

GROUP 54B

LOCAL
INTERCONNECT
NETWORK (LIN)

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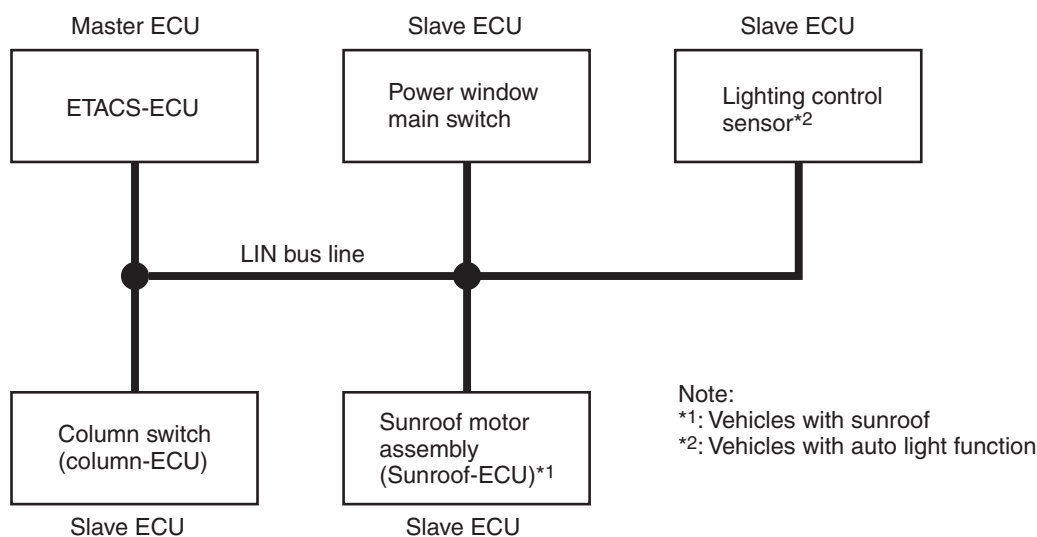
GENERAL INFORMATION

M1545110000435

LIN refers to "Local Interconnect Network," which is a serial multiplex communication protocol* administered by LIN consortium. A communication circuit employing the LIN protocol connects each ECU, and switch and sensor data can be shared among ECUs, which enables more reduction in wiring.

NOTE: *: The regulations that have been decided in detail, from software matters such as the necessary transmission rate for communication, the system, data format, and communication timing control method to hardware matters such as the harness type and length and the resistance values.

STRUCTURE



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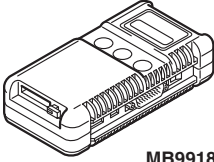
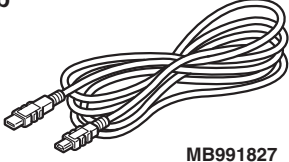
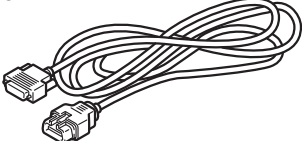
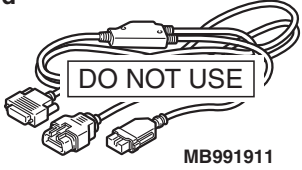
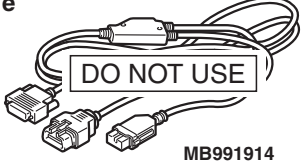
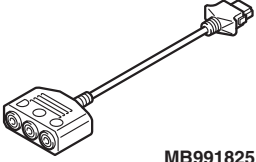
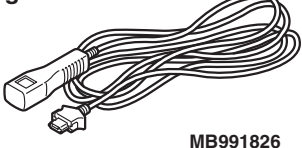
Master and slave ECUs are connected to the LIN bus lines. The master ECU is the ETACS*¹-ECU, and the slave ECUs are the column switch (column-ECU), the power window main switch, the sunroof-ECU*² and the lighting control sensor*³. The master ECU requests these slave ECUs to communicate each other via communication lines.


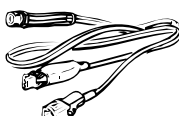
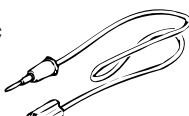

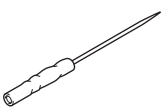
NOTE:

- *¹: ETACS (Electronic Time and Alarm Control System)
- *²: Vehicles with sunroof
- *³: Vehicles with auto light function

SPECIAL TOOLS

M1545100100129

Tool	Tool number and name	Supersession	Application
<p>a</p>  <p>MB991824</p> <p>b</p>  <p>MB991827</p> <p>c</p>  <p>MB991910</p> <p>d</p>  <p>MB991911</p> <p>e</p>  <p>MB991914</p> <p>f</p>  <p>MB991825</p> <p>g</p>  <p>MB991826 MB991958</p>	<p>MB991958</p> <p>a. MB991824</p> <p>b. MB991827</p> <p>c. MB991910</p> <p>d. MB991911</p> <p>e. MB991914</p> <p>f. MB991825</p> <p>g. 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 main harness C (for Chrysler models only)</p> <p>f. M.U.T.-III measurement adapter</p> <p>g. M.U.T.-III trigger harness</p>	<p>MB991824-KIT</p> <p>NOTE: G: MB991826</p> <p>M.U.T.-III Trigger Harness is not necessary when pushing V.C.I. ENTER key.</p>	<p>CAUTION</p> <p>M.U.T.-III main harness A (MB991910) should be used. M.U.T.-III main harness B and C should not be used for this vehicle.</p> <p>DTC, data list and actuator test check.</p>

Tool	Tool number and name	Supersession	Application
<p>a</p>  <p>b</p>  <p>c</p>  <p>d</p> 	<p>MB991223</p> <p>a. MB991219</p> <p>b. MB991220</p> <p>c. MB991221</p> <p>d. MB991222</p> <p>Harness set</p> <p>a. Check harness</p> <p>b. LED harness</p> <p>c. LED harness adapter</p> <p>d. Probe</p>	General service tool (jumper)	<p>Continuity check and voltage measurement at harness wire or connector</p> <p>a. For checking connector pin contact pressure</p> <p>b. For checking power supply circuit</p> <p>c. For checking power supply circuit</p> <p>d. For connecting a locally sourced tester</p>
 <p>MB992006</p>	<p>MB992006</p> <p>Extra fine probe</p>	—	Continuity check and voltage measurement at harness wire or connector

TROUBLESHOOTING

DIAGNOSIS FUNCTION

M1545104200043

HOW TO CONNECT THE SCAN TOOL (M.U.T.-III)

Required Special Tools:

MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

⚠ CAUTION

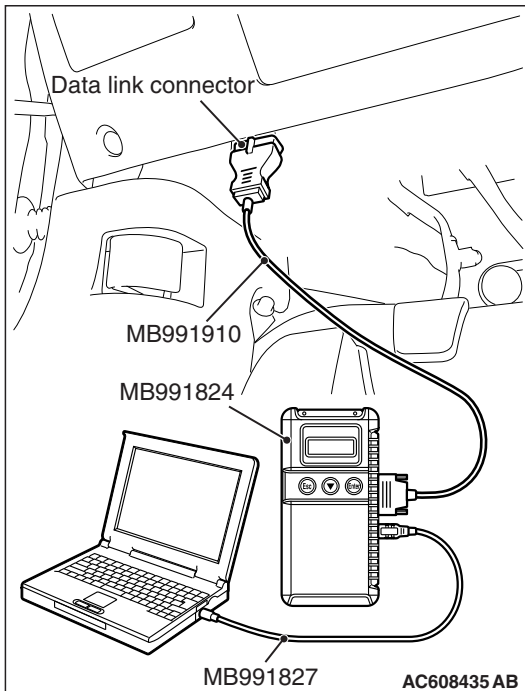
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991910 to special tool MB991824.
5. Connect special tool MB991910 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.

7. Start the M.U.T.-III system on the personal computer.

NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.



HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODES

Required Special Tools:

MB991958: Scan Tool (M.U.T.-III Sub Assembly)

- MB991824: Vehicle Communication Interface (V.C.I.)
- MB991827: M.U.T.-III USB Cable
- MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

NOTE: If the battery voltage is low, diagnostic trouble codes will not be set. Check the battery if scan tool MB991958 does not display.

1. Connect scan tool MB991958 to the data link connector.

2. Turn the ignition switch to the "ON" position.
3. Select "System select" from the start-up screen.
4. Select "From 2006 MY" of "Model Year." When the "Vehicle Information" is displayed, check the contents.
5. Select "ETACS" from "System List", and press the "OK" button.

NOTE: When the "Loading Option Setup" list is displayed, check the applicable item.

6. Select "Diagnostic Trouble Code" to read the DTC.
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

DIAGNOSIS CODE CHART

M1545100200591

Diagnosis code No.	Diagnostic item	Reference page
U0169	Sunroof LIN timeout <Vehicles with sunroof>	P.54B-7
U0215	P/W SW (DR) LIN timeout	P.54B-11
U0231	Lighting control sensor LIN timeout <Vehicles with auto light function>	P.54B-16
U1109	Column SW LIN timeout	P.54B-21
U150B	Column SW checksum error	P.54B-25
U150C	P/W SW (DR) checksum error	P.54B-26
U1511	Sunroof checksum error <Vehicles with sunroof>	P.54B-27
U1512	Lighting control sensor checksum error <Vehicles with auto light function>	P.54B-28
U1514	Bit error (LIN)	P.54B-29
U1515	No-Bus activity error (LIN)	P.54B-31

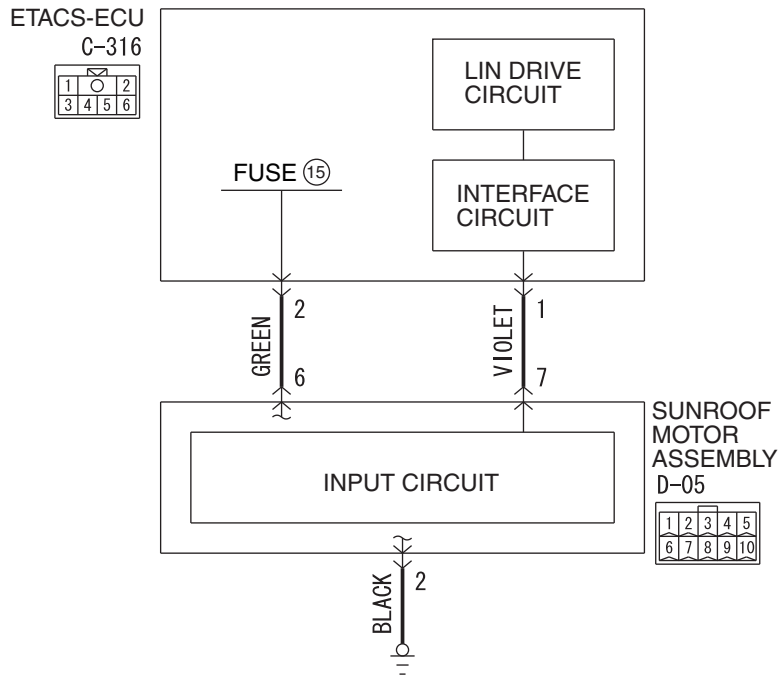
DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC U0169: Sunroof LIN timeout <Vehicles with sunroof>

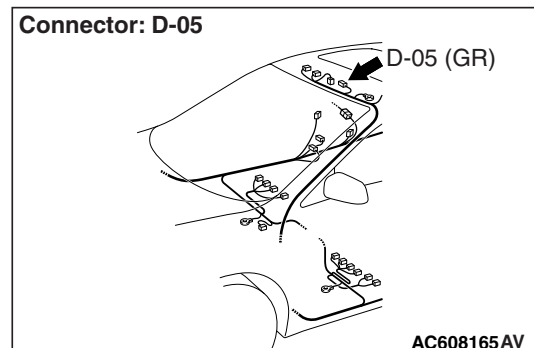
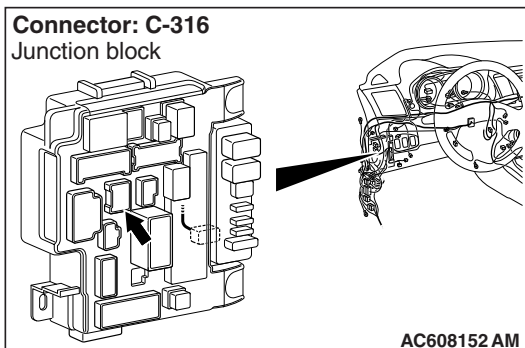
CAUTION

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

Sunroof Motor Assembly LIN Communication Circuit



WAS54M022A



TROUBLE JUDGEMENT

The ETACS-ECU receives signal from the sunroof motor assembly (sunroof-ECU). If signal cannot be received at all, DTC U0169 will be set.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- Connector(s) or wiring harness in the LIN bus lines between the sunroof motor assembly and the ETACS-ECU, the power supply system of the sunroof motor assembly, or the sunroof motor assembly itself may be defective.

Past trouble

- If DTC U0169 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) in the LIN bus line between the sunroof motor assembly and the ETACS-ECU, and the power supply system of the sunroof motor assembly.

TROUBLESHOOTING HINTS

- The sunroof motor assembly may be defective.
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector.

DIAGNOSIS**Required Special Tools:**

- MB991958 Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicles Communication Interface (V.C.I.)
 - MB991827 M.U.T.-III USB Cable
 - MB991910 M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check ETACS-ECU connector C-316 and sunroof motor assembly connector D-05 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are ETACS-ECU connector C-316 and sunroof motor assembly connector D-05 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s).

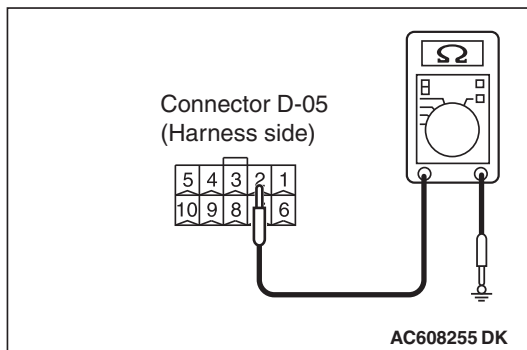
STEP 2. Check the ground circuit to the sunroof motor assembly. Measure the resistance at sunroof motor assembly connector D-05.

- (1) Disconnect sunroof motor assembly connector D-05 and measure the resistance available at the wiring harness side of the connector.
- (2) Measure the resistance value between sunroof motor assembly connector D-05 terminal 2 and ground.
 - The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.

NO : Go to Step 3.



STEP 3. Check the wiring harness between sunroof motor assembly connector D-05 (terminal 2) and the ground.

- Check the ground wires for open circuit.

Q: Is the wiring harness between sunroof motor assembly connector D-05 (terminal 2) and the ground in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

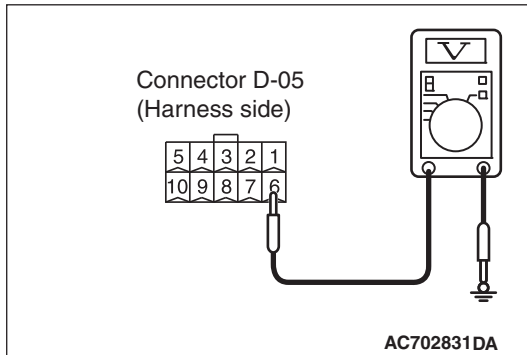
STEP 4. Check the battery power supply circuit to the sunroof motor assembly. Measure the voltage at sunroof motor assembly connector D-05.

- (1) Disconnect sunroof motor assembly connector D-05 measure the voltage available at the wiring harness side of the connector.
- (2) Measure the voltage between sunroof motor assembly connector D-05 terminal 6 and ground.
 - The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 6.

NO : Go to Step 5.



STEP 5. Check the wiring harness between ETACS-ECU connector C-316 (terminal 2) and sunroof motor assembly connector D-05 (terminal 6).

- Check the power supply line (battery supply) for open circuit and short circuit.

Q: Is the wiring harness between ETACS-ECU connector C-316 (terminal 2) and sunroof motor assembly connector D-05 (terminal 6) in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 6. Check the wiring harness between ETACS-ECU connector C-316 (terminal 1) and sunroof motor assembly connector D-05 (terminal 7).

Check the communication lines for open circuit.

Q: Is the wiring harness between ETACS-ECU connector C-316 (terminal 1) and sunroof motor assembly connector D-05 (terminal 7) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 7. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

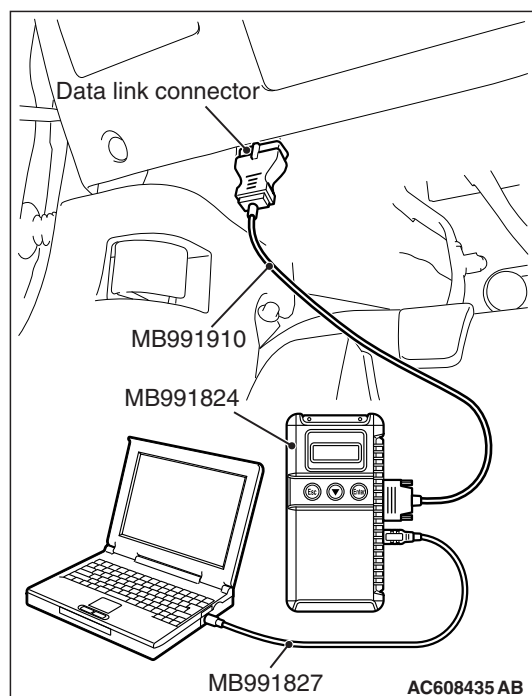
To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) [P.54B-5](#)."
- (2) Erase the DTC.
- (3) Turn the ignition switch to the "ON" position.
- (4) Check if the DTC is set.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the sunroof motor assembly.

NO : A poor connection, open circuit or other intermittent malfunction is present in the LIN bus lines between the sunroof motor assembly and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction [P.00-14](#)).

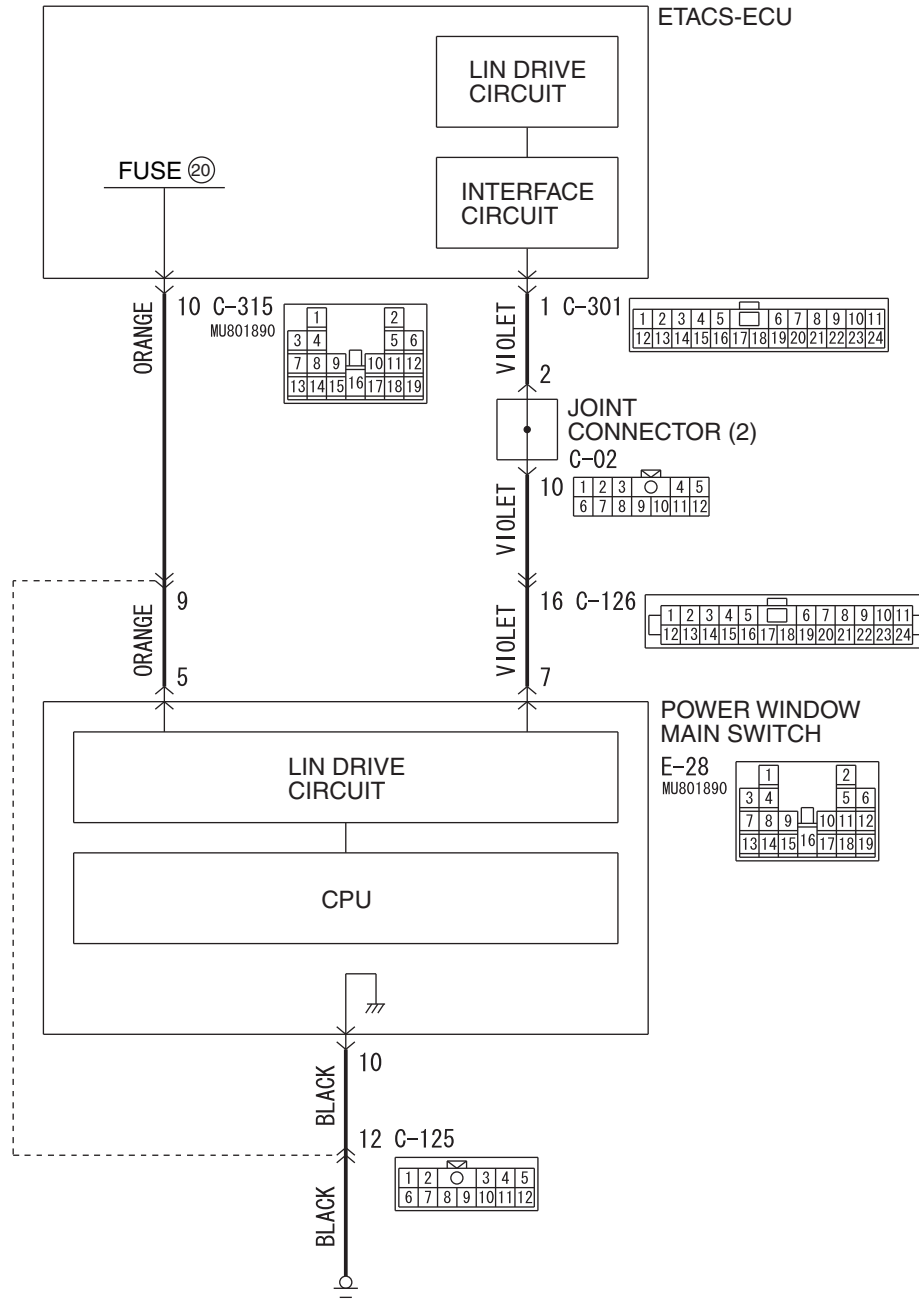


DTC U0215: P/W SW (DR) LIN timeout

CAUTION

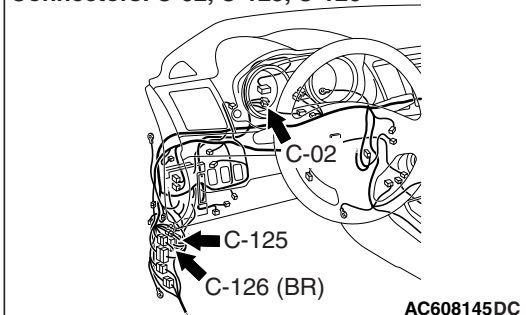
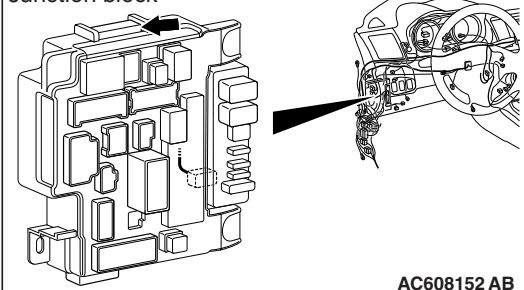
Before replacing the ECU, ensure that the communication circuit is normal.

Power Window Main Switch LIN Communication Circuit

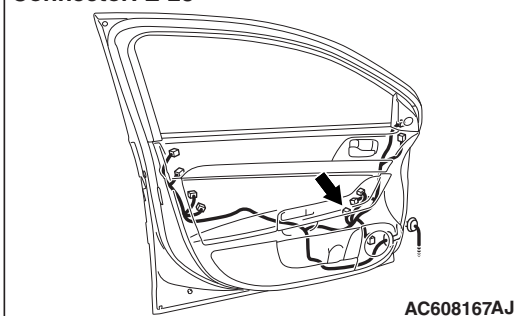


WAH54M044A

Connectors: C-02, C-125, C-126

Connector: C-301
Junction block

Connector: E-28



TROUBLE JUDGEMENT

The ETACS-ECU receives signal from the power window main switch. If signal cannot be received at all, DTC U0215 will be set.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- Connector(s) or wiring harness in the LIN bus lines between the power window main switch and the ETACS-ECU, the power supply system of the power window main switch, or the power window main switch itself may be defective.

Past trouble

- If DTC U0215 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) in the LIN bus line between the power window main switch and the ETACS-ECU, and the power supply system of the power window main switch.

TROUBLESHOOTING HINTS

- The power window main switch may be defective.
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector.

DIAGNOSIS

Required Special Tools:

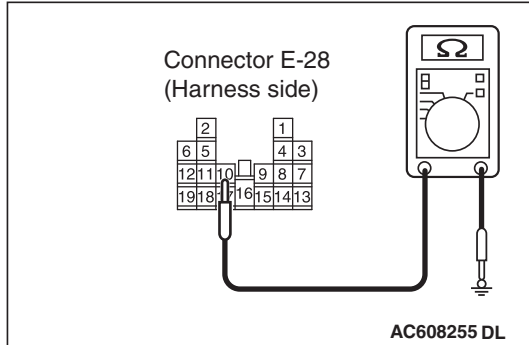
- MB991958 Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicles Communication Interface (V.C.I.)
 - MB991827 M.U.T.-III USB Cable
 - MB991910 M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check ETACS-ECU connectors C-301, C-315 and power window main switch connector E-28 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are ETACS-ECU connector C-301, C-315 and power window main switch connector E-28 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s).



STEP 2. Check the ground circuit to the power window main switch. Measure the resistance at power window main switch connector E-28.

- (1) Disconnect power window main switch connector E-28 and measure the resistance available at the wiring harness side of the connector.
- (2) Measure the resistance value between power window main switch connector E-28 terminal 10 and ground.
 - The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.

NO : Go to Step 3.

STEP 3. Check the wiring harness between power window main switch connector E-28 (terminal 10) and the ground.

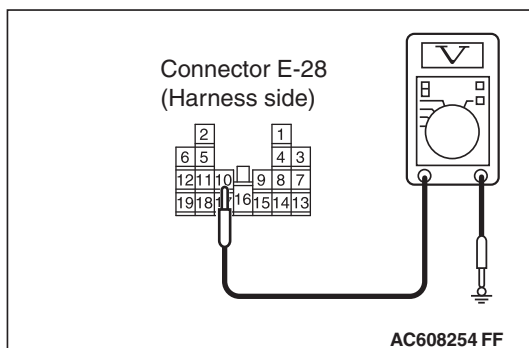
- Check the ground wires for open circuit.

NOTE: Also check intermediate connector C-125 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-125 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection [P.00E-2](#).

Q: Is the wiring harness between power window main switch connector E-28 (terminal 10) and the ground in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.



STEP 4. Check the battery power supply circuit to the power window main switch. Measure the voltage at power window main switch connector E-28.

- (1) Disconnect power window main switch connector E-28 and measure the voltage available at the wiring harness side of the connector.
- (2) Measure the voltage between power window main switch connector E-28 terminal 5 and ground.
 - The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Check the wiring harness between ETACS-ECU connector C-315 (terminal 10) and power window main switch connector E-28 (terminal 5).

- Check the power supply line (battery supply) for open circuit and short circuit.

NOTE: Also check intermediate connector C-125 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-125 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection [P.00E-2](#).

Q: Is the wiring harness between ETACS-ECU connector C-315 (terminal 10) and power window main switch connector E-28 (terminal 5) in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 6. Check the wiring harness between ETACS-ECU connector C-301 (terminal 1) and power window main switch connector E-28 (terminal 7).

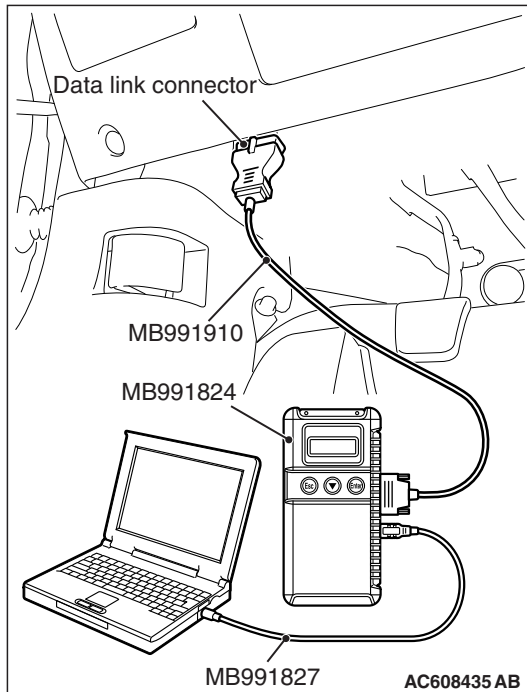
Check the communication lines for open circuit.

NOTE: Also check joint connector C-02 and intermediate connector C-125 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-02 or intermediate connector C-125 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection [P.00E-2](#).

Q: Is the wiring harness between ETACS-ECU connector C-301 (terminal 1) and power window main switch connector E-28 (terminal 7) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.



STEP 7. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) [P.54B-5](#)."
- (2) Erase the DTC.
- (3) Turn the ignition switch to the "ON" position.
- (4) Check if the DTC is set.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the power window main switch.

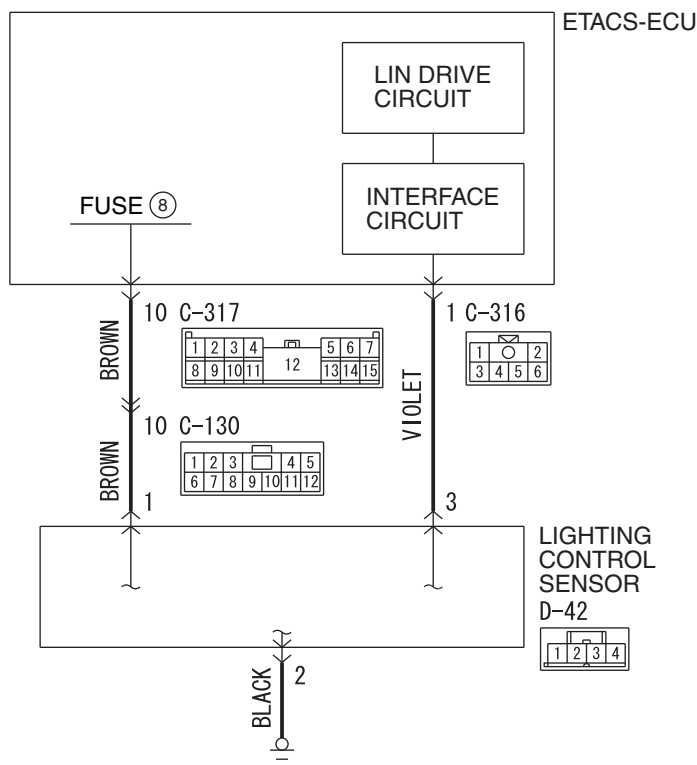
NO : A poor connection, open circuit or other intermittent malfunction is present in the LIN bus lines between the power window main switch and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction [P.00-14](#)).

DTC U0231: Lighting control sensor LIN timeout <Vehicles with auto light function>

CAUTION

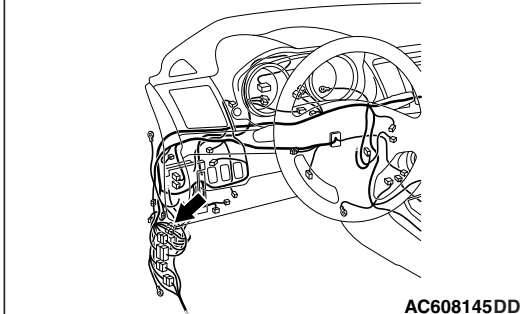
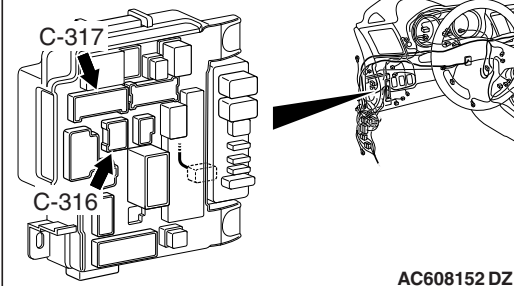
Before replacing the ECU, ensure that the communication circuit is normal.

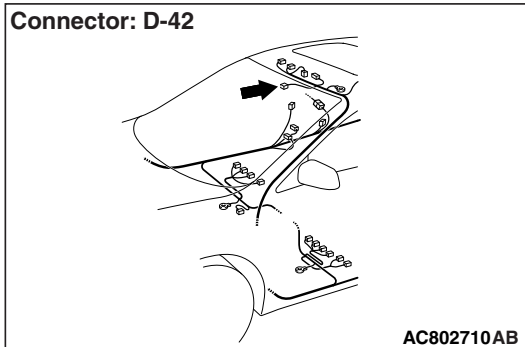
Lighting Control Sensor LIN Communication Circuit



WAS54M024A

Connector: C-130

Connectors: C-316, C-317
ETACS-ECU



TROUBLE JUDGMENT

The ETACS-ECU receives signal from the lighting control sensor. If signal cannot be received at all, DTC U0231 will be set.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- Connector(s) or wiring harness in the LIN bus lines between the lighting control sensor and the ETACS-ECU, the power supply system of the lighting control sensor, or the lighting control sensor itself may be defective.

Past trouble

- If DTC U0169 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) in the LIN bus line between the lighting control sensor and the ETACS-ECU, and the power supply system of the lighting control sensor.

TROUBLESHOOTING HINTS

- The lighting control sensor may be defective.
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector.

DIAGNOSIS

Required Special Tools:

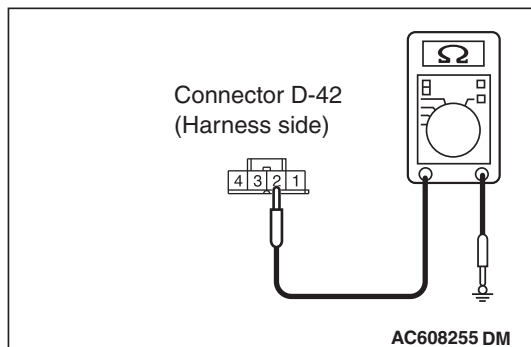
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 - MB991824: Vehicles Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check ETACS-ECU connectors C-316, C-317 and lighting control sensor connector D-42 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are ETACS-ECU connectors C-316, C-317 and lighting control sensor connector D-42 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s).



STEP 2. Check the ground circuit to the lighting control sensor. Measure the resistance at lighting control sensor connector D-42.

- (1) Disconnect power window main switch connector D-42 and measure the resistance available at the wiring harness side of the connector.
- (2) Measure the resistance value between power window main switch connector D-42 terminal 2 and ground.
 - The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.

NO : Go to Step 3.

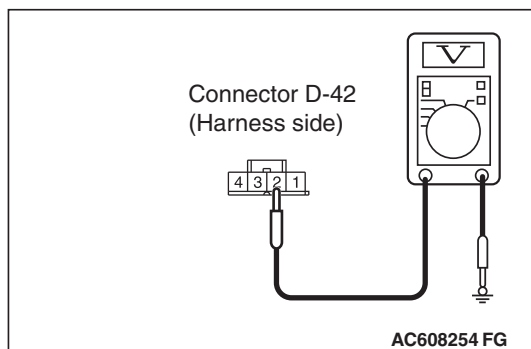
STEP 3. Check the wiring harness between lighting control sensor connector D-42 (terminal 2) and the ground.

- Check the ground wires for open circuit.

Q: Is the wiring harness between lighting control sensor connector D-42 (terminal 2) and the ground in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.



STEP 4. Check the battery power supply circuit to the lighting control sensor. Measure the voltage at lighting control sensor connector D-42.

- (1) Disconnect lighting control sensor connector D-42 measure the voltage available at the wiring harness side of the connector.
- (2) Measure the voltage between lighting control sensor connector D-42 terminal 2 and ground.
 - The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Check the wiring harness between ETACS-ECU connector C-317 (terminal 10) and lighting control sensor connector D-42 (terminal 1).

- Check the power supply line (battery supply) for open circuit and short circuit.

NOTE: Also check intermediate connector C-130 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-130 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection [P.00E-2](#).

Q: Is the wiring harness between ETACS-ECU connector C-317 (terminal 10) and lighting control sensor connector D-42 (terminal 1) in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

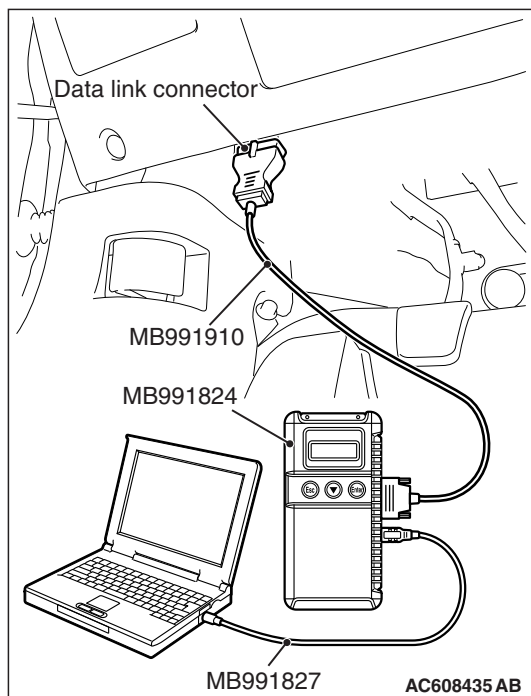
STEP 6. Check the wiring harness between ETACS-ECU connector C-316 (terminal 1) and lighting control sensor connector D-42 (terminal 3).

Check the communication line for open circuit.

Q: Is the wiring harness between ETACS-ECU connector C-316 (terminal 1) and lighting control sensor connector D-42 (terminal 3) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

**STEP 7. Recheck for diagnostic trouble code.**

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) [P.54B-5](#)."
- (2) Erase the DTC.
- (3) Turn the ignition switch to the "ON" position.
- (4) Check if the DTC is set.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the lighting control sensor.

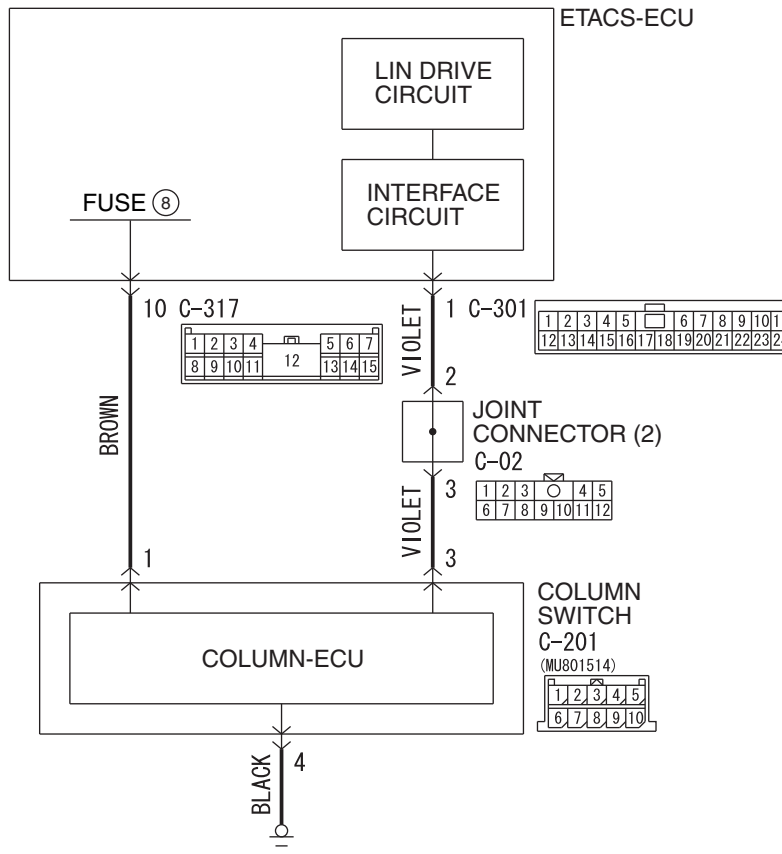
NO : A poor connection, open circuit or other intermittent malfunction is present in the LIN bus lines between the lighting control sensor and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction [P.00-14](#)).

DTC U1109: Column SW LIN timeout

CAUTION

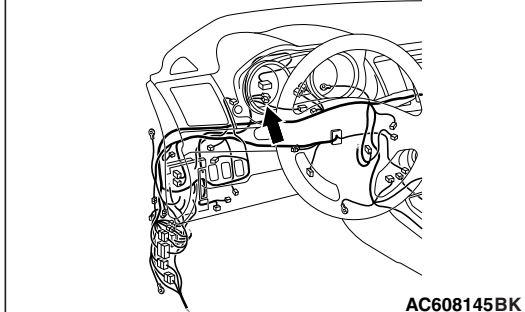
Before replacing the ECU, ensure that the communication circuit is normal.

Column Switch LIN Communication Circuit

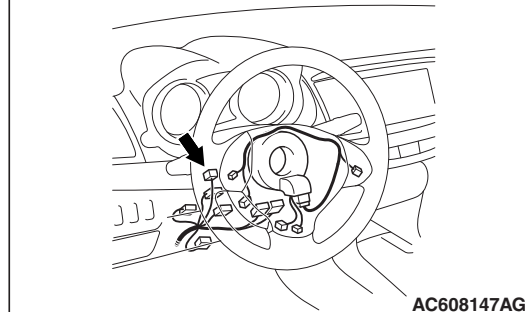


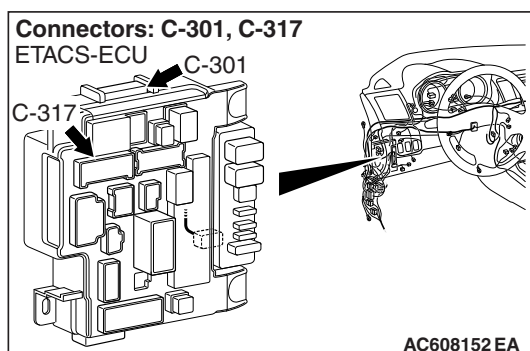
WAH54M045A

Connector: C-02



Connector: C-201





TROUBLE JUDGEMENT

The ETACS-ECU receives signal from the column switch. If signal cannot be received at all, DTC U1109 will be set.

TECHNICAL DESCRIPTION (COMMENT)

Current trouble

- Connector(s) or wiring harness in the LIN bus lines between the column switch and the ETACS-ECU, the power supply system of the column switch, or the column switch itself may be defective.

Past trouble

- If DTC U1109 is stored as a past trouble, carry out diagnosis with particular emphasis on wiring and connector(s) in the LIN bus line between the column switch and the ETACS-ECU, and the power supply system of the column switch.

TROUBLESHOOTING HINTS

- The lighting switch may be defective.
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector.

DIAGNOSIS

Required Special Tools:

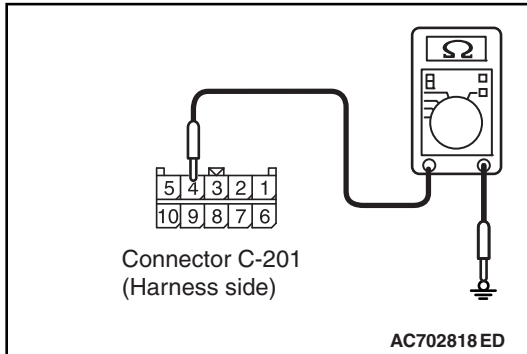
- MB991958 Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicles Communication Interface (V.C.I.)
 - MB991827 M.U.T.-III USB Cable
 - MB991910 M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check ETACS-ECU connectors C-301, C-317 and column switch connector C-201 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are ETACS-ECU connectors C-301, C-317 and column switch connector C-201 in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s).



STEP 2. Check the ground circuit to the column switch. Measure the resistance at column switch connector C-201.

- (1) Disconnect column switch connector C-201 and measure the resistance available at the wiring harness side of the connector.
- (2) Measure the resistance value between column switch connector C-201 terminal 4 and ground.
 - The resistance should be 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 4.

NO : Go to Step 3.

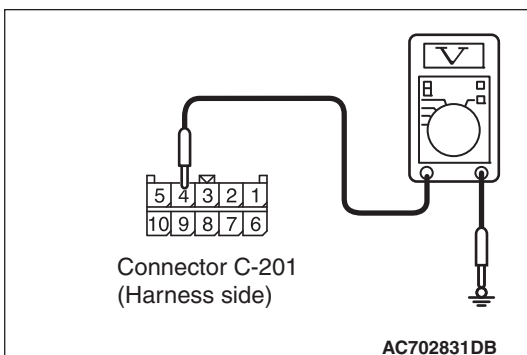
STEP 3. Check the wiring harness between column switch connector C-201 (terminal 4) and the ground.

- Check the ground wires for open circuit.

Q: Is the wiring harness between column switch connector C-201 (terminal 4) and the ground in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.



STEP 4. Check the battery power supply circuit to the column switch. Measure the voltage at column switch connector C-201.

- (1) Disconnect column switch connector C-201 measure the voltage available at the wiring harness side of the connector.
- (2) Measure the voltage between column switch connector C-201 terminal 1 and ground.
 - The voltage should measure approximately 12 volts (battery positive voltage).

Q: Is the measured voltage approximately 12 volts (battery positive voltage)?

YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Check the wiring harness between ETACS-ECU connector C-317 (terminal 10) and column switch connector C-201 (terminal 1).

- Check the power supply line (battery supply) for open circuit and short circuit.

Q: Is the wiring harness between ETACS-ECU connector C-317 (terminal 10) and column switch connector C-201 (terminal 1) in good condition?

YES : No action is necessary and testing is complete.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 6. Check the wiring harness between ETACS-ECU connector C-301 (terminal 1) and column switch connector C-201 (terminal 3).

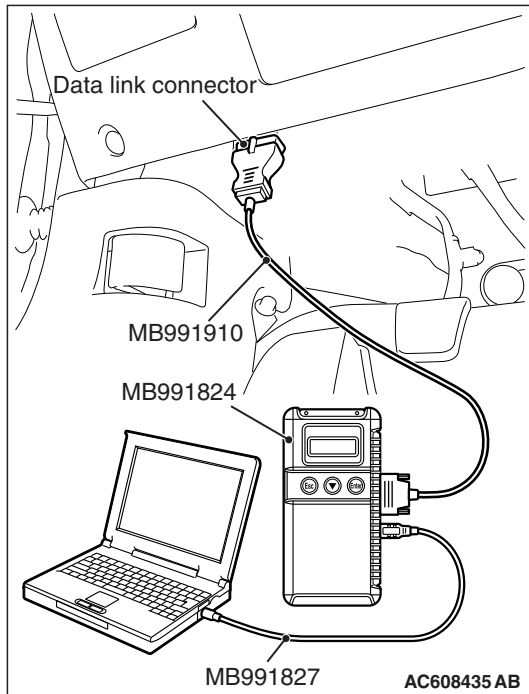
Check the communication lines for open circuit.

NOTE: Also check joint connector C-02 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-02 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection [P.00E-2](#).

Q: Is the wiring harness between ETACS-ECU connector C-301 (terminal 1) and column switch connector C-201 (terminal 3) in good condition?

YES : Go to Step 7.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.



STEP 7. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) [P.54B-5](#)."
- (2) Erase the DTC.
- (3) Turn the ignition switch to the "ON" position.
- (4) Check if the DTC is set.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the lighting switch.

NO : A poor connection, open circuit or other intermittent malfunction is present in the LIN bus lines between the column switch and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction [P.00-14](#)).

DTC U150B: Column SW checksum error

TROUBLE JUDGEMENT

The ETACS-ECU will set DTC U150B when abnormal signals are received from the column switch (column-ECU).

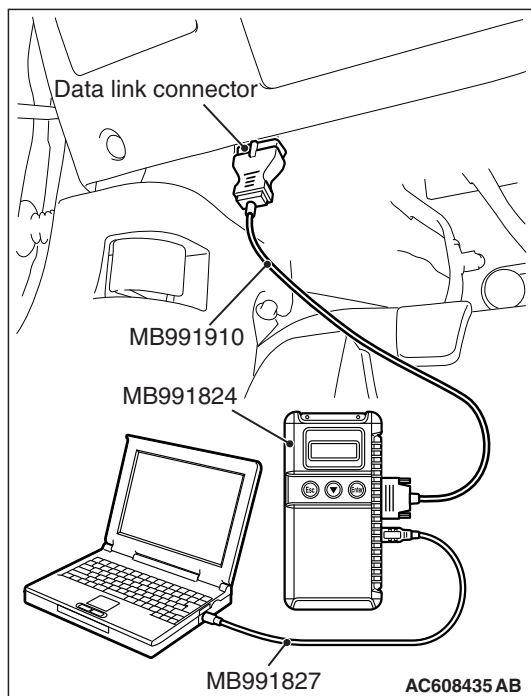
TROUBLESHOOTING HINTS

- The lighting switch may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicles Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**Recheck for diagnostic trouble code.**

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) [P.54B-5](#)."
- (2) Erase the DTC.
- (3) Turn the ignition switch to the "ON" position.
- (4) Check if the DTC is set.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the lighting 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 [P.00-14](#)).

DTC U150C: P/W SW (DR) checksum error**TROUBLE JUDGEMENT**

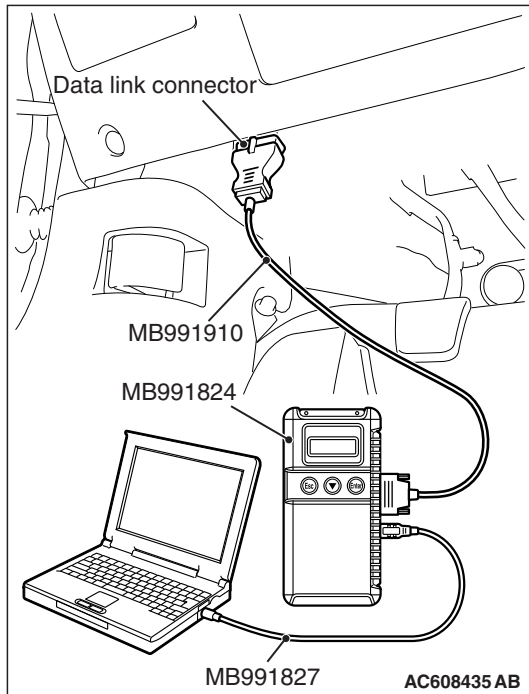
The ETACS-ECU will set DTC U150C when abnormal signals are received from the power window main switch.

TROUBLESHOOTING HINTS

- The power window main switch may be defective.

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicles Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) [P.54B-5](#)."
- (2) Erase the DTC.
- (3) Turn the ignition switch to the "ON" position.
- (4) Check if the DTC is set.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the power window main switch.

NO : A poor connection, open circuit, or other intermittent malfunctions in the LIN bus lines between the power window main switch and the ETACS-ECU (Refer to GROUP 00, How to Cope with Intermittent Malfunction [P.00-14](#)).

DTC U1511: Sunroof checksum error <Vehicles with sunroof>

TROUBLE JUDGEMENT

The ETACS-ECU will set DTC U1511 when abnormal signals are received from the sunroof motor assembly (sunroof-ECU).

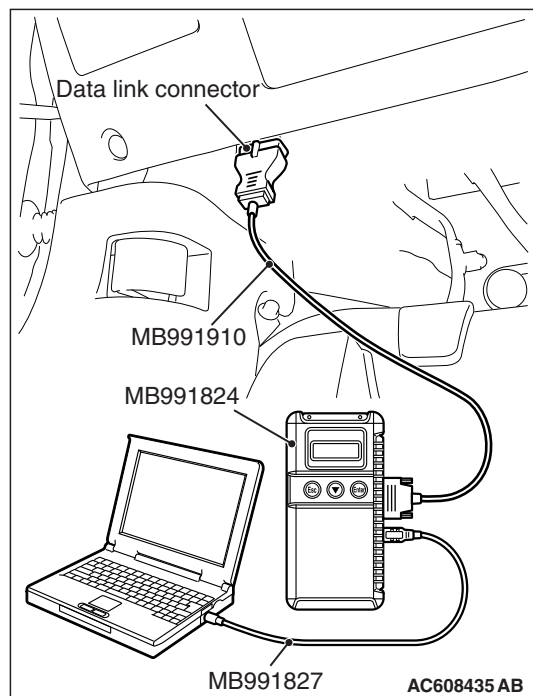
TROUBLESHOOTING HINTS

- The sunroof motor assembly may be defective.

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicles Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**Recheck for diagnostic trouble code.**

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) [P.54B-5](#)."
- (2) Erase the DTC.
- (3) Turn the ignition switch to the "ON" position.
- (4) Check if the DTC is set.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC 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 [P.00-14](#)).

DTC U1512: Lighting control sensor checksum error <Vehicles with auto light function>**TROUBLE JUDGMENT**

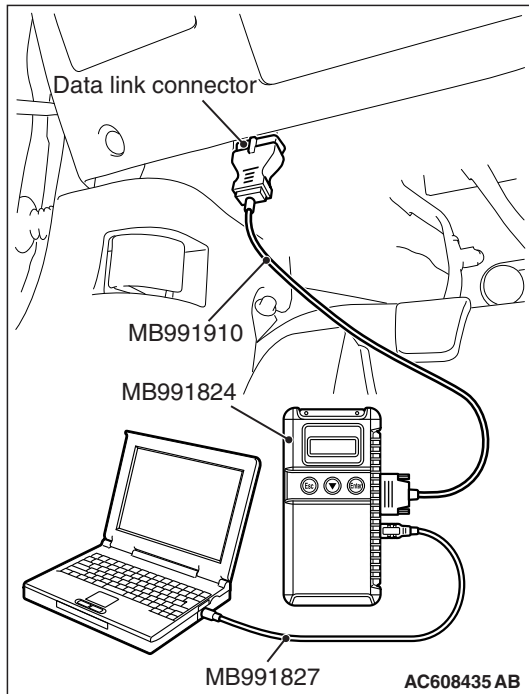
The ETACS-ECU will set DTC U1512 when abnormal signals are received from the lighting control sensor.

TROUBLESHOOTING HINTS

- The lighting control sensor may be defective.

DIAGNOSIS**Required Special Tools:**

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicles Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)



Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54B-5."
- (2) Erase the DTC.
- (3) Turn the ignition switch to the "ON" position.
- (4) Check if the DTC is set.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC 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 P.00-14).

DTC U1514: Bit error (LIN)

TROUBLE JUDGEMENT

The ETACS-ECU receives and sends data simultaneously. If the data contains a fault, the ETACS-ECU will set DTC U1514.

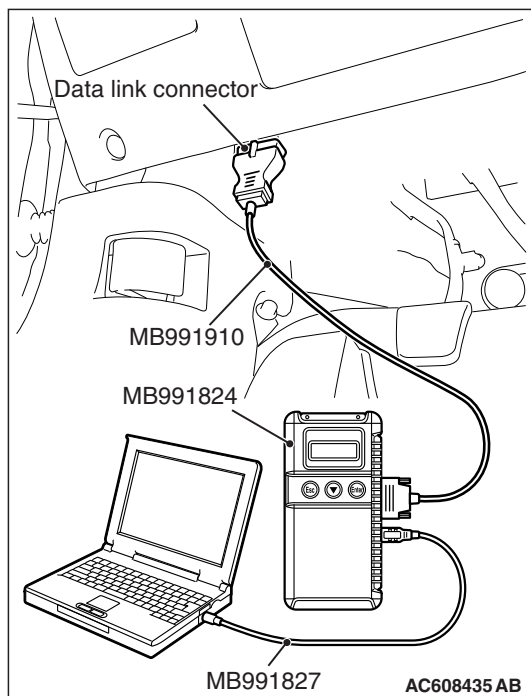
TROUBLESHOOTING HINTS

- The slave ECU may be defective.
- The ETACS-ECU may be defective.
- Electrical noise generated in the LIN bus lines

DIAGNOSIS

Required Special Tools:

- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicles Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

**Recheck for diagnostic trouble code.**

Check again if the DTC is set to the ETACS-ECU.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Ensure that the ignition switch is at the "LOCK" (OFF) position.
- (2) Start up the personal computer.
- (3) Connect special tool MB991827 to special tool MB991824 and the personal computer.
- (4) Connect special tool MB991910 to special tool MB991824.
- (5) Connect special tool MB991910 to the data link connector.
- (6) Erase the DTC.
- (7) Turn the ignition switch to the "ON" position.
- (8) Check if the DTC is set.
- (9) Turn the ignition switch to the "LOCK" (OFF) position.

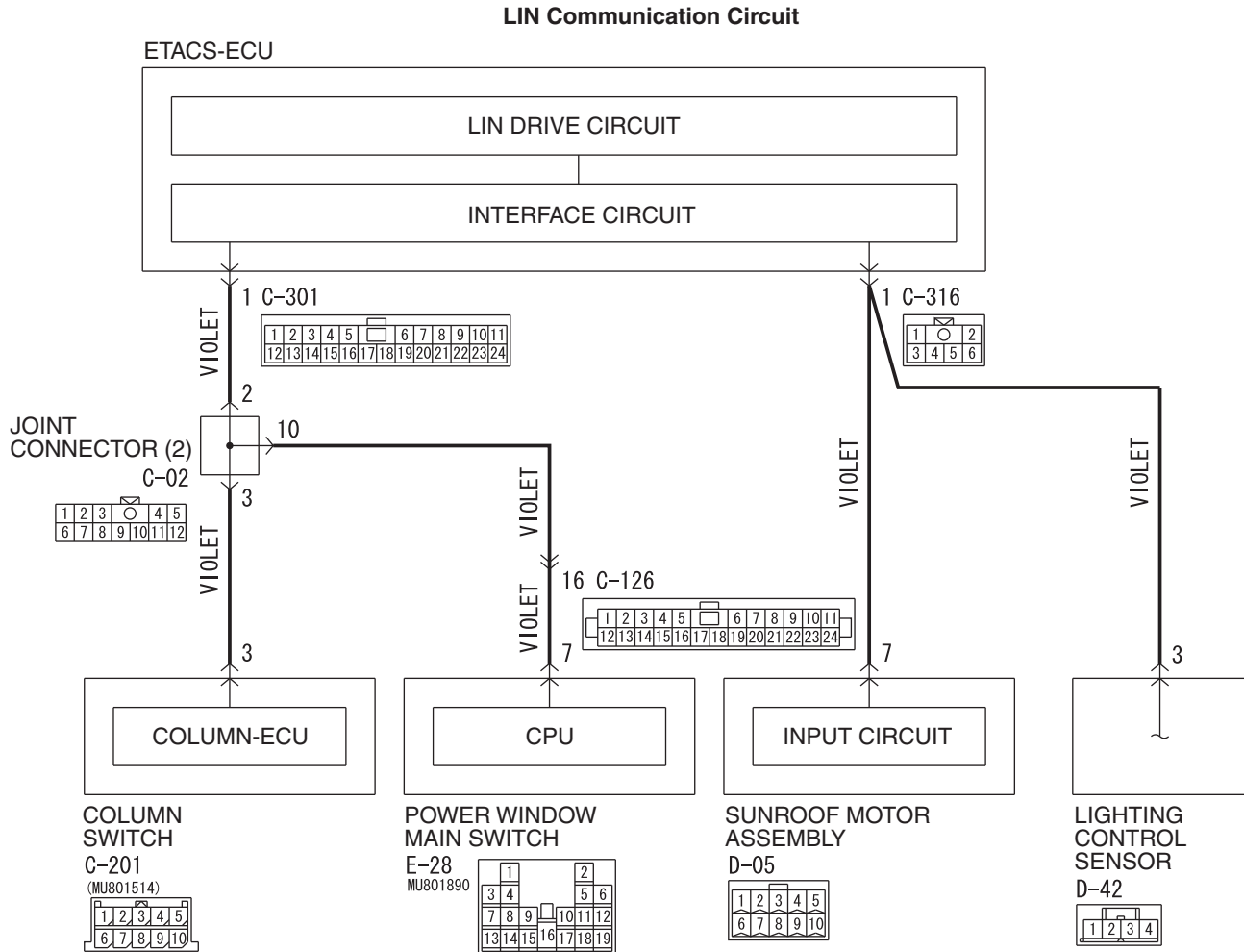
Q: Is the DTC set?

YES <A DTC other than U1514 is set.> : Replace the appropriate ECU.

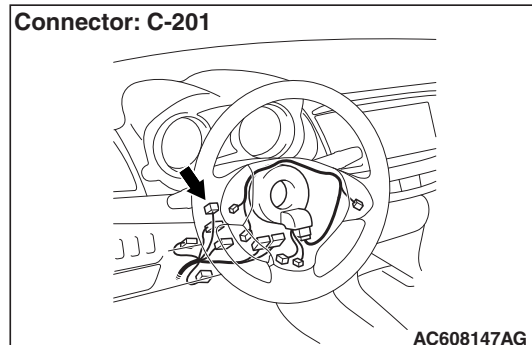
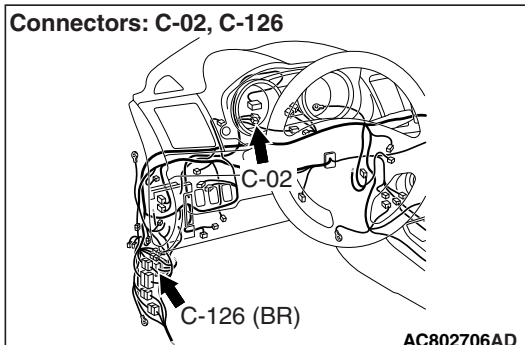
YES <The DTC U1514 is set.> : Replace the ETACS-ECU.

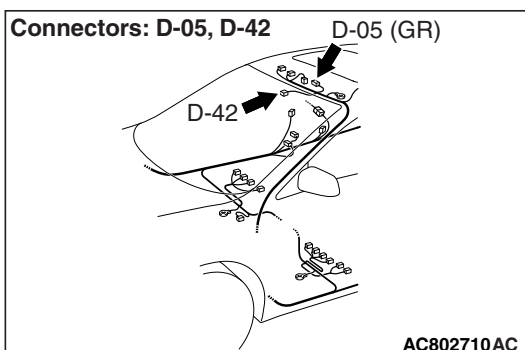
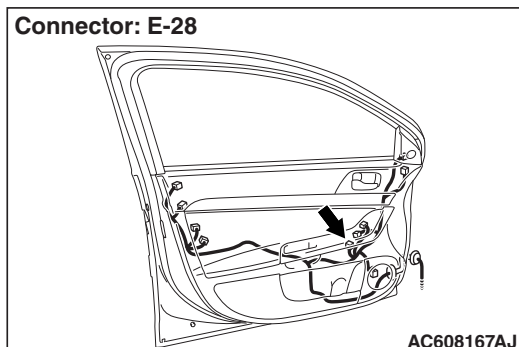
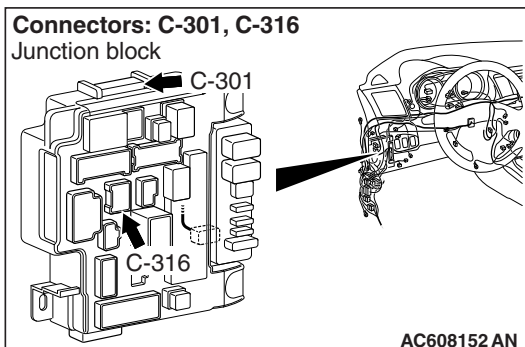
NO <The DTC is not set.> : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to Cope with Intermittent Malfunction [P.00-14](#)).

DTC U1515: No-Bus activity error (LIN)



W9H54M054A





TROUBLE JUDGMENT

The ETACS-ECU will set DTC U1515 when no communication has been carried out for more than a certain period after the slave task received last valid data.

TROUBLESHOOTING HINTS

- The ETACS-ECU may be defective.
- The slave ECU may be defective.
- LIN bus lines shorted to power supply
- LIN bus lines shorted to ground

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set
- MB992006: Extra Fine Probe
- MB991958: Scan Tool (M.U.T.-III Sub Assembly)
 - MB991824: Vehicles Communication Interface (V.C.I.)
 - MB991827: M.U.T.-III USB Cable
 - MB991910: M.U.T.-III Main Harness A (Vehicles with CAN communication system)

STEP 1. Check the following connectors.

Check the following connectors:

- Column switch connector C-201
- ETACS-ECU connectors C-301 and C-316
- Sunroof motor assembly connector D-05 <Vehicles with sunroof>
- Lighting control sensor connector D-42 <Vehicles with auto light function>
- Power window main switch connector E-28 <Vehicles with central door locking system>

Q: Are all the connectors in good condition?

YES : Go to Step 2.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection

[P.00E-2.](#)

STEP 2. Check the following wiring harness.

Check the wiring harness for open circuit between the following connectors:

- Wiring harness from ETACS-ECU connector C-301 (terminal 1) to column switch connector C-201 (terminal 3)
- Wiring harness from ETACS-ECU connector C-316 (terminal 1) to lighting control sensor connector D-42 (terminal 3) <Vehicles with auto light function>
- Wiring harness from ETACS-ECU connector C-316 (terminal 1) to sunroof motor assembly connector D-05 (terminal 7) <Vehicles with sunroof>
- Wiring harness from ETACS-ECU connector C-301 (terminal 1) to power window main switch connector E-28 (terminal 7) <Vehicles with central door locking system>

NOTE: Also check joint connector C-02 and intermediate connector C-126 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-02 or intermediate connector C-126 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Are all the wiring harness wires in good condition?

YES : Go to Step 3.

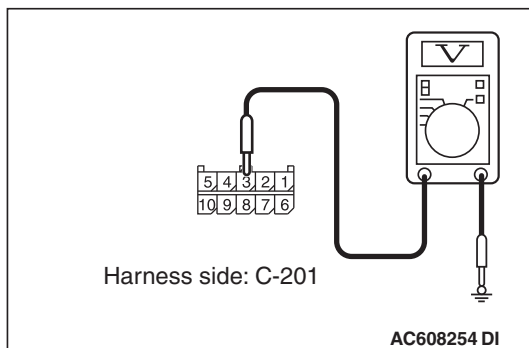
NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

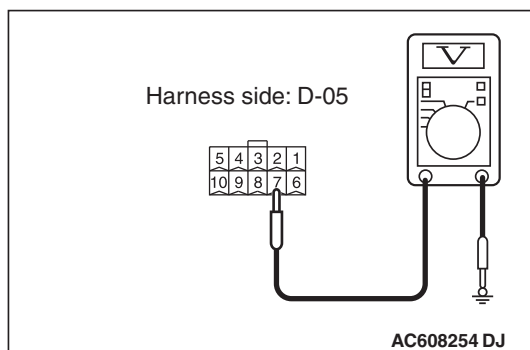
STEP 3. Measure the voltage at the LIN bus lines.

Check the LIN bus lines for short to power supply.

- (1) Disconnect all the ECU connectors which are connected to the LIN bus lines.
- (2) Turn the ignition switch from "LOCK" (OFF) to "ON" position.
- (3) Measure the voltage between column switch connector C-201 (terminal 3) and ground.
 - The voltmeter needle does not swing.

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

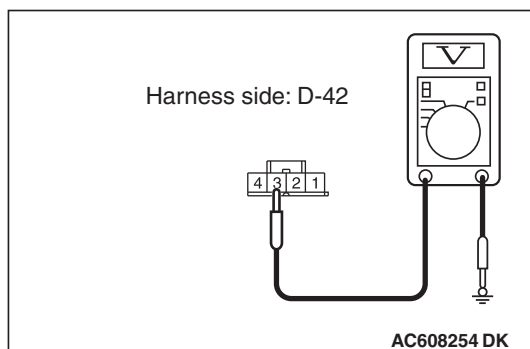




- (4) Measure the voltage between sunroof motor assembly connector D-05 (terminal 7) and ground. <Vehicles with sunroof>

- 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 lighting control sensor connector D-42 (terminal 3) and ground. <Vehicles with auto light function>

- 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?

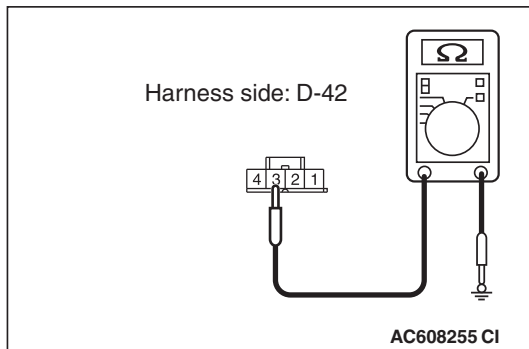
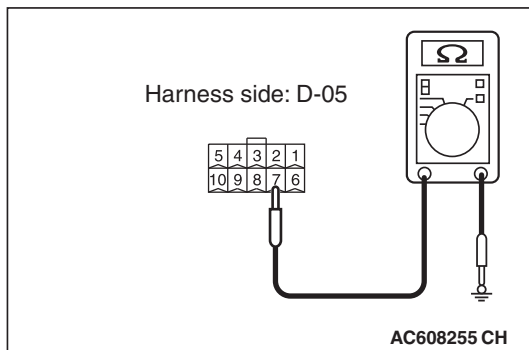
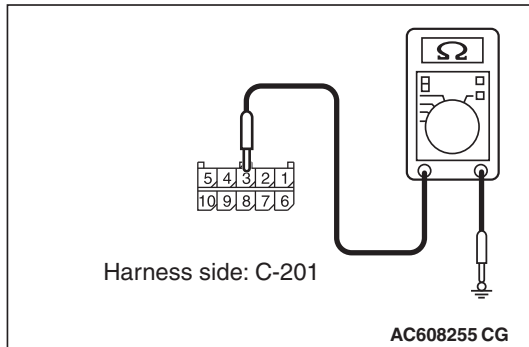
YES : Go to Step 4.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

STEP 4. Measure the resistance at the LIN bus lines.

Check the LIN bus lines for short to ground.

- (1) Disconnect all the ECU connectors which are connected to the LIN bus lines.
- (2) Measure the resistance value between column switch connector C-201 (terminal 3) and ground.
 - No continuity (1 k Ω or more)



- (3) Measure the resistance value between sunroof motor assembly connector D-05 (terminal 7) and ground. <Vehicles with sunroof>

- No continuity (1 k Ω or more)

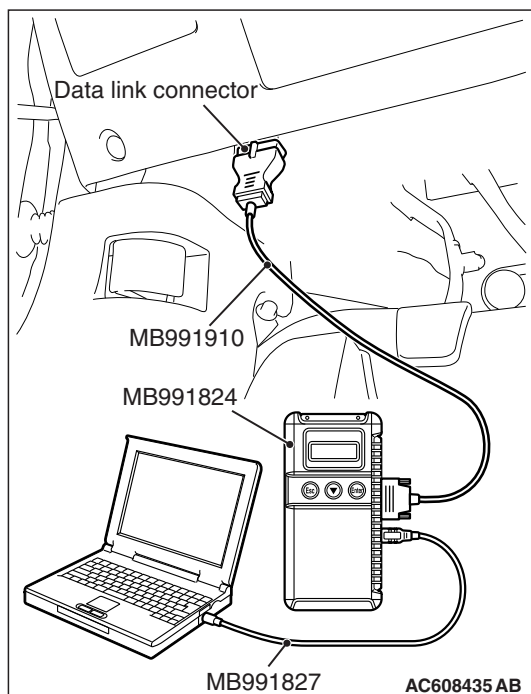
- (4) Measure the resistance value between lighting control sensor connector D-42 (terminal 3) and ground. <Vehicles with auto light function>

- No continuity (1 k Ω or more)

Q: Is the check result normal?

YES : Go to Step 5.

NO : The wiring harness may be damaged or the connector(s) may have loose, corroded or damaged terminals, or terminals pushed back in the connector. Repair the wiring harness as necessary.

**STEP 5. Check the column switch.**

Disconnect column switch connector C-201, and recheck whether DTC U1515 is set.

⚠ CAUTION

To prevent damage to scan tool MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

- (1) Connect scan tool MB991958. Refer to "How to connect the Scan Tool (M.U.T.-III) P.54B-5."
- (2) Connect all the relevant ECUs, and disconnect column switch connector C-201 only.
- (3) Erase the DTC.
- (4) Turn the ignition switch from "LOCK" (OFF) to "ON" position.
- (5) Check whether DTC U1515 is set.

NOTE: If DTC U1515 is not set, DTC U1109 is set because the column switch is disconnected. This is normal.

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

Q: Is DTC U1515 set?

YES : Reconnect the column switch connector, and go to Step 6.

NO : Replace the column switch.

STEP 6. Check the power window main switch.

Disconnect power window main switch connector E-28, and recheck whether DTC U1515 is set.

- (1) Connect all the relevant ECUs, and disconnect power window main switch connector E-28 only.
- (2) Erase the DTC.
- (3) Turn the ignition switch from "LOCK" (OFF) to "ON" position.
- (4) Check whether DTC U1515 is set.

NOTE: If DTC U1515 is not set, DTC U0215 is set because the power window main switch is disconnected. This is normal.

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

Q: Is DTC U1515 set?

YES : Reconnect the power window main switch connector, and go to Step 7.

NO : Replace the power window main switch.

STEP 7. Check the sunroof motor assembly.

Disconnect sunroof motor assembly connector D-05, and recheck whether DTC U1515 is set.

- (1) Connect all the relevant ECUs, and disconnect sunroof motor assembly connector D-05 only.
- (2) Erase the DTC.
- (3) Turn the ignition switch from "LOCK" (OFF) to "ON" position
- (4) Check whether DTC U1515 is set.

NOTE: If DTC U1515 is not set, DTC 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 DTC U1515 set?

YES : Reconnect the sunroof motor assembly connector, and go to Step 8.

NO : Replace the sunroof motor assembly.

STEP 8. Check the lighting control sensor.

Disconnect lighting control sensor connector D-42, and recheck whether DTC U1515 is set.

- (1) Connect all the relevant ECUs, and disconnect lighting control sensor connector D-42 only.
- (2) Erase the DTC.
- (3) Turn the ignition switch from "LOCK" (OFF) to "ON" position
- (4) Check whether DTC U1515 is set.

NOTE: If DTC U1515 is not set, DTC U0231 is set because the power lighting control sensor is disconnected. This is normal.

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

Q: Is DTC U1515 set?

YES : Reconnect the lighting control sensor connector, and go to Step 9.

NO : Replace the lighting control sensor.

STEP 9. Recheck for diagnostic trouble code.

Check again if the DTC is set to the ETACS-ECU.

- (1) Erase the DTC.
- (2) Turn the ignition switch from "LOCK" (OFF) to "ON" position
- (3) Check whether DTC U1515 is set.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the DTC set?

YES : Replace the ETACS-ECU.

NO : The trouble can be an intermittent malfunction (Refer to GROUP 00, How to Cope with Intermittent Malfunction [P.00-14](#)).

NOTES