

SECTION

LAN

LAN SYSTEM

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PRECAUTIONS

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Precautions When Using CONSULT-II

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Use CONSULT-II CONVERTER when connecting CONSULT-II to data link connector.

CAUTION:

CAN communication does not function normally if CONSULT-II is used without connecting CONSULT-II CONVERTER.

Precautions for Trouble Diagnosis

BKS002A6

CAUTION:

- Never apply 7.0 V or more to the measurement terminal.
- Use a tester whose open terminal voltage is 7.0 V or less.
- Turn the ignition switch OFF and disconnect the battery cable from the negative terminal when checking the harness.

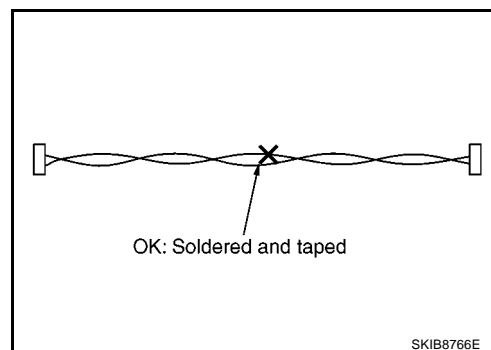
Precautions for Harness Repair

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- Solder the repaired area and wrap tape around the soldered area.

NOTE:

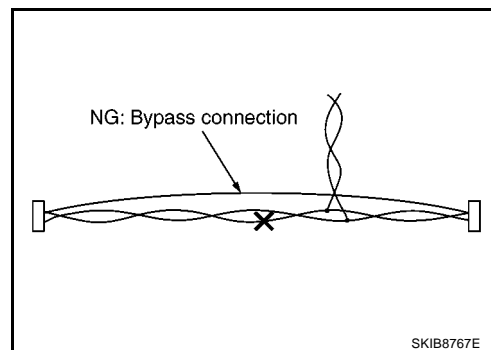
A fray of twisted lines must be within 110 mm (4.33 in).



- Bypass connection is never allowed at the repaired area.

NOTE:

Bypass connection may cause CAN communication error as spliced wires that are separate from the main line, or twisted lines that lose noise immunity.



- Replace the applicable harness as an assembly if error is detected on the shield lines of CAN communication line.

SYSTEM DESCRIPTION

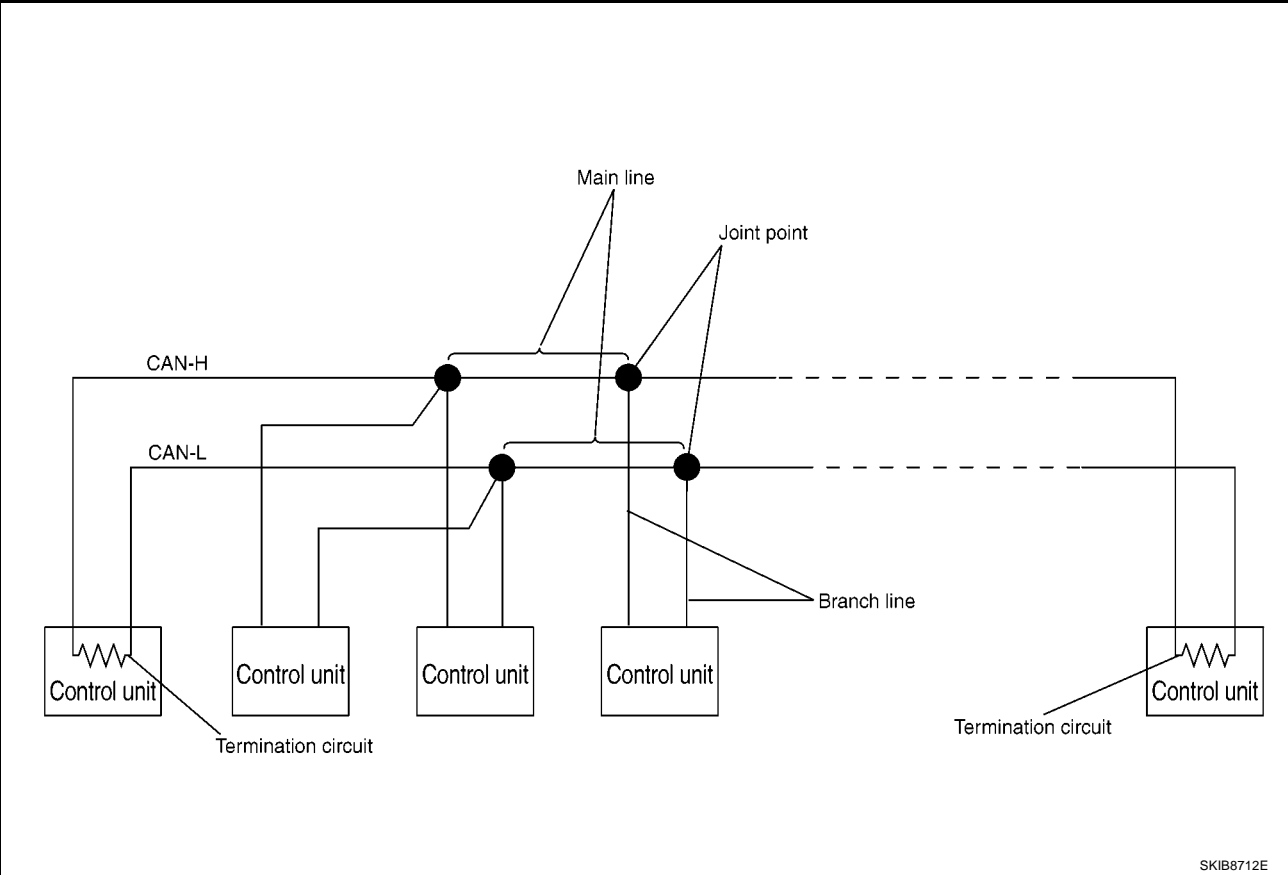
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CAN Communication System

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- CAN communication is a multiplex communication system. This enables it to transmit and receive many communication signals at high speed by connecting control units with two communication lines (CAN-H and CAN-L).
- Control units on the CAN network transmit signals with CAN communication control circuit in the control unit and receive only necessary signals from other control units for various controls.
- CAN communication lines adopt twisted-pair line style (two lines twisted) for noise immunity.

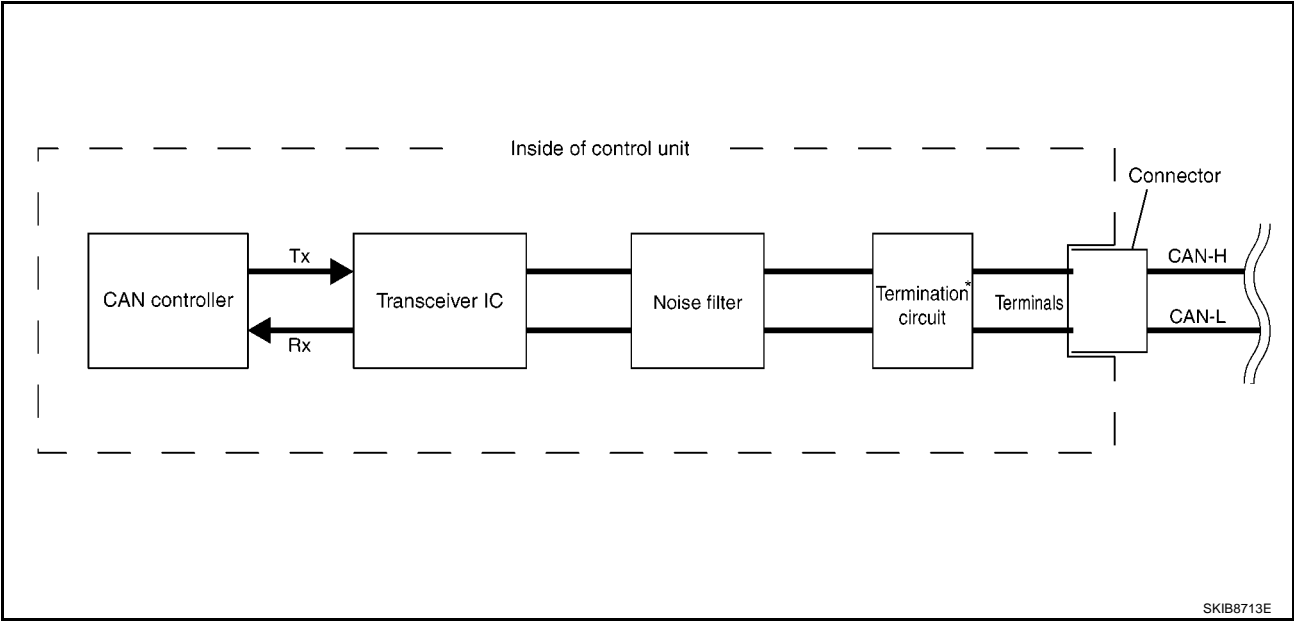
SYSTEM DIAGRAM



Each control unit passes an electric current to the termination circuits when transmitting CAN communication signal. The termination circuits produce an electrical potential difference between CAN-H and CAN-L. CAN communication system transmits and receives CAN communication signals by the potential difference.

Component	Description
Main line	CAN communication line between joint points
Branch line	CAN communication line between joint point and a unit
Joint point	A point connected a branch line with a main line
Termination circuit	Refer to LAN-4. "CAN COMMUNICATION CONTROL CIRCUIT" .

CAN COMMUNICATION CONTROL CIRCUIT



Component	System description
CAN controller	It controls CAN communication signal transmission and reception, error detection, etc.
Transceiver IC	It converts digital signal into CAN communication signal, and CAN communication signal into digital signal.
Noise filter	It eliminates noise of CAN communication signal.
Termination circuit* (Resistance of approx. 120 Ω)	It produces potential difference.

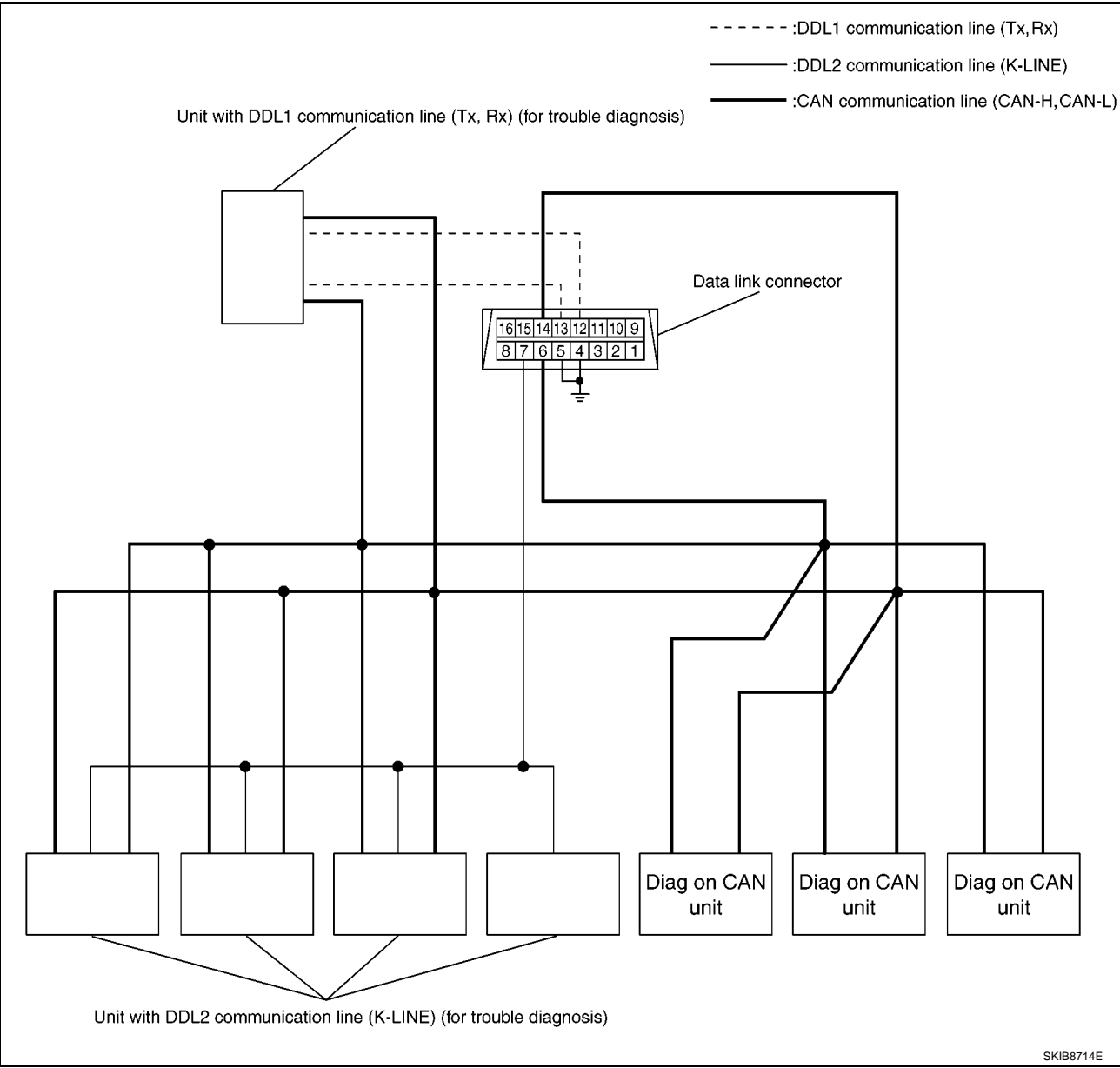
*: These are the only control units wired with both ends of CAN communication system.

Diag on CAN
DESCRIPTION

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“Diag on CAN” is a diagnosis using CAN communication instead of previous DDL1 and DDL2 communication line, between control unit and diagnosis unit.

SYSTEM DIAGRAM



Name	Harness	Description
DDL1	Tx Rx	It is used for trouble diagnosis. (CAN-H and CAN-L are used for controlling)
DDL2	K-LINE	It is used for trouble diagnosis. (CAN-H and CAN-L are used for controlling)
Diag on CAN	CAN-H CAN-L	It is used for trouble diagnosis and control.

TROUBLE DIAGNOSIS

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Condition of Error Detection

BKS002AA

“U1000” or “U1001” is indicated on SELF-DIAG RESULTS on CONSULT-II if CAN communication signal is not transmitted or received between units for 2 seconds or more.

CAN COMMUNICATION SYSTEM ERROR

- CAN communication line open (CAN-H, CAN-L, or both)
- CAN communication line short (ground, between CAN communication lines, other harnesses)
- Error of CAN communication control circuit of the unit connected to CAN communication line

WHEN INDICATED “U1000” OR “U1001” IS INDICATED EVEN THOUGH CAN COMMUNICATION SYSTEM IS NORMAL

- CONSULT-II CONVERTER not connected: Error may be detected by the self-diagnosis when not using CONSULT-II CONVERTER (depending on the control unit that performs CAN communication).
- Removal/installation of parts: Error may be detected when removing and installing CAN communication unit and related parts while turning the ignition switch ON. (A DTC except for CAN communication may be detected.)
- Fuse blown out (removed): CAN communication of the unit may cease.
- Voltage drop: Error may be detected if voltage drops due to discharged battery when turning the ignition switch ON (depending on the control unit that performs CAN communication).
- Error may be detected if the power supply circuit of the control unit, which performs CAN communication, malfunctions (depending on the control unit that performs CAN communication).
- Error may be detected if reprogramming is not completed normally.

CAUTION:

CAN communication system is normal if “U1000” or “U1001” is indicated on SELF-DIAG RESULTS of CONSULT-II under the above conditions. Erase the memory of the self-diagnosis of each unit.

Symptom When Error Occurs in CAN Communication System

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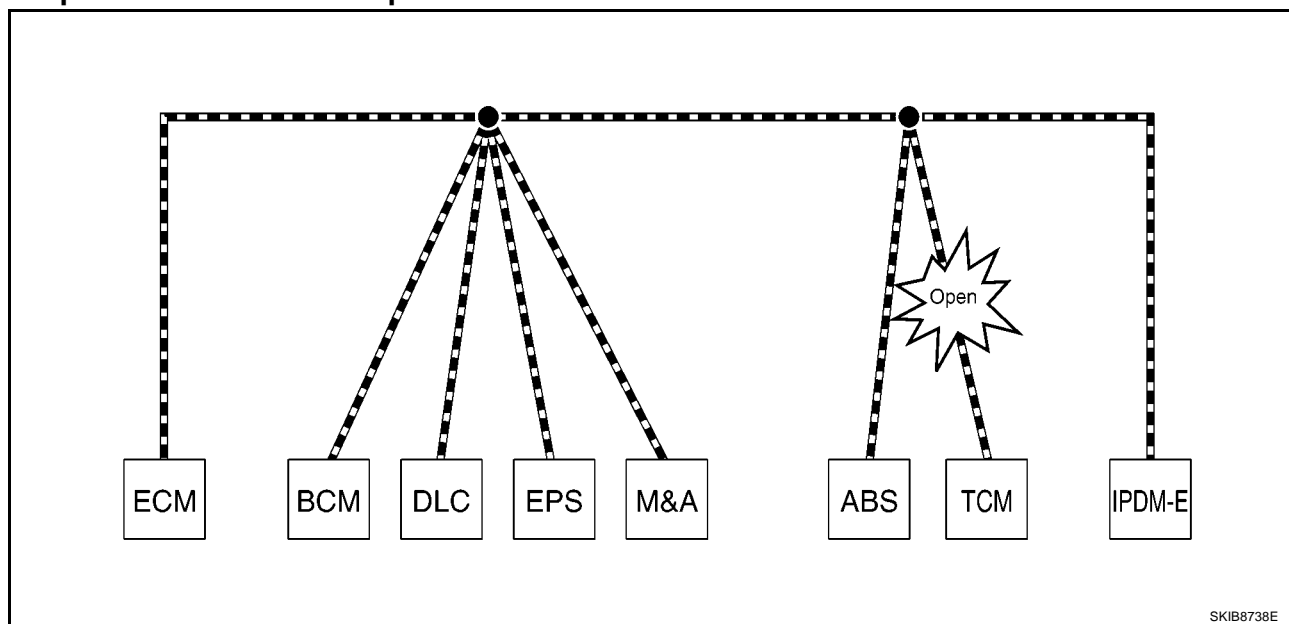
In CAN communication system, multiple units mutually transmit and receive signals. Each unit cannot transmit and receive signals if any error occurs on CAN communication line. Under this condition, multiple control units related to the root cause malfunction or start fail-safe mode.

ERROR EXAMPLE

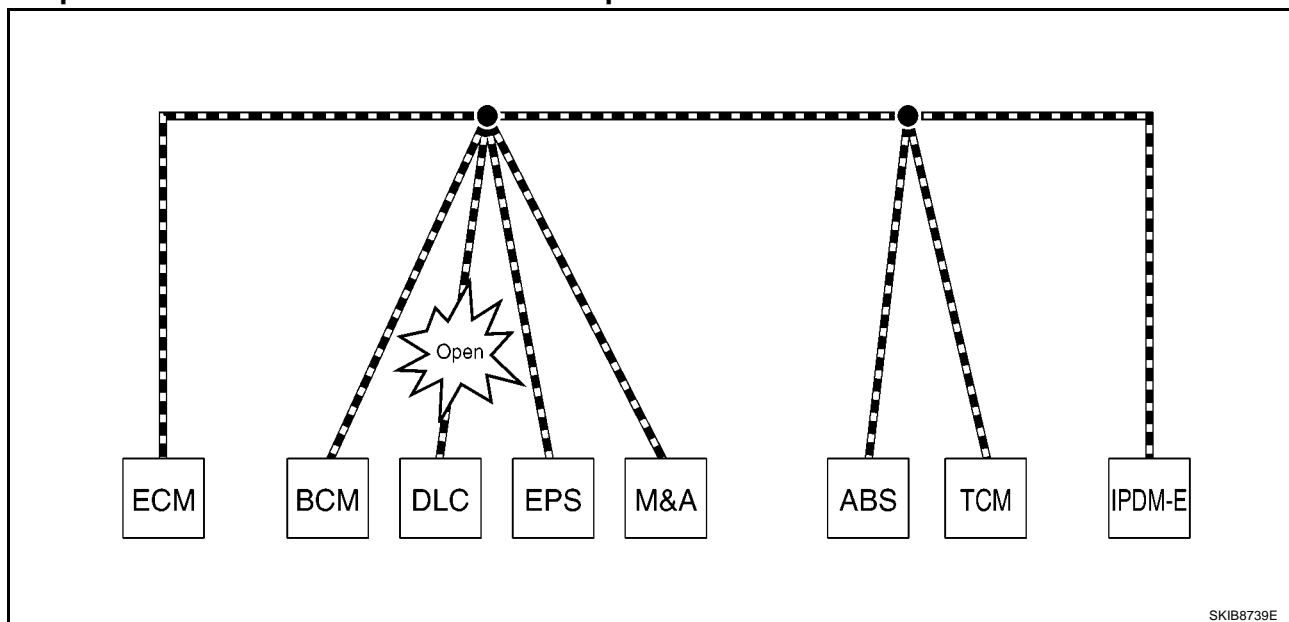
NOTE:

- Each vehicle differs in symptom of each unit under fail-safe mode and CAN communication line wiring.
- For abbreviations, refer to [LAN-40. "Abbreviation List"](#).

Example: TCM branch line open circuit



Unit name	Symptom
ECM	Engine torque, etc. get out of control, and shift shock increases.
BCM	Reverse warning chime does not sound.
EPS control unit	Normal operation.
Combination meter	<ul style="list-style-type: none"> Shift position indicator and OD OFF indicator turn OFF. Warning lamps turn ON.
ABS actuator and electric unit (control unit)	Normal operation.
TCM	No impact on operation.
IPDM E/R	Normal operation.

Example: Data link connector branch line open circuit

Unit name	Symptom
ECM	Normal operation.
BCM	
EPS control unit	
Combination meter	
ABS actuator and electric unit (control unit)	
TCM	
IPDM E/R	

CAUTION:

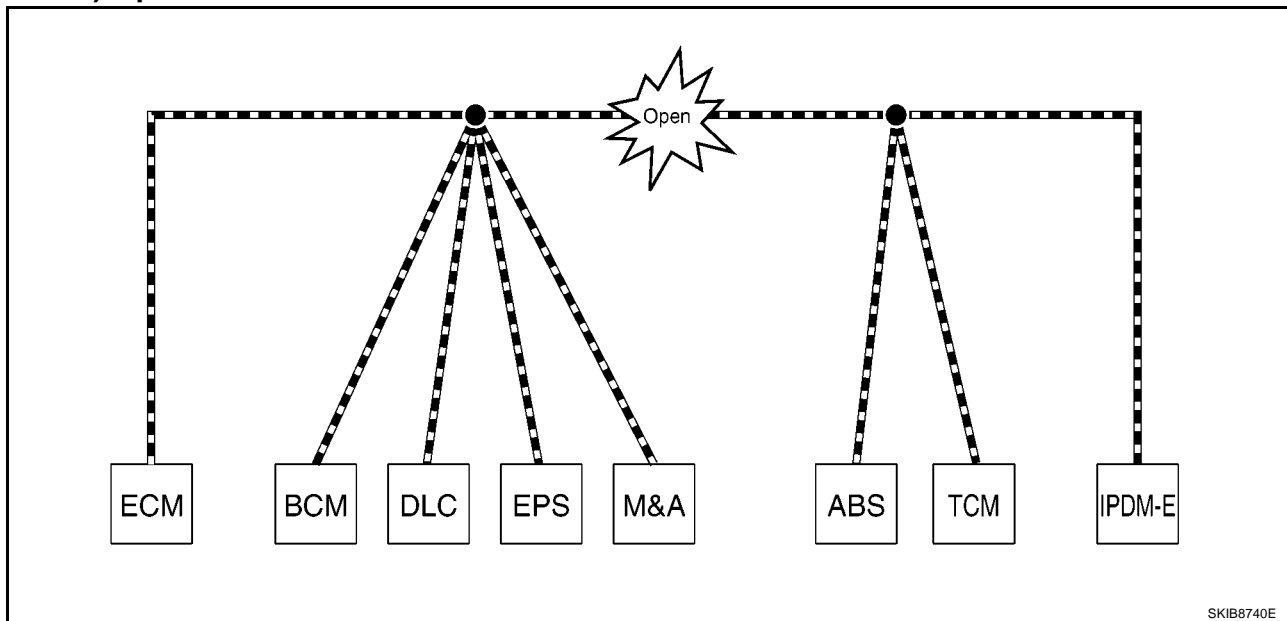
- When data link connector branch line is open, there is no influence on transmission and reception of CAN communication signals. Therefore, no symptoms occur. However, be sure to repair malfunctioning circuit.
- When data link connector branch line is open, screen-display of the CONSULT-II “SELECT SYSTEM” screen may be the same as the case when CAN communication line has short-circuit. However, symptoms differ depending on the case. See below and understand the differences. Do not misunderstand malfunctioning circuit.

	SELECT SYSTEM (CONSULT-II)	Difference of symptom
Data link connector branch line open circuit	All Diag on CAN units are not indicated.	Normal operation.
CAN-H, CAN-L harness short-circuit		Most the units which are connected to the CAN communication system enter fail-safe mode or are deactivated.

TROUBLE DIAGNOSIS

[CAN FUNDAMENTAL]

Example: Main Line Between Data Link Connector and ABS Actuator and Electric Unit (Control Unit) Open Circuit

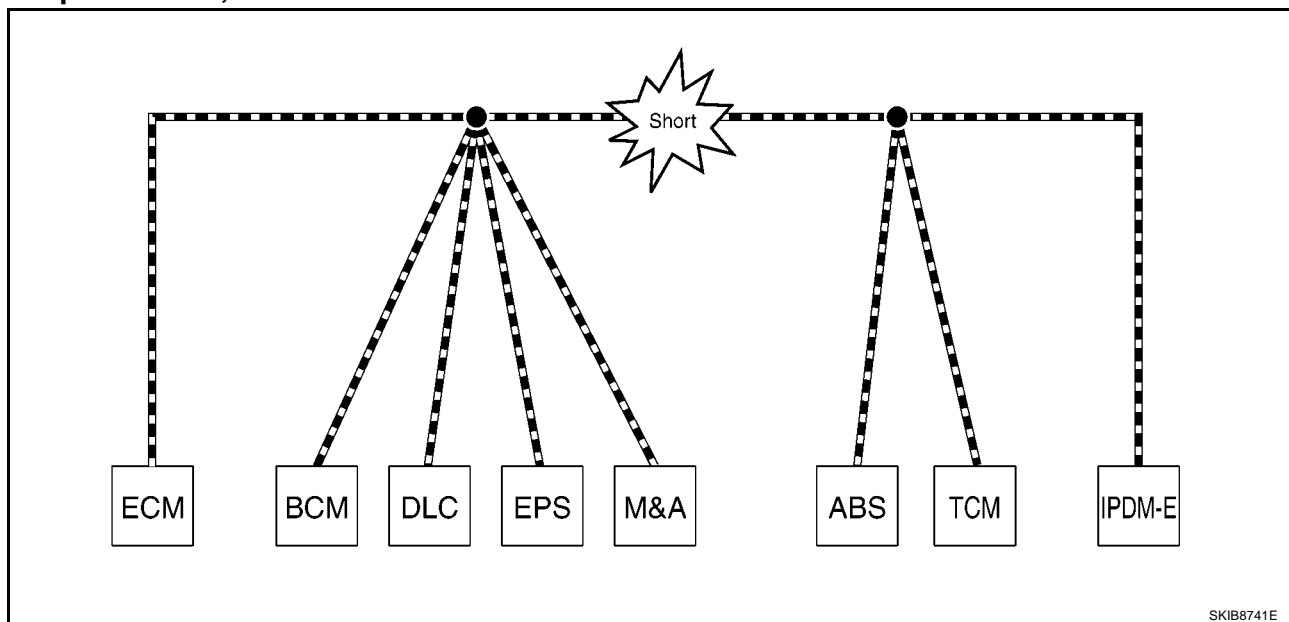


Unit name	Symptom
ECM	Engine torque, etc. get out of control, and shift shock increases.
BCM	<ul style="list-style-type: none"> Reverse warning chime does not sound. The front wiper moves under the continuous operation mode even though the front wiper switch turns to intermittent.
EPS control unit	The steering effort increases.
Combination meter	<ul style="list-style-type: none"> The shift position indicator and OD OFF indicator turn OFF. The speedometer continues indicating 0. The odo/trip meter stops.
ABS actuator and electric unit (control unit)	Normal operation.
TCM	No impact on operation.
IPDM E/R	When the ignition switch turns ON, <ul style="list-style-type: none"> The headlamps (Lo) turn ON. The cooling fan continues rotating.

TROUBLE DIAGNOSIS

[CAN FUNDAMENTAL]

Example: CAN-H, CAN-L Harness Short Circuit



Unit name	Symptom
ECM	<ul style="list-style-type: none"> ● Engine torque, etc. get out of control, and shift shock increases. ● Engine speed drops.
BCM	<ul style="list-style-type: none"> ● Reverse warning chime does not sound. ● The front wiper moves under the continuous operation mode even though the front wiper switch turns to intermittent. ● The room lamp does not turn ON. ● The engine does not start (if an error or malfunction occurs while turning the ignition switch is OFF.) ● The steering lock does not release (if an error or malfunction occurs while turning the ignition switch is OFF.)
EPS control unit	The steering effort increases.
Combination meter	<ul style="list-style-type: none"> ● The tachometer and the speedometer do not move. ● Warning lamps turn ON. ● Indicator lamps do not turn ON.
ABS actuator and electric unit (control unit)	Normal operation.
TCM	No impact on operation.
IPDM E/R	When the ignition switch turns ON, <ul style="list-style-type: none"> ● The headlamps (Lo) turn ON. ● The cooling fan continues rotating.

Self-Diagnosis

BKS002AC

DTC	Self-diagnosis item (CONSULT-II indication)	DTC detection condition	Inspection/Action
U1000	CAN COMM CIRCUIT	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) for 2 seconds or more.	Refer to LAN-14 , "TROUBLE DIAG- NOSES WORK FLOW" .
		When a control unit (except for ECM) is not transmitting or receiving CAN communication signal for 2 seconds or more.	
U1001	CAN COMM CIRCUIT	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission-related diagnosis) for 2 seconds or more.	
U1002	SYSTEM COMM	When a control unit is not transmitting or receiving CAN communication signal for 2 seconds or less.	Start the inspection. Refer to the applicable section of the indicated control unit.
U1010	CONTROL UNIT [CAN]	When detecting error during the initial diagnosis of CAN controller of each control unit.	Replace the control unit indicating "U1010".

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CAN Diagnostic Support Monitor

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CONSULT-II and CAN diagnostic support monitor (on-board diagnosis function) are used for detecting root cause.

MONITOR ITEM (CONSULT-II)

Example: CAN DIAG SUPPORT MNTR indication

Without PAST			With PAST		
SYSTEM	ENGINE		SYSTEM	ENGINE	
DATE			DATE		
P/#			P/#		
	PRSNT			PRSNT	PAST
INITIAL DIAG	OK		TRANSMIT DIAG	OK	OK
TRANSMIT DIAG	OK		VDC/TCS/ABS	-	-
TCM	OK		METER/M&A	OK	OK
VDC/TCS/ABS	UNKWN		BCM/SEC	OK	OK
METER/M&A	OK		ICC	-	-
ICC	UNKWN		HVAC	-	-
BCM/SEC	OK		TCM	OK	OK
IPDM E/R	OK		EPS	-	-
			IPDM E/R	OK	OK
			e4WD	-	-
			AWD/4WD	OK	OK

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Without PAST

Item	PRSNT	Description
Initial diagnosis	OK	Normal at present
	NG	Control unit error (Except for some control units)
Transmission diagnosis	OK	Normal at present
	UNKWN	Unable to transmit signals for 2 seconds or more.
		Diagnosis not performed
Control unit name (Reception diagnosis)	OK	Normal at present
	UNKWN	Unable to receive signals for 2 seconds or more.
		Diagnosis not performed
		No control unit for receiving signals. (No applicable optional parts)

With PAST

Item	PRSNT	PAST	Description
Transmission diagnosis	OK	OK	Normal at present and in the past
		1 – 39	Normal at present, but unable to transmit signals for 2 seconds or more in the past. (The number indicates the number of times the ignition switch is turned OFF to ON.)
	UNKWN	0	Unable to transmit signals for 2 seconds or more at present.
Control unit name (Reception diagnosis)	OK	OK	Normal at present and in the past
		1 – 39	Normal at present, but unable to receive signals for 2 seconds or more in the past. (The number indicates the number of times the ignition switch is turned OFF to ON.)
	UNKWN	0	Unable to receive signals for 2 seconds or more at present
	-	-	Diagnosis not performed.
			No control unit for receiving signals. (No applicable optional parts)

MONITOR ITEM (ON-BOARD DIAGNOSIS)**NOTE:**

- For some models, CAN communication diagnosis result is received from the vehicle monitor or A/C controller indicator. (CONSULT-II is not available.)
- Refer to “CAN Diagnostic Support Monitor” of “TROUBLE DIAGNOSIS”, “LAN SYSTEM” in applicable Service Manual for the details.

Example: Vehicle Display

Item	Result indicated	Error counter	Description
CAN_COMM (Initial diagnosis)	OK	0	Normal at present
	NG	1 – 50	Control unit error (The number indicates the amount of times that diagnosis was performed.)
CAN_CIRC_1 (Transmission diagnosis)	OK	0	Normal at present
	UNKWN	1 – 50	Unable to transmit for 2 seconds or more at present. (The number indicates the amount of times that diagnosis was performed.)
CAN_CIRC_2 – 9 (Reception diagnosis of each unit)	OK	0	Normal at present
	UNKWN	1 – 50	Unable to transmit for 2 seconds or more at present. (The number indicates the amount of times that diagnosis was performed.)
			Diagnosis not performed.
			No control unit for receiving signals. (No applicable optional parts)

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TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

TROUBLE DIAGNOSES WORK FLOW

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Information Needed for Trouble Diagnosis

BKS002AE

CAN communication system performs trouble diagnosis with the following tools.

Tool	Usage
Interview sheet	For filling in vehicle information and interview with customer.
Data sheet	For attaching CONSULT-II data or on-board diagnosis data.
Diagnosis sheet	For detecting the root cause. (Diagnosis sheet includes system diagram for every CAN system type)
SELECT SYSTEM (CONSULT-II)	For checking the condition of control units and the status of CAN communication.
SELF-DIAG RESULTS (CONSULT-II)	
CAN DIAG SUPPORT MNTR (CONSULT-II)	
CAN communication signal chart	For judging CAN communication signal between control units is normal or abnormal, by converting the customer interview information to transmission and reception of CAN communication signals.
Abbreviation list	For checking abbreviations in CAN communication signal chart and diagnosis sheet.

How to Use CAN Communication Signal Chart

BKS002AF

CAN communication signal chart lists up signals needed for trouble diagnosis. It is useful for detecting the root cause by finding a signal related to the symptom, and by checking transmission and reception unit.

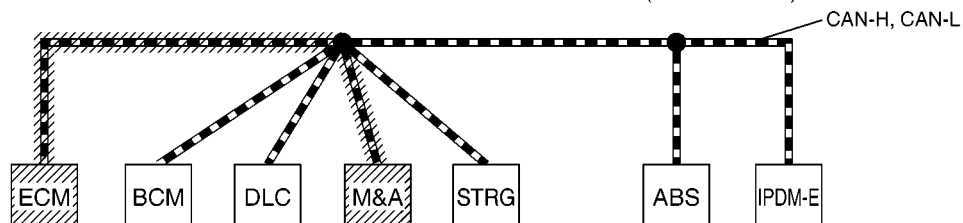
Example: Tachometer does not move even though the engine rotates.

T: Transmit R: Receive

Signal name/Connecting unit	ECM	BCM	M&A	STRG	ABS	IPDM-E
A/C compressor feedback signal	T		R			
A/C compressor request signal	T					R
Accelerator pedal position signal	T				R	
Cooling fan motor operation signal	T					R
Engine coolant temperature signal	T		R			
Engine speed signal	T		R		R	
Fuel consumption monitor signal	T		R			
Malfunction indicator lamp signal	T		R			
A/C switch signal	R	T				
Ignition switch signal		T				R
Sleep/wake up signal		T	R			R

No communication between ECM and M&A.

It indicates that an error occurs between ECM and M&A (Shaded area).



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Trouble Diagnosis Flow Chart

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Receiving vehicle

Interview with customer

- Interview with customer. (Since when? In which condition? What symptoms? etc.)

Check vehicle condition

- Check whether or not "U1000" or "U1001" is indicated on self-diagnosis results.
- Check whether or not it is reproduced error.

Check CAN system type

- Check CAN system type with CAN system type specification chart.

Create interview sheet

- Fill in interviewed items from customer on the interview sheet.

Create data sheet

- Print out CONSULT-II data (SELECT SYSTEM, SELF-DIAG RESULTS and CAN DIAG SUPPORT MNTR), and attach them to CONSULT-II data attachment sheet.
- Check the diagnosis result of CAN communication with on-board diagnosis function, and copy the item on on-board diagnosis copy sheet.

Create diagnosis sheet

- Print out applicable CAN system type diagnosis sheet.
- Make sure that all data is extracted.

Detect the root cause

- Detect the root cause with diagnosis sheet.

Inspection/Repair/Replacement

- Inspect the root cause and repair or replace the applicable parts.

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Trouble Diagnosis Procedure

INTERVIEW WITH CUSTOMER

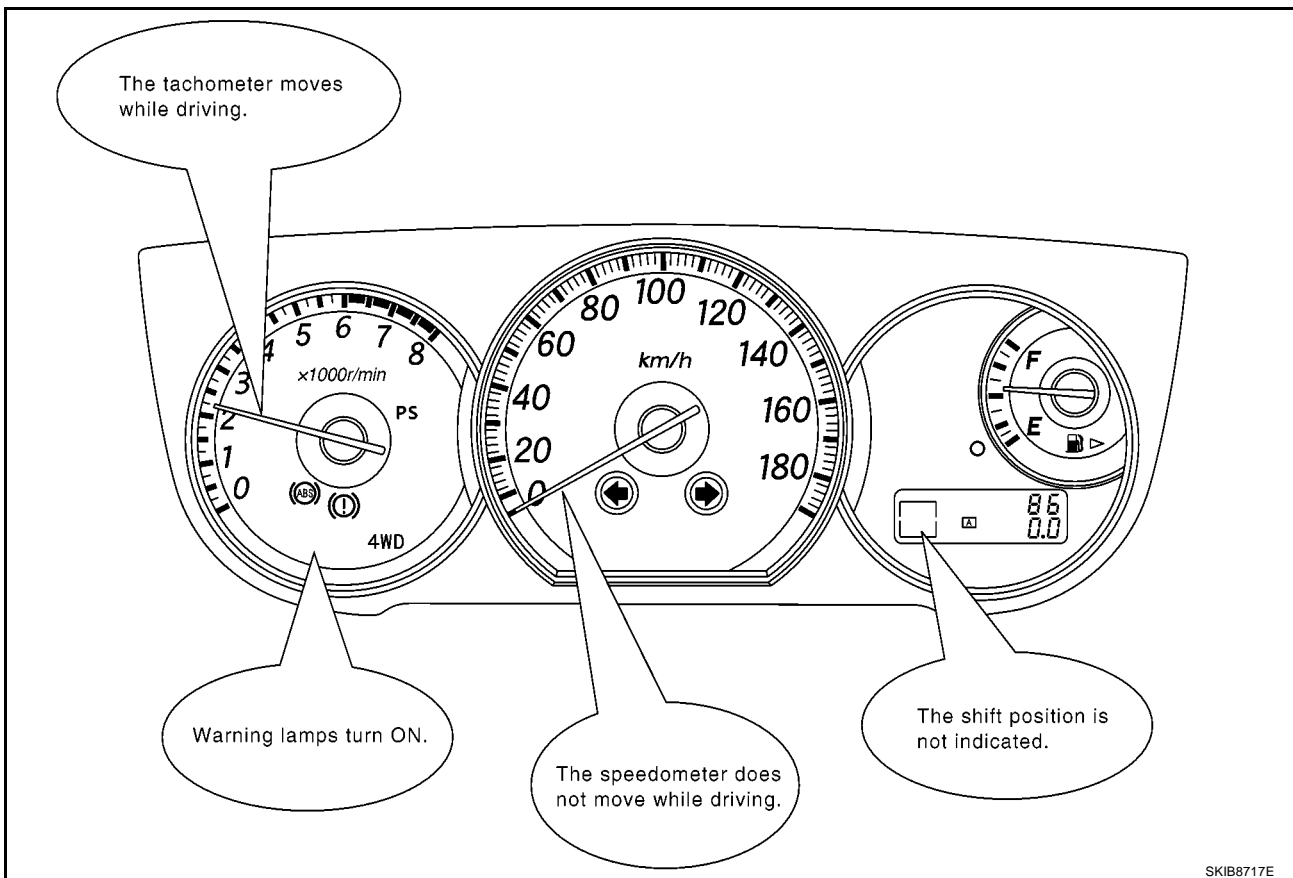
Interview with the customer is important to detect the root cause of CAN communication system. Grasp vehicle condition and symptom through the interview for proper trouble diagnosis.

Points in interview

- What: Parts name, System name
- When: Date, Frequency
- Where: Road condition, Place
- In what condition: Driving condition/environment
- Result: Symptom

NOTE:

- Check normal units as well as error symptoms.
- Example: Circuit between ECM and the combination meter is judged normal if the customer indicated tachometer functions normally.
- Multiple control units malfunction or enter fail-safe mode under CAN communication system error.
- Indication of the combination meter is important to detect the root cause because it is the most obvious from the customer, and it performs CAN communication with many units.



INSPECTION OF VEHICLE CONDITION

- Check whether or not “U1000” or “U1001” is indicated on “SELF-DIAG RESULTS” by CONSULT-II.

NOTE:

Root cause cannot be detected with procedure in this section if “U1000” or “U1001” is not indicated.

- Check whether the symptom is reproduced or not.

CAUTION:

- **Never turn the ignition switch OFF, and never disconnect the battery cable while the error is reproduced. Reproducing the error may stop, or the root cause cannot be detected.**
- **Check the trouble diagnosis procedure for detecting the root cause of CAN communication. The procedure for reproduced error differs from non-reproduced error's case. Refer to [LAN-24](#), **"DETECT THE ROOT CAUSE"**.**

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TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

CHECK OF CAN SYSTEM TYPE (HOW TO USE CAN SYSTEM TYPE SPECIFICATION CHART)

Check CAN system type from the vehicle equipment. Decide the diagnosis sheet.

NOTE:

CAN system type specification chart is divided for some vehicles (CAN system type is many).

CAN System Type Specification Chart (One sheet type)

NOTE:

CAN system type is easily checked with the vehicle equipment identification information under the chart.

Example:

If the vehicle equips Wagon, AWD, VQ35DE, CVT, VDC, and Intelligent Key system. (○ shows an example of CAN system type.)

CAN System Specification Chart

Check CAN system type from the following specification chart. Then decide diagnosis sheet.

Body type	Wagon					
Axle	2WD				AWD	
Engine	QR25DE		VQ35DE			
Transmission	A/T		CVT			
Brake control	ABS				VDC	
Intelligent Key system		X		X		X
CAN system type	1	2	3	4	5	6
Diagnosis sheet	(XX-XX)	(XX-XX)	(XX-XX)	(XX-XX)	(XX-XX)	(XX-XX)
CAN communication signal chart	XX-XX. "TYPE 1/TYPE 2"		XX-XX. "TYPE 3/TYPE 4"		XX-XX. "TYPE 5/TYPE 6"	

X : Applicable

Check the vehicle equipment with the vehicle identification number plate.

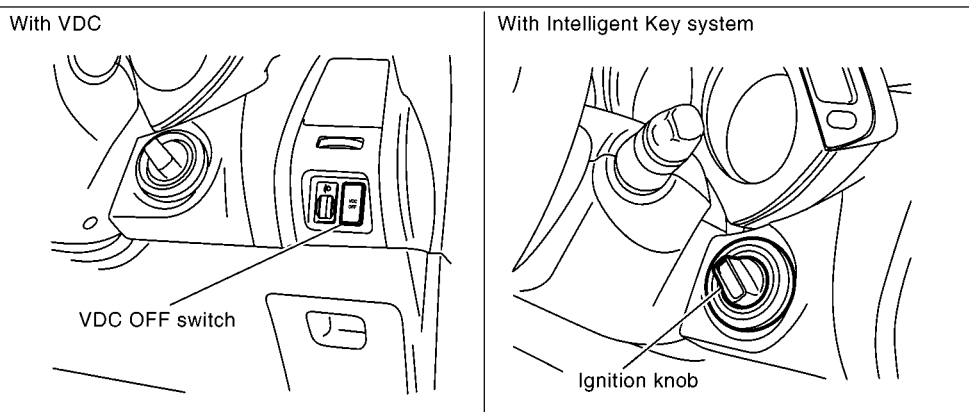
Check the vehicle equipment.

Which number is selected through the above?
The number is CAN system type of the vehicle.

VEHICLE EQUIPMENT IDENTIFICATION INFORMATION

NOTE:

Check CAN system type from the vehicle shape and equipment.



In the above example,

- Checking VDC OFF switch leads to judge whether or not VDC is equipped.
- Checking the ignition knob leads to judge whether or not Intelligent Key system is equipped.

For the above case, CAN system type is "6".

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TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

CAN System Type Specification Chart (Plural sheet type)

NOTE:

CAN system type is easily checked with the vehicle equipment identification information under the chart.

Example:

If the vehicle equips Sedan, 2WD, MR20DE, CVT, ABS, Active AFS, Intelligent Key system, Navigation system and Automatic drive positioner. (○ shows an example of CAN system type.)

CAN System Specification Chart

Refer to the specification chart as shown in the chart.

Body type	Sedan		
Axle	2WD		
Engine	HR15DE	MR20DE	HR15DE
Transmission	A/T	CVT	A/T
Brake control	ABS		
Specification chart	AAA SPECIFICATION CHART A	YYY SPECIFICATION CHART B	AAA SPECIFICATION CHART C

x: Applicable

Check the vehicle equipment with the vehicle identification number plate.
Check the vehicle equipment.
Select the vehicle equipment.
Refer to the specification chart.

SPECIFICATION CHART B

Check CAN system type from the following specification chart. Then decide diagnosis sheet.

Body type	Sedan																		
Axle	2WD																		
Engine	MR20DE																		
Transmission	CVT																		
Brake control	ABS																		
Active AFS		x			x	x			x	x								x	x
Intelligent Key system			x		x		x	x	x	x	x							x	x
Navigation system				x			x	x		x								x	x
Automatic drive positioner									x					x	x			x	x
CAN system type	9	10	11	12	13	14	15	16	17	18	19	20							
Diagnosis sheet	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX	AA: XX
CAN communication signal chart	XX-XX TYPE 9TYPE 10TYPE 11TYPE 12TYPE 13TYPE 14TYPE 15TYPE 16TYPE 17TYPE 18TYPE 19TYPE 20																		

x: Applicable

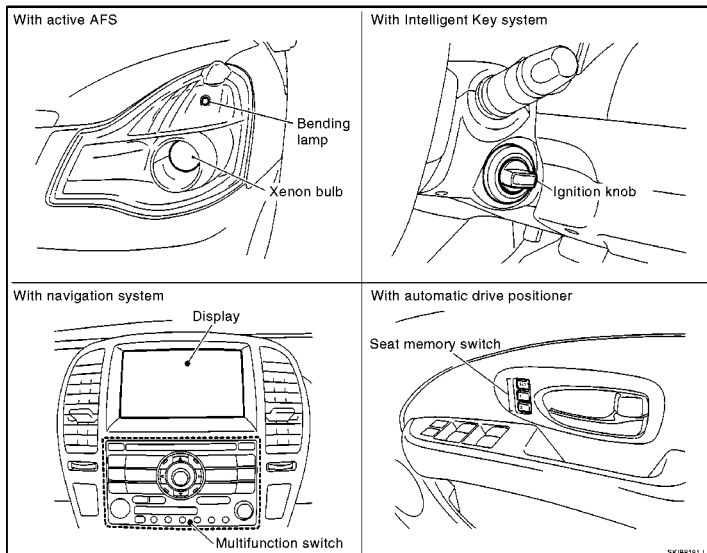
Check the vehicle equipment.

Which number is selected through the above?
The number is CAN system type of the vehicle.

VEHICLE EQUIPMENT IDENTIFICATION INFORMATION

NOTE:

Check CAN system type from the vehicle shape and equipment.



In the above example,

- Checking Xenon bulb and bending lamp lead to judge whether or not Active AFS is equipped.
- Checking the ignition knob leads to judge whether or not Intelligent Key system is equipped.
- Checking display and multifunction switch lead to judge whether or not Navigation system is equipped.
- Checking seat memory switch leads to judge whether or not Automatic drive positioner is equipped.

[For the above case, CAN system type is "20"]

SKIB8719E

CREATE INTERVIEW SHEET

Fill in the symptoms from interview with the customer, vehicle condition, and CAN system type on the interview sheet.

Interview Sheet (Example)**CAN Communication System Diagnosis Interview Sheet**

Receiving date: 3, Feb. 2005

Type: DBA-KG11

VIN No.: KG11-005040

Model: BDRARGZ397EDA-E-J-

First registration: 10, Jan. 2005

Mileage: 952 km

CAN system type: Type 19

Symptom (Results of interview with customer)

- Headlamps suddenly turn ON while driving the vehicle.
- The engine does not restart after stopping the vehicle and turning the ignition switch OFF.
- The cooling fan continues rotating while turning the ignition switch ON.

Condition at inspection

Error Symptom: Reproduced / Non-reproduced

- The engine does not start.
While turning the ignition switch ON,
- The headlamps (Lo) turn ON, and the cooling fan continues rotating.
 - The interior lamp does not turn ON.
- On CONSULT-II screen,
- IPDM E/R is not indicated on SELECT SYSTEM.
 - ENGINE: U1001
 - BCM, ADAPTIVE LIGHT: U1000

SKIB8720E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

CREATE DATA SHEET

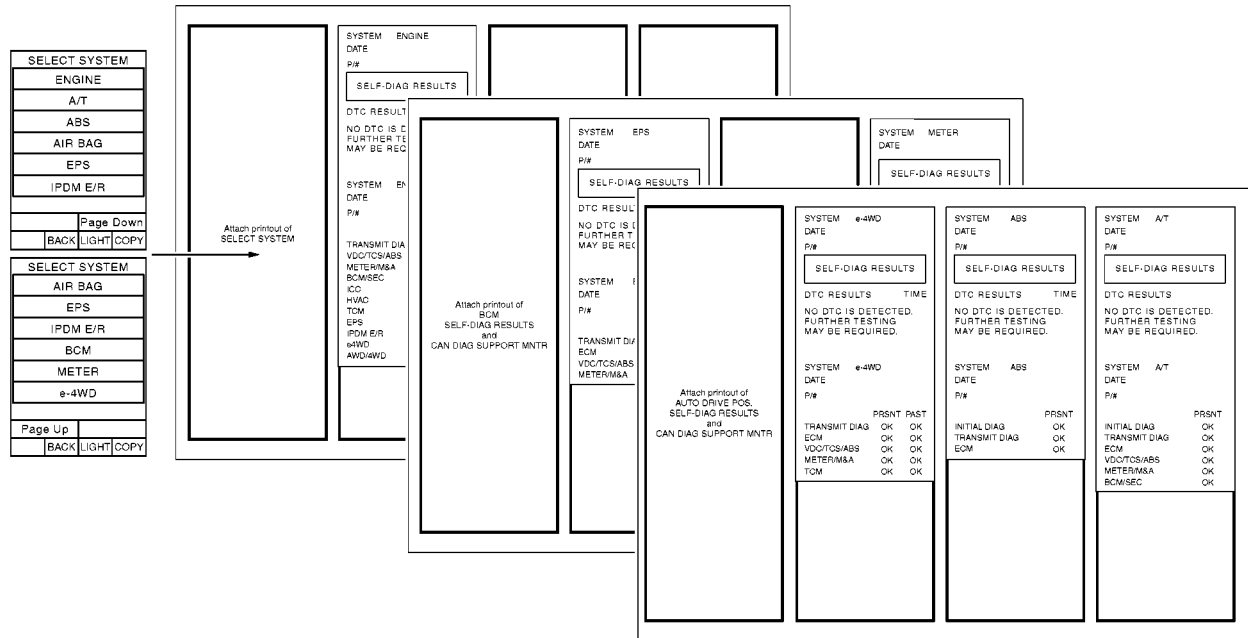
Create CONSULT-II Data Attachment Sheet

Print out the following CONSULT-II screens, and attach them to the CONSULT-II data attachment sheet.

- SELECT SYSTEM
- SELF-DIAG RESULTS
- CAN DIAG SUPPORT MNTR

NOTE:

Some items may not be needed according to CAN system type installed in the model.



Print out CONSULT-II data (SELECT SYSTEM, SELF-DIAG RESULTS and CAN DIAG SUPPORT MNTR), and attach them to CONSULT-II data attachment sheet.

SKIB8721E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

Create On-board Diagnosis Copy Sheet

Display the trouble diagnosis result of CAN communication with the on-board diagnosis function on the vehicle monitor, etc. Copy them on the on-board diagnosis copy sheet.

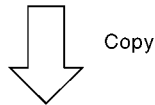
NOTE:

- For some models, CAN communication diagnosis result is received from the vehicle monitor or A/C controller indicator. (CONSULT-II is not available.)
- Refer to “CAN Diagnostic Support Monitor” of “TROUBLE DIAGNOSIS”, “LAN SYSTEM” in applicable Service Manual for the details.

Example: Copy the diagnosis result of CAN communication from the vehicle monitor.

Vehicle monitor indication

CAN DIAG SUPPORT MONITOR			Delete
CAN_COMM	OK	0	
CAN_CIRC_1	OK	0	
CAN_CIRC_2	UNKWN	12	
CAN_CIRC_3	UNKWN	12	
CAN_CIRC_4	UNKWN	0	
CAN_CIRC_5	OK	0	
CAN_CIRC_6	UNKWN	0	
CAN_CIRC_7	OK	0	
CAN_CIRC_8	UNKWN	0	
CAN_CIRC_9	UNKWN	50	



Vehicle monitor (Display control unit) CAN DIAG SUPPORT MONITOR copy sheet

Indication item (Diagnosis item)	Vehicle monitor		Indication item (Diagnosis item)	Vehicle monitor	
	Result indicated	Error counter		Result indicated	Error counter
CAN_COMM (Initial diagnosis)	OK	0	CAN_CIRC_5 (Receive diagnosis of Unified meter and A/C amp.)	OK	0
CAN_CIRC_1 (Transmit diagnosis)	OK	0	CAN_CIRC_6	Not available	
CAN_CIRC_2 (Receive diagnosis of BCM)	UNKWN	12	CAN_CIRC_7 (Receive diagnosis of IPDM E/R)	OK	0
CAN_CIRC_3 (Receive diagnosis of ECM)	UNKWN	12	CAN_CIRC_8	Not available	
CAN_CIRC_4	Not available		CAN_CIRC_9	Not available	

Result indicated: Fill in the indication (OK, NG or UNKWN).
Error counter: Fill in the indicated number.

SKIB8722E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

CREATE DIAGNOSIS SHEET

CAUTION:

Use the diagnosis sheet of decided CAN system type only.

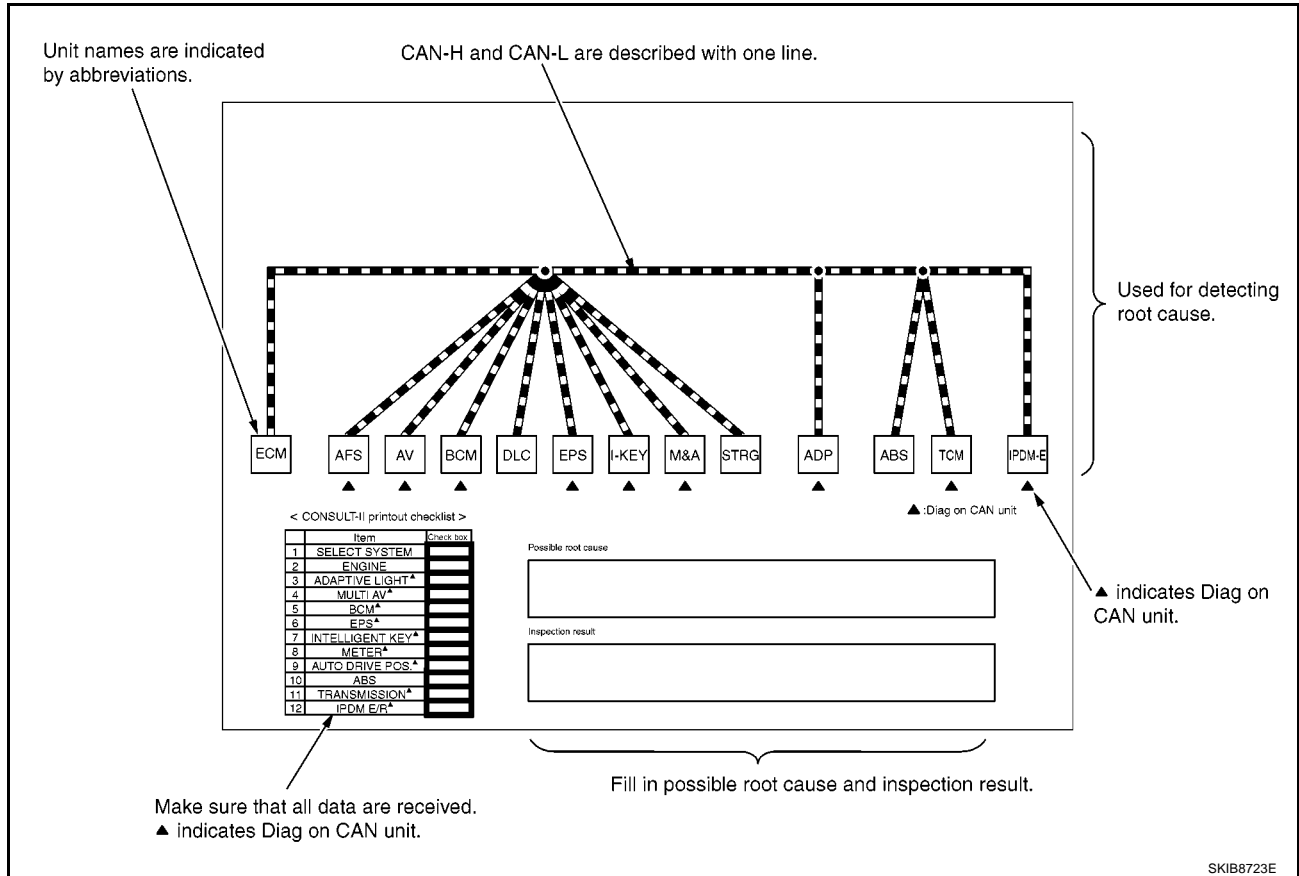
Print Out Diagnosis Sheet

Print out the diagnosis sheet of decided CAN system type.

Check of Received Data

Check the created data sheet for missing information or information not received.

- For abbreviations, refer to [LAN-40. "Abbreviation List"](#).



SKIB8723E

DETECT THE ROOT CAUSE

Identify the root cause according to the diagnosis sheet created.

Outline of identifying the root cause

- Draw a line on the possible cause according to the created diagnosis sheet. Narrow the search.

NOTE:

- Color-code when drawing lines.
- Do not draw a line onto a existing line.
- Drawing a line is not needed if the circuit is shorted. Each indication of the data sheet differs from that of the open circuit. Refer to [LAN-31, "Reproduced Error — Short Circuit —"](#) , [LAN-38, "Non-reproduced Error — Short Circuit —"](#) for the condition when the circuit is shorted.

Refer to the following for the details of the trouble diagnosis procedure.

- [LAN-25, "Reproduced Error — Open Circuit —"](#)
- [LAN-31, "Reproduced Error — Short Circuit —"](#)
- [LAN-32, "Non-reproduced Error — Open Circuit —"](#)
- [LAN-38, "Non-reproduced Error — Short Circuit —"](#)

CAUTION:

When the detected root cause is a branch line, or short-circuit, the control unit may have a malfunction, not the communication line. Be sure to check both communication line and the control unit.

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

Reproduced Error — Open Circuit —

Specify the error circuit through information of "SELECT SYSTEM" and "CAN DIAG SUPPORT MNTR".

1. SELECT SYSTEM: Check the items indicated in "SELECT SYSTEM". Draw a line on the error circuit.

CAUTION:

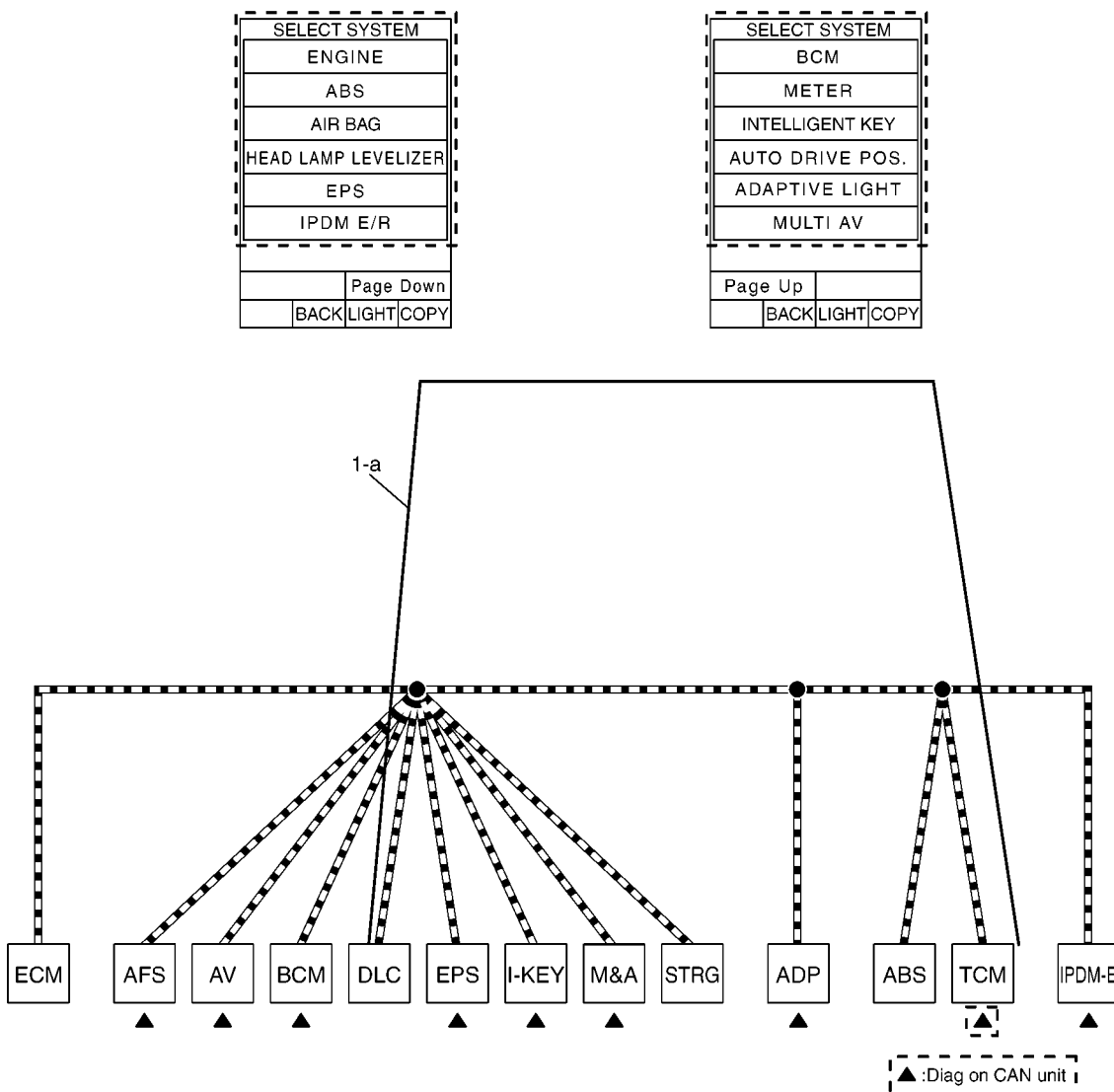
CAN communication line has no error if a unit except for Diag on CAN unit is not indicated. Power supply circuit, DDL1 communication line or DDL2 communication line may be malfunctioning.

- a. "TCM" is not indicated on "SELECT SYSTEM" which is Diag on CAN unit. This means DLC does not receive the signal from TCM. Draw a line between DLC and TCM (line 1-a in the figure).

NOTE:

- The name of Diag on CAN unit is not indicated on "SELECT SYSTEM" when CAN line between Diag on CAN unit and the data link connector is open circuit.
- For description of Diag on CAN, refer to [LAN-5, "Diag on CAN"](#).

(Example)



SKIB8724E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

2. CAN DIAG SUPPORT MNTR: Check each item on "CAN DIAG SUPPORT MNTR". Draw a line on the error circuit.
- a. Reception item of "ENGINE": On "TCM", "UNKWN" is indicated. This means ECM cannot receive the signal from TCM. Draw a line between ECM and TCM (line 2-a in the figure).

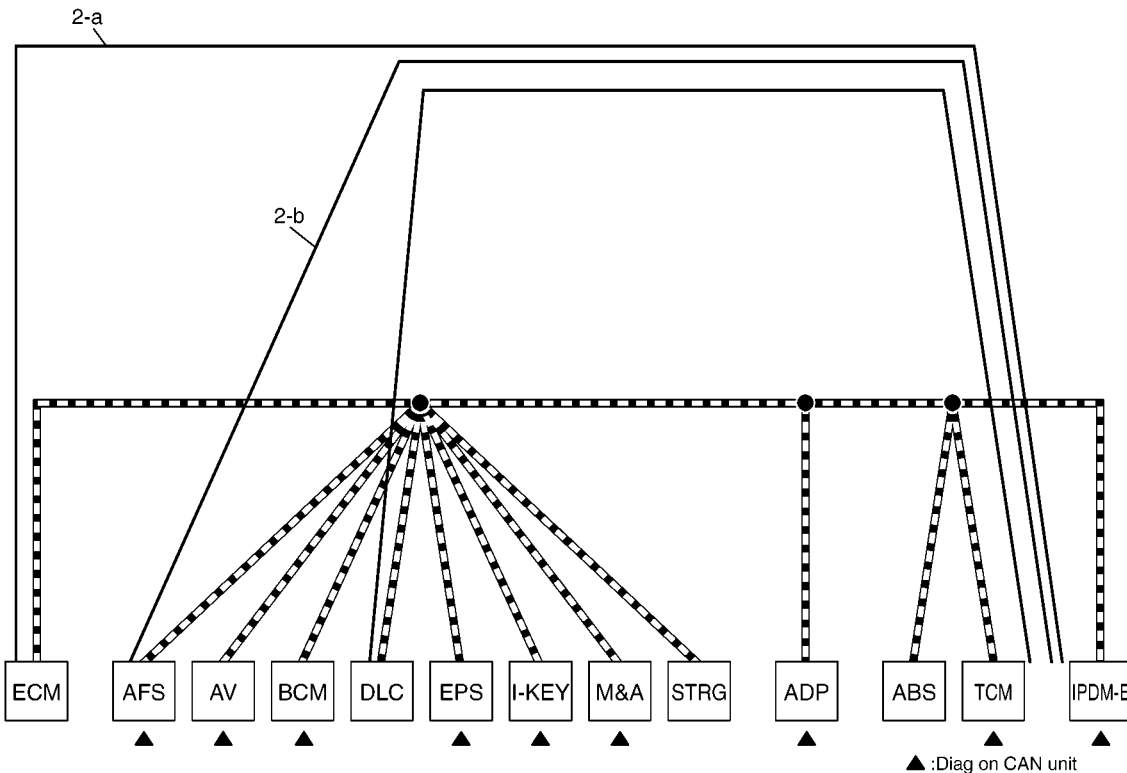
NOTE:

If "UNKWN" is indicated on "TRANSMIT DIAG", then the control unit cannot transmit CAN communication signal to each unit. Draw a line between the control unit and the joint point.

- b. Reception item of "ADAPTIVE LIGHT": On "TCM", "UNKWN" is indicated. This means AFS cannot receive the signal from TCM. Draw a line between AFS and TCM (line 2-b in the figure).
- c. Reception item of "MULTI AV": "UNKWN" is not indicated. This means that the AV can communicate normally with the units in the receiving items of AV. Do not draw any line.

(Example)

SYSTEM ENGINE			SYSTEM ADAPTIVE LIGHT			SYSTEM MULTI AV		
DATE			DATE			DATE		
P/#	PRSNT	PAST	P/#	PRSNT	PAST	P/#	PRSNT	PAST
TRANSMIT DIAG	OK	OK	TRANSMIT DIAG	-	-	TRANSMIT DIAG	-	-
VDC/TCS/ABS	OK	OK	ECM	OK	OK	ECM	OK	OK
METER/M&A	-	-	METER/M&A	OK	OK	METER/M&A	OK	OK
BCM/SEC	OK	OK	TCM	UNKWN	0	BCM/SEC	-	-
ICC	-	-	STRG	OK	OK	HVAC	-	-
HVAC	-	-	EPS	-	-	IPDM E/R	-	-
TCM	UNKWN	0	IPDM E/R	OK	OK	TIRE-P	-	-
EPS	OK	OK						
IPDM E/R	OK	OK						
e4WD	-	-						
AWD/4WD	-	-						



SKIB8725E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

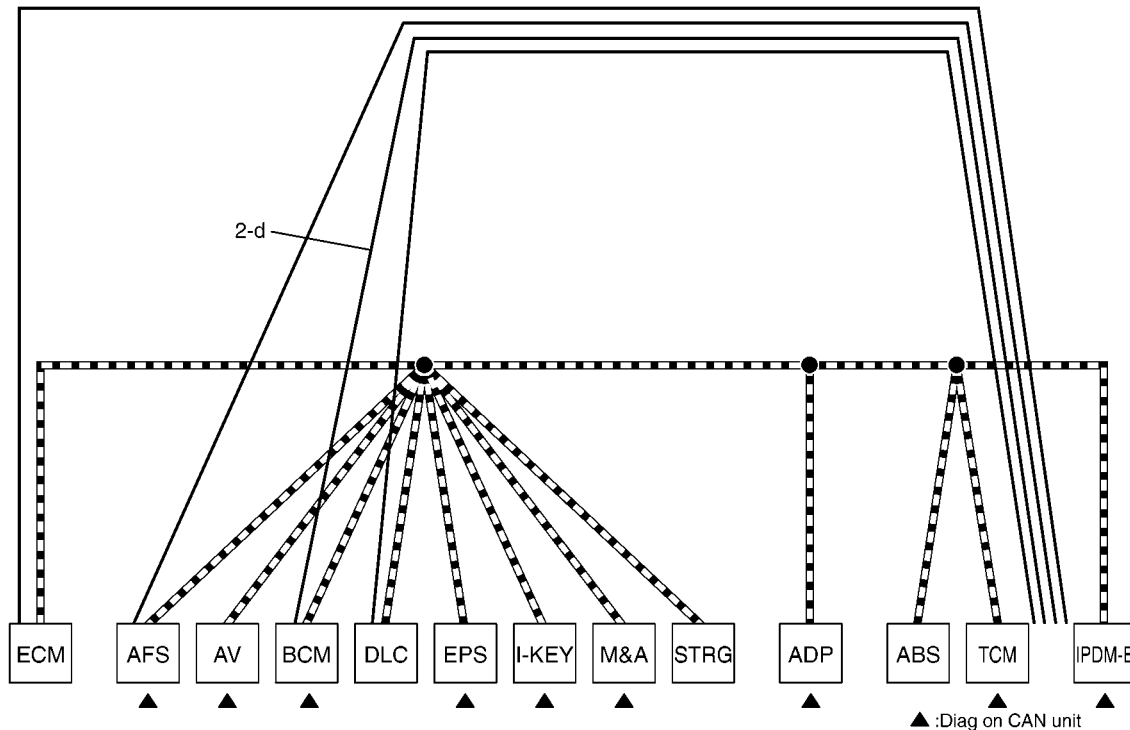
- Reception item of "BCM": On "TCM", "UNKWN" is indicated. This means BCM cannot receive the signal from TCM. Draw a line between BCM and TCM (line 2-d in the figure).
- Reception item of "EPS" and "INTELLIGENT KEY": "UNKWN" is not indicated. This means that the EPS and I-KEY can communicate normally with the units in the receiving items of EPS and I-KEY. Do not draw any line.

NOTE:

On CAN DIAG SUPPORT MNTR (without PAST), "UNKWN" is indicated even though the item is not used in the trouble diagnosis. For the details of each item on CAN diagnostic support monitor, refer to [LAN-43, "CAN Diagnostic Support Monitor"](#).

(Example)

SYSTEM	BCM		SYSTEM	EPS		SYSTEM	INTELLIGENT KEY	
DATE			DATE			DATE		
P/#	PRSNT	PAST	P/#	PRSNT		P/#	PRSNT	PAST
TRANSMIT DIAG	OK	OK	TRANSMIT DIAG	OK		TRANSMIT DIAG	OK	OK
ECM	OK	OK	ECM	OK		ECM	OK	OK
METER/M&A	OK	OK	VDC/TCS/ABS	OK		METER/M&A	OK	OK
TCM	UNKWN	0	METER/M&A	OK		BCM/SEC	OK	OK
MULTI AV	-	-						
IPDM E/R	OK	OK						
I-KEY	OK	OK						

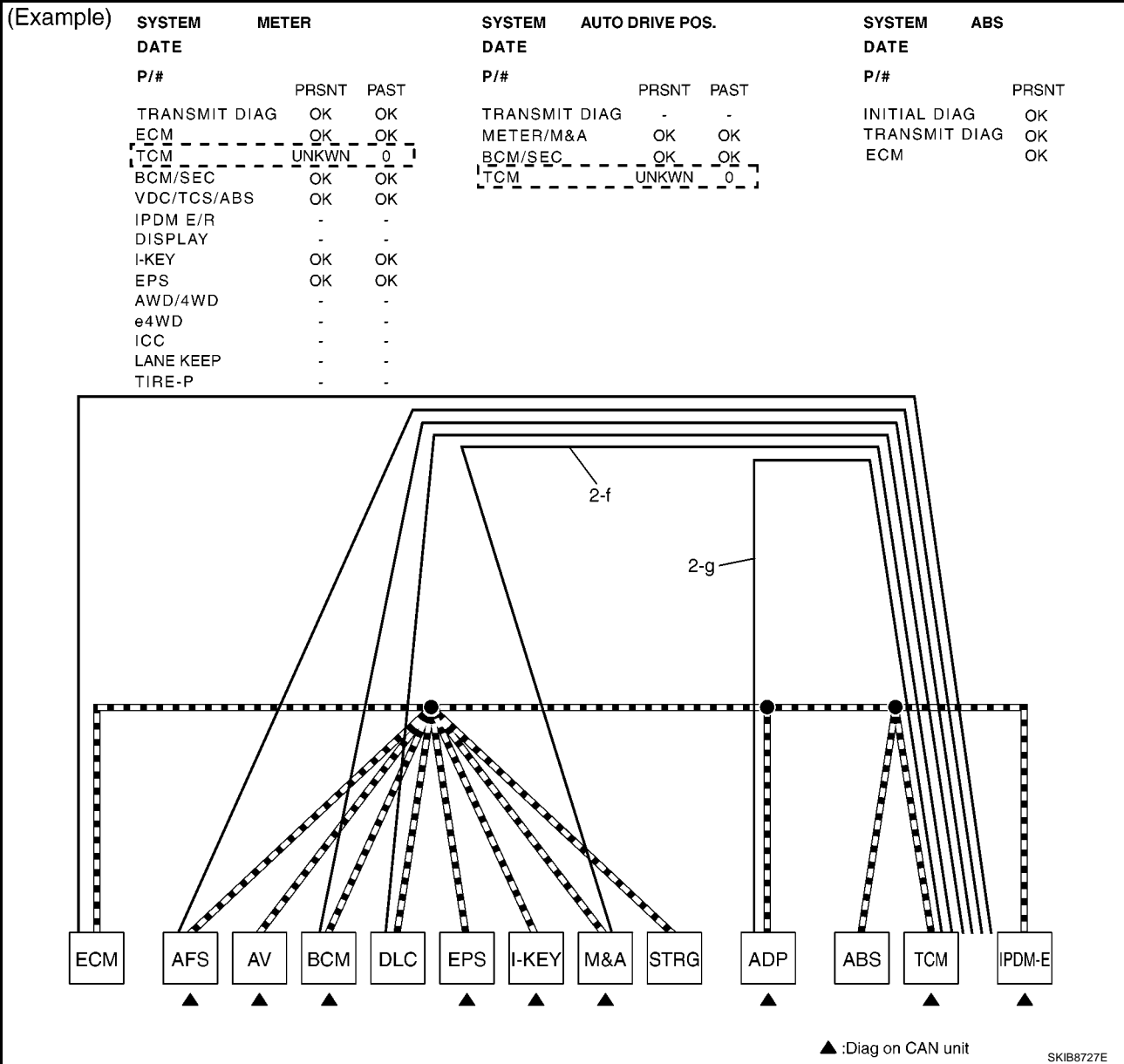


SKIB8726E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

- Reception item of "METER": On "TCM", "UNKWN" is indicated. This means M&A cannot receive the signal from TCM. Draw a line between M&A and TCM (line 2-f in the figure).
- Reception item of "AUTO DRIVE POS.": On "TCM", "UNKWN" is indicated. This means ADP cannot receive the signal from TCM. Draw a line between ADP and TCM (line 2-g in the figure).
- Reception item of "ABS": "UNKWN" is not indicated. This means that the ABS can communicate normally with the units in the receiving items of ABS. Do not draw any line.



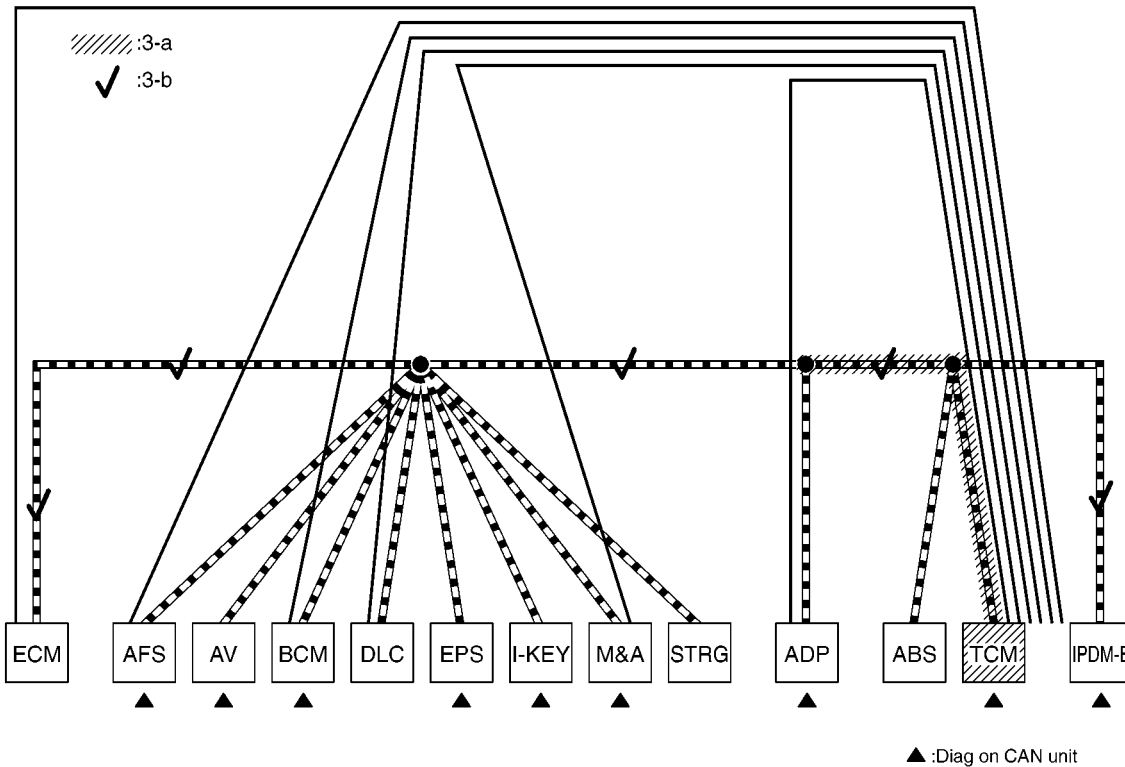
TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

- i. Reception item of "IPDM E/R": "UNKWN" is not indicated. This means that the IPDM-E can communicate normally with the units in the receiving items of IPDM-E. Do not draw any line.
3. Check the normal CAN communication line from "CAN DIAG SUPPORT MNTR" of the control units (ECM and IPDM-E), which connects to both ends of CAN communication system.
 - a. Through the previous procedure, the circuit between ADP joint point and TCM has the most amount of lines (shade 3-a in the figure).
 - b. Check the normal lines to detect the error circuit. Reception item of "IPDM E/R": On "ECM", "OK" is indicated. IPDM-E communicates normally with ECM. Put a check mark on the normal circuit between ECM and IPDM-E (check mark 3-b in the figure).

(Example)

SYSTEM DATE	IPDM E/R	
	PRSNT	PAST
TRANSMIT DIAG	OK	OK
ECM	OK	OK
BCM/SEC	OK	OK



SKIB8728E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

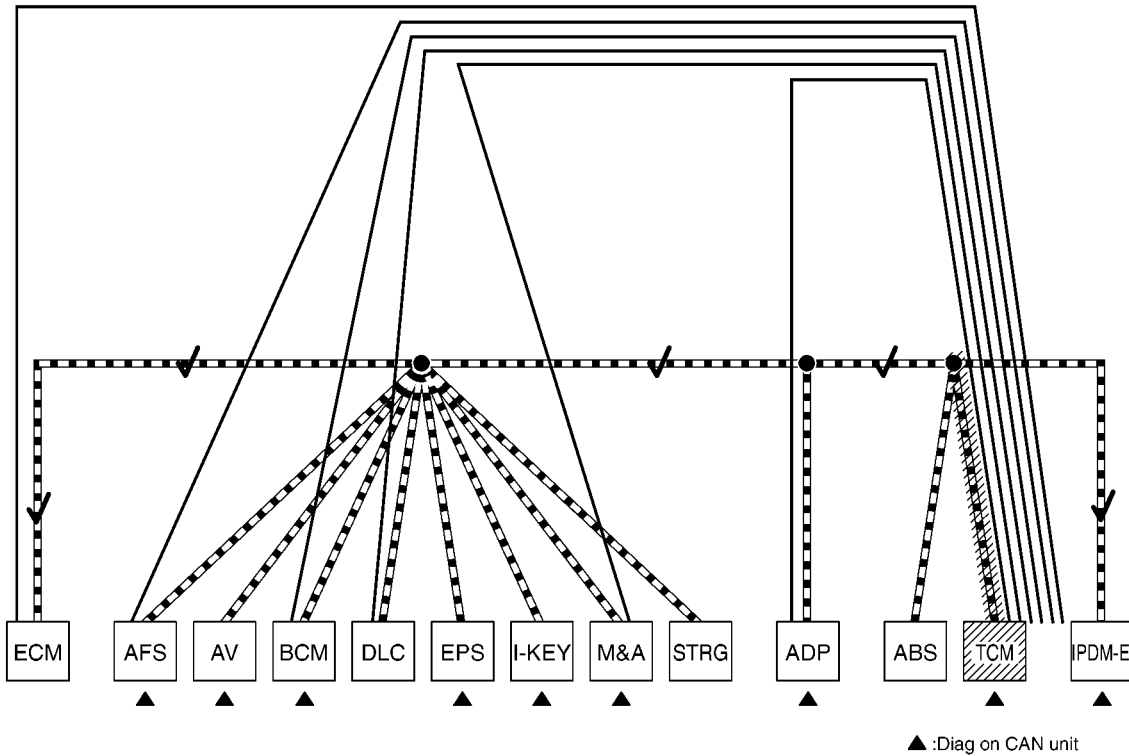
- Through the above procedure, the error is detected at TCM branch line (shaded in the figure).

NOTE:

For abbreviations, refer to [LAN-40, "Abbreviation List"](#).

- Perform the inspection for the detected error circuit. For the inspection procedure, refer to [LAN-53, "Mal-function Area Chart"](#).

(Example)



< CONSULT-II printout checklist >

	Item	Check box
1	SELECT SYSTEM	<input checked="" type="checkbox"/>
2	ENGINE	<input checked="" type="checkbox"/>
3	ADAPTIVE LIGHT [▲]	<input checked="" type="checkbox"/>
4	MULTI AV [▲]	<input checked="" type="checkbox"/>
5	BCM [▲]	<input checked="" type="checkbox"/>
6	EPS [▲]	<input checked="" type="checkbox"/>
7	INTELLIGENT KEY [▲]	<input checked="" type="checkbox"/>
8	METER [▲]	<input checked="" type="checkbox"/>
9	AUTO DRIVE POS. [▲]	<input checked="" type="checkbox"/>
10	ABS	<input checked="" type="checkbox"/>
11	TRANSMISSION [▲]	N-IDC
12	IPDM E/R [▲]	<input checked="" type="checkbox"/>

Possible root cause

- Error between TCM and joint point.
- Error in TCM.

Inspection result

SKIB8729E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

Non-reproduced Error — Open Circuit —

Check CAN communication signal chart according to SELF-DIAG RESULTS, CAN DIAG SUPPORT MNTR, and the interview with the customer. Detect the errors that occurred in the past.

- SELF-DIAG RESULTS: Check the unit indicating "U1000" or "U1001" on SELF-DIAG RESULTS.

(Example)

SYSTEM ENGINE
DATE

P/#

SELF-DIAG RESULTS

DTC RESULTS TIME

CAN COMM CIRCUIT 1t
[U1001]

SYSTEM ADAPTIVE LIGHT
DATE

P/#

SELF-DIAG RESULTS

DTC RESULTS TIME

NO DTC IS DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SYSTEM MULTI AV
DATE

P/#

SELF-DIAG RESULTS

DTC RESULTS TIME

NO DTC IS DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SYSTEM BCM
DATE

P/#

SELF-DIAG RESULTS

DTC RESULTS TIME

NO DTC IS DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SYSTEM EPS
DATE

P/#

SELF-DIAG RESULTS

DTC RESULTS TIME

CAN COMM CIRCUIT PAST
[U1000]

SYSTEM INTELLIGENT KEY
DATE

P/#

SELF-DIAG RESULTS

DTC RESULTS TIME

NO DTC IS DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SYSTEM METER
DATE

P/#

SELF-DIAG RESULTS

DTC RESULTS TIME

CAN COMM CIRCUIT 3
[U1000]

SYSTEM AUTO DRIVE POS.
DATE

P/#

SELF-DIAG RESULTS

DTC RESULTS TIME

NO DTC IS DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SYSTEM ABS
DATE

P/#

SELF-DIAG RESULTS

DTC RESULTS TIME

CAN COMM CIRCUIT 3
[U1000]

SYSTEM TRANSMISSION
DATE

P/#

SELF-DIAG RESULTS

DTC RESULTS TIME

CAN COMM CIRCUIT 3
[U1000]

SYSTEM IPDM E/R
DATE

P/#

SELF-DIAG RESULTS

DTC RESULTS TIME

NO DTC IS DETECTED.
FURTHER TESTING
MAY BE REQUIRED.

SKIB8731E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

2. CAN DIAG SUPPORT MNTR (with PAST): Check the CAN DIAG SUPPORT MNTR (with PAST) of units indicating "U1000" or "U1001" on SELF-DIAG RESULTS. Draw a line on the possible cause.

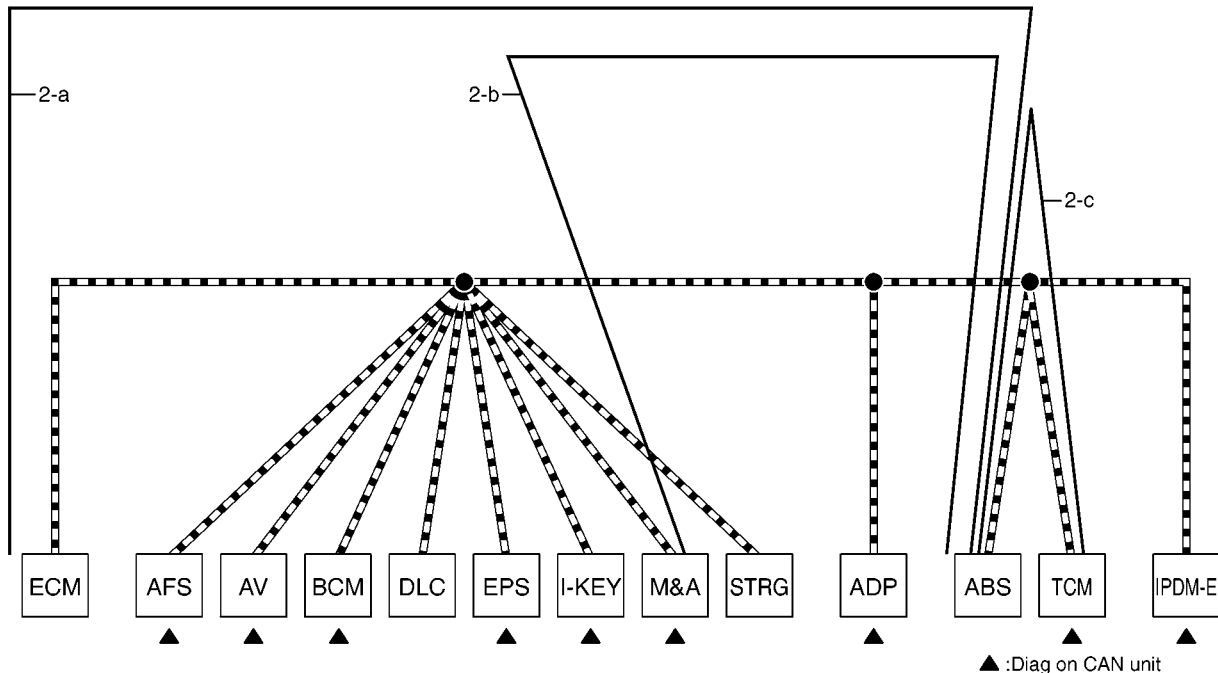
NOTE:

For the details of each indication on CAN DIAG SUPPORT MNTR, refer to [LAN-43, "CAN Diagnostic Support Monitor"](#).

- a. Reception item of "ENGINE": On "VDC/TCS/ABS", "3" is indicated in the "PAST". This means ECM could not receive the signal from ABS in the past. Draw a line between ECM and ABS (line 2-a in the figure).
- b. Reception item of "METER": On "VDC/TCS/ABS", "3" is indicated in the "PAST". This means M&A could not receive the signal from ABS in the past. Draw a line between M&A and ABS (line 2-b in the figure).
- c. Reception item of "TRANSMISSION": On "VDC/TCS/ABS", "3" is indicated in the "PAST". This means TCM could not receive the signal from ABS in the past. Draw a line between TCM and ABS (line 2-c in the figure).

(Example)

SYSTEM DATE P/#	ENGINE	SYSTEM DATE P/#	METER	SYSTEM DATE P/#	TRANSMISSION
	PRSENT PAST		PRSENT PAST		PRSENT PAST
TRANSMIT DIAG	OK OK	TRANSMIT DIAG	OK OK	TRANSMIT DIAG	OK OK
VDC/TCS/ABS	OK 3	ECM	OK OK	ECM	OK OK
METER/M&A	- -	TCM	OK OK	VDC/TCS/ABS	OK 3
BCM/SEC	OK OK	BCM/SEC	OK OK	METER/M&A	OK OK
ICC	- -	VDC/TCS/ABS	OK 3	BCM/SEC	OK OK
HVAC	- -	IPDM E/R	- -	ICC	- -
TCM	OK OK	DISPLAY	- -	e4WD	- -
EPS	OK OK	I-KEY	OK OK	AWD/4WD	- -
IPDM E/R	OK OK	EPS	OK OK		
e4WD	- -	AWD/4WD	- -		
AWD/4WD	- -	e4WD	- -		
		ICC	- -		
		LANE KEEP	- -		
		TIRE-P	- -		



SKIB8732E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

3. CAN DIAG SUPPORT MNTR (without PAST): Check the CAN DIAG SUPPORT MNTR (without PAST) of units indicating "U1000" or "U1001" on SELF-DIAG RESULTS. Draw a line on the possible cause.

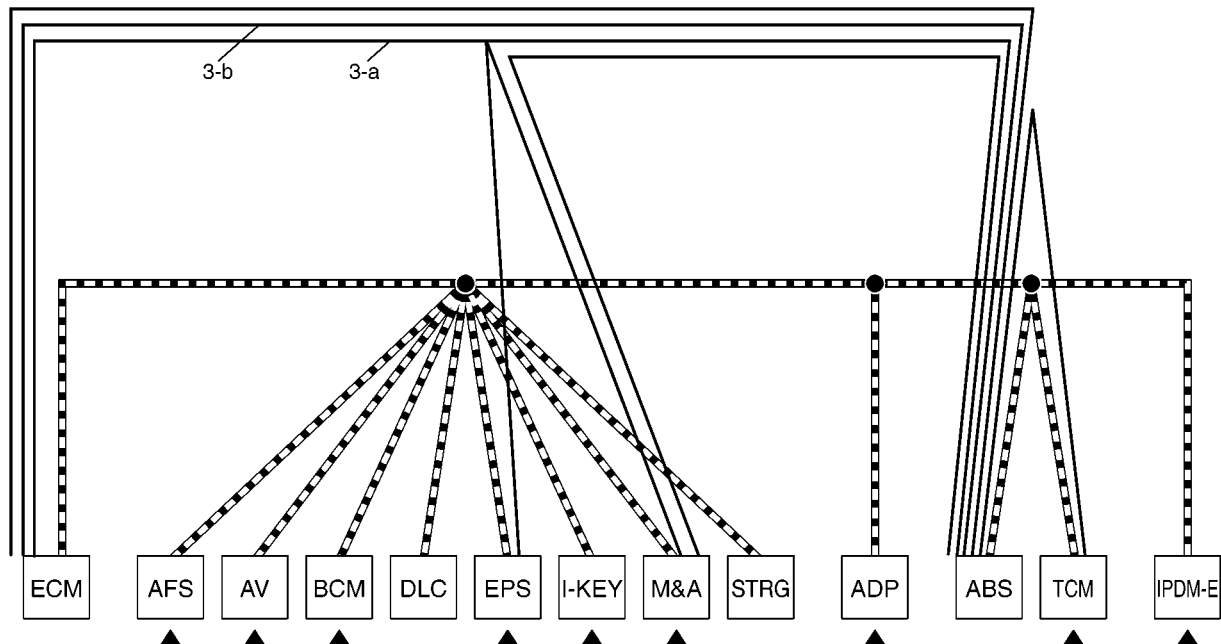
NOTE:

- While an error occurred in the past according to SELF-DIAG RESULTS, it is unclear which signal is not received. Assume that errors were detected from all reception items.
 - Draw a single line among the unit and all reception items. (Work flow differs from CAN DIAG SUPPORT MNTR (with PAST).)
- a. Reception item of "EPS": Assume that the unit could not receive the signals from ECM, ABS, and M&A. Draw a line among EPS, ECM, ABS, and M&A (line 3-a in the figure).
 - b. Reception item of "ABS": Assume that the unit could not receive the signal from ECM. Draw a line between ABS and ECM (line 3-b in the figure).

(Example)

SYSTEM	EPS
DATE	
P/#	PRSNT
TRANSMIT DIAG	OK
ECM	OK
VDC/TCS/ABS	OK
METER/M&A	OK

SYSTEM	ABS
DATE	
P/#	PRSNT
INITIAL DIAG	OK
TRANSMIT DIAG	OK
ECM	OK



▲ :Diag on CAN unit

SKIB8733E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

4. Search for the possible cause using CAN communication signal chart from the interview with the customer.

NOTE:

For the details of CAN communication signal, refer to [LAN-44, "CAN Communication Signal Chart"](#).

- a. ABS warning lamp turned ON and speedometer did not move: This means that "ABS warning lamp signal" and "Vehicle speed signal" could not communicate between M&A and ABS (4-a in the figure).
- b. The tachometer moved normally: This means that "Engine speed signal" could communicate normally between ECM and M&A (4-b in the figure).

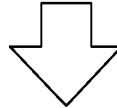
(Example)

First registration: 28, Jan. 2005

CAN system type: Type 20

Symptom (Interview result from customer)

- While driving,
- ABS warning lamp turned ON.
- Speedometer did not move.
- Tachometer moved normally.



CAN Communication Signal Chart

T: Transmit R: Receive

Signal name/Connecting unit	ECM	AFS ¹	AV ²	BCM	EPS	I-KEY ³	M&A	STRG ¹¹	ADP ⁴	ABS	TCM	IPDM-E
A/C compressor request signal	T											R
Accelerator pedal position signal	T										R	
Closed throttle position signal	T										R	
Cooling fan speed request signal	T											R
Engine and CVT integrated control signal	T										R	
	R										T	
Engine coolant temperature signal	T						R				R	
4-b Engine speed signal	T						R				R	
Engine status signal	T		R		R							
Fuel consumption monitor signal	T		R				R					
MI signal	T						R					
Wide open throttle position signal	T										R	
4-a ABS warning lamp signal							R			T		
Brake warning lamp signal							R			T		
Steering angle sensor signal		R						T				
Vehicle speed signal	R				R		R			T	R	
		R		R	R	R	T		R			
Input shaft revolution signal	R											T
Output shaft revolution signal	R											T
Shift position indicator signal	R	R	R	R ⁵			R		R ⁶		T	
Second position indicator signal							R				T	
Front wiper stop position signal				R								T
High beam status signal	R	R										T
Low beam status signal	R	R										T

SKIB8734E

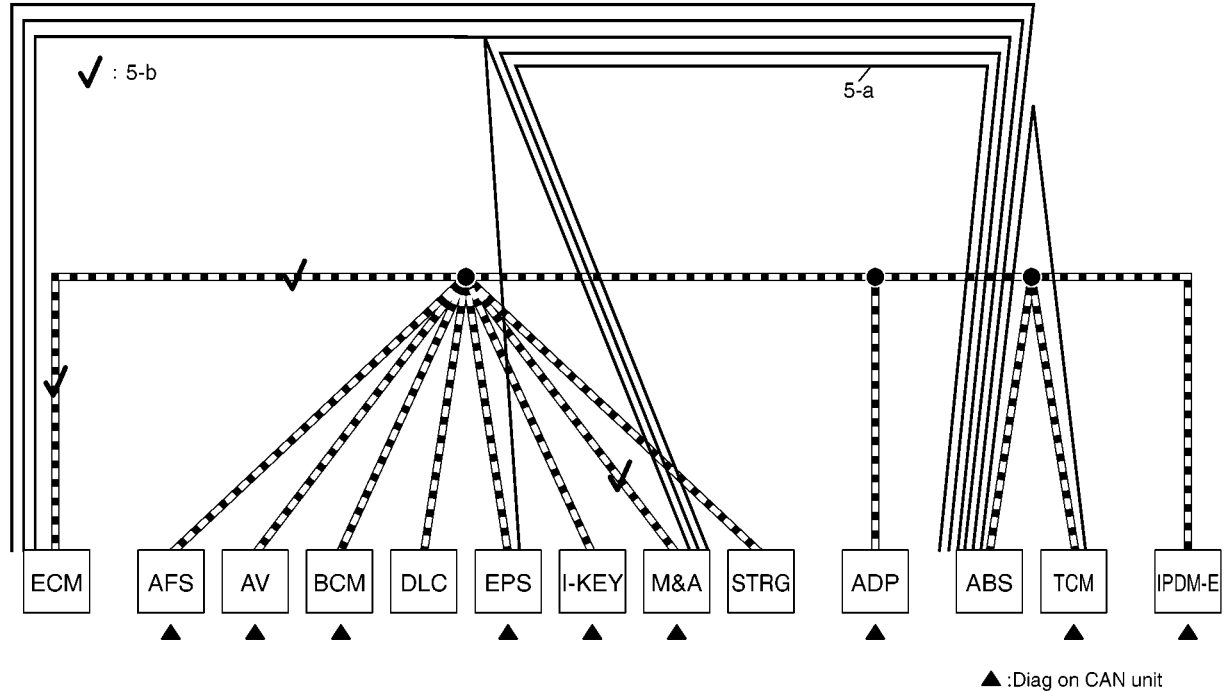
5. Fill in the possible cause assumed in step 4.

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

- The ABS warning lamp turned ON and speedometer did not move: Assume that a possible cause is no communication between M&A and ABS. Draw a line between M&A and ABS. (Line 5-a in the figure).
- The tachometer moved normally: Put check marks between ECM and M&A. The circuit between ECM and M&A is normal (check marks 5-b in the figure).

(Example)



SKIB8735E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

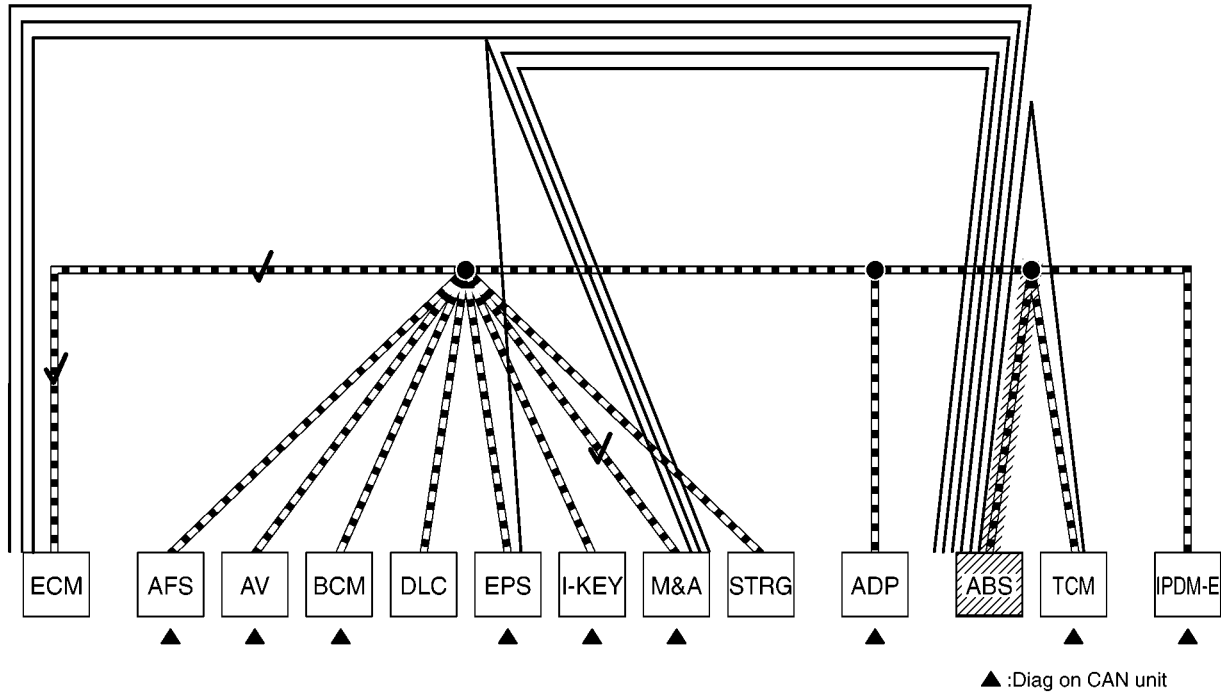
- The circuit which has the most amount of lines are the possible cause. Error is detected from ABS actuator and electric unit (control unit) branch line (shaded in the figure).

NOTE:

For abbreviations, refer to [LAN-40, "Abbreviation List"](#).

- Perform the inspection of the possible cause. Refer to [LAN-53, "Malfunction Area Chart"](#).

(Example)



< CONSULT-II printout checklist >

	Item	Check box
1	SELECT SYSTEM	<input checked="" type="checkbox"/>
2	ENGINE	<input checked="" type="checkbox"/>
3	ADAPTIVE LIGHT [▲]	<input checked="" type="checkbox"/>
4	MULTI AV [▲]	<input checked="" type="checkbox"/>
5	BCM [▲]	<input checked="" type="checkbox"/>
6	EPS [▲]	<input checked="" type="checkbox"/>
7	INTELLIGENT KEY [▲]	<input checked="" type="checkbox"/>
8	METER [▲]	<input checked="" type="checkbox"/>
9	AUTO DRIVE POS. [▲]	<input checked="" type="checkbox"/>
10	ABS	<input checked="" type="checkbox"/>
11	TRANSMISSION [▲]	<input checked="" type="checkbox"/>
12	IPDM E/R [▲]	<input checked="" type="checkbox"/>

Possible root cause

- Error between ABS actuator and electric unit (control unit) and joint point.
- Error in ABS actuator and electric unit (control unit).

Inspection result

SKIB8736E

TROUBLE DIAGNOSES WORK FLOW

[CAN FUNDAMENTAL]

Non-reproduced Error — Short Circuit —

When the received data and error symptom have symptoms shown below, short circuit of CAN communication line is a possible cause.

Item (CONSULT-II)	Indication	Inspection procedure
SELF-DIAG RESULTS	The memory of "U1000" and "U1001" is indicated for most units.	Refer to LAN-53, "Malfunction Area Chart" .
CAN DIAG SUPPORT MNTR	Only on CAN DIAG SUPPORT MNTR (with PAST), "1 - 39" is indicated on "PAST" of the transmission diagnosis and the reception item.	

(Example)

SYSTEM DATE P/#	ENGINE	SYSTEM DATE P/#	ADAPTIVE LIGHT	SYSTEM DATE P/#	MULTI AV	SYSTEM DATE P/#	BCM
SELF-DIAG RESULTS		SELF-DIAG RESULTS		SELF-DIAG RESULTS		SELF-DIAG RESULTS	

DTC RESULTS	TIME	DTC RESULTS	TIME	DTC RESULTS	TIME	DTC RESULTS	TIME
CAN COMM CIRCUIT [U1000]	1t	CAN COMM CIRCUIT [U1000]	5	CAN COMM CIRCUIT [U1000]	5	CAN COMM CIRCUIT [U1000]	5
CAN COMM CIRCUIT [U1001]	1t						

SYSTEM DATE P/#	EPS	SYSTEM DATE P/#	INTELLIGENT KEY	SYSTEM DATE P/#	METER	SYSTEM DATE P/#	AUTO DRIVE POS.
SELF-DIAG RESULTS		SELF-DIAG RESULTS		SELF-DIAG RESULTS		SELF-DIAG RESULTS	

DTC RESULTS	TIME	DTC RESULTS	TIME	DTC RESULTS	TIME	DTC RESULTS	TIME
CAN COMM CIRCUIT [U1000]			5	CAN COMM CIRCUIT [U1000]	5	CAN COMM CIRCUIT [U1000]	PAST

The memory of "U1000" and "U1001" is indicated for most units.

SYSTEM DATE P/#	ENGINE	SYSTEM DATE P/#	ADAPTIVE LIGHT	SYSTEM DATE P/#	MULTI AV	SYSTEM DATE P/#	BCM
TRANSMIT DIAG	OK	TRANSMIT DIAG	-	TRANSMIT DIAG	-	TRANSMIT DIAG	OK
VDC/TCS/ABS	OK	ECM	OK	ECM	OK	ECM	OK
METER/M&A	-	METER/M&A	OK	METER/M&A	OK	METER/M&A	OK
BCM/SEC	OK	TCM	OK	BCM/SEC	-	TCM	OK
ICC	-	STRG	OK	HVAC	-	MULTI AV	-
HVAC	-	EPS	-	IPDM E/R	-	IPDM E/R	OK
TCM	OK	IPDM E/R	OK	TIRE-P	-	I-KEY	OK
EPS	OK						
IPDM E/R	OK						
e4WD	-						
AWD/4WD	-						

SYSTEM DATE P/#	EPS	SYSTEM DATE P/#	INTELLIGENT KEY	SYSTEM DATE P/#	METER	SYSTEM DATE P/#	AUTO DRIVE POS.
TRANSMIT DIAG	OK	TRANSMIT DIAG	OK	TRANSMIT DIAG	OK	TRANSMIT DIAG	-
ECM	OK	ECM	OK	ECM	OK	METER/M&A	OK
VDC/TCS/ABS	OK	METER/M&A	OK	TCM	OK	BCM/SEC	OK
METER/M&A	-			BCM/SEC	OK	VDC/TCS/ABS	-
				VDC/TCS/ABS	OK	IPDM E/R	-
				IPDM E/R	-		-
					OK		5

Only on CAN DIAG SUPPORT MNTR (with PAST), "1-39" is indicated on "PAST" of the transmission diagnosis and the reception item.

SKIB8737E

INDEX FOR DTC

[CAN]

INDEX FOR DTC

PFP:00004

DTC No. Index

BKS0029F

DTC	Self-diagnosis item (CONSULT-II indication)	DTC detection condition	Inspection
U1000	CAN COMM CIRCUIT	When ECM is not transmitting or receiving CAN communication signal of OBD (emission-related diagnosis) for 2 seconds or more.	Refer to LAN-40. "HOW TO USE THIS SECTION" .
		When a control unit (except for ECM) is not transmitting or receiving CAN communication signal for 2 seconds or more.	
U1001	CAN COMM CIRCUIT	When ECM is not transmitting or receiving CAN communication signal other than OBD (emission-related diagnosis) for 2 seconds or more.	

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HOW TO USE THIS SECTION

PFP:00008

Caution

BKS0029G

- This section describes information specific to a vehicle, sheets for trouble diagnosis, and inspection procedures.
- For trouble diagnosis procedure, refer to [LAN-16, "Trouble Diagnosis Procedure"](#).

Abbreviation List

BKS0029H

Abbreviations in CAN communication signal chart and the diagnosis sheet are as per the following list.

Abbreviation	Unit name	SELECT SYSTEM (CONSULT-II)	CAN DIAG SUPPORT MNTR (CONSULT-II)
DLC	Data link connector	—	—
ECM	ECM	ENGINE	ECM
M&A	Combination meter	METER	METER/M&A
TCM	TCM	A/T	TCM

PRECAUTIONS

Precautions for SRS Airbag and Pretensioner Seatbelt

BKS002D0

WARNING:

- To install/remove the SRS airbag, pretensioner seatbelt system related components and harness, turn the ignition switch "OFF", disconnect the negative (–) terminal of the battery and wait over 3 minutes. (This is to discharge all the remaining electricity in the airbag sensor unit's auxiliary power circuit.)
- Do not use air impact or electrical tools when installing/removing the components.
- Do not use any electric soldering gun or so for harness used in SRS airbag and pretensioner seatbelt systems. Be careful with the harness not to tangle with or interfere with other components.
- Do not use any electrical test equipments such as circuit tester when inspecting the SRS airbag and pretensioner seatbelt circuit while installed unless the Service Manual instructs to do so. (The weak current in the tester can cause the SRS airbag to operate.)
- Do not insert any foreign materials such as a screwdriver in the airbag module and pretensioner seatbelt connector in order to prevent unintended operation due to static electricity.
- The harnesses used in SRS airbag and pretensioner are covered with yellow corrugate tube or insulation tape and installed on yellow connector for easy identification.
- Refer to "RS Restraint System" in this Service Manual for safe airbag system service information.

Precautions When Using CONSULT-II

BKS0029J

Use CONSULT-II CONVERTER when connecting CONSULT-II to data link connector.

CAUTION:

CAN communication does not function normally if CONSULT-II is used without connecting CONSULT-II CONVERTER.

Precautions for Trouble Diagnosis

BKS0029K

CAUTION:

- Never apply 7.0 V or more to the measurement terminal.
- Use a tester whose open terminal voltage is 7.0 V or less.
- Turn the ignition switch OFF and disconnect the battery cable from the negative terminal when checking the harness.

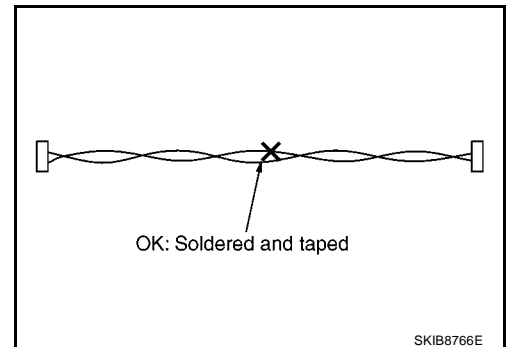
Precautions for Harness Repair

BKS0029L

- Solder the repaired area and wrap tape around the soldered area.

NOTE:

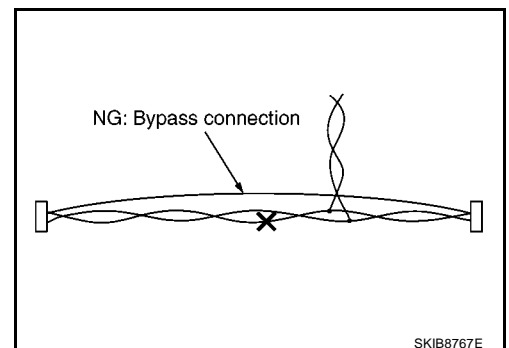
A fray of twisted lines must be within 110 mm (4.33 in).



- Bypass connection is never allowed at the repaired area.

NOTE:

Bypass connection may cause CAN communication error as spliced wires that are separate from the main line, or twisted lines that lose noise immunity.



PRECAUTIONS

[CAN]

- Replace the applicable harness as an assembly if error is detected on the shield lines of CAN communication line.

TROUBLE DIAGNOSIS

CAN Diagnostic Support Monitor

Use "CAN DIAG SUPPORT MNTR" for detecting the root cause.

MONITOR ITEM LIST (CONSULT-II)

ECM (QG15DE)

NOTE:

Replace the unit when "NG" is indicated on the "INITIAL DIAG".

SELECT SYS- TEM	CAN DIAG SUP- PORT MNTR	Description	Normal	Error
			PRSNT	
ECM	INITIAL DIAG	Status of CAN controller	OK	NG
	TRANSMIT DIAG	Signal transmission status		UNKWN
	TCM	Signal receiving status from the TCM		
	METER/M&A	Signal receiving status from the combination meter	OK	UNKWN

ECM (QG16DE)

NOTE:

Replace the unit when "NG" is indicated on the "INITIAL DIAG".

SELECT SYS- TEM	CAN DIAG SUP- PORT MNTR	Description	Normal	Error
			PRSNT	
ECM	INITIAL DIAG	Status of CAN controller	OK	NG
	TRANSMIT DIAG	Signal transmission status		UNKWN
	TCM	Signal receiving status from the TCM		

TCM

NOTE:

Replace the unit when "NG" is indicated on the "INITIAL DIAG".

SELECT SYS- TEM	CAN DIAG SUP- PORT MNTR	Description	Normal	Error
			PRSNT	
A/T	INITIAL DIAG	Status of CAN controller	OK	NG
	TRANSMIT DIAG	Signal transmission status		UNKWN
	ECM	Signal receiving status from the ECM		
	VDC/TCS/e4WD	Not used even though indicated		
	METER/M&A	Signal receiving status from the combination meter	OK	UNKWN
	ICC/e4WD	Not used even though indicated		

Combination meter

NOTE:

Replace the unit when "NG" is indicated on the "INITIAL DIAG".

SELECT SYS- TEM	CAN DIAG SUP- PORT MNTR	Description	Normal	Error
			PRSNT	
METER/M&A	TRANSMIT DIAG	Signal transmission status	OK	UNKWN
	ECM	Signal receiving status from the ECM		
	TCM	Signal receiving status from the TCM		

CAN System Specification Chart

BKS002AJ

Check CAN system type from the following specification chart. Then decide diagnosis sheet.

NOTE:

Refer to [LAN-18, "CHECK OF CAN SYSTEM TYPE \(HOW TO USE CAN SYSTEM TYPE SPECIFICATION CHART\)"](#) for how to use CAN system specification chart.

Body type	Sedan			
Axle	2WD			
Engine	QG15DE		QG16DE	
Transmission	M/T	A/T	M/T	A/T
Brake control	ABS			
CAN system type	1	2	3	4
Diagnosis sheet	LAN-48	LAN-49	LAN-50	LAN-51
CAN communication signal chart	LAN-44, "TYPE 1/TYPE 2/TYPE 3/TYPE 4"			

CAN Communication Signal Chart

BKS002AK

Refer to [LAN-14, "How to Use CAN Communication Signal Chart"](#) for how to use CAN communication signal chart.

TYPE 1/TYPE 2/TYPE 3/TYPE 4

NOTE:

Refer to [LAN-40, "Abbreviation List"](#) for the abbreviations of the connecting units.

T: Transmit R: Receive

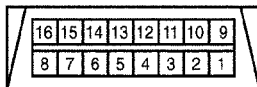
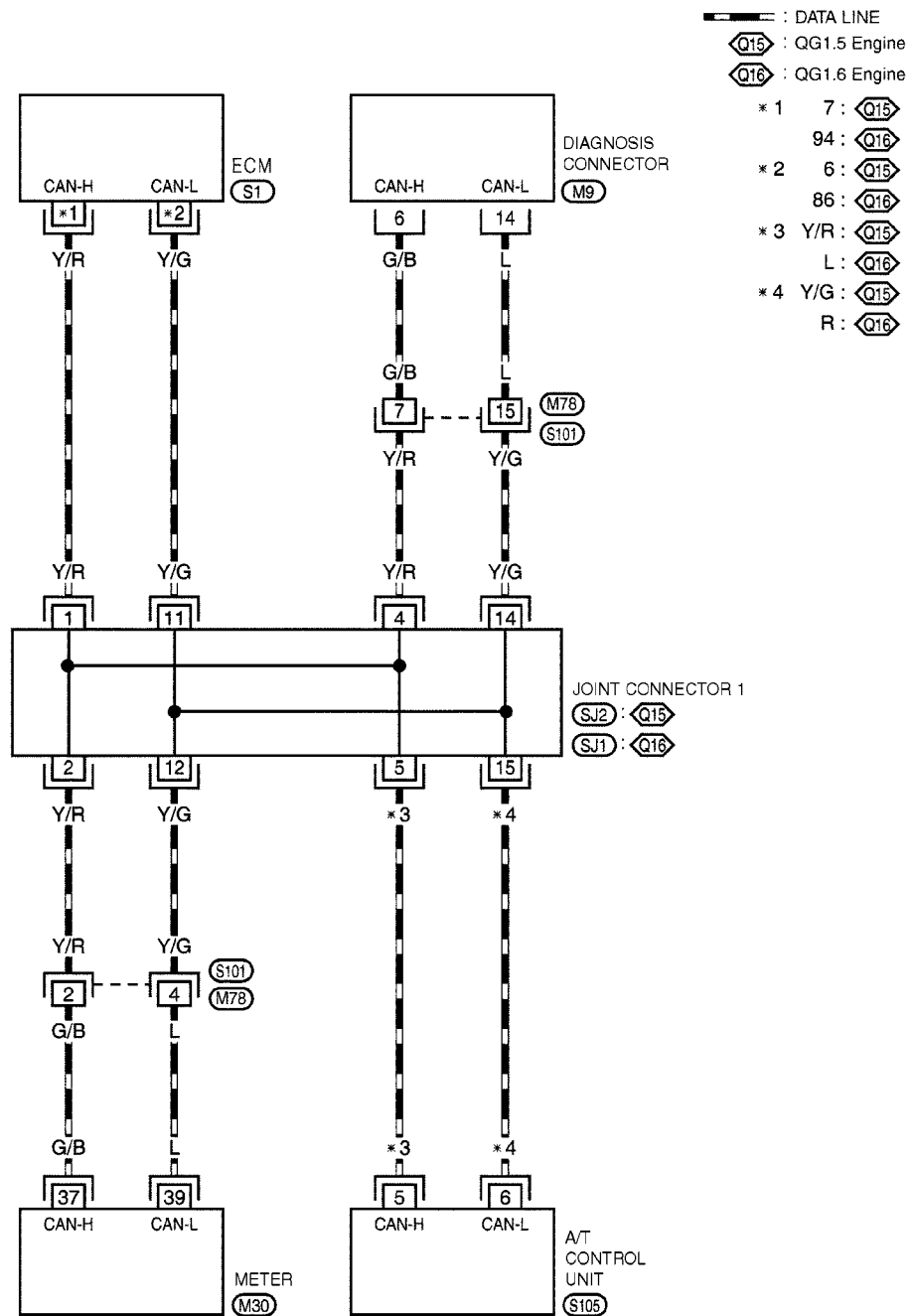
Signal name/Connecting unit	ECM	TCM	M&A
Engine and A/T integrated control signal	T	R	
	R	T	
Engine coolant temperature signal	T		R
Engine speed signal	T		R
Malfunctioning indicator lamp signal	T		R
A/T position indicator signal		T	R
A/T warning lamp signal		T	R
Snow mode signal		T	R
Air conditioner signal	R		T
Blower fan switch signal	R		T
Fuel gauge signal	R		T
Position lamp control signal	R		T
Rear window defogger switch signal	R		T
Reverse gear signal	R		T
Vehicle speed signal	R		T

TROUBLE DIAGNOSIS

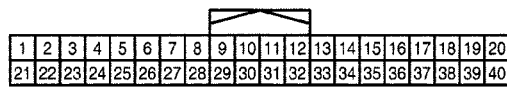
[CAN]

Wiring Diagram — CAN —

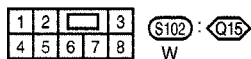
BKS002AM



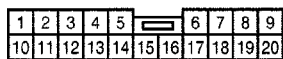
(M9)
B



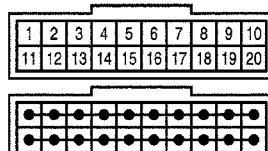
(M30)
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(S102) : Q15
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(S102) : Q16
W



(SJ1) (SJ2)
L L

REFER TO ELECTRIC UNIT

(S1) (S105)

LAN

Interview Sheet

BKS002AN

CAN Communication System Diagnosis Interview Sheet

Receiving date: Type: VIN No.: Model: First registration: Mileage: CAN system type:

Symptom (Results of interview with customer)

Condition at inspection

Error symptom : Reproduced / Non-reproduced

SKIB8701E

Data Sheet
CONSULT-II DATA ATTACHMENT SHEET

BKS002AO

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Attach printout of
METER
CAN DIAG SUPPORT MNTR

Attach printout of
A/T
SELF-DIAG RESULTS
and
CAN DIAG SUPPORT MNTR

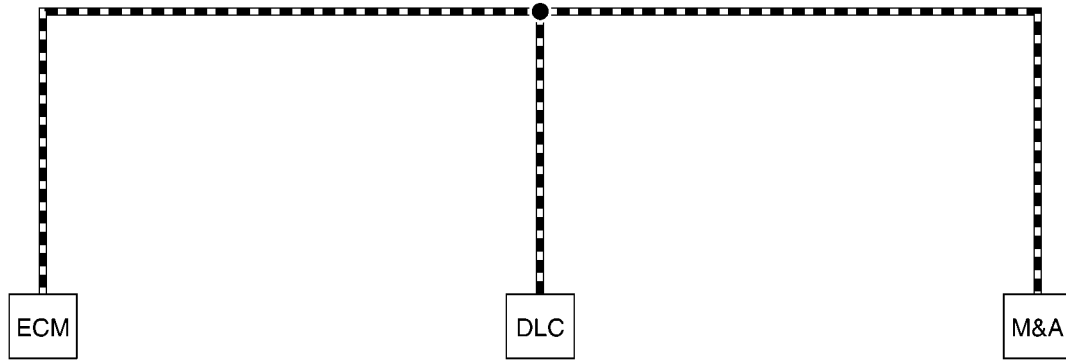
Attach printout of
ENGINE
SELF-DIAG RESULTS
and
CAN DIAG SUPPORT MNTR

Attach printout of
SELECT SYSTEM

PKIC9790E

CAN System (Type 1)
DIAGNOSIS SHEET

BKS002AP



▲ : Diag on CAN unit

< CONSULT-II printout checklist >

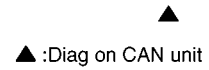
	Item	Check box
1	SELECT SYSTEM	<input type="checkbox"/>
2	ENGINE	<input type="checkbox"/>
3	METER▲	<input type="checkbox"/>

Possible root cause

Inspection result

PKIC9791E

BKS002AQ



Inspection result

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PKIC9792E

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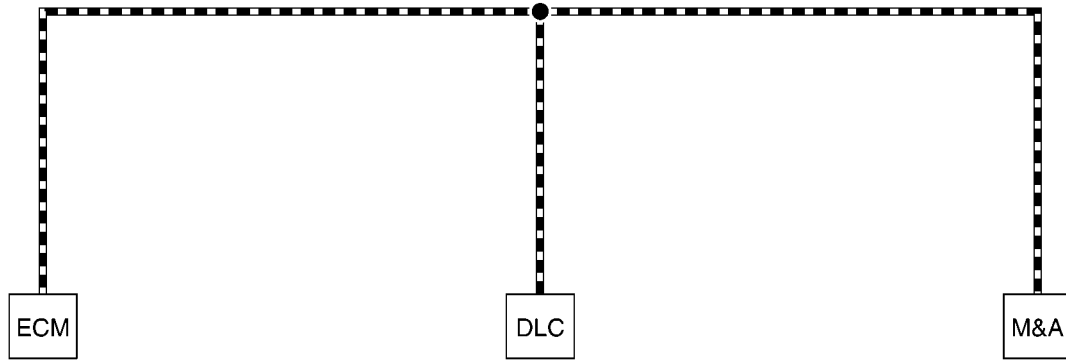
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CAN System (Type 3)
DIAGNOSIS SHEET

BKS002AR



▲ : Diag on CAN unit

< CONSULT-II printout checklist >

	Item	Check box
1	SELECT SYSTEM	<input type="checkbox"/>
2	ENGINE	<input type="checkbox"/>
3	METER▲	<input type="checkbox"/>

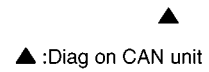
Possible root cause

Inspection result

PKIC9791E

[CAN]

BKS002AS



Possible root cause

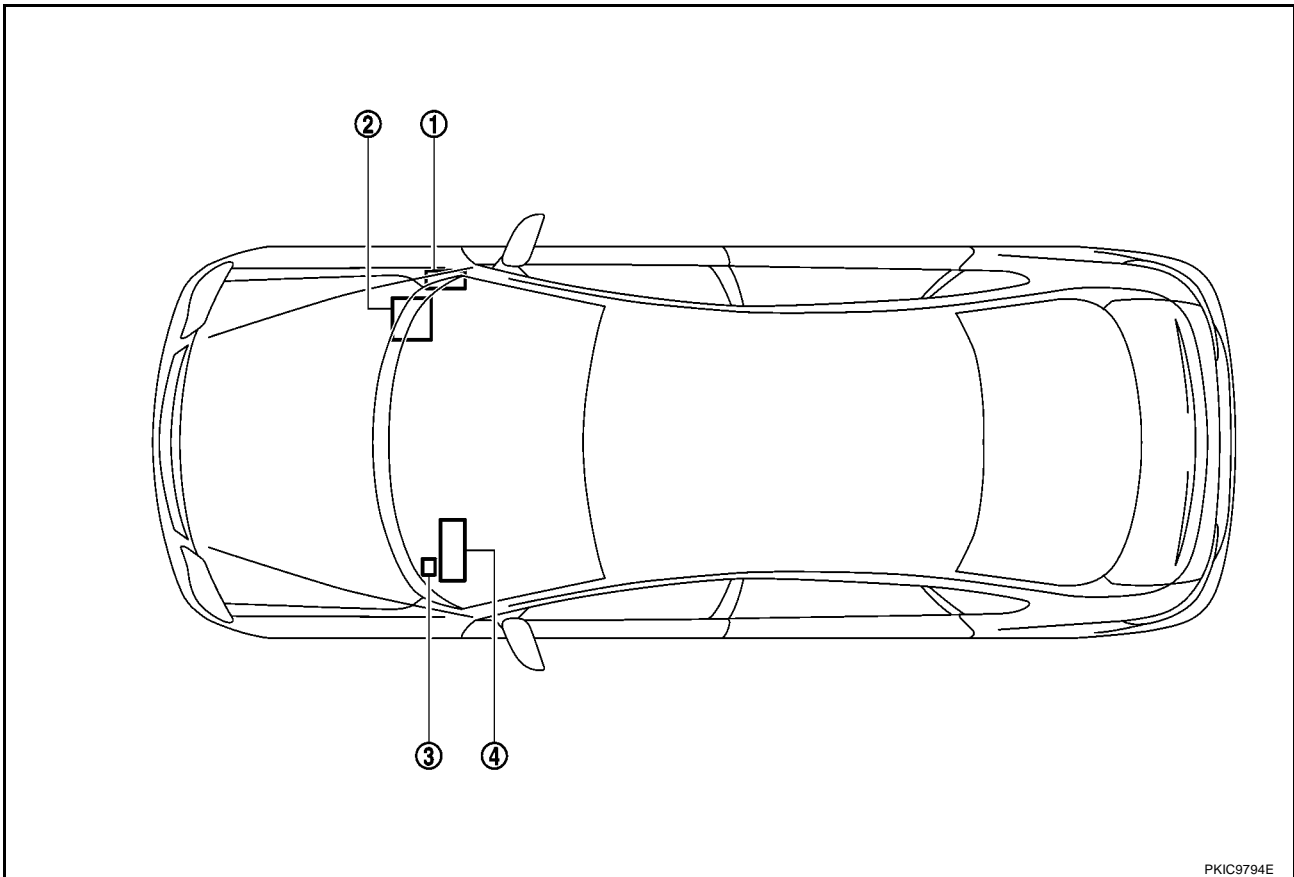
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PKIC9792E

Component Parts Location

BKS002AT



PKIC9794E

1. TCM S105
2. ECM S1
3. Data link connector M9
4. Combination meter M30

Harness Layout

BKS002AU

Refer to "HARNESS DIAGRAM" (WH-169).

Malfunction Area Chart

BRANCH LINE

BKS002AV

Trouble Area	Reference
ECM branch line circuit	LAN-53. "ECM Branch Line Circuit"
Data link connector branch line circuit	LAN-54. "Data Link Connector Branch Line Circuit"
TCM branch line circuit	LAN-54. "TCM Branch Line Circuit"
Combination meter branch line circuit	LAN-55. "Combination Meter Branch Line Circuit"

SHORT CIRCUIT

Trouble Area	Reference
CAN communication circuit	LAN-56. "CAN Communication Circuit"

ECM Branch Line Circuit

BKS002AW

INSPECTION PROCEDURE

1. CHECK CONNECTOR

- Turn the ignition switch OFF.
- Disconnect the battery cable from the negative terminal.
- Check the terminals and connectors of ECM for damage, bend, and loose connection (unit side and connector side).

OK or NG

- OK >> GO TO 2.
 NG >> Repair the terminal and connector.

2. CHECK HARNESS FOR OPEN CIRCUIT

- Disconnect the connector of ECM.
- Check the resistance between the ECM harness connector terminals.

QG15DE

ECM harness connector			Resistance (Ω)
Connector No.	Terminal No.		
S1	7	6	Approx. 108 – 132

QG16DE

ECM harness connector			Resistance (Ω)
Connector No.	Terminal No.		
S1	94	86	Approx. 108 – 132

OK or NG

- OK >> GO TO 3.
 NG >> Repair the ECM branch line.

3. CHECK POWER SUPPLY AND GROUND CIRCUIT

Check the power supply and the ground circuit of ECM. Refer to "POWER AND GROUND SYSTEM" (QG15: EC-53), "POWER SUPPLY CIRCUIT FOR ECM" (QG16: EC-75).

OK or NG

- OK >> ● Reproduced error: Replace ECM. Refer to "ECCS Control Unit" (QG15: EC-110), "Engine Control Component Parts Location" (QG16: EC-48).
 ● Non-reproduced error: Error was detected in ECM branch line.
- NG >> Repair the power supply and the ground circuit.

Data Link Connector Branch Line Circuit

BKS002AX

INSPECTION PROCEDURE

1. CHECK CONNECTOR

1. Turn the ignition switch OFF.
2. Disconnect the battery cable from the negative terminal.
3. Check the following terminals and connectors for damage, bend, and loose connection (connector side and harness side).
 - data link connector
 - Harness connector M78
 - Harness connector S101

OK or NG

OK >> GO TO 2.

NG >> Repair the terminal and connector.

2. CHECK HARNESS FOR OPEN CIRCUIT

Check the resistance between the data link connector terminals.

Data link connector			Resistance (Ω)
Connector No.	Terminal No.		
M9	6	14	Approx. 54 – 66

OK or NG

OK >> ● Reproduced error: Check the following items again.

- Decision of CAN system type.
- Not received CONSULT-II data (SELECT SYSTEM, SELF-DIAG RESULTS, CAN DIAG SUPPORT MNTR).
- Procedure for detecting root cause.
- Non-reproduced error: Error was detected in the data link connector branch line circuit.

NG >> Repair the data link connector branch line.

TCM Branch Line Circuit

BKS002AZ

INSPECTION PROCEDURE

1. CHECK CONNECTOR

1. Turn the ignition switch OFF.
2. Disconnect the battery cable from the negative terminal.
3. Check the terminals and connectors of TCM for damage, bend, and loose connection (unit side and connector side).

OK or NG

OK >> GO TO 2.

NG >> Repair the terminal and connector.

2. CHECK HARNESS FOR OPEN CIRCUIT

1. Disconnect the connector of TCM.
2. Check the resistance between the TCM harness connector terminals.

TCM harness connector			Resistance (Ω)
Connector No.	Terminal No.		
S105	5	6	Approx. 54 – 66

OK or NG

OK >> GO TO 3.

NG >> Repair the TCM branch line.

3. CHECK POWER SUPPLY AND GROUND CIRCUIT

Check the power supply and the ground circuit of TCM. Refer to "Wiring Diagram" (AT-19).

OK or NG

- OK >> ● Reproduced error: Replace TCM. Refer to "Components Location" (AT-17).
 ● Non-reproduced error: Error was detected in TCM branch line.
- NG >> Repair the power supply and the ground circuit.

Combination Meter Branch Line Circuit

BKS002AY

INSPECTION PROCEDURE

1. CHECK CONNECTOR

- Turn the ignition switch OFF.
- Disconnect the battery cable from the negative terminal.
- Check the following terminals and connectors for damage, bend, and loose connection (unit side and connector side).
 - Combination meter connector
 - Harness connector M78
 - Harness connector S101

OK or NG

- OK >> GO TO 2.
- NG >> Repair the terminal and connector.

2. CHECK HARNESS FOR OPEN CIRCUIT

- Disconnect the connector of combination meter
- Check the resistance between the combination meter harness connector terminals.

Combination meter harness connector			Resistance (Ω)
Connector No.	Terminal No.		
M30	37	39	Approx. 108 – 132

OK or NG

- OK >> GO TO 3.
- NG >> Repair the combination meter branch line.

3. CHECK POWER SUPPLY AND GROUND CIRCUIT

Check the power supply and the ground circuit of combination meter. Refer to "Wiring Diagram" (EL-67).

OK or NG

- OK >> ● Reproduced error: Replace combination meter. Refer to "Removal-Installation of Combination Meter" (EL-65).
 ● Non-reproduced error: Error was detected in combination meter branch line.
- NG >> Repair the power supply and the ground circuit.

CAN Communication Circuit

BKS002B0

INSPECTION PROCEDURE

1. CONNECTOR INSPECTION

1. Turn the ignition switch OFF.
2. Disconnect the battery cable from the negative terminal.
3. Disconnect all the unit connectors on CAN communication system.
4. Check terminals and connectors for damage, bend, and loose connection.

OK or NG

- OK >> GO TO 2.
 NG >> Repair the terminal and connector.

2. CHECK HARNESS CONTINUITY (SHORT CIRCUIT)

Check the continuity between the data link connector terminals.

Data link connector			Continuity
Connector No.	Terminal No.		
M9	6	14	No

OK or NG

- OK >> GO TO 3.
 NG >> Check the harness and repair the root cause.

3. CHECK HARNESS CONTINUITY (SHORT CIRCUIT)

Check the continuity between the data link connector and the ground.

Data link connector		Ground	Continuity
Connector No.	Terminal No.		
M4	6		No
	14		No

OK or NG

- OK >> GO TO 4.
 NG >> Check the harness and repair the root cause.

4. CHECK ECM AND COMBINATION METER TERMINATION CIRCUIT

1. Remove ECM and combination meter.
2. Check the resistance between ECM terminals.

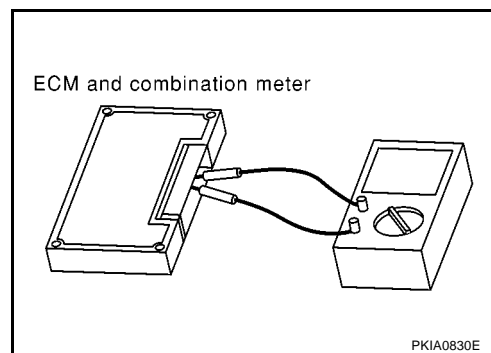
ECM			Resistance (Ω)
Terminal No.			
QG15DE	7	6	Approx. 108 - 132
QG16DE	94	86	

3. Check the resistance between combination meter terminals.

Combination meter		Resistance (Ω)
Terminal No.		
37	39	Approx. 108 - 132

OK or NG

- OK >> GO TO 5.
 NG >> Replace ECM or combination meter.



5. CHECK SYMPTOM

Connect all the connectors. Check if the symptoms described in the "Symptom (Results of interview with customer)" are reproduced.

Inspection result

Reproduced>>GO TO 6.

Non-reproduced>>Start the diagnosis again. Follow the trouble diagnosis procedure when non-reproduced error is detected.

6. CHECK UNIT REPRODUCTION

Perform the reproduction test as per the following procedure for each unit.

1. Turn the ignition switch OFF.
2. Disconnect the battery cable from the negative terminal.
3. Disconnect one of the unit connectors of CAN communication system.

NOTE:

ECM and combination meter have a termination circuit. Check other units first.

4. Connect the battery cable to the negative terminal. Check if the symptoms described in the "Symptom (Results of interview with customer)" are reproduced.

NOTE:

Although unit-related error symptoms occur, do not confuse them with other symptoms.

Inspection result

Reproduced>>Connect the connector. Check other units as per the above procedure.

Non-reproduced>>Replace unit whose connector was disconnected.

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