GROUP 54A

CHASSIS ELECTRICAL

CONTENTS

Continued on next page

⚠ WARNING
Battery posts, terminals and related accessories contain lead and lead compounds. WASH HANDS AFTER HANDLING.

BATTERY

ON-VEHICLE SERVICE

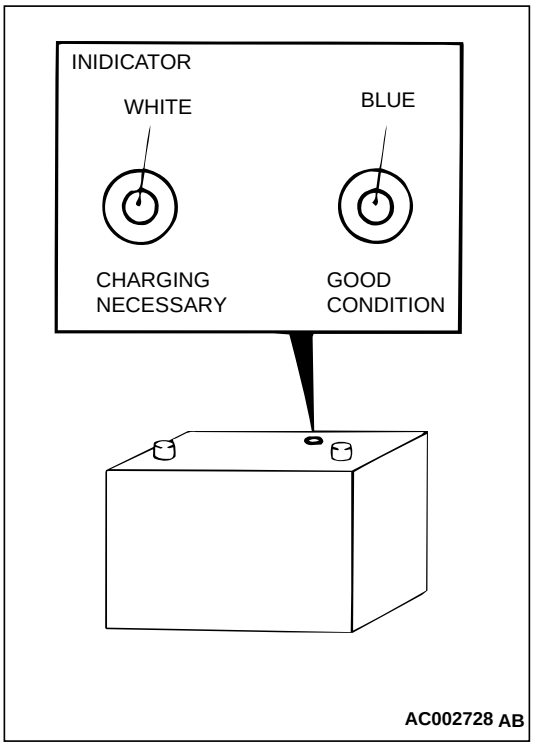
BATTERY CHECK

M1541001000342

⚠ ***WARNING***

Battery posts, terminals and related accessories contain lead and lead compounds. WASH HANDS AFTER HANDLING.

BATTERY VISUAL INSPECTION (1)



The battery contains a visual test indicator which gives a blue signal when an adequate charge level exists, and a white signal when charging is required.

BATTERY VISUAL INSPECTION (2)

Make sure the ignition switch is in "LOCK" (OFF) position and all battery fed accessories are OFF.

1. Disconnect the negative cable from battery before disconnecting the positive cable.

⚠ ***WARNING***

Care should be taken in the event battery case is cracked or leaking to protect hands from the electrolyte. A suitable pair of rubber gloves (not the household type) should be worn when removing battery by hand.

2. Remove the battery from the vehicle.
3. Inspect the battery carrier for damage caused by loss of acid from battery. If acid damage is present, it is necessary to clean area with a solution of clean warm water and baking soda. Scrub area with a stiff bristle brush. Wipe clean with a cloth moistened with ammonia or baking soda in water.

4. Clean the battery, especially the top with same solutions as described in step 3.
5. Inspect the battery case and cover for cracks. If cracks are present, battery must be replaced.
6. Clean the battery post with a suitable battery post cleaning tool.
7. Clean the inside surfaces of the terminal clamps with a suitable battery terminal cleaning tool. Replace damaged or frayed cables and broken terminal clamps.
8. Install the battery in the vehicle.
9. Connect the positive and negative cables to the battery in the order of mention.
10. Tighten the clamp nut securely.

BATTERY CHARGING

M1541001100394

⚠ ***WARNING***

When batteries are being charged, an explosive gas forms beneath the cover of each cell. Do not smoke near batteries on charge or which have recently been charged. Do not break live circuits at the terminals of the batteries on charge. A spark will occur where the live circuit is broken. Keep all open flames away from the battery.

Battery electrolyte temperature may temporarily be allowed to rise to 55C° (131F°). Increase of electrolyte temperature above 55C ° (131F°) is harmful to the battery, causing deformation of battery cell, decrease in life of battery, etc.

CHARGE RATE

If the test indicator is white, the battery should be charged as outlined below. When the dot appears or when maximum charge shown below is reached, charging should be stopped.

Charge Rate Chart

BATTERY	75D23L
Slow charging	5 amps 11 hours
	10 amps 5.5 hours
Fast charging	20 amps 2.8 hours
	30 amps 1.8hours

BATTERY TEST

M1541001200391

BATTERY TESTING PROCEDURE

STEP 1. Check the battery cables.
Remove the negative cable, then the positive cable. Check for dirty or corroded connections.

Q: Are the battery cables dirty or have corroded connections?
YES : Clean the battery cables. Then go to Step 2.
NO : Go to Step 2.

STEP 2. Check the battery post.
Check for loose battery post.

Q: Are the battery post faulty?
Yes : Replace the battery. Then go to Step 4.
NO : Go to Step 3.

STEP 3. Check the battery case and cover.
(1))Remove the hold-downs and shields.
(2) Check for broken/cracked case or cover.

Q: Is the battery case or cover faulty?
YES : Replace the battery. Then go to Step 4.
NO : Go to Step 4.

STEP 4. Check the open circuit voltage.
(1) Turn headlights on for 15 seconds.
(2) Turn headlights off for two minutes to allow battery positive voltage to stabilize.
(3) Disconnect the battery cables.
(4) Read open circuit voltage.

Q: Is open circuit voltage 12.4 volts or more?
NO : Go to Step 5.
YES : Go to Step 6.

STEP 5. Charge battery.

Q: Charging the battery?
YES : Charge the battery at 5 amps for 15 hours. Then re-test, go to Step 4.
NO : Go to Step6.

STEP 6. Check the load test.
(1) Connect a load tester to the battery.
(2) Load the battery at the recommended discharge rate (See LOAD TEST RATE CHART) for 15 seconds.
(3) Read voltage after 15 seconds, then remove load.
(4) Compare the measured value with the minimum voltage. (See LOAD TEST CHART.)

Q: Is the voltage higher than minimum voltage?
NO : Replace the battery. Then go to Step 4.
YES : The battery is normal.

LOAD TEST CHART (pending)

TEMPERATURE °C (°F)	21 (70) AND ABOVE	16 (60)	10 (50)	4 (40)	–1 (30)	–7 (20)	–12 (10)	–18 (0)
Minimum voltage	9.6	9.5	9.4	9.3	9.1	8.9	8.7	8.5

LOAD TEST RATE CHART

Load test	300 amps
Cranking ratio (0°F)	520 amps
Reserve capacity	118 minutes
Application	75D23L

IGNITION SWITCH

GENERAL DESCRIPTION

M1543000100267

IGNITION KEY REMINDER TONE ALARM

The ignition key reminder tone alarm will sound under the following condition, and warn the driver to remove the ignition key.

- The driver's door is opened when the ignition switch is at "LOCK" (OFF) or "ACC" position without removing the ignition key.

However, the light reminder tone alarm will take precedence over this function.

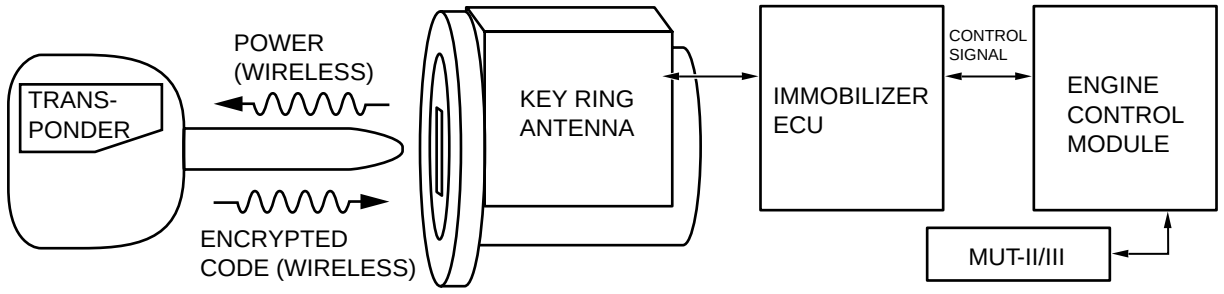
IMMOBILIZER SYSTEM

The immobilizer system consists of the ignition key, the key ring antenna, the immobilizer-ECU, and the engine control module (ECM). The ignition key has a built-in transponder. Only the registered ignition key permits the engine to start, therefore, the engine can never be started by means of a forged key or by connecting the ignition wiring directly. The system is significantly safe and reliable against theft. In addition, the driver has only to turn the ignition switch to the "ON" position to activate the immobilizer system. If the requirements for starting the engine are not satisfied, the engine will be immobilized. If a registered ignition key is lost, all your ignition keys need to be registered again using scan tool MB991958 (MUT-III Sub Assembly) to ensure security (Refer to P.54A-38). An additional ignition key can be registered as follows (only if no ignition keys are lost):

- Using scan tool MB991958 (MUT-III Sub Assembly) (Refer to P.54A-38).
- By operating two ignition keys that have been already registered (Refer to P.54A-38).

OPERATION

1. After the ignition is switched on, the engine control module sends a control signal and transponder read command signal to the immobilizer ECU.
2. When the immobilizer ECU receives the control signal from the engine control module through the key ring antenna, the immobilizer ECU supplies a current and sends random number data to the transponder in the ignition key.
3. The transponder uses the random number data to derive an ID code, which is sent to the immobilizer ECU through the key ring antenna.
4. The immobilizer ECU compares the ID code that was sent with pre-registered ID codes, and if it matches, a control signal approving ignition is sent to the engine control module. If the ID code does not match (in the case of counterfeit ignition keys, for example), the immobilizer ECU sends a control signal denying ignition to the engine control module, preventing the engine from starting.



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CAUTION WHEN REPLACING IMMOBILIZER SYSTEM RELATED PARTS

To replace immobilizer system related parts, refer to the table below. When the ignition key is re-registered with scan tool MB991958, the originally registered ignition key registration information will be lost.

ITEMS	ECM	IMMOBILIZER-ECU	IGNITION KEY
When replacing ECM	-	Replacement is not required	Replacement is not required. Re-registration are required.
When rewriting ECM	-	Replacement is not required	Replacement is not required. Re-registration is not required.
When replacing immobilizer-ECU	Replacement not required	-	Replacement is not required. Re-registration are required.
When adding ignition keys newly (if registered ignition keys are not lost)	Replacement not required	Replacement is not required	Register only additional ignition keys to be registered.
When adding ignition key newly (if registered ignition keys are lost)	Replacement not required	Replacement is not required	Register ignition key to be added and re-register all other ignition keys.
When ignition key is lost	Replacement not required	Replacement is not required	Re-register all other ignition keys except the lost one.

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IGNITION KEY REMINDER TONE ALARM

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The Ignition key reminder tone alarms is controlled by the Simplified Wiring System (SWS). For trouble-shooting, refer to GROUP 54B, SWS Diagnosis P.54B-22.

IMMOBILIZER SYSTEM DIAGNOSIS

INTRODUCTION TO IMMOBILIZER SYSTEM DIAGNOSIS

M1543009901207

⚠ CAUTION

The encrypted code should always be re-registered when replacing the immobilizer-ECU.

The immobilizer system consists of the ignition key, the key ring antenna, the immobilizer-ECU, and the engine control module. If the engine cannot be started by using a registered ignition key, one of these components may be defective. If the immobilizer system has immobilized the engine, MFI system DTC P0513 will be output. In this case, observe the immobilizer system troubleshooting.

IMMOBILIZER SYSTEM DIAGNOSTIC TROUBLESHOOTING STRATEGY

M1543006900625

Use the following steps to plan your diagnostic strategy.

1. Gather information about the problem from the customer.
2. Verify that the condition as described by the customer exists.
3. Check the vehicle for any immobilizer system DTCs.
4. If you cannot verify the condition and there are no immobilizer system DTCs, the malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/inspection Service Points – How to Cope with Intermittent Malfunctions P.00E-6.
5. If you can verify the condition but there are no immobilizer system DTCs, or the system cannot communicate with scan tool MB991958, refer to Symptom Chart and find the fault P.54A-17.
6. If there is an immobilizer system DTC, record the DTC, then erase it from the memory using scan tool MB991958.
7. Recreate the immobilizer system DTC set conditions to see if the same immobilizer system DTC will resets.
   (1) If the same immobilize system DTC resets, perform the appropriate diagnostic procedure. Refer to Diagnostic Trouble Code Chart P.54A-10.
   (2) If the same immobilizer system DTC does not reset, the malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.

DIAGNOSIS FUNCTION

M1543007000379

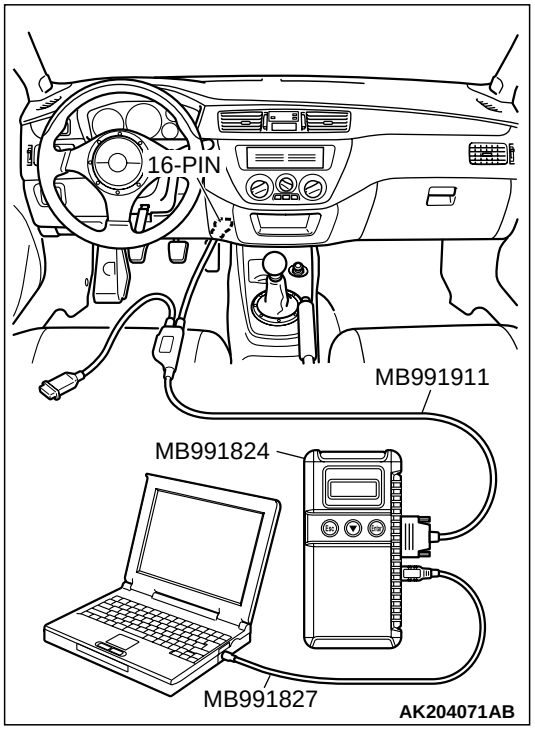
HOW TO CONNECT THE SCAN TOOL (MUT-III)

Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

⚠ CAUTION

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



1. Ensure that the ignition switch is at the "LOCK" (OFF) position.
2. Start up the personal computer.
3. Connect special tool MB991827 to special tool MB991824 and the personal computer.
4. Connect special tool MB991911 to special tool MB991824.
5. Connect special tool MB991911 to the data link connector.
6. Turn the power switch of special tool MB991824 to the "ON" position.

   NOTE: When special tool MB991824 is energized, special tool MB991824 indicator light will be illuminated in a green color.
7. Start the MUT-III system on the personal computer.

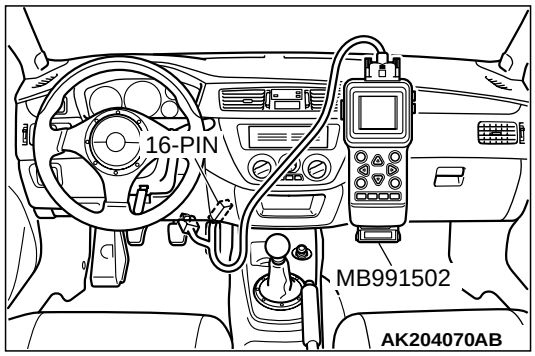
NOTE: Disconnecting scan tool MB991958 is the reverse of the connecting sequence, making sure that the ignition switch is at the "LOCK" (OFF) position.

HOW TO READ AND ERASE DIAGNOSTIC TROUBLE CODE

<When using the MUT-II>

Required Special Tool:

- MB991502: Scan Tool (MUT-II)



⚠ CAUTION

To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

NOTE: If Battery positive voltage is low, diagnostic trouble codes may not be output. Be sure to check the battery and charging system before continuing.

1. Connect scan tool MB991502 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Read the diagnostic trouble codes for immobilizer.
4. Refer to the DIAGNOSTIC TROUBLE CODE CHART(P.54A-10).
5. Turn the ignition switch to the "LOCK" (OFF) position and then back to "ON" again.
6. Erase the diagnostic trouble code(s) using MB991502 screen prompts.
7. Confirm that the diagnostic trouble code output is normal.
8. Turn the ignition switch to the "LOCK" (OFF) position.
9. Disconnect scan tool MB991502 from the data link connector.

<When using the MUT-III>

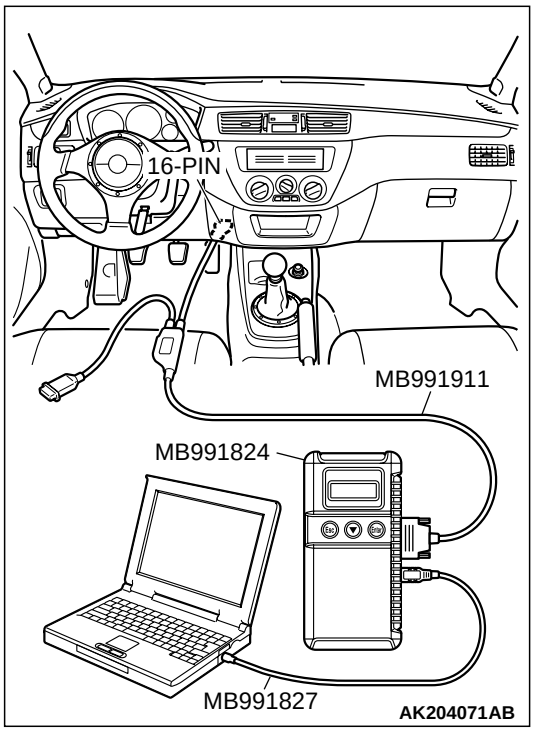
Required Special Tools:

- MB991958: Scan Tool (MUT-lll Sub Assembly)
  - MB991824: V.C.I
  - MB991827: USB Cable
  - MB991911: Main Harness B

⚠ CAUTION

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

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

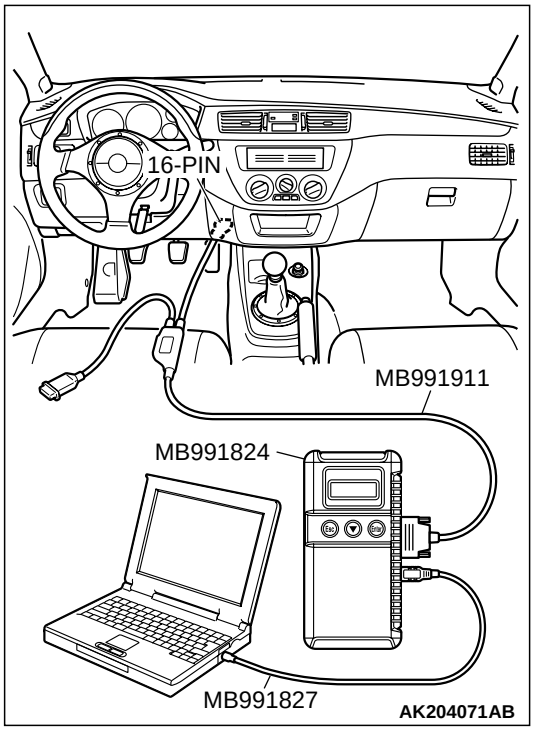


1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to "ON" position.
3. Select "Interactive Diagnosis" from the start-up screen.
4. Select "System select."
5. Choose "IMMOBILIZER" from the "POWER TRAIN" tab.
6. Select "Diagnostic Trouble Code."
7. If a DTC is set, it is shown.
8. Choose "Erase DTCs" to erase the DTC.

HOW TO READ DATA LIST (MUT-III)

Required Special Tools:

- MB991958: Scan Tool (MUT-lll Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B



⚠ CAUTION

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

1. Connect scan tool MB991958 to the data link connector.
2. Turn the ignition switch to "ON" position.
3. Select "Interactive Diagnosis" from the start-up screen.
4. Select "System select."
5. Choose "IMMOBILIZER" from the "POWER TRAIN" tab.
6. Select "Data List."
7. Choose an appropriate item and select the "OK" button

NOTE: refer to "Transponder Lock Check" P.54A-48.

DIAGNOSTIC TROUBLE CODE CHART

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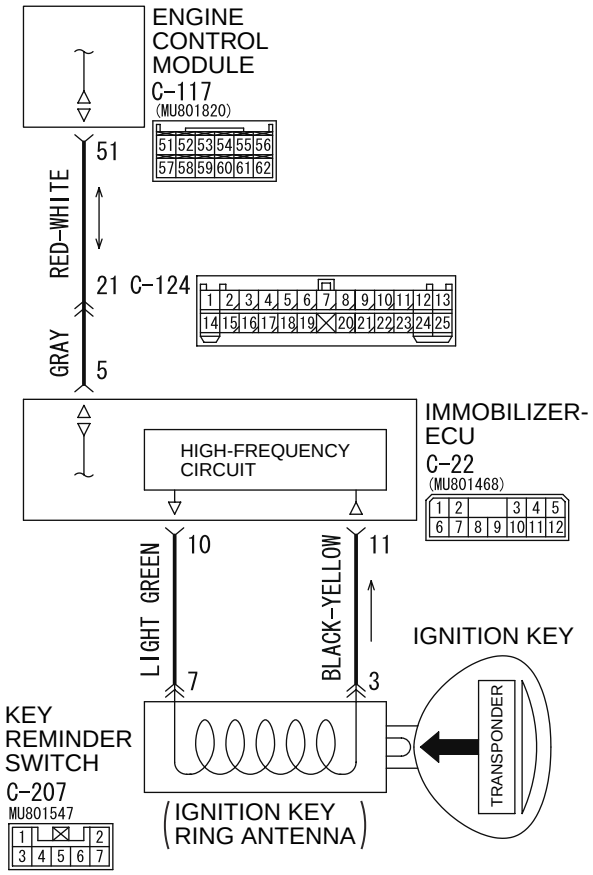
Use the following chart to develop proper diagnostic strategy.

DIAGNOSTIC TROUBLE CODE NO.	DESCRIPTION	REFERENCE PAGE
11	Transponder communication system or radio interference of encrypted code	P.54A-11.
12	Encrypted codes are not the same or are not registered	P.54A-17.

DIAGNOSTIC TROUBLE CODE PROCEDURES

DTC 11: Transponder Communication System or Radio Interference of Encrypted Code



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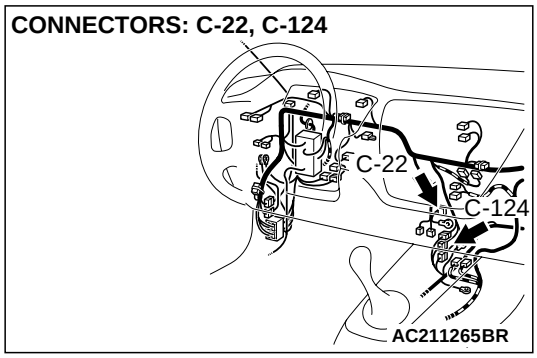

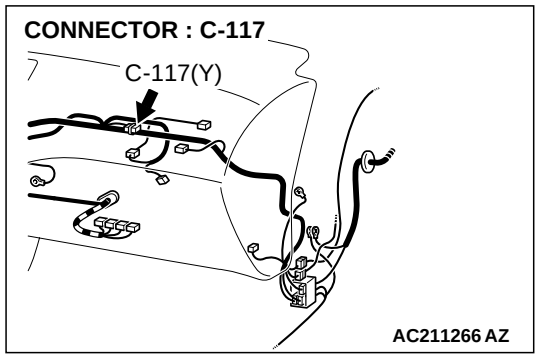

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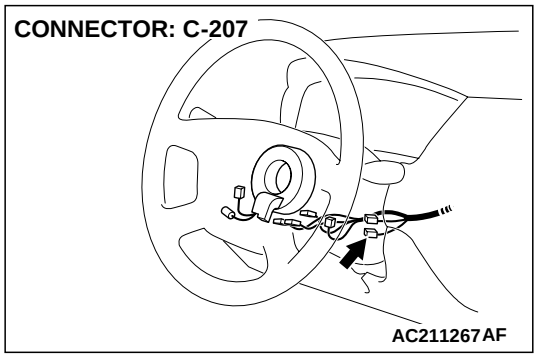


CIRCUIT OPERATION

The ignition key is powered by the ignition key ring antenna. The ignition key then sends an encrypted code. The ignition key ring antenna receives the encrypted code, and determines if the ignition key is registered.

DTC SET CONDITION

- DTC 11 may be output if other ignition keys are in the vicinity of the vehicle as it is being started.
- The transponder's encrypted code is not sent to the immobilizer-ECU immediately after the ignition switch is turned to "ON" position.

NOTE: DTC 11 is always output together with MFI system DTC P0513.

TROUBLESHOOTING HINTS

- Radio interference of the encrypted code
- Malfunction of the transponder
- Malfunction of the immobilizer-ECU.
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

STEP 1. Check for presence of other key near the key in the ignition.

Q: Is there any other key near the key in the ignition?

YES : Move the other key well away from key being used. Retest the system.

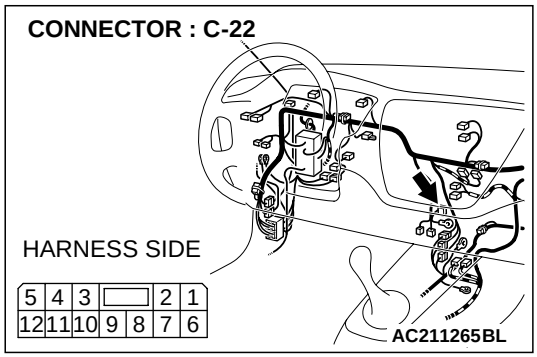
NO : Go to Step 2.

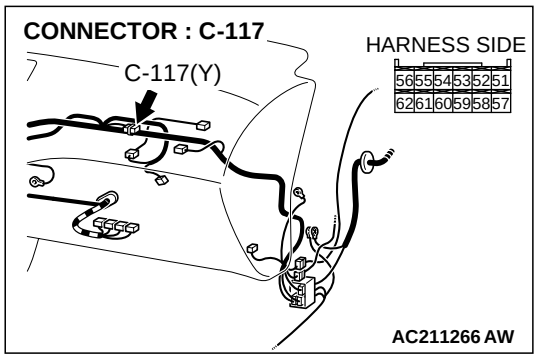
STEP 2. Check that the engine start using the spare ignition key which encrypted code has been registered.

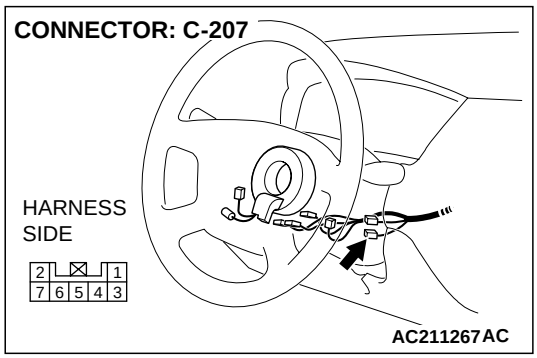
Q: Does the engine start using the spare ignition key for which the encrypted code has been registered?

YES : replace the ignition key that does not work. Then register the password (secret code) and encrypted code P.00E-2. Retest the system.

NO : Go to Step 3.





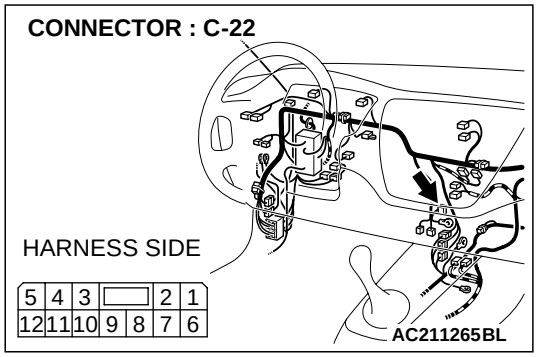


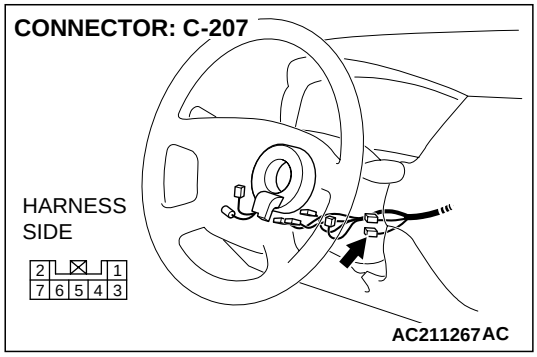
STEP 3. Check immobilizer-ECU connector C-22, key reminder switch connector C-207 and ECM connector C-117 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are immobilizer-ECU connector C-22, key reminder switch connector C-207 and ECM connector C-117 in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Confirm that scan tool MB991958 communicates normally.





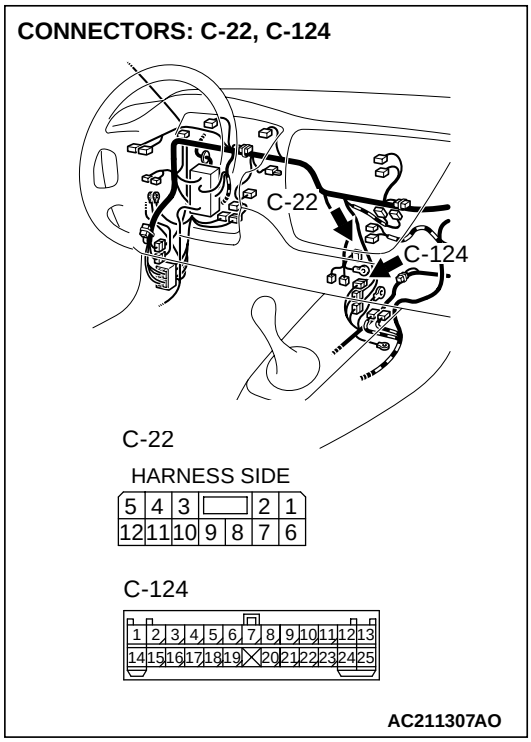
STEP 4. Check the harness wires between immobilizer-ECU connector C-22 (terminals 10 and 11) and key reminder switch connector C-207 (terminals 7 and 3).

Q: Are the harness wires between immobilizer-ECU connector C-22 (terminals 10 and 11) and key reminder switch connector C-207 (terminals 7 and 3) in good condition?

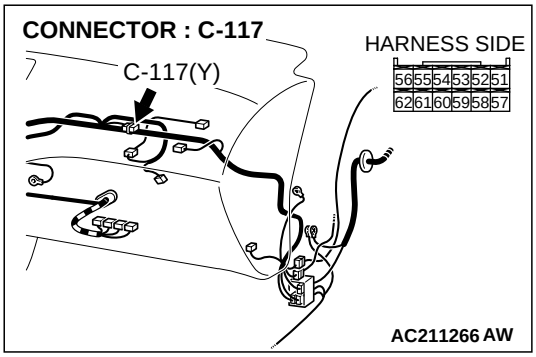
YES : Go to Step 5.

NO : Replace damaged component(s). Confirm that scan tool MB991958 communicates normally.

CONNECTORS: C-22, C-124



CONNECTOR : C-117



STEP 5. Check the harness wires between immobilizer-ECU connector C-22 (terminal 5) and ECM connector C-117 (terminal 51).

NOTE: Also check intermediate connector C-124 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-124 is damaged, Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Are the harness wires between immobilizer-ECU connector C-22 (terminal 5) and ECM connector C-117 (terminal 51) in good condition?

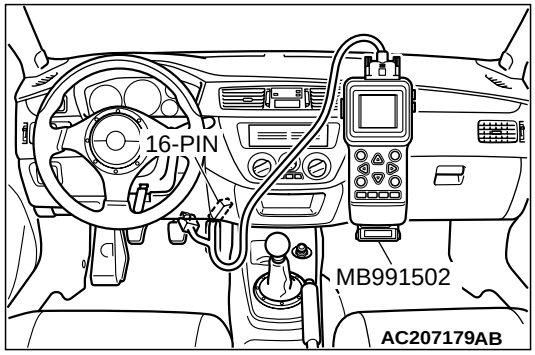
YES : Go to Step 6.

NO : Replace damaged component(s). Confirm that scan tool MB991958 communicates normally.

STEP 6. Using scan tool MB991502 or MB991958, read the diagnostic trouble code (DTC).

⚠ CAUTION

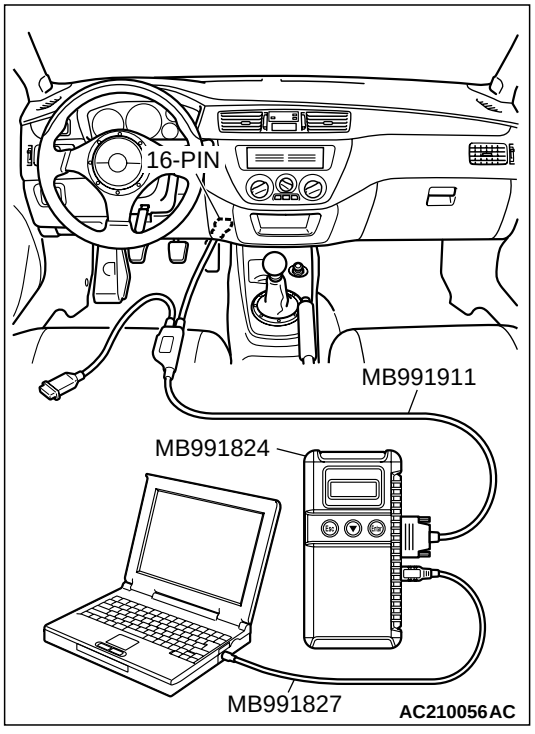
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.



(1) Connect scan tool MB991502 or MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Use scan tool MB991502 or MB991958 to check immobilizer system diagnostic trouble codes.
(4) Turn the ignition switch to "LOCK" (OFF) position.
(5) Disconnect scan tool MB991502 or MB9919588.

Q: Which DTC is output, DTC 11 or 12?

DTC12 is output : Refer to DTC 12 P.54A-17.
DTC11 is output : Go to Step 7.



STEP 7. Replace the key ring antenna.

Replace the key ring antenna.

Q: Has the immobilizer system set the DTC?

YES : Replace the immobilizer-ECU. Then register the password (secret code) and encrypted code P.54A-38. Retest the system.
NO : There is no action to be taken.

DTC12: Encrypted Codes are Not the Same or Not Registered.

DTC SET CONDITION

The encrypted code sent by the transponder is not the same encrypted code which is registered in the immobilizer-ECU.

NOTE: DTC 12 is always output together with MFI system DTC P0513.

TROUBLESHOOTING HINTS

- The encrypted code in the ignition key has not been properly registered
- Malfunction of immobilizer-ECU.

DIAGNOSIS

Was the encrypted code registered?

YES : Replace the immobilizer-ECU. and then re-register the encrypted code (Refer to P.54A-38).

NO : Register the encrypted code (Refer to P.54A-38).

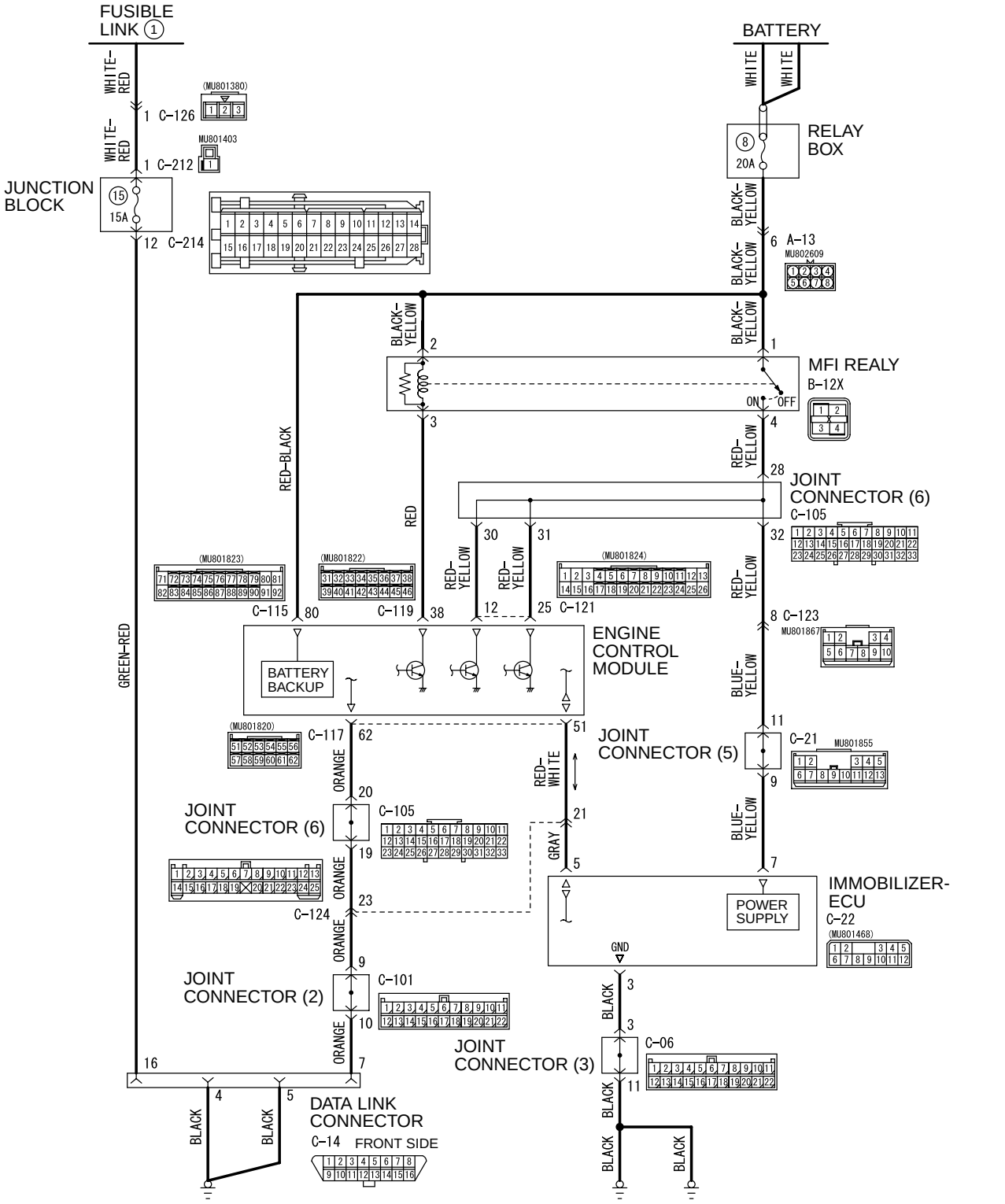
SYMPTOM CHART

M1543007200942

SYMPTOMS	INSPECTION PROCEDURE NO.	REFERENCE PAGE
Communication with scan tool MB991502 or MB991958 is impossible	1	P.54A-18
The ignition key cannot be registered	2	P.54A-25
Engine cranks but does not start	3	P.54A-27
The immobilizer indicator light does not illuminate.	4	P.54A-30

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Communication with Scan Tool MB991502 or MB991958 is Impossible.



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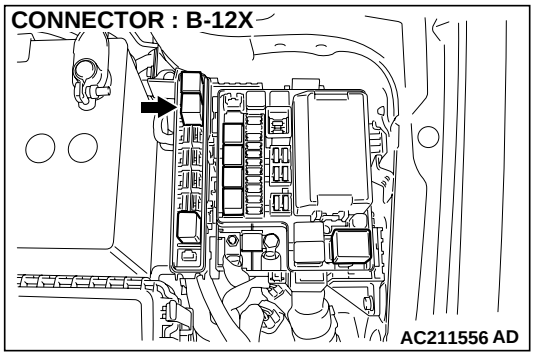
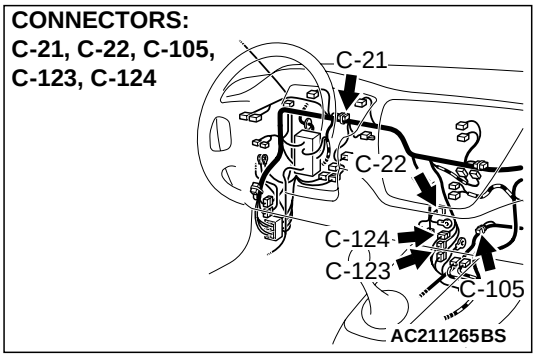
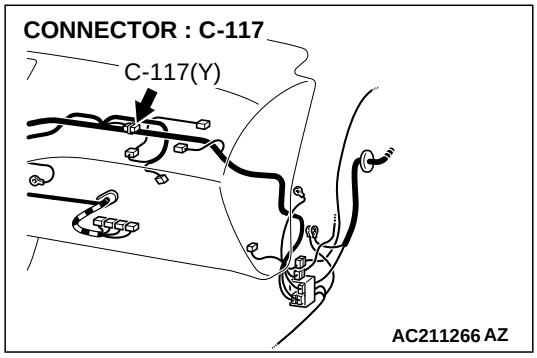
TSB Revision







CIRCUIT OPERATION

The Immobilizer-ECU is energized by the MFI relay when the ignition switch is turned "ON". The ECM transmits a signal from scan tool MB991958 to the immobilizer-ECU as it is. In the same way, a signal from the immobilizer-ECU is also transmitted to scan tool MB991502 or MB991958 as it is.

TECHNICAL DESCRIPTION (COMMENT)

- This malfunction may be caused by a defective immobilizer-ECU, ECM, or a defect in the communication line between the immobilizer-ECU and ECM. If this malfunction appears when the MFI system and scan tool MB991958 can communicate each other, MFI system DTC P0513 will reset.
- If the MFI system is normal, the MFI relay can be determined as normal. In addition, if the MFI system and scan tool MB991502 or MB991958 can communicate each other, the circuits between the data link connector and the ECM can determined as normal.

  NOTE: If this malfunction appears, MFI system DTC P0513 will be output.

TROUBLESHOOTING HINTS

- Malfunction of the immobilizer-ECU
- Malfunction of the ECM
- The wiring harness or connectors may have loose, corroded, or damaged terminals, or terminals pushed back in the connector

DIAGNOSIS

Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

STEP 1. Check if scan tool MB991502 or MB991958 can communicate with the MFI system and if an MFI system DTC other than P0513 is output.

⚠ CAUTION

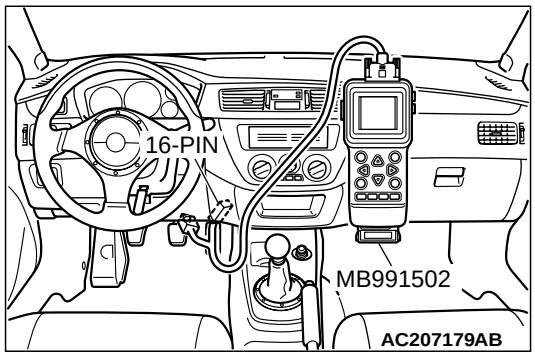
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

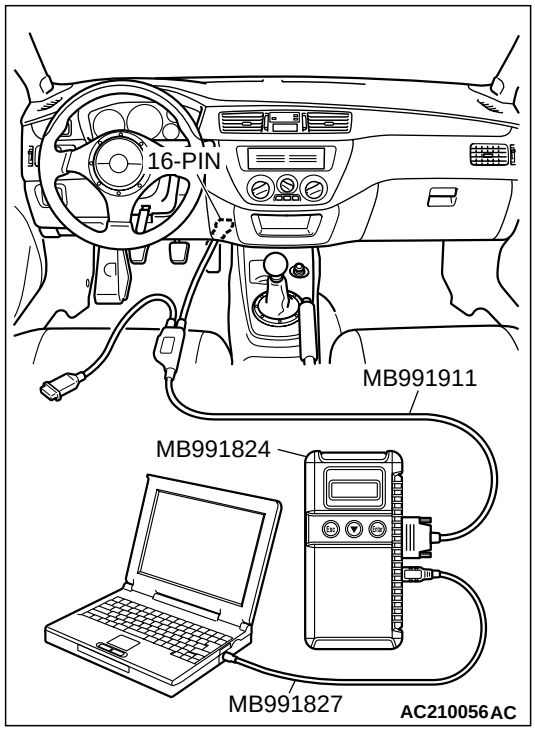
Use scan tool MB991502 or MB991958 to confirm the MFI system DTC.

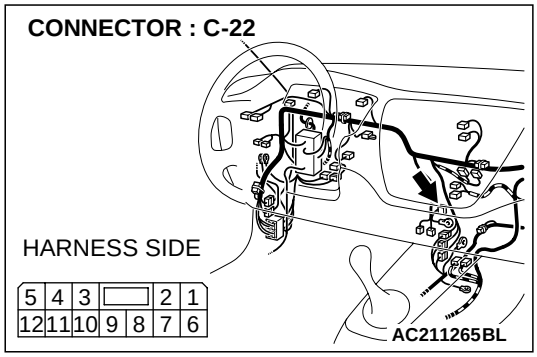
(1) Connect scan tool MB991502 or MB991958 to the data link connector.
(2) Turn the ignition switch "ON" position.
(3) Read the MFI system diagnosis code.

Q: Can scan tool MB991502 or MB991958 communicate with the MFI system? Is an MFI system DTC other than P0513 output?

YES : Go to Step 2.
NO : Refer to GROUP 13A, MFI Diagnosis P.13A-496.





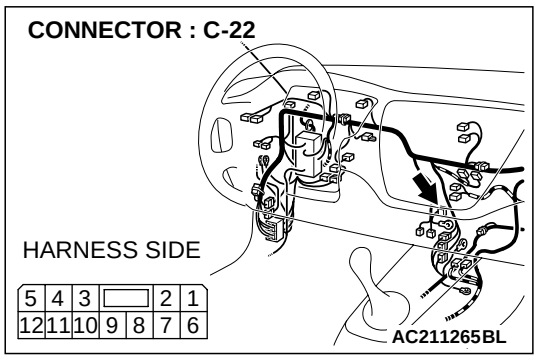


STEP 2. Check immobilizer-ECU connector C-22 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is immobilizer-ECU connector C-22 in good condition?

YES : Go to Step 3.

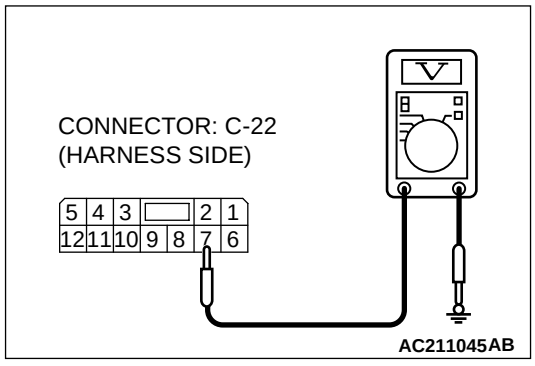
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Confirm that scan tool MB991502 or MB991958 communicates normally.



STEP 3. Check the battery power supply (MFI relay) circuit to the immobilizer-ECU. Measure the voltage at immobilizer-ECU connector C-22.

(1) Disconnect immobilizer-ECU connector C-22 and measure the voltage available at the wiring harness side of the connector.

(2) Turn the ignition switch to the "ON" position.

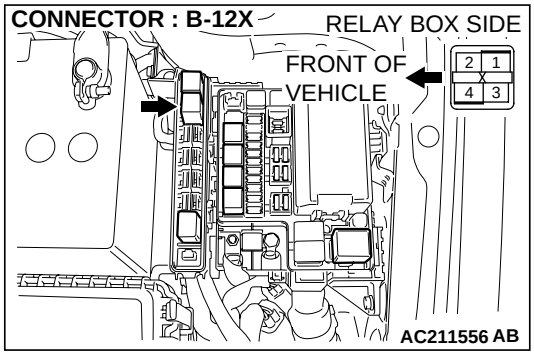


(3) Measure the voltage between terminal 7 and ground.

Q: Is battery voltage (approximately 12 volts) present?

YES : Go to Step 6.

NO : Go to Step 4.

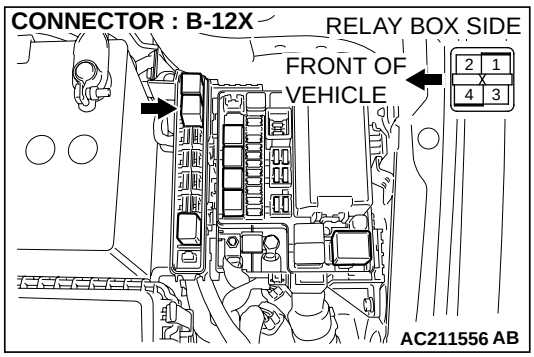


STEP 4. Check MFI relay connector B-12X for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is MFI relay connector B-12X in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Confirm that scan tool MB991502 or MB991958 communicates normally.



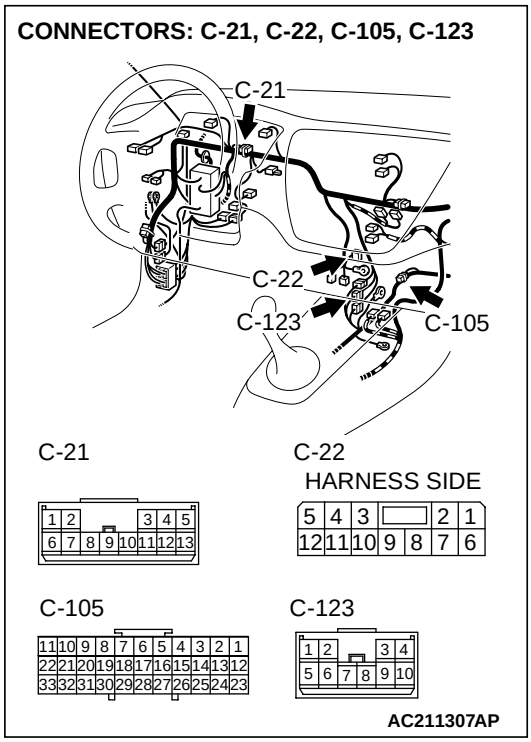
STEP 5. Check the harness wires between immobilizer-ECU connector C-22 (terminal 7) and MFI relay connector B-12X (terminal 4).

NOTE: Also check intermediate connector C-123, joint connector C-21 and C-105 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-123, joint connector C-21 or C-105 is damaged, Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

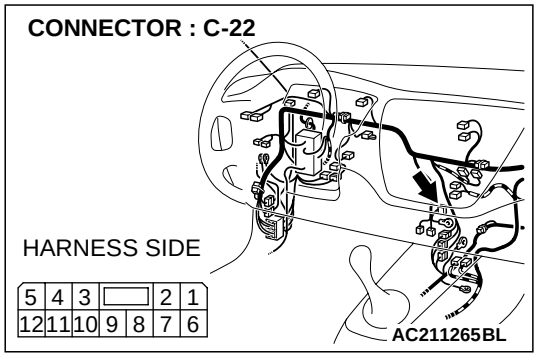
Q: Are the harness wires between immobilizer-ECU connector C-22 (terminal 7) and MFI relay connector B-12X (terminal 4) in good condition?

YES : There is no action to be taken.

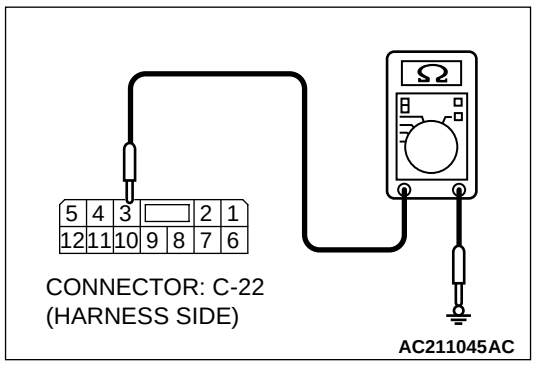
NO : Replace damaged component(s). Confirm that scan tool MB991502 or MB991958 communicates normally.



STEP 6. Check the ground circuit to the immobilizer-ECU. Measure the resistance at immobilizer-ECU connector C-22.



(1) Disconnect immobilizer-ECU connector C-22 and measure the resistance available at the wiring harness side of the connector.

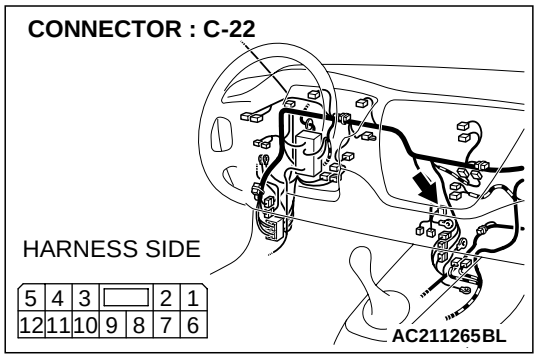


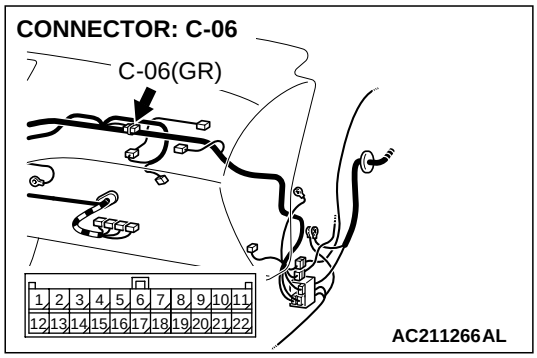
(2) Measure the resistance between terminal 3 and ground.

Q: Is the resistance less than 2 ohms?

YES : Go to Step 8.
NO : Go to Step 7.

STEP 7. Check the harness wire between immobilizer-ECU connector C-22 (terminal 3) and ground.

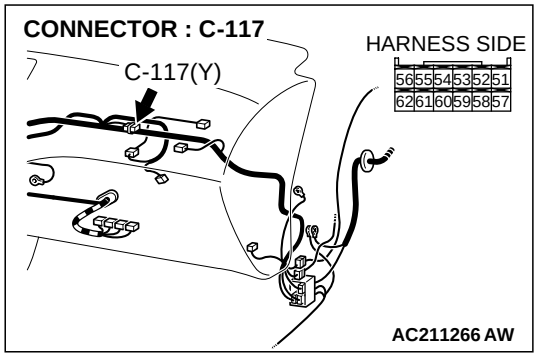




NOTE: Also check joint connector C-06 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-06 is damaged, Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the harness wire between immobilizer-ECU connector C-22 (terminal 3) and ground in good condition?

YES : There is no action to be taken.
NO : Repair or replace the damaged component(s). Confirm that scan tool MB991502 or MB991958 communicates normally.

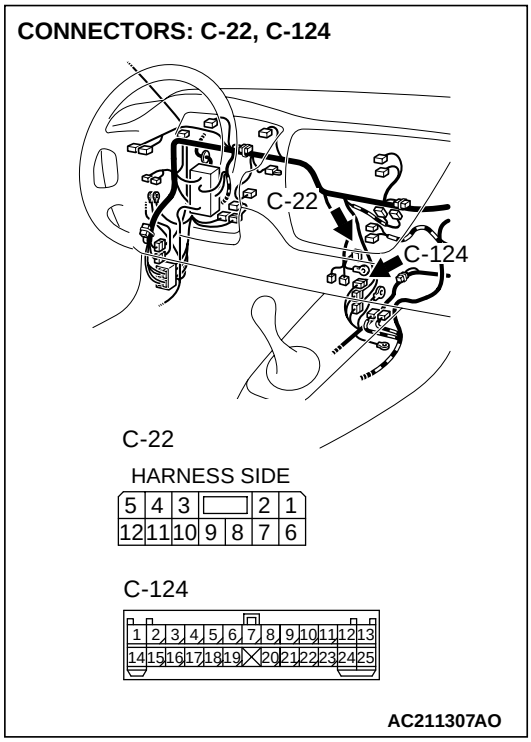


STEP 8. Check ECM connector C-117 for loose, corroded or damaged terminals, or terminal pushed back in the connector.

Q: Is ECM connector C-117 in good condition?

YES : Go to Step 9.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Confirm that scan tool MB991502 or MB991958 communicates normally.



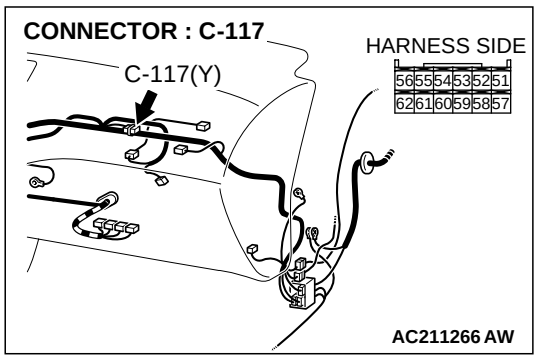
STEP 9. Check the harness wires between immobilizer-ECU connector C-22 (terminal 5) and ECM connector C-117 (terminal 51).

NOTE: Also check intermediate connector C-124 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-124 is damaged, Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Are the harness wires between immobilizer-ECU connector C-22 (terminal 5) and ECM connector C-117 (terminal 51) in good condition?

YES : Go to Step 10.

NO : Repair or replace the damaged component(s). Confirm that scan tool MB991502 or MB991958 communicates normally.



STEP 10. Replace the immobilizer-ECU or ECM.
Replace the immobilizer-ECU or ECM.

Q: Did the communication with the scan tool become possible after replacing the immobilizer-ECU or the engine control module?

YES : Register the password (secret code) and encrypted code P.54A-38. Confirm that scan tool MB991958 communicates normally

NO : Go to Step 11.

STEP 11. Recheck for malfunction.

Q: Is a malfunction eliminated?

YES : The procedure is complete. (If no malfunction are not found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00E-2).

NO : Replace the immobilizer-ECU or ECM.

INSPECTION PROCEDURE 2: The Ignition Key cannot be Registered.

TECHNICAL DESCRIPTION (COMMENT)
The ignition key transponder or the immobilizer-ECU is suspected to be defective.

TROUBLESHOOTING HINTS
- Malfunction of the ignition key
- Malfunction of immobilizer-ECU

DIAGNOSIS

Required Special Tools:
- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

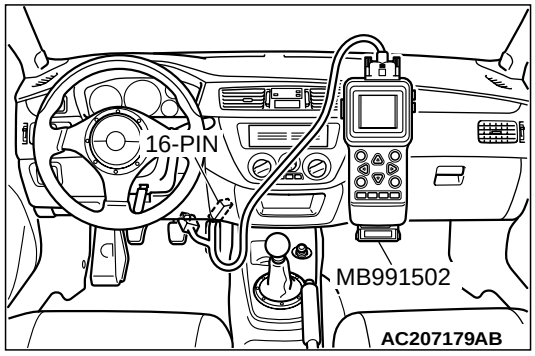
STEP 1. Using scan tool MB991502 or MB991958, read the diagnostic trouble code (DTC).

⚠ CAUTION

To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

Use scan tool MB991502 or MB991958 to check if DTC 11 is set.

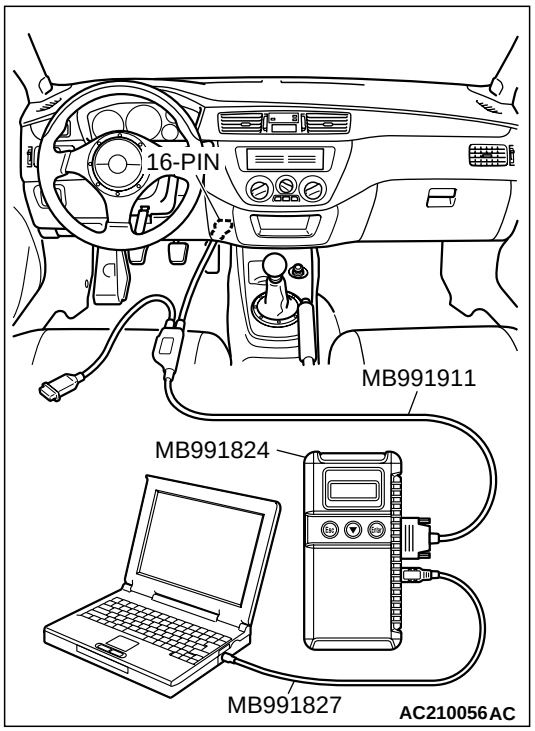
(1) Connect scan tool MB991502 or MB991958 to the data link connector.
(2) Turn the ignition switch "ON" position.
(3) Read the immobilizer system diagnosis code.



Q: Does DTC11 reset?

YES : Refer to P.54A-10.

NO : Replace the ignition key that cannot be registered. Then re-register the encrypted code. (Refer to P.54A-38). Verify that the ignition key can be registered, then Go to Step 2.



STEP 2. Retest the system.

Q: Does registered ignition key function properly?

YES : The procedure is complete. (If no malfunction are not found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6).

NO : Replace the immobilizer-ECU.

INSPECTION PROCEDURE 3: Engine Cranks, but does not Start.

TECHNICAL DESCRIPTION

If the engine cranks, but does not start, an MFI system problem may exist in addition to a malfunctioning immobilizer system. The engine will not start if the ignition key has not been properly registered.

TROUBLESHOOTING HINTS

- Malfunction of MFI system
- Malfunction of immobilizer-ECU

DIAGNOSIS

Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

STEP 1. Check the battery voltage.

Measure the battery voltage during cranking.

Q: Is the voltage 8 volts or more?

YES : Go to Step 2.

NO : Check the condition of the battery. Refer to P.54A-3.

STEP 2. Using scan tool MB991502 or MB991958, read the MFI system diagnostic trouble code (DTC).

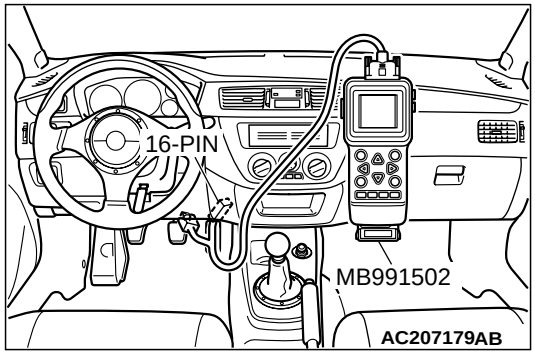
⚠ CAUTION

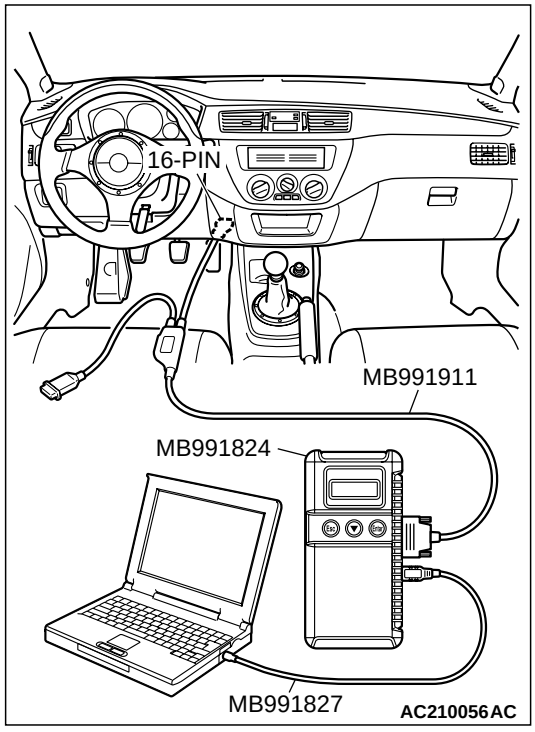
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

(1) Connect scan tool MB991502 or MB991958 to the data link connector.
(2) Turn the ignition switch "ON" position.
(3) Read the diagnosis code.

Q: Have any DTCs set?

Yes : Go to Step 3.
No : Go to Step 5.





STEP 3. Check for immobilizer system DTCs.

Q: Have any immobilizer system DTCs set?

YES : Refer to P.54A-10.
NO : Go to Step 4.

STEP 4. Check for MFI system DTCs.

Q: Have any MFI system DTCs set?

YES : Refer to GROUP 13A, Diagnosis P.13A-25.
NO : Go to Step 5.

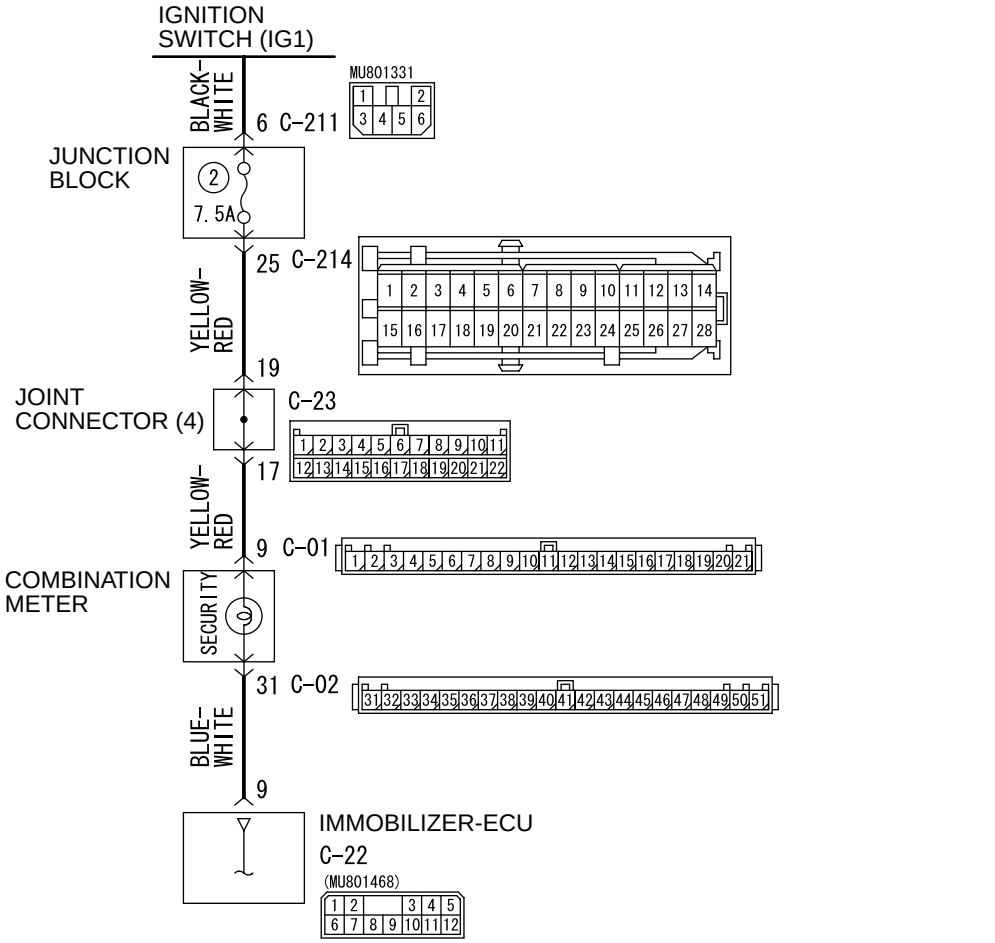
STEP 5. Attempt to start the engine.

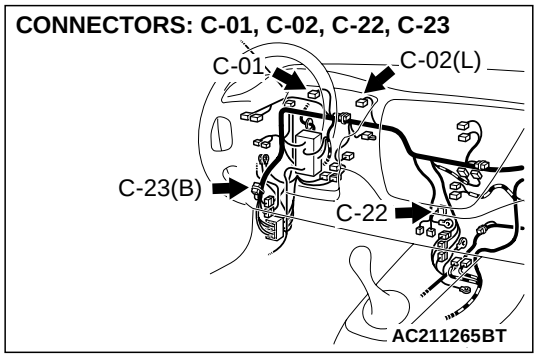
Q: Does the engine start?

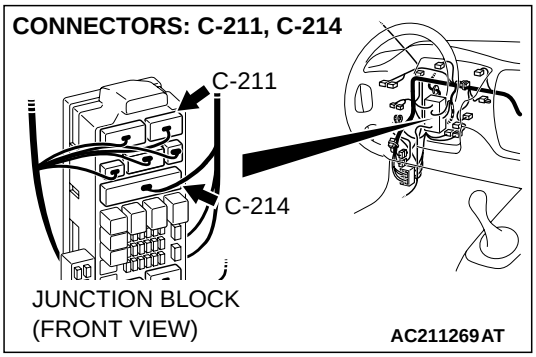
YES : The procedure is complete (If no malfunctions are found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6).

NO : Refer to GROUP 13A, Diagnosis – Symptom Chart P.13A-27. If the malfunction is not resolved, replace the immobilizer-ECU. Then register the password (secret code) and encrypted code. (Refer to P.54A-38). The engine should now start.

INSPECTION PROCEDURE 4: The Immobilizer Indicator Light does not Illuminate.







CIRCUIT OPERATION

If the requirements for starting the engine are not satisfied, the immobilizer-ECU flashes the immobilizer indicator for 30 seconds.

TECHNICAL DESCRIPTION (COMMENT)

The immobilizer indicator light or a malfunction of the combination meter or immobilizer-ECU.

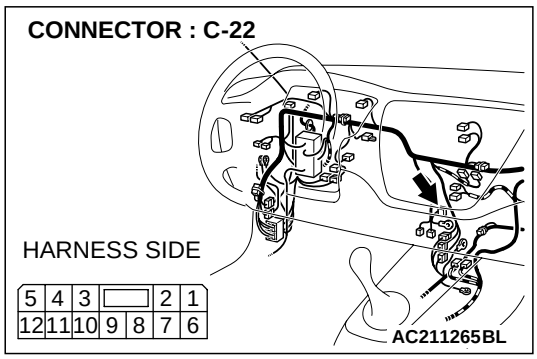
TROUBLESHOOTING HINTS

- Malfunction of combination meter
- Malfunction of immobilizer-ECU
- Damaged harness wires or connectors

DIAGNOSIS

Required Special Tools:

- MB991223: Harness

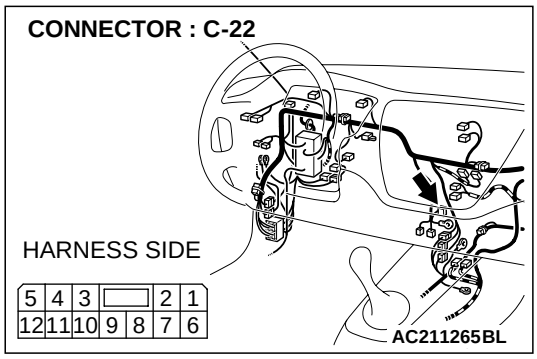


STEP 1. Check immobilizer-ECU connector C-22 for loose, corroded or damaged terminals, or terminals pushed back in the connector

Q: Is immobilizer-ECU connector C-22 in good condition?

YES : Go to Step 2.

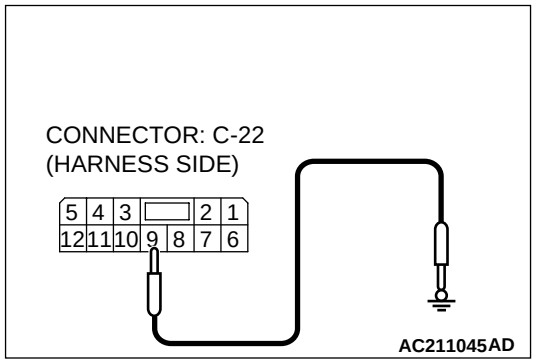
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Confirm that scan tool MB991958 communicates normally.



STEP 2. Check at immobilizer-ECU connector C-22 in order to check the immobilizer indicator light circuit.

(1) Disconnect immobilizer-ECU C-22, and measure at the wiring harness side.

(2) Turn the ignition switch to the "ON" position.

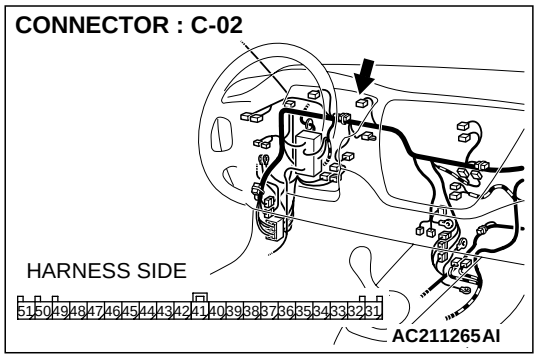


(3) Connect terminal 9 to the ground.

Q: Does only the immobilizer indicator light illuminate? (other indicator lights are in good condition)

YES : Replace the immobilizer-ECU. Then register the password (secret code) and encrypted code P.54A-38.

NO : Go to Step 3.



STEP 3. Check combination meter connector C-02 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is combination meter connector C-02 in good condition?

YES : Go to Step 4.

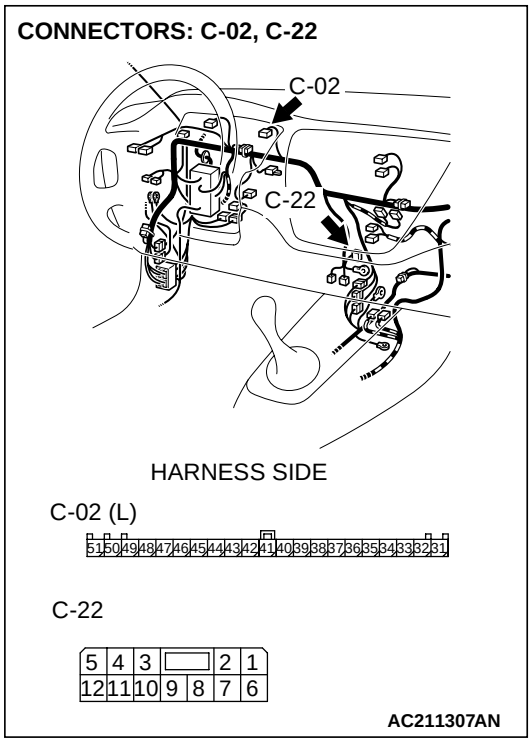
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Confirm that scan tool MB991958 communicates normally.

STEP 4. Check the wiring harness between combination meter connector C-02 (terminal 31) and immobilizer-ECU connector C-22 (terminal 9).

Q: Is the wiring harness between combination meter connector C-02 (terminal 31) and immobilizer-ECU connector C-22 (terminal 9) in good condition?

YES : Go to Step 5.

NO : Repair the wiring harness. Check to see that all meters operate.

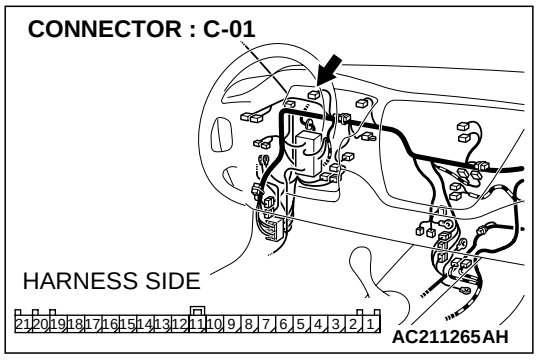


STEP 5. Check combination meter connector C-01 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

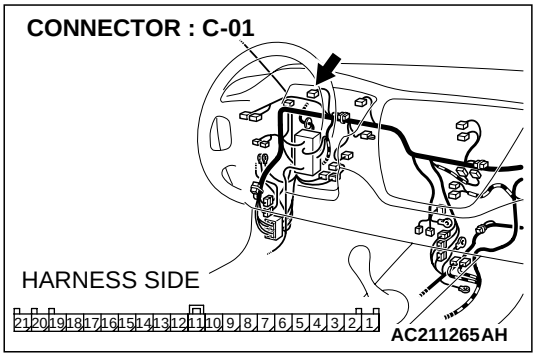
Q: Is combination meter connector C-01 in good condition?

YES : Go to Step 6.

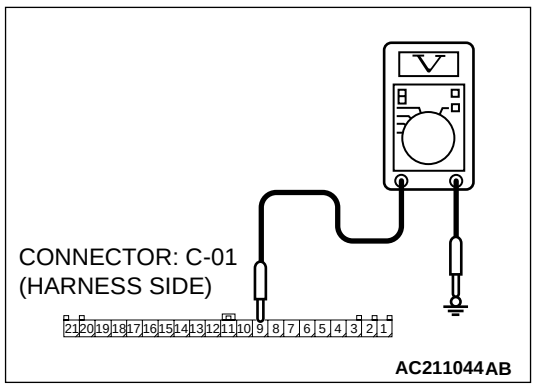
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Confirm that scan tool MB991958 communicates normally.



STEP 6. Check the ignition switch (IG1) circuit to the combination meter. Measure the voltage at combination meter connector C-01.



(1) Disconnect combination meter connector C-01 and measure the voltage available at the wiring harness side of the connector.
(2) Turn the ignition switch to the "ON" position.

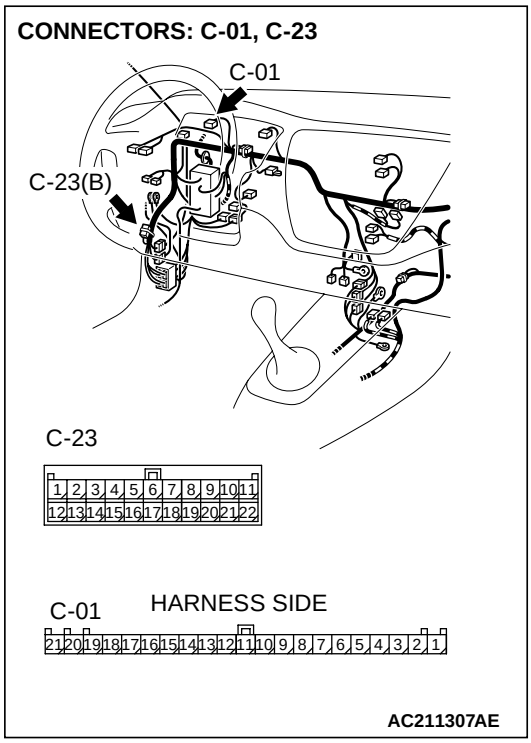


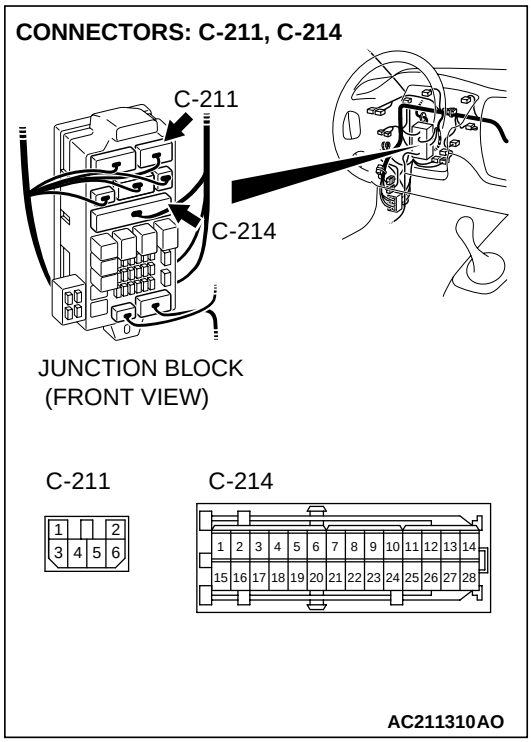
(3) Measure the voltage between terminal 9 and ground.
- The measured value should be approximately 12 volts (battery positive voltage).

Q: Is battery voltage (approximately 12 volts) present?

YES : Go to Step 8.
NO : Go to Step 7.

STEP 7. Check the wiring harness between combination meter connector C-01 (terminal 9) and the ignition switch (IG1).





NOTE: Also check junction block connector C-211 and C-214 and joint connector C-23 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If junction block connector C-211 or C-214 or joint connector C-23 is damaged, Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between combination meter connector C-01 (terminal 9) and the ignition switch (IG1) in good condition?

YES : Go to Step 8.

NO : Repair the wiring harness. Check to see that all meters operate.

STEP 8. Retest the system.

Q: Is the malfunction eliminated?

YES : The procedure is complete. (If no malfunctions are not found in all steps, an intermittent malfunction is suspected. Refer to GROUP 00, How to Use Troubleshooting/Inspection Service Point P.00-6).

NO : Go to Step 1.

DATA LIST REFERENCE TABLE

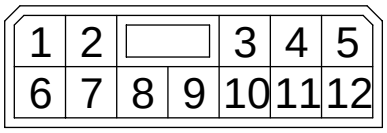
M1543007300273

MUT-III SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM	INSPECTION REQUIREMENT	NORMAL CONDITION
REGD.KEY	01	Key has been registered	-	Number of registered ignition keys
TP LOCK CHECK	02	Determining whether the ignition key can be registered or not	UNLOCK	Can be overwritten (Correct)
			LOCK	Can not be overwritten (Incorrect)

CHECK AT IMMOBILIZER-ECU

M1543007600412

Terminal Voltage Check

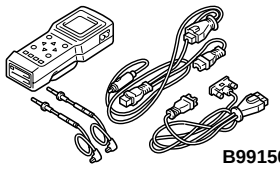
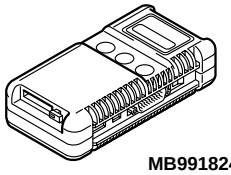
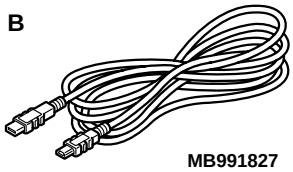
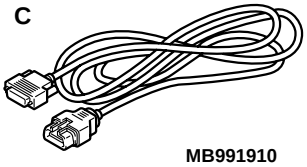
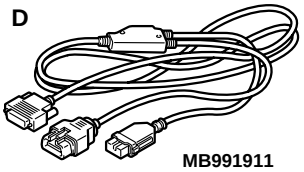
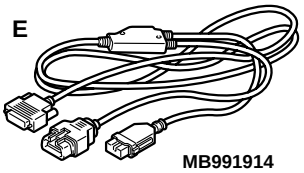
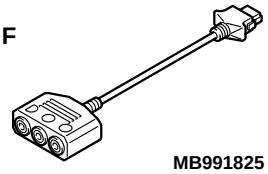
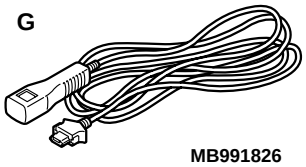


AC211809

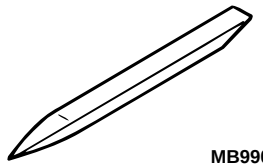
TERMINAL NO.	SIGNAL	CHECKING REQUIREMENT	TERMINAL VOLTAGE
1	Stoplight switch	ON (When brake pedal is depressed)	Battery positive voltage
		OFF (When brake pedal is not depressed)	0V
3	Immobilizer-ECU ground	Always	0V
5	powertrain control module	-	-
7	Immobilizer-ECU power supply	Ignition switch: "LOCK" (OFF)	0V
		Ignition switch: "ON"	Battery positive voltage
9	Immobilizer indicator light	When immobilizer indicator light is illuminated	Approximately 5 volts
		When immobilizer indicator light is not illuminated	0V
10	ignition key ring antenna	-	-
11	ignition key ring antenna	-	-

SPECIAL TOOLS

M1543000601049

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 B991502	MB991502 Scan tool (MUT-II)	MB991496-OD	• Checking the ETACS-ECU input signals
A  MB991824 B  MB991827 C  MB991910 D  MB991911 E  MB991914 F  MB991825 G  MB991826 MB991958	MB991958 A: MB991824 B: MB991827 C: MB991910 D: MB991911 E: MB991914 F: MB991825 G: MB991826 MUT-III Sub Assembly A: Vehicle Communication Interface B: MUT-III USB Cable C: MUT-III Main Harness A (Vehicles with CAN communication system) D: MUT-III Main Harness B (Vehicles without CAN communication system) E: MUT-III Main Harness C (Vehicles without CAN communication system) F: MUT-III Adapter Harness G: MUT-III Trigger Harness	MB991956-OD	• Reading diagnostic trouble code • Estimated vehicle speed sent **⚠ CAUTION** **MUT-III main harness B (MB991911) should be used. MUT-III main harness A and C should not be used for this vehicle.**

TSB Revision

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 MB990784	MB990784 Ornament remover	General service tool	Removal of trim, etc.

ON-VEHICLE SERVICE

HOW TO REGISTER ENCRYPTED CODE

M1543008100379

Required Special Tool:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)

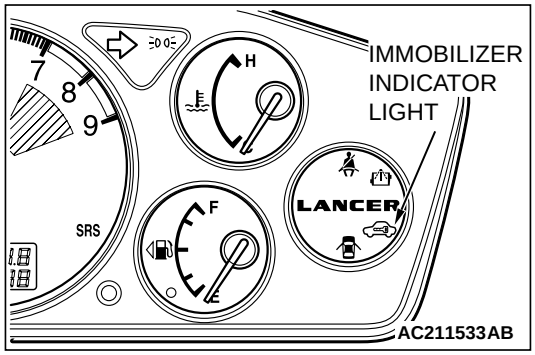
⚠ CAUTION

Because registering the encrypted codes is done after all previously-registered codes have been erased, you should keep all of the ignition keys that have already been registered accessible.

If the ignition key, Immobilizer-ECU, ECM is replaced or an ignition key is added, encrypted codes of all the ignition keys must be registered. (A maximum of eight different ignition key can be registered). Moreover, when the immobilizer-ECU has been replaced, you will need to use scan tool MB991958 to register the immobilizer-ECU and input the vehicle secret code and to register the password (secret code) that the owner specifies into the immobilizer-ECU.

If an attempt is made to start the engine with an unregistered ignition key, cranking occurs, but fuel supply is cut off to disable the engine. In approx. 10 seconds, the immobilizer indicator will blink for approx. 30 seconds.

NOTE: ECM has an encrypted code for immobilizer-ECU, and the encrypted code is registered in the immobilizer-ECU and ignition key.



POINTS TO NOTE DURING OPERATION

If none of the functions can be used, check the diagnostic trouble codes, and after carrying out any necessary repairs, repeat the operation.

If an incorrect password is input five times in a row, the immobilizer-ECU judges that an unauthorized operation is being attempted. Start-prevention mode will be set, and engine operation will stop and all special functions will be disabled. If the ignition switch is turned to "ON" position and left in that position for approximately 20 minutes, "Unauthorized operation, start-prevention mode" will be cancelled.

TSB Revision

KEY ID REGISTRATION

All ignition keys can be registered with scan tool MB991502 or MB991958. Additional ignition keys can be registered with or without scan tool MB991502 or MB991958.

Registration with the scan tool MB991502

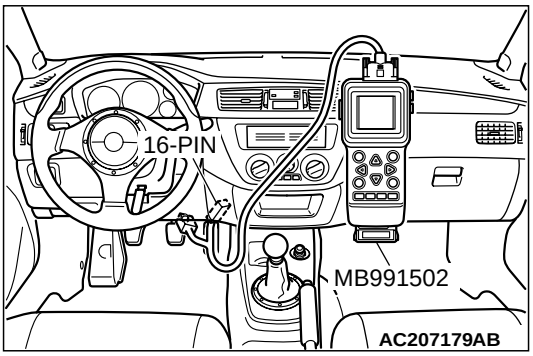
⚠ CAUTION

To prevent damage to scan tool MB991502, always turn the ignition switch to "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

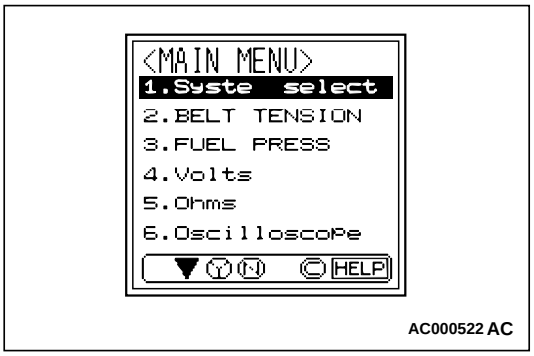
NOTE: Using the key ID register function will cause all key IDs that have been previously registered in the immobilizer-ECU to be erased. All keys need to be registered. Those which have been registered before should be on hand before using this function.

NOTE: If registering more than one key, do not disconnect scan tool MB991502 halfway through the registration process.

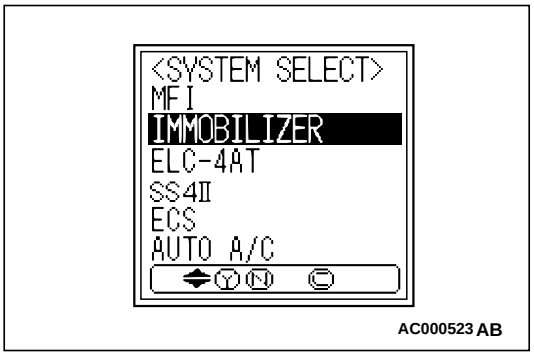
NOTE: After registering key IDs, check that the engine can be started using all of the keys that have been registered. If the engine will not start, refer to Immobilizer System Diagnosis P.54A-7.



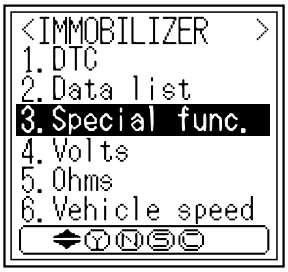
1. Connect scan tool MB991502 to data link connector (16-pin).
2. Turn the ignition switch to "ON" position.



3. At "System Select," press "YES".



4. Select "Immobilizer, " press "YES".



AC000530 AB

5. Select "Special Func," press "YES".
   If DTC 11 exists, "Can't execute" will be displayed. Check for DTC 11. (Refer to P.54A-10.)

AC000518 AB

AC101475

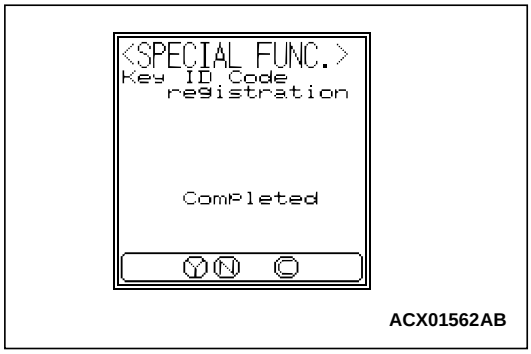
6. Select "key ID register, " press "YES".

ACX01626AB

7. Input the password. Use the "UP" and "DOWN" keys to change the current password digit to a value between 0 and 9. Use the "LEFT" and "RIGHT" keys to move to a different password digit. Press the "YES" key to accept the password.
   If an incorrect password is input five times in a row, this screen is displayed and the Immobilizer-ECU switches to unauthorized operation, start-prevention mode.
   NOTE: Four separate digits must be input to make up the password.

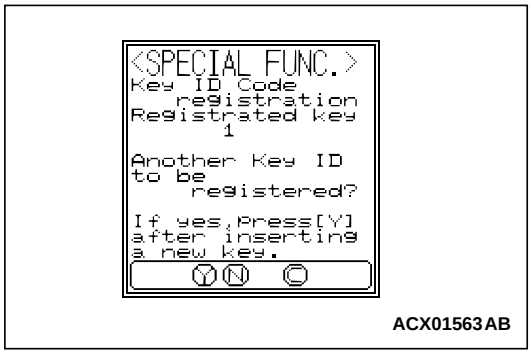
ACX01561AC

8. Press the "YES" key to start key ID registration.



ACX01562AB

9. This will be displayed when the key ID registration is successful. If an error occurs during key ID registration, the message "Can't execute" will be displayed. If the key has already been registered, "Key ID has been registered" will be displayed.



ACX01563AB

10. The number of keys currently registered will be displayed. To register an additional key, replace the ignition key with the next key to be registered within five seconds and then press the "YES" key. Key ID registration screen will be displayed, then register another key.
    If key ID registration is complete, press the "NO" key.
    NOTE: A maximum of eight different keys can be registered.
11. This completes the registration operation. Turn the ignition switch "LOCK" (OFF) and leave it off for approximately ten seconds.
12. Check that the engine can be started with each of the ignition keys.
13. Check that the immobilizer system DTC and MFI system DTC did not set.
14. Turn the ignition switch to "LOCK" (OFF) position.
15. Disconnect scan tool MB991502.

Registration of additional keys with the scan tool MB991502

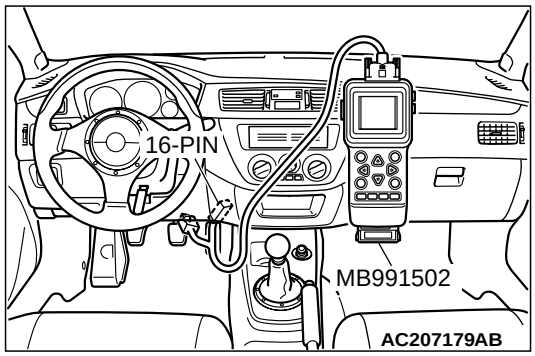
An additional key is registered with the scan tool while keeping all existing key data.

⚠ CAUTION

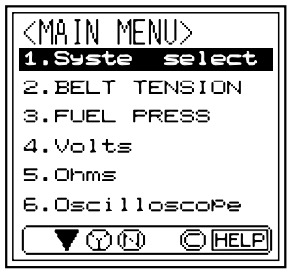
To prevent damage to scan tool MB991502, always turn the ignition switch to "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

NOTE: To register additional keys with the scan tool, no registered keys must be lost.

1. Connect scan tool MB991502 to data link connector (16-pin).
2. Turn the ignition switch to "ON" position.

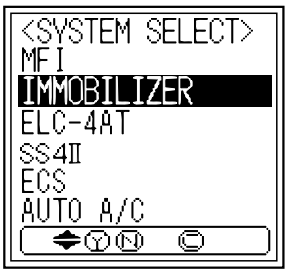


AC207179AB



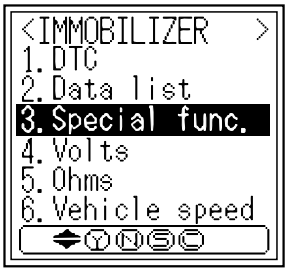
AC000522 AC

3. At "System Select," press "YES".



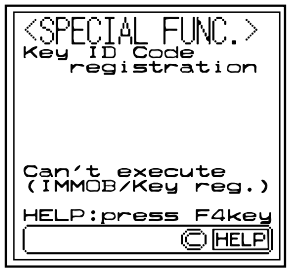
AC000523 AB

4. Select "Immobilizer," press "YES".



AC000530 AB

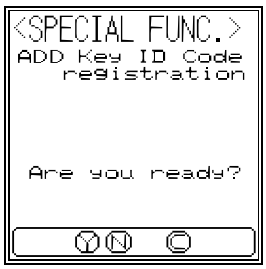
5. Select "Special Func," press "YES".
   If DTC 11 exists, "Can't execute" will be displayed. Check for DTC 11. (Refer to P.54A-10.)



AC000518 AB

AC101478

6. Select "Add key ID reg," press "YES".



AC101477

7. Press the "YES" key to start key ID registration.
8. This will be displayed when the add key ID registration is successful. If an error occurs during key ID registration, the message "Can't execute" will be displayed. If the key has already been registered, "Key ID has been registration" will be displayed.

AC101476

9. The number of keys currently registered will be displayed. To register an additional key, replace the ignition key with the next key to be registered within five seconds and then press the "YES" key. Key ID registration screen will be displayed, then register another key.
   If key ID registration is complete, press the "NO" key.
   NOTE: A maximum of eight different keys can be registered.
10. This completes the registration operation. Turn the ignition switch "LOCK" (OFF) and leave it off for approximately ten seconds.
11. Check that the engine can be started with each of the ignition keys.
12. Check that the immobilizer system DTC and MFI system DTC did not set.
13. Turn the ignition switch to "LOCK" (OFF) position.
14. Disconnect scan tool MB991502.

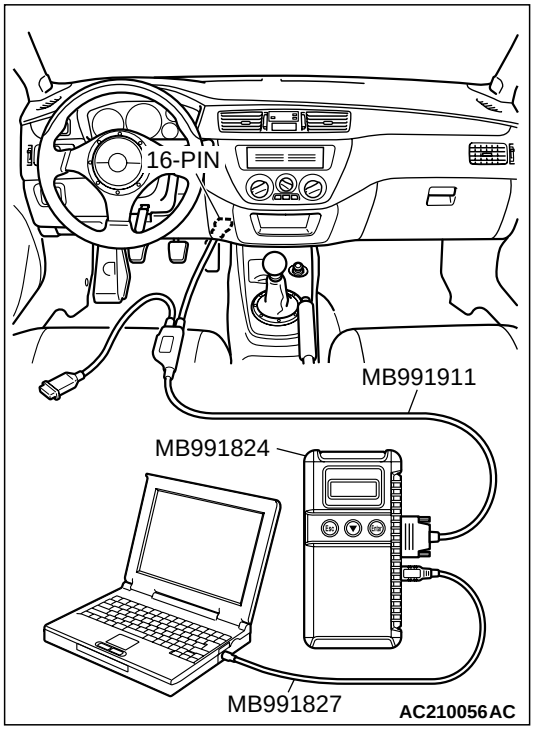
Registration with the scan tool MB991958

⚠ CAUTION

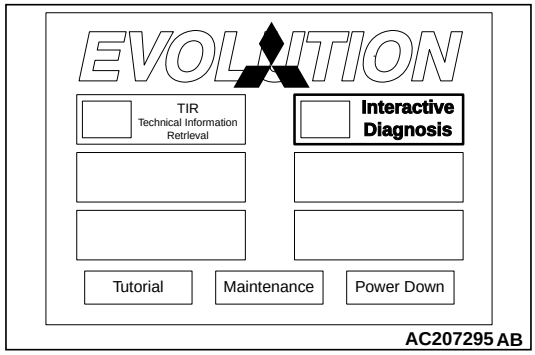
To prevent damage to scan tool MB991958, always turn the ignition switch to "LOCK" (OFF) position before connecting or disconnecting scan tool MB991958.

NOTE:

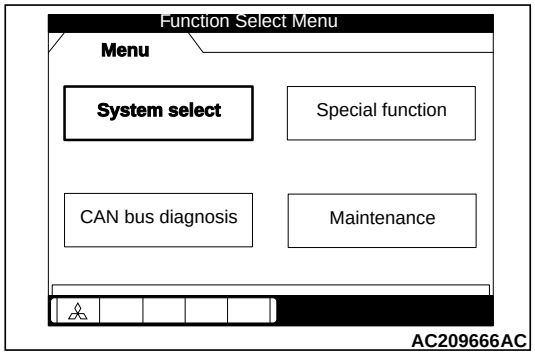
- *Before registration, check that no DTC code is set. If a DTC code is set, resolve the problem beforehand.*
- *Using the key ID register function will cause all key IDs that have been previously registered in the immobilizer-ECU to be erased. All keys need to be registered. Those which have been registered before should be on hand before using this function.*
- *If registering more than one key, do not disconnect scan tool MB991958 halfway through the registration process.*
- *After registering key IDs, check that the engine can be started using all of the keys that have been registered. If the engine will not start, refer to Immobilizer System Diagnosis* *P.54A-7.*



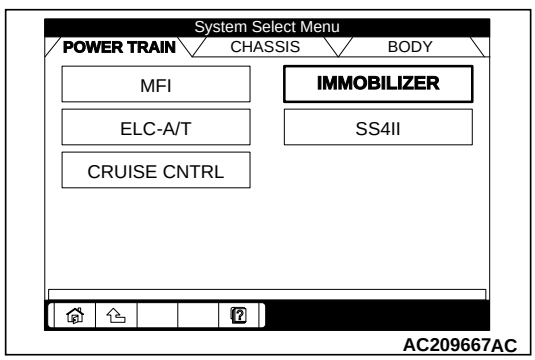
1. Connect the scan tool MB991958 to the data link connector.
2. Turn the ignition switch to "ON" position.



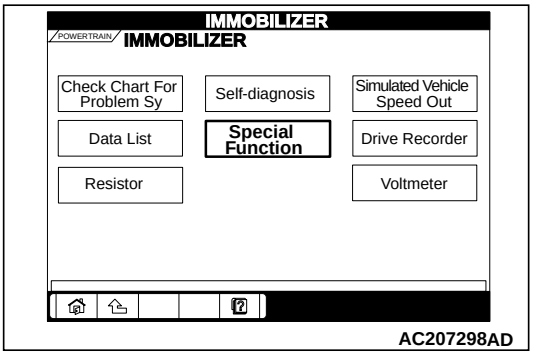
3. Select "Interactive Diagnosis" from the start-up screen.



4. Select "System select."

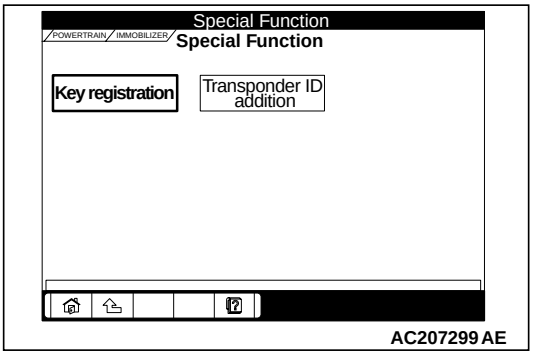


5. Choose "IMMOBILIZER" from the "POWER TRAIN" tab.



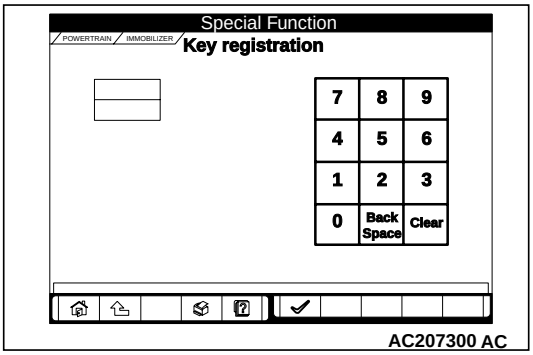
AC207298AD

6. Choose "Special Function" from "IMMOBILIZER" screen.



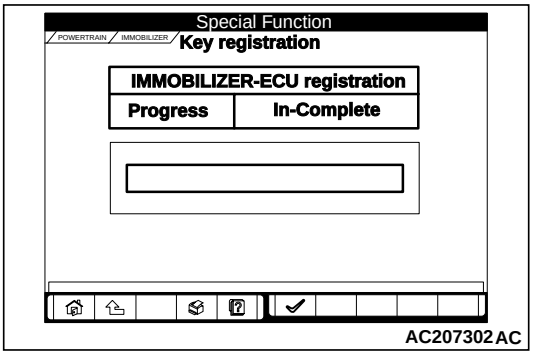
AC207299 AE

7. Choose "Key registration" from "Special Function" screen.



AC207300 AC

8. Enter your password from "Key registration" screen, and then click the check mark icon.



AC207302 AC

9. If the key ID was registered successfully, "Progress" indication will turn active (gray). Then the registration process completes. If the key ID failed to be registered, "In-Complete" indication will turn active (gray).
10. The number of keys currently registered will be displayed. To register an additional key, replace the ignition key with the next key to be registered within five seconds. Key ID registration screen will be displayed, then register another key.

    NOTE: A maximum of eight different keys can be registered.
11. This completes the registration operation. Turn the ignition switch "LOCK" (OFF) and leave it off for approximately ten seconds.
12. Check that the engine can be started with each of the ignition keys.
13. Check that the immobilizer system DTC and MFI system DTC did not set.
14. If not DTC is shown, terminate the MUT-III.
15. Turn the ignition switch to "LOCK" (OFF) position.
16. Disconnect scan tool MB991958.

TSB Revision

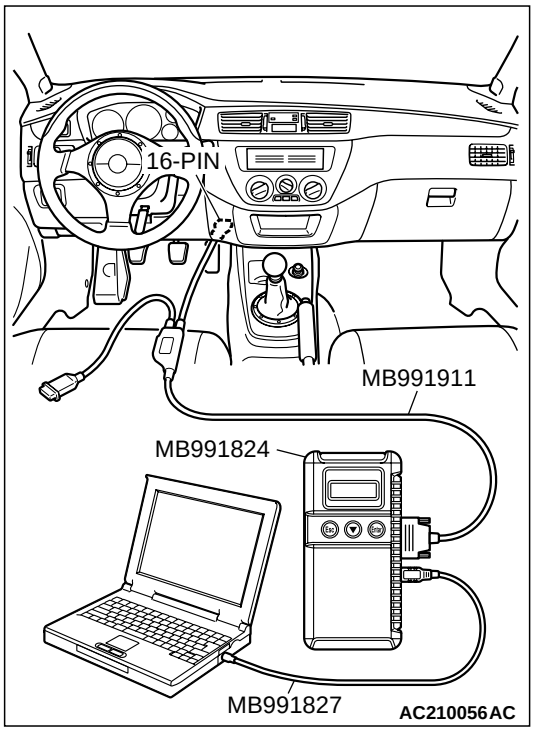
Registration of additional keys with the scan tool MB991958

Additional key(s) can be registered with the scan tool while keeping all existing key data.

⚠ CAUTION

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

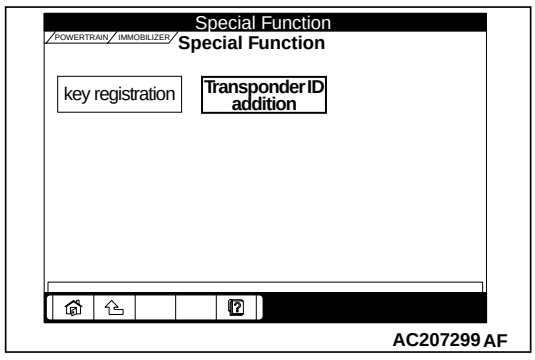
NOTE: To register additional keys with the scan tool, no registered keys must be lost.



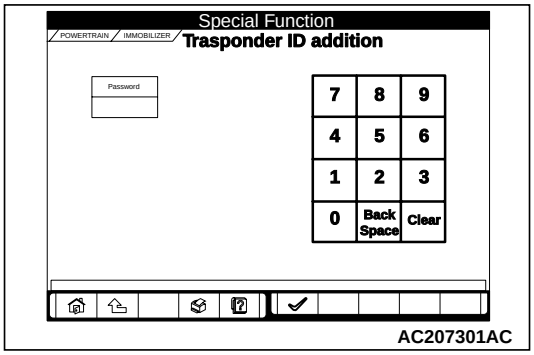
1. Connect scan tool MB991958 to the 16-pin data link connector.
2. Turn the ignition switch to "ON" position.

NOTE: Before registration, check that no DTC code is set. If a DTC code is set, resolve the problem beforehand.

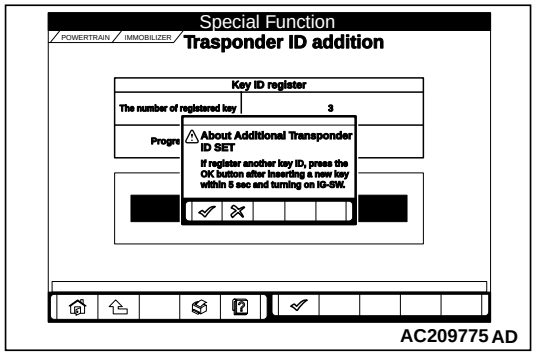
3. Carry out steps 3 to 6 of the sub-section "Registration with scan tool."



4. Choose "Transponder ID addition" from "Special Function" screen.



5. Enter your password from "Transponder ID addition" screen, and then click the check mark icon.



6. If an additional registration is made successfully, the screen will ask if another key is registered or not. If the third ignition key is registered, remove the key, which has been registered. Then insert the third key within five seconds, and then turn it to the ON position.
7. Register the additional ignition key according to step 6 above. The number of the registered ignition keys are shown on "The number of registered key" screen.

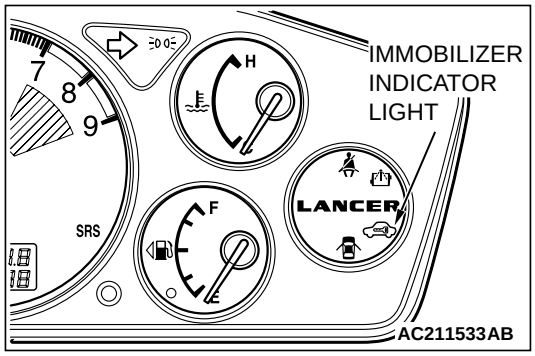
   NOTE: A maximum of eight different keys can be registered.
8. This completes the registration operation. Turn the ignition switch "LOCK" (OFF) and leave it off for approximately ten seconds.
9. Check that the engine can be started with each of the ignition keys.
10. Check that the immobilizer system DTC and MFI system DTC did not set.
11. If not DTC is shown, terminate the MUT-III.
12. Turn the ignition switch to "LOCK" (OFF) position.
13. Disconnect scan tool MB991958.

Registration of additional key(s) without using the scan tool

If the scan tool is not available, new key(s) can be registered by operating two keys which have been registered to the vehicle (A maximum of eight keys can be registered to one vehicle). Follow the procedure below to register new key(s) to the vehicle.

NOTE: The registered key is the key that allows you to start the engine.

1. Turn "ON" the ignition switch by using the first registered key (key A), and wait for five seconds.
2. Remove the first registered key (key A).
3. Insert the second registered ignition key (key B), and turn it to the ON position.
4. After approximately 10 seconds the immobilizer indicator light should flash, and then additional registration mode is entered.
5. Check the immobilizer indicator light flashes, and then remove the second registered key (key B).
6. Insert the third ignition key, and turn it to the ON position.
7. The immobilizer-ECU identifies the new key to accept or reject it, and operates the immobilizer indicator (See the table below).



The new key is:	Registration is:	Immobilizer indicator:	
		Operation	Timing
Not registered yet	Accepted	Illuminates for three seconds	In approximately three seconds after the ignition key(s) have been registered
Already registered	Rejected	Illuminates for three seconds	In approximately three seconds after the ECU judges that the keys have been registered
Read error	Rejected	Extinguished	After the ECU detects a read error

8. If a new ignition key is registered further, repeat steps 1 to 7 above.

A maximum of eight ignition keys can be registered to one vehicle (If you attempt to register the ninth key, the immobilizer-ECU rejects the key). If any of the following conditions are satisfied, the additional key registration mode will terminate:

- The ignition switch has been on for more than 30 seconds.
- After the ignition key has been turned to the "LOCK" (OFF), the engine control relay is turned off.
- The scan tool has started communicating with vehicle systems.

9. After the registration mode has terminated, the additionally registered key(s) should allow you to start the engine.

TRANSPONDER LOCK CHECK

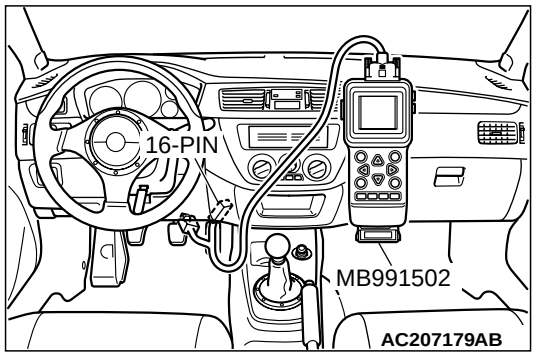
M1543024100078

<When using the MUT-II>

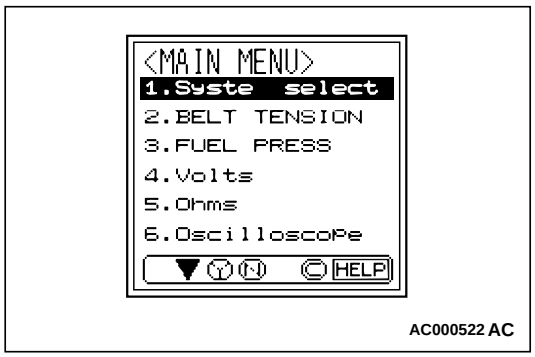
Required Special Tool:

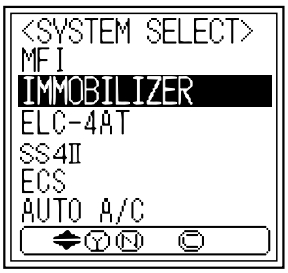
- MB991502: Scan Tool (MUT-II)

1. Connect scan tool MB991502 to the 16-pin data link connector.
2. Turn the ignition switch to "ON" position.

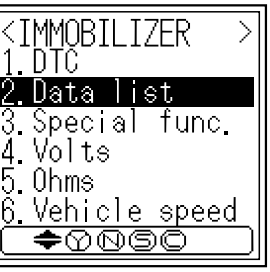


3. At "System Select," press "YES."

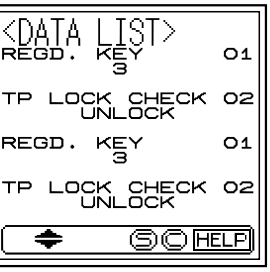




4. Select "Immobilizer," press "YES".



5. Select "Data list" press "YES".



6. Confirm "TP LOCK CHECK."

TP LOCK CHECK	IGNITION KEY:	JUDGMENT OF IGNITION KEY
UNLOCK	Can be overwritten	Correct
LOCK	Can not be overwritten	Incorrect

<When using the MUT-III>

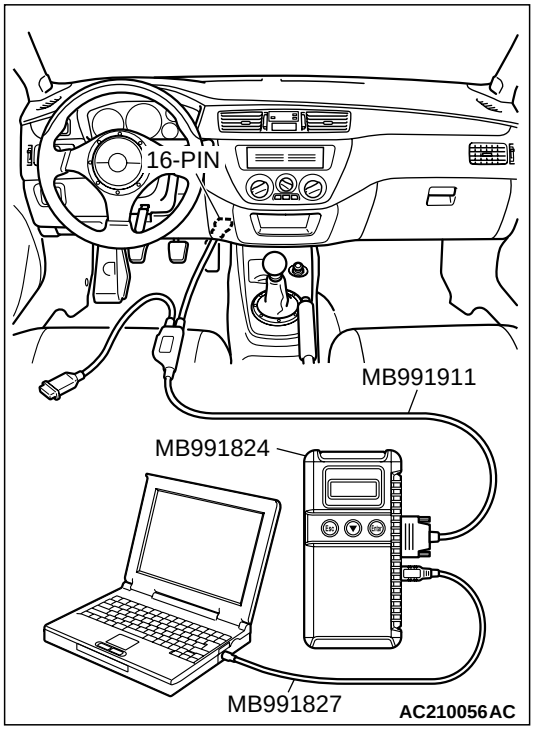
Required Special Tools:

- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

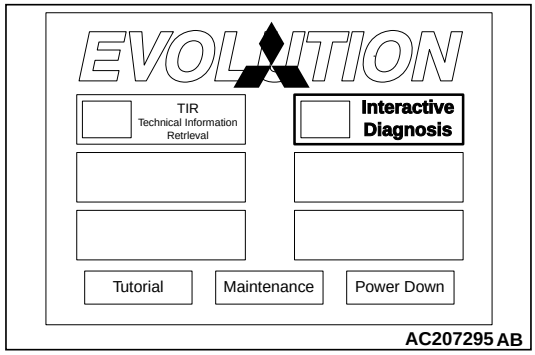
⚠ CAUTION

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

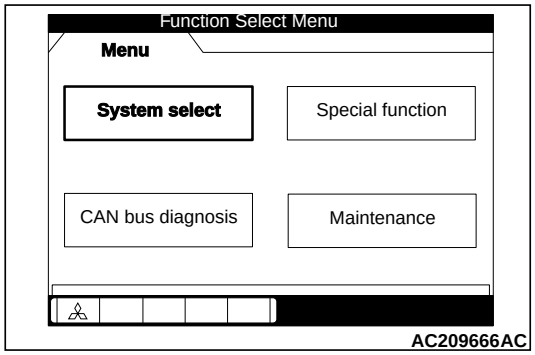
Follow the procedure below to judge if the ignition key can be overwritten (i.e. the ignition key is correct) or not.



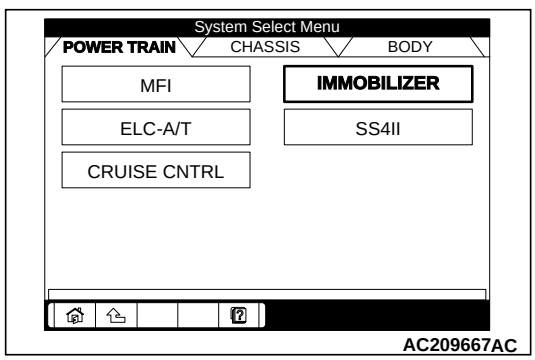
1. Connect the scan tool MB991958 to the data link connector.
2. Turn the ignition switch to "ON" position.



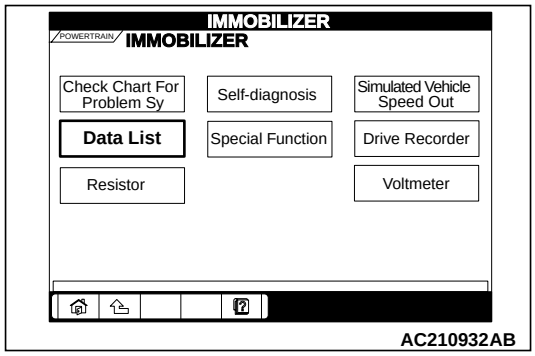
3. Select "Interactive Diagnosis" from the start-up screen.



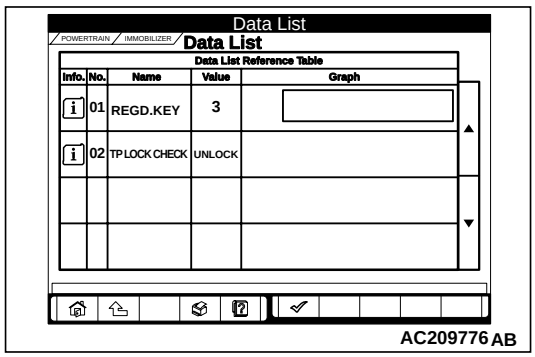
4. Select "System select."



5. Choose "IMMOBILIZER" from the "POWER TRAIN" tab.



6. Select "Data List."



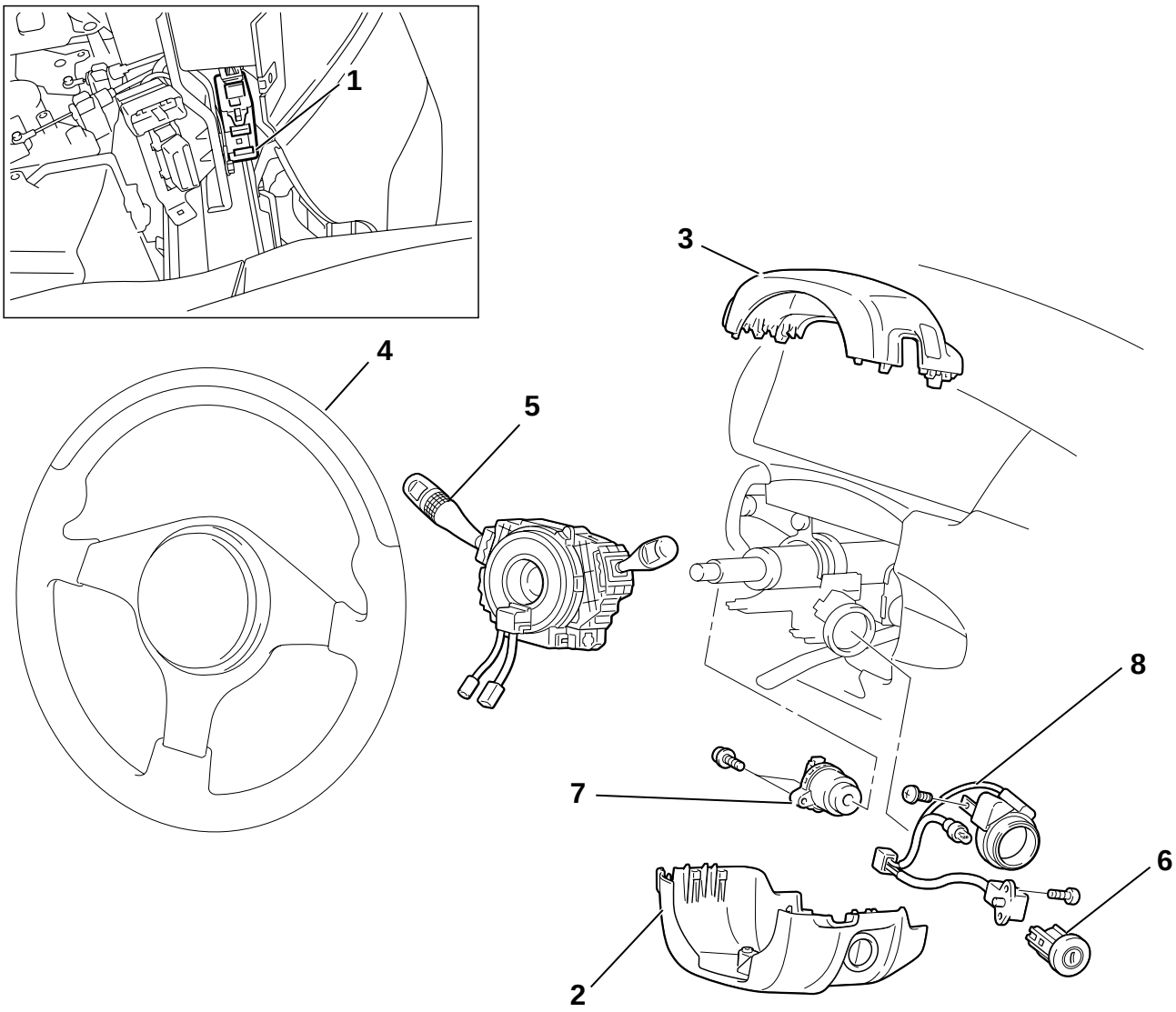
7. The multi-center display shows whether the ignition key, which has been inserted in the switch, can be rewritten and how many ignition keys have ever been registered.

TP LOCK CHECK	IGNITION KEY:	JUDGMENT OF IGNITION KEY
UNLOCK	Can be overwritten	Correct
LOCK	Can not be overwritten	Incorrect

IGNITION SWITCH

REMOVAL AND INSTALLATION

M1543002100337



AC211041 AC

IMMOBILIZER-ECU REMOVAL STEPS

- UNDER COVER (REFER TO GROUP 52A, INSTRUMENT PANEL P.52A-3.)

1. IMMOBILIZER-ECU

IGNITION SWITCH REMOVAL STEPS

2. LOWER COLUMN COVER (REFER TO GROUP 52A - INSTRUMENT PANEL P.52A-3.)
3. UPPER COLUMN COVER (REFER TO GROUP 52A - INSTRUMENT PANEL P.52A-3.)

<<A>>

IGNITION SWITCH REMOVAL STEPS

4. STEERING WHEEL (REFER TO GROUP 37A P.37-23.)
5. CLOCK SPRING COLUMN SWITCH ASSEMBLY (REFER TO GROUP 37A - STEERING SHAFTP.37-25.)
6. STEERING LOCK CYLINDER
7. IGNITION SWITCH
8. KEY REMINDER SWITCH

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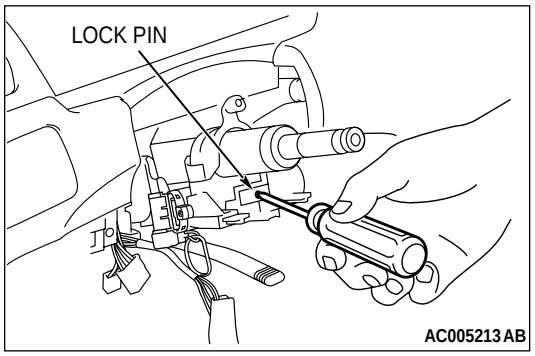
REMOVAL SERVICE POINT



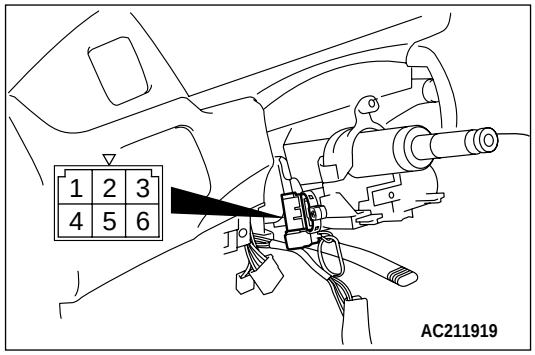
<<A>> STEERING LOCK CYLINDER REMOVAL

1. Insert the key into steering lock cylinder to turn the ignition key to the "ACC" position.
2. Insert the locking pin with a small crosstipped screwdriver, etc., and remove the steering lock cylinder.

INSPECTION

M1543019501965

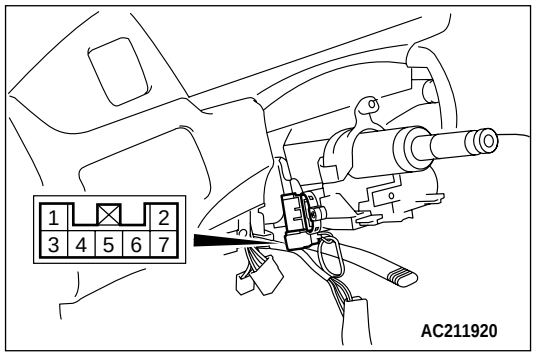
IGNITION SWITCH CONTINUITY CHECK



Disconnect ignition switch connector C-87 without removing the ignition switch and steering lock cylinder. Then check the continuity.

SWITCH POSITION	TESTER CONNECTION	SPECIFIED CONNECTION
"LOCK" (OFF)	1 – 2, 1 – 4, 1 – 5, 1 – 6	Open circuit
"ACC"	1 – 6	Less than 2 ohms
"ON"	1 – 2, 1 – 4, 1 – 6	Less than 2 ohms
"START"	1 – 2, 1 – 5	Less than 2 ohms

KEY REMINDER SWITCH AND IGNITION KEY RING ANTENNA CONTINUITY CHECK



1. Ignition key reminder switch continuity check.
   Disconnect key reminder switch connector C-88 without removing the ignition switch and steering lock cylinder. Then check the continuity.

STATUS OF IGNITION KEY	TESTER CONNECTION	SPECIFIED CONNECTION
Removed	4 – 6	Less than 2 ohms
Inserted	4 – 6	Open circuit

2. Ignition key ring antenna check.
   Check for continuity between terminal 3 and terminal 7.
   Standard value: 2 ohm or less

COMBINATION METER ASSEMBLY AND VEHICLE SPEED SENSOR

DIAGNOSIS

INTRODUCTION TO COMBINATION METER DIAGNOSIS

M1543009901081

All vehicles are equipped with an electrical speedometer and tachometer. If the speedometer or tachometer does not function, there may be trouble in the electrical system.

TROUBLESHOOTING STRATEGY

M1543006900562

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will be sure that you have exhausted most of the possible ways to find a combination meter fault.

1. Gather information from the customer.
2. Verify that the condition described by the customer exists.
3. Find the malfunction by following the symptom chart.
4. Verify the malfunction is eliminated.

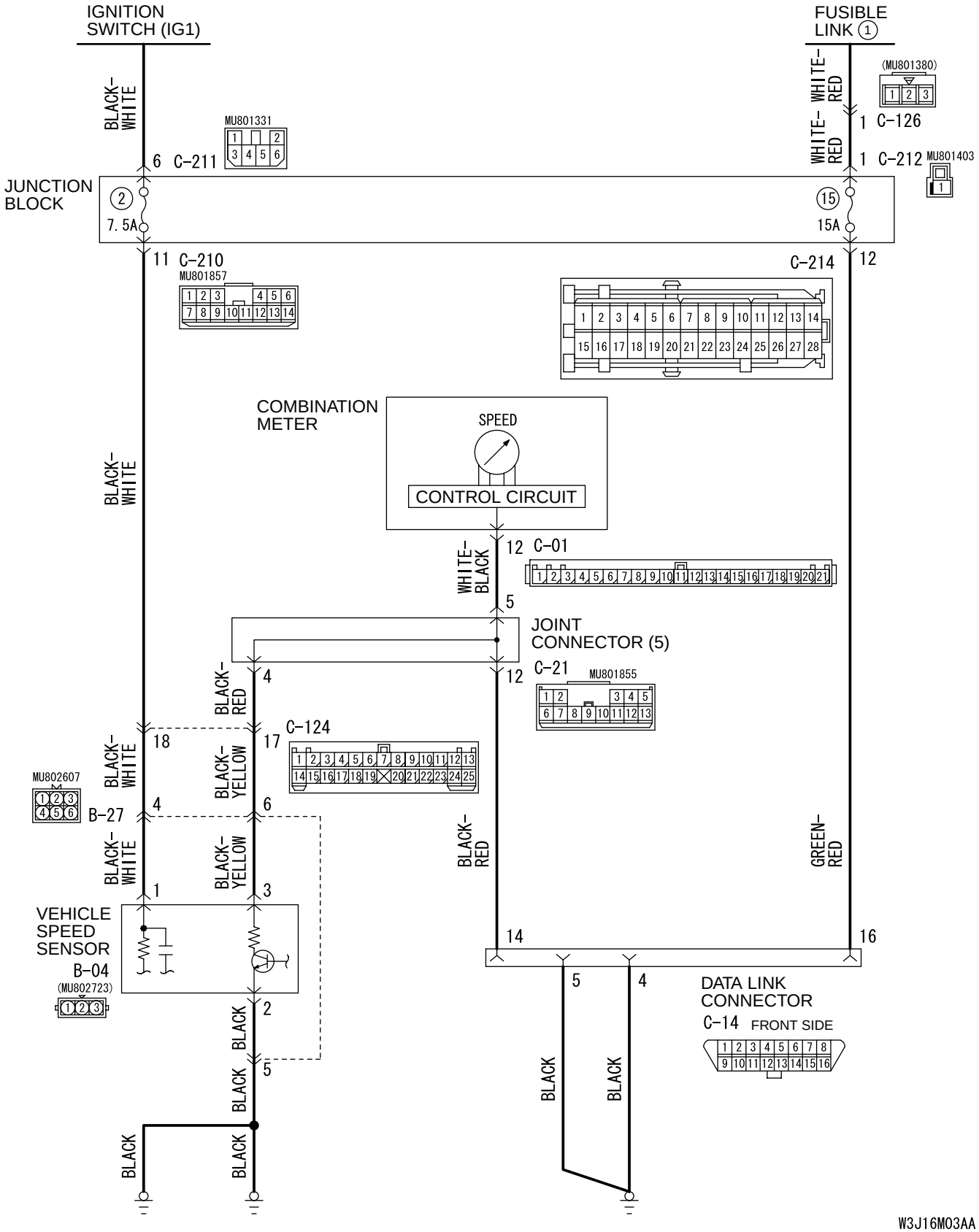
SYMPTOM CHART

M1543007200890

SYMPTOMS	INSPECTION PROCEDURE	REFERENCE PAGE
Speedometer does not work.	1	P.54A-55
Tachometer does not work.	2	P.54A-60
Fuel gauge does not work.	3	P.54A-64
Engine coolant temperature gauge does not work.	4	P.54A-69
Combination meters does not work.	5	P.54A-72

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Speedometer does not Work.



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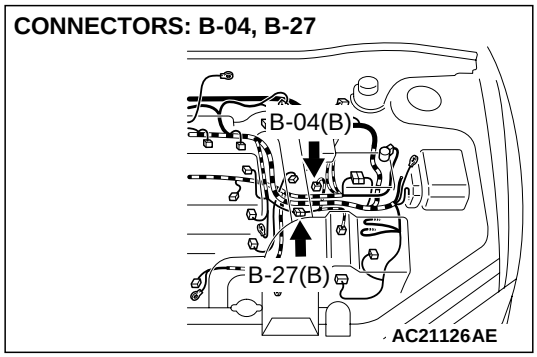
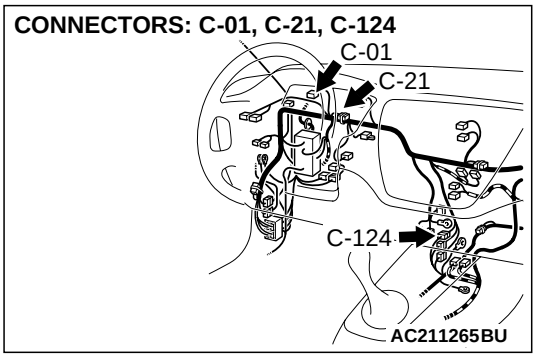




CIRCUIT OPERATION

- The ignition switch (IG1) circuit is the power source for the speedometer and vehicle speed sensor.
- The vehicle speed sensor is installed on the transaxle. Four pulses are generated with one turn of the vehicle speed sensor shaft. These pulse signals are sent into the speedometer. The speedometer calculates the pulse signals, and operates the indicator. At the same time, the travel distance is calculated.

TECHNICAL DESCRIPTION (COMMENT)

The cause may be a faulty vehicle speed sensor circuit system or a faulty speedometer. Vehicle speed sensor is also used by the engine control module (ECM).

TROUBLESHOOTING HINTS

- Malfunction of the vehicle speed sensor
- Malfunction of the combination meter (printed-circuit board or speedometer and tachometer)
- Damaged harness wires or connectors

DIAGNOSIS

Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

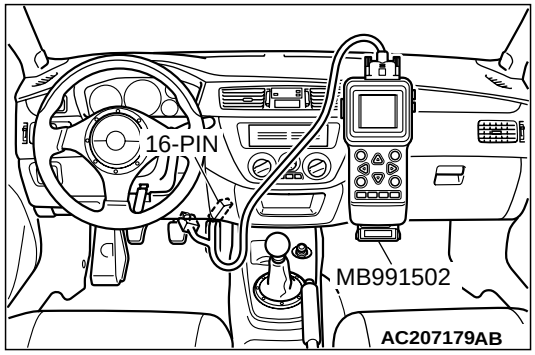
STEP 1. Check with other meter.

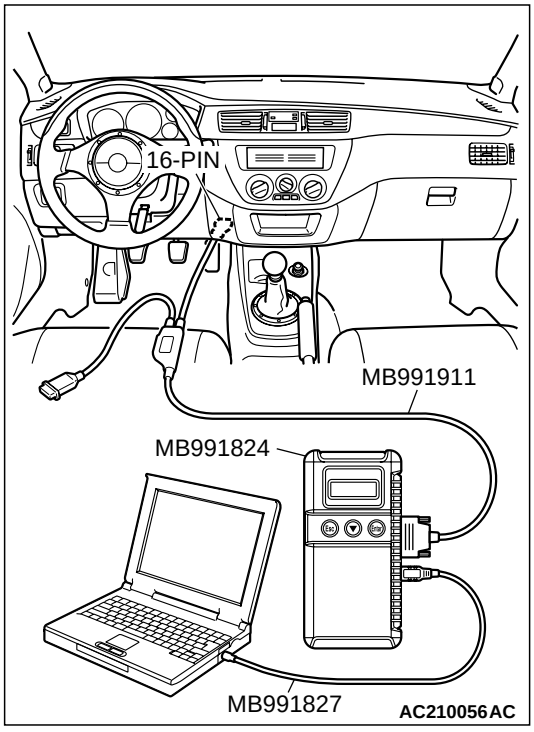
Check to see that the tachometer, fuel gauge and water thermometer are operating normally.

Q: Do all other meters operate?

YES <other meters all operate.> : Go to Step 2.

NO <one of the meters do not operate.> : Refer to INSPECTION PROCEDURE 5 P.54A-72.





STEP 2. Using scan tool MB991502 or MB991958, read the MFI system diagnostic trouble code (DTC).

⚠ CAUTION

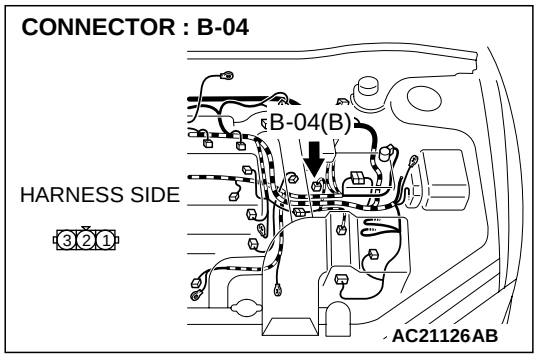
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

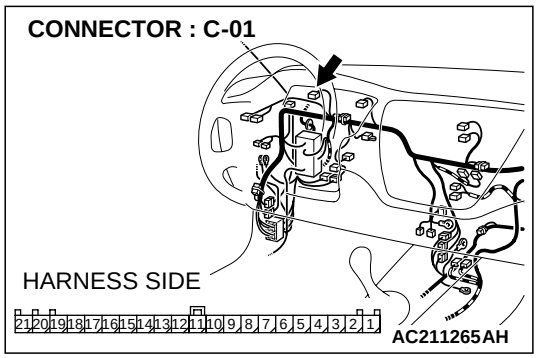
(1) Connect scan tool MB991502 or MB991958 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Read the MFI system diagnostic trouble code.

Q: Is DTC P0500 output?

YES : Refer to GROUP 13A, Multiport Fuel Injection (MFI) Diagnosis.P.13A-25

NO : Go to Step 3.





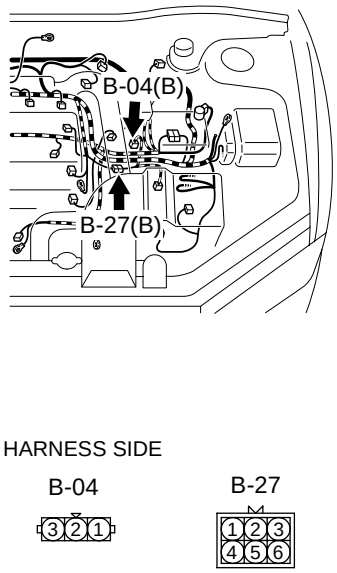
STEP 3. Check combination meter connector C-01 and vehicle speed sensor connector B-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are combination meter connector C-01 and vehicle speed sensor connector B-04 in good condition?

YES : Go to Step 4.

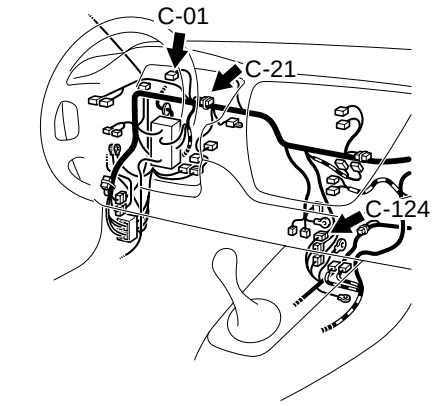
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The speedometer should work normally.

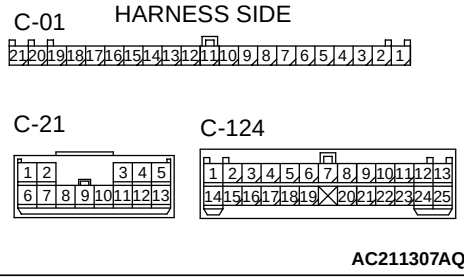
CONNECTORS: B-04, B-27



AC211304 AB

CONNECTORS: C-01, C-21, C-124





AC211307AQ

STEP 4. Check the wiring harness between combination meter connector C-01 (terminal 12) and vehicle speed sensor connector B-04 (terminal 3).

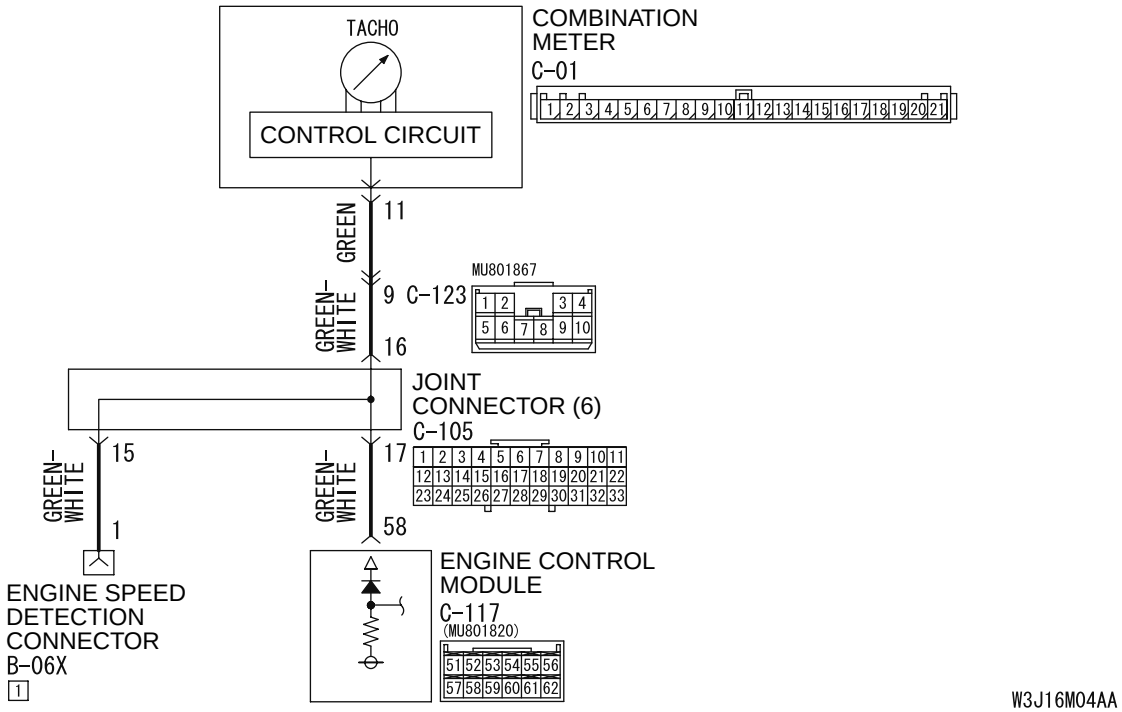
NOTE: Also check joint connector C-21, intermediate connector B-27 and C-124 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-21, intermediate connector B-27 or C-124 are damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

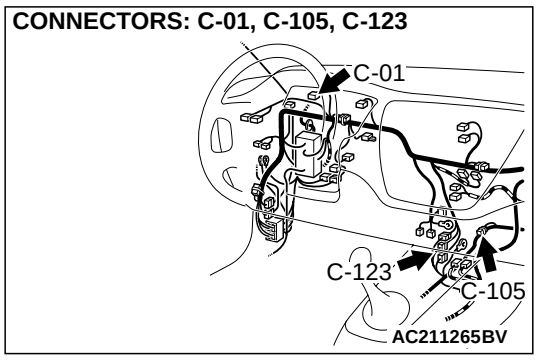
Q: Are the wiring harness between combination meter connector C-01 (terminal 11) and vehicle speed sensor connector B-04 (terminal 3) in good condition?

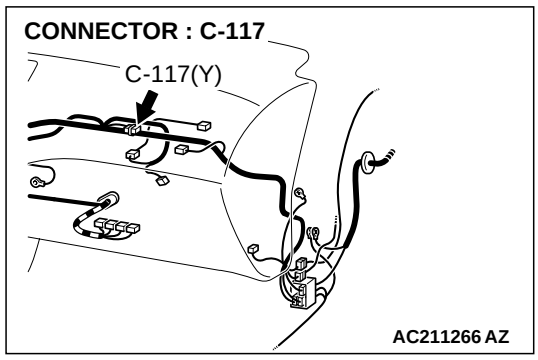
YES : Replace the combination meter. The speedometer should work normally.

NO : Repair the wiring harness. The speedometer should work normally.

INSPECTION PROCEDURE 2: Tachometer does not Work.







CIRCUIT OPERATION

- The tachometer power is supplied from the ignition switch (IG) circuit.
- The tachometer calculates the engine revolution (r/min) according to the ECM signals to operate the needle.

TECHNICAL DESCRIPTION (COMMENT)

The cause is thought to be because ECM signals are not transmitted or due to combination meter error.

TROUBLESHOOTING HINTS

- Malfunction of the combination meter (printed circuit board or speedometer and tachometer)
- Malfunction of the ECM
- Damaged wiring harness or connectors

DIAGNOSIS

Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991958: Scan Tool (MUT-III Sub Assembly)
  - MB991824: V.C.I.
  - MB991827: USB Cable
  - MB991911: Main Harness B

TSB Revision

STEP 1. Check with other meter.

Check to see that the speedometer, fuel gauge and water thermometer operate normally.

Q: Do all other meters operate?

YES <other meters all operate.> : Go to Step 2.

NO <one of the meters do not operate.> : Refer to INSPECTION PROCEDURE 5 P.54A-72.

STEP 2. Using scan tool MB991502 or MB991958, read the MFI system diagnostic trouble code (DTC).

⚠ CAUTION

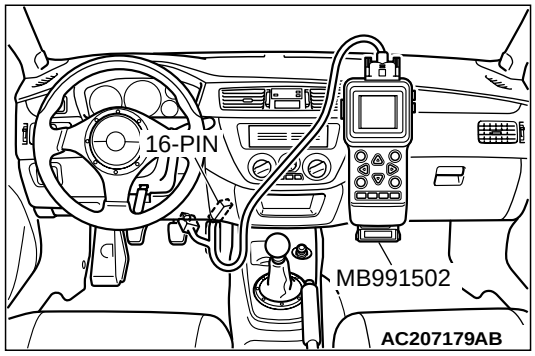
To prevent damage to scan tool MB991502 or MB991958, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502 or MB991958.

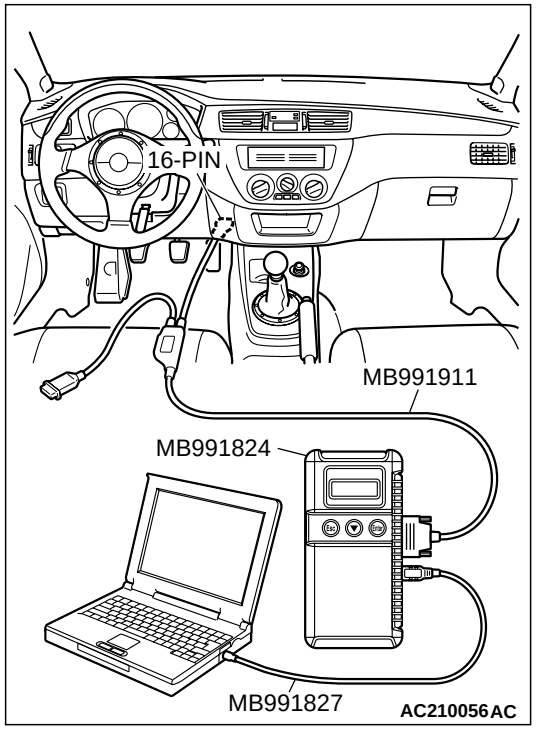
(1) Connect scan tool MB991502 or MB991958 to the data link connector.
(2) Turn the ignition switch to "ON" position.
(3) Read the MFI system diagnostic trouble code.

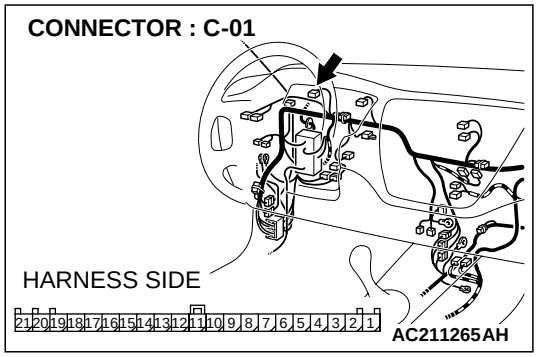
Q: Is DTC output to the MFI system?

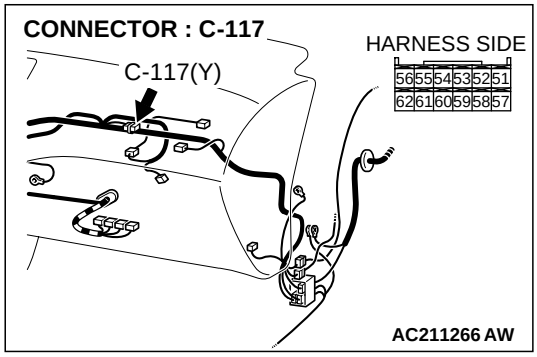
YES : Refer to Group 13, Multiport Fuel Injection (MFI) Diagnosis.P.13A-25

NO : Go to Step 3.









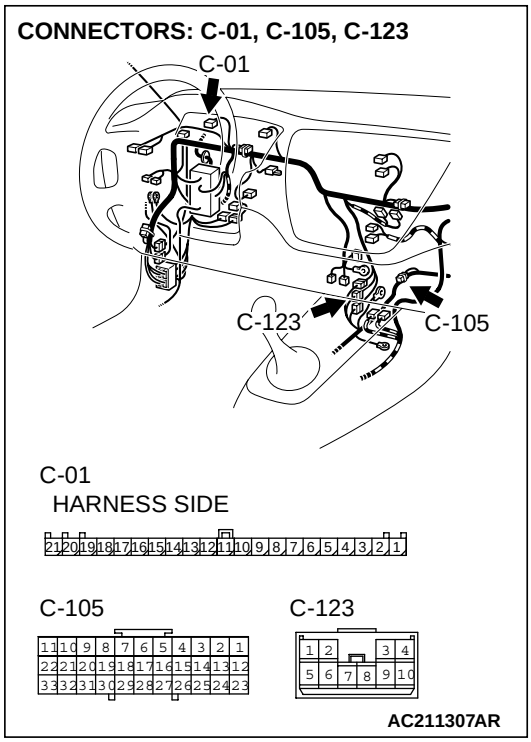
STEP 3. Check combination meter connector C-01 and ECM connector C-117 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are combination meter connector C-01 and ECM connector C-117 in good condition?

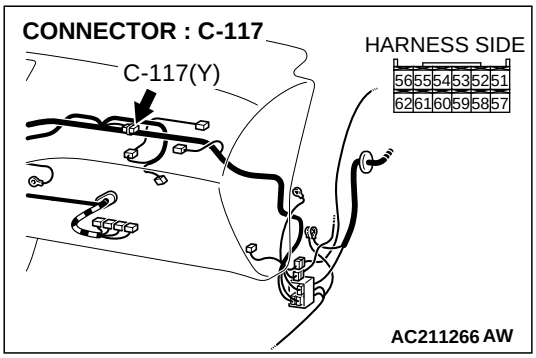
YES : Go to Step 4.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The speedometer should work normally.

CONNECTORS: C-01, C-105, C-123



CONNECTOR : C-117



STEP 4. Check the wiring harness between combination meter connector C-01 (terminal 11) and ECM connector C-117 (terminal 58).

NOTE: Also check joint connector C-105 and intermediate connector C-123 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If joint connector C-105 or intermediate connector C-123 are damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Are the wiring harness between combination meter connector C-01 (terminal 11) and ECM connector C-117 (terminal 58) in good condition?

YES : Go to Step 5.

NO : Repair the wiring harness. The speedometer should work normally.

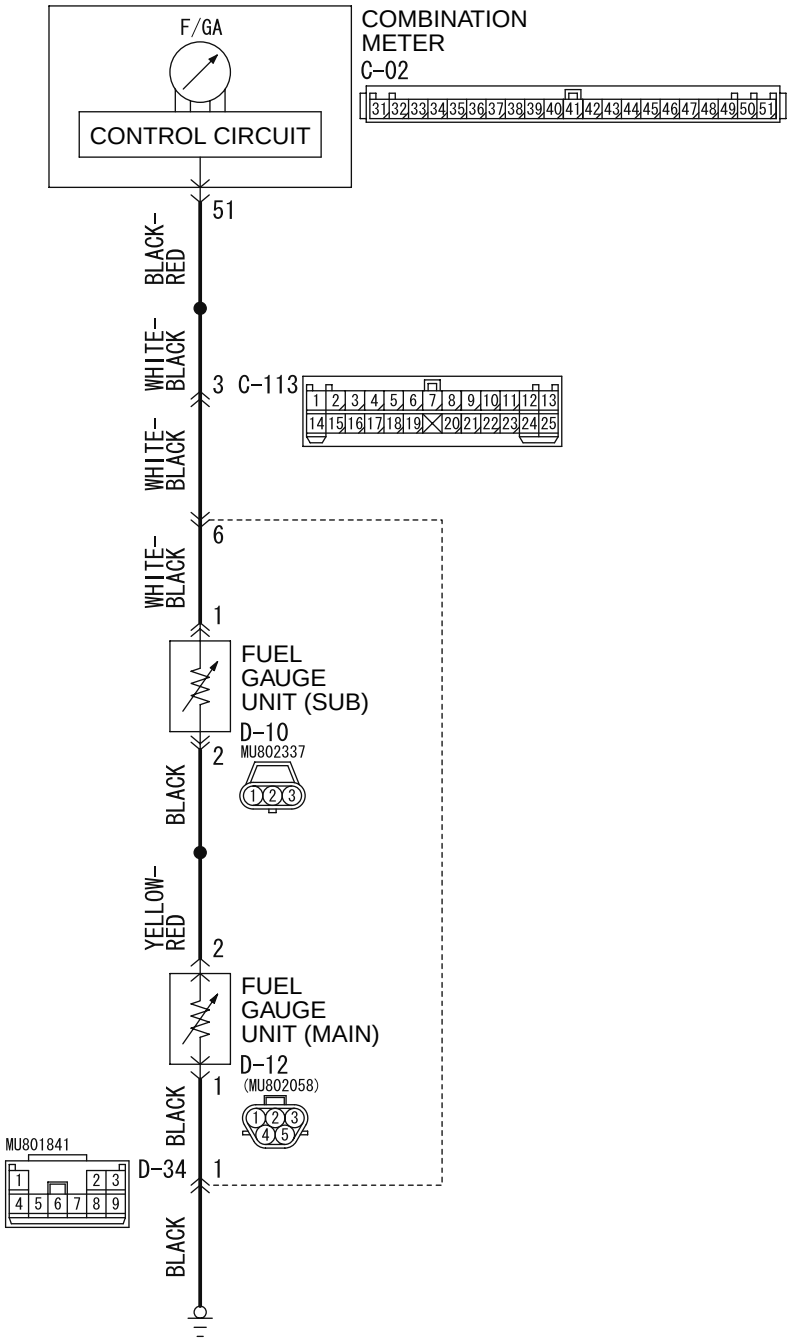
STEP 5. Replace the combination meter and check.

Q: Does the tachometer operate?

YES : There is no action to be taken.

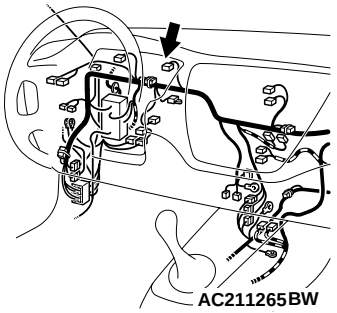
NO : Replace the ECM. The tachometer should work normally.

INSPECTION PROCEDURE 3: Fuel Gauge does not Work.



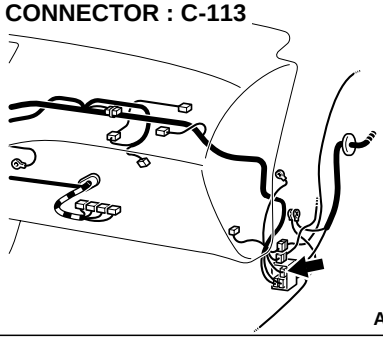
W3J16M06AA

CONNECTOR : C-02



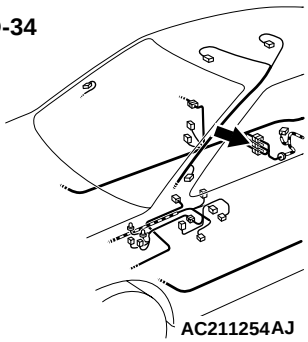
AC211265BW

CONNECTOR : C-113



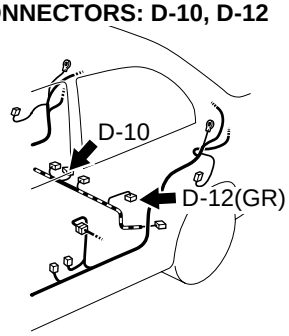
AC211266 AV

CONNECTOR : D-34



AC211254AJ

CONNECTORS: D-10, D-12



AC211255AJ

CIRCUIT OPERATION

- The ignition switch (IG1) circuit is the power source for the fuel gauge.
- The resistance value fluctuates causing the circuit current to fluctuate when the fuel gauge unit the float moves up and down.
- The fuel gauge moves the needle by the circuit current.

TECHNICAL DESCRIPTION (COMMENT)

If the ignition switch (IG1) circuit is open, the gauge needle will not move at all. If the ground circuit is open, the gauge needle will move up to its extreme position.

TROUBLESHOOTING HINTS

- Malfunction of the fuel gauge unit (fuel gauge unit)
- Malfunction of the combination meter (printed-circuit board or fuel gauge assembly)

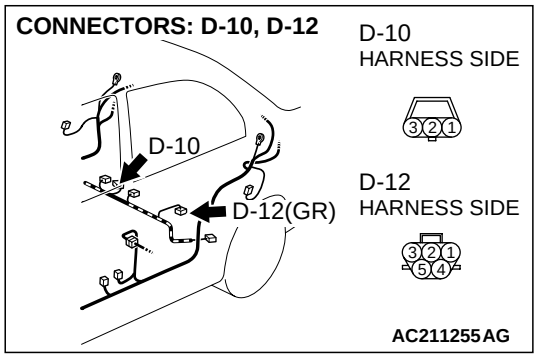
DIAGNOSIS

Required Special Tool:
MB991223: Harness Set

STEP 1. Check with other meter.
Check to see that the speedometer, fuel gauge and water thermometer operate normally.

Q: Do all other meters operate?

YES <other meters all operate.> : Go to Step 2.
NO <one of the meters do not operate.> : Refer to INSPECTION PROCEDURE 5 P.54A-72.



STEP 2. Check fuel gauge unit (sub) connector D-10 and fuel gauge unit (main) connector D-12 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are fuel gauge unit (sub) connector D-10 and fuel gauge unit (main) connector D-12 in good condition?

YES : Go to Step 3.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The fuel gauge should work normally.

STEP 3. Check the fuel gauge unit (sub) and fuel gauge unit (main).

Check to see that the fuel gauge unit (sub) and fuel gauge unit (main) are normal. Refer to P.54A-78.

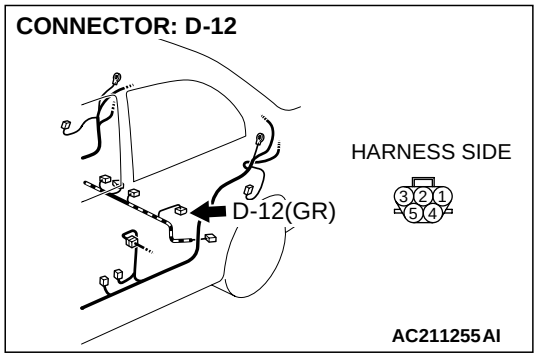
Q: Are fuel gauge unit (sub) and fuel gauge unit (main) normal?

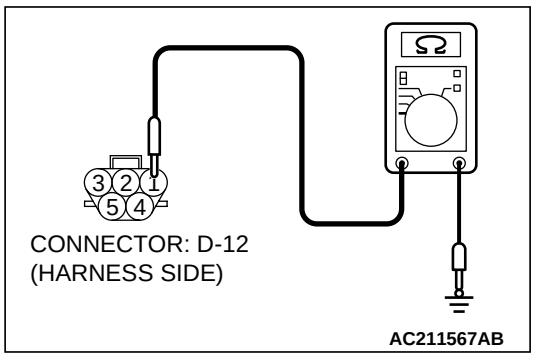
YES : Go to Step 4.

NO : Replace fuel gauge unit (sub) and fuel gauge unit (main). The fuel gauge should work normally.

STEP 4. Check the ground circuit to the fuel gauge unit (main). Measure the resistance at fuel gauge unit (main) connector D-12.

(1) Disconnect fuel gauge unit (main) connector D-12 and measure the resistance available at the wiring harness side of the connector.





(2) Measure the resistance value between terminal 1 and ground.

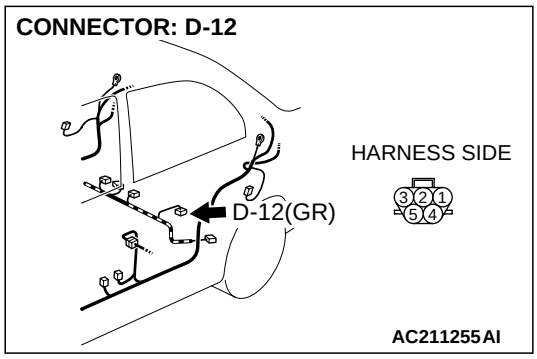
- The resistance should equal 2 ohms or less.

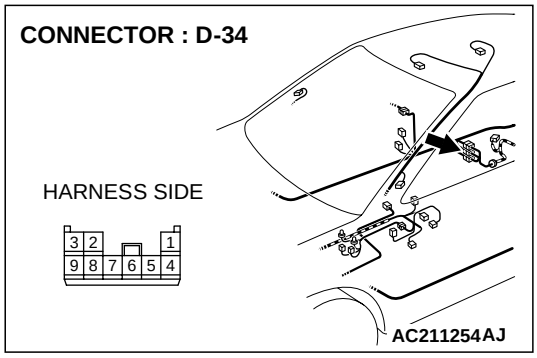
Q: Is the measured resistance 2 ohms or less?

YES : Go to Step 6.

NO : Go to Step 5.

STEP 5. Check the wiring harness between fuel gauge unit (main) connector D-12 (terminal 1) and ground.





NOTE: Also check intermediate connector D-34 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector D-34 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Is the wiring harness between fuel gauge unit (main) connector D-12 (terminal 1) and ground in good condition?

YES : There is no action to be taken.

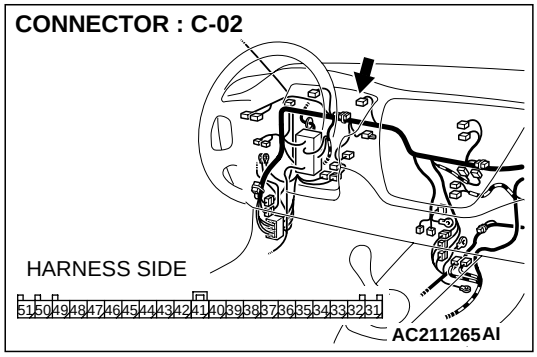
NO : Repair the wiring harness. The fuel gauge should work normally.

STEP 6. Check combination meter connector C-02 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

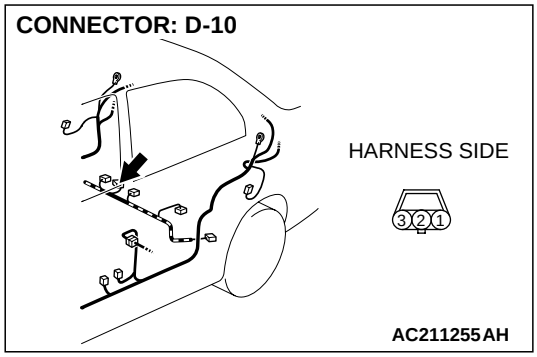
Q: Is combination meter connector C-02 in good condition?

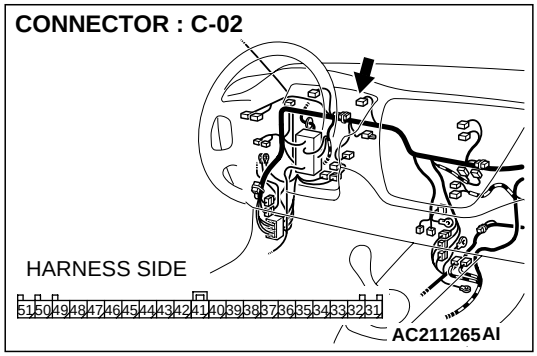
YES : Go to Step 7.

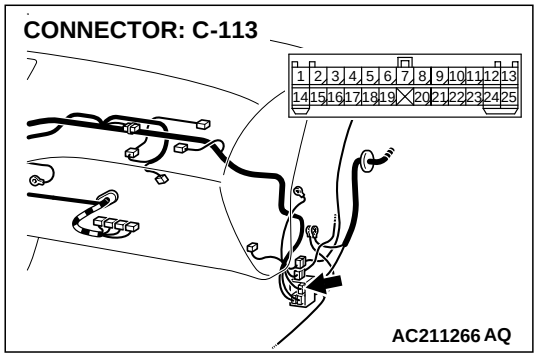
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The fuel gauge should work normally.

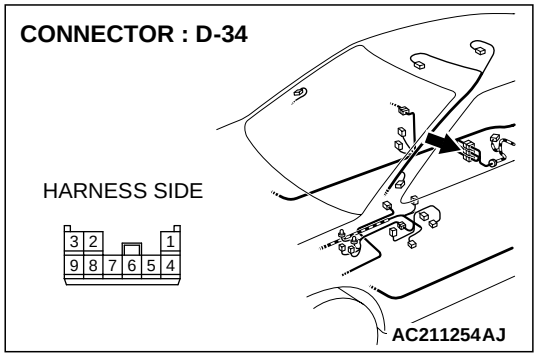


STEP 7. Check the wiring harness between fuel gauge unit (sub) connector D-10 (terminal 1) and combination meter connector C-02 (terminal 51).







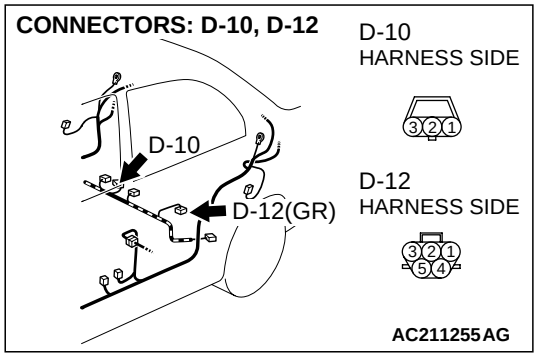


NOTE: Also check intermediate connectors C-113 and D-34 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-113 or D-34 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Are the wiring harness between fuel gauge unit (sub) connector D-10 (terminal 1) and combination meter connector C-02 (terminal 51) in good condition?

YES : Go to Step 8.

NO : Repair the wiring harness. The fuel gauge should work normally.



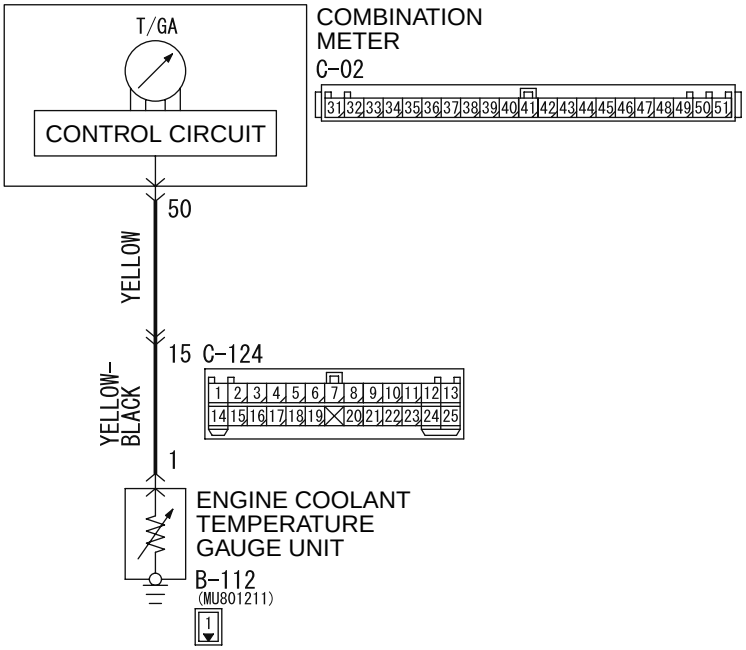
STEP 8. Check the wiring harness between fuel gauge unit (sub) connector D-10 (terminal 2) and fuel gauge unit (main) connector D-12 (terminal 2).

Q: Are the wiring harness between fuel gauge unit (sub) connector D-10 (terminal 2) and fuel gauge unit (main) connector D-12 (terminal 2) in good condition?

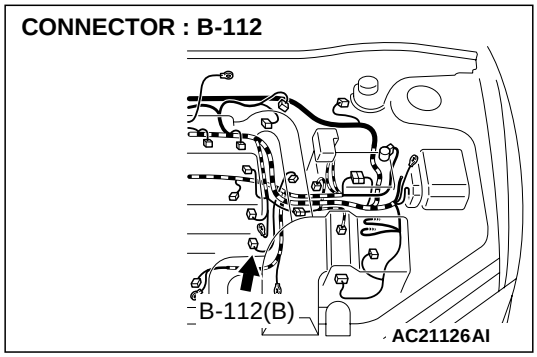
YES : Repair or replace the combination meter. The fuel gauge should work normally.

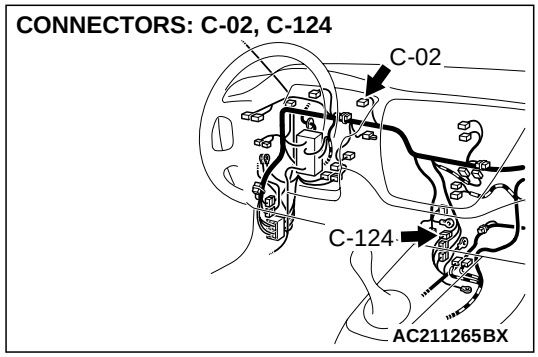
NO : Repair the wiring harness. The fuel gauge should work normally.

INSPECTION PROCEDURE 4: Engine Coolant Temperature Gauge does not Work.



W3J16M05AA





TSB Revision

CIRCUIT OPERATION

- The ignition switch (IG1) circuit is the power source for the engine coolant temperature gauge.
- Resistance value, which the engine coolant temperature gauge unit sends to the combination meter, is dependent on temperature of the engine coolant. This causes circuit current to fluctuate.
- The engine coolant temperature gauge moves the needle according to the circuit current.

TECHNICAL DESCRIPTION (COMMENT)

If the ignition switch (IG1) circuit is open, the gauge needle will not move at all. If the ground circuit is open, the gauge needle will move up to its extreme position.

TROUBLESHOOTING

- Malfunction of the engine coolant temperature gauge unit
- Malfunction of the combination meter (printed-circuit board or engine coolant temperature gauge assembly)
- Damaged harness wires or connectors

DIAGNOSIS

Required Special Tool:
MB991223: Harness Set

STEP 1. Check with other meter.
Check to see that the speedometer, tachometer and engine coolant temperature gauge unit operate normally.

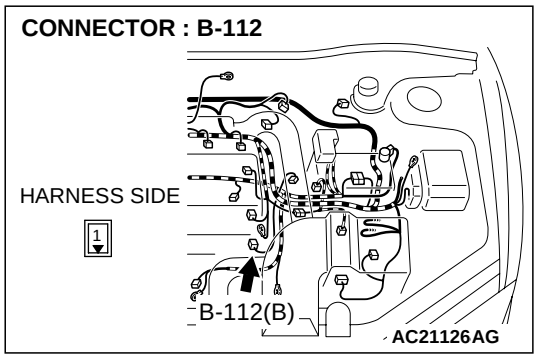
Q: Do all other meters operate?

YES <other meters all operate.> : Go to Step 2.
NO <one of the meters do not operate.> : Refer to INSPECTION PROCEDURE 5 P.54A-72.

STEP 2. Check engine coolant temperature gauge unit connector B-112 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is engine coolant temperature gauge unit connector B-112 in good condition?

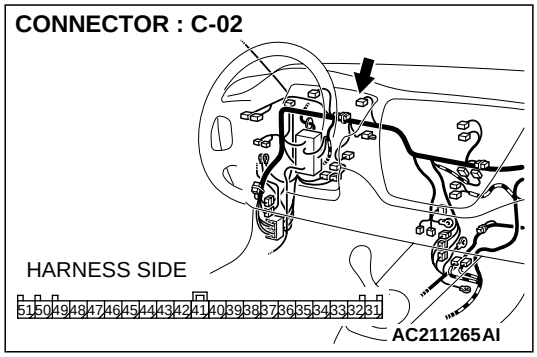
YES : Go to Step 3.
NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The engine coolant temperature gauge unit should work normally.



STEP 3. Check the engine coolant temperature gauge unit.
Check to see that the engine coolant temperature gauge unit operate normally. Refer to P.54A-80.

Q: Is the engine coolant temperature gauge unit normal?

YES : Go to Step 4.
NO : Replace the engine coolant temperature gauge unit. The engine coolant temperature gauge unit should work normally.

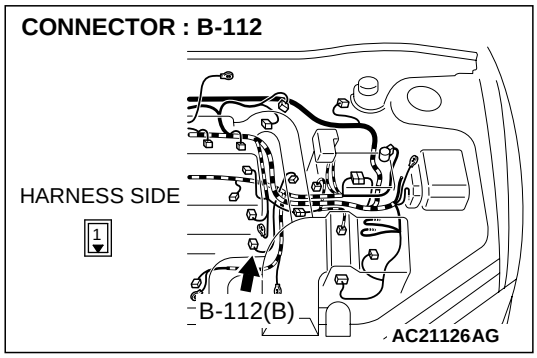


STEP 4. Check combination meter connector C-02 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is combination meter connector C-02 in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. The engine coolant temperature gauge unit should work normally.



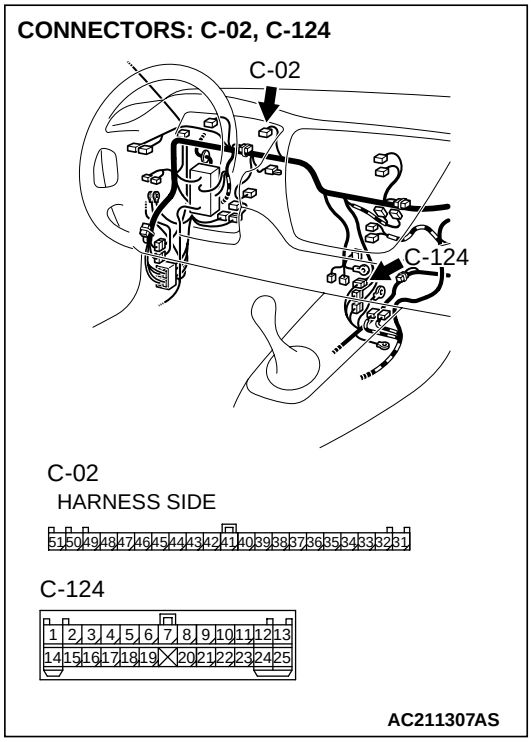
STEP 5. Check the wiring harness between engine coolant temperature gauge unit connector B-112 (terminal 1) and combination meter connector C-02 (terminal 50).

NOTE: Also check intermediate connector C-124 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-124 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

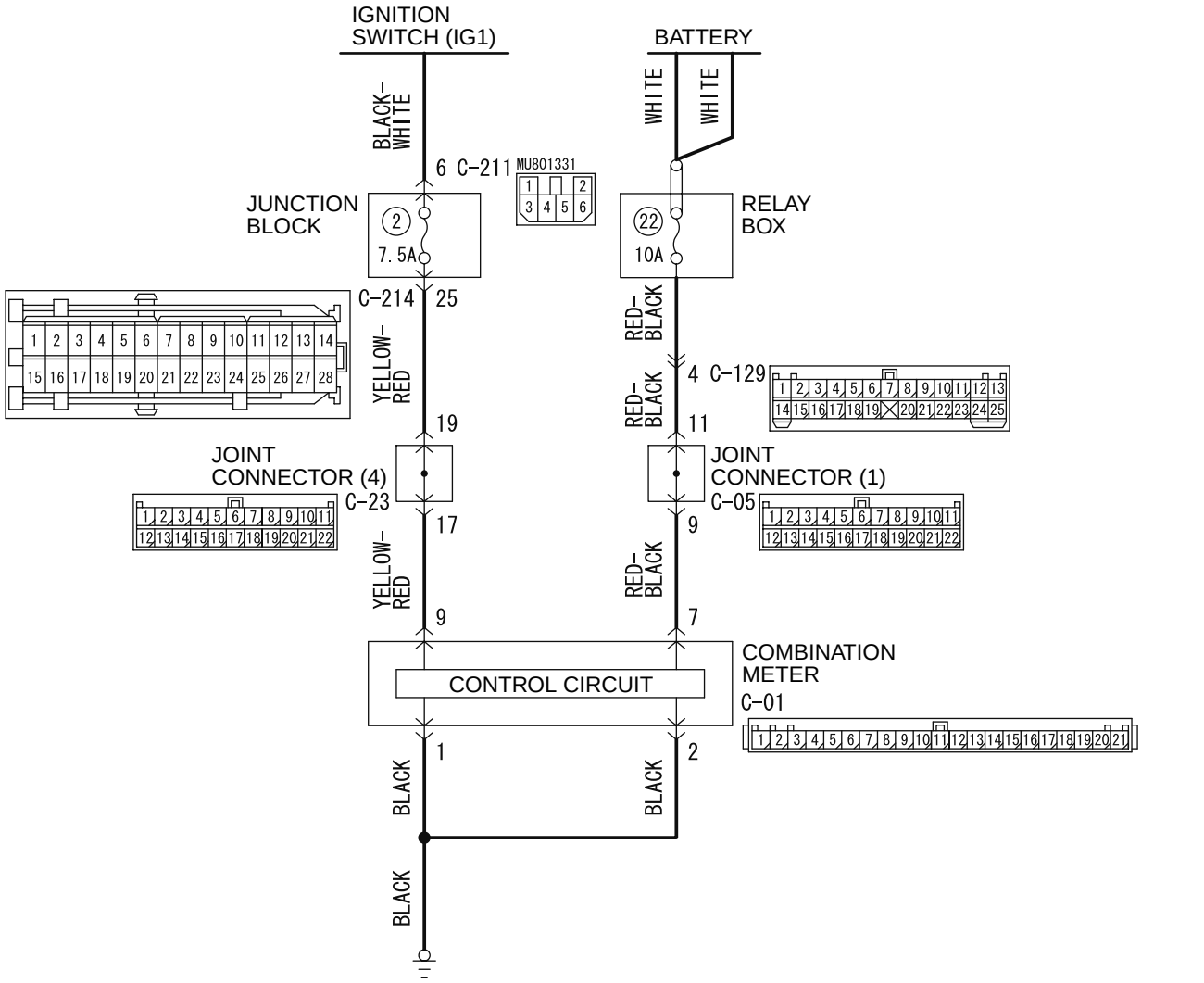
Q: Are the wiring harness between engine coolant temperature gauge unit connector B-112 (terminal 1) and combination meter connector C-02 (terminal 50) in good condition?

YES : Repair or replace the combination meter. The engine coolant temperature gauge unit should work normally.

NO : Repair the wiring harness. The engine coolant temperature gauge unit should work normally.



INSPECTION PROCEDURE 5: Combination meter does not work.



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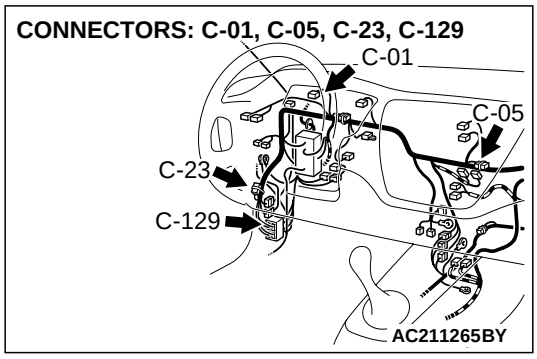
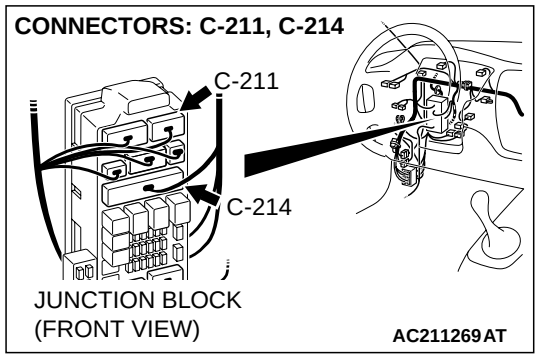




CIRCUIT OPERATION
The combination meter is powered by the ignition switch (IG1) and battery.

TECHNICAL DESCRIPTION (COMMENT)
The cause is thought to be malfunction of the power, ground circuitry or combination meter.

TROUBLESHOOTING HINTS
- Malfunction of the combination meter (printed-circuit board or speedometer and tachometer)
- Damaged wiring harness or connectors

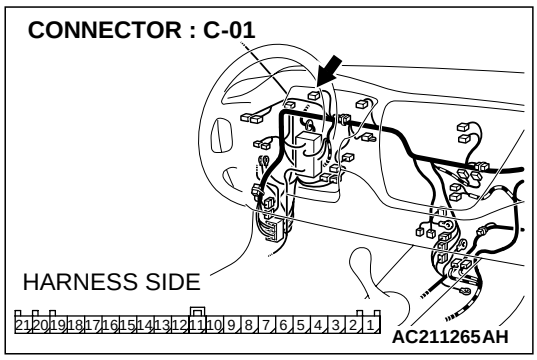
TSB Revision

DIAGNOSIS

Required Special Tools:

- MB991223: Harness Set

STEP 1. Check combination meter connector C-01 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

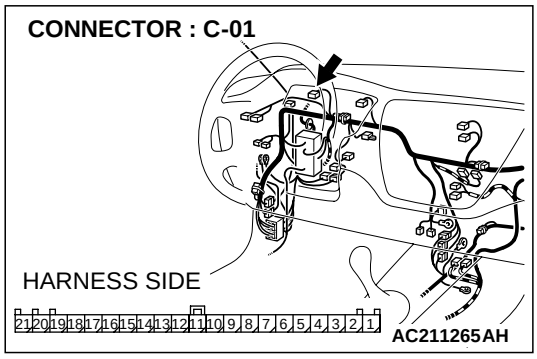


Q: Is combination meter connector C-01 in good condition?

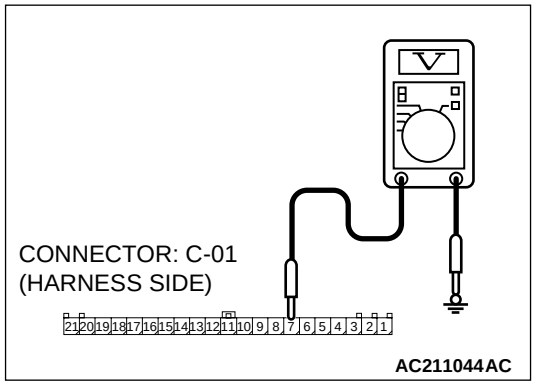
YES : Go to Step 2.

NO : Repair or replace the damaged component(s). Refer to GROUP 00E, Harness Connector Inspection P.00E-2. If the functions, which are described in "CIRCUIT OPERATION", work normally, the input signal from the ignition switch (IG1) should be normal.

STEP 2. Check the battery power supply circuit to the combination meter. Measure the voltage at combination meter connector C-01.



(1) Disconnect combination meter connector C-01 and measure the voltage available at the wiring harness side of the connector.



(2) Measure the voltage between terminal 7 and ground.

- The voltage should equal approximately 12 volts (battery positive voltage).

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

YES : Go to Step 4.

NO : Go to Step 3.

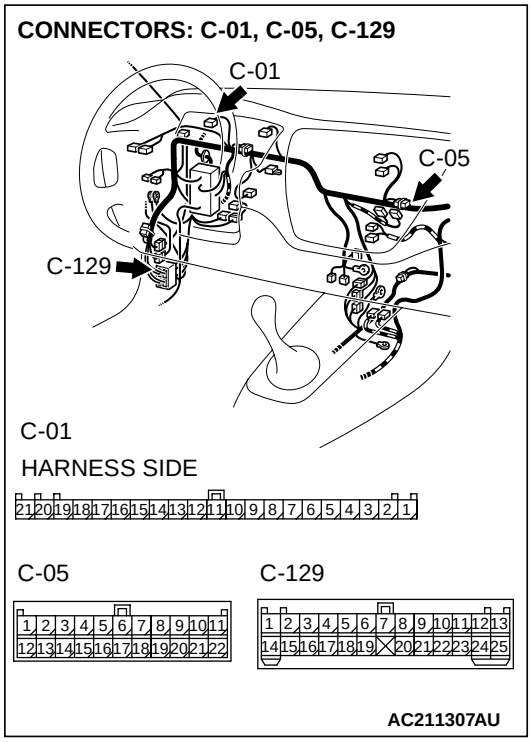
STEP 3. Check the wiring harness between combination meter connector C-01 (terminal 7) and battery.

NOTE: Also check intermediate connector C-129 and joint connector C-05 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If intermediate connector C-129 or joint connector C-05 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Are the wiring harness between combination meter connector C-01 (terminal 7) and battery in good condition?

YES : There is no action to be taken.

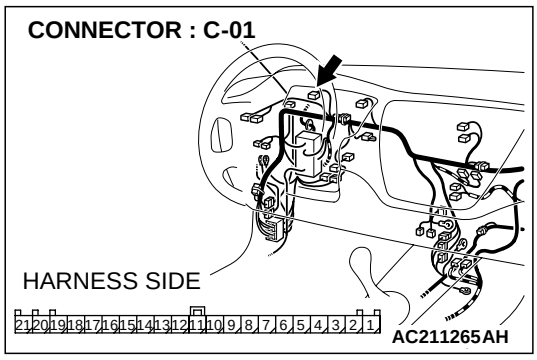
NO : Repair the wiring harness. Check to see that all meters operate.



STEP 4. Check the ignition switch (IG1) circuit to the combination meter. Measure the voltage at combination meter connector C-01.

(1) Disconnect combination meter connector C-01 and measure the voltage available at the wiring harness side of the connector.

(2) Turn the ignition switch to the "ON" position.



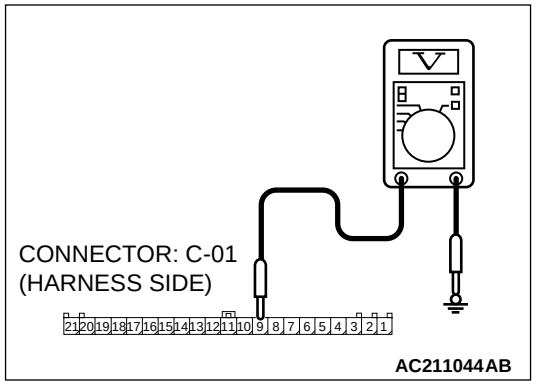
(3) Measure the voltage between terminal 9 and ground.

- The voltage should equal approximately 12 volts (battery positive voltage).

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

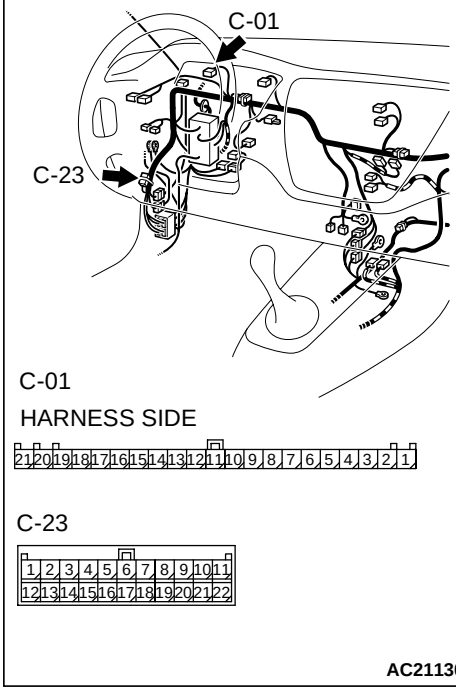
YES : Go to Step 6.

NO : Go to Step 5.

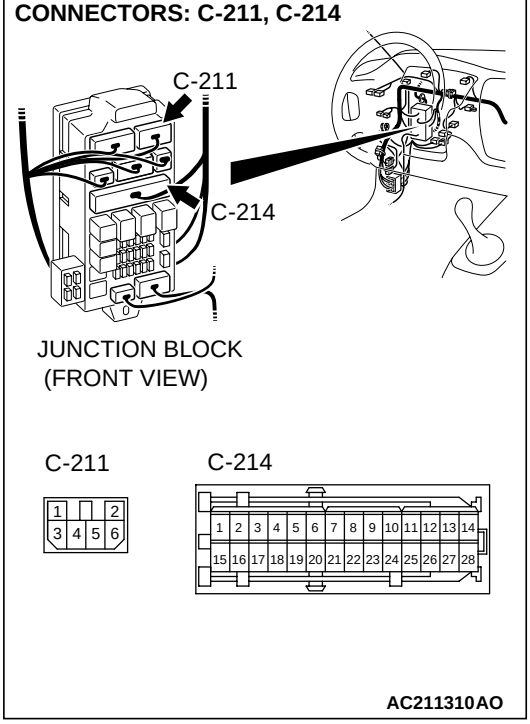


STEP 5. Check the wiring harness between combination meter connector C-01 (terminal 9) and ignition switch (IG1).

CONNECTORS: C-01, C-23



CONNECTORS: C-211, C-214



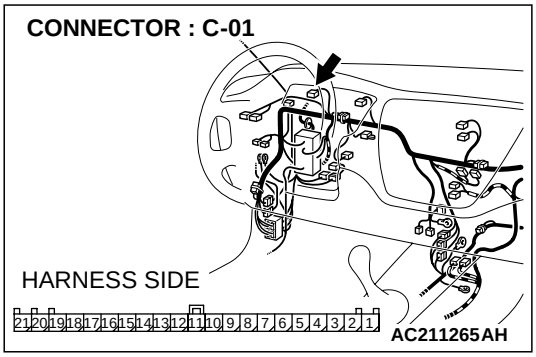
NOTE: Also check junction block connector C-211 and C-214 and joint connector C-23 for loose, corroded, or damaged terminals, or terminals pushed back in the connector. If junction block connector C-211 or C-214 or joint connector C-23 is damaged, repair or replace the connector as described in GROUP 00E, Harness Connector Inspection P.00E-2.

Q: Are the wiring harness between combination meter connector C-01 (terminal 9) and ignition switch (IG1) in good condition?

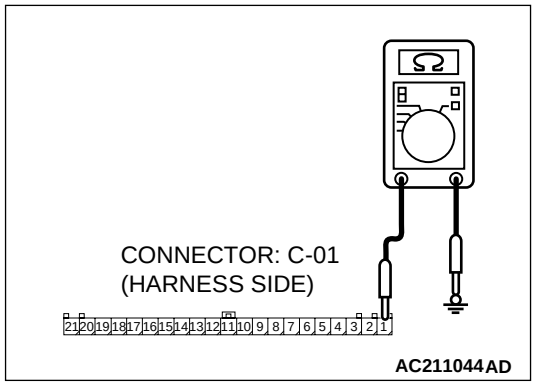
YES : There is no action to be taken.

NO : Repair the wiring harness. Check to see that all meters operate.

STEP 6. Check the ground circuit to the combination meter. Measure the resistance at combination meter connector C-01.



(1) Disconnect combination meter connector C-01 and measure the resistance available at the wiring harness side of the connector.



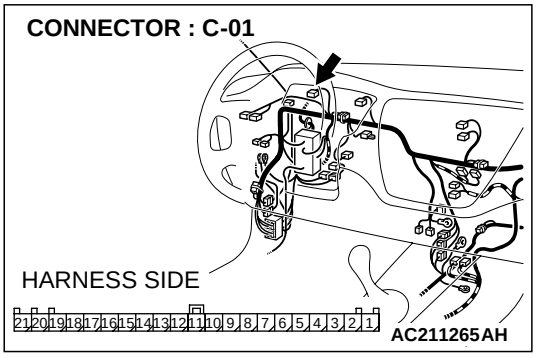
(2) Measure the resistance value between terminal 1 and ground.
- The resistance should equal 2 ohms or less.

Q: Is the measured resistance 2 ohms or less?

YES : Repair or replace the combination meter. Check to see that all meters operate.

NO : Go to Step 7.

STEP 7. Check the wiring harness between combination meter connector C-01 (terminals 1 and 2) and ground.



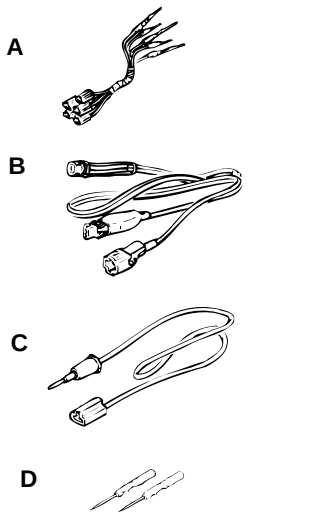
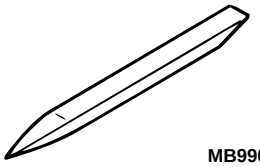
Q: Are the wiring harness between combination meter connector C-01 (terminals 1 and 2) and ground in good condition?

YES : There is no action to be taken.

NO : Repair the wiring harness. Check to see that all meters operate.

SPECIAL TOOLS

M1543000601050

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
A B C D  MB991223AC	MB991223 Harness set A: MB991219 Test harness B: MB991220 LED harness C: MB991221 LED harness adapter D: MB991222 Probe	MB991223	Making voltage and resistance measurements during troubleshooting A: Connect pin contact pressure inspection B: Power circuit inspection C: Power circuit inspection D: Commercial tester connection
 MB990784	MB990784 Ornament remover	General service tool	Removal of meter bezel

ON-VEHICLE SERVICE

SPEEDOMETER CHECK

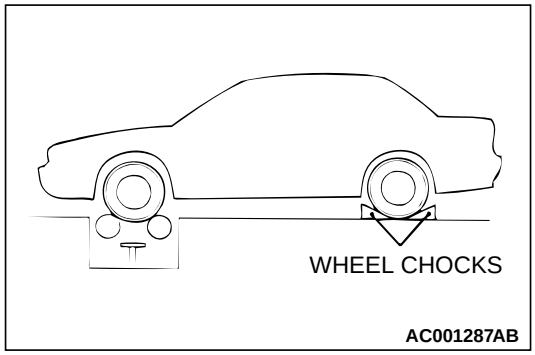
M1543000900337

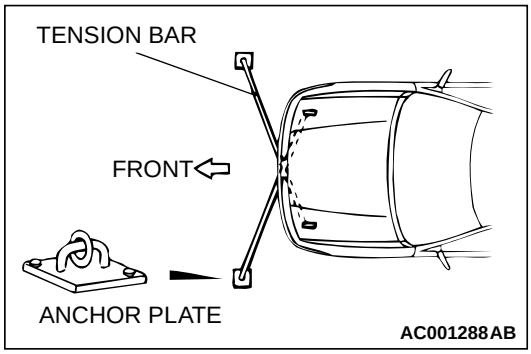
Adjust the pressure of tires to the specified level. (Refer to GROUP 31, On-vehicle Service P.31-6.)

⚠ CAUTION

Do not operate the clutch suddenly. Do not increase/decrease speed rapidly while testing.

1. Set the vehicle onto a speedometer tester and use wheel chocks to hold the front wheels.
2. Set the vehicle onto a speedometer tester and use wheel chocks to hold the rear wheels.





3. To prevent the front wheel from moving from side to side, attach tension bars to the tie-down hook, and secure both ends to anchor plates.
4. To prevent the vehicle from moving, attach a chain or wire to the rear retraction hook, and make sure the end of the chain or wire is secured.
5. Check if the speedometer indicator range is within the standard values.

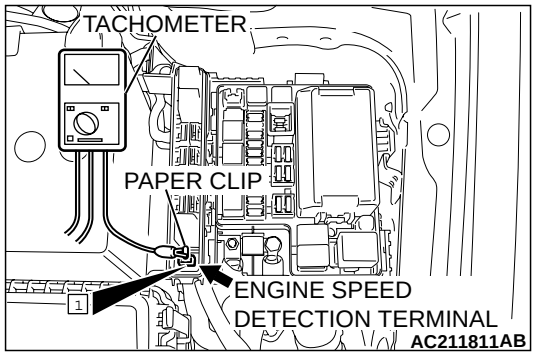
   Standard value:

STANDARD INDICATION km/h (mph)	ALLOWANCE RANGE km/h (mph)
32 (20)	31 – 35 (19 – 22)
64 (40)	61 – 71 (38 – 44)
97 (60)	92 – 106 (57 – 66)
129 (80)	122 – 142 (76 – 88)
161 (100)	151 – 177 (94 – 110)

6. If not to the standard value, inspect for proper tire size. If not correct, replace the tires with original size tires and retest. If correct, replace the speedometer. If still not to standard value, replace the vehicle speed sensor.

TACHOMETER CHECK

M1543001000348



1. Attach an external high quality tachometer to the engine speed detection connector on the harness side (such as with a paper clip).

   NOTE: For tachometer check, use an external high quality inductive tachometer.
2. Compare the readings of the vehicle tachometer and the external tachometer at every engine speed, and check if the variations are within the standard values.

   Standard values:

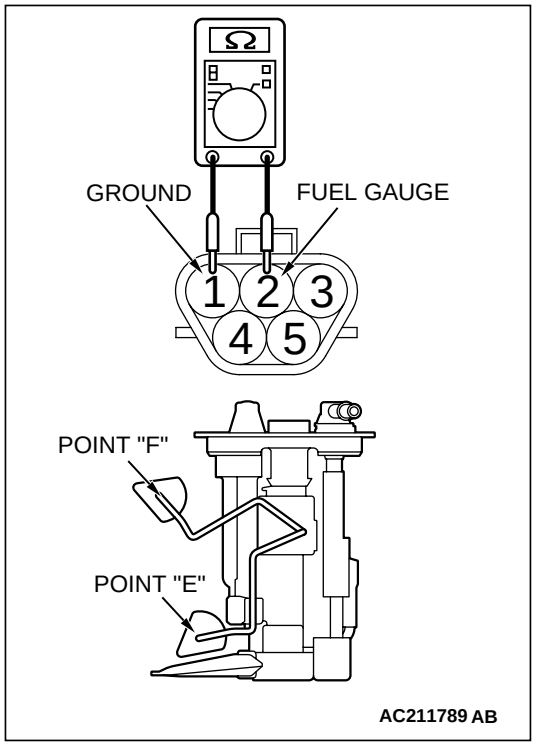
Engine speed (r/min)	Indication allowance of tachometer r/min
700	±120
3 000	– 100 +225
5 000	– 125 +325
6 000	– 125 +375

FUEL GAUGE UNIT CHECK

M1543001200331

Remove the fuel pump module and the remove the fuel gauge unit. (Refer to GROUP 13B, Fuel Tank P.13B-14.)

Fuel Gauge Unit Resistance

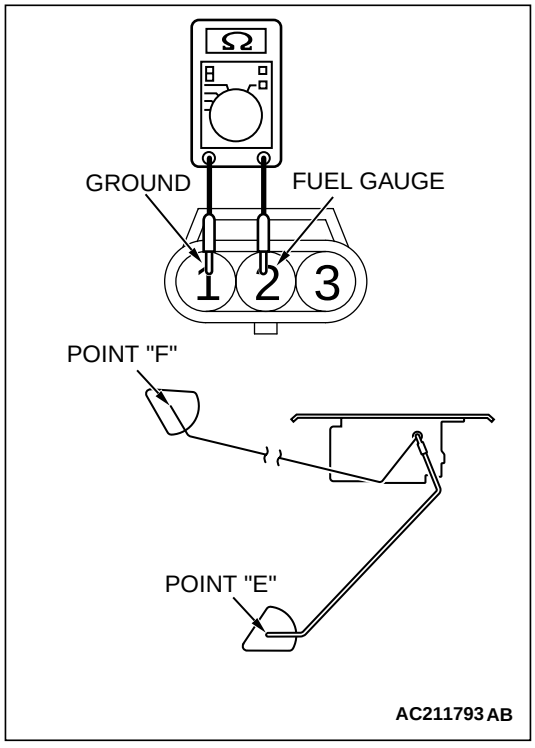


Fuel gauge unit (main)

1. Check that resistance value between terminals 2 and 1 is at the standard value when the fuel gauge unit float is between point "F" (highest) and point "E" (lowest).

   Standard value:
   - **Point "F": 2 ± 1 ohm**
   - **Point "E": 36.4 ± 1 ohm**
2. Check that resistance value changes smoothly when the float moves slowly between point "F" (highest) and point "E" (lowest).
3. If all checks are correct, go to fuel gauge unit float height check. If any check is not correct, replace the fuel gauge unit.

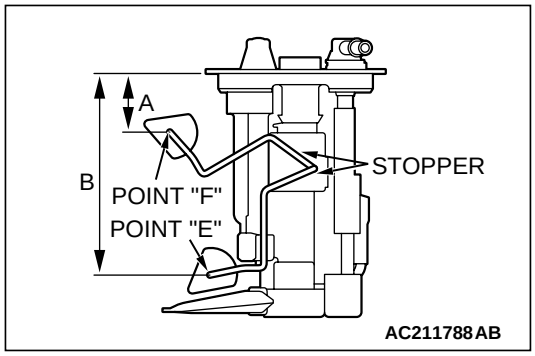
Fuel gauge unit (sub)



1. Check that resistance value between terminals 2 and 1 is at the standard value when the fuel gauge unit float is between point "F" (highest) and point "E" (lowest).

   Standard value:
   - **Point "F": 2 ± 1 ohm**
   - **Point "E": 73.6 ± 1 ohm**
2. Check that resistance value changes smoothly when the float moves slowly between point "F" (highest) and point "E" (lowest).
3. If all checks are correct, go to fuel gauge unit float height check. If any check is not correct, replace the fuel gauge unit.

Fuel Gauge Unit Float Height

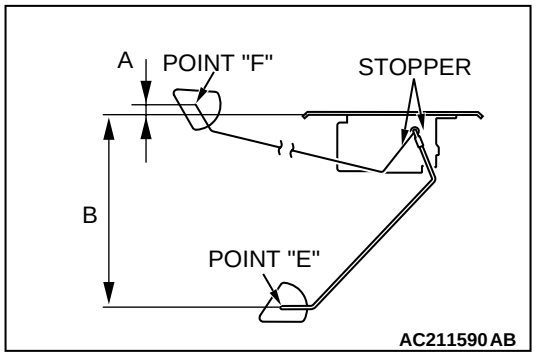


Fuel gauge unit (main)

1. Move the float and measure height A at point "F" (highest) and B at point "E" (lowest) with the float arm touching stopper.

   Standard value:
   - **A: 33.3 ± 2 mm (0.95 inch)**
   - **B: 121.9 ± 2 mm (5.97 inches)**

2. Adjust the float arm to the standard value, then go to the thermistor check.



Fuel gauge unit (sub)

1. Move the float and measure height A at point "F" (highest) and B at point "E" (lowest) with the float arm touching stopper.

   Standard value:
   - **A: 5.7 ± 2 mm (0.95 inch)**
   - **B: 141 ± 2 mm (5.97 inches)**

2. Adjust the float arm to the standard value, then go to the thermistor check.

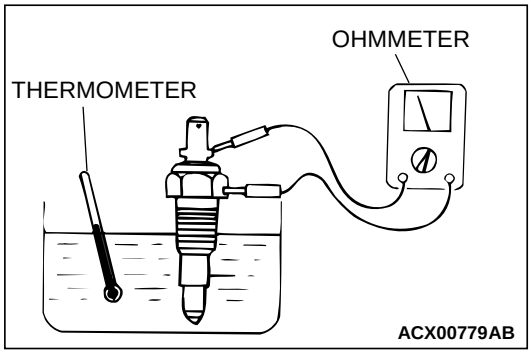
ENGINE COOLANT TEMPERATURE GAUGE UNIT CHECK

M1543001500321

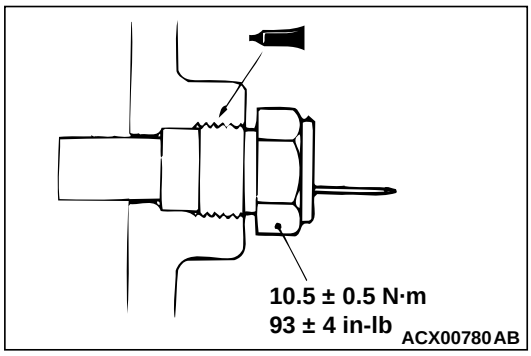
1. Drain the engine coolant. (Refer to GROUP 00, Maintenance Service – Engine Coolant P.00-44.)
2. Remove the engine coolant temperature gauge unit.
3. Put water temperature gauge unit into the hot water in specified temperature, and ensure that basic resistance is within standard value.

   Standard value: 70C° (150°F) 104 ± 13.5 ohm

   Reference value:



Temperature	Resistance Ω
50°C	230 ± 23
60°C	155 ± 15.5
80°C	73 ± 7.3



4. After inspection, apply specified sealant at threads of water temperature gauge unit, and tighten to the specified torque.

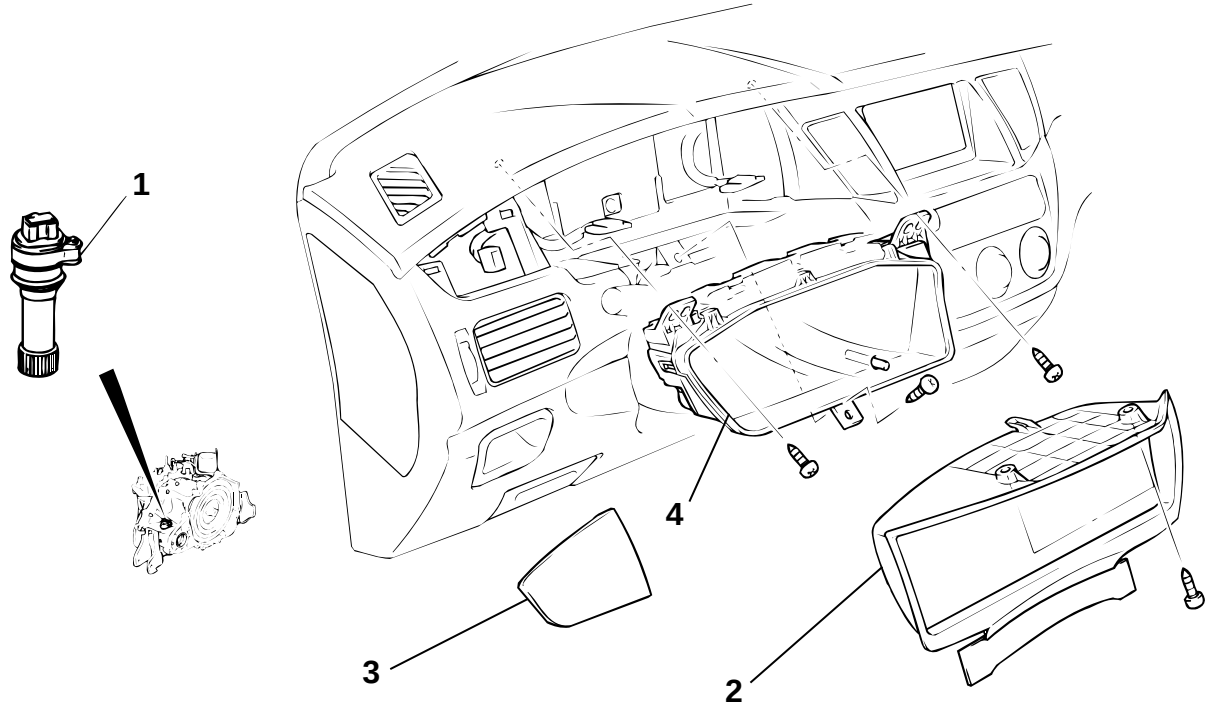
   Semi-drying sealant: 3M™ ADD part No.2310 or equivalent

5. Refill coolant. (Refer to GROUP 00, Maintenance Service – Engine Coolant P.00-44.)

COMBINATION METER ASSEMBLY AND VEHICLE SPEED SENSOR

REMOVAL AND INSTALLATION

M1543002900344



1. VEHICLE SPEED SENSOR

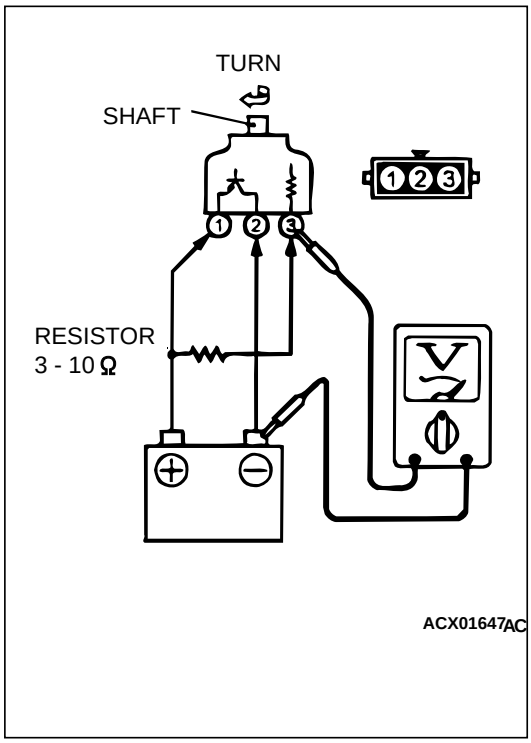
COMBINATION METER REMOVAL STEPS

2. METER BEZEL
3. INSTRUMENT PANEL ORNAMENT
4. COMBINATION METER

INSPECTION

M1543019501976

VEHICLE SPEED SENSOR CHECK

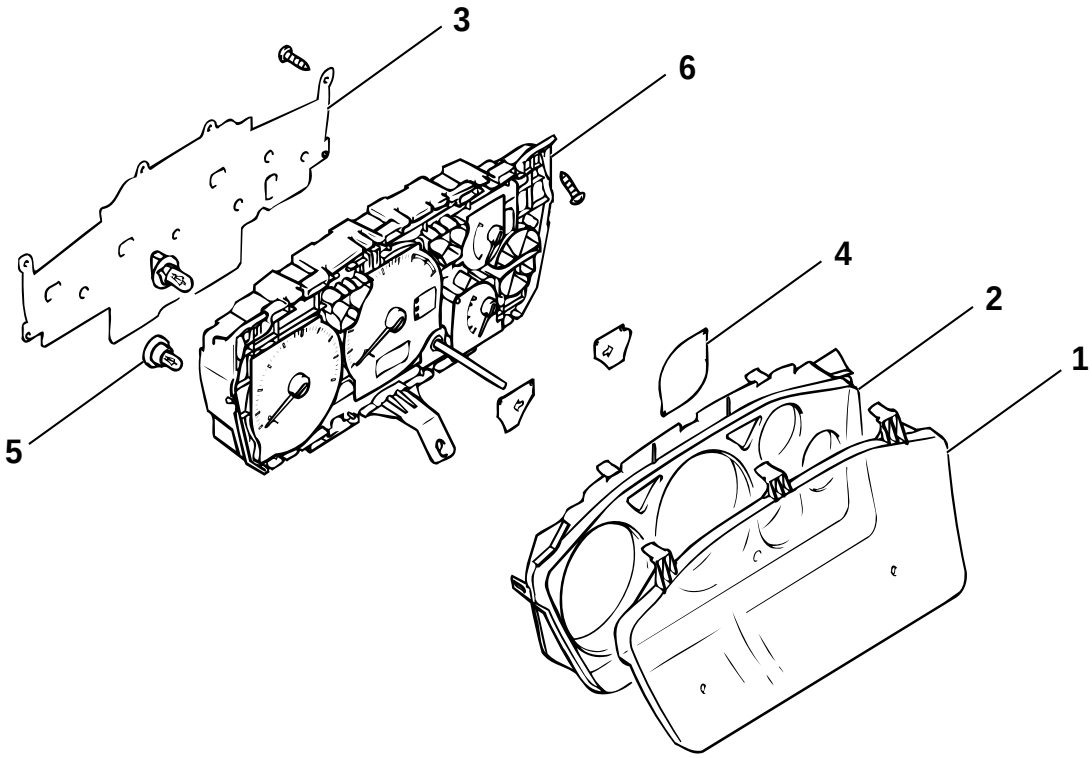


1. Remove the vehicle speed sensor and connect a 3 – 10 kiloohms resistor as shown in the illustration.
2. Turn the shaft of the vehicle speed sensor and check that there is voltage between terminals 2 – 3. (1 turn = 4 pulses)
3. If within the standard value, the vehicle speed sensor is OK. If not within the standard value, replace the vehicle speed sensor.

Standard value: 0 or Battery Voltage (1turn = 4pulses)

DISASSEMBLY AND ASSEMBLY

M1543003100266



DISASSEMBLY STEPS

1. GLASS
2. WINDOW PLATE
3. CIRCUIT BOARD COVER

DISASSEMBLY STEPS (Continued)

4. INDICATOR PLATE
5. BULB
6. METER ASSEMBLY

TSB Revision