

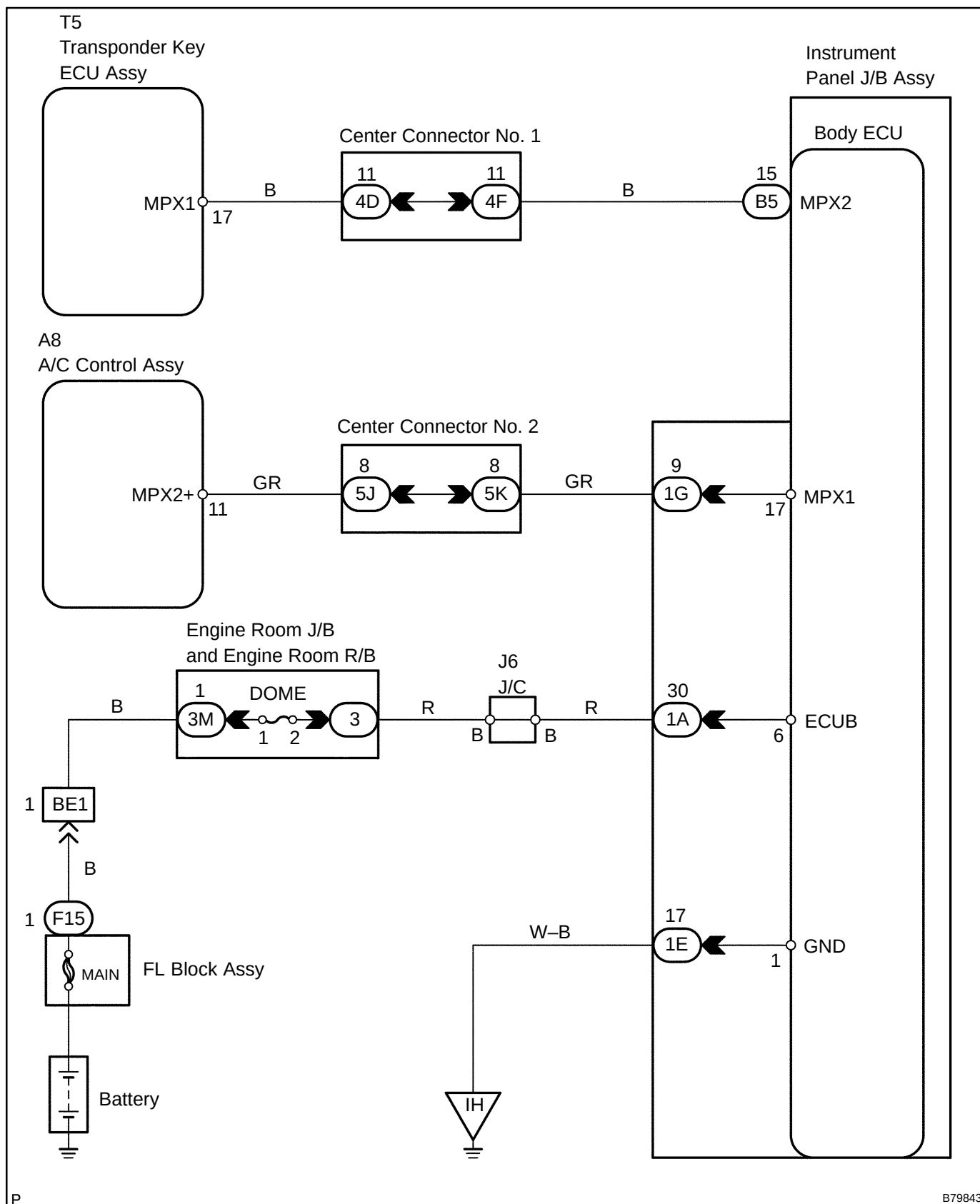
DTC	B1200	BODY ECU COMMUNICATION STOP
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CIRCUIT DESCRIPTION

This DTC is detected when communication between the multiplex network body ECU and gateway ECU stops for more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1200	Body ECU communication stops	• Instrument panel J/B assy (Body ECU) • Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

1 INSPECT FUSE (DOME)

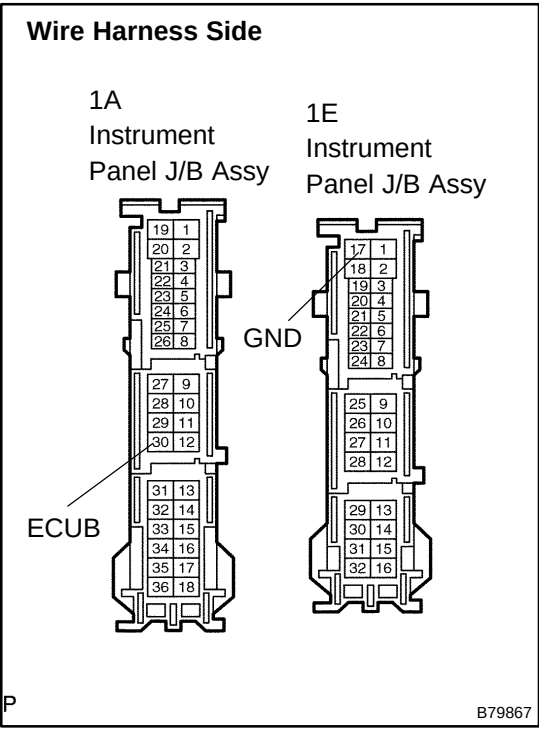
- (a) Remove the DOME fuse from engine room J/B and engine room R/B.
- (b) Measure the resistance.

Standard: Below 1 Ω

NG REPLACE FUSE

OK

2 CHECK WIRE HARNESS (INSTRUMENT PANEL J/B ASSY – BODY GROUND)



- (a) Disconnect the 1A and 1E J/B connectors.
- (b) Measure the voltage and resistance of the wire harness side connectors.

Standard:

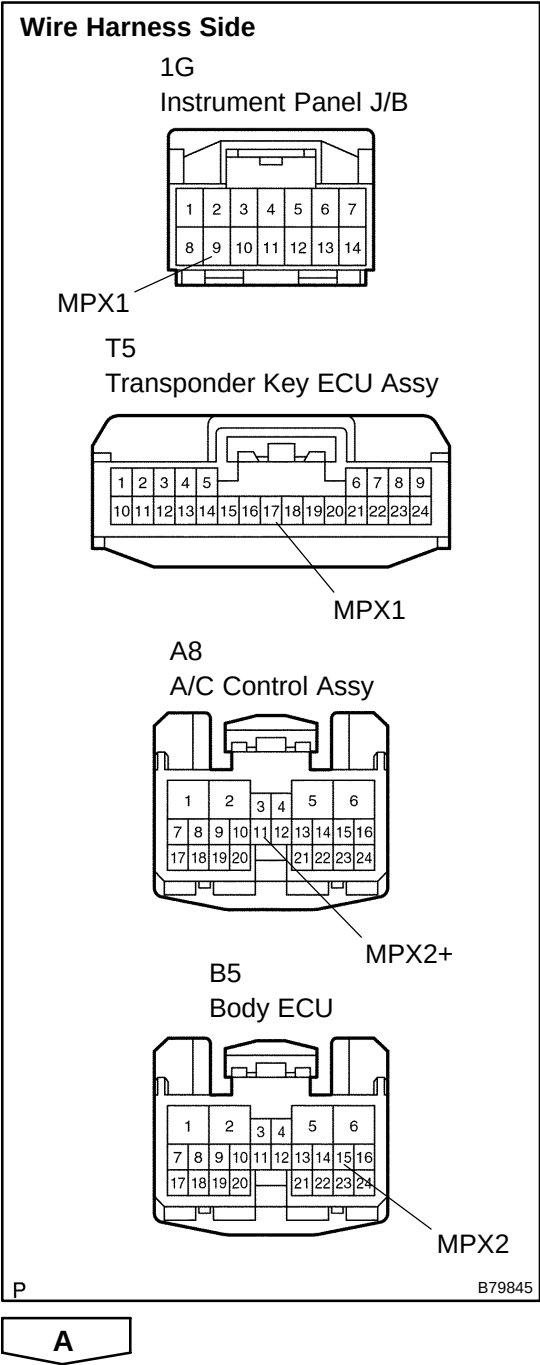
Tester Connection	Specified Condition
1A-30 (ECUB) – Body ground	10 to 14 V
1E-17 (GND) – Body ground	Below 1 Ω

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3

CHECK RESISTANCE OF COMMUNICATION LINE



- (a) Disconnect the 1G J/B connector.
- (b) Disconnect the T5, A8 and B5 ECU connectors.
- (c) Measure the resistance between the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T5-17 (MPX1) – B5-15 (MPX2)	Below 1 Ω
A8-11 (MPX2+) – 1G-9 (MPX1)	Below 1 Ω

Result:

Result	Proceed To
Both are OK	A
One is OK	B
Both are NG	C

B

REPLACE INSTRUMENT PANEL J/B ASSY AND REPAIR OR REPLACE HARNESS AND CONNECTOR

C

REPAIR OR REPLACE HARNESS AND CONNECTOR

REPLACE INSTRUMENT PANEL J/B ASSY (MULTIPLEX NETWORK BODY ECU)

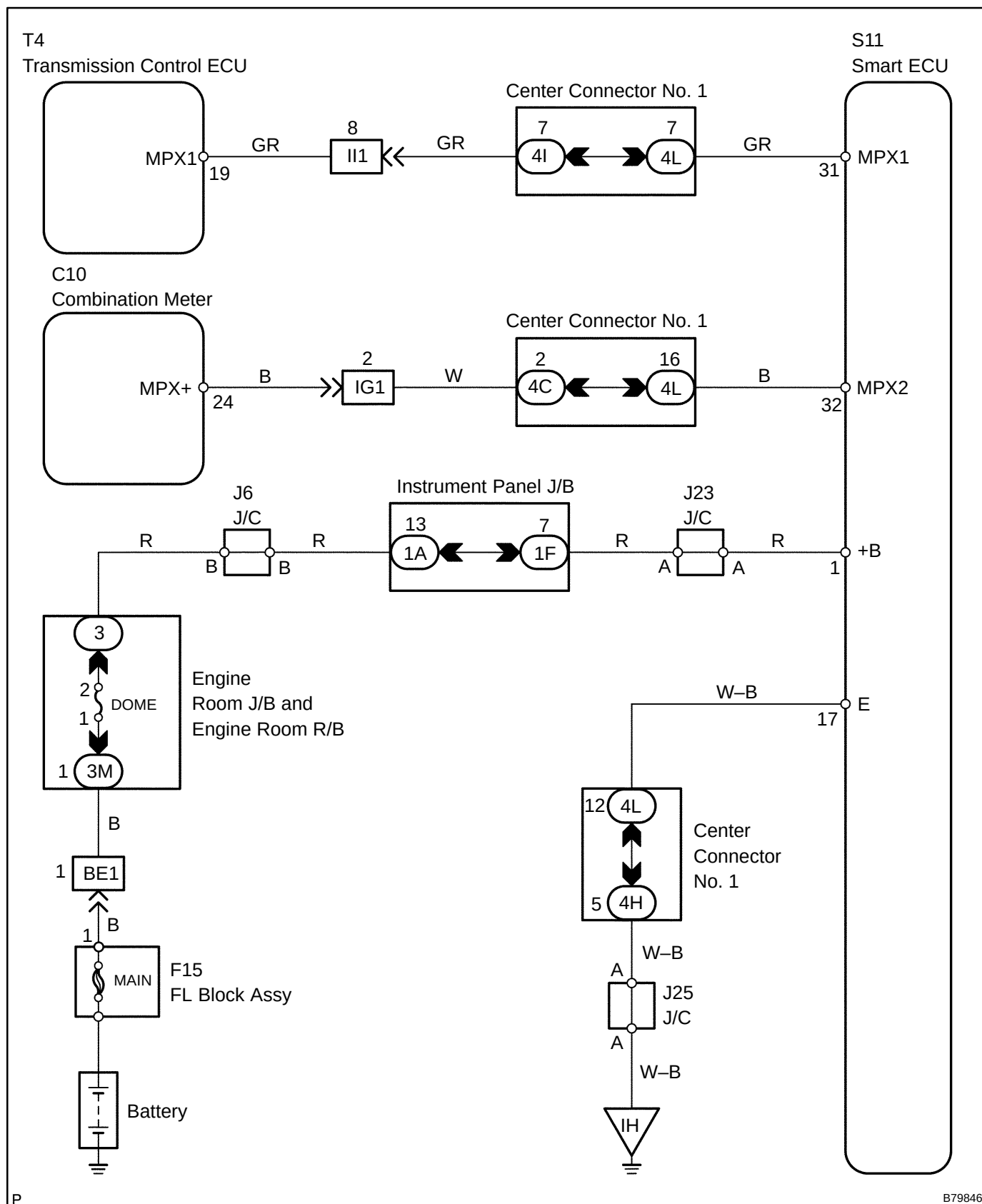
DTC	B1207	SMART ECU COMMUNICATION STOP
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CIRCUIT DESCRIPTION

This DTC is detected when communication between the smart ECU and gateway ECU stops for more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1207	Smart ECU communication stops	• Smart ECU • Wire harness

WIRING DIAGRAM



P

B79846

INSPECTION PROCEDURE

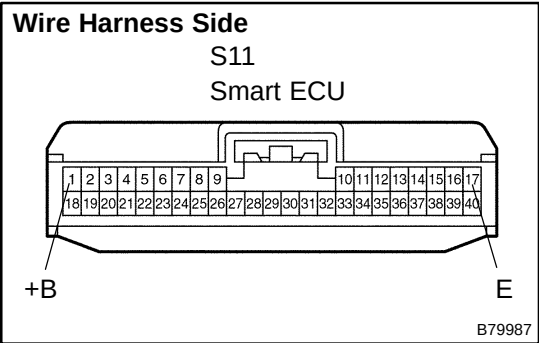
1 CHECK OPERATION

- (a) With the smart key in your possession, push the lock button on the door outside handle (smart door lock operation). Check that the smart indicator illuminates or starts blinking.
With the smart key in your possession, touch the inside of the door outside handle (smart door unlock operation). Check that the smart indicator illuminates or starts blinking.
OK: Smart indicator illuminates or starts blinking.
- NG

Go to step 3

OK

2 CHECK WIRE HARNESS (SMART ECU – BODY GROUND)



- (a) Disconnect the S11 ECU connector.
(b) Measure the resistance and voltage of the wire harness side connector.
- Standard:**
- | Tester Connection | Specified Condition |
|--------------------------|---------------------|
| S11-1 (+B) – Body ground | 10 to 14 V |
| S11-17 (E) – Body ground | Below 1 Ω |

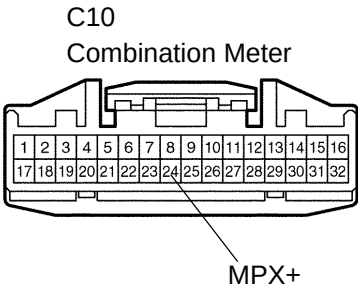
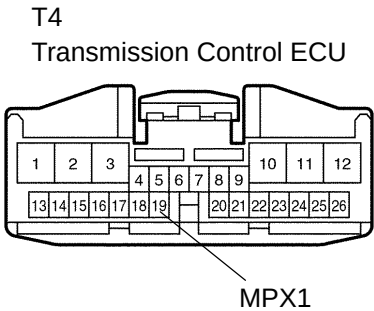
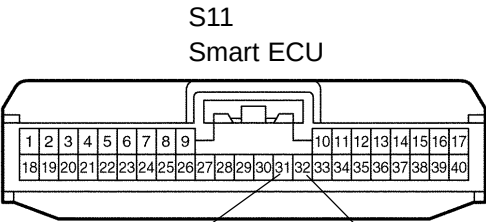
NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3 CHECK RESISTANCE OF COMMUNICATION LINE

Wire Harness Side



P B79848

- (a) Disconnect the S11 and T4 ECU connectors.
- (b) Disconnect the C10 meter connector.
- (c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
S11-31 (MPX1) – T4-19 (MPX1)	Below 1 Ω
S11-32 (MPX2) – C10-24 (MPX+)	Below 1 Ω

Result:

Result	Proceed To
Both are OK	A
One is OK	B
Both are NG	C

B

REPLACE SMART ECU AND REPAIR OR REPLACE HARNESS AND CONNECTOR

C

REPAIR OR REPLACE HARNESS AND CONNECTOR

A

REPLACE SMART ECU

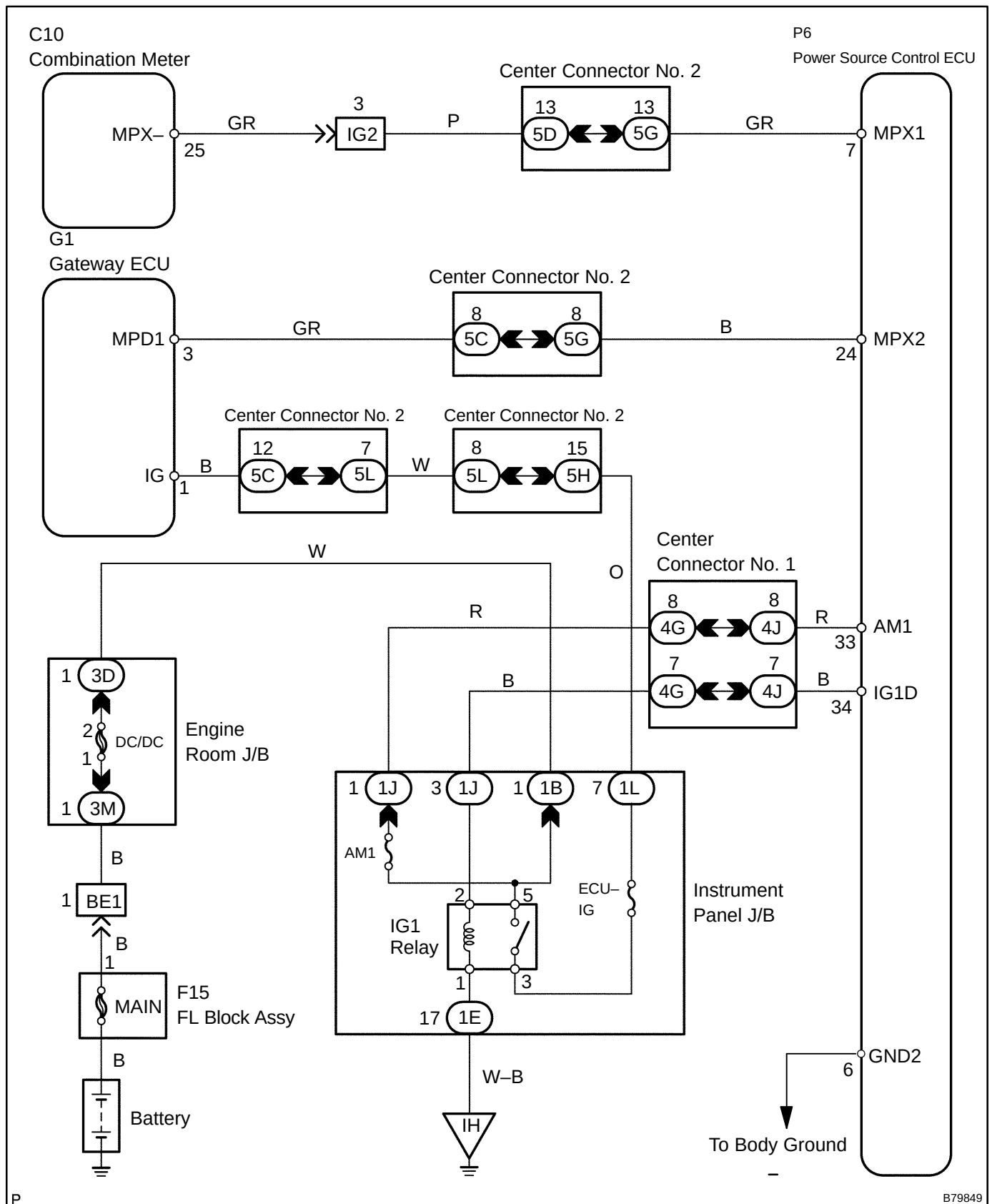
DTC	B1210	POWER SOURCE CONTROL ECU COMMUNICATION STOP
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CIRCUIT DESCRIPTION

This DTC is detected when communication between the power source control ECU and gateway ECU stops for more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1210	Power source control ECU communication stops	• Power source control ECU • Wire harness

WIRING DIAGRAM



cardiagn.com

INSPECTION PROCEDURE

1 CHECK OPERATION

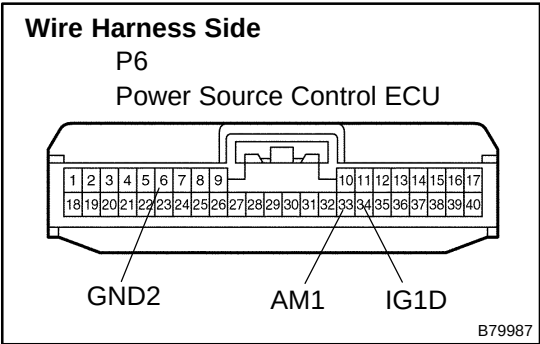
- (a) Without depressing the brake pedal, push the power switch repeatedly. Check that the power modes change between OFF, ON (ACC) and ON (IG) alternately.
OK: Smart indicator illuminates or starts blinking according to power modes.

NG

Go to PUSH BUTTON START SYSTEM
(See page 05-2429)

OK

2 CHECK WIRE HARNESS (POWER SOURCE CONTROL ECU – BODY GROUND)



- (a) Disconnect the P6 ECU connector.
(b) Measure the resistance and voltage of the wire harness side connector.

Standard:

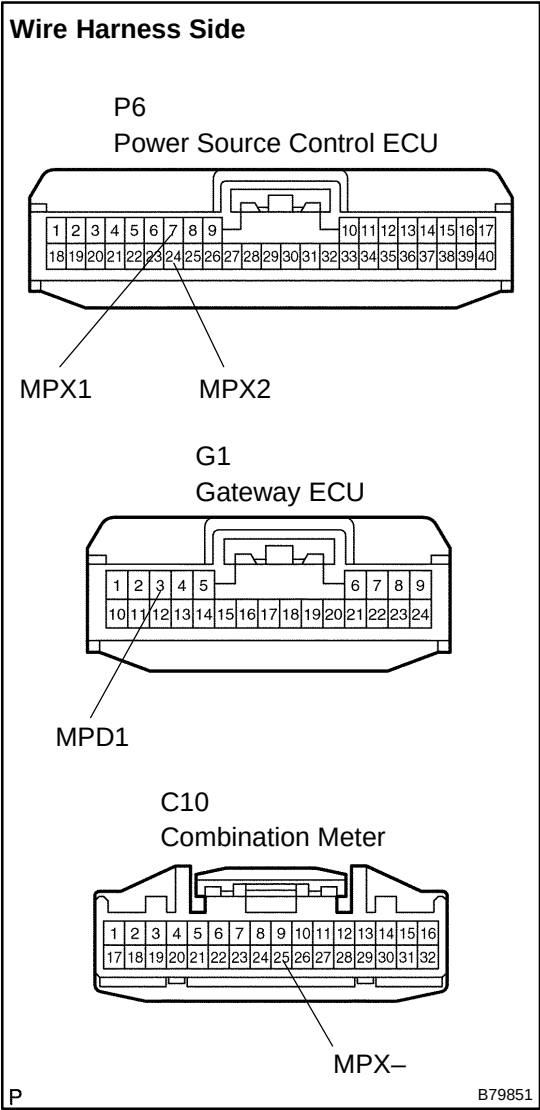
Tester Connection	Condition	Specified Condition
P6-34 (IG1D) – Body ground	Power switch 1: OFF → 2: ON (IG)	1: 0 V → 2: 10 to 14 V
P6-33 (AM1) – Body ground	Constant	10 to 14 V
P6-6 (GND2) – Body ground	Constant	Below 1 Ω

NG

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3 CHECK RESISTANCE OF COMMUNICATION LINE



- (a) Disconnect the P6 and G1 ECU connectors.
- (b) Disconnect the C10 meter connector.
- (c) Measure the resistance between the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
P6-7 (MPX1) – C10-25 (MPX-)	Below 1 Ω
P6-24 (MPX2) – G1-3 (MPD1)	Below 1 Ω

Result:

Result	Proceed to
Both are OK	A
One is OK	B
Both are NG	C

B

REPLACE POWER SOURCE CONTROL ECU AND REPAIR OR REPLACE HARNESS AND CONNECTOR

C

REPAIR OR REPLACE HARNESS AND CONNECTOR

A

REPLACE POWER SOURCE CONTROL ECU

DTC	B1214	DOOR SYSTEM COMMUNICATION BUS MALFUNCTION (+B SHORT)
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DTC	B1215	DOOR SYSTEM COMMUNICATION BUS MALFUNCTION (GND SHORT)
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CIRCUIT DESCRIPTION

DTCS B1214 and B1215 are detected when +B and body ground is short-circuited on the door system communication bus. Detecting this condition will disable the door system communication bus (BEAN) and output some diagnosis codes.

DTC NO.	DTC Detection Condition	Trouble Area
B1214	Door system communication circuit and +B battery system short	• Body ECU • Smart ECU* • Power source control ECU • Radio receiver amplifier • Transmission control ECU • A/C amplifier • Combination meter • Transponder key ECU (Immobilizer ECU) • Wire harness
B1215	Door system communication circuit and body ground short	• Body ECU • Smart ECU* • Power source control ECU • Radio receiver amplifier • Transmission control ECU • A/C amplifier • Combination meter • Transponder key ECU (Immobilizer ECU) • Wire harness

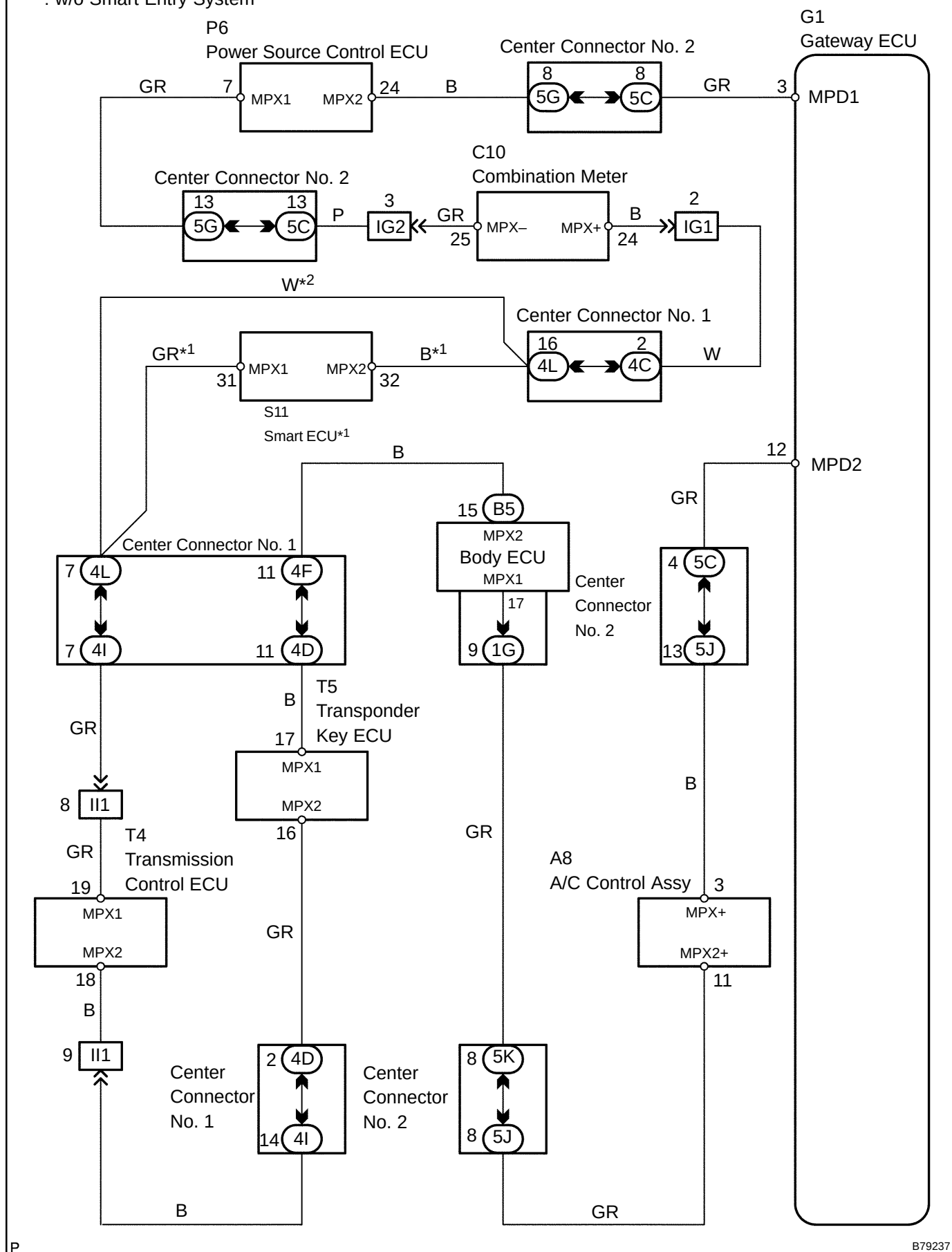
*: w/ Smart entry system

WIRING DIAGRAM

The wiring diagram is shown on the next page.

*1: w/ Smart Entry System

*2: w/o Smart Entry System



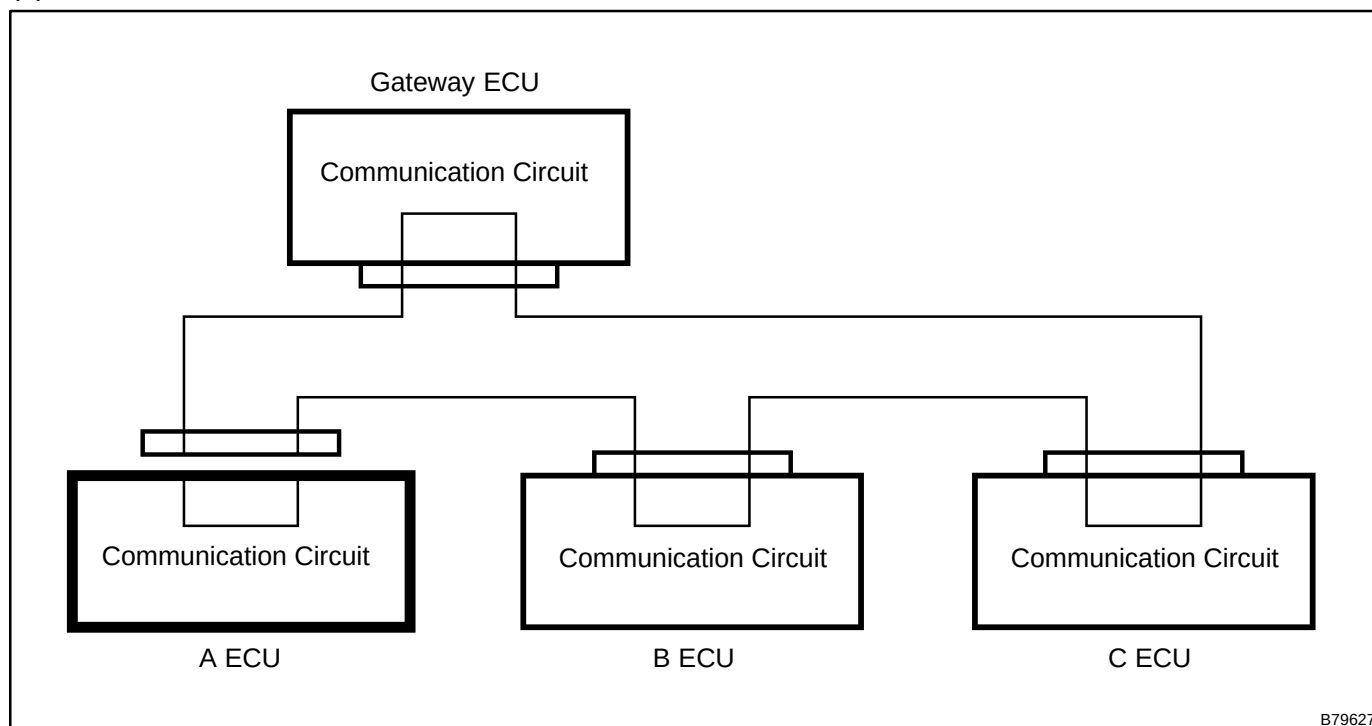
P

B79237

INSPECTION PROCEDURE

1 CHECK DIAGNOSTIC TROUBLE CODE (A ECU)

(a) Disconnect the A ECU connector and check for DTCs B1214 and B1215.



OK: DTCs B1214 and B1215 are not output.

NOTICE:

Disconnect the connectors one by one. Reconnect the connector before starting the next check.

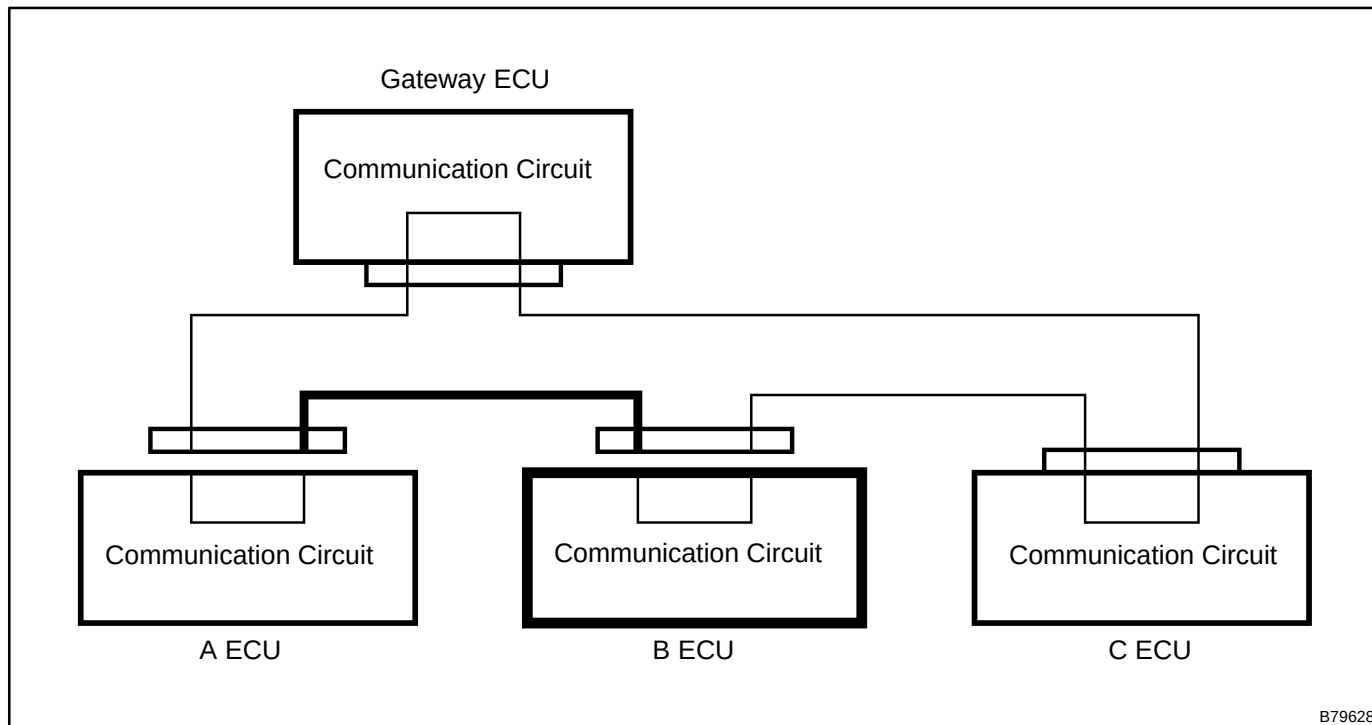
HINT:

- The A ECU in the door system bus represents the power source control ECU.
- If the result is as specified, the disconnected A ECU (power source control ECU) is malfunctioning.

NG**Go to step 2****OK****REPLACE A ECU**

2	CHECK DIAGNOSTIC TROUBLE CODE (B ECU)
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(a) Disconnect the A ECU and B ECU connectors and check for DTCs B1214 and B1215.



OK: DTCs B1214 and B1215 are not output.

NOTICE:

Disconnect the connectors one by one. Reconnect the connector before starting the next check.

HINT:

- The B ECU in door system bus represents one of the following: combination meter, smart ECU*, transmission control ECU, transponder key ECU or body ECU.
- If the result is as specified, the disconnected B ECU (one of the ECUs from the above list) or the wire harness between the A ECU and B ECU is malfunctioning.

*: w/ Smart entry system

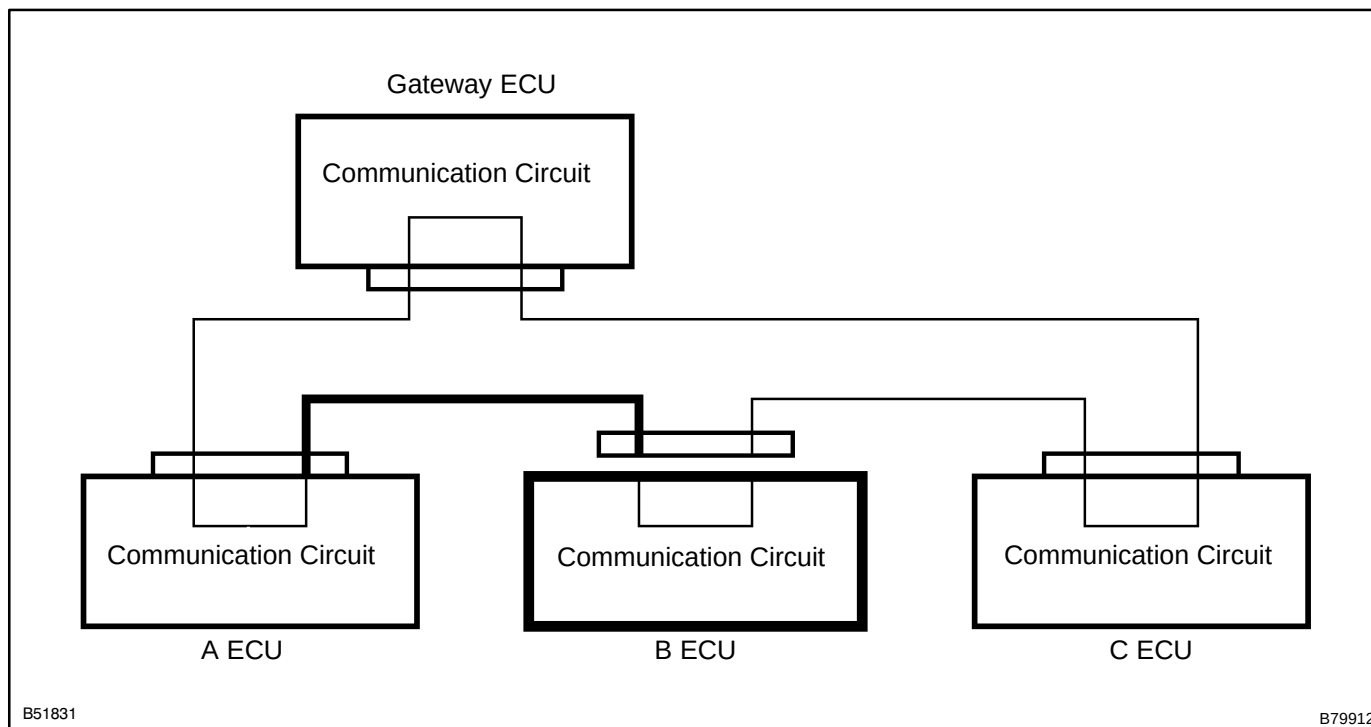
NG

Go to step 4

OK

3 CHECK WIRE HARNESS BETWEEN A ECU AND B ECU

(a) Disconnect the B ECU connectors and check for DTCs B1214 and B1215.



OK: DTCs B1214 and B1215 are not output.

NOTICE:

Disconnect the connectors one by one. Reconnect the connector before starting the next check.

HINT:

If the result is as specified, the wire harness between the A ECU and B ECU is functioning normally but the disconnected B ECU is malfunctioning.

NG

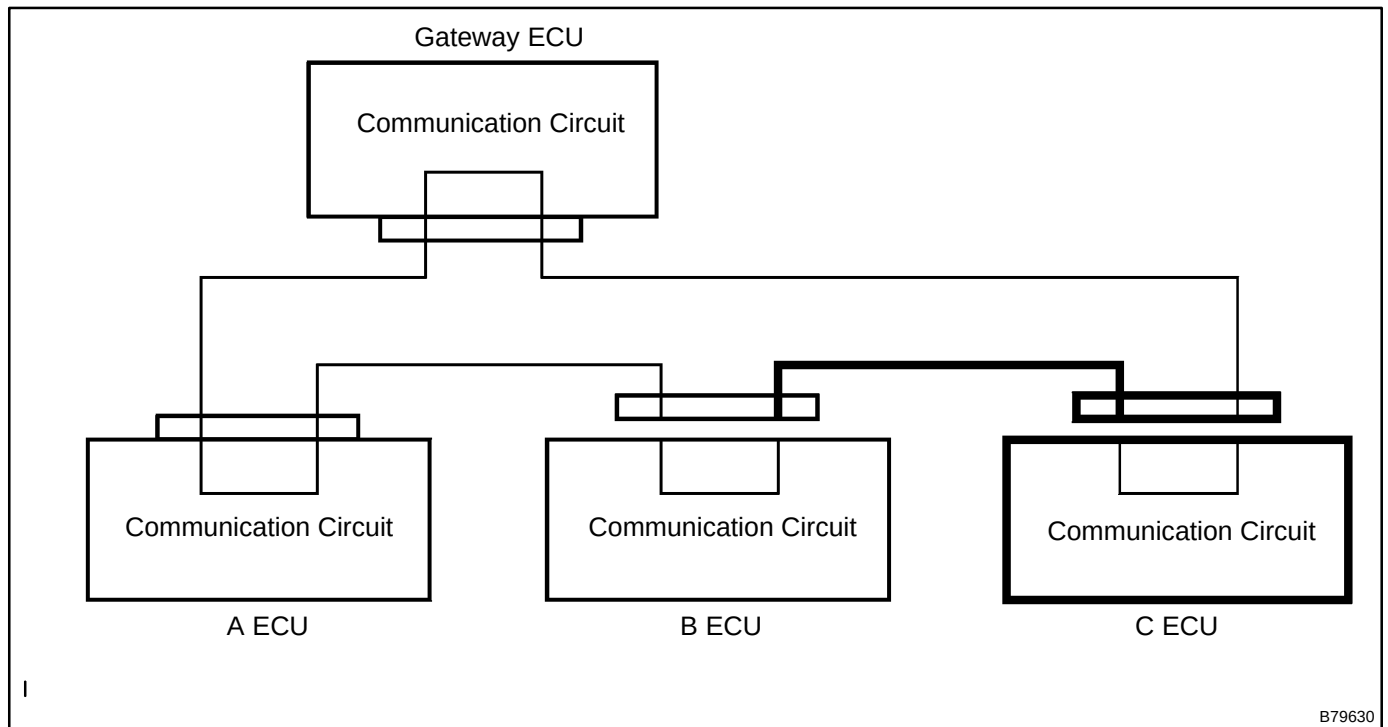
REPAIR OR REPLACE BETWEEN WIRE HARNESS OF A ECU AND B ECU

OK

REPLACE B ECU

4 CHECK DIAGNOSTIC TROUBLE CODE (C ECU)

(a) Disconnect the B ECU and C ECU connectors and check for DTCs B1214 and B1215.



OK: DTCs B1214 and B1215 are not output.

NOTICE:

Disconnect the connectors one by one. Reconnect the connector before starting the next check.

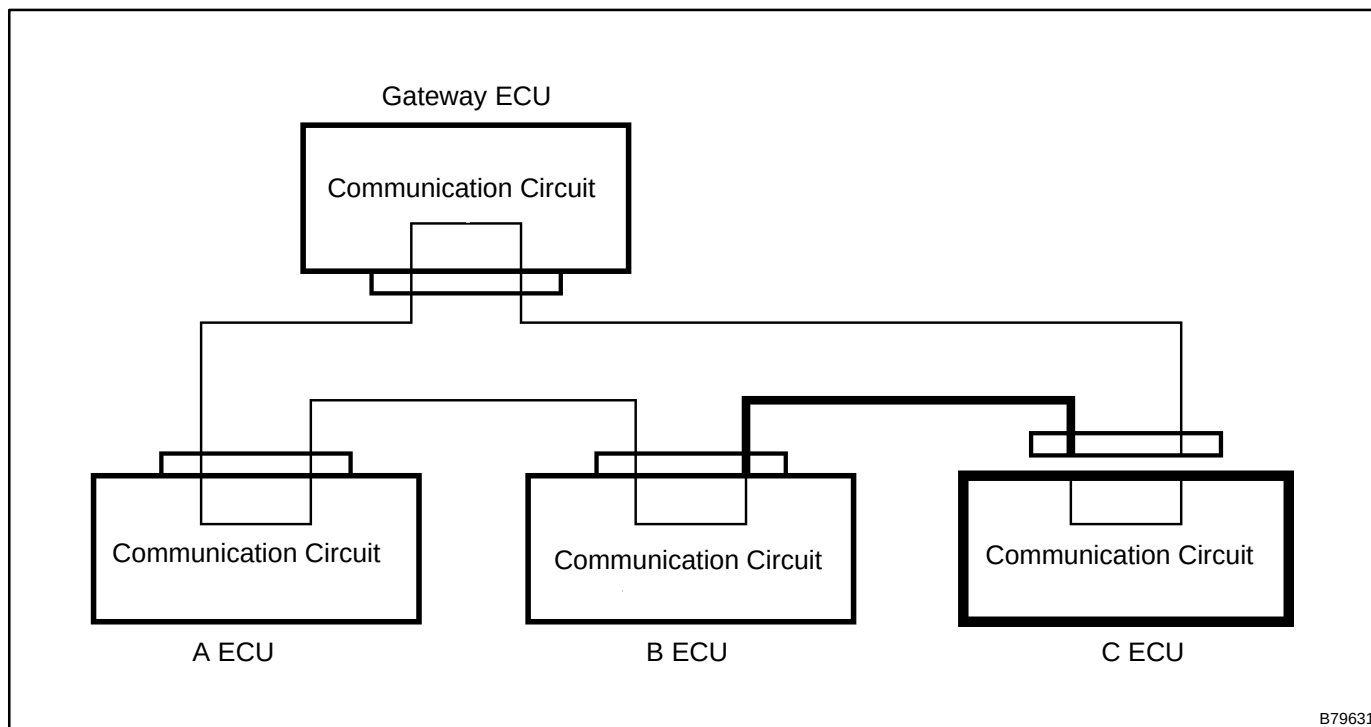
HINT:

- The C ECU in the door system bus represents the A/C control assy.
- If the result is as specified, the disconnected C ECU (A/C control assy) or the wire harness between the B ECU and C ECU is malfunctioning.

NG**Go to step 6****OK**

5 CHECK WIRE HARNESS BETWEEN B ECU AND C ECU

(a) Disconnect the C ECU connector and check for DTCs B1214 and B1215.



OK: DTCs B1214 and B1215 are not output.

NOTICE:

Disconnect the connectors one by one. Reconnect the connector before starting the next check.

HINT:

If the result is as specified, the wire harness between the B ECU and C ECU is functioning normally but the disconnected C ECU malfunctioning.

NG

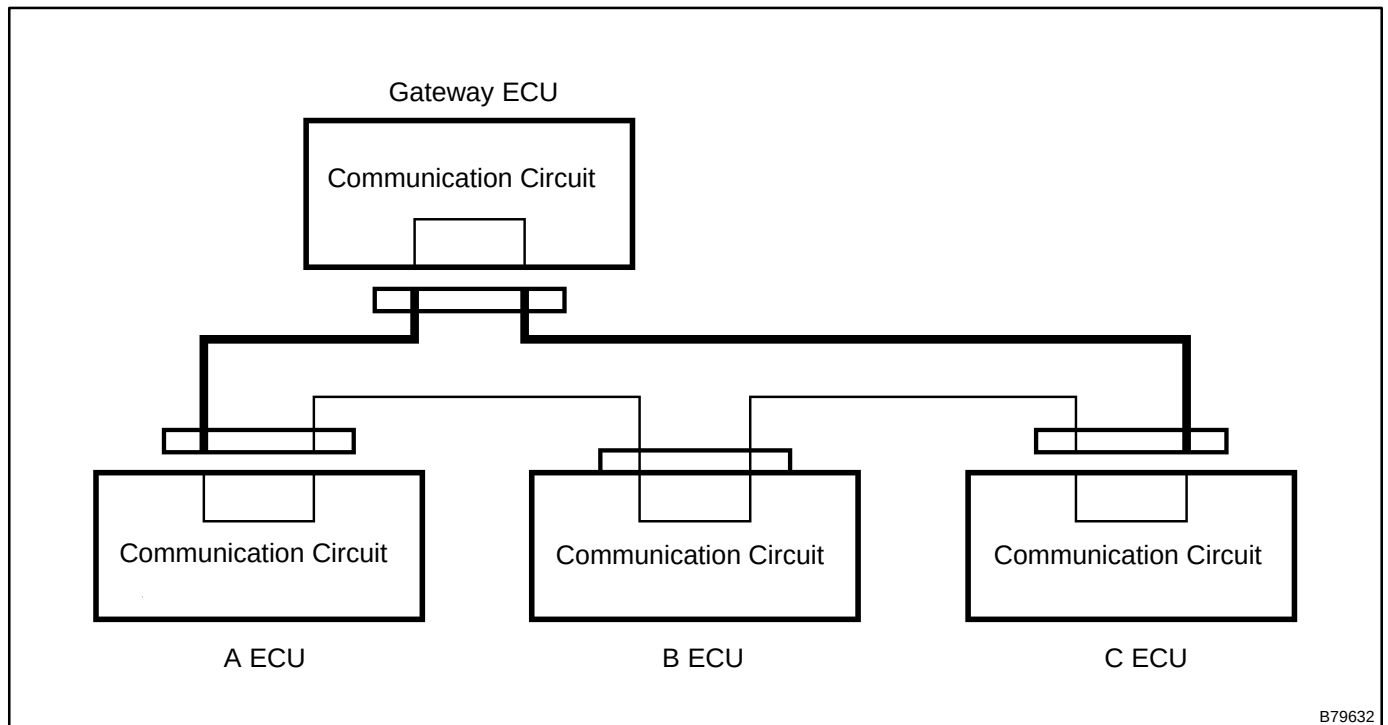
REPAIR OR REPLACE BETWEEN WIRE HARNESS OF B ECU AND C ECU

OK

REPLACE C ECU

6 CHECK WIRE HARNESS BETWEEN GATEWAY ECU AND A ECU OR C ECU

(a) Check for a short-circuit in +B or body ground.



- (1) Disconnect the A ECU, C ECU and gateway ECU connectors.
- (2) Measure the voltage and resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A ECU connector/gateway ECU connector – body ground	0 V
C ECU connector/gateway ECU connector – body ground	0 V
A ECU connector/gateway ECU connector – body ground	10 kΩ or higher
C ECU connector/gateway ECU connector – body ground	10 kΩ or higher

HINT:

- The A ECU in the door system bus represents the power source control ECU.
- The C ECU in the door system bus represents the A/C control assy.

NG

REPAIR OR REPLACE BETWEEN WIRE HARNESS OF GATEWAY ECU AND A ECU OR C ECU

OK

REPLACE NETWORK GATEWAY ECU

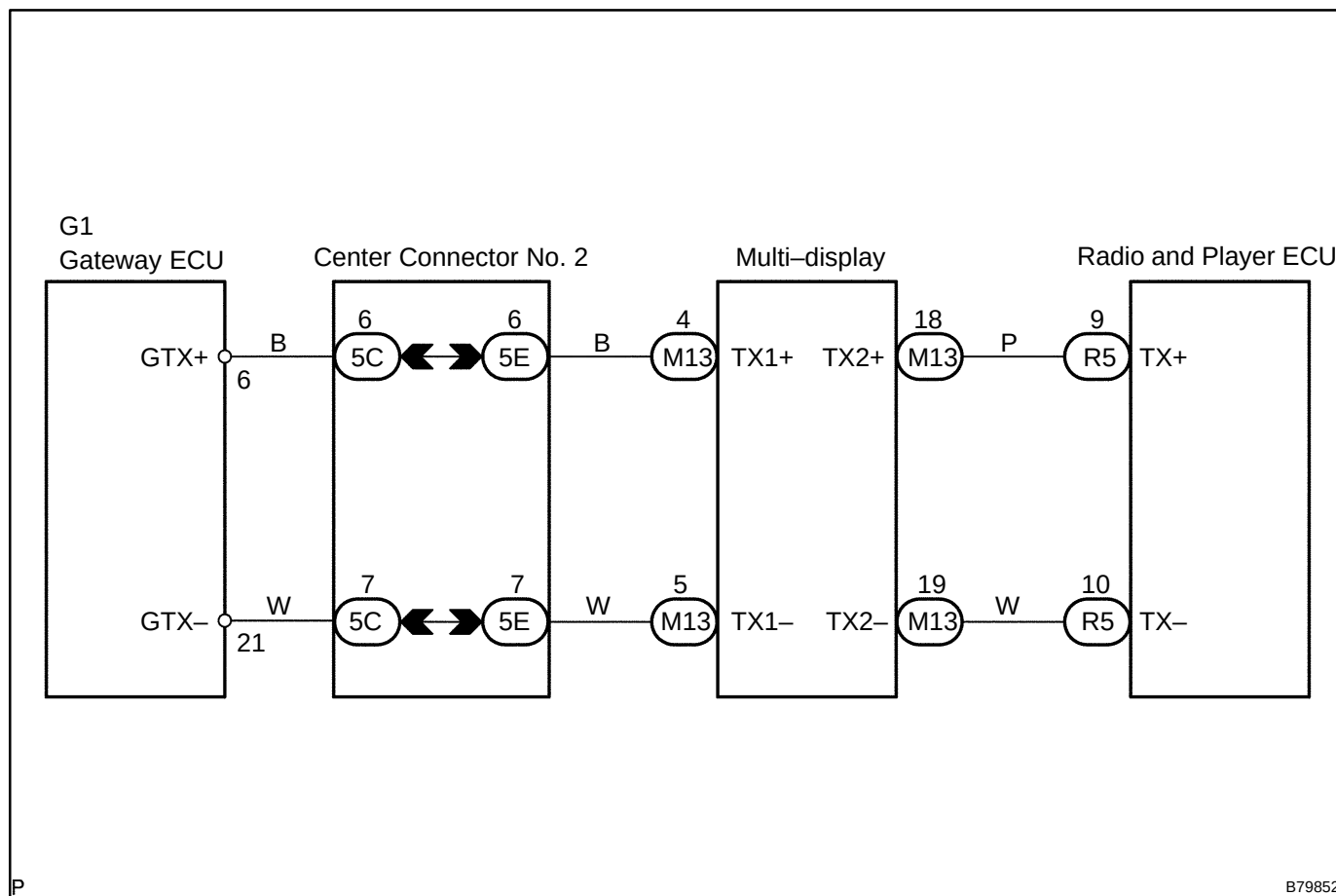
DTC	B1248	AVC-LAN COMMUNICATION IMPOSSIBLE
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CIRCUIT DESCRIPTION

This DTC is detected when communication is impossible between the radio and player ECU and gateway ECU.

DTC No.	DTC Detection Condition	Trouble Area
B1248	AVC-LAN communication is impossible	• Radio and player ECU • Wire harness

WIRING DIAGRAM



INSPECTION PROCEDURE

1 CHECK OPERATION

- (a) Check that the radio and player switch can operate normally.
OK: Radio and player switch can operate normally.

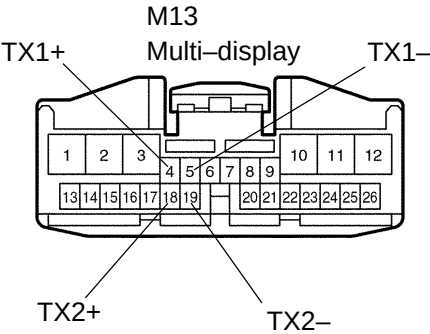
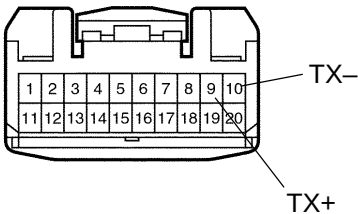
NG Go to AUDIO SYSTEM (See page 05-1757)

OK

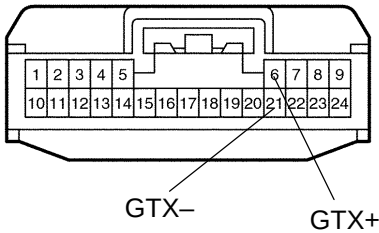
2 CHECK RESISTANCE OF COMMUNICATION LINE

Wire Harness Side

R5
Radio and Player ECU



G1
Gateway ECU



P B79854

- (a) Disconnect the R5, M13 and G1 ECU connectors.
(b) Measure the resistance between the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
R5-9 (TX+) – M13-18 (TX2+)	Below 1 Ω
R5-10 (TX-) – M13-19 (TX2-)	Below 1 Ω
M13-4 (TX1+) – G1-6 (GTX+)	Below 1 Ω
M13-5 (TX1-) – G1-21 (GTX-)	Below 1 Ω

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

REPLACE RADIO AND PLAYER ECU

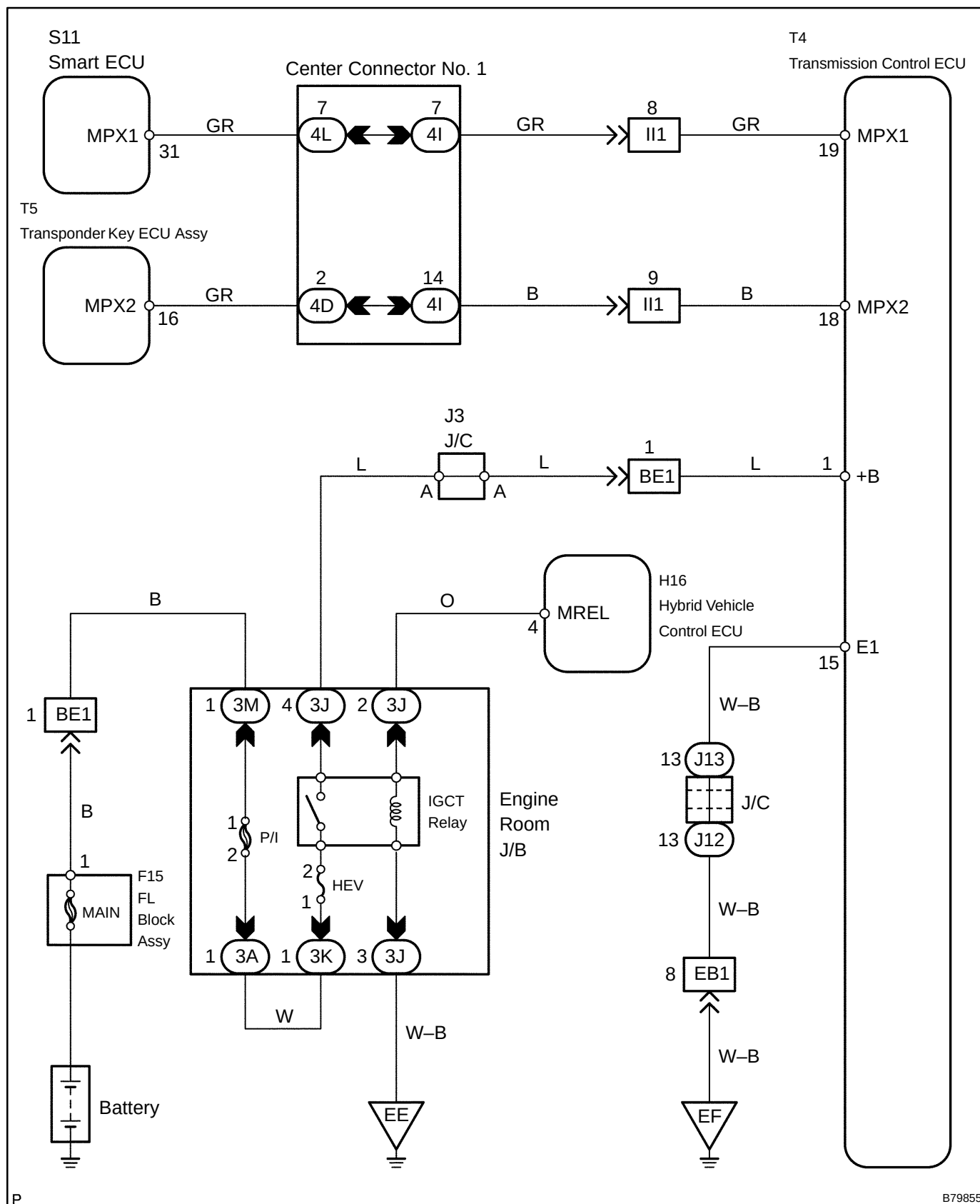
DTC	B1260	TRANSMISSION CONTROL ECU COMMUNICATION STOP
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CIRCUIT DESCRIPTION

This DTC is detected when communication between the transmission control ECU and gateway ECU stops for more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1260	Transmission control ECU communication stops	• Transmission control ECU • Wire harness

WIRING DIAGRAM



P

B79855

INSPECTION PROCEDURE

1 INSPECT FUSE (HEV)

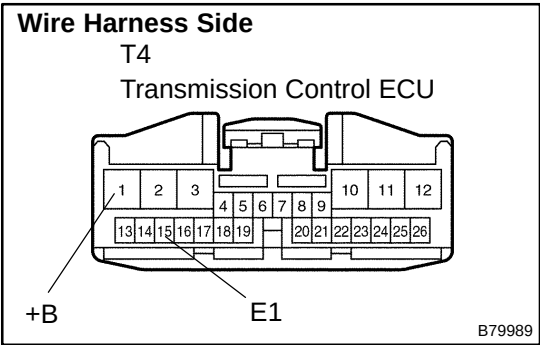
- (a) Remove the HEV fuse from the engine room J/B.
- (b) Measure the resistance.

Standard: Below 1 Ω

NG REPLACE FUSE

OK

2 CHECK WIRE HARNESS (TRANSMISSION CONTROL ECU – BODY GROUND)



- (a) Disconnect the T4 ECU connector.
- (b) Measure the voltage and resistance between the wire harness side connector.

Standard:

Tester Connection	Condition	Specified Condition
T4-1 (+B) – Body ground	Power switch 1: OFF → 2: ON (IG)	1: 0 V → 2: 10 to 14 V
T4-15 (E1) – Body ground	Constant	Below 1 Ω

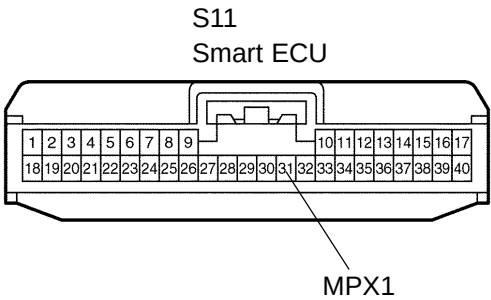
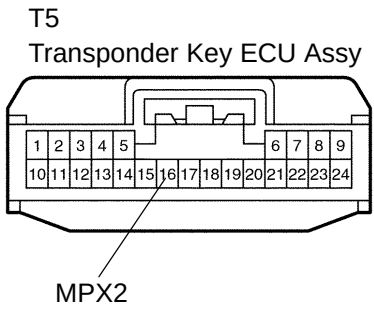
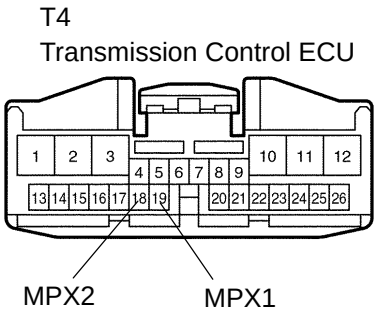
NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3

CHECK RESISTANCE OF COMMUNICATION LINE

Wire Harness Side



P B79857

A

- (a) Disconnect the T4, T5 and S11 ECU connectors.
(b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T4-19 (MPX1) – S11-31 (MPX1)	Below 1 Ω
T4-18 (MPX2) – T5-16 (MPX2)	Below 1 Ω

Result:

Result	Proceed To
Both are OK	A
One is OK	B
Both are NG	C

B

REPLACE TRANSMISSION CONTROL ECU AND REPAIR OR REPLACE HARNESS AND CONNECTOR

C

REPAIR OR REPLACE HARNESS AND CONNECTOR

REPLACE TRANSMISSION CONTROL ECU

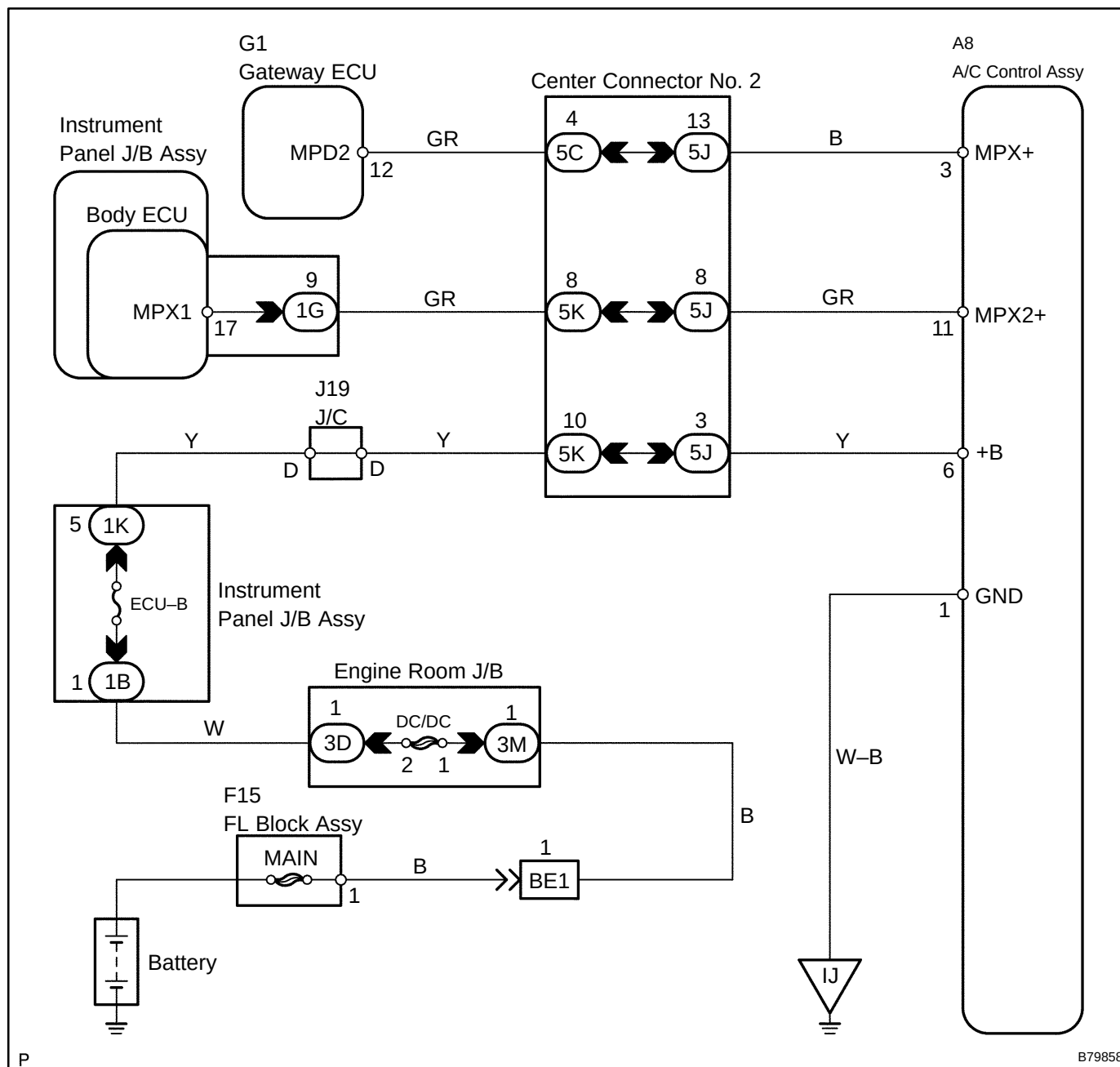
DTC	B1262	A/C ECU COMMUNICATION STOP
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CIRCUIT DESCRIPTION

This DTC is detected when communication between the A/C control assy (A/C ECU) and gateway ECU stops for more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1262	A/C ECU communication stops	• A/C control assy • Wire harness

WIRING DIAGRAM



1	CHECK OPERATION
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- OK: A/C switch can operate the air conditioner normally.**

Go to step 2

OK

2	CHECK WIRE HARNESS (A/C CONTROL ASSY – BODY GROUND)
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B79990

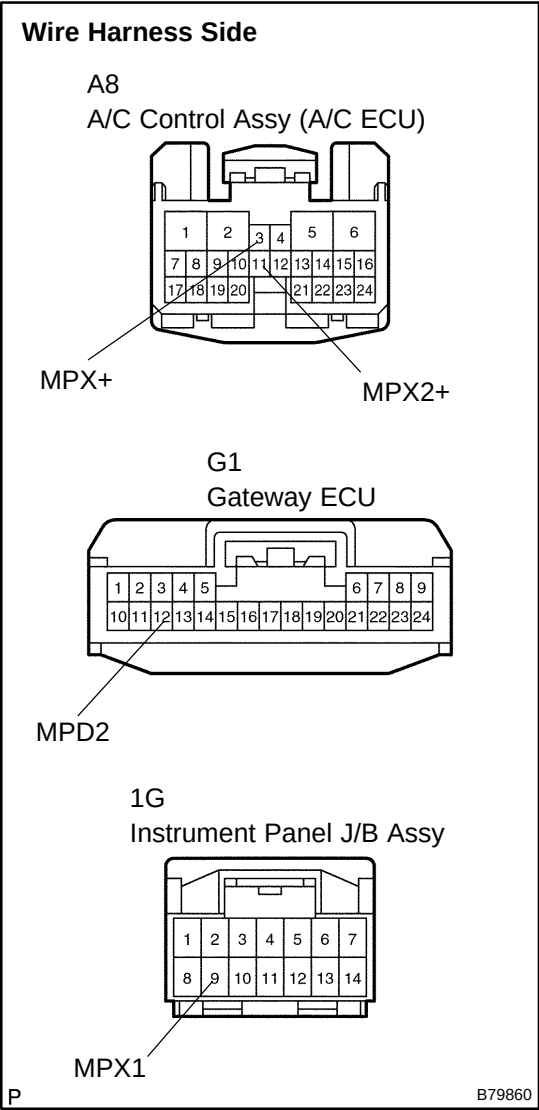
- Standard:**

Tester Connection	Condition	Specified Condition
A8-6 (+B) – Body ground	Constant	10 to 14 V
A8-1 (GND) – Body ground	Constant	Below 1 Ω

REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3 CHECK RESISTANCE OF COMMUNICATION LINE



- (a) Disconnect the A8 and G1 ECU connectors.
- (b) Disconnect the 1G J/B connector.
- (c) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
A8-3 (MPX+) – G1-12 (MPD2)	Below 1 Ω
A8-11 (MPX2+) – 1G-9 (MPX1)	Below 1 Ω

Result:

Result	Proceed to
Both are OK	A
One is OK	B
Both are NG	C

B

REPLACE A/C CONTROL ASSY AND REPAIR OR REPLACE HARNESS AND CONNECTOR

C

REPAIR OR REPLACE HARNESS AND CONNECTOR

A

REPLACE A/C CONTROL ASSY

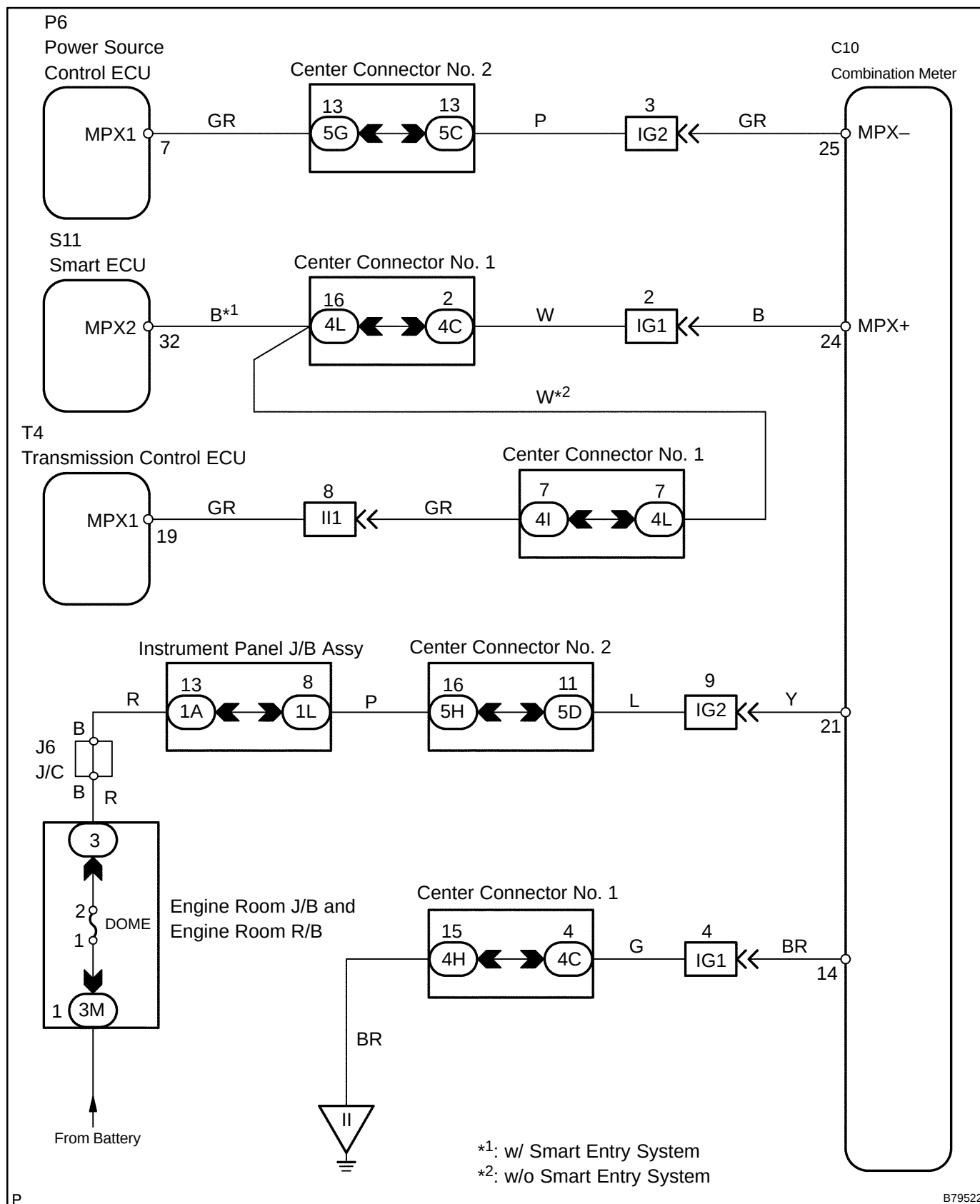
DTC	B1271	COMBINATION METER ECU COMMUNICATION STOP
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CIRCUIT DESCRIPTION

This DTC is detected when communication between the combination meter assy (meter ECU) and gateway ECU stops for more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1271	Combination meter ECU communication stops	• Combination meter assy • Wire harness

WIRING DIAGRAM



B79522

INSPECTION PROCEDURE

1 CHECK OPERATION

- (a) Check that the indicator (READY) on the combination meter illuminates when the hybrid vehicle control system is operating (power switch ON (READY)).
OK: Indicator can operate properly.

NG Go to step 2

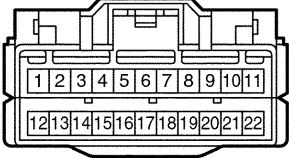
OK

REPLACE COMBINATION METER ASSY

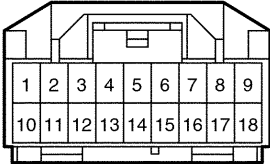
2 CHECK WIRE HARNESS (COMBINATION METER ASSY – BODY GROUND)

Wire Harness Side

IG1
(C10 Combination Meter)



IG2
(C10 Combination Meter)



B80254 B80259

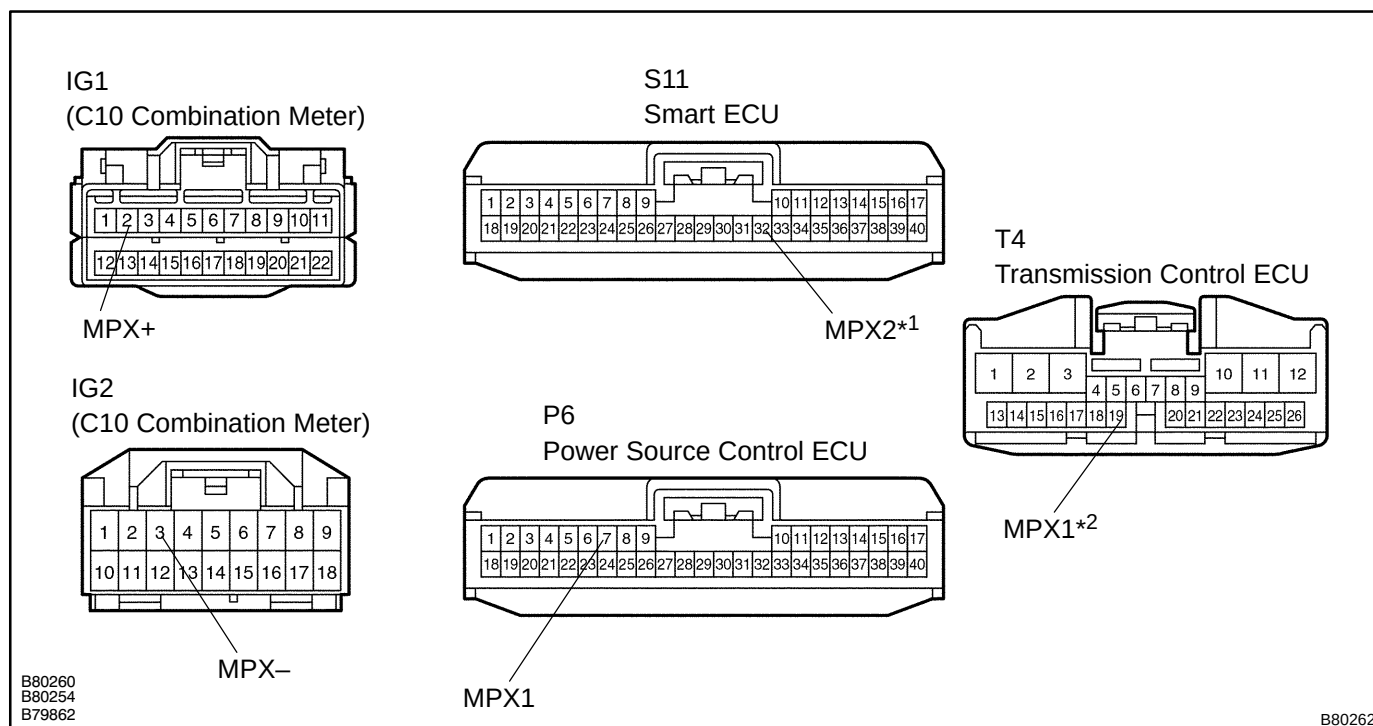
- (a) Disconnect the IG1 and IG2 meter connectors.
(b) Measure the resistance and voltage of the wire harness side connector.
Standard:

Tester Connection	Specified Condition
IG2-9 – Body ground	10 to 14 V
IG1-4 – Body ground	Below 1 Ω

NG REPAIR OR REPLACE HARNESS AND CONNECTOR

OK

3 CHECK RESISTANCE OF COMMUNICATION LINE



- Disconnect the IG1 and IG2 meter connectors.
- Disconnect the P6 and, S11 or T4 ECU connectors.
- Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
IG1-2 (MPX+) – S11-32 (MPX2)*1	Below 1 Ω
IG1-2 (MPX+) – T4-19 (MPX1)*2	Below 1 Ω
IG2-3 (MPX-) – P6-7 (MPX1)	Below 1 Ω

*1: w/ Smart entry system

*2: w/o Smart entry system

Result:

Result	Proceed To
Both are OK	A
One is OK	B
Both are NG	C

B

**REPLACE COMBINATION METER ASSY AND
REPAIR OR REPLACE HARNESS AND
CONNECTOR**

C

**REPAIR OR REPLACE HARNESS AND
CONNECTOR**

A

REPLACE COMBINATION METER ASSY

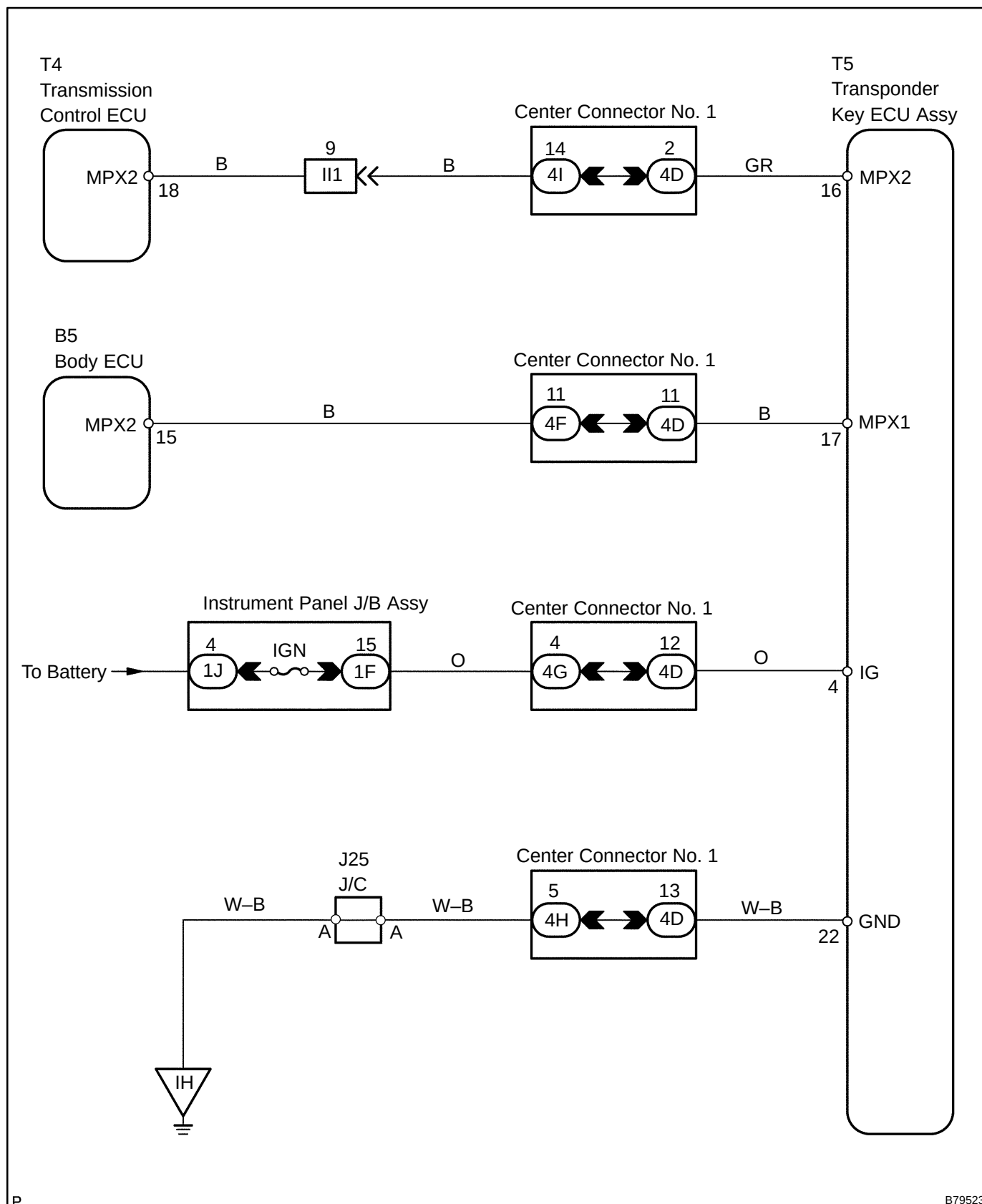
DTC	B1294	IMMOBILIZER ECU COMMUNICATION STOP
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CIRCUIT DESCRIPTION

This DTC is detected when communication between the transponder key ECU (immobilizer ECU) and gateway ECU stops more than 10 seconds.

DTC No.	DTC Detection Condition	Trouble Area
B1294	Transponder key ECU communication stops	• Transponder key ECU • Wire harness

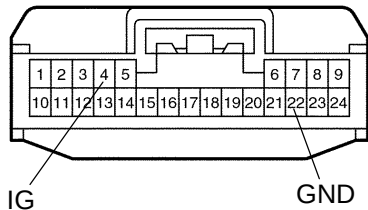
WIRING DIAGRAM



INSPECTION PROCEDURE**1 INSPECT FUSE (IGN)**

- (a) Remove the IGN fuse from the instrument panel J/B
(b) Measure the resistance.

Standard: Below 1 Ω

NG**REPLACE FUSE****OK****2 CHECK WIRE HARNESS (TRANSPONDER KEY ECU ASSY – BODY GROUND)****Wire Harness Side****T5****Transponder Key ECU Assy**

- (a) Disconnect the T5 ECU connector.
(b) Measure the voltage and resistance of the wire harness side connectors.

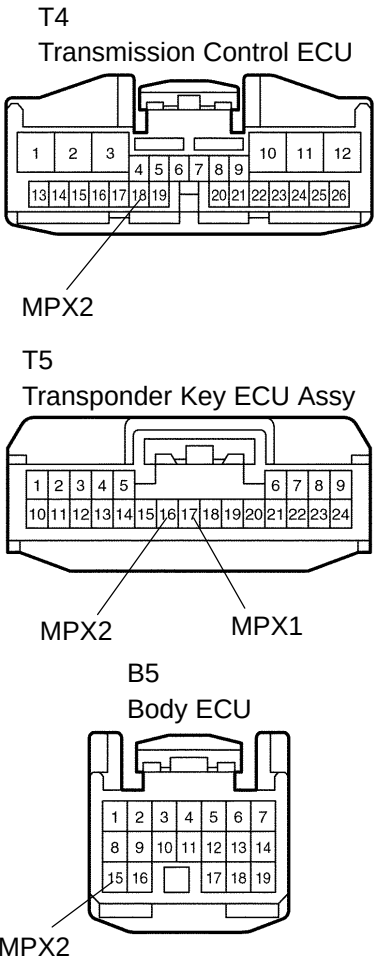
Standard:

Tester Connection	Condition	Specified Condition
T5-4 (IG) – Body ground	Power switch 1: OFF → 2: ON (IG)	1: 0 V → 2: 10 to 14V
T5-22 (GND) – Body ground	Constant	Below 1 Ω

NG**REPAIR OR REPLACE HARNESS AND CONNECTOR****OK**

3 CHECK RESISTANCE OF COMMUNICATION LINE

Wire Harness Side



P

B79864

- (a) Disconnect the T4, T5 and B5 ECU connectors.
- (b) Measure the resistance of the wire harness side connectors.

Standard:

Tester Connection	Specified Condition
T5-17 (MPX1) – B5-15 (MPX2)	Below 1 Ω
T5-16 (MPX2) – T4-18 (MPX2)	Below 1 Ω

Result:

Result	Proceed to
Both are OK	A
One is OK	B
Both are NG	C

B

**REPLACE TRANSPONDER KEY ECU ASSY
AND REPAIR OR REPLACE HARNESS AND
CONNECTOR**

C

**REPAIR OR REPLACE HARNESS AND
CONNECTOR**

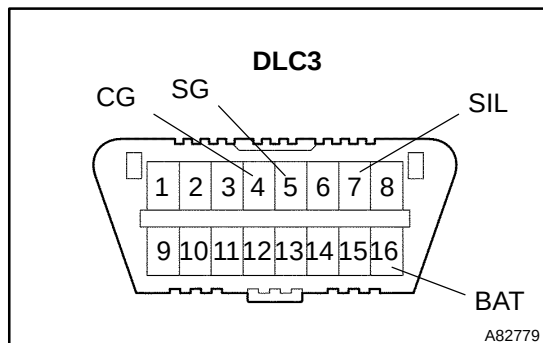
A

REPLACE TRANSPONDER KEY ECU ASSY

DIAGNOSIS SYSTEM

1. DESCRIPTION

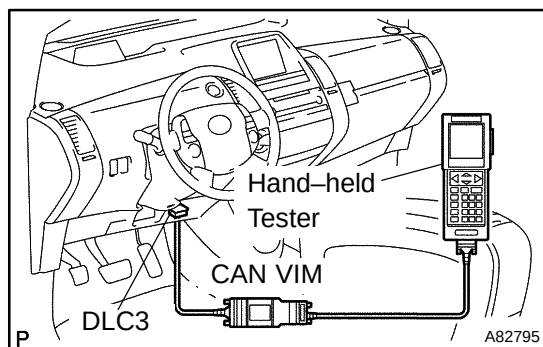
The gateway ECU controls the function of the multiplex communication system on the vehicle. Data of the multiplex communication system and the Diagnostic Trouble Code (DTC) can be read in the Data Link Connector 3 (DLC3) of the vehicle.



2. CHECK DLC3

The vehicle's ECU uses the ISO 15765-4 for communication protocol. The terminal arrangement of the DLC3 complies with ISO 15031-03 and matches the ISO 15765-4 format.

Symbol	Terminal No.	Name	Reference terminal	Result	Condition
SIL	7	Bus "+" line	5 – Signal ground	Pulse generation	During transmission
CG	4	Chassis ground	Body ground	1 Ω or less	Always
SG	5	Signal ground	Body ground	1 Ω or less	Always
BAT	16	Battery positive	Body ground	9 to 14 V	Always



HINT:

Connect the cable of the hand-held tester (with CAN VIN) to the DLC3, turn the power switch ON (IG) and attempt to use the tester. If the screen displays UNABLE TO CONNECT TO VEHICLE, a problem exists in the vehicle side or the tester side. If communication is normal when the hand-held tester is connected to another vehicle, inspect the DLC3 on the original vehicle.

If communication is still impossible when the tester is connected to another vehicle, the problem is probably in the tester itself. Consult the Service Department listed in the tester's instruction manual.

3. INSPECT BATTERY VOLTAGE

Standard: 11 to 14 V

If voltage is below 11 V, recharge the battery before proceeding.

DIAGNOSTIC TROUBLE CODE CHART

If a malfunction code is displayed during DTC check, check the circuit corresponding to the code in the table below. Proceed to the page given for the circuit.

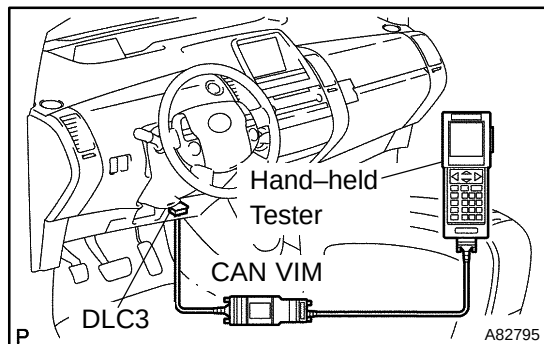
DTC No. (See Page)	Detection Item	Trouble Area
B1200 (05-2559)	Body ECU communication stop	• Wire harness • Body ECU
B1207* (05-2563)	Smart ECU communication stop	• Wire harness • Smart ECU
B1210 (05-2567)	Power source control ECU communication stop	• Wire harness • Power source control ECU
B1214, B1215 (05-2571)	• Door system communication bus malfunction (+B short) • Door system communication bus malfunction (GND short)	• Wire harness • ECUs (Door system bus)
B1248 (05-2579)	AVC-LAN communication impossible	• Wire harness • ECU (AVC-LAN system bus)
B1260 (05-2581)	Transmission control ECU communication stop	• Wire harness • Transmission control ECU
B1262 (05-2585)	A/C ECU communication stop	• Wire harness • A/C ECU
B1271 (05-2588)	Combination meter ECU communication stop	• Wire harness • Meter ECU
B1294 (05-2592)	Immobilizer ECU communication stop	• Wire harness • Transponder key ECU

*: w/ Smart entry system

HINT:

When "+B or GND short malfunction of communication bus" DTCs (B1214, B1215, etc.) are detected at the same time as "communication stop" DTCs (B1211, B1212, etc.), please repair the "+B or GND short malfunction of communication bus" DTCs first.

DTC CHECK/CLEAR



1. CHECK DTC

- (a) Connect the hand-held tester (with CAN VIN) to the DLC3 through the CAN VIN (controller area network vehicle interface module).
- (b) Turn the power switch ON (IG).
- (c) Read DTCs by following the prompts on the hand-held tester screen.

HINT:

Refer to the tester operator's manual for further details.

2. CLEAR DTC

- (a) Connect the hand-held tester (with CAN VIN) to the DLC3 through the CAN VIM.
- (b) Turn the power switch ON (IG).
- (c) Erase the DTCs by following the prompts on the tester screen.

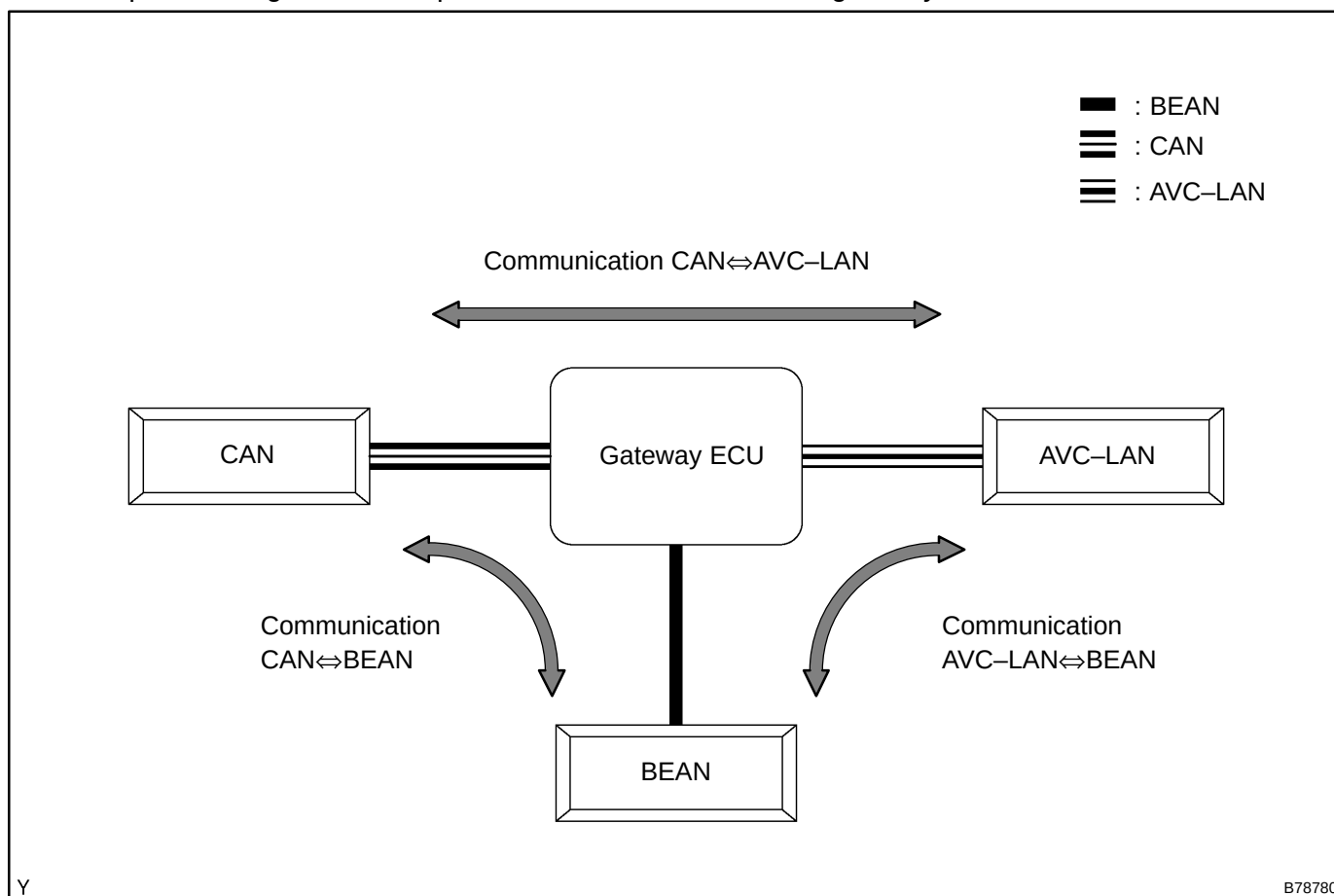
HINT:

Refer to the hand-held tester operator's manual for further details.

SYSTEM DESCRIPTION

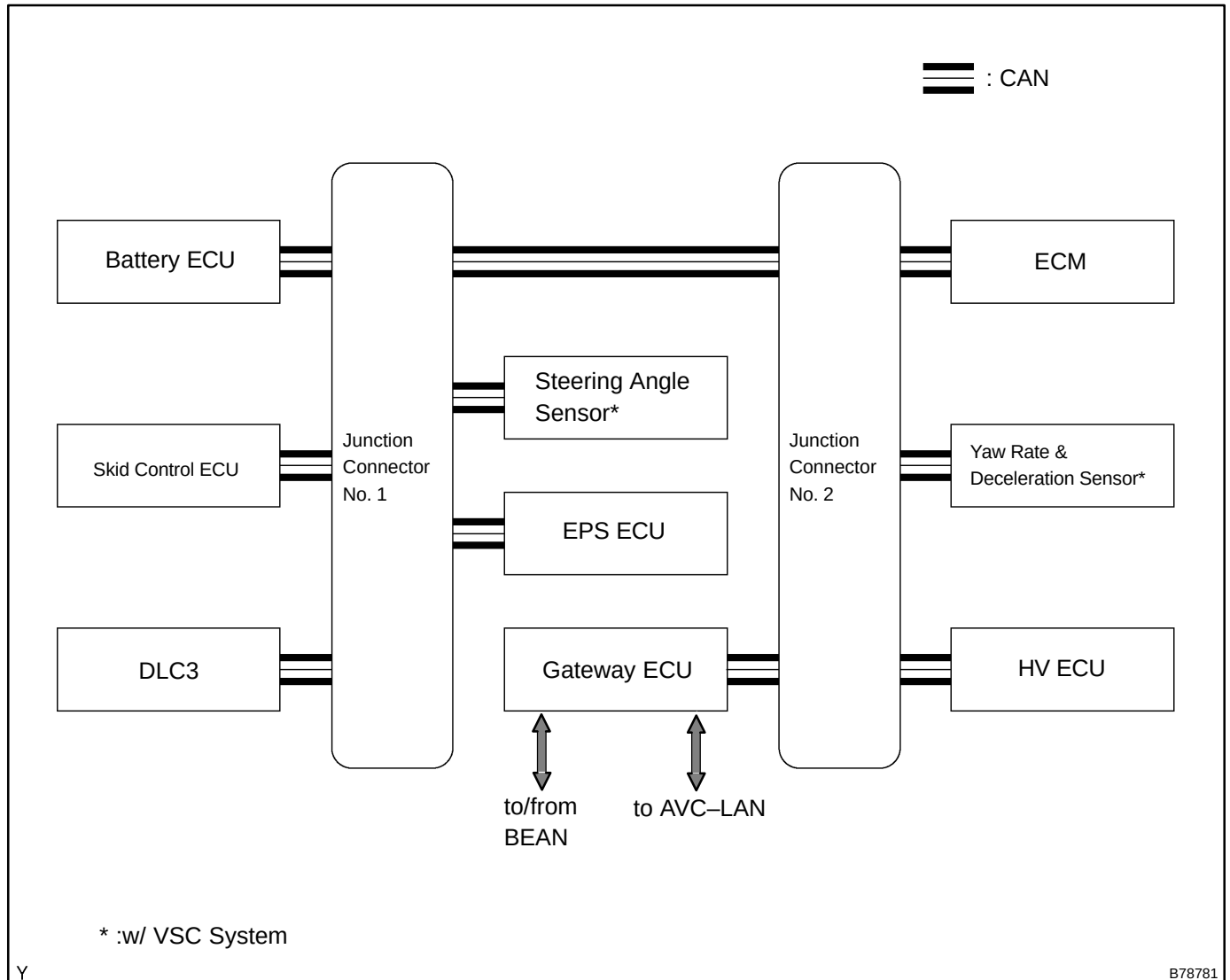
- The PRIUS primarily uses the 3 types of multiplex communication systems described below.
 - The Controller Area Network (CAN) is a network of the vehicle control systems (engine electrical, chassis electrical, and hybrid system) and maintains communication between the ECUs.
 - The Body Electronics Area Network (BEAN) is a network of the ECUs of the body electric system control and maintains communication between the ECUs.
 - The Audio Visual Communication–Local Area Network (AVC–LAN) is a network of the ECUs of the audio visual system and the audio visual devices and maintains communication between the devices and the ECUs.
- These 3 types of multiplex communication systems are connected to the gateway ECU. The gateway ECU, which is provided with communication circuits that support the 3 types of multiplex communication systems, enables communication among the multiplex communication systems that are connected to the gateway ECU.

For example, to enable air conditioning control, the air conditioning ECU receives the engine coolant temperature signal that is input into the ECM via the CAN, gateway ECU and BEAN.



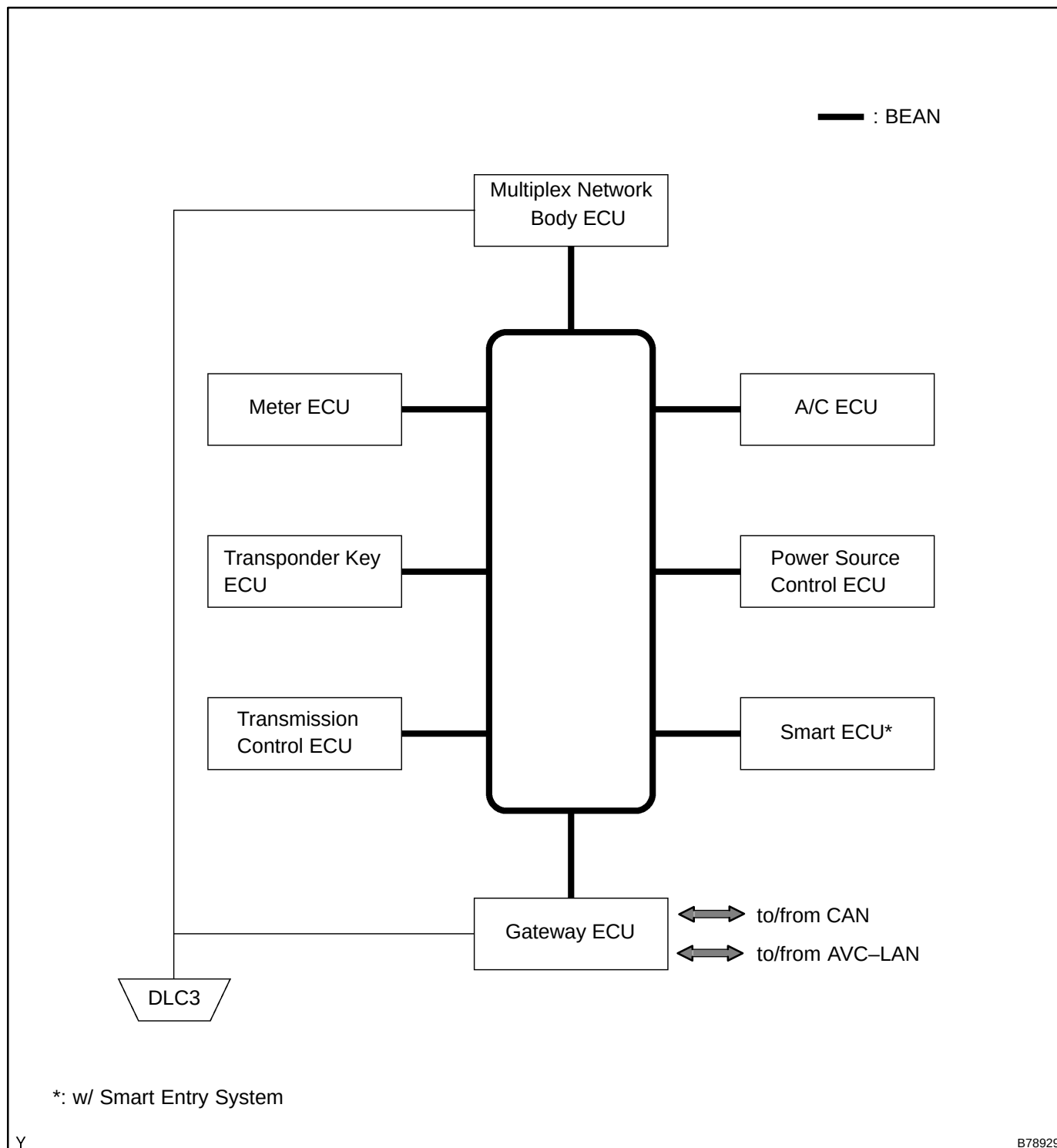
- The CAN in the PRIUS is established among the HV ECU, battery ECU, EPS ECU, ECM, skid control ECU, steering angle sensor*, yaw rate & deceleration sensor*, gateway ECU and DLC3.

CAN System Diagram

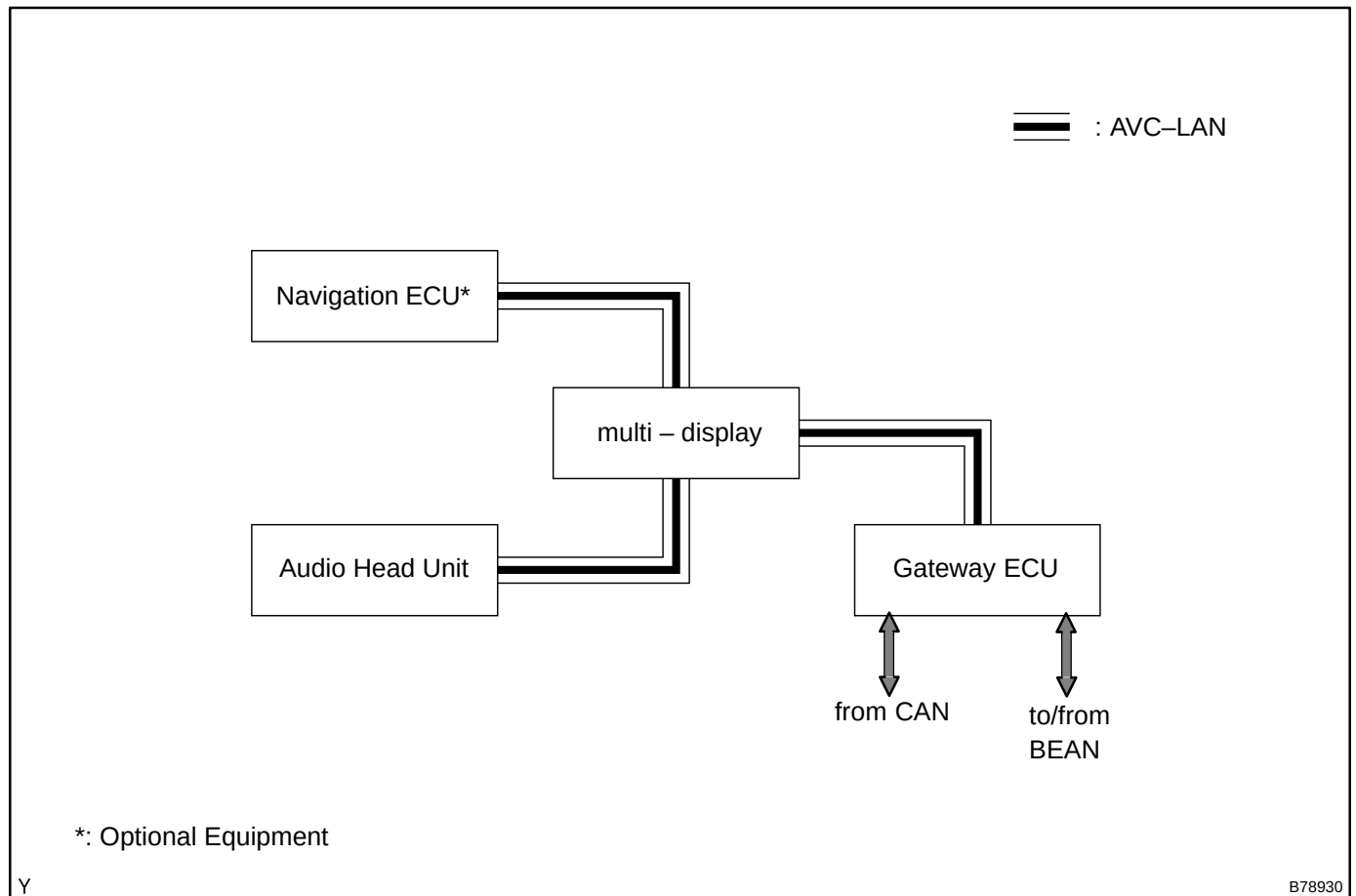


- The BEAN in the PRIUS is established among the body ECU, meter ECU, A/C ECU, transponder key ECU, power source control ECU, transmission control ECU, smart ECU* and gateway ECU.

BEAN System Diagram



- The AVC-LAN is established among the multi – display, audio head unit, navigation ECU* and gateway ECU.

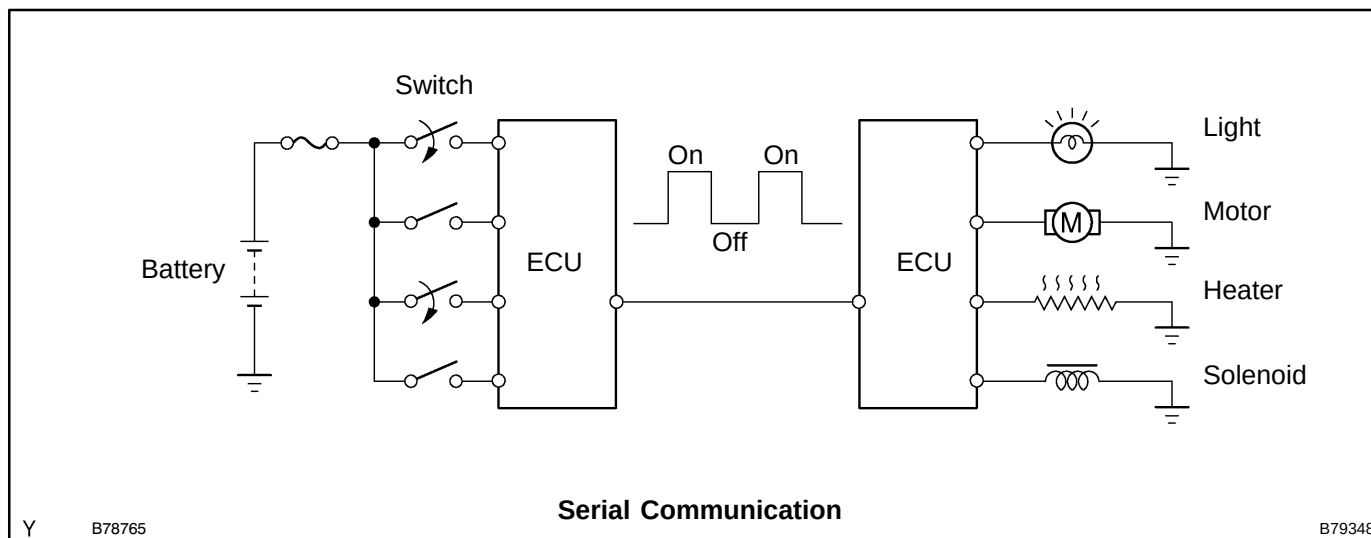
AVC-LAN System Diagram

BASIC OF MPX (Multiplex Communication)

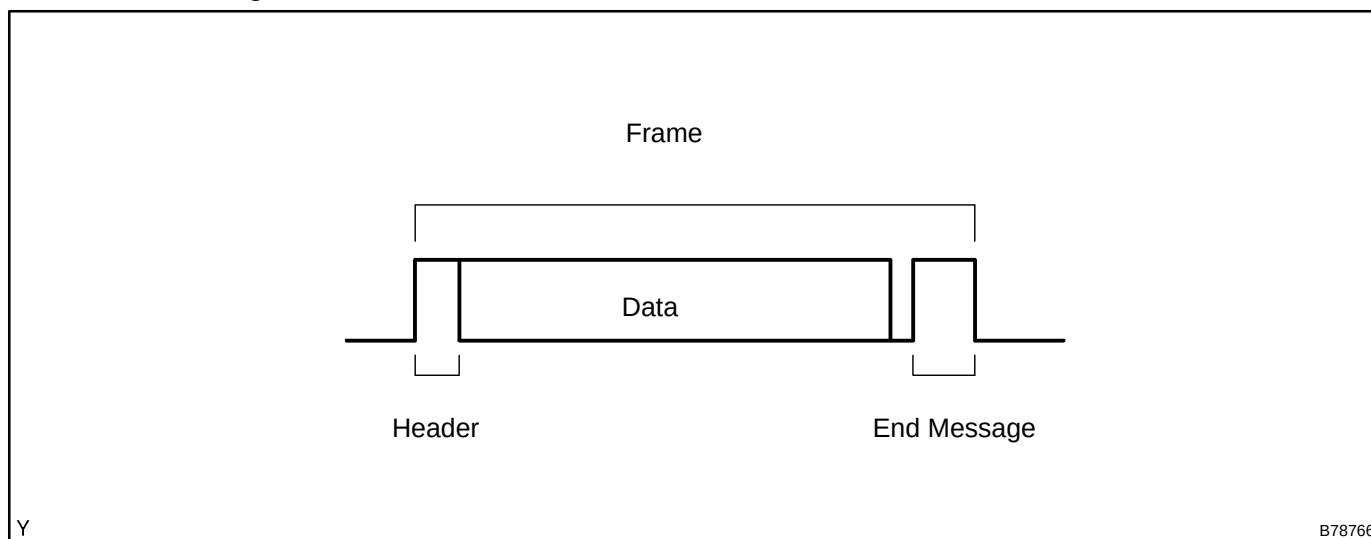
1. GENERAL

The PRIUS multiplex communication system uses serial communication, which converts multiple pieces of information into serial communication data. As a result, they can be transmitted through a single communication wire.

Conceptual Drawing



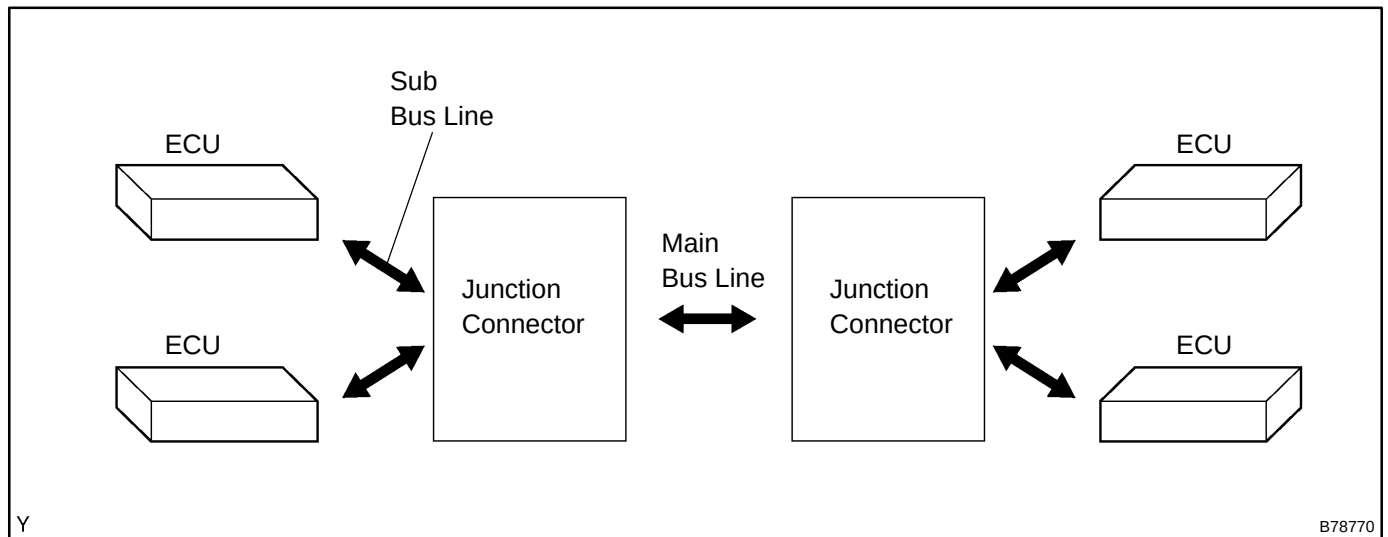
- Serial communication data consists of bits and frames. A bit is the basic unit that represents the amount of information. A bit is represented by binary values "0" or "1". A frame is a body of data that is transmitted together. A frame contains a "header" that indicates the beginning of the data and an "end" message that indicates the end of the data.



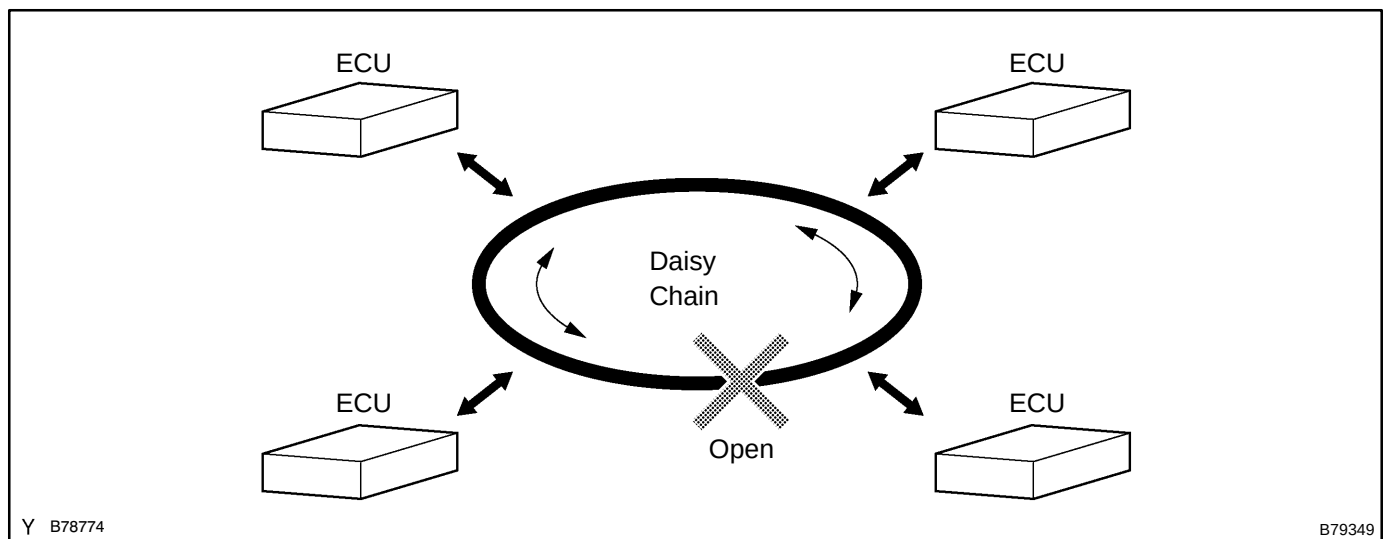
2. NETWORK STYLE

Based on serial communication, various ECUs are connected on a network to exchange various pieces of information. Such a system is called a multiplex communication system.

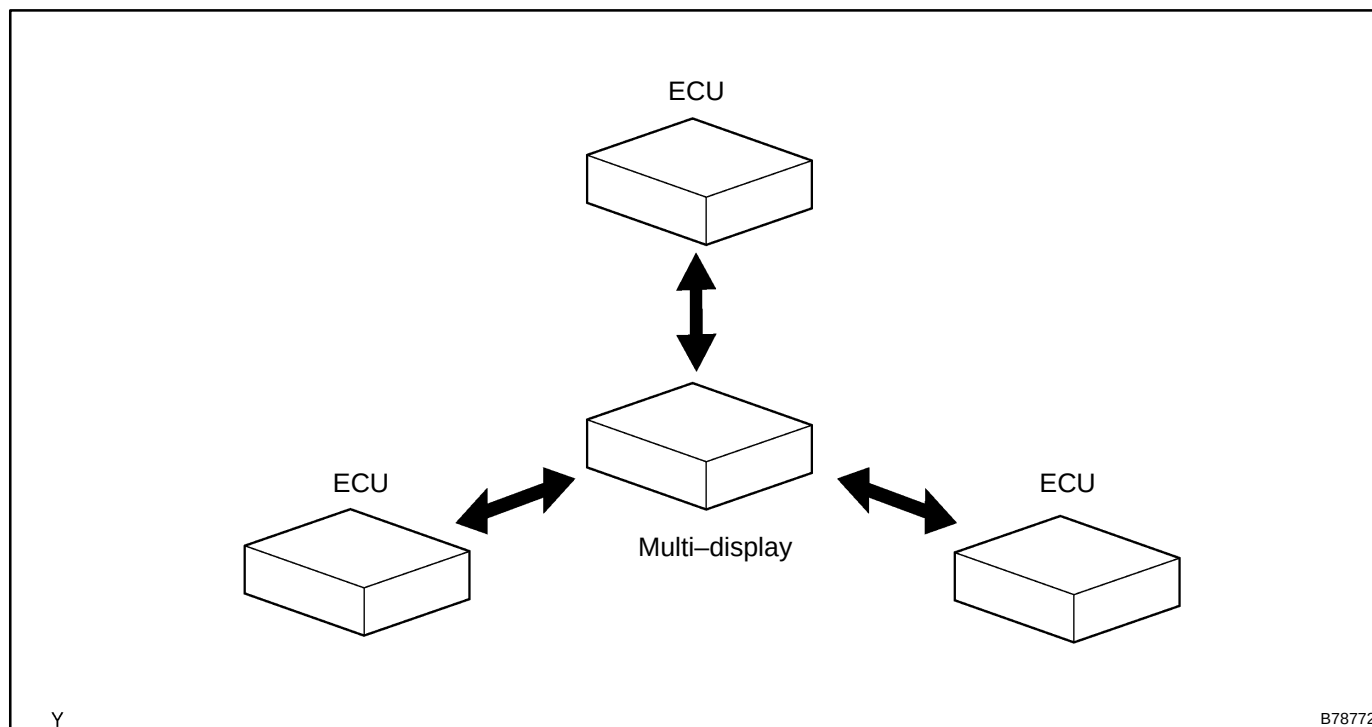
- The CAN communication on the PRIUS uses the multi star style bus connection. In this style of network, the ECUs are connected in a star shape. The ECUs cannot establish communication with other ECUs without passing through the master ECUs. For the Prius, the 2 junction connectors are the master ECUs and they are connected with main bus lines. Each of the junction connectors extends sub bus lines and communicates between all the connected ECUs.



- The BEAN on the PRIUS uses the ring and bus styles of networks to connect ECUs. The connection method is called a daisy chain. In a daisy chain, communication can be maintained even if there is an area that has an open circuit. The ECUs are connected in a ring form, which enables a signal that is output by a transmitting ECU to circle the ring and return to its original ECU. This ring also functions as a single common communication wire. The transmitting ECUs output signals through a common communication wire and the receiving ECUs input data through a common communication wire.



- The AVC-LAN in the PRIUS uses a star style. This style is centered on a master ECU, which holds a central control function. The ECUs are connected in a star shape. The ECUs cannot establish communication with other ECUs without passing through the master ECU. For the Prius, the multi display or audio head unit functions as a master ECU.



3. DIFFERENCE OF CAN, BEAN AND AVC-LAN

Data for respective protocols (CAN, BEAN and AVC-LAN) are arranged differently. Therefore, it is not possible to exchange data between different protocols. For this reason, data arrangement must be converted before transferring data to communication bus (CAN, BEAN and AVC-LAN). This conversion is called gateway function, which is performed by the gateway ECU.

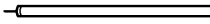
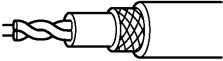
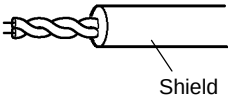
Control	Chassis Electrical System Control	Body Electrical System Control	Body Electrical System Control
Protocol	CAN (ISO Standard)	BEAN (TOYOTA Original)	AVC-LAN (TOYOTA Original)
Communication Speed	500 k bps (Max. 1 M bps)	Max. 10 k bps	Max. 17.8 k bps
Communication Wire	Twisted-pair Wire	AV Single Wire	Twisted-pair Wire
Drive Type	Differential Voltage Drive	Single Wire Voltage Drive	Differential Voltage Drive
Data Length	1 – 8 Byte (Variable)	1 – 11 Byte (Variable)	0 – 32 Byte (variable)

*: "bps" stands for bit per second.

Although BEAN and AVC-LAN communicate at almost the same speed, the CAN communication speed is much faster than BEAN or AVC-LAN. When the vehicle control system uses BEAN or AVC-LAN, which have a slower communication speed than CAN, it means that the system control could be delayed by the slow speed. For this reason, the vehicle control system uses CAN, which can send and receive a large volume of data at one time, in addition to being able to transmit at a faster speed.

4. COMMUNICATION WIRE

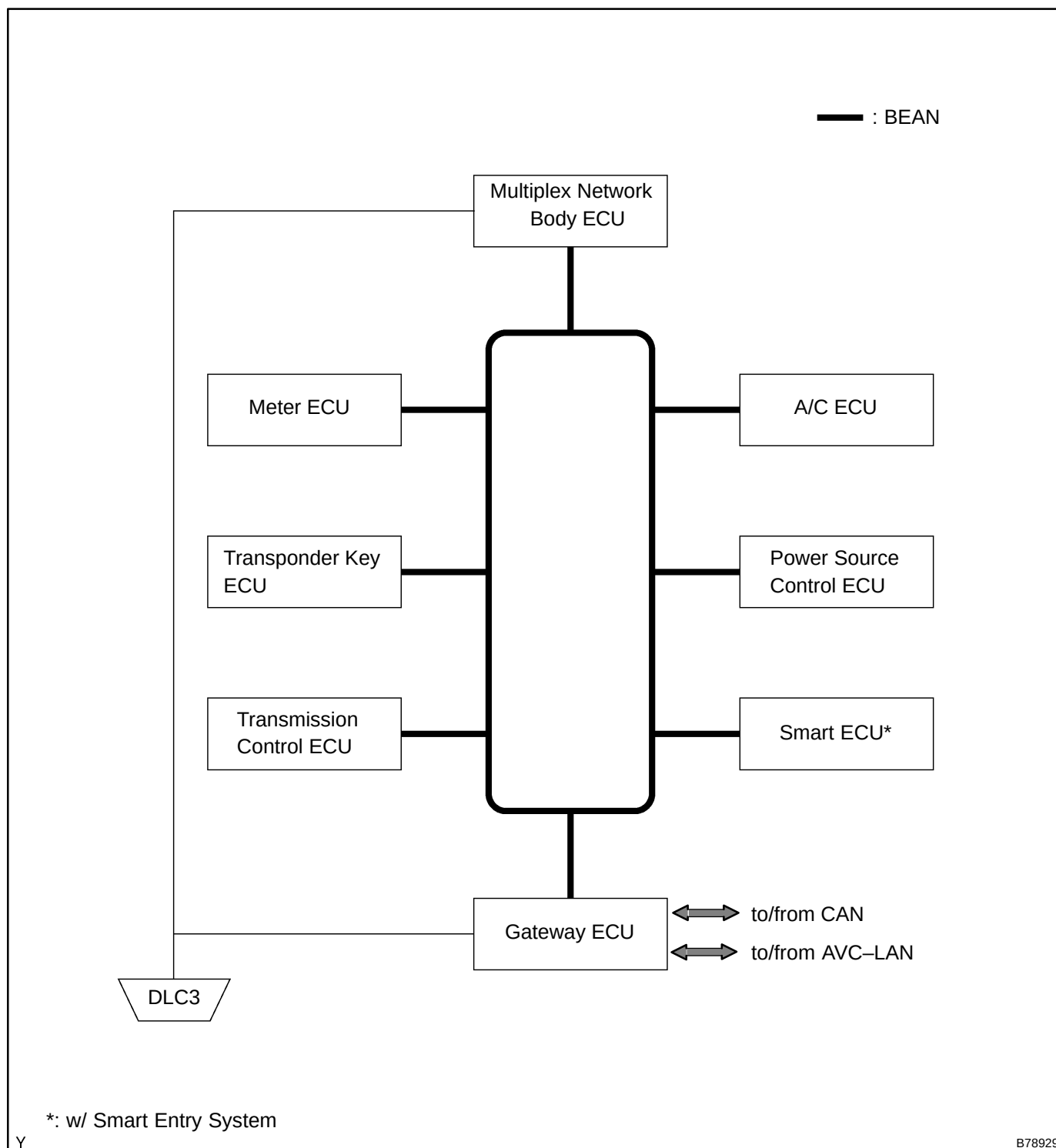
A single, automobile vinyl (AV) wire is used for BEAN communication. A twisted-pair wire is used for CAN and AVC-LAN communication.

Function	Outline
AV Single Wire 	Lightweight single communication wire that consists of single core line surrounded by insulation. Voltage is applied to this line in order to drive communication. This system is called "single wire voltage drive".
Twisted-pair Wire for AVC-LAN 	Pair of lines is twisted together and covered with insulation. Communication is driven by applying positive (+) and negative (-) voltage to two lines in order to send single signal. This system, which is called "differential voltage drive", can reduce noise.
Twisted-pair Wire for CAN 	Pair of lines is twisted. Communication is driven by applying 1.5 to 2.5 V and 2.5 to 3.5 V of voltage to two lines in order to send single signal. This system, which is called "differential voltage drive", can reduce noise.

Y B78777 B79350 B80336

B80263

SYSTEM DIAGRAM



HOW TO PROCEED WITH TROUBLESHOOTING

HINT:

- Use this procedure to troubleshoot the multiplex communication system.
- The hand-held tester should be used in step 2.

1 VEHICLE BROUGHT TO WORKSHOP



2 DTC CHECK (See page 05-2557)

- Check for DTCs and note any codes that are output.
- Delete the DTC.
- Recheck for DTCs. Try to prompt the DTC by simulating the original activity that the DTC suggests.
 - If the DTC does not reoccur, proceed to A.
 - If the DTC reoccurs, proceed to B.

B

Go to step 4

A

3 OVERALL ANALYSIS AND TROUBLESHOOTING

- Terminals of ECU (see page 05-2550)

4 ADJUST, REPAIR OR REPLACE



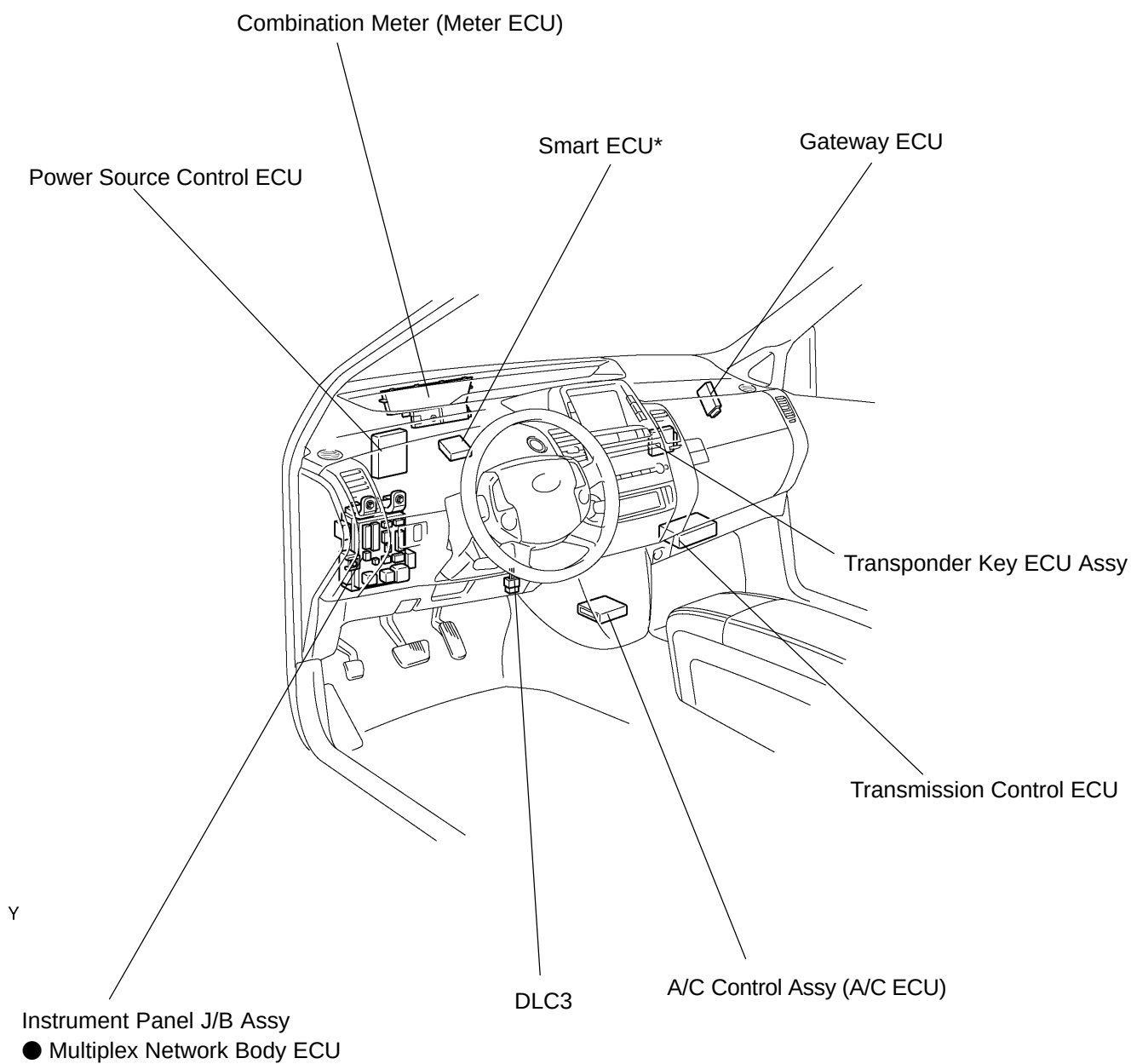
5 CONFIRMATION TEST



END

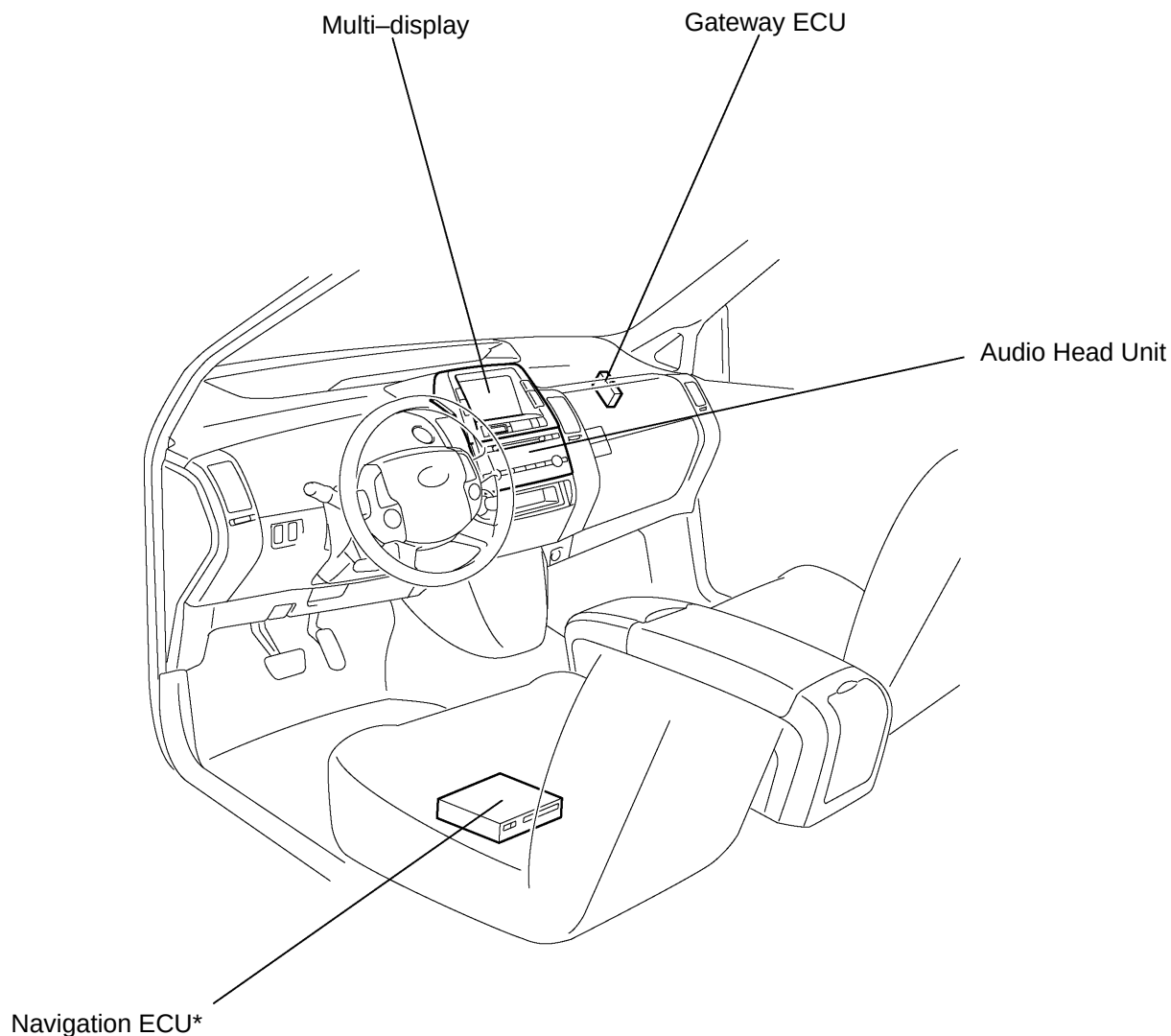
LOCATION

BEAN Component



*: w/ Smart Entry System

B80264

AVC-LAN Component

*: Optional Equipment

B80265

MULTIPLEX COMMUNICATION SYSTEM

05J6T-01

PRECAUTION

NOTICE FOR INITIALIZATION:

When disconnecting the negative (–) battery terminal, initialize the following system(s) after the terminal is reconnected.

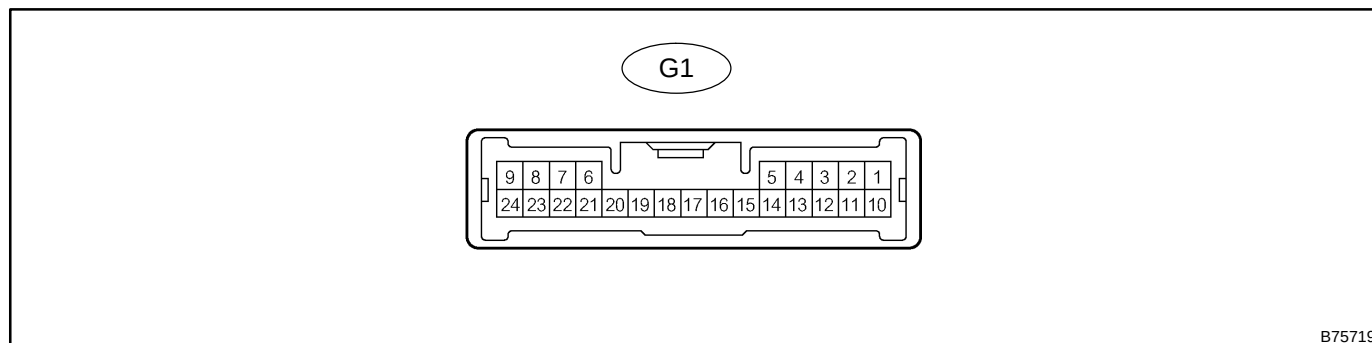
System Name	See Page
Power Window Control System	05-2028

NOTICES FOR HYBRID SYSTEM ACTIVATION:

When the warning lamp is illuminated or the battery has been disconnected and reconnected, pressing the power switch may not start the system on the first try. If so, press the power switch again.

TERMINALS OF ECU

1. CHECK GATEWAY ECU

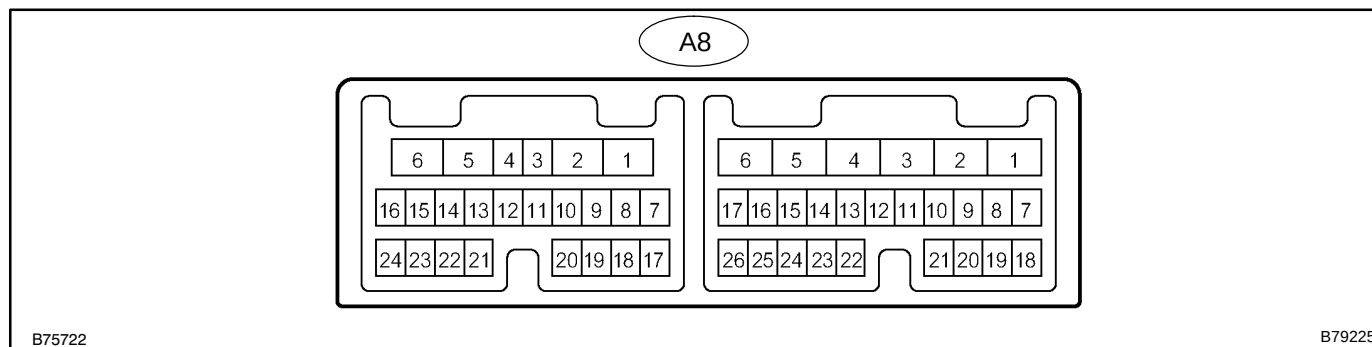


- (a) Disconnect the G1 ECU connector.
- (b) Measure the voltage and resistance between each terminal of the wire harness side connector and body ground.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
BATT (G1-10) – Body ground	Y – Body ground	+B (BATT) power supply	Constant	10 to 14 V
IG (G1-1) – Body ground	B – Body ground	Ignition power supply	Ignition switch ON	10 to 14 V
ACC (G1-2) – Body ground	P – Body ground	ACC power supply	Ignition switch ACC	10 to 14 V
SIL (G1-7) – Body ground	W – Body ground	Bus "+" line	During transmission	Pulse generation
MPD2 (G1-12) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
MPD1 (G1-3) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
GTX+ (G1-6) – Body ground	B – Body ground	AVC-LAN line	Constant	10 kΩ or higher
GTX- (G1-21) – Body ground	W – Body ground	AVC-LAN line	Constant	10 kΩ or higher
GND (G1-24) – Body ground	W-B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

2. CHECK A/C ECU

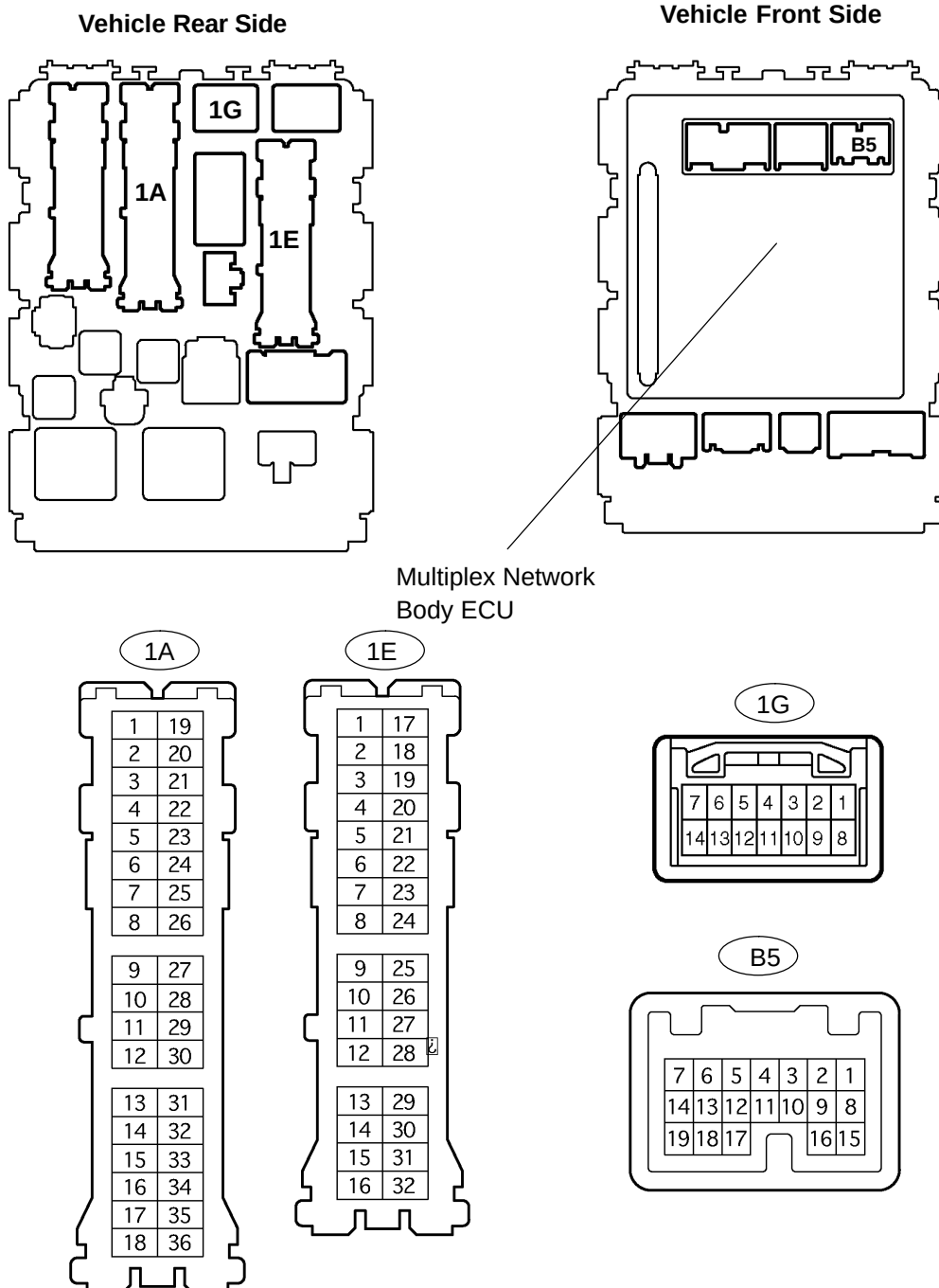
- (a) Disconnect the A8 ECU connector.
 (b) Measure the voltage and resistance between each terminal of the wire harness side connector and body ground.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (A8-6) – Body ground	Y – Body ground	+B power supply	Constant	10 to 14 V
MPX+ (A8-3) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
MPX2+ (A8-11) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
GND (A8-1) – Body ground	W-B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

3. CHECK INSTRUMENT PANEL J/B ASSY (MULTIPLEX NETWORK BODY ECU)



B70491
B79229

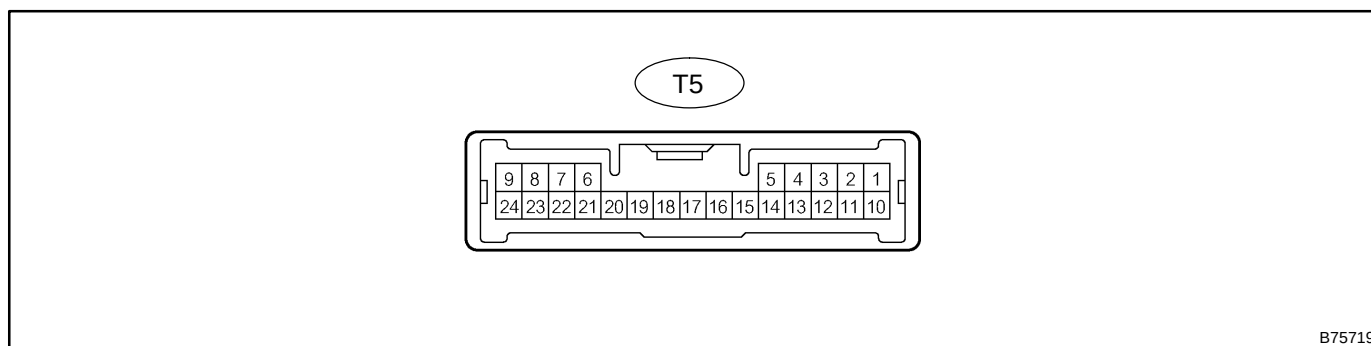
B80270

- (a) Disconnect the B5 ECU connector.
- (b) Disconnect the 1A, 1E and 1G J/B connectors.
- (c) Measure the voltage and resistance of each terminal of the wire harness side connectors.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
ECUB (1A-30) – Body ground	R – Body ground	+B (ECUB) power supply	Constant	10 to 14 V
MPX1 (1G-9) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
MPX2 (B5-15) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
GND (1E-17) – Body ground	W-B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

4. CHECK TRANSPONDER KEY ECU

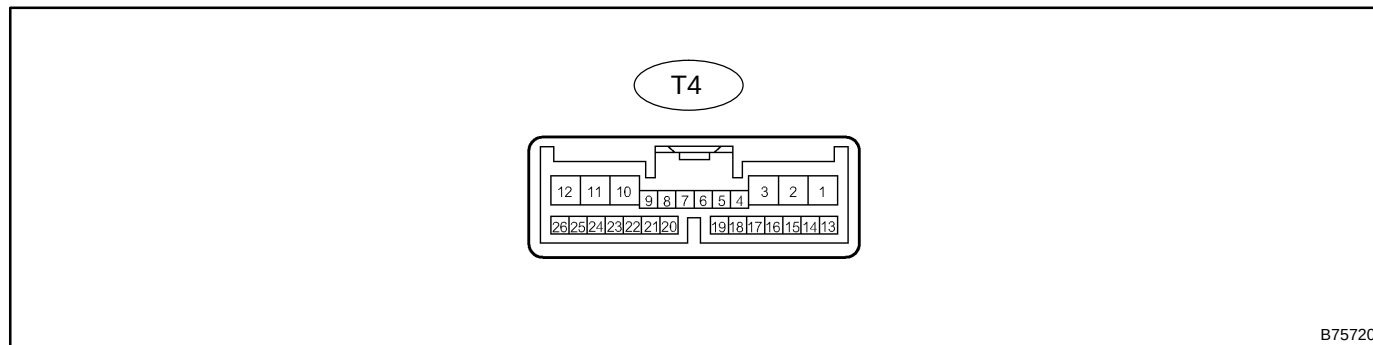
- (a) Disconnect the T5 ECU connector.
- (b) Measure the voltage and resistance of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
IG (T5-4) – Body ground	O – Body ground	+B (IG) power supply	Constant	10 to 14 V
MPX1 (T5-17) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
MPX2 (T5-16) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
GND (T5-22) – Body ground	W-B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

5. CHECK TRANSMISSION CONTROL ECU



B75720

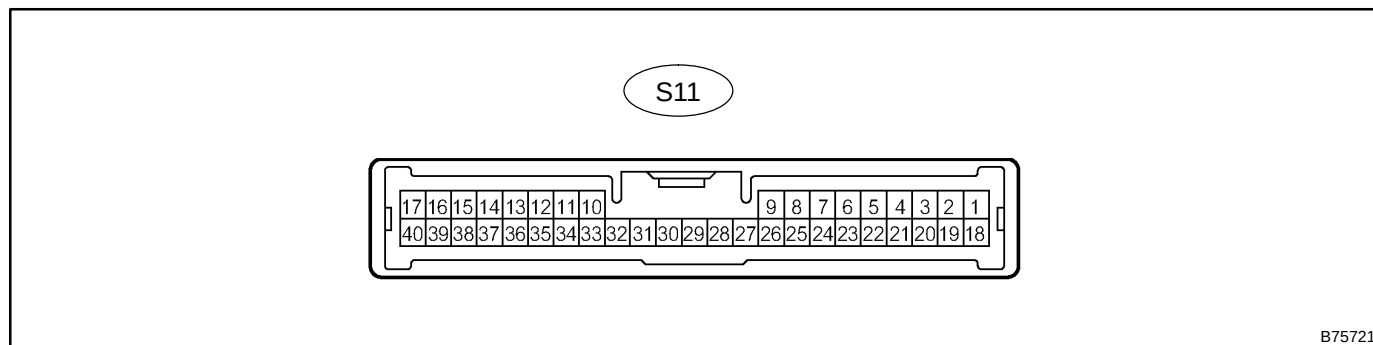
- Disconnect the T4 ECU connector.
- Measure the voltage and resistance of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (T4–1) – Body ground	L – Body ground	+B power supply	Constant	10 to 14 V
MPX1 (T4–19) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
MPX2 (T4–18) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
E1 (T4–15) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

6. CHECK SMART ECU



B75721

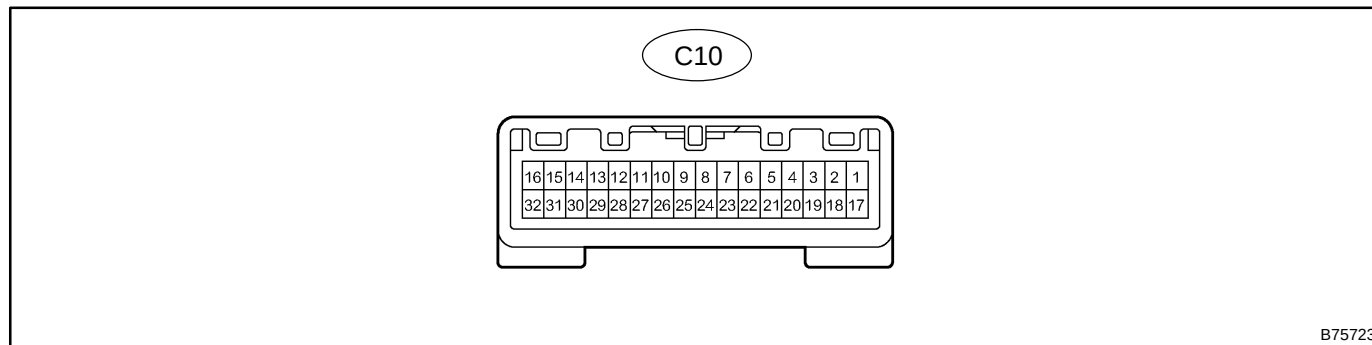
- Disconnect the S11 ECU connector.
- Measure the voltage and resistance of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
+B (S11–1) – Body ground	O – Body ground	+B power supply	Constant	10 to 14 V
MPX1 (S11–31) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
MPX2 (S11–32) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
E (S11–17) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

7. CHECK METER ECU (COMBINATION METER)



B75723

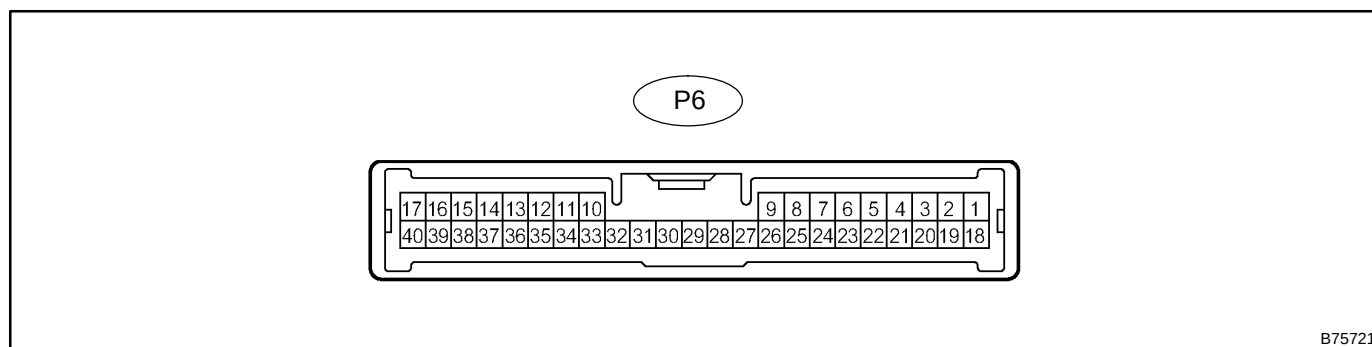
- Disconnect the C10 ECU connector.
- Measure the voltage and resistance each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
– (C10–21) – Body ground	Y – Body ground	+B power supply	Constant	10 to 14 V
MPX+ (C10–24) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
MPX– (C10–25) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
– (C10–14) – Body ground	BR – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.

8. CHECK POWER SOURCE CONTROL ECU



B75721

- Disconnect the P6 ECU connector.
- Measure the voltage and resistance of each terminal of the wire harness side connector.

Standard:

Symbols (Terminal No.)	Wiring Color	Terminal Description	Condition	Specified Condition
AM1 (P6–33) – Body ground	R – Body ground	+B (AM1) power supply	Constant	10 to 14 V
MPX1 (P6–7) – Body ground	GR – Body ground	MPX line	Constant	10 kΩ or higher
MPX2 (P6–24) – Body ground	B – Body ground	MPX line	Constant	10 kΩ or higher
GND2 (P6–6) – Body ground	W–B – Body ground	Ground	Constant	Below 1 Ω

If the result is not as specified, there may be a malfunction on the wire harness side.