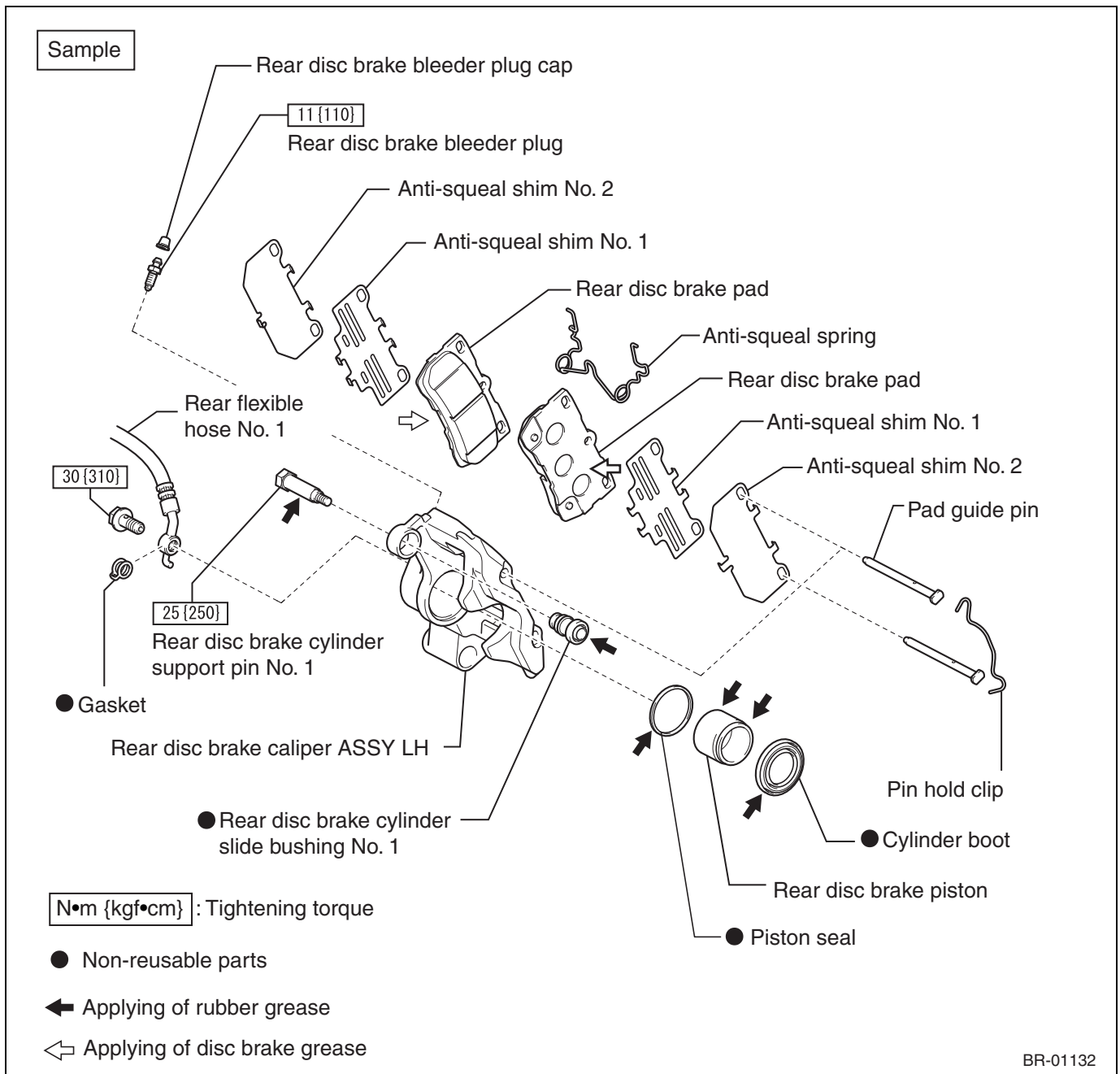




(3) Tightening torque, lubrication locations and non-reusable parts are described as the essential points of the procedures.

CAUTION:

If the above items can only be indicated in an illustration, an exploded view with these essentials is included. In such cases, all information such as torque and lubrication is included within the illustration.

- (4) Procedures only describe essential items, with the location and contents of procedures included in an illustration, as well as detailed procedures, standard values, or precautions explained using text.
- (5) In some cases, a single illustration is common to various similar models. For that reason, the actual vehicle may differ in their exact details.

Monitor strategy

Related DTCs	P0171: Fuel system main feedback control functional check (System too lean) P0172: Fuel system main feedback control functional check (System too rich) P1170: Fuel system main feedback control functional check (Direct injection fail) P117B: Fuel system main feedback control functional check (Portinjection fail)
Required Sensors/Components (Main)	Fuel system
Required Sensors/Components (Related)	Air/fuel ratio sensor, intake air flow meter SUB-ASSY, crankshaft position sensor
Frequency of Operation	Continuous
Duration	9 seconds ×3 times: P0171 and P0172 9 seconds: P1170 and P117B
MIL Operation	2 driving cycles: P0171 and P0172 Immediately after: P1170 and P117B
Sequence of Operation	None

TYPICAL ENABLING CONDITIONS

All

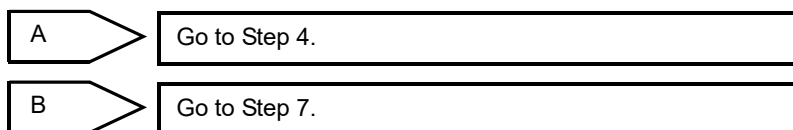
Overlap prohibited DTC	P0030 (air/fuel ratio sensor - heater) P0037, P0038 (oxygen sensor - heater) P0068, P0107, P0108 (Vacuum (MAP) sensor) P0102, P0103 (intake air flow (MAF) meter) P0111, P0112, P0113 (Intake Air Temperature (IAT) sensor) P0117, P0118 (engine coolant temperature (ECT) sensor) P0122, P0123, P0222, P0223 (Throttle position sensor) P0137, P0138 (oxygen sensor - lack of continuity in circuit) P0140 (oxygen sensor - output voltage) P0300, P0301, P0302, P0303, P0304 (misfire) P0458, P0459 (Solenoid bulb for the purge control) P0604, P0605 (ECM ROM) P1160 (throttle return spring) P2101, P2102 (Throttle actuator control motor) P2109 (Throttle position sensor minimum stop) P2119 (Throttle actuator control) P2122, P2123, P2127, P2128 (Accelerator Pedal Position Sensor (APPS) circuit) P2135 (Throttle position sensor (TPS) degree of correlation) P2138 (Accelerator pedal position sensor (APPS) degree of correlation) P2195, P2196 (air/fuel ratio sensor - output voltage)
------------------------	---

P0171, P0172

F/B operation condition	Closed loop
Oil dilution	Unspecified

P1170

Diagnosis A	
Detecting conditions for the P0171 malfunction detection	Satisfied
P0171 malfunction	Detected
Direct injection ratio	100%
Diagnosis B	
Detecting conditions for the P0172 malfunction detection	Satisfied



4	Check wiring harness and connector (canister pump module - ECM)
---	---

NOTE:

For the inspection procedure and precautions for wiring harnesses and connectors, refer to IN - 36.

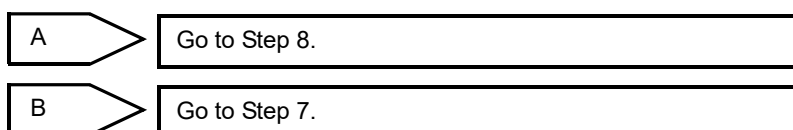
- (1) Turn the ignition switch to OFF.
- (2) Disconnect the canister pump module connector.
- (3) Disconnect the ECM connector.
- (4) Measure the resistance between the terminals. (For terminal arrangement, refer to ES - 36.)

Resistance

Inspection terminals	Inspection conditions	Standard value
A35-8(MPMP) - G-8-4	Always	Less than 1 Ω
A35-8 (MPMP) or G-8-4 - chassis ground	Always	10 k Ω or more

Result

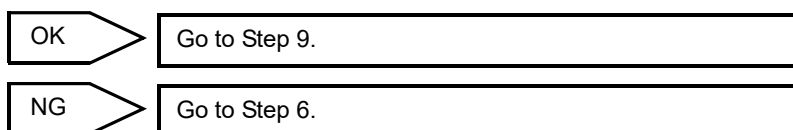
Result	Possible faulty parts	Go to
OK	ECM	A
NG	Connector or wiring harness between the ECM and canister pump module	B



5	Performing of SSM4 active test ([ELCM switching valve])
---	---

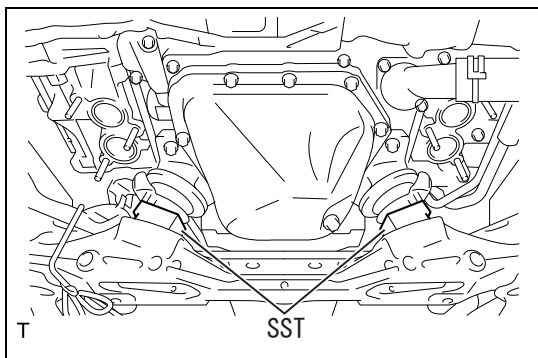
- (1) Connect the SSM4 to the DLC3.
- (2) Turn the ignition switch to ON.
- (3) Select the following menu items using the SSM4. : [Each System] / [Engine Control System] / [Work Support] / [Active Test] / [ELCM switching valve]
- (4) In [Active Test], check for the operating sound when the ELCM switching valve is started.

Criteria: Operating sound is heard.



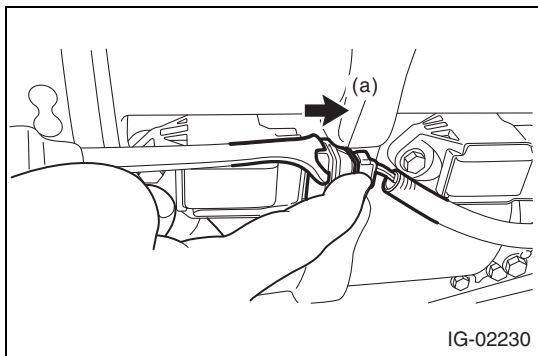
6	Check wiring harness and connector (canister pump module - ECM)
---	---

- (1) Turn the ignition switch to OFF.
- (2) Disconnect the canister pump module connector.
- (3) Disconnect the ECM connector.
- (4) Measure the resistance between the terminals. (For terminal arrangement, refer to ES - 36.)



- (6) Install the SST between engine mount and front crossmember.

SST 18632AA020

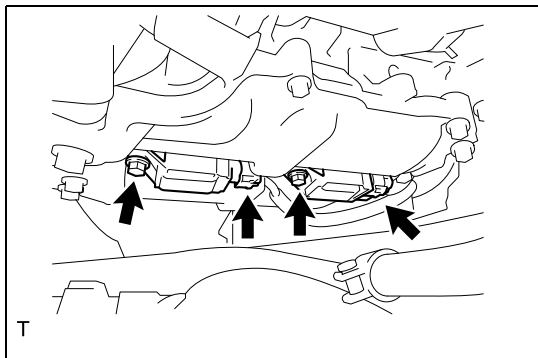


12. Removal of ignition coil ASSY (bank 2 side)

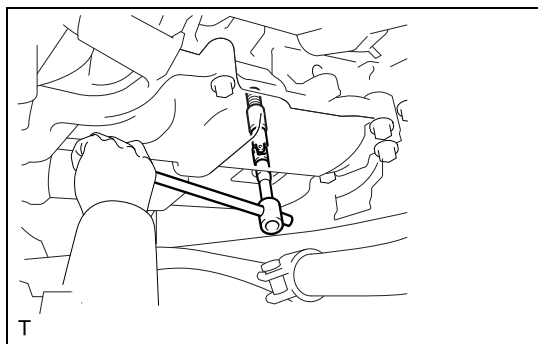
- (1) Disconnect 2 connectors for the ignition coil ASSY.

NOTE:

Slide the connectors in the direction of the arrow using a tool such as a clip remover while pressing the spring (a) shown in the figure.

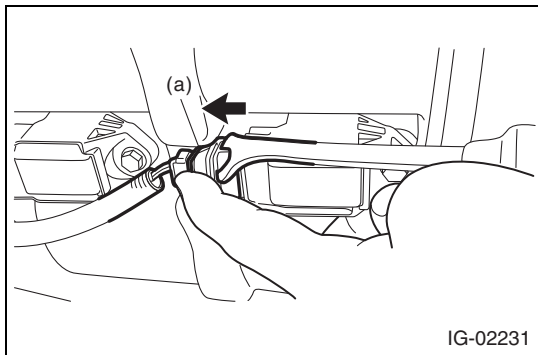


- (2) Remove 2 bolts, and remove 2 ignition coil ASSYs.



13. Removal of spark plug (bank 2 side)

- (1) Remove the two spark plugs.



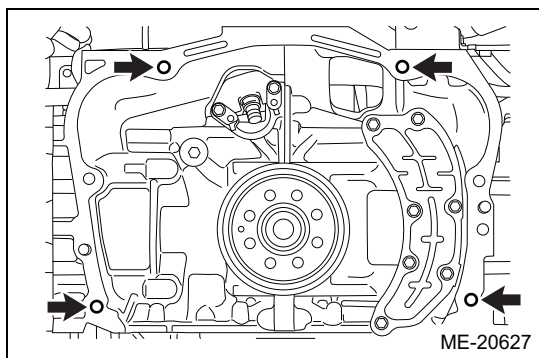
14. Removal of ignition coil ASSY (bank 1 side)

- (1) Disconnect 2 connectors for the ignition coil ASSY.

NOTE:

Slide the connectors in the direction of the arrow using a tool such as a clip remover while pressing the spring (a) shown in the figure.

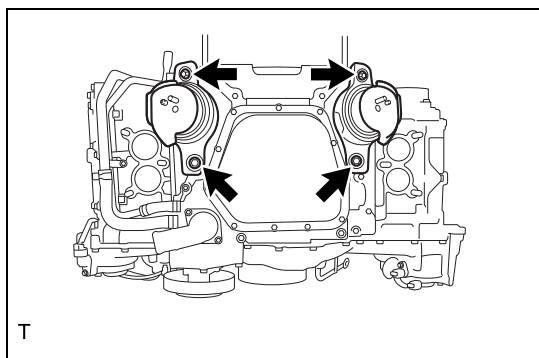
44. Removal of drive plate & ring gear SUB-ASSY (transmission A/T) (Refer to EM - 53)
45. Clutch cover ASSY removal (transmission M/T) (Refer to CL - 24)
46. Clutch disc ASSY removal (transmission M/T) (Refer to CL - 24)
47. Flywheel SUB-ASSY removal (transmission M/T) (Refer to EM - 53)
48. Crank angle sensor plate removal (Refer to EM - 53)
49. Engine stand installation



- (1) Use the sections shown in the figure to install the engine ASSY to the engine stand.

CAUTION:

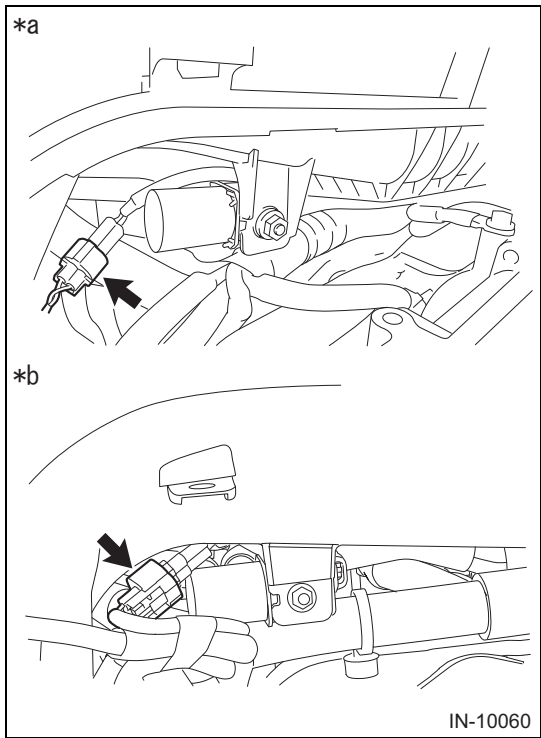
- Since the operation with the engine ASSY suspended are danger, never perform it other than when installing the ASSY to the engine stand or removing it from the stand.
- To prevent damage to the engine, make sure to secure at four positions.



50. Engine mounting insulator FR removal

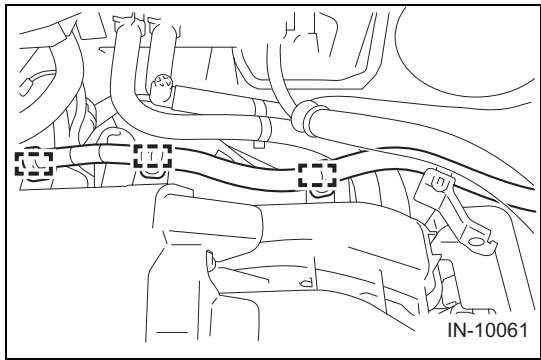
- (1) Remove the four bolts and remove the two engine mounting insulators FR.

51. Engine hanger removal
 - (1) Remove the bolt and remove the engine hanger.
52. Removal of alternator ASSY (Refer to BH - 31)
53. Idler pulley SUB-ASSY NO. 2 removal (Refer to LU - 15)
54. Oil level gauge guide removal (Refer to LU - 15)
55. V-ribbed belt tensioner ASSY removal (Refer to LU - 15)
56. Removal of compressor ASSY (with magnet clutch) (Refer to AC - 150)
57. Removal of intake manifold (Refer to IE - 15)
58. Fuel delivery pipe NO.2 removal (Refer to FU - 31)
59. Fuel delivery pipe removal (Refer to FU - 31)
60. Removal of fuel delivery pipe (bank 2 side) (Refer to FU - 31)
61. Removal of fuel delivery pipe (bank 1 side) (Refer to FU - 32)
62. Fuel injector ASSY removal (Refer to FU - 32)
63. Fuel injector seal removal (Refer to FU - 34)
64. Removal of fuel pump ASSY (Refer to FU - 59)
65. Fuel pump lifter removal (Refer to FU - 59)
66. Pump drive case ASSY removal (Refer to FU - 59)

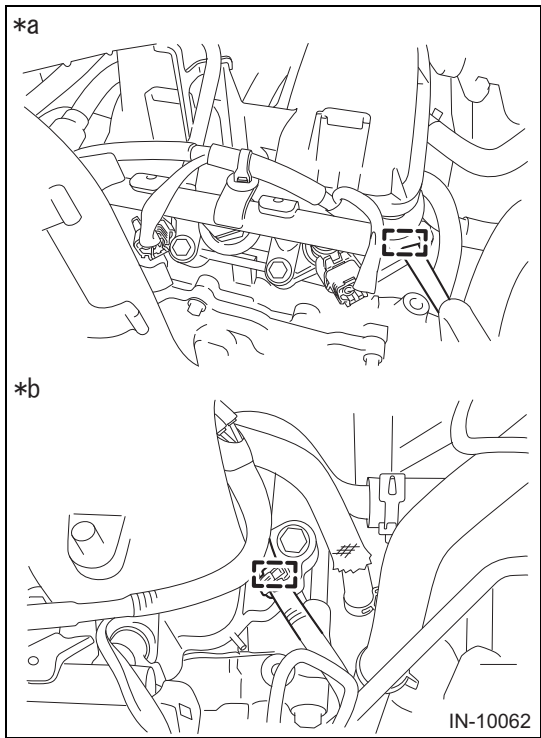


(2) Disconnect the purge control solenoid valve connector.
Text in Illustration

*a	Transmission A/T
*b	Transmission M/T



(3) Release the three clips and disconnect the wiring harness. (Transmission A/T)



(4) Disengage the clamp and disconnect the engine wire harness.
Text in Illustration

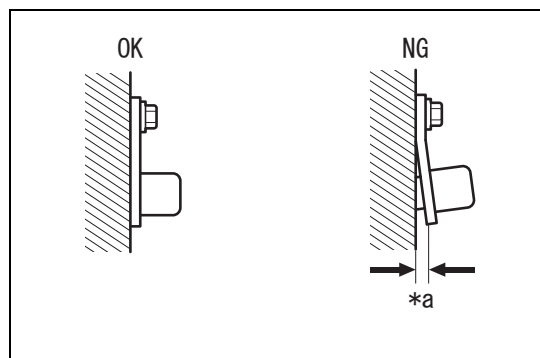
*a	Transmission A/T
*b	Transmission M/T

Inspection steps

NOTE:

Read the freeze frame data using the SSM4. A part of the engine running conditions under which the engine trouble occurred is recorded in the freeze frame data, which is useful for troubleshooting.

1 Check of transmission revolution sensor (SP2) installation condition



- (1) Check the installation condition of the transmission revolution sensor (SP2).

Criteria: The mounting bolt is not loosened and the sensor is not lifted or tilted.

Captions in illustration

*a Clearance

NG

Repair of installation condition or replacement of transmission revolution sensor (SP2) (refer to AT - 169)

OK

2 Check of transmission revolution sensor (SP2) unit

- (1) Disconnect the connector L3 of the transmission revolution sensor (SP2).
 (2) Check the transmission revolution sensor (SP2) unit. (Refer to AT - 170)
 (3) Connect the connector L3 of the transmission revolution sensor (SP2).

NG

Replacement (SP2) of transmission revolution sensor (SP2) (refer to AT - 169)

OK

3 Check wiring harness and connector (transmission control computer ASSY - transmission revolution sensor (SP2))

NOTE:

For the inspection procedure and precautions for wiring harnesses and connectors, refer to IN - 36.

- (1) Disconnect the connector A19 of the transmission control computer ASSY.
 (2) Disconnect the connector L3 of the transmission revolution sensor (SP2).
 (3) Measure the resistance between the terminals. (Refer to AT - 24 for terminal arrangement of transmission control computer ASSY)

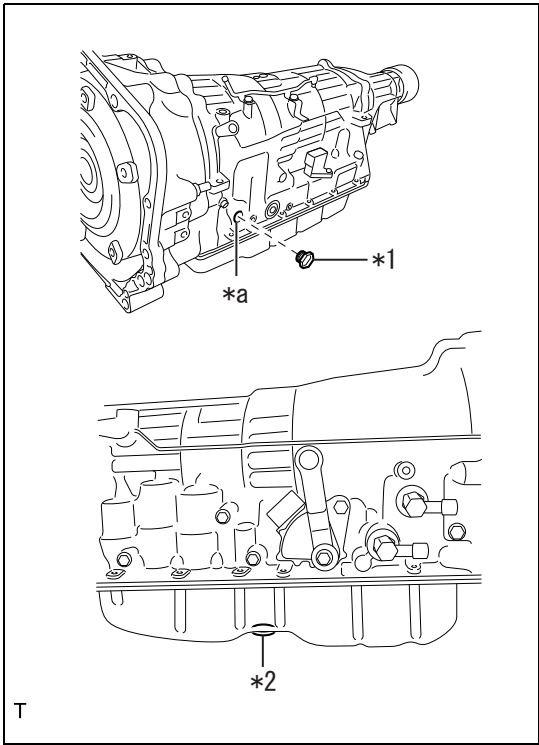
Resistance

Inspection terminals	Inspection conditions	Standard value
A19-18 (SP2+) - L3-2 (SP2+)	Always	Less than 1 Ω
A19-7 (SP2-) - L3-1 (SP2-)	Always	Less than 1 Ω
A19-18 (SP2+) - chassis ground	Always	10 k Ω or more

1. Filling of automatic transmission fluid

CAUTION:

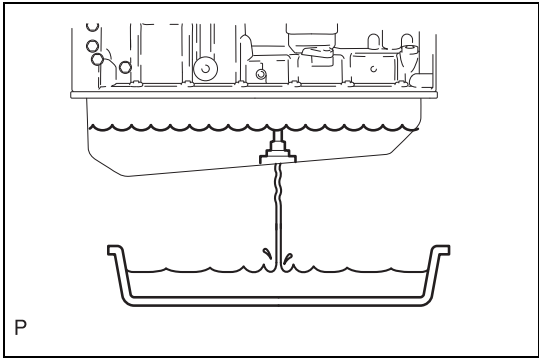
- Perform procedures when the automatic transmission fluid is sufficiently cool.
 - Be sure to fill the automatic transmission fluid after switching to oil amount adjustment mode.
 - Slowly add the fluid. Adding the fluid rapidly can cause the fluid to hit internal parts and splash around resulting in fluid flowing out of the refill hole.
- (1) Lift up the vehicle and maintain in a horizontal position.
 - (2) Remove the under cover front AL. (Refer to IE - 39)
 - (3) Remove the under cover COMPL T/M. (Refer to IE - 40)
 - (4) Remove the refill plug and the O-ring.



(5) Use a socket hexagon wrench to remove the overflow plug.

Captions in illustration

*1	Refill plug
*2	Overflow plug
*a	Refill hole



(6) Add fluid through the refill hole until the fluid flows out of the over-flow tube.

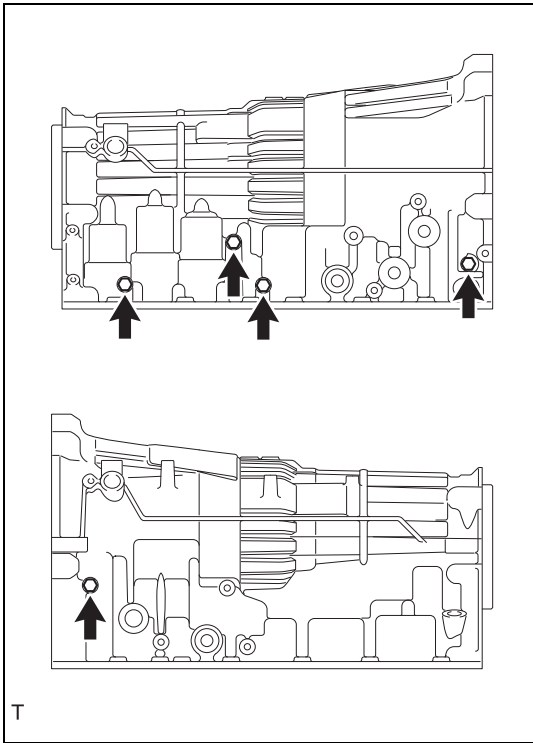
CAUTION:

Slowly add the fluid. Adding the fluid rapidly can cause the fluid to hit internal parts and splash around resulting in fluid flowing out of the refill hole.

- (7) Wait until the fluid stops flowing and drops.
 - (8) Use a socket hexagon wrench to temporarily tighten the overflow plug.
- NOTE:
- Perform the replacement of the gasket and final tightening after adjusting the fluid amount.
- (9) Fill the specified amount of fluid from the refill hole.

Specified amount

Related operation	Filling amount (reference)
Removal/installation of oil pan and drain plug	2.0 L {2.1 US qt, 1.8 Imp qt}
Installation/removal of transmission valve body ASSY	3.0 L {3.2 US qt, 2.6 Imp qt}



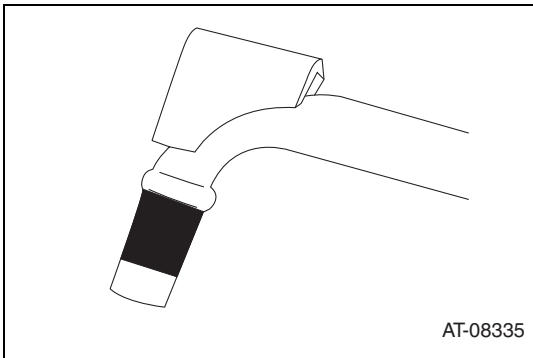
- (3) Apply ATF to 5 new O-rings and install them to the 5 automatic transmission case plugs.
- (4) Install the 5 automatic transmission case plugs to the automatic transmission case SUB-ASSY.
Standard value: $T=7.4\text{N}\cdot\text{m}$ {75kgf·cm} {5.5ft·lbf}

79. Installation of automatic transmission breather tube

- (1) Clean and degrease the transmission case SUB-ASSY mounting area of the breather tube with appropriate detergent.
- (2) Degrease the breather tube insert hole of the automatic transmission case SUB-ASSY.

CAUTION:

Keep foreign matter from entering automatic transmission case SUB-ASSY.



- (3) Apply Adhesive to the entire perimeter of the automatic transmission breather tube that fits to the automatic transmission case SUB-ASSY.

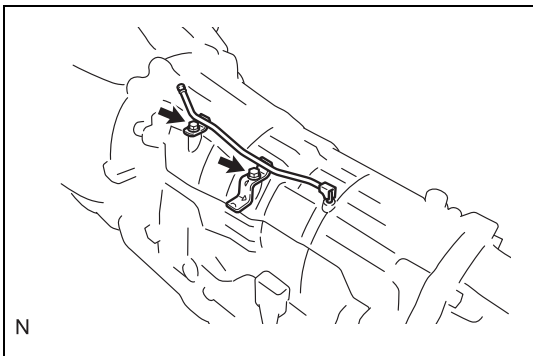
Adhesive: Three Bond 1281 or the equivalent

CAUTION:

Keep the Adhesive applied area from coming in contact with foreign matter.

Captions in illustration

	Adhesive
---	----------



- (4) Install the automatic transmission breather tube to the automatic transmission case SUB-ASSY with 2 bolts.

CAUTION:

Do not use excessive force to insert it into the case SUB-ASSY.

Standard value: $T=5.4\text{N}\cdot\text{m}$ {55kgf·cm} {4.0ft·lbf}

4 Diagnostic code and freeze frame data check (Refer to BC - 13)

- (1) Check and record the diagnostic code and the freeze frame data.
 - (2) Clear the diagnostic code and the freeze frame data.
 - (3) Diagnostic code list recheck
 - (a) Based on the recorded diagnostic code and the freeze frame data, reproduce the malfunction and check the diagnosis code again.
- NOTE:
- When a diagnostic code is output, refer to "List of diagnostic codes (BC - 6)".
 - If an error code for CAN communication system is output, first troubleshoot CAN communication and repair it. (Refer to BC - 66)
 - If SSM4 cannot communicate with skid control computer (brake actuator ASSY), check CAN communication. (Refer to NW - 30)
 - If there is no respond from the skid control computer (brake actuator ASSY), check the power and voltage input circuit for the skid control computer (brake actuator ASSY). (Refer to BC - 34)

Result

Result	Go to
Diagnostic code is not output. Malfunction can be checked and reproduced.	A
Diagnostic code is output.	B
Diagnostic code is not output. Malfunction cannot be checked and reproduced.	C

B

Refer to "List of diagnostic codes (BC - 6)" and perform troubleshooting for each code. Then go to step 7.

C

Go to "Malfunction simulation (IN - 32)".

A

5 Symptom table (Refer to BC - 7)

Result

Result	Go to
Not applicable to the symptom table.	A
Applicable to the symptom table.	B

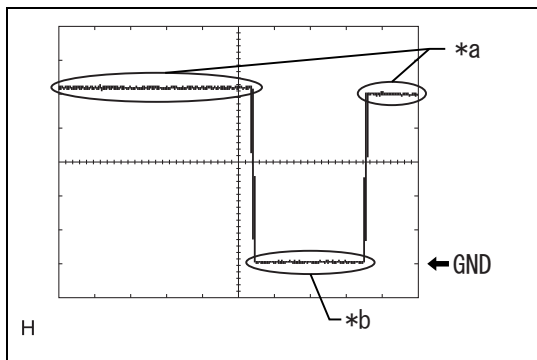
B

Perform troubleshooting for relevant symptom and go to step 8.

A

6 Perform troubleshooting in the following procedures according to the trouble phenomenon.

- (1) Data monitor (Refer to BC - 20)
- (2) Function inspection (Refer to BC - 4)
- (3) ECM terminal arrangement (Refer to BC - 19)



(2) Oscilloscope waveform.

(a) Waveform 1

Item	Contents
Measuring terminal	D59-3 (SLR+) ←→D59-1 (GND)
Equipment setting	2 V/DIV, 200 ms/DIV
Measuring condition	Steering lock actuator motor stopped → Steering lock actuator motor running → Steering lock actuator motor stopped

Captions in illustration

*a	Steering lock actuator motor stopped
*b	Steering lock actuator motor running

Data monitor / active test

CAUTION:

As the steering lock actuator ASSY (Steering lock ECM) carries out data communication with the SSM4 via the CAN communication function of the smart key computer ASSY (Collation ECM), it cannot perform normal monitoring if there is a CAN communication or smart key computer ASSY (Collation ECM) malfunction.

1. Data monitor

NOTE:

The SSM4 can be used to read the input to the steering lock actuator ASSY (Steering lock ECM), communication, and operating conditions.

(1) Use the SSM4 and data monitor to determine functionality and narrow down the defective part.

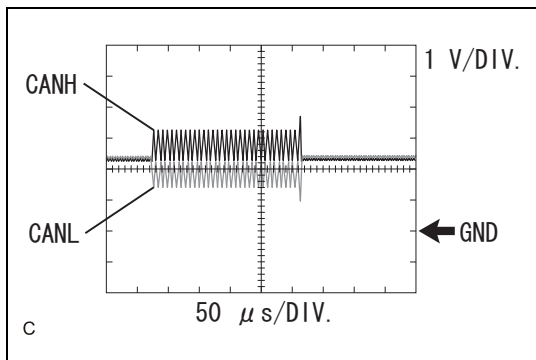
[SSM4 screen: [Each System] → [Keyless Access(Power Supply ECM)] → [Data monitor]]

Item name	Description/display range	Normal value	Remarks
[Shift P signal] *1	Shift position (P) state Display range: ON/OFF	ON: The shift is in the P position OFF: The shift is not in the P position	Used for determining the presence of a shift switch (P) failure.
[Steering unlock SW]	Indicates the steering unlock sensor signal output from the steering lock actuator ASSY (Steering lock ECM). Display range: ON/OFF	ON: Steering unlock OFF: Steering lock	- The steering will be locked when any door is opened (or closed) while the vehicle is set to IG OFF and the shifter is in the P position (Transmission A/T). - The steering will be unlocked when the electrical key transmitter SUB-ASSY (Electronic key) is inside the vehicle and the vehicle is set to ACC ON or IG ON. - The engine cannot be started when the steering unlock signal is OFF.
[Steering lock unlock wait time-out]	Steering lock unlock malfunction Display range: Yes/No	Yes: Unlocking malfunction (For example: When the lock bar is stuck, etc.) No: Lock/Unlock functioning properly	If the engine cannot be started due to a malfunction in the steering lock/unlock, "Yes" is displayed.

*1: Transmission A/T

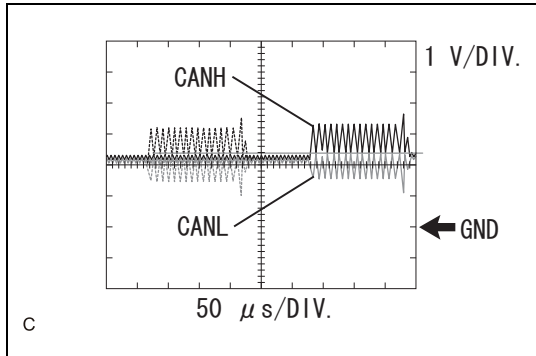
[SSM4 screen: [Each System] → [Keyless Access(Collation ECM)] → [Data monitor]]

Item name	Description/display range	Normal value	Remarks
[Ignition]	Indicates the IG power supply input state of the smart key computer ASSY (Collation ECM). Display range: ON/OFF	ON: IG ON OFF: IG OFF	When it is in the ACC ON state, "OFF" is displayed.
[Immobilizer]	Indicates the state of the engine immobilizer system determined by the smart key computer ASSY (Collation ECM). Display range: Unset / Set	Unset: Engine immobilizer unset (engine start possible) state. Set: Engine immobilizer set (engine start prohibited) state.	The engine cannot be started when this item displays "Set". NOTE: - The security indicator light blink when this item is "Set". - The security indicator light is linked to the immobilizer set and unset state. This is unrelated to the steering lock/unlock states.



(1) CAN bus waveform (Group 1)

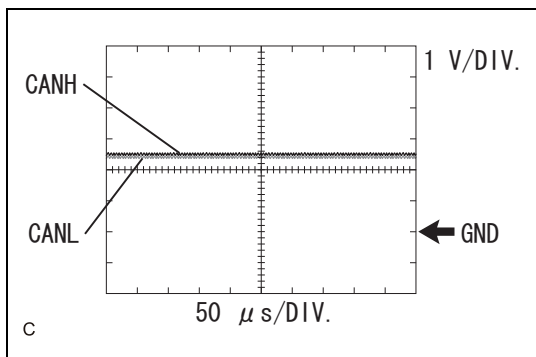
(a) Normal waveform



(b) Open circuit in both lines of one of ECM sub-lines (both CAN-H and CAN-L)

NOTE:

- If an ECM or sensor is connected to CAN bus sub-line with open circuit in both lines, the signal will disappear (indicated by dotted line). (the signals from other ECMs and sensors are displayed normally).
- The waveform is similar to the normal waveform. The defective part can be identified by CAN bus check procedure.



(c) CAN bus short (CAN-H and CAN-L are shorted)

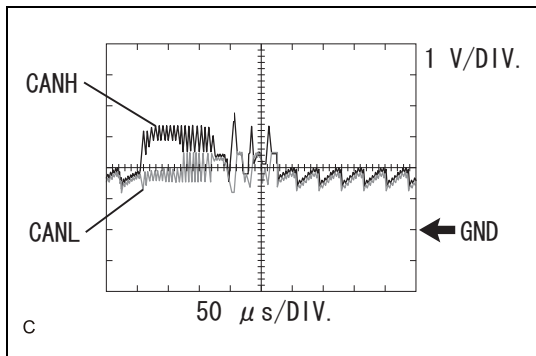
NOTE:

- No waveform is displayed.
- In case of ECM internal error, the waveform will change by removing a ECM. If the waveform does not change, the wiring harness may be defective.

(2) Example: CAN bus waveform (Group 2)

CAUTION:

The actual waveform greatly depends on the location of open or short circuit, and the waveforms is only an examples.



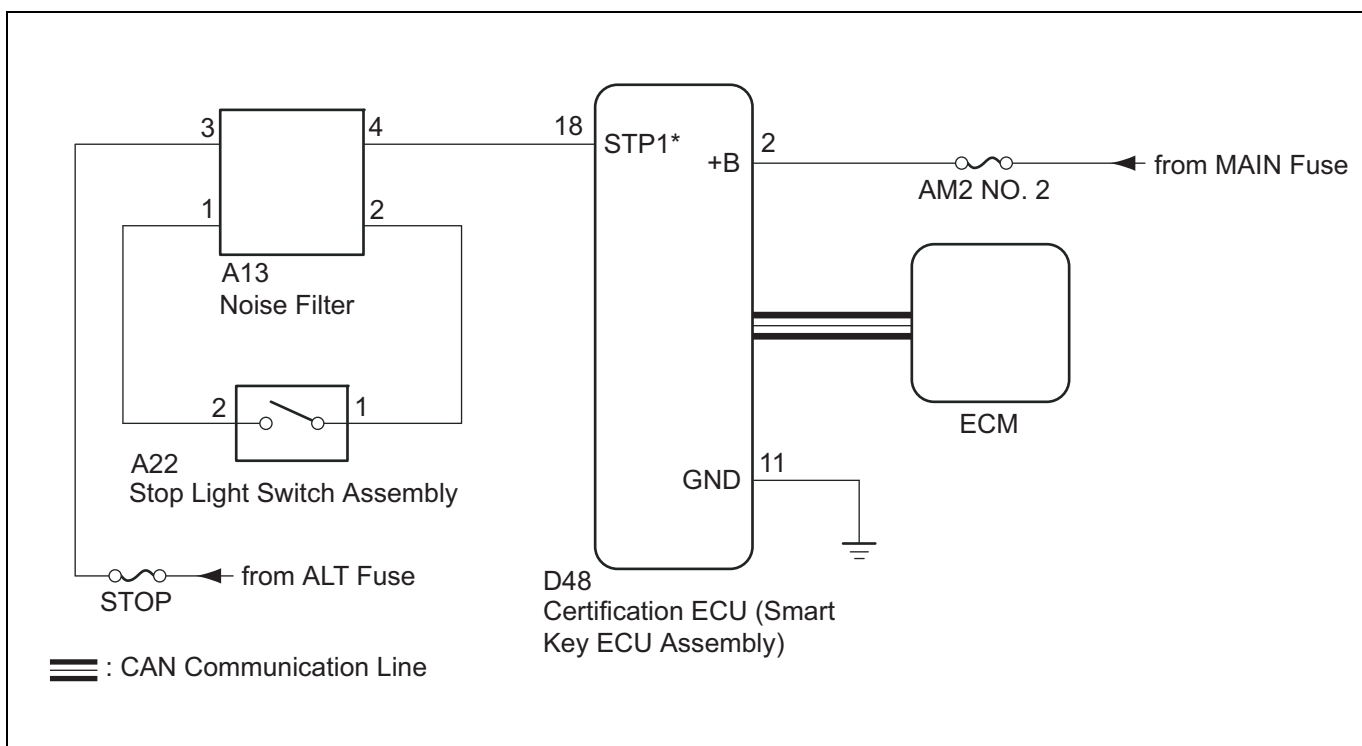
(a) Open circuit on either CAN bus sub-line (CAN-H)

NOTE:

- If an ECM is connected to CAN bus sub-line with an open circuit in either CAN-H or CAN-L, abnormal waveform is output. This defect interferes the signals from other parts, which deforms the waveform of other parts.
- Identify the defective part by performing CAN bus check, based on DTC, or removing each ECM or sensor to observe the waveform change. If ECM or sensor with open circuit in either CAN-H or CAN-L is removed, the waveform will be identical to the one when there is an open circuit in both CAN-H and CAN-L on CAN bus sub-line.

Item Name	Description/display range	Normal value	Remarks
[Number of times the vehicle enters 14-day power saving mode]	Number of times power save control 2 mode (which disables the door outer handle lock/unlock sensors of all doors except the driver's door) is activated (power save control 2 mode is activated when the engine is never started for 14 or more days). Display range: 0 to 255	0 to 255	-
[Incorrect ID code]	The wireless ID code is incorrect. Display range: [Yes]/[No]	[Yes]: Communication status is abnormal. [No]: Communication status is normal.	The ID code registered to the vehicle is different from that registered to the electrical key transmitter SUB-ASSY.] (When the received wireless ID is inconsistent with that of the registered electrical key transmitter SUB-ASSY, "Yes" is displayed for "Judgment: Incorrect wireless ID code" (an item under [Data monitor]). If a wireless signal of another vehicle is received, "Yes" is displayed for "Judgment: Incorrect ID code" (an item under [Data monitor]). Probable causes - An attempt might have been made to use an electrical key transmitter SUB-ASSY of another vehicle.] - Communication error due to interference from external radio waves - Defect in the electrical key transmitter SUB-ASSY or the collation ECM (smart key ECM ASSY)
[Incorrect ROL code]	The rolling code is incorrect. Display range: [Yes]/[No]	[Yes]: Communication status is abnormal. [No]: Communication status is normal.	The ROL code registered to the vehicle is different from that registered to the electrical key transmitter SUB-ASSY. Probable causes - A switch on the electrical key transmitter SUB-ASSY was pressed 100 times or more in a location where radio waves cannot reach the vehicle. - Communication error due to interference from external radio waves - Defect in the electrical key transmitter SUB-ASSY or the collation ECM (smart key ECM ASSY)
[Wireless Signal Encryption Support]	Wireless/smart signal encryption support status Display range: [Yes]/[No]	[Yes]: Wireless/smart signal encryption is supported. [No]: Wireless/smart signal encryption is not supported.	-
[Immobilizer]	This item indicates the engine immobilizer system status, as determined by the smart key ECM ASSY (collation ECM). Display range: [Unset] / [Set]	[Unset]: The engine immobilizer is unset (engine start permitted) (ACC ON or further) [Set]: The engine immobilizer is set (engine start prohibited) (IG OFF)	When [Set] is displayed for this item, you cannot start the engine. - The security indicator light blinks when [Set] is displayed for this item. - The security indicator light is interlocked with the [Set]/[Unset] status of the immobilizer, but not with the [Lock]/[Unlock] status of the steering wheel.
[Short-circuit in the D seat exterior transmitter output circuit]	Driver's side unlock sensor output circuit status Display range: [NG(Past)] / [OK]	[NG]: The driver's side unlock sensor output circuit is abnormal. [OK]: The driver's side unlock sensor output circuit is normal.	-
[Short-circuit in the P seat exterior transmitter output circuit]	Passenger's side unlock sensor output circuit status Display range: [NG(Past)] / [OK]	[NG]: The passenger's side unlock sensor output circuit is abnormal. [OK]: The passenger's side unlock sensor output circuit is normal.	-

Circuit figure



Inspection steps

CAUTION:

- The entry & start system has functions that use the CAN communication. Before performing troubleshooting, perform the inspection in "How to troubleshoot", and check that there are no communication problems. (Refer to TD - 146)
- Before replacing the collation ECM (smart key ECM ASSY), refer to "entry & start system (entry function)". (Refer to TD - 5)
- After repair, perform the [DTC output confirmation operation], and check that the DTC is not output again.
- Before performing the following inspection steps, check the fuses related to this system.

1	Reading the values using the SSM4 (stop light switch ASSY)
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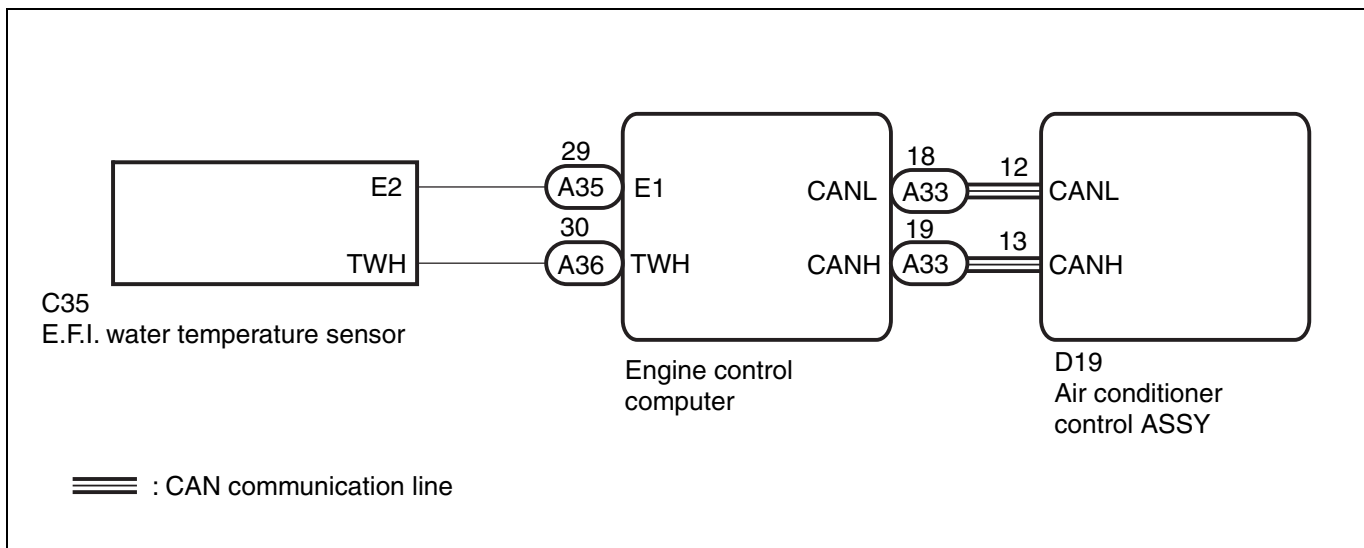
- (1) Connect the SSM4 to the DLC3.
- (2) Turn the ignition switch to ON.
- (3) Turn on the SSM4.
- (4) Input the following menus: [Keyless Access(Power Supply ECM)]
→[Data monitor]
- (5) Based on the contents of the SSM4 display, read the [Data monitor].

Power source control

Tester display	Measurement items / range	Normal condition	Notes for diagnosis
[Stop Light Switch 1]	Brake pedal status / [OFF] or [ON]	OFF: The brake pedal is not being depressed. ON: The brake pedal is being depressed.	• Using this item, determine if there is any problem with the stop light switch. • When this item is [OFF], the engine will not start. • If there is a problem caused by this item, if you press the engine switch for a certain amount of time, you can start the engine.

DTC NO.	Detecting conditions 1.Diagnosis condition 2.Abnormal condition 3.Abnormal period	Inspection parts
E24	1.None 2.Sensor malfunction/communication error 3.Judgment for current malfunction (panel): 4.0 seconds or more continuously	•E.F.I. water temperature sensor •Wire harness and connector (engine control computer - E.F.I. water temperature sensor) •Engine control computer •Air conditioner control ASSY •CAN communication system

Circuit figure



Inspection steps

CAUTION:

- The heater & air conditioner system uses the CAN communication system. First, perform a "Communication function inspection", following "How to troubleshoot" and after checking for any malfunction in the communication system, you can proceed with troubleshooting.
- This diagnostic code may be affected by abnormality of the engine control computer. Before inspection, check the diagnostic code of "engine" and make sure that it is normal.
- If diagnostic codes P0117 (Engine Coolant Temperature Circuit Low Input) and P0118 (Intake Air Temperature Circuit High Input) are output at the same time, the E.F.I. water temperature sensor system may be abnormal.

1	Read diagnostic code (engine)
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- (1) Connect the SSM4 to the DLC3.
- (2) Turn the ignition switch to ON.
- (3) Follow the SSM4 on-screen instructions to check the diagnostic code of engine.

Result

Result	Go to
No diagnostic code is output.	A
Diagnostic code is output.	B

B

To relevant diagnostic code chart

A