Technical Service Bulletin

SUBJECT:	No:	TSB-19-54-003
ADDITION OF MAIN DRIVE LITHIUM-ION BATTERY DISASSEMBLY & MAINTENANCE PROCEDURE - SERVICE MANUAL REVISION	DATE:	March 2019
	MODEL:	2012 i-MiEV

CIRCULATE TO:	[ ] GENERAL MANAGER	[X] PARTS MANAGER	[X] TECHNICIAN
[X] SERVICE ADVISOR	[X] SERVICE MANAGER	[ ] WARRANTY PROCESSOR	[ ] SALES MANAGER

PURPOSE

This TSB updates the Chassis Electrical section of the affected Service Manual to add the **Main Drive Lithium-ion Battery Disassembly & Maintenance** procedure to 54D-Electric Motor Unit and Traction Battery/Main Drive Lithium-ion Battery.

The information in this bulletin should be added after "**Traction Battery Removal and Installation**."

AFFECTED VEHICLES

- 2012 i-MiEV

AFFECTED SERVICE MANUALS

- 2012 i-MiEV Service Manual, Group 54-Chassis Electrical

Continued

GROUP 54D

ELECTRIC MOTOR UNIT AND MAIN DRIVE LITHIUM-ION BATTERY

CONTENTS

BATTERY MANAGEMENT UNIT (BMU) AND MAIN DRIVE LITHIUM-ION BATTERY

GENERAL

M1549226500212

OUTLINE OF CHANGES

Due to the addition of Main Drive Lithium-ion Battery disassembly/assembly, the service procedure has been established. The other service procedures are the same as before.

- The DTC for the EV-ECU is changed.
- The troubleshooting of symptom procedures for the EV-ECU is changed.
- The DTC for the EMCU is changed.
- The DTC for the BMU is changed.
- The on-vehicle service of the BMU is changed.
- The Main Drive Lithium-ion Battery disassembly/assembly is added.
- The Main Drive Lithium-ion Battery inspection is added.

SERVICE PRECAUTION

M1549406100012

Disassembly, assembly and inspections of the Main Drive Lithium-ion Battery should be carried out by only specially trained mechanics. Carry out the work at the place which the rain, snow, sand, or dust will not enter. Make sure that the floor of the work place is dry (not wet). Make sure that the Main Drive Lithium-ion Battery is not wet.

PRECAUTIONS ON INSIDE OPERATION OF THE MAIN DRIVE LITHIUM-ION BATTERY

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⚠ DANGER

Observe the following precautions during service operations inside the Main Drive Lithium-ion Battery as they may cause an electric shock, electric leak, vehicle fires or disabled drive-away.

1. Precautions on handling high-voltage terminals

When doing any repair work in vicinity of the areas below, pay attention to the following.

Affected areas: Module terminal, bus bar, orange wiring harness and connectors, fuses, resistors and service plugs

- Touching two different terminals by bare hands simultaneously may cause burns.
- Touching two different terminals simultaneously by a rubber or metal object may cause fires due to a short circuit.
- Touching a terminal and its surrounding area by bare hands simultaneously may cause electric shocks or burns. (by leakage of electricity)
- Touching a terminal and its surrounding area simultaneously by a rubber or metal object may cause fires due to a short circuit. (by leakage of electricity)

NOTE: In the descriptions above, "rubber" indicates a part containing graphite such as tires or coolant hoses. Isolated rubber products are not included.

- A contaminated or damaged terminal seating will increase contact resistance. This will cause vehicle fires due to overheat.
- A contaminated or damaged terminal thread will decrease terminal contact pressure. This will cause vehicle fires due to overheat.

NOTE: Check not only that a terminal nut is seated securely, but also that terminal contact surfaces are seated securely.

2. Precautions on other operations

How to handle tools

- Electric shocks, burns or fires may be caused if a tool, which is put or left on a component, contacts a high-voltage circuit.

How to handle metal parts

- If a metal part drops inside the Main Drive Lithium-ion Battery, leakage of electricity or short circuit may cause vehicle fires.

How to handle waterproof seals

- A deteriorated waterproof seal may cause water ingress inside the Main Drive Lithium-ion Battery. This will cause leakage of electricity, thus disabling the vehicle drive-away.

EV-ECU

DIAGNOSTIC TROUBLE CODE CHART

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DTC	Diagnostic item	Reference page
P0A0A	Service plug switch	P.54D-6
P0AA1	Main contactor (+) (seizure)	P.54D-8
P0AA4	Main contactor (−) (seizure)	P.54D-13
P0ADB	Main contactor (+) circuit (low input)	P.54D-18
P0ADF	Main contactor (−) circuit (low input)	
P0AE2	Charging contactor (seizure)	P.54D-21
P0AE6	Charging contactor (low input)	P.54D-26
P0AE7	Charging contactor (high input)	
P1A15	High-voltage system error (1)	P.54D-28
P1A17	High-voltage system error (3)	P.54D-37
P1AF2	EMCU condenser discharge command F/B	P.54D-21
P1AFA	Quick charger READY timeout	P.54D-41
P1AFB	Quick charging time timeout	P.54D-46
P1AFC	Quick charging current error	P.54D-48
P1AFD	Quick charging voltage abnormality	P.54D-51
P1B01	Quick charged vehicle error	P.54D-55
P1B04	Maximum cell voltage abnormality during charging	P.54D-60
P1B05	Minimum cell voltage abnormality during charging	
P1B06	Maximum cell temperature abnormality during charging	P.54D-61
P1B07	Total battery voltage abnormality during charging	P.54D-60
P1B0C	On board charging current error (overcurrent)	P.54D-63
P1B0D	Quick charging current error (overcurrent)	P.54D-66
P1B21	On board charger output current error	P.54D-63

DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC P0A0A Service plug switch

OPERATION
The service plug switch in the Main Drive Lithium-ion Battery sets the service plug state to the EV-ECU by means of the service plug switch signal.

DTC SET CONDITION
- When the signal of the service plug switch in the Main Drive Lithium-ion Battery is turned off, DTC P0A0A will be stored.

PROBABLE CAUSES
- Damaged wiring harness or connector(s)
- Disengagement of the service plug in the Main Drive Lithium-ion Battery
- Malfunction of the service plug switch
- Malfunction of the EV-ECU

DIAGNOSIS

STEP 1. Measure the voltage at C-22 Main Drive Lithium-ion Battery assembly connector

(1) Disconnect the C-22 Main Drive Lithium-ion Battery connector, and measure the voltage at the wiring harness side.
(2) Turn the electric motor switch to the "ON" position.
(3) Measure the voltage between the C-22 Main Drive Lithium-ion Battery assembly connector terminal No. 4 and the ground.

OK: Battery voltage

Q: Is the check result normal?

YES : Go to Step 4.
NO : Go to Step 2.

STEP 2. Connector check: C-22 Main Drive Lithium-ion Battery connector, B-27 intermediate connector, C-102 intermediate connector, A-08X EV control relay (relay box) connector

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the damaged connector. Or, correct or replace the relay box.

STEP 3. Check the wiring harness between A-08X EV control relay (relay box) connector terminal No. 1 and C-22 Main Drive Lithium-ion Battery connector terminal No. 4

Check the power supply line for open circuit.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Repair the wiring harness.

STEP 4. Measure the resistance at C-22, C-21 Main Drive Lithium-ion Battery connector

Check the service plug switch in the Main Drive Lithium-ion Battery (Refer to P.54D-173).

Q: Is the check result normal?

YES : Go to Step 8.
NO : Go to Step 5.

STEP 5. Connector check: C-21, C-22 Main Drive Lithium-ion Battery connector, service plug switch connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

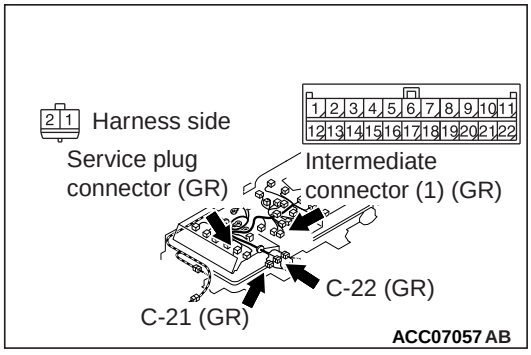
Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the damaged connector.

STEP 6. Check the wiring harness between C-22 Main Drive Lithium-ion Battery connector terminal No. 4 and service plug connector terminal No. 1, C-21 Main Drive Lithium-ion Battery connector terminal No. 4 and service plug switch connector terminal No. 2

NOTE: Before checking harness, check intermediate connector (1) terminal No. 4 and No. 11 of power supply line, and repair if necessary.

Check power supply line or out signal line for open circuit.



Q: Is the check result normal?

YES : Go to Step 7.
NO : Repair the wiring harness.

STEP 7. Check the service plug switch in Main Drive Lithium-ion Battery

(1) Removal the service plug switch in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the service plug switch in Main Drive Lithium-ion Battery (Refer to P.54D-205).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Replace the service plug switch in Main Drive Lithium-ion Battery (Refer to P.54D-185).

STEP 8. Connector check: C-21 Main Drive Lithium-ion Battery connector, C-110 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the damaged connector.

STEP 9. Check the wiring harness between C-21 Main Drive Lithium-ion Battery connector terminal No. 4 and C-110 EV-ECU connector terminal No. 74

Check the signal lines for open circuit.

Q: Is the check result normal?

YES : Go to Step 10.
NO : Repair the wiring harness.

STEP 10. Check whether the DTC is stored again.

Check again if the DTC is stored in the EV-ECU.
(1) Check the connection of the service plug. (The service plug switch is set to ON.)
(2) Erase the stored DTC.
(3) Set the electric motor switch from the "LOCK" (OFF) position to the "ON" position.
(4) Check if the DTC is stored.

Q: Is DTC P0A0 stored?

YES : Replace the EV-ECU. Then go to Step 11.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunctions).

STEP 11. Check whether the DTC is stored again.

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON" position.
(3) Check if the DTC is stored.

Q: Is DTC P0A0 stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P0AA1 Main contactor (+) (seizure)

⚠ ***DANGER***

- ***When servicing the high voltage system parts, always shut off the high voltage by pulling the service plug.***
- ***When servicing the high voltage system parts, always wear the protective equipment or armor to measure the high voltage.***

⚠ **CAUTION**

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be stored. Prior to this diagnosis, always diagnose the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics Table).

OPERATION

- The main contactors (+) and (−) and the charging contactor inside the Main Drive Lithium-ion Battery, which are controlled by the EV-ECU, activate and deactivate the high-voltage circuit. The EV-ECU monitors the voltage in the smoothing condenser in the EMCU.

DTC SET CONDITION

- if a seizure of the main contactor (+) or charging contactor is determined when the high-voltage circuit is shut down, DTC P0AA1 will be stored.

NOTE: This diagnostic trouble code is stored as a current trouble only. Therefore, follow the trouble-shooting steps for the current trouble.

PROBABLE CAUSES

- Damaged wiring harness or connector(s)
- Malfunction of the main contactor (+) in the Main Drive Lithium-ion Battery
- Malfunction of the charging contactor in the Main Drive Lithium-ion Battery
- Malfunction of the EV-ECU
- Malfunction of the EV water PTC heater
- Malfunction of the A/C control unit
- Malfunction of the onboard charger/DC-DC converter
- Malfunction of the EMCU
- Malfunction of the A/C compressor

DIAGNOSIS

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines

Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C − Troubleshooting). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines

Check again if DTC P0AA1 is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Return the electric motor switch to the "LOCK" (OFF) position. Then turn the electric motor switch from the "LOCK" (OFF) position to the "ON" position.
(4) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Use scan tool MB991958 to confirm a DTC of other systems

Check if DTC P0AE7 is stored in the EV-ECU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC.
NO : Go to Step 4.

STEP 4. Connector check: C-22 Main Drive Lithium-ion Battery connector, C-111 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the damaged connector.

STEP 5. Check the wiring harness between C-111 EV-ECU connector terminal No. 107 and C-22 Main Drive Lithium-ion Battery connector terminal No. 3

Check the signal lines for short to power supply.

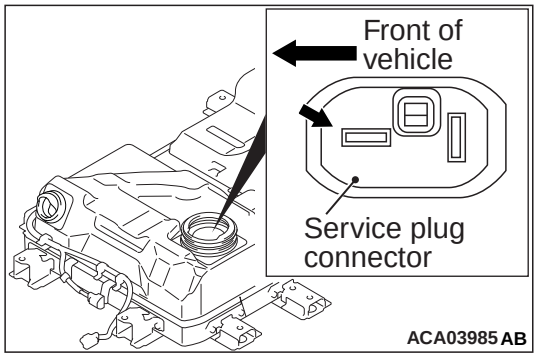
Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the wiring harness.

STEP 6. Voltage measurement at G-19 high-voltage, service plug connector

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***



(1) Using a high voltage multimeter, measure the high voltage between the G-19 connection terminal and service plug connection forward terminal.

OK: Approximately 0 V

Q: Is the check result normal?

YES : Go to Step 10.
NO : Go to Step 7.

STEP 7. Connector check: C-22 Main Drive Lithium-ion Battery connector, main contactor (+) connector

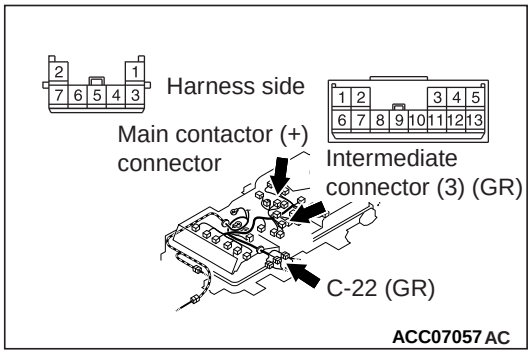
Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the damaged connector.

STEP 8. Check the wiring harness between C-22 Main Drive Lithium-ion Battery connector terminal No. 3 and main contactor (+) connector terminal No. 3, C-22 Main Drive Lithium-ion Battery connector terminal No. 5 and main contactor (+) connector terminal No. 1

NOTE: Before checking harness, check intermediate connector (3) terminal No. 4 and No. 13 of ground line, and repair if necessary.



Check out signal line and ground line for open circuit.

Q: Is the check result normal?

YES : Go to Step 9.

NO : Repair the wiring harness.

STEP 9. Check the main contactor (+) in Main Drive Lithium-ion Battery

(1) Removal the main contactor (+) in Main Drive Lithium-ion Battery (Refer to P.54D-176).

(2) Check the main contactor (+) in Main Drive Lithium-ion Battery (Refer to P.54D-204).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Replace the main contactor (+) in Main Drive Lithium-ion Battery (Refer to P.54D-198). Then go to Step 11.

STEP 10. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC except P0AE7, P1A16 or P1A26 is stored in the EV-ECU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the diagnostic trouble code.

NO : Go to Step 11.

STEP 11. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC is stored in the A/C control unit.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC (Refer to GROUP 55 – Troubleshooting).

NO : Go to Step 12.

STEP 12. Measure the resistance of the G-21 EV water PTC heater connector

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Wear the specified protection equipment during the check.***

(1) Pull the service plug.
(2) Disconnect the EV water PTC heater connector.
(3) Measure the resistance at the EV water PTC heater side.
(4) Measure the resistance between the G-21 EV water PTC heater connector terminal No.1 and No.2.

OK: 1 MΩ or more

Q: Is the check result normal?

YES : Go to Step 13.
NO : Check the high-voltage fuse No.3. Replace the EV water PTC heater (Refer to GROUP 55 – EV Water PTC Heater).

STEP 13. Measure the resistance at A-113 EV water PTC heater connector

(1) Disconnect the A-113 EV water PTC heater connector and measure it on the resistance at the EV water PTC heater side.
(2) Measure the resistance between the A-113 EV water PTC heater connector terminal No. 3, 4, 5 and ground.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 14.
NO : Replace the EV water PTC heater (Refer to GROUP 55 – EV Water PTC Heater).

STEP 14. Measure the resistance at A-113 EV water PTC heater connector

(1) Disconnect the A-113 EV water PTC heater connector and measure it on the resistance at the wiring harness side.
(2) Measure the resistance between the A-113 EV water PTC heater connector terminal No. 3, 4, 5 and ground.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 17.
NO : Go to Step 15.

STEP 15. Connector check: A-113 EV water PTC heater connector, B-01 joint connector, C-113 A/C control unit connector

Q: Is the check result normal?

YES : Go to Step 16.
NO : Repair the damaged connector.

STEP 16. Check the wiring harness between A-113 EV water PTC heater connector terminal No. 3, 4, 5 and C-113 A/C control unit connector terminal No. 34, 35, 36
Check the signal line for short circuit.

Q: Is the check result normal?

YES : Replace the A/C control unit (Refer to GROUP 55 – A/C Control Unit).
NO : Repair the wiring harness.

STEP 17. Check whether the DTC is stored again.
Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) After the electric motor switch from the "LOCK" (OFF) position, reset the electric motor switch from the "LOCK" (OFF) position to the "ON" position.
(4) Check if the DTC is stored.

Q: Is DTC P0AA1 stored?

YES : Replace the EV-ECU. Then go to Step 18.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunctions).

STEP 18. Check whether the DTC is stored again.
Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) After the electric motor switch from the "LOCK" (OFF) position, reset the electric motor switch from the "LOCK" (OFF) position to the "ON" position.
(4) Check if the DTC is stored.

Q: Is DTC P0AA1 stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P0AA4 Main contactor (–) (seizure)

⚠ ***DANGER***

- ***When servicing the high voltage system parts, always shut off the high voltage by pulling the service plug.***
- ***When servicing the high voltage system parts, always wear the protective equipment or armor to measure the high voltage.***

⚠ **CAUTION**

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be stored. Prior to this diagnosis, always diagnose the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics Table).

OPERATION

- The main contactors (+) and (−) and the charging contactor inside the Main Drive Lithium-ion Battery, which are controlled by the EV-ECU, activate and deactivate the high-voltage circuit. The EV-ECU monitors the voltage in the smoothing condenser in the EMCU.

DTC SET CONDITION

- If a seizure of the main contactor (−) is determined when the high-voltage circuit is activated, DTC P0AA4 will be stored.

PROBABLE CAUSES

- Damaged wiring harness or connector(s)
- Malfunction of the main contactor (−) in the Main Drive Lithium-ion Battery
- Malfunction of the EV-ECU
- Malfunction of the EV water PTC heater
- Malfunction of the A/C control unit
- Malfunction of the onboard charger/DC-DC converter
- Malfunction of the EMCU
- Malfunction of the A/C compressor

DIAGNOSIS

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines

Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C − Troubleshooting). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines

Check again if DTC P0AA4 is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Connector check: C-22 Main Drive Lithium-ion Battery connector, C-111 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 4.
NO : Repair the damaged connector.

STEP 4. Check the wiring harness between C-111 EV-ECU connector terminal No. 106 and C-22 Main Drive Lithium-ion Battery connector terminal No. 6

Check the signal lines for short to power supply.

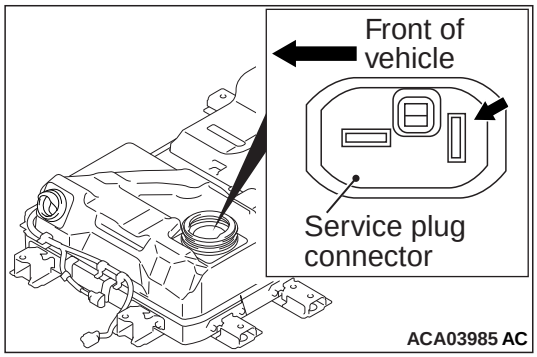
Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Voltage measurement at G-18 high-voltage, service plug connector

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***



(1) Using a high voltage multimeter, measure the high voltage between the G-18 connection terminal and service plug connection backward terminal.

OK: Approximately 0 V

Q: Is the check result normal?

YES : Go to Step 9.
NO : Go to Step 6.

STEP 6. Connector check: C-22 Main Drive Lithium-ion Battery connector, main contactor (–) connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

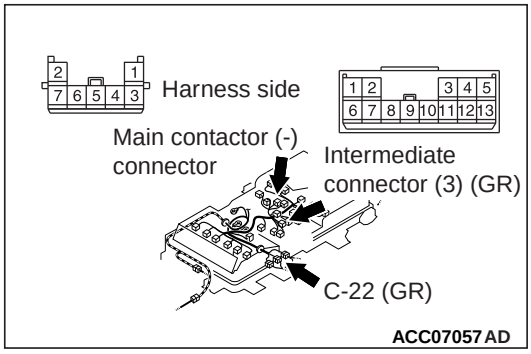
Q: Is the check result normal?

YES : Go to Step 7.
NO : Repair the damaged connector.

STEP 7. Check the wiring harness between C-22 Main Drive Lithium-ion Battery connector terminal No. 6 and main contactor (–) connector terminal No. 7, C-22 Main Drive Lithium-ion Battery connector terminal No. 5 and main contactor (–) connector terminal No. 2

NOTE: Before checking harness, check intermediate connector (3) terminal No. 4 and No. 12 of ground line, and repair if necessary.

Check out signal line and ground line for open circuit.



Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the wiring harness.

STEP 8. Check the main contactor (–) in Main Drive Lithium-ion Battery

(1) Removal the main contactor (–) in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the main contactor (–) in Main Drive Lithium-ion Battery (Refer to P.54D-204).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Replace the main contactor (–) in Main Drive Lithium-ion Battery (Refer to P.54D-198). Then go to Step 10.

STEP 9. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC except P0AE7, P1A16 or P1A26 is stored in the EV-ECU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC.
NO : Go to Step 10.

STEP 10. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC is stored in the A/C control unit.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC (Refer to GROUP 55 – Troubleshooting).
NO : Go to Step 11.

STEP 11. Measure the resistance of the G-21 EV water PTC heater connector

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Wear the specified protection equipment during the check.***

(1) Pull the service plug.
(2) Disconnect the G-21 EV water PTC heater connector.
(3) Measure it on the resistance at the EV water PTC heater side.
(4) Measure the resistance between the G-21 EV water PTC heater connector terminal No.1 and No.2.

OK: 1 MΩ or more

Q: Is the check result normal?

YES : Go to Step 12.
NO : Check the high-voltage fuse No.3. Replace the EV water PTC heater (Refer to GROUP 55 – EV Water PTC Heater).

STEP 12. Measure the resistance at A-113 EV water PTC heater connector

(1) Disconnect the A-113 EV water PTC heater connector and measure it on the resistance at the EV water PTC heater side.
(2) Measure the resistance between the A-113 EV water PTC heater connector terminal No. 3, 4, 5 and ground.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 13.
NO : Replace the EV water PTC heater (Refer to GROUP 55 – EV Water PTC Heater).

STEP 13. Measure the resistance at A-113 EV water PTC heater connector

(1) Disconnect the A-113 EV water PTC heater connector and measure it on the resistance at the wiring harness side.
(2) Measure the resistance between the A-113 EV water PTC heater connector terminal No. 3, 4, 5 and ground.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 16.
NO : Go to Step 14.

STEP 14. Connector check: A-113 EV water PTC heater connector, B-01 joint connector, C-113 A/C control unit connector

Q: Is the check result normal?

YES : Go to Step 15.
NO : Repair the damaged connector.

STEP 15. Check the wiring harness between A-113 EV water PTC heater connector terminal No. 3, 4, 5 and C-113 A/C control unit connector terminal No. 34, 35, 36

Check the signal line for short circuit.

Q: Is the check result normal?

YES : Replace the A/C control unit.
NO : Repair the wiring harness.

STEP 16. Check whether the DTC is stored again.
Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Check if the DTC is stored.

Q: Is DTC P0AA4 stored?

YES : Replace the EV-ECU. Then go to Step 14.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunctions).

STEP 14. Check whether the DTC is stored again.
Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Check if the DTC is stored.

Q: Is DTC P0AA4 stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P0ADB Main contactor (+) circuit (low input)
DTC P0ADF Main contactor (–) circuit (low input)

OPERATION
The main contactors (+) and (–) in the Main Drive Lithium-ion Battery are controlled by the EV-ECU.

DTC SET CONDITIONS
- When the excitation circuit monitor of the main contactor (+) in the Main Drive Lithium-ion Battery is off while the main contactor (+) in the Main Drive Lithium-ion Battery ON command is underway, DTC P0ADB will be stored.
- When the excitation circuit monitor of the main contactor (–) in the Main Drive Lithium-ion Battery is off while the main contactor (–) in the Main Drive Lithium-ion Battery ON command is underway, DTC P0ADF will be stored.

PROBABLE CAUSES
- Damaged wiring harness or connector(s)
- Malfunction of the main contactors (+) or (–) in the Main Drive Lithium-ion Battery
- Malfunction of the EV-ECU

DIAGNOSIS

STEP 1. Connector check: C-22 Main Drive Lithium-ion Battery connector, C-111 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the damaged connector.

STEP 2. Check the wiring harness between C-111 EV-ECU connector terminal No. 106, 107 and C-22 Main Drive Lithium-ion Battery connector terminal No. 3, 6

Check the signal lines for open circuit and short to ground.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the wiring harness.

STEP 3. Measure the resistance at C-22 Main Drive Lithium-ion Battery connector

Check the main contactor (+) or (–) in the Main Drive Lithium-ion Battery (Refer to P.54D-170).

Q: Is the check result normal?

YES : Go to Step 8.
NO : Go to Step 4.

STEP 4. Connector check: C-22 Main Drive Lithium-ion Battery connector, main contactor (+), (–) connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the damaged connector.

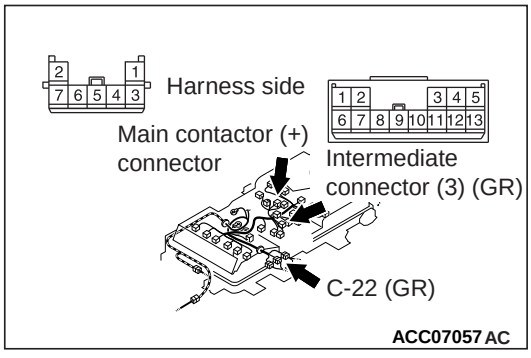
STEP 5. Check the wiring harness between C-22 Main Drive Lithium-ion Battery connector terminal No. 3 and main contactor (+) connector terminal No. 3, C-22 Main Drive Lithium-ion Battery connector terminal No. 5 and main contactor (+) connector terminal No. 1

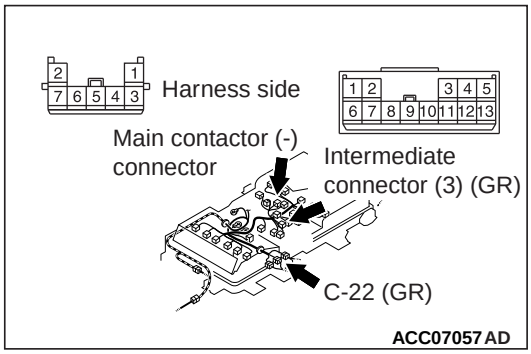
NOTE: Before checking harness, check intermediate connector (3) terminal No. 4 and No. 13 of ground line, and repair if necessary.

Check out signal line and ground line for open circuit.

Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the wiring harness.





STEP 6. Check the wiring harness between C-22 Main Drive Lithium-ion Battery connector terminal No. 6 and main contactor (–) connector terminal No. 7, C-22 Main Drive Lithium-ion Battery connector terminal No. 5 and main contactor (–) connector terminal No. 2

NOTE: Before checking harness, check intermediate connector (3) terminal No. 4 and No. 12 of ground line, and repair if necessary.

Check out signal line and ground line for open circuit.

Q: Is the check result normal?

YES : Go to Step 7.

NO : Repair the wiring harness.

STEP 7. Check the main contactor (+) or (–) in Main Drive Lithium-ion Battery

(1) Removal the main contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-176).

(2) Check the main contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-204).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Replace the main contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-198).

STEP 8. Check whether the DTCs is stored again

Check again if the DTCs is stored in the EV-ECU.

(1) Erase the stored DTCs.

(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.

(3) Check if the DTCs is stored.

Q: Is DTC P0ADB or P0ADF stored?

YES : Replace the EV-ECU. Then go to Step 9.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunctions).

STEP 9. Check whether the DTCs is stored again

Check again if the DTCs is stored in the EV-ECU.
(1) Erase the stored DTCs.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Check if the DTCs is stored.

Q: Is DTC P0ADB or P0ADF stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P0AE2 Charging contactor (seizure)

⚠ *DANGER*

- ***When servicing the high voltage system parts, always shut off the high voltage by pulling the service plug.***
- ***When servicing the high voltage system parts, always wear the protective equipment or armor to measure the high voltage.***

⚠ **CAUTION**

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be stored. Prior to this diagnosis, always diagnose the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics Table.).

OPERATION

- The main contactors (+) and (–) and the charging contactor inside the Main Drive Lithium-ion Battery, which are controlled by the EV-ECU, activate and deactivate the high-voltage circuit. The EV-ECU monitors the voltage in the smoothing condenser in the EMCU.

DTC SET CONDITION

- If a seizure of the charging contactor or main contactor (+) is determined when the high-voltage circuit is activated, DTC P0AE2 will be stored.

PROBABLE CAUSES

- Damaged wiring harness or connector(s)
- Malfunction of the charging contactor in the Main Drive Lithium-ion Battery
- Malfunction of the EV-ECU
- Malfunction of the EV water PTC heater
- Malfunction of the A/C compressor
- Malfunction of the onboard charger/DC-DC converter
- Malfunction of the EMCU

DIAGNOSIS

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines

Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C – Troubleshooting). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines

Check again if DTC P0AE2 is stored in the EV-ECU.

(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Use scan tool MB991958 to confirm a DTC of other systems

Check if DTC P0AE7 is stored in the EV-ECU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC.
NO : Go to Step 4.

STEP 4. Connector check: C-22 Main Drive Lithium-ion Battery connector, C-111 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the damaged connector.

STEP 5. Check the wiring harness between C-111 EV-ECU connector terminal No. 105 and C-22 Main Drive Lithium-ion Battery connector terminal No. 7

Check the output lines for open circuit and short to ground.

Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the wiring harness.

STEP 6. Voltage measurement at G-19 high-voltage connector, service plug

⚠ ***DANGER***

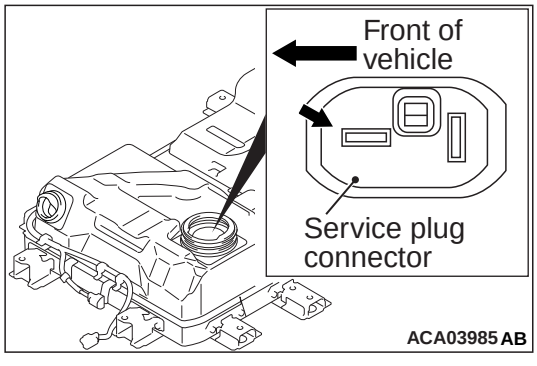
- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

(1) Using a high voltage multimeter, measure the high voltage between the G-19 connection terminal and service plug forward terminal.

OK: Approximately 0 V

Q: Is the check result normal?

YES : Go to Step 10.
NO : Go to Step 7.



STEP 7. Connector check: C-22 Main Drive Lithium-ion Battery connector, charging contactor connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

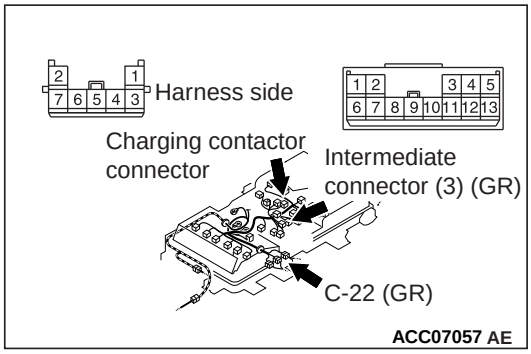
Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the damaged connector.

STEP 8. Check the wiring harness between C-22 Main Drive Lithium-ion Battery connector terminal No. 7 and charging contactor connector terminal No. 4, C-22 Main Drive Lithium-ion Battery connector terminal No. 5 and charging contactor connector terminal No. 6

NOTE: Before checking harness, check intermediate connector (3) terminal No. 4 and No. 11 of ground line, and repair if necessary.

Check out signal line and ground line for open circuit.



Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the wiring harness.

STEP 9. Check the charging contactor in Main Drive Lithium-ion Battery

(1) Removal the charging contactor in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the charging contactor in Main Drive Lithium-ion Battery (Refer to P.54D-204).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Replace the charging contactor in Main Drive Lithium-ion Battery (Refer to P.54D-198). Then go to Step 11.

STEP 10. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC except P0AE7, P1A16 or P1A26 is stored in the EV-ECU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC.
NO : Go to Step 11.

STEP 11. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC is stored in the A/C control unit.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the diagnostic trouble code (Refer to GROUP 55 – Troubleshooting).

NO : Go to Step 12.

STEP 12. Measure the resistance of the G-21 EV water PTC heater connector

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Wear the specified protection equipment during the check.***

(1) Pull the service plug.
(2) Disconnect the G-21 EV water PTC heater connector.
(3) Measure it on the resistance at the EV water PTC heater side.
(4) Measure the resistance between the G-21 EV water PTC heater connector terminal No.1 and No.2.

OK: 1 MΩ or more

Q: Is the check result normal?

YES : Go to Step 13.

NO : Check the high-voltage fuse No.3. Replace the EV water PTC heater (Refer to GROUP 55 – EV Water PTC Heater).

STEP 13. Measure the resistance at A-113 EV water PTC heater connector

(1) Disconnect the A-113 EV water PTC heater connector and measure the resistance at the EV water PTC heater side.
(2) Measure the resistance between the A-113 EV water PTC heater connector terminal No. 3, 4, 5 and ground.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 14.

NO : Replace the EV water PTC heater (Refer to GROUP 55 – EV Water PTC Heater).

STEP 14. Measure the resistance at A-113 EV water PTC heater connector

(1) Disconnect the A-113 EV water PTC heater connector and measure the resistance at the wiring harness side.
(2) Measure the resistance between the A-113 EV water PTC heater connector terminal No. 3, 4, 5 and ground.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 17.
NO : Go to Step 15.

STEP 15. Connector check: A-113 EV water PTC heater connector, B-01 joint connector, C-113 A/C control unit connector

Q: Is the check result normal?

YES : Go to Step 16.
NO : Repair the damaged connector.

STEP 16. Check the wiring harness between A-113 EV water PTC heater connector terminal No. 3, 4, 5 and C-113 A/C control unit connector terminal No. 34, 35, 36

Check the signal line for short circuit.

Q: Is the check result normal?

YES : Replace the A/C control unit (Refer to GROUP 55 – A/C Control Unit).
NO : Repair the wiring harness.

STEP 17. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Check if the DTC is stored.

Q: Is DTC P0AE2 stored?

YES : Replace the EV-ECU. Then go to Step 18.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunctions).

STEP 18. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Check if the DTC is stored.

Q: Is DTC P0AE2 stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P0AE6 Charging contactor (low input)
DTC P0AE7 Charging contactor (high input)

OPERATION
The charging contactor in the Main Drive Lithium-ion Battery is controlled by the EV-ECU.

DTC SET CONDITIONS
- When the excitation coil monitor of the charging contactor in the Main Drive Lithium-ion Battery is off while the charging contactor in the Main Drive Lithium-ion Battery ON command is underway, DTC P0AE6 will be stored.
- When the excitation coil monitor of the charging contactor in the Main Drive Lithium-ion Battery is on while the charging contactor in the Main Drive Lithium-ion Battery OFF command is underway, DTC P0AE7 will be stored.

PROBABLE CAUSES
- Damaged wiring harness or connector(s)
- Malfunction of the charging contactor in the Main Drive Lithium-ion Battery
- Malfunction of the EV-ECU

DIAGNOSIS

STEP 1. Connector check: C-22 Main Drive Lithium-ion Battery connector, C-111 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the damaged connector.

STEP 2. Check the wiring harness between C-111 EV-ECU connector terminal No. 105 and C-22 Main Drive Lithium-ion Battery connector terminal No. 7

Check the output lines for open circuit and short to ground.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the wiring harness.

STEP 3. Measure the resistance at C-22 Main Drive Lithium-ion Battery connector

Check the charging contactor in the Main Drive Lithium-ion Battery (Refer to P.54D-170).

Q: Is the check result normal?

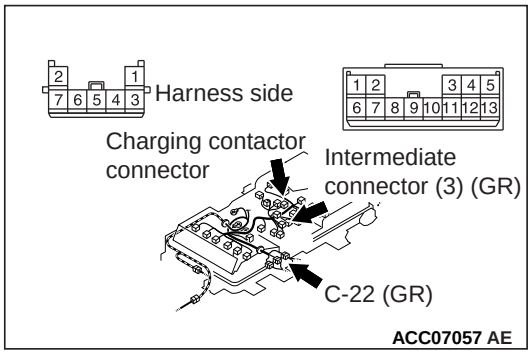
YES : Go to Step 7.
NO : Go to Step 4.

STEP 4. Connector check: C-22 Main Drive Lithium-ion Battery connector, charging contactor connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the damaged connector.



STEP 5. Check the wiring harness between C-22 Main Drive Lithium-ion Battery connector terminal No. 7 and charging contactor connector terminal No. 4, C-22 Main Drive Lithium-ion Battery connector terminal No. 5 and charging contactor connector terminal No. 6

NOTE: Before checking harness, check intermediate connector (3) terminal No. 4 and No. 11 of ground line, and repair if necessary.

Check out signal line and ground line for open circuit.

Q: Is the check result normal?

YES : Go to Step 6.

NO : Repair the wiring harness.

STEP 6. Check the charging contactor in Main Drive Lithium-ion Battery

(1) Removal the charging contactor in Main Drive Lithium-ion Battery (Refer to P.54D-176).

(2) Check the charging contactor in Main Drive Lithium-ion Battery (Refer to P.54D-204).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Replace the charging contactor in Main Drive Lithium-ion Battery (Refer to P.54D-198).

STEP 7. Check whether the DTCs is stored again

Check again if the DTCs is stored in the EV-ECU.

(1) Erase the stored DTCs.

(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.

(3) Check if the DTCs is stored.

Q: Is DTC P0AE6 or P0AE7 stored?

YES : Replace the EV-ECU. Then go to Step 8.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunctions).

STEP 8. Check whether the DTC is stored again
Check again if the DTCs is stored in the EV-ECU.
(1) Erase the stored DTCs.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Check if the DTCs is stored.

Q: Is DTC P0AE6 or P0AE7 stored?
YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P1A15 High-voltage system error (1)

⚠ *DANGER*
- ***When servicing the high voltage system parts, always shut off the high voltage by pulling the service plug.***
- ***When servicing the high voltage system parts, always wear the protective equipment or armor to measure the high voltage.***

⚠ **CAUTION**
If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be stored. Prior to this diagnosis, always diagnose the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics Table.).

OPERATION
The high-voltage circuit activation and shutdown are controlled by the EV-ECU. The EV-ECU also monitors the voltage of the smooth condenser in the EMCU via the CAN communication.

DTC SET CONDITION
- If the charging time of the smooth condenser in the EMCU reaches the specified time or more when the high-voltage circuit activation, DTC P1A15 will be stored.

NOTE: This DTC is stored as a current trouble only. Therefore, follow the troubleshooting steps for the current trouble.

PROBABLE CAUSES
- Damaged wiring harness or connector(s)
- Malfunction of the high-voltage fuse No.1 (Main, 280A) (traction battery assembly)
- Malfunction of the main contactors (+) or (–) in the traction battery
- Malfunction of the resistor in the Main Drive Lithium-ion Battery
- Bus bar in the traction battery loosely tightened
- Malfunction of the EMCU
- Malfunction of the EV water PTC heater
- Malfunction of the A/C control unit
- Malfunction of the onboard charger/DC-DC converter
- Malfunction of the A/C compressor

DIAGNOSIS

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines
Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?
YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C – Troubleshooting). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines

Check again if DTC P1A15 is stored in the EV-ECU.

(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC except P0AA1, P1A17 or P1AF2 is stored in the EV-ECU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC.
NO : Go to Step 4.

STEP 4. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC is stored in the A/C control unit.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC (Refer to GROUP 55 – Troubleshooting).
NO : Go to Step 5.

STEP 5. Using scan tool MB991958, check freeze frame (FFD) data

Check the freeze frame data.

Freeze frame data

- Item No. 15: EMCU: Condenser voltage

OK: 220 V or more

Q: Is the check result normal?

YES : Go to Step 6.
NO : Go to Step 9.

STEP 6. Check whether the DTC is stored again

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Wear the specified protection equipment during the check.***

Check again if the DTC is stored in the EV-ECU.
(1) Pull the service plug.

⚠ ***DANGER***

Isolate bare wires of the disconnected high-voltage circuit with a plastic tape.

(2) Disconnect the G-21 EV water PTC heater connector.
(3) Push the service plug.
(4) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(5) Erase the DTC.
(6) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 7.
NO : Go to Step 25.

STEP 7. Check whether the DTC is stored again

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Wear the specified protection equipment during the check.***

Check again if the DTC is stored in the EV-ECU.
(1) Pull the service plug.

⚠ ***DANGER***

Isolate bare wires of the disconnected high-voltage circuit with a plastic tape.

(2) Disconnect the G-20 A/C compressor connector.
(3) Push the service plug.
(4) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(5) Erase the DTC.
(6) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 8.
NO : Replace the A/C compressor (Refer to GROUP 55 – A/C Compressor).

STEP 8. Check whether the DTC is stored again

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Wear the specified protection equipment during the check.***

Check again if the DTC is stored in the EV-ECU.
(1) Pull the service plug.

⚠ ***DANGER***

Isolate bare wires of the disconnected high-voltage circuit with a plastic tape.

(2) Disconnect the G-13 onboard charger/DC-DC converter connector.
(3) Push the service plug.
(4) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(5) Erase the DTC.
(6) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Replace the inverter. Then go to Step 30.
NO : Replace the onboard charger/DC-DC converter.

STEP 9. High-voltage fuse No.1 (Main,280A) (traction battery assembly) check

Check the high-voltage fuse No.1 (Main, 280A).

Q: Is the check result normal?

YES : Go to Step 11.
NO : Replace the high-voltage fuse No.1 (Main, 280A). Then go to Step 10.

STEP 10. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC is stored in the EMCU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC.
NO : Go to Step 30.

STEP 11. Connector check: G-18, G-19 traction battery connectors, G-05, G-06 inverter connectors

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***
- Check whether terminals are engaged correctly (deformation or discoloration).
- Check whether the terminals are tightened to the specified torque.
- Check whether foreign materials are pinched.

Q: Is the check result normal?

YES : Go to Step 12.
NO : Reconnect the terminals or replace the traction battery cable.

STEP 12. Check the wiring harness between G-05, G-06 inverter connector terminal and G-18, G-19 traction battery connector terminal

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

Check the high-voltage line for damage.

Q: Is the check result normal?

YES : Go to Step 13.
NO : Replace the traction battery cable.

STEP 13. Connector check: C-22 traction battery connector, C-111 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 14.
NO : Repair the damaged connector.

STEP 14. Check the wiring harness between C-111 EV-ECU connector terminal Nos. 105, 106, 107 and C-22 traction battery connector terminal Nos. 3, 6, 7

Check the signal lines and ground line for open.

Q: Is the check result normal?

YES : Go to Step 15.
NO : Repair the wiring harness.

STEP 15. Check the resistance at each coil of the charging contactor, the main contactors (+) and (-)
Refer to P.54D-170.

Q: Is the check result normal?

YES : Go to Step 25.
NO : Go to Step 16.

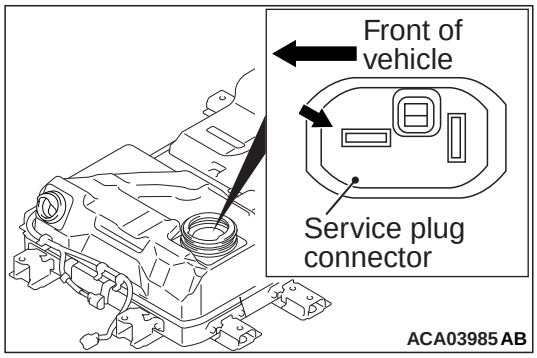
STEP 16. Voltage measurement at G-19 high-voltage connector, service plug

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

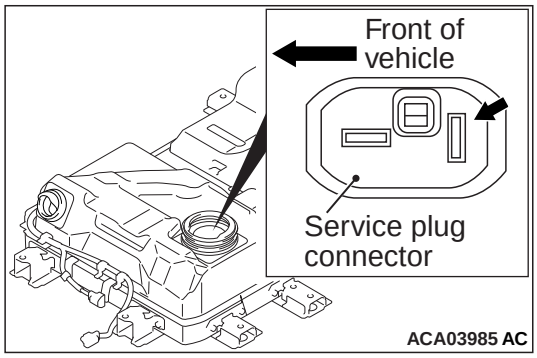
(1) Disconnect traction battery connector C-22, and then apply a voltage of 12 V between terminals No. 7 and 5 (at traction battery side).
(2) Using a high voltage multimeter, measure the high voltage between the G-19 connection terminal and service plug forward terminal.

OK: 110 V – 180 V



Q: Is the check result normal?

YES : Go to Step 17.
NO : Go to Step 18.



STEP 17. Voltage measurement at G-18 high-voltage, service plug connector

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

(1) Disconnect traction battery connector C-22, and then apply a voltage of 12 V between terminals No. 6 and 5 (at traction battery side).
(2) Using a high voltage multimeter, measure the high voltage between the G-18 connection terminal and service plug connection backward terminal.

OK: 110 V – 180 V

Q: Is the check result normal?

YES : Go to Step 30.
NO : Go to Step 18.

STEP 18. Check the main contactor (–) or charging contactor in traction battery

(1) Removal the main contactor (–) or charging contactor in traction battery (Refer to P.54D-176).
(2) Check the main contactor (–) or charging contactor in traction battery (Refer to P.54D-204).

Q: Is the check result normal?

YES : Go to Step 19.
NO : Replace the main contactor (–) or charging contactor in traction battery (Refer to P.54D-198).

STEP 19. Check the resistor in traction battery

(1) Removal the resistor in traction battery (Refer to P.54D-176).
(2) Check the resistor in traction battery (Refer to P.54D-206).

Q: Is the check result normal?

YES : Go to Step 20.
NO : Replace the resistor in traction battery (Refer to P.54D-197).

STEP 20. Check the bus bar in traction battery

(1) Check whether the bus bar in the traction battery is tightened correctly (Refer to P.54D-185).

Q: Is the check result normal?

YES : Go to Step 21.
NO : Retighten the bus bar in the traction battery (Refer to P.54D-185).

STEP 21. Use scan tool MB991958, check data list of others system

(1) Select "Reset" for CMUs 01 to 12 on the special function screen, and then execute it.
(2) Check the data list on CMUs 01 to 12.
- Item No. 1: Module voltage

Q: Is the check result normal?

YES : Go to Step 22.
NO : Carry out troubleshooting for the DTC in the BMU.

STEP 22. Connector check: C-22 traction battery connector, main contactor (–) connector, charging contactor connector

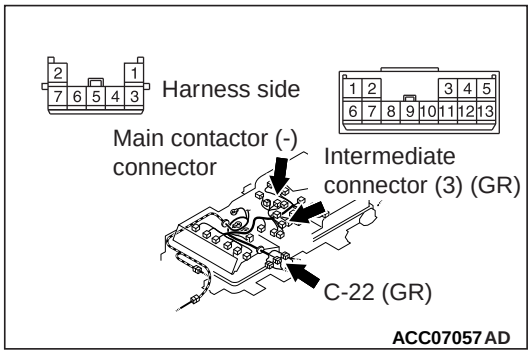
Q: Is the check result normal?

YES : Go to Step 23.
NO : Repair the damaged connector.

STEP 23. Check the wiring harness between C-22 traction battery connector terminal No. 6 and main contactor (–) connector terminal No. 7, C-22 traction battery connector terminal No. 5 and main contactor (–) connector terminal No. 2

NOTE: Before checking harness, check intermediate connector (3) terminal No. 4 and No. 12 of ground line, and repair if necessary.

Check out signal line and ground line for open circuit.

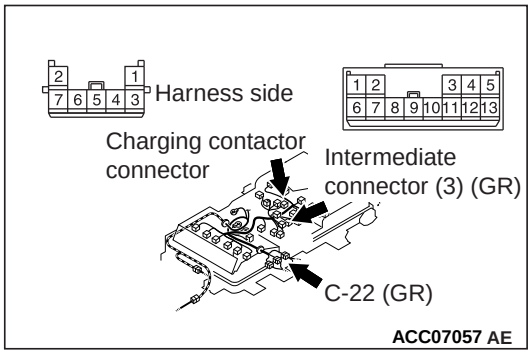


Q: Is the check result normal?

YES : Go to Step 24.
NO : Repair the wiring harness.

STEP 24. Check the wiring harness between C-22 traction battery connector terminal No. 7 and charging contactor connector terminal No. 4, C-22 traction battery connector terminal No. 5 and charging contactor connector terminal No. 6

NOTE: Before checking harness, check intermediate connector (3) terminal No. 4 and No. 11 of ground line, and repair if necessary.



Check out signal line and ground line for open circuit.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunctions).

NO : Repair the wiring harness.

STEP 25. Measure the resistance of the G-21 EV water PTC heater connector

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Wear the specified protection equipment during the check.***

(1) Pull the service plug.
(2) Disconnect the G-21 EV water PTC heater connector.
(3) Measure it on the resistance at the EV water PTC heater side.
(4) Measure the resistance between the G-21 EV water PTC heater connector terminal No.1 and No.2.

OK: 1 MΩ or more

Q: Is the check result normal?

YES : Go to Step 26.

NO : Check the high-voltage fuse No.3. Replace the EV water PTC heater (Refer to GROUP 55 – EV Water PTC Heater).

STEP 26. Measure the resistance at A-113 EV water PTC heater connector

(1) Disconnect the A-113 EV water PTC heater connector and measure it on the resistance at the EV water PTC heater side.
(2) Measure the resistance between the A-113 EV water PTC heater connector terminal Nos. 3, 4, 5 and ground.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 27.

NO : Replace the EV water PTC heater (Refer to GROUP 55 – EV Water PTC Heater).

STEP 27. Measure the resistance at A-113 EV water PTC heater connector

(1) Disconnect the A-113 EV water PTC heater connector and measure it on the resistance at the wiring harness side.
(2) Measure the resistance between the A-113 EV water PTC heater connector terminal Nos. 3, 4, 5 and ground.

OK: No continuity

Q: Is the check result normal?

YES : Go to Step 30.
NO : Go to Step 28.

STEP 28. Connector check: A-113 EV water PTC heater connector, B-01 joint connector, C-113 A/C control unit connector

Q: Is the check result normal?

YES : Go to Step 29.
NO : Repair the damaged connector.

STEP 29. Check the wiring harness between A-113 EV water PTC heater connector terminal Nos. 3, 4, 5 and C-113 A/C control unit connector terminal Nos. 34, 35, 36

Check the signal line for short circuit.

Q: Is the check result normal?

YES : Replace the A/C control unit.
NO : Repair the wiring harness.

STEP 30. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Check if the DTC is stored.

Q: Is DTC P1A15 stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P1A17 High-voltage system error (3) <To 2014 model year>

⚠ ***DANGER***

- ***When servicing the high voltage system parts, always shut off the high voltage by pulling the service plug.***
- ***When servicing the high voltage system parts, always wear the protective equipment or armor to measure the high voltage.***

⚠ **CAUTION**

If there is any problem in the CAN bus lines, an incorrect diagnostic trouble code may be stored. Prior to this diagnosis, always diagnose the CAN bus lines (Refer to GROUP 54C – CAN Bus Diagnostics Table.).

OPERATION

- The high-voltage circuit activation and shutdown are controlled by the EV-ECU. The EV-ECU also monitors the voltage of the smooth condenser in the EMCU via the CAN communication.

DTC SET CONDITION

- When the main contactors (+) and (−) are set to ON, if the voltage of the smooth condenser in the EMCU is kept at 200 V or less, DTC P1A17 will be stored.

PROBABLE CAUSES

- Damaged wiring harness or connector(s)
- Malfunction of the main contactors (+) or (−) in the Main Drive Lithium-ion Battery
- Malfunction of the EMCU

DIAGNOSIS

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines

Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C − Troubleshooting). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines

Check again if DTC P1A17 is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Use scan tool MB991958 to confirm a DTC of other systems

Check if DTC P1A15 is stored in the EV-ECU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC.
NO : Go to Step 4.

STEP 4. High-voltage fuse No.1 (Main,280A) (Main Drive Lithium-ion Battery assembly) check

Check the high-voltage fuse No.1 (Main, 280A).

Q: Is the check result normal?

YES : Go to Step 6.
NO : Replace the high-voltage fuse No.1 (Main, 280A). Then go to Step 5.

STEP 5. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC is stored in the EMCU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC.
NO : Go to Step 15.

STEP 6. Connector check: G-18, G-19 Main Drive Lithium-ion Battery connector, G-05, G-06 inverter connector

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***
- Check whether terminals are engaged correctly (deformation or discoloration).
- Check whether the terminals are tightened to the specified torque.
- Check whether foreign materials are pinched.

Q: Is the check result normal?

YES : Go to Step 7.
NO : Reconnect the terminals or replace the Main Drive Lithium-ion Battery cable.

STEP 7. Check the wiring harness between G-05, G-06 inverter connector terminal and G-18, G-19 Main Drive Lithium-ion Battery connector terminal.

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

Check the high-voltage line for damage.

Q: Is the check result normal?

YES : Go to Step 8.
NO : Replace the Main Drive Lithium-ion Battery cable.

STEP 8. Connector check: C-22 Main Drive Lithium-ion Battery connector, C-111 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the damaged connector.

STEP 9. Check the wiring harness between C-111 EV-ECU connector terminal No. 105, 106, 107 and C-22 Main Drive Lithium-ion Battery connector terminal No. 3, 6, 7
Check the signal lines, ground line for open.

Q: Is the check result normal?

YES : Go to Step 10.
NO : Repair the wiring harness.

STEP 10. Check the resistance at each coil of the main contactors (+) or (-)
Refer to P.54D-170.

Q: Is the check result normal?

YES : Go to Step 15.
NO : Go to Step 11.

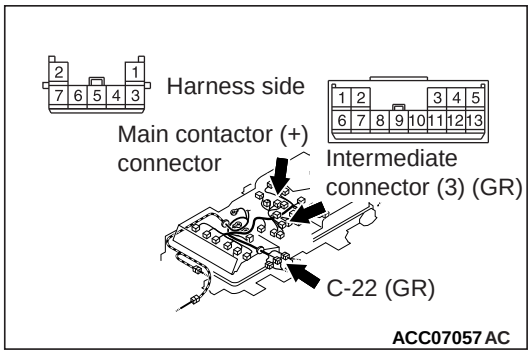
STEP 11. Connector check: C-22 Main Drive Lithium-ion Battery connector, main contactor (+), (–) connector
Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

YES : Go to Step 12.
NO : Repair the damaged connector.

STEP 12. Check the wiring harness between C-22 Main Drive Lithium-ion Battery connector terminal No. 3 and main contactor (+) connector terminal No. 3, C-22 Main Drive Lithium-ion Battery connector terminal No. 5 and main contactor (+) connector terminal No. 1

NOTE: Before checking harness, check intermediate connector (3) terminal No. 4 and No. 13 of ground line, and repair if necessary.
Check out signal line and ground line for open circuit.

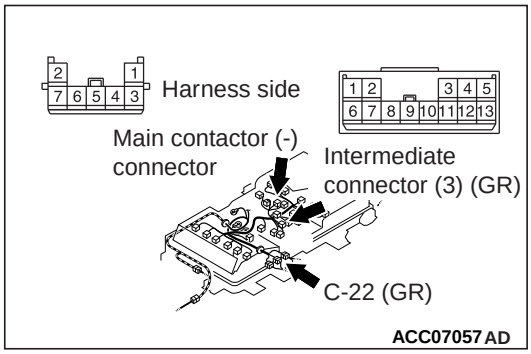


Q: Is the check result normal?

YES : Go to Step 13.
NO : Repair the wiring harness.

STEP 13. Check the wiring harness between C-22 Main Drive Lithium-ion Battery connector terminal No. 6 and main contactor (–) connector terminal No. 7, C-22 Main Drive Lithium-ion Battery connector terminal No. 5 and main contactor (–) connector terminal No. 2

NOTE: Before checking harness, check intermediate connector (3) terminal No. 4 and No. 12 of ground line, and repair if necessary.



Check out signal line and ground line for circuit.

Q: Is the check result normal?

YES : Go to Step 14.
NO : Repair the wiring harness.

STEP 14. Check the main contactor (+) or (–) in Main Drive Lithium-ion Battery

(1) Removal the main contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the main contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-204).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Replace the main contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-198).

STEP 15. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON", and then to the "START" position temporarily.
(3) Check if the DTC is stored.

Q: Is the DTC P1A17 stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P1AFA Quick charger READY timeout
DTC P1AFE Quick charger error
DTC P1AFF Quick charge port lock error
DTC P1B00 Quick charger battery conformity error

⚠ CAUTION
If there is any problem in the CAN bus lines, an incorrect DTC may be stored. Prior to this diagnosis, always diagnose the CAN bus lines.

OPERATION

- The quick charger communicates with EV-ECU via the local CAN (for the quick charger).

DTC SET CONDITION

- When the quick charger present output voltage of 200 V or less continues for 10 seconds or longer, DTC P1AFA will be stored.
- After the quick charger contactor is driven, if the quick charger error signal from the quick charger is ON, DTC P1AFE will be stored.
- When the quick charger contactor is set to ON, if the quick charge port lock signal is OFF, DTC P1AFF will be stored.

- If the quick charger does not compatible with the vehicle Main Drive Lithium-ion Battery, DTC P1B00 will be stored.

PROBABLE CAUSES

- Malfunction of the quick charging relay <DTC P1AFA>
- Damaged wiring harness or connector(s) <DTC P1AFA>
- Malfunction of the quick charge contactors (+) or (−) in the Main Drive Lithium-ion Battery <DTC P1AFA>
- Malfunction of the EV charger cable (quick charging) <DTC P1AFA>
- Malfunction of quick charger

DIAGNOSIS

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines

Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C − Troubleshooting). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines

Check again if DTC P1AFA, P1AFE, P1AFF, or P1B00 is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the quick charging connector to charge the battery fully.
(3) Check if the DTC is stored.

Q: Is the DTC stored?

YES <DTC P1AFA> : Go to Step 3.
YES <DTC P1AFE, P1AFF, P1B00> : Go to Step 15.
NO : This diagnosis is complete.

STEP 3. Measure the voltage at C-105 quick charging relay connector

(1) Disconnect the on quick charging relay, and measure the voltage at the wiring harness side.
(2) Connect the quick charging connector.
(3) Measure the voltage between the C-105 quick charging relay connector terminal No. 1 and 3.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8.
NO : Go to Step 4.

STEP 4. Connector check: C-21 Main Drive Lithium-ion Battery connector, C-105 quick charging relay connector, G-10 quick charging connection, C-106, C-111 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the damaged connector.

STEP 5. Check the wiring harness between C-105 quick charging relay connector terminal No. 3 and G-10 quick charging connection terminal No. 3, C-106 EV-ECU connector terminal No. 4

Check the power supply line for open circuit.

Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the wiring harness.

STEP 6. Check the wiring harness between C-105 quick charging relay connector terminal No. 1 and C-26 Main Drive Lithium-ion Battery connector terminal No. 1, C-21 Main Drive Lithium-ion Battery connector terminal No. 8 and G-10 quick charging connection terminal No. 10, C-111 EV-ECU connector terminal No. 124

Check the power supply line and ground line for open circuit.

Q: Is the check result normal?

YES : Go to Step 7.
NO : Repair the wiring harness.

STEP 7. Quick charging relay check

Check the quick charging relay.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction).
NO : Replace the quick charging relay.

STEP 8. Measure the resistance at C-21, C-26 Main Drive Lithium-ion Battery connector

Check the quick charge contactor (+), (–) in the Main Drive Lithium-ion Battery (Refer to P.54D-170).

Q: Is the check result normal?

YES : Go to Step 16.
NO : Go to Step 9.

STEP 9. Voltage measurement at G-01 EV charger cable (quick charging) connector, service plug

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

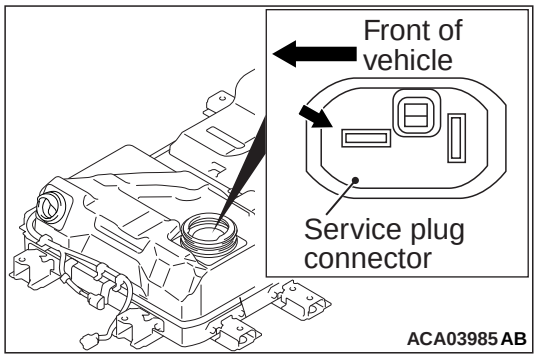
(1) Disconnect Main Drive Lithium-ion Battery connectors C-21 and C-26, and then apply a voltage of 12 V between Main Drive Lithium-ion Battery-side connector C-26 terminal No. 1 and Main Drive Lithium-ion Battery-side connector C-21 terminal No. 8.

(2) Using a high voltage multimeter, measure the high voltage between the G-01 EV charger cable (quick charging) connection terminal and service plug forward terminal.

OK: 110 V – 180 V

Q: Is the check result normal?

YES : Go to Step 10.
NO : Go to Step 11.



STEP 10. Voltage measurement at G-02 EV charger cable (quick charging) connector, service plug connector

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

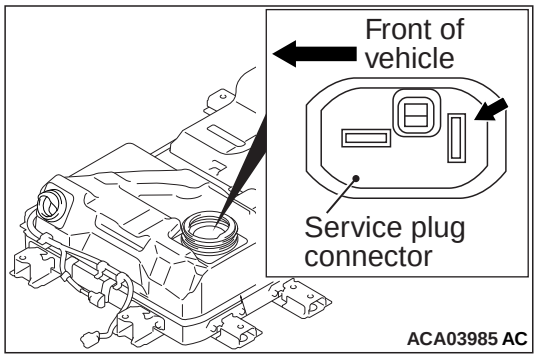
(1) Disconnect Main Drive Lithium-ion Battery connectors C-21 and C-26, and then apply a voltage of 12 V between Main Drive Lithium-ion Battery-side connector C-43 terminal No. 1 and Main Drive Lithium-ion Battery-side connector C-41 terminal No. 8.

(2) Using a high voltage multimeter, measure the high voltage between the G-02 EV charger cable (quick charging) connection terminal and service plug connection backward terminal.

OK: 110 V – 180 V

Q: Is the check result normal?

YES : Go to Step 16.
NO : Go to Step 11.



STEP 11. Check the quick charge contactor (+) or (–)

(1) Removal the quick charge contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the quick charge contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-204).

Q: Is the check result normal?

YES : Go to Step 12.
NO : Replace the quick charge contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-198).

STEP 12. Connector check: C-21, C-26 Main Drive Lithium-ion Battery connector, quick charge contactor (+), (–) connector

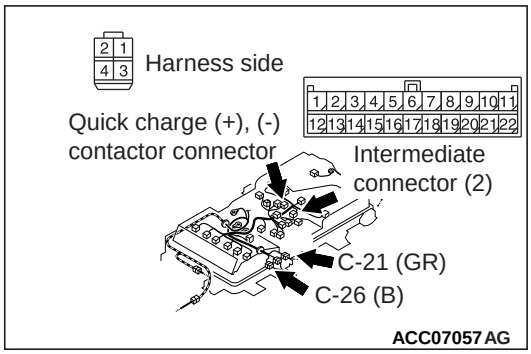
Q: Is the check result normal?

YES : Go to Step 13.
NO : Repair the damaged connector.

STEP 13. Check the wiring harness between C-26 Main Drive Lithium-ion Battery connector terminal No. 1 and quick charge contactor (+), (–) connector terminal No. 1, 2, C-21 Main Drive Lithium-ion Battery connector terminal No. 8 and quick charge contactor (+), (–) connector terminal No. 3, 4

NOTE: Before checking harness, check intermediate connector (2) terminal No. 9, 10 and 11 of power supply line, intermediate connector (2) terminal No. 6, 7 and 8 of ground line, and repair if necessary.

Check power supply line and ground line for open circuit.



Q: Is the check result normal?

YES : Go to Step 14.
NO : Repair the wiring harness.

STEP 14. Connector check: G-01, G-02 EV charger cable (quick charging) connectors

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***
- Check whether terminals are engaged correctly (deformation or discoloration).
- Check whether the terminals are tightened to the specified torque.
- Check whether foreign materials are pinched.

Q: Is the check result normal?

YES : Go to Step 15.
NO : Reconnect the terminals or replace the EV charger cable (quick charging).

STEP 15. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the quick charging connector to charge the battery fully.
(3) Check if the DTC is stored.

Q: Is DTC P1AFA stored?

YES : Check the quick charger. Then go to Step 16.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction).

STEP 16. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the quick charging gun.
(3) Check if the DTC is stored.

Q: Is DTC P1AFA stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P1AFB Quick charging time time-out

⚠ **CAUTION**

If there is any problem in the CAN bus lines, an incorrect DTC may be stored. Prior to this diagnosis, always diagnose the CAN bus lines.

OPERATION

- The BMU communicates with the EV-ECU via CAN.

DTC SET CONDITIONS

- If the quick charging continues for the maximum quick charging time of 5 minutes or longer, DTC P1AFB will be stored.

PROBABLE CAUSES

- Malfunction of the BMU
- Malfunction of the EV-ECU

- Malfunction of the module in the traction battery

DIAGNOSIS

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines

Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C – Troubleshooting.). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines

Check again if DTC P1AFB is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the quick charging connector to charge the battery.
(3) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Using scan tool MB991958, check data list

Check the BMU service data.

- Item No. 3: Battery cell maximum voltage
- Item No. 5: Battery cell minimum voltage
- Item No. 8: Module maximum temperature
- Item No. 10: Minimum module temperature

Q: Is the check result normal?

YES : Go to Step 4.
NO : Replace the BMU. Then go to Step 8.

STEP 4. Use scan tool MB991958 to confirm a DTC of other systems

Charge the battery fully by regular charging. Then, check if DTC is stored in the EV-ECU.

Q: Is the DTC stored?

YES : Troubleshoot the EV-ECU.
NO : Go to Step 5.

STEP 5. Using scan tool MB991958, check data list

(1) Check the domestic power supply facility.
(2) Connect the regular charging cable.
(3) Check the BMU service data.
- Item No. 3: Battery cell maximum voltage
- Item No. 4: Maximum voltage cell ID
- Item No. 5: Battery cell minimum voltage
- Item No. 6: Minimum voltage cell ID
- Item No. 33: Maximum value of cell voltage difference

OK: The highest cell voltage exceeds 4.0 V, and the voltages among the cells differs by less than 0.2 V.

Q: Is the check result normal?

YES : Go to Step 7.
NO : Go to Step 6.

STEP 6. Using scan tool MB991958, check data list of others systems

(1) Select "Reset" for ID of the cell of the lowest voltage (CMU ID) on the special function screen, and then execute it.
(2) Check the data list corresponding to the relevant CMU ID.

Q: Is the check result normal?

YES : Go to Step 7.
NO : Replace the traction battery. Then go to Step 8.

STEP 7. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the normal charging cable to charge the battery fully.
(3) Check if the DTC is stored.

Q: Is DTC P1AFB stored?

YES : Replace the EV-ECU. Then go to Step 8.
NO : The diagnosis is complete.

STEP 8. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the quick charging gun.
(3) Check if the DTC is stored.

Q: Is DTC P1AFB stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P1AFC Quick charging current error

⚠ CAUTION
If there is any problem in the CAN bus lines, an incorrect DTC may be stored. Prior to this diagnosis, always diagnose the CAN bus lines.

OPERATIONS

- The quick charger communicates with the EV-ECU via the local CAN (for the quick charger).

- The BMU communicates with the EV-ECU via CAN.

DTC SET CONDITION

- If the difference between the Main Drive Lithium-ion Battery current received from the BMU and the present output current received from the quick charger is higher than the specified value for 5 seconds or longer, DTC P1AFC will be stored.

PROBABLE CAUSES

- Malfunction of wiring harness and connectors (Local CAN (for quick charger))
- Malfunction of the EV charger cable (quick charging)
- Malfunction of quick charger
- Malfunction of the BMU
- Malfunction of the current sensor in the Main Drive Lithium-ion Battery

DIAGNOSIS

⚠ ***DANGER***

- ***When high voltage system components are serviced, be sure to remove service plug to shut down high voltage (Refer to GROUP 00 – Precautions Before Service, Precautions on how to use the high-voltage vehicle).***
- ***When removing service plug, wear the specified protective equipment.***

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines

Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C – Troubleshooting). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines

Check again if DTC P1AFC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the quick charging connector to charge the battery.
(3) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Current sensor check

Carry out the simple inspection of the current sensor.

Q: Is the check result normal?

YES : Go to Step 4.
NO : Go to Step 7.

STEP 4. Measure the local CAN (for quick charger) terminator resistor

(1) Disconnect the EV-ECU connector C-111, and measure the resistance at the wiring harness side.
(2) Connect the quick charger.
(3) Measure the resistance between terminal No. 101 and No. 102.

OK: 120 ± 20 Ω

Q: Is the check result normal?

YES : Go to Step 11.
NO : Go to Step 5.

STEP 5. Check the local CAN (for quick charger) bus connector: G-10 quick charger connector, G-17 intermediate connector, C-111 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the damaged connector.

STEP 6. Check the local CAN (for quick charger) bus line between the G-10 quick charging connection terminal No. 8, 9 and C-111 EV-ECU connector terminal No. 101, 102

Check the signal lines for short to ground or open circuit.

Q: Is the check result normal?

YES : Check the quick charger. Then go to Step 12.
NO : Repair the wiring harness.

STEP 7. Measure the resistance at C-26 Main Drive Lithium-ion Battery connector

Check the current sensor in the Main Drive Lithium-ion Battery (Refer to P.54D-174).

Q: Is the check result normal?

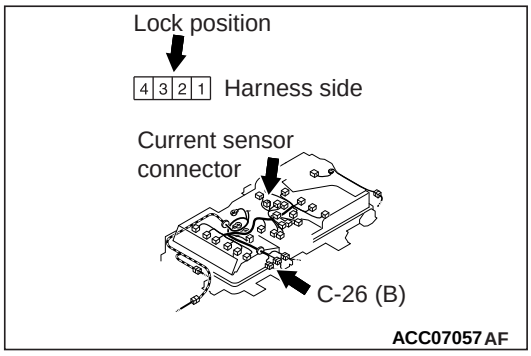
YES : Go to Step 11.
NO : Go to Step 8.

STEP 8. Connector check: C-26 Main Drive Lithium-ion Battery connector, current sensor connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the damaged connector.



STEP 9. Check the wiring harness between C-26 Main Drive Lithium-ion Battery connector terminal No. 3, 2, 8, 7 and current sensor connector terminal No. 1, 2, 3, 4

Check out signal line for open circuit.

Q: Is the check result normal?

YES : Go to Step 10.

NO : Repair the wiring harness.

STEP 10. Check the current sensor in Main Drive Lithium-ion Battery

(1) Removal the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-176).

(2) Check the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-206).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Replace the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-195).

STEP 11. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.

(1) Erase the stored DTC.

(2) Connect the quick charging connector to charge the battery.

(3) Check if the DTC is stored.

Q: Is DTC P1AFC stored?

YES : Replace the BMU. Then go to Step 12.

NO : The diagnosis is complete.

STEP 12. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.

(1) Erase the stored diagnostic trouble code.

(2) Connect the quick charging gun.

(3) Check if the DTC is stored.

Q: Is DTC P1AFC stored?

YES : Return to Step 1.

NO : The diagnosis is complete.

DTC P1AFD Quick charging voltage abnormality

⚠ CAUTION

If there is any problem in the CAN bus lines, an incorrect DTC may be stored. Prior to this diagnosis, always diagnose the CAN bus lines.

OPERATIONS

- The BMU communicates with the EV-ECU via CAN.
- The quick charging plug communicates with the EV-ECU via the local CAN (for the quick charger).

DTC SET CONDITION

- If the difference between the present output voltage and total battery voltage of 10 V or more continues for 5 seconds or longer, DTC P1AFD will be stored.

PROBABLE CAUSES

- Malfunction of the quick charging relay
- Damaged wiring harness or connector(s)
- Malfunction of the quick charge contactors (+) or (−) in the Main Drive Lithium-ion Battery
- Malfunction of the EV charger cable (quick charging)
- Malfunction of quick charger

DIAGNOSIS

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines

Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C − Troubleshooting.). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines

Check again if DTC P1AFD is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the quick charging connector to charge the battery fully.
(3) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Use scan tool MB991958 to confirm a DTC of other systems

Check if DTC is stored in the EV-ECU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC.
NO : Go to Step 4.

STEP 4. Measure the voltage at C-105 quick charging relay connector

(1) Disconnect the on quick charging relay, and measure the voltage at the wiring harness side.
(2) Connect the quick charging connector.
(3) Measure the voltage between the C-105 quick charging relay connector terminal No. 1 and 3.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 9.
NO : Go to Step 5.

STEP 5. Connector check: C-21 Main Drive Lithium-ion Battery connector, C-105 quick charging relay connector, G-10 quick charging connection, G-17 intermediate connector, C-106, C-111 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the damaged connector.

STEP 6. Check the wiring harness between C-105 quick charging relay connector terminal No. 3 and G-10 quick charging connection terminal No. 3, C-106 EV-ECU connector terminal No. 4

Check the power supply line for open circuit.

Q: Is the check result normal?

YES : Go to Step 7.
NO : Repair the wiring harness.

STEP 7. Check the wiring harness between C-105 quick charging relay connector terminal No. 1 and C-26 Main Drive Lithium-ion Battery connector terminal No. 1, C-21 Main Drive Lithium-ion Battery connector terminal No. 8 and G-10 quick charging connection terminal No. 10, C-111 EV-ECU connector terminal No. 124

Check the power supply line and ground line for open circuit.

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the wiring harness.

STEP 8. Quick charging relay check

Check the quick charging relay.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction).
NO : Replace the quick charging relay.

STEP 9. Measure the resistance at C-21, C-26 Main Drive Lithium-ion Battery connector

Check the quick charge contactor (+), (–) in the Main Drive Lithium-ion Battery (Refer to P.54D-170).

Q: Is the check result normal?

YES : Go to Step 15.
NO : Go to Step 10.

STEP 10. Check the quick charge contactor (+) or (–)

(1) Removal the quick charge contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the quick charge contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-204).

Q: Is the check result normal?

YES : Go to Step 11.
NO : Replace the quick charge contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-198).

STEP 11. Connector check: C-21, C-26 Main Drive Lithium-ion Battery connector, quick charge contactor (+), (–) connector

Q: Is the check result normal?

YES : Go to Step 12.
NO : Repair the damaged connector.

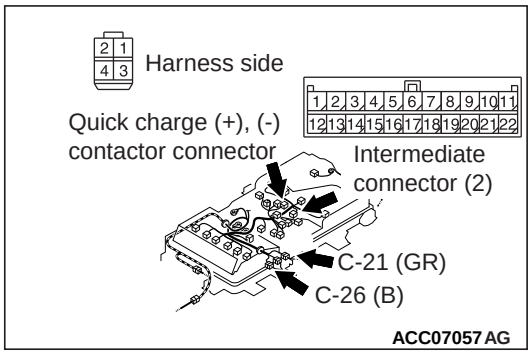
STEP 12. Check the wiring harness between C-26 Main Drive Lithium-ion Battery connector terminal No. 1 and quick charge contactor (+), (–) connector terminal No. 1, 2, C-21 Main Drive Lithium-ion Battery connector terminal No. 8 and quick charge contactor (+), (–) connector terminal No. 3, 4

NOTE: Before checking harness, check intermediate connector (2) terminal No. 9, 10 and 11 of power supply line, intermediate connector (2) terminal No. 6, 7 and 8 of ground line, and repair if necessary.

Check power supply line and ground line for open circuit.

Q: Is the check result normal?

YES : Go to Step 13.
NO : Repair the wiring harness.



STEP 13. Connector check: G-01, G-02 EV charger cable (quick charging) connectors

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***
- Check whether terminals are engaged correctly (deformation or discoloration).
- Check whether the terminals are tightened to the specified torque.
- Check whether foreign materials are pinched.

Q: Is the check result normal?

YES : Go to Step 14.
NO : Reconnect the terminals or replace the EV charger cable (quick charging).

STEP 14. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the quick charging connector to charge the battery fully.
(3) Check if the DTC is stored.

Q: Is DTC P1AFD stored?

YES : Check the quick charger. Then go to Step 15.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunctions).

STEP 15. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored diagnostic trouble code.
(2) Connect the quick charging gun.
(3) Check if the DTC is stored.

Q: Is DTC P1AFD stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P1B01 Quick charged vehicle error

OPERATIONS

- The quick charging plug communicates with the EV-ECU via the local CAN (for the quick charger).
- The quick charger supplies voltage to the Main Drive Lithium-ion Battery.

DTC SET CONDITION

- If the vehicle error judgment signal is received from the quick charger, DTC P1B01 will be stored.

PROBABLE CAUSES

- Malfunction of the quick charging relay
- Damaged wiring harness or connector(s)

- Malfunction of the quick charge contactors (+) or (–) in the Main Drive Lithium-ion Battery
- Malfunction of the EV charger cable (quick charging)
- Malfunction of quick charger

DIAGNOSIS

STEP 1. Quick charger check

⚠ DANGER

- ***When servicing the high voltage system parts, always shut off the high voltage by pulling the service plug.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

Check if the quick charger can be removed from the quick charging connection.

Q: Is the check result normal?

YES : Go to Step 2.
NO : Check the quick charger. Then go to Step 2.

STEP 2. Voltage measurement at G-01 EV charger cable (quick charging) connector, service plug

⚠ DANGER

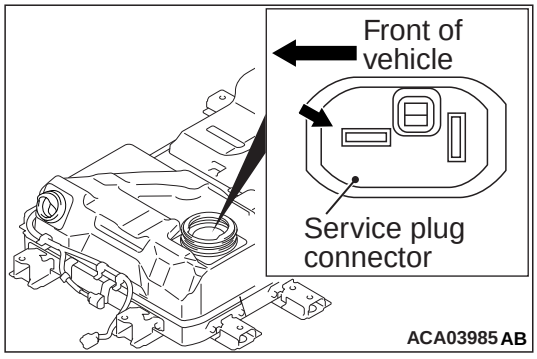
- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

Using a high voltage multimeter, measure the high voltage between the G-01 EV charger cable (quick charging) connection terminal and service plug forward terminal.

OK: Approximately 0 V

Q: Is the check result normal?

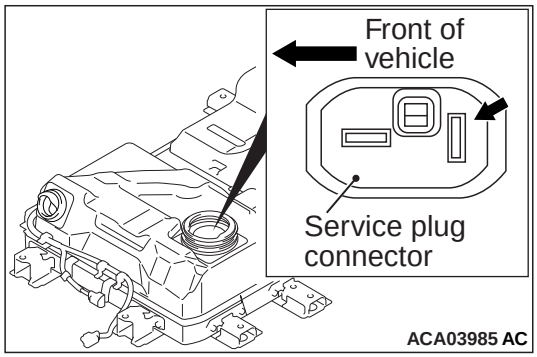
YES : Go to Step 3.
NO : Go to Step 9.



STEP 3. Voltage measurement at G-02 EV charger cable (quick charging) connector, service plug connector

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***



(1) Using a high voltage multimeter, measure the high voltage between the G-02 EV charger cable (quick charging) connection terminal and service plug connection backward terminal.

OK: Approximately 0 V

Q: Is the check result normal?

YES : Go to Step 4.
NO : Go to Step 9.

STEP 4. Measure the voltage at C-105 quick charging relay connector

(1) Disconnect the on quick charging relay, and measure the voltage at the wiring harness side.
(2) Connect the quick charging connector.
(3) Measure the voltage between the C-105 quick charging relay connector terminal No. 1 and 3.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 9.
NO : Go to Step 5.

STEP 5. Connector check: C-21 Main Drive Lithium-ion Battery connector, C-105 quick charging relay connector, G-10 quick charging connection, C-106, C-111 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the damaged connector.

STEP 6. Check the wiring harness between C-105 quick charging relay connector terminal No. 3 and G-10 quick charging connection terminal No. 3, C-106 EV-ECU connector terminal No. 4

Check the power supply line for open circuit.

Q: Is the check result normal?

YES : Go to Step 7.
NO : Repair the wiring harness.

STEP 7. Check the wiring harness between C-105 quick charging relay connector terminal No. 1 and C-26 Main Drive Lithium-ion Battery connector terminal No. 1, C-21 Main Drive Lithium-ion Battery connector terminal No. 8 and G-10 quick charging connection terminal No. 10, C-111 EV-ECU connector terminal No. 124

Check the power supply line and ground line for open circuit.

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the wiring harness.

STEP 8. Quick charging relay check

Check the quick charging relay.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction).
NO : Replace the quick charging relay.

STEP 9. Measure the resistance at C-21, C-26 Main Drive Lithium-ion Battery connector

Check the quick charge contactor (+), (–) in the Main Drive Lithium-ion Battery (Refer to P.54D-170).

Q: Is the check result normal?

YES : Go to Step 15.
NO : Go to Step 10.

STEP 10. Check the quick charge contactor (+) or (–)

(1) Removal the quick charge contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the quick charge contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-204).

Q: Is the check result normal?

YES : Go to Step 11.
NO : Replace the quick charge contactor (+) or (–) in Main Drive Lithium-ion Battery (Refer to P.54D-198).

STEP 11. Connector check: C-21, C-26 Main Drive Lithium-ion Battery connector, quick charge contactor (+), (–) connector

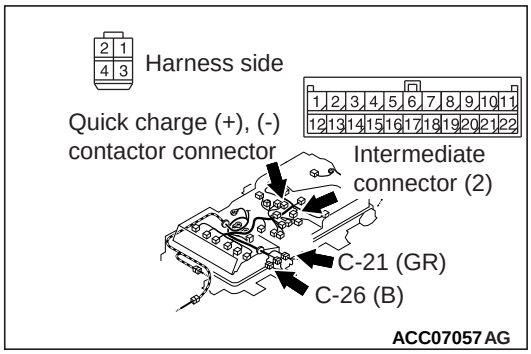
Q: Is the check result normal?

YES : Go to Step 12.
NO : Repair the damaged connector.

STEP 12. Check the wiring harness between C-26 Main Drive Lithium-ion Battery connector terminal No. 1 and quick charge contactor (+), (–) connector terminal No. 1, 2, C-21 Main Drive Lithium-ion Battery connector terminal No. 8 and quick charge contactor (+), (–) connector terminal No. 3, 4

NOTE: Before checking harness, check intermediate connector (2) terminal No. 9, 10 and 11 of power supply line, intermediate connector (2) terminal No. 6, 7 and 8 of ground line, and repair if necessary.

Check power supply line and ground line for open circuit.



Q: Is the check result normal?

YES : Go to Step 13.
NO : Repair the wiring harness.

STEP 13. Connector check: G-01, G-02 EV charger cable (quick charging) connectors

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***
- Check whether terminals are engaged correctly (deformation or discoloration).
- Check whether the terminals are tightened to the specified torque.
- Check whether foreign materials are pinched.

Q: Is the check result normal?

YES : Go to Step 14.
NO : Reconnect the terminals or replace the EV charger cable (quick charging).

STEP 14. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the quick charging connector to charge the battery fully.
(3) Check if the DTC is stored.

Q: Is DTC P1B01 stored?

YES : Check the quick charger. Then go to Step 15.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction).

STEP 15. Check whether the DTC is stored again
Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the quick charging gun.
(3) Check if the DTC is stored.

Q: Is DTC P1B01 stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P1B04 Maximum cell voltage abnormality during charging
DTC P1B05 Minimum cell voltage abnormality during charging
DTC P1B07 Total battery voltage abnormality during charging

⚠ CAUTION
If there is any problem in the CAN bus lines, an incorrect DTC may be stored. Prior to this diagnosis, always diagnose the CAN bus lines.

OPERATION
- The BMU communicates with the EV-ECU via CAN.

DTC SET CONDITIONS
- If the maximum cell voltage of 4.27 V or more continues, DTC P1B04 will be stored.
- If the minimum cell voltage of 2.3 V or less continues, DTC P1B05 will be stored.
- If the total battery voltage of 380 V or more continues, DTC P1B07 will be stored.

PROBABLE CAUSES
- Malfunction of the BMU
- Malfunction of the module in the traction battery

DIAGNOSIS

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines
Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C – Troubleshooting). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines
Check again if DTCs P1B04, P1B05 or P1B07 is stored in the EV-ECU.
(1) Erase the stored DTCs.
(2) Connect the normal charging cable or the quick charging connector to charge the battery.
(3) Check if the DTCs is stored.

Q: Is the DTCs stored?

YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Using scan tool MB991958, check data list

Check the BMU service data.

- Item No. 3: Battery cell maximum voltage
- Item No. 4: Maximum voltage cell ID
- Item No. 5: Battery cell minimum voltage
- Item No. 6: Minimum voltage cell ID
- Item No. 7: Battery total voltage

Q: Is the check result normal?

YES : Go to Step 4.
NO : Replace the BMU. Then go to Step 5.

STEP 4. Use scan tool MB991958 to confirm a DTC of others systems

(1) Select "Reset" for ID of the cell of the lowest or highest voltage (CMU ID) on the special function screen, and then execute it.
(2) Check the data list regarding the ID (CMU ID) of the cell of lowest or highest voltage.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Replace the traction battery. Then go to Step 5.

STEP 5. Check whether the DTCs is stored again

Check again if the DTCs is stored in the EV-ECU.
(1) Erase the stored DTCs.
(2) Connect the normal charging cable or the quick charging connector to charge the battery.
(3) Check if the DTCs is stored.

Q: Is DTC P1B04, P1B05 or P1B07 stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P1B06 Maximum cell temperature abnormality during charging

⚠ CAUTION
If there is any problem in the CAN bus lines, an incorrect DTC may be stored. Prior to this diagnosis, always diagnose the CAN bus lines.

OPERATION

- The BMU communicates with the EV-ECU via CAN.

DTC SET CONDITION

- If the maximum cell temperature of 60°C (140°F) or more continues, DTC P1B06 will be stored.

PROBABLE CAUSES

- Malfunction of the BMU
- Malfunction of the module in the Main Drive Lithium-ion Battery
- Malfunction of air outlet changeover system

DIAGNOSIS

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines

Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.

NO : Repair the CAN bus line (Refer to GROUP 54C – Troubleshooting). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines

Check again if DTC P1B06 is stored in the EV-ECU.

(1) Erase the stored DTC.
(2) Connect the normal charging cable or the quick charging connector to charge the battery.
(3) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 3.

NO : This diagnosis is complete.

STEP 3. Main Drive Lithium-ion Battery cooling system check

Check that when operating the A/C (cooling), the cool air flows out to the foot area using the air outlet changeover dial (FOOT mode).

Q: Is the check result normal?

YES : Go to Step 4.

NO : Check the heater/air conditioning/ventilation (Refer to GROUP 55 – Air Outlet Changeover Damper Motor Check). Then go to Step 4.

STEP 4. Using scan tool MB991958, check data list

Check the BMU service data.

- Item No. 8: Module maximum temperature
- Item No. 9: Maximum temperature module ID

Q: Is the check result normal?

YES : Go to Step 5.

NO : Replace the BMU. Then go to Step 6.

STEP 5. Use scan tool MB991958 to confirm a DTC of others systems

(1) Select "Reset" for ID of the module having the highest temperature (CMU ID) on the special function screen, and then execute it.
(2) Check the data list regarding the ID (CMU ID) of the module having the highest temperature.

Q: Is the check result normal?

YES : Go to Step 6.

NO : Replace the Main Drive Lithium-ion Battery. Then go to Step 6.

STEP 6. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the normal charging cable or the quick charging connector to charge the battery.
(3) Check if the DTC is stored.

Q: Is DTC P1B06 stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P1B0C On board charging current error (overcurrent)
DTC P1B21 On board charger output current error

⚠ CAUTION
If there is any problem in the CAN bus lines, an incorrect DTC may be stored. Prior to this diagnosis, always diagnose the CAN bus lines.

OPERATION

- The on-board charger and BMU communicate with the EV-ECU via CAN.

DTC SET CONDITIONS

- If the battery current value received from the BMU is larger than the on-board charger current command value by the specified value or more for 5 seconds or longer, DTC P1B0C will be stored.
- If the battery current received from the BMU is larger than the charger output current value received from the on-board charger via the CAN by the specified value or more for 5 seconds or longer, DTC P1B21 will be stored.

PROBABLE CAUSES

- Damaged wiring harness or connector(s)
- Malfunction of the on-board charger
- Malfunction of the BMU
- Malfunction of the current sensor in the Main Drive Lithium-ion Battery
- Malfunction of the EV-ECU

DIAGNOSIS

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines

Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C – Troubleshooting). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines

Check again if DTC P1B0C or P1B21 is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the normal charging cable to charge the battery fully.
(3) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC is stored in the on-board charger.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC. Then go to Step 4.
NO : Go to Step 4.

STEP 4. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC is stored in the BMU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the DTC. Then go to Step 5.
NO : Go to Step 5.

STEP 5. Current sensor check

Carry out the simple inspection of the current sensor.

Q: Is the check result normal?

YES : Go to Step 10.
NO : Go to Step 6.

STEP 6. Measure the resistance at C-26 Main Drive Lithium-ion Battery connector

Check the current sensor in the Main Drive Lithium-ion Battery (Refer to P.54D-174).

Q: Is the check result normal?

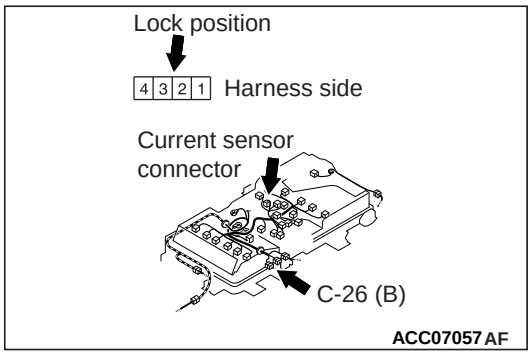
YES : Go to Step 10.
NO : Go to Step 7.

STEP 7. Connector check: C-26 Main Drive Lithium-ion Battery connector, current sensor connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the damaged connector.



STEP 8. Check the wiring harness between C-26 Main Drive Lithium-ion Battery connector terminal No. 3, 2, 8, 7 and current sensor connector terminal No. 1, 2, 3, 4

Check out signal line for open circuit.

Q: Is the check result normal?

YES : Go to Step 9.

NO : Repair the wiring harness.

STEP 9. Check the current sensor in Main Drive Lithium-ion Battery

(1) Removal the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-176).

(2) Check the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-206).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Replace the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-195).

STEP 10. Check whether the DTC is stored again.

Check again if the DTC is stored in the EV-ECU.

(1) Erase the stored DTC.

(2) Connect the normal charging cable to charge the battery fully.

(3) Check if the DTC is stored.

Q: Is DTC P1B0C or P1B21 stored?

YES : Replace the BMU. Then go to Step 11.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction.).

STEP 11. Check whether the DTC is stored again.

Check again if the DTC is stored in the EV-ECU.

(1) Erase the stored DTC.

(2) Connect the normal charging cable to charge the battery fully.

(3) Check if the DTC is stored.

Q: Is DTC P1B0C or P1B21 stored?

YES : Replace the EV-ECU. Then go to Step 12.

NO : The diagnosis is complete.

STEP 12. Check whether the DTC is stored again.
Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the regular charging cable.
(3) Check if the DTC is stored.

Q: Is DTC P1B0C or P1B21 stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

DTC P1B0D Quick charging current error (overcurrent)

⚠ CAUTION
If there is any problem in the CAN bus lines, an incorrect DTC may be stored. Prior to this diagnosis, always diagnose the CAN bus lines.

OPERATION
- The quick charger communicates with the EV-ECU via the local CAN (for the quick charger).
- The BMU communicates with the EV-ECU via CAN.

DTC SET CONDITION
- If the battery current from the BMU is larger than the on-board charger current command value by the specified value or more for 5 seconds or longer, DTC P1B0D will be stored.

PROBABLE CAUSES
- Damaged wiring harness or connector(s)
- Malfunction of quick charger
- Malfunction of the BMU
- Malfunction of the EV-ECU
- Malfunction of the current sensor in the Main Drive Lithium-ion Battery

DIAGNOSIS

STEP 1. Using scan tool MB991958, diagnose the CAN bus lines
Use the scan tool to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus line (Refer to GROUP 54C – Troubleshooting). Then go to Step 2.

STEP 2. DTC recheck after resetting CAN bus lines
Check again if DTC P1B0D is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the normal charging cable to charge the battery fully.
(3) Check if the DTC is stored.

Q: Is the DTC stored?

YES : Go to Step 3.
NO : This diagnosis is complete.

STEP 3. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC is stored in the BMU.

Q: Is the diagnostic trouble code stored?

YES : Carry out troubleshooting for the DTC. Then go to Step 4.
NO : Go to Step 4.

STEP 4. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the normal charging cable to charge the battery fully.
(3) Check if the DTC is stored.

Q: Is DTC P1B0D stored?

YES : Check the quick charger. Then go to Step 5.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points - How to Cope with Intermittent Malfunction.).

STEP 5. Current sensor check

Carry out the simple inspection of the current sensor.

Q: Is the check result normal?

YES : Go to Step 10.
NO : Go to Step 6.

STEP 6. Measure the resistance at C-26 Main Drive Lithium-ion Battery connector

Check the current sensor in the Main Drive Lithium-ion Battery (Refer to P.54D-174).

Q: Is the check result normal?

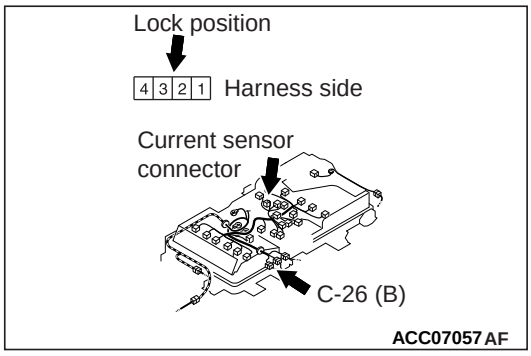
YES : Go to Step 10.
NO : Go to Step 7.

STEP 7. Connector check: C-26 Main Drive Lithium-ion Battery connector, current sensor connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the damaged connector.



STEP 8. Check the wiring harness between C-26 Main Drive Lithium-ion Battery connector terminal No. 3, 2, 8, 7 and current sensor connector terminal No. 1, 2, 3, 4

Check out signal line for open circuit.

Q: Is the check result normal?

YES : Go to Step 9.

NO : Repair the wiring harness.

STEP 9. Check the current sensor in Main Drive Lithium-ion Battery

(1) Removal the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-176).

(2) Check the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-206).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Replace the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-195).

STEP 10. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.

(1) Erase the stored DTC.

(2) Connect the normal charging cable to charge the battery fully.

(3) Check if the DTC is stored.

Q: Is DTC P1B0D stored?

YES : Replace the BMU. Then go to Step 11.

NO : The diagnosis is complete.

STEP 11. Check whether the DTC is stored again

Check again if the DTC is stored in the EV-ECU.

(1) Erase the stored DTC.

(2) Connect the normal charging cable to charge the battery fully.

(3) Check if the DTC is stored.

Q: Is DTC P1B0D stored?

YES : Replace the EV-ECU. Then go to Step 12.

NO : The diagnosis is complete.

STEP 12. Check whether the DTC is stored again
Check again if the DTC is stored in the EV-ECU.
(1) Erase the stored DTC.
(2) Connect the quick charging gun.
(3) Check if the DTC is stored.

Q: Is DTC P1B0D stored?

YES : Return to Step 1.
NO : The diagnosis is complete.

TROUBLE SYMPTOM CHART

M1549222500102

Trouble symptoms	Inspection procedure number	Reference page
The cruising range shortened.	1	P.54D-69

SYMPTOM PROCEDURES

Inspection Procedure 1: The cruising range shortened.

COMMENTS ON TROUBLE SYMPTOMS
- The cause is assumed to be too low ambient temperature during charging.
- The cause is assumed to be high-load operations during driving.
- The cause is assumed to be the service status of the air conditioning (cooling and heating).

PROBABLE CAUSES
- Improper tire pressure
- Brake drag
- Poor wheel alignment
- Malfunction of the module in the Main Drive Lithium-ion Battery

DIAGNOSIS

STEP 1. Check whether the DTC is stored
Check if the DTC is stored in the EV-ECU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the EV-ECU.
NO : Go to Step 2.

STEP 2. Check the tire pressure
Check the tire pressure (Refer to GROUP 31 – On-vehicle Service – Tire Pressure Check).

Q: Is the check result normal?

YES : Go to Step 3.
NO : Check the tire and adjust the tire pressure.

STEP 3. Scan tool MB991958 data list
Check the BMU service data.
- Item 33: Maximum value of cell voltage difference

OK: Less than 0.02 V

Q: Is the check result normal?

YES : Go to Step 7.
NO : Go to Step 4.

STEP 4. Using scan tool MB991958, actuator test
Perform the actuator test for BMU, and check the BMU service data.

Actuator test
- Item No. 2: Battery balancer unit

  OK: All the BMU service data items from 188 to 275 are set to ON.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Replace the Main Drive Lithium-ion Battery.

STEP 5. Using scan tool MB991958, check data list
Check the BMU service data.

Data list
- Item No. 5: Minimum cell voltage

  OK: 3.8 V or more

Q: Is the check result normal?

YES : Perform the cell voltage leveling procedure. Then go to Step 6.
NO : Charge the Main Drive Lithium-ion Battery regularly. Leave it for 2 hours and go to Step 6.

STEP 6. Using scan tool MB991958, check data list
Check the BMU service data.

Data list
- Item No. 33: Maximum value of cell voltage difference

  OK: Less than 0.02 V

Q: Is the check result normal?

YES : Go to Step 7.
NO : Go to Step 5. If the answer is "NO" consecutively three times, go to Step 9.

STEP 7. Brake drag force check
Check the brake drag force (Refer to GROUP 35A – On-vehicle Service – Brake Drag Force Check).

Q: Is the check result normal?

YES : Go to Step 8.
NO : Disassemble the brake caliper assembly and check for fouling and rust on the piston sliding section and deterioration of piston seal, and check the sliding status of the guide pin and lock pin.

STEP 8. Wheel alignment check
Check the wheel alignment (Refer to GROUP 33 – On-vehicle Service – Front Wheel Alignment Check and Adjustment, GROUP 34 – On-vehicle Service – Rear Wheel Alignment Check).

Q: Is the check result normal?

YES : Go to Step 9.
NO : Adjust the wheel alignment (Refer to GROUP 33 – On-vehicle Service – Front Wheel Alignment Check and Adjustment, GROUP 34 – On-vehicle Service – Rear Wheel Alignment Check).

STEP 9. Check the trouble symptom
Measure the Main Drive Lithium-ion Battery capacity.

Q: Is the check result normal?

YES : The diagnosis is complete.
NO : Go to Step 1.

ELECTRIC MOTOR CONTROL UNIT (EMCU) AND MOTOR (ELECTRIC MOTOR UNIT)

DIAGNOSTIC TROUBLE CODE CHART

M1549300600090

EMCU

DTC	Diagnostic item	Reference page
P0A0D	Motor drive voltage rise (H/W detection)	P.54D-71

DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC P0A0D Motor drive voltage rise (H/W detection)

⚠ CAUTION
- **Even when the vehicle is normal, a DTC might be stored depending on the service status. Therefore, check the interview information before the diagnosis.**

DTC SET CONDITION
If the motor (electric motor unit) drive voltage increases to approximately 420 V or more, the EMCU will store DTC P0A0D.

PROBABLE CAUSES
- Malfunction of the high-voltage fuse No.1 (Main, 280A) (Main Drive Lithium-ion Battery assembly)
- Bus bar in the Main Drive Lithium-ion Battery looseness
- Malfunction of the BMU
- open circuit in the high-voltage circuit or connection looseness
- Malfunction of the EV-ECU
- Malfunction of the EMCU

DIAGNOSIS

STEP 1. Use scan tool MB991958 to confirm a DTC of other systems

Check if the DTC other than P1A22 is stored in the EV-ECU.

Q: Is the DTC stored?

YES : Carry out troubleshooting for the EV-ECU. Then go to Step 2.
NO : Go to Step 2.

STEP 2. Use scan tool MB991958, check freeze frame (FFD) data

Check the freeze frame data.

Freeze frame data

- Item No. 33: Condenser voltage

  OK: The difference between the condenser voltage and total battery voltage is 20 V or less.

Q: Is the check result normal?

YES : Go to Step 6.
NO : Go to Step 3.

STEP 3. High-voltage fuse No.1 (Main,280A) (Main Drive Lithium-ion Battery assembly) check

Check the high-voltage fuse No.1 (Main, 280A).

Q: Is the check result normal?

YES : Go to Step 4.
NO : Replace the high-voltage fuse No.1 (Main, 280A). Then go to Step 7.

STEP 4. High-voltage connector check: G-05, G-06 inverter high-voltage terminal, G-18, G-19 Main Drive Lithium-ion Battery high-voltage terminal

⚠ DANGER

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Wear the specified protection equipment during the check.***

(1) Shut down the high voltage.
(2) Check that the following terminals are tightened to the specified torque.
  - G-05, G-06 inverter high-voltage terminal
  - G-18, G-19 Main Drive Lithium-ion Battery high-voltage terminal

Q: Is the check result normal?

YES : Go to Step 5.
NO : Tighten the high-voltage terminal to the specified torque.

STEP 5. Check the bus bar in Main Drive Lithium-ion Battery

(1) Main Drive Lithium-ion Battery cover removal and installation (Refer to P.54D-182).
(2) Air duct removal and installation (Refer to P.54D-184).
(3) Pad removal and installation (Refer to P.54D-184).
(4) Check whether the bus bar in the Main Drive Lithium-ion Battery is tightened correctly (Refer to P.54D-185).

Q: Is the check result normal?

YES : Go to Step 6.
NO : Retighten the bus bar in the Main Drive Lithium-ion Battery (Refer to P.54D-185). Then go to Step 7.

STEP 6. Check whether the DTC is stored again

Check again if the DTC is stored in the EMCU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON" position.
(3) Set the electric motor switch to the "START" position, and start the electric motor unit.
(4) Run the vehicle.
(5) Check if the DTC is stored.

Q: Is DTC P0A0D stored?

YES : Replace the inverter. Then go to Step 7.
NO : The diagnosis is complete.

STEP 7. Check whether the DTC is stored again

Check again if the DTC is stored in the EMCU.
(1) Erase the stored DTC.
(2) Set the electric motor switch from the "LOCK" (OFF) position to the "ON" position.
(3) Set the electric motor switch to the "START" position, and start the electric motor unit.
(4) Run the vehicle.
(5) Check if the DTC is stored.

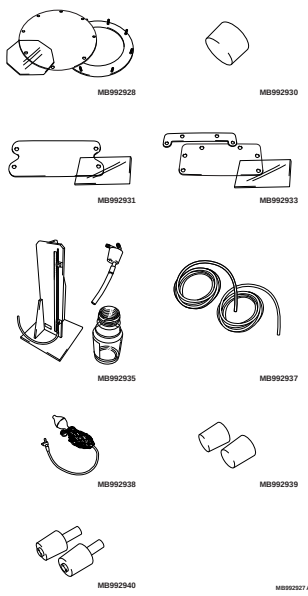
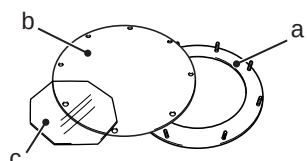
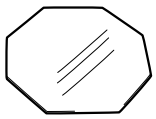
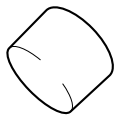
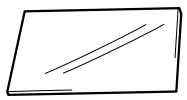
Q: Is DTC P0A0D stored?

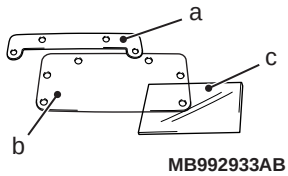
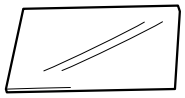
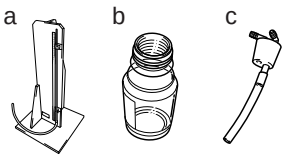
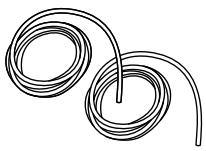
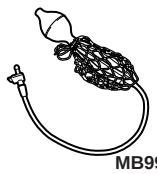
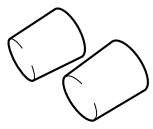
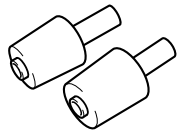
YES : Return to Step 1.
NO : The diagnosis is complete.

BATTERY MANAGEMENT UNIT (BMU) AND MAIN DRIVE LITHIUM-ION BATTERY

SPECIAL TOOLS

M1549400200107

Tool	Tool number and name	Supersession	Application
	MB992927 Battery air leak check tool kit	–	Air leak check of the Main Drive Lithium-ion Battery *NOTE: Air leak check tool set*
 MB992928AB	MB992928 Service plug cover a. Plate A b. Plate B c. Silicone rubber	–	Air leak check of the Main Drive Lithium-ion Battery
 MB992929	MB992929 Service plug gasket	–	Air leak check of the Main Drive Lithium-ion Battery *NOTE: Silicone rubber of special tool service plug cover (MB992928)*
 MB992930	MB992930 Plug (67 – 74)	–	Air leak check of the Main Drive Lithium-ion Battery
 MB992932	MB992932 Duct gasket A	–	Air leak check of the Main Drive Lithium-ion Battery *NOTE: Silicone rubber of special tool dust cover A (MB992931)*

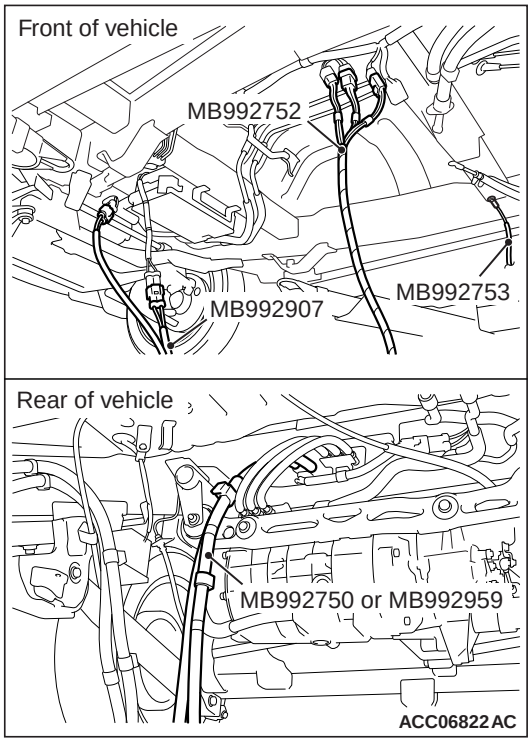
Tool	Tool number and name	Supersession	Application
 MB992933AB	MB992933 Duct cover B a. Plate A b. Plate B c. Silicone rubber	–	Air leak check of the Main Drive Lithium-ion Battery
 MB992934	MB992934 Duct gasket B	–	Air leak check of the Main Drive Lithium-ion Battery *NOTE: Silicone rubber of special tool dust cover B (MB992933)*
 MB992935AB	MB992935 Pressure gauge unit a. Measuring bench b. Bottle c. Rubber plug with nipple	–	Air leak check of the Main Drive Lithium-ion Battery
 MB992936	MB992936 Nipple (29 – 35)	–	Air leak check of the Main Drive Lithium-ion Battery *NOTE: Rubber plug with nipple included in special tool pressure gauge unit (MB992935)*
 MB992937	MB992937 Hose (6)	–	Air leak check of the Main Drive Lithium-ion Battery
 MB992938	MB992938 Air pump	–	Air leak check of the Main Drive Lithium-ion Battery
 MB992939	MB992939 Plug (23 – 27.5)	–	Air leak check of the Main Drive Lithium-ion Battery
 MB992940	MB992940 Nipple (19 – 22)	–	Air leak check of the Main Drive Lithium-ion Battery

RECOMMENDED TOOLS

M1549406200064

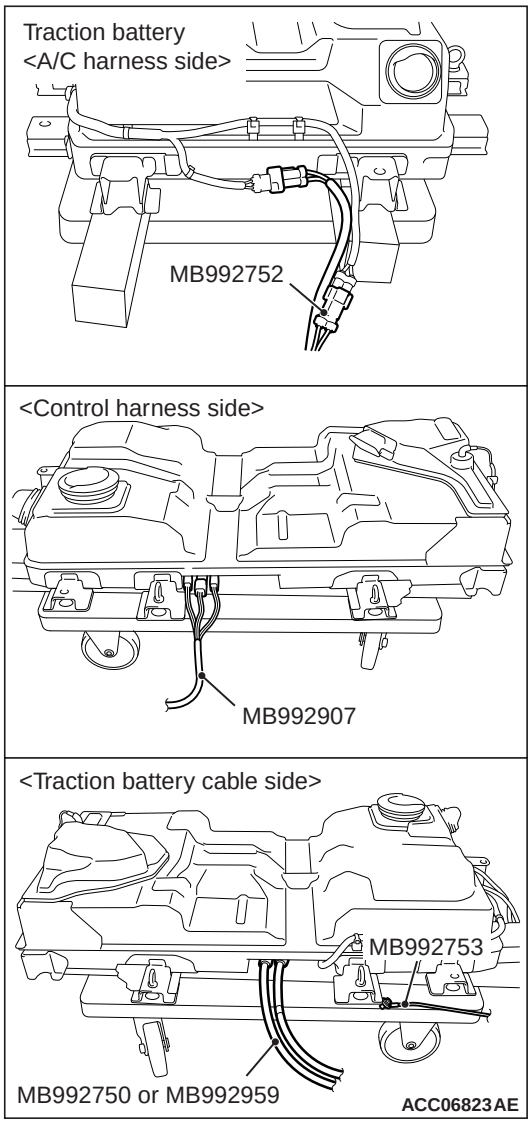
The following recommended tools are necessary when you proceed to the operations following the air leak check without mounting the traction battery after it is disassembled and assembled. If the recommended tools are not available, mount the traction battery before you proceed to the operations following the air leak check.

Number	Name	Use
MB992750	PN line extra harness	Extended wiring harness wires which allow you to perform the following operations without mounting the traction battery. • Numbering the CMU • traction battery capacity measurement
MB992752	Control line extra harness	
MB992753	Ground extra harness	
MB992907	A/C extra harness	



How to use

Use the recommended tools to connect the traction battery to the vehicle as shown.



INSPECTION CHART FOR DIAGNOSTIC TROUBLE CODE

M1549400600398

Code No.	Diagnosis item	Reference page
P1A40	Main Drive Lithium-ion Battery current sensor (high) abnormal	P.54D-81
P1A41	Main Drive Lithium-ion Battery current sensor (low) abnormal	P.54D-85
P1A42	Power supply circuit of Main Drive Lithium-ion Battery current sensor abnormal	P.54D-88
P1A43	Detection circuit of Main Drive Lithium-ion Battery current sensor abnormal	P.54D-91
P1A44	Detecting ground fault	P.54D-94
P1A46	Detection circuit of Main Drive Lithium-ion Battery ground fault detector abnormal	P.54D-108
P1A48	Output circuit of Main Drive Lithium-ion Battery fan abnormal <Vehicles with Main Drive Lithium-ion Battery warming system or quick charging system>	P.54D-122
P1A4B	Voltage of each battery cell abnormal	P.54D-124
P1A52	CMU01 battery cell low voltage abnormal	P.54D-125
P1A53	CMU02 battery cell low voltage abnormal	P.54D-125

Code No.	Diagnosis item	Reference page
P1A54	CMU03 battery cell low voltage abnormal	P.54D-125
P1A55	CMU04 battery cell low voltage abnormal	P.54D-125
P1A56	CMU05 battery cell low voltage abnormal	P.54D-125
P1A57	CMU06 battery cell low voltage abnormal	P.54D-125
P1A58	CMU07 battery cell low voltage abnormal	P.54D-125
P1A59	CMU08 battery cell low voltage abnormal	P.54D-125
P1A5A	CMU09 battery cell low voltage abnormal	P.54D-125
P1A5B	CMU10 battery cell low voltage abnormal	P.54D-125
P1A5C	CMU11 battery cell low voltage abnormal	P.54D-125
P1A5D	CMU12 battery cell low voltage abnormal	P.54D-125
P1A5E	CMU01 battery cell high voltage abnormal	P.54D-127
P1A5F	CMU02 battery cell high voltage abnormal	P.54D-127
P1A60	CMU03 battery cell high voltage abnormal	P.54D-127
P1A61	CMU04 battery cell high voltage abnormal	P.54D-127
P1A62	CMU05 battery cell high voltage abnormal	P.54D-127
P1A63	CMU06 battery cell high voltage abnormal	P.54D-127
P1A64	CMU07 battery cell high voltage abnormal	P.54D-127
P1A65	CMU08 battery cell high voltage abnormal	P.54D-127
P1A66	CMU09 battery cell high voltage abnormal	P.54D-127
P1A67	CMU10 battery cell high voltage abnormal	P.54D-127
P1A68	CMU11 battery cell high voltage abnormal	P.54D-127
P1A69	CMU12 battery cell high voltage abnormal	P.54D-127
P1A6A	CMU01 module temperature abnormal (high input)	P.54D-128
P1A6B	CMU02 module temperature abnormal (high input)	P.54D-128
P1A6C	CMU03 module temperature abnormal (high input)	P.54D-128
P1A6D	CMU04 module temperature abnormal (high input)	P.54D-128
P1A6E	CMU05 module temperature abnormal (high input)	P.54D-128
P1A6F	CMU06 module temperature abnormal (high input)	P.54D-128
P1A70	CMU07 module temperature abnormal (high input)	P.54D-128
P1A71	CMU08 module temperature abnormal (high input)	P.54D-128
P1A72	CMU09 module temperature abnormal (high input)	P.54D-128
P1A73	CMU10 module temperature abnormal (high input)	P.54D-128
P1A74	CMU11 module temperature abnormal (high input)	P.54D-128
P1A75	CMU12 module temperature abnormal (high input)	P.54D-128
P1A76	CMU01 battery cell voltage sensor abnormal	P.54D-130
P1A77	CMU02 battery cell voltage sensor abnormal	P.54D-130
P1A78	CMU03 battery cell voltage sensor abnormal	P.54D-130

Code No.	Diagnosis item	Reference page
P1A79	CMU04 battery cell voltage sensor abnormal	P.54D-130
P1A7A	CMU05 battery cell voltage sensor abnormal	P.54D-130
P1A7B	CMU06 battery cell voltage sensor abnormal	P.54D-130
P1A7C	CMU07 battery cell voltage sensor abnormal	P.54D-130
P1A7D	CMU08 battery cell voltage sensor abnormal	P.54D-130
P1A7E	CMU09 battery cell voltage sensor abnormal	P.54D-130
P1A7F	CMU10 battery cell voltage sensor abnormal	P.54D-130
P1A80	CMU11 battery cell voltage sensor abnormal	P.54D-130
P1A81	CMU12 battery cell voltage sensor abnormal	P.54D-130
P1A82	CMU01 module temperature sensor abnormal	P.54D-132
P1A83	CMU02 module temperature sensor abnormal	P.54D-132
P1A84	CMU03 module temperature sensor abnormal	P.54D-132
P1A85	CMU04 module temperature sensor abnormal	P.54D-132
P1A86	CMU05 module temperature sensor abnormal	P.54D-132
P1A87	CMU06 module temperature sensor abnormal	P.54D-132
P1A88	CMU07 module temperature sensor abnormal	P.54D-132
P1A89	CMU08 module temperature sensor abnormal	P.54D-132
P1A8A	CMU09 module temperature sensor abnormal	P.54D-132
P1A8B	CMU10 module temperature sensor abnormal	P.54D-132
P1A8C	CMU11 module temperature sensor abnormal	P.54D-132
P1A8D	CMU12 module temperature sensor abnormal	P.54D-132
P1A8E	CMU01 balancer abnormal	P.54D-133
P1A8F	CMU02 balancer abnormal	P.54D-133
P1A90	CMU03 balancer abnormal	P.54D-133
P1A91	CMU04 balancer abnormal	P.54D-133
P1A92	CMU05 balancer abnormal	P.54D-133
P1A93	CMU06 balancer abnormal	P.54D-133
P1A94	CMU07 balancer abnormal	P.54D-133
P1A95	CMU08 balancer abnormal	P.54D-133
P1A96	CMU09 balancer abnormal	P.54D-133
P1A97	CMU10 balancer abnormal	P.54D-133
P1A98	CMU11 balancer abnormal	P.54D-133
P1A99	CMU12 balancer abnormal	P.54D-133
P1A9A	CMU ID auto numbering error	P.54D-135
P1A9B	Change ID (CMU01)	P.54D-136
P1A9C	Change ID (CMU02)	P.54D-136
P1A9D	Change ID (CMU03)	P.54D-136

Code No.	Diagnosis item	Reference page
P1A9E	Change ID (CMU04)	P.54D-136
P1A9F	Change ID (CMU05)	P.54D-136
P1AA0	Change ID (CMU06)	P.54D-136
P1AA1	Change ID (CMU07)	P.54D-136
P1AA2	Change ID (CMU08)	P.54D-136
P1AA3	Change ID (CMU09)	P.54D-136
P1AA4	Change ID (CMU10)	P.54D-136
P1AA5	Change ID (CMU11)	P.54D-136
P1AA6	Change ID (CMU12)	P.54D-136
P1AA8	Local CAN (for Main Drive Lithium-ion Battery) signal time-out	P.54D-137
P1AA9	Cell number mismatch	P.54D-140
P1AAB	Numbers of cells abnormal	P.54D-137
P1AB5	CMU01 module temperature abnormal (low input)	P.54D-142
P1AB6	CMU02 module temperature abnormal (low input)	P.54D-142
P1AB7	CMU03 module temperature abnormal (low input)	P.54D-142
P1AB8	CMU04 module temperature abnormal (low input)	P.54D-142
P1AB9	CMU05 module temperature abnormal (low input)	P.54D-142
P1ABA	CMU06 module temperature abnormal (low input)	P.54D-142
P1ABB	CMU07 module temperature abnormal (low input)	P.54D-142
P1ABC	CMU08 module temperature abnormal (low input)	P.54D-142
P1ABD	CMU09 module temperature abnormal (low input)	P.54D-142
P1ABE	CMU10 module temperature abnormal (low input)	P.54D-142
P1ABF	CMU11 module temperature abnormal (low input)	P.54D-142
P1AC0	CMU12 module temperature abnormal (low input)	P.54D-142
P1AC1	Main Drive Lithium-ion Battery cooling fan failed (driving abnormal) <Vehicles with Main Drive Lithium-ion Battery warming system or quick charging system>	P.54D-144
P1AC2	Main Drive Lithium-ion Battery cooling fan failed (short circuits to power supply system) <Vehicles with Main Drive Lithium-ion Battery warming system or quick charging system>	P.54D-149
P1AC3	Main Drive Lithium-ion Battery cooling fan failed (stop abnormal) <Vehicles with Main Drive Lithium-ion Battery warming system or quick charging system>	P.54D-154
U1082	Local CAN (for Main Drive Lithium-ion Battery) bus off	P.54D-156
U11A0	CMU01 time-out	P.54D-159
U11A1	CMU02 time-out	P.54D-159
U11A2	CMU03 time-out	P.54D-159
U11A3	CMU04 time-out	P.54D-159
U11A4	CMU05 time-out	P.54D-159

Code No.	Diagnosis item	Reference page
U11A5	CMU06 time-out	P.54D-159
U11A6	CMU07 time-out	P.54D-159
U11A7	CMU08 time-out	P.54D-159
U11A8	CMU09 time-out	P.54D-159
U11A9	CMU10 time-out	P.54D-159
U11AA	CMU11 time-out	P.54D-159
U11AB	CMU12 time-out	P.54D-159
U1925	CMU ID numbering reception error	P.54D-165

DIAGNOSTIC CODE PROCEDURES

Code No. P1A40: Main Drive Lithium-ion Battery Current Sensor (high) Abnormal

TROUBLE JUDGMENT

Check Conditions

- The electric motor switch is at "ON" position or while the Main Drive Lithium-ion Battery is charged.
- The following diagnostic trouble code is not stored.
  a. P1A42: Power supply circuit of Main Drive Lithium-ion Battery current sensor abnormal

Judgment Criterion

- The output voltage of the Main Drive Lithium-ion Battery current sensor (high) is less than 0.2 V.

or

- The output voltage of the Main Drive Lithium-ion Battery current sensor (high) is more than 4.8 V.

FAIL-SAFE AND BACKUP FUNCTION

- Turn off the balancer drive.

PROBABLE CAUSES

- The Main Drive Lithium-ion Battery current sensor is failed.
- Open circuits of Main Drive Lithium-ion Battery current sensor circuit, short circuits to ground, short circuits to power supply system or damage; poor contact of connector.
- The BMU is failed.

DIAGNOSIS

STEP 1. Connector check: C-26 Main Drive Lithium-ion Battery connector

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the connector.

STEP 2. Check the Main Drive Lithium-ion Battery current sensor itself

- Check the Main Drive Lithium-ion Battery current sensor itself (Refer to P.54D-174).

Q: Is the check result normal?

YES : Go to Step 6.
NO : Go to Step 3.

STEP 3. Connector check: C-26 Main Drive Lithium-ion Battery connector, current sensor connector

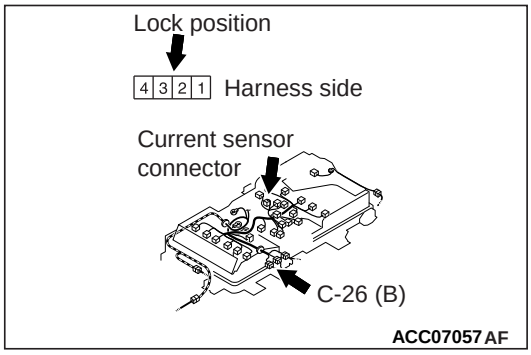
Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

YES : Go to Step 4.
NO : Repair the connector.

STEP 4. Check the wiring harness between C-26 (terminal No. 3, 2, 8, 7) Main Drive Lithium-ion Battery connector and current sensor (terminal No. 1, 2, 3, 4) connector

Check out signal line for open circuit.



Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Check the current sensor in Main Drive Lithium-ion Battery

(1) Removal the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-206).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Replace the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-195).

STEP 6. Perform resistance measurement at C-26 Main Drive Lithium-ion Battery connector

- Disconnect connector, and measure at harness side.
- Resistance between terminal No. 8 and ground.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 10.
NO : Go to Step 7.

STEP 7. Connector check: C-109 BMU connector

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the connector.

STEP 8. Check the wiring harness between C-26 (terminal No. 8) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 42) BMU connector

- Check grounding line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the wiring harness.

STEP 9. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 10. Connector check: C-109 BMU connector

Q: Is the check result normal?

YES : Go to Step 11.
NO : Repair the connector.

STEP 11. Check the wiring harness between C-26 (terminal No. 2) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 31) BMU connector

- Check the power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 12.
NO : Repair the wiring harness.

STEP 12. Perform voltage measurement at C-109 BMU connector

- Measure BMU terminal voltage
- Disconnect C-26 Main Drive Lithium-ion Battery connector
- Electric motor switch: ON
- Voltage between terminal No. 32 and ground.

OK: 0 – 0.1 V

Q: Is the check result normal?

YES : Go to Step 13.

NO : Check and repair harness between C-109 (terminal No. 32) BMU connector and C-26 (terminal No. 3) Main Drive Lithium-ion Battery connector.

- Check output line for short circuit to power supply.

STEP 13. Check the wiring harness between C-26 (terminal No. 3) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 32) BMU connector

- Check output line for open circuit, short circuit to ground and damage.

Q: Is the check result normal?

YES : Go to Step 14.

NO : Repair the wiring harness.

STEP 14. Perform resistance measurement at C-26 Main Drive Lithium-ion Battery connector

- Disconnect the connector, and measure at the wiring harness side.
- Resistance between terminal No. 6 and ground.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 16.

NO : Go to Step 15.

STEP 15. Check the wiring harness between C-26 (terminal No. 6) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 43) BMU connector

- Check the shield line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 9.

NO : Repair the wiring harness.

STEP 16. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

Code No. P1A41: Main Drive Lithium-ion Battery Current Sensor (low) Abnormal

TROUBLE JUDGMENT

Check Conditions

- The electric motor switch is "ON" position or while the Main Drive Lithium-ion Battery is charged.
- The following diagnostic trouble code is not stored.
  a. P1A42: Power supply circuit of Main Drive Lithium-ion Battery current sensor abnormal

Judgment Criterion

- The output voltage of the Main Drive Lithium-ion Battery current sensor (low) is less than 0.2 V.

or

- The output voltage of the Main Drive Lithium-ion Battery current sensor (low) is more than 4.8 V.

FAIL-SAFE AND BACKUP FUNCTION

- Use the Main Drive Lithium-ion Battery current sensor (high) to control and turn off the balancer drive when the Main Drive Lithium-ion Battery current sensor (high) is normal.

PROBABLE CAUSES

- The Main Drive Lithium-ion Battery current sensor is failed.
- Open circuits of Main Drive Lithium-ion Battery current sensor circuit, short circuits to ground, short circuits to power supply system or damage; poor contact of connector.
- The BMU is failed.

DIAGNOSIS

STEP 1. Connector check: C-26 Main Drive Lithium-ion Battery connector

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the connector.

STEP 2. Check the Main Drive Lithium-ion Battery current sensor itself

- Check the Main Drive Lithium-ion Battery current sensor itself (Refer to P.54D-174).

Q: Is the check result normal?

YES : Go to Step 6.
NO : Go to Step 3.

STEP 3. Connector check: C-26 Main Drive Lithium-ion Battery connector, current sensor connector

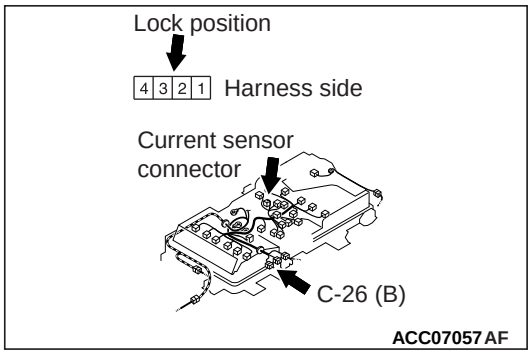
Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

YES : Go to Step 4.
NO : Repair the connector.

STEP 4. Check the wiring harness between C-26 (terminal No. 3, 2, 8, 7) Main Drive Lithium-ion Battery connector and current sensor (terminal No. 1, 2, 3, 4) connector

Check out signal line for open circuit.



Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Check the current sensor in Main Drive Lithium-ion Battery

(1) Removal the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-206).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Replace the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-195).

STEP 6. Perform resistance measurement at C-26 Main Drive Lithium-ion Battery connector

- Disconnect the connector, and measure at the wiring harness side.
- Resistance between terminal No. 8 and ground.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 10.
NO : Go to Step 7.

STEP 7. Connector check: C-109 BMU connector

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the connector.

STEP 8. Check the wiring harness between C-26 (terminal No. 8) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 42) BMU connector

- Check grounding line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the wiring harness.

STEP 9. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 10. Connector check: C-109 BMU connector

Q: Is the check result normal?

YES : Go to Step 11.
NO : Repair the connector.

STEP 11. Check the wiring harness between C-26 (terminal No. 2) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 31) BMU connector

- Check the power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 12.
NO : Repair the wiring harness.

STEP 12. Perform voltage measurement at C-109 BMU connector

- Measure BMU terminal voltage
- Disconnect C-26 Main Drive Lithium-ion Battery connector
- Electric motor switch: ON
- Voltage between terminal No. 33 and ground.

  OK: 0 – 0.1 V

Q: Is the check result normal?

YES : Go to Step 13.
NO : Check and repair harness between C-109 (terminal No. 33) BMU connector and C-26 (terminal No. 7) Main Drive Lithium-ion Battery connector.
- Check output line for short circuit to power supply.

STEP 13. Check the wiring harness between C-26 (terminal No. 7) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 33) BMU connector

- Check output line for open circuit, short circuit to ground and damage.

Q: Is the check result normal?

YES : Go to Step 14.
NO : Repair the wiring harness.

STEP 14. Perform resistance measurement at C-26 Main Drive Lithium-ion Battery connector

- Disconnect the connector, and measure at the wiring harness side.
- Resistance between terminal No. 6 and ground.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 16.
NO : Go to Step 15.

STEP 15. Check the wiring harness between C-26 (terminal No. 6) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 43) BMU connector

- Check the shield line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the wiring harness.

STEP 16. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

Code No. P1A42: Power Supply Circuit Of Main Drive Lithium-ion Battery Current Sensor Abnormal

TROUBLE JUDGMENT

Check Condition

- The electric motor switch is at "ON" position or while the Main Drive Lithium-ion Battery is charged.

Judgment Criterion

- The power supply voltage of the Main Drive Lithium-ion Battery current sensor is more than 5.3 V.

or

- The power supply voltage of the Main Drive Lithium-ion Battery current sensor is less than 4.7 V.

FAIL-SAFE AND BACKUP FUNCTION

- Turn off the balancer drive.

PROBABLE CAUSES

- The Main Drive Lithium-ion Battery current sensor is failed.
- Open circuits of Main Drive Lithium-ion Battery current sensor circuit, short circuits to ground or damage; poor contact of connector.
- The BMU is failed.

DIAGNOSIS

STEP 1. Connector check: C-26 Main Drive Lithium-ion Battery connector

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the connector.

STEP 2. Perform voltage measurement at C-26 Main Drive Lithium-ion Battery connector

- Disconnect the connector, and measure at the wiring harness side.
- Electric motor switch: ON
- Voltage between terminal No. 2 and ground.

OK: 4.75 – 5.25 V

Q: Is the check result normal?

YES : Go to Step 6.
NO : Go to Step 3.

STEP 3. Connector check: C-109 BMU connector

Q: Is the check result normal?

YES : Go to Step 4.
NO : Repair the connector.

STEP 4. Check the wiring harness between C-26 (terminal No. 2) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 31) BMU connector

- Check power supply line for open circuit, short circuit to ground.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 6. Check the Main Drive Lithium-ion Battery current sensor itself

- Check the Main Drive Lithium-ion Battery current sensor itself (Refer to P.54D-174).

Q: Is the check result normal?

YES : Go to Step 10.
NO : Go to Step 7.

STEP 7. Connector check: C-26 Main Drive Lithium-ion Battery connector, current sensor connector

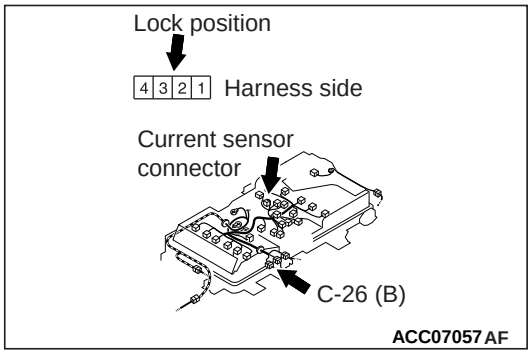
Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the connector.

STEP 8. Check the wiring harness between C-26 (terminal No. 3, 2, 8, 7) Main Drive Lithium-ion Battery connector and current sensor (terminal No. 1, 2, 3, 4) connector

Check out signal line for open circuit.



Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the wiring harness.

STEP 9. Check the current sensor in Main Drive Lithium-ion Battery

(1) Removal the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-206).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Replace the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-195).

STEP 10. Check the wiring harness between C-26 (terminal No. 2) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 31) BMU connector

- Check the power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the wiring harness.

Code No. P1A43: Detection Circuit Of Main Drive Lithium-ion Battery Current Sensor Abnormal

TROUBLE JUDGMENT

Check Conditions

- The electric motor switch is "ON" position or while the Main Drive Lithium-ion Battery starts to be charged.
- The control value of the Main Drive Lithium-ion Battery current sensor (high) is more than −20 A and less than 20 A.
- Either one of the following diagnostic trouble codes is not stored.
  a. P1A42: Power supply circuit of Main Drive Lithium-ion Battery current sensor abnormal
  b. P1A40: Main Drive Lithium-ion Battery current sensor (high) abnormal
  c. P1A41: Main Drive Lithium-ion Battery current sensor (low) abnormal

Judgment Criterion

- The difference is more than 10 A between the control value of the Main Drive Lithium-ion Battery current sensor (high) and the control value of the Main Drive Lithium-ion Battery current sensor (low).

Check Conditions

- The electric motor switch is "ON" position or while the Main Drive Lithium-ion Battery starts to be charged.
- Either one of the following diagnostic trouble codes is not stored.
  a. P1A42: Power supply circuit of Main Drive Lithium-ion Battery current sensor abnormal
  b. P1A40: Main Drive Lithium-ion Battery current sensor (high) abnormal
  c. P1A41: Main Drive Lithium-ion Battery current sensor (low) abnormal

Judgment Criterion

- The output voltage of the Main Drive Lithium-ion Battery current sensor (high) is less than 0.3 V.

or

- The output voltage of the Main Drive Lithium-ion Battery current sensor (high) is more than 4.7 V.

FAIL-SAFE AND BACKUP FUNCTION

- Turn off the balancer drive.

PROBABLE CAUSES

- The Main Drive Lithium-ion Battery current sensor is failed.
- Damage of Main Drive Lithium-ion Battery current sensor circuit; poor contact of connector.
- The BMU is failed.

DIAGNOSIS

STEP 1. Scan tool MB991958 data list

- Refer to Data List Reference Table.
  a. Item 12: electric current
  b. Item 13: Main Drive Lithium-ion Battery current sensor (high) control value
  c. Item 14: Main Drive Lithium-ion Battery current sensor (low) control value

Q: Are all check results normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Go to Step 2.

STEP 2. Connector check: C-26 Main Drive Lithium-ion Battery connector

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the connector.

STEP 3. Check the Main Drive Lithium-ion Battery current sensor itself

- Check the Main Drive Lithium-ion Battery current sensor itself (Refer to P.54D-174).

Q: Is the check result normal?

YES : Go to Step 7.
NO : Go to Step 4.

STEP 4. Connector check: C-26 Main Drive Lithium-ion Battery connector, current sensor connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

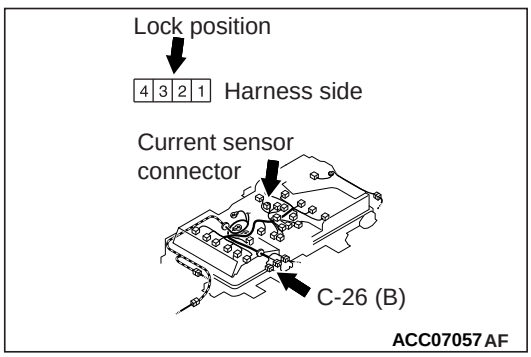
YES : Go to Step 5.
NO : Repair the connector.

STEP 5. Check the wiring harness between C-26 (terminal No. 3, 2, 8, 7) Main Drive Lithium-ion Battery connector and current sensor (terminal No. 1, 2, 3, 4) connector

Check out signal line for open circuit.

Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the wiring harness.



STEP 6. Check the current sensor in Main Drive Lithium-ion Battery

(1) Removal the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-206).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Replace the current sensor in Main Drive Lithium-ion Battery (Refer to P.54D-195).

STEP 7. Connector check: C-109 BMU connector

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the connector.

STEP 8. Check the wiring harness between C-26 (terminal No. 7) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 33) BMU connector

- Check signal line for damage.

Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the wiring harness.

STEP 9. Check the wiring harness between C-26 (terminal No. 3) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 32) BMU connector

- Check signal line for damage.

Q: Is the check result normal?

YES : Go to Step 10.
NO : Repair the wiring harness.

STEP 10. Perform resistance measurement at C-26 Main Drive Lithium-ion Battery connector

- Disconnect the connector, and measure at the wiring harness side.
- Resistance between terminal No. 6 and ground.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 12.
NO : Go to Step 11.

STEP 11. Check the wiring harness between C-26 (terminal No. 6) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 43) BMU connector

- Check the shield line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 12.
NO : Repair the wiring harness.

STEP 12. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

Code No. P1A44: Detecting Ground Fault

TROUBLE JUDGMENT

Check Conditions

- 3.5 seconds elapse after the electric motor switch is turned ON, or 2 seconds elapse after the traction battery starts to be charged.
- Not during the pre-check operation.
- Not during the quick charge.

Judgment Criterion

- For more than 5 seconds, ground fault is detected.

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSES

- Ground fault of high voltage system component
- Malfunction of the quick charging relay
- The quick charging contactor (+) or the quick charging contactor (–) is stuck in ON.
- The BMU is failed.

DIAGNOSIS

⚠ ***DANGER***

- ***When high voltage system components are serviced, be sure to pull service plugs to shut down high voltage.***
- ***When pulling service plugs, wear the specified protective equipment.***

STEP 1. Use scan tool MB991958 to confirm a diagnostic trouble code

- Electric motor switch: 20 seconds elapse after ON
- Select lever position: P range

Q: Is the diagnostic trouble code stored?

YES : If the diagnostic trouble code is stored during the electric motor switch ON, the ground fault could occur inside the traction battery. Then go to Step 2.

NO : Go to Step 7.

STEP 2. Check the service plug for the insulation resistance

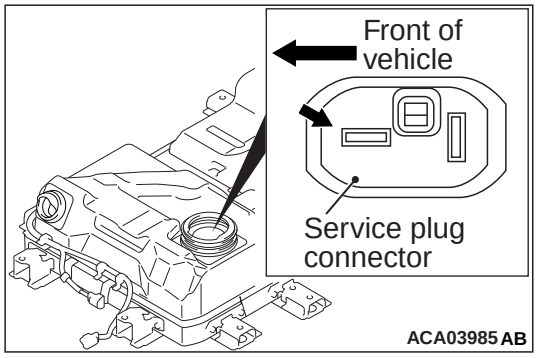
⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

⚠ **CAUTION**

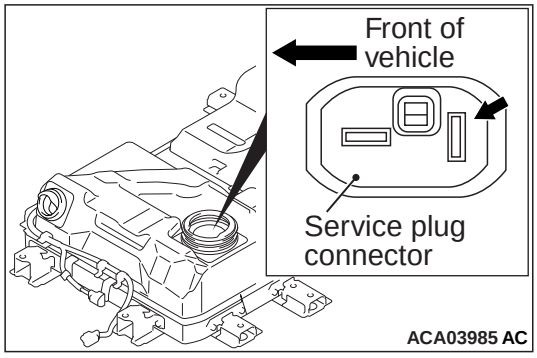
When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between service plug forward terminal and ground.



- Insulation resistance between service plug backward terminal and ground.

  OK: 10 MΩ or more



Q: Is the check result normal?

YES : Go to Step 6.
NO : Go to Step 3.

STEP 3. Check the service plug for the insulation resistance

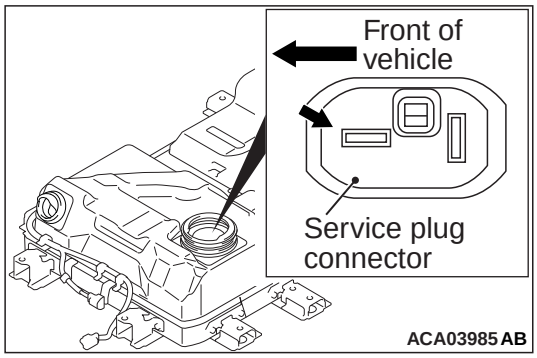
⚠ *DANGER*

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

⚠ CAUTION

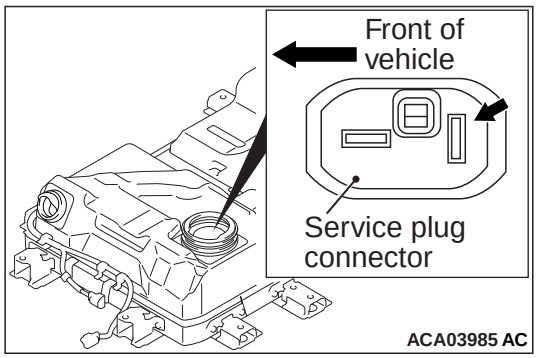
When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Removal the each contactor (Refer to P.54D-176).
- Insulation resistance between service plug forward terminal and traction battery mounting.



- Insulation resistance between service plug backward terminal and traction battery mounting.

  OK: 10 MΩ or more



Q: Is the check result normal?

YES : Check the each contactor (Refer to P.54D-204).
NO : Go to Step 4.

STEP 4. Check the service plug for the insulation resistance

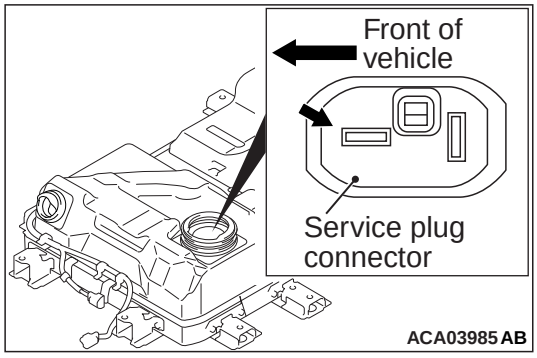
⚠ *DANGER*

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

⚠ CAUTION

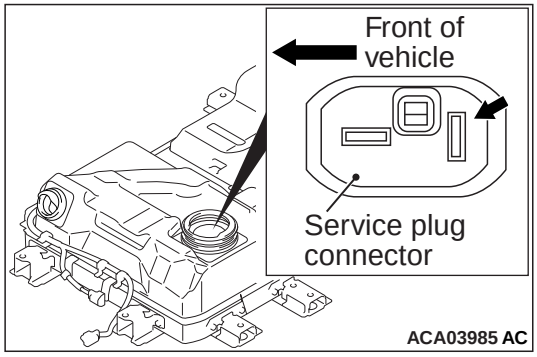
When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Removal the resistor (Refer to P.54D-176).
- Insulation resistance between service plug forward terminal and traction battery mounting.



- Insulation resistance between service plug backward terminal and traction battery mounting.

  OK: 10 MΩ or more



Q: Is the check result normal?

YES : Check the resistor (Refer to P.54D-206).
NO : Go to Step 5.

STEP 5. Check the service plug for the insulation resistance

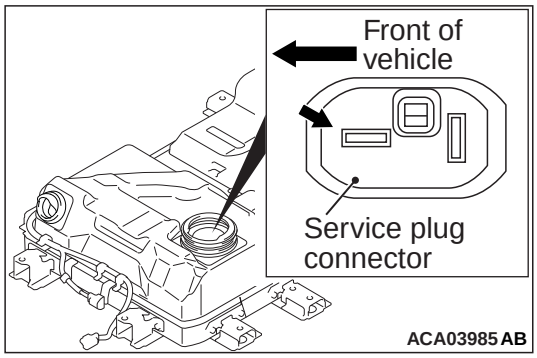
⚠ *DANGER*

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

⚠ CAUTION

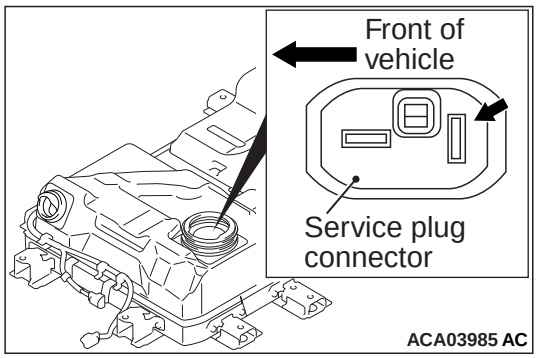
When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Remove the bus bar (Refer to P.54D-176).
- Insulation resistance between service plug forward terminal and traction battery mounting.



- Insulation resistance between service plug backward terminal and traction battery mounting.

  OK: 10 MΩ or more



Q: Is the check result normal?

YES : heck to tighten the bus bar in the traction battery.
NO : Go to Step 6.

STEP 6. Use scan tool MB991958 to check diagnostic trouble code related to the other systems

Check if the diagnostic trouble code is stored in the BMU.

Q: Is the diagnostic trouble code stored?

YES : Carry out troubleshooting for the diagnostic trouble code.
NO : Go to Step 7.

STEP 7. Use scan tool MB991958 diagnostic trouble code

- During the quick charging.

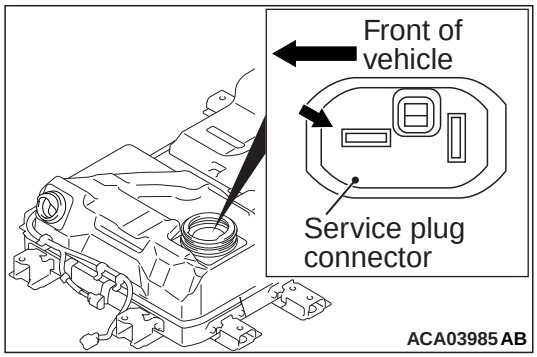
Q: Is the diagnostic trouble code stored?

YES : Go to Step 8.
NO : Go to Step 11.

STEP 8. Voltage measurement at G-01 EV charger cable (quick charging) connector, service plug

⚠ DANGER

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***



Using a high voltage multimeter, measure the high voltage between the G-01 EV charger cable (quick charging) connection terminal and service plug forward terminal.

OK: Approximately 0 V

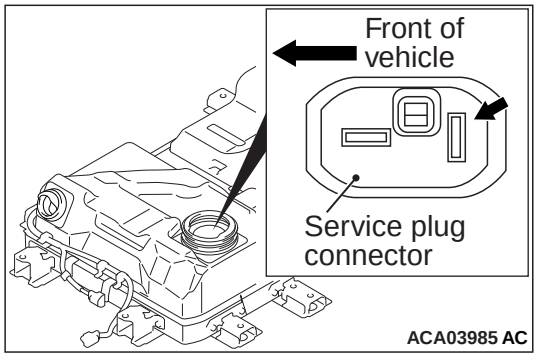
Q: Is the check result normal?

YES : Go to Step 9.
NO : Go to Step 10.

STEP 9. Voltage measurement at G-02 EV charger cable (quick charging) connector, service plug connector

⚠ DANGER

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***



Using a high voltage multimeter, measure the high voltage between the G-02 EV charger cable (quick charging) connection terminal and service plug connection backward terminal.

OK: Approximately 0 V

Q: Is the check result normal?

YES : Go to Step 11.
NO : Go to Step 10.

STEP 10. Check the quick charge contactor (+) or (–)

(1) Removal the quick charge contactor (+) or (–) in traction battery (Refer to P.54D-176).
(2) Check the quick charge contactor (+) or (–) in traction battery (Refer to P.54D-204).

Q: Is the check result normal?

YES : Go to Step 11.
NO : Replace the quick charge contactor (+) or (–) in traction battery (Refer to P.54D-198).

STEP 11. Use scan tool MB991958 diagnostic trouble code

- Select lever position: P range
- A/C switch: OFF
- Electric motor switch: Turn the switch to the LOCK or ACC position. Then wait for 20 seconds, and turn it to the START position further (the READY indicator will illuminate).

Q: Is the diagnostic trouble code stored?

YES : Go to Step 25.
NO : Go to Step 12.

STEP 12. Use scan tool MB991958 diagnostic trouble code

- Electric motor switch: Turn the switch to the LOCK or ACC position. Then wait for 20 seconds, and turn it to the START position further (the READY indicator will illuminate).
- Select lever position: D range

Q: Is the diagnostic trouble code stored?

YES : Go to Step 13.
NO : Go to Step 21.

STEP 13. Connector check: G-07 inverter (U terminal) connector, G-08 inverter (V terminal) connector, G-09 inverter (W terminal) connector

⚠ ***DANGER***

- ***When high voltage system components are serviced, be sure to pull service plugs to shut down high voltage before serving.***
- ***When pulling service plugs, wear the specified protective equipment.***

Q: Is the check result normal?

YES : Go to Step 14.
NO : Repair the connector.

STEP 14. Check the G-07 inverter (U terminal) connector, G-08 inverter (V terminal) connector and G-09 inverter (W terminal) connector for the insulation resistance

⚠ **CAUTION**

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Disconnect the connector, and measure at the wiring harness side.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and ground.

  OK: 10 MΩ or more

Q: Is the check result normal?

YES : Check the inverter for the insulation resistance.
NO : Go to Step 15.

STEP 15. Connector check: G-16 motor (electric motor unit: U terminal) connector

Q: Is the check result normal?

YES : Go to Step 16.
NO : Repair the connector.

STEP 16. Check the G-07 inverter (U terminal) connector for the insulation resistance

⚠ CAUTION
When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Disconnect the connector, and measure at the wiring harness side.
- Disconnect G-16 motor (electric motor unit: U terminal) connector.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and the cable shield ground (mounting bracket).

OK: 10 MΩ or more

Q: Is the check result normal?

YES : Go to Step 17.
NO : Replace the wiring harness between G-07 inverter (U terminal) connector and G-16 motor (electric motor unit: U terminal) connector.

STEP 17. Connector check: G-15 motor (electric motor unit: V terminal) connector

Q: Is the check result normal?

YES : Go to Step 18.
NO : Repair the connector.

STEP 18. Check the G-08 inverter (V terminal) connector for the insulation resistance

⚠ CAUTION

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Disconnect the connector, and measure at the wiring harness side.
- Disconnect G-15 motor (electric motor unit: V terminal) connector.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and the cable shield ground (mounting bracket).

OK: 10 MΩ or more

Q: Is the check result normal?

YES : Go to Step 19.

NO : Replace the wiring harness between G-08 inverter (W terminal) connector and G-15 motor (electric motor unit: V terminal) connector.

STEP 19. Connector check: G-14 motor (electric motor unit: W terminal) connector

Q: Is the check result normal?

YES : Go to Step 20.

NO : Repair the connector.

STEP 20. Check the G-09 inverter (W terminal) connector for the insulation resistance

⚠ CAUTION

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Disconnect the connector, and measure at the wiring harness side.
- Disconnect G-14 motor (electric motor unit: W terminal) connector.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and the cable shield ground (mounting bracket).

OK: 10 MΩ or more

Q: Is the check result normal?

YES : Check the motor (electric motor unit) for the insulation resistance.

NO : Replace the wiring harness between G-09 inverter (W terminal) connector and G-14 motor (electric motor unit: W terminal) connector.

STEP 21. Use scan tool MB991958 diagnostic trouble code

- Electric motor switch: READY
- A/C set temperature: minimum temperature
- A/C switch: ON
- MAX switch: ON

Q: Is the diagnostic trouble code stored?

YES : Go to Step 22.
NO : Go to Step 23.

STEP 22. After replacing the A/C refrigerant and the compressor oil, check the diagnostic trouble code again

- Electric motor switch: READY
- A/C set temperature: minimum temperature
- A/C switch: ON
- MAX switch: ON

Q: Is the diagnostic trouble code stored?

YES : Replace the A/C compressor.
NO : Check is complete.

STEP 23. Use scan tool MB991958 diagnostic trouble code

- Electric motor switch: READY
- A/C set temperature: maximum temperature
- MAX switch: ON

Q: Is the diagnostic trouble code stored?

YES : Replace the electric hot water heater.
NO : Go to Step 24.

STEP 24. Use scan tool MB991958 diagnostic trouble code

NOTE: Turn the electric motor switch "ON" position and connect the charging cable. Then turning the electric motor switch "LOCK" (OFF) position can check the monitor during the regular charging.

- Electric motor switch: "LOCK" (OFF)
- During the regular charging

Q: Is the diagnostic trouble code stored?

YES : Replace the on-board charger/DC-DC converter.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 25. Check the G-05 inverter (− terminal) connector or the G-06 inverter (+ terminal) connector for the insulation resistance

⚠ ***DANGER***

- ***When high voltage system components are serviced, be sure to pull service plugs to shut down high voltage before serving.***
- ***When pulling service plugs, wear the specified protective equipment.***

⚠ **CAUTION**

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Measure the insulation resistance with the connector connected.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and ground.

  OK: 10 MΩ or more

Q: Is the check result normal?

YES : Check the traction battery ground fault detector circuit (Refer to Code No. P1A46: Detection circuit of traction battery ground fault detector abnormal P.54D-108).

NO : Go to Step 26.

STEP 26. Check the G-05 inverter (− terminal) connector or the G-06 inverter (+ terminal) connector for the insulation resistance

⚠ **CAUTION**

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Measure the insulation resistance with the connector connected.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and ground.

Q: When the G-20 A/C compressor connector is disconnected, does the insulation resistance change by the value more than 10 MΩ?

YES : The A/C compressor could have ground fault. Check the A/C compressor for the insulation resistance.

NO : Go to Step 27.

STEP 27. Check the G-05 inverter (− terminal) connector or the G-06 inverter (+ terminal) connector for the insulation resistance

⚠ CAUTION

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Measure the insulation resistance with the connector connected.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and ground.

Q: When the G-21 heater connector is disconnected, does the insulation resistance change by the value more than 10 MΩ?

YES : The heater could have ground fault. Check the heater for the insulation resistance.

NO : Go to Step 28.

STEP 28. Check the G-05 inverter (− terminal) connector or G-06 inverter (+ terminal) connector for the insulation resistance

⚠ CAUTION

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Measure the insulation resistance with the connector connected.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and ground.

Q: When the G-05 inverter (− terminal) connector and the G-06 inverter (+ terminal) connector are disconnected, does the insulation resistance change by the value more than 10 MΩ?

YES : Go to Step 29.

NO : Go to Step 32.

STEP 29. Connector check: G-18 traction battery connector, G-19 traction battery connector

Q: Is the check result normal?

YES : Go to Step 30.

NO : Repair the connector.

STEP 30. Check the G-05 inverter (− terminal) connector for the insulation resistance

⚠ CAUTION

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Disconnect the connector, and measure at the wiring harness side.
- Disconnect G-18 traction battery connector.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and the cable shield ground (mounting bracket).

OK: 10 MΩ or more

Q: Is the check result normal?

YES : Go to Step 31.

NO : Replace the wiring harness between G-05 inverter (− terminal) connector and G-18 traction battery connector.

STEP 31. Check the G-06 inverter (+ terminal) connector for the insulation resistance

⚠ CAUTION

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Disconnect the connector, and measure at the wiring harness side.
- Disconnect G-19 traction battery connector.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and the cable shield ground (mounting bracket).

OK: 10 MΩ or more

Q: Is the check result normal?

YES : Check if diagnostic trouble codes of CMU relation is stored.

NO : Replace the wiring harness between G-06 inverter (+ terminal) connector and G-19 traction battery connector.

STEP 32. Check the G-05 inverter (− terminal) connector or the G-06 inverter (+ terminal) connector for the insulation resistance

⚠ CAUTION

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Measure the insulation resistance with the connector connected.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and ground.

Q: When the G-13 on-board charger/DC-DC converter connector is disconnected, does the insulation resistance changes by the value more than 10 MΩ.

YES : The on-board charger/DC-DC converter could have ground fault. Check the on-board charger/DC-DC converter for the insulation resistance.

NO : Go to Step 33.

STEP 33. After replacing the inverter, reconfirm the scan tool MB991958 diagnostic trouble code

- Recheck if the diagnostic trouble code is stored again after checking the inverter for the insulation resistance.

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.

NO : Check is end.

Code No. P1A46: Detection Circuit Of Traction Battery Ground Fault Detector Abnormal

TROUBLE JUDGMENT

Check Conditions

- 3.5 seconds elapse after the electric motor switch is turned ON, or 2 seconds elapse after the traction battery starts to be charged.
- Not while ground fault is prevented from being detected (not during the quick charge).

Judgment Criterion

- If the traction battery ground fault detector input is not turned ON within 5.5 seconds after the pre-check signal is turned ON from OFF.

or

- If the traction battery ground fault detector input is not turned OFF within 2.5 seconds after the pre-check signal is turned OFF from ON.

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSES

- Ground fault of high voltage system component.
- Malfunction of the quick charging relay.
- The traction battery ground fault detector is failed.
- Open circuits of traction battery ground fault detector circuit, short circuits to ground, short circuits to power supply system or damage; poor contact of connector.
- The quick charging contactor (+), (−) is stuck ON.
- The BMU is failed.

DIAGNOSIS

⚠ DANGER

- ***When high voltage system components are serviced, be sure to pull service plugs to shut down high voltage.***
- ***When pulling service plugs, wear the specified protective equipment.***

STEP 1. Use scan tool MB991958 to confirm a diagnostic trouble code

- Electric motor switch: 20 seconds elapse after ON
- Select lever position: P range

Q: Is the diagnostic trouble code stored?

YES : If the diagnostic trouble code is stored during the electric motor switch ON, the ground fault could occur inside the traction battery. Then go to Step 2.

NO : Go to Step 7.

STEP 2. Check the service plug for the insulation resistance

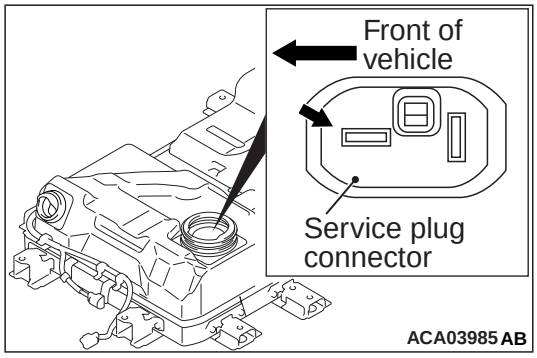
⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

⚠ **CAUTION**

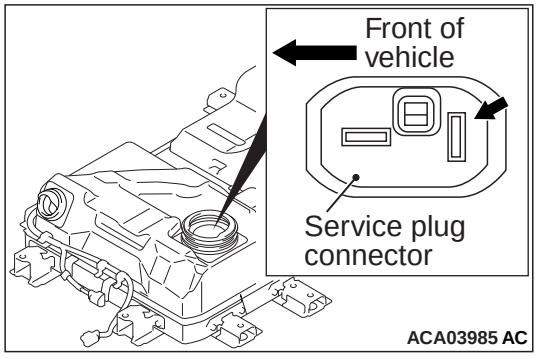
When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between service plug forward terminal and ground.



- Insulation resistance between service plug backward terminal and ground.

  OK: 10 MΩ or more



Q: Is the check result normal?

YES : Go to Step 6.
NO : Go to Step 3.

STEP 3. Check the service plug for the insulation resistance

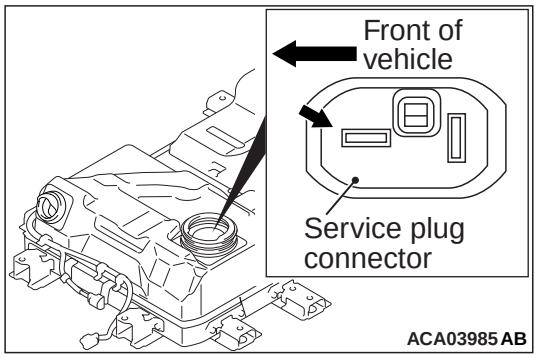
⚠ *DANGER*

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

⚠ CAUTION

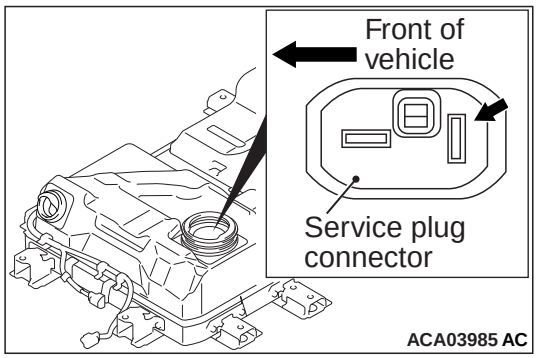
When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Removal the each contactor (Refer to P.54D-176).
- Insulation resistance between service plug forward terminal and traction battery mounting.



- Insulation resistance between service plug backward terminal and traction battery mounting.

  OK: 10 MΩ or more



Q: Is the check result normal?

YES : Check the each contactor (Refer to P.54D-204).
NO : Go to Step 4.

STEP 4. Check the service plug for the insulation resistance

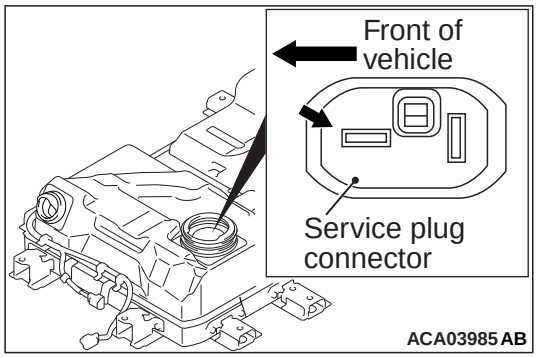
⚠ *DANGER*

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

⚠ CAUTION

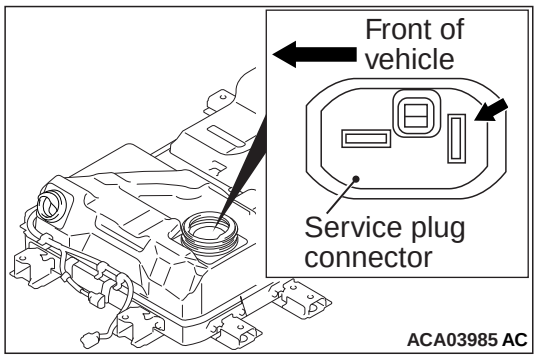
When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Removal the resistor (Refer to P.54D-176).
- Insulation resistance between service plug forward terminal and traction battery mounting.



- Insulation resistance between service plug backward terminal and traction battery mounting.

  OK: 10 MΩ or more



Q: Is the check result normal?

YES : Check the resistor (Refer to P.54D-206).
NO : Go to Step 5.

STEP 5. Check the service plug for the insulation resistance

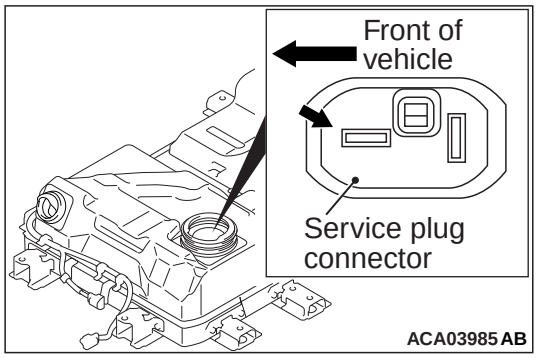
⚠ *DANGER*

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***

⚠ **CAUTION**

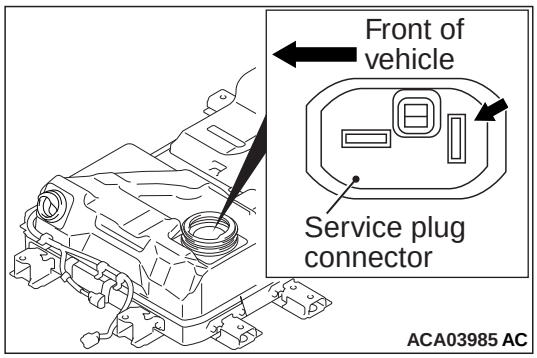
When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Remove the bus bar (Refer to P.54D-176).
- Insulation resistance between service plug forward terminal and traction battery mounting.



- Insulation resistance between service plug backward terminal and traction battery mounting.

  OK: 10 MΩ or more



Q: Is the check result normal?

YES : heck to tighten the bus bar in the traction battery.
NO : Go to Step 6.

STEP 6. Use scan tool MB991958 to check diagnostic trouble code related to the other systems

Check if the diagnostic trouble code is stored in the BMU.

Q: Is the diagnostic trouble code stored?

YES : Carry out troubleshooting for the diagnostic trouble code.
NO : Go to Step 7.

STEP 7. Use scan tool MB991958 diagnostic trouble code

- During the quick charging.

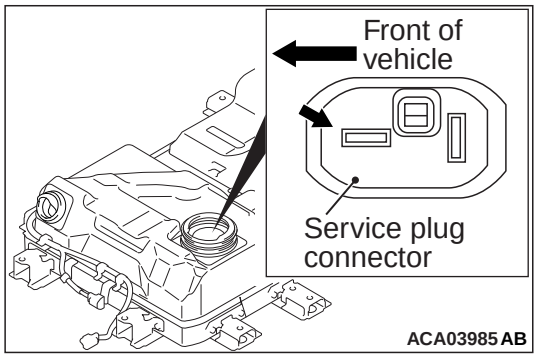
Q: Is the diagnostic trouble code stored?

YES : Go to Step 8.
NO : Go to Step 11.

STEP 8. Voltage measurement at G-01 EV charger cable (quick charging) connector, service plug

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***



Using a high voltage multimeter, measure the high voltage between the G-01 EV charger cable (quick charging) connection terminal and service plug forward terminal.

OK: Approximately 0 V

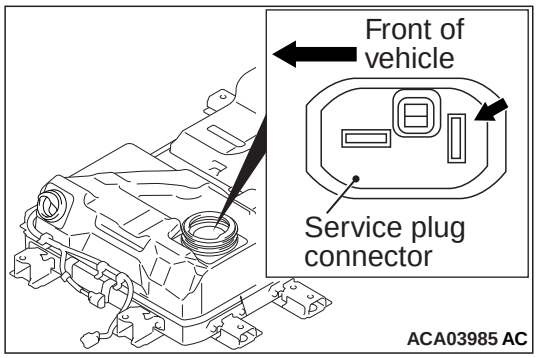
Q: Is the check result normal?

YES : Go to Step 9.
NO : Go to Step 10.

STEP 9. Voltage measurement at G-02 EV charger cable (quick charging) connector, service plug connector

⚠ ***DANGER***

- ***Check the high-voltage circuit while reading carefully the precautions on handling a high-voltage vehicle.***
- ***Be sure to wear the specified protective equipment when pulling the service plug.***



Using a high voltage multimeter, measure the high voltage between the G-02 EV charger cable (quick charging) connection terminal and service plug connection backward terminal.

OK: Approximately 0 V

Q: Is the check result normal?

YES : Go to Step 11.
NO : Go to Step 10.

STEP 10. Check the quick charge contactor (+) or (–)

(1) Removal the quick charge contactor (+) or (–) in traction battery (Refer to P.54D-176).
(2) Check the quick charge contactor (+) or (–) in traction battery (Refer to P.54D-204).

Q: Is the check result normal?

YES : Go to Step 11.
NO : Replace the quick charge contactor (+) or (–) in traction battery (Refer to P.54D-198).

STEP 11. Use scan tool MB991958 diagnostic trouble code

- Select lever position: P range
- A/C switch: OFF
- Electric motor switch: Turn the switch to the LOCK or ACC position. Then wait for 20 seconds, and turn it to the START position further (the READY indicator will illuminate).

Q: Is the diagnostic trouble code stored?

YES : Go to Step 13.
NO : Go to Step 12.

STEP 12. Use scan tool MB991958 diagnostic trouble code

- Electric motor switch: Turn the switch to the LOCK or ACC position. Then wait for 20 seconds, and turn it to the START position further (the READY indicator will illuminate).
- Select lever position: D range

Q: Is the diagnostic trouble code stored?

YES : Go to Step 13.
NO : Go to Step 21.

STEP 13. Connector check: G-07 inverter (U terminal) connector, G-08 inverter (V terminal) connector, G-09 inverter (W terminal) connector

⚠ ***DANGER***

- ***When high voltage system components are serviced, be sure to pull service plugs to shut down high voltage before serving.***
- ***When pulling service plugs, wear the specified protective equipment.***

Q: Is the check result normal?

YES : Go to Step 14.
NO : Repair the connector.

STEP 14. Check the G-07 inverter (U terminal) connector, G-08 inverter (V terminal) connector and G-09 inverter (W terminal) connector for the insulation resistance

⚠ **CAUTION**

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Disconnect the connector, and measure at the wiring harness side.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and ground.

  OK: 10 MΩ or more

Q: Is the check result normal?

YES : Check the inverter for the insulation resistance. Then go to Step 25.
NO : Go to Step 15.

STEP 15. Connector check: G-16 motor (electric motor unit: U terminal) connector

Q: Is the check result normal?

YES : Go to Step 16.
NO : Repair the connector.

STEP 16. Check the G-07 inverter (U terminal) connector for the insulation resistance

⚠ CAUTION
When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Disconnect the connector, and measure at the wiring harness side.
- Disconnect G-16 motor (electric motor unit: U terminal) connector.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and the cable shield ground (mounting bracket).

OK: 10 MΩ or more

Q: Is the check result normal?

YES : Go to Step 17.
NO : Replace the wiring harness between G-07 inverter (U terminal) connector and G-16 motor (electric motor unit: U terminal) connector.

STEP 17. Connector check: G-15 motor (electric motor unit: V terminal) connector

Q: Is the check result normal?

YES : Go to Step 18.
NO : Repair the connector.

STEP 18. Check the G-08 inverter (V terminal) connector for the insulation resistance

⚠ CAUTION

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Disconnect the connector, and measure at the wiring harness side.
- Disconnect G-15 motor (electric motor unit: V terminal) connector.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and the cable shield ground (mounting bracket).

OK: 10 MΩ or more

Q: Is the check result normal?

YES : Go to Step 19.

NO : Replace the wiring harness between G-08 inverter (W terminal) connector and G-15 motor (electric motor unit: V terminal) connector.

STEP 19. Connector check: G-14 motor (electric motor unit: W terminal) connector

Q: Is the check result normal?

YES : Go to Step 20.

NO : Repair the connector.

STEP 20. Check the G-09 inverter (W terminal) connector for the insulation resistance

⚠ CAUTION

When the insulation resistance is measured, set the range of the special tool electric insulation tester (MB992355) to 500 V. When the insulation resistance is measured at the range more than 500 V, the component may be damaged.

- Disconnect the connector, and measure at the wiring harness side.
- Disconnect G-14 motor (electric motor unit: W terminal) connector.
- Use the special tool electric insulation tester (MB992355) to set the range to 500 V.
- Insulation resistance between terminal No. 1 and the cable shield ground (mounting bracket).

OK: 10 MΩ or more

Q: Is the check result normal?

YES : Check the motor (electric motor unit) for the insulation resistance. Then go to Step 25.

NO : Replace the wiring harness between G-09 inverter (W terminal) connector and G-14 motor (electric motor unit: W terminal) connector.

STEP 21. Scan tool MB991958 diagnostic trouble code.

- Electric motor switch: READY
- A/C set temperature: minimum temperature
- A/C switch: ON
- MAX switch: ON

Q: Is the diagnostic trouble code stored?

YES : Go to Step 22.
NO : Go to Step 23.

STEP 22. After replacing the A/C refrigerant and the compressor oil, check the diagnostic trouble code again.

- Electric motor switch: READY
- A/C set temperature: minimum temperature
- A/C switch: ON
- MAX switch: ON

Q: Is the diagnostic trouble code stored?

YES : Replace the A/C compressor.
NO : Check is complete.

STEP 23. Scan tool MB991958 diagnostic trouble code.

- Electric motor switch: READY
- A/C set temperature: maximum temperature
- MAX switch: ON

Q: Is the diagnostic trouble code stored?

YES : Replace the electric hot water heater.
NO : Go to Step 24.

STEP 24. Scan tool MB991958 diagnostic trouble code.

NOTE: Turn the electric motor switch "ON" position and connect the charging cable. Then turning the electric motor switch "LOCK" (OFF) position can check the monitor during the regular charging.

- Electric motor switch: "LOCK" (OFF)
- During the regular charging

Q: Is the diagnostic trouble code stored?

YES : Replace the on-board charger/DC-DC converter.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 25. Connector check: C-22 traction battery connector

Q: Is the check result normal?

YES : Go to Step 26.
NO : Repair the connector.

STEP 26. Perform voltage measurement at C-22 traction battery connector

- Disconnect the connector, and measure at harness side.
- Electric motor switch: ON
- Voltage between terminal No. 4 and ground.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 28.
NO : Go to Step 27.

STEP 27. Connector check: A-08X EV control relay connector

Q: Is the check result normal?

YES : Check intermediate connectors B-27, C-102 and C-112, and repair if necessary. If intermediate connectors are normal, check and repair harness between A-08X (terminal No. 1) EV control relay connector and C-22 (terminal No. 4) traction battery connector.
- Check the power supply line for open/short circuit.

NO : Repair the connector.

STEP 28. Perform voltage measurement at C-22 traction battery connector

- Disconnect the connector, and measure at harness side.
- Resistance between terminal No. 5 and ground.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 29.
NO : Check and repair harness between C-22 (terminal No. 5) traction battery connector and ground.
- Check grounding line for open circuit and damage.

STEP 29. Connector check: C-21 traction battery connector

Q: Is the check result normal?

YES : Go to Step 30.
NO : Repair the connector.

STEP 30. Perform voltage measurement at C-21 traction battery connector

- Disconnect the connector, and measure at harness side.
- Resistance between terminal No. 6 and ground.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 31.

NO : Check intermediate connector C-104, and repair if necessary. If intermediate connector is normal, check and repair harness between C-21 (terminal No. 6) traction battery connector and ground.

- Check grounding line for open circuit and damage.

STEP 31. Connector check: A-08X EV control relay connector

Q: Is the check result normal?

YES : Go to Step 32.

NO : Repair the connector.

STEP 32. Check the wiring harness between A-08X (terminal No. 1) EV control relay connector and C-22 (terminal No. 4) traction battery connector.

NOTE: Before checking the wiring harness, check intermediate connectors B-27, C-102 and C-112, and repair if necessary.

- Check the power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 33.

NO : Repair the line.

STEP 33. Connector check: C-109 BMU connector

Q: Is the check result normal?

YES : Go to Step 34.

NO : Repair the connector.

STEP 34. Perform voltage measurement at C-109 BMU connector

- Measure BMU terminal voltage.
- Disconnect C-21 traction battery connector.
- Electric motor switch: ON
- Voltage between terminal No. 35 and ground.

OK: 0 – 0.1 V

Q: Is the check result normal?

YES : Go to Step 35.

NO : Check and repair harness between C-109 (terminal No. 35) BMU connector and C-21 (terminal No. 5) traction battery connector.

- Check output line for short circuit to power supply.

STEP 35. Check the wiring harness between C-21 (terminal No. 5) traction battery connector and C-109 (terminal No. 35) BMU connector

- Check output line for open circuit, short circuit to ground and damage.

Q: Is the check result normal?

YES : Go to Step 36.
NO : Repair the wiring harness.

STEP 36. Check the wiring harness between C-21 (terminal No. 7) traction battery connector and C-109 (terminal No. 46) BMU connector

- Check signal line for open circuit, short circuit to ground, short circuit to power supply system and damage.

Q: Is the check result normal?

YES : Go to Step 37.
NO : Repair the wiring harness.

STEP 37. Perform voltage measurement at C-109 BMU connector

- Measure BMU terminal voltage.
- Electric motor switch: "LOCK" (OFF) → ON
- Voltage between terminal No. 46 and ground.

  OK: 5.3 V or more → 1 V or less (After several seconds elapse)

Q: Is the check result normal?

YES : Go to Step 38.
NO : Replace the BMU.

STEP 38. Perform voltage measurement at C-109 BMU connector

- Measure BMU terminal voltage.
- Electric motor switch: "LOCK" (OFF) → ON
- Voltage between terminal No. 35 and ground.

  OK: 8 V or more → 1.3 V or less (After several seconds elapse)

Q: Is the check result normal?

YES : Replace the BMU.
NO : Go to Step 39.

STEP 39. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Go to Step 40.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 40. Connector check: C-21, C-22 traction battery connector, ground fault detector connector

Removal the traction battery cover (Refer to P.54D-182).

Q: Is the check result normal?

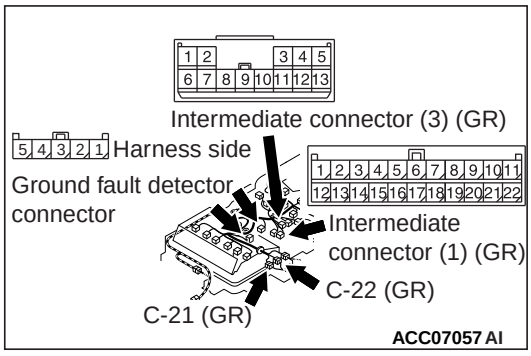
YES : Go to Step 41.
NO : Repair the connector.

STEP 41. Check the wiring harness between C-22 (terminal No. 4, 5) traction battery connector and ground fault detector (terminal No. 1, 3) connector, C-21 (terminal No. 5, 6, 7) traction battery connector and ground fault detector (terminal No. 2, 4, 5) connector

NOTE:

- *Before checking harness, check intermediate connector (1) (terminal No. 5 and No. 11) of ground line, intermediate connector (3) (terminal No. 3 and No. 4) of power supply line, and repair if necessary.*

Check power supply line, out signal line and ground line for open circuit.



Q: Is the check result normal?

YES : Replace the ground fault detector in traction battery (Refer to P.54D-176).
NO : Repair the wiring harness.

Code No. P1A48: Output Circuit Of Main Drive Lithium-ion Battery Fan Abnormal <Vehicles with Main Drive Lithium-ion Battery warming system or quick charging system>

TROUBLE JUDGMENT

Check Conditions

- The electric motor switch is at "ON" position or while the Main Drive Lithium-ion Battery is charged.

Judgment Criterion

- The PWM output signal of the Main Drive Lithium-ion Battery cooling fan is 100 % (while the fan is stopped) and the PWM output signal status of the Main Drive Lithium-ion Battery cooling fan is High (during the rotation).

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSES

- The Main Drive Lithium-ion Battery fan is failed.
- Short circuits to power supply system of Main Drive Lithium-ion Battery fan circuit; poor contact of connector.

- The BMU is failed.

DIAGNOSIS

STEP 1. Connector check: C-14 Main Drive Lithium-ion Battery fan connector

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the connector.

STEP 2. Measure the voltage at C-14 Main Drive Lithium-ion Battery fan connector

- Disconnect the connector and measure the voltage at the female side.
- Electric motor switch: ON
- Voltage between terminal No. 2 and ground.

OK: 0 – 0.1 V

Q: Is the check result normal?

YES : Go to Step 6.
NO : Go to Step 3.

STEP 3. Connector check: C-107 BMU connector

Q: Is the check result normal?

YES : Go to Step 4.
NO : Repair the connector.

STEP 4. Check the wiring harness between C-14 (terminal No. 2) Main Drive Lithium-ion Battery fan connector and C-107 (terminal No. 13) BMU connector

NOTE: Before checking the wiring harness, check intermediate connector C-102, and repair if necessary.

- Check output line for short circuit to power supply.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 6. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Go to Step 7.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 7. Connector check: C-14 Main Drive Lithium-ion Battery fan connector, cooling fan connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-176).

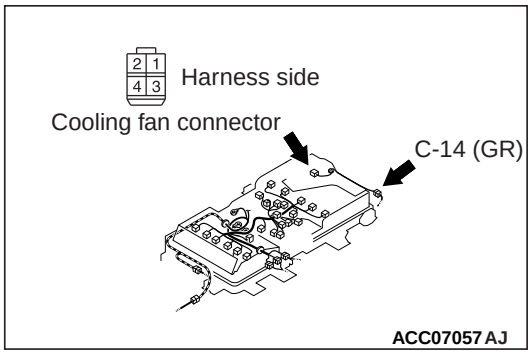
Q: Is the check result normal?

YES : Go to Step 8.

NO : Repair the damaged connector.

STEP 8. Check the wiring harness between C-14 (terminal No. 1, 2, 3, 4) Main Drive Lithium-ion Battery fan connector and cooling fan (terminal No. 1, 2, 3, 4) connector

Check power supply line, out signal line and ground line for open circuit.



Q: Is the check result normal?

YES : Replace the cooling fan in Main Drive Lithium-ion Battery (Refer to P.54D-199).

NO : Repair the wiring harness.

Code No. P1A4B: Voltage Of Each Battery Cell Abnormal

TROUBLE JUDGMENT

Check Conditions

- Three seconds elapse after the electric motor switch is turned "ON", or three seconds elapse after the traction battery starts to be charged.
- The absolute value of the current is less than 1 A.
- The energy level gauge is more than 4 segments.
- Either one of the following diagnostic trouble codes is not stored.
  a. P1AA8: Local CAN (for traction battery) signal time-out
  b. U1082: Local CAN (for traction battery) bus off

Judgment Criterion

- When the information that the difference is more than 0.2 V between the lowest battery cell voltage and the highest battery cell voltage is received for more than 5 seconds.

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSE

- The module (battery cell and CMU) in the traction battery is failed.

DIAGNOSIS

STEP 1. Use scan tool MB991958 to confirm a diagnostic trouble code of other systems

Check if diagnostic trouble code No. P1A30, P1A31 or P1A33 is stored in the EV-ECU.

Q: Is the diagnostic trouble code stored?

YES : Carry out troubleshooting for diagnostic trouble code No. P1A30, P1A31 or P1B33.

NO : Go to Step 2.

STEP 2. Scan tool MB991958 data list

(1) Check the domestic power supply facility.
(2) Connect the regular charging cable.
(3) Check service data.
- Item No. 6: Minimum voltage cell ID
- Item No. 33: Maximum value of cell voltage difference

OK: 0.2 V less (electric motor switch: ON, also the energy level gauge of the combination meter has more than 4 segments.)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Go to Step 3.

STEP 3. Scan tool MB991958 data list of others system

(1) Select "Reset" for ID of the cell of the lowest voltage (CMU ID) on the special function screen, and then execute it.
(2) Check the data list regarding the ID (CMU ID) of the cell of lowest voltage.

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Replace the traction battery.

Code No. P1A52: CMU01 battery cell low voltage abnormal, P1A53: CMU02 battery cell low voltage abnormal, P1A54: CMU03 battery cell low voltage abnormal, P1A55: CMU04 battery cell low voltage abnormal, P1A56: CMU05 battery cell low voltage abnormal, P1A57: CMU06 battery cell low voltage abnormal, P1A58: CMU07 battery cell low voltage abnormal, P1A59: CMU08 battery cell low voltage abnormal, P1A5A: CMU09 battery cell low voltage abnormal, P1A5B: CMU10 battery cell low voltage abnormal, P1A5C: CMU11 battery cell low voltage abnormal, P1A5D: CMU12 battery cell low voltage abnormal

TROUBLE JUDGMENT

Check Conditions

- Three seconds elapse after the electric motor switch is turned ON, or three seconds elapse after the Main Drive Lithium-ion Battery starts to be charged.

- Either one of the following diagnostic trouble codes is not stored.
  a. P1AA8: Local CAN (for Main Drive Lithium-ion Battery) signal time-out
  b. U1082: Local CAN (for Main Drive Lithium-ion Battery) bus off

Judgment Criterion
- The battery cell voltage is less than 2.3 V.

FAIL-SAFE AND BACKUP FUNCTION
- Not available

PROBABLE CAUSE
- The module (battery cell, CMU and battery cell voltage sensor) in the Main Drive Lithium-ion Battery is failed.

DIAGNOSIS

STEP 1. Scan tool MB991958 data list
- Check the data list reference table corresponding to the diagnostic trouble code.

  OK: 2.3 V or more

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Go to Step 2.

STEP 2. Scan tool MB991958 data list of others system

(1) Select "Reset" for the relevant CMU ID on the special function screen, and then execute it.
(2) Check the data list on the relevant CMU ID.
- Item No. 1: Module voltage
- Item No. 2: Cell total voltage
- Item No. 3: Voltage diff. (Module – Total cell)
- Item No. 4 – No. 11: Battery cell (A – H) voltage
- Item No. 12: Cell Monitor IC
- Item No. 13: Voltage sensor
- Item No. 28 – No. 35: Cell (A – H) voltage underflow
- Item No. 36 – No. 43: Cell (A – H) voltage overflow
- Item No. 63 – No. 66: Cell (A, C, E, G) connection terminal

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Replace the Main Drive Lithium-ion Battery.

Code No. P1A5E: CMU01 battery cell high voltage abnormal, P1A5F: CMU02 battery cell high voltage abnormal, P1A60: CMU03 battery cell high voltage abnormal, P1A61: CMU04 battery cell high voltage abnormal, P1A62: CMU05 battery cell high voltage abnormal, P1A63: CMU06 battery cell high voltage abnormal, P1A64: CMU07 battery cell high voltage abnormal, P1A65: CMU08 battery cell high voltage abnormal, P1A66: CMU09 battery cell high voltage abnormal, P1A67: CMU10 battery cell high voltage abnormal, P1A68: CMU11 battery cell high voltage abnormal, P1A69: CMU12 battery cell high voltage abnormal

TROUBLE JUDGMENT

Check Conditions

- Three seconds elapse after the electric motor switch is turned ON, or three seconds elapse after the Main Drive Lithium-ion Battery starts to be charged.
- Either one of the following diagnostic trouble codes is not stored.
  a. P1AA8: Local CAN (for Main Drive Lithium-ion Battery) signal time-out
  b. U1082: Local CAN (for Main Drive Lithium-ion Battery) bus off

Judgment Criterion

- The battery cell voltage is more than 4.2 V.

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSE

- The module (battery cell, CMU and battery cell voltage sensor) in the Main Drive Lithium-ion Battery is failed.

DIAGNOSIS

STEP 1. Scan tool MB991958 data list

- Check the data list reference table corresponding to the diagnostic trouble code.

  OK: 4.2 V or less

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Go to Step 2.

STEP 2. Scan tool MB991958 data list of others system

(1) Select "Reset" for the relevant CMU ID on the special function screen, and then execute it.
(2) Check the data list on the relevant CMU ID.
- Item No. 1: Module voltage
- Item No. 2: Cell total voltage
- Item No. 3: Voltage diff. (Module – Total cell)
- Item No. 4 – No. 11: Battery cell (A – H) voltage
- Item No. 12: Cell Monitor IC
- Item No. 13: Voltage sensor
- Item No. 28 – No. 35: Cell (A – H) voltage underflow
- Item No. 36 – No. 43: Cell (A – H) voltage overflow
- Item No. 63 – No. 66: Cell (A, C, E, G) connection terminal

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Replace the Main Drive Lithium-ion Battery.

Code No. P1A6A: CMU01 module temperature abnormal (high input), P1A6B: CMU02 module temperature abnormal (high input), P1A6C: CMU03 module temperature abnormal (high input), P1A6D: CMU04 module temperature abnormal (high input), P1A6E: CMU05 module temperature abnormal (high input), P1A6F: CMU06 module temperature abnormal (high input), P1A70: CMU07 module temperature abnormal (high input), P1A71: CMU08 module temperature abnormal (high input), P1A72: CMU09 module temperature abnormal (high input), P1A73: CMU10 module temperature abnormal (high input), P1A74: CMU11 module temperature abnormal (high input), P1A75: CMU12 module temperature abnormal (high input)

TROUBLE JUDGMENT

Check Conditions
- Three seconds elapse after the electric motor switch is turned ON, or three seconds elapse after the Main Drive Lithium-ion Battery starts to be charged.
- Either one of the following diagnostic trouble codes is not stored.
  a. P1AA8: Local CAN (for Main Drive Lithium-ion Battery) signal time-out
  b. U1082: Local CAN (for Main Drive Lithium-ion Battery) bus off

Judgment Criterion
- The module temperature is more than 60°C (140°F).

FAIL-SAFE AND BACKUP FUNCTION
- Drive the Main Drive Lithium-ion Battery fan for 10 minutes after judging malfunctions. <Vehicles with Main Drive Lithium-ion Battery warming system or quick charging system>.

PROBABLE CAUSES

- The Main Drive Lithium-ion Battery cooling is insufficient with the failed air conditioning control system.
- The module (battery cell, CMU and module temperature sensor) in the Main Drive Lithium-ion Battery is failed.

DIAGNOSIS

STEP 1. Scan tool MB991958 other system diagnostic trouble code

Q: Is diagnostic trouble code of compressor & heater controller stored?

YES : Check the compressor & heater controller. (Refer to GROUP 55 – Troubleshooting – Diagnostic Trouble Code Chart <A/C control unit>).

NO : Go to Step 2.

STEP 2. Scan tool MB991958 actuator test

(1) Check the compressor & heater controller. (Refer to GROUP 55 – Actuator Test Reference Table <A/C control unit>).
- Item No. 02: Battery cooling flap motor

Q: Is the check result normal?

YES : Go to Step 3.

NO : Main Drive Lithium-ion Battery cooling selection damper motor check.

STEP 3. Scan tool MB991958 data list

- Check the data list reference table corresponding to the diagnostic trouble code.

  OK: At ambient temperature (atmospheric temperature) or equivalent (when the vehicle is not driven and the battery is not charged for a long time)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Go to Step 4.

STEP 4. Scan tool MB991958 data list of others system

(1) Select "Reset" on the special function screen of the relevant CMU ID, and then execute it.
(2) Check the data list corresponding to the relevant CMU ID.
- Item No. 14: Reference low voltage
- Item No. 15: Reference high voltage
- Item No. 16 – No. 21: Temperature sensor (1 – 6) (open)
- Item No. 22 – No. 27: Temperature sensor (1 – 6) (short)
- Item No. 44 – No. 49: Temperature sensor (1 – 6) underflow
- Item No. 50 – No. 55: Temperature sensor (1 – 6) overflow
- Item No. 67: A/D conversion (Reference volt)
- Item No. 68 – No. 73: A/D conversion (temp. sensor 1 – 6)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Check to tighten the bus bar in the Main Drive Lithium-ion Battery or replace the Main Drive Lithium-ion Battery.

Code No. P1A76: CMU01 battery cell voltage sensor abnormal, P1A77: CMU02 battery cell voltage sensor abnormal, P1A78: CMU03 battery cell voltage sensor abnormal, P1A79: CMU04 battery cell voltage sensor abnormal, P1A7A: CMU05 battery cell voltage sensor abnormal, P1A7B: CMU06 battery cell voltage sensor abnormal, P1A7C: CMU07 battery cell voltage sensor abnormal, P1A7D: CMU08 battery cell voltage sensor abnormal, P1A7E: CMU09 battery cell voltage sensor abnormal, P1A7F: CMU10 battery cell voltage sensor abnormal, P1A80: CMU11 battery cell voltage sensor abnormal, P1A81: CMU12 battery cell voltage sensor abnormal

TROUBLE JUDGMENT

Check Conditions

- Three seconds elapse after the electric motor switch is turned ON, or three seconds elapse after the Main Drive Lithium-ion Battery starts to be charged.
- Either one of the following diagnostic trouble codes is not stored.
  a. P1AA8: Local CAN (for Main Drive Lithium-ion Battery) signal time-out
  b. U1082: Local CAN (for Main Drive Lithium-ion Battery) bus off

Judgment Criterion

- The signal is received from the appropriate module CMU, which shows that one of the battery cell voltage has an invalid value.

FAIL-SAFE AND BACKUP FUNCTION

- If the CMU detecting abnormalities also detects the module temperature sensor abnormalities, drive the Main Drive Lithium-ion Battery fan for 10 minutes <Vehicles with Main Drive Lithium-ion Battery warming system or quick charging system>.

PROBABLE CAUSES

- The module (battery cell, CMU and battery cell voltage sensor) in the Main Drive Lithium-ion Battery is failed.
- The BMU is failed.

DIAGNOSIS

STEP 1. Scan tool MB991958 data list

- Check the data list reference table corresponding to the diagnostic trouble code.

  OK: Not 2.51 V (initial value) (electric motor switch: "LOCK" (OFF) → "ON")

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Go to Step 2.

STEP 2. Scan tool MB991958 data list of others system

(1) Select "Reset" for the relevant CMU ID on the special function screen, and then execute it.

(2) Check the data list on the relevant CMU ID.

- Item No. 1: Module voltage
- Item No. 2: Cell total voltage
- Item No. 3: Voltage diff. (Module – Total cell)
- Item No. 4 – No. 11: Battery cell (A – H) voltage
- Item No. 12: Cell Monitor IC
- Item No. 13: Voltage sensor
- Item No. 28 – No. 35: Cell (A – H) voltage underflow
- Item No. 36 – No. 43: Cell (A – H) voltage overflow
- Item No. 63 – No. 66: Cell (A, C, E, G) connection terminal

Q: Is the check result normal?

YES : Go to Step 3.

NO : Replace the Main Drive Lithium-ion Battery. Then go to Step 3.

STEP 3. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.

NO : Check is complete.

Code No. P1A82: CMU01 module temperature sensor abnormal, P1A83: CMU02 module temperature sensor abnormal, P1A84: CMU03 module temperature sensor abnormal, P1A85: CMU04 module temperature sensor abnormal, P1A86: CMU05 module temperature sensor abnormal, P1A87: CMU06 module temperature sensor abnormal, P1A88: CMU07 module temperature sensor abnormal, P1A89: CMU08 module temperature sensor abnormal, P1A8A: CMU09 module temperature sensor abnormal, P1A8B: CMU10 module temperature sensor abnormal, P1A8C: CMU11 module temperature sensor abnormal, P1A8D: CMU12 module temperature sensor abnormal

TROUBLE JUDGMENT

Check Conditions

- Three seconds elapse after the electric motor switch is turned ON, or three seconds elapse after the Main Drive Lithium-ion Battery starts to be charged.
- Either one of the following diagnostic trouble codes is not stored.
  a. P1AA8: Local CAN (for Main Drive Lithium-ion Battery) signal time-out
  b. U1082: Local CAN (for Main Drive Lithium-ion Battery) bus off

Judgment Criterion

- The signal is received from the appropriate module CMU, which shows that one of the module temperatures has an invalid value.

FAIL-SAFE AND BACKUP FUNCTION

- If the CMU detecting abnormalities also detects the battery cell voltage sensor abnormalities, drive the Main Drive Lith-ium-ion Battery fan for 10 minutes <Vehicles with Main Drive Lithium-ion Battery warming system or quick charging system>.

PROBABLE CAUSES

- The module (battery cell, CMU and module temperature sensor) in the Main Drive Lithium-ion Battery is failed.
- The BMU is failed.

DIAGNOSIS

STEP 1. Scan tool MB991958 data list

- Check the data list reference table corresponding to the diagnostic trouble code.

NOTE: To precisely judge the diagnose, do not perform the diagnosis at the temperature of 10°(50°F) around the Main Drive Lithium-ion Battery.

OK: Not 10°C (50°F) (initial value) (electric motor switch: "LOCK" (OFF) → "ON")

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Go to Step 2.

STEP 2. Scan tool MB991958 data list of others system

(1) Select "Reset" for the relevant CMU ID on the special function screen, and then execute it.

(2) Check the data list on the relevant CMU ID.

- Item No. 14: Reference low voltage
- Item No. 15: Reference high voltage
- Item No. 16 – No. 21: Temperature sensor (1 – 6) (open)
- Item No. 22 – No. 27: Temperature sensor (1 – 6) (short)
- Item No. 44 – No. 49: Temperature sensor (1 – 6) under-flow
- Item No. 50 – No. 55: Temperature sensor (1 – 6) over-flow
- Item No. 67: A/D conversion (Reference volt)
- Item No. 68 – No. 73: A/D conversion (temp. sensor 1 – 6)

Q: Is the check result normal?

YES : Go to Step 3.

NO : Replace the Main Drive Lithium-ion Battery. Then go to Step 3.

STEP 3. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.

NO : Check is complete.

Code No. P1A8E: CMU01 balancer abnormal, P1A8F: CMU02 balancer abnormal, P1A90: CMU03 balancer abnormal, P1A91: CMU04 balancer abnormal, P1A92: CMU05 balancer abnormal, P1A93: CMU06 balancer abnormal, P1A94: CMU07 balancer abnormal, P1A95: CMU08 balancer abnormal, P1A96: CMU09 balancer abnormal, P1A97: CMU10 balancer abnormal, P1A98: CMU11 balancer abnormal, P1A99: CMU12 balancer abnormal

TROUBLE JUDGMENT

Check Conditions

- Three seconds elapse after the electric motor switch is turned ON, or three seconds elapse after the Main Drive Lithium-ion Battery starts to be charged.
- Balancer allowed to be driven is OFF.
- Either one of the following diagnostic trouble codes is not stored.
  a. P1AA8: Local CAN (for Main Drive Lithium-ion Battery) signal time-out
  b. U1082: Local CAN (for Main Drive Lithium-ion Battery) bus off

Judgment Criterion

- The signal is received from the appropriate module CMU, which shows that one of the balancers is being driven.

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSES

- The module (CMU) in the Main Drive Lithium-ion Battery is failed.
- The BMU is failed.

DIAGNOSIS

STEP 1. Scan tool MB991958 data list

- Check the data list reference table corresponding to the diagnostic trouble code.

  OK: OFF (electric motor switch: "ON")

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Go to Step 2.

STEP 2. Scan tool MB991958 data list of others system

(1) Select "Reset" for the relevant CMU ID on the special function screen, and then execute it.
(2) Check the data list on the relevant CMU ID.
  - Item No. 58: CAN controller

Q: Is the check result normal?

YES : Go to Step 3.

NO : Replace the Main Drive Lithium-ion Battery. Then go to Step 3.

STEP 3. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.

NO : Check is complete.

Code No. P1A9A: CMU ID auto numbering error

TROUBLE JUDGMENT

Check Conditions
- When the CMUs are numbered for identification.
- Either one of the following diagnostic trouble codes is not stored.
  a. U1925: CMU ID numbering reception error

Judgment Criterion
- Information pertaining to identification number is invalid.

FAIL-SAFE AND BACKUP FUNCTION
- Not available

PROBABLE CAUSES
- The module (CMU) in the Main Drive Lithium-ion Battery is failed.
- The BMU is failed.

DIAGNOSIS

STEP 1. Use scan tool MB991958 to confirm the other diagnostic trouble code

Check if diagnostic trouble code No. U1925 is stored.

Q: Is the diagnostic trouble code stored?

YES : Carry out troubleshooting for diagnostic trouble code No. U1925.
NO : Go to Step 2.

STEP 2. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Go to Step 3.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 3. Scan tool MB991958 diagnostic trouble code

(1) Select "CMU ID numbering" on a special function screen, and execute it.

Q: Is the diagnostic trouble code stored?

YES : Replace the Main Drive Lithium-ion Battery.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

Code No. P1A9B: CMU ID change (CMU01), P1A9C: CMU ID change (CMU02), P1A9D: CMU ID change (CMU03), P1A9E: CMU ID change (CMU04), P1A9F: CMU ID change (CMU05), P1AA0: CMU ID change (CMU06), P1AA1: CMU ID change (CMU07), P1AA2: CMU ID change (CMU08), P1AA3: CMU ID change (CMU09), P1AA4: CMU ID change (CMU10), P1AA5: CMU ID change (CMU11), P1AA6: CMU ID change (CMU12),

TROUBLE JUDGMENT

Check Conditions
- When the CMUs are numbered for identification.
- Either one of the following diagnostic trouble codes is not stored.
  a. U1925: CMU ID numbering reception error

Judgment Criterion
- Information pertaining to identification number is modified.

FAIL-SAFE AND BACKUP FUNCTION
- Not available

PROBABLE CAUSES
- The module (CMU) in the Main Drive Lithium-ion Battery is failed.
- The BMU is failed.

DIAGNOSIS

STEP 1. Use scan tool MB991958 to confirm the other diagnostic trouble code

Check if diagnostic trouble code No. U1925 is stored.

Q: Is the diagnostic trouble code stored?

YES : Carry out troubleshooting for diagnostic trouble code No. U1925.
NO : Go to Step 2.

STEP 2. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Go to Step 3.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 3. Scan tool MB991958 diagnostic trouble code

(1) Select "CMU ID numbering" on a special function screen, and execute it.

Q: Is the diagnostic trouble code stored?

YES : Replace the Main Drive Lithium-ion Battery.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

Code No. P1AA8: Local CAN (for Main Drive Lithium-ion Battery) Signal Time-out

TROUBLE JUDGMENT

Check Conditions

- Three seconds elapse after the electric motor switch is turned ON, or three seconds elapse after the Main Drive Lithium-ion Battery starts to be charged.
- Code No. U1082: Local CAN (for Main Drive Lithium-ion Battery) bus off is not stored.

Judgment Criterion

- One of the CMU signals cannot be received through the CAN communication.

FAIL-SAFE AND BACKUP FUNCTION

- Drive the Main Drive Lithium-ion Battery fan for 10 minutes after judging malfunctions <Vehicles with Main Drive Lithium-ion Battery warming system or quick charging system>.

PROBABLE CAUSES

- Damaged wiring harness or connector(s)
- The Local CAN (for Main Drive Lithium-ion Battery) bus is failed.
- The BMU is failed.

DIAGNOSIS

STEP 1. Check the local CAN (for Main Drive Lithium-ion Battery) terminating resistance itself

- Check the local CAN (for Main Drive Lithium-ion Battery) terminating resistance itself (Refer to P.54D-173).

Q: Is the check result normal?

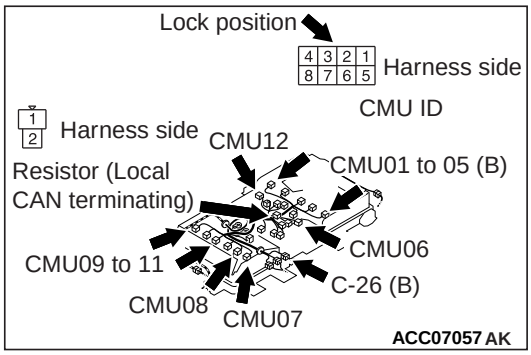
YES : Go to Step 6.
NO : Go to Step 2.

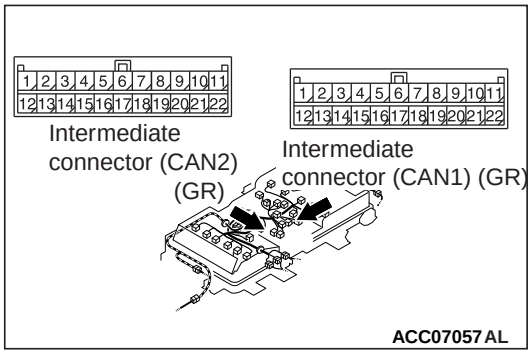
STEP 2. Connector check: C-26 Main Drive Lithium-ion Battery connector, CMU12 from CMU01 connector, resistor (local CAN terminating) connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the damaged connector.





STEP 3. Check the wiring harness between C-26 (terminal No. 5) Main Drive Lithium-ion Battery connector and CMU12 from CMU01 (terminal No. 8) connector, resistor (local CAN terminating) (terminal No. 1) connector

NOTE:

- *Before checking harness, check intermediate connector (CAN1) (terminal No. 11 from No. 3), intermediate connector (CAN2) (terminal No. 9 from No. 3) of out signal line, and repair if necessary.*

Check signal line (CANH) for open circuit.

Q: Is the check result normal?

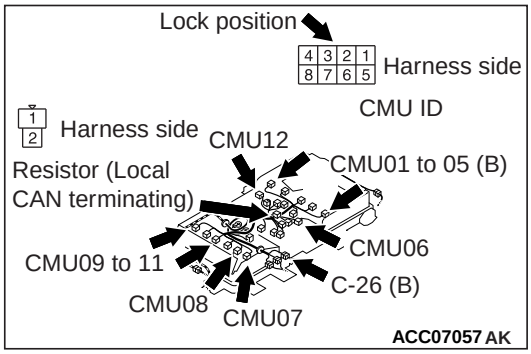
YES : Go to Step 4.

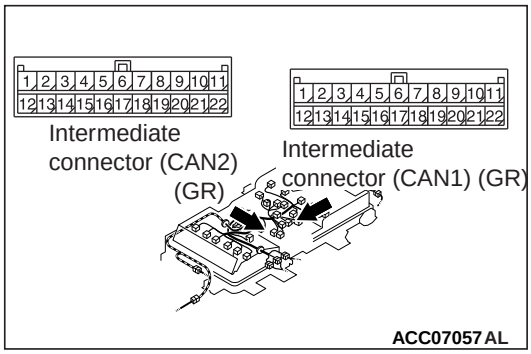
NO : Repair the wiring harness.

STEP 4. Check the wiring harness between C-26 Main Drive Lithium-ion Battery connector terminal No. 10 and CMU12 from CMU01 connector terminal No. 4, resistor (local CAN terminating) connector terminal No. 2

NOTE:

- *Before checking harness, check intermediate connector (CAN1) terminal No. 22 from No. 14, intermediate connector (CAN2) terminal No. 20 from No. 14 of out signal line, and repair if necessary.*





Check signal line (CANL) for open circuit.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the wiring harness.

STEP 5. Check the local CAN (for Main Drive Lithium-ion Battery) terminating resistor

(1) Removal the local CAN terminating resistor in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the local CAN terminating resistor in Main Drive Lithium-ion Battery (Refer to P.54D-205).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Replace the local CAN terminating resistor in Main Drive Lithium-ion Battery.

STEP 6. Connector check: C-26 Main Drive Lithium-ion Battery connector, C-109 BMU connector

Q: Is the check result normal?

YES : Go to Step 7.
NO : Repair the connector.

STEP 7. Check the wiring harness between C-26 (terminal No. 10) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 38) BMU connector

- Check signal line for open circuit, short circuit to ground, short circuit to power supply system and damage.

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the line.

STEP 8. Check the wiring harness between C-26 (terminal No. 5) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 37) BMU connector

- Check signal line for open circuit, short circuit to ground, short circuit to power supply system and damage.

Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the line.

STEP 9. Scan tool MB991958 data list of others system

(1) Select "Reset" for CMUs 01 to 12 on the special function screen, and then execute it.
(2) Check the data list on CMUs 01 to 12.
- Item No. 58: CAN controller

Q: Is the check result normal?

YES : Go to Step 10.
NO : Replace the Main Drive Lithium-ion Battery. Then go to Step 10.

STEP 10. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.
NO : Check is complete.

Code No. P1AA9: Cell number mismatch

TROUBLE JUDGMENT

Check Conditions

- When the CMUs are numbered for identification.
- The following diagnostic trouble codes is stored at the same time.
  a. U1925: CMU ID numbering reception error

Judgment Criterion

- The number of cells are invalid.

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSES

- Improper installation of the Main Drive Lithium-ion Battery.
- The BMU is failed.

DIAGNOSIS

STEP 1. Use scan tool MB991958 to confirm the other diagnostic trouble code

Check if diagnostic trouble code No. U1925 is stored.

Q: Is the diagnostic trouble code stored?

YES : Carry out troubleshooting for diagnostic trouble code No. U1925 (Refer to P.54D-165).

NO : Go to Step 2.

STEP 2. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.

NO : Go to Step 3.

STEP 3. Scan tool MB991958 diagnostic trouble code

(1) Select "CMU ID numbering" on the special function screen of the BMU, and execute it.

Q: Is the diagnostic trouble code stored?

YES : Replace the Main Drive Lithium-ion Battery.

NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

Code No. P1AAB: Numbers of Cells Abnormal

TROUBLE JUDGMENT

Check Conditions

- 5 seconds elapse after the electric motor switch is turned ON, or 5 seconds elapse after the Main Drive Lithium-ion Battery starts to be charged.
- Code No. U1082: Local CAN (for Main Drive Lithium-ion Battery) bus off is not stored.

Judgment Criterion

- Detects cell number mismatch in CAN communication data.

PROBABLE CAUSES

- Improper installation of the BMU or the Main Drive Lithium-ion Battery.
- CMU ID not numbered.

DIAGNOSIS

STEP 1. Scan tool MB991958 CAN bus diagnosis
Use the scan tool MB991958 to diagnose the CAN bus lines.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the CAN bus line. (Refer to GROUP 54C – Troubleshooting.) Then go to Step 2.

STEP 2. Diagnostic trouble code recheck after resetting CAN bus lines
Check again if diagnostic trouble code No. P1AAB is stored in the BMU.
(1) Erase the stored diagnostic trouble code.
(2) Set the electric motor switch from the LOCK (OFF) position to the ON position.
(3) Check if the diagnostic trouble code is stored.

Q: Is the diagnostic trouble code stored?

YES : Go to Step 3.
NO : The diagnosis is complete.

STEP 3. Use scan tool MB991958 to confirm a diagnostic trouble code of other systems
Check if diagnostic trouble code No. P1B30 is stored in the EV-ECU.

Q: Is the diagnostic trouble code stored?

YES : If diagnostic trouble code No. P1B30 is stored in the EV-ECU, replace the BMU.
NO : If no diagnostic trouble code No. P1B30 is stored in the EV-ECU, go to Step 4 .

STEP 4. Scan tool MB991958 diagnostic trouble code
Number(assign) CMU ID, and then check that diagnostic trouble code No. P1AAB is stored in the BMU.
(1) Select "CMU ID numbering" on the special function screen of the BMU, and execute it.

Q: Is the diagnostic trouble code stored?

YES : Replace the Main Drive Lithium-ion Battery.
NO : The diagnosis is complete.

Code No. P1AB5: CMU01 module temperature abnormal (low input), P1AB6: CMU02 module temperature abnormal (low input), P1AB7: CMU03 module temperature abnormal (low input), P1AB8: CMU04 module temperature abnormal (low input), P1AB9: CMU05 module temperature abnormal (low input), P1ABA: CMU06 module temperature abnormal (low input), P1ABB: CMU07 module temperature abnormal (low input), P1ABC: CMU08 module temperature abnormal (low input), P1ABD: CMU09 module temperature abnormal (low input), P1ABE: CMU10 module temperature abnormal (low input), P1ABF: CMU11 module temperature abnormal (low input), P1AC0: CMU12 module temperature abnormal (low input)

TROUBLE JUDGMENT

Check Conditions

- Three seconds elapse after the electric motor switch is turned ON, or three seconds elapse after the Main Drive Lithium-ion Battery starts to be charged.
- Either one of the following diagnostic trouble codes is not stored.
  a. P1AA8: Local CAN (for Main Drive Lithium-ion Battery) signal time-out
  b. U1082: Local CAN (for Main Drive Lithium-ion Battery) bus off

Judgment Criterion

- The module temperature is less than –30°C (–22°F).

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSE

- The module (battery cell, CMU and module temperature sensor) in the Main Drive Lithium-ion Battery is failed.

DIAGNOSIS

STEP 1. Scan tool MB991958 data list

- Check the data list reference table corresponding to the diagnostic trouble code.

  OK: At ambient temperature (atmospheric temperature) or equivalent (when the vehicle is not driven and the battery is not charged for a long time)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Go to Step 2.

STEP 2. M.U.T.-III data list of others system

(1) Select "Reset" for the relevant CMU ID on the special function screen, and then execute it.
(2) Check the data list on the relevant CMU ID.
- Item No. 14: Reference low voltage
- Item No. 15: Reference high voltage
- Item No. 16 – No. 21: Temperature sensor (1 – 6) (open)
- Item No. 22 – No. 27: Temperature sensor (1 – 6) (short)
- Item No. 44 – No. 49: Temperature sensor (1 – 6) underflow
- Item No. 50 – No. 55: Temperature sensor (1 – 6) overflow
- Item No. 67: A/D conversion (Reference volt)
- Item No. 68 – No. 73: A/D conversion (temp. sensor 1 – 6)

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

NO : Check to tighten the bus bar in the Main Drive Lithium-ion Battery or replace the Main Drive Lithium-ion Battery.

Code No. P1AC1: Main Drive Lithium-ion Battery Fan Failed (driving abnormal) <Vehicles with Main Drive Lithium-ion Battery warming system or quick charging system>

TROUBLE JUDGMENT

Check Condition
- The electric motor switch is at "ON" position or while the Main Drive Lithium-ion Battery is charged.

Judgment Criterion
- For more than 5 seconds, the PWM output signal of the Main Drive Lithium-ion Battery fan is 10 % (while the fan is being driven). The output of the rotational speed is less than 2.0 V (less than 1,645 r/min or equivalent).

FAIL-SAFE AND BACKUP FUNCTION
- Not available

PROBABLE CAUSES
- The Main Drive Lithium-ion Battery fan relay is failed.
- The Main Drive Lithium-ion Battery fan is failed.
- Open circuits of Main Drive Lithium-ion Battery fan relay circuit, short circuits to ground or damage; poor contact of connector.
- Open circuits of Main Drive Lithium-ion Battery fan circuit, short circuits to ground or damage; poor contact of connector.
- The BMU is failed.

DIAGNOSIS

STEP 1. Connector check: A-115X Main Drive Lithium-ion Battery fan relay connector

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the connector.

STEP 2. Check the Main Drive Lithium-ion Battery fan relay itself

- Remove the Main Drive Lithium-ion Battery fan relay, and then check it.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Replace the Main Drive Lithium-ion Battery fan relay.

STEP 3. Perform voltage measurement at A-115X Main Drive Lithium-ion Battery fan relay

- Remove the relay, and measure at relay box side.
- Voltage between terminal No. 4 and ground.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 4.
NO : Check and repair harness between auxiliary battery and A-115X (terminal No. 4) Main Drive Lithium-ion Battery fan relay connector.
- Check power supply line for open circuit, short circuit to ground.

STEP 4. Connector check: C-14 Main Drive Lithium-ion Battery fan connector

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the connector.

STEP 5. Perform voltage measurement at C-14 Main Drive Lithium-ion Battery fan connector

- Disconnect the connector, and measure at harness side.
- Remove the A-115X Main Drive Lithium-ion Battery fan relay, and short-circuit the terminal 4 and 3 at the relay box side.
- Voltage between terminal No. 1 and ground.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6.

NO : Check intermediate connector A-107, and repair if necessary. If intermediate connector is normal, check and repair harness between A-115X (terminal No. 3) Main Drive Lithium-ion Battery fan relay connector and C-14 (terminal No. 1) Main Drive Lithium-ion Battery fan connector.

- Check output line for open circuit, short circuit to ground.

STEP 6. Perform resistance measurement at A-115X Main Drive Lithium-ion Battery fan relay connector

- Remove the relay, and measure at relay box side.
- Resistance between terminal No. 1 and ground.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7.

NO : Check intermediate connector B-122, and repair if necessary. If intermediate connector is normal, Check and repair harness between A-115X (terminal No. 1) Main Drive Lithium-ion Battery fan relay connector and ground.

- Check grounding line for open circuit and damage.

STEP 7. Perform resistance measurement at C-14 Main Drive Lithium-ion Battery fan connector

- Disconnect the connector, and measure at harness side.
- Resistance between terminal No. 4 and ground.

OK: Continuity (2 Ω less)

Q: Is the check result normal?

YES : Go to Step 8.

NO : Check intermediate connector C-104, and repair if necessary. If intermediate connector is normal, check and repair harness between C-14 (terminal No. 4) Main Drive Lithium-ion Battery fan connector and ground.

- Check grounding line for open circuit and damage.

STEP 8. Check the wiring harness between auxiliary battery and A-115X (terminal No. 4) Main Drive Lithium-ion Battery fan relay connector

- Check the power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the wiring harness.

STEP 9. Check the wiring harness between A-115X (terminal No. 3) Main Drive Lithium-ion Battery fan relay connector and C-14 (terminal No. 1) Main Drive Lithium-ion Battery fan connector

NOTE: Before checking the wiring harness, check intermediate connector C-107, and repair if necessary.

- Check the output line for damage.

Q: Is the check result normal?

YES : Go to Step 10.
NO : Repair the wiring harness.

STEP 10. Perform PWM signal wave pattern measurement at Main Drive Lithium-ion Battery fan (Using an oscilloscope)

- Use special tool test harness (MB991658) to connect C-14 Main Drive Lithium-ion Battery fan connector, and measure at pick-up harness.
- For several seconds right after starting the regular charge.
- Voltage between terminal No. 2 and ground.

OK: The wave pattern must be the same as that described in Inspection Procedure Using an Oscilloscope.

Q: Is the check result normal?

YES : Go to Step 15.
NO : Go to Step 11.

STEP 11. Connector check: C-106 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 12.
NO : Repair the connector.

STEP 12. Check the wiring harness between C-14 (terminal No. 2) Main Drive Lithium-ion Battery fan connector and C-106 (terminal No. 2) EV-ECU connector

NOTE: Before checking the wiring harness, check intermediate connector B-01, and repair if necessary.

- Check signal line for open circuit, short circuit to ground and damage.

Q: Is the check result normal?

YES : Go to Step 13.
NO : Repair the wiring harness.

STEP 13. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Go to Step 14.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 14. After replacing the BMU, reconfirm the diagnostic trouble code

- After replacing the BMU, reconfirm whether the diagnostic trouble codes are stored.

Q: Is the diagnostic trouble code stored?

YES : Go to Step 20.
NO : Check is complete.

STEP 15. Connector check: C-107 BMU connector

Q: Is the check result normal?

YES : Go to Step 16.
NO : Repair the connector.

STEP 16. Perform voltage measurement at C-107 BMU connector

- Measure BMU terminal voltage.
- Right after starting the regular charge.
- Voltage between terminal No. 21 and ground.

OK: 2 V or more → 1 V or less (After several seconds elapse)

Q: Is the check result normal?

YES : Go to Step 18.
NO : Go to Step 17.

STEP 17. Scan tool MB991958 data list

- Refer to data list reference table.
  a. Item 32: Main Drive Lithium-ion Battery fan rotational speeds

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Replace the BMU.

STEP 18. Check the wiring harness between C-14 Main Drive Lithium-ion Battery fan connector (terminal No. 3) and C-107 BMU connector (terminal No. 21)

NOTE: Before checking the wiring harness, check intermediate connector C-102, and repair if necessary.

- Check the output line for open circuit, short circuit to ground and damage.

Q: Is the check result normal?

YES : Go to Step 19.
NO : Repair the wiring harness.

STEP 19. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Go to Step 20.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 20. Connector check: C-14 Main Drive Lithium-ion Battery fan connector, cooling fan connector

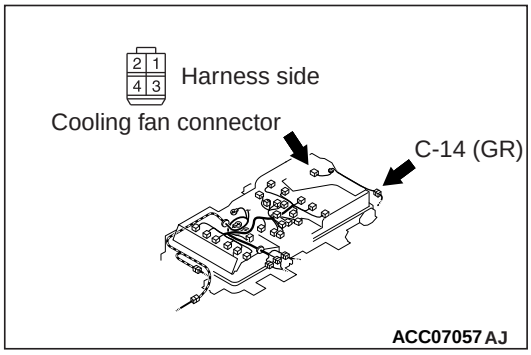
Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-176).

Q: Is the check result normal?

YES : Go to Step 21.
NO : Repair the connector.

STEP 21. Check the wiring harness between C-14 (terminal No. 1, 2, 3, 4) Main Drive Lithium-ion Battery fan connector and cooling fan (terminal No. 1, 2, 3, 4) connector

Check power supply line, out signal line and ground line for open circuit.



Q: Is the check result normal?

YES : Replace the cooling fan in the Main Drive Lithium-ion Battery (Refer to P.54D-199).
NO : Repair the wiring harness.

Code No. P1AC2: Main Drive Lithium-ion Battery Cooling Fan Failed (short circuits to power supply system) <Vehicles with Main Drive Lithium-ion Battery warming system or quick charging system>

TROUBLE JUDGMENT

Check Condition

- The electric motor switch is at "ON" position or while the Main Drive Lithium-ion Battery is charged.

Judgment Criterion

- For more than 5 seconds, the PWM output signal of the Main Drive Lithium-ion Battery fan is 10 % (while the fan is being driven). The output of the rotational speed is more than 5 V (more than 4,112 r/min or equivalent).

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSE

- The Main Drive Lithium-ion Battery fan relay is failed.
- Open circuits of Main Drive Lithium-ion Battery fan relay circuit, short circuits to ground or damage; poor contact of connector.
- The Main Drive Lithium-ion Battery fan is failed.
- Short circuits to power supply system of Main Drive Lithium-ion Battery fan circuit; poor contact of connector.
- The BMU is failed.

DIAGNOSIS

STEP 1. Connector check: A-115X Main Drive Lithium-ion Battery fan relay connector

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the connector.

STEP 2. Check Main Drive Lithium-ion Battery fan relay itself

- Remove the Main Drive Lithium-ion Battery fan relay, and check it.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Replace the Main Drive Lithium-ion Battery fan relay.

STEP 3. Perform voltage measurement at A-115X Main Drive Lithium-ion Battery fan relay

- Remove the relay, and measure at relay box side.
- Voltage between terminal No. 4 and ground.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 4.
NO : Check and repair harness between auxiliary battery and A-115X (terminal No. 4) Main Drive Lithium-ion Battery fan relay connector.
- Check power supply line for open circuit, short circuit to ground.

STEP 4. Connector check: C-14 Main Drive Lithium-ion Battery fan connector

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the connector.

STEP 5. Perform voltage measurement at C-14 Main Drive Lithium-ion Battery fan connector

- Disconnect connector, and measure at harness side.
- Remove the A-115X Main Drive Lithium-ion Battery fan relay, and short-circuit the terminal 4 and 3 at the relay box side.
- Voltage between terminal No. 1 and ground.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6.
NO : Check intermediate connector A-107, and repair if necessary. If intermediate connector is normal, check and repair harness between A-115X (terminal No. 3) Main Drive Lithium-ion Battery cooling fan relay connector and C-14 (terminal No. 1) Main Drive Lithium-ion Battery fan connector.
- Check output line for open circuit, short circuit to ground.

STEP 6. Perform resistance measurement at A-115X Main Drive Lithium-ion Battery fan relay connector

- Remove the relay, and measure at relay box side.
- Resistance between terminal No. 1 and ground.

OK: Continuity (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 7.
NO : Check intermediate connector B-122, and repair if necessary. If intermediate connector is normal, Check and repair harness between A-115X (terminal No. 1) Main Drive Lithium-ion Battery fan relay connector and ground.
- Check grounding line for open circuit and damage.

STEP 7. Check the wiring harness between auxiliary battery and A-115X (terminal No. 4) Main Drive Lithium-ion Battery fan relay connector

- Check the power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the wiring harness.

STEP 8. Check the wiring harness between A-115X (terminal No. 3) Main Drive Lithium-ion Battery fan relay connector and C-14 (terminal No. 1) Main Drive Lithium-ion Battery fan connector

NOTE: Before checking the wiring harness, check intermediate connector C-107, and repair if necessary.

- Check the output line for damage.

Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the wiring harness.

STEP 9. Connector check: C-106 EV-ECU connector

Q: Is the check result normal?

YES : Go to Step 10.
NO : Repair the connector.

STEP 10. Check the wiring harness between C-14 (terminal No. 2) Main Drive Lithium-ion Battery fan connector and C-107 (terminal No. 13) BMU connector

NOTE: Before checking the wiring harness, check intermediate connector C-102, and repair if necessary.

- Check the signal line for open circuit, short circuit to ground and damage.

Q: Is the check result normal?

YES : Go to Step 11.
NO : Repair the wiring harness.

STEP 11. Perform voltage measurement at C-107 BMU connector

- Measure the BMU terminal voltage.
- Disconnect C-14 Main Drive Lithium-ion Battery fan connector.
- Electric motor switch: ON
- Voltage between terminal No. 21 and ground.

OK: 0 – 0.1 V

Q: Is the check result normal?

YES : Go to Step 13.
NO : Go to Step 12.

STEP 12. Connector check: C-107 BMU connector, C-14 Main Drive Lithium-ion Battery fan connector

Q: Is the check result normal?

YES : Check intermediate connector C-102, and repair if necessary. If intermediate connector is normal, check and repair harness between C-14 (terminal No. 3) Main Drive Lithium-ion Battery fan connector and C-107 (terminal No. 21) BMU connector.
- Check the output line for short circuit to power supply.

NO : Repair the connector.

STEP 13. Perform voltage measurement at C-107 BMU connector
- Measure the BMU terminal voltage.
- Right after starting the regular charge.
- Voltage between terminal No. 21 and ground.

OK: 5 V or less (while the Main Drive Lithium-ion Battery fan is driving)

Q: Is the check result normal?

YES : Go to Step 14.
NO : Go to Step 15.

STEP 14. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 15. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

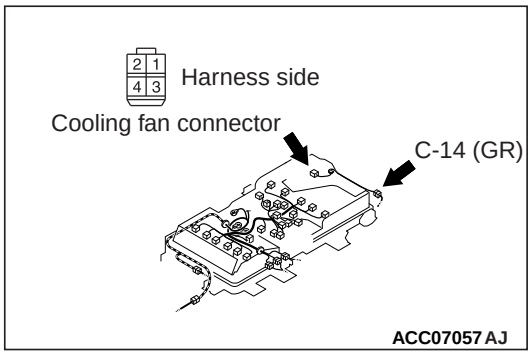
YES : Go to Step 16.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 16 Connector check: C-14 Main Drive Lithium-ion Battery fan connector, cooling fan connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-176).

Q: Is the check result normal?

YES : Go to Step 17.
NO : Repair the connector.



STEP 17. Check the wiring harness between C-14 (terminal No. 1, 2, 3, 4) Main Drive Lithium-ion Battery fan connector and cooling fan (terminal No. 1, 2, 3, 4) connector

Check power supply line, out signal line and ground line for open circuit.

Q: Is the check result normal?

YES : Replace the cooling fan in the Main Drive Lithium-ion Battery (Refer to P.54D-199).

NO : Repair the wiring harness.

Code No. P1AC3: Main Drive Lithium-ion Battery Fan Failed (stop abnormal) <Vehicles with Main Drive Lithium-ion Battery warming system or quick charging system>

TROUBLE JUDGMENT

Check Condition

- The electric motor switch is at "ON" position or while the Main Drive Lithium-ion Battery is charged.

Judgment Criterion

- For more than 5 seconds, the PWM output signal of the Main Drive Lithium-ion Battery fan is 100 % (while the fan stops). The output of the rotational speed is more than 0.7 V (more than 493 r/min or equivalent).

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSES

- The Main Drive Lithium-ion Battery fan is failed.
- Open circuits of Main Drive Lithium-ion Battery fan relay circuit, short circuits to power supply system or damage; poor contact of connector.
- The BMU is failed.

DIAGNOSIS

STEP 1. Connector check: C-107 BMU connector, C-14 Main Drive Lithium-ion Battery fan connector

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the connector.

STEP 2. Check the wiring harness between C-14 (terminal No. 2) Main Drive Lithium-ion Battery fan connector and C-107 (terminal No. 13) BMU connector

NOTE: Before checking the wiring harness, check intermediate connector C-102, and repair if necessary.

- Check the signal line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 3.
NO : Repair the wiring harness.

STEP 3. Perform voltage measurement at C-107 BMU connector

- Measure the BMU terminal voltage.
- Disconnect C-14 Main Drive Lithium-ion Battery fan connector.
- Electric motor switch: ON
- Voltage between terminal No. 21 and ground.

OK: 0 – 0.1 V

Q: Is the check result normal?

YES : Go to Step 4.
NO : Check intermediate connector C-102, and repair if necessary. If intermediate connector is normal, check and repair harness between C-14 Main Drive Lithium-ion Battery fan connector (terminal No. 3) and C-107 BMU connector (terminal No. 21).

- Check the output line for short circuit to power supply.

STEP 4. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU. Then go to Step 5.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 5. Scan tool MB991958 diagnostic trouble code

Q: Is the diagnostic trouble code stored?

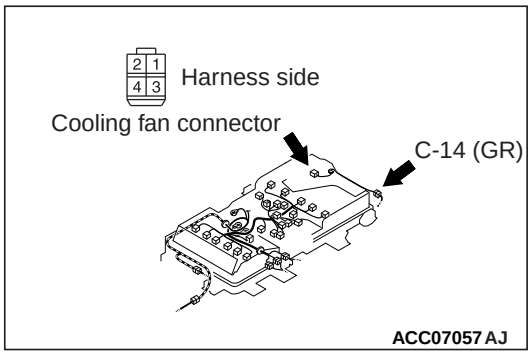
YES : Go to Step 6.
NO : Check is complete.

STEP 6. Connector check: C-14 Main Drive Lithium-ion Battery fan connector, cooling fan connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-176).

Q: Is the check result normal?

YES : Go to Step 7.
NO : Repair the connector.



STEP 7. Check the wiring harness between C-14 (terminal No. 1, 2, 3, 4) Main Drive Lithium-ion Battery fan connector and cooling fan (terminal No. 1, 2, 3, 4) connector

Check power supply line, out signal line and ground line for open circuit.

Q: Is the check result normal?

YES : Replace the cooling fan in the Main Drive Lithium-ion Battery (Refer to P.54D-199).

NO : Repair the wiring harness.

Code No. U1082: Local CAN (for Main Drive Lithium-ion Battery) Bus Off

TROUBLE JUDGMENT

Check Condition

- Three seconds elapse after the electric motor switch is turned ON, or three seconds elapse after the Main Drive Lithium-ion Battery starts to be charged.

Judgment Criterion

- When the bus off of the BMU is judged.

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSES

- The harnesses and connectors are failed.
- The Local CAN (for Main Drive Lithium-ion Battery) bus is failed.
- The BMU is failed.

DIAGNOSIS

STEP 1. Connector check: C-26 Main Drive Lithium-ion Battery connector

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the connector. Then go to Step 12.

STEP 2. Check the local CAN (for Main Drive Lithium-ion Battery) terminating resistor itself

- Check the local CAN (for Main Drive Lithium-ion Battery) terminating resistor itself of on-vehicle service.

Q: Is the check result normal?

YES : Go to Step 7.

NO : Go to Step 3.

STEP 3. Connector check: C-26 Main Drive Lithium-ion Battery connector, CMU12 from CMU01 connector, resistor (local CAN terminating) connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

YES : Go to Step 4.
NO : Repair the connector. Then go to Step 6.

STEP 4. Check the wiring harness between C-26 (terminal No. 5) Main Drive Lithium-ion Battery connector and CMU12 from CMU01 (each terminal No. 8) connector, resistor (local CAN terminating) (terminal No. 1) connector

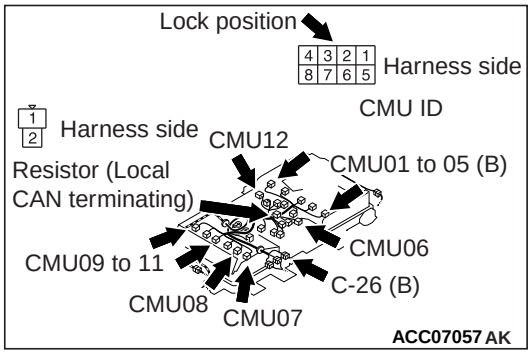
NOTE:

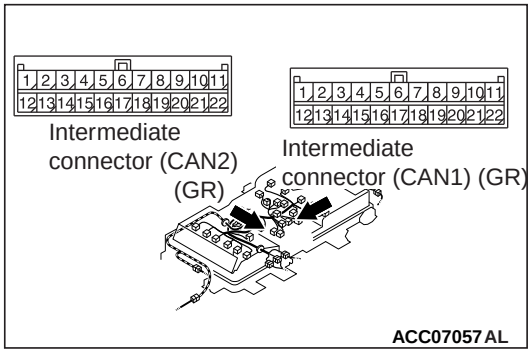
- *Before checking harness, check intermediate connector (CAN1) (terminal No. 11 from No. 3), intermediate connector (CAN2) (terminal No. 9 from No. 3) of out signal line, and repair if necessary.*

Check signal line (CANH) for open circuit.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the wiring harness. Then go to Step 6.

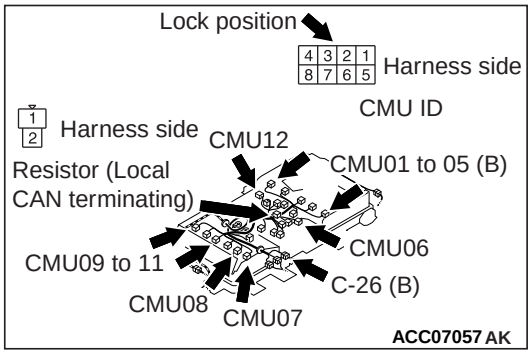


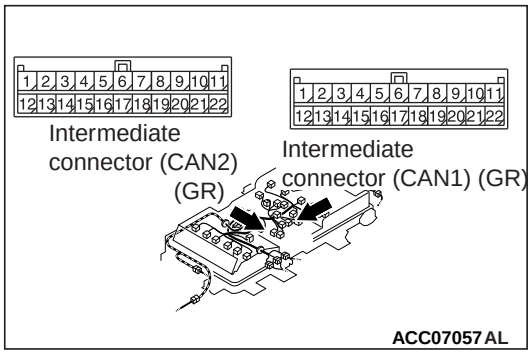


STEP 5. Check the wiring harness between C-26 (terminal No. 10) Main Drive Lithium-ion Battery connector and CMU12 from CMU01 (each terminal No. 4) connector, resistor (local CAN terminating) (terminal No. 2) connector

NOTE:

- *Before checking harness, check intermediate connector (CAN1) (terminal No. 22 from No. 14), intermediate connector (CAN2) (terminal No. 20 from No. 14) of out signal line, and repair if necessary.*





Check signal line (CANL) for open circuit.

Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the wiring harness. Then go to Step 6.

STEP 6. Check the local CAN (for Main Drive Lithium-ion Battery) terminating resistor

(1) Removal the local CAN terminating resistor in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the local CAN terminating resistor in Main Drive Lithium-ion Battery (Refer to P.54D-205).

Q: Is the check result normal?

YES : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).
NO : Replace the local CAN terminating resistor in Main Drive Lithium-ion Battery.

STEP 7. Connector check: C-109 BMU connector

Q: Is the check result normal?

YES : Go to Step 8.
NO : Repair the connector. Then go to Step 12.

STEP 8. Check the wiring harness between C-26 (terminal No. 10) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 38) BMU connector

- Check the signal line for open circuit, short circuit to ground, short circuit to power supply system and damage.

Q: Is the check result normal?

YES : Go to Step 9.
NO : Repair the wiring harness. Then go to Step 12.

STEP 9. Check the wiring harness between C-26 (terminal No. 5) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 37) BMU connector

- Check the signal line for open circuit, short circuit to ground, short circuit to power supply system and damage.

Q: Is the check result normal?

YES : Go to Step 10.
NO : Repair the wiring harness. Then go to Step 12.

STEP 10. Scan tool MB991958 data list of others system

(1) Select "Reset" for CMUs 01 to 12 on the special function screen, and then execute it.
(2) Check the data list on CMUs 01 to 12.
- Item No. 58: CAN controller

Q: Is the check result normal?

YES : Go to Step 11.
NO : Replace the Main Drive Lithium-ion Battery. Then go to Step 11.

STEP 11. Scan tool MB991958 diagnostic trouble code

Reconfirm whether the diagnostic trouble codes are stored in the BMU.

1. Erase the diagnostic trouble codes being stored.
2. Electric motor switch: "LOCK" (OFF) → "ON"
3. Confirm whether the diagnostic trouble codes are stored.

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU. Then go to Step 12.
NO : Check is complete.

STEP 12. Scan tool MB991958 diagnostic trouble code

Reconfirm whether the diagnostic trouble codes are stored in the BMU.

1. Erase the diagnostic trouble codes being stored.
2. Electric motor switch: "LOCK" (OFF) → "ON"
3. Confirm whether the diagnostic trouble codes are stored.

Q: Is the diagnostic trouble code stored?

YES : Go to Step 1.
NO : Check is complete.

Code No. U11A0: CMU01 time-out, U11A1: CMU02 time-out, U11A2: CMU03 time-out, U11A3: CMU04 time-out, U11A4: CMU05 time-out, U11A5: CMU06 time-out, U11A6: CMU07 time-out, U11A7: CMU08 time-out, U11A8: CMU09 time-out, U11A9: CMU10 time-out, U11AA: CMU11 time-out, U11AB: CMU12 time-out

TROUBLE JUDGMENT

Check Conditions

- Three seconds elapse after the electric motor switch is turned ON, or three seconds elapse after the Main Drive Lithium-ion Battery starts to be charged.
- The following diagnostic trouble code is not stored.
  a. U1082: Local CAN (for Main Drive Lithium-ion Battery) bus off

Judgment Criterion

- For more than 3 seconds, one of the CMU signals cannot be received through the CAN communication.

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSES

- The module (CMU) in the Main Drive Lithium-ion Battery is failed.
- The harnesses and connectors are failed.
- The Local CAN (for Main Drive Lithium-ion Battery) bus is failed.
- Short circuits to ground of CMU power supply circuits; poor contact of connector.
- The BMU is failed.

DIAGNOSIS

STEP 1. Connector check: C-22 Main Drive Lithium-ion Battery connector

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the connector. Then go to Step 20.

STEP 2. Measure the voltage at C-22 Main Drive Lithium-ion Battery connector

- Disconnect the connector, and measure at harness side.
- Electric motor switch: ON
- Voltage between terminal No. 4 and ground.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 6.
NO : Go to Step 3.

STEP 3. Connector check: A-08X EV control relay connector

Q: Is the check result normal?

YES : Go to Step 4.
NO : Repair or replace the connector. Then go to Step 20.

STEP 4. Check the wiring harness between A-08X (terminal No. 1) EV control relay connector and C-22 (terminal No. 4) Main Drive Lithium-ion Battery connector

NOTE: Before checking the wiring harness, check intermediate connectors B-27, C-102 and C-112, and repair if necessary.

- Check the power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the wiring harness. Then go to Step 20.

STEP 5. Check the wiring harness between C-21 (terminal No. 3) Main Drive Lithium-ion Battery connector and C-104 (terminal No. 3) BMU connector

- Check the ground line damage.

Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the wiring harness. Then go to Step 20.

STEP 6. Connector check: C-26 Main Drive Lithium-ion Battery connector

Q: Is the check result normal?

YES : Go to Step 7.
NO : Repair the connector. Then go to Step 20.

STEP 7. Check the local CAN (for Main Drive Lithium-ion Battery) terminating resistor itself

- Check the local CAN (for Main Drive Lithium-ion Battery) terminating resistor itself of on-vehicle service.

Q: Is the check result normal?

YES : Go to Step 12.
NO : Go to Step 8.

STEP 8. Connector check: C-26 Main Drive Lithium-ion Battery connector, CMU12 from CMU01 connector, resistor (local CAN terminating) connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

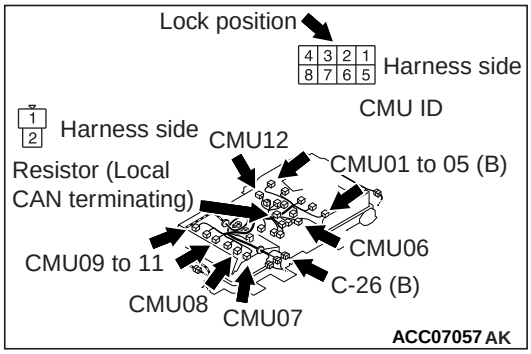
Q: Is the check result normal?

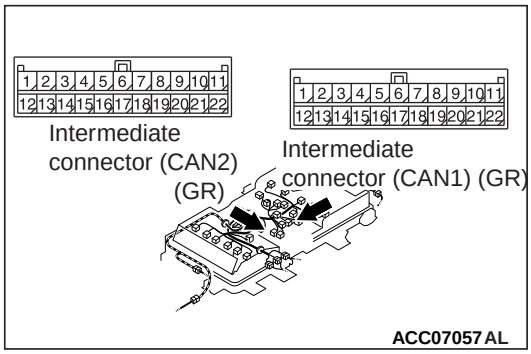
YES : Go to Step 9.
NO : Repair the connector. Then go to Step 9.

STEP 9. Check the wiring harness between C-26 (terminal No. 5) Main Drive Lithium-ion Battery connector and CMU12 from CMU01 (each terminal No. 8) connector, resistor (local CAN terminating) (terminal No. 1) connector

NOTE:

- *Before checking harness, check intermediate connector (CAN1) (terminal No. 11 from No. 3), intermediate connector (CAN2) (terminal No. 9 from No. 3) of out signal line, and repair if necessary.*





Check signal line (CANH) for open circuit.

Q: Is the check result normal?

YES : Go to Step 10.

NO : Repair the wiring harness. Then go to Step 10.

STEP 10. Check the wiring harness between C-26 (terminal No. 10) Main Drive Lithium-ion Battery connector and CMU12 from CMU01 (terminal No. 4) connector, resistor (local CAN terminating) (terminal No. 2) connector

NOTE:

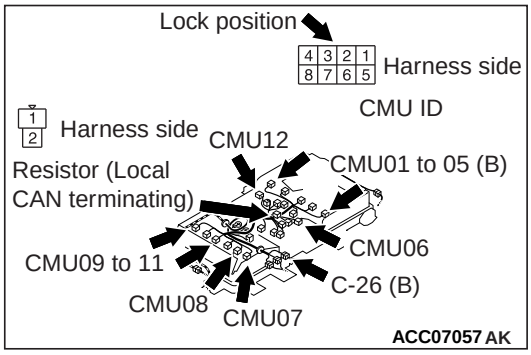
- *Before checking harness, check intermediate connector (CAN1) (terminal No. 22 from No. 14), intermediate connector (CAN2) (terminal No. 20 from No. 14) of out signal line, and repair if necessary.*

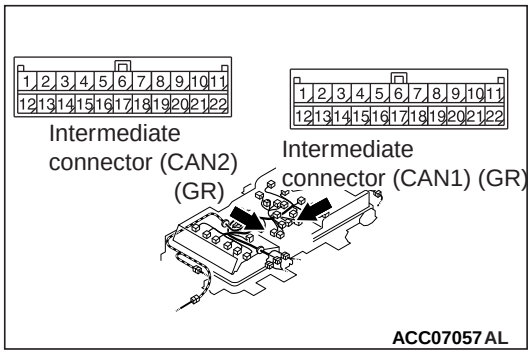
Check signal line (CANL) for open circuit.

Q: Is the check result normal?

YES : Go to Step 11.

NO : Repair the wiring harness. Then go to Step 11.





STEP 11. Check the local CAN (for Main Drive Lithium-ion Battery) terminating resistor

(1) Removal the local CAN terminating resistor in Main Drive Lithium-ion Battery (Refer to P.54D-176).
(2) Check the local CAN terminating resistor in Main Drive Lithium-ion Battery (Refer to P.54D-205).

Q: Is the check result normal?

YES : Go to Step 20.
NO : Replace the local CAN terminating resistor in Main Drive Lithium-ion Battery. Then go to Step 20.

STEP 12. Connector check: C-109 BMU connector

Q: Is the check result normal?

YES : Go to Step 13.
NO : Repair the connector. Then go to Step 20.

STEP 13. Check the wiring harness between C-26 (terminal No. 10) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 38) BMU connector

- Check the signal line for open circuit, short circuit to ground, short circuit to power supply system and damage.

Q: Is the check result normal?

YES : Go to Step 14.
NO : Repair the wiring harness. Then go to Step 20.

STEP 14. Check the wiring harness between C-26 (terminal No. 5) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 37) BMU connector

- Check the signal line for open circuit, short circuit to ground, short circuit to power supply system and damage.

Q: Is the check result normal?

YES : Go to Step 15.
NO : Repair the wiring harness. Then go to Step 20.

STEP 15. Scan tool MB991958 data list of others system

(1) Select "Reset" for CMUs 01 to 12 on the special function screen, and then execute it.
(2) Check the data list on CMUs 01 to 12.
    - Item No. 58: CAN controller

Q: Is the check result normal?

YES : Go to Step 19.
NO : Go to Step 16.

STEP 16. Connector check: C-26 Main Drive Lithium-ion Battery connector, CMU12 from CMU01 connector, resistor (local CAN terminating) connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

Q: Is the check result normal?

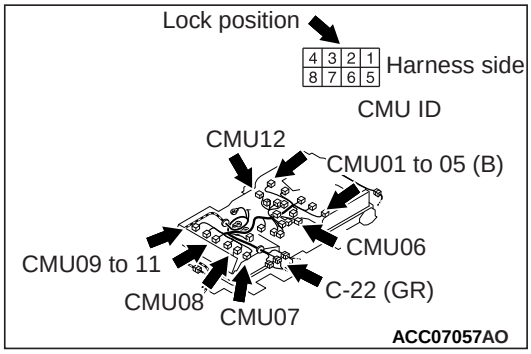
YES : Go to Step 17.
NO : Repair the connector. Then go to Step 17.

STEP 17. Check the wiring harness between C-22 (terminal No. 4) Main Drive Lithium-ion Battery connector and CMU12 from CMU01 (each terminal No. 1) connector

NOTE:

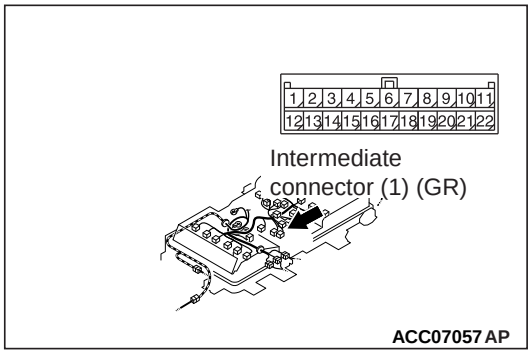
- *Before checking harness, check intermediate connector (1) (terminal No. 3, No. 11 from No. 6, No. 22 from No. 15) of out signal line, and repair if necessary.*

Check power supply line for open circuit.



Q: Is the check result normal?

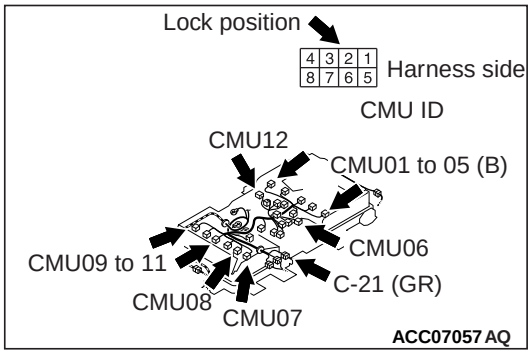
YES : Go to Step 18.
NO : Repair the wiring harness. Then go to Step 18.

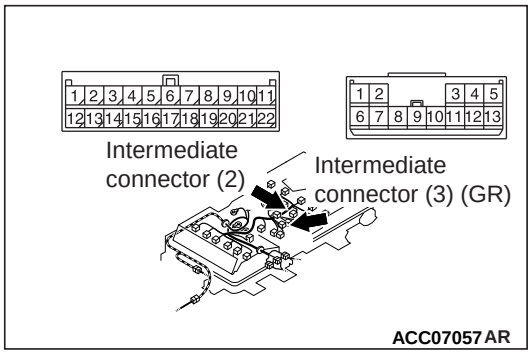


STEP 18. Check the wiring harness between C-21 (terminal No. 3) Main Drive Lithium-ion Battery connector and CMU12 from CMU01 (each terminal No. 7) connector

NOTE:

- *Before checking harness, check intermediate connector (2) (terminal No. 16 from No. 12, No. 22 from No. 18), intermediate connector (3) (terminal No. 1, No. 2, No. 10 from No. 6) of out signal line, and repair if necessary.*





Check ground line for open circuit.

Q: Is the check result normal?

YES : Replace the Main Drive Lithium-ion Battery. Then go to Step 20.

NO : Repair the wiring harness. Then go to Step 20.

STEP 19. Scan tool MB991958 diagnostic trouble code

Reconfirm whether the diagnostic trouble codes are stored in the BMU.

1. Erase the diagnostic trouble codes being stored.
2. Electric motor switch: "LOCK" (OFF) → "ON"
3. Confirm whether the diagnostic trouble codes are stored.

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU. Then go to Step 20.

NO : Check is complete.

STEP 20. Scan tool MB991958 diagnostic trouble code

Reconfirm whether the diagnostic trouble codes are stored in the BMU.

1. Erase the diagnostic trouble codes being stored.
2. Electric motor switch: "LOCK" (OFF) → "ON"
3. Confirm whether the diagnostic trouble codes are stored.

Q: Is the diagnostic trouble code stored?

YES : Go to Step 1.

NO : Check is complete.

Code No. U1925: CMU ID numbering reception error

TROUBLE JUDGMENT

Check Conditions

- When the CMUs are numbered for identification.

Judgment Criterion

- Within 5 seconds after the system has numbered a CMU, the system cannot receive any information pertaining to that identification number from the CMU.
  or
- A parity error is detected in communication data.
  or
- A checksum error is detected in communication data.

FAIL-SAFE AND BACKUP FUNCTION

- Not available

PROBABLE CAUSES

- The module (CMU) in the Main Drive Lithium-ion Battery is failed.
- The harnesses and connectors are failed.
- Short circuits to ground of CMU power supply circuits; poor contact of connector.
- Noise interruption in communication wires.
- The BMU is failed.

DIAGNOSIS

STEP 1. Connector check: C-22 Main Drive Lithium-ion Battery connector

Q: Is the check result normal?

YES : Go to Step 2.
NO : Repair the connector. Then go to Step 14.

STEP 2. Measure the voltage at C-22 Main Drive Lithium-ion Battery connector

- Disconnect the connector, and measure at harness side.
- Electric motor switch: ON
- Voltage between terminal No. 4 and ground.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 8.
NO : Go to Step 3.

STEP 3. Connector check: C-21 Main Drive Lithium-ion Battery connector, A-08X EV control relay connector, C-104 ground connector

Q: Is the check result normal?

YES : Go to Step 4.
NO : Repair or replace the connector. Then go to Step 14.

STEP 4. Check the wiring harness between A-08X (terminal No. 1) EV control relay connector and C-22 (terminal No. 4) Main Drive Lithium-ion Battery connector

NOTE: Before checking the wiring harness, check intermediate connectors B-27, C-102 and C-112, and repair if necessary.

- Check the power supply line for damage.

Q: Is the check result normal?

YES : Go to Step 5.
NO : Repair the wiring harness. Then go to Step 14.

STEP 5. Check the wiring harness between C-21 (terminal No. 3) Main Drive Lithium-ion Battery connector and C-104 (terminal No. 3) ground connector

- Check the ground line short circuit and damage.

Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the wiring harness. Then go to Step 14.

STEP 6. Connector check: C-26 Main Drive Lithium-ion Battery connector, C-109 BMU connector

Q: Is the check result normal?

YES : Go to Step 7.
NO : Repair the connector. Then go to Step 14.

STEP 7. Check the wiring harness between C-26 (terminal No. 4, 9) Main Drive Lithium-ion Battery connector and C-109 (terminal No. 49, 48) BMU connector

- Check the signal line for open circuit and damage.

Q: Is the check result normal?

YES : Go to Step 12.
NO : Repair the wiring harness. Then go to Step 14.

STEP 8. Connector check: CMU12 from CMU01 connector

Removal the Main Drive Lithium-ion Battery cover (Refer to P.54D-182).

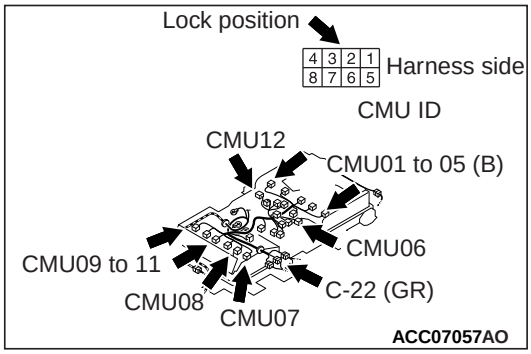
Q: Is the check result normal?

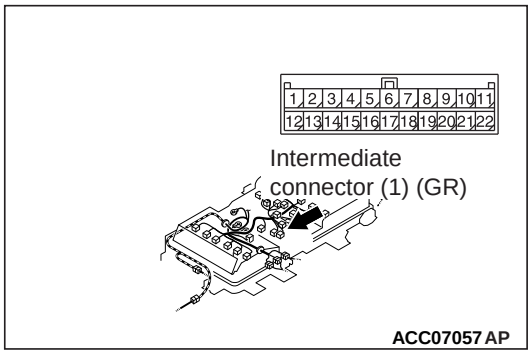
YES : Go to Step 9.
NO : Repair the connector. Then go to Step 9.

STEP 9. Check the wiring harness between C-22 (terminal No. 4) Main Drive Lithium-ion Battery connector and CMU12 from CMU01 (each terminal No. 1) connector

NOTE:

- *Before checking harness, check intermediate connector (1) (terminal No. 3, No. 11 from No. 6, No. 22 from No. 15) of out signal line, and repair if necessary.*





Check power supply for open circuit.

Q: Is the check result normal?

YES : Go to Step 10.

NO : Repair the wiring harness. Then go to Step 10.

STEP 10. Check the wiring harness between C-21 (terminal No. 3) Main Drive Lithium-ion Battery connector and CMU12 from CMU01 (each terminal No. 7) connector

NOTE:

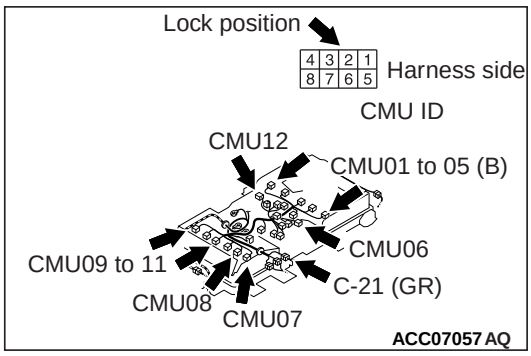
- *Before checking harness, check intermediate connector (2) (terminal No. 16 from No. 12, No. 22 from No. 18), intermediate connector (3) (terminal No. 1, No. 2, No. 10 from No. 6) of out signal line, and repair if necessary.*

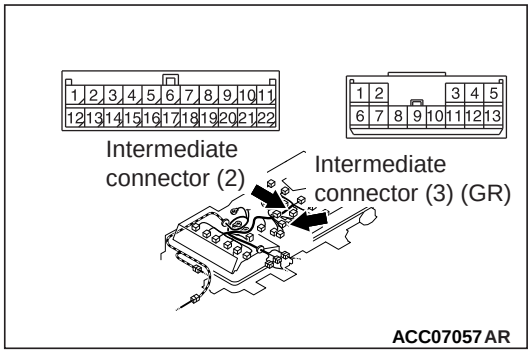
Check ground line for open circuit.

Q: Is the check result normal?

YES : Go to Step 11.

NO : Repair the wiring harness. Then go to Step 11.

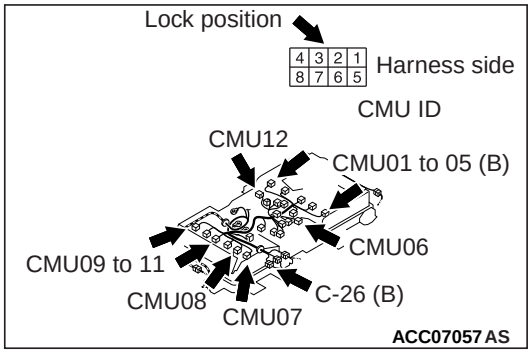




STEP 11. Check the wiring harness between C-26 (terminal No. 4, 9) Main Drive Lithium-ion Battery connector and CMU07 (terminal No. 2) connector, CMU06 (terminal No. 6) connector, CMU07 (terminal No. 6) connector from CMU06 (terminal No. 2) connector

NOTE:

- *Check the wiring harness between CMU07 connector (terminal No. 6) and CMU08 connector (terminal No. 2), CMU08 connector (terminal No. 6) and CMU09 connector (terminal No. 2), CMU09 connector (terminal No. 6) and CMU10 connector (terminal No. 2), CMU10 connector (terminal No. 6) and CMU11 connector (terminal No. 2), CMU11 connector (terminal No. 6) and CMU12 connector (terminal No. 2), CMU1 connector2 (terminal No. 6) and CMU01 connector (terminal No. 2), CMU01 connector (terminal No. 6) and CMU02 connector (terminal No. 2), CMU02 connector (terminal No. 6) and CMU03 connector (terminal No. 2), CMU03 connector (terminal No. 6) and CMU04 connector (terminal No. 2), CMU04 connector (terminal No. 6) and CMU05 connector (terminal No. 2), CMU05 connector (terminal No. 6) and CMU06 connector (terminal No. 2), and repair if necessary.*



Check signal line for open circuit.

Q: Is the check result normal?

YES : Go to Step 12.
NO : Repair the wiring harness. Then go to Step 14.

STEP 12. Scan tool MB991958 diagnostic trouble code

Reconfirm whether the diagnostic trouble codes are stored in the BMU.

1. Erase the diagnostic trouble codes being stored.
2. Electric motor switch: "LOCK" (OFF) → "ON"
3. Confirm whether the diagnostic trouble codes are stored.

Q: Is the diagnostic trouble code stored?

YES : Replace the BMU. Then go to Step 13.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 13. Scan tool MB991958 diagnostic trouble code

Reconfirm whether the diagnostic trouble codes are stored in the BMU.

1. Erase the diagnostic trouble codes being stored.
2. Electric motor switch: "LOCK" (OFF) → "ON"
3. Confirm whether the diagnostic trouble codes are stored.

Q: Is the diagnostic trouble code stored?

YES : Replace the Main Drive Lithium-ion Battery.
NO : Intermittent malfunction (Refer to GROUP 00 – How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions).

STEP 14. Scan tool MB991958 diagnostic trouble code

(1) Select "CMU ID numbering" on the special function screen of the relevant CMU ID, and execute it.

Q: Is the diagnostic trouble code stored?

YES : Go to Step 1.
NO : Check is complete.

ON-VEHICLE SERVICE

CHECK ON COIL RESITANCE OF CONTACTOR

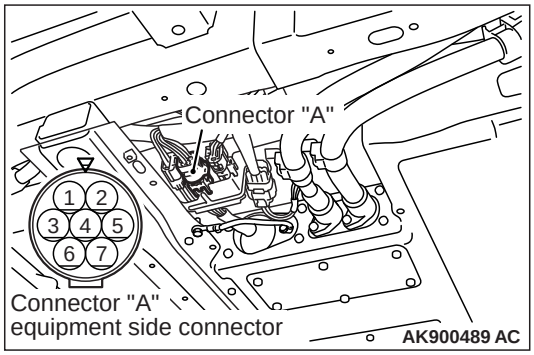
M1549402100098

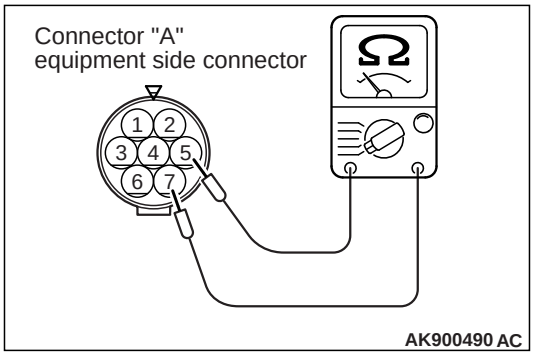
⚠ ***DANGER***

- ***Be sure to pull service plugs to shut down high voltage for servicing the high voltage system components.***
- ***When pulling service plugs, wear the specified protective equipment.***

CHECK ON COIL RESITANCE OF CHARGING CONTACTOR

1. Disconnect the Main Drive Lithium-ion Battery connector "A".



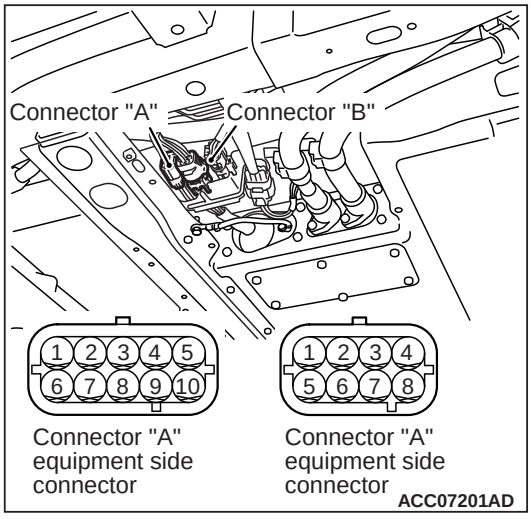


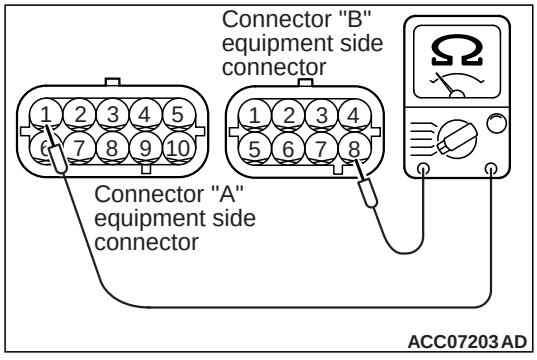
2. Measure the resistance between terminal No. 7 and No. 5 of the Main Drive Lithium-ion Battery connector "A".

Standard value: 33 – 39 Ω [at 23°C (73°F)]

CHECK ON COIL RESITANCE OF QUICK CHARGING CONTACTOR (+), (–)

1. Disconnect the Main Drive Lithium-ion Battery connector "A" and "B".

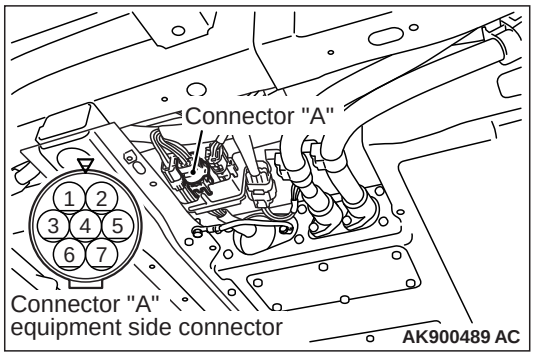




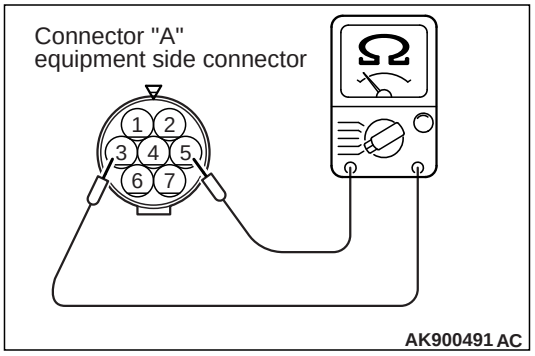
2. Measure the resistance between terminal No. 1 of the Main Drive Lithium-ion Battery connector "A" and No. 8 of the Main Drive Lithium-ion Battery connector "B".

Standard value: 17 – 19 Ω [at 23°C (73°F)]

CHECK ON COIL RESITANCE OF MAIN CONTACTOR (+)



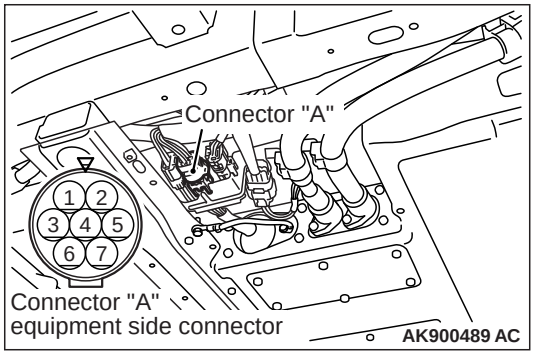
1. Disconnect the Main Drive Lithium-ion Battery connector "A".



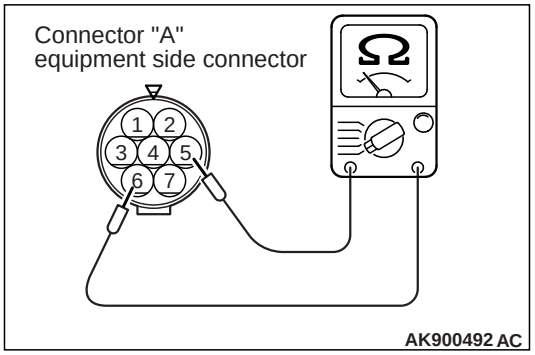
2. Measure the resistance between terminal No. 3 and No. 5 of the Main Drive Lithium-ion Battery connector "A".

   Standard value: 33 – 39 Ω [at 23°C (73°F)]

CHECK ON COIL RESITANCE OF MAIN CONTACTOR (–)



1. Disconnect the Main Drive Lithium-ion Battery connector "A".

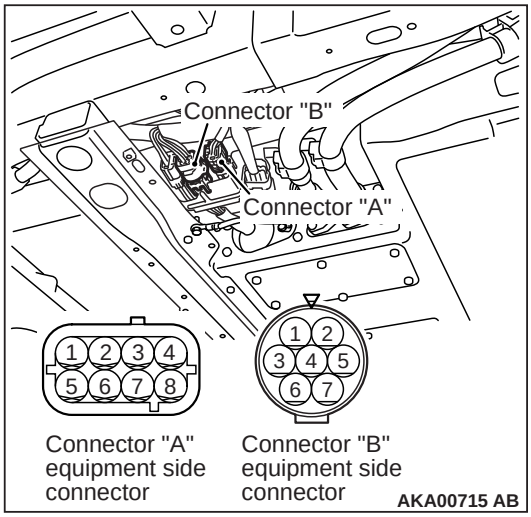


2. Measure the resistance between terminal No. 6 and No. 5 of the Main Drive Lithium-ion Battery connector "A".

   Standard value: 33 – 39 Ω [at 23°C (73°F)]

CHECK ON SERVICE PLUG SWITCH

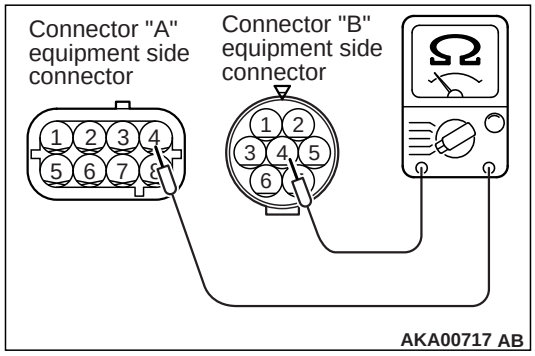
M1549402400099



1. Disconnect the connector "A" and the connector "B" of the Main Drive Lithium-ion Battery.

⚠ ***DANGER***

When pulling service plugs, wear the specified protective equipment.

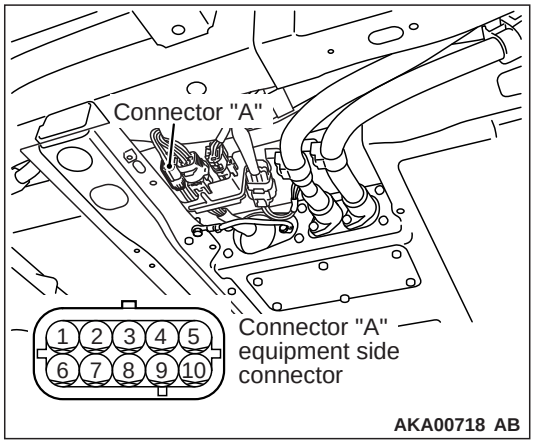


2. Measure the resistance between the Main Drive Lithium-ion Battery connector "A" terminal No. 4 and the Main Drive Lithium-ion Battery connector "B" terminal No. 4.

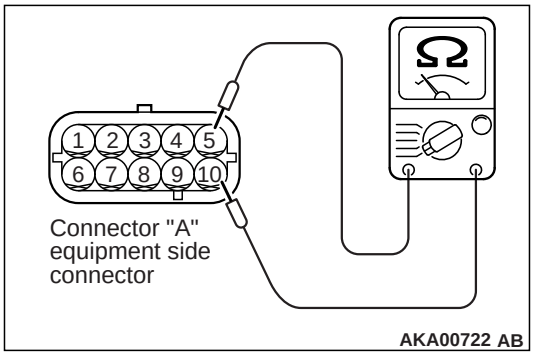
Service plug status	Normal condition
Inserted service plug	Continuity (2 Ω or less)
Disconnected service plug	No continuity

LOCAL CAN (FOR MAIN DRIVE LITHIUM-ION BATTERY) TERMINATING RESISTOR CHECK

M1549402500104



1. Disconnect the Main Drive Lithium-ion Battery connector "A".

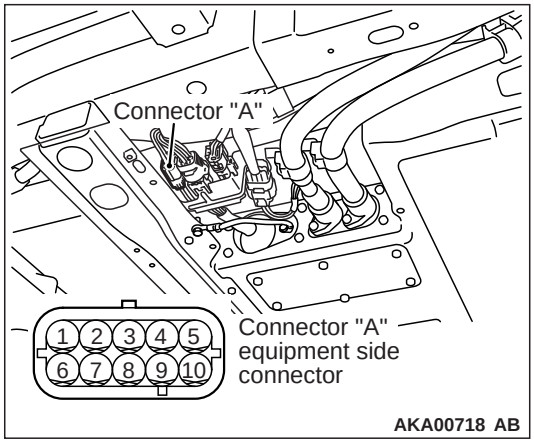


2. Measure the resistance between terminal No. 5 and No. 10 of Main Drive Lithium-ion Battery connector "A".

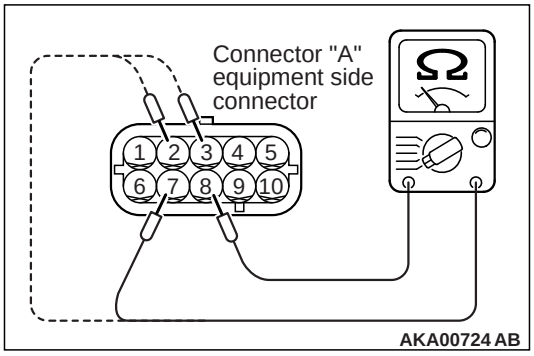
Standard value: 80 – 96 Ω [at 20°C (68°F)]

CHECK ON MAIN DRIVE LITHIUM-ION BATTERY CURRENT SENSOR

M1549454900095



1. Disconnect the Main Drive Lithium-ion Battery connector "A".



2. Measure the resistance between the terminals of the Main Drive Lithium-ion Battery connector "A".

Standard value:

Measured terminal	Resistance value
2 – 8	1 – 5 kΩ [at 25°C (77°F)]
3 – 8	1 – 5 kΩ [at 25°C (77°F)]
7 – 8	1 – 5 kΩ [at 25°C (77°F)]

CHECK AND REPLACEMENT OF THE HIGH-VOLTAGE FUSE INSIDE THE MAIN DRIVE LITHIUM-ION BATTERY

M1549403000209

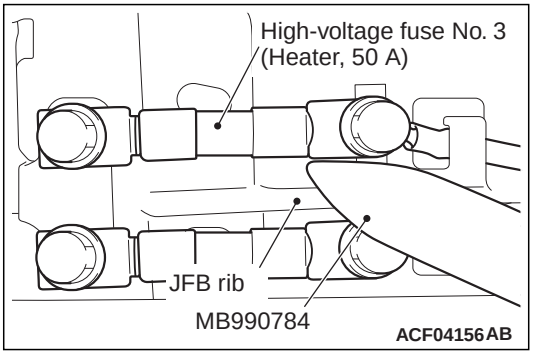
⚠ DANGER

When servicing the high-voltage system parts, be sure to wear the specified protection equipment and disconnect the service plug to interrupt the high-voltage supply (Refer to GROUP 00 – Precautions before service, Precautions on how to use the high-voltage vehicle).

1. Remove the front floor covers A and B (Refer to GROUP 51 – Under Cover).

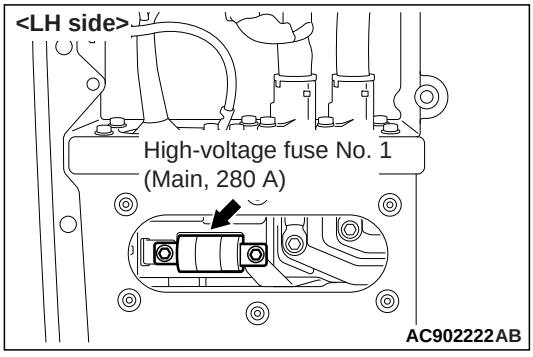
2. Remove the work hole lid for the main drive lithium-ion battery.

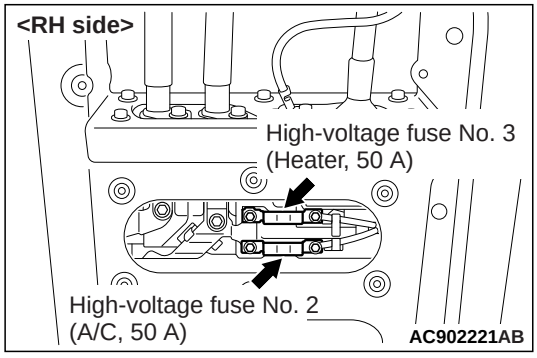
⚠ CAUTION
To pull out high-voltage fuse No. 3 (heater, 50A), wedge the ornament remover (special tool: MB990784) into the JFB ribs to counterhold the fuse.



3. Remove each mounting bolt and remove each high-voltage fuse.
4. check the resistance between the high-voltage fuses, and if there is no continuity (open circuit), replace the high-voltage fuses.

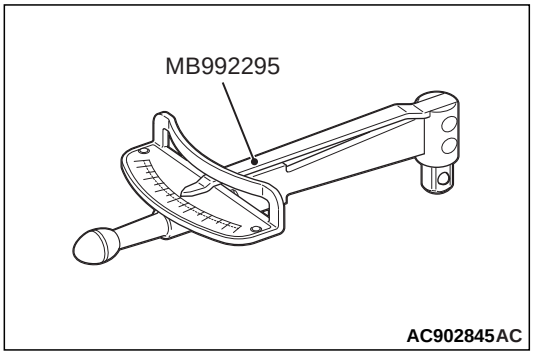
⚠ CAUTION
When tightening the mounting bolts, secure the high-voltage fuse terminal portion, because there is a risk of damage to the high-voltage fuse when an excessive force applies to the high-voltage fuse main body.





5. Tighten each mounting bolt to the specified torque. Tighten each mounting bolt for the high-voltage fuse No. 2 and 3 to the specified torque using the torque wrench (special tool: MB992295).

   Tightening torque:
   High-voltage fuse No. 1: 9.0 ± 3.0 N·m (80 ± 26 in-lb)
   High-voltage fuse No. 2 and 3: 7.0 ± 3.0 N·m (62 ± 26 in-lb)



6. Install the work hole lid for the main drive lithium-ion battery.
7. Install the front floor covers A and B (Refer to GROUP 51 – Under Cover).

MAIN DRIVE LITHIUM-ION BATTERY DISASSEMBLY AND ASSEMBLY

SERVICE PROCEDURE

M1549403800012

⚠ CAUTION

- **When you assemble and disassemble the Main Drive Lithium-ion Battery, always wear electric-insulated gloves, boots and protection glasses.**
- **After you remove the Main Drive Lithium-ion Battery, be sure to disconnect all of the four bus bars from the front and rear modules to reduce the possibility of electric shock. Do not connect the bus bars until you complete the service work.**
- **Use special tool (MB992915) to protect the unaffected area (which you do not service) of the removed Main Drive Lithium-ion Battery.**
- **When you service an electric terminal on the module, remove the respective cover only (do not remove the other covers).**
- **Before engaging the bus bar, make sure that it is not scratched or contaminated.**
- **A damaged wiring harness clip should be replaced with new one.**
- **Always use a torque wrench to tighten a nut or bolt to the specified torque. Then identify it with a paint mark.**

After assembling the Main Drive Lithium-ion Battery, check the followings:

1. **Before mounting the Main Drive Lithium-ion Battery to the vehicle, check the Main Drive Lithium-ion Battery for air leaks (Refer to P.54D-199).**
2. **When any of the cell modules is replaced, use the M.U.T.-III to select and execute "CMU ID numbering" on the BMU special function menu to number the CMUs for identification after the Main Drive Lithium-ion Battery assembly has been mounted. Then measure the Main Drive Lithium-ion Battery capacity.**
3. **Use the scan tool MB991958 to check that no diagnostic trouble code is stored.**

*NOTE: *: Using the recommended tools allows you to number the CMU and measure the Main Drive Lithium-ion Battery capacity without mounting the Main Drive Lithium-ion Battery.*

EIGHT-CELL MODULE REMOVAL AND INSTALLATION

Service procedure	Work description	Reference page
1	Main Drive Lithium-ion Battery cover removal and installation	P.54D-182

Service procedure	Work description	Reference page
2	Air duct removal and installation	P.54D-184
3	Pad removal and installation	P.54D-184
4	Bus bar removal and installation	P.54D-185
5	Eight-cell module removal and installation	P.54D-186

FOUR-CELL MODULE REMOVAL AND INSTALLATION

Service procedure	Work description	Reference page
1	Main Drive Lithium-ion Battery cover removal and installation	P.54D-182
2	Air duct removal and installation	P.54D-184
3	Pad removal and installation	P.54D-184
4	Bus bar removal and installation	P.54D-185
5	JFB cover removal and installation	P.54D-190
6	Four-cell module removal and installation	P.54D-191

GROUND FAULT DETECTOR REMOVAL AND INSTALLATION

Service procedure	Work description	Reference page
1	Main Drive Lithium-ion Battery cover removal and installation	P.54D-182
2	Air duct removal and installation	P.54D-184
3	Pad removal and installation	P.54D-184
4	Bus bar removal and installation	P.54D-185
5	Ground fault detector removal and installation	P.54D-195

ELECTRIC CURRENT SENSOR REMOVAL AND INSTALLATION

Service procedure	Work description	Reference page
1	Main Drive Lithium-ion Battery cover removal and installation	P.54D-182
2	Air duct removal and installation	P.54D-184
3	Pad removal and installation	P.54D-184
4	Bus bar removal and installation	P.54D-185
5	JFB cover removal and installation	P.54D-190
6	Electric current sensor removal and installation	P.54D-195

RESISTOR REMOVAL AND INSTALLATION

Service procedure	Work description	Reference page
1	Main Drive Lithium-ion Battery cover removal and installation	P.54D-182

Service procedure	Work description	Reference page
2	Air duct removal and installation	P.54D-184
3	Pad removal and installation	P.54D-184
4	Bus bar removal and installation	P.54D-185
5	JFB cover removal and installation	P.54D-190
6	JFB removal and installation	P.54D-196
7	Resistor removal and installation	P.54D-197

CONTACTOR REMOVAL AND INSTALLATION

Service procedure	Work description	Reference page
1	Main Drive Lithium-ion Battery cover removal and installation	P.54D-182
2	Air duct removal and installation	P.54D-184
3	Pad removal and installation	P.54D-184
4	Bus bar removal and installation	P.54D-185
5	JFB cover removal and installation	P.54D-190
6	JFB removal and installation	P.54D-196
7	Electric current sensor removal and installation	P.54D-195
8	Ground fault detector removal and installation	P.54D-195
9	Resistor removal and installation	P.54D-197
10	Contactor removal and installation	P.54D-198

COOLING FAN REMOVAL AND INSTALLATION

Service procedure	Work description	Reference page
1	Main Drive Lithium-ion Battery cover removal and installation	P.54D-182
2	Cooling fan removal and installation	P.54D-199

SERVICE PLUG REMOVAL AND INSTALLATION

Service procedure	Work description	Reference page
1	Main Drive Lithium-ion Battery cover removal and installation	P.54D-182
2	Air duct removal and installation	P.54D-184
3	Pad removal and installation	P.54D-184
4	Bus bar (service plug) removal and installation	P.54D-185

SERVICE PROCEDURE CHECK SHEET

M1549403900097

⚠ CAUTION

- **When you assemble and disassemble the Main Drive Lithium-ion Battery, always wear electric-insulated gloves, boots and protection glasses.**
- **After you remove the Main Drive Lithium-ion Battery, be sure to disconnect all of the four bus bars from the front and rear modules to reduce the possibility of electric shock. Do not connect the bus bars until you complete the service work.**
- **Use special tool (MB992915) to protect the unaffected area (which you do not service) of the removed Main Drive Lithium-ion Battery.**
- **When you service an electric terminal on the module, remove the respective cover ONLY (do not remove the other covers).**
- **Before engaging the bus bar, make sure that it is not scratched or contaminated.**
- **A damaged wiring harness clip should be replaced with new one.**
- **Always use a torque wrench to tighten a nut or bolt to the specified torque. Then identify it with a paint mark.**

ITEMS TO CHECK AFTER THE MAIN DRIVE LITHIUM-ION BATTERY HAS BEEN ASSEMBLED

Check column	Service procedure	Work description
	1	Check the battery assembly for air leaks.
	2	Use the scan tool MB991958 to number the CMUs for identification.
	3	Measure the Main Drive Lithium-ion Battery capacity.
	4	Use the scan tool MB991958 to check that no diagnostic trouble code is stored.

EIGHT-CELL MODULE REMOVAL AND INSTALLATION

Check column	Service procedure	Work description
	1	Main Drive Lithium-ion Battery cover removal and installation
	2	Air duct removal and installation
	3	Pad removal and installation
	4	Bus bar removal and installation
	5	Eight-cell module removal and installation

FOUR-CELL MODULE REMOVAL AND INSTALLATION

Check column	Service procedure	Work description
	1	Main Drive Lithium-ion Battery cover removal and installation
	2	Air duct removal and installation
	3	Pad removal and installation
	4	Bus bar removal and installation
	5	JFB cover removal and installation
	6	Four-cell module removal and installation

GROUND FAULT DETECTOR REMOVAL AND INSTALLATION

Check column	Service procedure	Work description
	1	Main Drive Lithium-ion Battery cover removal and installation
	2	Air duct removal and installation
	3	Pad removal and installation
	4	Bus bar removal and installation
	5	Ground fault detector removal and installation

ELECTRIC CURRENT SENSOR REMOVAL AND INSTALLATION

Check column	Service procedure	Work description
	1	Main Drive Lithium-ion Battery cover removal and installation
	2	Air duct removal and installation
	3	Pad removal and installation
	4	Bus bar removal and installation
	5	JFB cover removal and installation
	6	Electric current sensor removal and installation

RESISTOR REMOVAL AND INSTALLATION

Check column	Service procedure	Work description
	1	Main Drive Lithium-ion Battery cover removal and installation
	2	Air duct removal and installation
	3	Pad removal and installation
	4	Bus bar removal and installation
	5	JFB cover removal and installation
	6	JFB removal and installation
	7	Resistor removal and installation

CONTACTOR REMOVAL AND INSTALLATION

Check column	Service procedure	Work description
	1	Main Drive Lithium-ion Battery cover removal and installation
	2	Air duct removal and installation
	3	Pad removal and installation
	4	Bus bar removal and installation
	5	JFB cover removal and installation
	6	JFB removal and installation
	7	Electric current sensor removal and installation
	8	Ground fault detector removal and installation
	9	Resistor removal and installation
	10	Contactor removal and installation

COOLING FAN REMOVAL AND INSTALLATION

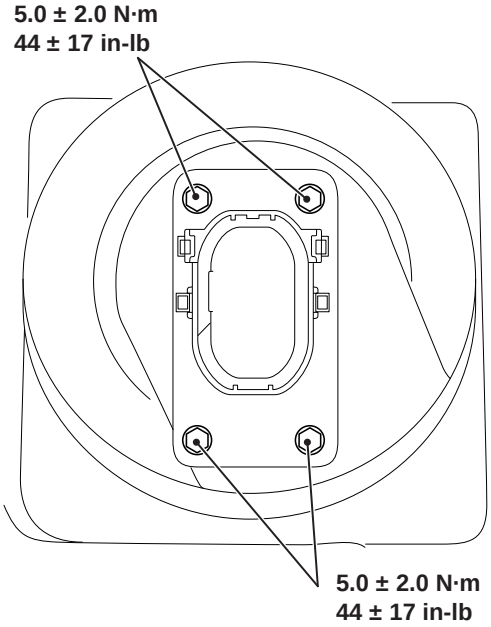
Check column	Service procedure	Work description
	1	Main Drive Lithium-ion Battery cover removal and installation
	2	Cooling fan removal and installation

SERVICE PLUG REMOVAL AND INSTALLATION

Check column	Service procedure	Work description
	1	Main Drive Lithium-ion Battery cover removal and installation
	2	Air duct removal and installation
	3	Pad removal and installation
	4	Bus bar (service plug) removal and installation

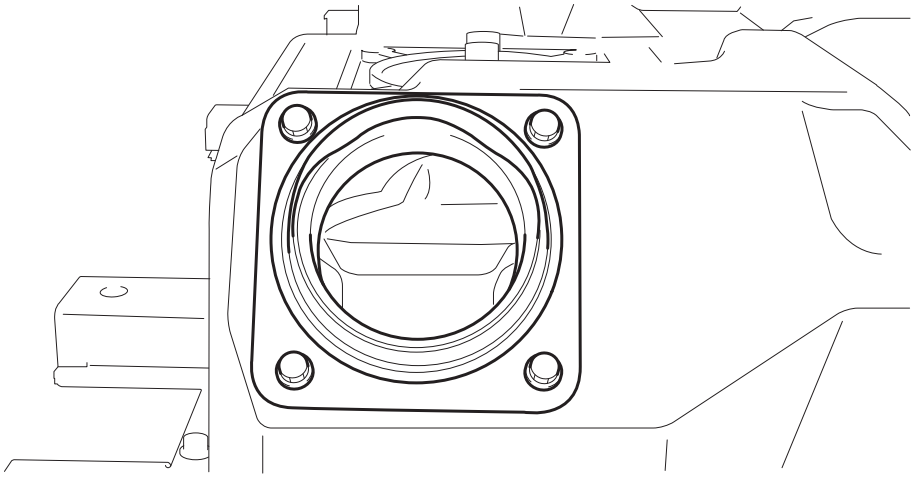
MAIN DRIVE LITHIUM-ION BATTERY COVER REMOVAL AND INSTALLATION

M1549404000019



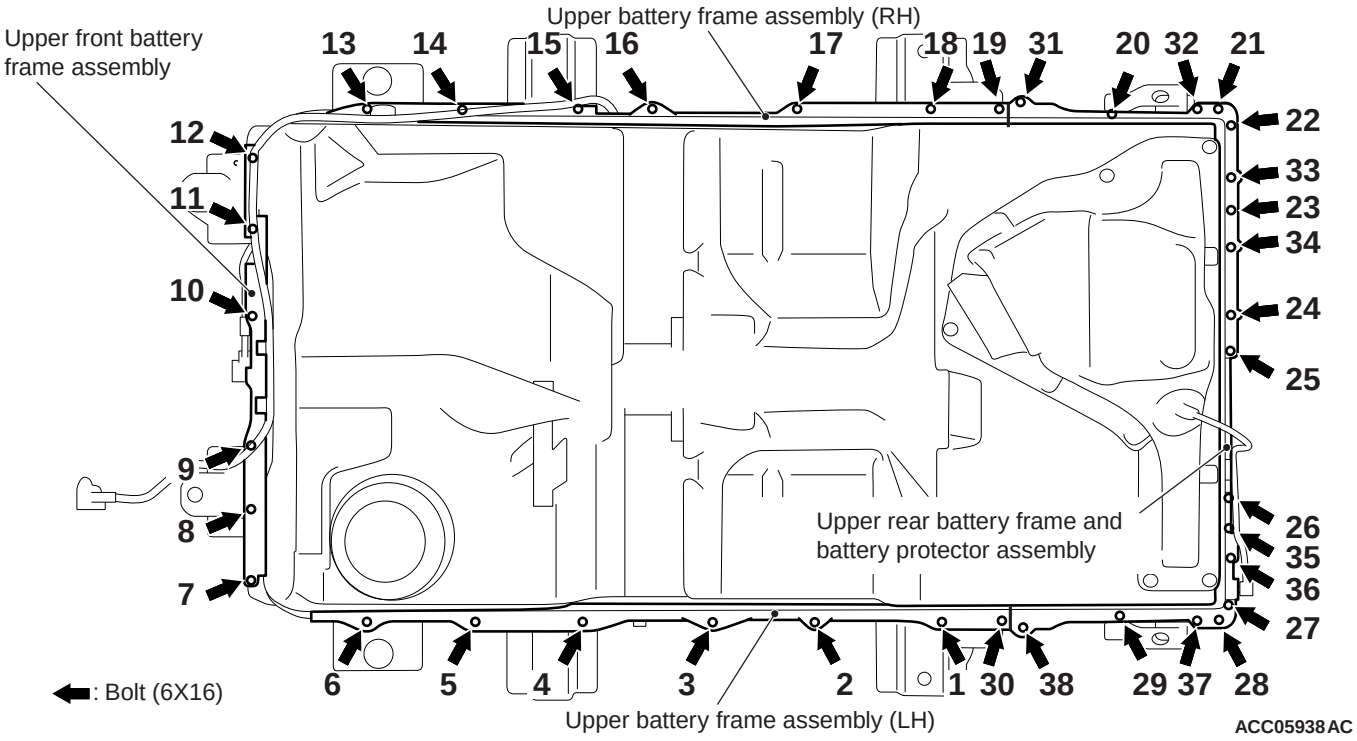
ACC05936AC

1. Remove the four fasteners securing the service plug base to the Main Drive Lithium-ion Battery cover.



ACC07225

2. Remove the four fasteners to remove the cooling duct. <Vehicles with Main Drive Lithium-ion Battery warming system or quick-charging system>

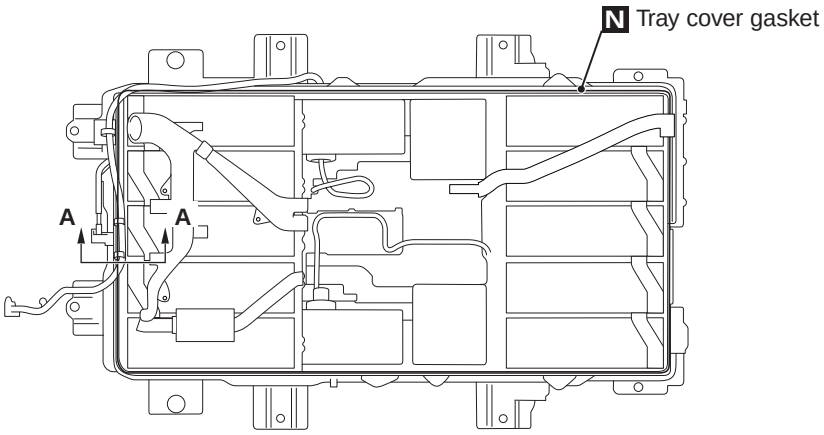


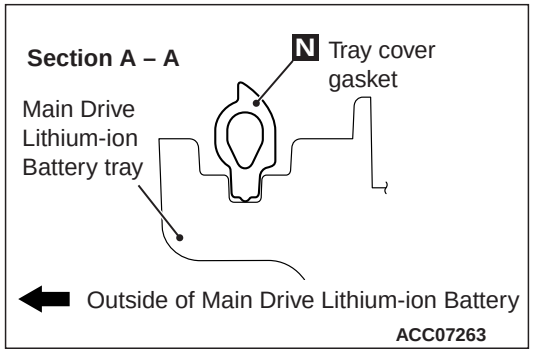
3. Remove the 38 fasteners securing the Main Drive Lithium-ion Battery cover to the Main Drive Lithium-ion Battery tray.

   NOTE: Tighten the 38 fasteners securing the Main Drive Lithium-ion Battery cover to the Main Drive Lithium-ion Battery tray in the order shown.

   Tightening torque:
   10 ± 2 N·m (89 ± 17 in-lb)

4. Remove the frame or protector securing the Main Drive Lithium-ion Battery cover to the Main Drive Lithium-ion Battery tray.





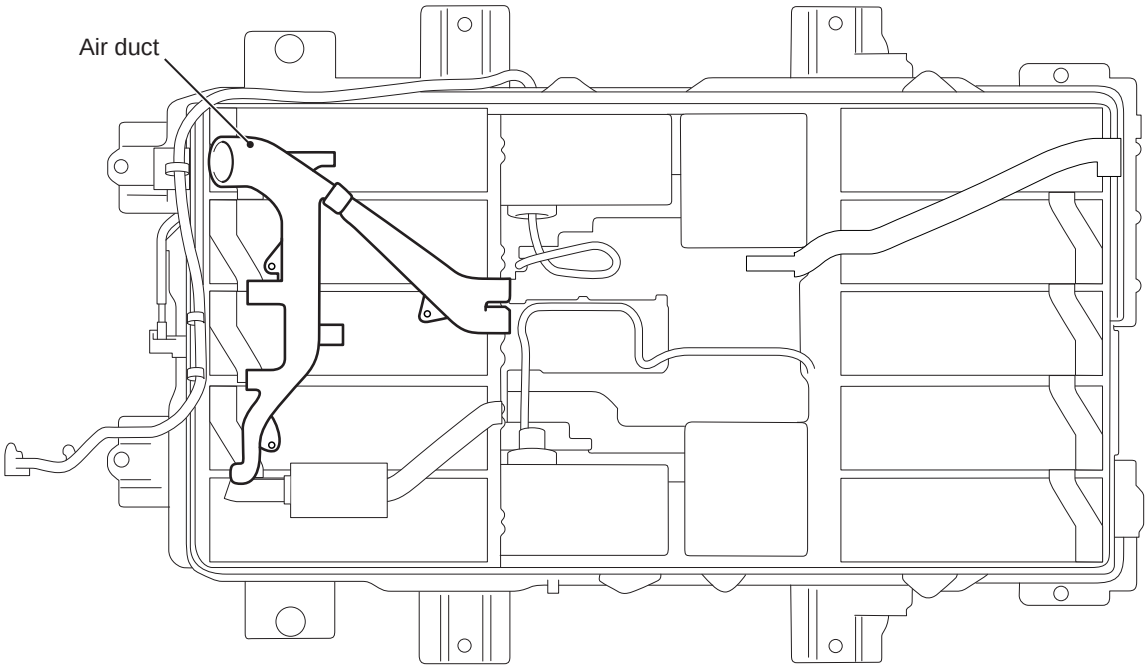
ACD02614 AB

5. Remove the cover of the Main Drive Lithium-ion Battery.

NOTE: Make sure that the tray cover gasket is located between the Main Drive Lithium-ion Battery cover and the Main Drive Lithium-ion Battery tray as shown.

AIR DUCT REMOVAL AND INSTALLATION

M1549404100016

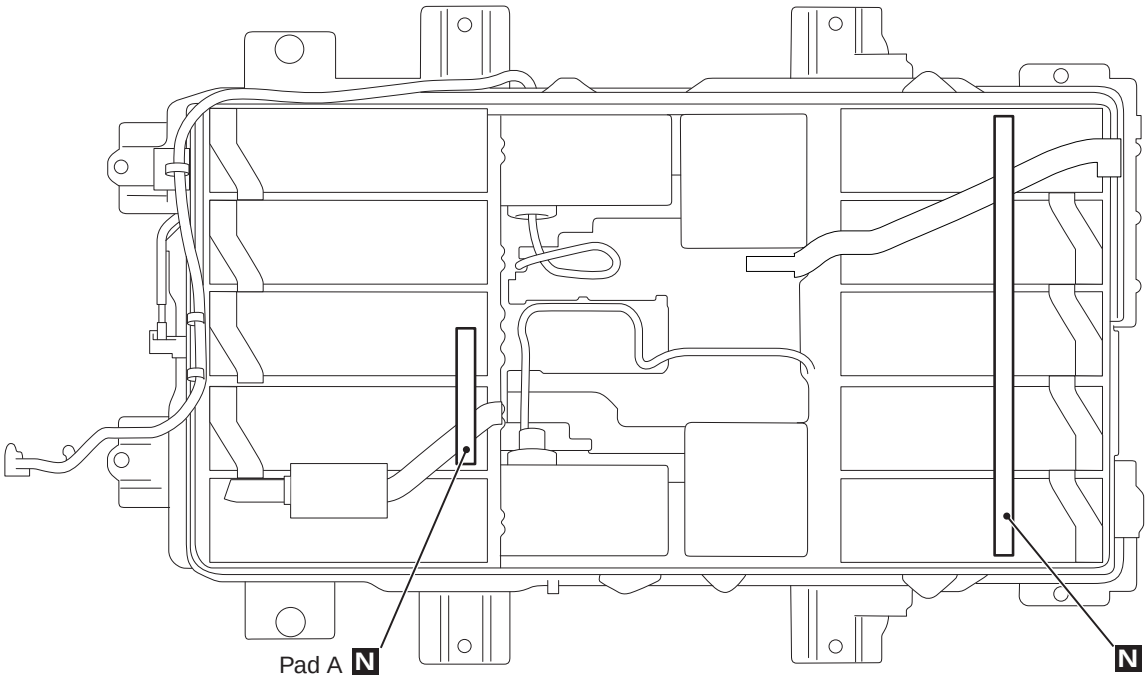


ACC05940AC

1. Remove the three mounting fasteners from the air duct.
2. Remove the air duct.

PAD REMOVAL AND INSTALLATION

M1549404200013



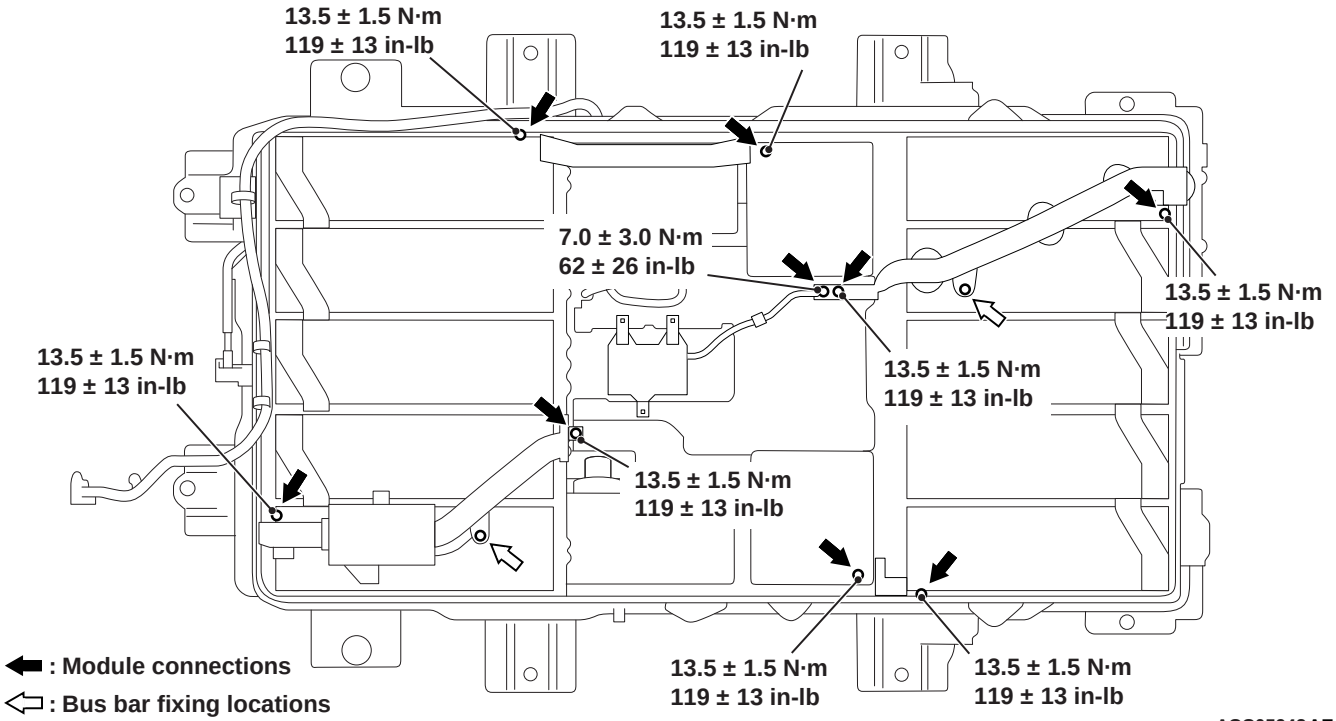
ACD02690 AB

Remove the pad.

Number of pads:
A and B

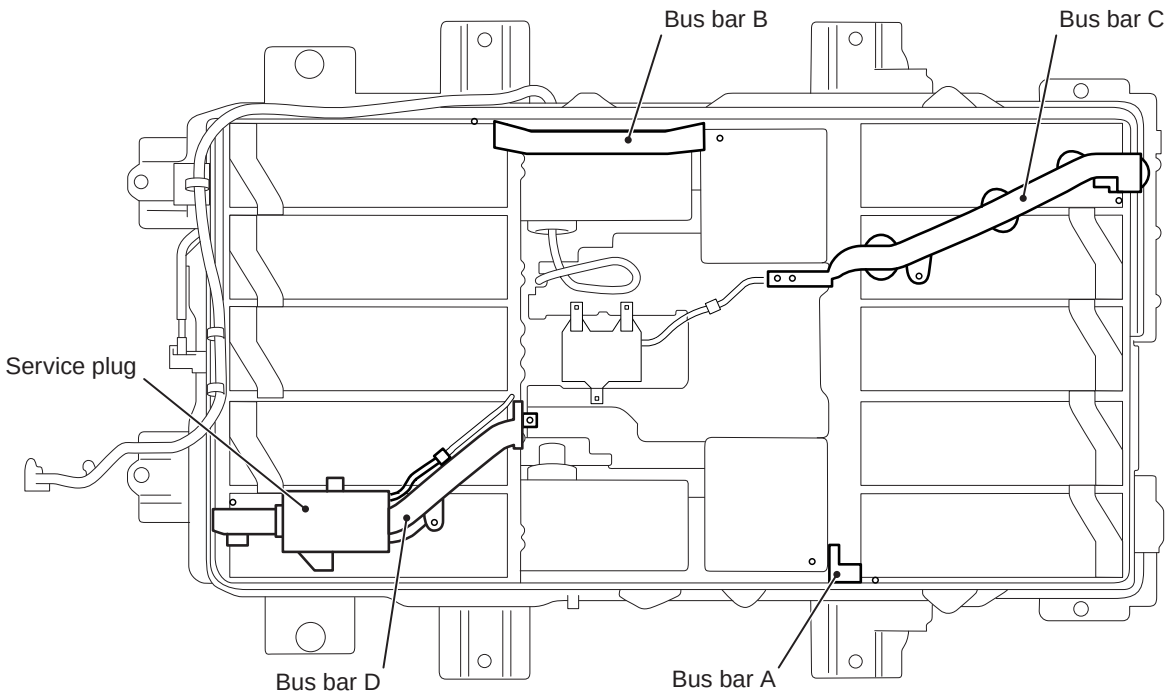
BUS BAR REMOVAL AND INSTALLATION

M1549404300010



ACC05942AE

1. Disconnect the bus bar from the module (nine locations) and loosen it (two locations).



ACC05943AB

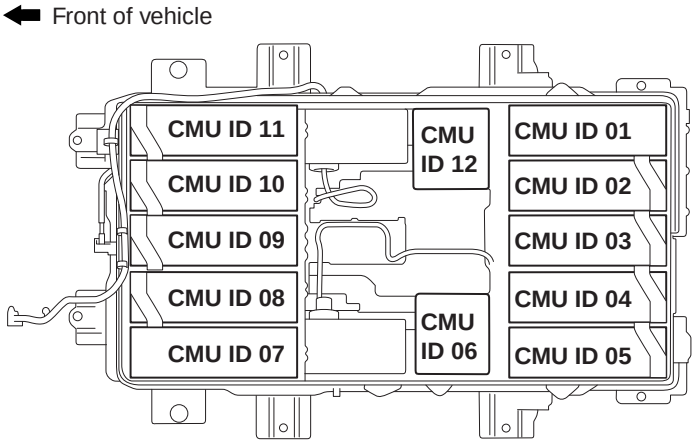
⚠ CAUTION
Before installing the bus bar shown by "A" in the figure, use an multimeter to check that there is no potential difference between the two module terminals at the bus bar ends.

2. Remove the four bus bars in the alphabetical order shown.

EIGHT-CELL MODULE REMOVAL AND INSTALLATION

M1549404400062

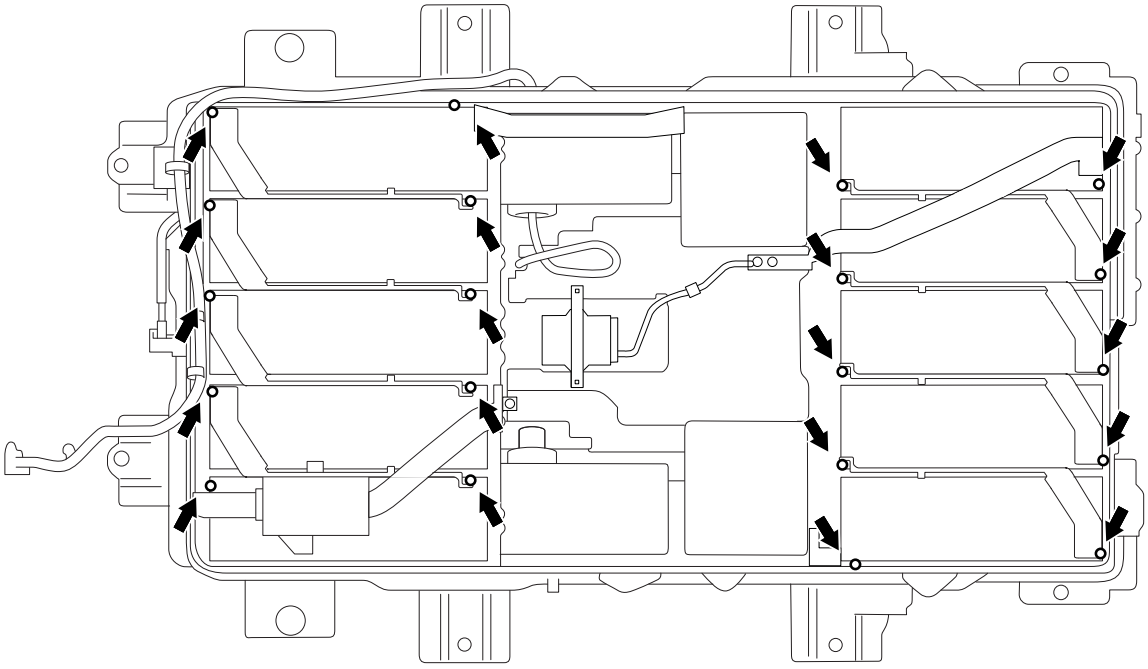
NOTE:



ACC07060AC

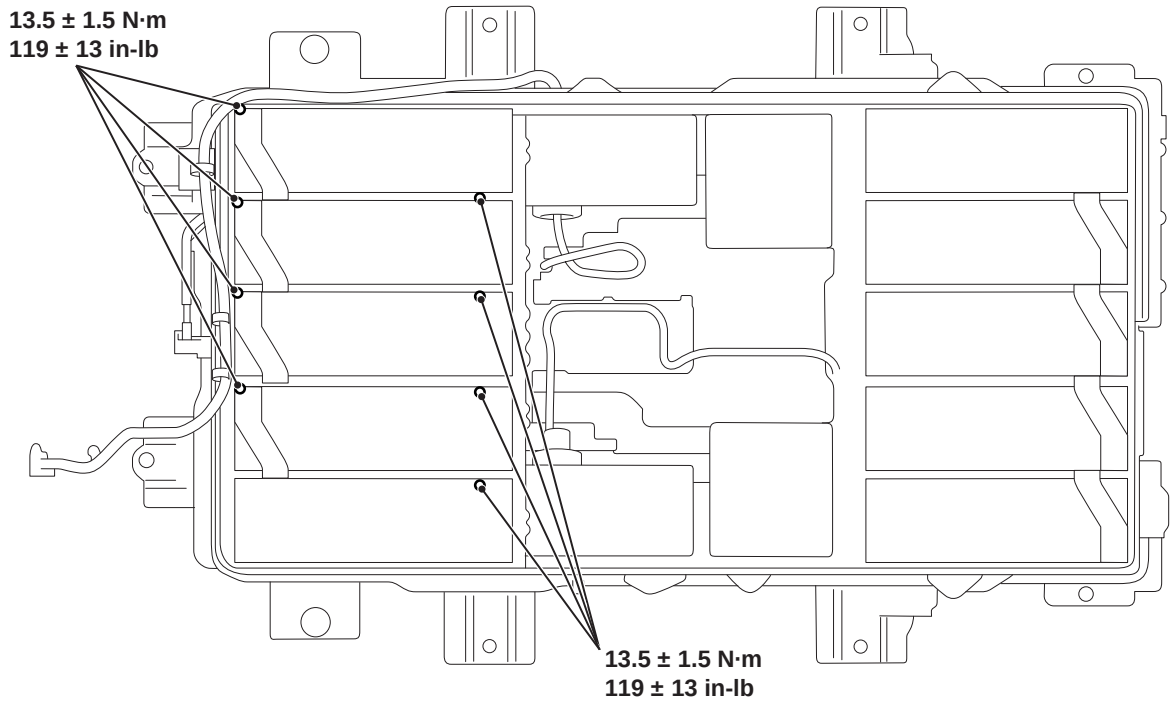
The CMU IDs on the module are assigned as shown.

⚠ CAUTION



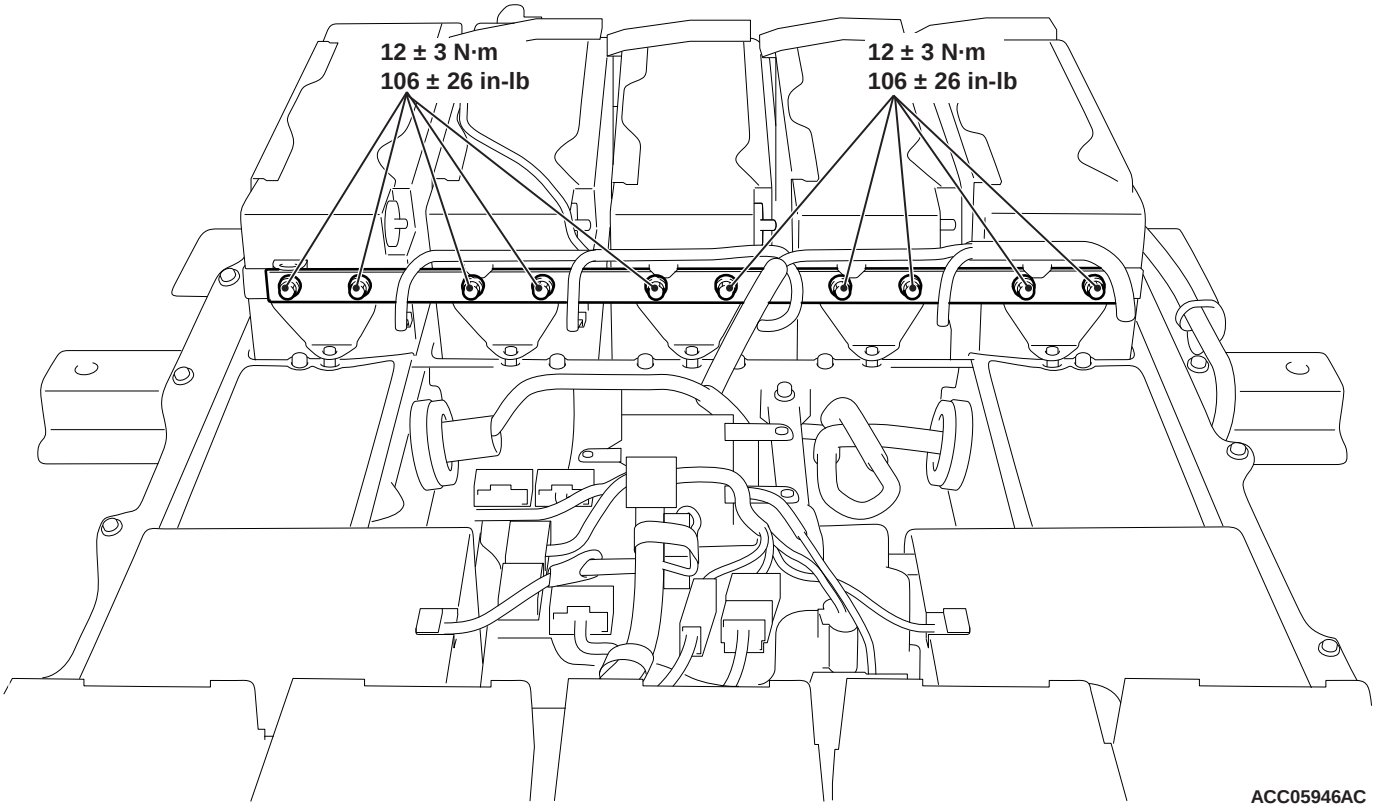
ACE03021AC

Use a straight wrench as the clearances among the modules are small.



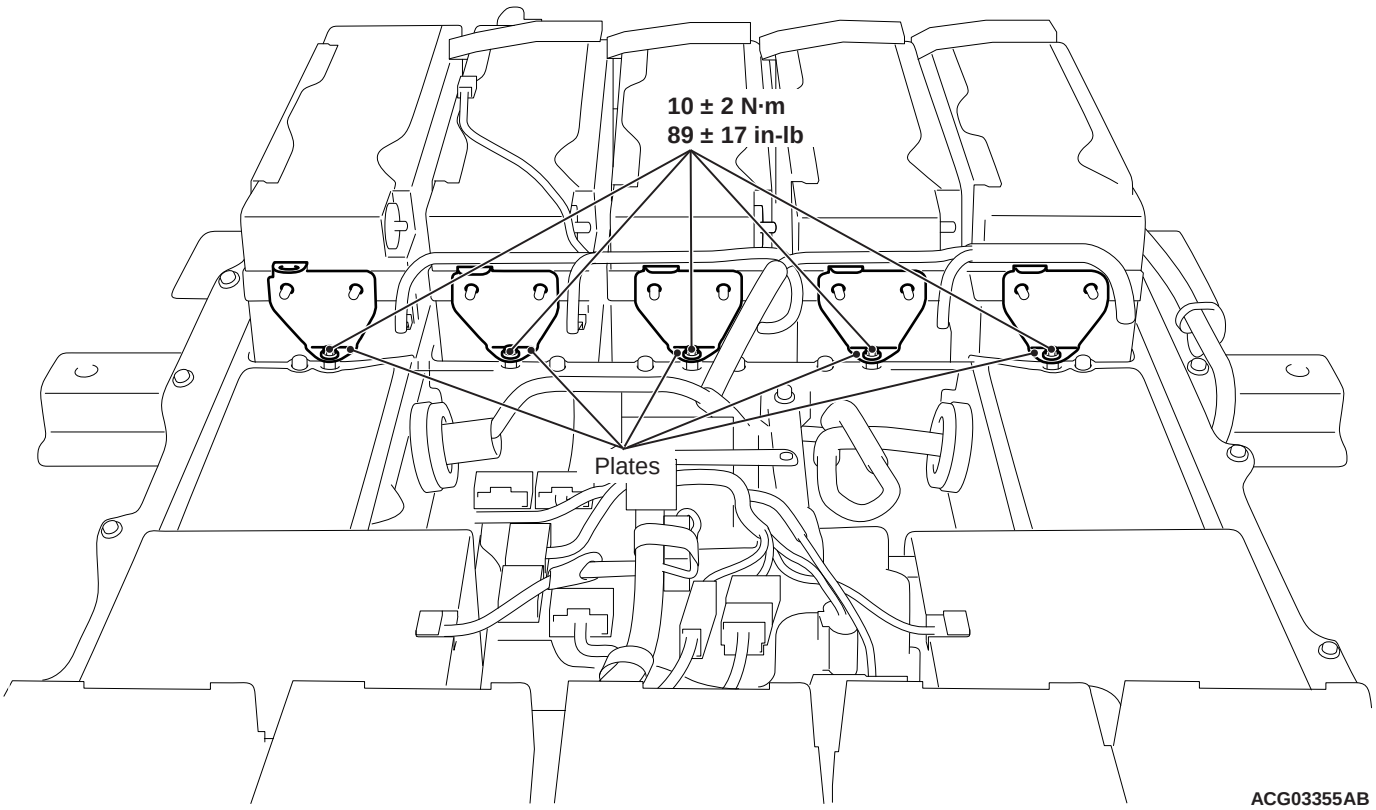
ACC05944AG

1. Loosen the eight fasteners securing the bus bars to the module.

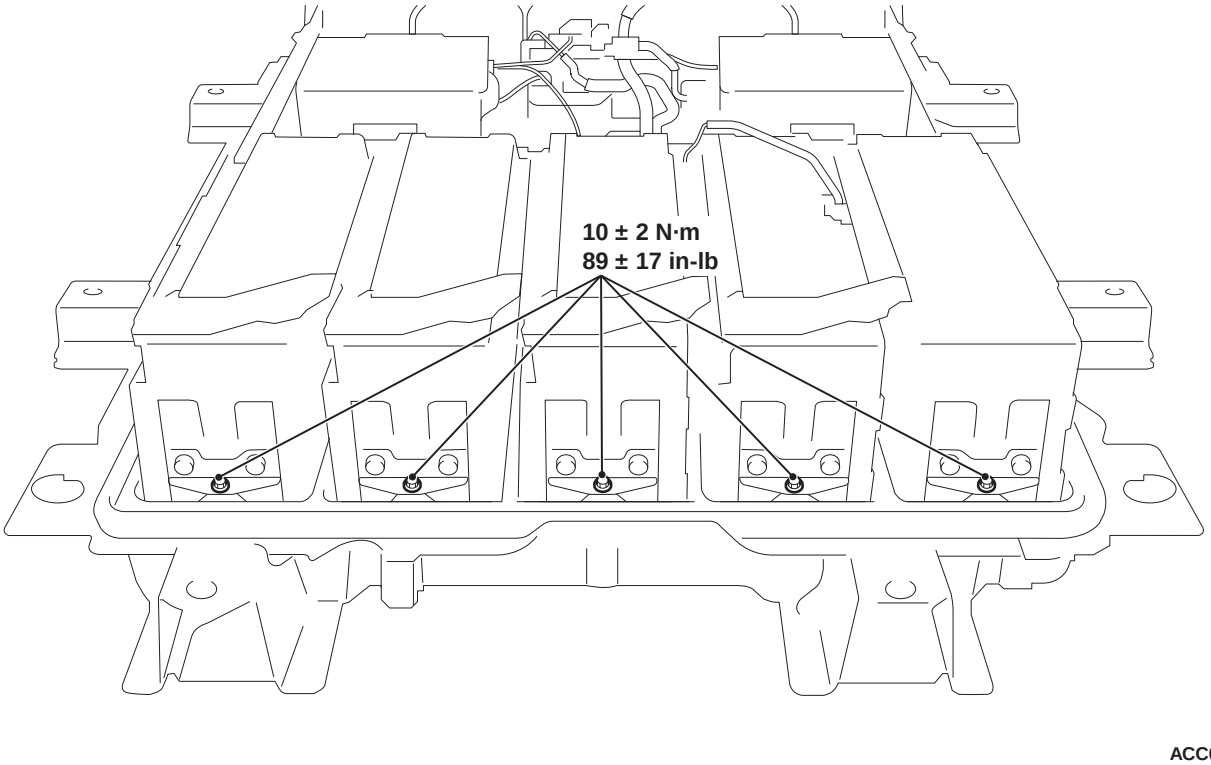


ACC05946AC

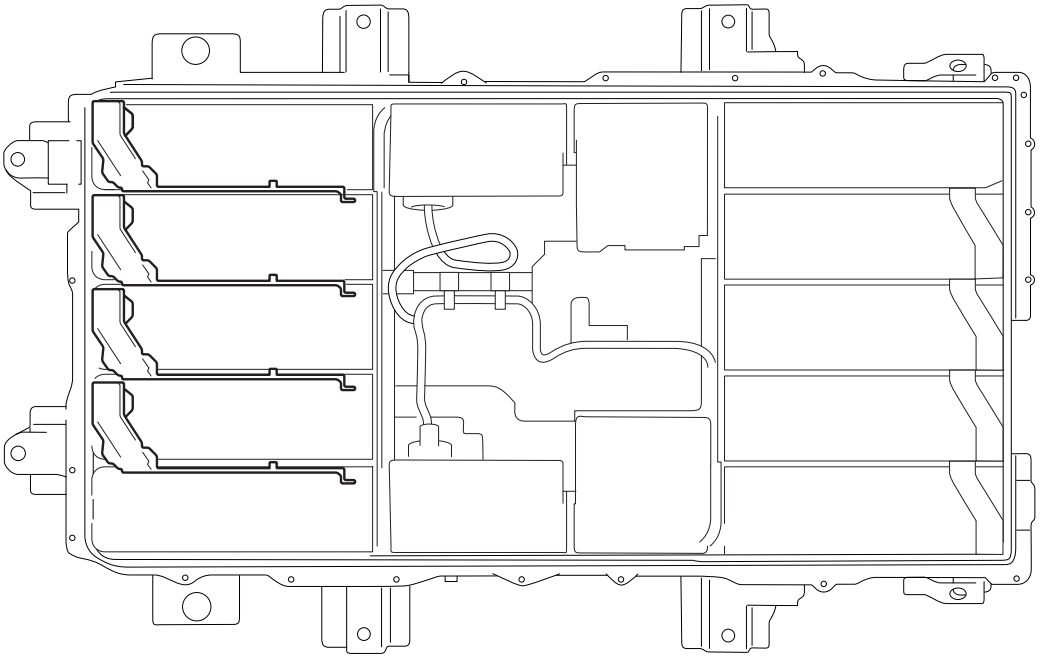
2. Remove the ten module securing fasteners. Then remove the plate from the module.



3. Remove the five module securing fasteners.
4. Remove the five plates from the module.

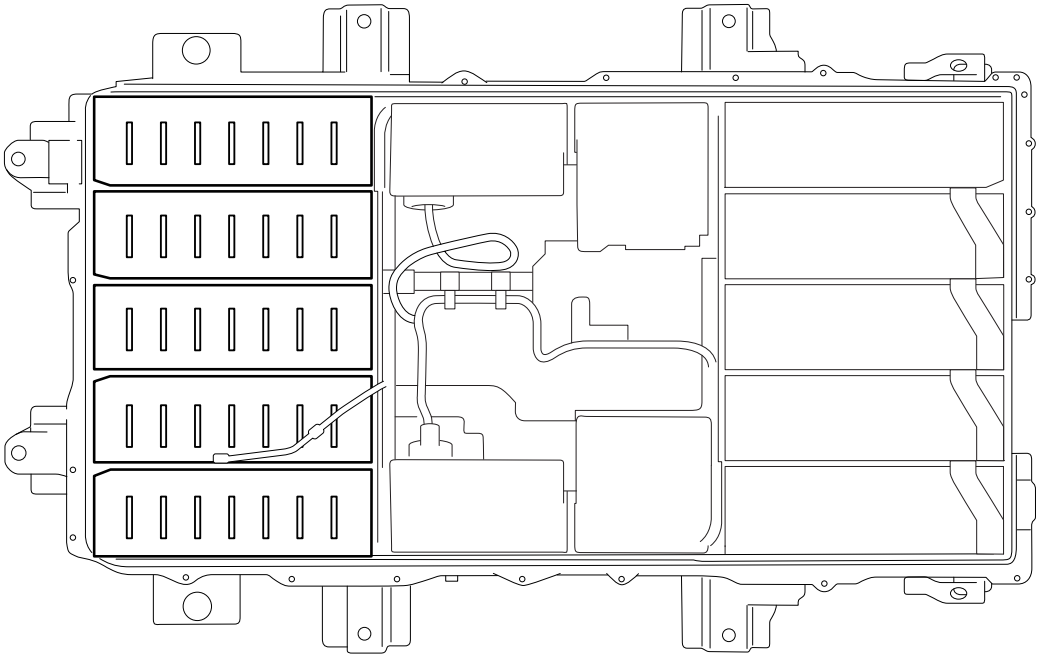


5. Remove the five module securing fasteners.



ACC05950

6. Disconnect the bus bars from the module, and then tilt the module to remove the four bus bars.

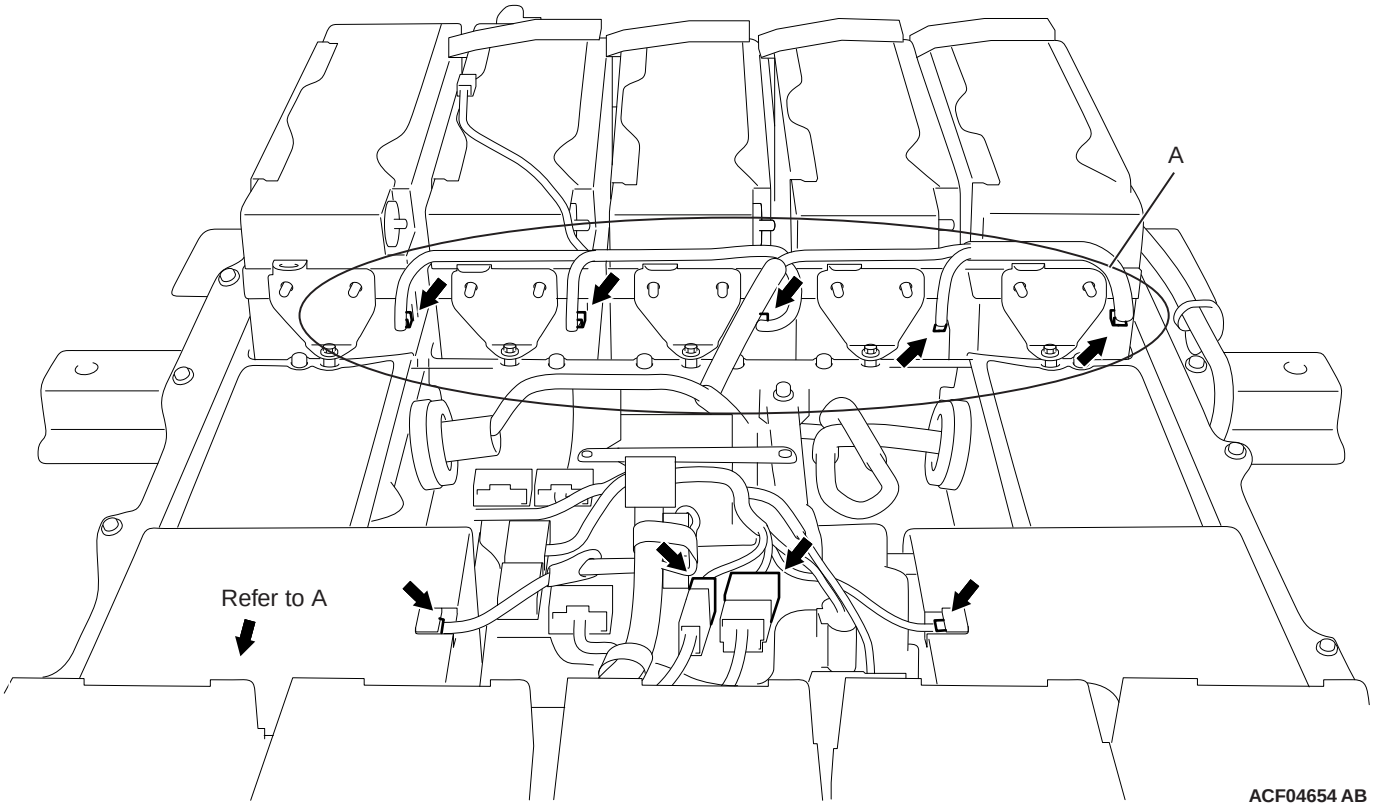


ACC05951

7. Remove the five modules.

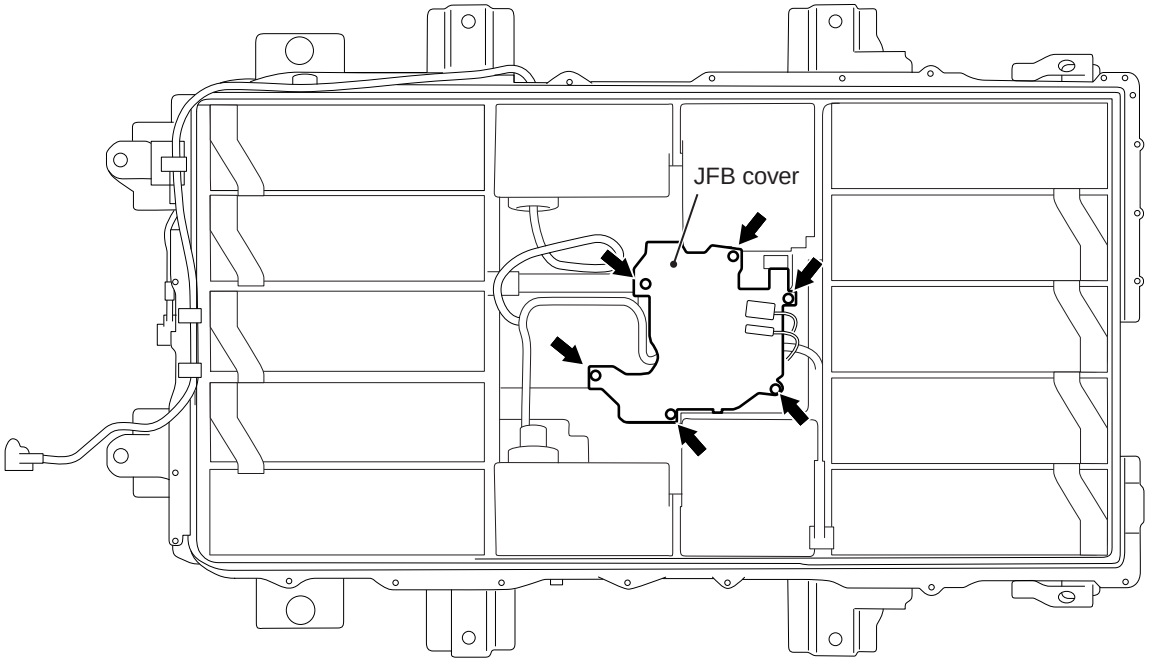
JFB COVER REMOVAL AND INSTALLATION

M1549404600055



ACF04654 AB

1. Disconnect the contactor connectors from the respective module to remove the wiring harnesss.



ACC05955AC

2. Disengage the six fasteners and the contactor connector from the JFB cover.

⚠ CAUTION

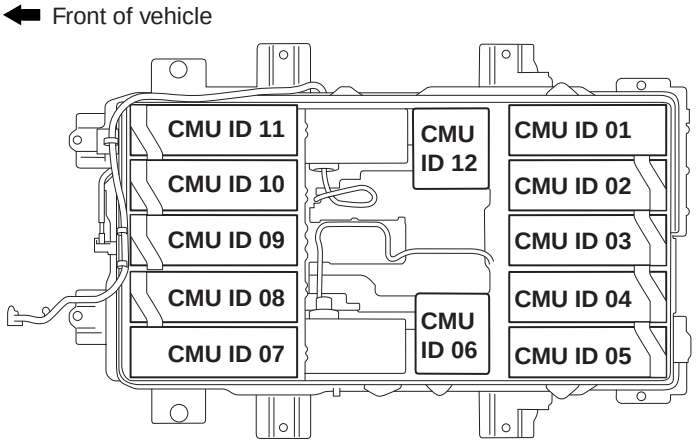
Before loosening the JFB bar, make sure that the four bus bar are removed (Refer to P.54D-185).

3. Remove the JFB cover.

FOUR-CELL MODULE REMOVAL AND INSTALLATION

M1549404700052

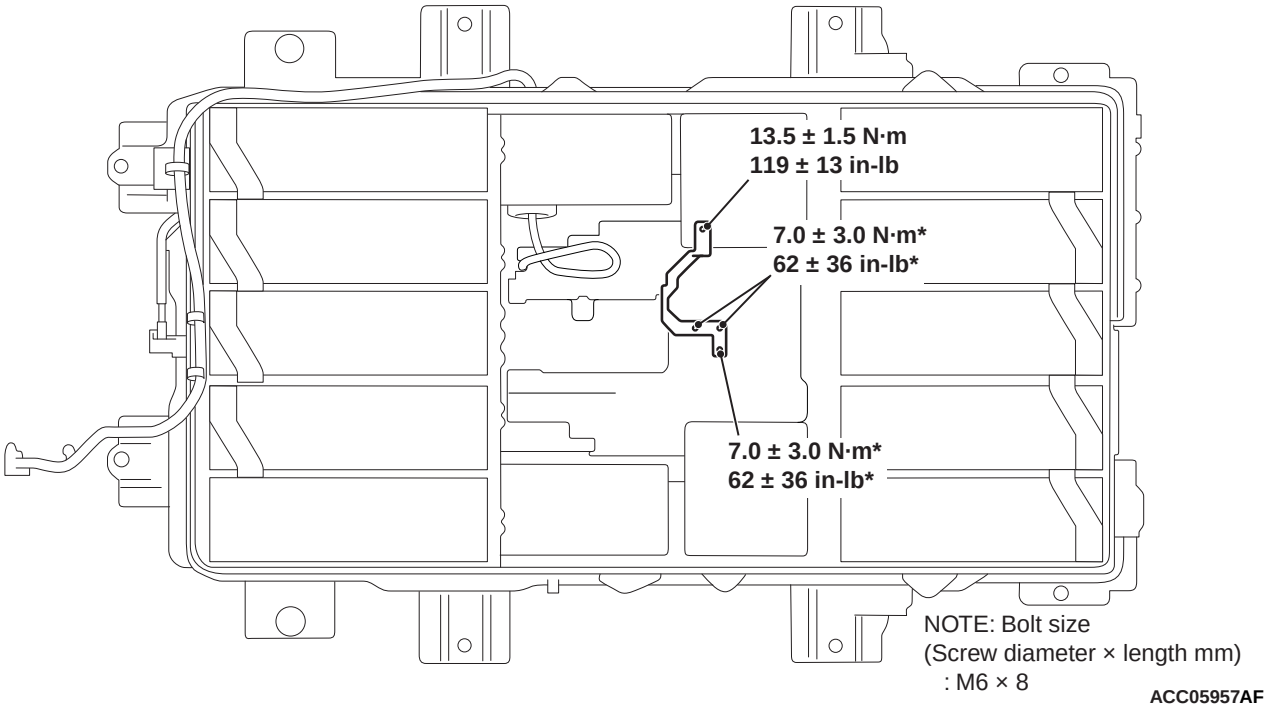
NOTE:



ACC07060 AC

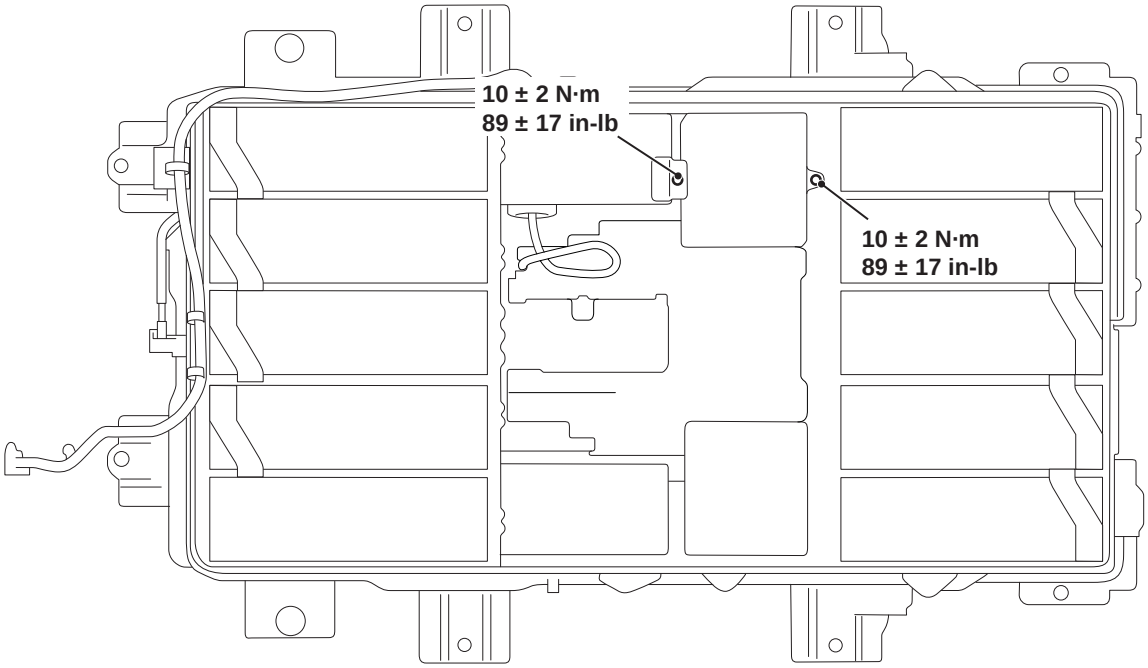
The CMU IDs on the module are assigned as shown.

Four-cell module (right side of the vehicle) removal



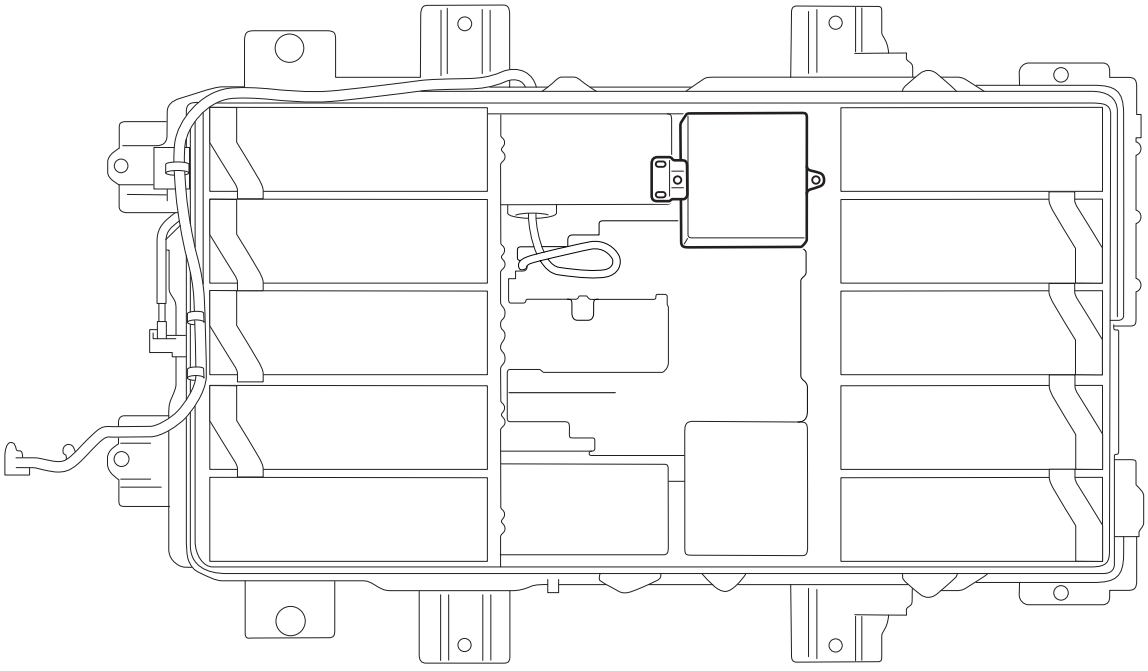
ACC05957AF

1. Disconnect the bus bar (three locations). Then remove the bus bar.



ACC05958AC

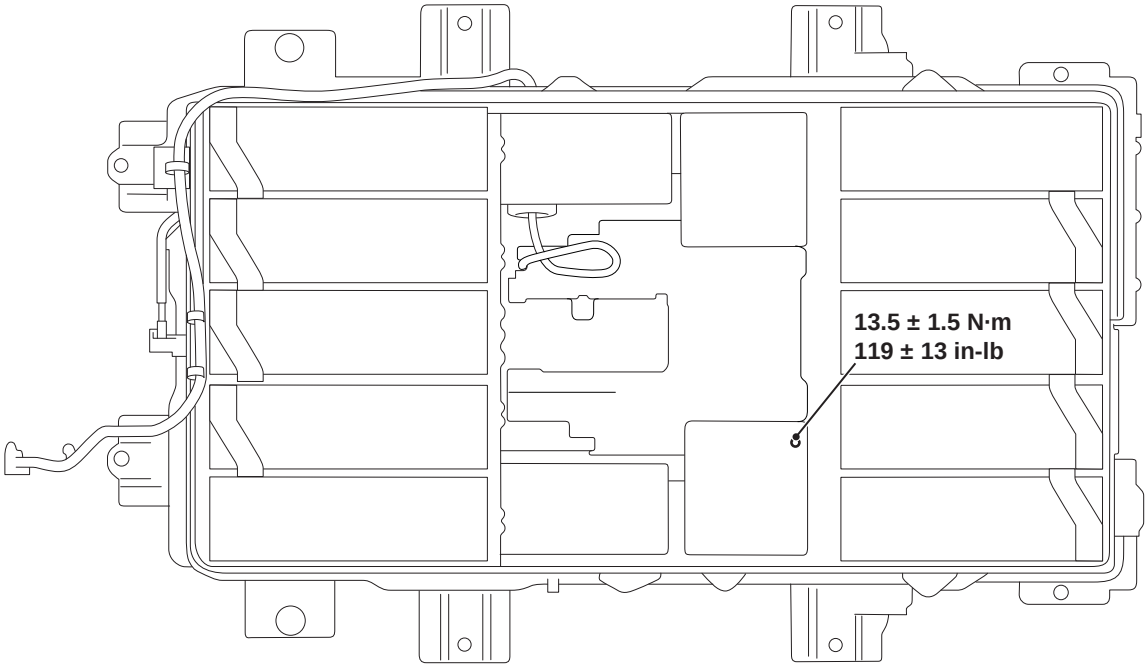
2. Remove the two module securing fasteners.



ACC05959

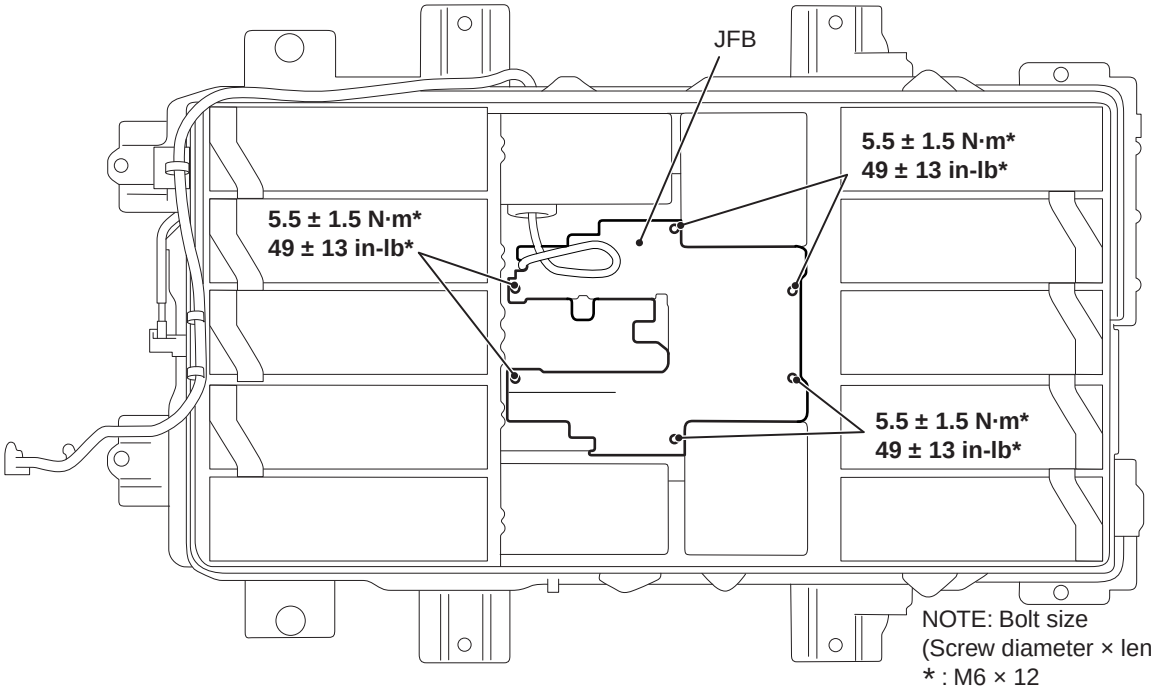
3. Remove the module.

Four-cell module (left side of the vehicle) removal



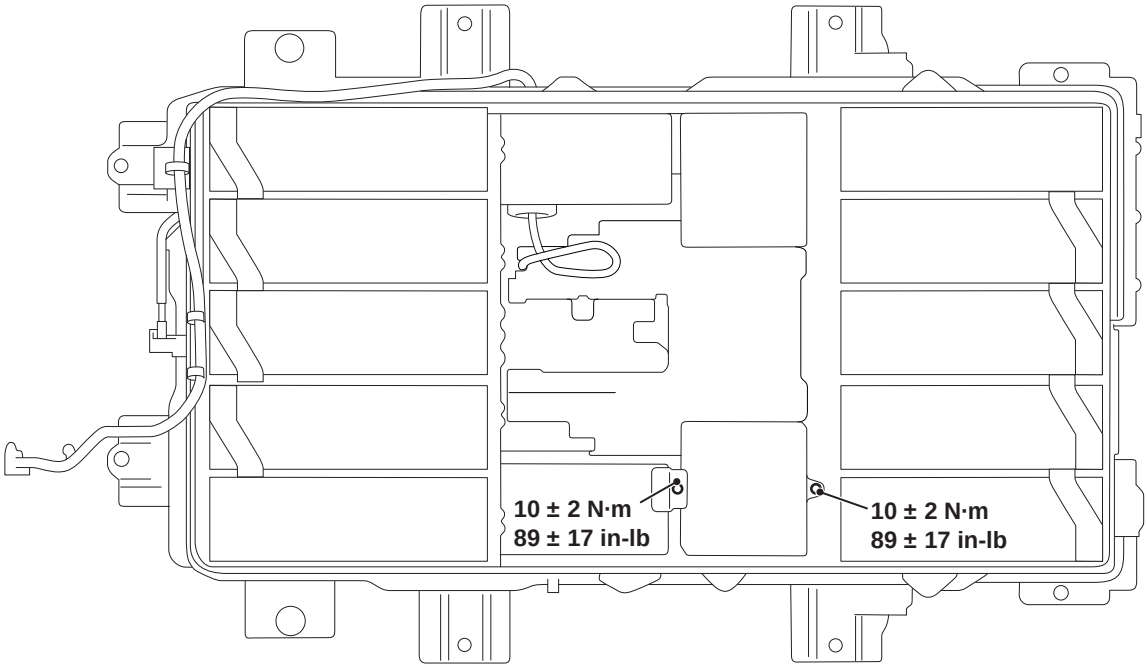
ACC05960AF

1. Disconnect the bus bar (one location).



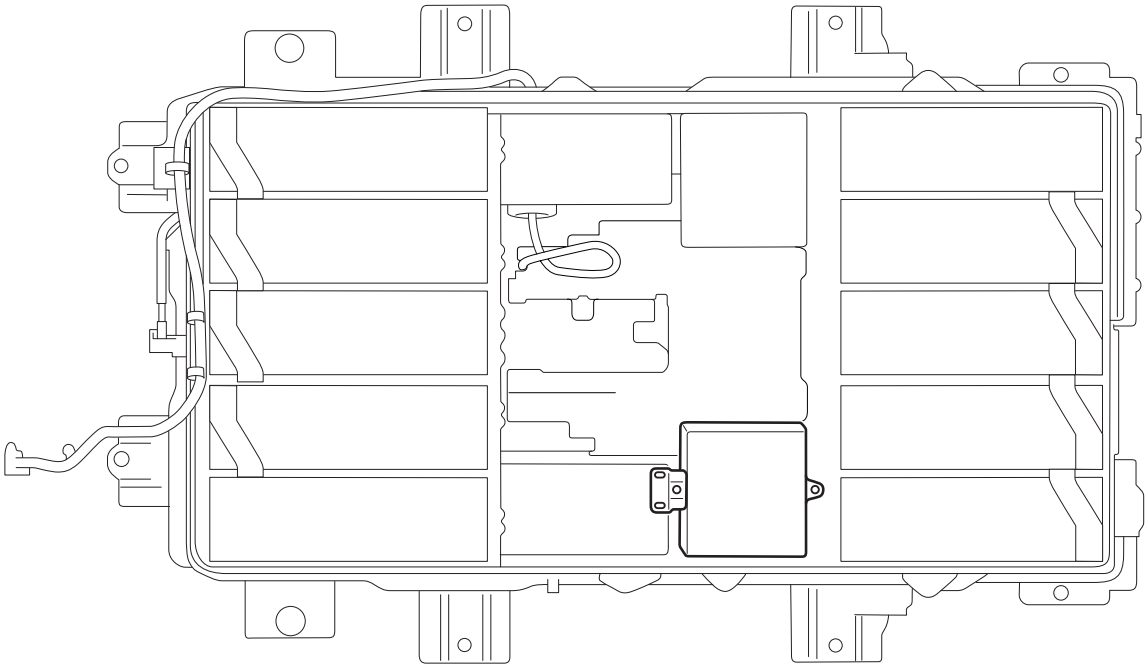
ACC05961AC

2. Remove the six fasteners from the JFB.



ACC05962 AC

3. Remove the two module securing fasteners.

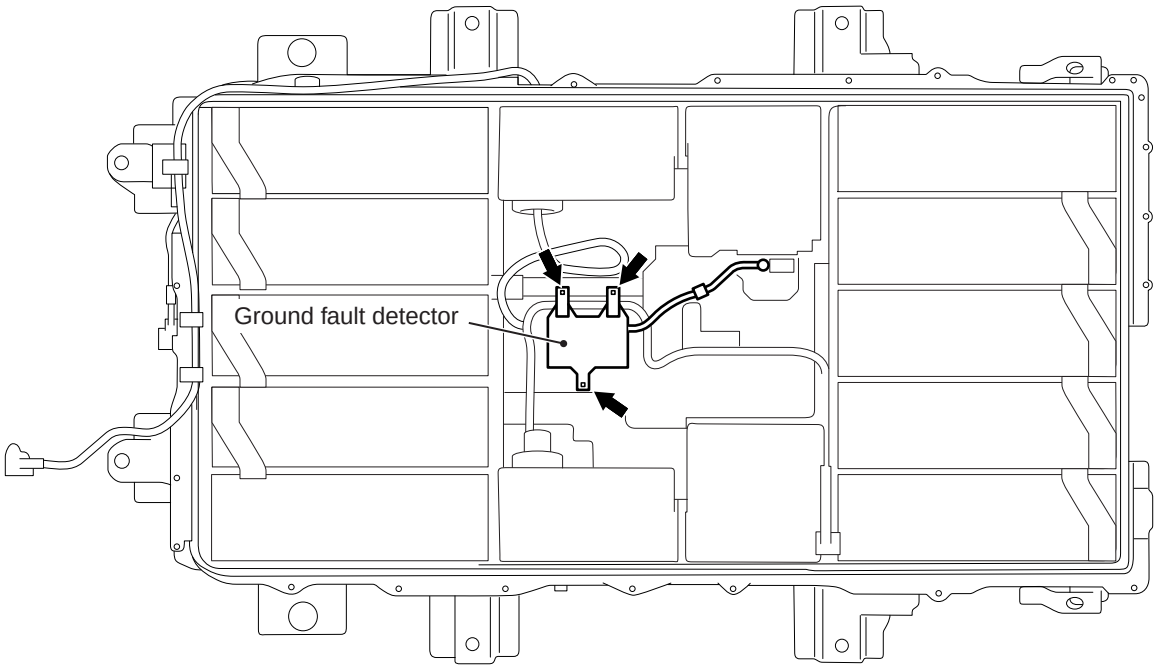


ACC05963

4. Remove the module.

GROUND FAULT DETECTOR REMOVAL AND INSTALLATION

M1549404500014

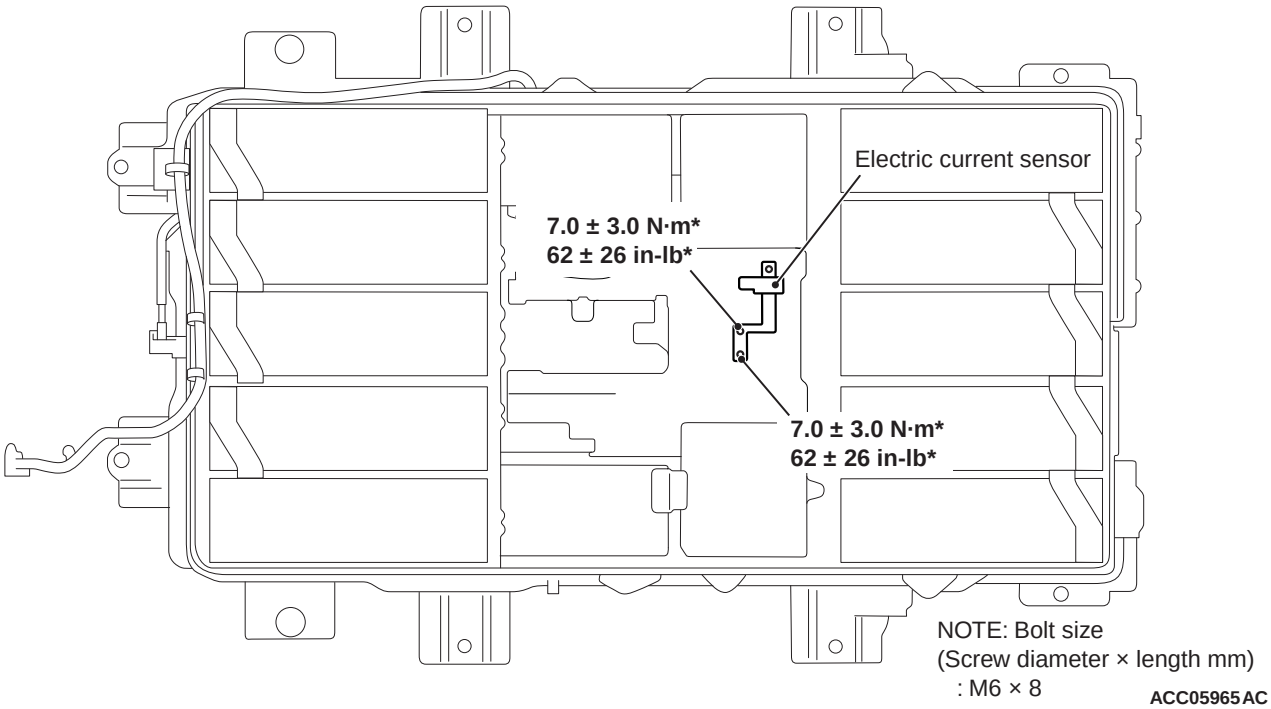


ACC05953AC

1. Remove the three fasteners from the ground fault detector.
2. Remove the ground fault detector.

ELECTRIC CURRENT SENSOR REMOVAL AND INSTALLATION

M1549404800015

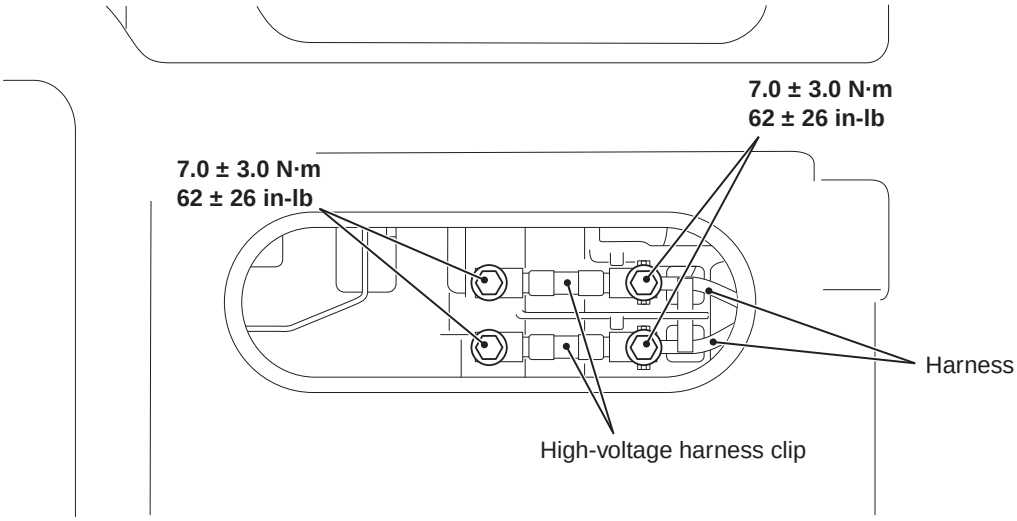


ACC05965AC

1. Disconnect the bus bar (three locations).
2. Remove the bus bar and the electric current sensor.

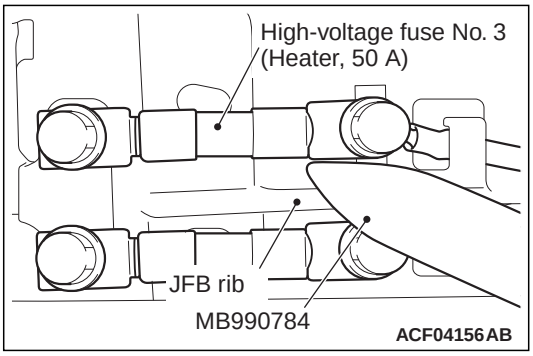
JFB REMOVAL AND INSTALLATION

M1549404900012



ACC05966AC

⚠ CAUTION

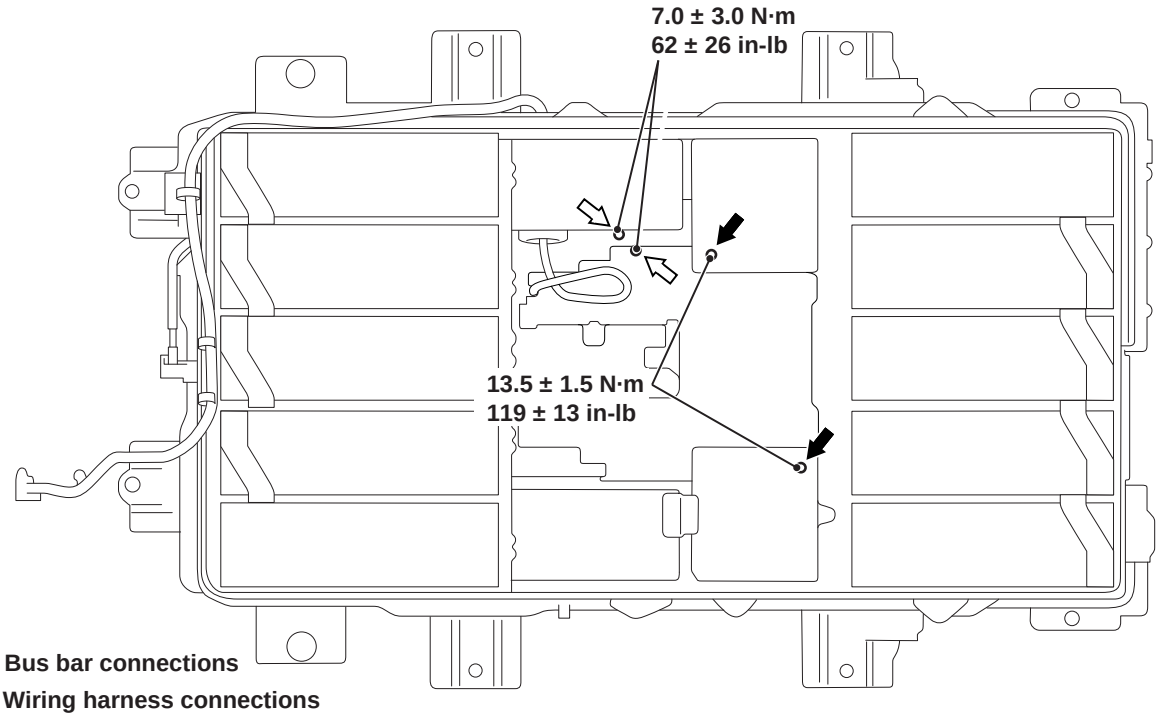


ACF04156AB

•To pull out high-voltage fuse No. 3 (heater, 50A), wedge the ornament remover (special tool: MB990784) into the JFB ribs to counterhold the fuse.

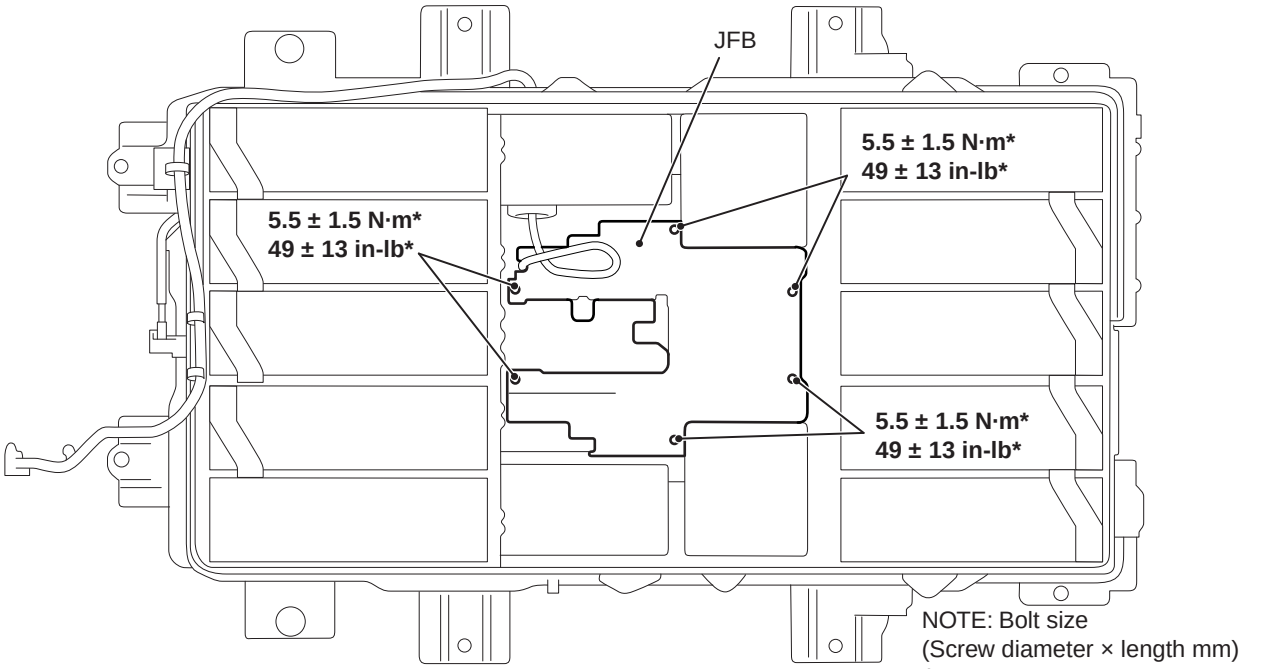
•When you disconnect the wiring harness from the fuse terminals, be careful not to deform the terminals.

Remove the service hole lid from the bottom of the Main Drive Lithium-ion Battery, and loosen the four fuse securing fasteners.



ACC05967AE

1. Loosen the bus bar (two locations) and the wiring harness wires (two locations).



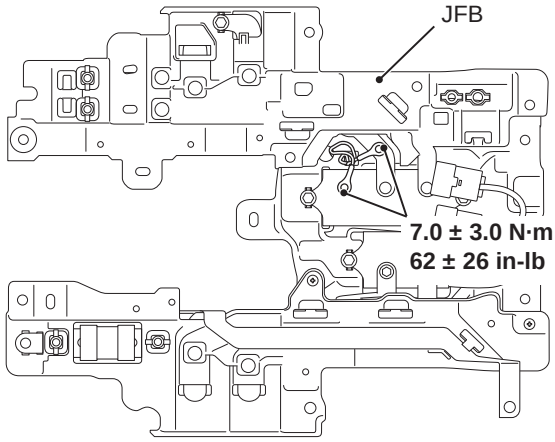
ACC05961AC

2. Remove the six fasteners from the JFB.
3. Remove the JFB.

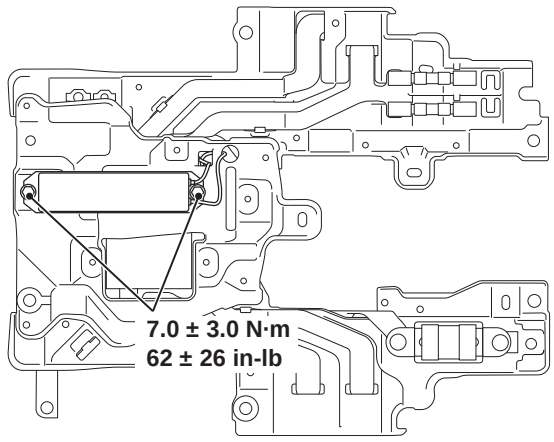
RESISTOR REMOVAL AND INSTALLATION

M1549405000012

Top surface side of drive battery



Bottom surface side of drive battery

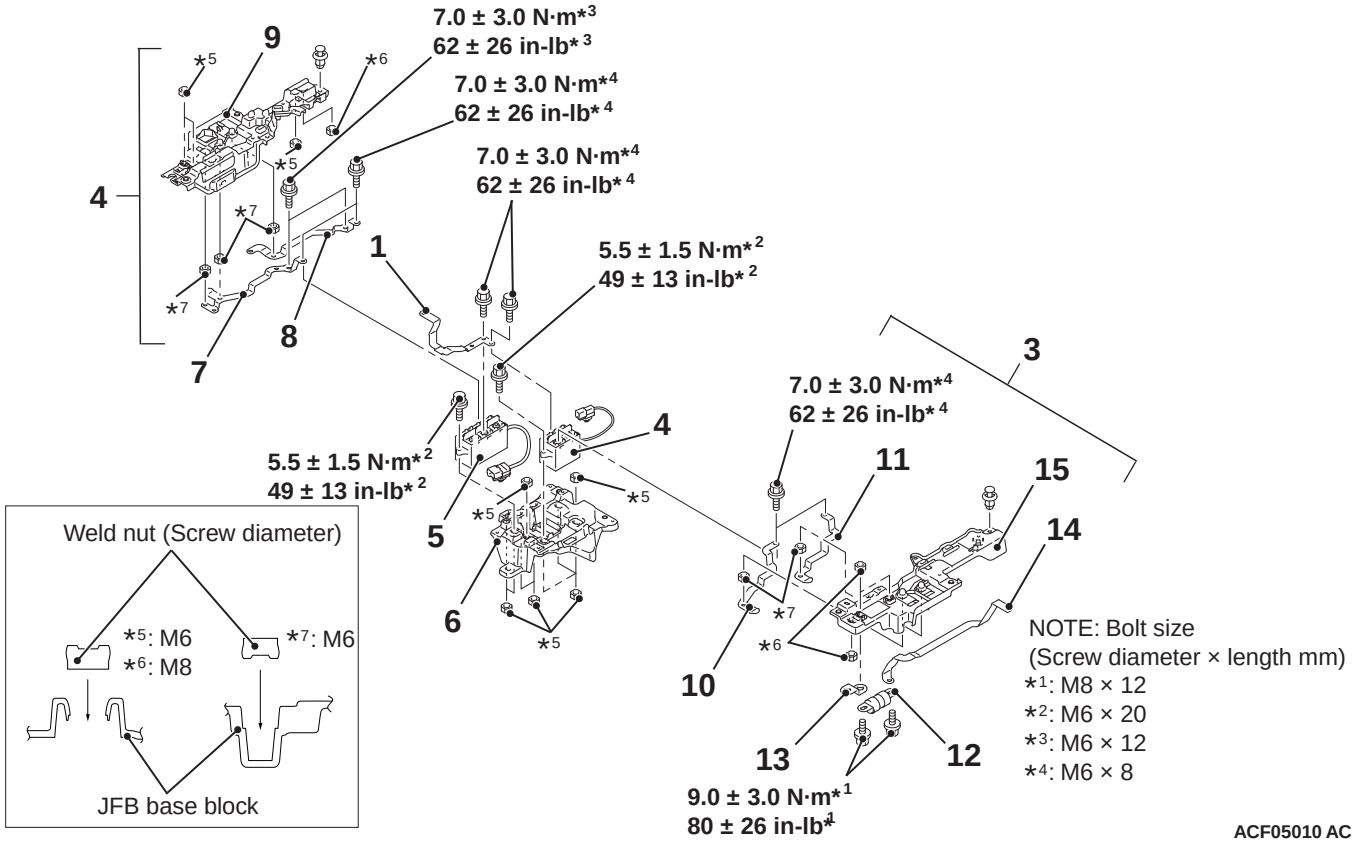


ACC07051AC

1. Remove the two resistor securing fasteners.
2. Remove the resistor.

CONTACTOR REMOVAL AND INSTALLATION

M1549405100019



Removal steps

- Four-cell module connection (Refer to P.54D-191)

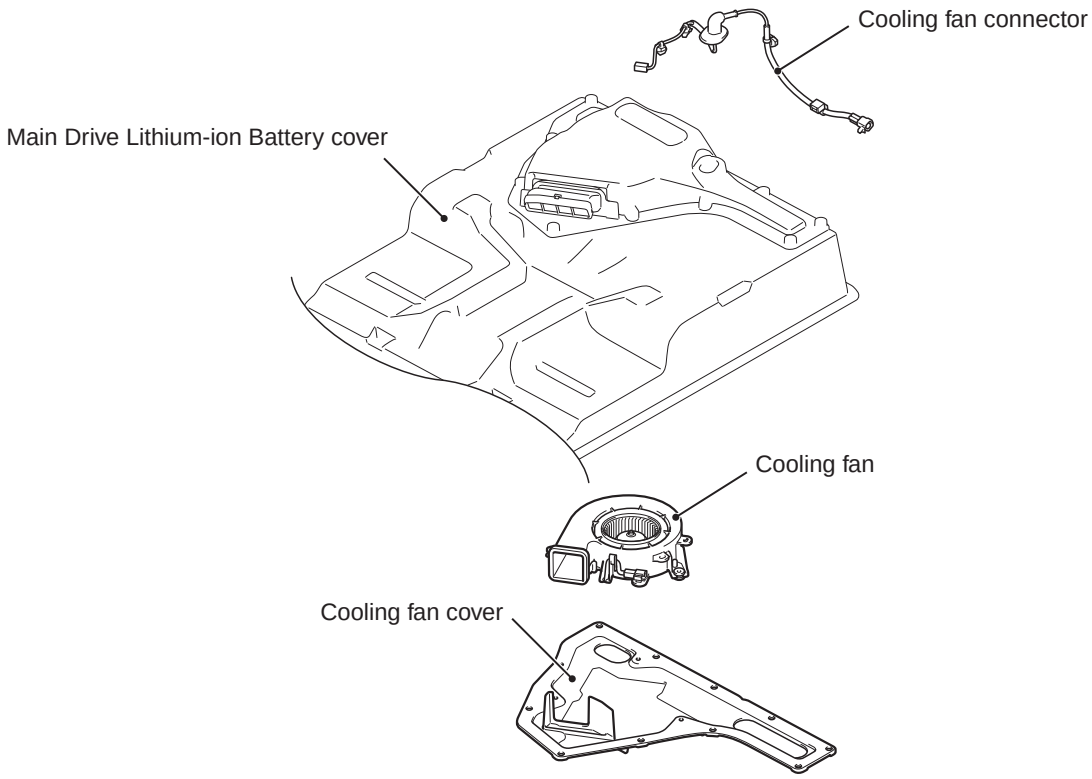
1. JFB bus bar P
2. JB base block assembly (LH) connection
3. JB base block assemby (RH) connection
4. Contactor (2P)
5. Contactor (3P)
6. JB centre base block assembly

Removal steps (Continued)

7. JFB bus bar F
8. JFB bus bar G
9. JB base block assembly (LH)
10. JFB bus bar C
11. JFB bus bar B
12. High-voltage fuse
13. JFB bus bar E
14. JFB bus bar D
15. JB base block assembly (RH)

COOLING FAN REMOVAL AND INSTALLATION

M1549405900015



ACC06111AB

1. Remove the 11 fasteners securing the cooling fan cover to the Main Drive Lithium-ion Battery cover.

   Tightening torque: 7.3 ± 1.2 N·m (65 ± 10 in-lb)

2. Disconnect the cooling fan connector.
3. Remove the three fasteners securing the cooling fan to the cooling fan cover.

   Tightening torque: 5.0 ± 2.0 N·m (44 ± 17 in-lb)

INSPECTION

AIR LEAK CHECK

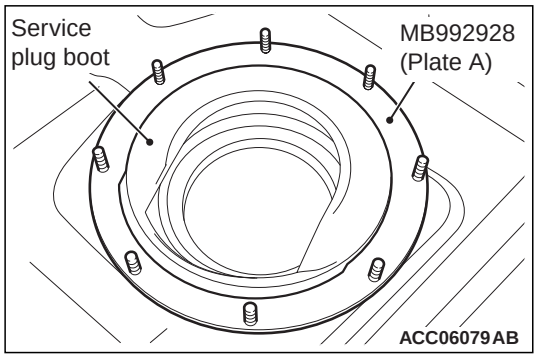
M1549405200016

Preparation for inspection

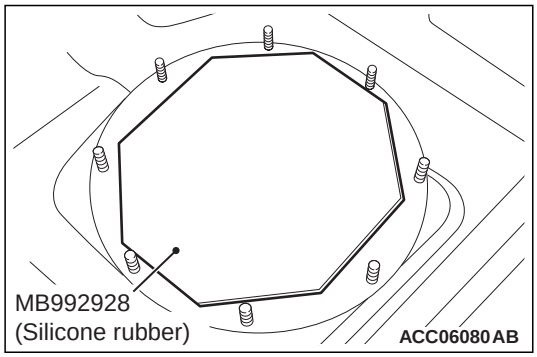
⚠ CAUTION

Set the special tool securely, or air leak may be caused.

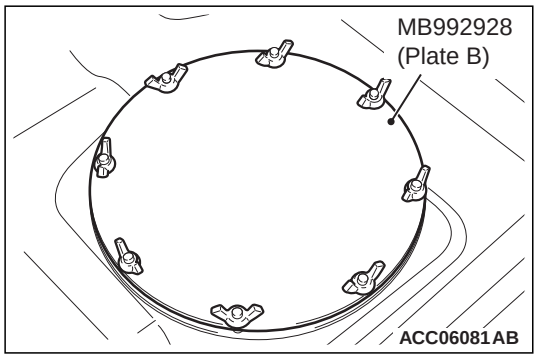
1. Set the work hole lid.
2. Set the service plug cover (MB992928) to the service plug boot.



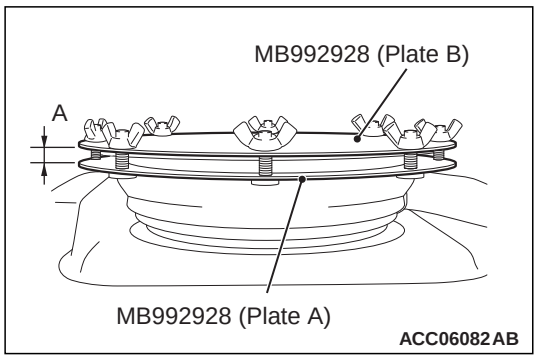
(1) Set the plate A of the service plug cover (MB992928) to the service plug boot.



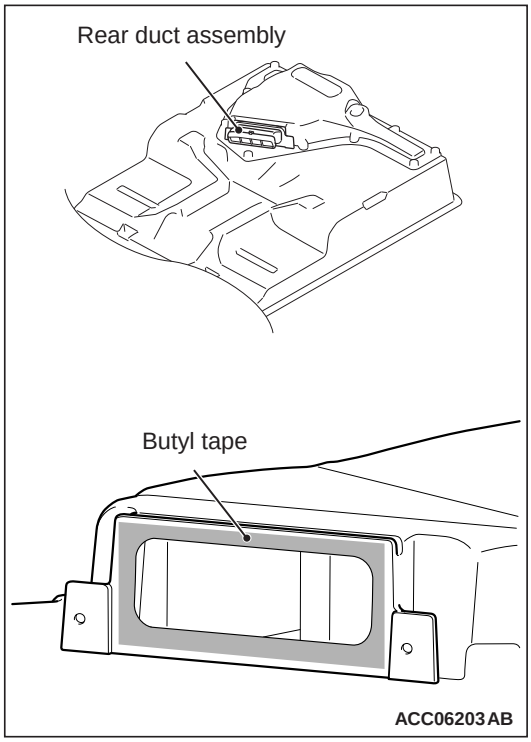
(2) Put the silicone rubber of the service plug cover (MB992928) on the service plug boot.



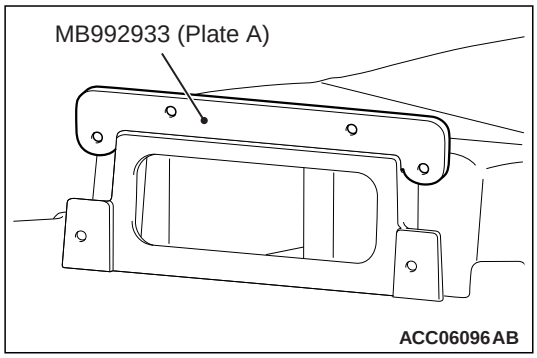
(3) Set the plate B of the service plug cover (MB992928). Tighten the screws so that the clearance (A) between the plates A and B is even.



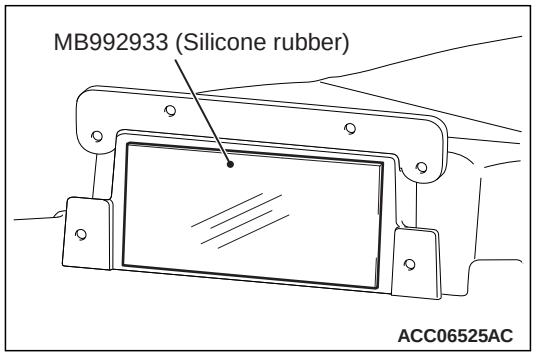
3. Set the duct cover B (MB992933) to the cooling fan outlet.



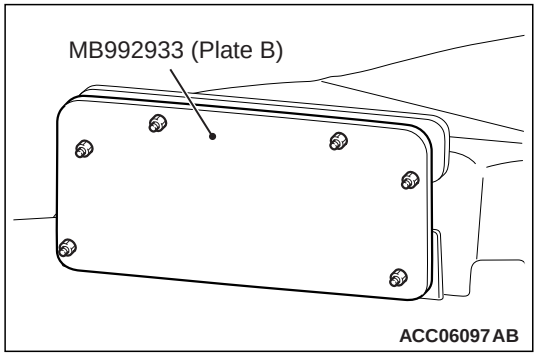
(1) Remove the rear duct assembly, and remove the butyl tape from the Main Drive Lithium-ion Battery side.



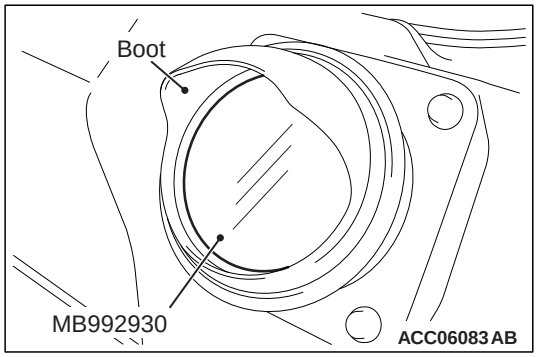
(2) Engage the plate A of the dust cover B (MB992933) into the groove above the cooling fan outlet.



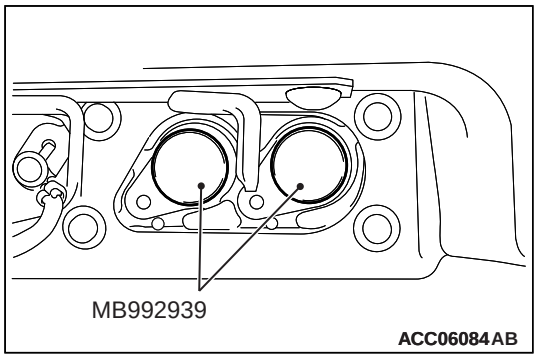
(3) Use the silicone rubber of the duct cover B (MB992933) to seal the cooling fan outlet. Then secure the plate B of the duct cover B (MB992933) on it.

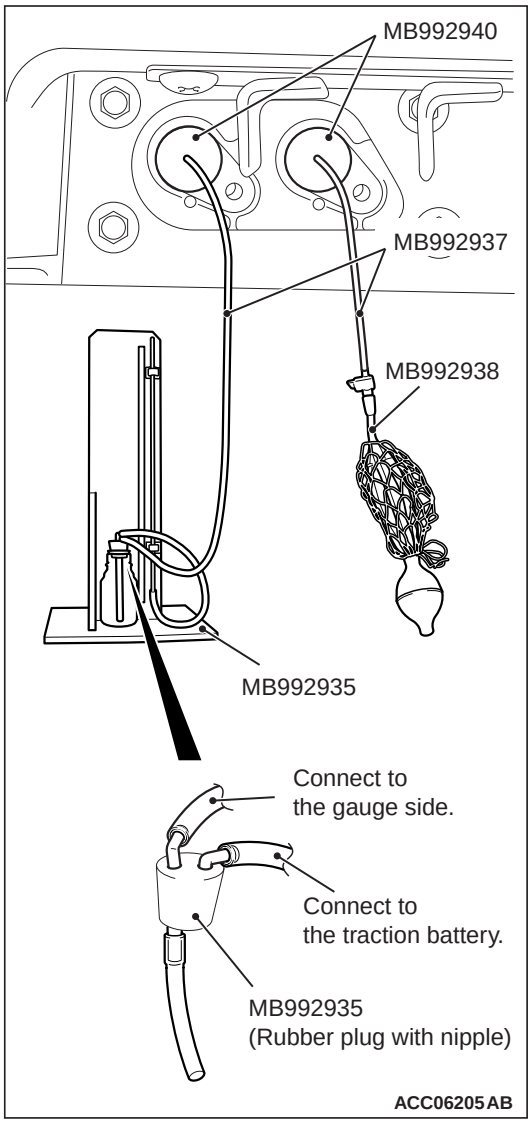


4. Install the plug (MB992930) to the cooling fan inlet. <Vehicles with Main Drive Lithium-ion Battery warming system or quick-charging system>
   (1) Make sure that the plug (MB992930) is flush with the cooling fan inlet boot.



5. Insert the plugs (MB992939) into the ports for the EV charger cables. <Vehicles with Main Drive Lithium-ion Battery warming system or quick-charging system>





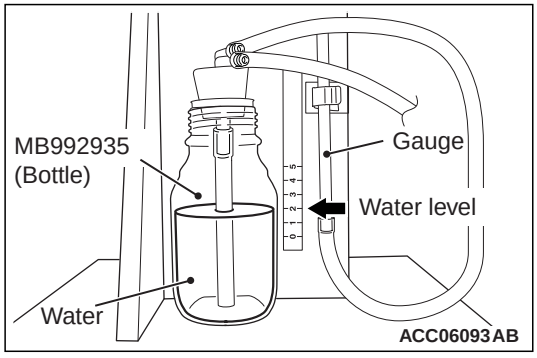
6. Install the pressure gauge unit (MB992935), the hoses (MB992937), the air pump (MB992938) and the nipple (MB992940) into the ports for the EV charger cables. Connect the longer tube spliced at rubber plug with nipples of pressure gauge unit (MB992935) to the gauge on the measuring bench, and connect the shorter tube to the Main Drive Lithium-ion Battery.

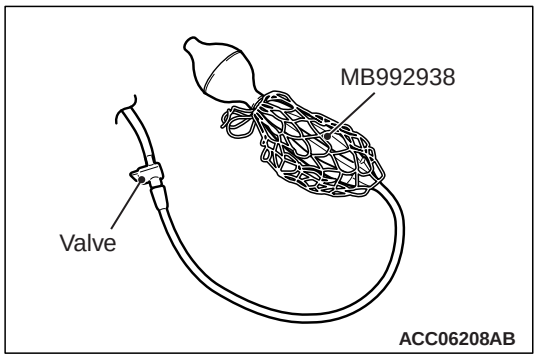
How to check

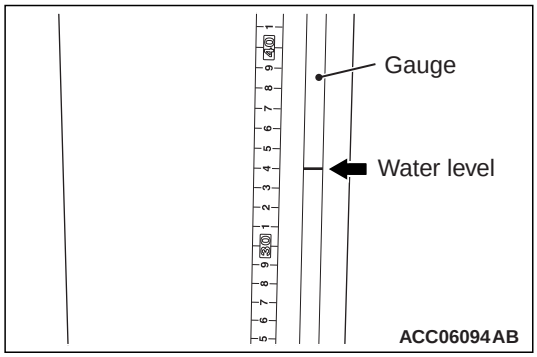
⚠ CAUTION

Do not place the pressure gauge unit (MB992935) higher than the Main Drive Lithium-ion Battery, or water will intrude into the battery.

1. Pour 200 ml (7.4 fl oz) of water into the bottle of the pressure gauge unit (MB992935).







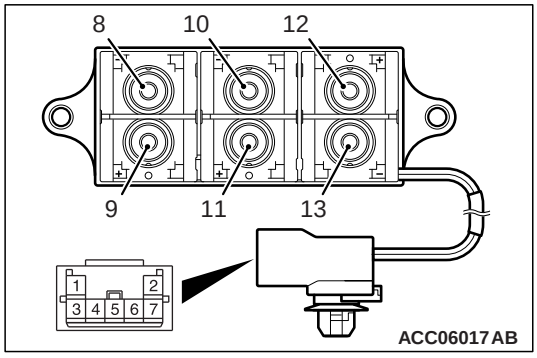
2. Operate the air pump (MB992938) to deliver water into the gauge side of the pressure gauge unit (MB992935) so that the water level in the gauge rises 320 mm (12.6 inch) above the water level in the bottle.
3. Close the valve of the special tool Air pump (MB992938) and then wait for five minutes, Then open the valve again. Then apply pressure to the system so that the water level rises 320 mm (12.6 inch). Then close the valve again and then wait for ten minutes.
4. Then measure the water level inside the gauge.

   OK: The water level inside the gauge should fluctuate within 20 mm (0.8 inch).
5. If the water level fluctuation exceeds the specified range, locate air leakage by using soapy water to repair it.

CONTACTOR CHECK

M1549405300024

Checks of main contactor (+), main contactor (–) and electric charging contactor



Main contactor (+)

Battery voltage	Terminal number	Normal conditions
Deenergized	10 – 11	No continuity
Energized [between terminal 3 (+) and terminal 1 (–)]		Continuity exists (2 Ω or less).

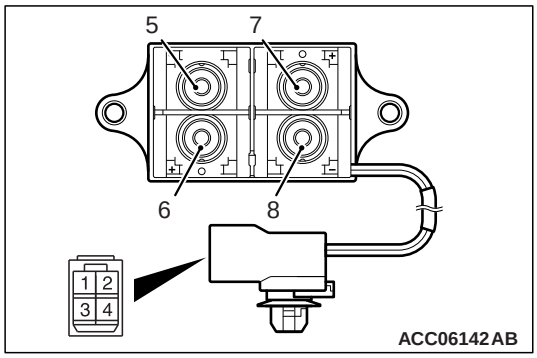
Main contactor (–)

Battery voltage	Terminal number	Normal conditions
Deenergized	12 – 13	No continuity
Energized [between terminal 4 (+) and terminal 2 (–)]		Continuity exists (2 Ω or less).

Electric charging contactor

Battery voltage	Terminal number	Normal conditions
Deenergized	8 – 9	No continuity
Energized [between terminal 7 (+) and terminal 6 (–)]		Continuity exists (2 Ω or less).

Check of quick-charging contactors (+) and (–)



Quick-charging contactor (+)

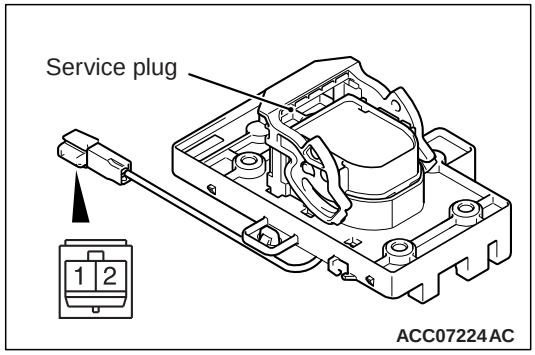
Battery voltage	Terminal number	Normal conditions
Deenergized	5 – 6	No continuity
Energized [terminal 1 (+), terminal 3 (–)]		Continuity exists (2 Ω or less).

Quick charging contactor (–)

Battery voltage	Terminal number	Normal conditions
Deenergized	7 – 8	No continuity
Energized [between terminal 2 (+) and terminal 4 (–)]		Continuity exists (2 Ω or less).

SERVICE PLUG SWITCH INSPECTION

M1549405400010

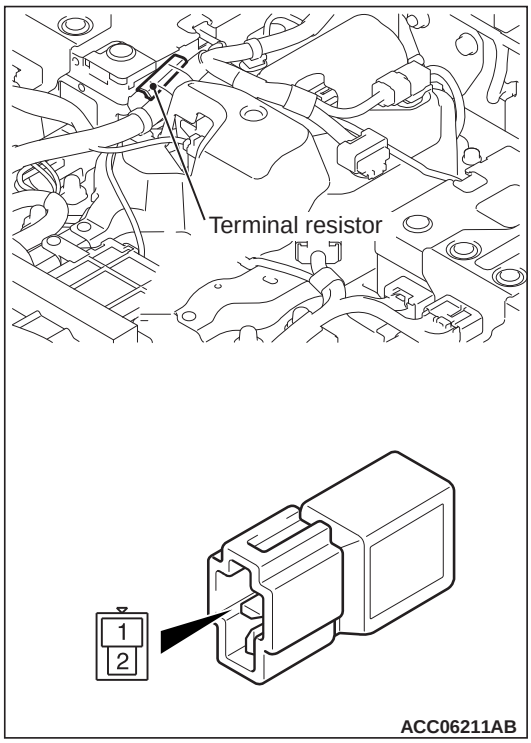


Service plug	Terminal number	Normal conditions
Removed	1 – 2	No continuity
Inserted		Continuity exists (2 Ω or less).

LOCAL CAN TERMINATING RESISTOR CHECK

M1549405500017

1. Remove the cover of the Main Drive Lithium-ion Battery. Refer to P.54D-182.

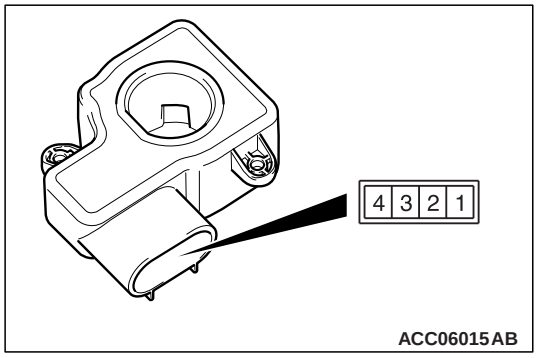


2. Check the terminating resistor.

Terminal number	Normal conditions
1 – 2	120 Ω

MAIN DRIVE LITHIUM-ION BATTERY ELECTRIC CURRENT SENSOR CHECK

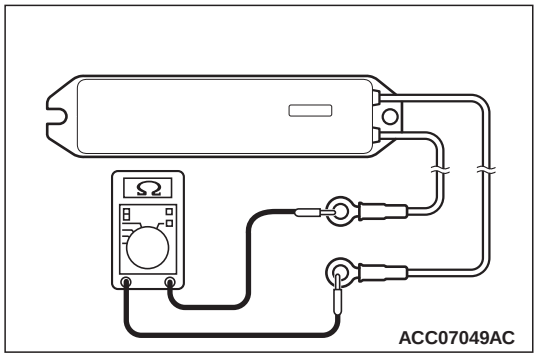
M1549405600014



Terminal number	Normal conditions
1 – 3	1 – 5 kΩ [at 25°C (77°F)]
2 – 3	1 – 5 kΩ [at 25°C (77°F)]
4 – 3	1 – 5 kΩ [at 25°C (77°F)]

RESISTOR CHECK

M1549406300016



Measure the resistance of the resistor.

Standard value: 24Ω ± 10%