GROUP 54F

CONTROLLER AREA NETWORK (CAN)

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GENERAL INFORMATION

M1548310000159

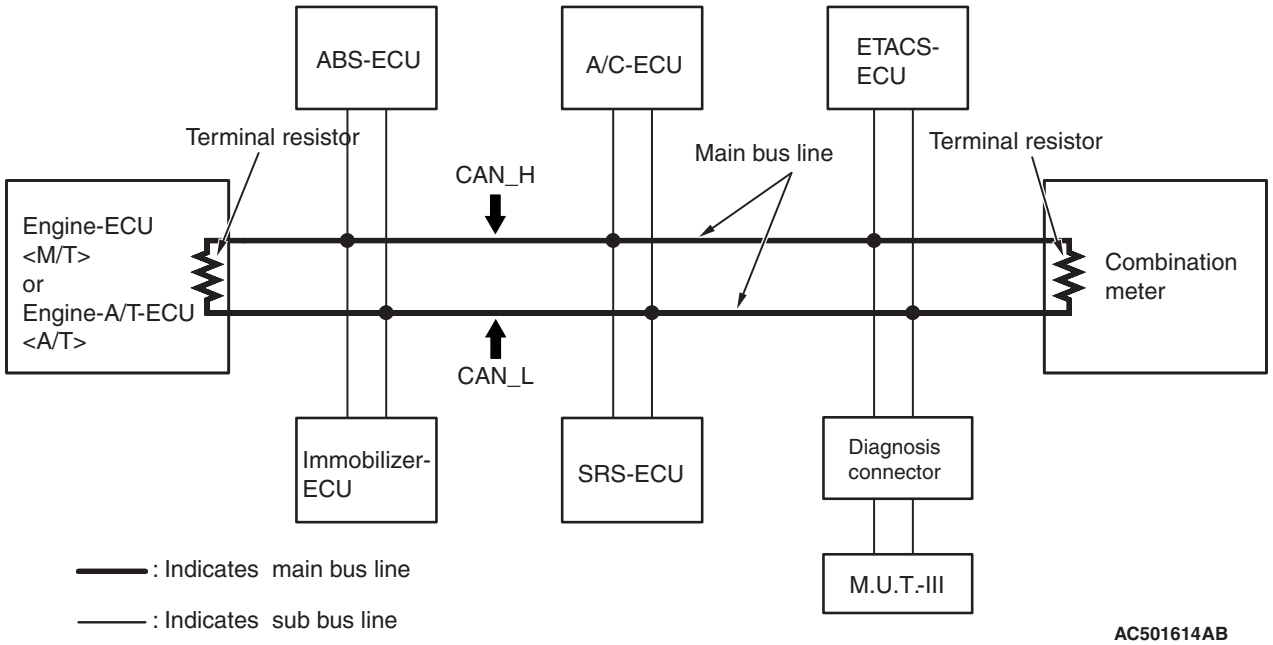
CAN, an abbreviation for Controller Area Network, is an ISO-certified international standard for a serial multiplex communication protocol*. A communication circuit employing the CAN protocol connects each ECU, and sensor data can be shared among, which enables more reduction in wiring.

*NOTE: *: The regulations 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.*

CAN offers the following advantages.

- Transmission rates are much faster than those in conventional communication (up to 1 Mbps), allowing much more data to be sent.
- It is exceptionally immune to noise, and the data obtained from each error detection device is more reliable.
- Each ECU connected via the CAN communicates independently, therefore if the ECU enters damaged mode, communications can be continued in some cases.

STRUCTURE



- The CAN bus line consists of two lines, CAN_L and CAN_H (CAN Low and CAN High, respectively), as well as two terminal resistors (A twisted-pair cable, highly resistant to noise, is used for the communications line).
- The CAN bus line connecting the two terminal resistors is the main bus line, and the CAN bus line connecting each ECU is the sub-bus line.
- The terminal resistors are installed in the engine-ECU and combination meter to stabilize communication signals (The terminal resistance is set at approximately 120 Ω).
- ECUs are connected in the CAN bus line as follows.
  - Engine-ECU <M/T> or engine-A/T-ECU <A/T>
  - ABS-ECU
  - SRS-ECU
  - A/C-ECU
  - Immobilizer-ECU <vehicles for Hong Kong and Singapore>
  - ETACS-ECU
  - Combination meter

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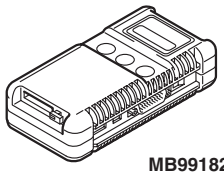
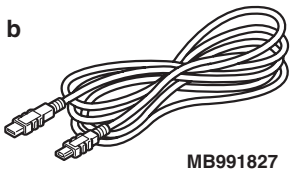
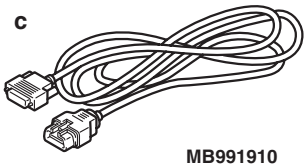
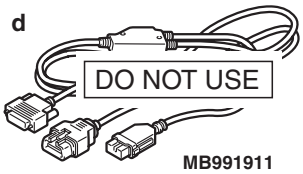
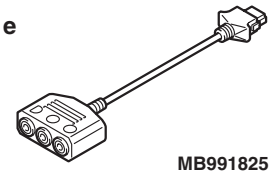
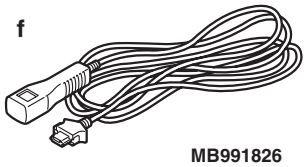
SPECIAL TOOL

M1548304200262

Tool	Number	Name	Use
a  MB991824 b  MB991827 c  MB991910 d  MB991911 e  MB991825 f  MB991826 MB991955	MB991955 a. MB991824 b. MB991827 c. MB991910 d. MB991911 e. MB991825 f. MB991826	M.U.T.-III sub-assembly a. Vehicle Communication Interface (V.C.I.) b. M.U.T.-III USB cable c. M.U.T.-III main harness A (Vehicles with CAN communication system) d. M.U.T.-III main harness B (Vehicles without CAN communication system) e. M.U.T.-III measure adapter f. M.U.T.-III trigger harness	CAN bus diagnostics **⚠ CAUTION** **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.**

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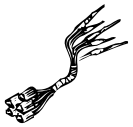
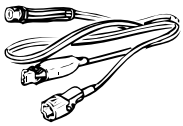
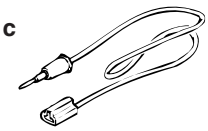
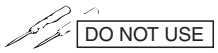
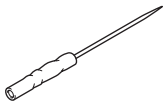
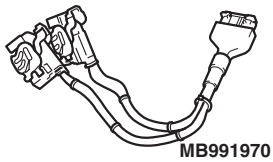
Tool	Number	Name	Use
a  b  c  d  MB991223	MB991223 a. MB991219 b. MB991220 c. MB991221 d. MB991222	Harness set a. Check harness b. LED harness c. LED harness adapter d. Probe	Continuity check and voltage measurement at harness wire or connector a. For checking connector pin contact pressure b. For checking power supply circuit c. For checking power supply circuit d. For connecting a locally sourced tester
 MB992006	MB992006	Extra fine probe	Continuity check and voltage measurement at harness wire or connector
 MB991970	MB991974	ABS check harness	Checking continuity and measuring voltage at ABS-ECU harness-side connector

TEST EQUIPMENT

M1548304300087

Test equipment	Name	Use
 AC000019	Digital multimeter	Checking CAN bus circuit (for resistance and voltage measurements)

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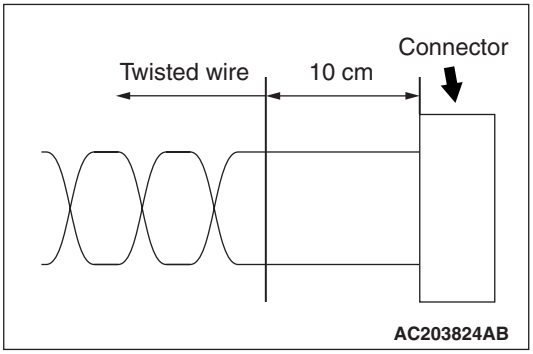
SERVICE PRECAUTIONS

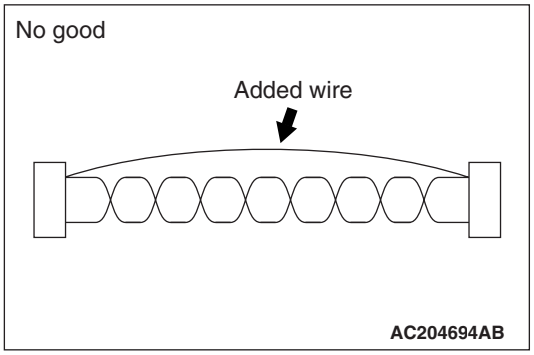
M1548302100184

Warnings in diagnosis section	Details regarding warning
⚠ CAUTION When servicing an CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.	–
⚠ CAUTION A digital multimeter should be used.	When measuring resistance value or voltage in CAN bus lines, use a digital multimeter. If not using a digital multimeter, the equipments, which are connected through the CAN communication lines, may be damaged.
⚠ CAUTION When measuring the resistance, disconnect the negative battery terminal.	Disconnect the negative battery terminal when measuring the resistance value in the CAN bus line. If you fail to do so, the equipments, which are connected through the CAN communication lines, may be damaged.
⚠ CAUTION The test wiring harness should be used.	Always use the test harness when measuring the voltage or resistance value at the female connector. If you fail to do so, connectors may be damaged.
⚠ CAUTION The strand end of the twist wire should be within 10 cm from the connector.	 If you repair the wire due to a defective connector or its terminal or harness wire, you should cut the wire so that the strand end of the twist wire should be within 10 cm from the connector as shown. If it exceeds 10 cm, twist the wiring harness just like the original twisted wire. If the strand end exceeds 10 cm, a communication error may be caused.
⚠ CAUTION Strictly observe the specified wiring harness repair procedure.	When you repair a CAN bus line, observe the precautions on how to repair the CAN bus line strictly. Refer to P.54F-6. If a new wire is added or a splice point is modified for the CAN_L or CAN_H line, an error in the CAN communication may be caused.

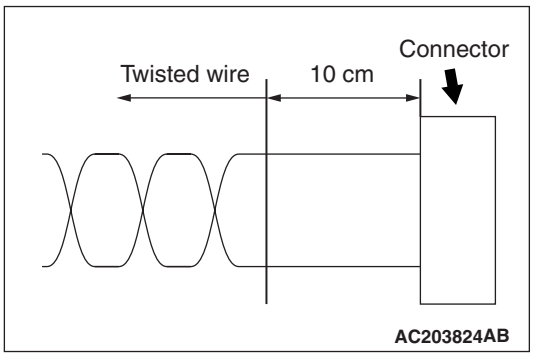
PRECAUTIONS ON HOW TO REPAIR THE CAN BUS LINES

M1548301900080

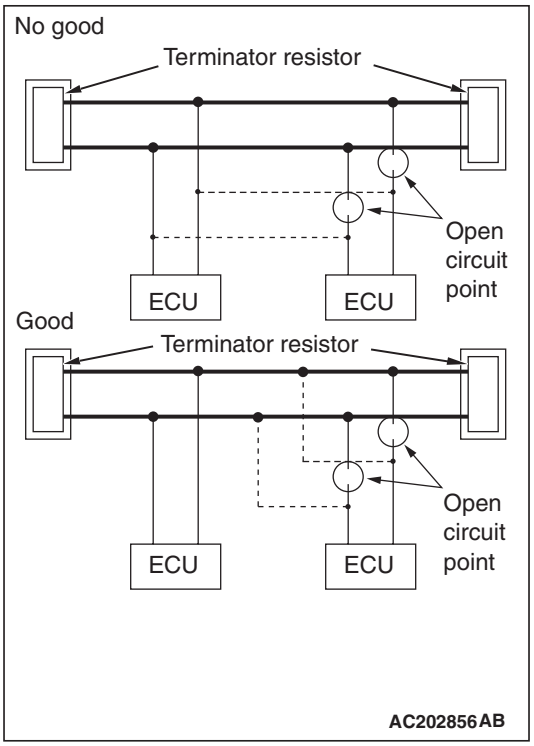
PRECAUTIONS ON HOW TO REPAIR THE CAN BUS LINES



- If the CAN bus line(s) are repaired, renew all the twisted wires between the end connectors. If the wiring harness is partially repaired, or only CAN_L or CAN_H line is repaired, noise suppression is deteriorated, causing a communication error.



- If the connector or wire on the main bus line or the sub-bus wire is replaced, the frayed end of the twisted wire should be within 10 cm from the connector. If it exceeds 10 cm, twist the wiring harness just like the original twisted wire. If the frayed end exceeds 10 cm, noise suppression is deteriorated, causing a communication error.



- If a sub-bus line is repaired, splice a new wire directly into the main bus line. If a new wire is spliced into the sub-bus line, which is connected to another device, the CAN communication will be disabled.

PRECAUTIONS ON HOW TO REPAIR THE TERMINATOR RESISTOR

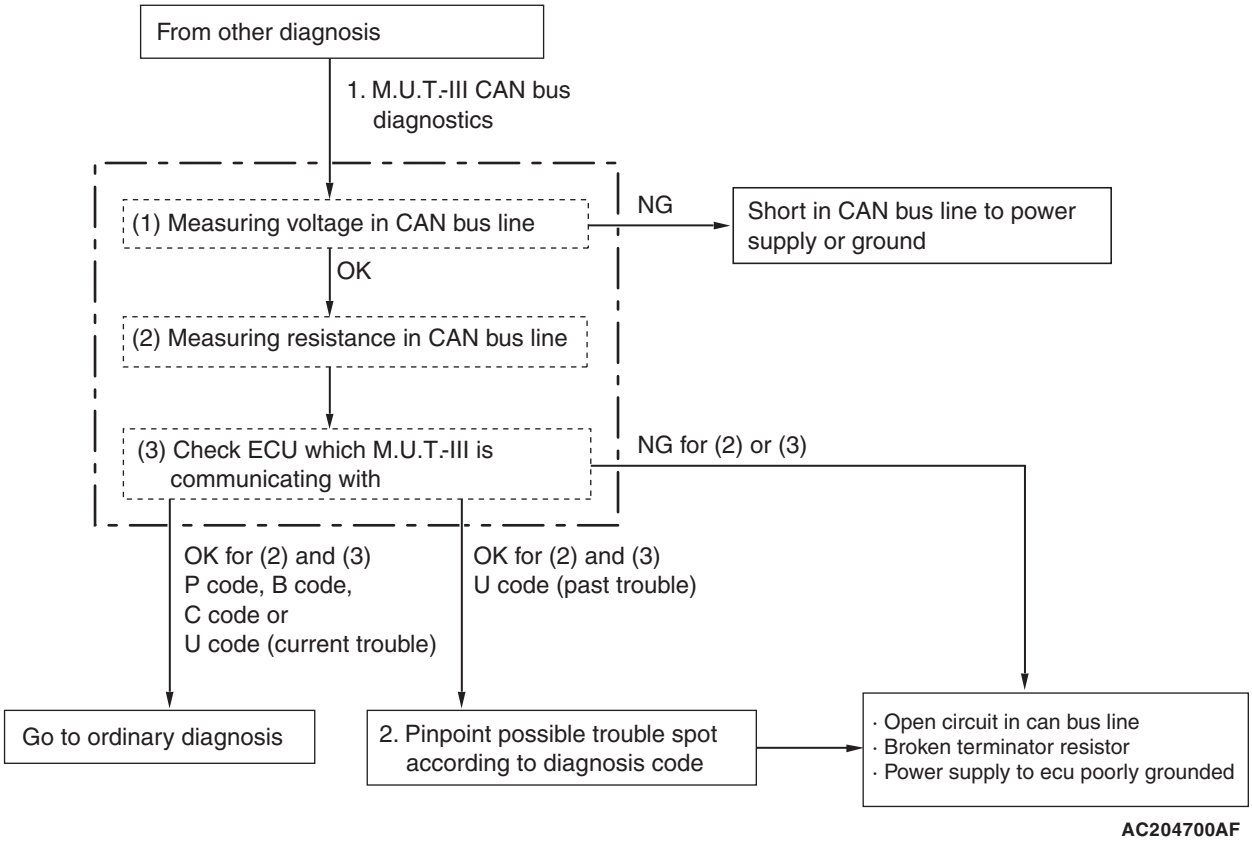
If one-side terminator resistor is broken, the CAN communication will continue although noise suppression is deteriorated. No diagnosis codes may be set even if the terminator resistor was broken. If a damage is found, replace the ECU which incorporates the defective terminator resistor.

EXPLANATION ABOUT THE M.U.T.-III CAN BUS DIAGNOSTICS

M1548300100199

The M.U.T.-III CAN bus diagnostics carries out the three checks below automatically, and then displays current condition of the CAN bus lines according to the check results.

CAN BUS LINE DIAGNOSTIC FLOW



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1. M.U.T.-III CAN bus diagnostics

The M.U.T.-III diagnoses CAN bus lines in accordance with the following strategy.

NOTE: When the M.U.T.-III carries out the voltage and resistance measurements, it will cease the communication between each of the ECU. If the M.U.T.-III cannot cease the communication, it will carry out the voltage measurement.

(1) Measuring voltage in CAN bus line

Diagnoses the power supply (such as wires of higher voltage than CAN communication line) and earthing (such as wires of lower voltage than CAN communication line) of CAN bus lines for short circuit by measuring the voltages between the CAN_L line or H line and body earth.

Terminal to be diagnosed	Normal value	Measurement value	Trouble when the measurement value does not meet the normal value	Note
Measuring the voltage between the CAN_L line and body earth	1.0 V or more and 4.0 V or less	Less than 1.0 V	Short to earth of the CAN_L line	If the CAN_L or H line is shorted to earth or power supply, a diagnosis code may not be set.
		More than 4.0 V	Short to power supply of the CAN_L line	
Measuring the voltage between the CAN_H line and body earth	1.0 V or more and 4.0 V or less	Less than 1.0 V	Short to earth of the CAN_H line	
		More than 4.0 V	Short to power supply of the CAN_H line	

(2) Measuring resistance in CAN bus line

Checks the terminator resistors (incorporated in the combination meter or the engine-ECU), which are connected to each end of a CAN bus line, for breakage and a CAN bus main line for open circuit by measuring the resistance value between a CAN_L line and H line.

Normal value	Measurement value	Trouble when the measurement value does not meet the normal value	Note
60 ± 10 Ω	120 ± 20 Ω	Trouble in a CAN main line or terminator resistor	If only one terminator resistor is broken at either side, the CAN communication will continue although noise suppression is deteriorated. If a CAN main bus line is open circuit, the CAN communication is suspended at that open circuit point.
	No continuity	Trouble in CAN main bus line or between the diagnosis connector and main bus line	–
	2 Ω or less	CAN bus line (between CAN_L and H lines) is shorted	If a CAN bus line is shorted, all ECUs cease communicating each other (This fail-safe function is called "Bus off").
	Other than above	Poorly engaged connector	–

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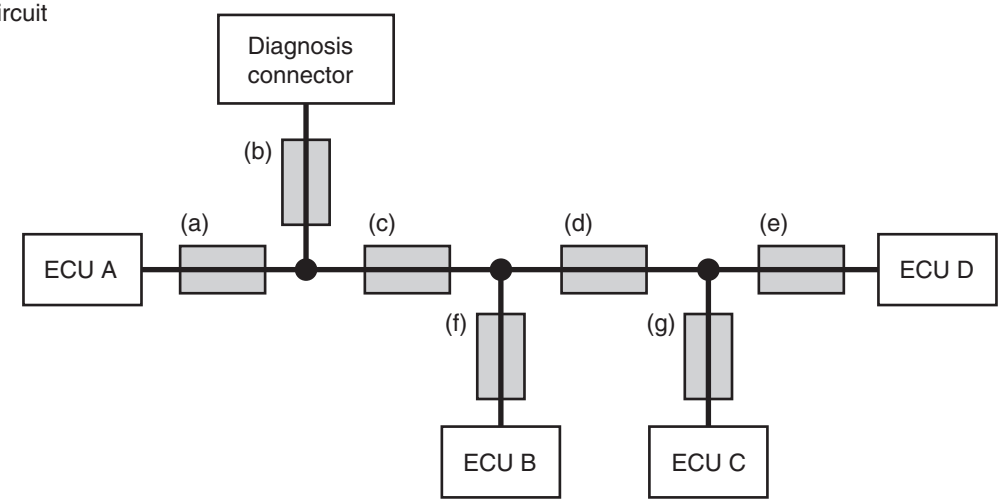
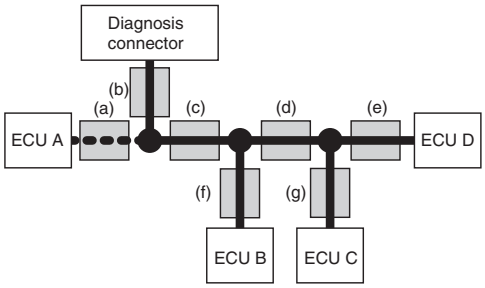
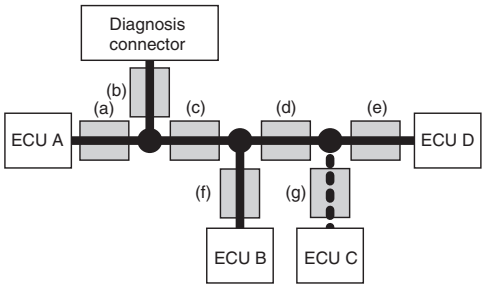
(3) Checking the communication condition of ECUs

The M.U.T.-III narrows down troubles in circuit by itself. Its strategy is as follows.

Reference circuit



AC502594AB

ECU which cannot communicate with the M.U.T.-III	Possible trouble spot	Logic for narrowing down trouble spot	
ECU A	CAN bus line (a) and power supply system to ECU A	ECU A communicates with the M.U.T.-III via CAN bus lines (a) and (b). The M.U.T.-III judges that CAN bus line (b) is normal, because it can communicate with other ECUs. Possible trouble may be present in CAN bus line (a) or the power supply system to ECU A.	 AC204742 AZ
ECU C	CAN bus line (g) and power supply system to ECU C	ECU C communicates with the M.U.T.-III via CAN bus lines (b), (c), (d) and (g). The M.U.T.-III judges that CAN bus lines (b), (c) and (d) are normal, because it can communicate with ECUs B and D. Possible trouble may be present in CAN bus line (g) or the power supply system to ECU C.	 AC204742 BA

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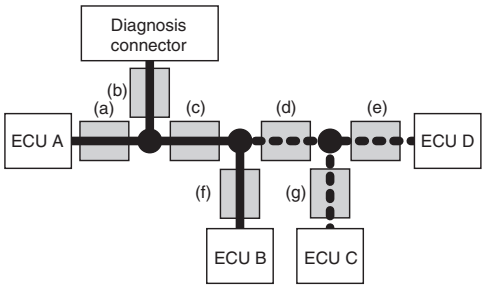
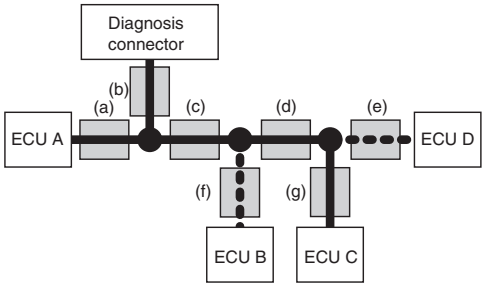
ECU which cannot communicate with the M.U.T.-III	Possible trouble spot	Logic for narrowing down trouble spot	
ECU C and ECU D	Trouble in CAN bus line (d)	ECUs C ad D communicate with the M.U.T.-III via CAN bus lines (b), (c), (d), (e) and (g). The M.U.T.-III judges that CAN bus lines (b) and (c) are normal, because it can communicate with ECU B. Possible trouble may be present in CAN bus line (d), (e) or (g) or the power supply system to ECU D. CAN bus line (d) is shared by ECUs C and D when they communicate with the M.U.T.-III, so CAN bus line (d) is suspected as ultimate cause. CAN bus line (g) or (e) and power supply systems to ECU C or D are also suspected as second cause.	 AC204742BB
ECU B and ECU D	CAN bus line (e) or (f) or power supply system to ECU B or D	ECUs C ad D communicate with the M.U.T.-III via CAN bus lines (b), (c), (d), (e) and (g). The M.U.T.-III judges that CAN bus lines (b), (c) and (d) are normal, because it can communicate with ECU C. Possible trouble may be present in CAN bus line (f) or (e) or the power supply system to ECU B or D.	 AC204742BC

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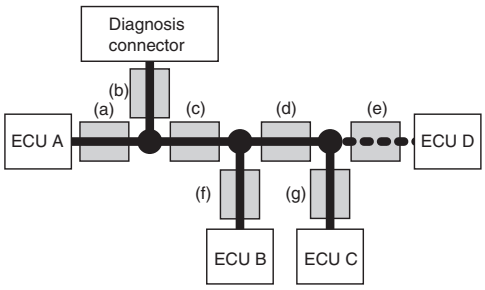
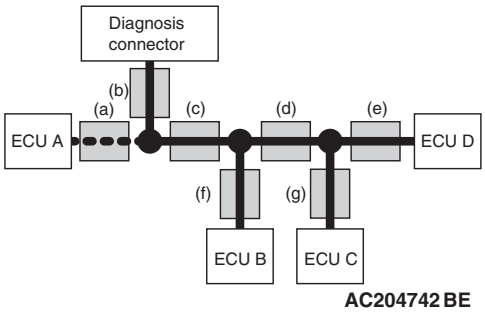
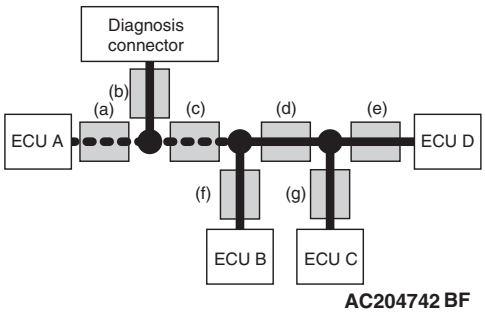
2. If diagnosis code related to CAN communication is set as past trouble, isolate opens as described below.

   NOTE: If you pinpoint trouble spot according to diagnosis code, you should use time-out diagnosis code. diagnosis code related to failure information is set when the data to be set contains an error, so CAN bus line itself is probably normal.

NOTE: Time-out diagnosis code codes are stored in each ECU memory individually. Therefore, it is possible that these diagnosis code codes have not been set simultaneously. If the trouble spot cannot be found when you diagnose by judging from multiple diagnosis code codes, check the communication lines between each ECU.

Diagnosis code to be set	Possible trouble spot	Logic for narrowing down trouble spot	
Time-out diagnosis code associated with ECU D is stored in ECU A, ECU B and ECU C. Time-out diagnosis code associated with ECUs A, B and C is stored in ECU. "Bus off" diagnosis code is stored in ECU D.	Trouble in CAN bus line (e) and power supply system to ECU D	When time-out diagnosis code associated with ECU D is stored in ECU A, B and C, or time-out diagnosis code associated with ECUs A, B and C is stored in ECU D, or "bus off" diagnosis code is stored in ECU D, CAN bus line (e) is suspected. When diagnosis code is not stored in ECU D, the power supply to ECU D is suspected.	 AC204742 BD
Time-out diagnosis code associated with ECU A is stored in ECUs B, C and D. Time-out diagnosis code associated with ECUs B, C and D is stored in ECU D. "Bus off" diagnosis code is stored in ECU A.	Trouble in CAN bus line (a) and power supply system to ECU A.	When time-out diagnosis code associated with ECU A is stored in ECUs B, C and D, or time-out diagnosis code associated with ECUs B, C and D is stored in ECU A, or "bus off" diagnosis code is stored in ECU A, CAN bus line (a) or (c) is suspected. When diagnosis code is not stored in ECU A, the power supply to ECU A is suspected.	 AC204742 BE  AC204742 BF

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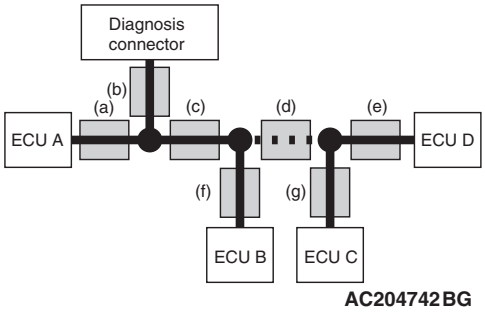
<table>
<tr><th>Diagnosis code to be set</th><th>Possible trouble spot</th><th colspan="2">Logic for narrowing down trouble spot</th></tr>
<tr><td>Time-out diagnosis code codes associated with ECUs C and D are stored in ECU A and ECU B.</td><td rowspan="2">Trouble in CAN bus line (d)</td><td rowspan="2">If time-out diagnosis code codes associated with ECUs C and D are stored in ECUs A and B, or time-out codes associated with ECUs A and B are stored in ECUs C and D, CAN bus line (d) is suspected. CAN bus line (g) or (e) and power supply systems to ECU C or D are also suspected as second cause.</td><td rowspan="2"> 

AC204742BG</td></tr>
<tr><td>Time-out diagnosis code codes associated with ECUs A and B are stored in ECU C and ECU D.</td></tr>
</table>

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TROUBLESHOOTING

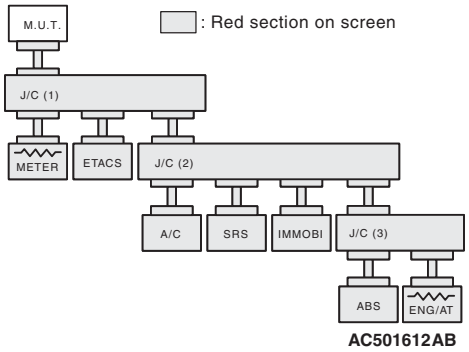
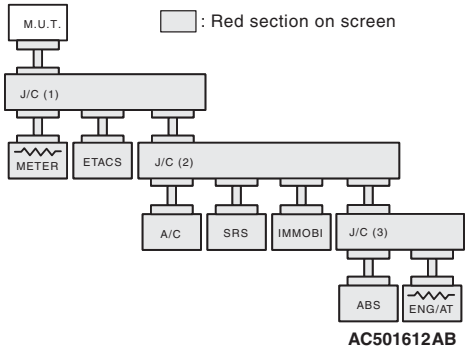
CAN BUS DIAGNOSTICS TABLE

M1548300200323

This diagnosis applies only to the CAN bus lines. If a different system is defective, proceed to the applicable diagnosis section for each system. Observe the diagnosis procedure below only when the CAN bus line is defective.

⚠ CAUTION

During diagnosis, a diagnosis code associated with another system may be set when the ignition switch is turned on with connector(s) disconnected. After completing the repair, confirm all systems for diagnosis code(s). If diagnosis code(s) are set, erase them all.

M.U.T.-III screen (The ECUs that are not adopted are not displayed.)	Comment	Diagnosis detail	Reference page
 AC501612AB	Short circuit to battery in red displayed area is estimated.	Diagnosis Item 1 Diagnose shorts in the power supply to CAN bus line	P.54F-17
 AC501612AB	Earthing in red displayed area is estimated.	Diagnosis Item 2 Diagnose shorts in the ground to CAN bus line	P.54F-32

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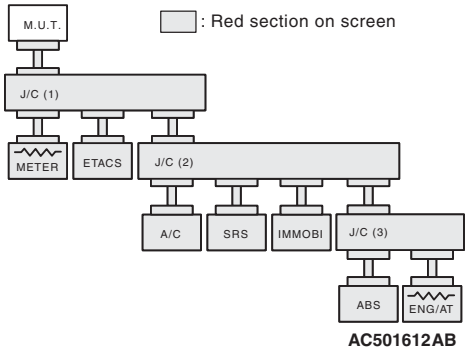
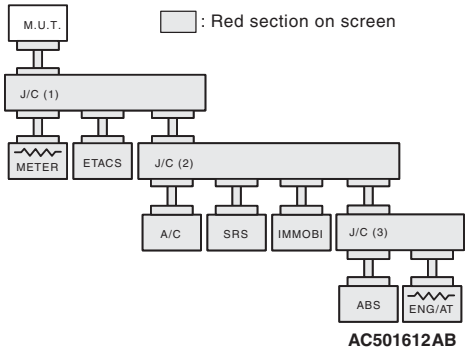
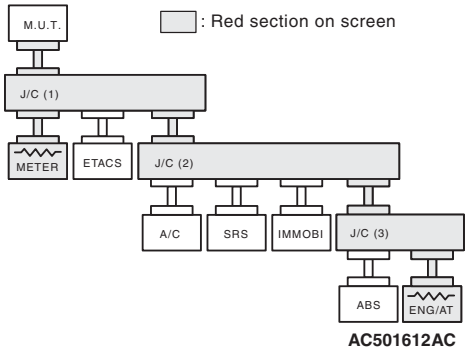
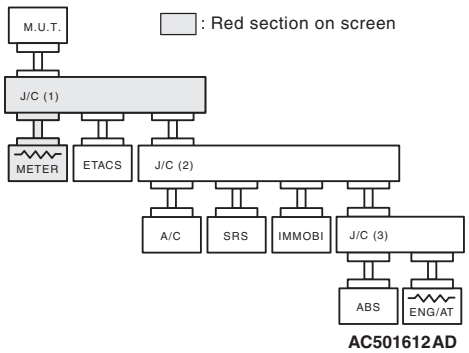
M.U.T.-III screen (The ECUs that are not adopted are not displayed.)	Comment	Diagnosis detail	Reference page
 AC501612AB	Short circuit between CAN_H and CAN_L in red displayed area is estimated.	Diagnosis Item 3 Diagnose shorts between CAN_H and L lines	P.54F-47
 AC501612AB	Disconnection in red displayed area is estimated.		
 AC501612AC	Disconnection in red displayed area is estimated.	Diagnosis Item 4 Diagnose the terminator resistors	P.54F-63
 AC501612AD	Harness disconnection or loose connection in red displayed area is estimated.	Diagnosis Item 5 Diagnose when the M.U.T.-III cannot receive the data sent by combination meter.	P.54F-65

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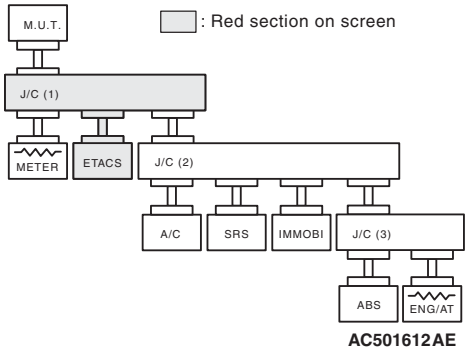
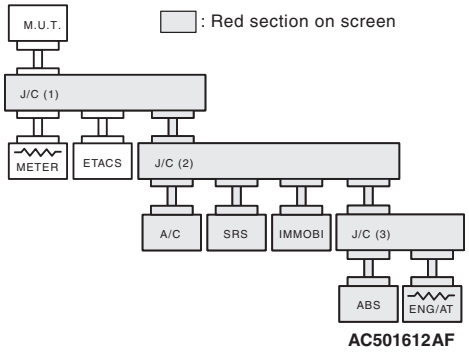
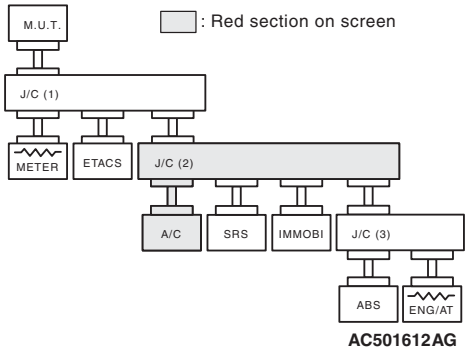
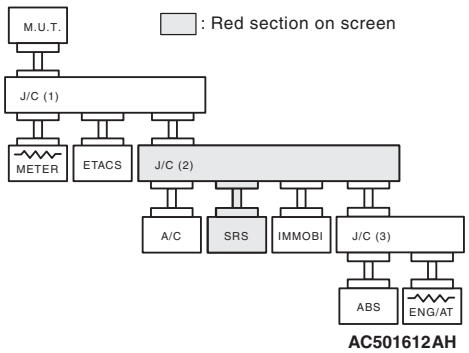
M.U.T.-III screen (The ECUs that are not adopted are not displayed.)	Comment	Diagnosis detail	Reference page
 AC501612AE	Harness disconnection or loose connection in red displayed area is estimated.	Diagnosis Item 6 Diagnose when the M.U.T.-III cannot receive the data sent by ETACS-ECU.	P.54F-69
 AC501612AF	Harness disconnection or loose connection in red displayed area is estimated.	Diagnosis Item 7 Diagnose the lines between the joint connectors (CAN1 and CAN2)	P.54F-73
 AC501612AG	Harness disconnection or loose connection in red displayed area is estimated.	Diagnosis Item 8 Diagnose when the M.U.T.-III cannot receive the data sent by A/C-ECU.	P.54F-78
 AC501612AH	Harness disconnection or loose connection in red displayed area is estimated.	Diagnosis Item 9 Diagnose when the M.U.T.-III cannot receive the data sent by SRS-ECU	P.54F-82

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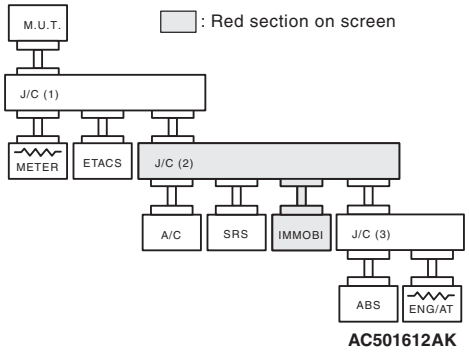
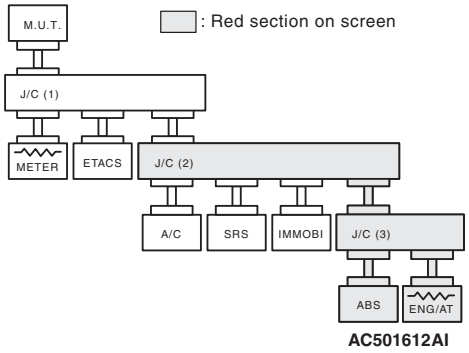
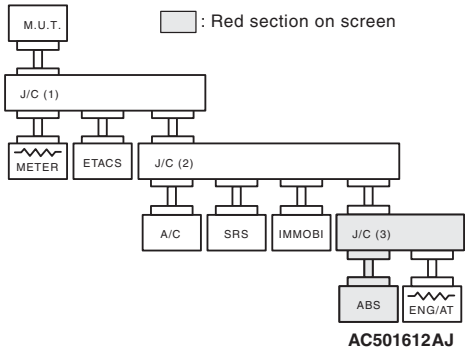
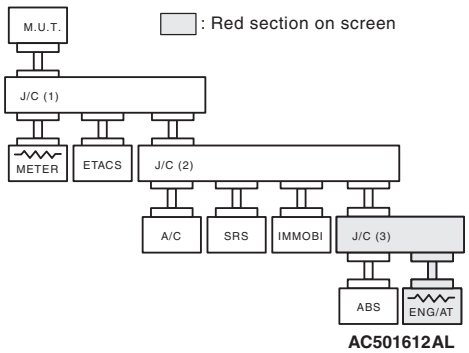
M.U.T.-III screen (The ECUs that are not adopted are not displayed.)	Comment	Diagnosis detail	Reference page
 AC501612AK	Harness disconnection or loose connection in red displayed area is estimated.	Diagnosis Item 10 Diagnose when the M.U.T.-III cannot receive the data sent by immobilizer-ECU <vehicles for Hong Kong and Singapore>	P.54F-86
 AC501612AI	Harness disconnection or loose connection in red displayed area is estimated.	Diagnosis Item 11 Diagnose the lines between the joint connectors (CAN2 and CAN3)	P.54F-89
 AC501612AJ	Harness disconnection or loose connection in red displayed area is estimated.	Diagnosis Item 12 Diagnose when the M.U.T.-III cannot receive the data sent by ABS-ECU	P.54F-95
 AC501612AL	Harness disconnection or loose connection in red displayed area is estimated.	Diagnosis Item 13 Diagnose when the M.U.T.-III cannot receive the data sent by engine-ECU <M/T> or engine-A/T-ECU <A/T>.	P.54F-99

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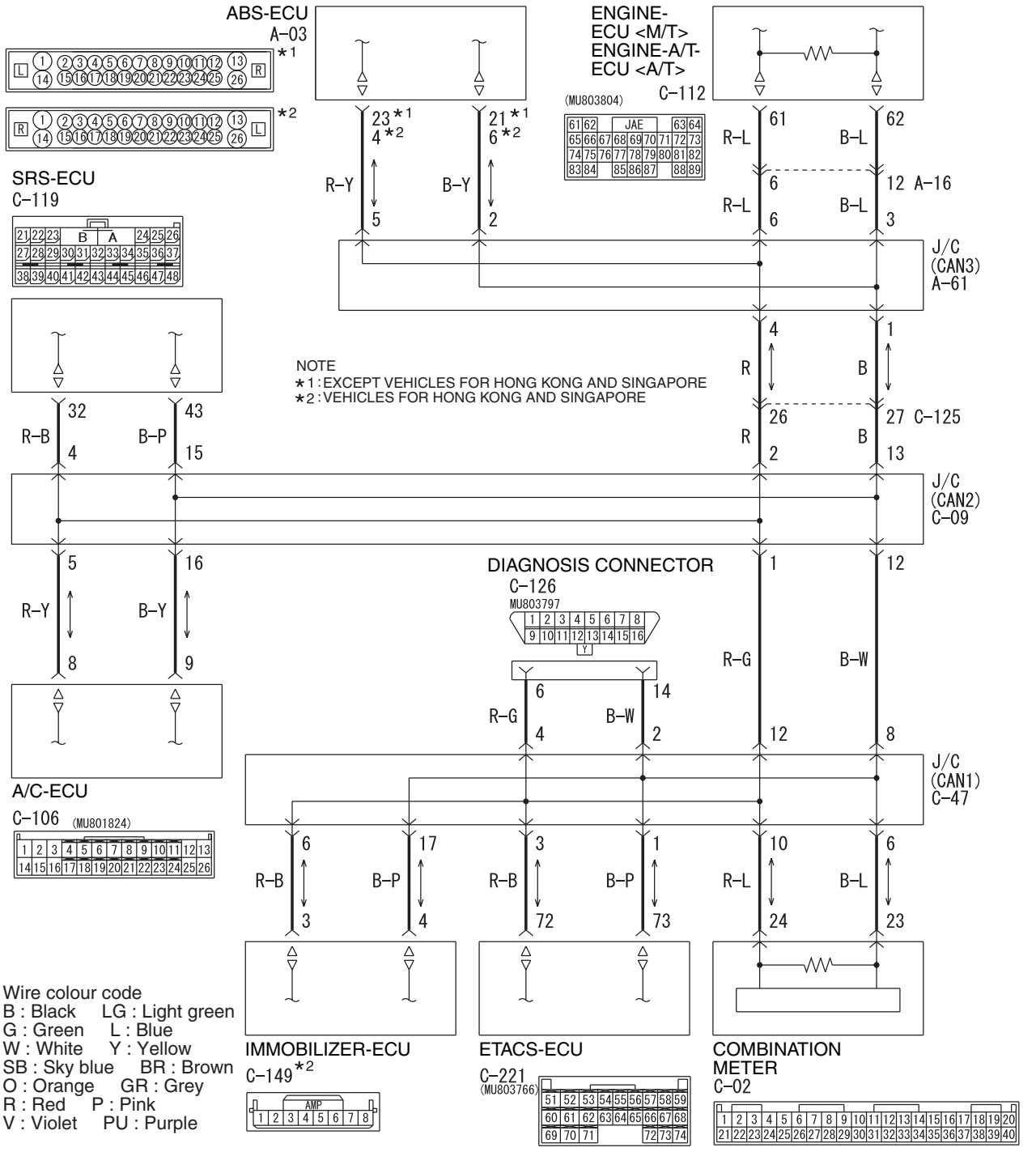
CAN BUS DIAGNOSIS

Diagnosis Item 1: Diagnose shorts in the power supply to CAN bus line

⚠ CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



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FUNCTION

When diagnosing the CAN bus lines, the M.U.T.-III measures the voltage of CAN_H and CAN_L line and detects the short to power supply or ground.

TRUBLE JUDGEMENT CONDITIONS

The M.U.T.-III judges the trouble when it is impossible to receive the periodically sent data and the voltage of CAN_H or CAN_L line is more than 4.0 volts.

TROUBLESHOOTING HINTS

- Malfunction of the wiring harness
- Short to power supply of the connector
- Malfunction of each ECU

DIAGNOSIS PROCEDURE

STEP 1. Check the CAN bus lines. Voltage measurement at C-126 diagnosis connector.

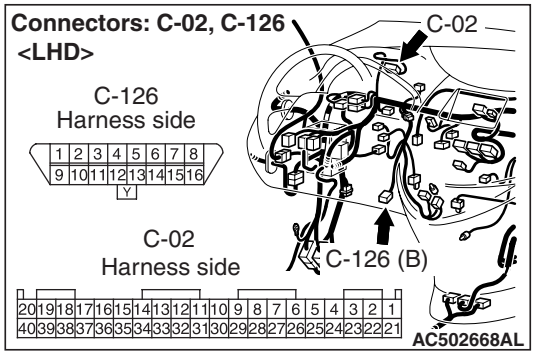
⚠ CAUTION

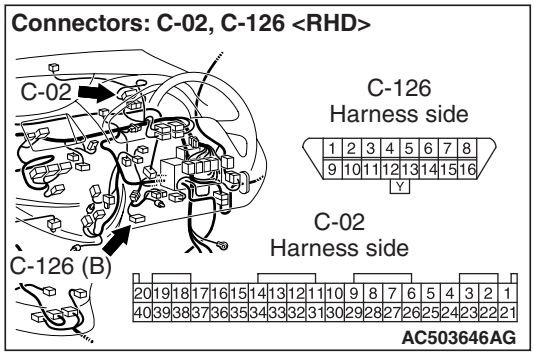
A digital multimeter should be used. For details refer to P.54F-5.

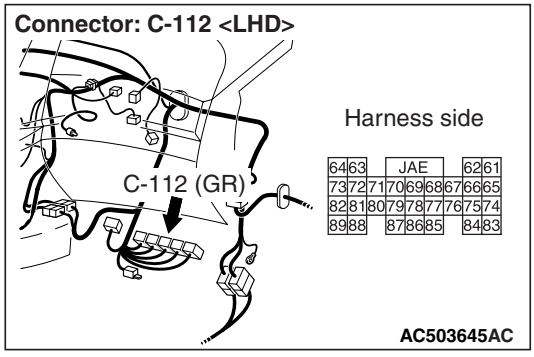
⚠ CAUTION

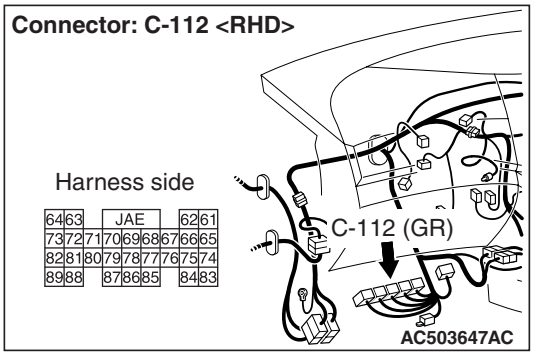
The test wiring harness should be used. For details refer to P.54F-5.

NOTE: This inspection allows you to check that there is a short to power supply in either CAN_H line or CAN_L line. Thus, in the following steps, check the CAN bus line that is defective.

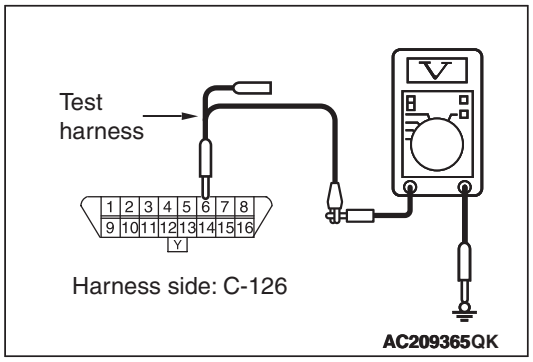






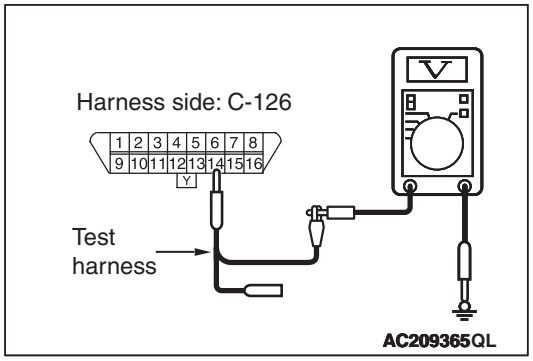


(1) Disconnect engine-ECU <M/T> or engine-A/T-ECU <A/T> connector C-112 and combination meter connector C-02, and measure the voltage at the harness side of diagnosis connector C-126.
(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-126 diagnosis connector terminal No.6 (CAN_H) and body earth

OK: 4.0 V or less



(4) Voltage between C-126 diagnosis connector terminal No.14 (CAN_L) and body earth

OK: 4.0 V or less

(5) Disconnect the negative battery terminal.

Q: Is the check result normal?

YES : <Both of the measurement results show 4.0 V or less> Go to Step 18.

NO : <Either of CAN_H line or CAN_L line the measurement results show 4.0 V or less> Go to Step 2.

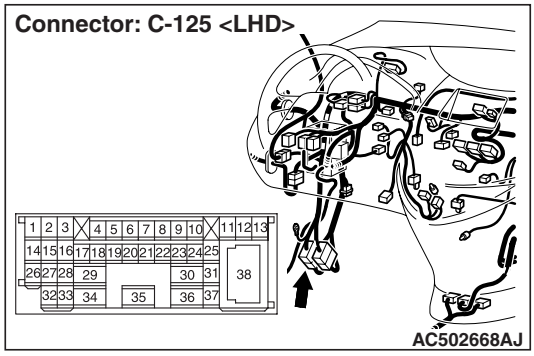
STEP 2. Check the CAN line. Voltage measurement at C-125 intermediate connector.

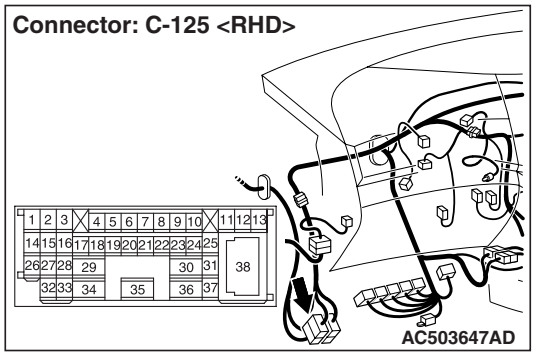
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

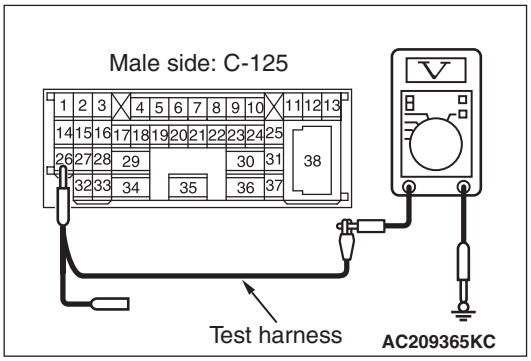
⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.





(1) Disconnect intermediate connector (C-125), and measure at its male-side intermediate connector (at the front wiring harness side).
(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-125 intermediate connector terminal No.26 (CAN_H) and body earth

OK: 4.0 V or less

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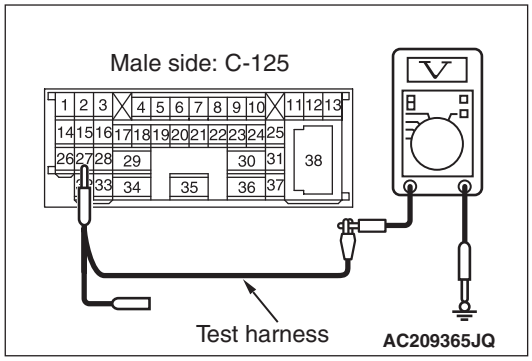


(4) Voltage between C-125 intermediate connector terminal No.27 (CAN_L) and body earth

OK: 4.0 V or less

(5) Disconnect the negative battery terminal.

Q: Is the check result normal?

YES : <4.0 V or less> Go to Step 7.

NO : <more than 4.0 V> Go to Step 3.

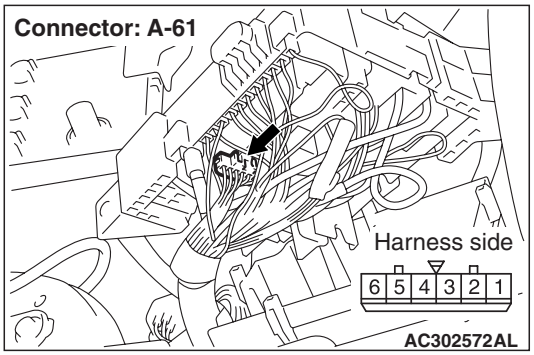
STEP 3. Check the CAN line between joint connector (CAN3) and the engine-ECU <M/T> or engine-A/T-ECU <A/T>. Voltage measurement at A-61 joint connector (CAN3).

⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

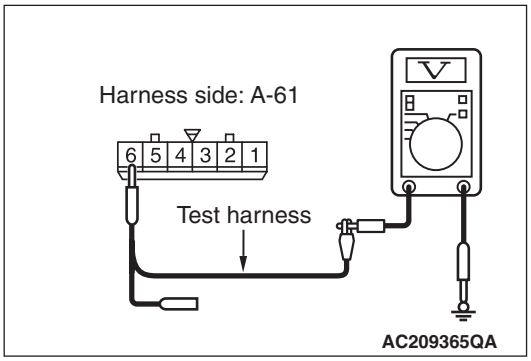
⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.



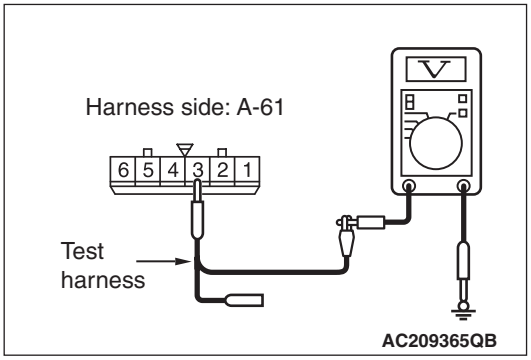
(1) Disconnect joint connector (CAN3), and measure at the wiring harness side.

(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between A-61 joint connector (CAN3) terminal No.6 (CAN_H) and body earth

OK: 4.0 V or less



(4) Voltage between A-61 joint connector (CAN3) terminal No.3 (CAN_L) and body earth

OK: 4.0 V or less

(5) Disconnect the negative battery terminal.

Q: Is the check result normal?

YES : <4.0 V or less> Go to Step 4.

NO : <more than 4.0 V> Check intermediate connector A-16, and repair if necessary. If the intermediate connector is in good condition, repair the wiring harness between joint connector (CAN3) and the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.

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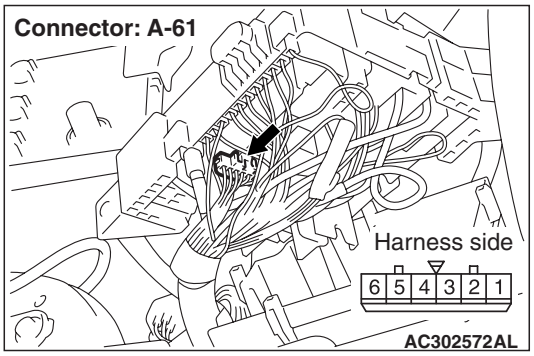
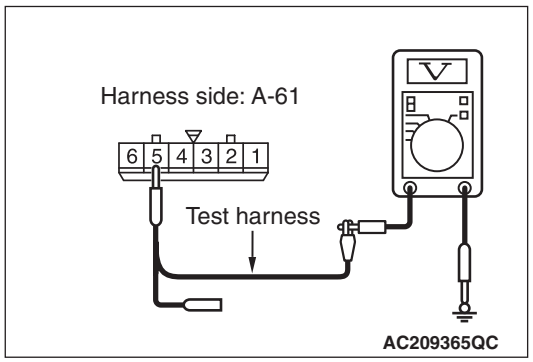
STEP 4. Check the CAN line between joint connector (CAN3) and the ABS-ECU. Voltage measurement at A-61 joint connector (CAN3).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.

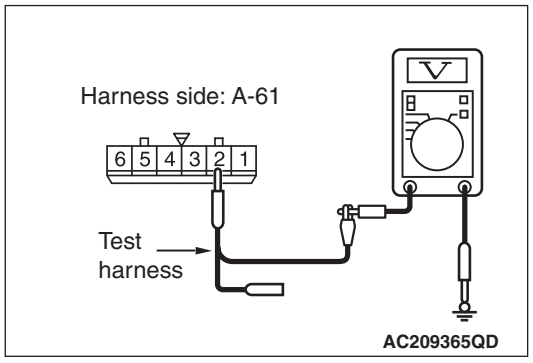


(1) Disconnect joint connector (CAN3), and measure at the wiring harness side.
(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between A-61 joint connector (CAN3) terminal No.5 (CAN_H) and body earth

OK: 4.0 V or less



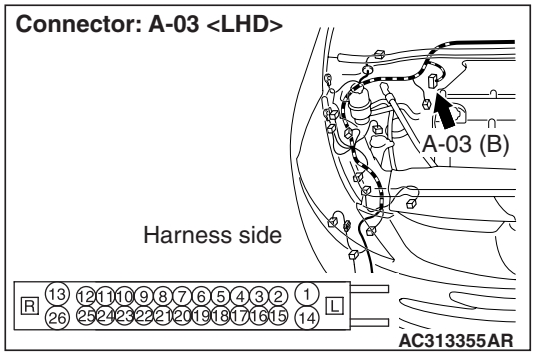
(4) Voltage between A-61 joint connector (CAN3) terminal No.2 (CAN_L) and body earth

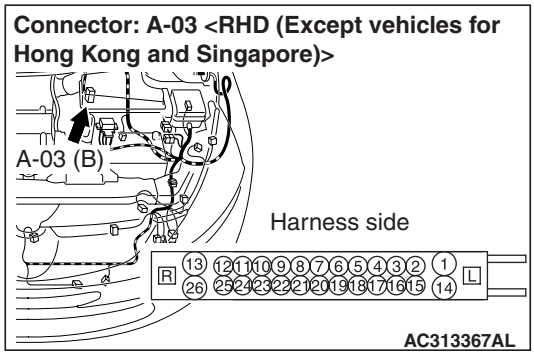
OK: 4.0 V or less

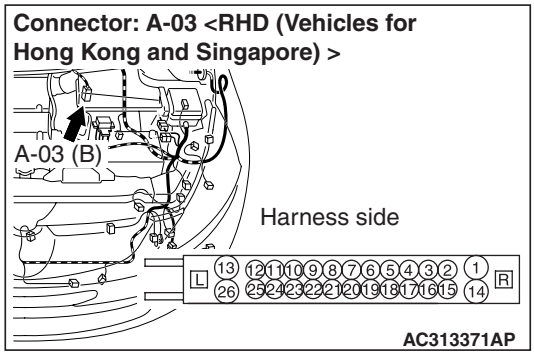
(5) Disconnect the negative battery terminal.

Q: Is the check result normal?
YES : <4.0 V or less> Repair intermediate connector (C-125), or the wiring harness between joint connector (CAN3) and the intermediate connector (C-125).
NO : <more than 4.0 V> Go to Step 5.

STEP 5. M.U.T.-III CAN bus diagnostics [ABS-ECU connector disconnected]







(1) Disconnect ABS-ECU connector A-03, and diagnose by using the M.U.T.-III.

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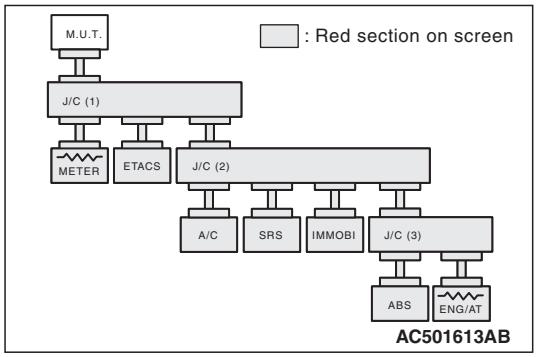


(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN3) and the ABS-ECU connector.

NO : Check the ABS-ECU connector, and repair if necessary. If the ABS-ECU connector is in good condition, go to Step 6.

STEP 6. M.U.T.-III CAN bus diagnostics (retest the system)

Diagnose CAN bus lines, and check if M.U.T.-III screen shows normal state.

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 P.00-5).

NO : Check the ABS-ECU connector, and repair if necessary. If the ABS-ECU connector is in good condition, replace the ABS-ECU.

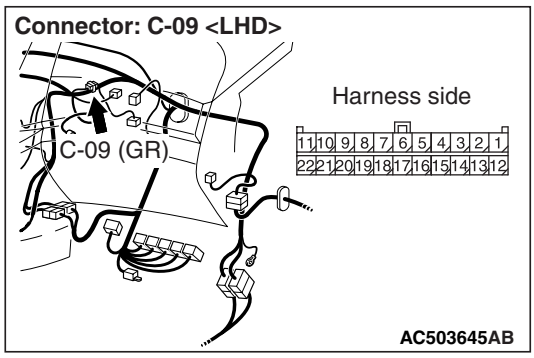
STEP 7. Check the CAN line. Voltage measurement at C-09 joint connector (CAN2).

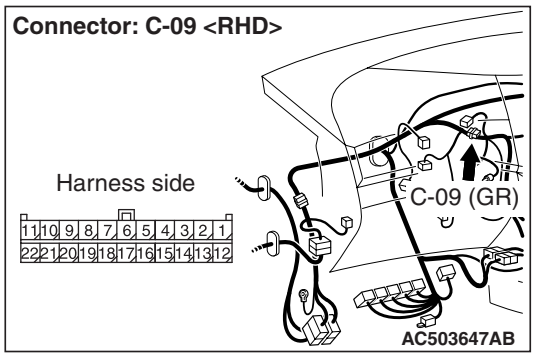
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

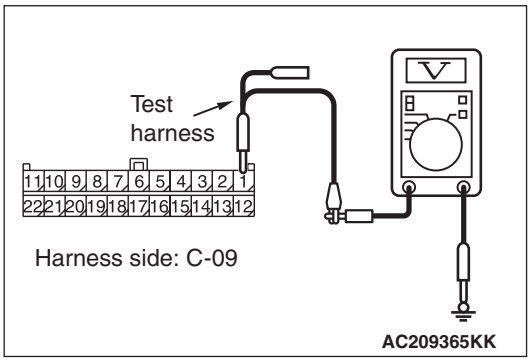
The test wiring harness should be used. For details refer to P.54F-5.





(1) Disconnect the joint connector (CAN2), and measure at the wiring harness side.

(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-09 joint connector (CAN2) terminal No.1 (CAN_H) and body earth

OK: 4.0 V or less

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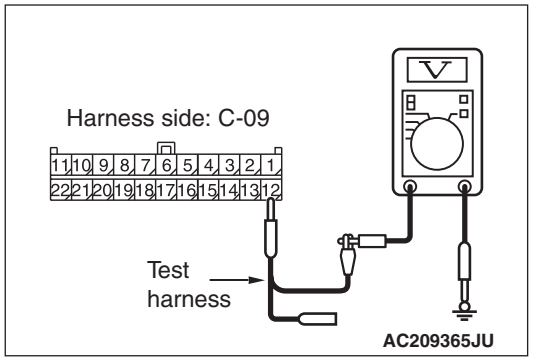


(4) Voltage between C-09 joint connector (CAN2) terminal No.12 (CAN_L) and body earth

OK: 4.0 V or less

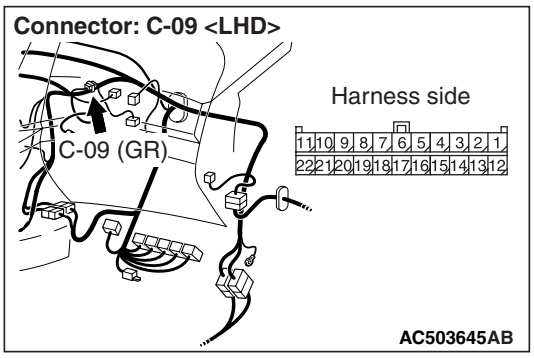
(5) Disconnect the negative battery terminal.

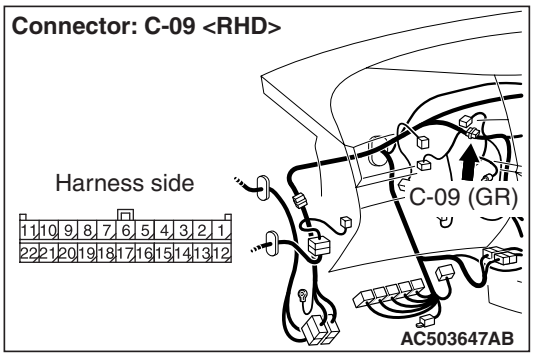
Q: Is the check result normal?
YES : <4.0 V or less> Go to Step 14.
NO : <more than 4.0 V> Go to Step 8.

STEP 8. Check the CAN line between joint connector (CAN2) and the A/C-ECU. Voltage measurement at C-09 joint connector (CAN2).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

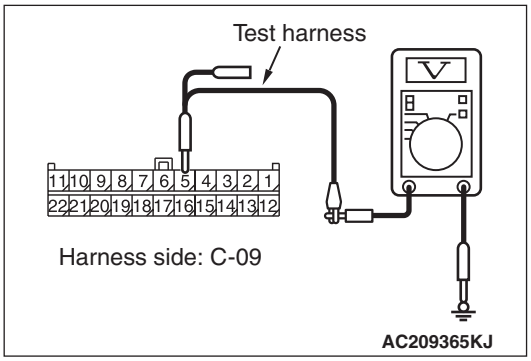
⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.





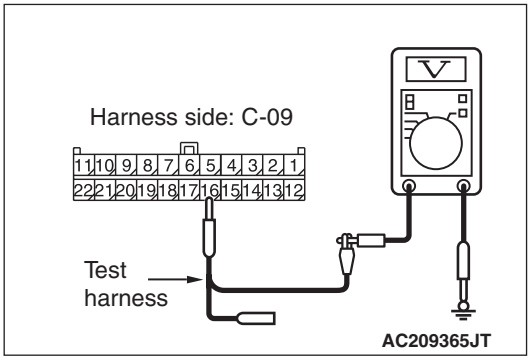
(1) Disconnect joint connector (CAN2), and measure at the wiring harness side.

(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-09 joint connector (CAN2) terminal No.5 (CAN_H) and body earth

OK: 4.0 V or less



(4) Voltage between C-09 joint connector (CAN2) terminal No.16 (CAN_L) and body earth

OK: 4.0 V or less

(5) Disconnect the negative battery terminal.

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <4.0 V or less> Go to Step 10.
NO : <more than 4.0 V> Go to Step 9.

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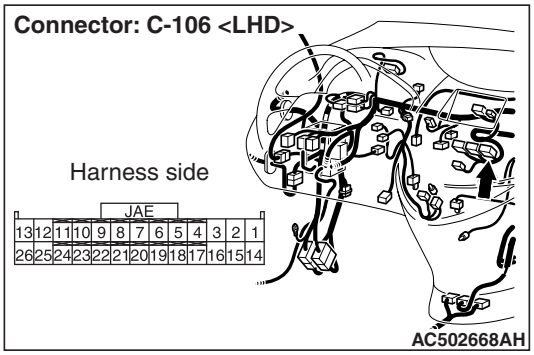
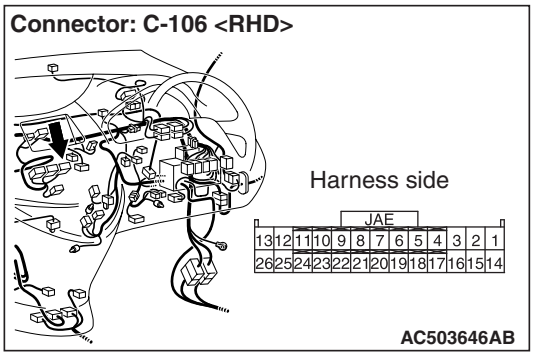
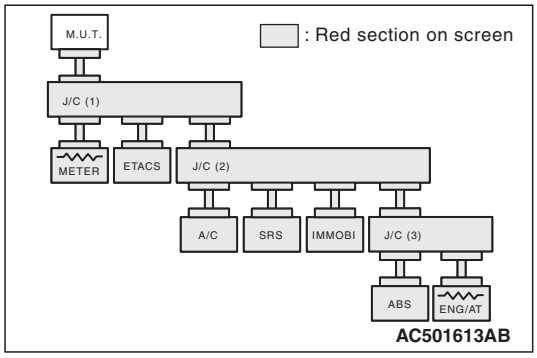
STEP 9. M.U.T.-III CAN bus diagnostics [A/C-ECU connector disconnected]





(1) Disconnect A/C-ECU connector C-106, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN2) and the A/C-ECU connector.

NO : Check the A/C-ECU connector, and repair if necessary. If the A/C-ECU connector is in good condition, refer to GROUP 55 – Troubleshooting P.55-186 <except vehicles for Hong Kong and Singapore> or P.55-193 <vehicles for Hong Kong and Singapore>.

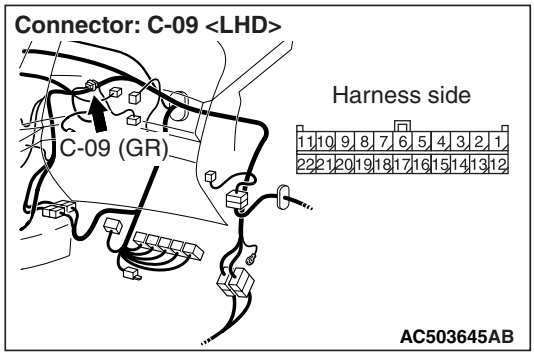
STEP 10. Check the CAN line between joint connector (CAN2) and the SRS-ECU. Voltage measurement at C-09 joint connector (CAN2).

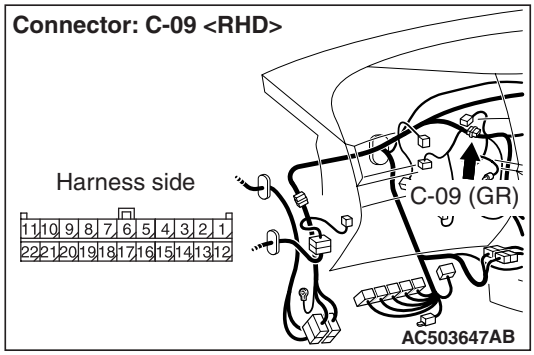
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

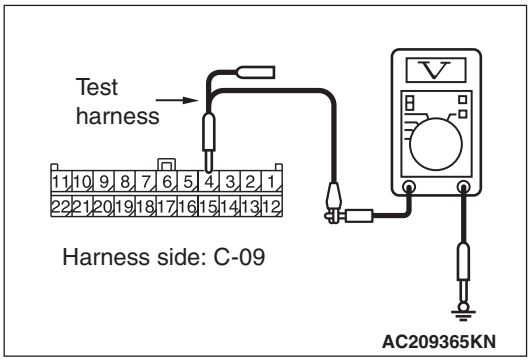
The test wiring harness should be used. For details refer to P.54F-5.





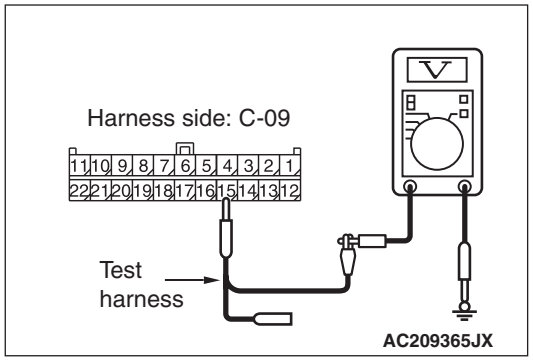
(1) Disconnect joint connector (CAN2), and measure at the wiring harness side.

(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-09 joint connector (CAN2) terminal No.4 (CAN_H) and body earth

OK: 4.0 V or less



(4) Voltage between C-09 joint connector (CAN2) terminal No.15 (CAN_L) and body earth

OK: 4.0 V or less

(5) Disconnect the negative battery terminal.

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

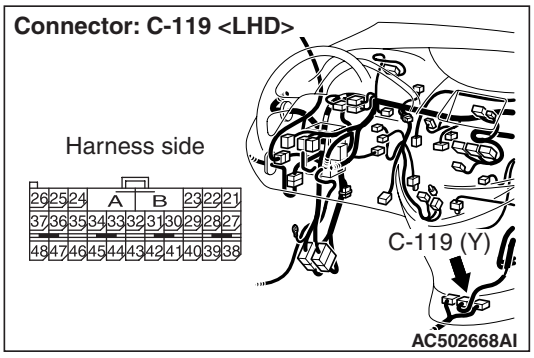
Q: Is the check result normal?

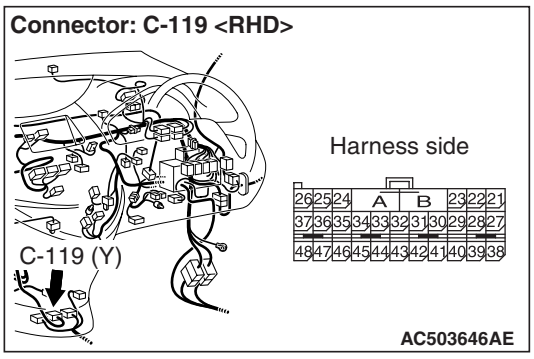
YES <except vehicles for Hong Kong and Singapore> : <4.0 V or less> Repair the wiring harness between joint connector (CAN2) and intermediate connector (C-125).

YES <vehicles for Hong Kong and Singapore> : <4.0 V or less> Go to Step 12.

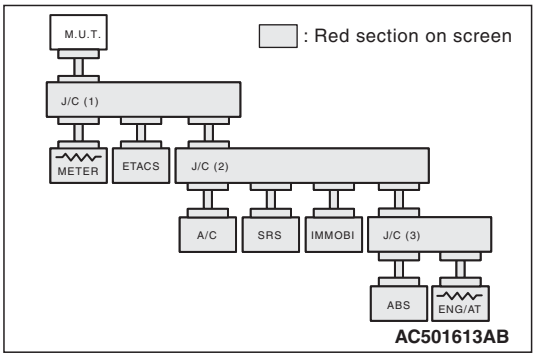
NO : <more than 4.0 V> Go to Step 11.

STEP 11. M.U.T.-III CAN bus diagnostics [SRS-ECU connector disconnected]





(1) Disconnect SRS-ECU connector C-119, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN2) and the SRS-ECU connector.

NO : Check the SRS-ECU connector, and repair if necessary. If the SRS-ECU connector is in good condition, refer to GROUP 52B – Troubleshooting P.52B-159 <except vehicles for Hong Kong and Singapore> or P.52B-318 <vehicles for Hong Kong and Singapore>.

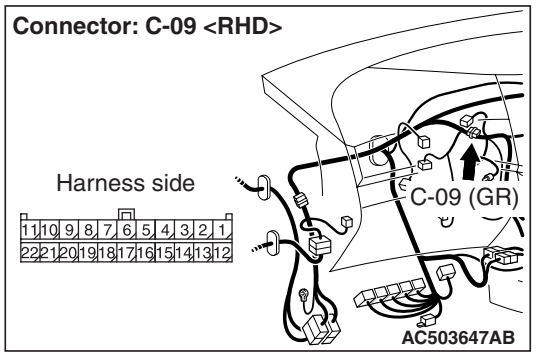
STEP 12. Check the CAN line between joint connector (CAN2) and the immobilizer-ECU. Voltage measurement at C-09 joint connector (CAN2).

⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.



(1) Disconnect joint connector (CAN2), and measure at the wiring harness side.

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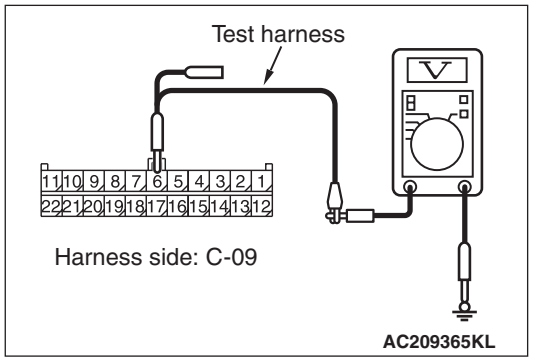
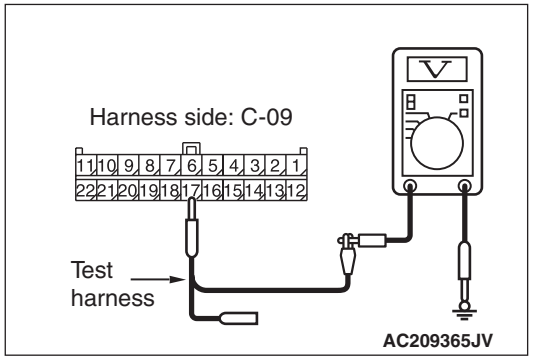
(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-09 joint connector (CAN2) terminal N.6 (CAN_H) and body earth

OK: 4.0 V or less



(4) Voltage between C-09 joint connector (CAN2) terminal No.17 (CAN_L) and body earth

OK: 4.0 V or less

(5) Disconnect the negative battery terminal.

⚠ CAUTION

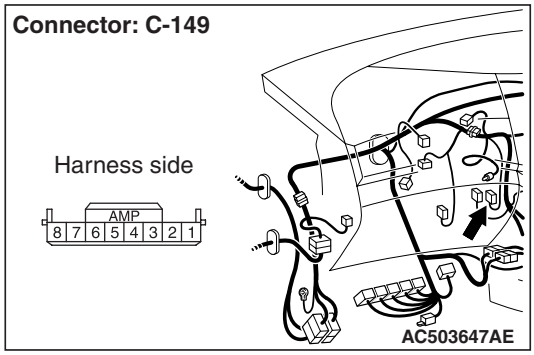
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

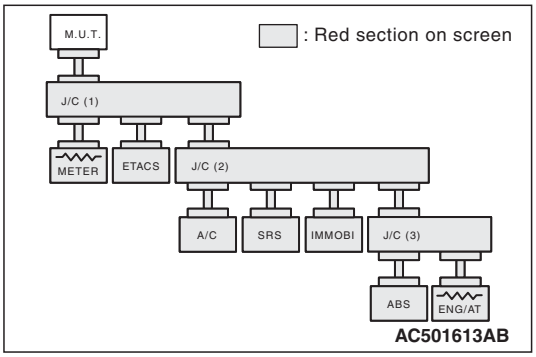
YES : <4.0 V or less> Repair the wiring harness between joint connector (CAN2) and intermediate connector (C-125).

NO : <more than 4.0 V> Go to Step 13.

STEP 13. M.U.T.-III CAN bus diagnostics [immobilizer-ECU connector disconnected]



(1) Disconnect immobilizer-ECU connector C-149, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN2) and the immobilizer-ECU connector.

NO : Check the immobilizer-ECU connector, and repair if necessary. If the immobilizer-ECU connector is in good condition, refer to GROUP 54A – Ignition switch – Troubleshooting P.54A-32.

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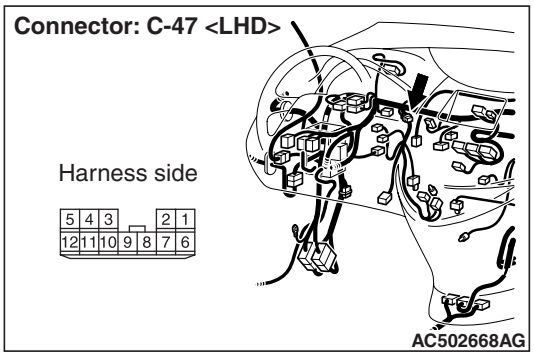
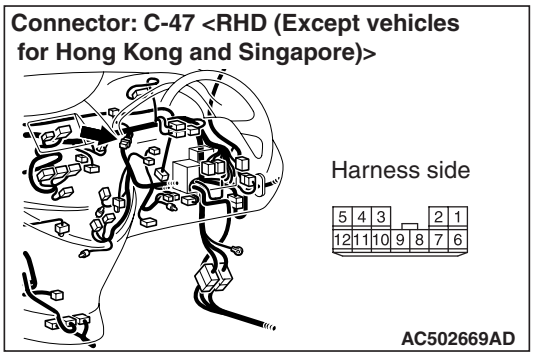
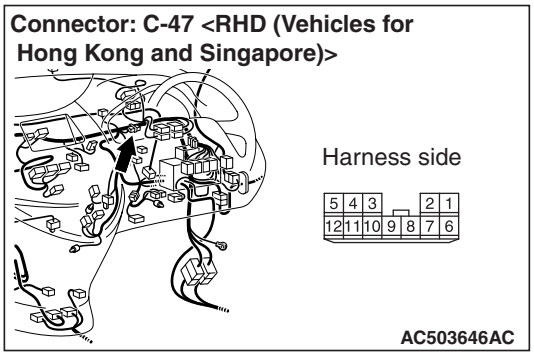
STEP 14. Check the CAN line between joint connector (CAN1) and the combination meter. Voltage measurement at C-47 joint connector (CAN1).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.

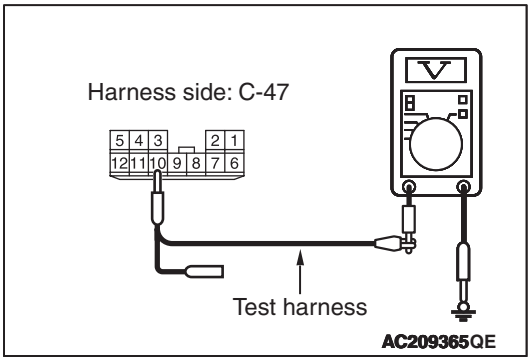






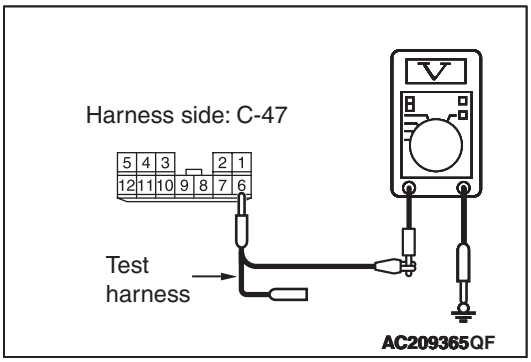
(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-47 joint connector (CAN1) terminal No.10 (CAN_H) and body earth

OK: 4.0 V or less



(4) Voltage between C-47 joint connector (CAN1) terminal No.6 (CAN_L) and body earth

OK: 4.0 V or less

(5) Disconnect the negative battery terminal.

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <4.0 V or less> Go to Step 15.
NO : <more than 4.0 V> Repair the wiring harness between joint connector (CAN1) and the combination meter connector.

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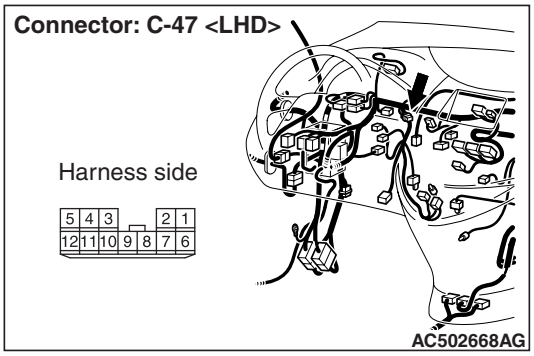
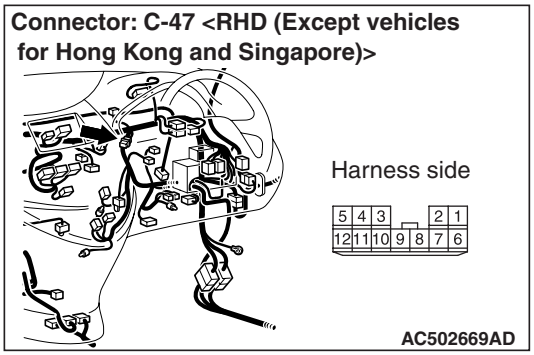
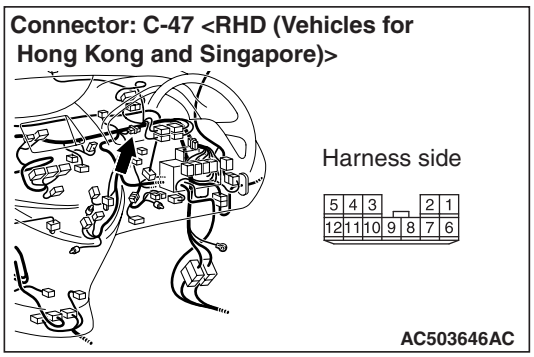
STEP 15. Check the CAN line between joint connector (CAN1) and the ETACS-ECU. Voltage measurement at C-47 joint connector (CAN1).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.

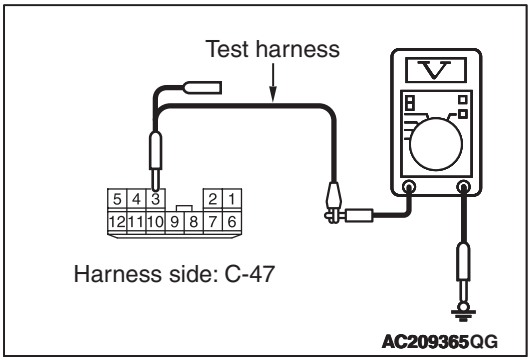






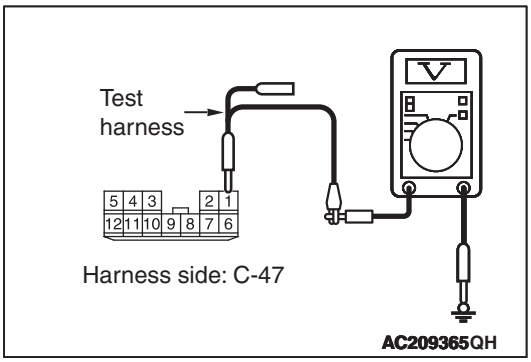
(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-47 joint connector (CAN1) terminal No.3 (CAN_H) and body earth

OK: 4.0 V or less



(4) Voltage between C-47 joint connector (CAN1) terminal No.1 (CAN_L) and body earth

OK: 4.0 V or less

(5) Disconnect the negative battery terminal.

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <4.0 V or less> Go to Step 17.
NO : <more than 4.0 V> Go to Step 16.

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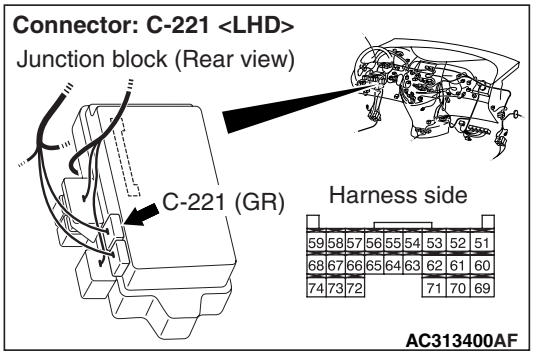
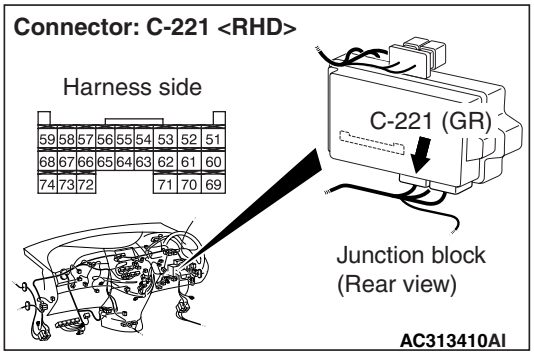
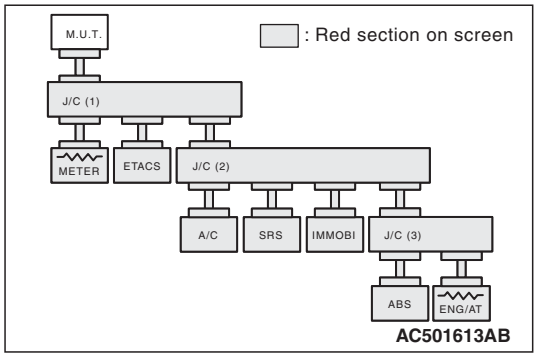
STEP 16. M.U.T.-III CAN bus diagnostics [ETACS-ECU connector disconnected]





(1) Disconnect ETACS-ECU connector C-221, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) and the ETACS-ECU connector.

NO : Check the ETACS-ECU connector, and repair if necessary. If the ETACS-ECU connector is in good condition, refer to GROUP 54B – Troubleshooting P.54B-71 <except vehicles for Hong Kong and Singapore> or P.54D-70 <vehicles for Hong Kong and Singapore>.

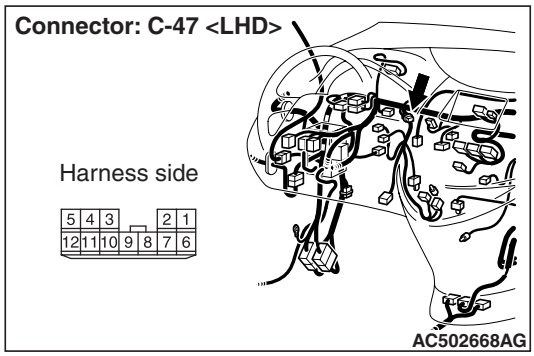
STEP 17. Check the CAN line between joint connector (CAN1) and the diagnosis connector. Voltage measurement at C-47 joint connector (CAN1).

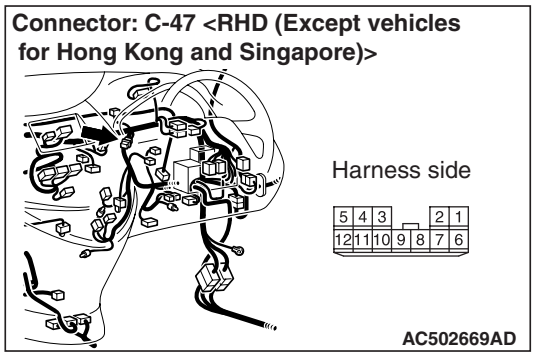
⚠ CAUTION

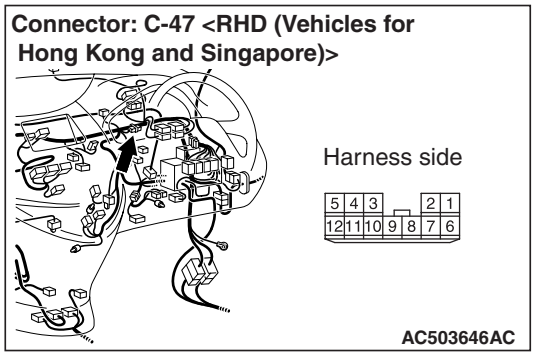
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.







(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

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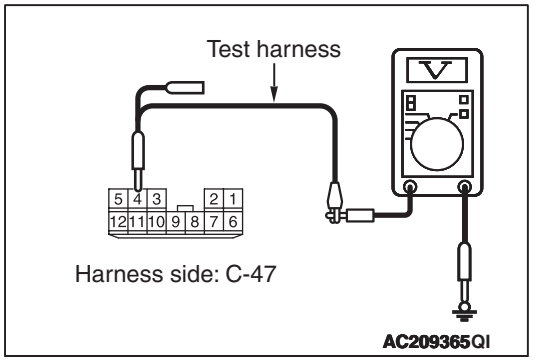
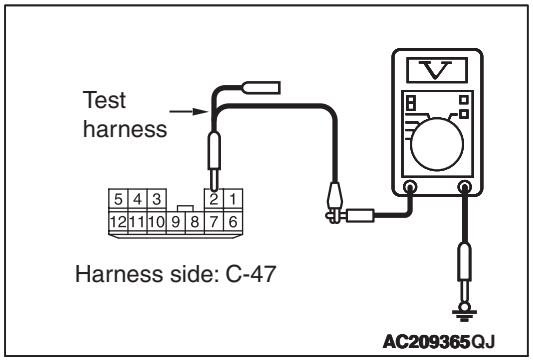
(2) Connect the negative battery terminal, and turn the ignition switch to the ON position.



(3) Voltage between C-47 joint connector (CAN1) terminal No.4 (CAN_H) and body earth

OK: Less than 1.0 V



(4) Voltage between C-47 joint connector (CAN1) terminal No.2 (CAN_L) and body earth

OK: Less than 1.0 V

(5) Disconnect the negative battery terminal.

⚠ CAUTION

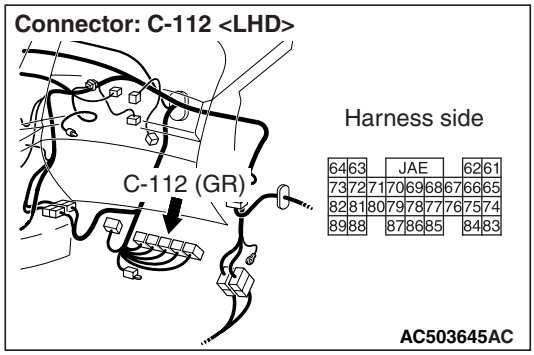
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

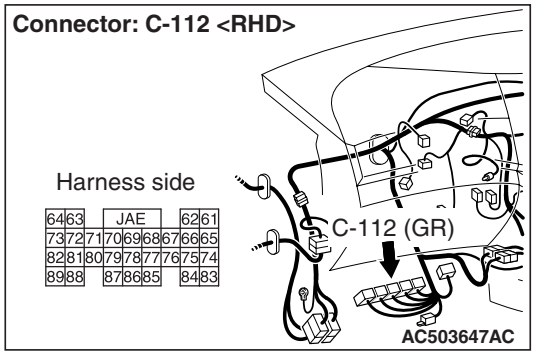
Q: Is the check result normal?

YES : <Less than 1.0 V> Repair the wiring harness between joint connector (CAN1) and joint connector (CAN2).

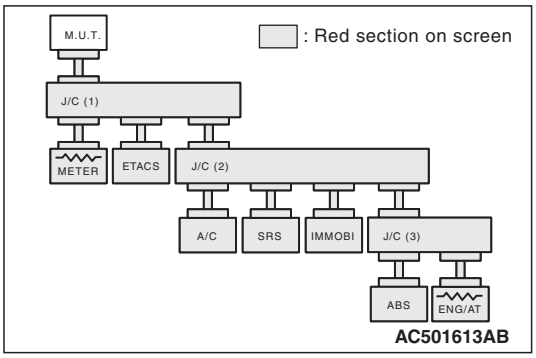
NO : <1.0 V or more> Repair the diagnosis connector, or the wiring harness between joint connector (CAN1) and the diagnosis connector.

STEP 18. M.U.T.-III CAN bus diagnostics [engine-ECU connector disconnected]





(1) Disconnect engine-ECU <M/T> or engine-A/T-ECU connector C-112, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

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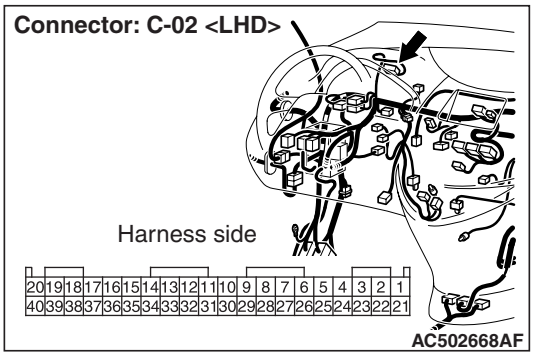
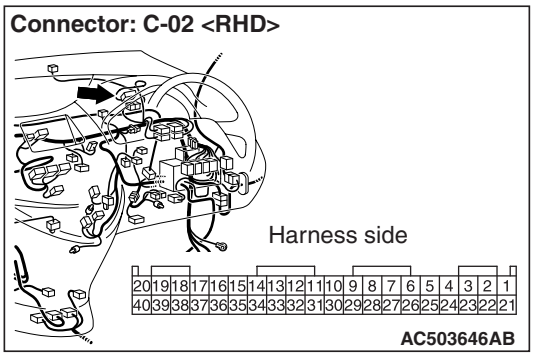
Q: Does M.U.T.-III screen correspond to the illustration?

YES : Go to Step 19.

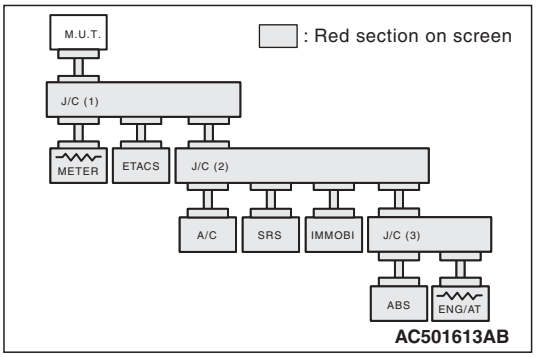
NO : Check the engine-ECU <M/T> or engine-A/T-ECU connector, and repair if necessary. If the engine-ECU <M/T> or engine-A/T-ECU connector is in good condition, refer to GROUP 13A – Troubleshooting P.13A-232 <except vehicles for Hong Kong, Singapore, Australia and New Zealand>, GROUP 13B – Troubleshooting P.13B-221 <vehicles for Hong Kong and Singapore> or GROUP 13C – Troubleshooting P.13C-277 <vehicles for Australia and New Zealand>.

STEP 19. M.U.T.-III CAN bus diagnostics [combination meter connector disconnected]





(1) Disconnect combination meter connector C-02, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

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 P.00-5).

NO : Check the combination meter connector, and repair if necessary. If the combination meter connector is in good condition, refer to GROUP 54A – Combination meter – Troubleshooting P.54A-75.

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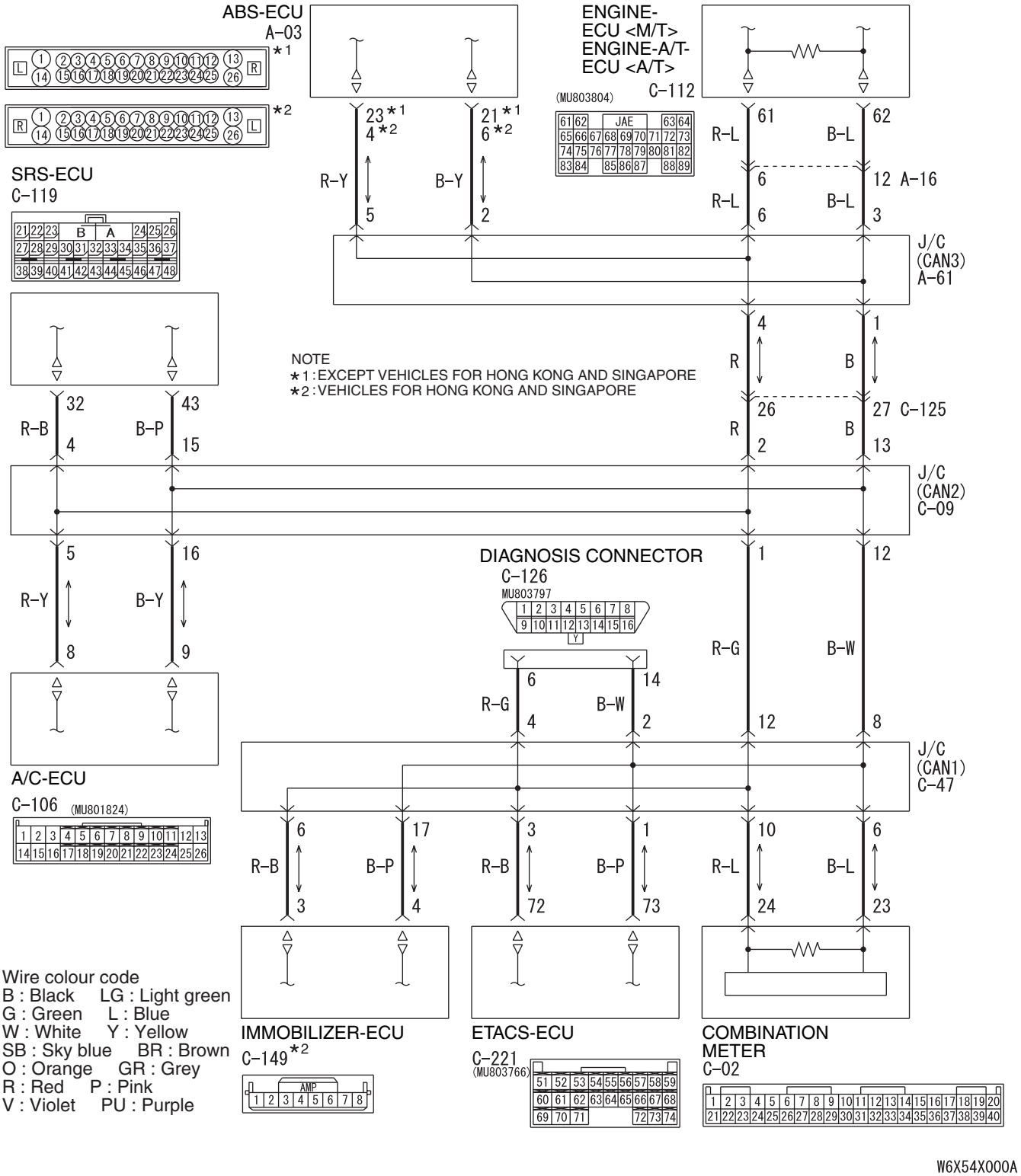
Diagnosis Item 2: Diagnose shorts in the ground to CAN bus line

⚠ CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



W6X54X000A

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FUNCTION

When diagnosing the CAN bus lines, the M.U.T.-III measures the voltage of CAN_H and CAN_L line and detects the short to power supply or ground.

TRUBLE JUDGEMENT CONDITIONS

The M.U.T.-III judges the trouble when it is impossible to receive the periodically sent data and the voltage of CAN_H or CAN_L line is less than 1.0 volt.

TROUBLESHOOTING HINTS

- Malfunction of the wiring harness
- Malfunction of the connector
- Malfunction of each ECU

DIAGNOSIS PROCEDURE

STEP 1.Check the CAN bus lines. Resistance measurement at C-126 diagnosis connector.

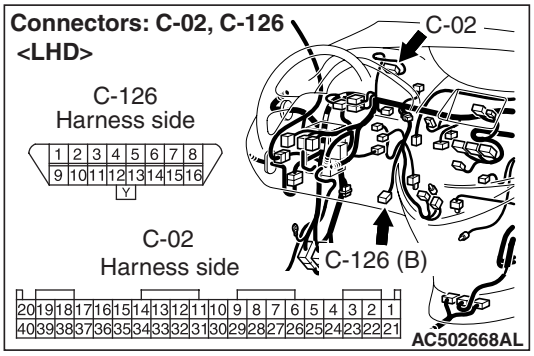
⚠ CAUTION

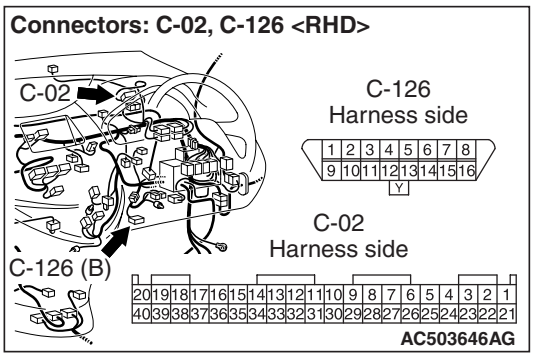
A digital multimeter should be used. For details refer to P.54F-5.

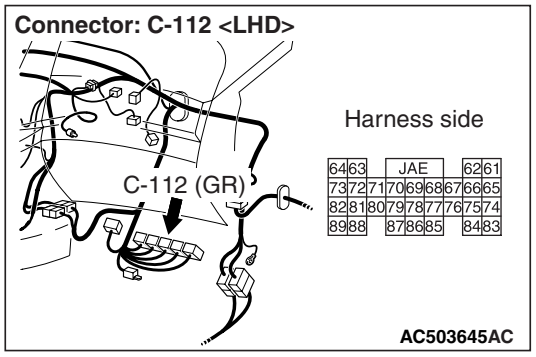
⚠ CAUTION

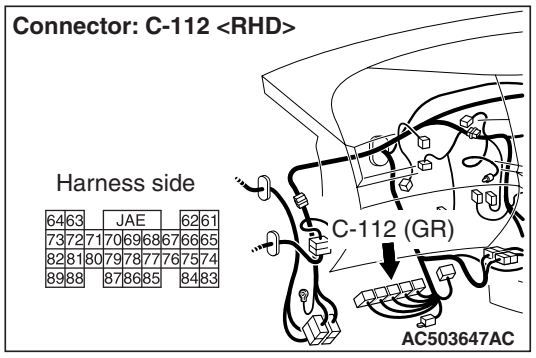
The test wiring harness should be used. For details refer to P.54F-5.

NOTE: This inspection allows you to check that there is a short to power supply in either CAN_H line or CAN_L line. Thus, in the following steps, check the CAN bus line that is defective.







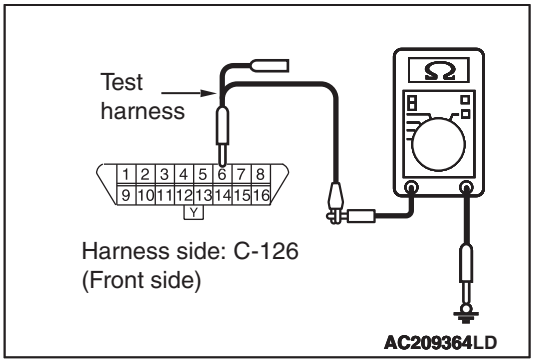


(1) Disconnect engine-ECU <M/T> or engine-A/T-ECU <A/T> connector C-112 and combination meter connector C-02, and measure the resistance at harness side of diagnosis connector C-126.

⚠ CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between C-126 diagnosis connector terminal No.6 (CAN_H) and body earth

OK: 1 kΩ or more

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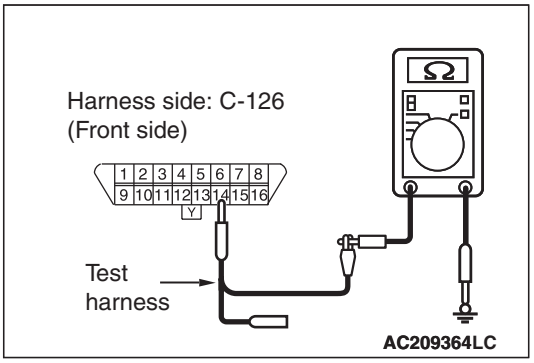


(4) Resistance between C-126 diagnosis connector terminal No.14 (CAN_L) and body earth

OK: 1 kΩ or more

Q: Is the check result normal?

YES : <Both of the measurement results show 1 kΩ or more> Go to Step 18.

NO : <Either of CAN_H line or CAN_L line the measurement results show 1 kΩ or more> Go to Step 2.

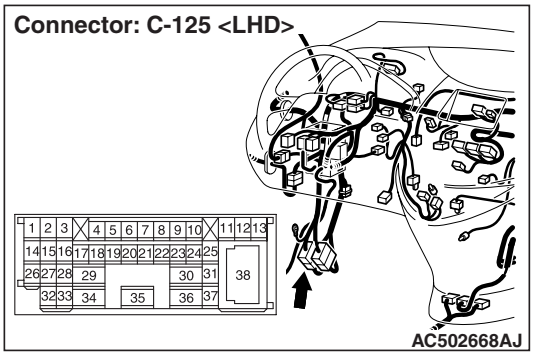
STEP 2. Check the CAN line. Resistance measurement at C-125 intermediate connector.

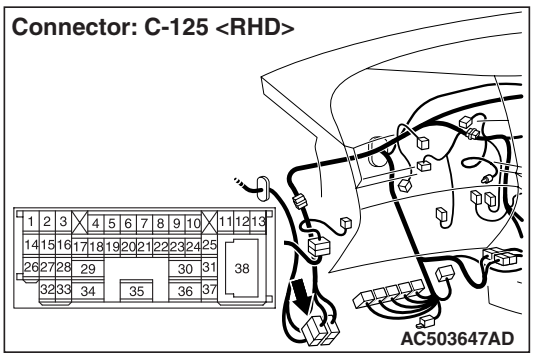
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.



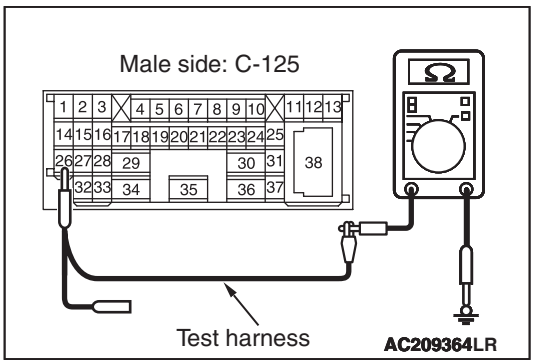


(1) Disconnect intermediate connector (C-125), and measure at its male-side intermediate connector (at the front wiring harness side).

⚠ CAUTION

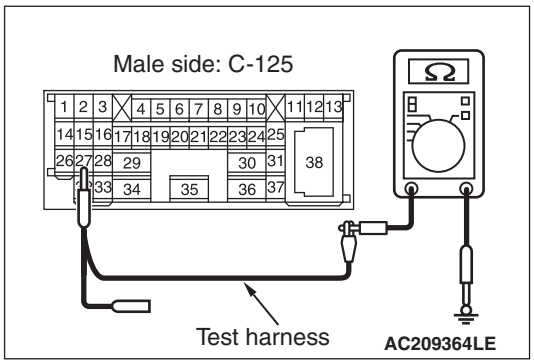
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between C-125 intermediate connector terminal No.26 (CAN_H) and body earth

OK: 1 kΩ or more



(4) Resistance between C-125 intermediate connector terminal No.27 (CAN_L) and body earth

OK: 1 kΩ or more

Q: Is the check result normal?

YES : <1 kΩ or more> Go to Step 7.

NO : <less than 1 kΩ> Go to Step 3.

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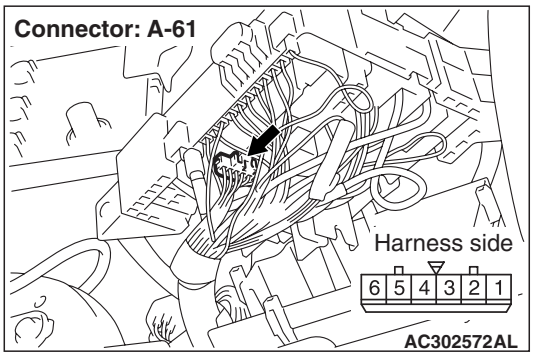
STEP 3. Check the CAN line between joint connector (CAN3) and the engine-ECU <M/T> or engine-A/T-ECU <A/T>. Resistance measurement at A-61 joint connector (CAN3).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

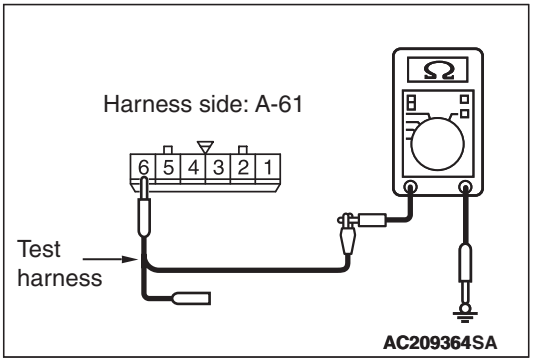
⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.



(1) Disconnect joint connector (CAN3), and measure at the wiring harness side.

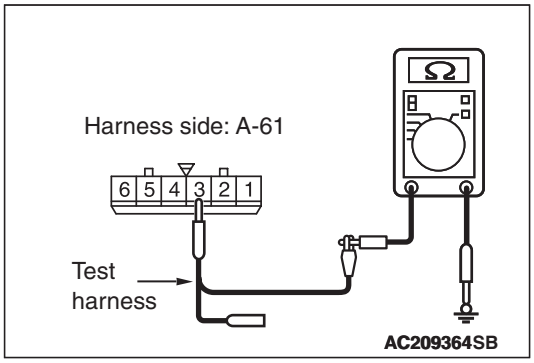
⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between A-61 joint connector (CAN3) terminal No.6 (CAN_H) and body earth

OK: 1 kΩ or more



(4) Resistance between A-61 joint connector (CAN3) terminal No.3 (CAN_L) and body earth

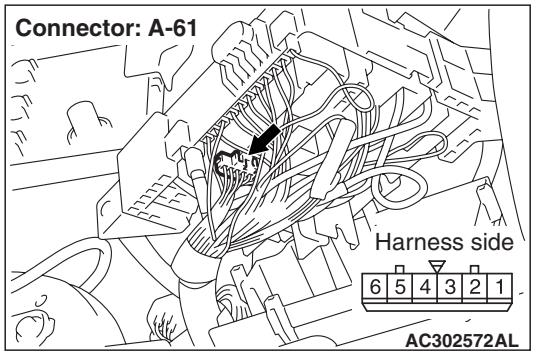
OK: 1 kΩ or more

Q: Is the check result normal?
YES : <1 kΩ or more> Go to Step 4.
NO : <less than 1 kΩ> Check intermediate connector A-16, and repair if necessary. If the intermediate connector is in good condition, repair the wiring harness between joint connector (CAN3) and the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.

STEP 4. Check the CAN line between joint connector (CAN3) and the ABS-ECU. Resistance measurement at A-61 joint connector (CAN3).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

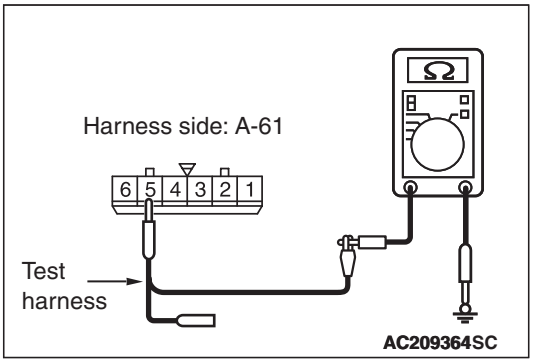
⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.



(1) Disconnect joint connector (CAN3), and measure at the wiring harness side.

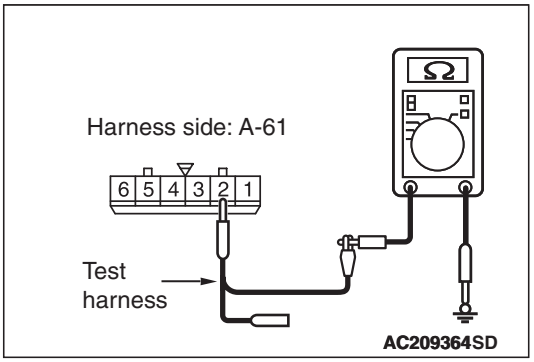
⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between A-61 joint connector (CAN3) terminal No.5 (CAN_H) and body earth

OK: 1 kΩ or more



(4) Resistance between A-61 joint connector (CAN3) terminal No.2 (CAN_L) and body earth

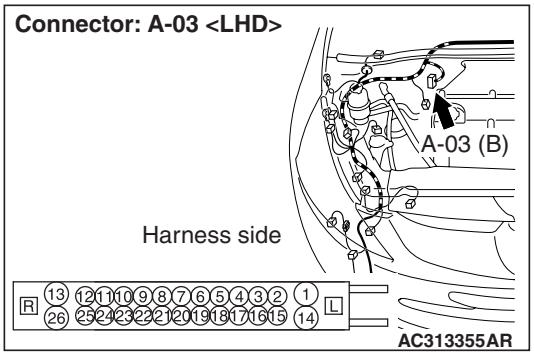
OK: 1 kΩ or more

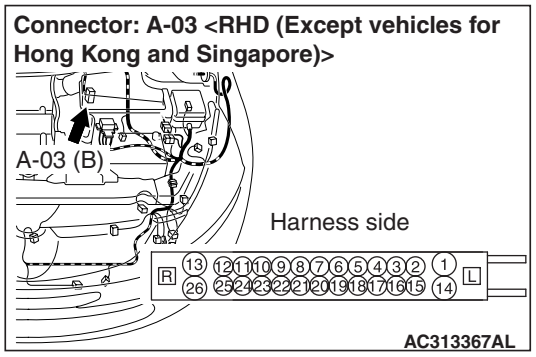
Q: Is the check result normal?

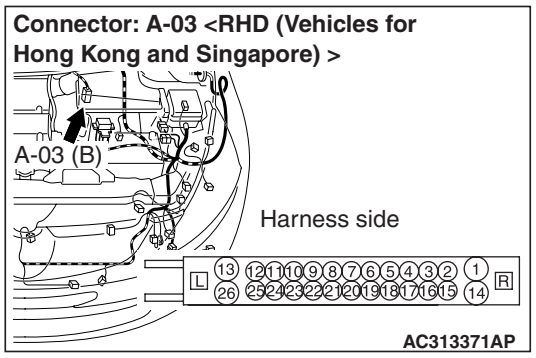
YES : <1 kΩ or more> Repair intermediate connector (C-125), or the wiring harness between joint connector (CAN3) and intermediate connector (C-125).

NO : <less than 1 kΩ> Go to Step 5.

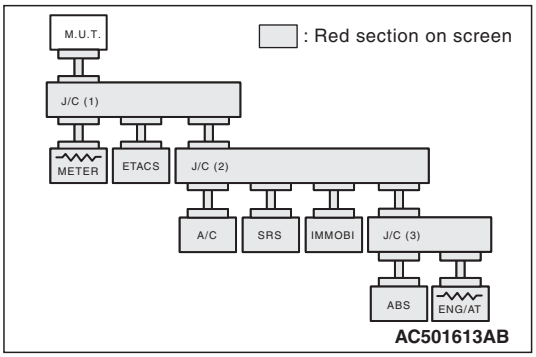
STEP 5. M.U.T.-III CAN bus diagnostics [ABS-ECU connector disconnected]







(1) Disconnect ABS-ECU connector A-03, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN3) and the ABS-ECU connector.

NO : Check the ABS-ECU connector, and repair if necessary. If the ABS-ECU connector is in good condition, go to Step 6.

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STEP 6. M.U.T.-III CAN bus diagnostics (retest the system)

Diagnose CAN bus lines, and check if M.U.T.-III screen shows normal state.

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 P.00-5).

NO : Check the ABS-ECU connector, and repair if necessary. If the ABS-ECU connector is in good condition, replace the ABS-ECU.

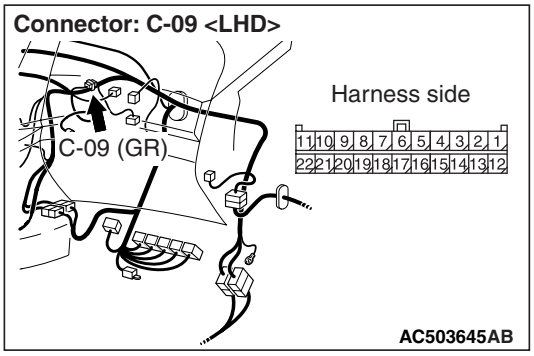
STEP 7. Check the CAN line. Resistance measurement at C-09 joint connector (CAN2).

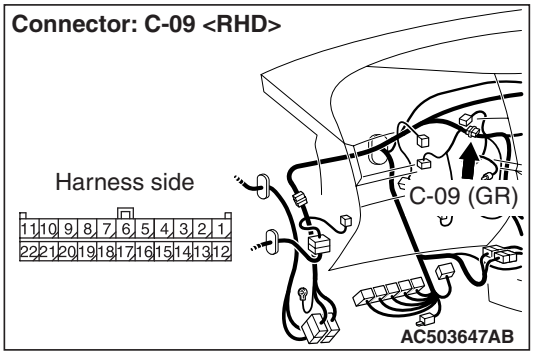
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.





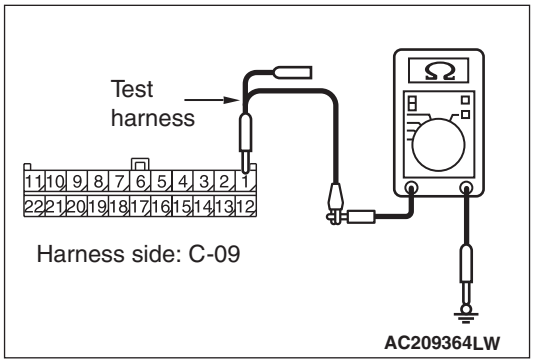
(1) Disconnect joint connector (CAN2), and measure at the wiring harness side.

⚠ CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

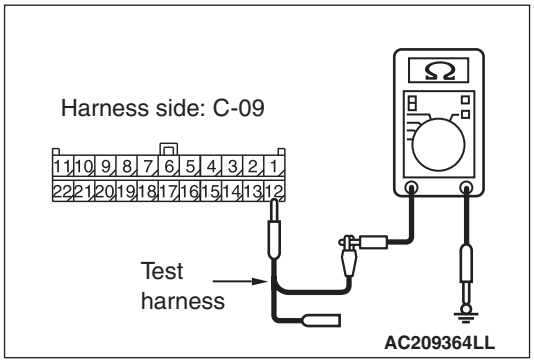
⚠ CAUTION

Ensure that the negative battery terminal is disconnected.



(2) Resistance between C-09 joint connector (CAN2) terminal No.1 (CAN_H) and body earth

OK: 1 kΩ or more



(3) Resistance between C-09 joint connector (CAN2) terminal No.12 (CAN_L) and body earth

OK: 1 kΩ or more

Q: Is the check result normal?

YES : <1 kΩ or more> Go to Step 14.

NO : <less than 1 kΩ> Go to Step 8.

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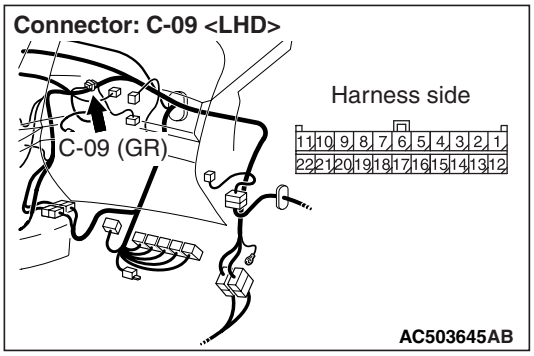
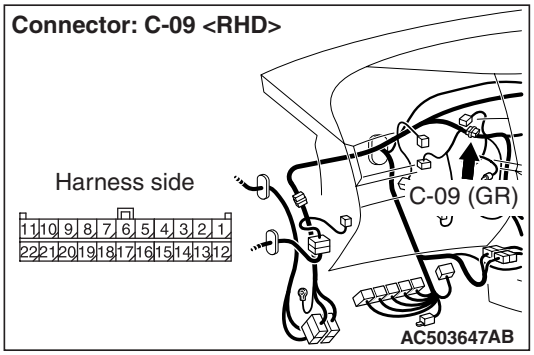
STEP 8. Check the CAN line between joint connector (CAN2) and the A/C-ECU. Resistance measurement at C-09 joint connector (CAN2).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.

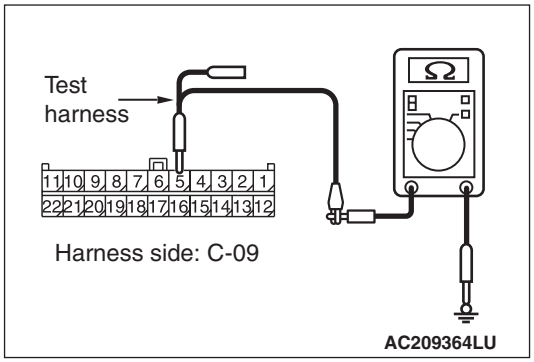




(1) Disconnect joint connector (CAN2), and measure at the wiring harness side.

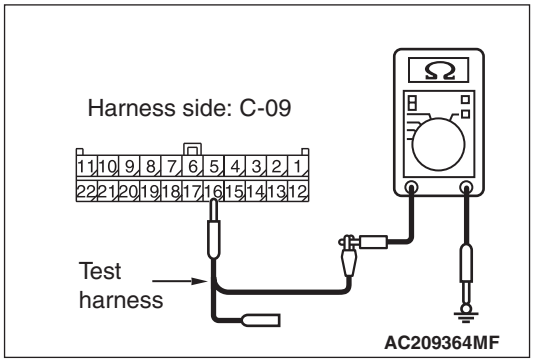
⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between C-09 joint connector (CAN2) terminal No.5 (CAN_H) and body earth

OK: 1 kΩ or more



(4) Resistance between C-09 joint connector (CAN2) terminal No.16 (CAN_L) and body earth

OK: 1 kΩ or more

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <1 kΩ or more> Go to Step 10.
NO : <less than 1 kΩ> Go to Step 9.

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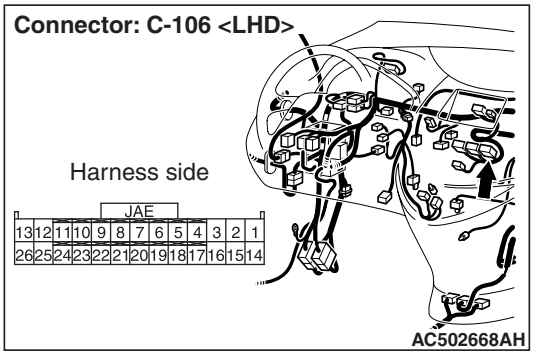
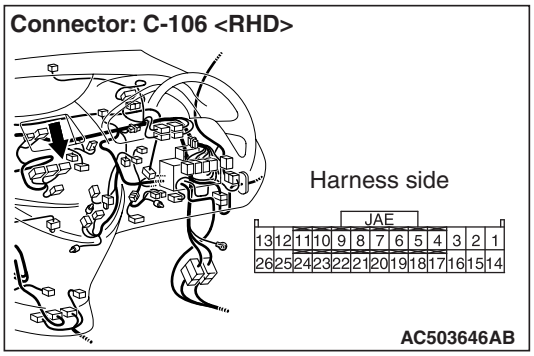
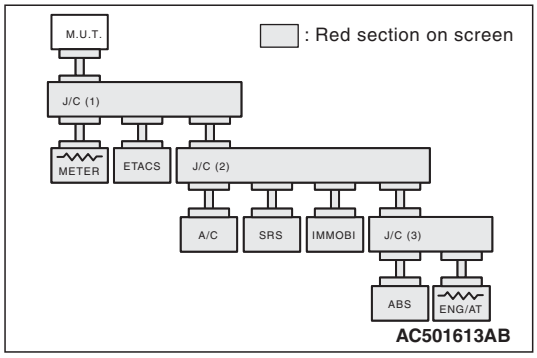
STEP 9. M.U.T.-III CAN bus diagnostics [A/C-ECU connector disconnected]





(1) Disconnect A/C-ECU connector C-106, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN2) and the A/C-ECU connector.

NO : Check the A/C-ECU connector, and repair if necessary. If the A/C-ECU connector is in good condition, refer to GROUP 55 – Troubleshooting P.55-186 <except vehicles for Hong Kong and Singapore> or P.55-193 <vehicles for Hong Kong and Singapore>.

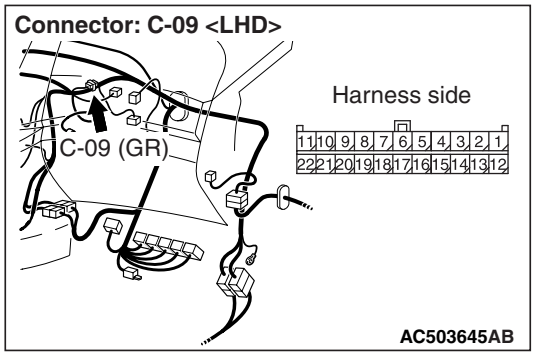
STEP 10. Check the CAN line between joint connector (CAN2) and the SRS-ECU. Resistance measurement at C-09 joint connector (CAN2).

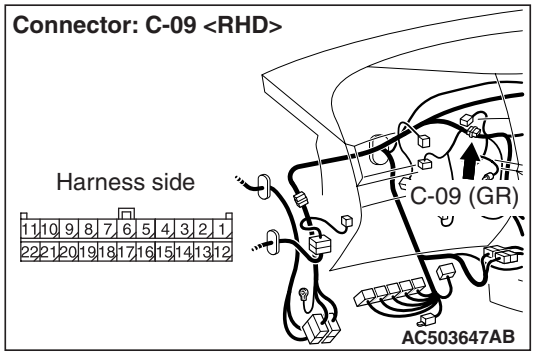
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.



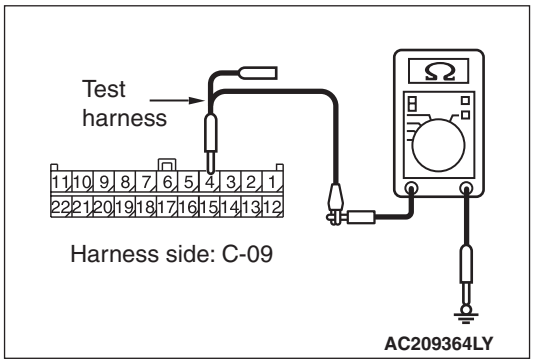


(1) Disconnect joint connector (CAN2), and measure at the wiring harness side.

⚠ CAUTION

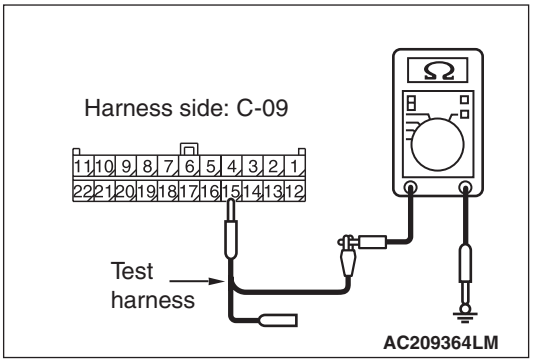
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between C-09 joint connector (CAN2) terminal No.4 (CAN_H) and body earth

OK: 1 kΩ or more



(4) Resistance between C-09 joint connector (CAN2) terminal No.15 (CAN_L) and body earth

OK: 1 kΩ or more

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

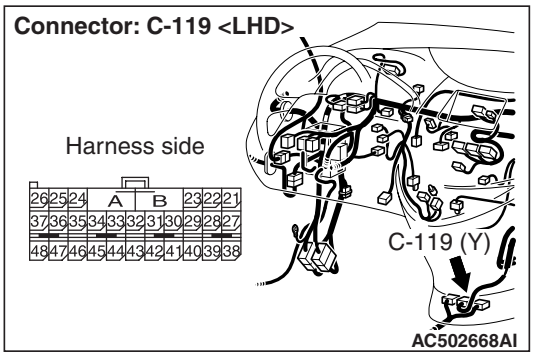
Q: Is the check result normal?

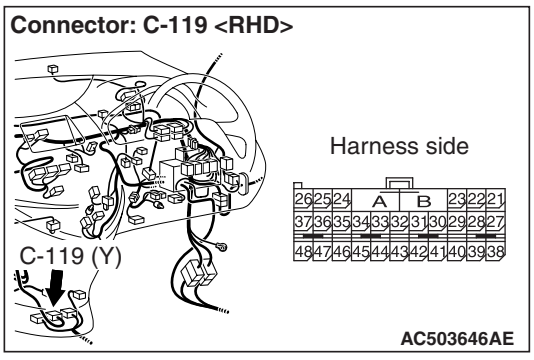
YES <except vehicles for Hong Kong and Singapore> : <1 kΩ or more> Repair the wiring harness between joint connector (CAN2) and intermediate connector (C-125).

YES <vehicles for Hong Kong and Singapore> : <1 kΩ or more> Go to Step 12.

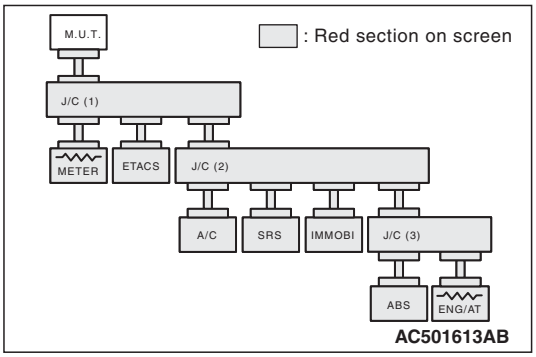
NO : <less than 1 kΩ> Go to Step 11.

STEP 11. M.U.T.-III CAN bus diagnostics [SRS-ECU connector disconnected]





(1) Disconnect SRS-ECU connector C-119, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN2) and the SRS-ECU connector.

NO : Check the SRS-ECU connector, and repair if necessary. If the SRS-ECU connector is in good condition, refer to GROUP 52B – Troubleshooting P.52B-159 <except vehicles for Hong Kong and Singapore> or P.52B-318 <vehicles for Hong Kong and Singapore>.

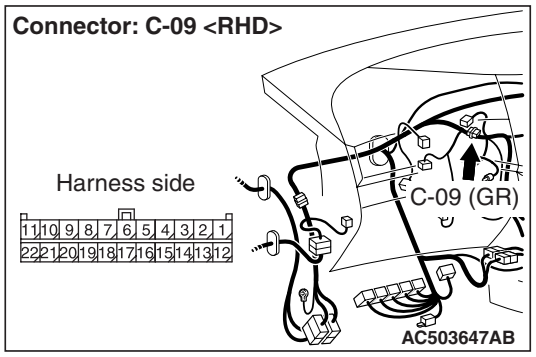
STEP 12. Check the CAN line between joint connector (CAN2) and the immobilizer-ECU. Resistance measurement at C-09 joint connector (CAN2).

⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.



(1) Disconnect joint connector (CAN2), and measure at the wiring harness side.

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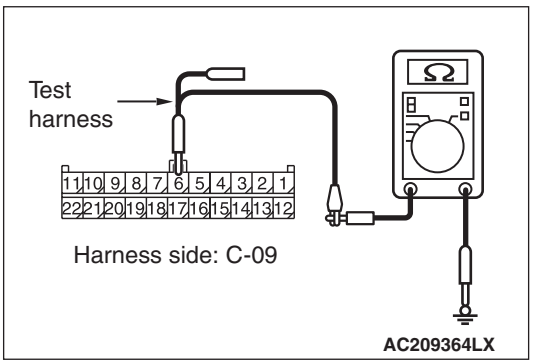
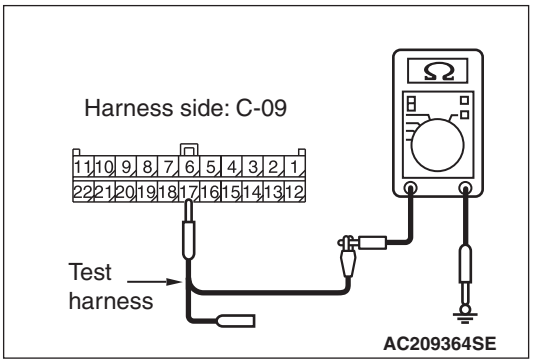
⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between C-09 joint connector (CAN2) terminal No.6 (CAN_H) and body earth

OK: 1 kΩ or more



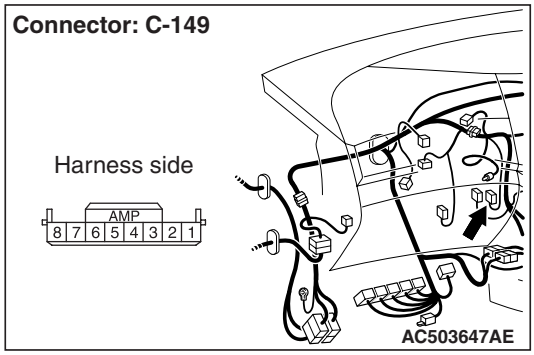
(4) Resistance between C-09 joint connector (CAN2) terminal No.17 (CAN_L) and body earth

OK: 1 kΩ or more

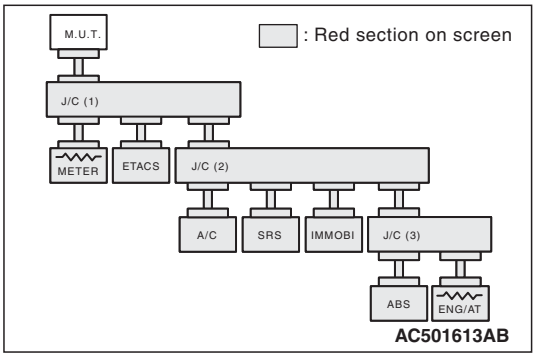
⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <1 kΩ or more> Repair the wiring harness between joint connector (CAN2) and intermediate connector (C-125).
NO : <less than 1 kΩ> Go to Step 13.

STEP 13. M.U.T.-III CAN bus diagnostics [immobilizer-ECU connector disconnected]



(1) Disconnect immobilizer-ECU connector C-149, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?
YES : Repair the wiring harness between joint connector (CAN2) and the immobilizer-ECU connector.
NO : Check the immobilizer-ECU connector, and repair if necessary. If the immobilizer-ECU connector is in good condition, refer to GROUP 54A – Ignition switch – Troubleshooting P.54A-32.

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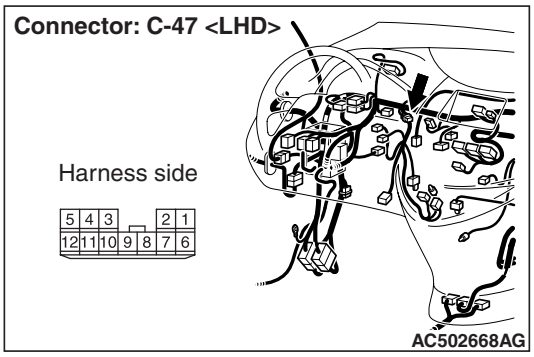
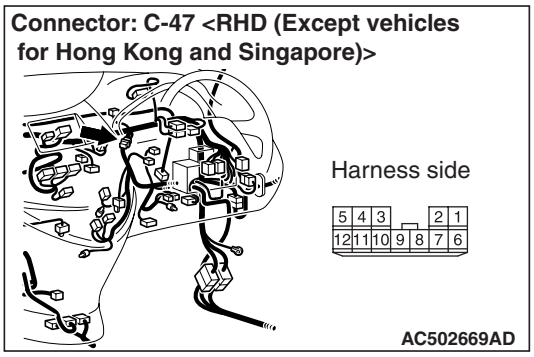
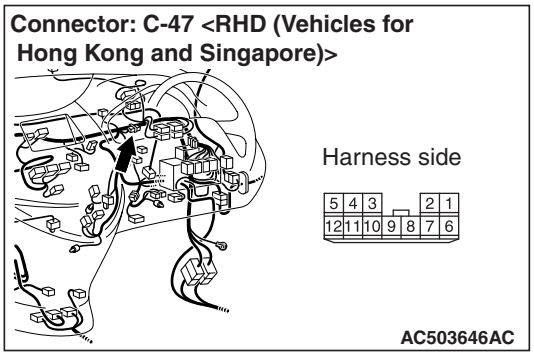
STEP 14. Check CAN line between joint connector (CAN2) and the combination meter. Resistance measurement at C-47 joint connector (CAN1).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.



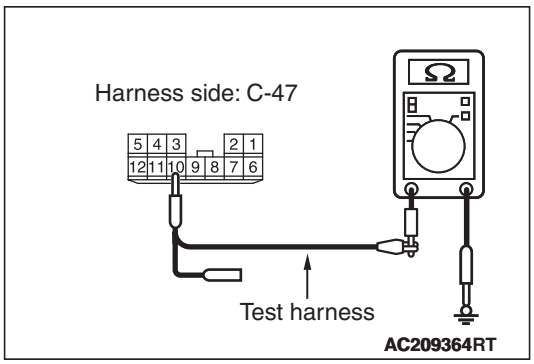




(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

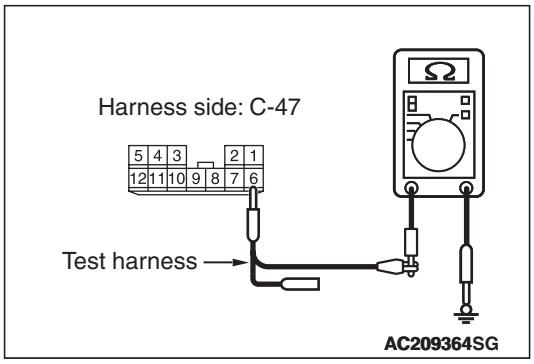
⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between C-47 joint connector (CAN1) terminal No.10 (CAN_H) and body earth

OK: 1 kΩ or more



(4) Resistance between C-47 joint connector (CAN1) terminal No.6 (CAN_L) and body earth

OK: 1 kΩ or more

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <1 kΩ or more> Go to Step 15.
NO : <less than 1 kΩ> Repair the wiring harness between joint connector (CAN1) and the combination meter connector.

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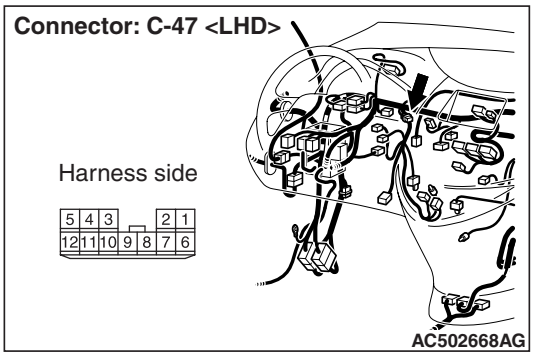
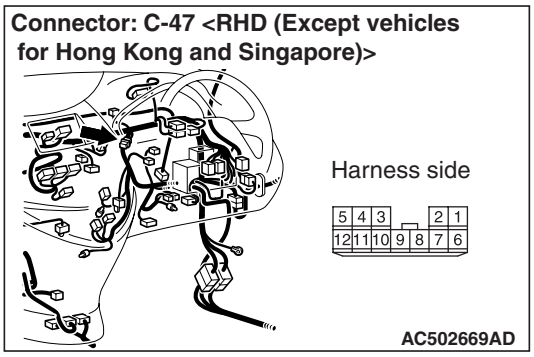
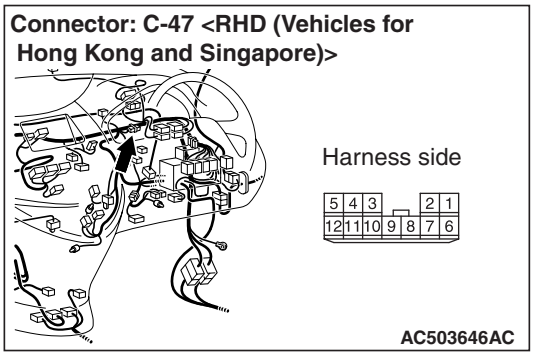
STEP 15. Check the CAN line between joint connector (CAN1) and the ETACS-ECU. Resistance measurement at C-47 joint connector (CAN1).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.



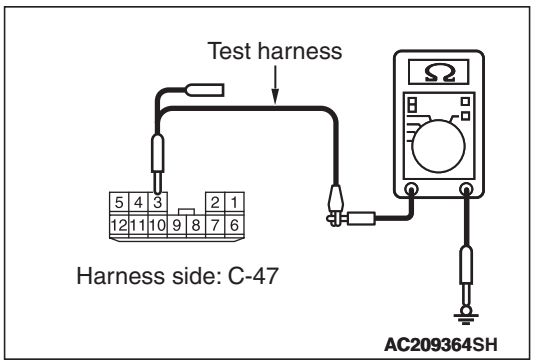




(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

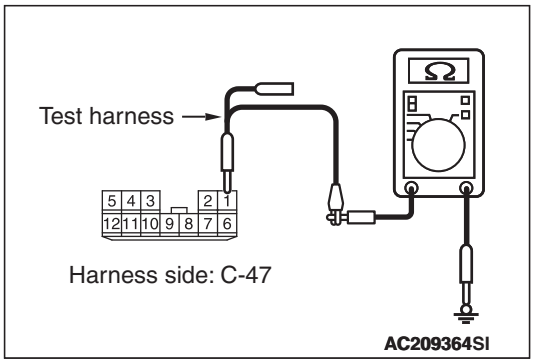
⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(2) Ensure that the negative battery terminal is disconnected.



(3) Resistance between C-47 joint connector (CAN1) terminal No.3 (CAN_H) and body earth

OK: 1 kΩ or more



(4) Resistance between C-47 joint connector (CAN1) terminal No.1 (CAN_L) and body earth

OK: 1 kΩ or more

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <1 kΩ or more> Go to Step 17.
NO : <less than 1 kΩ> Go to Step 16.

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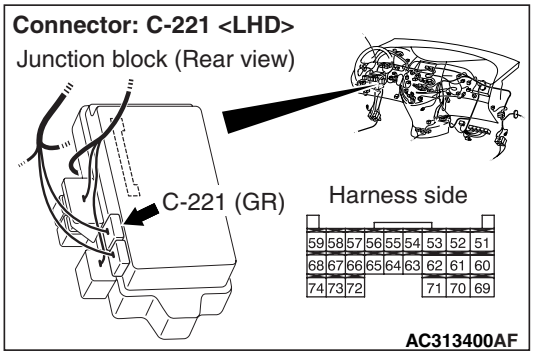
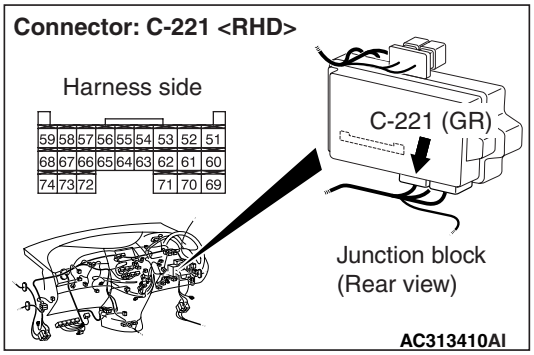
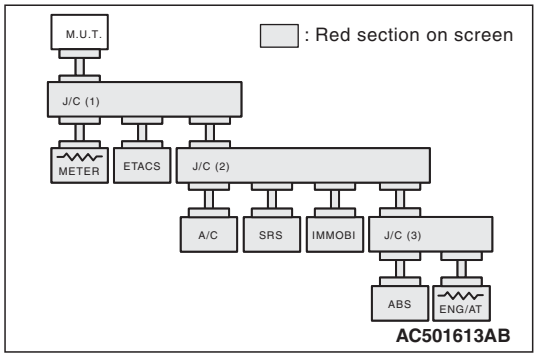
STEP 16. M.U.T.-III CAN bus diagnostics [ETACS-ECU connector disconnected]





(1) Disconnect ETACS-ECU connector C-221, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

YES : Repair the wiring harness between joint connector (CAN1) and the ETACS-ECU connector.

NO : Check the ETACS-ECU connector, and repair if necessary. If the ETACS-ECU connector is in good condition, refer to GROUP 54B – Troubleshooting P.54B-71 <except vehicles for Hong Kong and Singapore> or P.54D-70 <vehicles for Hong Kong and Singapore>.

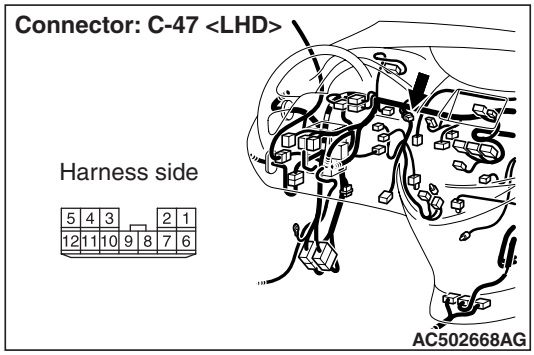
STEP 17. Check the CAN line between joint connector (CAN1) and the diagnosis connector. Resistance measurement at C-47 joint connector (CAN1).

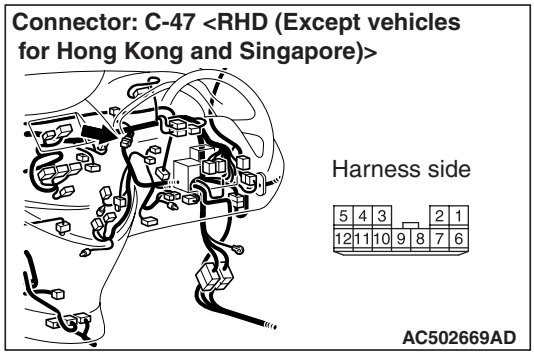
⚠ CAUTION

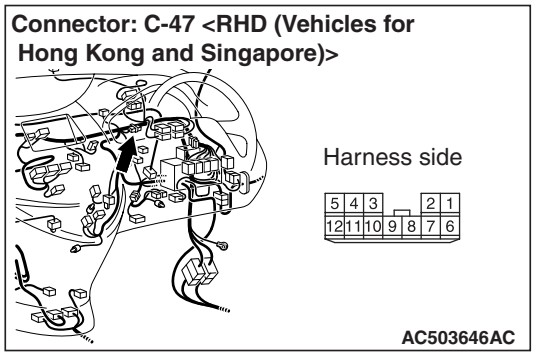
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.







(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

⚠ CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(2) Ensure that the negative battery terminal is disconnected.

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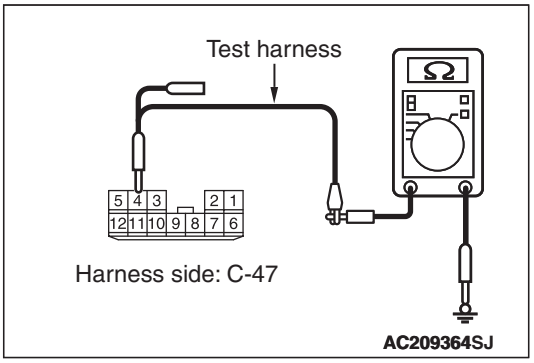
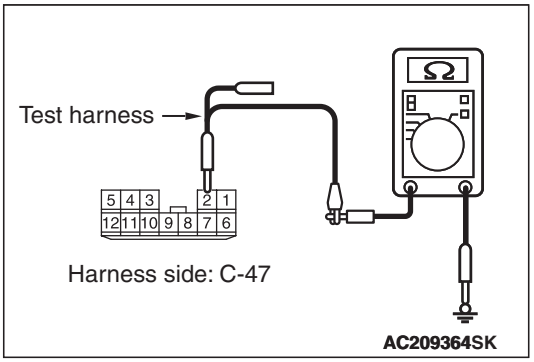


(3) Resistance between C-47 joint connector (CAN1) terminal No.4 (CAN_H) and body earth

OK: 1 kΩ or more



(4) Resistance between C-47 joint connector (CAN1) terminal No.2 (CAN_L) and body earth

OK: 1 kΩ or more

⚠ CAUTION

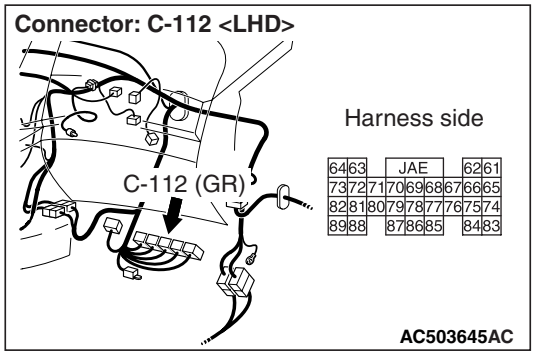
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

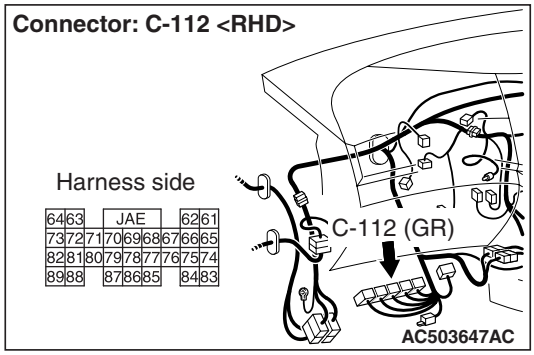
Q: Is the check result normal?

YES : <1 kΩ or more> Repair the wiring harness between joint connector (CAN1) and joint connector (CAN2).

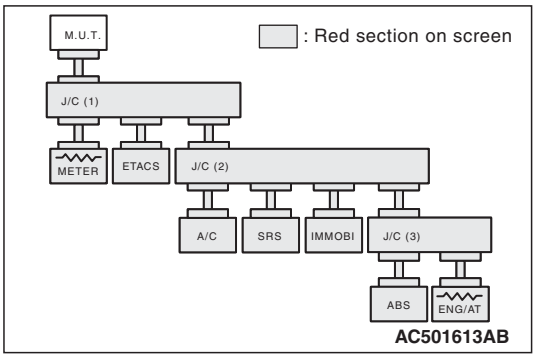
NO : <less than 1 kΩ> Repair the diagnosis connector, or the wiring harness between joint connector (CAN1) and the diagnosis connector.

STEP 18. M.U.T.-III CAN bus diagnostics [engine-ECU connector disconnected]





(1) Disconnect engine-ECU <M/T> or engine-A/T-ECU connector C-112, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

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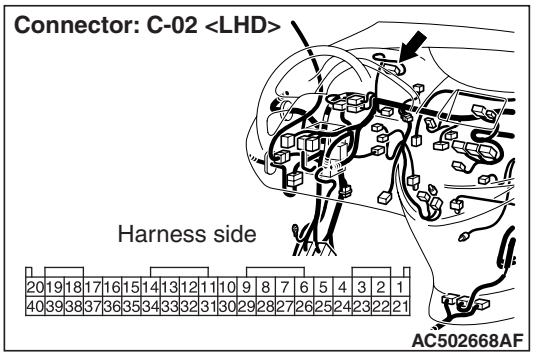
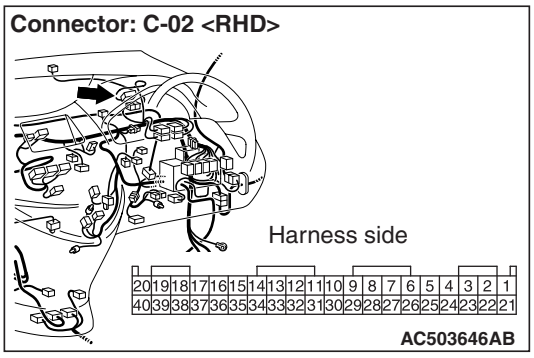
Q: Does M.U.T.-III screen correspond to the illustration?

YES : Go to Step 19.

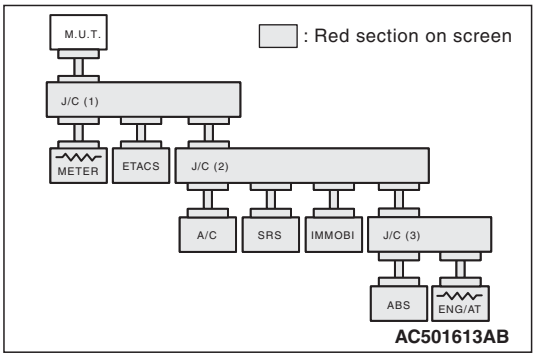
NO : Check the engine-ECU <M/T> or engine-A/T-ECU connector, and repair if necessary. If the engine-ECU <M/T> or engine-A/T-ECU connector is in good condition, refer to GROUP 13A – Troubleshooting P.13A-232 <except vehicles for Hong Kong, Singapore, Australia and New Zealand>, GROUP 13B – Troubleshooting P.13B-221 <vehicles for Hong Kong and Singapore> or GROUP 13C – Troubleshooting P.13C-277 <vehicles for Australia and New Zealand>.

STEP 19. M.U.T.-III CAN bus diagnostics [combination meter connector disconnected]





(1) Disconnect combination meter connector C-02, and diagnose by using the M.U.T.-III.



(2) Diagnose CAN bus lines, and check if M.U.T.-III screen is as shown in the illustration.

NOTE: The ECUs that are not adopted are not displayed.

Q: Does M.U.T.-III screen correspond to the illustration?

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 P.00-5).

NO : Check the combination meter connector, and repair if necessary. If the combination meter connector is in good condition, refer to GROUP 54A – Combination meter – Troubleshooting P.54A-75.

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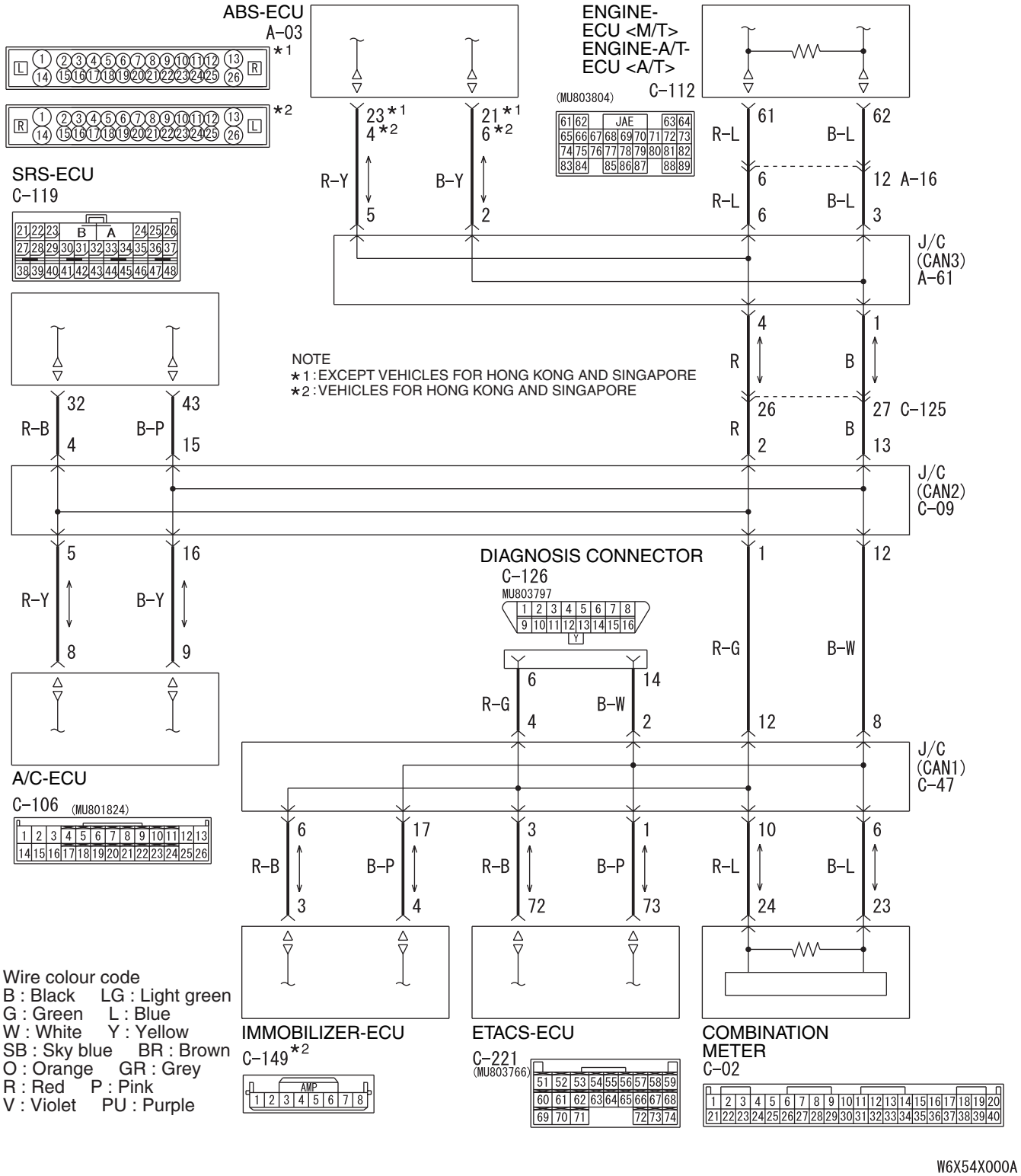
Diagnosis Item 3: Diagnose shorts between CAN_H and L lines

⚠ CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



Wire colour code
B : Black LG : Light green
G : Green L : Blue
W : White Y : Yellow
SB : Sky blue BR : Brown
O : Orange GR : Grey
R : Red P : Pink
V : Violet PU : Purple

W6X54X000A

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FUNCTION

The M.U.T.-III MB991958 judges a short between CAN_H and CAN_L line when all data from ECU cannot be received while checking periodically sent data from each ECU even if the voltage is normal.

TRUBLE JUDGEMENT CONDITIONS

The M.U.T.-III MB991958 judges the trouble when it is impossible to send and receive the all ECU periodically sent data and the voltage of CAN_H and CAN_L line is 4.0 volts or less and 1.0 volt or more.

TROUBLESHOOTING HINTS

- Malfunction of the wiring harness

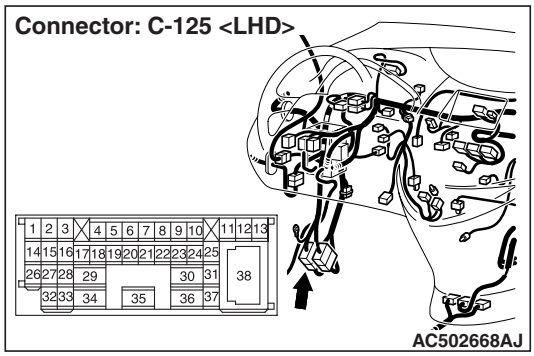
NOTE: The M.U.T.-III cannot receive all the periodically sent data from each ECU by the open circuit of harness between the diagnosis connector, the joint connector (CAN1), joint connector (CAN2) and the joint connector (CAN3). In addition, the M.U.T.-III measures the voltage itself and shows 2.5 volts due to the open circuit of harness. Therefore, it is judged as a short between CAN_H and CAN_L line.

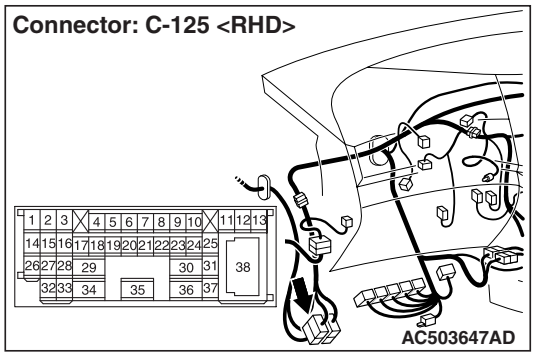
- Malfunction of the connector
- Malfunction of each ECU

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-125 intermediate connector

⚠ CAUTION





The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54F-5.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector.

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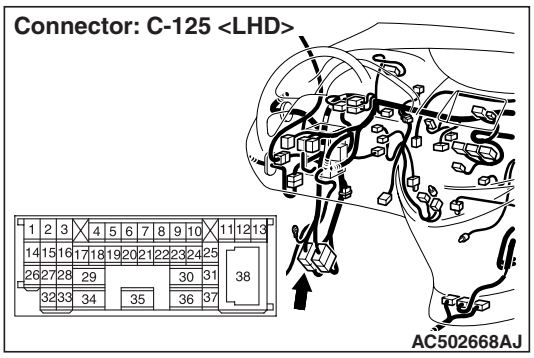
STEP 2. Resistance measurement at C-125 intermediate connector.

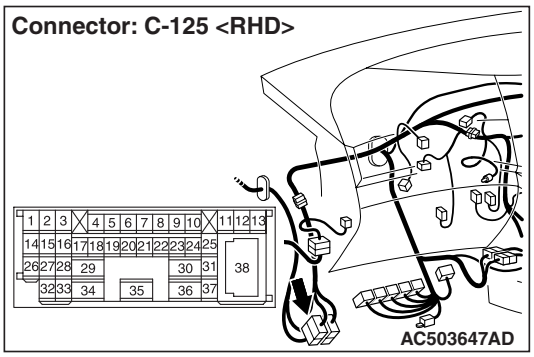
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.



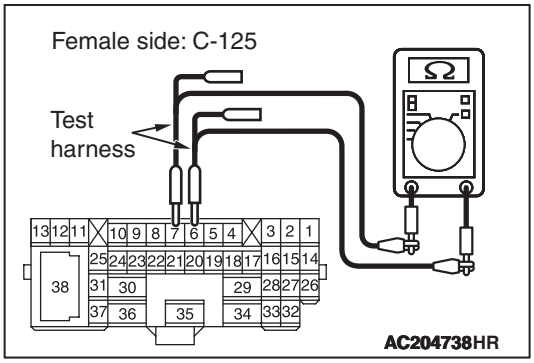


(1) Disconnect the connector, and measure at its female-side intermediate connector (at the instrument panel wiring harness side).
(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Resistance between C-125 intermediate connector terminal Nos.6 and 7

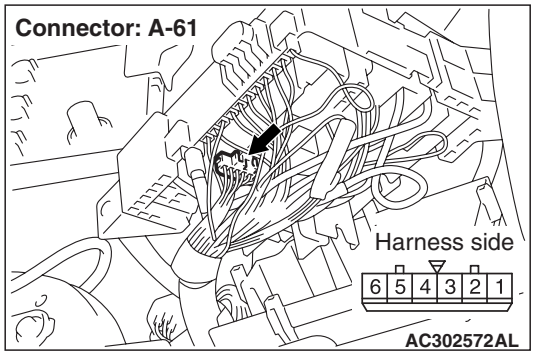
OK: 120 ± 20 Ω

Q: Is the check result normal?
YES : <Within 120 ± 20 Ω> Go to Step 3.
NO : <Not within 120 ± 20 Ω> Go to Step 8.

STEP 3. Connector check: A-61 joint connector (CAN3)

NOTE: When checking A-61 joint connector (CAN3), disassemble and check the engine compartment relay box by referring to P.54F-105.

⚠ CAUTION



The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54F-5.

When checking the joint connector, ensure that its wiring harness side is not damaged.

Q: Is the check result normal?
YES : Go to Step 4.
NO : Repair a defective connector or replace the joint connector.

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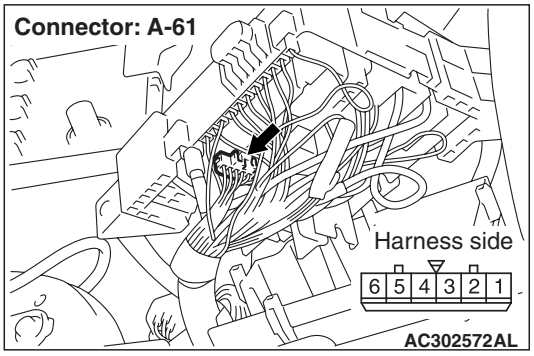
STEP 4. Resistance measurement at A-61 joint connector (CAN3).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

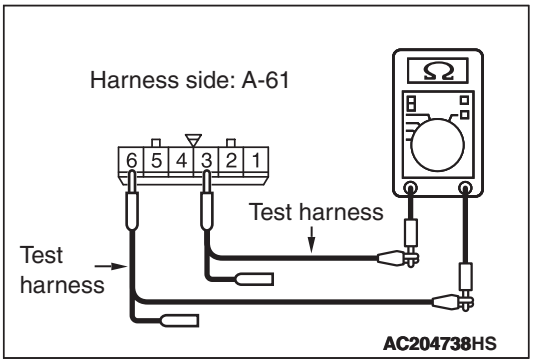
⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.



(1) Disconnect the connector, and measure at the wiring harness side.
(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Resistance between A-61 joint connector (CAN3) terminal Nos.3 and 6

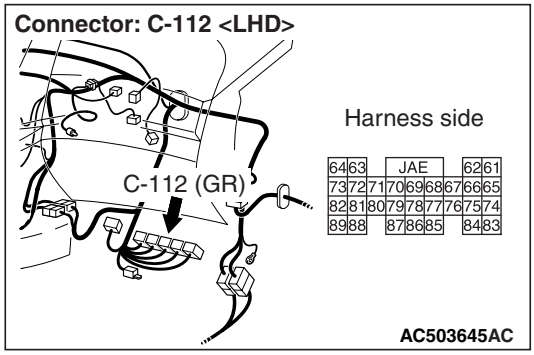
OK: 120 ± 20 Ω

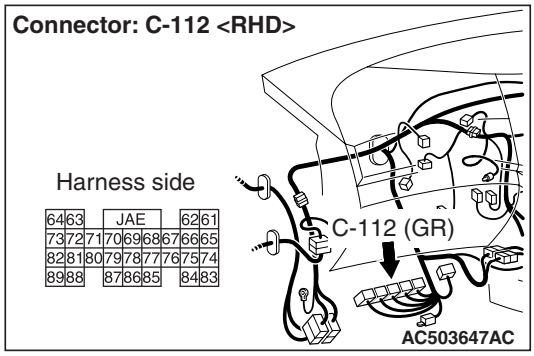
⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <Within 120 ± 20 Ω> Go to Step 6.
NO : <Not within 120 ± 20 Ω> Go to Step 5.

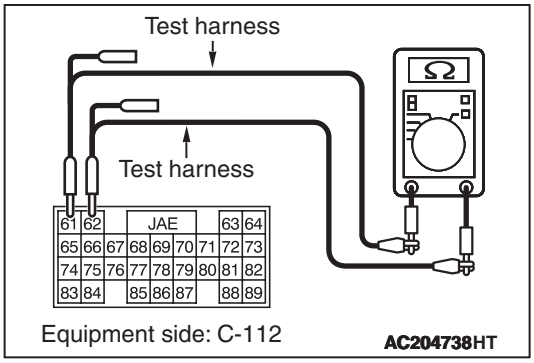
STEP 5. Resistance measurement at C-112 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.





(1) Remove the engine-ECU <M/T> or engine-A/T-ECU <A/T>, and measure at the equipment side.



(2) Resistance between C-112 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector terminal Nos.61 and 62

OK: 120 ± 20 Ω

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

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Q: Is the check result normal?

YES : <Within 120 ± 20 Ω> Check the intermediate connector A-16, and repair if necessary. If the intermediate connector is in good condition, replace the wiring harness between joint connector (CAN3) and the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.

NO : <Not within 120 ± 20 Ω> Check the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector, and repair if necessary. If the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector is in good condition, replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

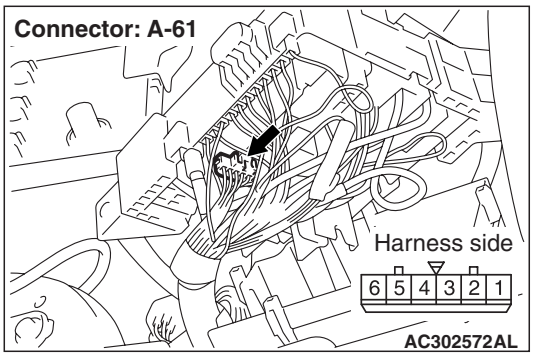
STEP 6. Resistance measurement at A-61 joint connector (CAN3).

⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.



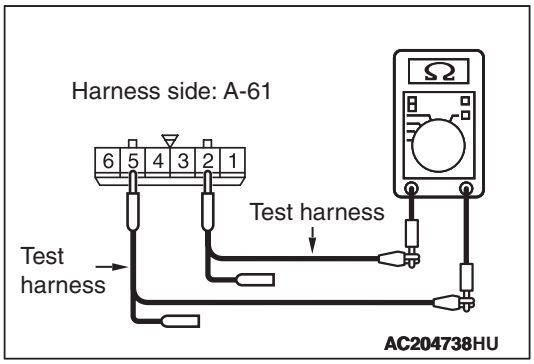
(1) Disconnect the connector, and measure at the wiring harness side.

(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Resistance between A-61 joint connector (CAN3) terminal Nos.2 and 5

OK: 1 kΩ or more

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES : <1 kΩ or more> Repair the wiring harness between joint connector (CAN3) and intermediate connector (C-125).

NO : <Less than 1 kΩ> Go to Step 7.

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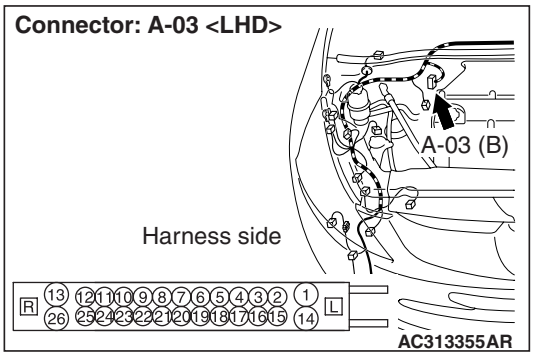
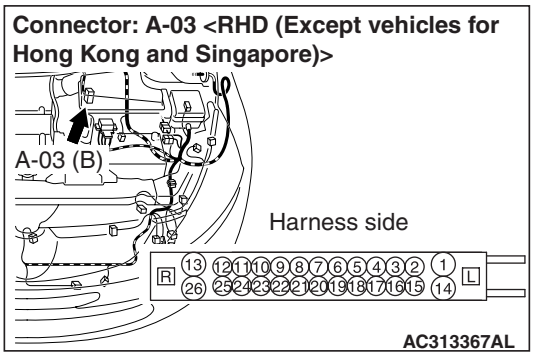
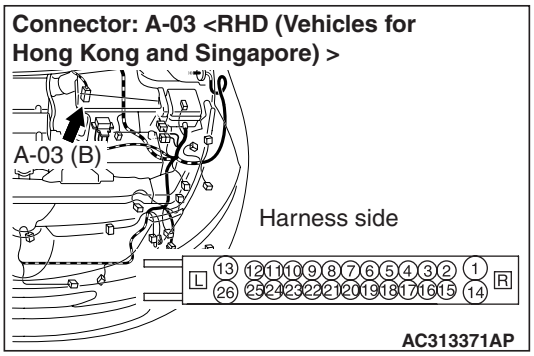
STEP 7. Resistance measurement at A-03 ABS-ECU connector.

⚠ CAUTION

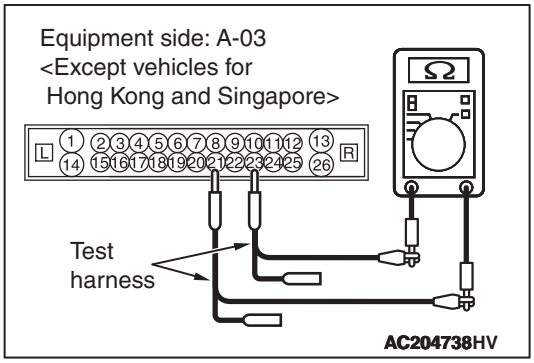
A digital multimeter should be used. For details refer to P.54F-5.





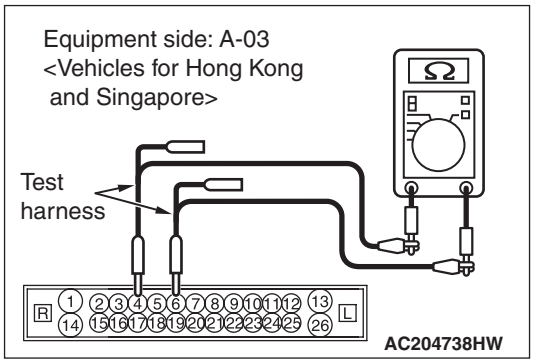


(1) Remove the ABS-ECU, and measure at the equipment side.



(2) Resistance between A-03 ABS-ECU connector terminal Nos.21 and 23 <Except vehicles for Hong Kong and Singapore>

OK: 1 kΩ or more



(3) Resistance between A-03 ABS-ECU connector terminal Nos.4 and 6 <Vehicles for Hong Kong and Singapore>

OK: 1 kΩ or more

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES : <1 kΩ or more> Repair the wiring harness between joint connector (CAN3) and the ABS-ECU connector.

NO : <Less than 1 kΩ> Check the ABS-ECU connector, and repair if necessary. If the ABS-ECU connector is in good condition, replace the ABS-ECU.

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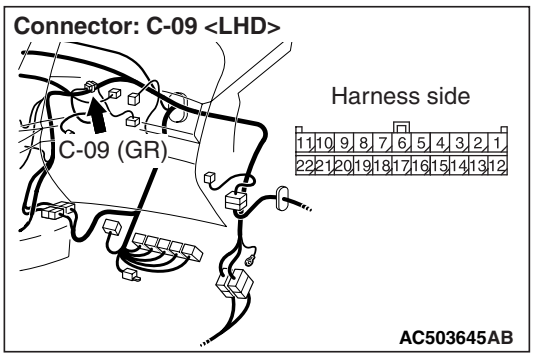
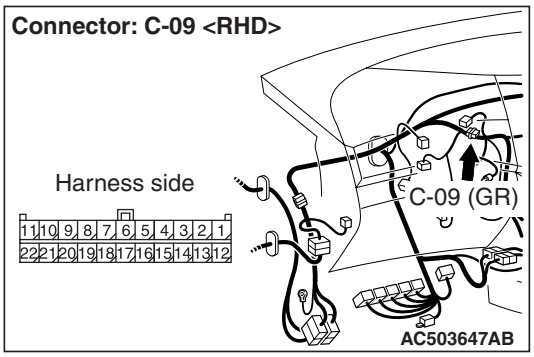
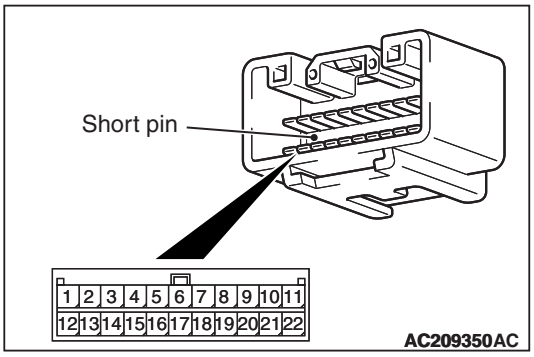
STEP 8. Connector check: C-09 joint connector (CAN2)

⚠ CAUTION





The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54F-5.



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 9.

NO : Repair a defective connector or replace the joint connector.

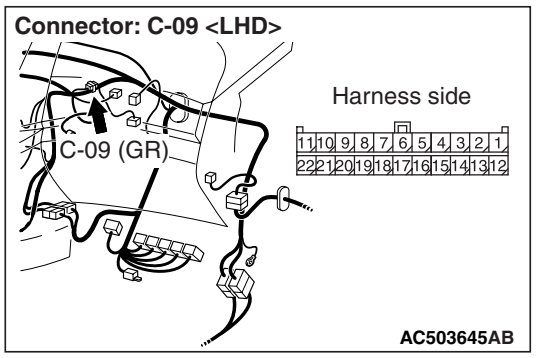
STEP 9. Resistance measurement at C-09 joint connector (CAN1).

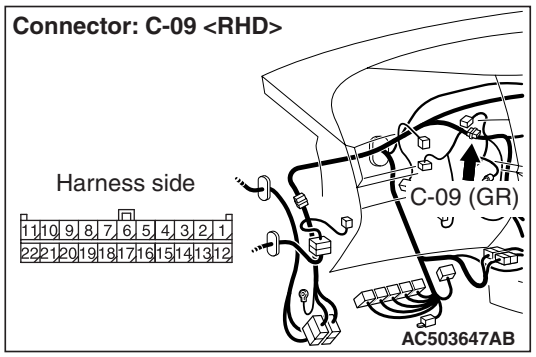
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.





(1) Disconnect joint connector (CAN2), and measure at the wiring harness side.

(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.

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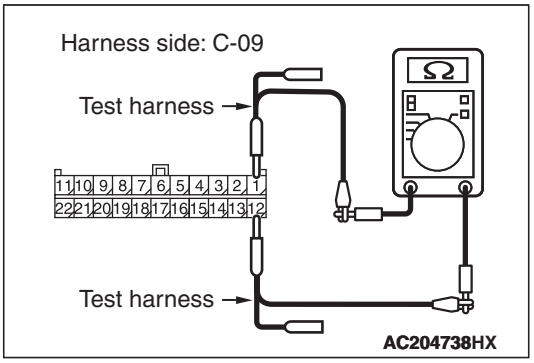


(4) Resistance between C-09 joint connector (CAN2) terminal Nos.1 and 12

OK: 120 ± 20 Ω

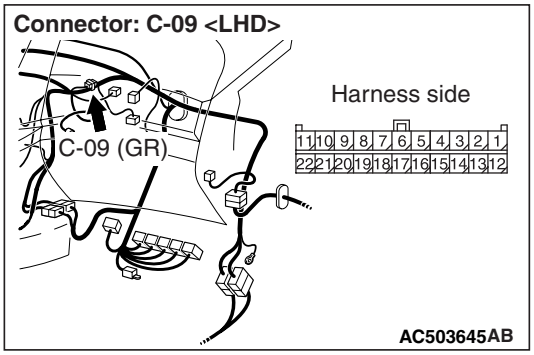
⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

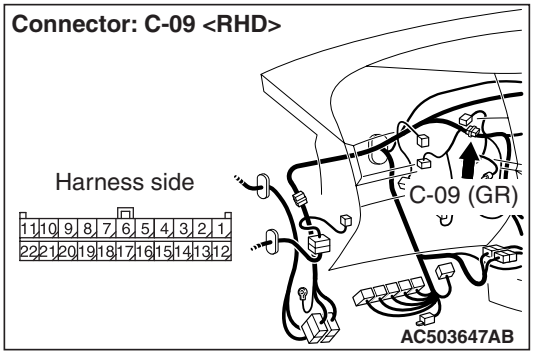
Q: Is the check result normal?
YES : <Within 120 ± 20 Ω> Go to Step 16.
NO : <Not within 120 ± 20 Ω> Go to Step 10.

STEP 10. Resistance measurement at C-09 joint connector (CAN2).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.



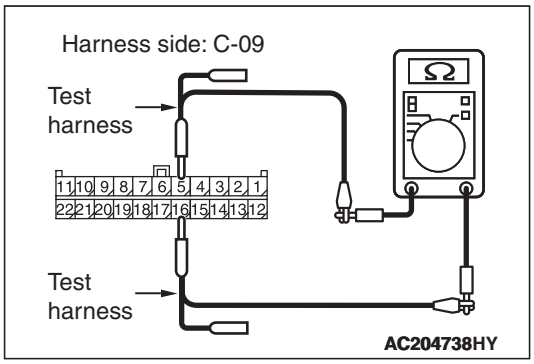


(1) Disconnect joint connector (CAN2), and measure at the wiring harness side.

(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Resistance between C-09 joint connector (CAN2) terminal Nos.5 and 16

OK: 1 kΩ or more

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <1 kΩ or more> Go to Step 12.
NO : <Less than 1 kΩ> Go to Step 11.

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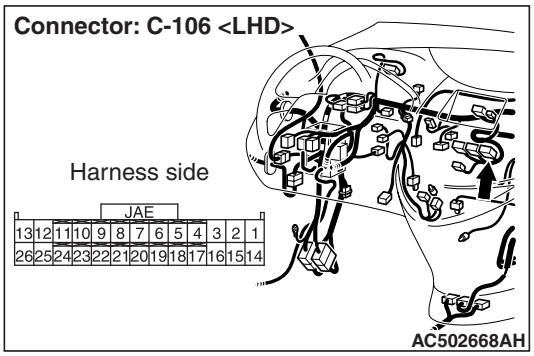
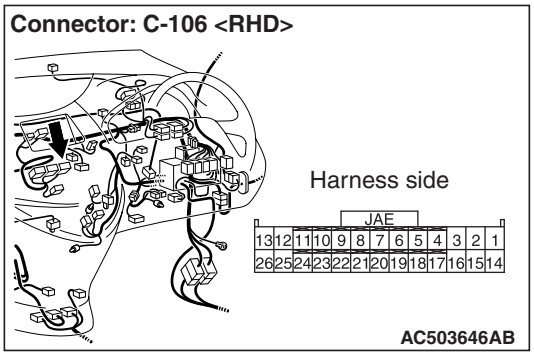
STEP 11. Resistance measurement at C-106 A/C-ECU connector.

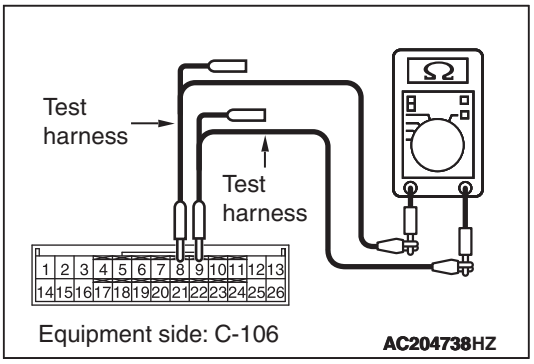
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.





(1) Remove the A/C-ECU, and measure at the equipment side.



(2) Resistance at C-106 A/C-ECU connector terminal Nos.8 and 9

OK: 1 kΩ or more

Q: Is the check result normal?

YES : <1 kΩ or more> Repair the wiring harness between joint connector (CAN2) and the A/C-ECU connector.

NO : <Less than 1 kΩ> Check the A/C-ECU connector, and repair if necessary. If the A/C-ECU connector is in good condition, replace the A/C-ECU.

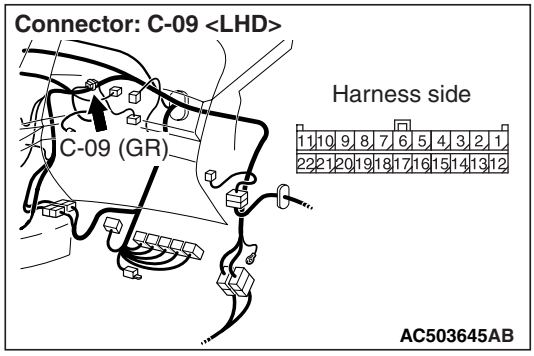
STEP 12. Resistance measurement at C-09 joint connector (CAN2).

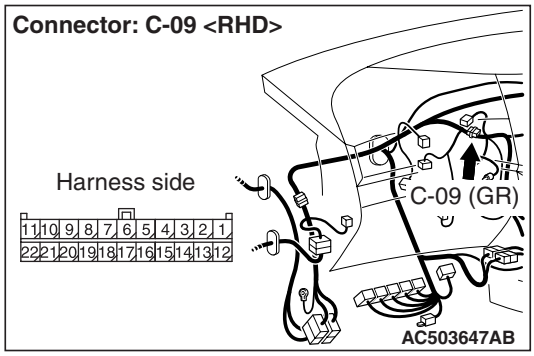
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.





(1) Disconnect the connector, and measure at the wiring harness side.

(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.

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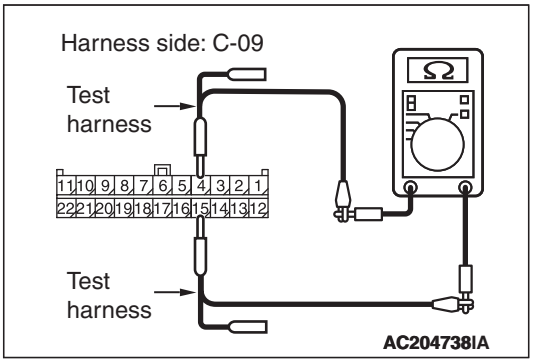


(4) Resistance between C-09 joint connector (CAN2) terminal Nos.4 and 15

OK: 1 kΩ or more

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES <except vehicles for Hong Kong and Singapore> : <1 kΩ or more> Repair the wiring harness between joint connector (CAN2) and intermediate connector (C-125).

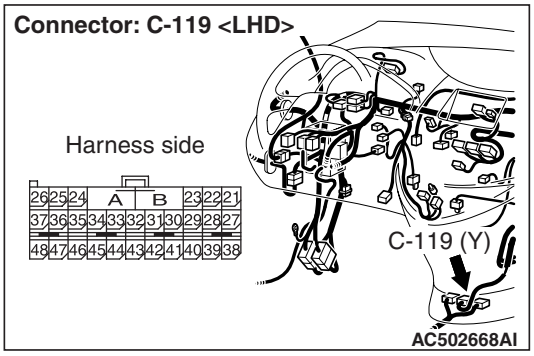
YES <vehicles for Hong Kong and Singapore> : <1 kΩ or more> Go to Step 14.

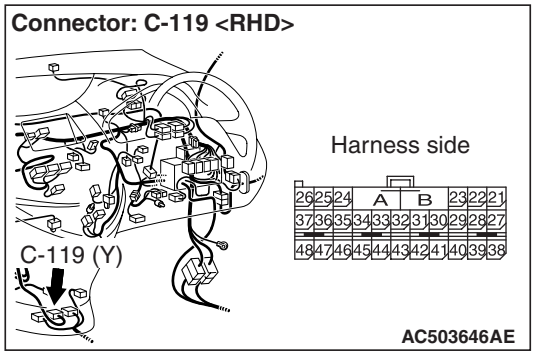
NO : <Less than 1 kΩ> Go to Step 13.

STEP 13. Resistance measurement at C-119 SRS-ECU connector.

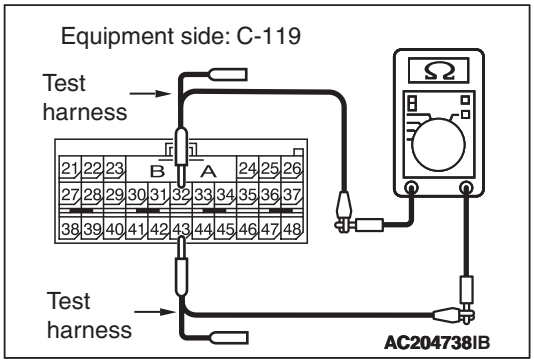
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.





(1) Remove the SRS-ECU, and measure at the equipment side.



(2) Resistance between C-119 SRS-ECU connector terminal Nos.32 and 43

OK: 1 kΩ or more

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES : <1 kΩ or more> Repair the wiring harness between joint connector (CAN2) and the SRS-ECU connector.

NO : <Less than 1 kΩ> Check the SRS-ECU connector, and repair if necessary. If the SRS-ECU connector is in good condition, replace the SRS-ECU.

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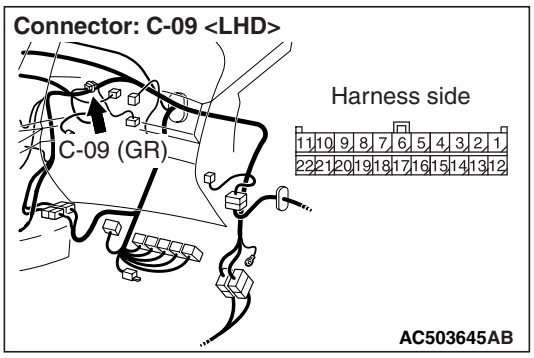
STEP 14. Resistance measurement at C-09 joint connector (CAN2).

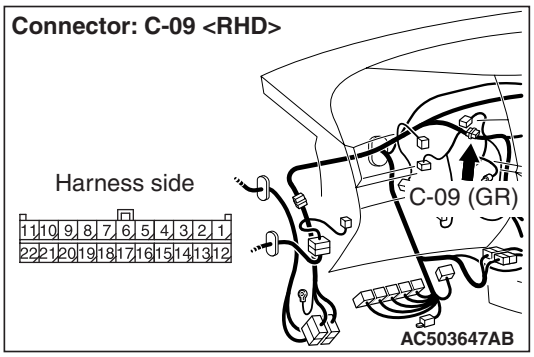
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.





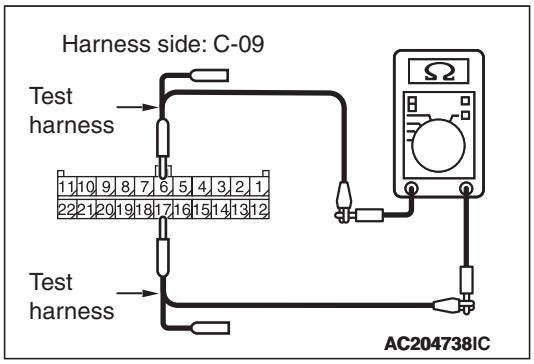
(1) Disconnect the connector, and measure at the wiring harness side.

(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Resistance between C-09 joint connector (CAN2) terminal Nos.6 and 17

OK: 1 kΩ or more

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES : <1 kΩ or more> Repair the wiring harness between joint connector (CAN2) and intermediate connector (C-125).

NO : <Less than 1 kΩ> Go to Step 15.

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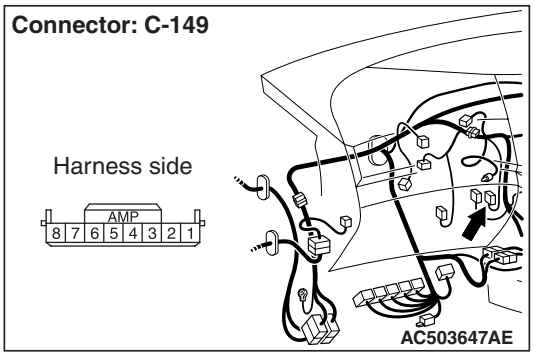
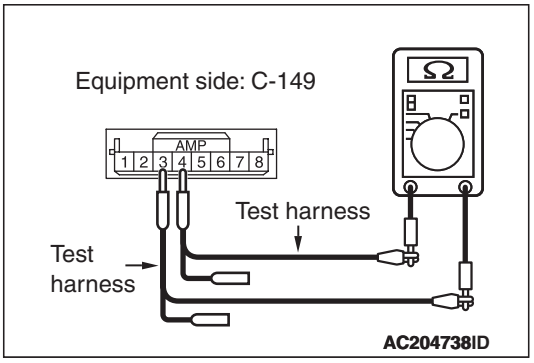
STEP 15. Resistance measurement at C-149 immobilizer-ECU connector.

⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.



(1) Remove the immobilizer-ECU, and measure at the equipment side.



(2) Resistance between C-149 immobilizer-ECU connector terminal Nos.3 and 4

OK: 1 kΩ or more

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

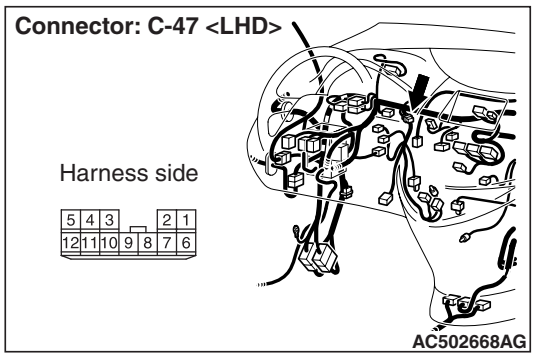
Q: Is the check result normal?

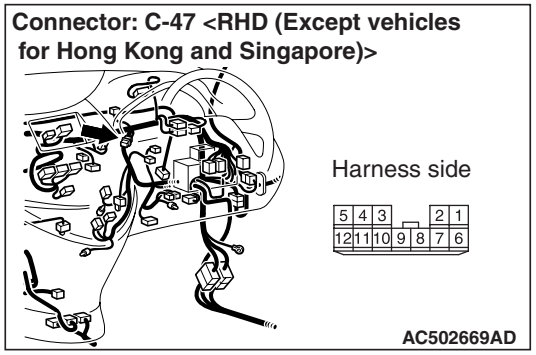
YES : <1 kΩ or more> Repair the wiring harness between joint connector (CAN2) and the immobilizer-ECU connector.

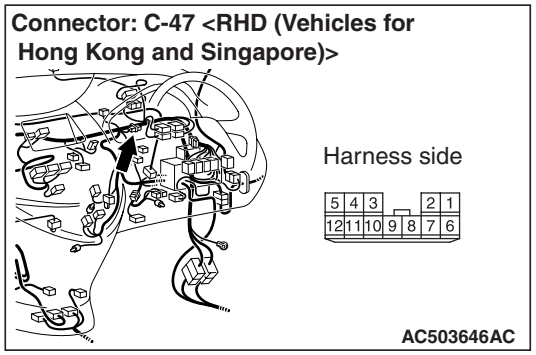
NO : <Less than 1 kΩ> Check the immobilizer-ECU connector, and repair if necessary. If the immobilizer-ECU connector is in good condition, replace the immobilizer-ECU.

STEP 16. Connector check: C-47 joint connector (CAN1)

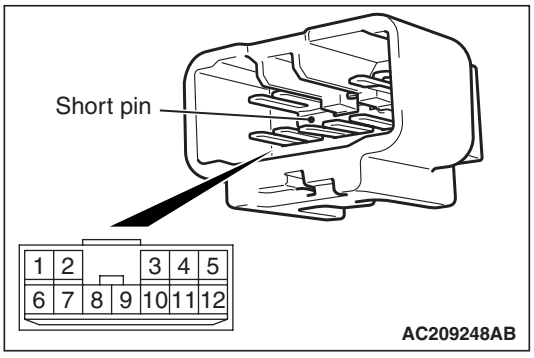
⚠ CAUTION







The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54F-5.



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

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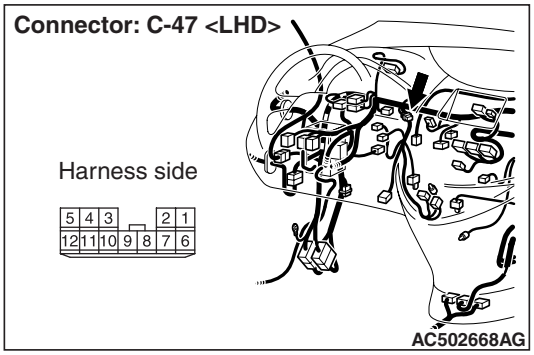
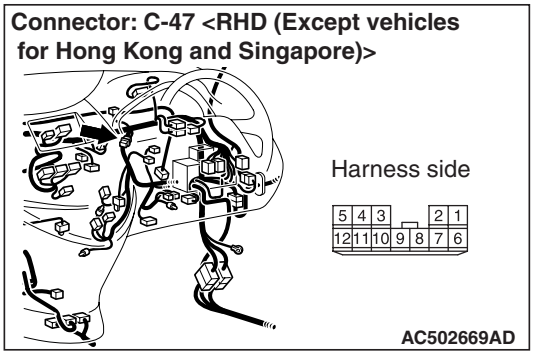
Q: Is the check result normal?
YES : Go to Step 17.
NO : Repair a defective connector or replace the joint connector.

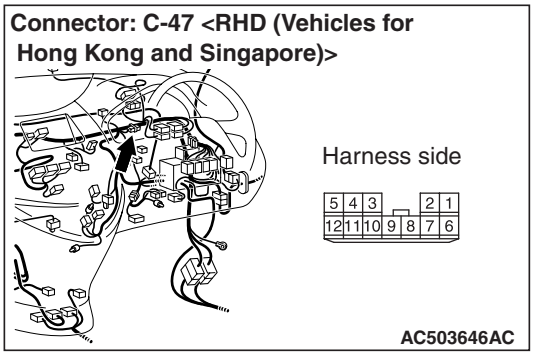
STEP 17. Resistance measurement at C-47 joint connector (CAN1).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.





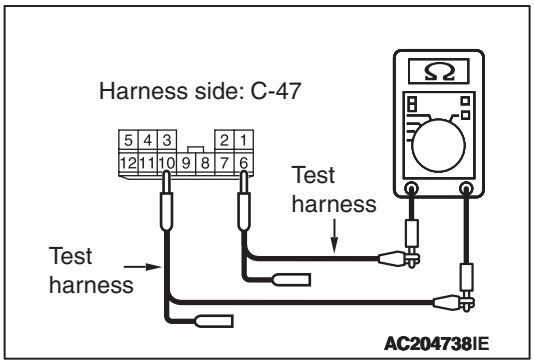


(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Resistance between C-47 joint connector (CAN1) terminal Nos.6 and 10

OK: 120 ± 20 Ω

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <Within 120 ± 20 Ω> Go to Step 19.
NO : <Not within 120 ± 20 Ω> Go to Step 18.

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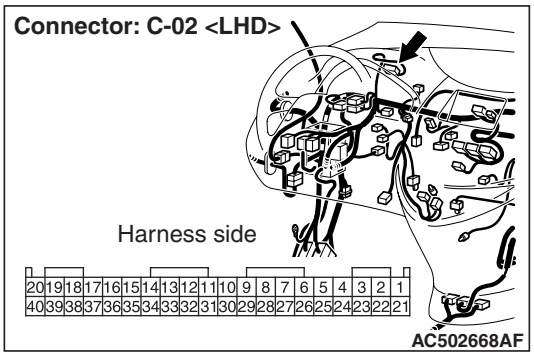
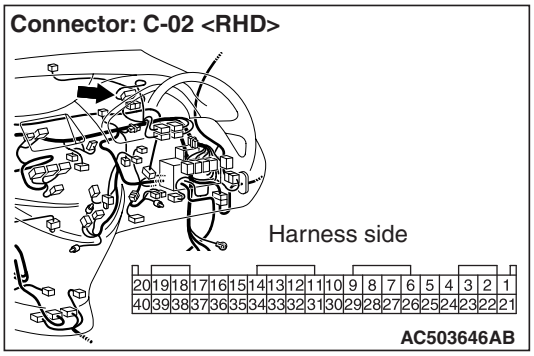
STEP 18. Resistance measurement at C-02 combination meter connector.

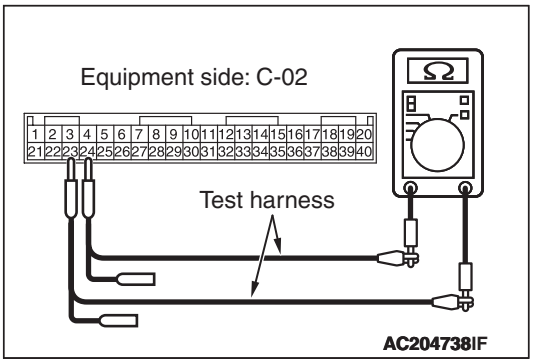
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.





(1) Remove the combination meter, and measure at the equipment side.



(2) Resistance at C-02 combination meter connector terminal Nos.23 and 24

OK: 120 ± 20 Ω

Q: Is the check result normal?

YES : <Within 120 ± 20 Ω> Repair the wiring harness between joint connector (CAN1) and the combination meter connector.

NO : <Not within 120 ± 20 Ω> Check the combination meter connector, and repair if necessary. If the combination meter connector is in good condition, replace the combination meter.

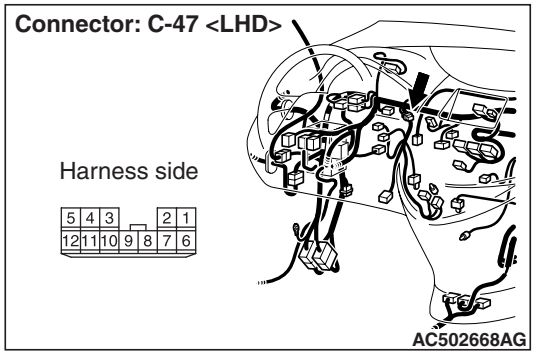
STEP 19. Resistance measurement at C-47 joint connector (CAN1).

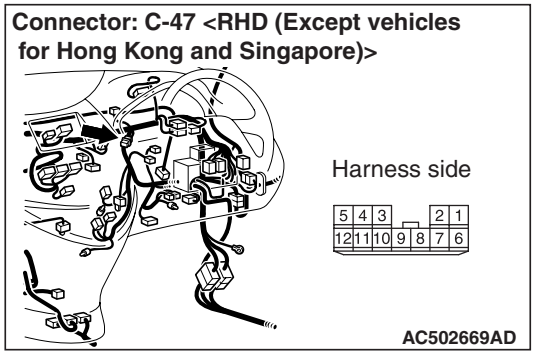
⚠ CAUTION

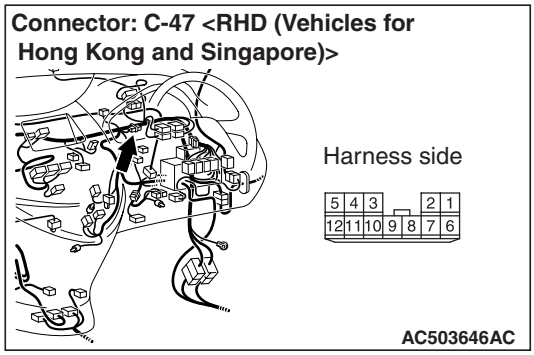
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.







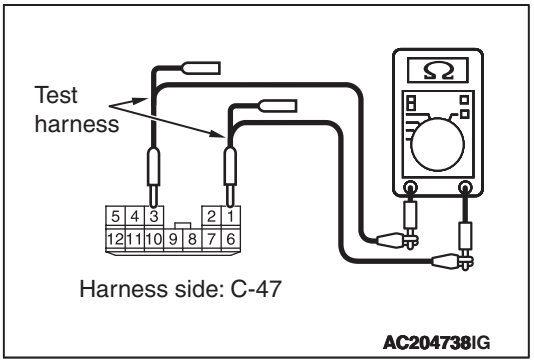
(1) Disconnect joint connector (CAN1), and measure at the wiring harness side.

(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Resistance between C-47 joint connector (CAN1) terminal Nos.1 and 3

OK: 1 kΩ or more

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

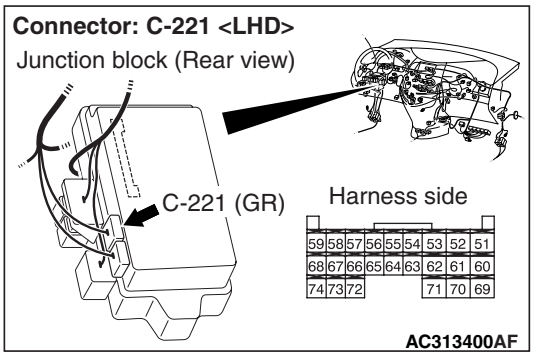
YES : <1 kΩ or more> Go to Step 21.

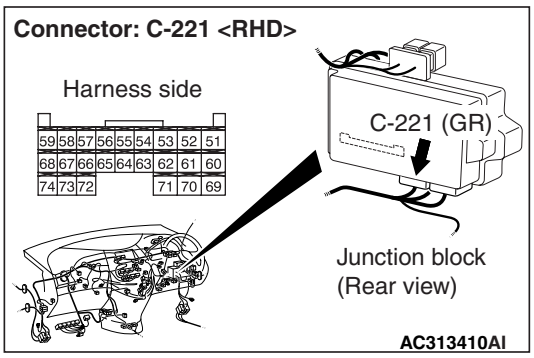
NO : <Less than 1 kΩ> Go to Step 20.

STEP 20. Resistance measurement at C-221 ETACS-ECU connector.

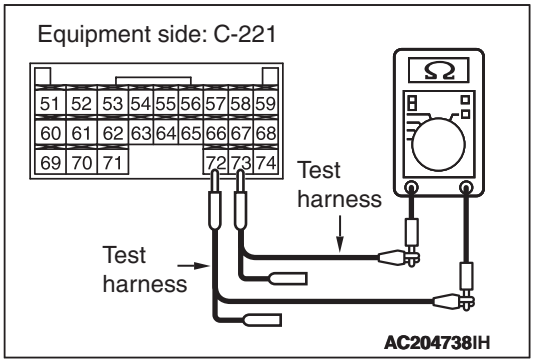
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.





(1) Remove the ETACS-ECU, and measure at the equipment side.



(2) Resistance at C-221 ETACS-ECU connector terminal Nos.72 and 73

OK: 1 kΩ or more

Q: Is the check result normal?

YES : <1 kΩ or more> Repair the wiring harness between joint connector (CAN1) and the ETACS-ECU connector.

NO : <Less than 1 kΩ> Check the ETACS-ECU connector, and repair if necessary. If the ETACS-ECU connector is in good condition, replace the ETACS-ECU.

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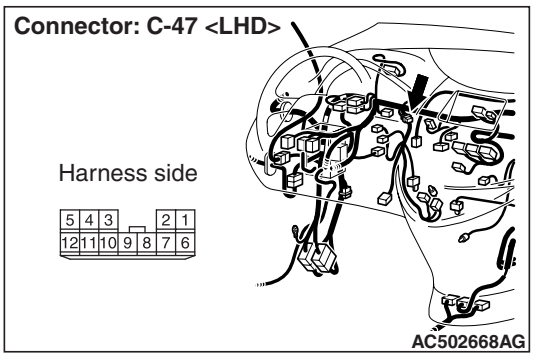
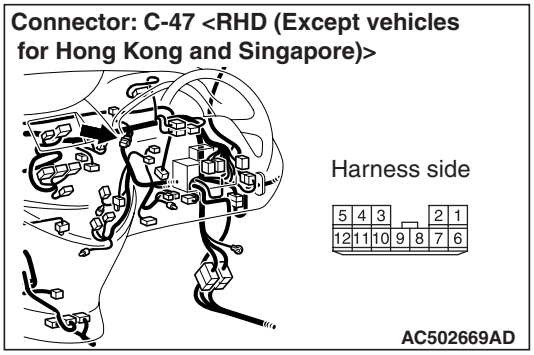
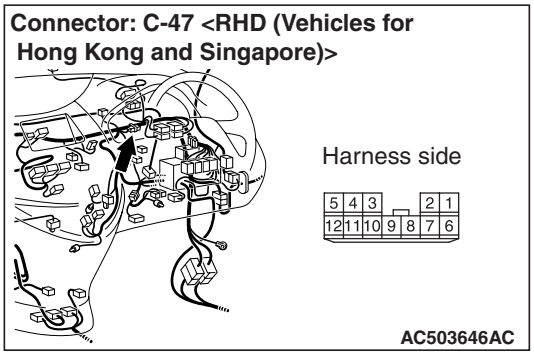
STEP 21. Resistance measurement at C-47 joint connector (CAN1).

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.





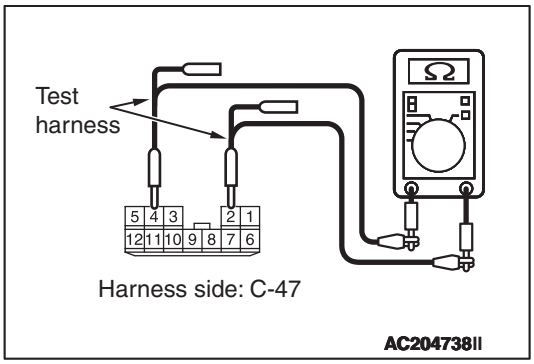


(1) Disconnect the joint connector (CAN1), and measure at the wiring harness side.

(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Resistance between C-47 joint connector (CAN1) terminal Nos.2 and 4

OK: 1 kΩ or more

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES : <1 kΩ or more> Repair the wiring harness between joint connector (CAN1) and joint connector (CAN2).

NO : <Less than 1 kΩ> Check the diagnosis connector, and repair if necessary. If the diagnosis connector is in good condition, repair the wiring harness between joint connector (CAN1) and the diagnosis connector.

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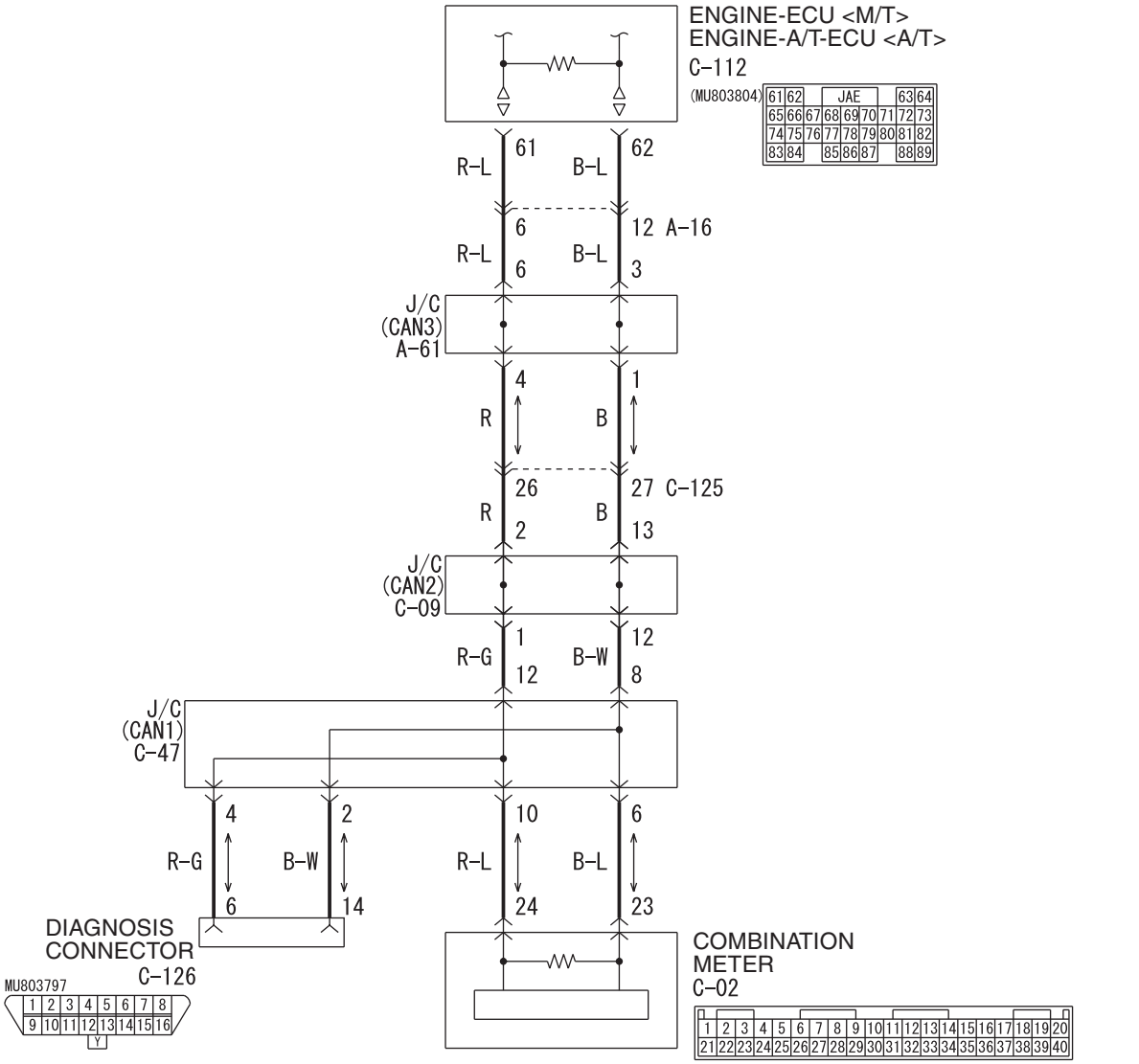
Diagnosis Item 4: Diagnose the terminator resistors

⚠ CAUTION
When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



W6X54X001A

FUNCTION

The resistance in the communication errors condition cannot be measured by the CAN bus diagnostics, therefore, judge the terminator resistor only when receiving the each ECU periodically sent data normally.

TRUBLE JUDGEMENT CONDITIONS

The M.U.T.-III judges the trouble when the periodically sent data from each ECU can be received normally but the resistance value between CAN_H and CAN_L line is other than from 50 ohms to 70 ohms.

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PROBABLE CAUSES

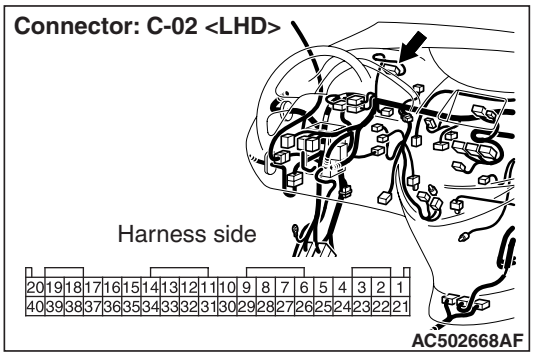
- Damaged harness wires and connectors
- Malfunction of the combination meter
- Malfunction of the engine-ECU

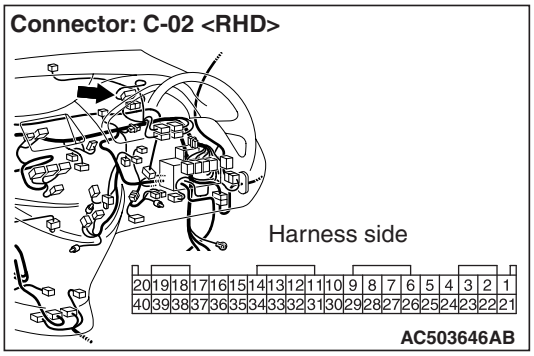
DIAGNOSIS PROCEDURE

STEP 1. Resistance measurement at C-02 combination meter connector.

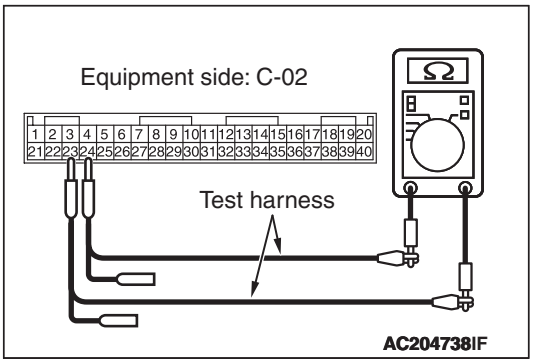
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.





(1) Remove the combination meter, and measure at the equipment side.



(2) Resistance at C-02 combination meter connector terminal Nos.23 and 24

OK: 120 ± 20 Ω

Q: Is the check result normal?

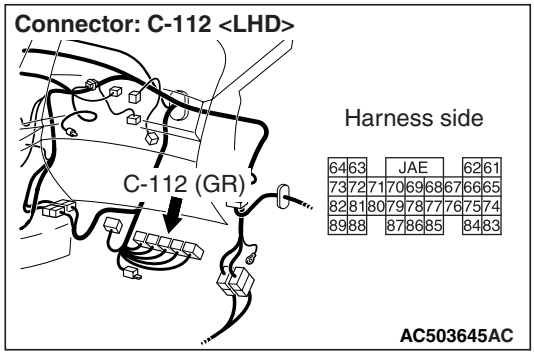
YES : <Within 120 ± 20 Ω> Go to Step 2.

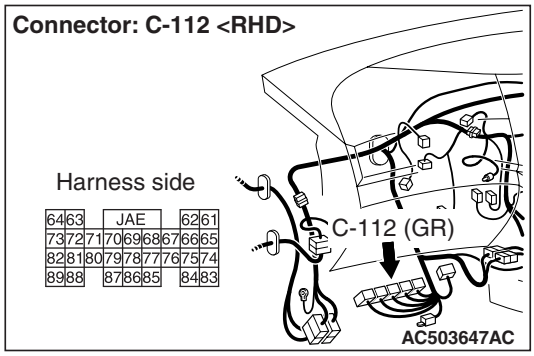
NO : <Not within 120 ± 20 Ω> Replace the combination meter.

STEP 2. Resistance measurement at C-112 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.

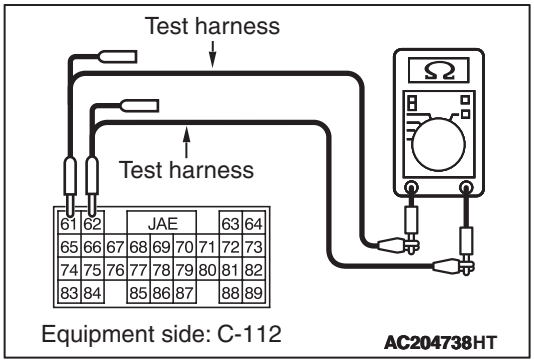
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.





(1) Remove the engine-ECU <M/T> or engine-A/T-ECU <A/T>, and measure at the equipment side.



(2) Resistance between C-112 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector terminal Nos.61 and 62

OK: 120 ± 20 Ω

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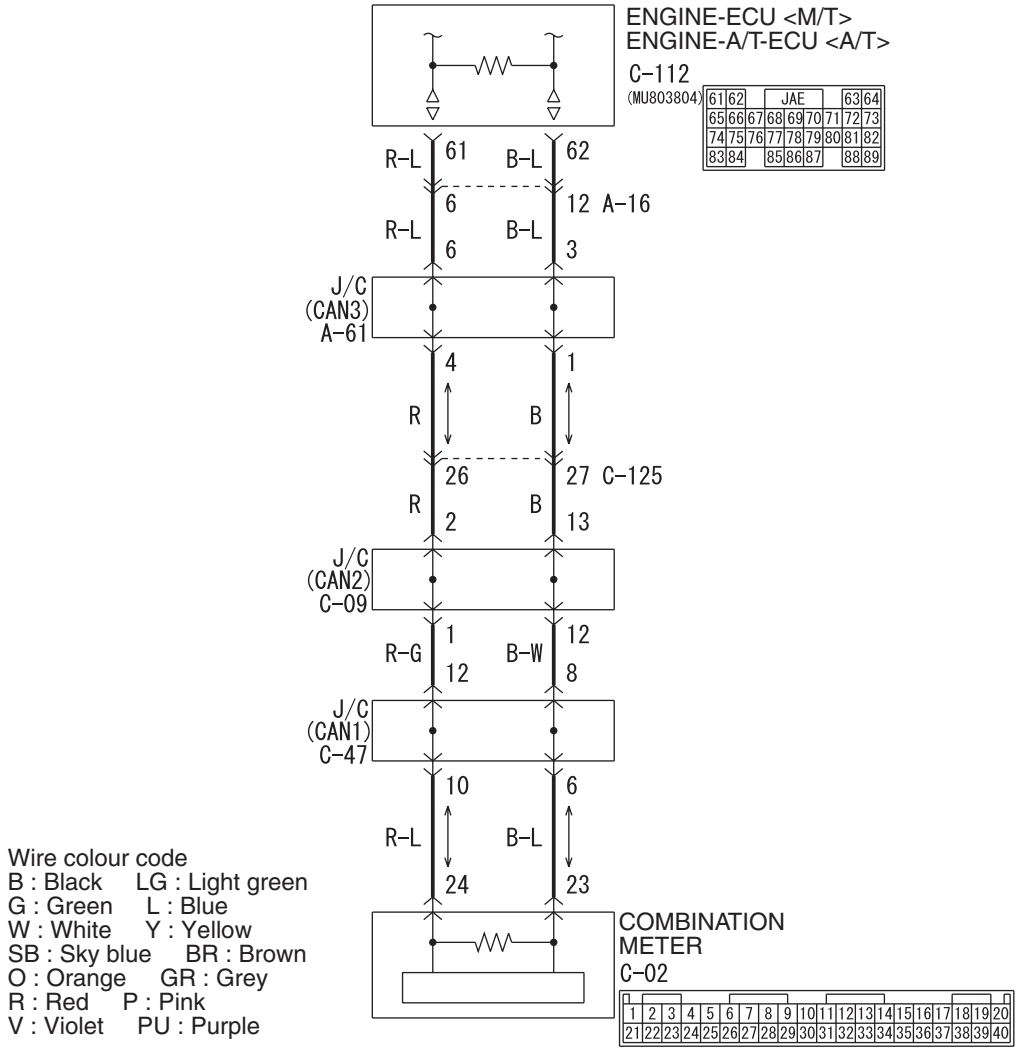
⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <Within 120 ± 20 Ω> Repair the wiring harness between the combination meter connector and the engine-ECU connector.
NO : <Not within 120 ± 20 Ω> Replace the engine-ECU.

Diagnosis Item 5: Diagnose when the M.U.T.-III cannot receive the data sent by combination meter.

⚠ CAUTION
When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



W6X54X002A

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FUNCTION

The diagnostic result demonstrates that "the M.U.T.-III cannot receive the sent data from the combination meter" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the combination meter data only.

TRUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from combination meter cannot be received and sent.

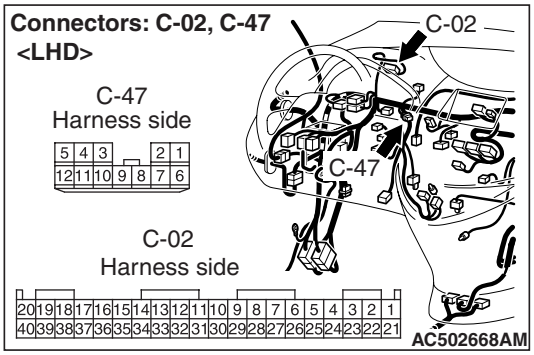
PROBABLE CAUSES

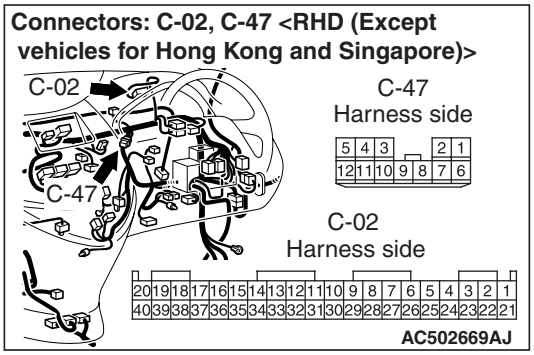
- Damaged harness wires and connectors
- Power supply circuit malfunction of the combination meter
- Malfunction of the combination meter

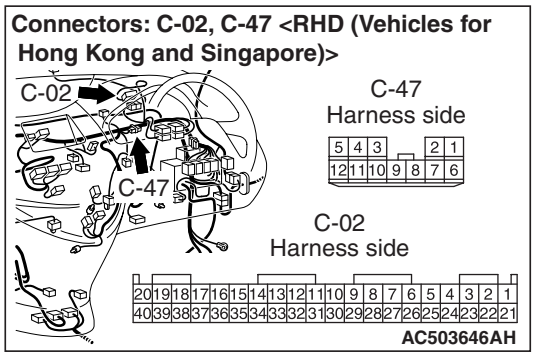
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-47 joint connector (CAN1) and C-02 combination meter connector

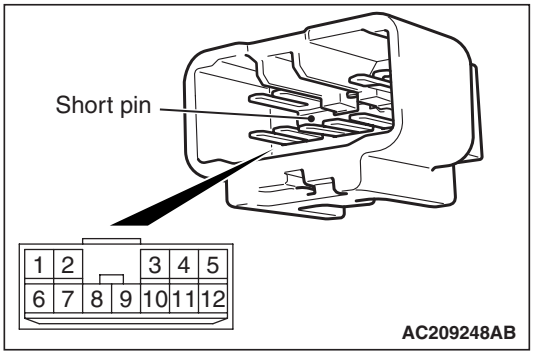
⚠ CAUTION







The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54F-5.



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

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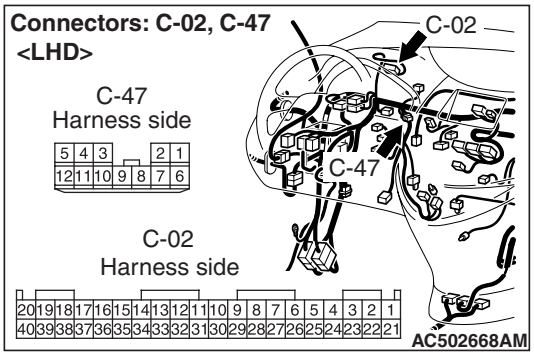
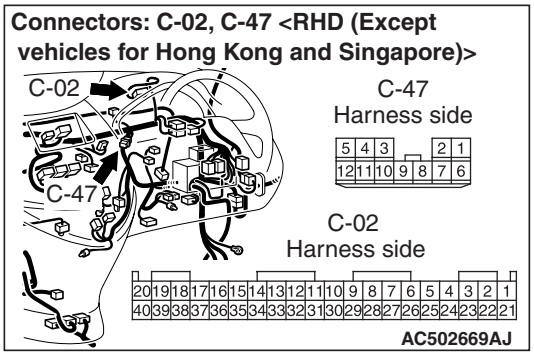
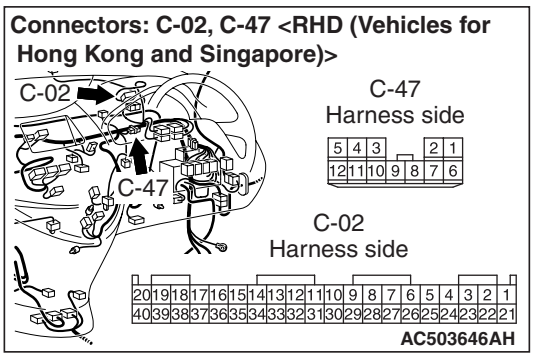
STEP 2. Resistance measurement at C-47 joint connector (CAN1) and C-02 combination meter connector.

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.



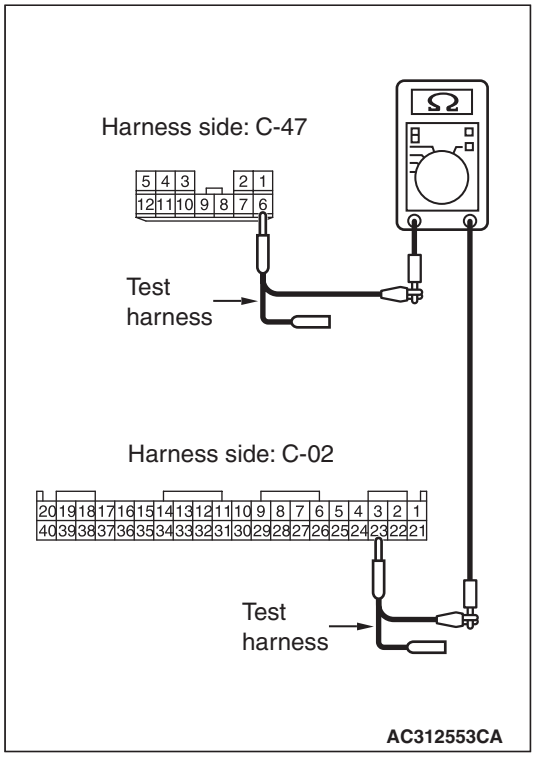




(1) Disconnect joint connector (CAN1) and the combination meter connector, and measure at the wiring harness side.
(2) Turn the ignition switch to the OFF (LOCK) position.

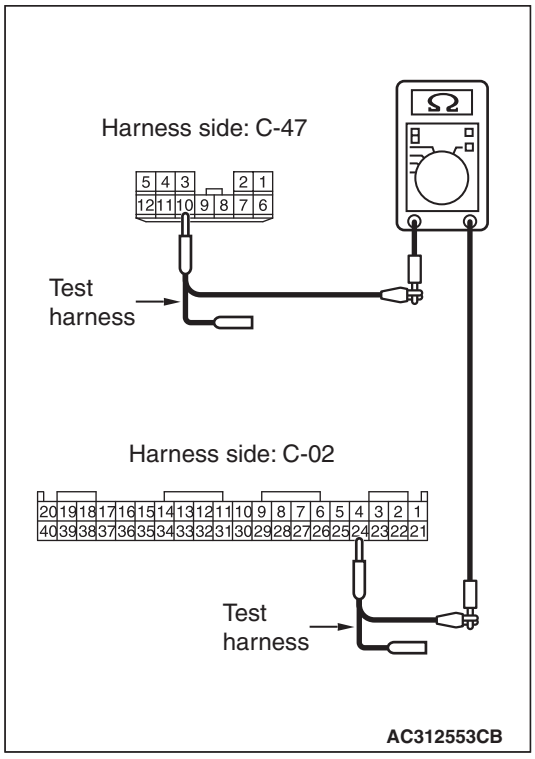
⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Continuity between C-47 joint connector (CAN1) terminal No.6 and C-02 combination meter connector terminal No.23

OK: 2 Ω or less



(5) Continuity between C-47 joint connector (CAN1) terminal No.10 and C-02 combination meter connector terminal No.24

OK: 2 Ω or less

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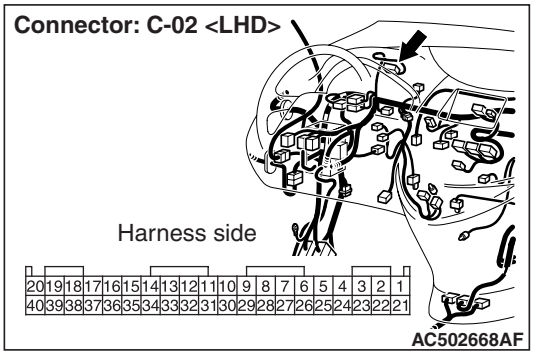
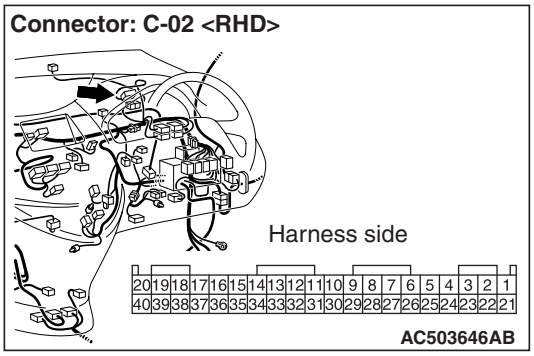
⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <All the resistances measure 2 Ω or less> Go to Step 3.
NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN1) and the combination meter connector.

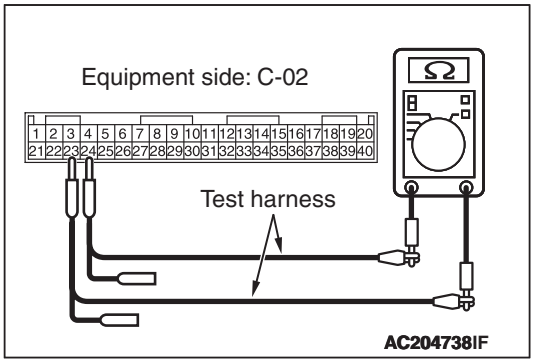
STEP 3. Resistance measurement at C-02 combination meter connector.

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.





(1) Remove the combination meter, and measure at the equipment side.



(2) Resistance at C-02 combination meter connector terminal Nos.23 and 24

OK: 120 ± 20 Ω

Q: Is the check result normal?
YES : <Within 120 ± 20 Ω> Power supply to the combination meter may be suspected. Diagnose the combination meter. Refer to P.54A-75.
NO : <Not within 120 ± 20 Ω> Replace the combination meter.

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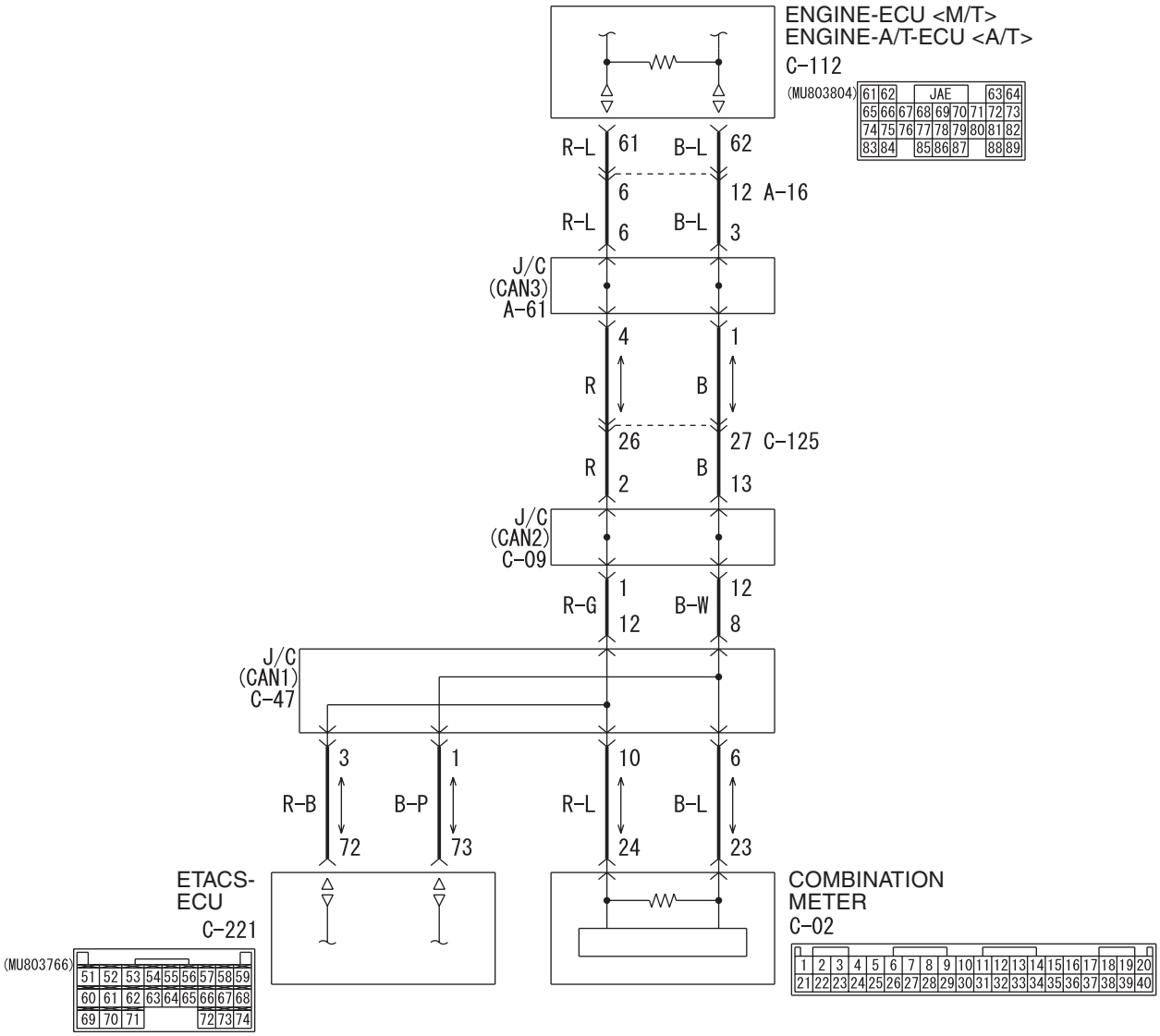
Diagnosis Item 6: Diagnose when the M.U.T.-III cannot receive the data sent by ETACS-ECU.

⚠ CAUTION
When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



Wire colour code
B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

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FUNCTION

The diagnostic result demonstrates that "the M.U.T.-III cannot receive the sent data from the ETACS-ECU" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the ETACS-ECU data only.

TRUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from ETACS-ECU cannot be received and sent.

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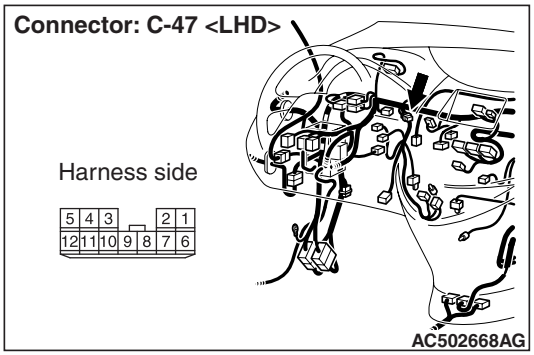
PROBABLE CAUSES

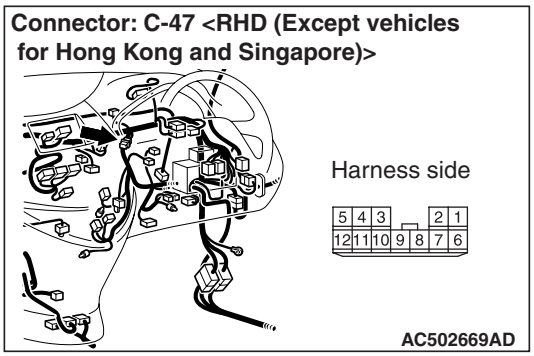
- Damaged harness wires and connectors
- Power supply circuit malfunction of the ETACS-ECU
- Malfunction of the ETACS-ECU

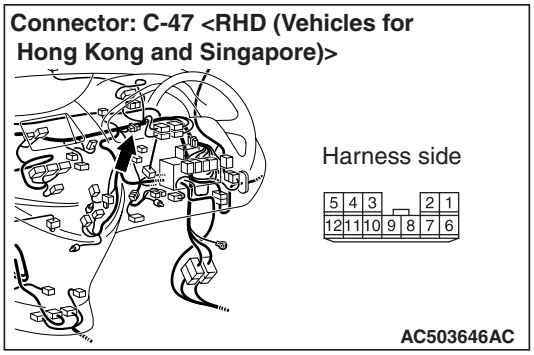
DIAGNOSIS PROCEDURE

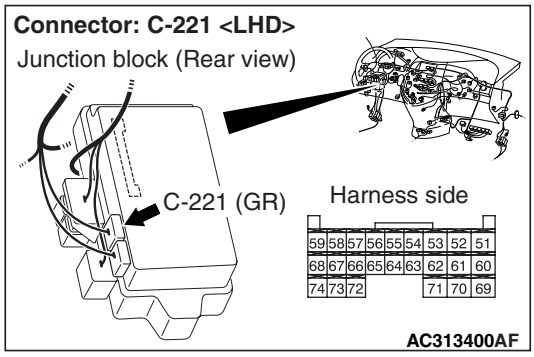
STEP 1. Connector check: C-47 joint connector (CAN1) and C-221 ETACS-ECU connector

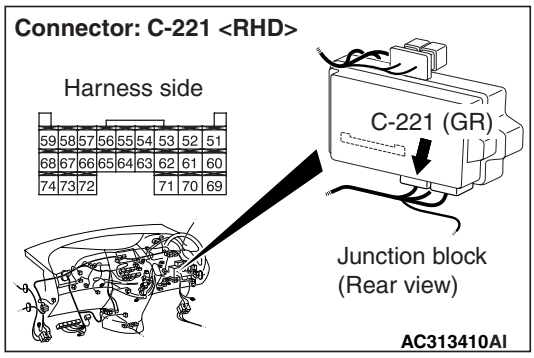
⚠ CAUTION



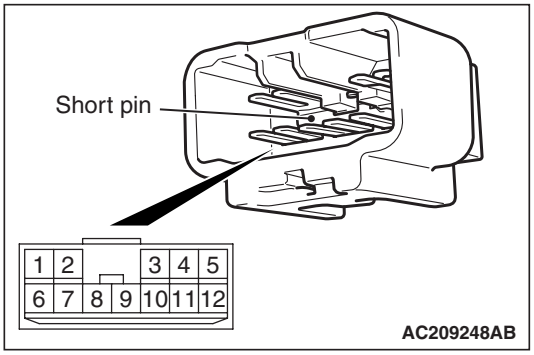








The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54F-5.



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

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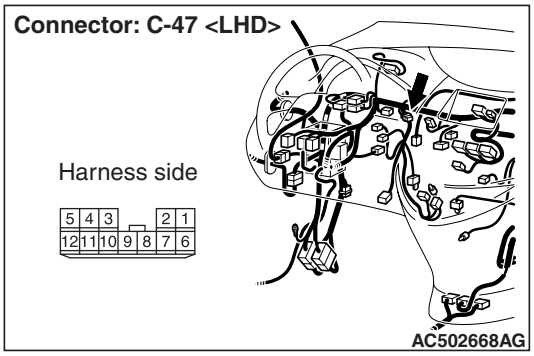
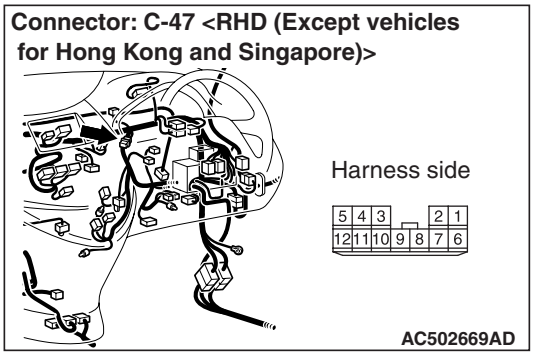
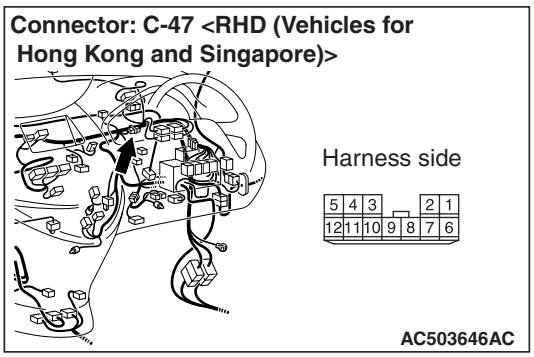
STEP 2. Resistance measurement at C-47 joint connector (CAN1) and C-221 ETACS-ECU connector.

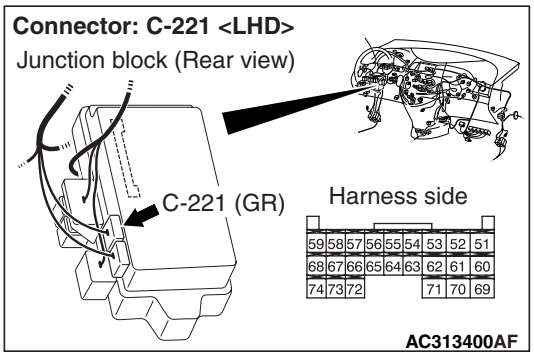
⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

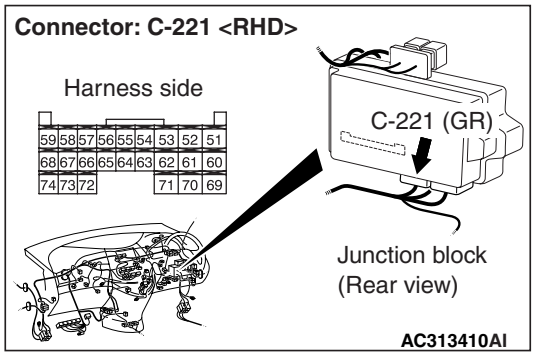
⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.







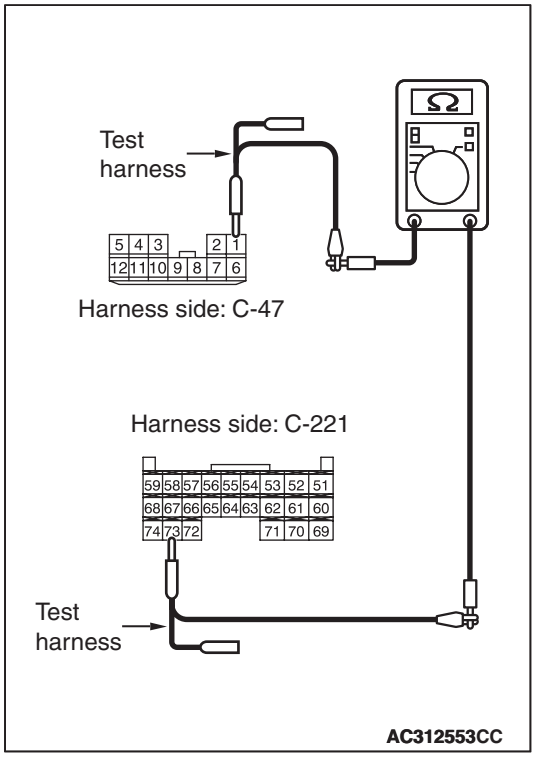




(1) Disconnect joint connector (CAN1) and the ETACS-ECU connector, and measure at the wiring harness side.
(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Continuity between C-47 joint connector (CAN1) terminal No.1 and C-221 ETACS-ECU connector terminal No.73

OK: 2 Ω or less

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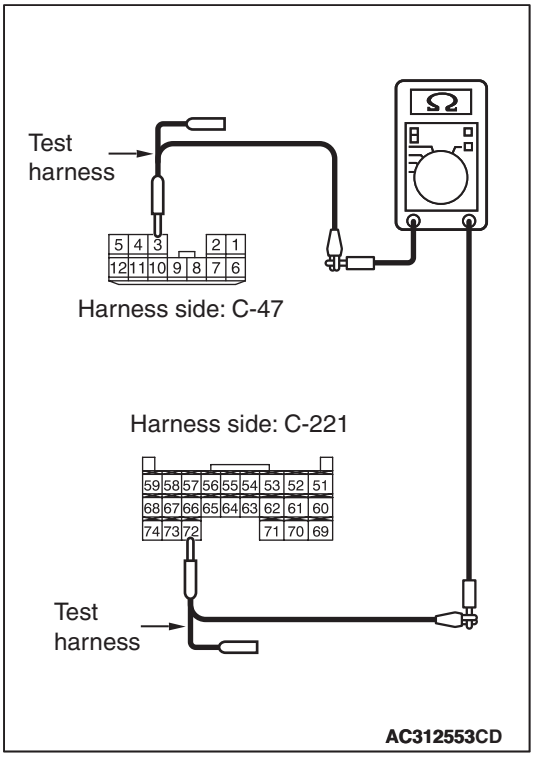

(5) Continuity between C-47 joint connector (CAN1) terminal No.3 and C-221 ETACS-ECU connector terminal No.72

OK: 2 Ω or less

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES : . <All the resistances measure 2 Ω or less> Power supply to the ETACS-ECU may be suspected. Diagnose the SWS. Refer to GROUP 54B – Troubleshooting P.54B-71 <except vehicles for Hong Kong and Singapore> or P.54D-70 <vehicles for Hong Kong and Singapore>.

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN1) and the ETACS-ECU connector.

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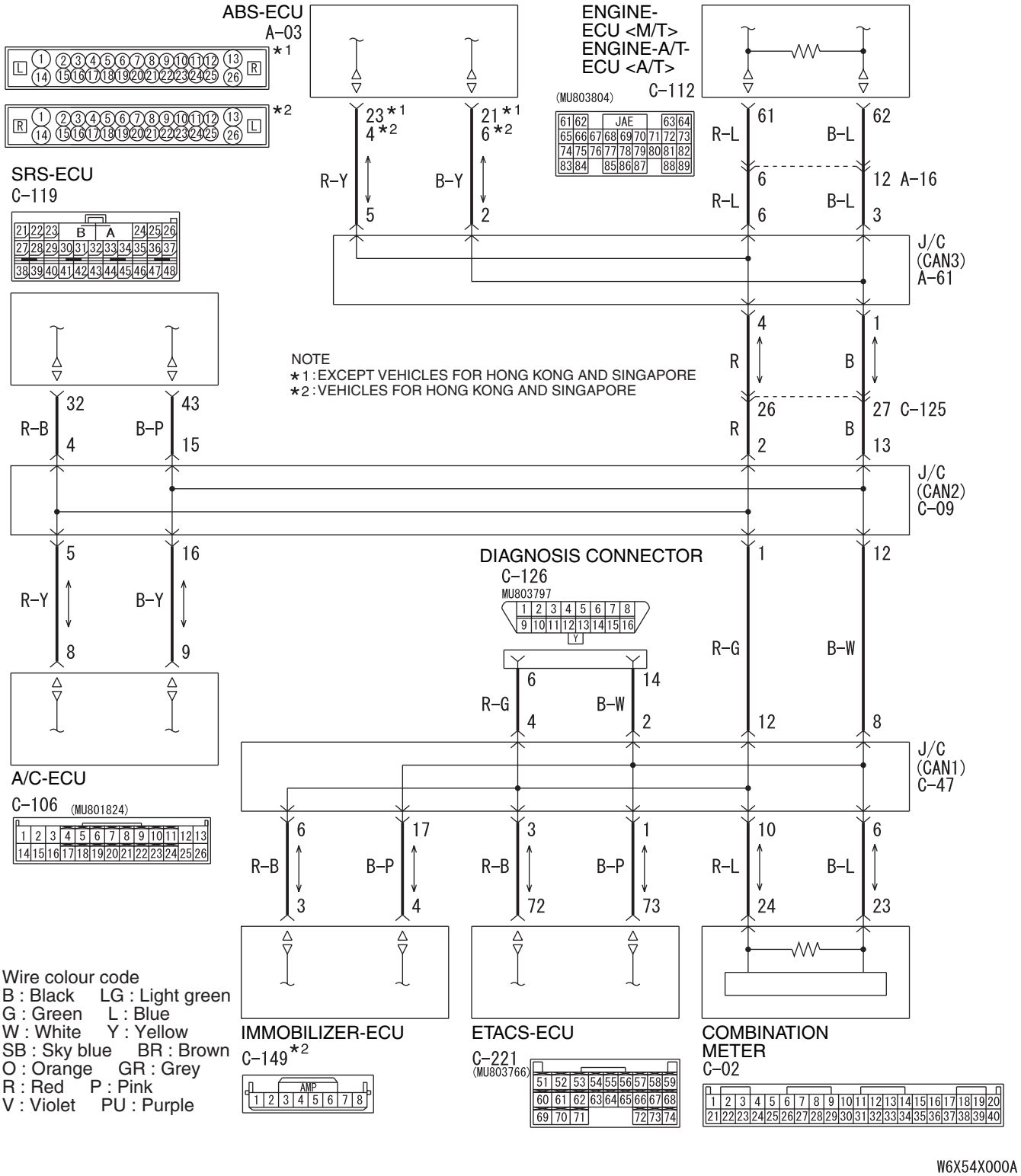
Diagnosis Item 7: Diagnose the lines between the joint connectors (CAN1 and CAN2)

⚠ CAUTION
When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



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FUNCTION

The diagnostic result demonstrates that "diagnose the lines between the joint connectors (CAN1 and CAN2)" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the engine-ECU, the ABS-ECU, the A/C-ECU and the SRS-ECU data.

TRUBLE JUDGEMENT CONDITIONS

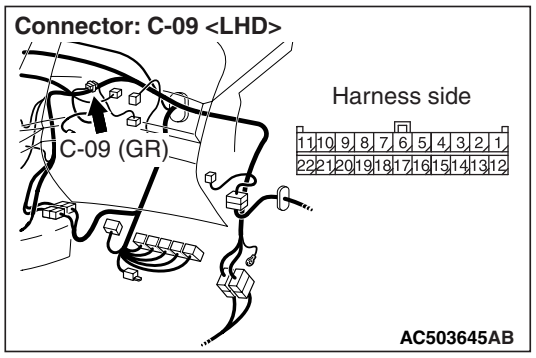
M.U.T.-III judges the trouble when the periodically sent data from engine-ECU, the ABS-ECU, the A/C-ECU and the SRS-ECU cannot be received and sent.

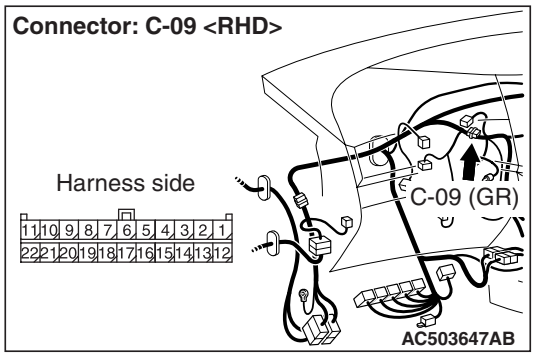
PROBABLE CAUSE

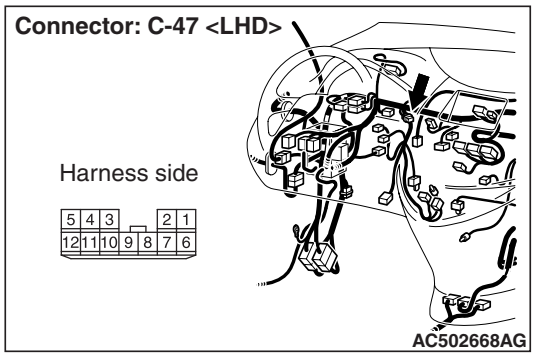
Damaged harness wires and connectors

DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-47 joint connector (CAN1) and C-09 joint connector (CAN2)







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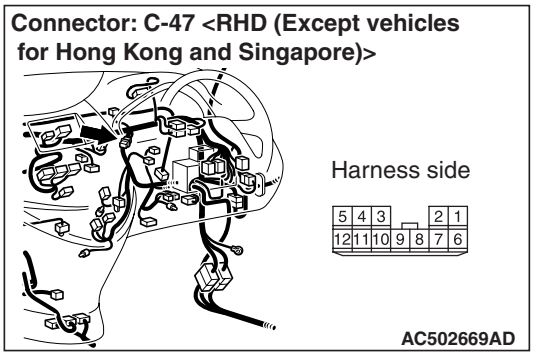

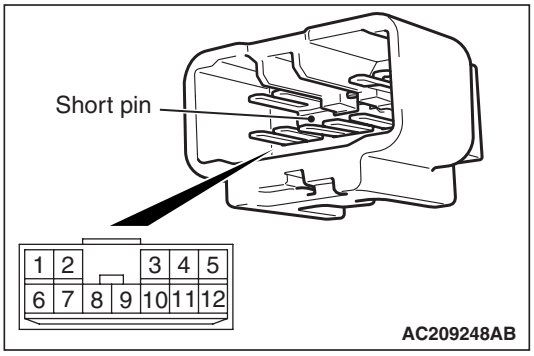

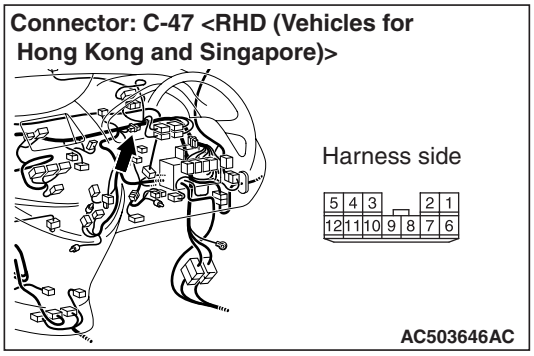

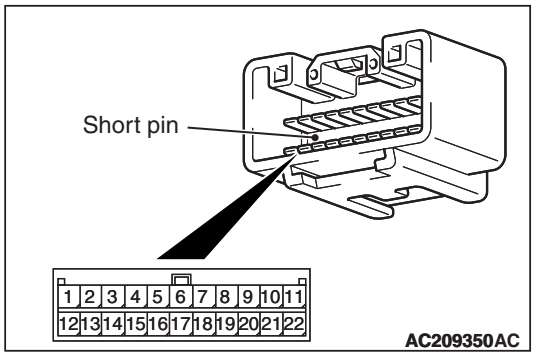

The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54F-5.

When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

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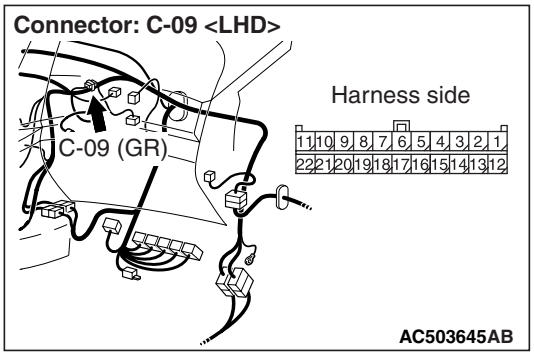
STEP 2. Resistance measurement at C-47 joint connector (CAN1) and C-09 joint connector (CAN2).

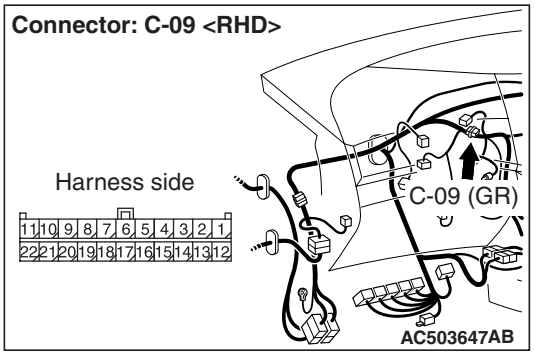
⚠ CAUTION

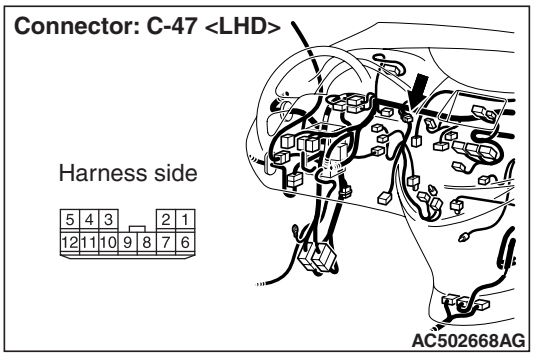
A digital multimeter should be used. For details refer to P.54F-5.

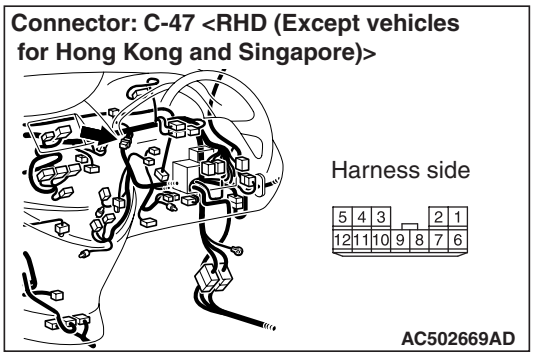
⚠ CAUTION

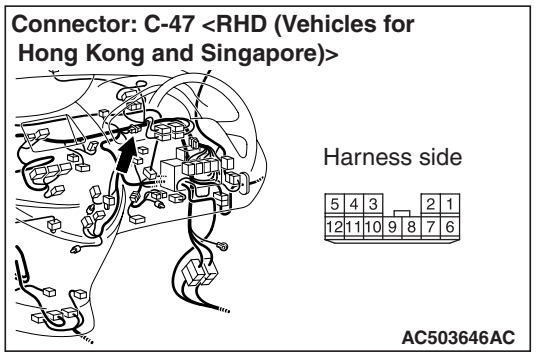
The test wiring harness should be used. For details refer to P.54F-5.











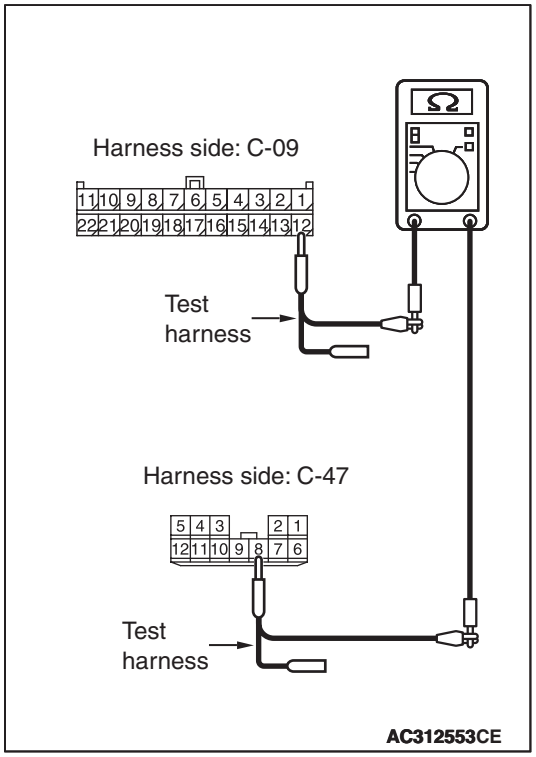
(1) Disconnect joint connector (CAN1) and joint connector (CAN2), and measure at the wiring harness side.

(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION

When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Continuity between C-47 joint connector (CAN1) terminal No.8 and C-09 joint connector (CAN2) terminal No.12

OK: 2 Ω or less

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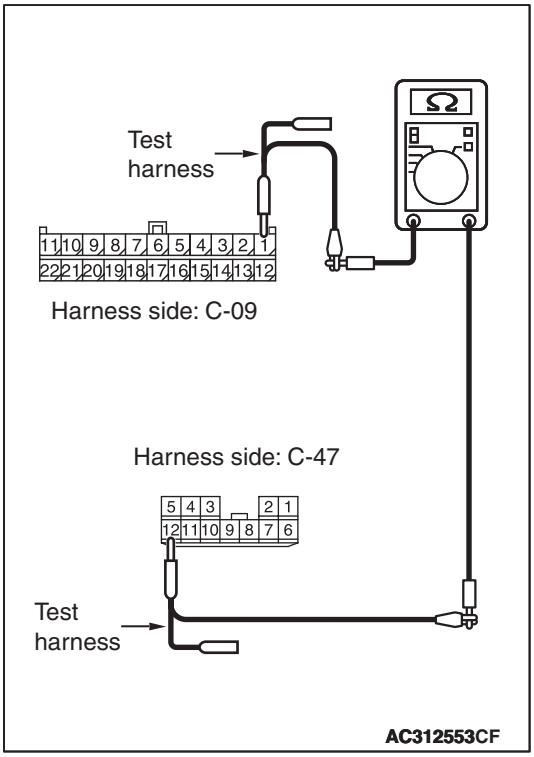

(5) Continuity between C-47 joint connector (CAN1) terminal No.12 and C-09 joint connector (CAN2) terminal No.1

OK: 2 Ω or less

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES : <All the resistances measure 2 Ω or less> Follow diagnosis item 5, 6, 8, 9, 10, 12 and 13. Refer to P.54F-13.

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN1) and joint connector (CAN2).

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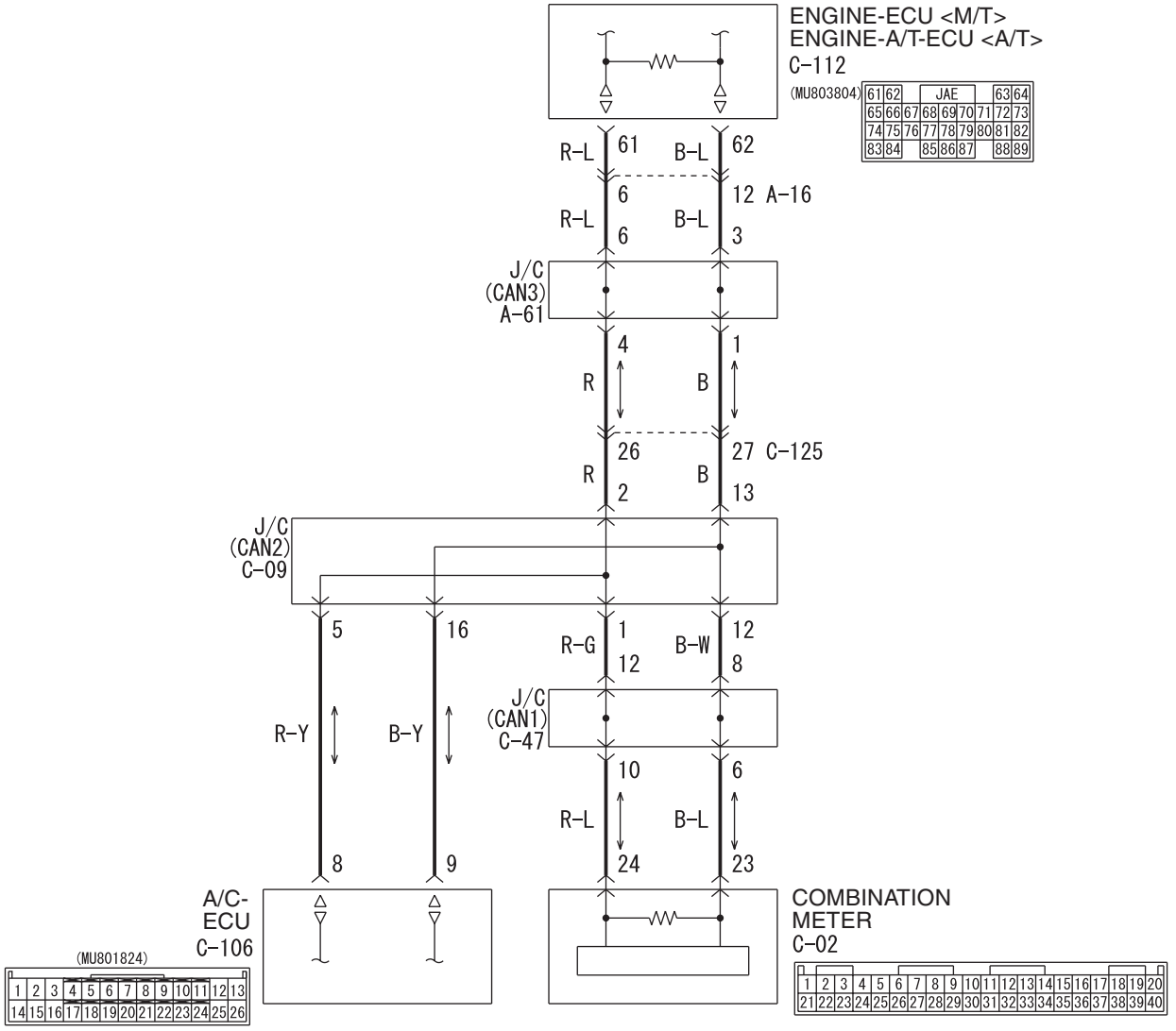
Diagnosis Item 8: Diagnose when the M.U.T.-III cannot receive the data sent by A/C-ECU.

⚠ CAUTION
When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



Wire colour code
B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W6X54X004A

FUNCTION

The diagnostic result demonstrates that "the M.U.T.-III cannot receive the sent data from the A/C-ECU" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the A/C-ECU data only.

TRUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from A/C-ECU cannot be received and sent.

PROBABLE CAUSES

- Damaged harness wires and connectors
- Power supply circuit malfunction of the A/C-ECU
- Malfunction of the A/C-ECU

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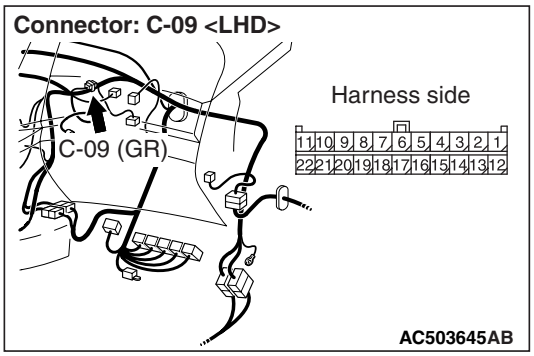
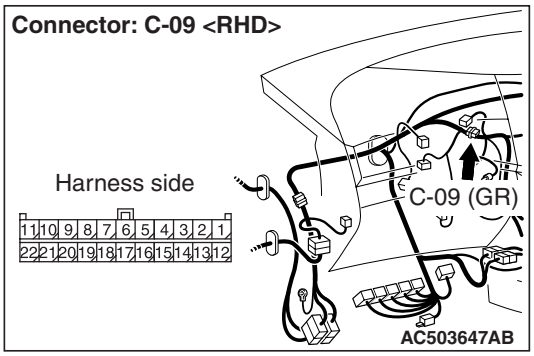
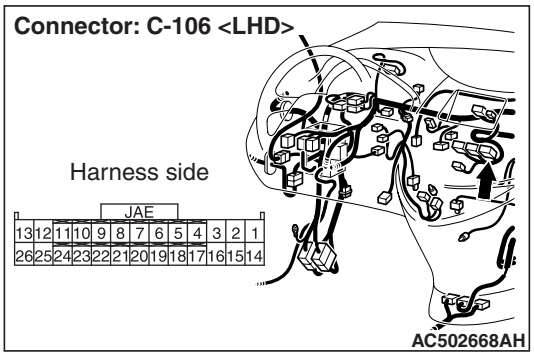
DIAGNOSIS PROCEDURE

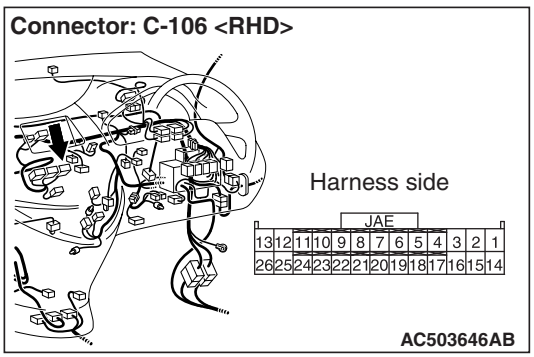
STEP 1. Connector check: C-09 joint connector (CAN2) and C-106 A/C-ECU connector

⚠ CAUTION

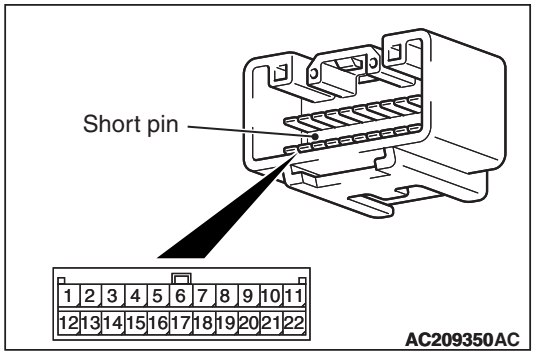








The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54F-5.



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

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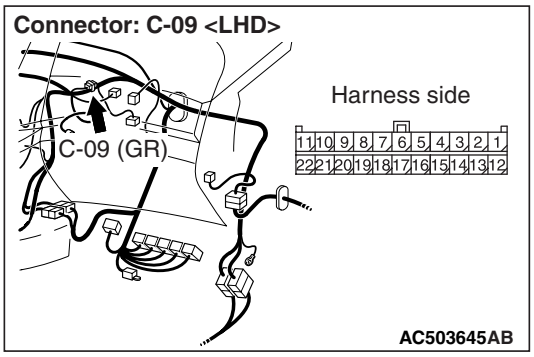
STEP 2. Resistance measurement at C-09 joint connector (CAN2) and C-106 A/C-ECU connector.

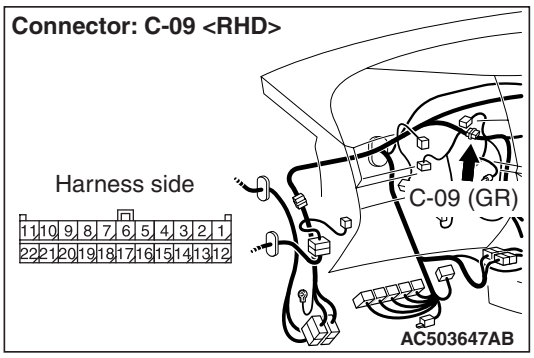
⚠ CAUTION

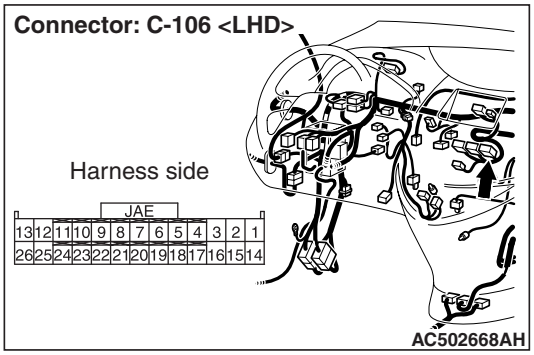
A digital multimeter should be used. For details refer to P.54F-5.

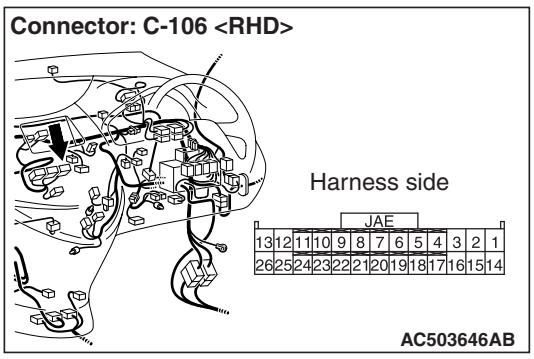
⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.









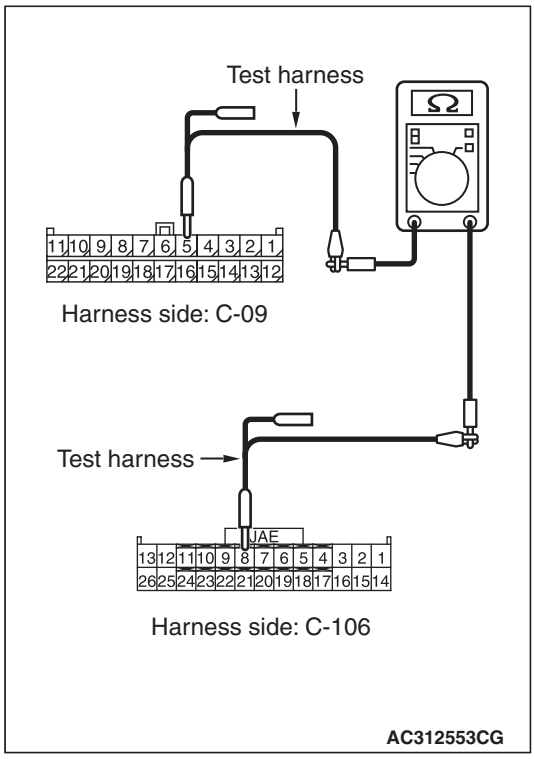
(1) Disconnect joint connector (CAN2) and the A/C-ECU connector, and measure at the wiring harness side.

(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION

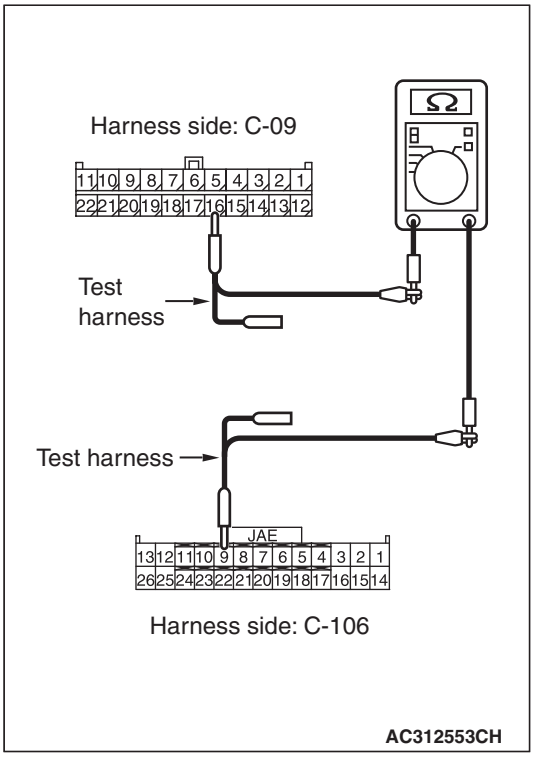
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Continuity between C-09 joint connector (CAN2) terminal No.5 and C-106 A/C-ECU connector terminal No.8

OK: 2 Ω or less



(5) Continuity between C-09 joint connector (CAN2) terminal No.16 and C-106 A/C-ECU connector terminal No.9

OK: 2 Ω or less

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES : <All the resistances measure 2 Ω or less> Power supply to the A/C-ECU may be suspected. Diagnose the A/C. Refer to GROUP 55 – Troubleshooting P.55-186 <except vehicles for Hong Kong and Singapore> or P.55-193 <vehicles for Hong Kong and Singapore>.

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN2) and the A/C-ECU connector.

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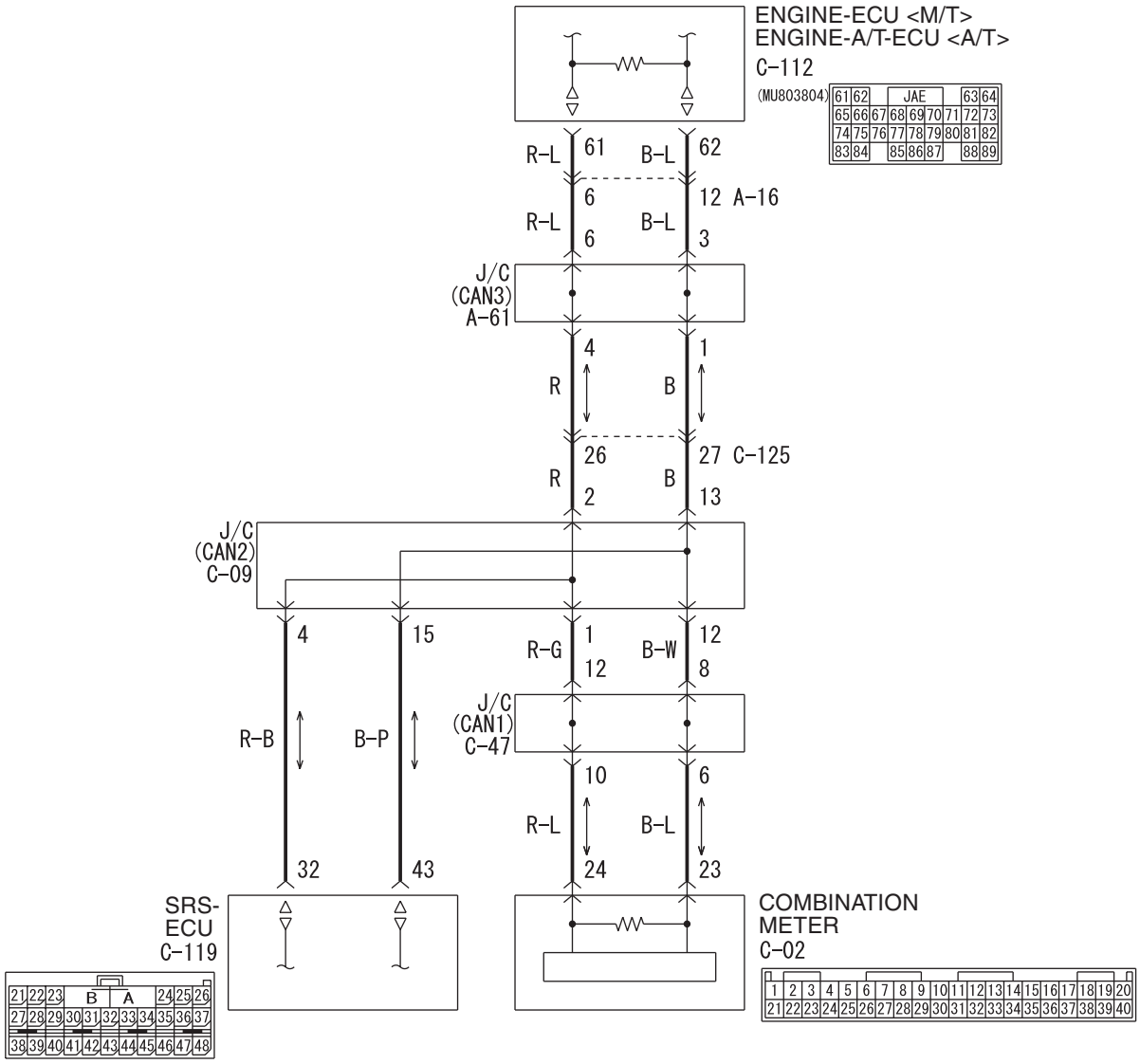
Diagnosis Item 9: Diagnose when the M.U.T.-III cannot receive the data sent by SRS-ECU.

⚠ CAUTION
When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



Wire colour code
B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W6X54X005A

FUNCTION

The diagnostic result demonstrates that "the M.U.T.-III cannot receive the sent data from the SRS-ECU" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the SRS-ECU data only.

TRUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from SRS-ECU cannot be received and sent.

PROBABLE CAUSES

- Damaged harness wires and connectors
- Power supply circuit malfunction of the SRS-ECU
- Malfunction of the SRS-ECU

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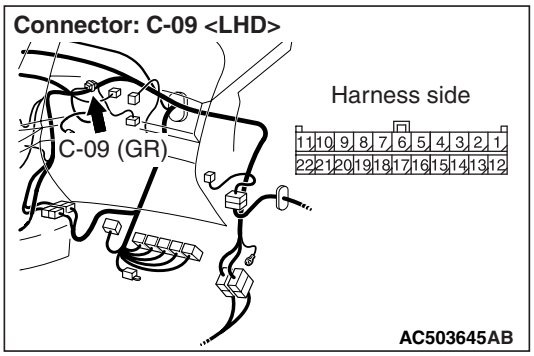
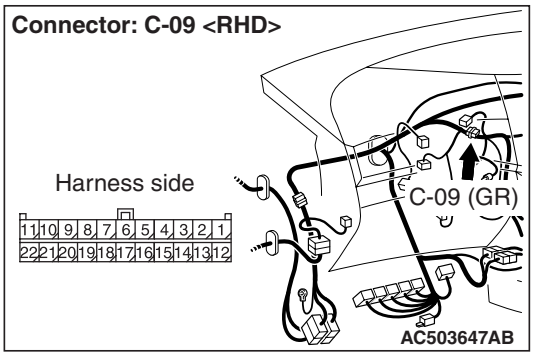
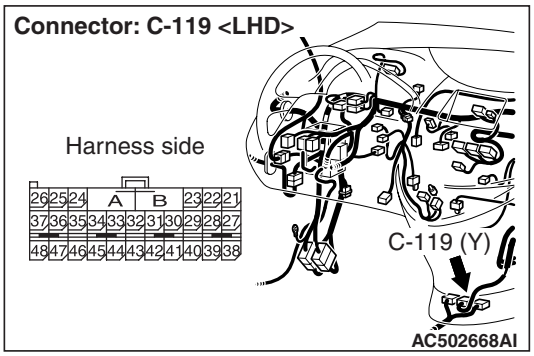
DIAGNOSIS PROCEDURE

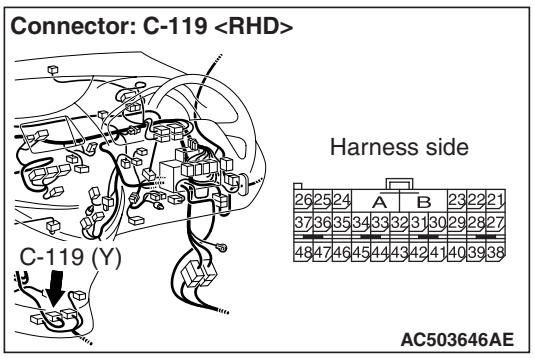
STEP 1. Connector check: C-09 joint connector (CAN2) and C-119 SRS-ECU connector

⚠ CAUTION

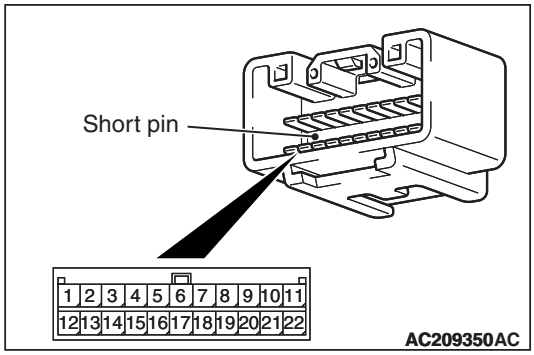








The strand end of the twist wire should be within 10 cm from the connector. For details refer to **P.54F-5****.**



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

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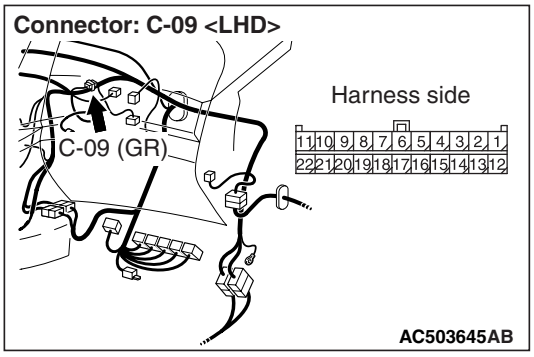
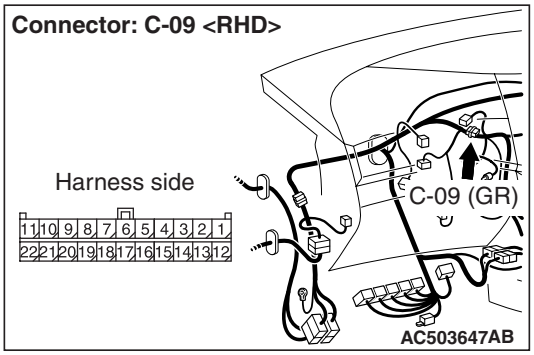
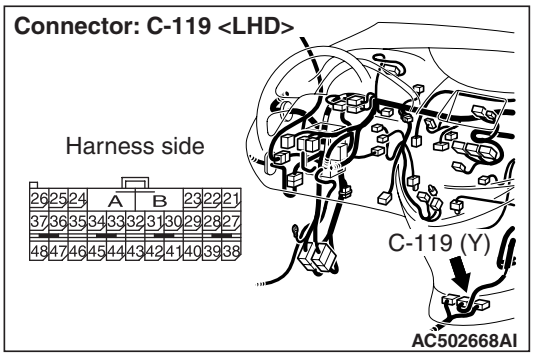
STEP 2. Resistance measurement at C-09 joint connector (CAN2) and C-119 SRS-ECU connector.

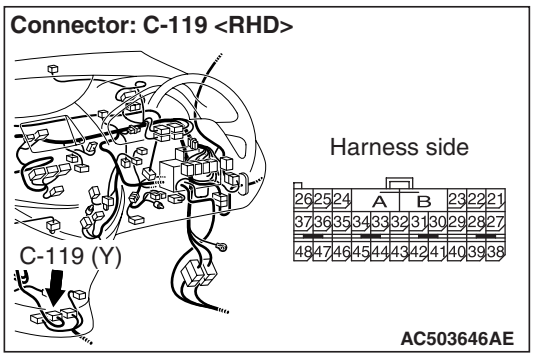
⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.





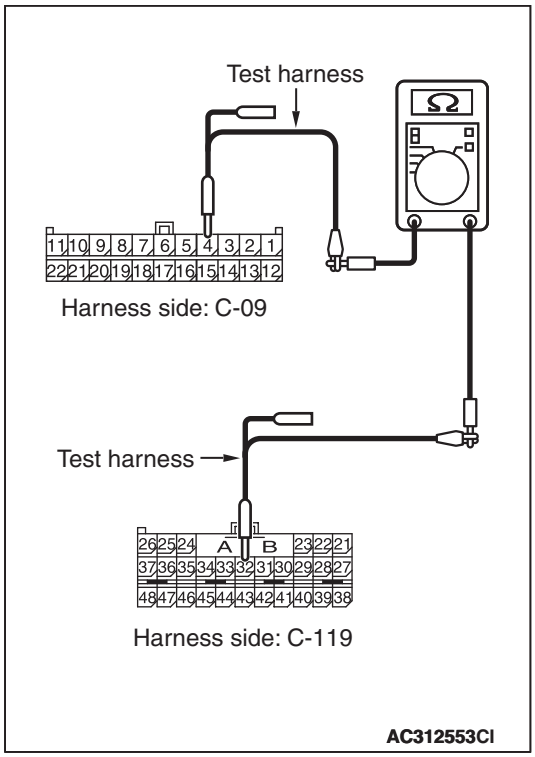




(1) Disconnect joint connector (CAN2) and the SRS-ECU connector, and measure at the wiring harness side.
(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Continuity between C-09 joint connector (CAN2) terminal No.4 and C-119 SRS-ECU connector terminal No.32

OK: 2 Ω or less

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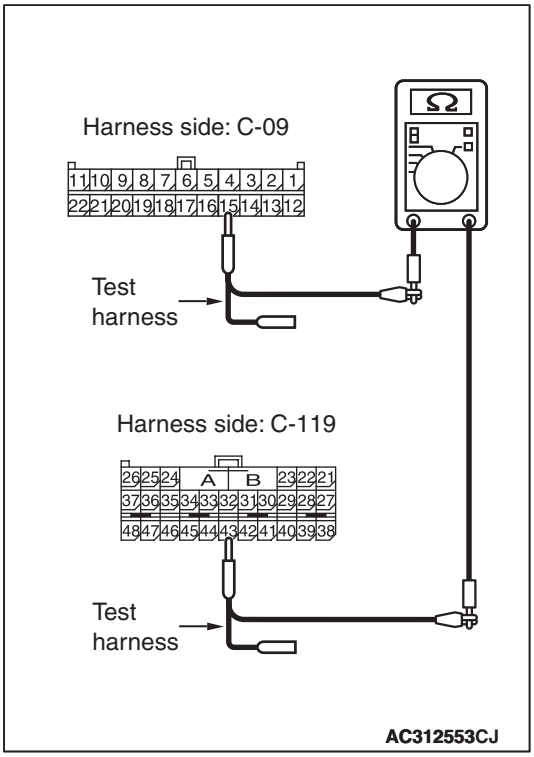

(5) Continuity between C-09 joint connector (CAN2) terminal No.15 and C-119 SRS-ECU connector terminal No.43

OK: 2 Ω or less

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES : <All the resistances measure 2 Ω or less> Power supply to the SRS-ECU may be suspected. Diagnose the SRS. Refer to GROUP 52B – Troubleshooting P.52B-159 <except vehicles for Hong Kong and Singapore> or P.52B-318 <vehicles for Hong Kong and Singapore>.

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN2) and the SRS-ECU connector.

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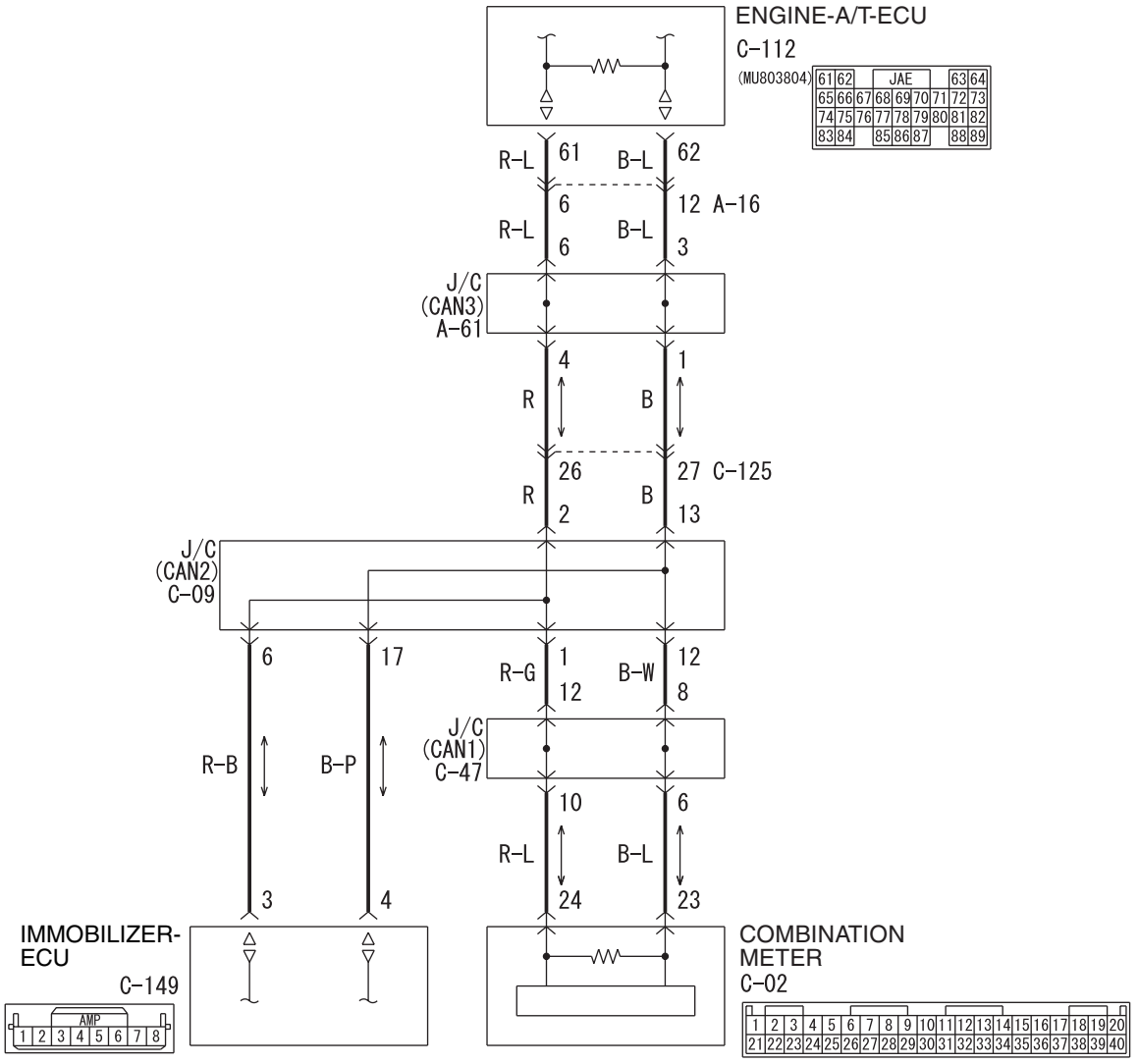
Diagnosis Item 10: Diagnose when the M.U.T.-III cannot receive the data sent by immobilizer-ECU.

⚠ CAUTION
When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



W6X54X086A

FUNCTION

The diagnostic result demonstrates that "the M.U.T.-III cannot receive the sent data from the immobilizer-ECU" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the immobilizer-ECU data only.

TRUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from immobilizer-ECU cannot be received and sent.

PROBABLE CAUSES

- Damaged harness wires and connectors
- Power supply circuit malfunction of the immobilizer-ECU
- Malfunction of the immobilizer-ECU

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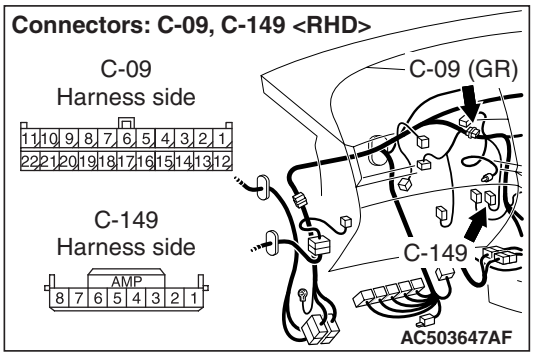
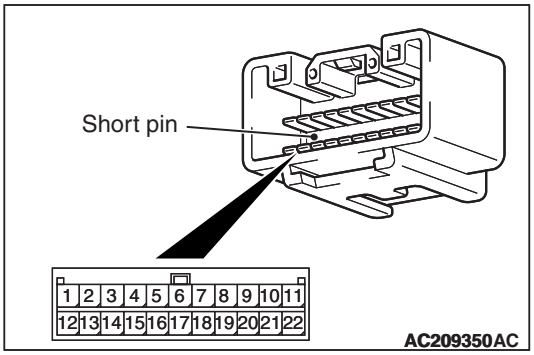
DIAGNOSIS PROCEDURE

STEP 1. Connector check: C-09 joint connector (CAN2) and C-149 immobilizer-ECU connector

⚠ CAUTION



The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54F-5.



When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

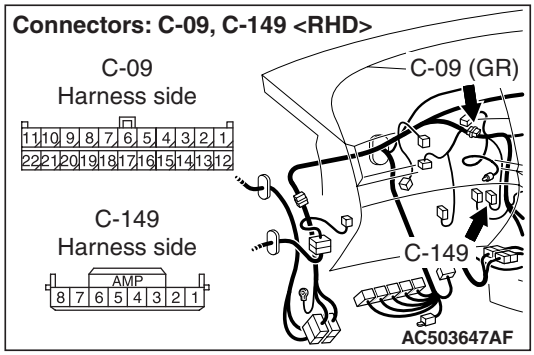
STEP 2. Resistance measurement at C-09 joint connector (CAN2) and C-149 immobilizer-ECU connector.

⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.



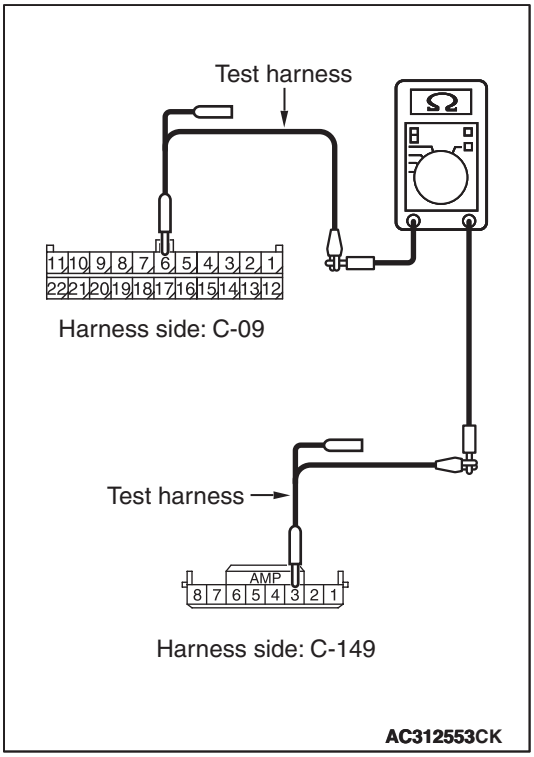
(1) Disconnect joint connector (CAN2) and the immobilizer-ECU connector, and measure at the wiring harness side.

(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION

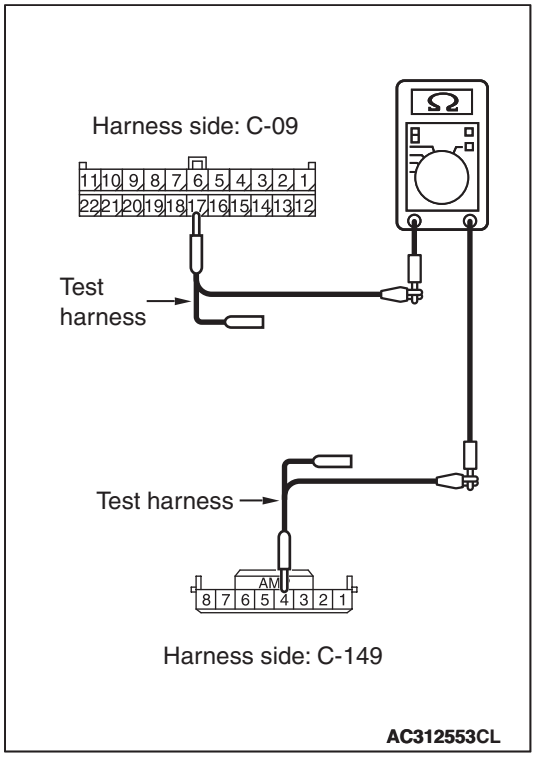
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Continuity between C-09 joint connector (CAN2) terminal No.6 and C-149 immobilizer-ECU connector terminal No.3

OK: 2 Ω or less



(5) Continuity between C-09 joint connector (CAN2) terminal No.17 and C-149 immobilizer-ECU connector terminal No.4

OK: 2 Ω or less

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES : <All the resistances measure 2 Ω or less> Power supply to the immobilizer-ECU may be suspected. Diagnose the immobilizer. Refer to GROUP 54A – Ignition switch – Troubleshooting P.54A-32.

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN2) and the immobilizer-ECU connector.

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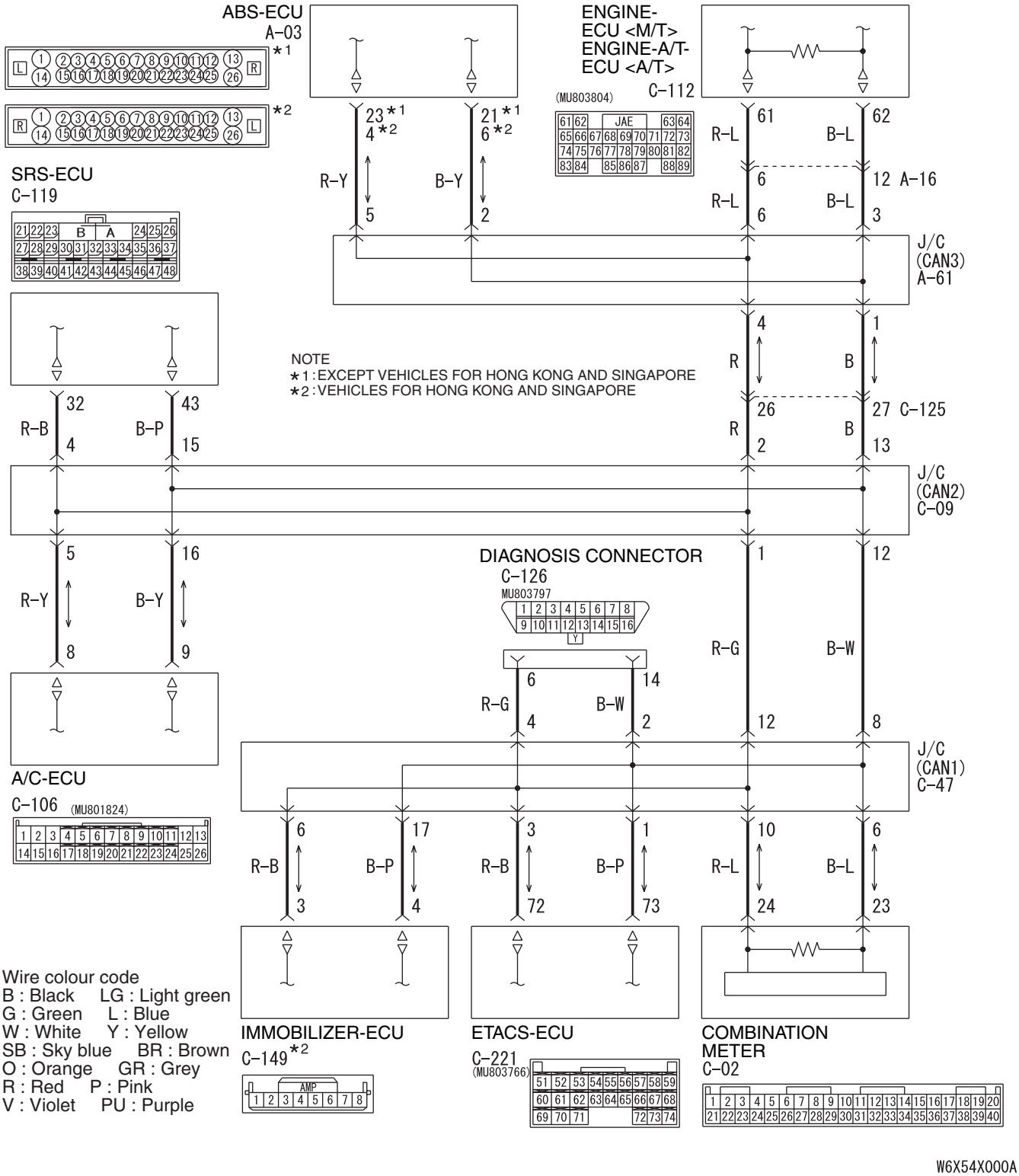
Diagnosis Item 11: Diagnose the lines between the joint connectors (CAN2 and CAN3)

⚠ CAUTION

When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



W6X54X000A

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FUNCTION

The diagnostic result demonstrates that "diagnose the lines between the joint connectors (CAN2 and CAN3)" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the ABS-ECU data.

TRUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from the engine-ECU <M/T> or engine-A/T-ECU <A/T> and the ABS-ECU cannot be received and sent.

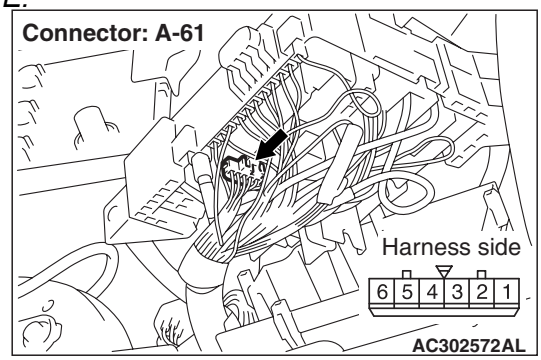
PROBABLE CAUSE

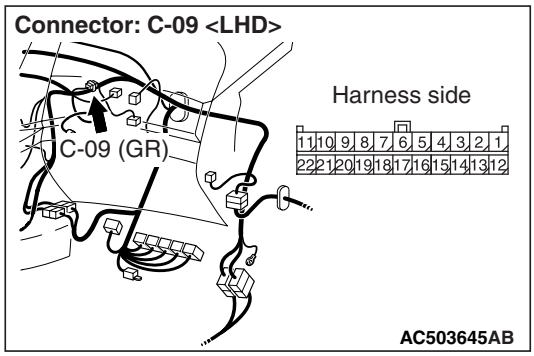
Damaged harness wires and connectors

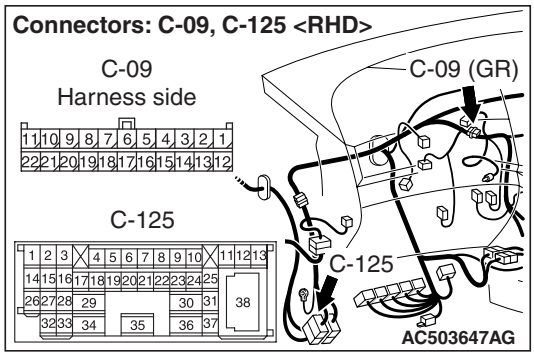
DIAGNOSIS PROCEDURE

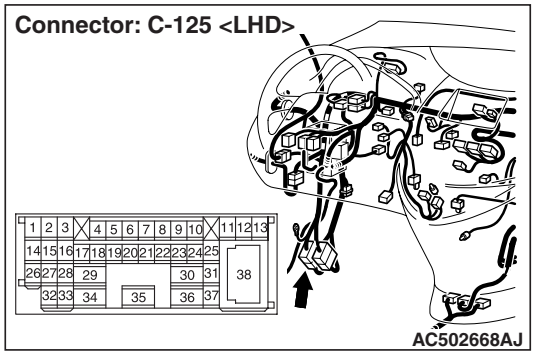
STEP 1. Connector check: C-125 intermediate connector, C-09 joint connector (CAN2) and A-61 joint connector (CAN3)

NOTE:









When checking A-61 joint connector (CAN3), disassemble and check the engine compartment relay box by referring to P.54F-105.

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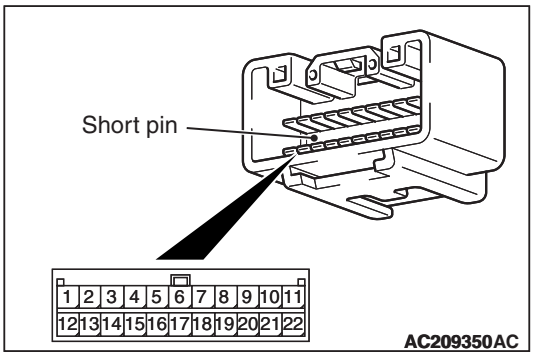
⚠ CAUTION
The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54F-5.



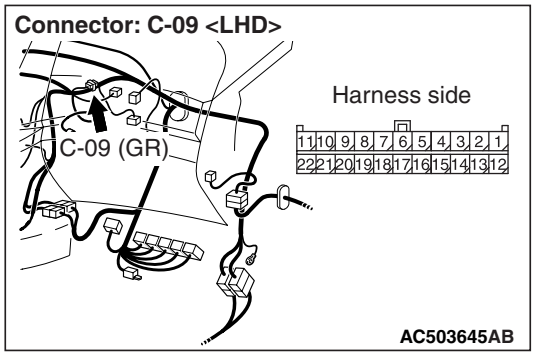
When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

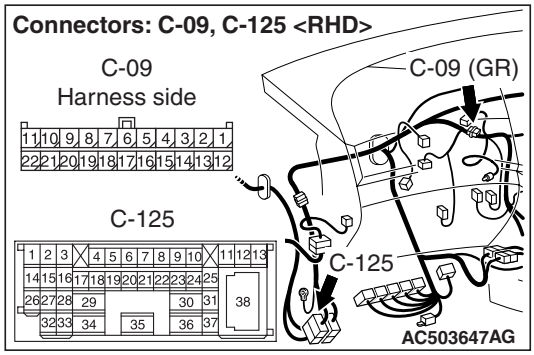
Q: Is the check result normal?
YES : Go to Step 2.
NO : Repair the defective connector. Replace the joint connector as necessary.

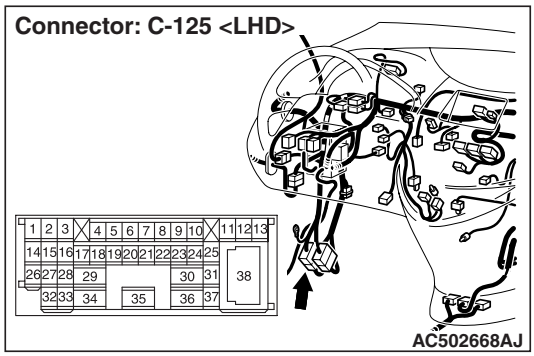
STEP 2. Resistance measurement at C-09 joint connector (CAN2) and C-125 intermediate connector.

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.



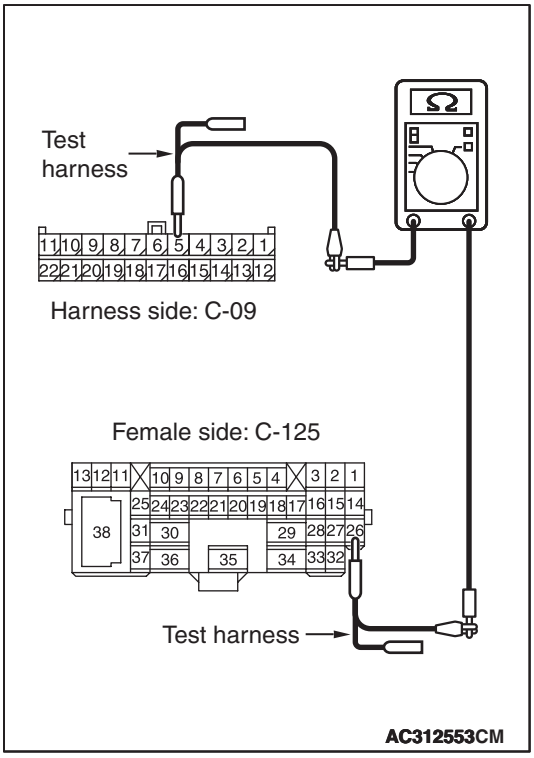




(1) Disconnect the joint connector (CAN2) and the intermediate connector, and measure at the wiring harness side.
(2) Turn the ignition switch to the OFF (LOCK) position.

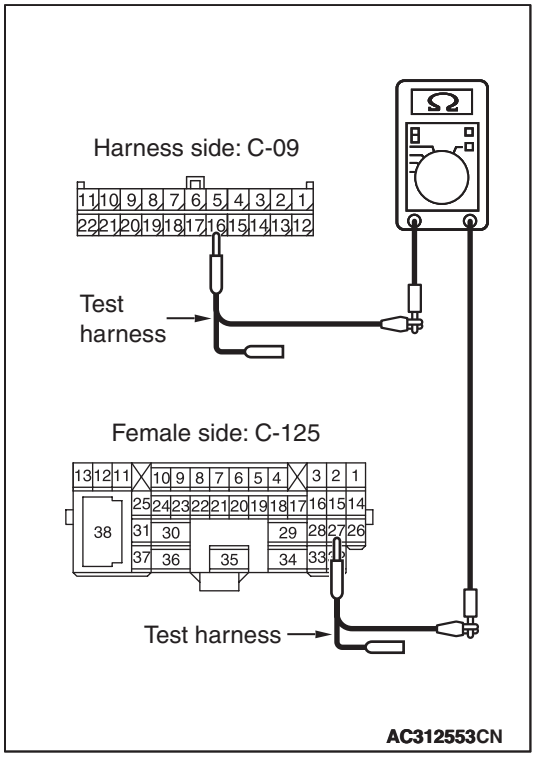
⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Continuity between C-09 joint connector (CAN2) terminal No.5 and C-125 intermediate connector terminal No.26

OK: 2 Ω or less



(5) Continuity between C-09 joint connector (CAN2) terminal No.16 and C-125 intermediate connector terminal No.27

OK: 2 Ω or less

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <All the resistances measure 2 Ω or less> Go to Step 3.
NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN2) and intermediate connector (C-125).

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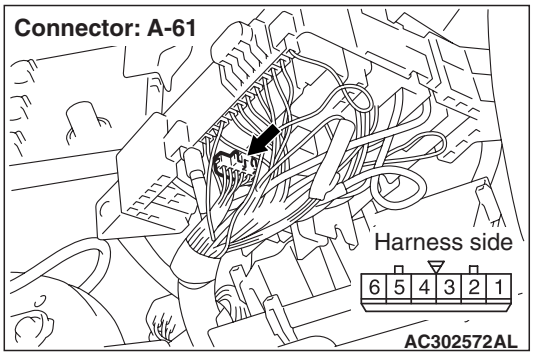
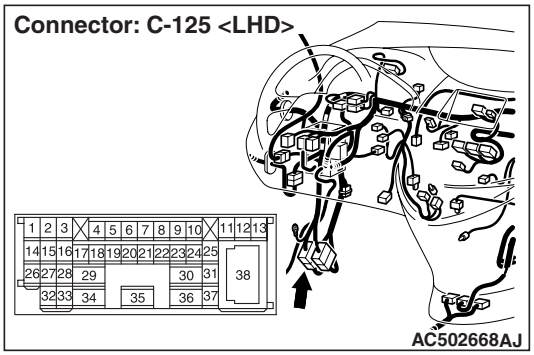
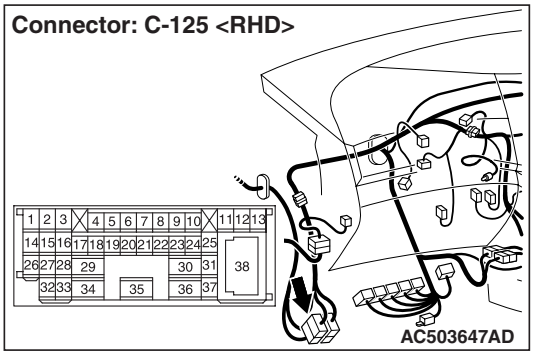
STEP 3. Resistance measurement at A-61 joint connector (CAN3) and C-125 intermediate connector.

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.



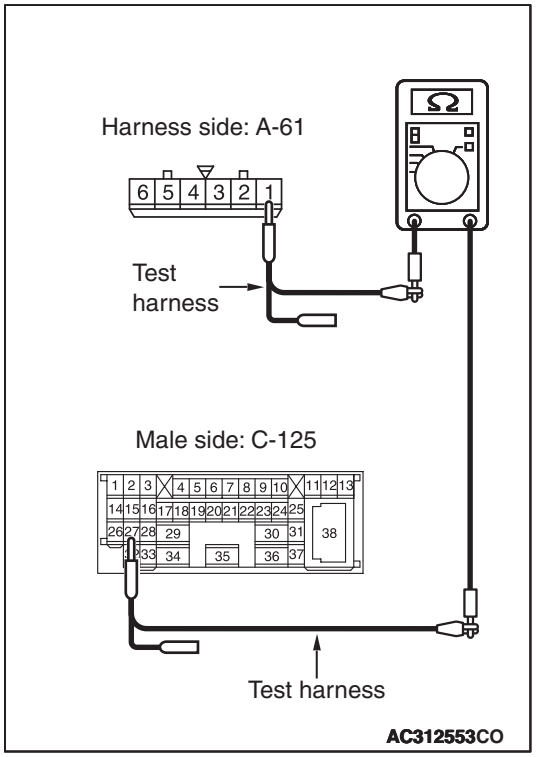




(1) Disconnect joint connector (CAN3) and the intermediate connector, and measure at the wiring harness side.
(2) Turn the ignition switch to the OFF (LOCK) position.

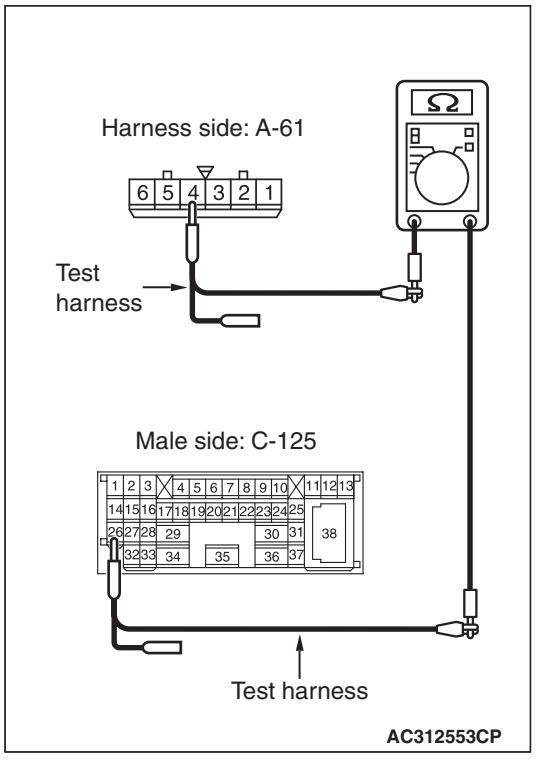
⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Continuity between A-61 joint connector (CAN3) terminal No.1 and C-125 intermediate connector terminal No.27

OK: 2 Ω or less



(5) Continuity between A-61 joint connector (CAN3) terminal No.4 and C-125 intermediate connector terminal No.26

OK: 2 Ω or less

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⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <All the resistances measure 2 Ω or less> Follow diagnosis item 5, 6, 8, 9, 10, 12 and 13. Refer to P.54F-13.
NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN3) and intermediate connector (C-125).

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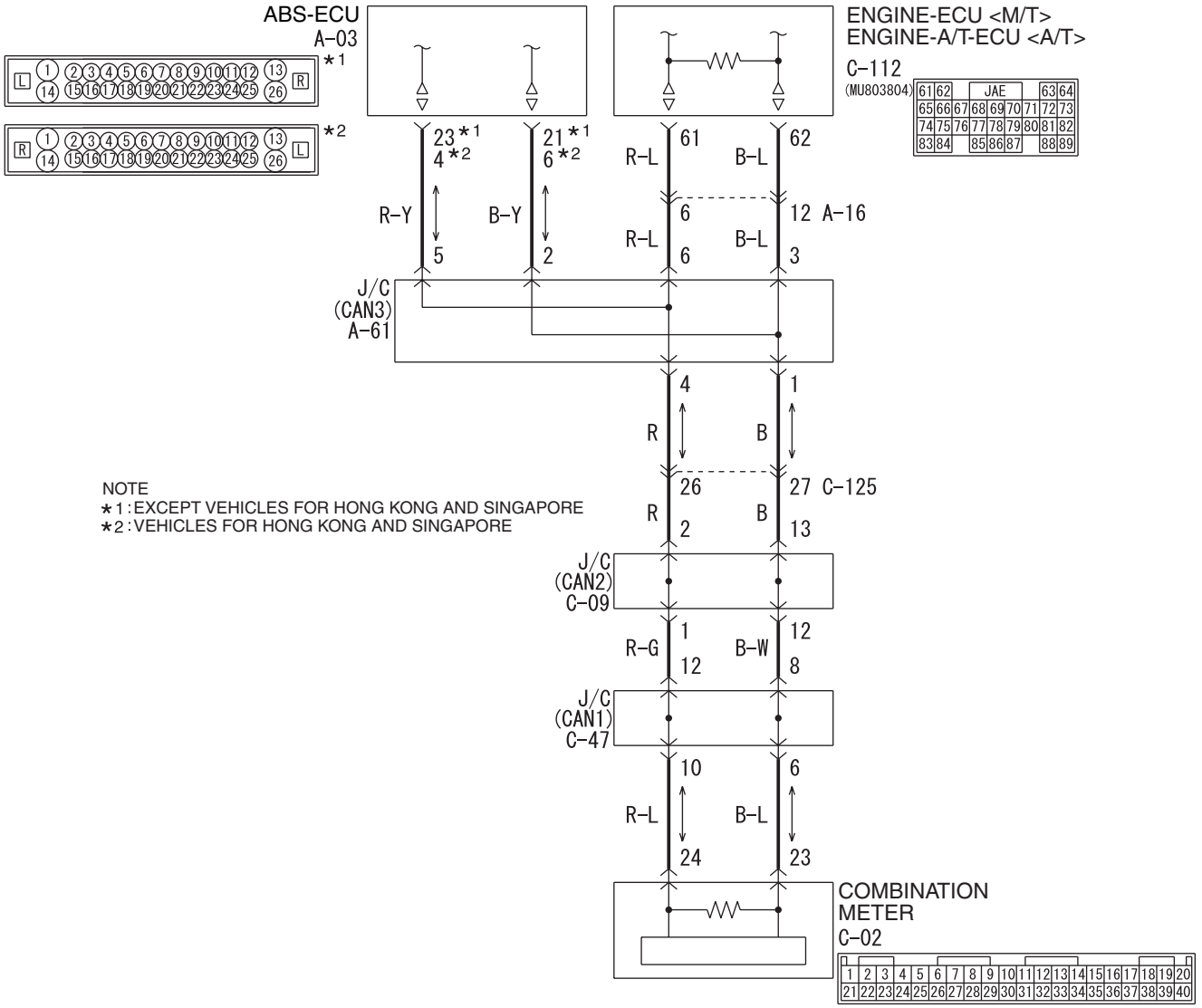
Diagnosis Item 12: Diagnose when the M.U.T.-III cannot receive the data sent by ABS-ECU.

⚠ CAUTION
When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



Wire colour code
B : Black LG : Light green G : Green L : Blue W : White Y : Yellow SB : Sky blue
BR : Brown O : Orange GR : Grey R : Red P : Pink V : Violet PU : Purple

W6X54X006A

FUNCTION

The diagnostic result demonstrates that "the M.U.T.-III cannot receive the sent data from the ABS-ECU" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the ABS-ECU data only.

TRUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from ABS-ECU cannot be received and sent.

PROBABLE CAUSES

- Damaged harness wires and connectors
- Power supply circuit malfunction of the ABS-ECU
- Malfunction of the ABS-ECU

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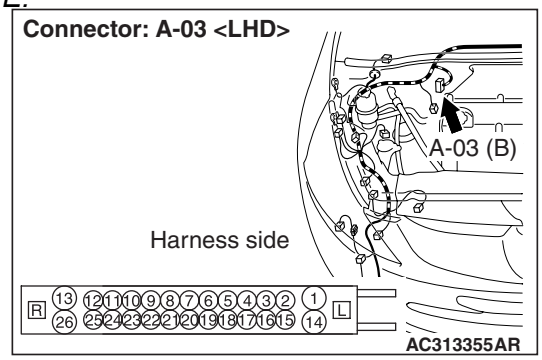
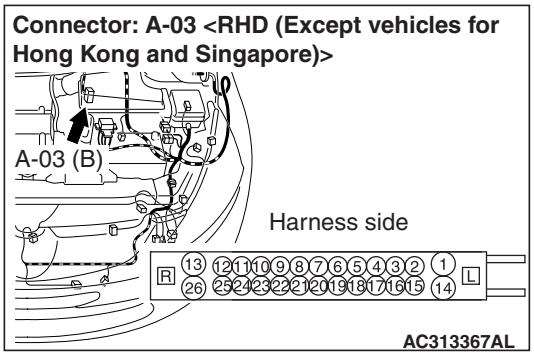
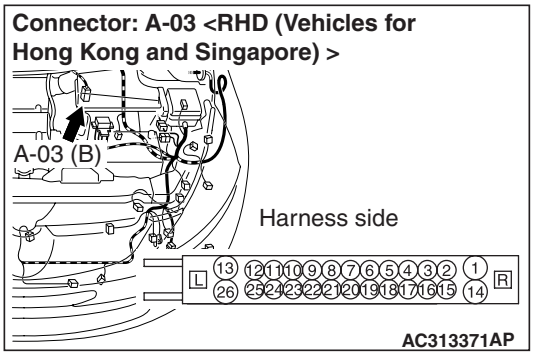
DIAGNOSIS PROCEDURE

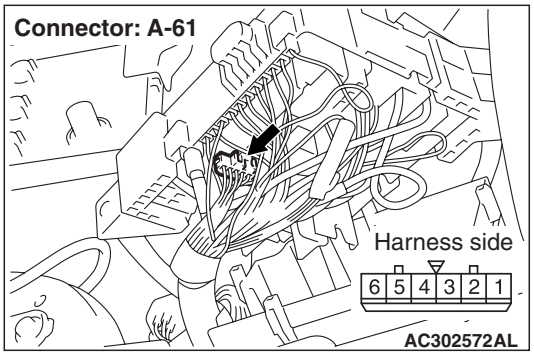
STEP 1. Connector check: A-61 joint connector (CAN3) and A-03 ABS-ECU connector

NOTE:









When checking A-61 joint connector (CAN3), disassemble and check the engine compartment relay box by referring to P.54F-105.

⚠ CAUTION

The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54F-5.

When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

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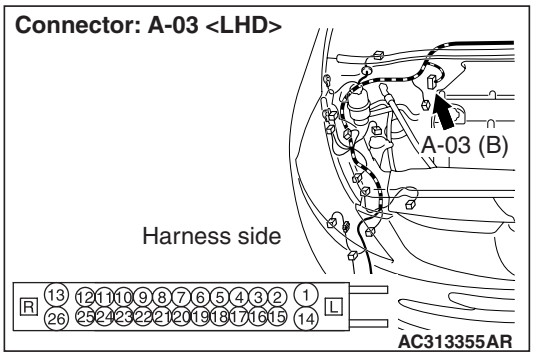
STEP 2. Resistance measurement at A-61 joint connector (CAN3) and A-03 ABS-ECU connector.

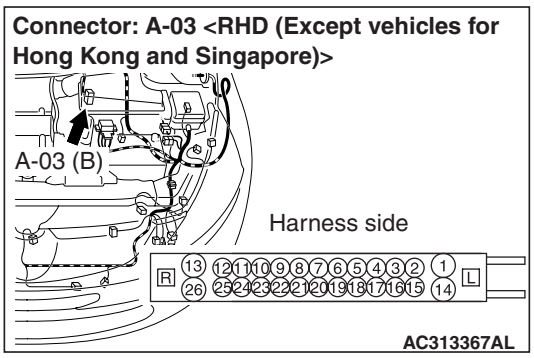
⚠ CAUTION

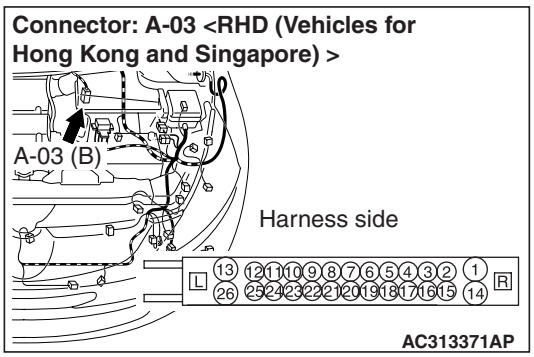
A digital multimeter should be used. For details refer to P.54F-5.

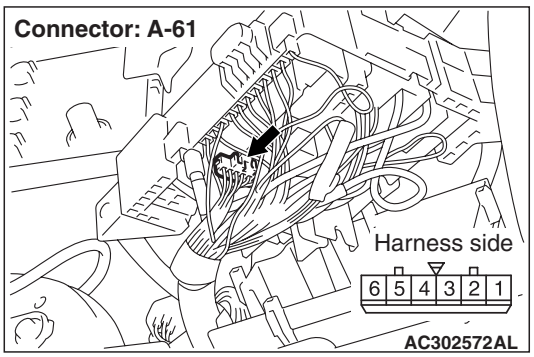
⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.









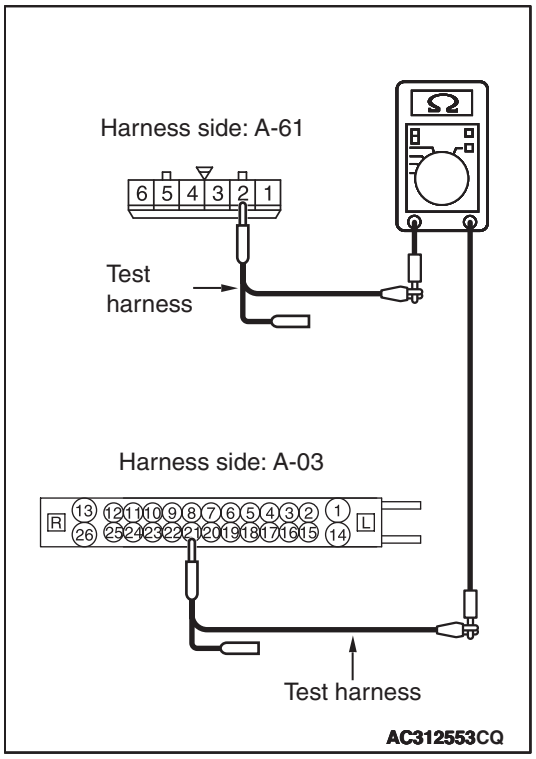
(1) Disconnect joint connector (CAN3) and the ABS-ECU connector, and measure at the wiring harness side.

(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION

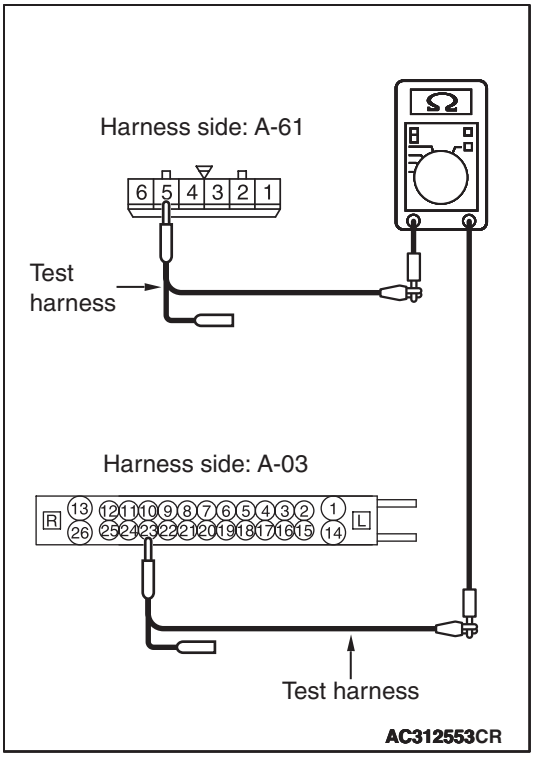
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



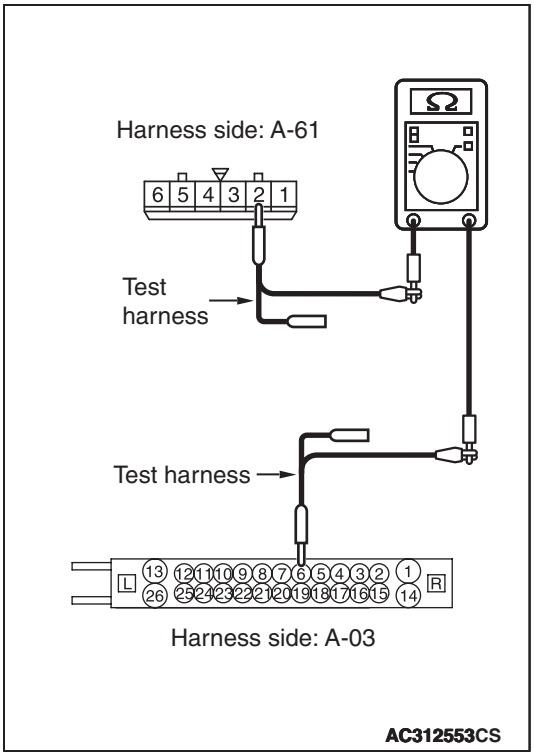
(4) Continuity between A-61 joint connector (CAN3) terminal No.2 and A-03 ABS-ECU connector terminal No.21 <except vehicles for Hong Kong and Singapore>

OK: 2 Ω or less



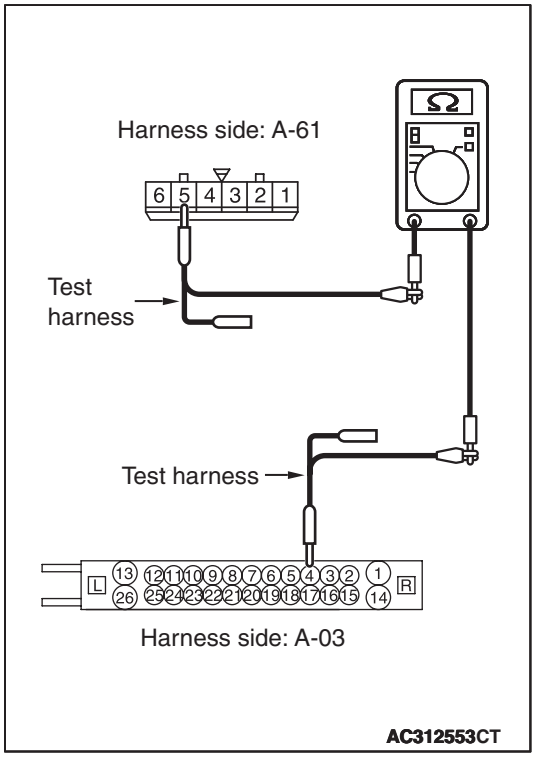
(5) Continuity between A-61 joint connector (CAN3) terminal No.5 and A-03 ABS-ECU connector terminal No.23 <except vehicles for Hong Kong and Singapore>

OK: 2 Ω or less



(6) Continuity between A-61 joint connector (CAN3) terminal No.2 and A-03 ABS-ECU connector terminal No.6 <vehicles for Hong Kong and Singapore>

OK: 2 Ω or less



(7) Continuity between A-61 joint connector (CAN3) terminal No.5 and A-03 ABS-ECU connector terminal No.4 <vehicles for Hong Kong and Singapore>

OK: 2 Ω or less

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES : <All the resistances measure 2 Ω or less> Power supply to the ABS-ECU may be suspected. Diagnose the ABS. Refer to GROUP 35B – Troubleshooting P.35B-61.

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN3) and the ABS-ECU connector.

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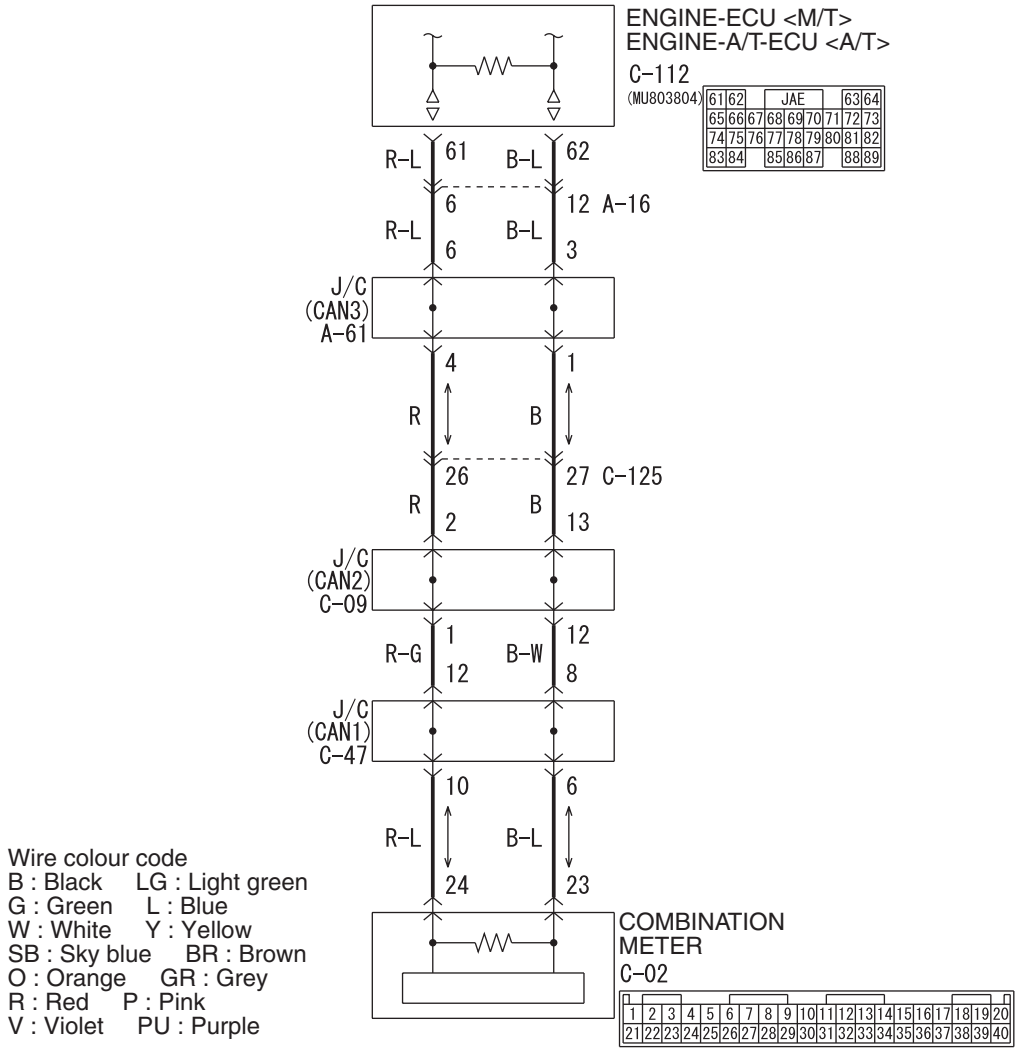
Diagnosis Item 13: Diagnose when the M.U.T.-III cannot receive the data sent by engine-ECU <M/T> or engine-A/T-ECU <A/T>.

⚠ CAUTION
When servicing a CAN bus line, earth yourself by touching a metal object such as an unpainted water pipe. If you fail to do, a component connected to the CAN bus line may be broken.



W6X54X002A

FUNCTION

The diagnostic result demonstrates that "the M.U.T.-III cannot receive the sent data from the engine-ECU" when the M.U.T.-III checks the periodically sent data from each ECU and cannot receive the engine-ECU <M/T> or engine-A/T-ECU <A/T> data only.

TRUBLE JUDGEMENT CONDITIONS

M.U.T.-III judges the trouble when the periodically sent data from engine-ECU <M/T> or engine-A/T-ECU <A/T> cannot be received and sent.

PROBABLE CAUSES

- Damaged harness wires and connectors
- Power supply circuit malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>
- Malfunction of the engine-ECU <M/T> or engine-A/T-ECU <A/T>

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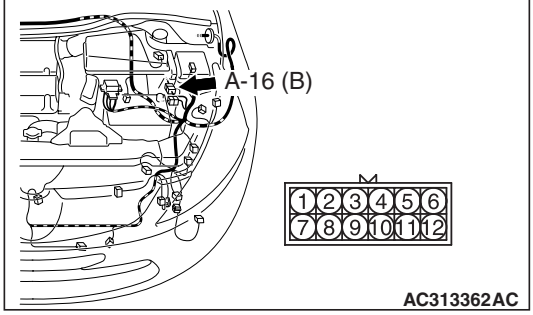
DIAGNOSIS PROCEDURE

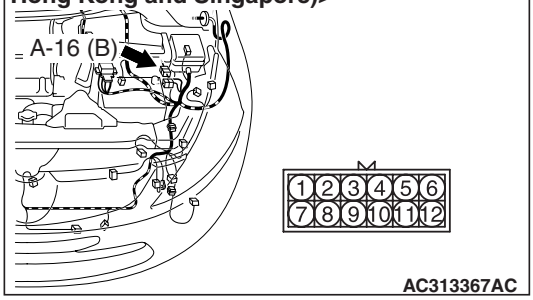
STEP 1. Connector check: A-16 intermediate connector, A-61 joint connector (CAN3) and C-112 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector

NOTE:

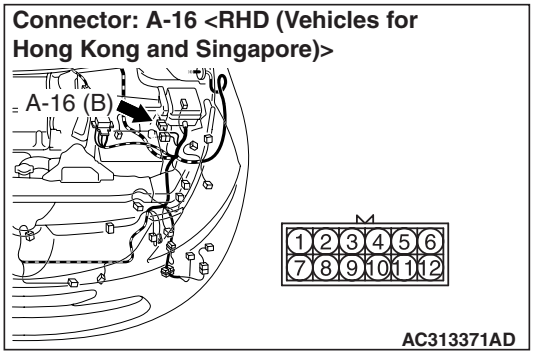
Connector: A-16 <LHD>



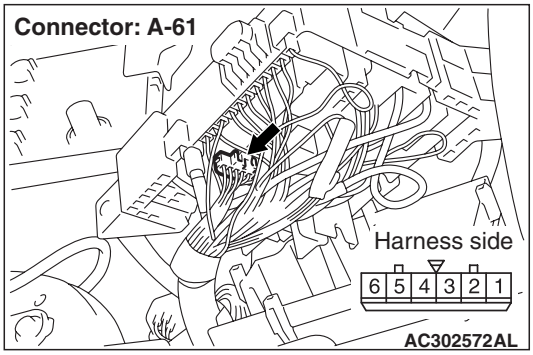
Connector: A-16 <RHD (Except vehicles for Hong Kong and Singapore)>



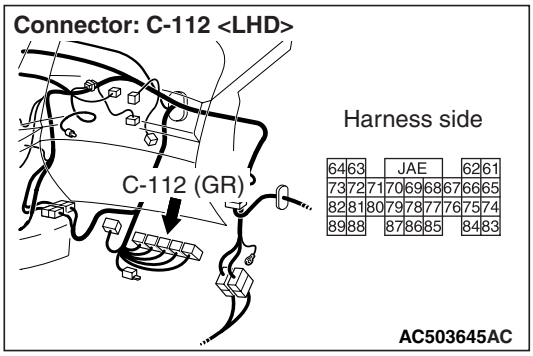
Connector: A-16 <RHD (Vehicles for Hong Kong and Singapore)>



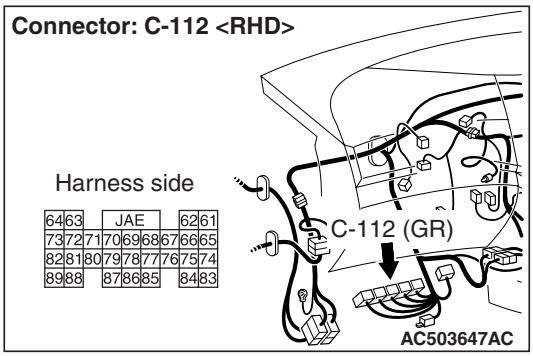
Connector: A-61



Connector: C-112 <LHD>



Connector: C-112 <RHD>



When checking A-61 joint connector (CAN3), disassemble and check the engine compartment relay box by referring to P.54F-105.

⚠ CAUTION

The strand end of the twist wire should be within 10 cm from the connector. For details refer to P.54F-5.

When checking the joint connector, ensure that its wiring harness side and its short pins are not damaged.

Q: Is the check result normal?

YES : Go to Step 2.

NO : Repair the defective connector. Replace the joint connector as necessary.

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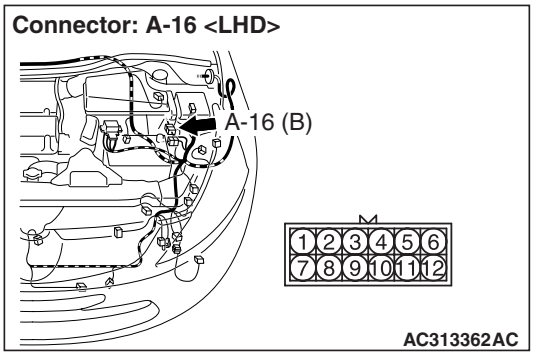
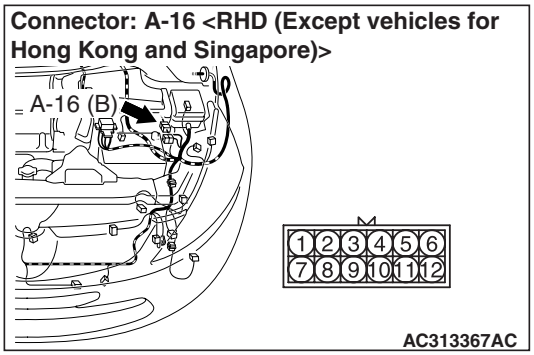
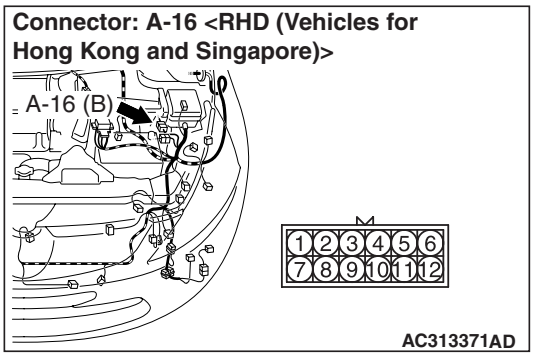
STEP 2. Resistance measurement at A-61 joint connector (CAN3) and A-16 intermediate connector.

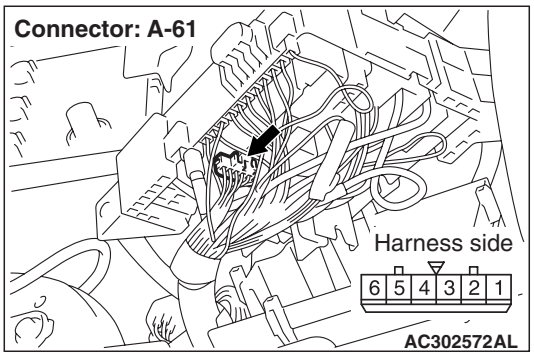
⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.

⚠ CAUTION
The test wiring harness should be used. For details refer to P.54F-5.





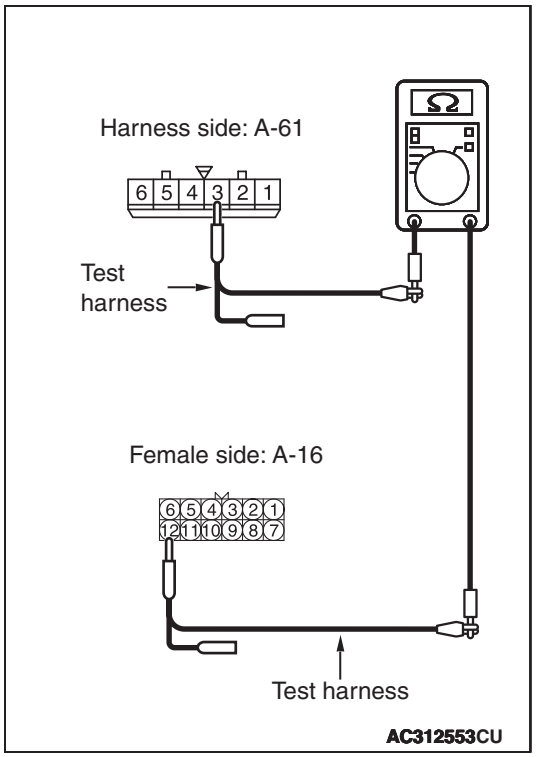




(1) Disconnect joint connector (CAN3) and the intermediate connector, and measure at the wiring harness side.
(2) Turn the ignition switch to the OFF (LOCK) position.

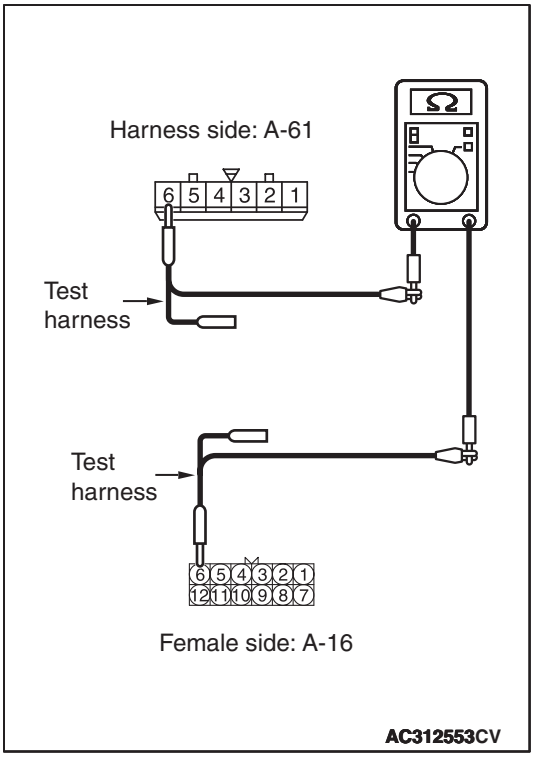
⚠ CAUTION
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Continuity between A-61 joint connector (CAN3) terminal No.3 and A-16 intermediate connector terminal No.12

OK: 2 Ω or less



(5) Continuity between A-61 joint connector (CAN3) terminal No.6 and A-16 intermediate connector terminal No.6

OK: 2 Ω or less

⚠ CAUTION

Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?

YES : <All the resistances measure 2 Ω or less> Go to Step 3.

NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between joint connector (CAN3) and intermediate connector (A-16).

STEP 3. Resistance measurement at A-16 intermediate connector and C-112 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.

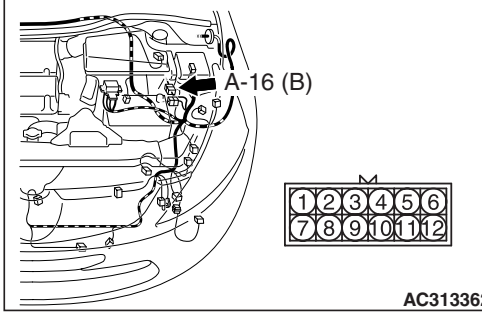
⚠ CAUTION

A digital multimeter should be used. For details refer to P.54F-5.

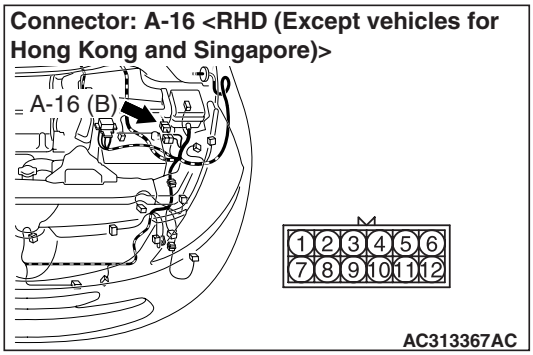
⚠ CAUTION

The test wiring harness should be used. For details refer to P.54F-5.

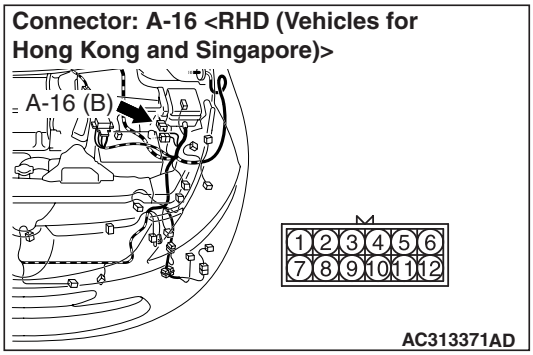
Connector: A-16 <LHD>



Connector: A-16 <RHD (Except vehicles for Hong Kong and Singapore)>



Connector: A-16 <RHD (Vehicles for Hong Kong and Singapore)>



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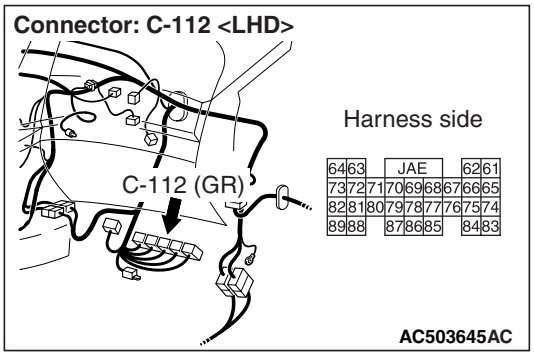
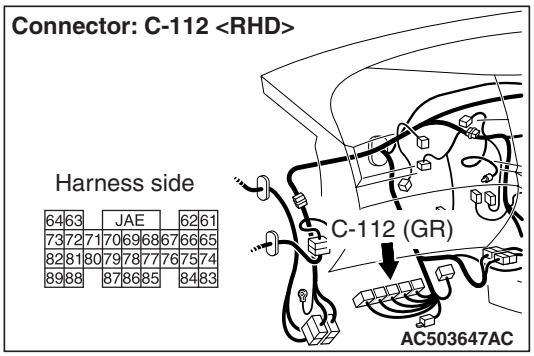


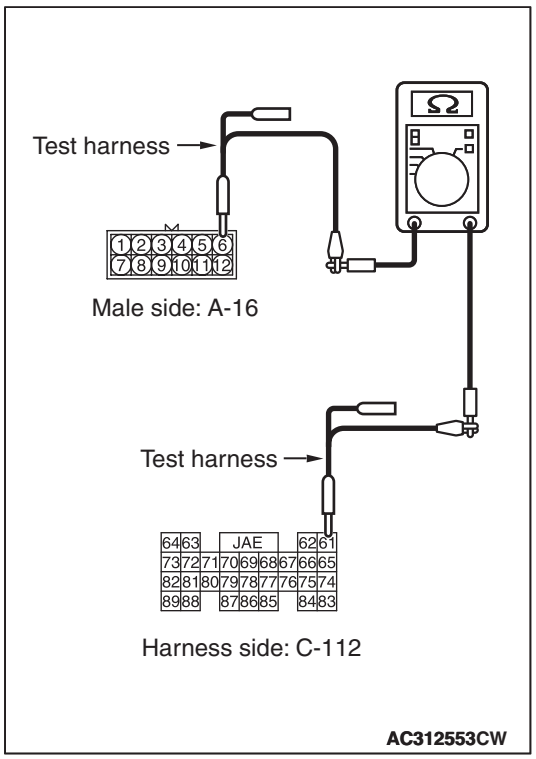


(1) Disconnect the intermediate connector and the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector, and measure at the wiring harness side.
(2) Turn the ignition switch to the OFF (LOCK) position.

⚠ CAUTION

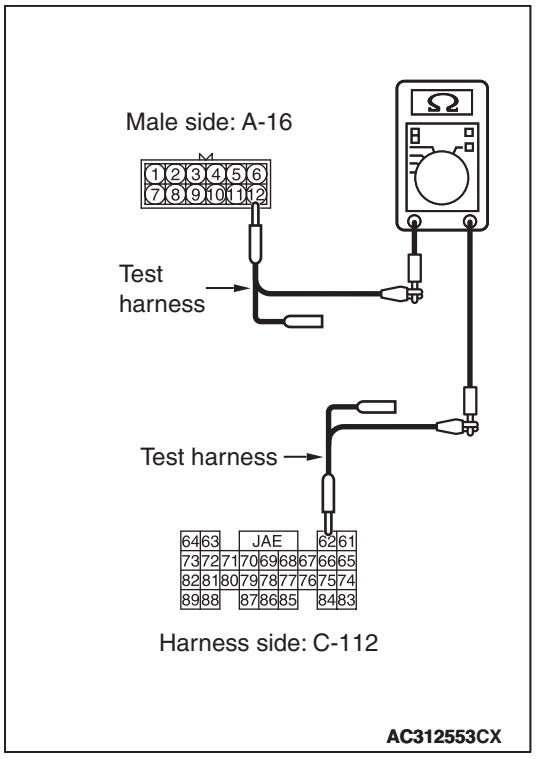
When measuring the resistance, disconnect the negative battery terminal. For details refer to P.54F-5.

(3) Ensure that the negative battery terminal is disconnected.



(4) Continuity between A-16 intermediate connector terminal No.6 and C-112 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector terminal No.61

OK: 2 Ω or less



(5) Continuity between A-16 intermediate connector terminal No.12 and C-112 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector terminal No.62

OK: 2 Ω or less

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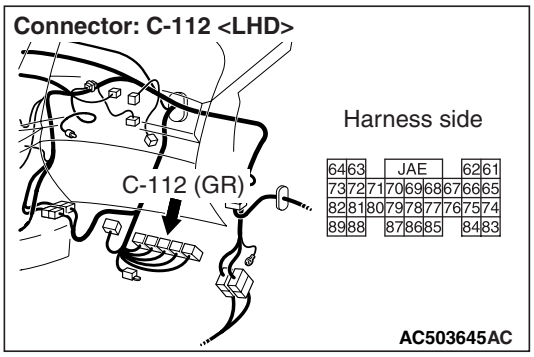
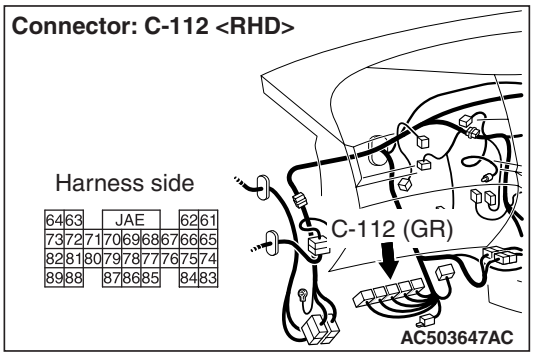
⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <All the resistances measure 2 Ω or less> Go to Step 4.
NO : <Either or all of the voltages measure more than 2 Ω> Repair the wiring harness between intermediate connector (A-16) and the engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.

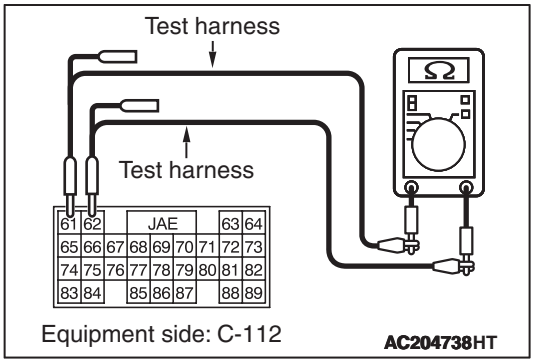
STEP 4. Resistance measurement at C-112 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector.

⚠ CAUTION
A digital multimeter should be used. For details refer to P.54F-5.





(1) Remove the engine-ECU <M/T> or engine-A/T-ECU <A/T>, and measure at the equipment side.



(2) Resistance between C-112 engine-ECU <M/T> or engine-A/T-ECU <A/T> connector terminal Nos.61 and 62

OK: 120 ± 20 Ω

⚠ CAUTION
Strictly observe the specified wiring harness repair procedure. For details refer to P.54F-5.

Q: Is the check result normal?
YES : <Within 120 ± 20 Ω> Power supply to the engine-ECU <M/T> or engine-A/T-ECU <A/T> may be suspected. Diagnose the fuel system. Refer to GROUP 13A – Troubleshooting P.13A-232 <except vehicles for Hong Kong, Singapore, Australia and New Zealand>, GROUP 13B – Troubleshooting P.13B-221 <vehicles for Hong Kong and Singapore> or GROUP 13C – Troubleshooting P.13C-277 <vehicles for Australia and New Zealand>.
NO : <Not within 120 ± 20 Ω> Replace the engine-ECU <M/T> or engine-A/T-ECU <A/T>.

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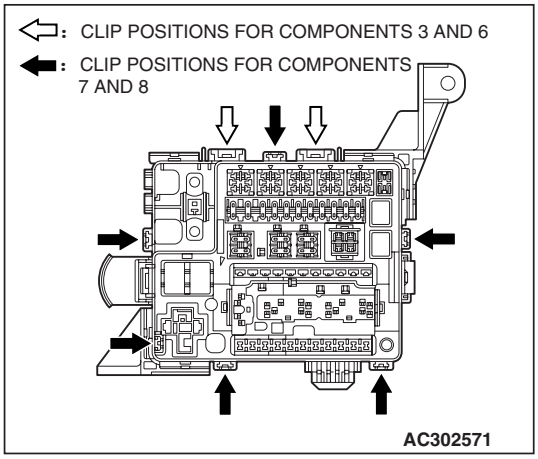
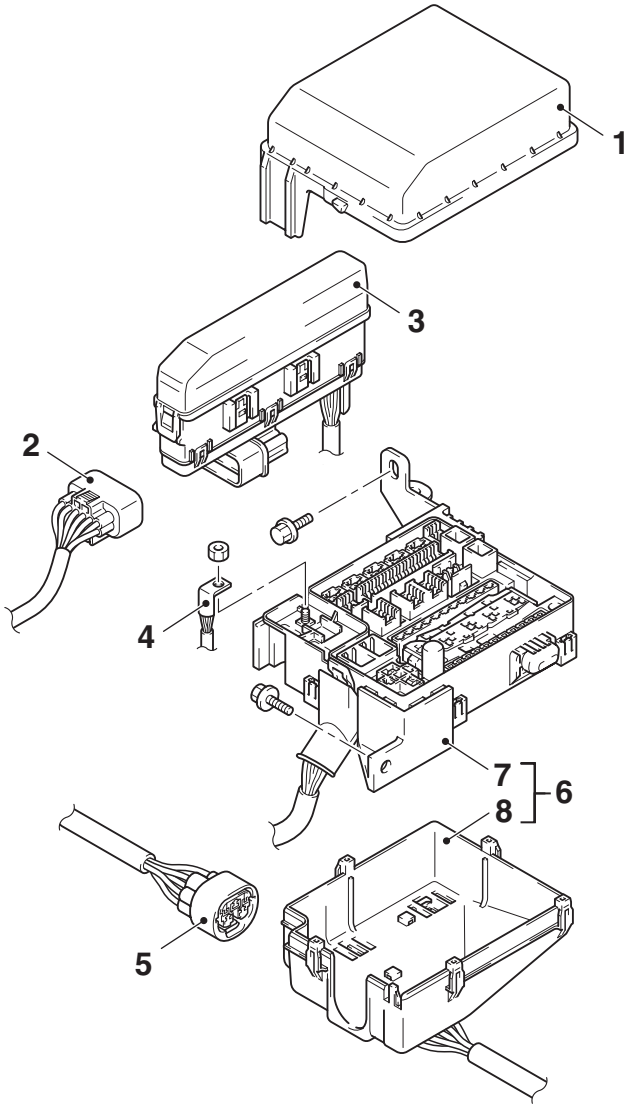
ENGINE COMPARTMENT RELAY BOX DISASSEMBLY AND REASSEMBLY

M1548304400039





AC303074

Disassembly steps

1. Relay box cover
2. Connector
3. Relay box
4. Terminal

Disassembly steps (Continued)

5. Connector
6. Relay box assembly
7. Relay box body
8. Relay box under cover

CAN COMMUNICATION SIGNAL TABLE

M1548300400264

SIGNAL	TRANSMITTER ECU	RECEIVER ECU						
		Engine-ECU <M/T> or Engine-A/T-ECU <A/T>	ABS-ECU	COMBINATION METER	SRS-ECU	A/C-ECU	Immobilizer-ECU	ETACS-ECU
Engine speed signal	Engine-ECU <M/T> or Engine-A/T-ECU <A/T>	–	–	×	–	×	–	–
A/C information signal		–	–	–	–	×	–	–
Vehicle speed signal		–	–	×	–	×	×	–
Vehicle stop signal		–	–	×	–	×	–	×
Malfunction indicator lamp request signal		–	–	×	–	–	–	–
Auto-cruise control indicator lamp signal		–	–	×	–	–	–	–
Engine coolant temperature signal		–	–	×	–	×	–	–
Brake switch signal		–	–	–	×	–	–	–
Selector position signal <A/T>		–	–	×	–	–	×	×
Sports mode shift gear indicator signal <A/T>		–	–	×	–	–	–	–
ABS warning light request signal	ABS-ECU	–	–	×	–	–	–	–
Communication continuation request signal	Combination meter	–	–	–	–	–	–	×
Vehicle speed signal		–	–	–	–	–	–	×
Vehicle speed warning buzzer request signal <Vehicles for GCC>		–	–	–	–	–	–	×
Ignition switch (IG1) signal		–	–	–	–	–	–	×
Seat belt signal		–	–	–	–	–	–	×
Fuel information signal		×	–	–	–	–	–	–

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SIGNAL	TRANSMITTER ECU	RECEIVER ECU						
		Engine-ECU <M/T> or Engine-A/T-ECU <A/T>	ABS-ECU	COMBINATION METER	SRS-ECU	A/C-ECU	Immobilizer-ECU	ETACS-ECU
Communication continuation request signal	A/C-ECU	–	–	–	–	–	–	×
Compressor signal		×	–	–	–	–	–	–
Idle-up request signal		×	–	–	–	–	–	–
Cooling fan request signal		×	–	–	–	–	–	–
Blower fan signal		×	–	–	–	–	–	–
Operating buzzer request signal		–	–	–	–	–	–	×
Communication standby signal	ETACS-ECU	–	–	×	–	–	×	–
Ignition switch (ACC) signal		–	–	×	–	×	×	–
Ignition switch (IG1) signal		–	–	×	–	–	×	–
High-beam indicator request signal		–	–	×	–	–	–	–
Turn-signal indicator request signal		–	–	×	–	–	–	–
Fog light indicator request signal		–	–	×	–	–	–	–
Illumination signal		–	–	×	–	–	–	–
Door "open" signals		–	–	×	–	–	×	–
Interior light shut-off signal		–	–	×	–	–	–	–

NOTE: "×" indicates the applicable points.

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CAN COMMUNICATION-RELATED DIAGNOSIS CODE (U CODE) TABLE

M1548300300308

Code No.	Diagnostic item	Output ECU	Action
U1073	Bus Off	Engine-ECU <M/T> or Engine-A/T-ECU <A/T>, ABS-ECU, Combination meter, SRS-ECU, A/C-ECU	CAN main bus line diagnostics
U1100	Engine-ECU <M/T> or Engine-A/T-ECU <A/T> time-out (related to engine)	Combination meter, A/C-ECU	
U1101	Engine-A/T-ECU time-out (related to automatic transmission) <A/T>	Combination meter	
U1102	ABS-ECU time-out	Engine-ECU <M/T> or Engine-A/T-ECU <A/T>, Combination meter	
U1108	Combination meter time-out	Engine-ECU <M/T> or Engine-A/T-ECU <A/T>	
U1109	ETACS-ECU time-out	Combination meter, A/C-ECU	
U1110	A/C-ECU time-out	Engine-ECU <M/T> or Engine-A/T-ECU <A/T>	
U1112	SRS-ECU time-out	Combination meter	
U1117	Immobilizer malfunction	Engine-A/T-ECU <vehicles for Hong Kong and Australia>	
U1120	Failure information on engine-ECU <M/T> or Engine-A/T-ECU <A/T> (related to engine)	Combination meter, A/C-ECU	Diagnose CAN main bus lines and confirm input signals.
U1206	Flag invalid	Combination meter	
10	Bus Off	ETACS-ECU	CAN main bus line diagnosis
11	engine-ECU <M/T> or Engine-A/T-ECU <A/T> time-out (related to engine)		
12	Engine-A/T-ECU time-out or not equipped (related to transmission) <A/T>		
13	A/C-ECU time-out		
14	Combination meter time-out		
15	Centre display unit time-out or not equipped		
21	Failure information on engine-A/T-ECU (related to meter)		Diagnose CAN main bus lines and confirm input signals.