

GROUP 54B


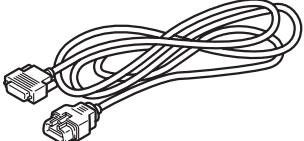
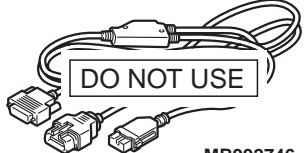
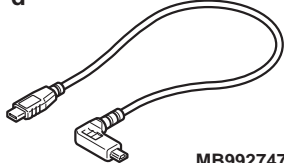
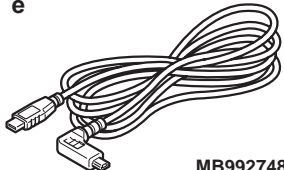
LOCAL
INTERCONNECT
NETWORK (LIN)

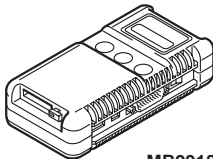
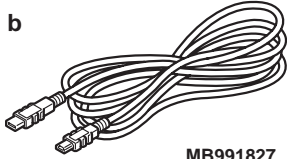
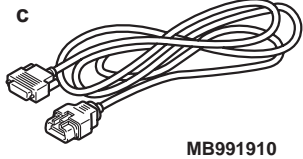
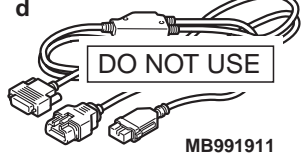
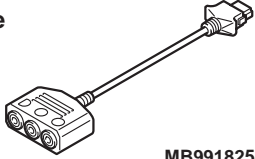
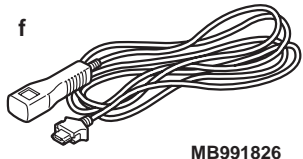
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SPECIAL TOOLS

M1545100100282

Tool	Number	Name	Use
<p>a</p>  <p>MB992744</p>	<p>a. MB992744 b. MB992745 c. MB992746 d. MB992747 e. MB992748</p>	<p>a. Vehicle communication interface-Lite (V.C.I.-Lite) b. V.C.I.-Lite main harness A (for vehicles with CAN communication) c. V.C.I.-Lite main harness B (for vehicles without CAN communication) d. V.C.I.-Lite USB cable short e. V.C.I.-Lite USB cable long</p>	<p>LIN communication line check (service data and diagnosis codes)</p>
<p>b</p>  <p>MB992745</p>			
<p>c</p>  <p>MB992746</p>			
<p>d</p>  <p>MB992747</p>			
<p>e</p>  <p>MB992748 ACB05421AB</p>			

Tool	Number	Name	Use
<p>a</p>  <p>MB991824</p> <p>b</p>  <p>MB991827</p> <p>c</p>  <p>MB991910</p> <p>d</p>  <p>DO NOT USE</p> <p>MB991911</p> <p>e</p>  <p>MB991825</p> <p>f</p>  <p>MB991826</p> <p>MB991955</p>	<p>MB991955</p> <p>a. MB991824</p> <p>b. MB991827</p> <p>c. MB991910</p> <p>d. MB991911</p> <p>e. MB991825</p> <p>f. MB991826</p>	<p>M.U.T.-III sub-assembly</p> <p>a. Vehicle Communication Interface (V.C.I.)</p> <p>b. M.U.T.-III USB cable</p> <p>c. M.U.T.-III main harness A (Vehicles with CAN communication system)</p> <p>d. M.U.T.-III main harness B (Vehicles without CAN communication system)</p> <p>e. M.U.T.-III measure adapter</p> <p>f. M.U.T.-III trigger harness</p>	<p>⚠ CAUTION</p> <p>For vehicles with CAN communication, use M.U.T.-III main harness A to send simulated vehicle speed. If you connect M.U.T.-III main harness B instead, the CAN communication does not function correctly.</p> <p>LIN communication line check (service data and diagnosis codes)</p>

TROUBLESHOOTING

DIAGNOSIS CODE CHART

M1545100201055

Diagnosis code No.	Diagnostic item	Reference page
U0169	Sunroof LIN timeout <Vehicles with sunroof>	P.54B-4
U0231	RLS LIN timeout <Vehicles with lighting control sensor>	P.54B-5
U1109	Column SW LIN timeout	P.54B-6
U150B	Column SW LIN checksum error	P.54B-7
U1511	Sunroof ECU LIN checksum error <Vehicles with sunroof>	P.54B-7
U1512	RLS LIN checksum error <Vehicles with lighting control sensor>	P.54B-7

Diagnosis code No.	Diagnostic item	Reference page
U1514	LIN transmission bit error	P.54B-7
U1515	No bus activity error for LIN	P.54B-8

DIAGNOSIS FUNCTION

M1545104200106

HOW TO READ DIAGNOSIS CODE

Refer to GROUP 00 – Diagnosis function .

HOW TO ERASE DIAGNOSIS CODE

Refer to GROUP 00 – Diagnosis function .

DIAGNOSIS CODE PROCEDURES**Code No.U0169 Sunroof LIN timeout <Vehicles with sunroof>****⚠ CAUTION**

Before replacing the ECU, ensure that the communication circuit is normal.

JUDGMENT CRITERIA

The ETACS-ECU will set diagnosis code No. U0169 when no signals are received from the sunroof motor assembly.

PROBABLE CAUSES

- Faulty sunroof motor assembly
- Malfunction of the LIN bus

DIAGNOSIS PROCEDURE**STEP 1. Resistance measurement at the sunroof motor assembly connector**

- (1) Disconnect the connector, and measure at the wiring harness side.
- (2) Measure the resistance between the sunroof motor assembly connector (earth terminal) and the body earth.

OK: Continuity exists (2 Ω or less)**Q: Is the check result normal?****YES :** Go to Step 3.**NO :** Go to Step 2.**STEP 2. Check of open circuit in body earth line between sunroof motor assembly connector (earth terminal) and the body earth.****Q: Is the check result normal?**

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 – How to use Troubleshooting/inspection Service Points – How to Cope with Intermittent Malfunction).

NO : Repair the connector(s) or wiring harness.**STEP 3. Voltage measurement at the sunroof motor assembly connector.**

- (1) Disconnect the connector, and measure at the wiring harness side.
- (2) Measure the voltage between the sunroof motor assembly connector (power supply terminal) and the body earth.

OK: System voltage**Q: Is the check result normal?****YES :** Go to Step 5.**NO :** Go to Step 4.**STEP 4. Check of short to power supply, short to earth, and open circuit in SR+ line between ETACS-ECU connector and sunroof motor assembly connector.****Q: Is the check result normal?**

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 – How to use Troubleshooting/inspection Service Points – How to Cope with Intermittent Malfunction).

NO : Repair the connector(s) or wiring harness.**STEP 5. Check of open circuit in (LIN2-1, LIN2-2 and LIN2-3) line between ETACS-ECU connector and sunroof motor assembly connector.****Q: Is the check result normal?****YES :** Go to Step 6.**NO :** Repair the connector(s) or wiring harness.**STEP 6. Check whether the diagnosis code is reset.**

Check again if the diagnosis code is set to the ETACS-ECU.

- (1) Erase the diagnosis code.

- (2) Turn the ignition switch from the LOCK (OFF) position to the ON position.
- (3) Check if diagnosis code is set.

Q: Is the diagnosis code set?

YES : Replace the sunroof motor assembly.
NO : A poor connection, open circuit, or other intermittent malfunctions in the LIN bus lines between the sunroof motor assembly and the ETACS-ECU (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

Code No.U0231 RLS LIN timeout <Vehicles with lighting control sensor>

⚠ CAUTION

Before replacing the ECU, ensure that the communication circuit is normal.

JUDGMENT CRITERIA

The ETACS-ECU will set diagnosis code No. U0231 when no signals are received from the lighting control sensor.

PROBABLE CAUSES

- Faulty lighting control sensor
- Malfunction of the LIN bus

DIAGNOSIS PROCEDURE

STEP 1. Resistance measurement at the lighting control sensor connector

- (1) Disconnect the connector, and measure at the wiring harness side.
- (2) Measure the resistance between the lighting control sensor connector (earth terminal) and the body earth.

OK: Continuity exists (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 3.
NO : Go to Step 2.

STEP 2. Check of open circuit in body earth line between lighting control sensor connector (earth terminal) and the body earth.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 – How to use Troubleshooting/inspection Service Points – How to Cope with Intermittent Malfunction).
NO : Repair the connector(s) or wiring harness.

STEP 3. Voltage measurement at the lighting control sensor connector.

- (1) Disconnect the connector, and measure at the

wiring harness side.

- (2) Measure the voltage between the lighting control sensor connector (power supply terminal) and the body earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5.
NO : Go to Step 4.

STEP 4. Check of short to power supply, short to earth, and open circuit in BUP1 line between ETACS-ECU connector and lighting control sensor connector.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 – How to use Troubleshooting/inspection Service Points – How to Cope with Intermittent Malfunction).
NO : Repair the connector(s) or wiring harness.

STEP 5. Check of open circuit in (LIN2-1, LIN2-2 and LIN2-3) line between ETACS-ECU connector and lighting control sensor connector.

Q: Is the check result normal?

YES : Go to Step 6.
NO : Repair the connector(s) or wiring harness.

STEP 6. Check whether the diagnosis code is reset.

Check again if the diagnosis code is set to the ETACS-ECU.

- (1) Erase the diagnosis code.
- (2) Turn the ignition switch from the LOCK (OFF) position to the ON position.
- (3) Check if diagnosis code is set.

Q: Is the diagnosis code set?

YES : Replace the lighting control sensor.

NO : A poor connection, open circuit, or other intermittent malfunctions in the LIN bus lines between the lighting control sensor and the ETACS-ECU (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

Code No.U1109 Column SW LIN timeout

⚠ CAUTION

Before replacing the ECU, ensure that the communication circuit is normal.

JUDGMENT CRITERIA

The ETACS-ECU will set diagnosis code No. U1109 when no signals are received from the column switch (column switch ECU).

PROBABLE CAUSES

- Faulty wiper and washer switch
- Malfunction of the LIN bus

DIAGNOSIS PROCEDURE

STEP 1. Resistance measurement at the column switch connector

- (1) Disconnect the connector, and measure at the wiring harness side.
- (2) Measure the resistance between the column switch connector (earth terminal) and the body earth.

OK: Continuity exists (2 Ω or less)

Q: Is the check result normal?

YES : Go to Step 3.

NO : Go to Step 2.

STEP 2. Check of open circuit in body earth line between column switch connector (earth terminal) and the body earth.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 – How to use Troubleshooting/inspection Service Points – How to Cope with Intermittent Malfunction).

NO : Repair the connector(s) or wiring harness.

STEP 3. Voltage measurement at the column switch connector.

- (1) Disconnect the connector, and measure at the

wiring harness side.

- (2) Measure the voltage between the column switch connector (power supply terminal) and the body earth.

OK: System voltage

Q: Is the check result normal?

YES : Go to Step 5.

NO : Go to Step 4.

STEP 4. Check of short to power supply, short to earth, and open circuit in BUP1 line between ETACS-ECU connector and column switch connector.

Q: Is the check result normal?

YES : The trouble can be an intermittent malfunction (Refer to GROUP 00 – How to use Troubleshooting/inspection Service Points – How to Cope with Intermittent Malfunction).

NO : Repair the connector(s) or wiring harness.

STEP 5. Check of open circuit in DATA line between ETACS-ECU connector and column switch connector.

Q: Is the check result normal?

YES : Go to Step 6.

NO : Repair the connector(s) or wiring harness.

STEP 6. Check whether the diagnosis code is reset.

Check again if the diagnosis code is set to the ETACS-ECU.

- (1) Erase the diagnosis code.
- (2) Turn the ignition switch from "LOCK" (OFF) position to "ON" position.
- (3) Check if diagnosis code is set.

Q: Is the diagnosis code set?

- YES :** Replace the wiper/washer switch.
- NO :** A poor connection, open circuit, or other intermittent malfunctions in the LIN bus lines between the column switch and the ETACS-ECU (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).

Code No.U150B Column SW LIN checksum error

JUDGMENT CRITERIA

The ETACS-ECU will set diagnosis code No. U150B when abnormal signals are received from the column switch (column switch ECU).

PROBABLE CAUSES

- Faulty wiper and washer switch

Code No.U1511 Sunroof ECU LIN checksum error <vehicles with sunroof>

JUDGMENT CRITERIA

The ETACS-ECU will set diagnosis code No. U1511 when abnormal signals are received from the sunroof motor assembly.

PROBABLE CAUSES

- Faulty sunroof motor assembly

Code No.U1512 RLS LIN checksum error <Vehicles with lighting control sensor>

JUDGMENT CRITERIA

The ETACS-ECU will set diagnosis code No. U1512 when abnormal signals are received from the lighting control sensor.

PROBABLE CAUSES

- Faulty lighting control sensor

Code No.U1514 LIN transmission bit error

JUDGMENT CRITERIA

The ETACS-ECU receives and sends data simultaneously. If the data contains a fault, the ETACS-ECU will set diagnosis code No. U1514.

PROBABLE CAUSES

- Malfunction of the slave ECU
- Malfunction of the ETACS-ECU
- Electrical noise generated in the LIN bus lines

Code No.U1515 No bus activity error for LIN

⚠ CAUTION

- Before replacing the ECU, ensure that the power supply circuit, the earth circuit and the communication circuit are normal.
- When the ETACS-ECU of vehicles without KOS is replaced, the encrypted code of the ignition key needs to be registered to the ETACS-ECU. (If the encrypted code is not registered, the engine cannot be started. Register the encrypted code as described in GROUP 54A, Immobilizer System – How to Register Key ID.)

TROUBLE JUDGMENT

The ETACS-ECU will store diagnosis code No. U1515 when no communication has been carried out for more than a certain period after it received last valid data.

PROBABLE CAUSES

- Malfunction of the ETACS-ECU
- Malfunction of the slave ECU
- LIN bus lines shorted to power supply
- LIN bus lines shorted to earth

DIAGNOSIS PROCEDURE

STEP 1. Measure the voltage at the LIN bus lines.

Check the LIN bus lines for short to power supply.

- (1) Disconnect all the connectors which are connector to the LIN bus lines.
- (2) Turn the ignition switch from "LOCK" (OFF) to "ON" position.
- (3) Measure the voltage between the column switch connector (power supply terminal) and the body earth.
 - The voltmeter needle does not swing.

NOTE: If the LIN bus lines are short to power supply, the voltmeter indicates a constant value.
- (4) Measure the voltage between the sunroof motor assembly connector (power supply terminal) and the body earth. <vehicles with sunroof>
 - The voltmeter needle does not swing.

NOTE: If the LIN bus lines are short to power supply, the voltmeter indicates a constant value.
- (5) Measure the voltage between the lighting control sensor connector (power supply terminal) and the body earth. <vehicles with lighting control

sensor>

- The voltmeter needle does not swing.

NOTE: If the LIN bus lines are short to power supply, the voltmeter indicates a constant value.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the connector(s) or wiring harness.

STEP 2. Measure the resistance at the LIN bus lines.

Check the LIN bus lines for short to earth.

- (1) Disconnect all the connectors which are connector to the LIN bus lines.
- (2) Measure the resistance between the column switch connector (earth terminal) and the body earth.
 - No continuity (1 kΩ or more)
- (3) Measure the resistance between the sunroof motor assembly connector (earth terminal) and the body earth. <vehicles with sunroof>
 - No continuity (1 kΩ or more)
- (4) Measure the resistance between the lighting control sensor connector (earth terminal) and the body earth. <vehicles with lighting control sensor>
 - No continuity (1 kΩ or more)

Q: Is the check result normal?

YES : Go to Step 3.

NO : Repair the connector(s) or wiring harness.

STEP 3. Check the column switch.

Disconnect column switch connector, and recheck whether diagnosis code No. U1515 is set.

- (1) Connect all the relevant ECUs, and disconnect column switch connector only.
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch from "LOCK" (OFF) to "ON" position.
- (4) Check whether diagnosis code No. U1515 is set.

NOTE: If diagnosis code No. U1515 is not set, diagnosis code No. U1109 is set because the column switch is disconnected. This is normal.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is diagnosis code No. U1515 set?

YES : Reconnect the column switch connector, and go to Step 4.

NO : Replace the wiper/washer switch.

STEP 4. Check the sunroof motor assembly.

Disconnect sunroof motor assembly connector, and recheck whether diagnosis code No. U1515 is set.

- (1) Connect all the relevant ECUs, and disconnect sunroof motor assembly connector only.
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch from "LOCK" (OFF) to "ON" position.
- (4) Check whether diagnosis code No. U1515 is set.

NOTE: If diagnosis code No. U1515 is not set, diagnosis code No. U0169 is set because the sunroof motor assembly is disconnected. This is normal.

- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is diagnosis code No. U1515 set?

YES : Reconnect the sunroof motor assembly connector, and go to Step 5.

NO : Replace the sunroof motor assembly.

STEP 5. Check the lighting control sensor.

Disconnect lighting control sensor connector, and recheck whether diagnosis code No. U1515 is set.

- (1) Connect all the relevant ECUs, and disconnect lighting control sensor connector only.
- (2) Erase the diagnosis code.
- (3) Turn the ignition switch from "LOCK" (OFF) to

"ON" position.

- (4) Check whether diagnosis code No. U1515 is set.

NOTE: If diagnosis code No. U1515 is not set, diagnosis code No. U0231 is set because the sunroof motor assembly is disconnected. This is normal.

- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is diagnosis code No. U1515 set?

YES : Reconnect the lighting control sensor, and go to Step 6.

NO : Replace the lighting control sensor.

STEP 6. Recheck for diagnosis code.

Check again if the diagnosis code is set to the ETACS-ECU.

- (1) Erase the diagnosis code.
- (2) Turn the ignition switch from "LOCK" (OFF) to "ON" position.
- (3) Check whether diagnosis code No. U1515 is set.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the diagnosis code set?

YES : Replace the ETACS-ECU.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00 – How to Cope with Intermittent Malfunction).