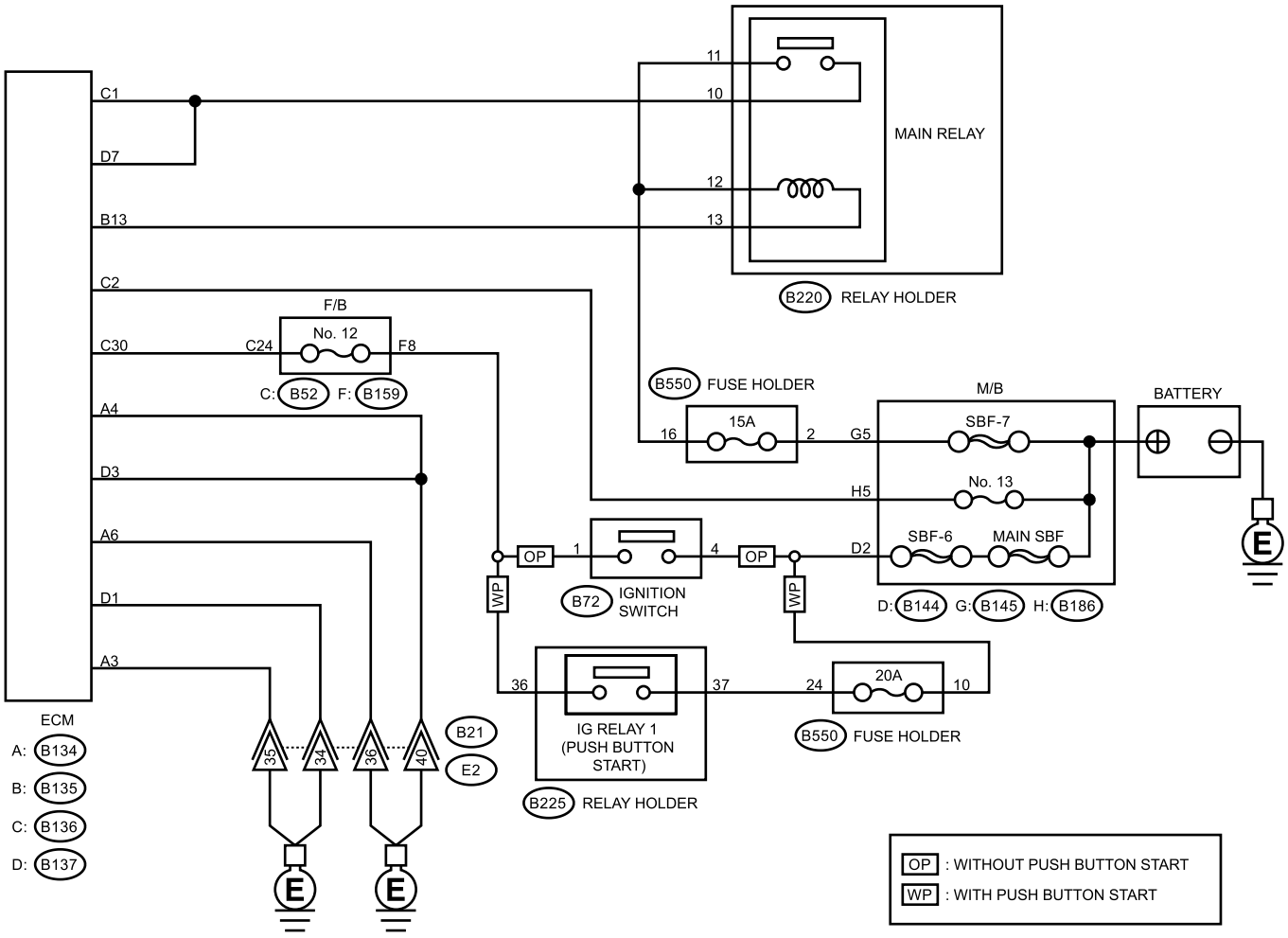
Judgment value

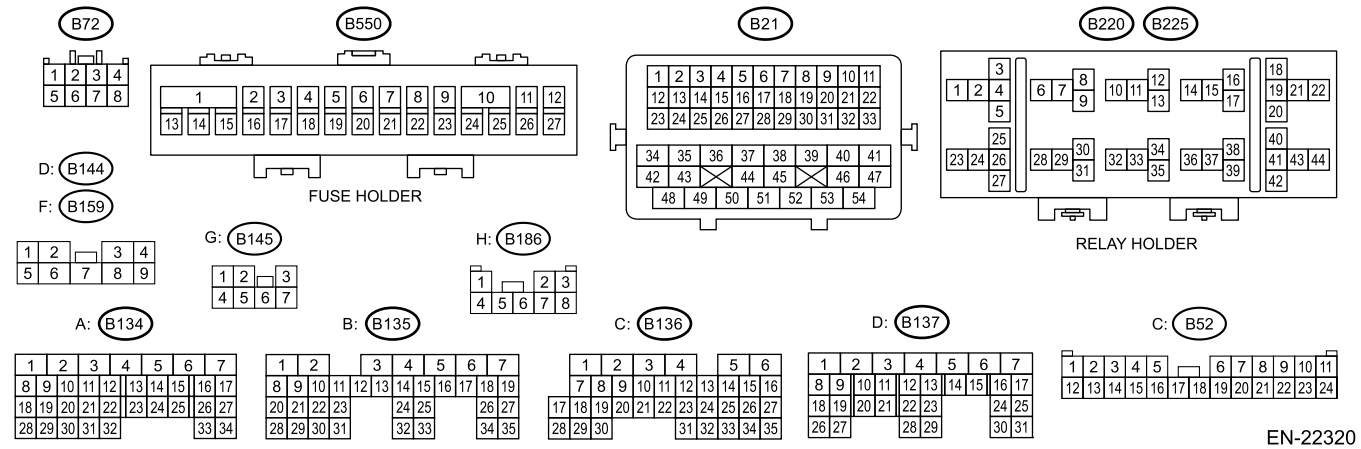
Malfunction Criteria	Threshold Value
Output voltage	≥ 4.095V

time needed for diagnosis:1000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC P2530 IGNITION SWITCH RUN POSITION CIRCUIT

DTC detecting condition:
Immediately at fault recognition
Trouble symptom:
Improper idling
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and Inspection Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..
Wiring diagram:
Engine Electrical System Ref. to WIRING SYSTEM>Engine Electrical System>WIRING DIAGRAM.


C1
D7
B13
C2
C30
A4
D3
A6
D1
A3
ECM
A: B134
B: B135
C: B136
D: B137
11
10
12
13
MAIN RELAY
B220 RELAY HOLDER
F/B
No. 12
C24
F8
C: B52 F: B159
B550 FUSE HOLDER
16
15A
2
G5
M/B
SBF-7
BATTERY
H5
No. 13
OP
1
4
D2
SBF-6
MAIN SBF
WP
B72 IGNITION SWITCH
D: B144 G: B145 H: B186
36
37
24
20A
10
IG RELAY 1 (PUSH BUTTON START)
B550 FUSE HOLDER
B225 RELAY HOLDER
35
34
36
40
B21
E2
OP : WITHOUT PUSH BUTTON START
WP : WITH PUSH BUTTON START


B72
B550
B21
B220
B225
D: B144
F: B159
FUSE HOLDER
G: B145
H: B186
RELAY HOLDER
A: B134
B: B135
C: B136
D: B137
C: B52

EN-22320

1. CHECK ECM CONNECTOR.

Check the connecting condition of ECM connector.

Is the ECM connector correctly connected?

Yes	Go to 2.
No	Connect the ECM connector correctly.

2. CHECK INPUT VOLTAGE OF ECM.

1. Turn the ignition switch to ON.
2. Measure the voltage between ECM connector and chassis ground while wiggling the harness between ECM connector and ignition switch connector (for models without push button start), or between ECM connector and IG relay 1 (push button start) connector (for models with push button start).

Connector & terminal

(B136) No. 30 (+) — Chassis ground (−):

Is the voltage 8 V or more all the time?

Yes	Even if DTC is detected, the circuit has returned to a normal condition at this time. Reproduce the failure, and then perform the diagnosis again. **Note:** **In this case, the following items may be the cause of fault.** **Model without push button start** • **Open circuit or short circuit to ground in harness between ECM connector and ignition switch connector** • **Poor contact of ignition switch connector** • **Poor contact of ignition switch** **Model with push button start** • **Open circuit or short circuit to ground in harness between ECM connector and IG relay 1 (push button start) connector** • **Poor contact in IG relay 1 (push button start) connector** • **Poor contact in IG relay 1 (push button start)**
No	Repair the harness and connector. **Note:** **In this case, repair the following item:** **Model without push button start** • **Open circuit or short circuit to ground in harness between ECM connector and ignition switch connector** • **Poor contact of ignition switch connector** • **Poor contact of ignition switch** • **Faulty fuse (F/B No. 12)** **Model with push button start** • **Open circuit or short circuit to ground in harness between ECM connector and IG relay 1 (push button start) connector** • **Poor contact in IG relay 1 (push button start) connector** • **Poor contact in IG relay 1 (push button start)** • **Faulty fuse (F/B No. 12)**

1. OUTLINE OF DIAGNOSIS

Detect instantaneous open in ignition switch input circuit to ECM.
Judge as NG if out of specification.

2. COMPONENT DESCRIPTION

ECM monitors the voltage of the ignition switch input circuit. Judge as ignition switch ON when the voltage is the specified value or more.

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9V
Engine speed	≥ 600rpm

4. GENERAL DRIVING CYCLE

Always perform the diagnosis continuously after the enable conditions have been established.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established within the predetermined time.
Judgment value

Malfunction Criteria	Threshold Value
Number of instantaneous opens in ignition switch input circuit	≥ 5time(s)

time needed for diagnosis: 5000ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC P2610 ECM/PCM ENGINE OFF TIMER PERFORMANCE

DTC detecting condition:
Detected when two consecutive driving cycles with fault occur.
Caution:
After servicing or replacing faulty parts, perform Clear Memory Mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Clear Memory Mode>OPERATION., and inspection mode Ref. to ENGINE (DIAGNOSTICS)(STI)>Inspection Mode>PROCEDURE..

1. CHECK DTC.

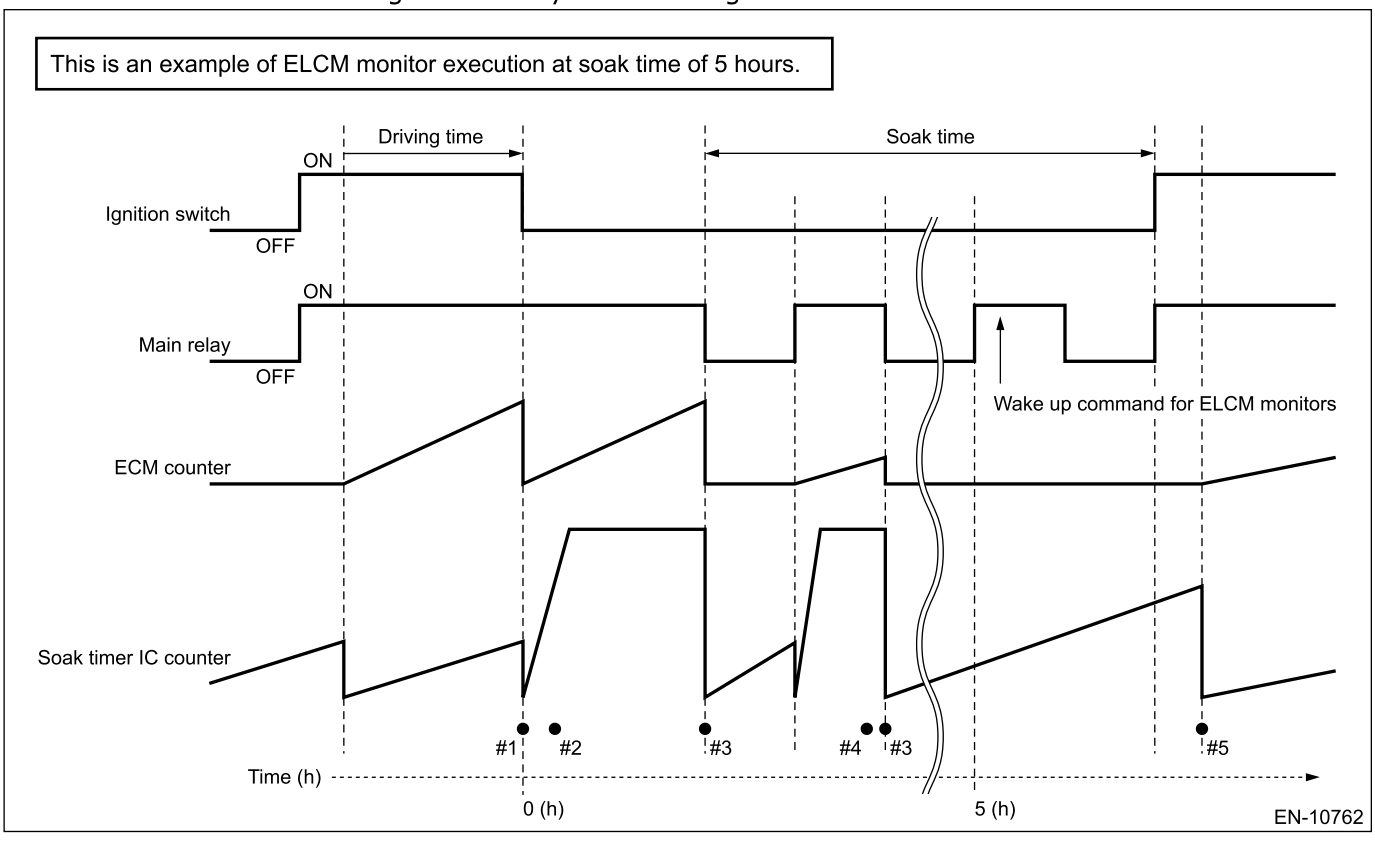
Read the engine DTC using the Subaru Select Monitor or general scan tool. Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).

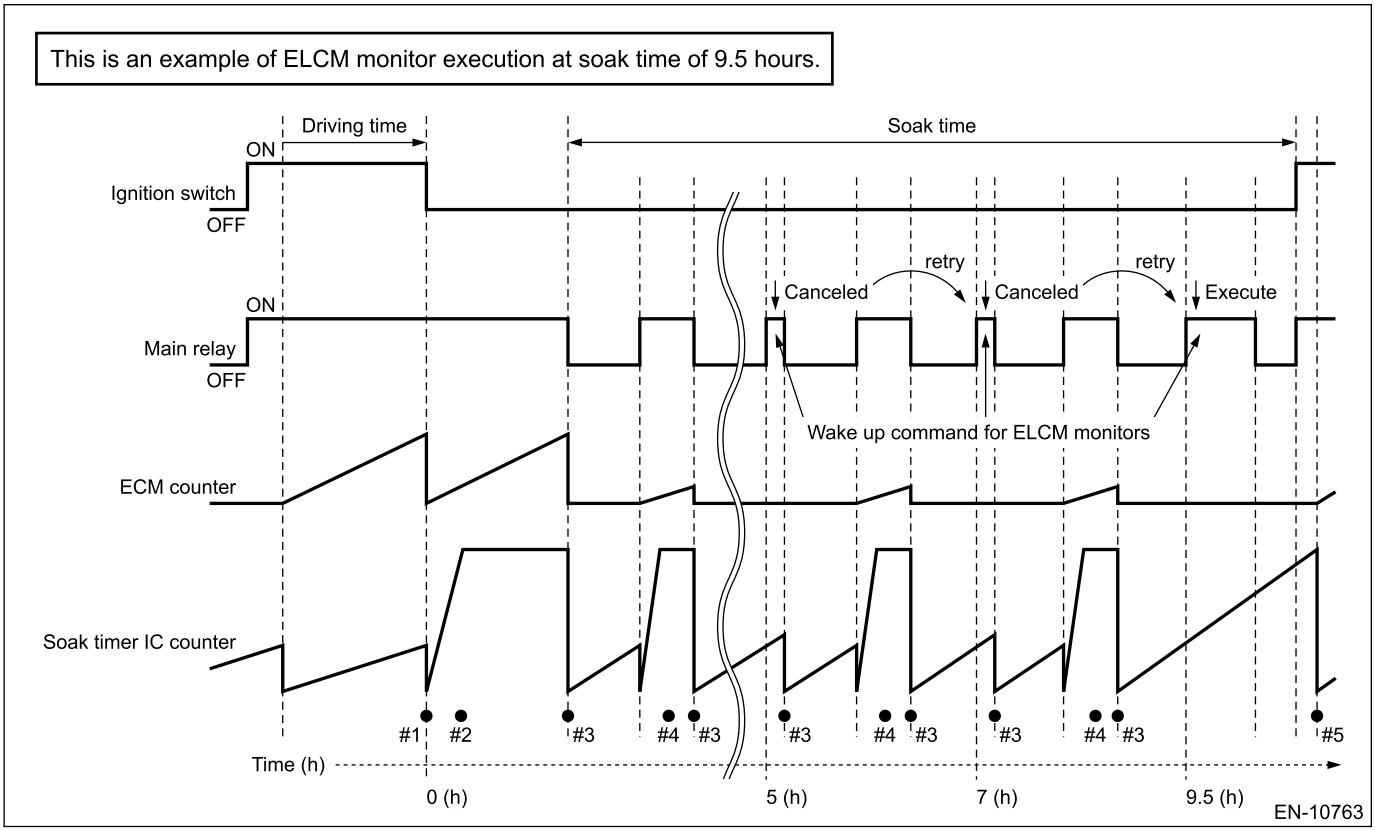
Is DTC other than P2610 displayed? (Current malfunction)

Yes	Check DTC using “List of Diagnostic Trouble Code (DTC)”. Ref. to ENGINE (DIAGNOSTICS)(STI)>List of Diagnostic Trouble Code (DTC).
No	Replace the ECM. Ref. to FUEL INJECTION (FUEL SYSTEMS)(STI)>Engine Control Module (ECM). **Note:** **The soaking timer IC is built into the ECM.**

1. OUTLINE OF DIAGNOSIS

Detect malfunction of soaking timer IC by the five diagnoses below.





	Monitor Number	Explanation	Time required for diagnosis
#1	Monitor 1 <Timer diagnosis>	Perform diagnosis of the soaking timer IC accuracy	128 ms
#2	Monitor 2 <Full count diagnosis>	Perform diagnosis of the soaking timer IC counter function	128 ms
#3	Monitor 3 <Soaking timer IC setting diagnosis>	Perform diagnosis of communication between ECM and soaking timer IC	128 ms
#4	Monitor 4 <Timer diagnosis (during soaking)>	Perform diagnosis of the soaking timer IC accuracy during soaking	None
#5	Monitor 5 <Wake-up diagnosis>	Perform diagnosis of wake-up function	None

2. COMPONENT DESCRIPTION

The soaking timer IC is built into the ECM.

3. EXECUTION CONDITION

Monitor1:

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

Secondary parameters	Execution condition
Ignition switch	OFF
Elapsed time after starting the engine	> 600 s and < 61380 s

Monitor2:

Secondary parameters	Execution condition
Battery voltage Ignition switch	≥ 10.9 V OFF
Counter in ECM	≥ 4 s

Monitor3:

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Ignition switch	OFF

Monitor4:

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V
Ignition switch	OFF

Monitor5:

Secondary parameters	Execution condition
Ignition switch Time in the soaking timer IC	ON > 3600s

4. GENERAL DRIVING CYCLE

Perform the diagnosis only once when the ignition switch is OFF and when the ignition switch is ON after the soaking of one hour or more.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment value

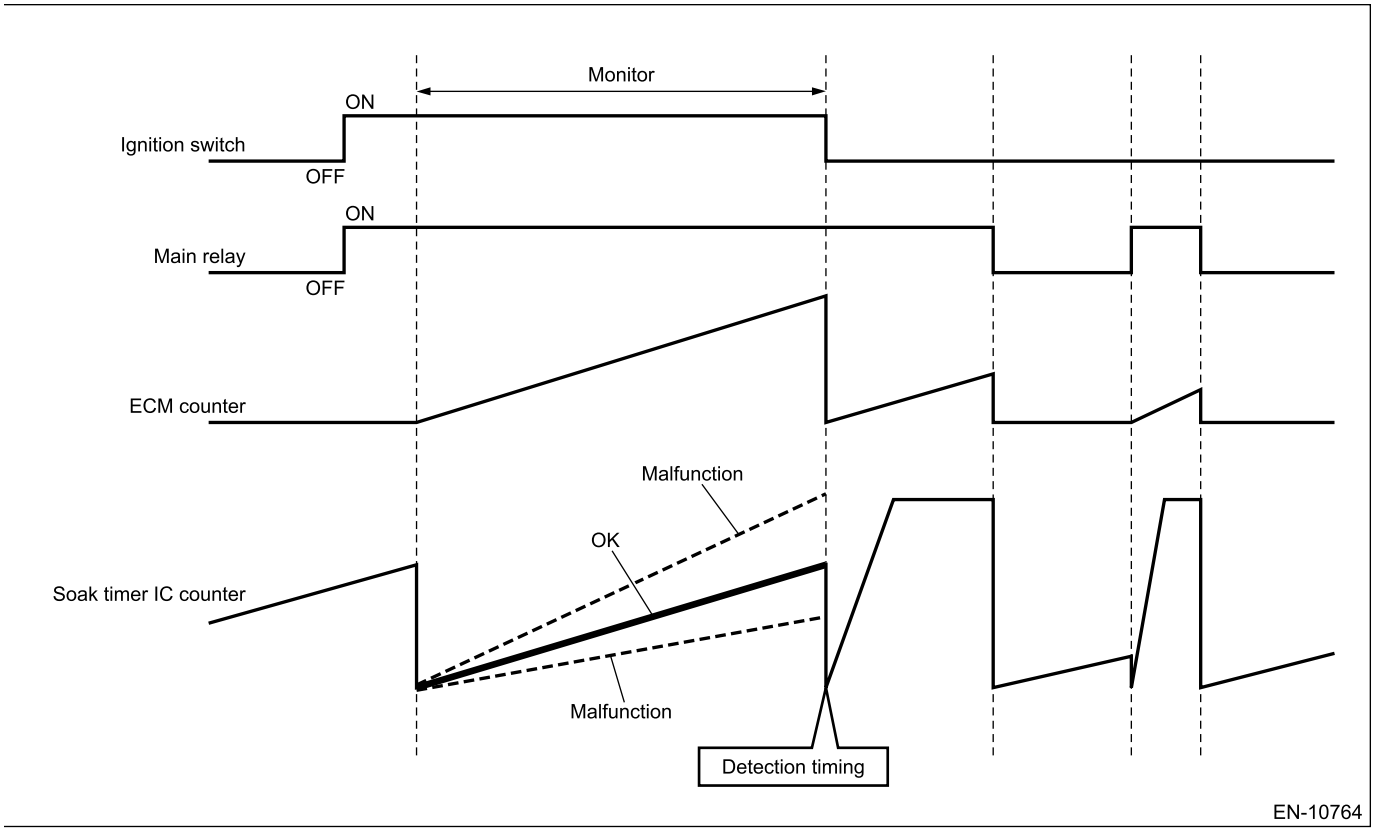
Malfunction Criteria	Threshold Value
Ignition switch Driving cycle When any one of the followings is established:	ON Completed

Malfunction Criteria	Threshold Value
· Timer diagnosis	NG
· Full count diagnosis	NG
· Soaking timer IC setting diagnosis	NG
· Timer diagnosis (during soaking)	NG
· Wake-up diagnosis	NG

Time needed for diagnosis: Approx. 5 — 9.5 hours

<Monitor1: Timer diagnosis>

Start the count up operation of counters in ECM and in soaking timer IC when the engine is started. Judge as timer malfunction if the difference between the counter in ECM and counter in soaking timer IC exceeds the allowable limit when the ignition switch is OFF.



Judge as NG when the following conditions are established.

Judgment value

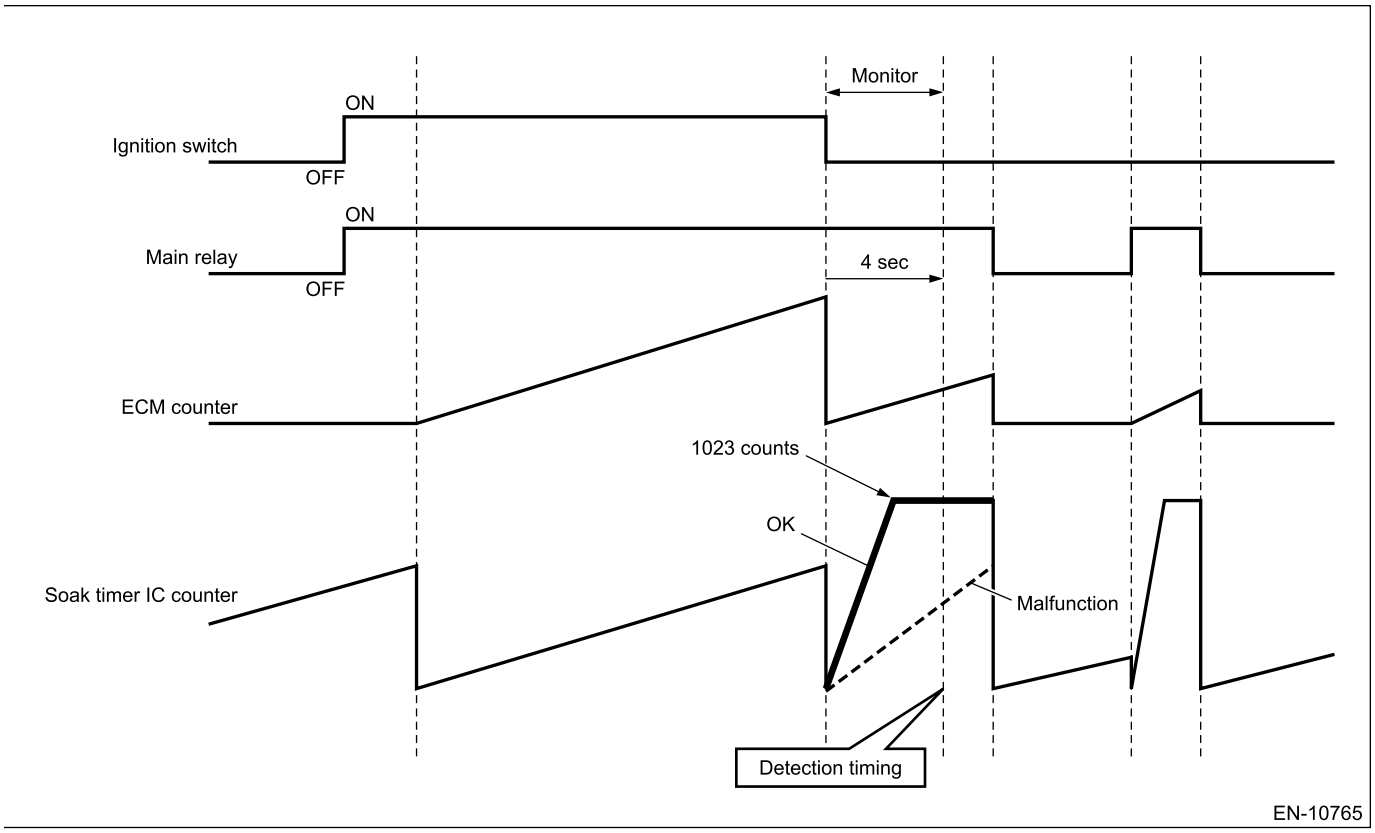
Malfunction Criteria	Threshold Value
|osoaktimcpu − osoaktimic| / osoaktimcpu osoaktimcpu = Counter in ECM osoaktimic = Counter in soaking timer IC	> 0.24

Time needed for diagnosis: 128 ms

<Monitor2: Full count diagnosis>

Reset the counter in soaking timer IC and start the count up operation.

Judge as full count diagnosis malfunction if counter in soaking timer IC is not $3FF (1023 count) after 4 seconds.



Judge as NG when the following conditions are established.

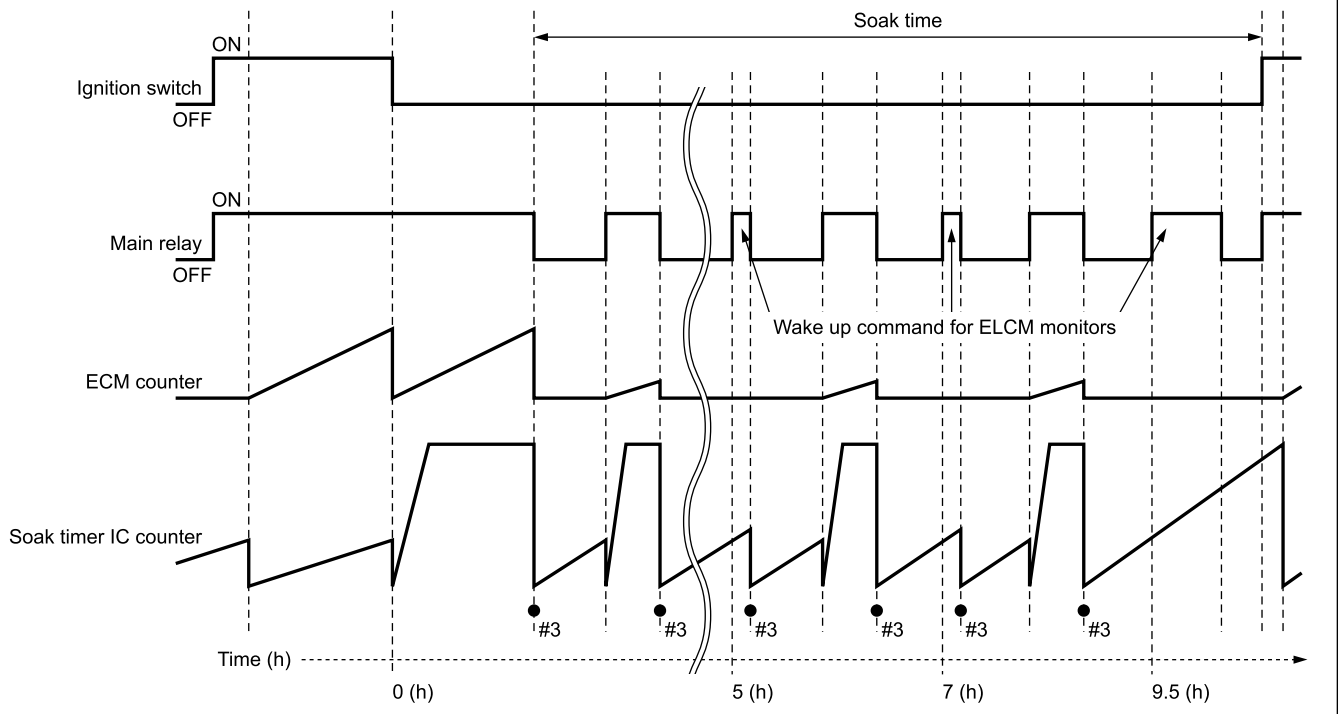
Judgment value

Malfunction Criteria	Threshold Value
osoakfcntic osoakfcntic = Counter in soaking timer IC	≠$3FF (1023 count)

Time needed for diagnosis: 128 ms

<Monitor3: Soaking timer IC setting diagnosis>

When setting the activation setting time to soaking timer IC, compare the writing value to soaking timer IC with read out value. Judge as malfunction if the values do not match 3 times in a row.



Judge as NG when the following conditions are established.

Judgment value

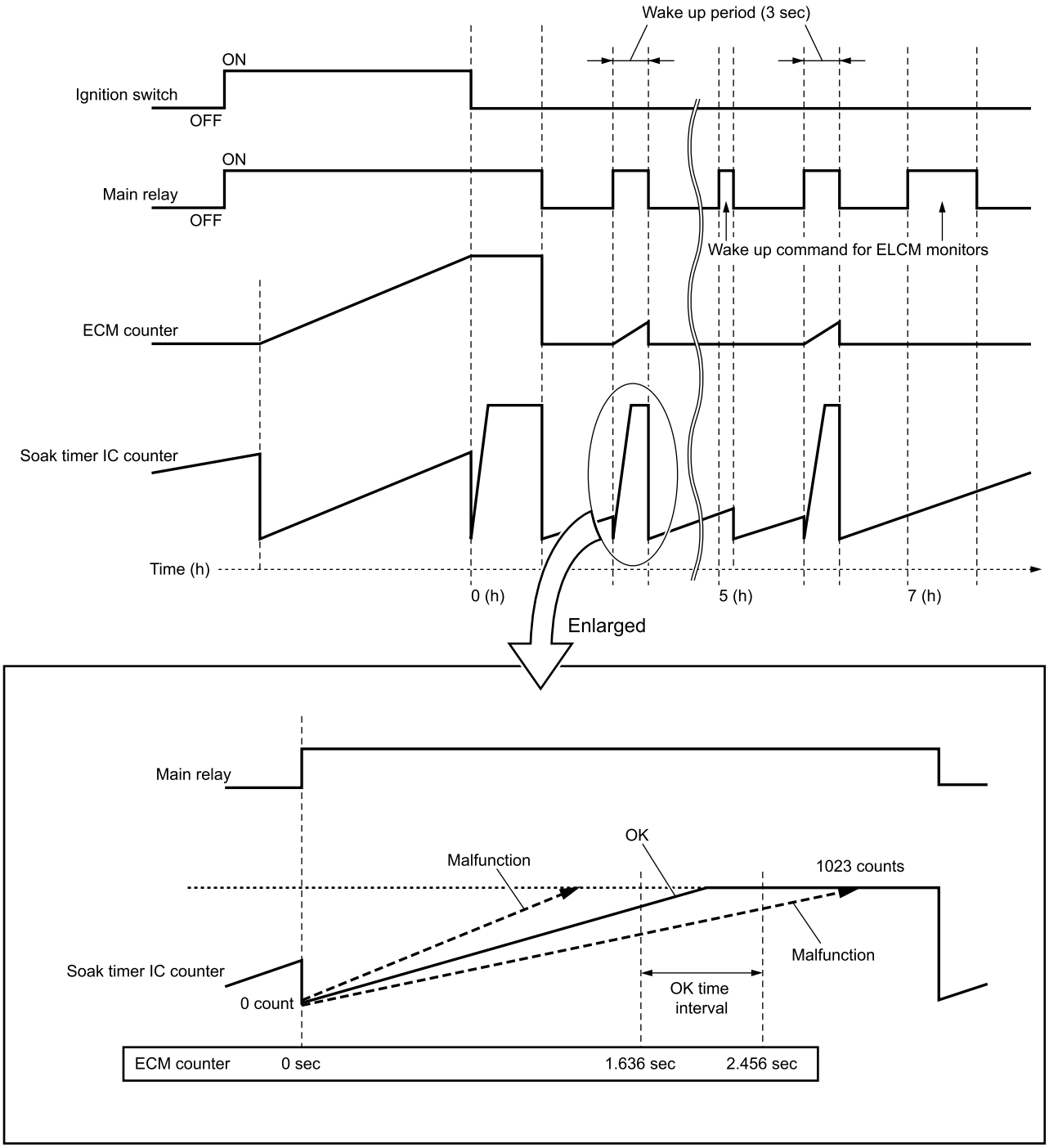
Malfunction Criteria	Threshold Value
Writing value and read out value when setting the soaking timer	Unmatch

Time needed for diagnosis: 128 ms

<Monitor4: Timer diagnosis (during soaking)>

Wake-up at the predetermined interval until 5 or 7 or 9.5 hours have passed after the ignition switch is OFF, and compare the counter in soaking timer IC with the counter in ECM.

Judge as malfunction if the counter in soaking timer IC is counted up to maximum value (1023 count) when the counter in ECM is 1636 ms, or if the counter in soaking timer IC is not counted up to maximum value (1023 count) when the counter in ECM is 2456 ms.



EN-10767

Judge as NG when the following conditions are established.

Judgment value

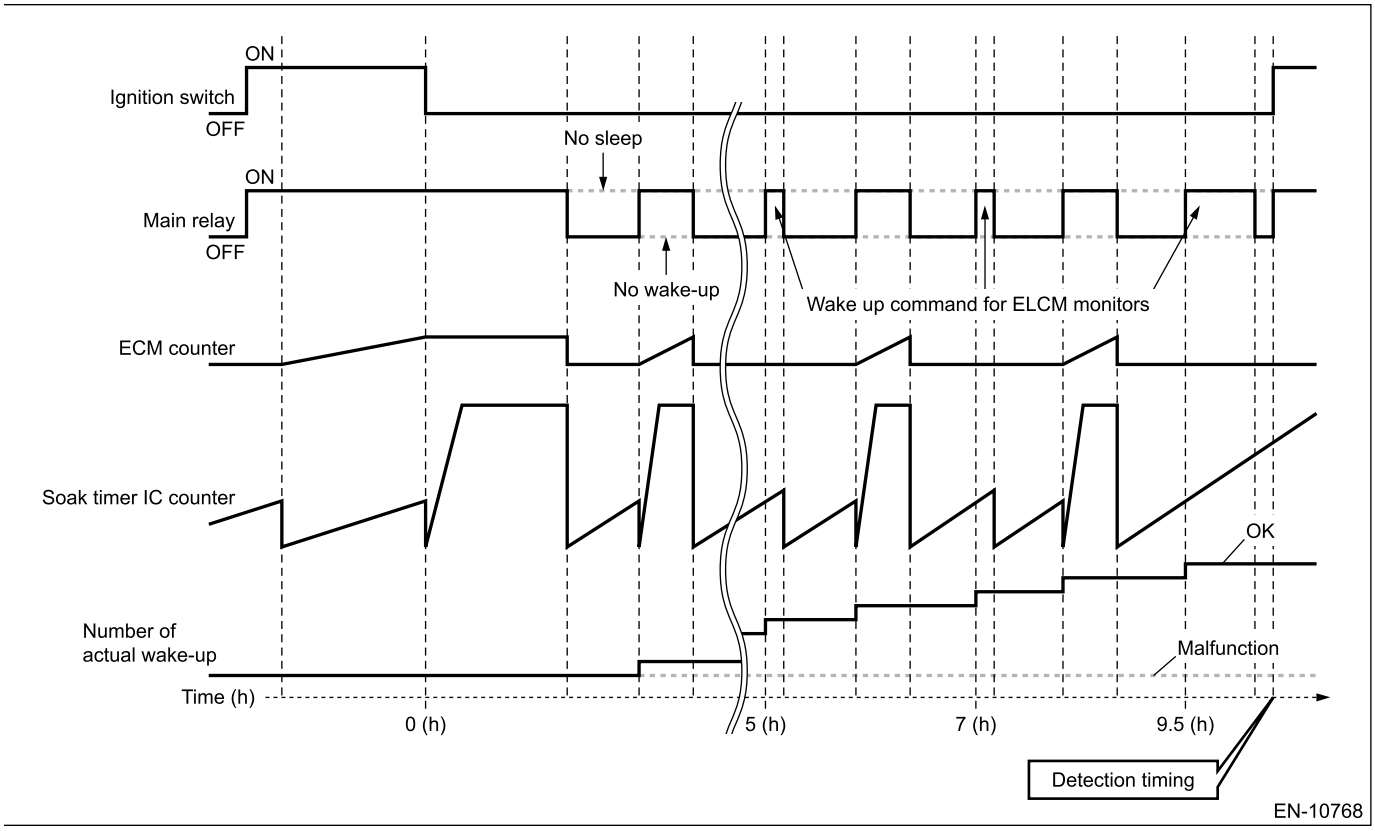
Malfunction Criteria	Threshold Value
When any one of the followings is established:	
・ All of the following conditions are established. Counter in ECM	 ≤ 1636 ms

Malfunction Criteria	Threshold Value
Counter in soaking timer IC	= $3FF (1023 count)
· All of the following conditions are established. Counter in ECM Counter in soaking timer IC	 ≥ 2456 ms ≠$3FF (1023 count)

Time needed for diagnosis: Less than 1 second

<Monitor5: Wake-up diagnosis>

Store the number of wake-up activation when the ECM wakes up by the soaking timer IC.
Next time when the ignition switch is ON, if the number of wake-up activation does not reach the predetermined value even though the counter in soaking timer IC operates 1 hour or more, judge as wake-up malfunction.



Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
Number of wake-up	≠ Wake-up indication count

Time needed for diagnosis: Less than 1 second

Malfunction indicator light illumination: Illuminates when malfunction occurs in 2 continuous driving cycles.

DTC U0073 CONTROL MODULE COMMUNICATION BUS OFF

Note:
For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when CAN communication failure has occurred.

2. COMPONENT DESCRIPTION

(Common Specifications)

CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.
Judgment value

Malfunction Criteria	Threshold Value
CAN bus condition	= “Bus off”

time needed for diagnosis: 436ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE

Note:
For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.

Judge as NG when CAN communication failure between TCM, VDC CM and combination meter has occurred.

2. COMPONENT DESCRIPTION

(Common Specifications)

CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.

Judgment value

Malfunction Criteria	Threshold Value
ID received from control module connected to CAN	None

Time needed for diagnosis: 500 ms
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC U0155 LOST COMMUNICATION WITH INSTRUMENT PANEL CLUSTER (IPC) CONTROL MODULE

Note:
For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC U0122. Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0122 LOST COMMUNICATION WITH VEHICLE DYNAMICS CONTROL MODULE.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE

Note:
For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.

1. OUTLINE OF DIAGNOSIS

Detect malfunction of CAN communication.
Judge as NG when data received from TCM, VDC CM and combination meter is not normal.

2. COMPONENT DESCRIPTION

(Common Specifications)

CAN Protocol 2.0 B (Active)
Frame Format: 11 Bit ID Frame (Standard Frame)
Conforms to ISO11898
Communication Speed: 500 kbps

3. EXECUTION CONDITION

Secondary parameters	Execution condition
Battery voltage	≥ 10.9 V

4. GENERAL DRIVING CYCLE

Perform the diagnosis continuously after starting the engine.

5. DIAGNOSTIC METHOD

Judge as NG when the following conditions are established.
Judgment value

Malfunction Criteria	Threshold Value
Data updated from control module connected to CAN	None

Time needed for diagnosis: 2 seconds
Malfunction indicator light illumination: Illuminates as soon as a malfunction occurs.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure with Diagnostic Trouble Code (DTC)

DTC U0423 INVALID DATA RECEIVED FROM INSTRUMENT PANEL CLUSTER CONTROL MODULE

Note:
For the diagnostic procedure, refer to LAN section. Ref. to LAN SYSTEM (DIAGNOSTICS)>Basic Diagnostic Procedure.

1. OUTLINE OF DIAGNOSIS

Note:
For the detection standard, refer to DTC U0416. Ref. to ENGINE (DIAGNOSTICS) (STI)>Diagnostic Procedure with Diagnostic Trouble Code (DTC)>DTC U0416 INVALID DATA RECEIVED FROM VEHICLE DYNAMICS CONTROL MODULE.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure without Diagnostic Trouble Code (DTC)

LIST

Item	Note
Check brake override system	Ref. to ENGINE (DIAGNOSTICS)(STI)>Diagnostic Procedure without Diagnostic Trouble Code (DTC)>CHECK BRAKE OVERRIDE SYSTEM.

ENGINE (DIAGNOSTICS)(STI) > Diagnostic Procedure without Diagnostic Trouble Code (DTC)

CHECK BRAKE OVERRIDE SYSTEM

Warning:
This test must be performed at the place where safety driving can be confirmed with a great care. While driving, always observe the road traffic law such as speed limit.
Note:

- **The value of «Accel. Opening Angle» on data monitor usually varies depending on the value of the accelerator sensor No. 1 voltage ratio. However, they do not become the same value.**
- **You can judge that the control is functioning if the value of accelerator sensor No. 1 voltage ratio stays constant even though there is a voltage difference between «Accel. Opening Angle» on the data monitor and accelerator sensor No. 1 voltage, and at the same time the value of «Accel. Opening Angle» is changing. (The data during driving can be stored using Subaru Select Monitor 4 data save function. The stored data can be confirmed during driving.)**
- **If a client claims that deceleration feel occurs when he/she intentionally depresses the accelerator pedal and the brake pedal at the same time, advice the client not to depress both pedals at the same time. (Example: Operating the brake pedal with the left foot while operating the accelerator pedal, etc.)**

1. CHECK DTC.

Read all DTC using Subaru Select Monitor or general scan tool.
Note:

- **Subaru Select Monitor**
  For detailed operation procedures, refer to "Application help". Ref. to ENGINE (DIAGNOSTICS)(STI)>Read Diagnostic Trouble Code (DTC).
- **General scan tool**
  For detailed operation procedures, refer to the general scan tool operation manual.

Are any DTCs displayed? (Current malfunction)

Yes — Check DTC using "List of Diagnostic Trouble Code (DTC)".

No — Go to 2.

2. READ DATA MONITOR.

Read the value of «Stop Light Switch» using Subaru Select Monitor.
Note:
For detailed operation procedures, refer to "Data Monitor". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Does the value of «Stop Light Switch» change to ON/OFF on the data monitor?

Yes	Go to 3.
No	Check the stop light circuit.

3. CHECK BRAKE PEDAL.

Check the brake pedal.

Is the check result OK?

Yes	Go to 4.
No	Adjust or replace the brake pedal. Ref. to BRAKE>Brake Pedal.

4. READ DATA MONITOR.

Using the Subaru Select Monitor, read the values of «Accelerator Pedal Pos.#1» and «Accelerator Pedal Pos.#2» when operating the accelerator pedal from full closed to full open.
Note:
For detailed operation procedures, refer to "Data Monitor". Ref. to ENGINE (DIAGNOSTICS)(STI)>Subaru Select Monitor.

Do the values of «Accelerator Pedal Pos.#1» and «Accelerator Pedal Pos.#2» change continuously?

Yes	Go to 5.
No	Replace the accelerator pedal assembly. Ref. to SPEED CONTROL SYSTEMS(STI)>Accelerator Pedal.

5. READ DATA MONITOR.

Using the Subaru Select Monitor, read the value of «Speed, vehicle» when driving at a constant speed of 16.1 km/h (10 MPH) or 64.4 km/h (40 MPH).

Warning:

The driving test must be performed in compliance with the road traffic law such as speed limit.

Note:

The data during driving can be stored using Subaru Select Monitor 4 data save function.

The stored data can be confirmed during driving.

Is there noticeable change in the value displayed in «Speed, vehicle»?

Yes	Check the combination meter. Ref. to INSTRUMENTATION/DRIVER INFO>Combination Meter System.
No	In this case, temporary poor contact of connector, temporary open or short circuit of harness may be the cause.

INSPECTION

1. ENGINE

Note:
Malfunction of parts other than those listed is also possible. Ref. to MECHANICAL(STI)>Symptoms and causes.

Symptoms	Faulty parts
1. Engine stalls during idling.	1) Electronic throttle control 2) Manifold absolute pressure sensor 3) Mass air flow and intake air temperature sensor 4) Ignition parts (∗1) 5) Engine coolant temperature sensor (∗2) 6) Crankshaft position sensor (∗3) 7) Camshaft position sensor (∗3) 8) Fuel injection parts (∗4)
2. Rough idling	1) Electronic throttle control 2) Manifold absolute pressure sensor 3) Mass air flow and intake air temperature sensor 4) Engine coolant temperature sensor (∗2) 5) Ignition parts (∗1) 6) Air intake system (∗5) 7) Fuel injection parts (∗4) 8) Crankshaft position sensor (∗3) 9) Camshaft position sensor (∗3) 10) Oxygen sensor 11) Fuel pump and fuel pump relay
3. Engine does not return to idle.	1) Electronic throttle control 2) Engine coolant temperature sensor 3) Manifold absolute pressure sensor 4) Mass air flow and intake air temperature sensor 5) Accelerator pedal position sensor
4. Poor acceleration	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Electronic throttle control 4) Fuel injection parts (∗4) 5) Fuel pump and fuel pump relay 6) Engine coolant temperature sensor (∗2) 7) Crankshaft position sensor (∗3) 8) Camshaft position sensor (∗3) 9) A/C switch and A/C relay 10) Engine torque control signal circuit 11) Ignition parts (∗1) 12) Accelerator pedal position sensor

Symptoms	Faulty parts
5. Engine stalls, hesitates, or sputters at acceleration.	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (∗2) 4) Crankshaft position sensor (∗3) 5) Camshaft position sensor (∗3) 6) Purge control solenoid valve 7) Fuel injection parts (∗4) 8) Fuel pump and fuel pump relay 9) Electronic throttle control
6. Surging	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (∗2) 4) Crankshaft position sensor (∗3) 5) Camshaft position sensor (∗3) 6) Fuel injection parts (∗4) 7) Electronic throttle control 8) Fuel pump and fuel pump relay
7. Spark knock	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor 4) Knock sensor 5) Fuel injection parts (∗4) 6) Fuel pump and fuel pump relay
8. After burning in exhaust system	1) Manifold absolute pressure sensor 2) Mass air flow and intake air temperature sensor 3) Engine coolant temperature sensor (∗2) 4) Fuel injection parts (∗4) 5) Fuel pump and fuel pump relay

∗1: Check ignition coil and spark plug.
∗2: Indicate the symptom occurring only in cold temperatures.
∗3: Ensure secure installation.
∗4: Check fuel injector, fuel pressure regulator and fuel filter.
∗5: Inspect for air leak in air intake system.