GROUP 23Ac

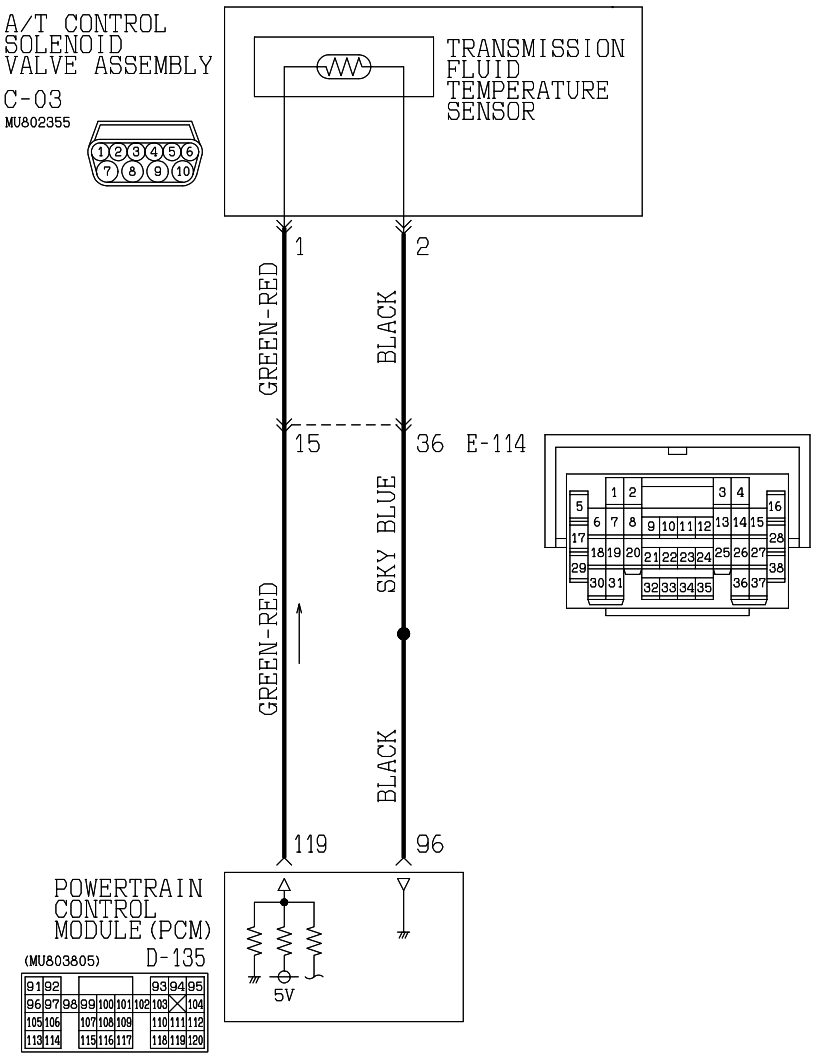
DIAGNOSTIC TROUBLE CODE PROCEDURES

CONTENTS

DIAGNOSTIC TROUBLE CODE PROCEDURES <AUTOMATIC TRANSMISSION>

DTC 15: Transmission Fluid Temperature Sensor System (Open Circuit)

Transmission Fluid Temperature Sensor System Circuit



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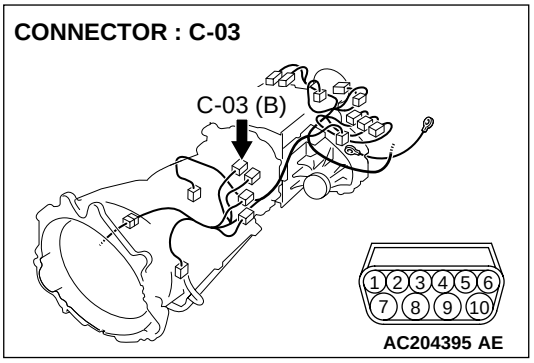
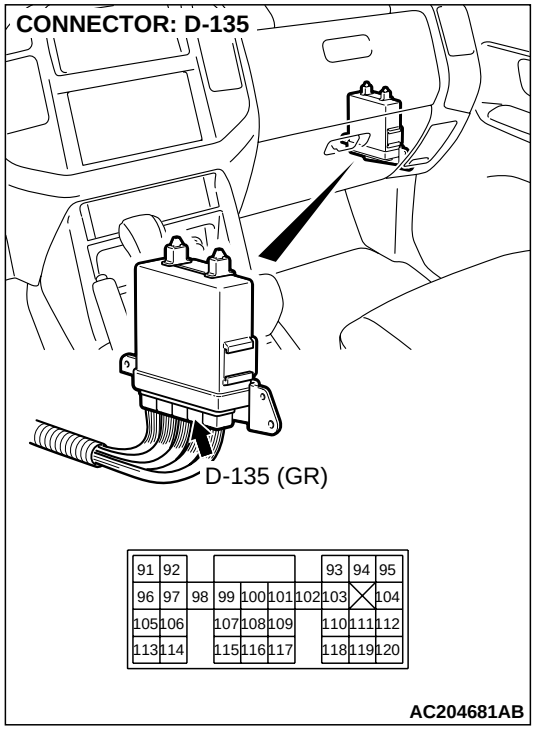
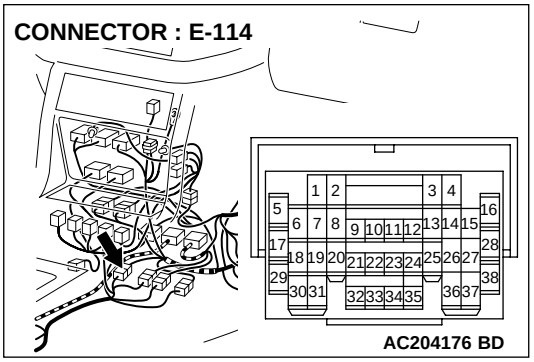
TSB Revision







CIRCUIT OPERATION

- The PCM (terminal 119) applies 5 volts to the transmission fluid temperature sensor output terminal (terminal 1).
- The transmission fluid temperature sensor circuit is grounded to the PCM (terminal 96).
- When the transmission fluid temperature is cold, the transmission fluid temperature sensor resistance is high. When the transmission fluid temperature is hot, the transmission fluid temperature sensor resistance is low.

DTC SET CONDITIONS

If the transmission fluid temperature sensor output voltage is greater than 4.5 volts after driving for 10 minutes or more (if the transmission fluid temperature does not increase), there is an open circuit in the transmission fluid temperature sensor and DTC 15 is set.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

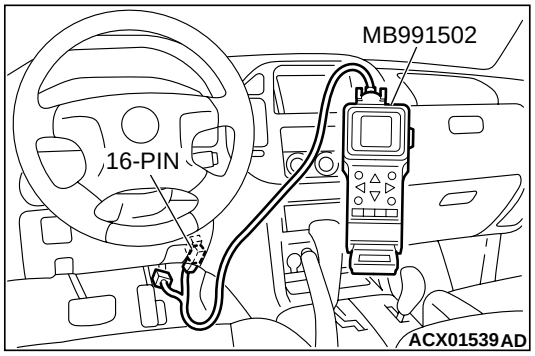
- Malfunction of the transmission fluid temperature sensor circuit
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991502: Scan Tool (MUT-II)

TSB Revision



STEP 1. Using scan tool MB991502, check data list item 15: Transmission Fluid Temperature Sensor.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 15, Transmission Fluid Temperature Sensor.
- When the engine is cool: Almost equal to the ambient temperature (atmospheric temperature)

  NOTE: Set scan tool MB991502 to data reading mode for item number 13, Intake Air Temperature (IAT) Sensor and note the temperature measurement. When the engine is cool, the temperature should be almost equal to the ambient temperature (atmospheric temperature), and the IAT sensor measurement should be approximately the same as the transmission fluid temperature sensor.
- When the engine is warm: 70 to 80°C (158 to 176°F)

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

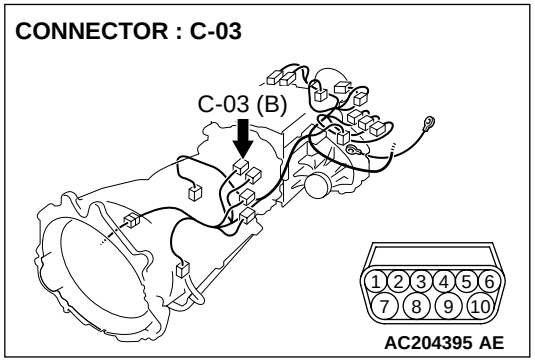
Q: Is the sensor operating properly?

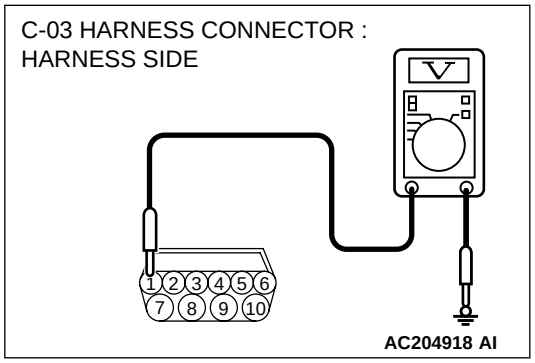
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

STEP 2. Measure the sensor output voltage at the A/T control solenoid valve assembly connector C-03 by backprobing.

(1) Do not disconnect connector C-03.
(2) Turn the ignition switch to the "ON" position.





(3) Measure the voltage between terminal 1 and ground by backprobing.
- When transmission fluid temperature is 20°C (68°F), voltage should measure between 3.8 and 4.0 volts.
- When transmission fluid temperature is 40°C (104°F), voltage should measure between 3.2 and 3.4 volts.
- When transmission fluid temperature is 80°C (176°F), voltage should measure between 1.7 and 1.9 volts.

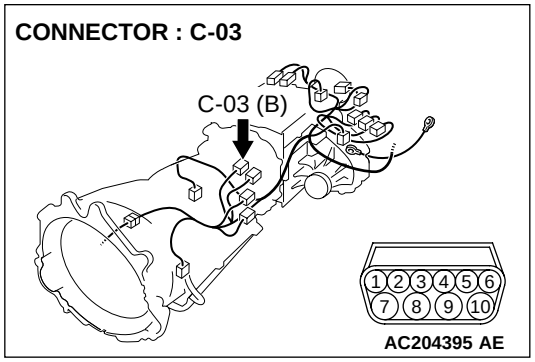
(4) Turn the ignition switch to the "LOCK" (OFF) position.

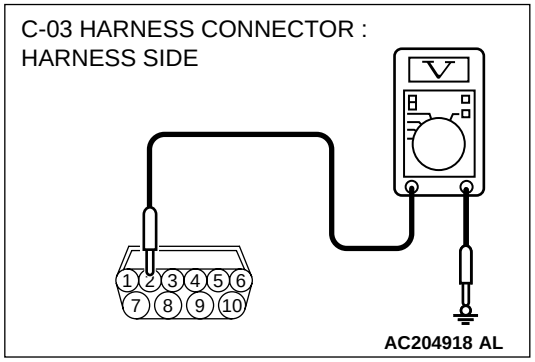
Q: Is the measured voltage within the specified range?

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

STEP 3. Measure the ground voltage at the A/T control solenoid valve assembly connector C-03 by backprobing.

(1) Do not disconnect connector C-03.
(2) Turn the ignition switch to the "ON" position.



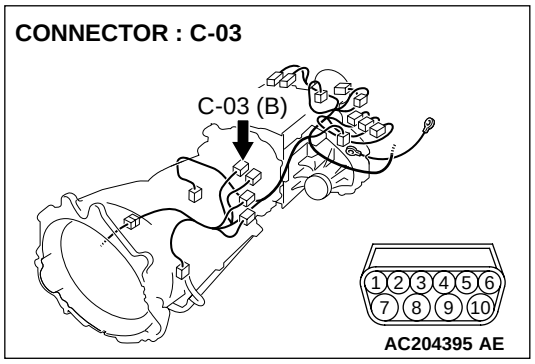


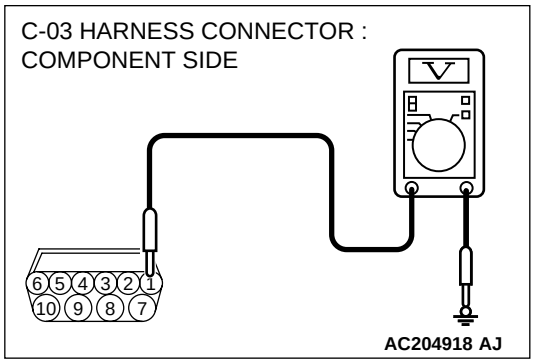
(3) Measure the voltage between terminal 2 and ground by backprobing.
- The voltage should measure 0.5 volt or less.

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

Q: Is the measured voltage 0.5 volt or less?

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





STEP 4. Check the sensor output voltage at A/T control solenoid valve assembly connector C-03.

(1) Disconnect connector C-03 and measure at the harness side.

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

(3) Measure the voltage between terminal 1 and ground.
- The voltage should measure between 4.5 and 4.9 volts.

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

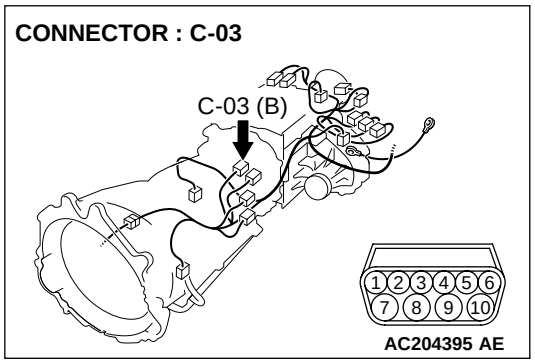
Q: Is the measured voltage between 4.5 and 4.9 volts?

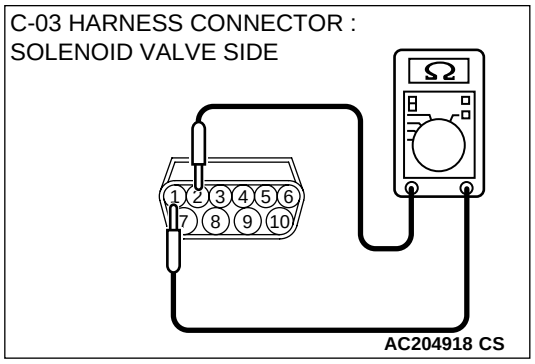
YES : Go to Step 5.

NO : Go to Step 9.

STEP 5. Check the transmission fluid temperature sensor at A/T control solenoid valve assembly connector C-03.

(1) Disconnect connector C-03 and measure at the sensor side.



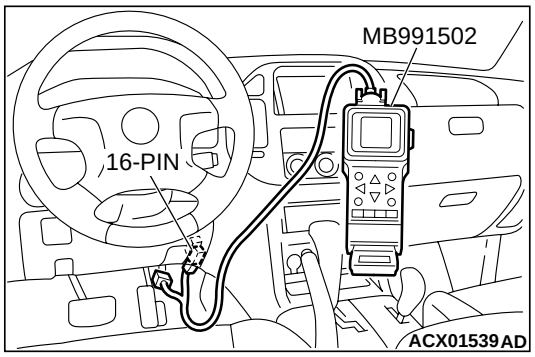


(2) Measure the resistance between terminal 1 and 2.
- When transmission fluid temperature is 0°C (32°F), resistance should be between 16.7 and 20.5 kΩ.
- When transmission fluid temperature is 20°C (68°F), resistance should be between 7.3 and 8.9 kΩ.
- When transmission fluid temperature is 40°C (104°F), resistance should be between 3.4 and 4.2 kΩ.
- When transmission fluid temperature is 60°C (140°F), resistance should be between 1.9 and 2.2 kΩ.
- When transmission fluid temperature is 80°C (176°F), resistance should be between 1.0 and 1.2 kΩ.
- When transmission fluid temperature is 100°C (212°F), resistance should be between 0.57 and 0.69 kΩ.

Q: Is the measured resistance within the specified range?

YES : Go to Step 6.

NO : Replace the transmission fluid temperature sensor. Refer to GROUP 23B, Transmission P.23B-18.



STEP 6. Using scan tool MB991502, check data list item 15: Transmission Fluid Temperature Sensor.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 15, Transmission Fluid Temperature Sensor.
- When the engine is cool: Almost equal to the ambient temperature (atmospheric temperature)

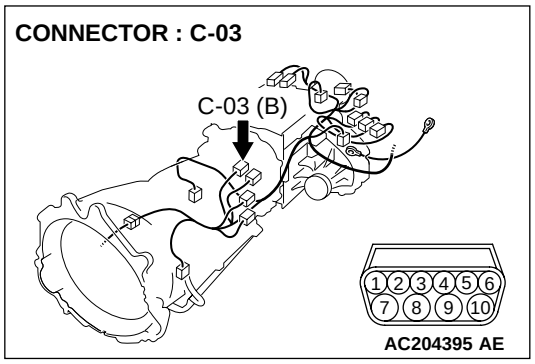
  NOTE: Set scan tool MB991502 to data reading mode for item number 13, Intake Air Temperature (IAT) Sensor and note the temperature measurement. When the engine is cool, the temperature should be almost equal to the ambient temperature (atmospheric temperature), and the IAT sensor measurement should be approximately the same as the transmission fluid temperature sensor.
- When the engine is warm: 70 to 80°C (158 to 176°F)

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

Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.



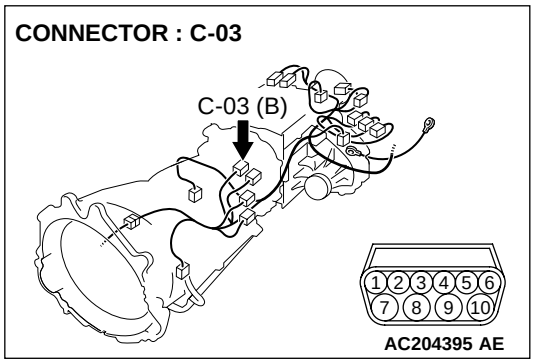
STEP 7. Check A/T control solenoid valve assembly connector C-03 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

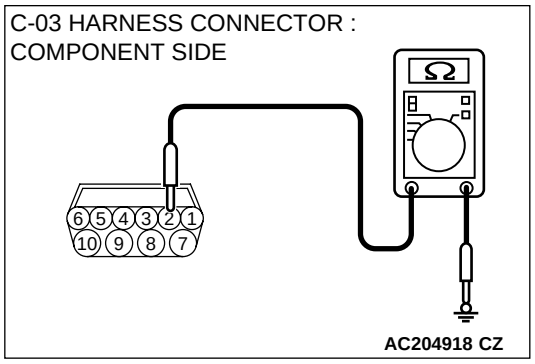
YES : Go to Step 8.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 8. Measure the resistance of the ground circuit at A/T control solenoid valve assembly connector C-03.



(1) Disconnect connector C-03 and measure at the harness side.



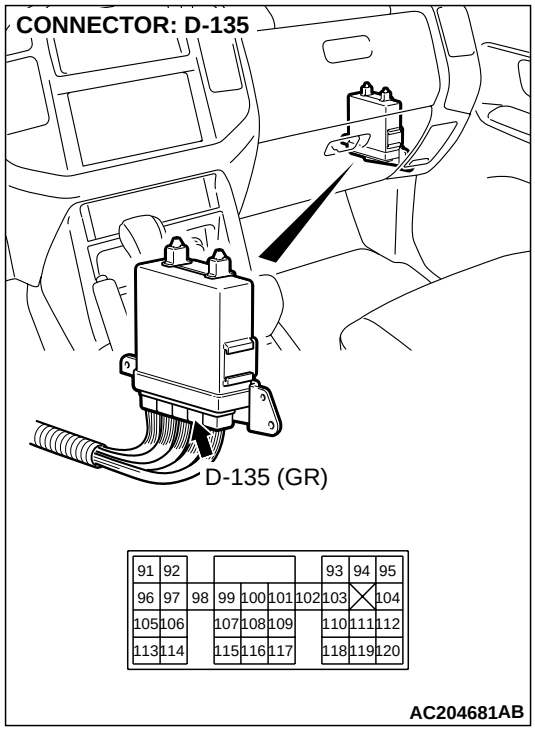
(2) Measure the resistance between terminal 2 and ground.
- The resistance should measure less than 2 ohms.

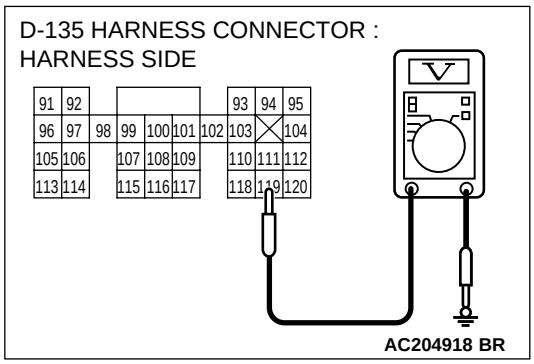
Q: Is the resistance less than 2 ohms?

YES : Go to Step 5.
NO : Go to Step 14.

STEP 9. Measure the sensor output voltage at PCM connector D-135 by backprobing.

(1) Do not disconnect connector D-135.
(2) Turn the ignition switch to the "ON" position.





(3) Measure the voltage between terminal 119 and ground by backprobing.
- When transmission fluid temperature is 20°C (68°F), voltage should measure between 3.8 and 4.0 volts.
- When transmission fluid temperature is 40°C (104°F), voltage should measure between 3.2 and 3.4 volts.
- When transmission fluid temperature is 80°C (176°F), voltage should measure between 1.7 and 1.9 volts.

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

Q: Is the measured voltage within the specified range?

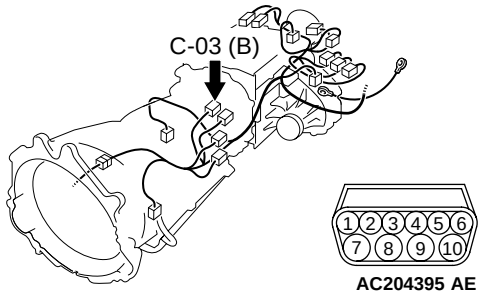
YES : Go to Step 12.
NO : Go to Step 10.

STEP 10. Check A/T control solenoid valve assembly connector C-03, PCM connector D-135 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 11.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



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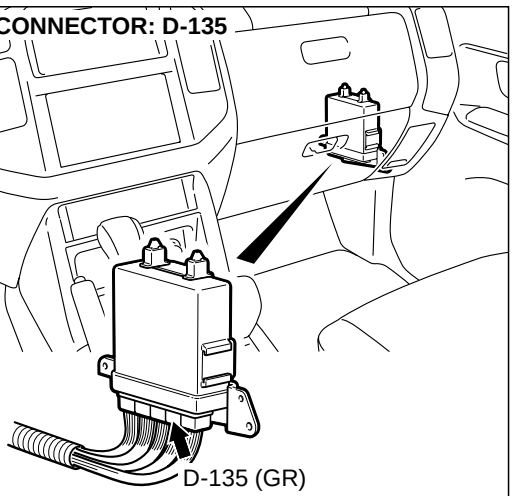
CONNECTOR: D-135



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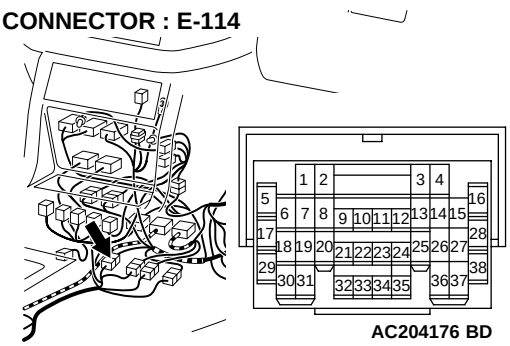
CONNECTOR : E-114



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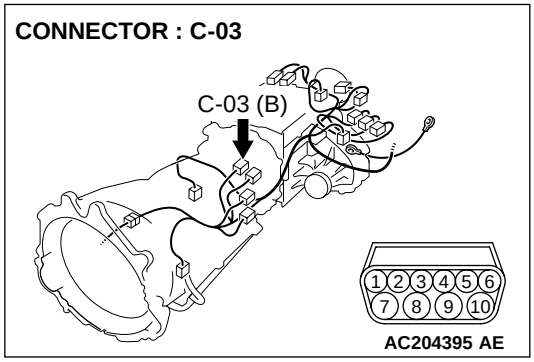
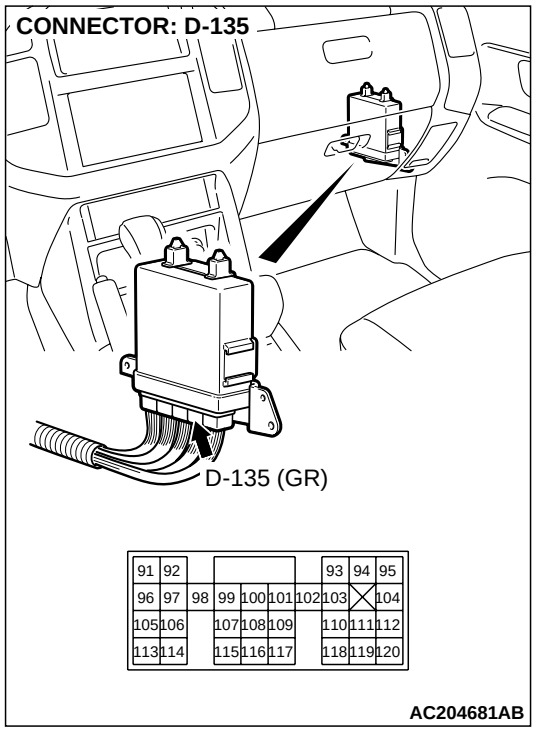
TSB Revision





STEP 11. Check the harness for short circuit to ground between A/T control solenoid valve connector C-03 terminal 1 and PCM connector D-135 terminal 119.

Q: Is the harness wire in good condition?

YES : Go to Step 6.

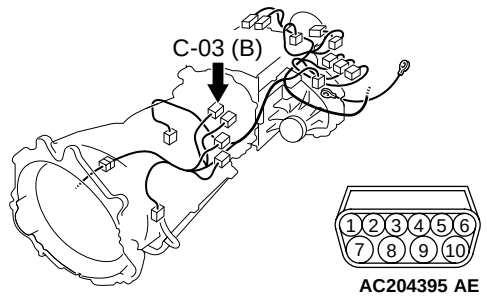
NO : Repair or replace the harness wire.

STEP 12. Check A/T control solenoid valve assembly connector C-03, PCM connector D-135 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 13.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



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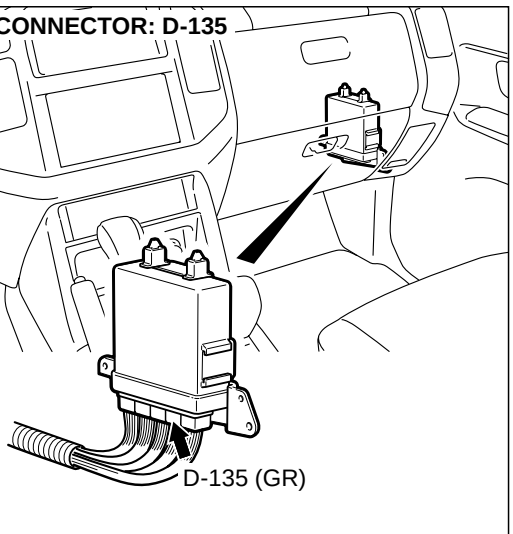
CONNECTOR: D-135



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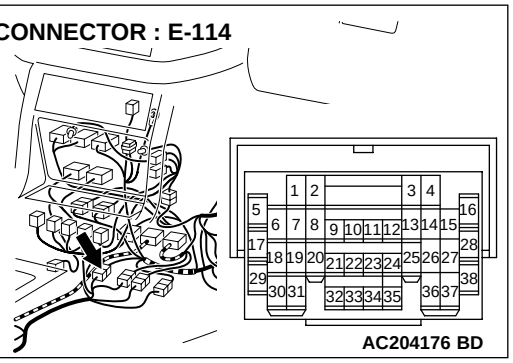
CONNECTOR : E-114



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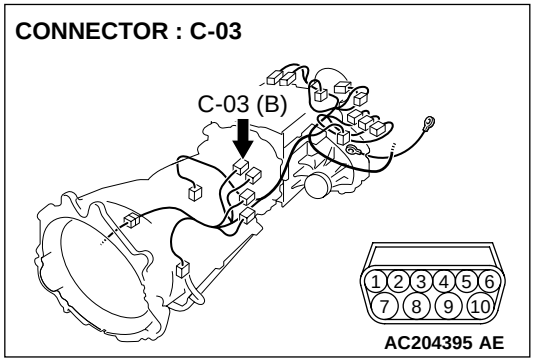
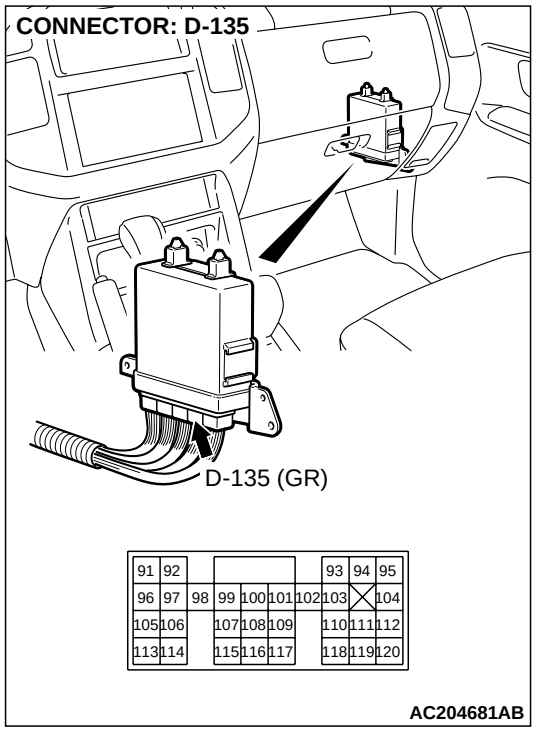




STEP 13. Check the harness for open circuit between A/T control solenoid valve connector C-03 terminal 1 and PCM connector D-135 terminal 119.

Q: Is the harness wire in good condition?

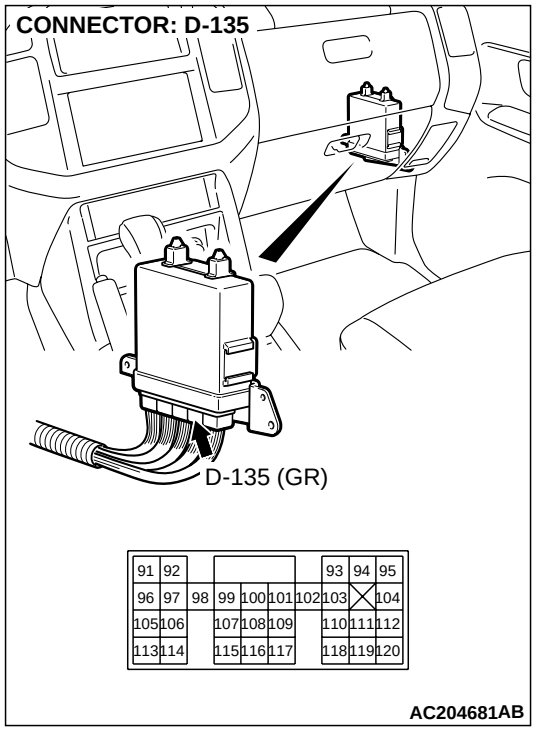
YES : Go to Step 6.

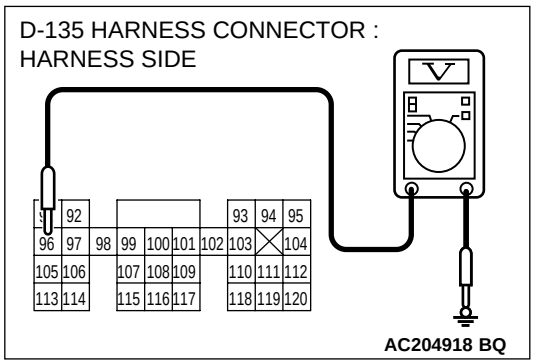
NO : Repair or replace the harness wire.

STEP 14. Measure the ground voltage at PCM connector D-135 by backprobing.

(1) Do not disconnect connector D-135.

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





(3) Measure the voltage between terminal 96 and ground by backprobing.
- Voltage should measure 0.5 volt or less.

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

Q: Is the measured voltage within the specified range?

YES : Go to Step 15.

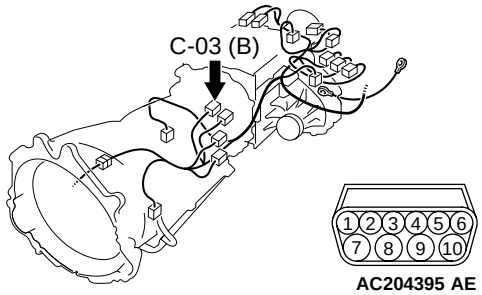
NO : Go to Step 17.

STEP 15. Check A/T control solenoid valve assembly connector C-03, PCM connector D-135 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 16.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



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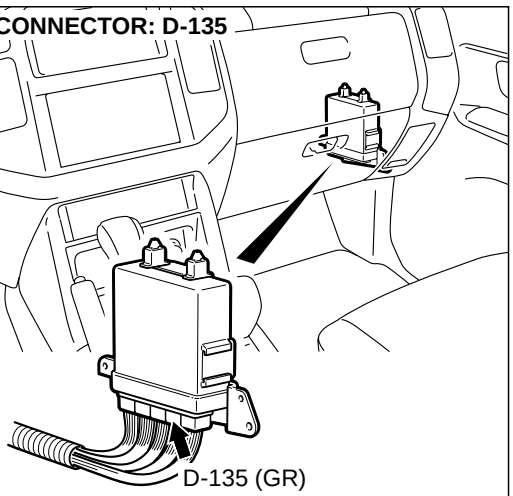
CONNECTOR: D-135



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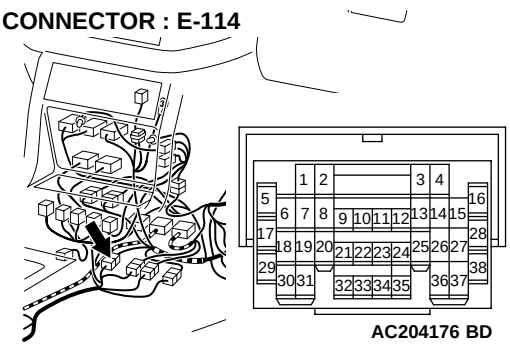
CONNECTOR : E-114



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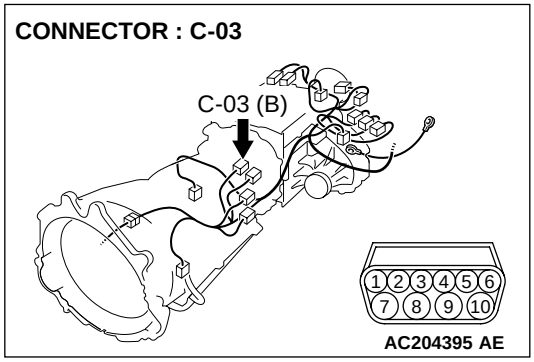
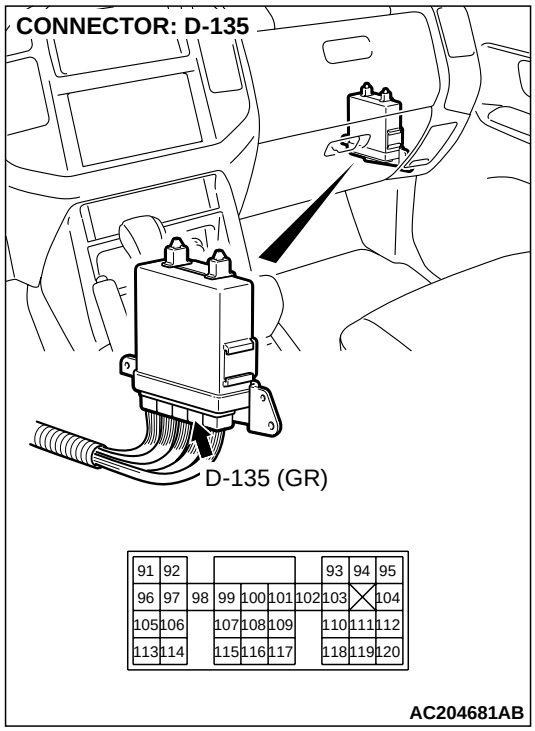
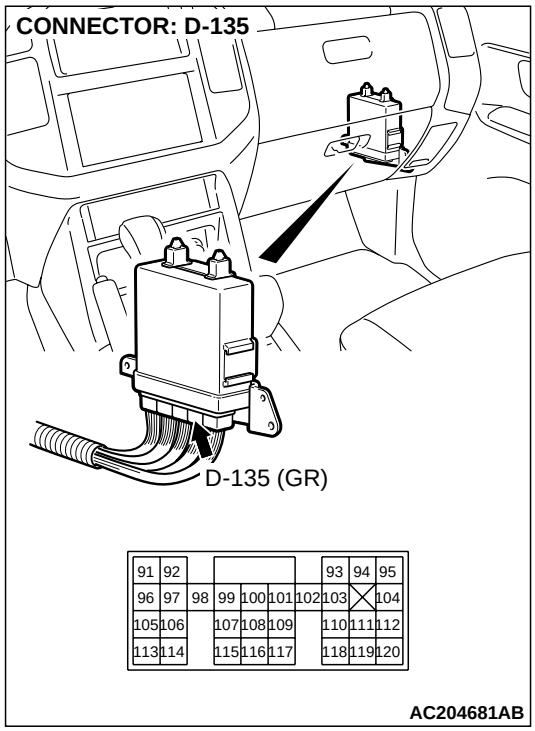
STEP 16. Check the harness for open circuit or damage between A/T control solenoid valve connector C-03 terminal 2 and PCM connector D-135 terminal 96.
Q: Is the harness wire in good condition?

YES : Go to Step 6.
NO : Repair or replace the harness wire.







STEP 17. Check PCM connector D-135 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

DTC 16: Transmission Fluid Temperature Sensor System (Short Circuit)

Transmission Fluid Temperature Sensor System Circuit

Refer to P.23Ac-2.

CIRCUIT OPERATION

Refer to P.23Ac-2.

DTC SET CONDITIONS

If the transmission fluid temperature sensor output detects the voltage which corresponds to 0 volt for more than one second, there is a short in the transmission fluid temperature sensor circuit and DTC 16 is set.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the transmission fluid temperature sensor circuit
- Damaged harness, connector
- Malfunction of the PCM

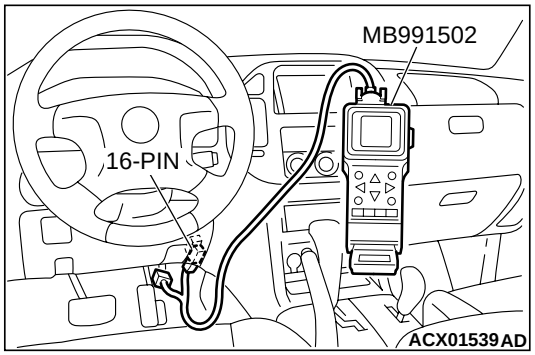
DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 15: Transmission Fluid Temperature Sensor.

⚠ CAUTION

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



(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 15, Transmission Fluid Temperature Sensor.
- When the engine is cool: Almost equal to the ambient temperature (atmospheric temperature)

  NOTE: Set scan tool MB991502 to data reading mode for item number 13, Intake Air Temperature (IAT) Sensor and note the temperature measurement. When the engine is cool, the temperature should be almost equal to the ambient temperature (atmospheric temperature), and the IAT sensor measurement should be approximately the same as the transmission fluid temperature sensor.
- When the engine is warm: 70 to 80°C (158 to 176°F)

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

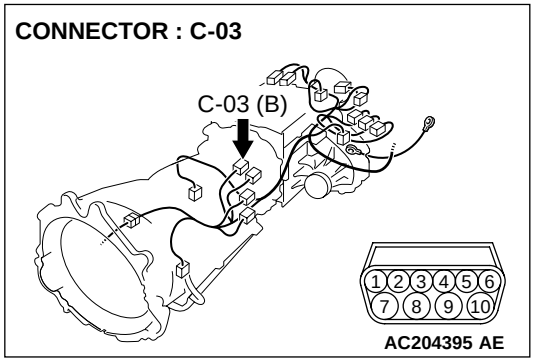
Q: Is the sensor operating properly?

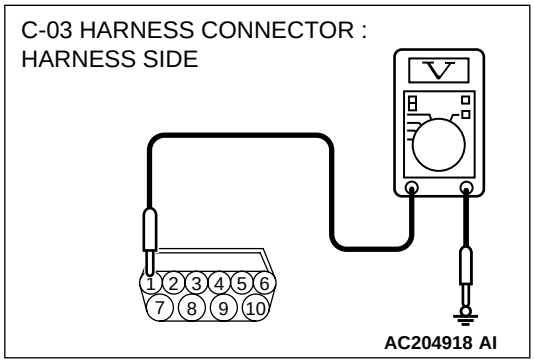
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

STEP 2. Measure the sensor output voltage at the A/T control solenoid valve assembly connector C-03 by backprobing.

(1) Do not disconnect connector C-03.
(2) Turn the ignition switch to the "ON" position.





(3) Measure the voltage between terminal 1 and ground by backprobing.
- When transmission fluid temperature is 20°C (68°F), voltage should measure between 3.8 and 4.0 volts.
- When transmission fluid temperature is 40°C (104°F), voltage should measure between 3.2 and 3.4 volts.
- When transmission fluid temperature is 80°C (176°F), voltage should measure between 1.7 and 1.9 volts.

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

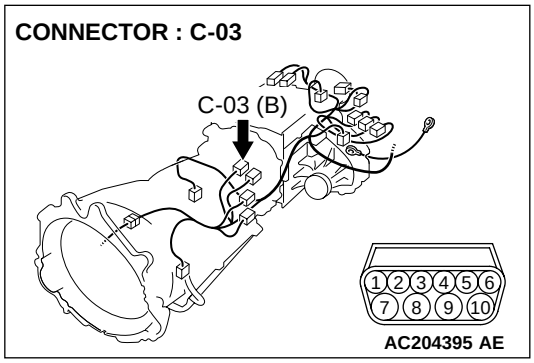
Q: Is the measured voltage within the specified range?

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

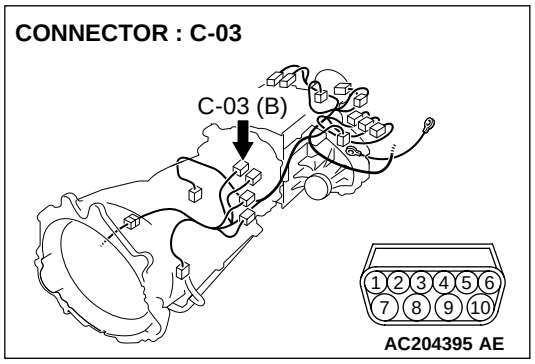
STEP 3. Check A/T control solenoid valve assembly connector C-03 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

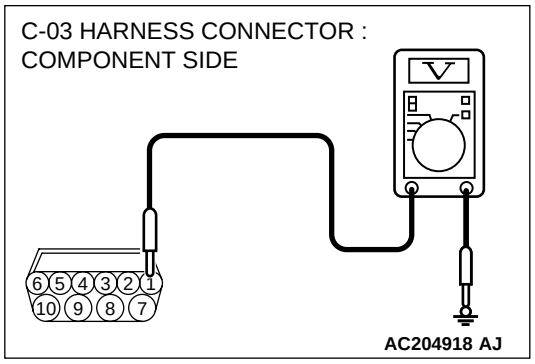
YES : Go to Step 4.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 4. Check the sensor output voltage at A/T control solenoid valve assembly connector C-03.



(1) Disconnect connector C-03 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.



(3) Measure the voltage between terminal 1 and ground.
- The voltage should measure between 4.5 and 4.9 volts.

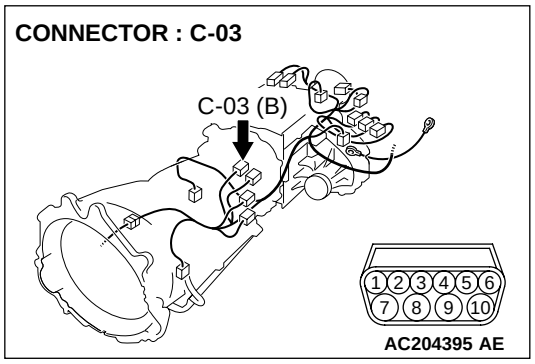
(4) Turn the ignition switch to the "LOCK" (OFF) position.

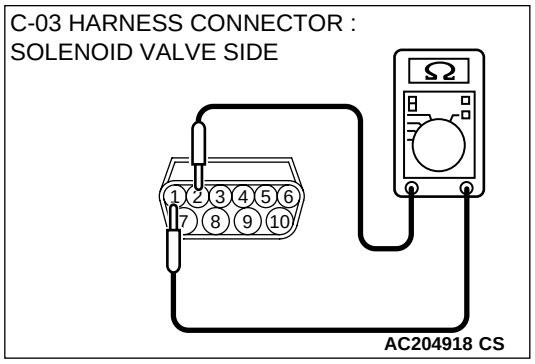
Q: Is the measured voltage between 4.5 and 4.9 volts?

YES : Go to Step 5.
NO : Go to Step 7.

STEP 5. Check the transmission fluid temperature sensor at A/T control solenoid valve assembly connector C-03.

(1) Disconnect connector C-03 and measure at the sensor side.



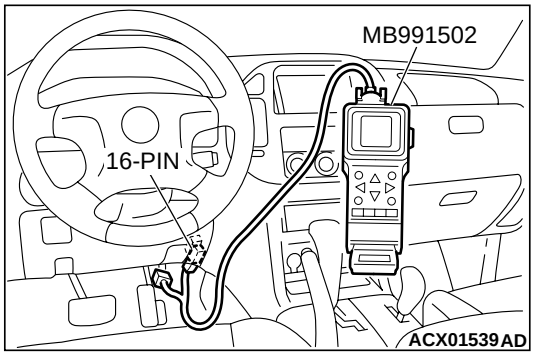


(2) Measure the resistance between terminal 1 and 2.
- When transmission fluid temperature is 0°C (32°F), resistance should be between 16.7 and 20.5 kΩ.
- When transmission fluid temperature is 20°C (68°F), resistance should be between 7.3 and 8.9 kΩ.
- When transmission fluid temperature is 40°C (104°F), resistance should be between 3.4 and 4.2 kΩ.
- When transmission fluid temperature is 60°C (140°F), resistance should be between 1.9 and 2.2 kΩ.
- When transmission fluid temperature is 80°C (176°F), resistance should be between 1.0 and 1.2 kΩ.
- When transmission fluid temperature is 100°C (212°F), resistance should be between 0.57 and 0.69 kΩ.

Q: Is the measured resistance within the specified range?

YES : Go to Step 6.

NO : Replace the transmission fluid temperature sensor. Refer to GROUP 23B, Transmission P.23B-18.



STEP 6. Using scan tool MB991502, check data list item 15: Transmission Fluid Temperature Sensor.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 15, Transmission Fluid Temperature Sensor.
- When the engine is cool: Almost equal to the ambient temperature (atmospheric temperature)

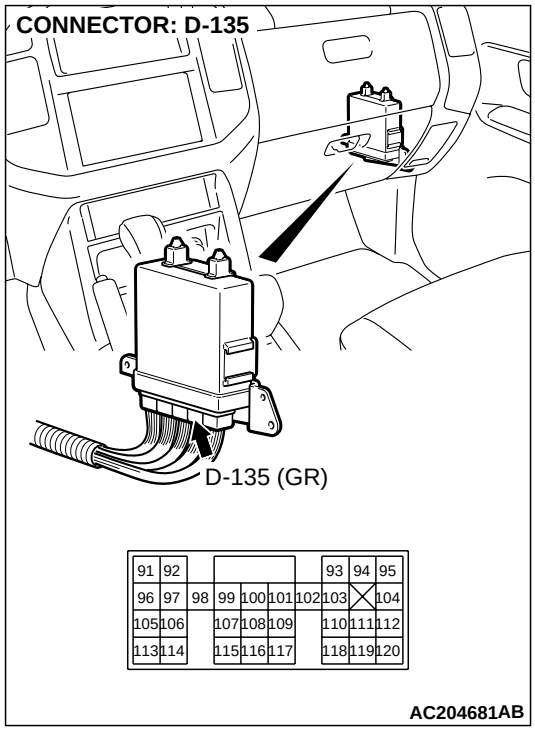
  NOTE: Set scan tool MB991502 to data reading mode for item number 13, Intake Air Temperature (IAT) Sensor and note the temperature measurement. When the engine is cool, the temperature should be almost equal to the ambient temperature (atmospheric temperature), and the IAT sensor measurement should be approximately the same as the transmission fluid temperature sensor.
- When the engine is warm: 70 to 80°C (158 to 176°F)

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

Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

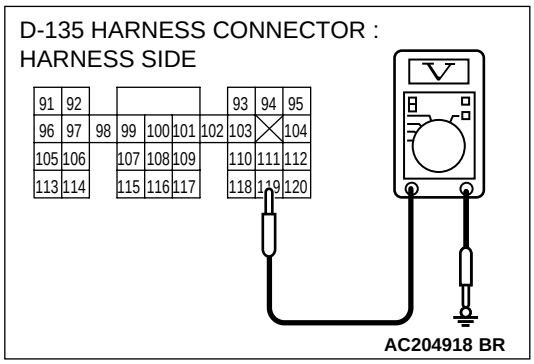
NO : Replace the PCM.



STEP 7. Measure the sensor output voltage at PCM connector D-135 by backprobing.

(1) Do not disconnect connector D-135.

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



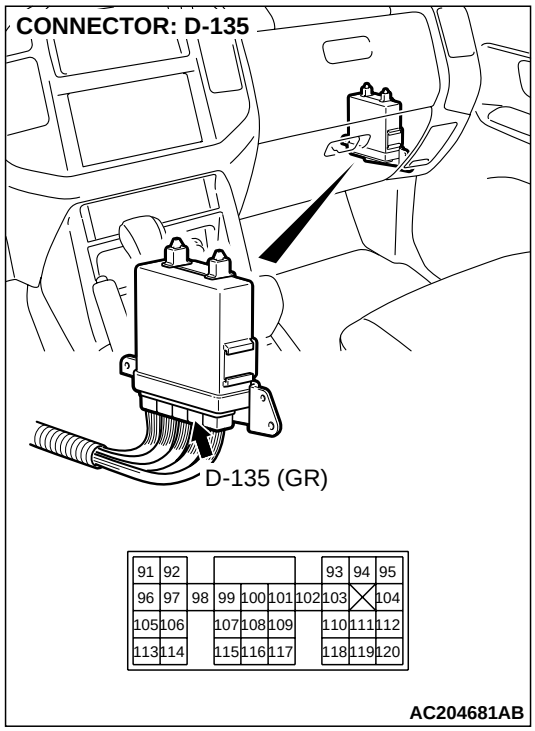
(3) Measure the voltage between terminal 119 and ground by backprobing.
- When transmission fluid temperature is 20°C (68°F), voltage should measure between 3.8 and 4.0 volts.
- When transmission fluid temperature is 40°C (104°F), voltage should measure between 3.2 and 3.4 volts.
- When transmission fluid temperature is 80°C (176°F), voltage should measure between 1.7 and 1.9 volts.

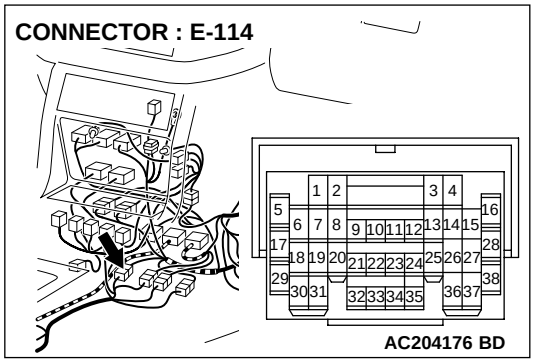
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage within the specified range?

YES : Go to Step 6.

NO : Go to Step 8.

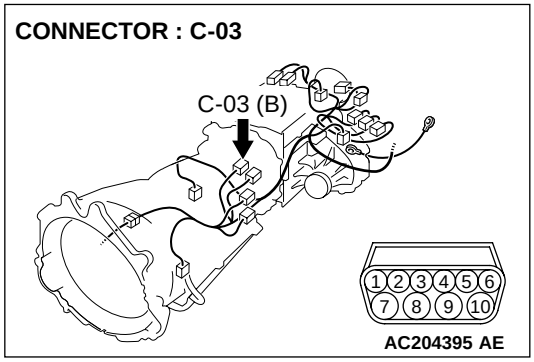


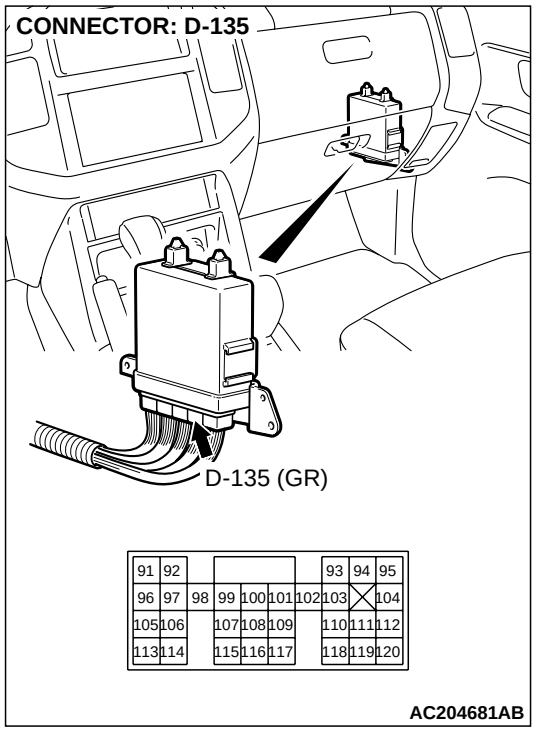


STEP 8. Check PCM connector D-135 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 9.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 9. Check the harness for a short circuit to ground between A/T control solenoid valve connector C-03 terminal 1 and PCM connector D-135 terminal 119.

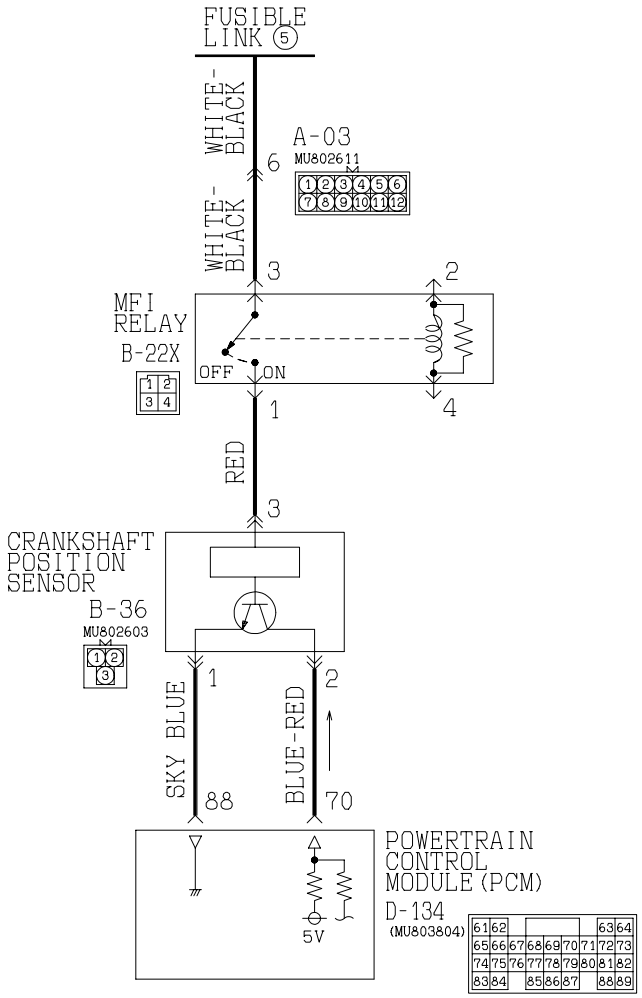
Q: Is the harness wire in good condition?

YES : Go to Step 6.

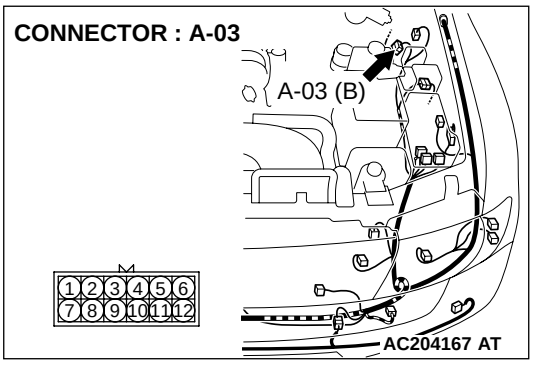
NO : Repair or replace the harness wire.

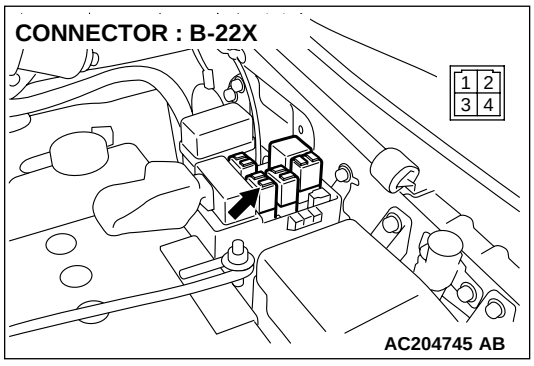
DTC 21: Crankshaft Position Sensor System

Crankshaft Position Sensor System Circuit

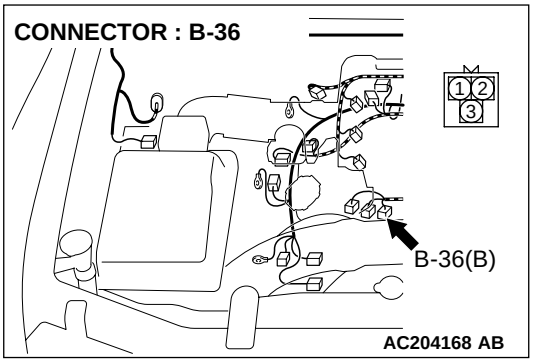


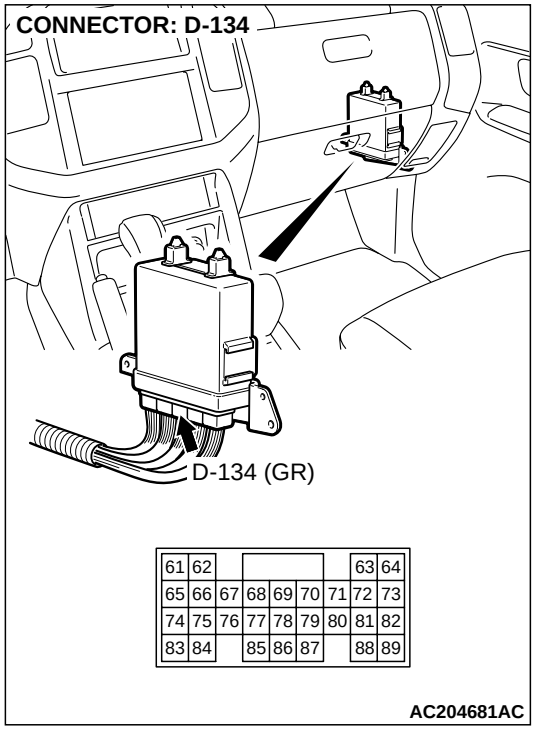
W3Q20M07AA
AC205188 AB





TSB Revision





CIRCUIT OPERATION

The crankshaft position sensor power is supplied from the MFI relay (terminal 1) to the crankshaft position sensor (terminal 3). The crankshaft position sensor (terminal 1) is grounded by the PCM (terminal 88). The PCM (terminal 70) supplies 5 volts to the crankshaft position sensor output (terminal 2). The crankshaft position sensor detects the crank angle (position) of each cylinder, and converts that data to pulse signals that are sent to the PCM.

DTC SET CONDITIONS

If the crankshaft position sensor does not detect an output pulse for more than 5 seconds while driving more than 25 km/h (16 mph), it is judged that there is an open circuit in the crankshaft position sensor and DTC 21 is set.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

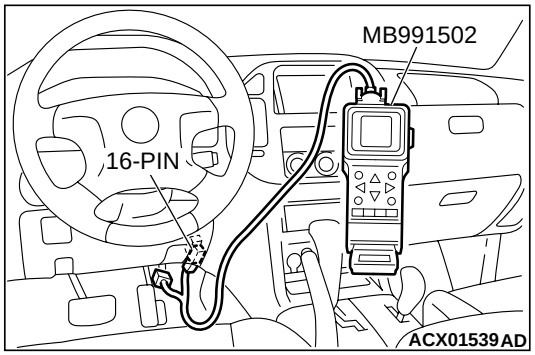
- Malfunction of the crankshaft position sensor circuit
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 21: Crankshaft Position Sensor.

⚠ 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.



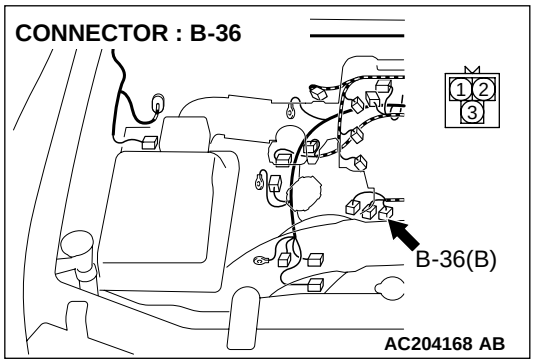
(1) Connect scan tool MB991502 to the data link connector.
(2) With the gear selector lever in the "P" position, start the engine and run at idle.
(3) Set scan tool MB991502 to data reading mode for item 21, Crankshaft Position Sensor.
- When the accelerator pedal is not depressed (throttle valve is fully closed) the display on scan tool MB991502 should be "600 to 900 r/min."
- With the accelerator pedal depressed, the engine speed display on scan tool MB991502 should increase according to engine speed.

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

Q: Does the engine speed display increase according to engine speed when the accelerator pedal is depressed?

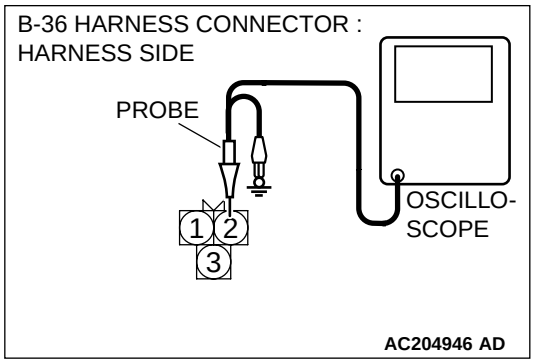
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

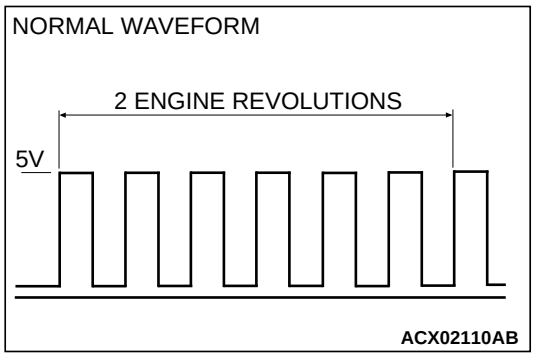


STEP 2. Using the oscilloscope, check the waveform at crankshaft position sensor connector B-36.

(1) Do not disconnect connector B-36.



(2) Connect an oscilloscope probe to crankshaft position sensor connector B-36 terminal 2 by backprobing.
(3) With the gear selector lever in the "P" position, start the engine and run at idle.

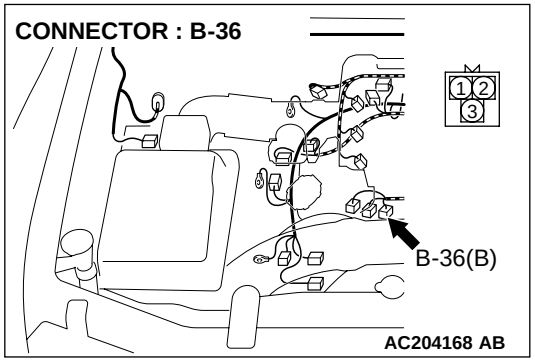


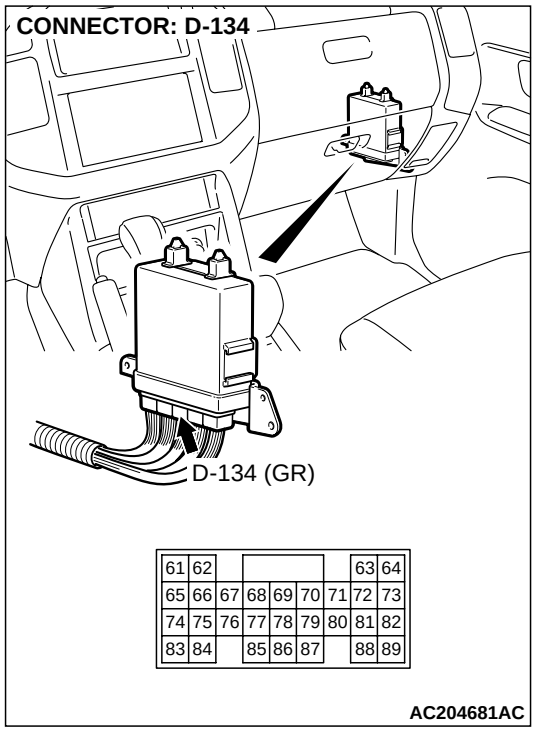
(4) Check the waveform.
- The waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts or more and the minimum value 0.6 volt or less. The output waveform should not contain electrical noise.

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

Q: Is the waveform normal?

YES : Go to Step 3.
NO : Go to Step 5.



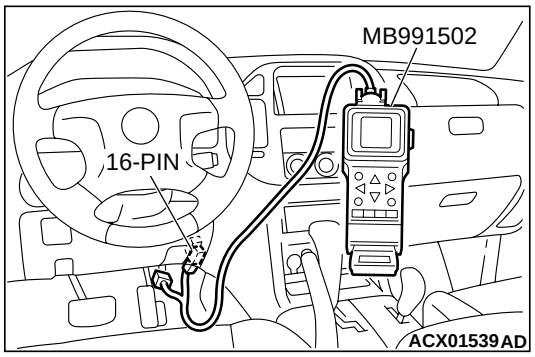


STEP 3. Check crankshaft position sensor connector B-36 and PCM connector D-134 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 4. Using scan tool MB991502, check data list item 21: Crankshaft Position Sensor.

⚠ 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.

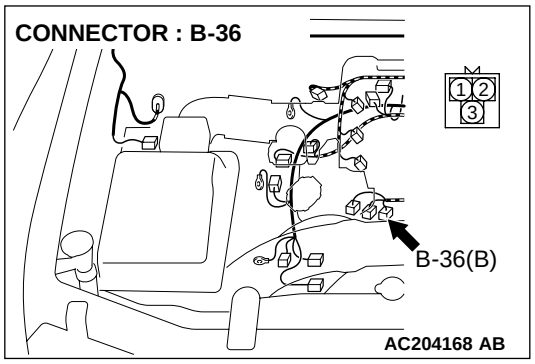
(1) Connect scan tool MB991502 to the data link connector.
(2) With the gear selector lever in the "P" position, start the engine and run at idle.
(3) Set scan tool MB991502 to data reading mode for item 21, Crankshaft Position Sensor.
- When the accelerator pedal is not depressed (throttle valve is fully closed) the display on scan tool MB991502 should be "600 to 900 r/min."
- With the accelerator pedal depressed, the engine speed display on scan tool MB991502 should increase according to engine speed.

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

Q: Does the engine speed display increase according to engine speed when the accelerator pedal is depressed?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.

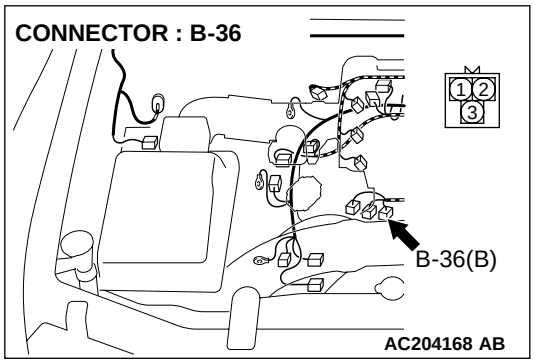


STEP 5. Check crankshaft position sensor connector B-36 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 6.

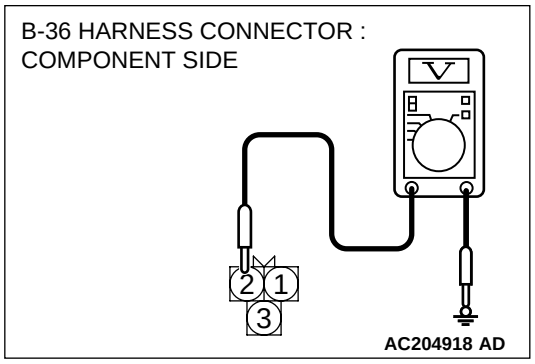
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 6. Measure the sensor output voltage at crankshaft position sensor connector B-36.

(1) Disconnect connector B-36 and measure at the harness side.

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



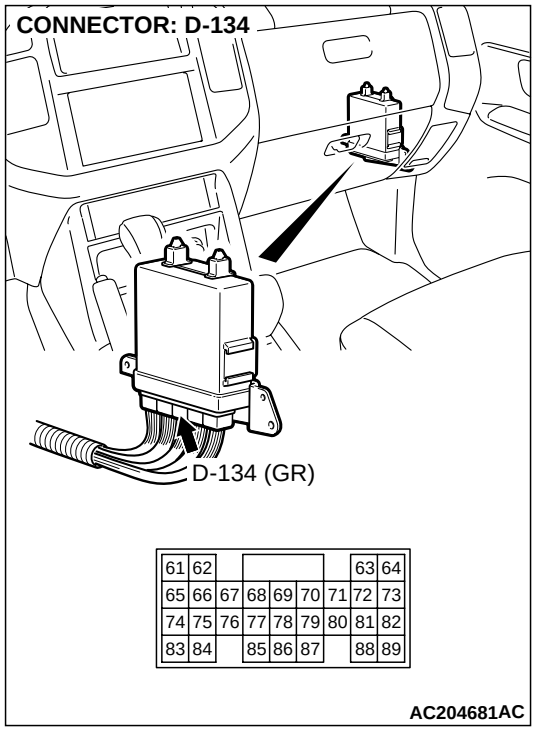
(3) Measure the voltage between terminal 2 and ground.
- The voltage should measure between 4.9 and 5.1 volts.

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

Q: Is the measured voltage between 4.9 and 5.1 volts?

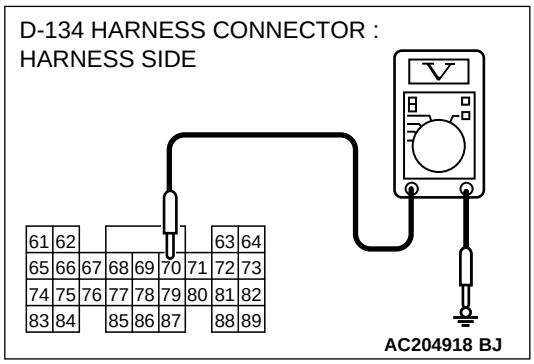
YES : Go to Step 12.

NO : Go to Step 7.



STEP 7. Measure the sensor output voltage at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.
(2) Disconnect connector B-36 at the crankshaft position sensor.
(3) Turn the ignition switch to the "ON" position.

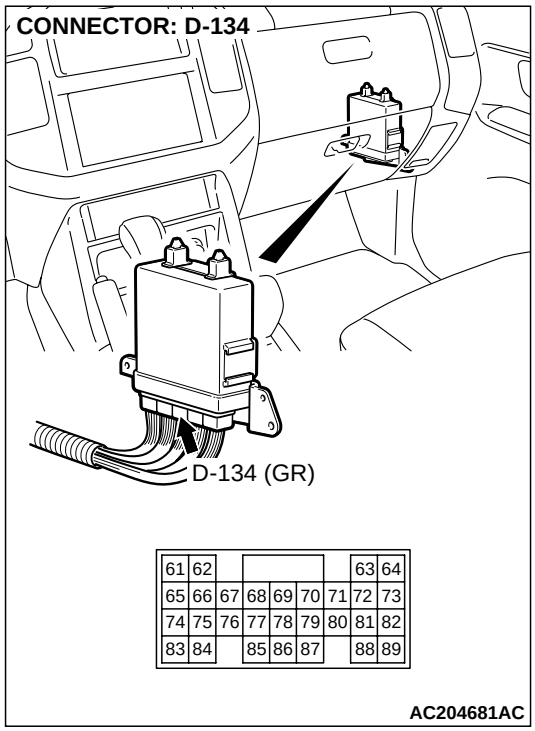


(4) Measure the voltage between terminal 70 and ground by backprobing.
- Voltage should measure between 4.9 and 5.1 volts.

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

Q: Is the measured voltage between 4.9 and 5.1 volts?

YES : Go to Step 8.
NO : Go to Step 10.

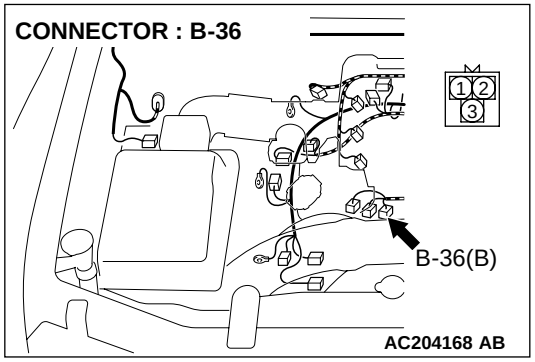


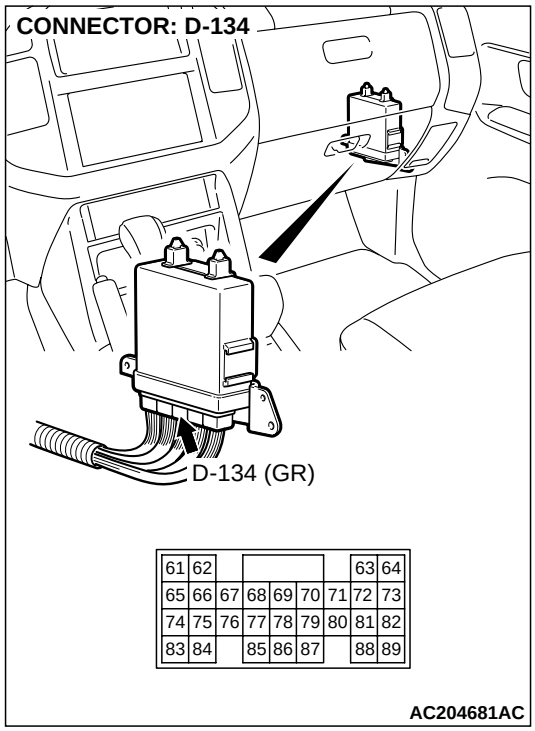
STEP 8. Check PCM connector D-134 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 9.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



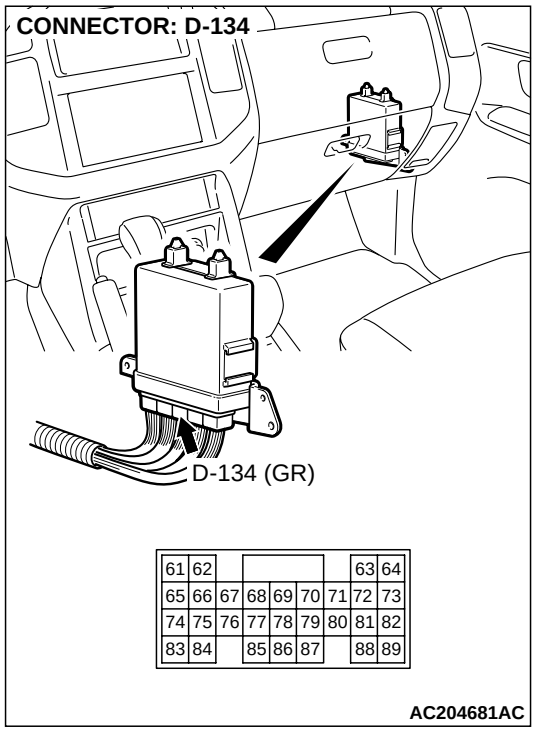


STEP 9. Check the harness for open circuit between crankshaft position sensor connector B-36 terminal 2 and PCM connector D-134 terminal 70.

Q: Is the harness wire in good condition?

YES : Go to Step 4.

NO : Repair or replace the harness wire.

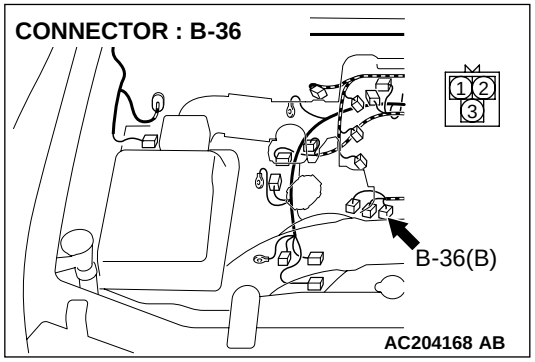


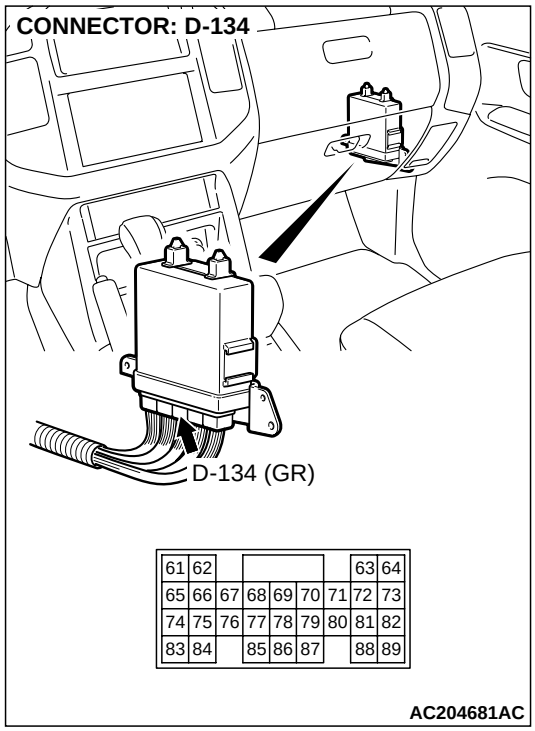
STEP 10. Check PCM connector D-134 for loose, corroded or damaged terminals, or terminals pushed back in the connector

Q: Are the connector and terminals in good condition?

YES : Go to Step 11.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



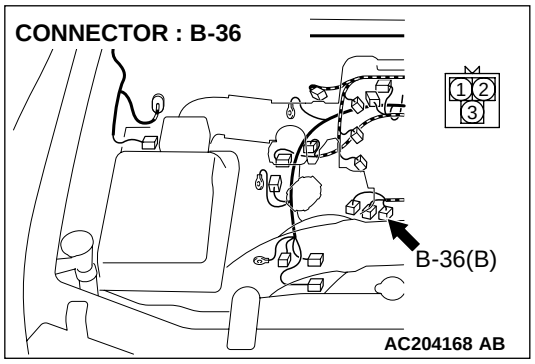


STEP 11. Check harness for a short circuit to ground between crankshaft position sensor connector B-36 terminal 2 and PCM connector D-134 terminal 70.

Q: Is the harness wire in good condition?

YES : Go to Step 4.

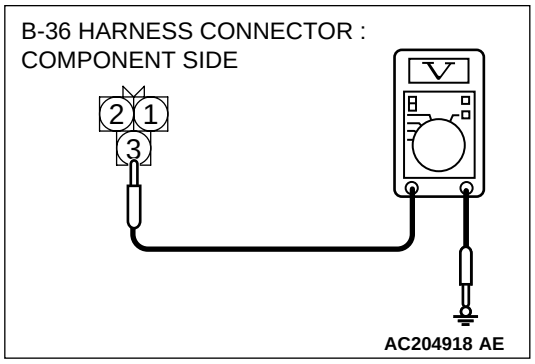
NO : Repair or replace the harness wire.



STEP 12. Measure the power supply voltage at crankshaft position sensor connector B-36.

(1) Disconnect connector B-36 and measure at the harness side.

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



(3) Measure the voltage between terminal 3 and ground.
- The voltage should measure battery positive voltage.

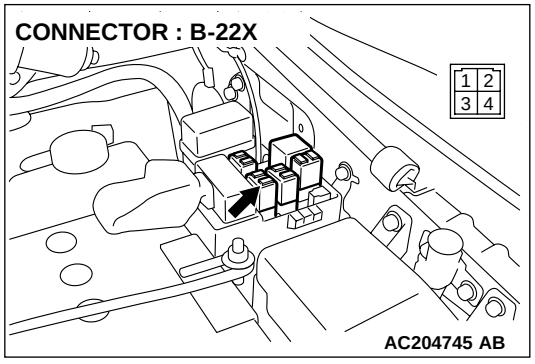
(4) Turn the ignition switch to "LOCK" (OFF) position.

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 15.

NO : Go to Step 13.

STEP 13. Check MFI relay connector B-22X for loose, corroded or damaged terminals, or terminals pushed back in the connector.

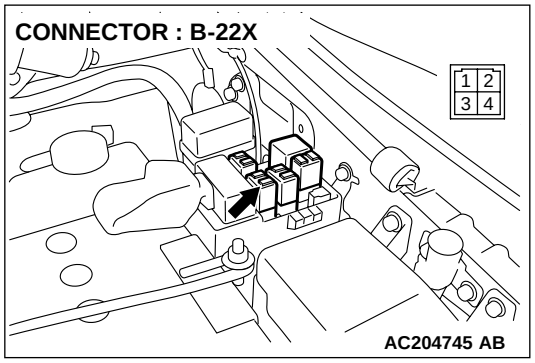


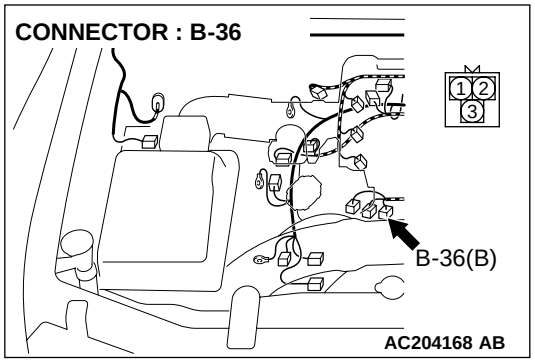
Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 14. Check the harness for open circuit or short circuit to ground between MFI relay connector B-22X terminal 1 and crankshaft position sensor connector B-36 terminal 3.





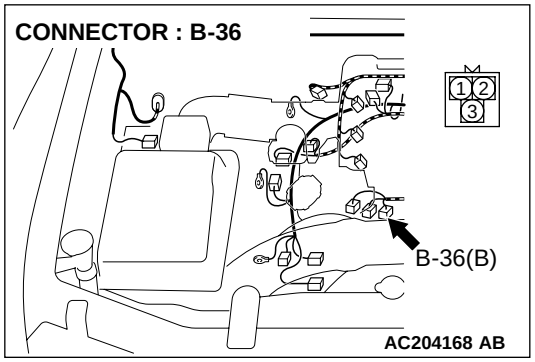
Q: Is the harness wire in good condition?

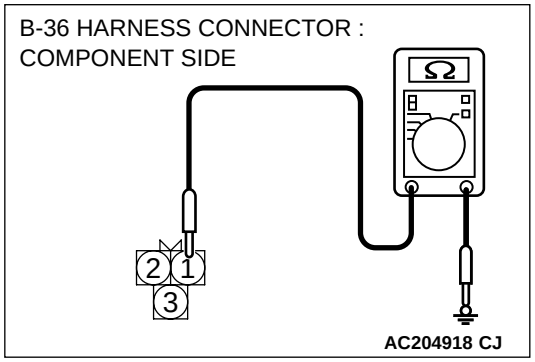
YES : Go to Step 4.

NO : Repair or replace the harness wire.

STEP 15. Measure the resistance of the ground circuit at crankshaft position sensor connector B-36.

(1) Disconnect connector B-36 and measure at the harness side.



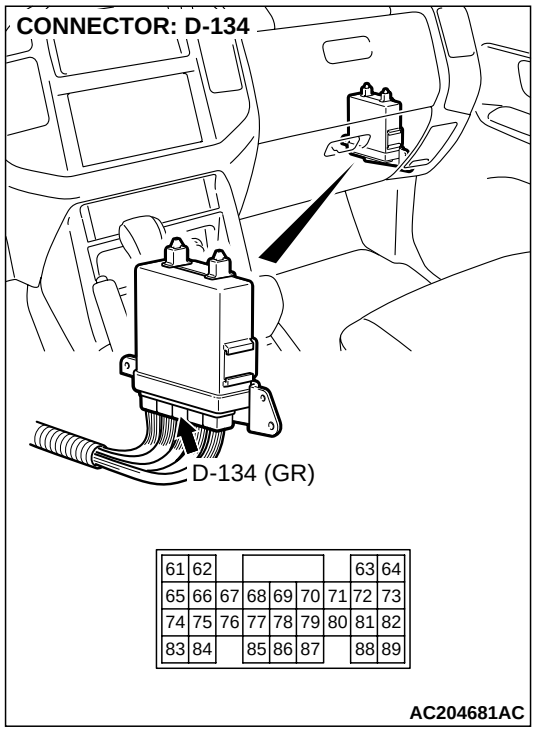


(2) Measure the resistance between terminal 1 and ground.
- The resistance should measure less than 2 ohms.

Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 18.

NO : Go to Step 16.

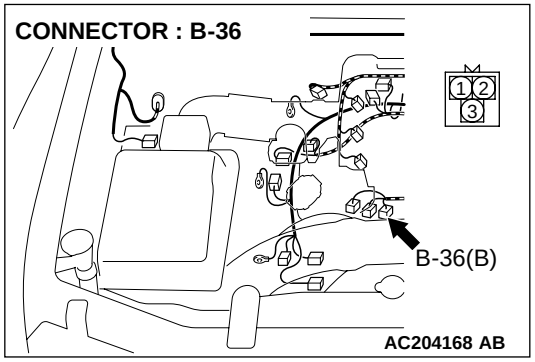


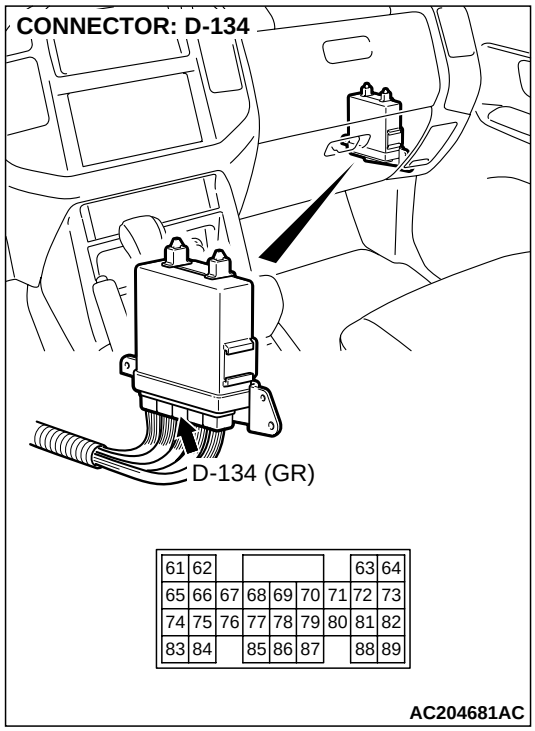
STEP 16. Check PCM connector D-134 for loose, corroded or damaged terminals, or terminals pushed back in the connector

Q: Are the connector and terminals in good condition?

YES : Go to Step 17.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



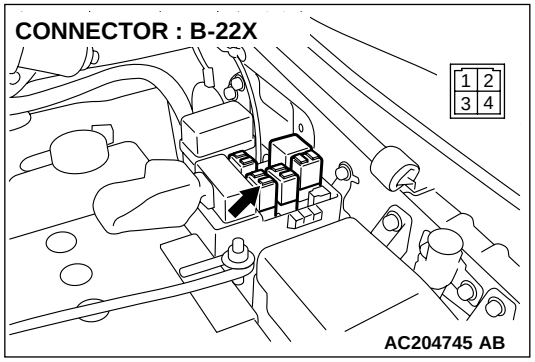


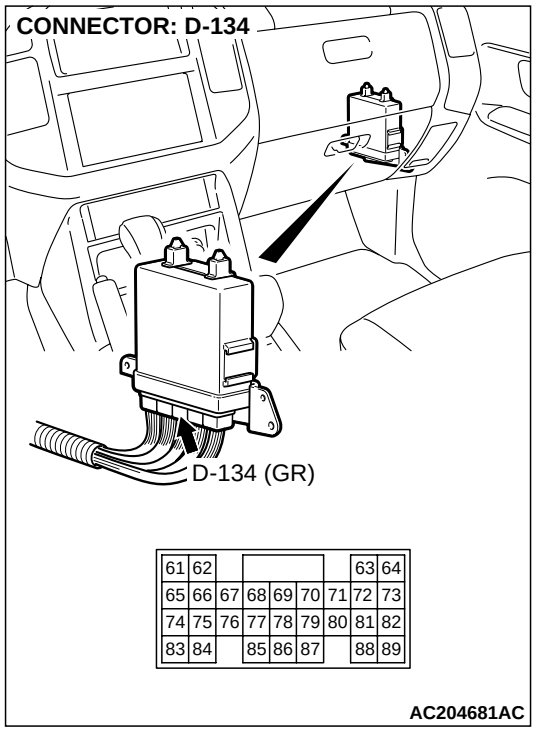
STEP 17. Check the harness for open circuit or damage between crankshaft position sensor connector B-36 terminal 1 and PCM connector D-134 terminal 88.

Q: Is the harness wire in good condition?

YES : Go to Step 4.

NO : Repair or replace the harness wire.

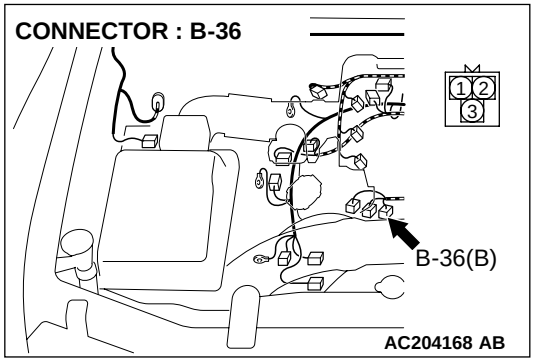


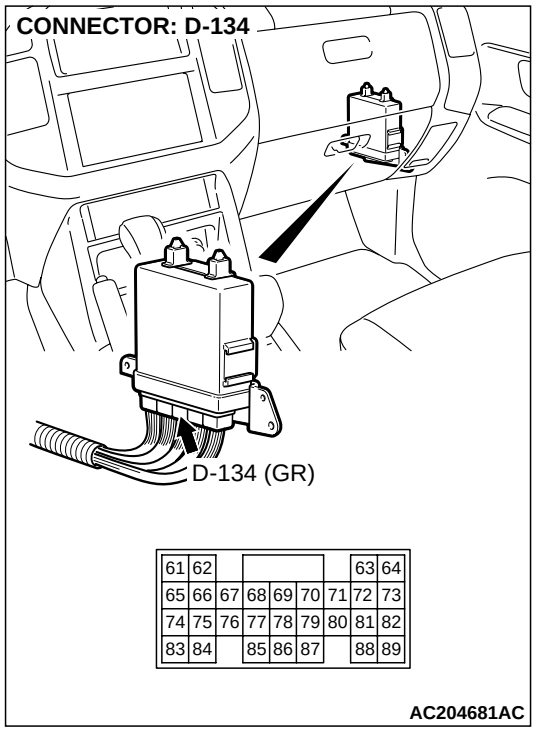


STEP 18. Check MFI relay connector B-22X and PCM connector D-134 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 19.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



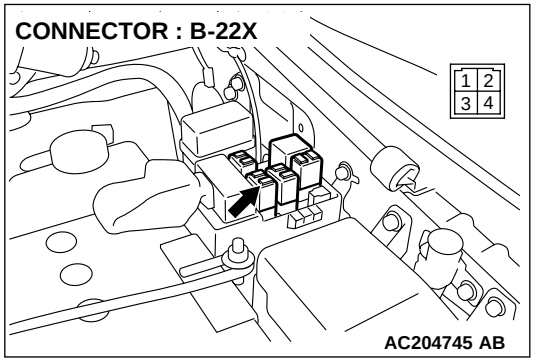


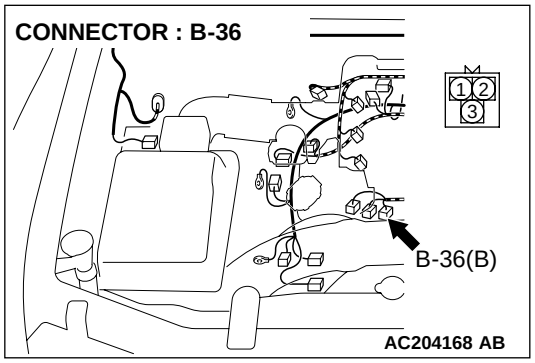
STEP 19. Check harness for damage between crankshaft position sensor connector B-36 terminal 2 and PCM connector D-134 terminal 70.

Q: Is the harness wire in good condition?

YES : Go to Step 20.

NO : Repair or replace the harness wire.



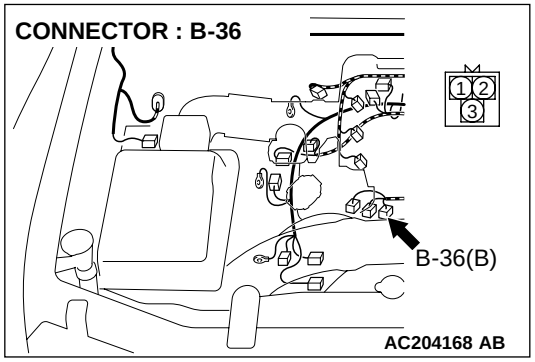


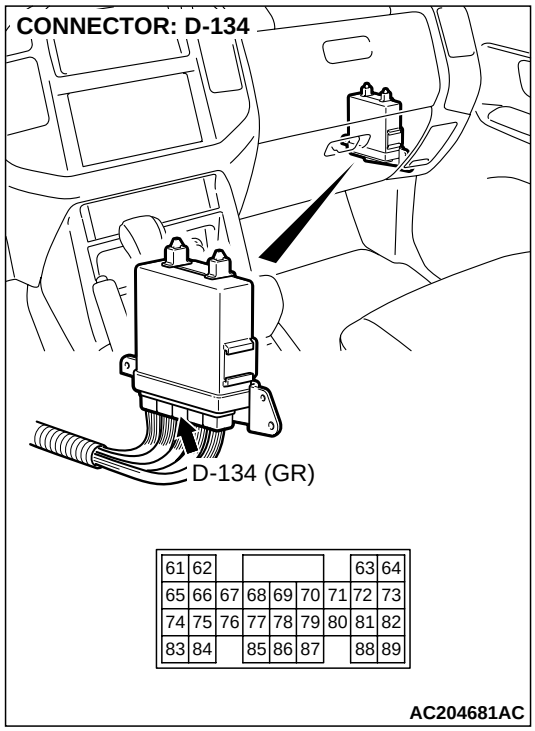
STEP 20. Check harness for damage between MFI relay connector B-22X terminal 1 and crankshaft position sensor connector B-36 terminal 3.

Q: Is the harness wire in good condition?

YES : Go to Step 21.

NO : Repair or replace the harness wire.





STEP 21. Check harness for damage between crankshaft position sensor connector B-36 terminal 1 and PCM connector D-134 terminal 88.

Q: Is the harness wire in good condition?

YES : Go to Step 22.

NO : Repair or replace the harness wire.

STEP 22. Check the crankshaft sensing blade.

Refer to GROUP 11A, Crankshaft Front Oil Seal P.11A-25.

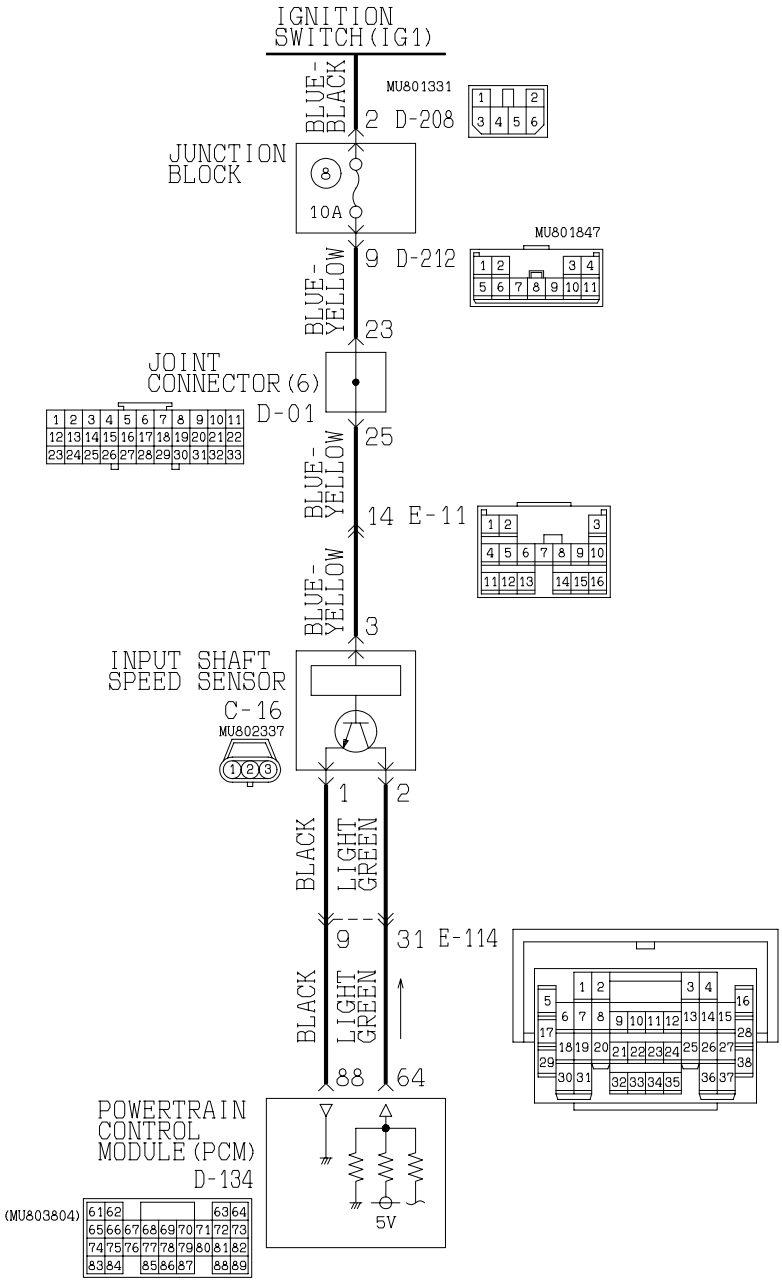
Q: Is the vane in good condition?

YES : Replace the crankshaft position sensor. Refer to GROUP 16, Ignition System – Crankshaft Position Sensor P.16-42.

NO : Replace the crankshaft sensing blade.

DTC 22: Input Shaft Speed Sensor System

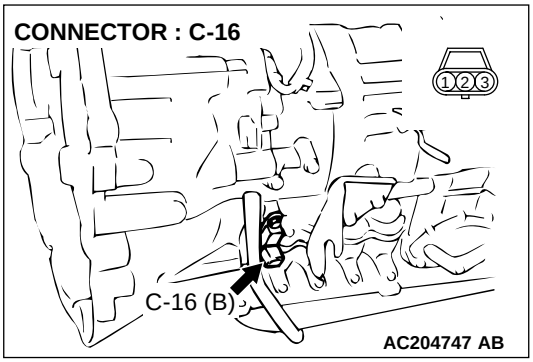
Input Shaft Speed Sensor System Circuit



W3Q20M08AA
AC205189 AB

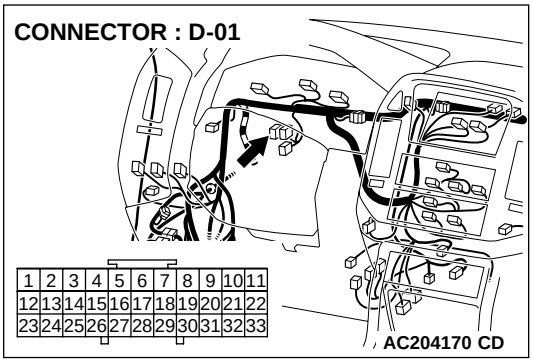
TSB Revision

CONNECTOR : C-16



AC204747 AB

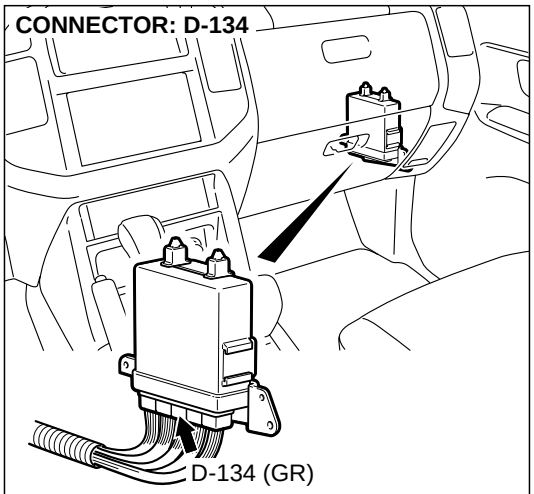
CONNECTOR : D-01



1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

AC204170 CD

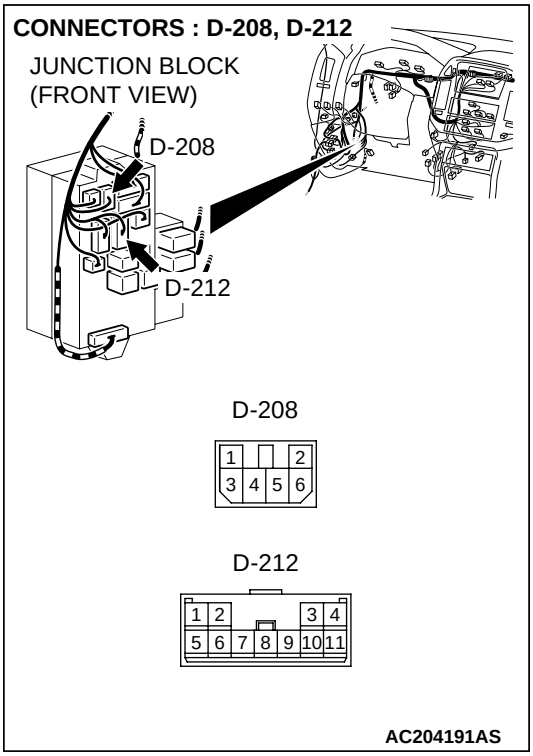
CONNECTOR: D-134



61	62						63	64
65	66	67	68	69	70	71	72	73
74	75	76	77	78	79	80	81	82
83	84		85	86	87		88	89

AC204681AC

CONNECTORS : D-208, D-212



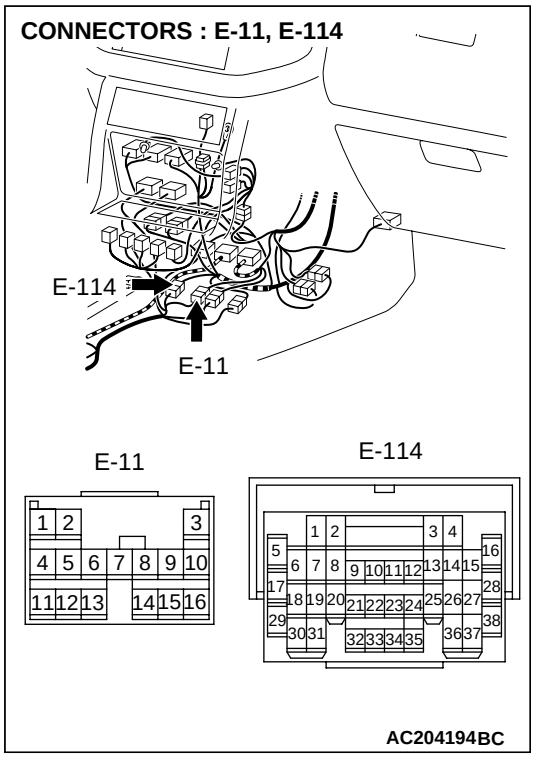
D-208

1			2
3	4	5	6

D-212

1	2						3	4
5	6	7	8	9	10	11		

AC204191AS



CIRCUIT OPERATION

- The input shaft speed sensor generates 0 ⇔ 5 volts pulse signal when the input shaft rotates. The pulse signal frequency increases with a rise in input shaft speed.
- The input shaft speed sensor is connected to the PCM (terminals 64 and 88) via the input shaft speed sensor connector (terminals 1 and 2).
- The PCM detects the input shaft speed by the signal input to terminal 64.
- The input shaft speed sensor generates the pulse signal as the teeth of the reverse clutch retainer pass the magnetic tip of the sensor.

DTC SET CONDITIONS

If no output pulse is detected from the input shaft speed sensor for one second or more while driving in 3rd or 4th gear at a speed of 30 km/h (19 mph) or more, it is judged that an open circuit or short circuit in the input shaft speed sensor circuit. If DTC 22 is set consecutively four times, the transmission is locked into 3rd gear or 2nd gear as a fail-safe measure, and the "N" range light flashes once per second.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the input shaft speed sensor circuit
- Malfunction of the reverse clutch retainer
- Damaged harness, connector
- Malfunction of the PCM

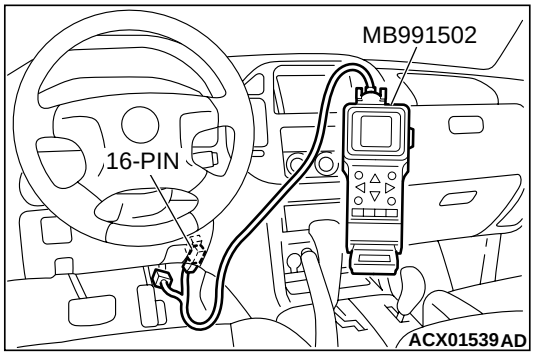
TSB Revision

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 22: Input Shaft Speed Sensor.

⚠ 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.



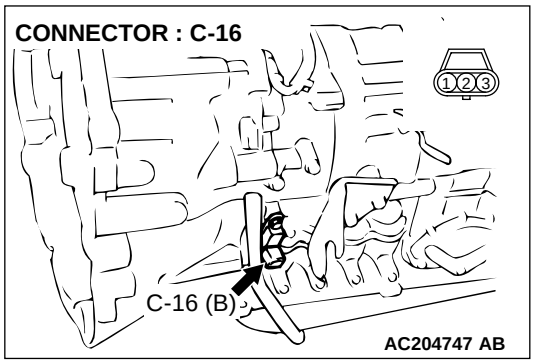
(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 22, Input Shaft Speed Sensor.
- When driving at constant speed of 50 km/h (31 mph), the display should be "1,400 – 1,700 r/min". (Gear range: 4th gear)

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

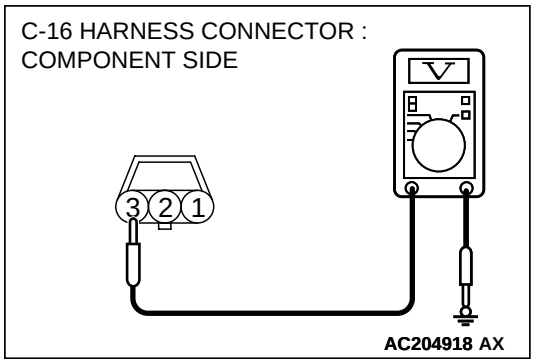
Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Go to Step 2.

STEP 2. Measure the power supply voltage at input shaft speed sensor connector C-16.



(1) Disconnect connector C-16 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.



(3) Measure the voltage between terminal 3 and ground.
- The voltage should measure battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

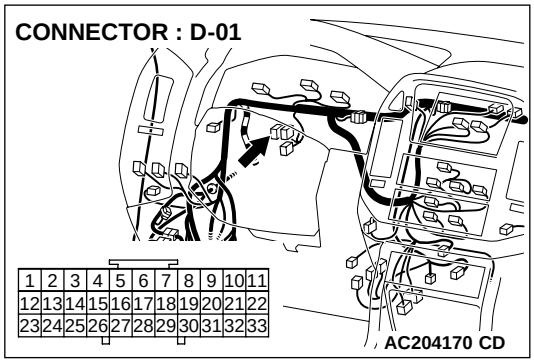
YES : Go to Step 5.
NO : Go to Step 3.

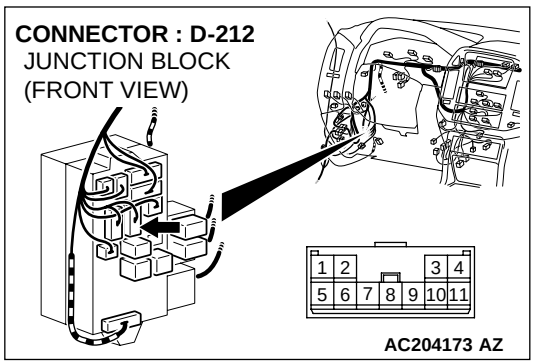
STEP 3. Check joint connector D-01, junction block connector D-212 and intermediate connector E-11 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

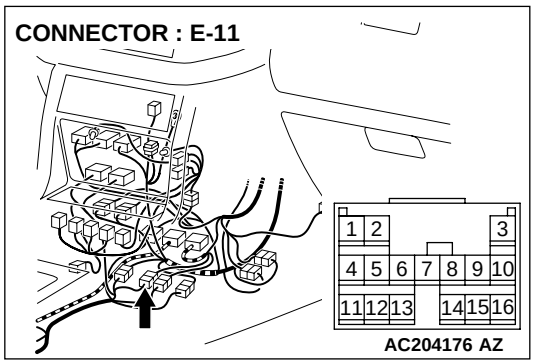
Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





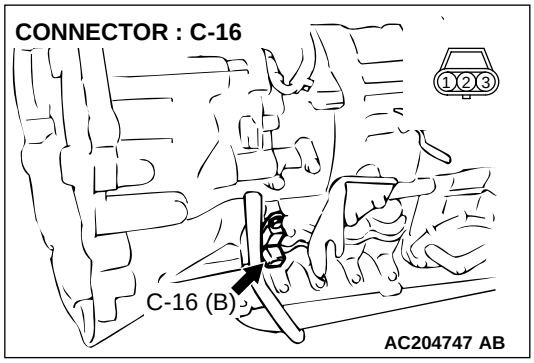


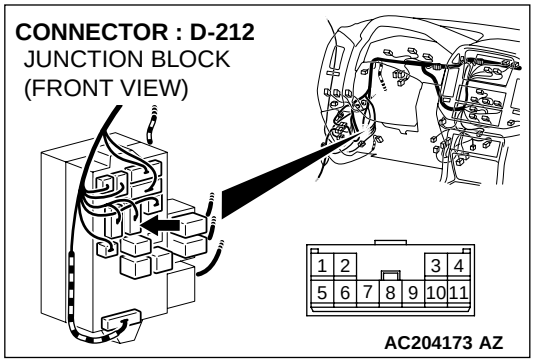
STEP 4. Check the harness for open circuit or short circuit to ground between input shaft speed sensor connector C-16 terminal 3 and the junction block connector D-212 terminal 9.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.

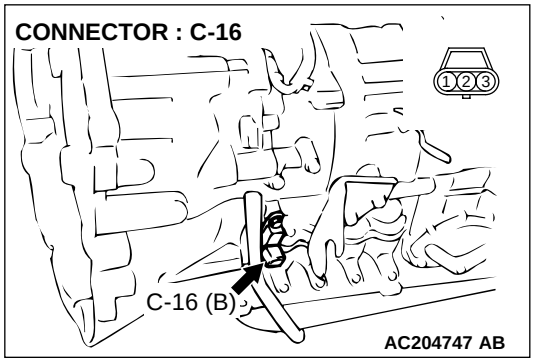


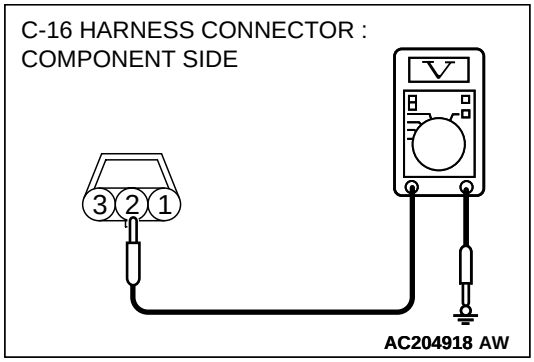


STEP 5. Measure the PCM to speed sensor output voltage at the input shaft speed sensor connector C-16.

(1) Disconnect connector C-16 from the speed sensor and measure voltage at the harness side.

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





(3) Measure the voltage between terminal 2 and ground.
- The voltage should measure between 4.5 and 4.9 volts.

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

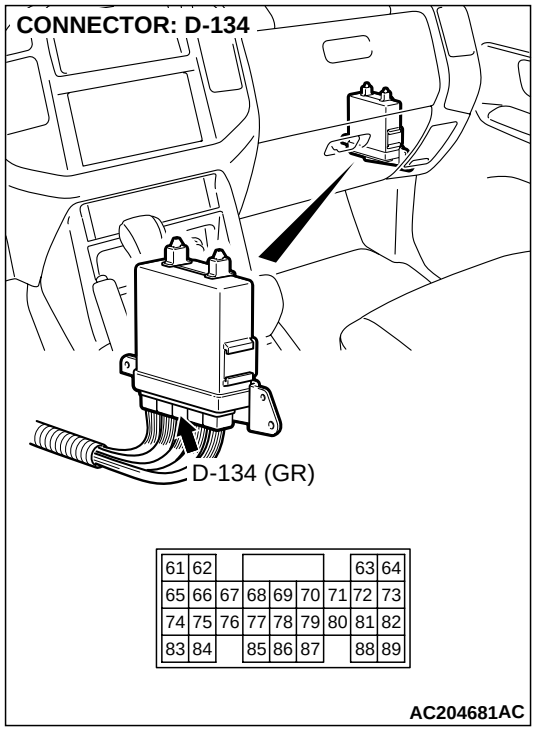
Q: Is the measured voltage between 4.5 and 4.9 volts?

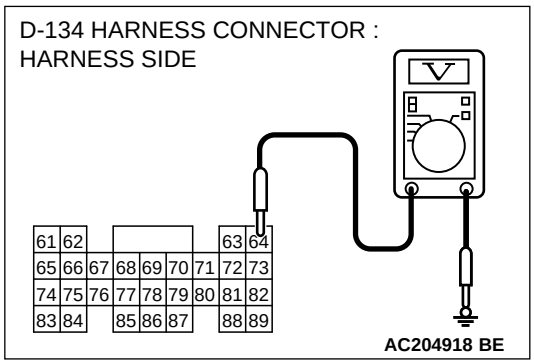
YES : Go to Step 11.

NO : Go to Step 6.

STEP 6. Measure the PCM output voltage to the speed sensor at the PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.
(2) Disconnect connector C-16 at the input shaft speed sensor.
(3) Turn the ignition switch to the "ON" position.





(4) Measure the voltage between PCM terminal 64 and ground by backprobing.
- The voltage should measure between 4.5 and 4.9 volts.

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

Q: Is the measured voltage between 4.5 and 4.9 volts?

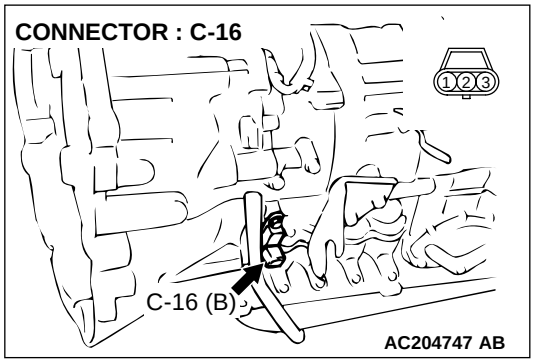
YES : Go to Step 7.
NO : Go to Step 9.

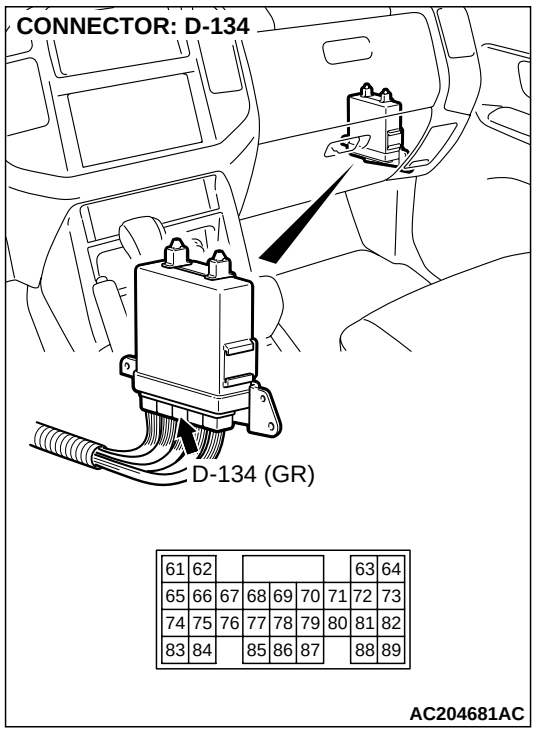
STEP 7. Check input shaft speed sensor connector C-16, PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

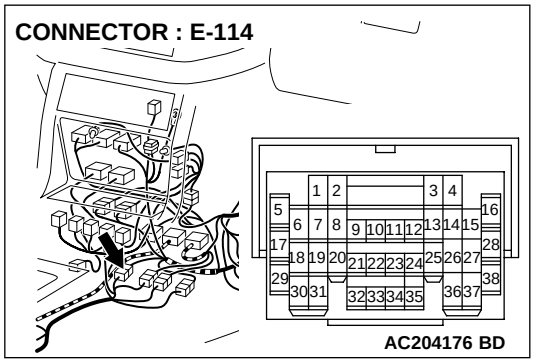
Q: Are the connectors in good condition?

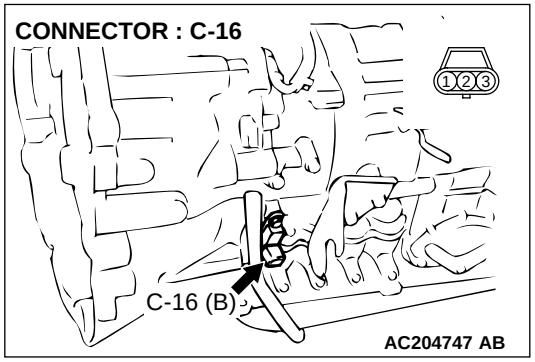
YES : Go to Step 8.

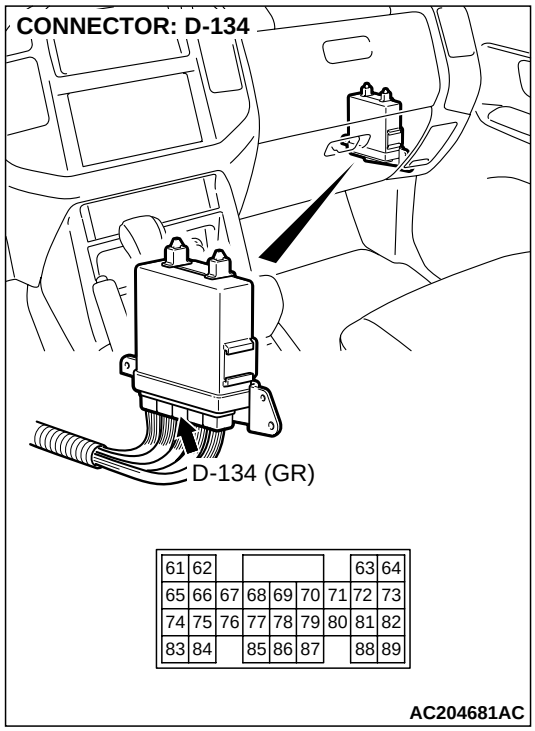
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.











STEP 8. Check the harness for open circuit or damage between input shaft speed sensor connector C-16 terminal 2 and PCM connector D-134 terminal 64.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

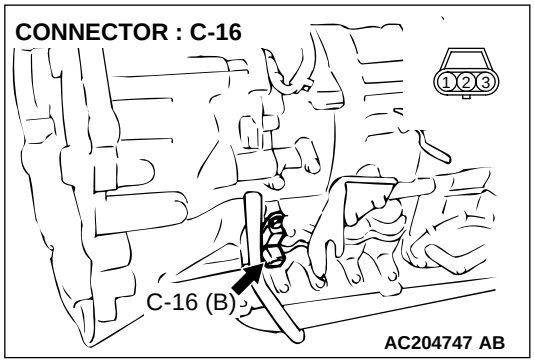
NO : Repair or replace the harness wire.

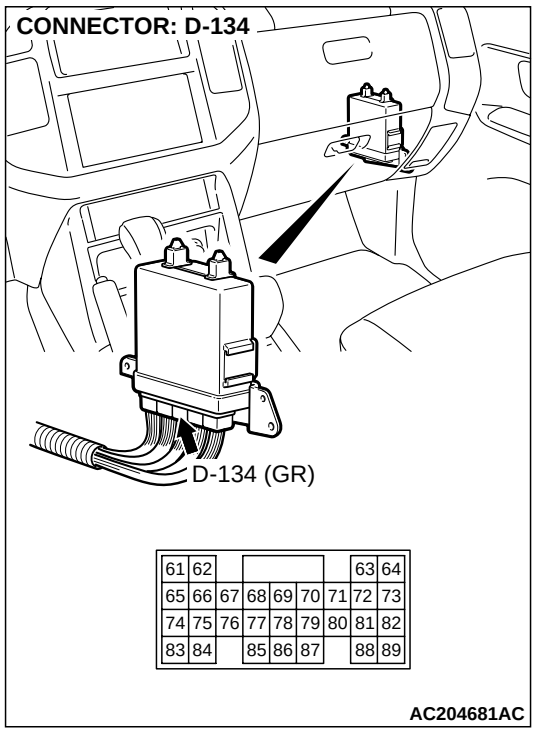
STEP 9. Check input shaft speed sensor connector C-16, PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

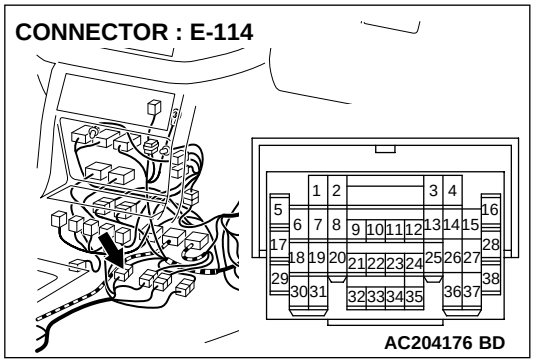
Q: Are the connectors and terminals in good condition?

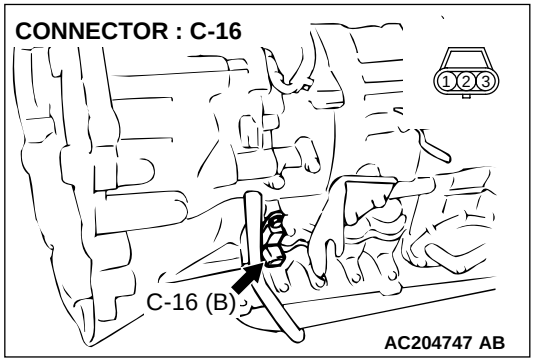
YES : Go to Step 10.

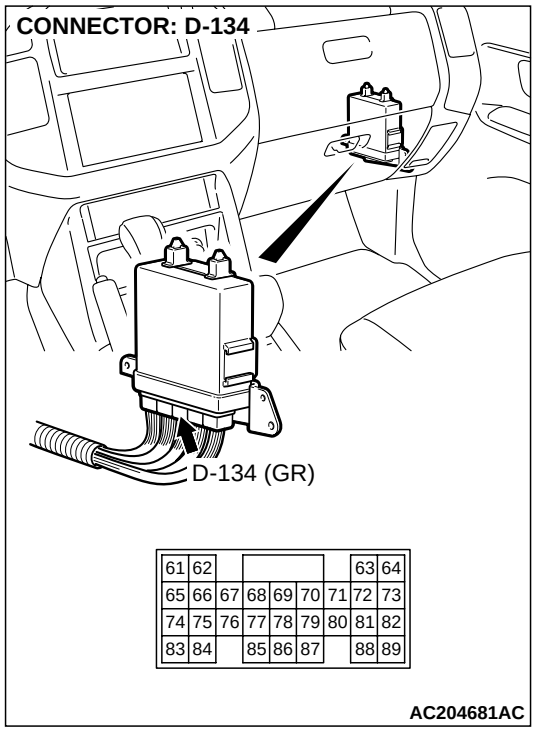
NO : Repair or replace the damages components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.









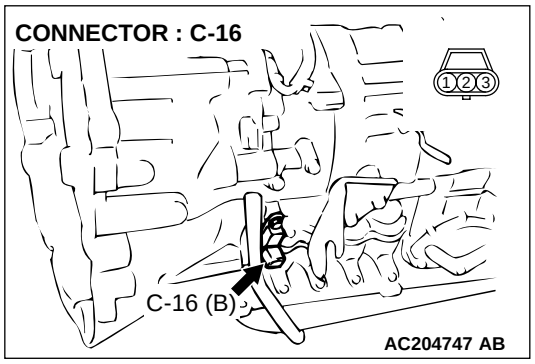


STEP 10. Check the harness for short circuit to ground between input shaft speed sensor connector C-16 terminal 2 and PCM connector D-134 terminal 64.

Q: Is the harness wire in good condition?

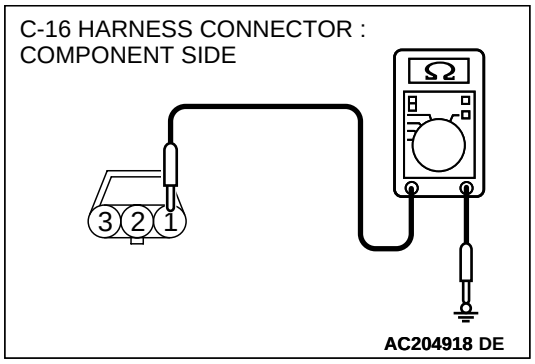
YES : Go to Step 11.

NO : Repair or replace the harness wire.



STEP 11. Measure the ground circuit for resistance at the input shaft speed sensor connector C-16.

(1) Disconnect connector C-16 from the speed sensor and measure at the harness side.



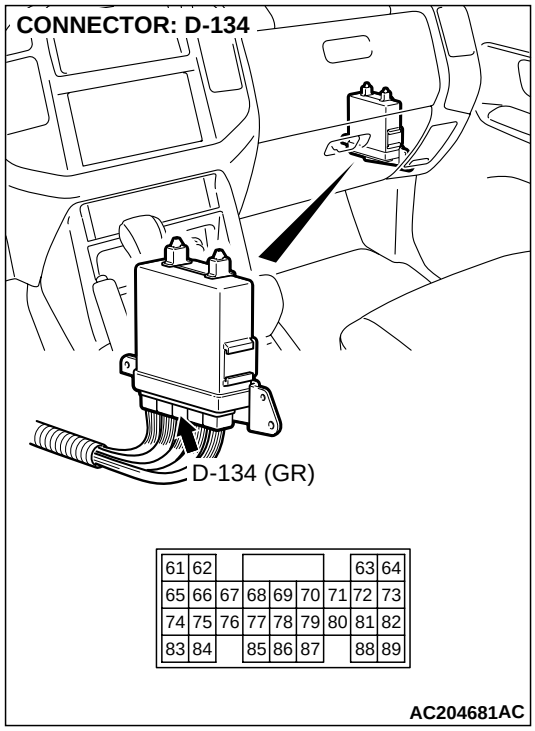
(2) Measure the resistance between terminal 1 and ground.
- The resistance should measure less than 2 ohms.

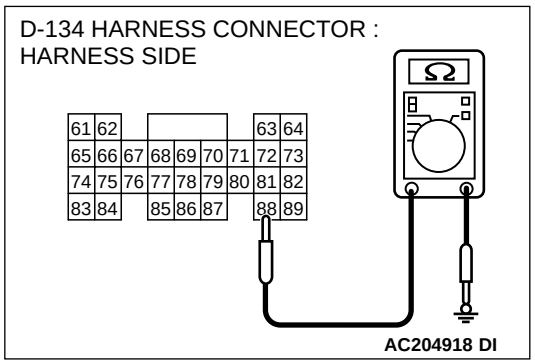
Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 16.
NO : Go to Step 12.

STEP 12. Measure the resistance at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.
(2) Turn the ignition switch to the "ON" position.





(3) Measure the resistance between terminal 88 and ground by backprobing.
- The resistance should measure less than 2 ohms.

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

Q: Is the measured resistance less than 2 ohms?

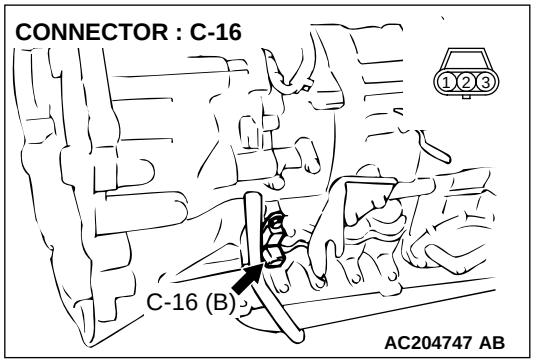
YES : Go to Step 13.
NO : Go to Step 15.

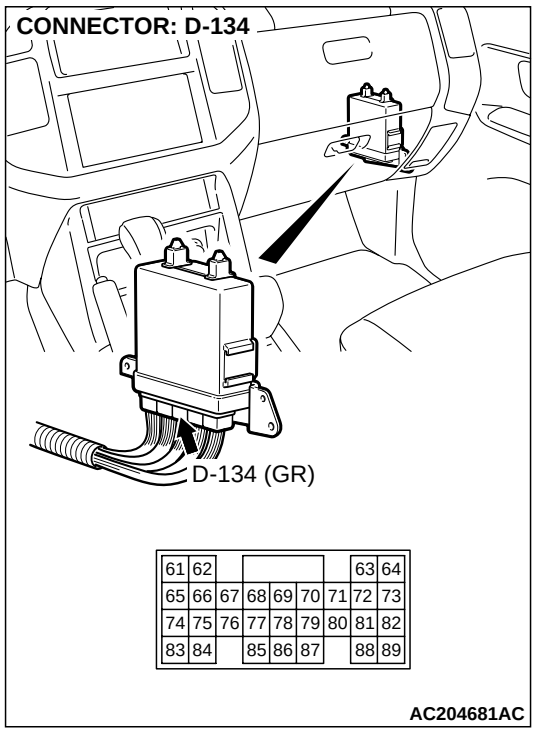
STEP 13. Check input shaft speed sensor connector C-16, PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

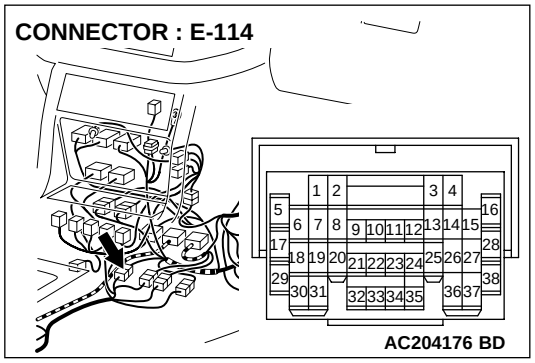
Q: Are the connectors and terminals in good condition?

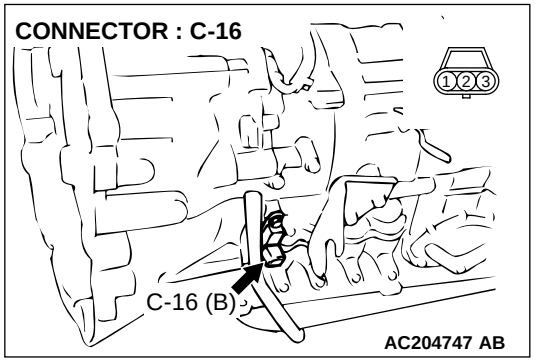
YES : Go to Step 14.

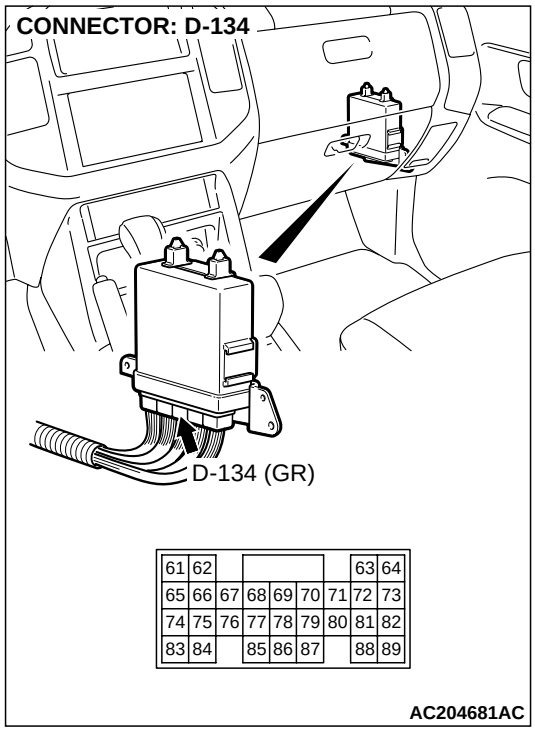
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.









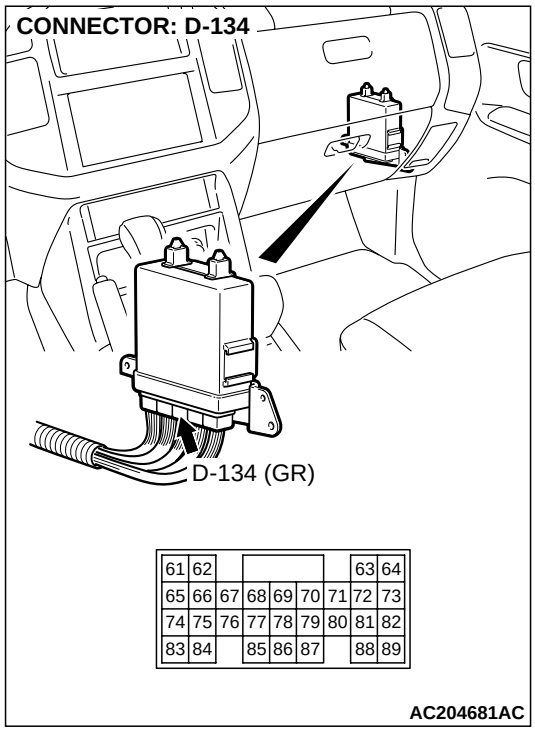


STEP 14. Check the harness for open circuit or damage between input shaft speed sensor harness side connector C-16 terminal 1 and PCM connector D-134 terminal 88.

Q: Is the harness wire in good condition?

YES : Go to Step 16.

NO : Repair or replace the harness wire.



STEP 15. Check PCM connector D-134 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

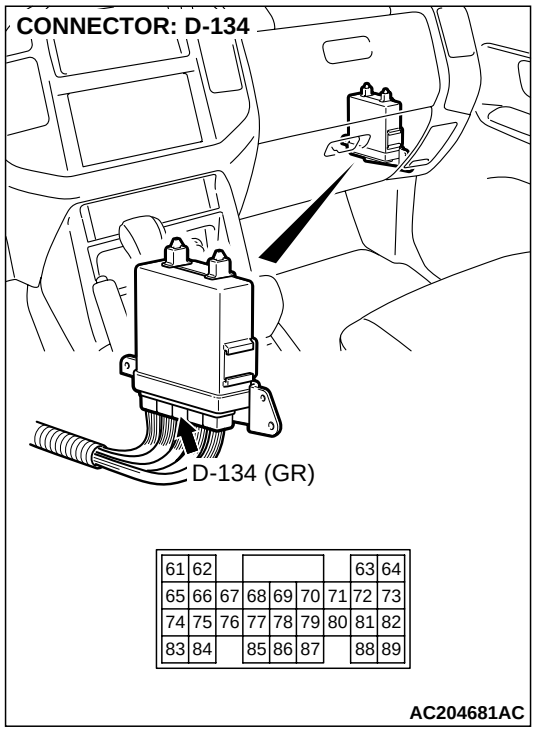
Q: Are the connector and terminals in good condition?

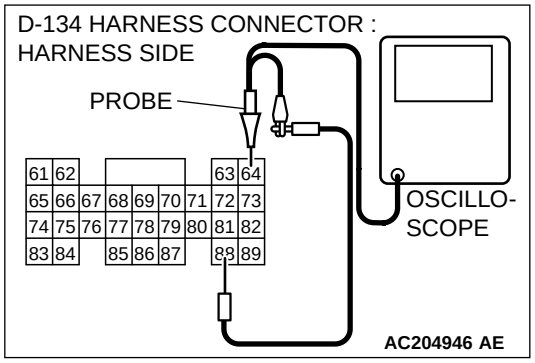
YES : Replace the PCM.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

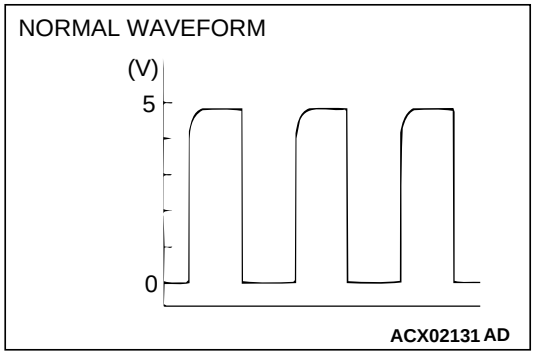
STEP 16. Using an oscilloscope, check the input shaft speed sensor waveform at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.





(2) Connect an oscilloscope probe to PCM connector D-134 terminal 64 and terminal 88 by backprobing.
(3) Start the engine and drive the vehicle at constant speed of 50 km/h (31 mph). (Gear range: 4th gear)

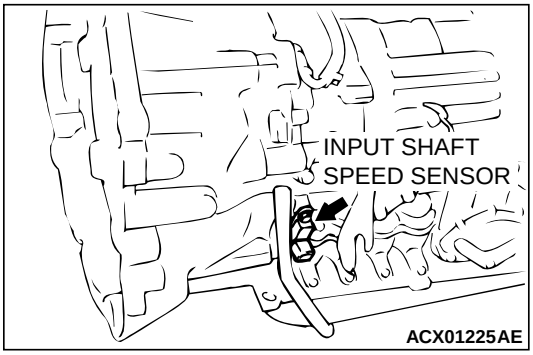


(4) Check the input shaft speed sensor waveform.
- The input shaft speed sensor waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.8 volt and less. The output waveform should not contain electrical noise.

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

Q: Is the waveform normal?

YES : Go to Step 19.
NO : Go to Step 17.

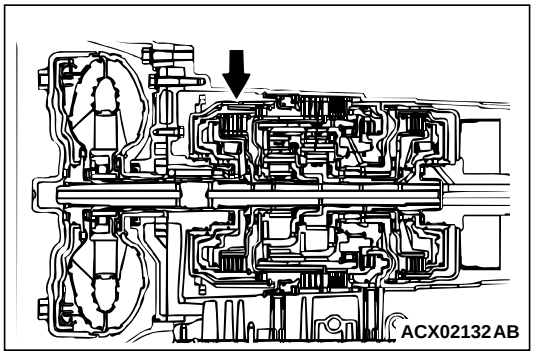


STEP 17. Replace the input shaft speed sensor.

(1) Replace the input shaft speed sensor. Refer to GROUP 23B, Transmission P.23B-18.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is A/T DTC 22 set?

YES : Go to Step 18.
NO : The procedure is complete.

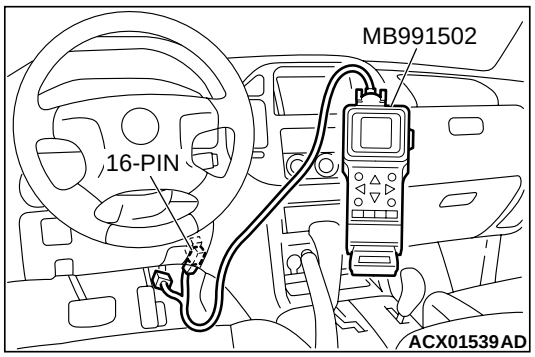


STEP 18. Replace the reverse clutch retainer.

(1) Replace the reverse clutch retainer. Refer to GROUP 23B, Reverse and Overdrive Clutches P.23B-67.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is A/T DTC 22 set?

YES : An A/T DTC may have set due to external radio frequency (RFI) possibility caused by cellular phone activity, or aftermarket components installed on the vehicle.
NO : The procedure is complete.



STEP 19. Using scan tool MB991502, check data list item 22: Input Shaft Speed Sensor.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 22, Input Shaft Speed Sensor.
- When driving at constant speed of 50 km/h (31 mph), the display should be "1,400 – 1,700 r/min." (Gear range: 4th gear)

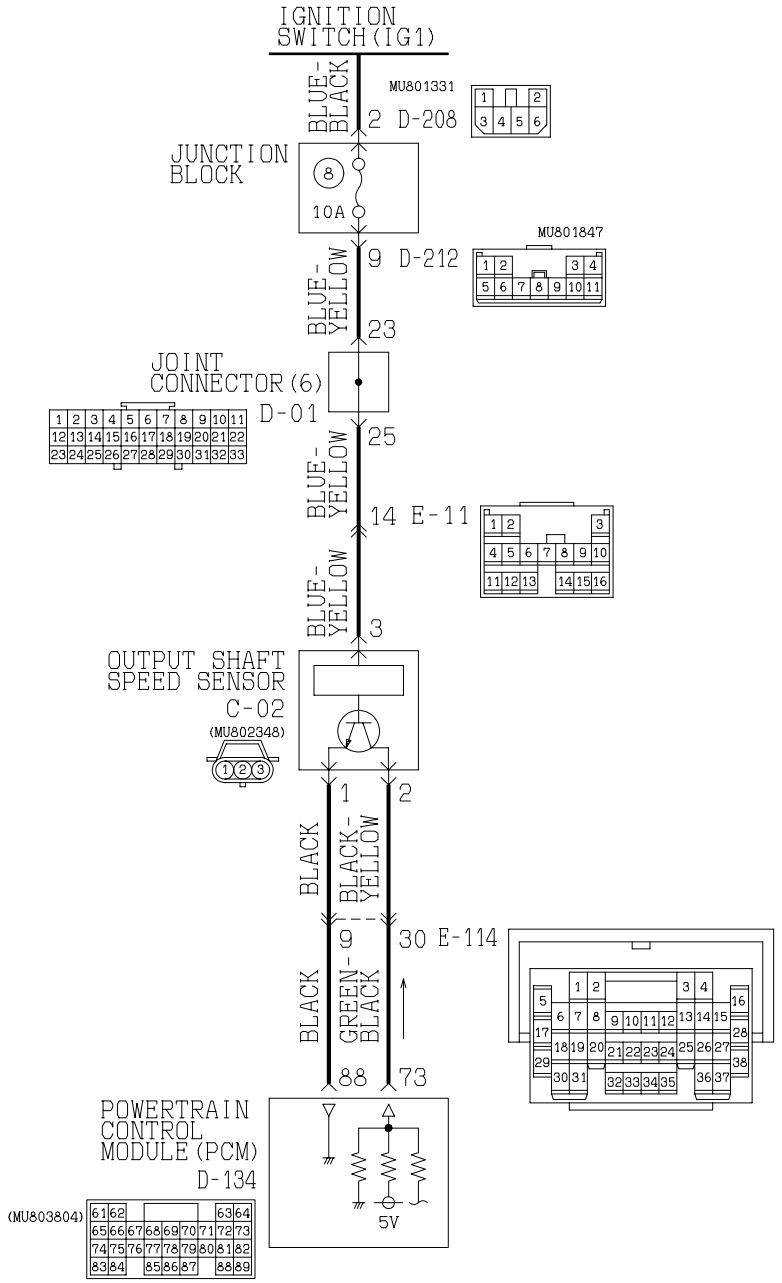
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Replace the PCM.

DTC 23: Output Shaft Speed Sensor System

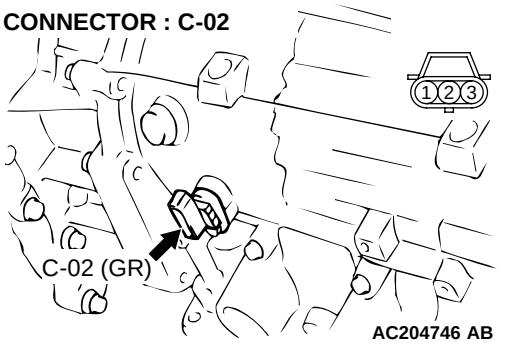
Output Shaft Speed Sensor System Circuit



W3Q20M09AA
AC205190 AB

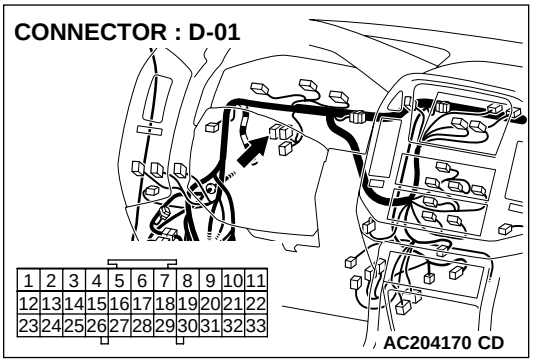
TSB Revision

CONNECTOR : C-02



AC204746 AB

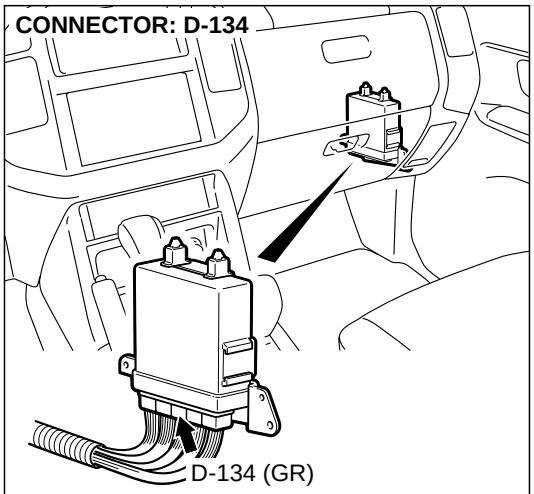
CONNECTOR : D-01



1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

AC204170 CD

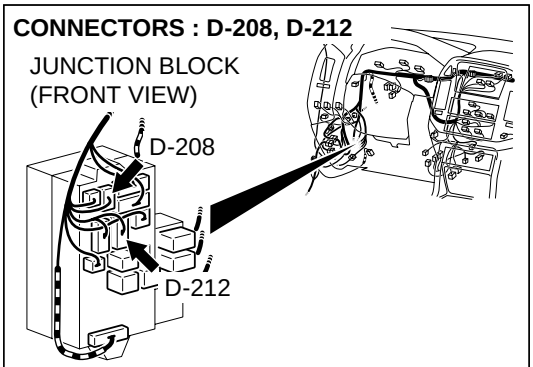
CONNECTOR: D-134



61	62						63	64
65	66	67	68	69	70	71	72	73
74	75	76	77	78	79	80	81	82
83	84		85	86	87		88	89

AC204681AC

CONNECTORS : D-208, D-212



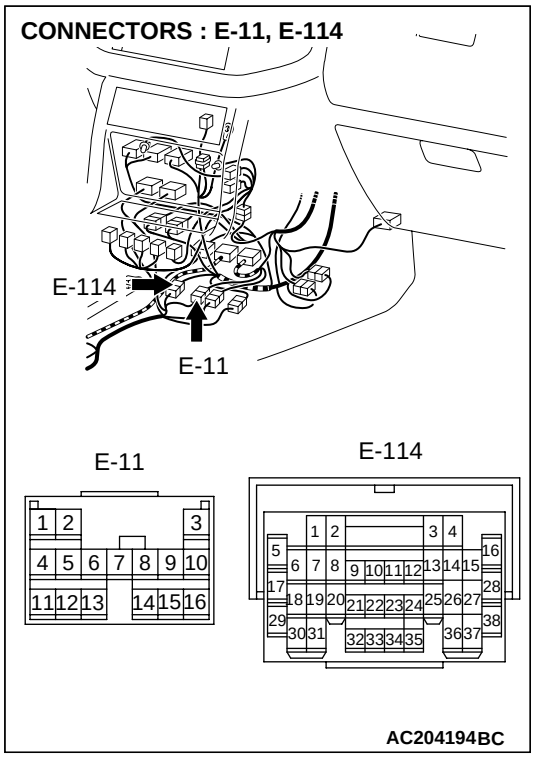
D-208

1			2
3	4	5	6

D-212

1	2						3	4
5	6	7	8	9	10	11		

AC204191AS



CIRCUIT OPERATION

- The output shaft speed sensor generates a 0 ⇔ 5 volt pulse signal when the output shaft rotates. The pulse signal frequency increases with a rise in output shaft speed.
- The output shaft speed sensor is connected to the PCM (terminals 73 and 88) via the output shaft speed sensor connector (terminals 1 and 2).
- The PCM detects the output shaft speed by the signal output to terminal 73.
- The output shaft speed sensor generates the pulse signal as the teeth of the output shaft pass the magnetic tip of the sensor.

DTC SET CONDITIONS

If the output from the output shaft speed sensor is continuously 50 percent lower than the vehicle speed for one second or more while driving in 3rd or 4th gear at a speed of 30 km/h (19 mph) or more, it is judged that an open circuit or short circuit in the output shaft speed sensor circuit and DTC 23 is set. If DTC 23 is set consecutively four times, the transmission is locked into 3rd gear or 2nd gear as a fail-safe measure, and the "N" range light flashes once per second.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)

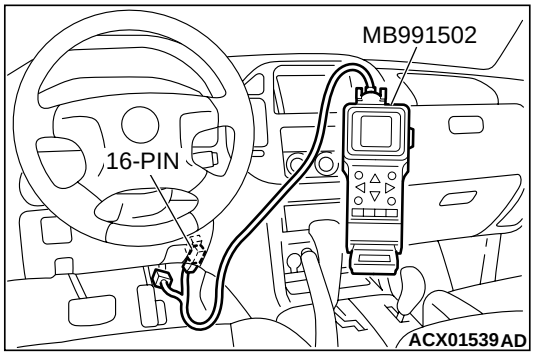
- Malfunction of the output shaft speed sensor
- Malfunction of the output shaft
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 23: Output Shaft Speed Sensor.

⚠ 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.



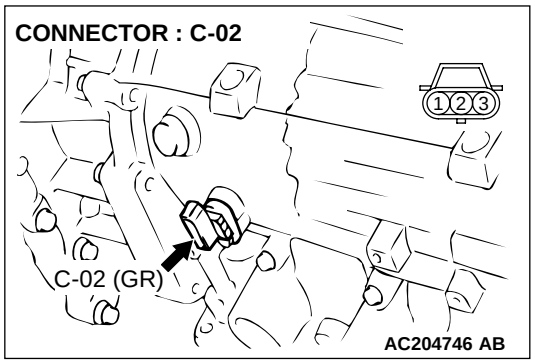
(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 23, Output Shaft Speed Sensor.
- When driving at constant speed of 50 km/h (31 mph), the display should be "1,400 – 1,700 r/min". (Gear range: 4th gear)

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

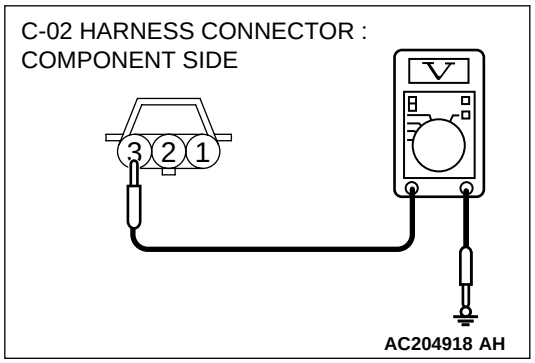
Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Go to Step 2.

STEP 2. Measure the power supply voltage at output shaft speed sensor connector C-02.



(1) Disconnect connector C-02 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.



(3) Measure the voltage between terminal 3 and ground.
- The voltage should measure battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

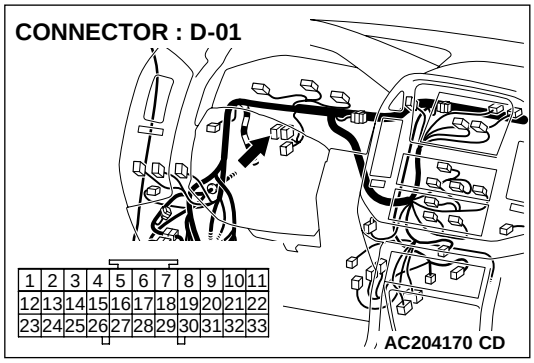
YES : Go to Step 5.
NO : Go to Step 3.

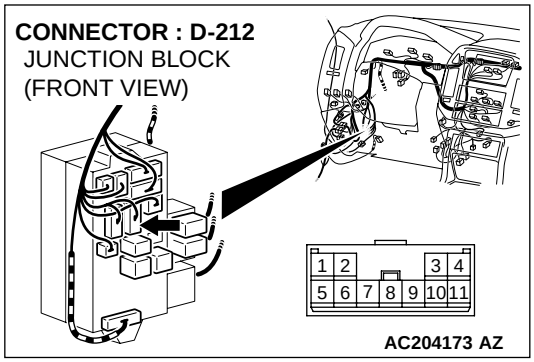
STEP 3. Check joint connector D-01, junction block connector D-212 and intermediate connector E-11 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

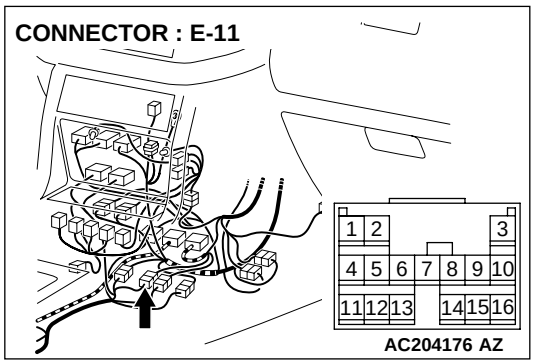
Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





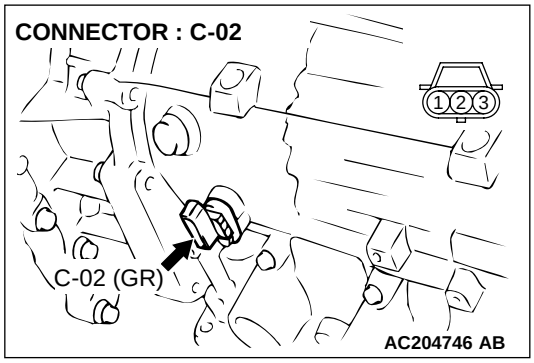


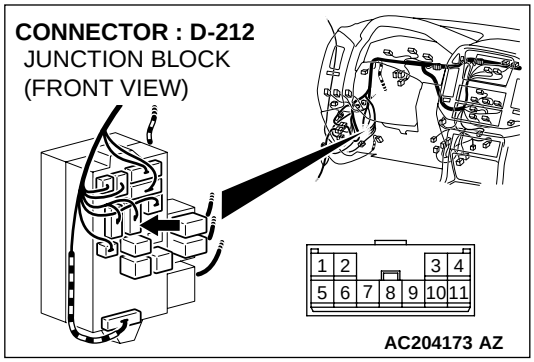
STEP 4. Check the harness for open circuit or short circuit to ground between output shaft speed sensor connector C-02 terminal 3 and the junction block connector D-212 terminal 9.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.

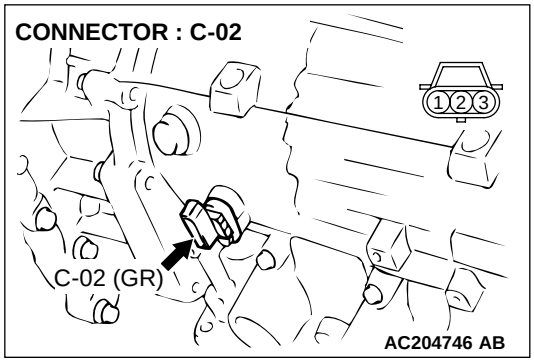


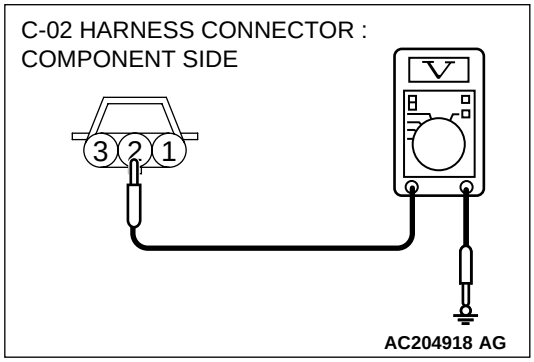


STEP 5. Measure the PCM to speed sensor output voltage at the output shaft speed sensor connector C-02.

(1) Disconnect connector C-02 from the speed sensor and measure voltage at the harness side.

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





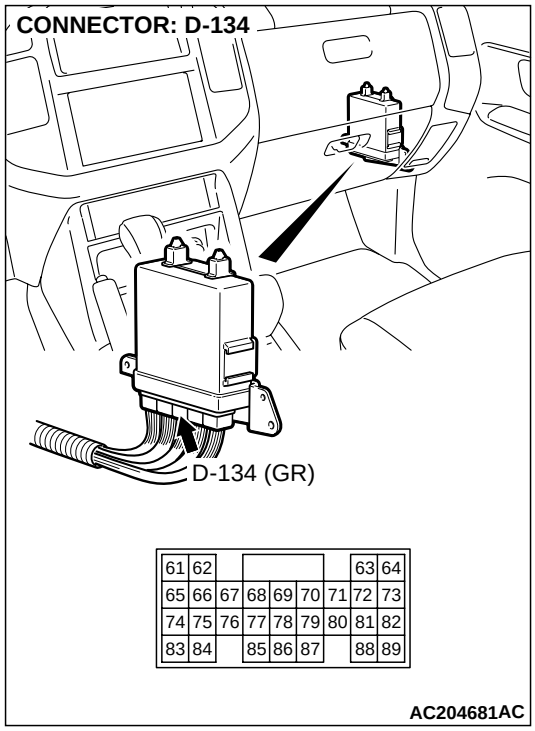
(3) Measure the voltage between terminal 2 and ground.
- The voltage should measure between 4.5 and 4.9 volts.

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

Q: Is the measured voltage between 4.5 and 4.9 volts?

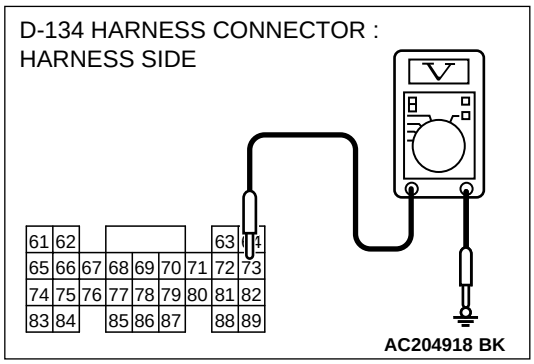
YES : Go to Step 11.

NO : Go to Step 6.



STEP 6. Measure the PCM output voltage to the speed sensor at the PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.
(2) Disconnect connector C-02 at the output shaft speed sensor.
(3) Turn the ignition switch to the "ON" position.



(4) Measure the voltage between PCM terminal 73 and ground by backprobing.
- The voltage should measure between 4.5 and 4.9 volts.

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

Q: Is the measured voltage between 4.5 and 4.9 volts?

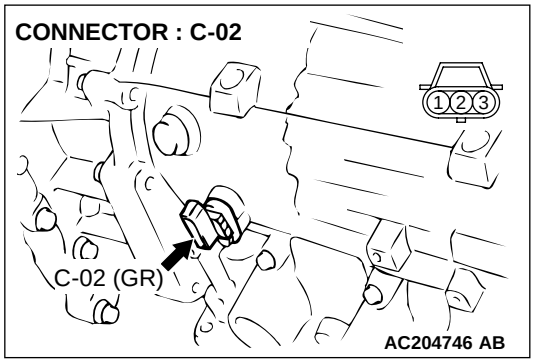
YES : Go to Step 7.
NO : Go to Step 9.

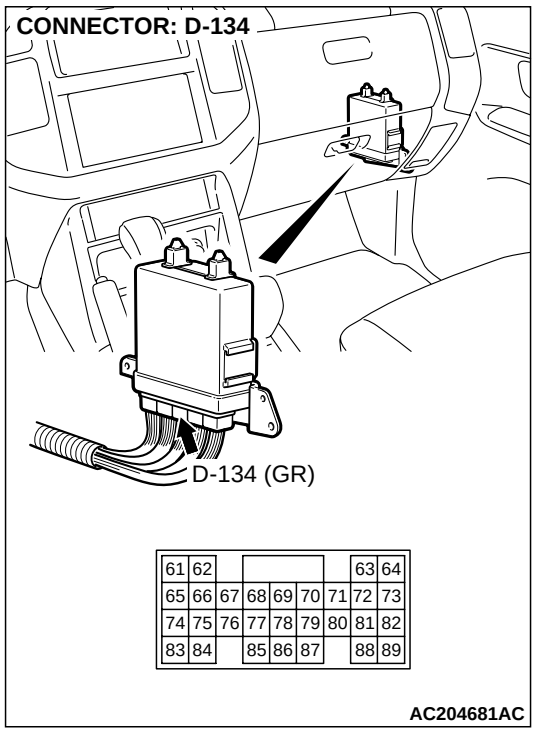
STEP 7. Check output shaft speed sensor connector C-02, PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

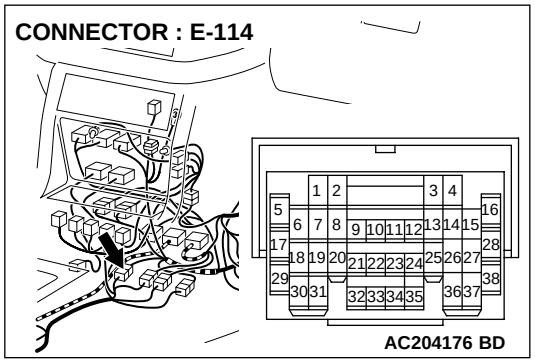
Q: Are the connectors in good condition?

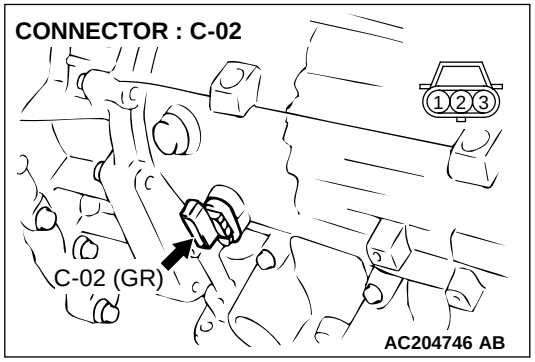
YES : Go to Step 8.

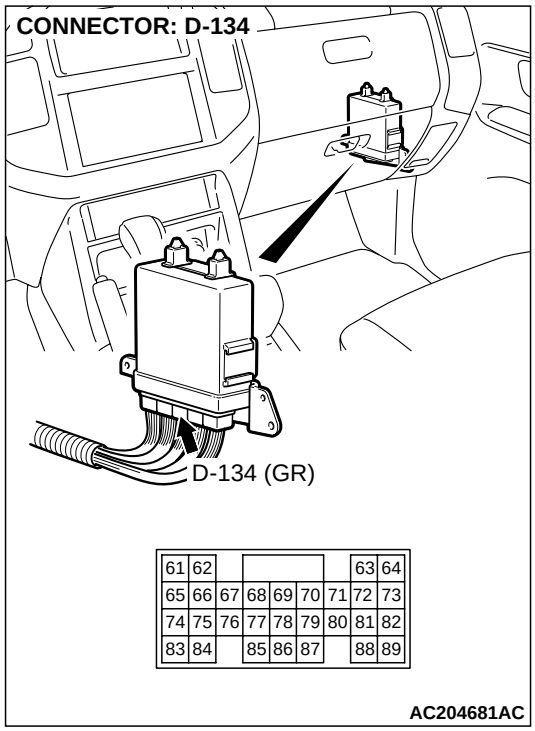
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.











STEP 8. Check the harness for open circuit or damage between output shaft speed sensor connector C-02 terminal 2 and PCM connector D-134 terminal 73.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

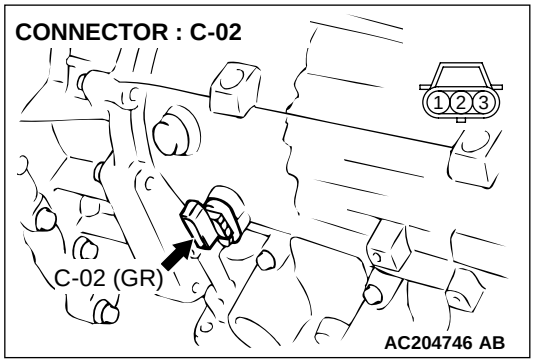
NO : Repair or replace the harness wire.

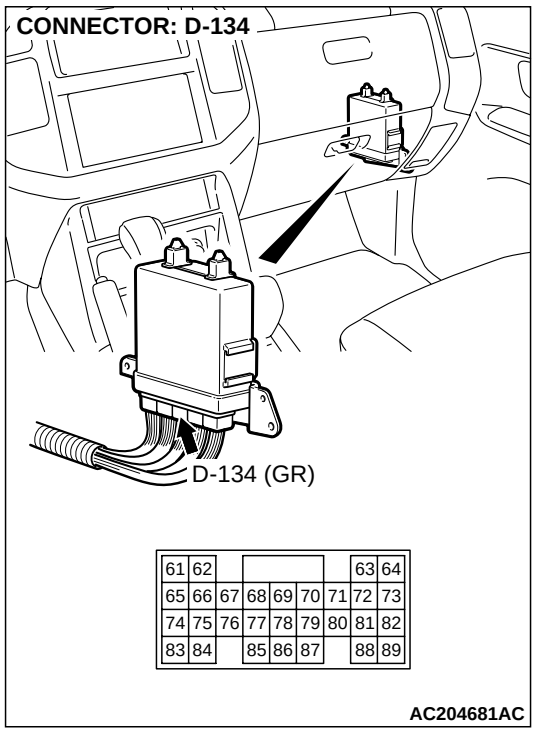
STEP 9. Check output shaft speed sensor connector C-02, PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

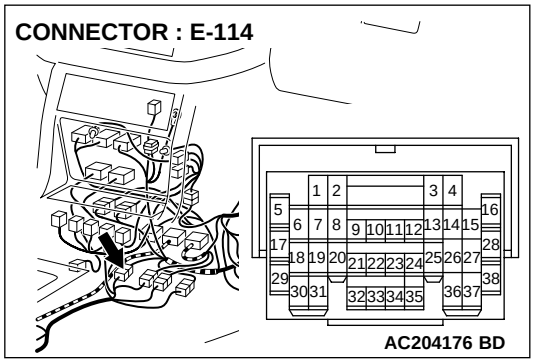
Q: Are the connectors and terminals in good condition?

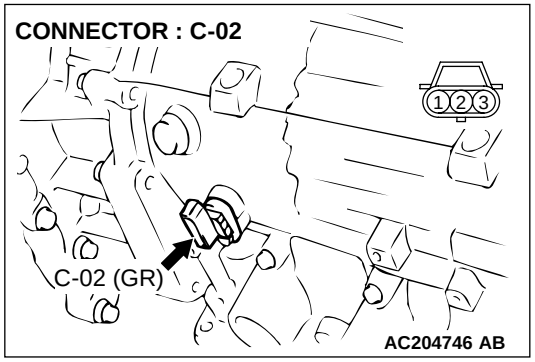
YES : Go to Step 10.

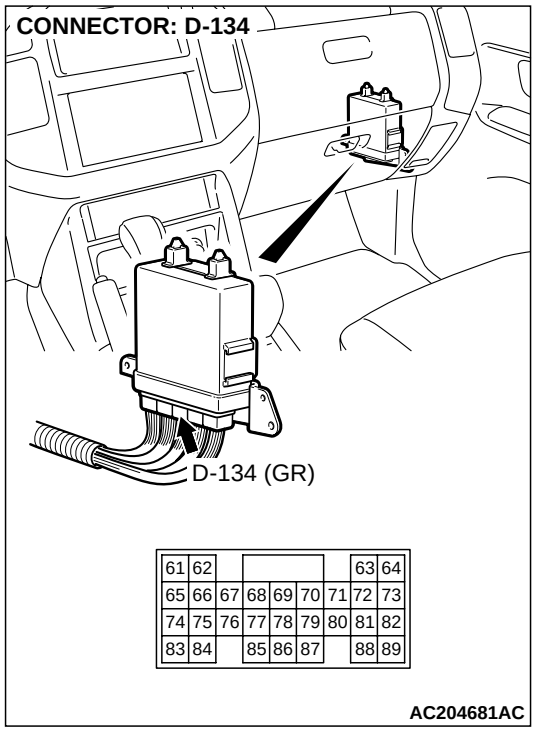
NO : Repair or replace the damages components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.









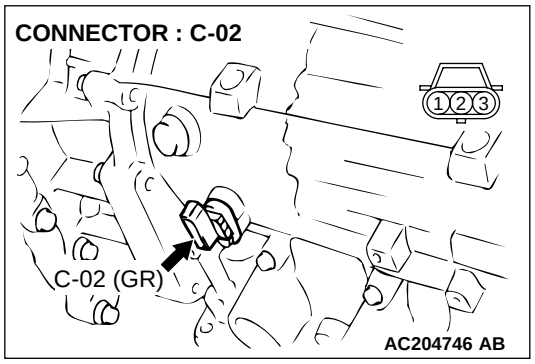


STEP 10. Check the harness for short circuit to ground between output shaft speed sensor connector C-02 terminal 2 and PCM connector D-134 terminal 73.

Q: Is the harness wire in good condition?

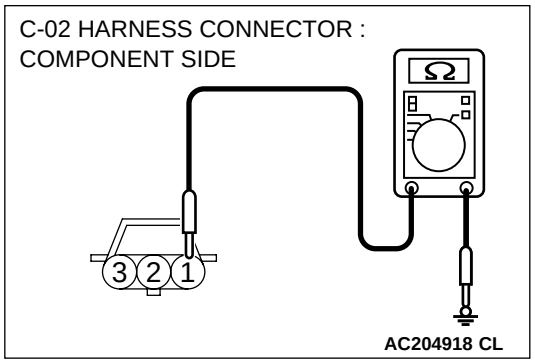
YES : Go to Step 11.

NO : Repair or replace the harness wire.



STEP 11. Measure the ground circuit for resistance at the output shaft speed sensor connector C-02.

(1) Disconnect connector C-02 from the speed sensor and measure at the harness side.



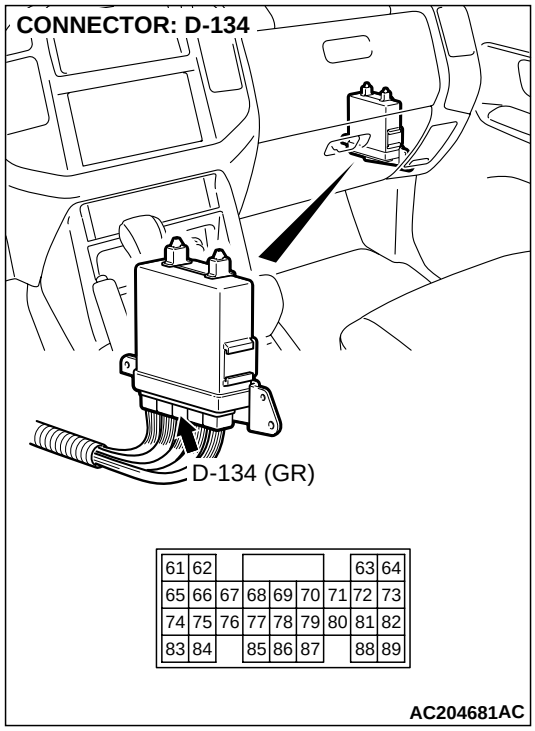
(2) Measure the resistance between terminal 1 and ground.
- The resistance should measure less than 2 ohms.

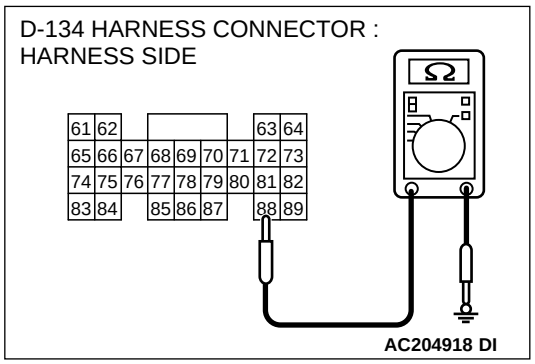
Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 16.
NO : Go to Step 12.

STEP 12. Measure the resistance at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.
(2) Turn the ignition switch to the "ON" position.





(3) Measure the resistance between terminal 88 and ground by backprobing.
- The resistance should measure less than 2 ohms.

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

Q: Is the measured resistance less than 2 ohms?

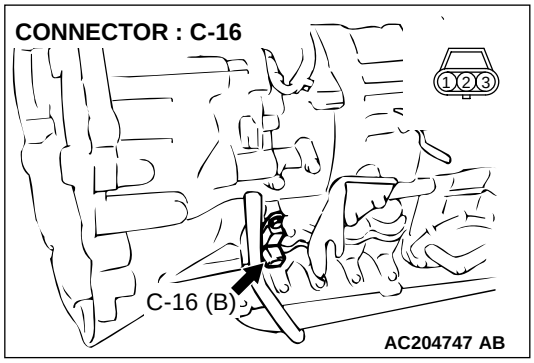
YES : Go to Step 13.
NO : Go to Step 15.

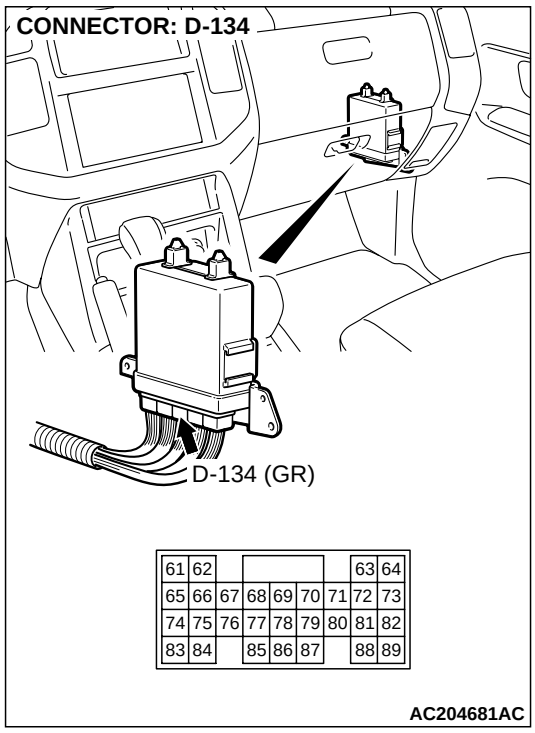
STEP 13. Check output shaft speed sensor connector C-02, PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

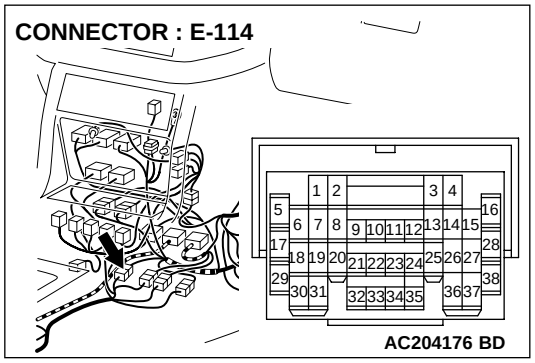
Q: Are the connectors and terminals in good condition?

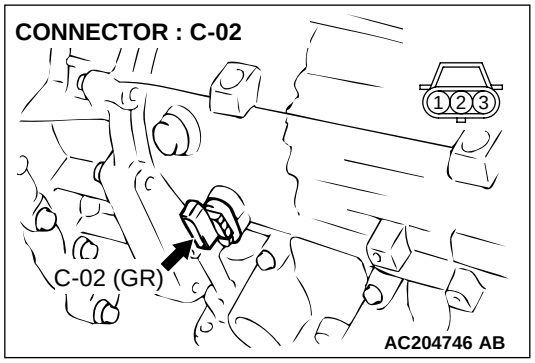
YES : Go to Step 14.

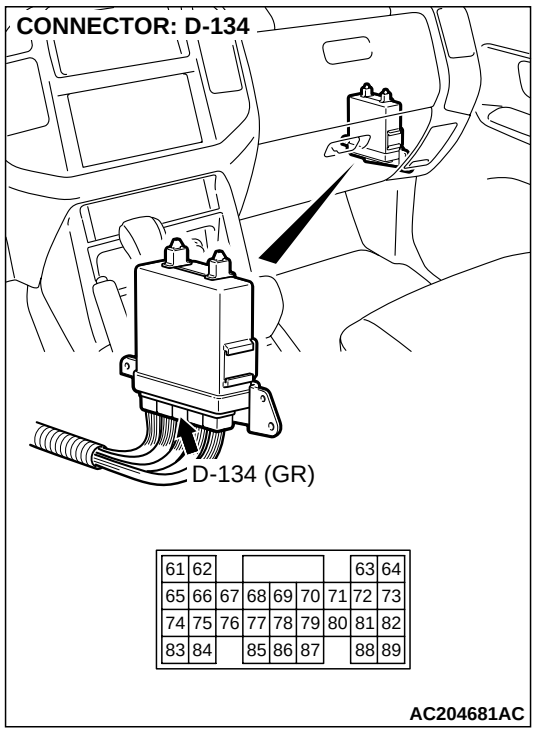
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.









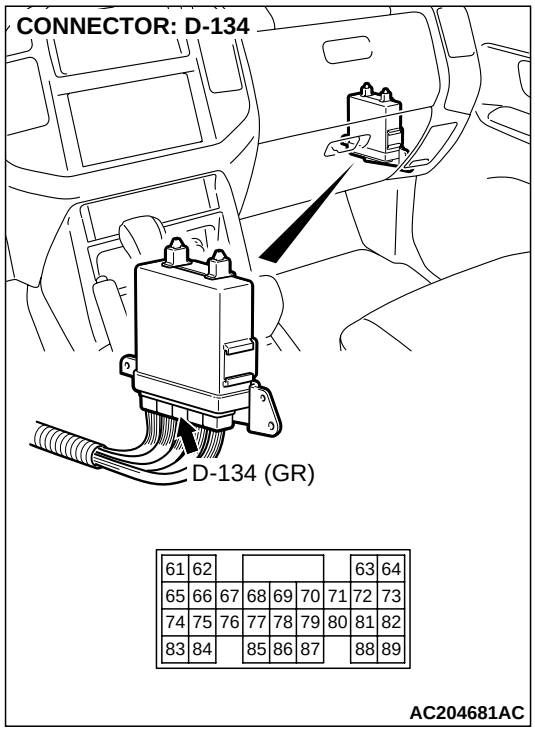


STEP 14. Check the harness for open circuit or damage between output shaft speed sensor harness side connector C-02 terminal 1 and PCM connector D-134 terminal 88.

Q: Is the harness wire in good condition?

YES : Go to Step 16.

NO : Repair or replace the harness wire.



STEP 15. Check PCM connector D-134 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

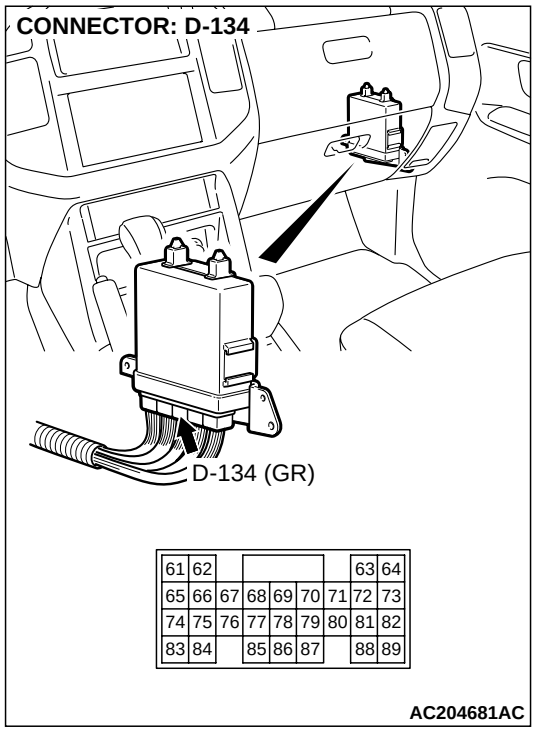
Q: Are the connector and terminals in good condition?

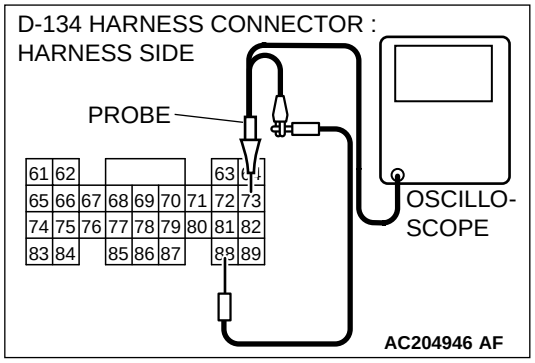
YES : Replace the PCM.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

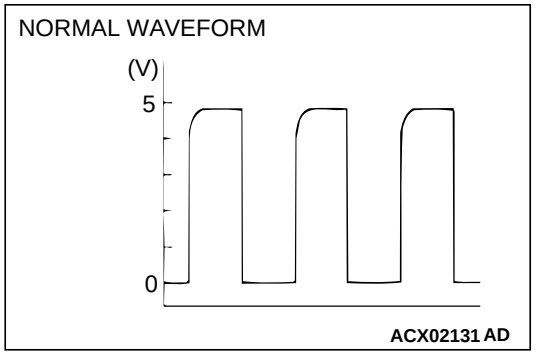
STEP 16. Using an oscilloscope, check the output shaft speed sensor waveform at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.





(2) Connect an oscilloscope probe to PCM connector D-134 terminal 73 and terminal 88 by backprobing.
(3) Start the engine and drive the vehicle at constant speed of 50 km/h (31 mph). (Gear range: 4th gear)

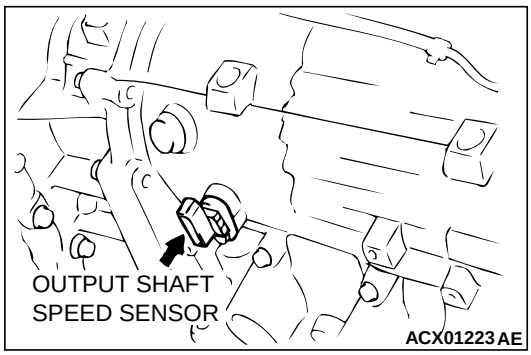


(4) Check the output shaft speed sensor waveform.
- The output shaft speed sensor waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.8 volt and less. The output waveform should not contain electrical noise.

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

Q: Is the waveform normal?

YES : Go to Step 19.
NO : Go to Step 17.

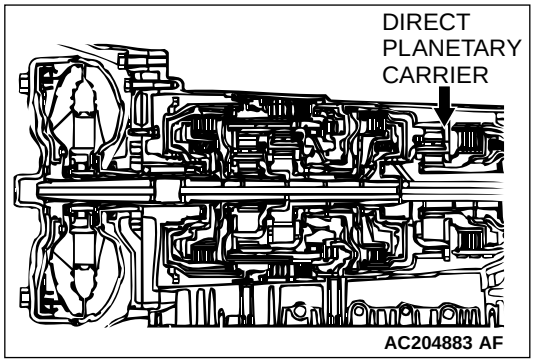


STEP 17. Replace the output shaft speed sensor.

(1) Replace the output shaft speed sensor. Refer to GROUP 23B, Transmission P.23B-18.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is A/T DTC 23 set?

YES : Go to Step 18.
NO : The procedure is complete.



STEP 18. Replace the direct planetary carrier.

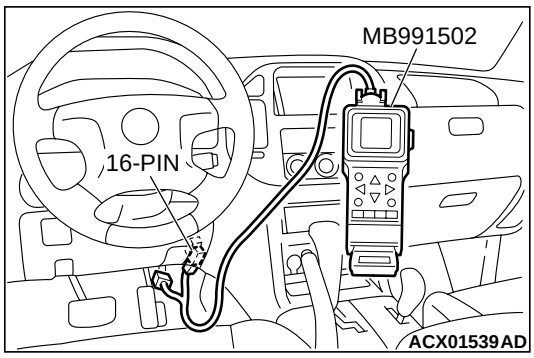
(1) Replace the direct planetary carrier. Refer to GROUP 23B, Transmission P.23B-18.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is A/T DTC 23 set?

YES : An A/T DTC may have set due to external radio frequency (RFI) possibility caused by cellular phone activity, or aftermarket components installed on the vehicle.
NO : The procedure is complete.

STEP 19. Using scan tool MB991502, check data list item 23: Output Shaft Speed Sensor.

⚠ 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.



(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 23, Output Shaft Speed Sensor.
- When driving at constant speed of 50 km/h (31 mph), the display should be "1,400 – 1,700 r/min." (Gear range: 4th gear)

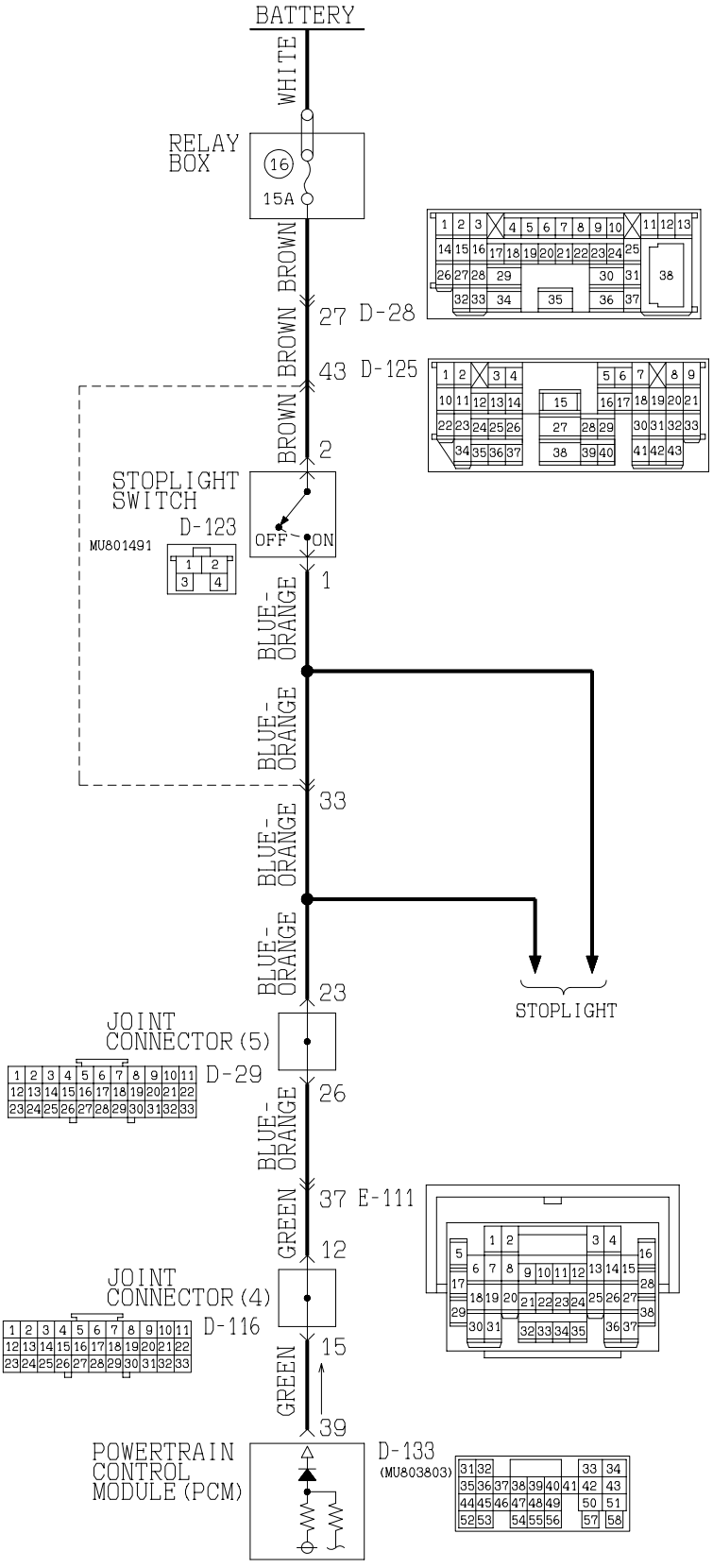
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Replace the PCM.

DTC 26: Stoplight Switch System

Stoplight Switch System Circuit



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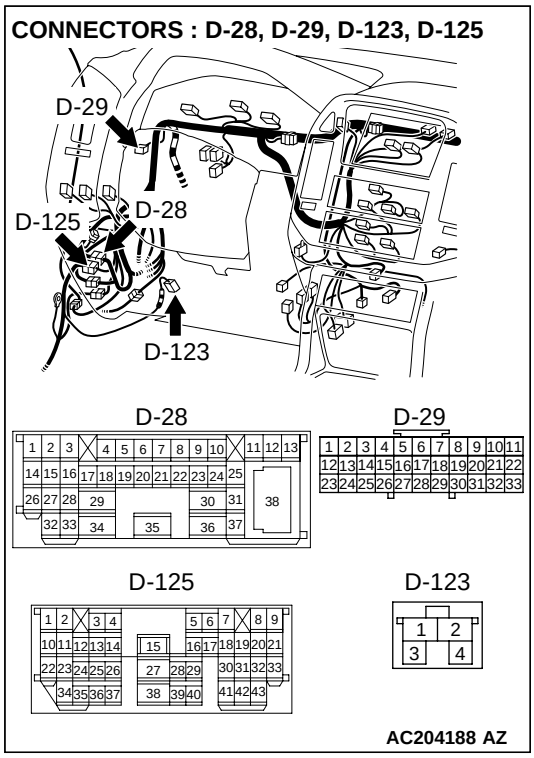
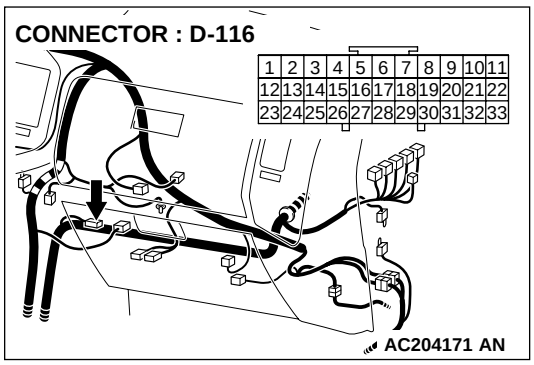
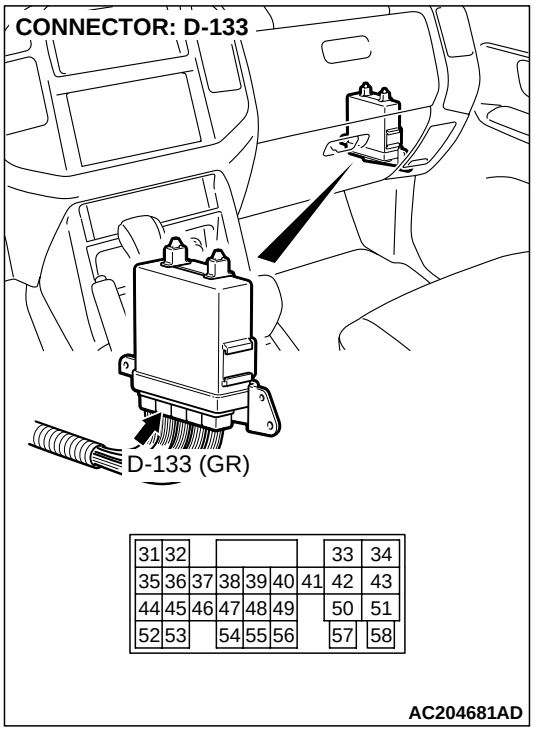
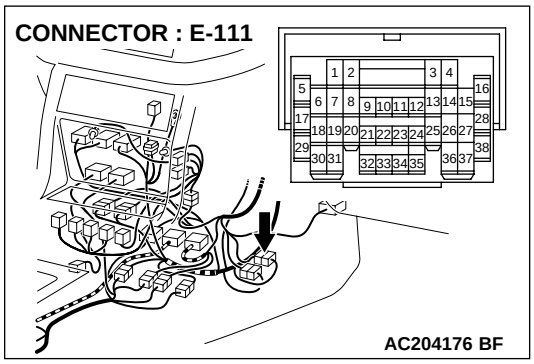
TSB Revision









CIRCUIT OPERATION

- Battery positive voltage is supplied to the stoplight switch (terminal 2).
- When the brake pedal is depressed, battery positive voltage is applied to the PCM (terminal 39).

DTC SET CONDITIONS

If the stoplight switch is on for five minutes or more while driving above 50 km/h (31 mph), it is judged there is a short circuit in the stoplight switch and DTC 26 is set.

TSB Revision

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the stoplight switch circuit
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:

- MB991502: Scan Tool (MUT-II)

STEP 1. Check the brake pedal height.

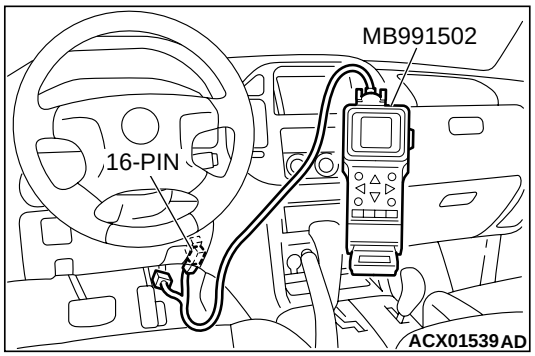
Refer to GROUP 35A, On-vehicle Service – Brake Pedal Check and Adjustment P.35A-115.

Q: Is the height adjusted properly?

YES : Go to Step 2.
NO : Adjust the brake pedal to the proper height.

STEP 2. Using scan tool MB991502, check data list item 26: Stoplight Switch.

⚠ 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.

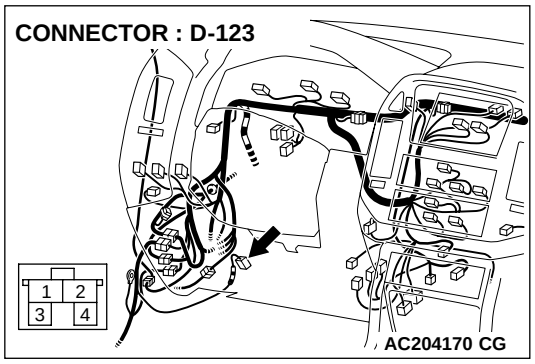


(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 26, Stoplight Switch.
- When the brake pedal is depressed, the display on scan tool MB991502 should be "ON."
- When the brake pedal is not depressed, the display on scan tool MB991502 should be "OFF."

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

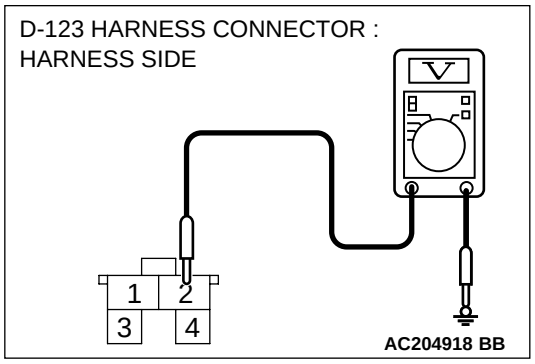
Q: Is the switch operating properly?

YES : If can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00E-2.
NO : Go to Step 3.



STEP 3. Measure the stoplight switch power supply voltage at connector D-123 by backprobing.

(1) Remove the stoplight switch from the mounting bracket.
(2) Do not disconnect connector D-123.



(3) Measure the voltage between terminal 2 and ground by backprobing.
- The voltage should measure battery positive voltage.

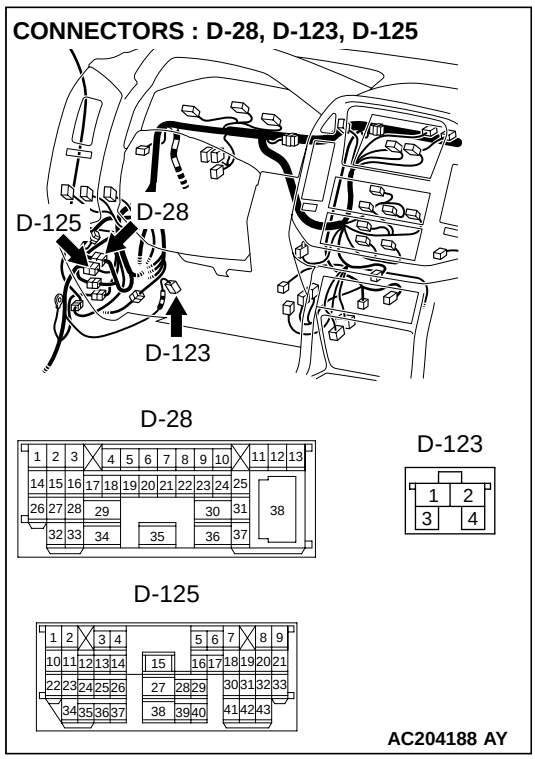
Q: Is the measured voltage battery positive voltage?

YES : Go to Step 6.
NO : Go to step 4.

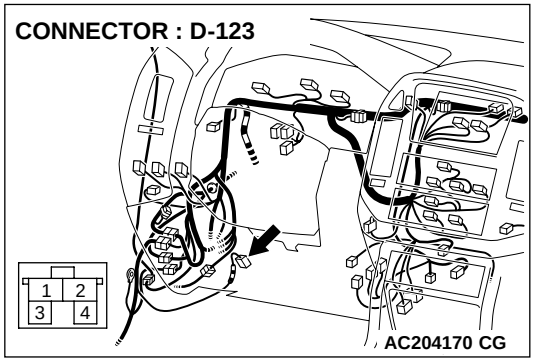
STEP 4. Check stoplight switch connector D-123, intermediate connector D-28 and D-125 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 5. Check the harness for open circuit or short circuit to ground between stoplight switch connector D-123 terminal 2 and the power supply fuse.



Q: Is the harness wire in good condition?

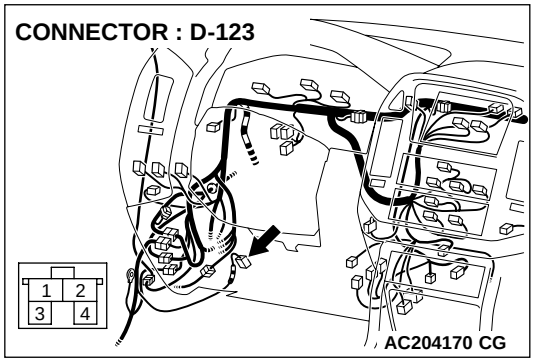
YES : Go to Step 6.

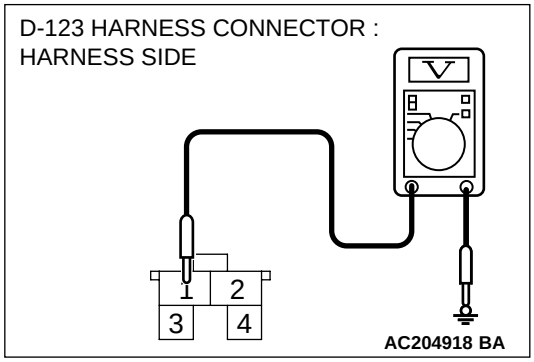
NO : Repair or replace the harness wire.

STEP 6. Measure the stoplight switch output voltage to the PCM at connector D-123 by backprobing.

(1) Remove the stoplight switch from the mounting bracket.

(2) Do not disconnect connector D-123.





(3) Measure the voltage between stoplight switch connector D-123 terminal 1 and ground by backprobing.

- When the switch button is out (closed circuit), voltage should equal battery positive voltage.
- When the switch button is depressed (open circuit), voltage should measure less than 1.0 volt.

Q: Is the measured voltage battery positive voltage with the switch button released (closed circuit), and less than 1.0 volt with the switch button depressed (open circuit)?

YES : Go to Step 8.

NO : Go to Step 7.

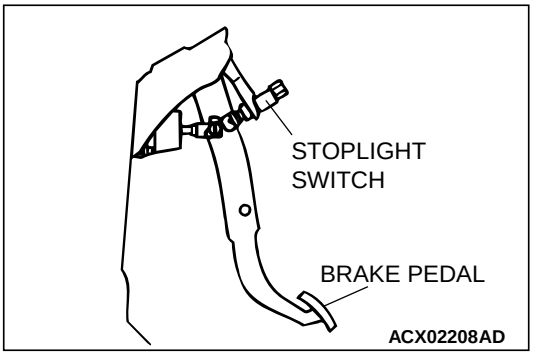
STEP 7. Check the stoplight switch.

Refer to GROUP 35A, On-vehicle Service – Stoplight Switch Check P.35A-116.

Q: Does the stoplight switch pass the checks?

YES : Go to Step 8.

NO : Replace the stoplight switch. Refer to GROUP 35A, Brake Pedal P.35A-132.



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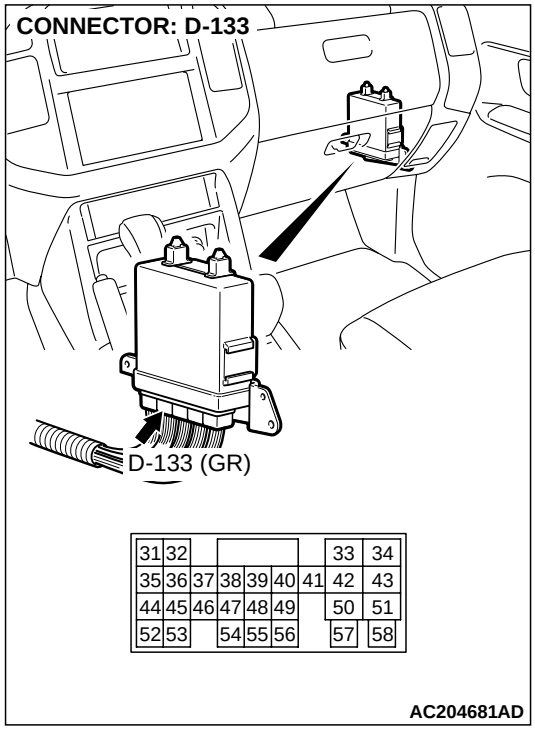
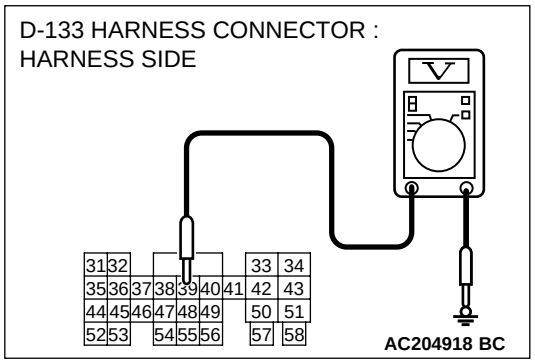
STEP 8. Measure the stoplight switch output voltage at PCM connector D-133 by backprobing.

(1) Install the stoplight switch into the mounting bracket if it was removed.

(2) Do not disconnect connector D-133.





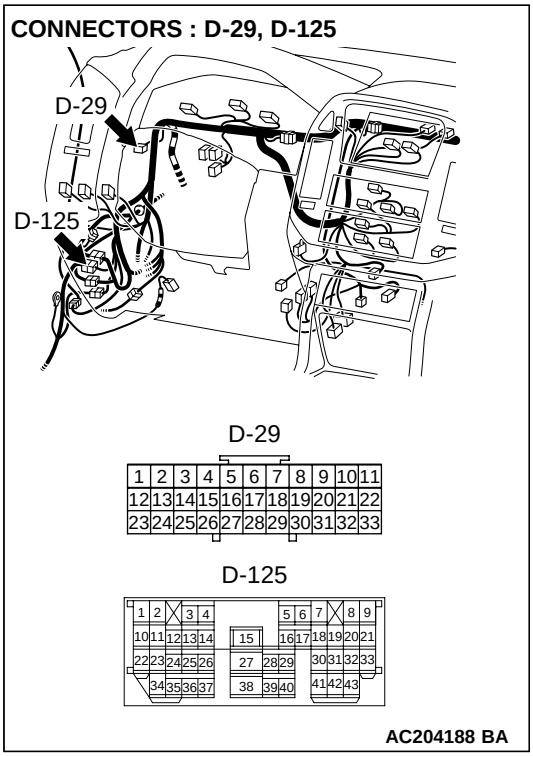
(3) Measure the voltage between terminal 39 and ground by backprobing.
- When the brake pedal is depressed, voltage should measure battery positive voltage.
- When the brake pedal is not depressed, voltage should measure less than 1.0 volt.

Q: Is the measured voltage battery positive voltage with the brake pedal depressed (closed circuit), and less than 1.0 volt with the brake pedal released (open circuit)?

YES : Go to Step 11.
NO : Go to Step 9.

STEP 9. Check joint connector D-29, D-116, intermediate connector D-125, E-111 and PCM connector D-133 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

CONNECTORS : D-29, D-125



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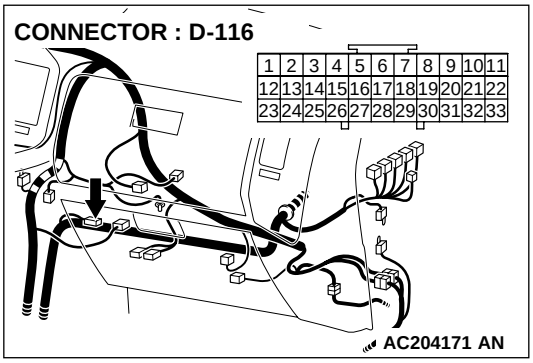
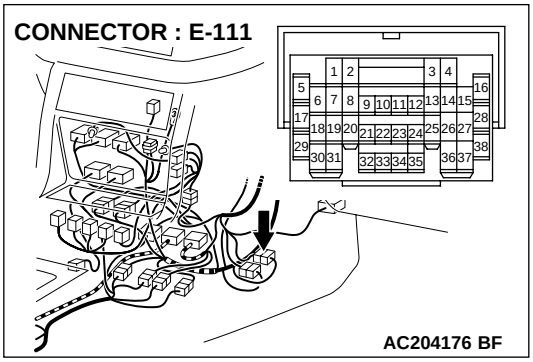
CONNECTOR : D-116

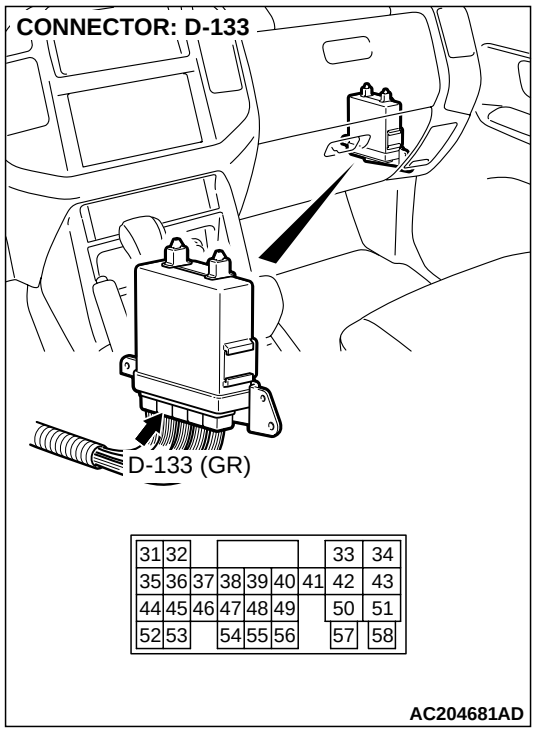


AC204171 AN

CONNECTOR : E-111



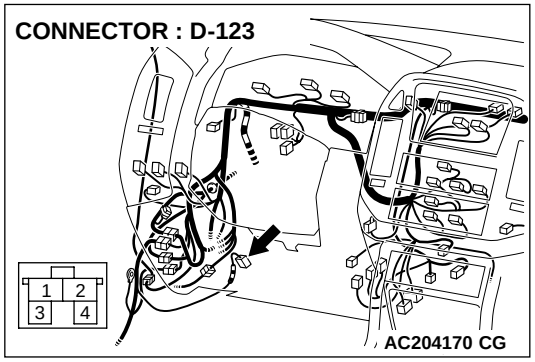
AC204176 BF

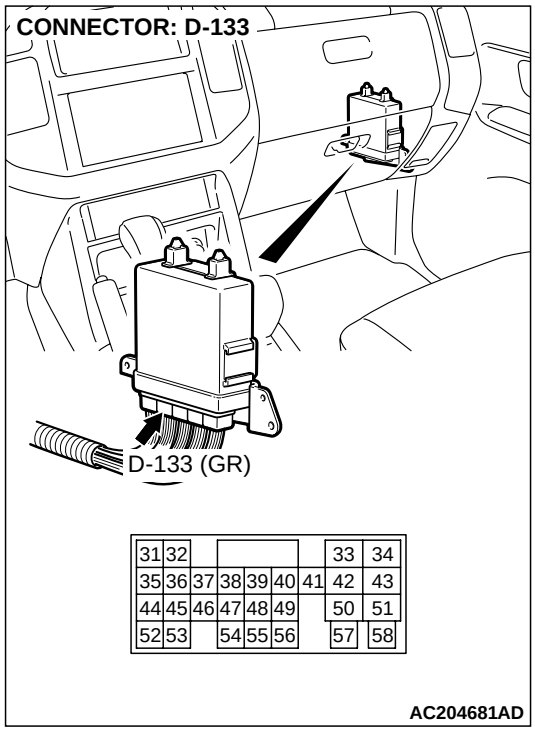


Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



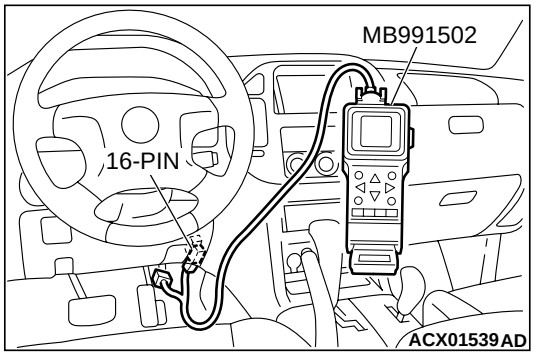


STEP 10. Check the harness for open circuit or short circuit to ground between stoplight switch connector D-123 terminal 1 and PCM connector D-133 terminal 39.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair or replace the harness wire.



STEP 11. Using scan tool MB991502, check data list item 26: Stoplight Switch.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 26, Stoplight Switch.
- When the brake pedal is depressed, the display on scan tool MB991502 should be "ON."
- When the brake pedal is not depressed, the display on scan tool MB991502 should be "OFF."

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

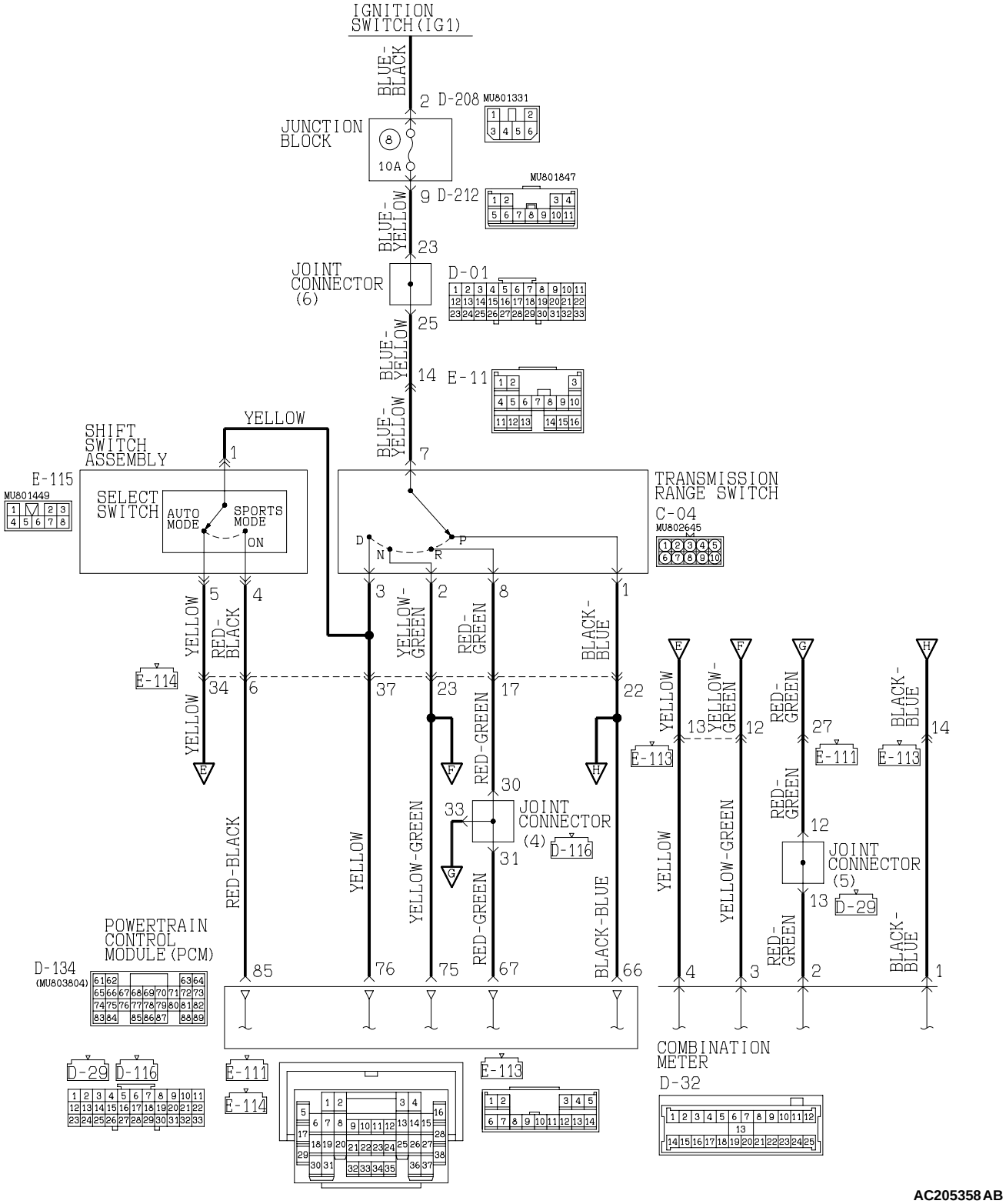
Q: Is the switch operating properly?

YES : If can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.

DTC 27: Transmission Range Switch System (Open Circuit)

Transmission Range Switch System Circuit



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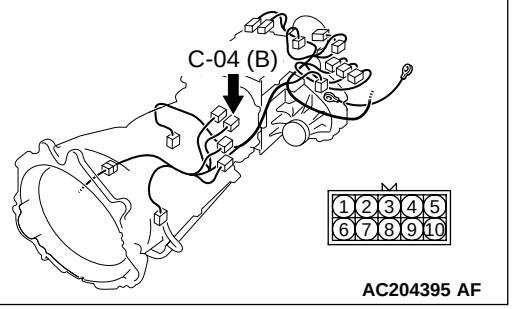
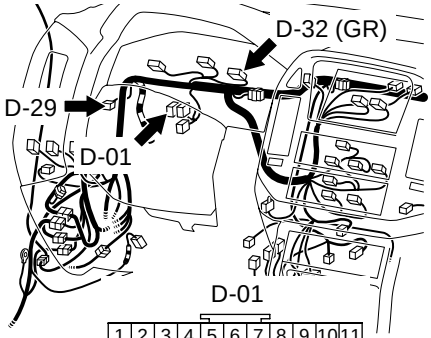
CONNECTOR : C-04



CONNECTORS : D-01, D-29, D-32



D-01

1	2	3	4	5	6	7	8	9	10	11	
12	13	14	15	16	17	18	19	20	21	22	
23	24	25	26	27	28	29	30	31	32	33	

D-29

1	2	3	4	5	6	7	8	9	10	11	
12	13	14	15	16	17	18	19	20	21	22	
23	24	25	26	27	28	29	30	31	32	33	

D-32

1	2	3	4	5	6	7	8	9	10	11	12	
						13						
14	15	16	17	18	19	20	21	22	23	24	25	

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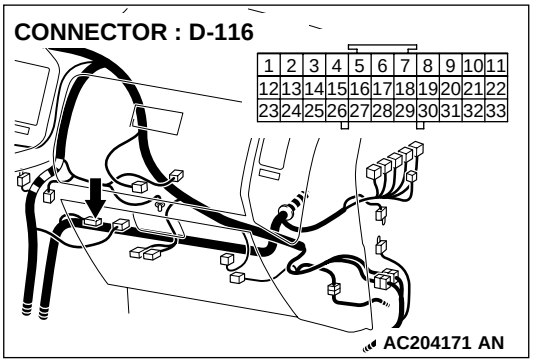
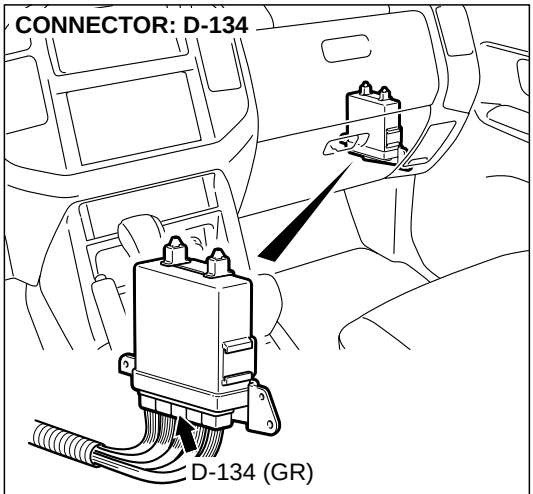
CONNECTOR : D-116

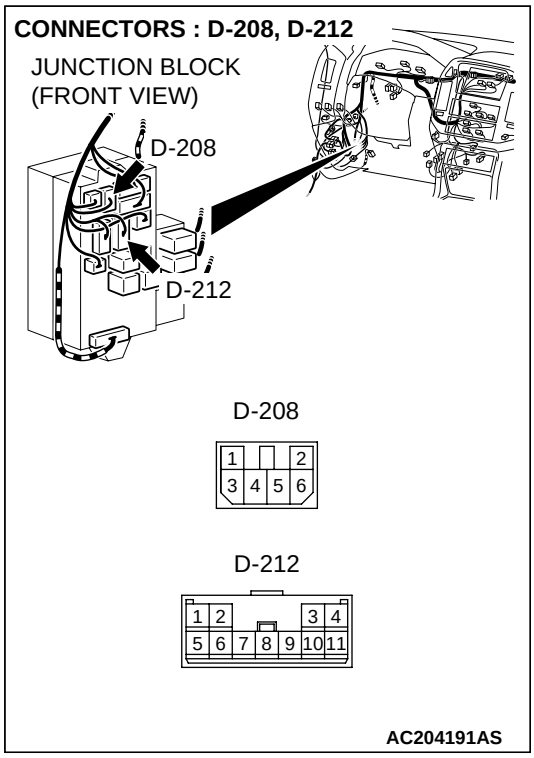


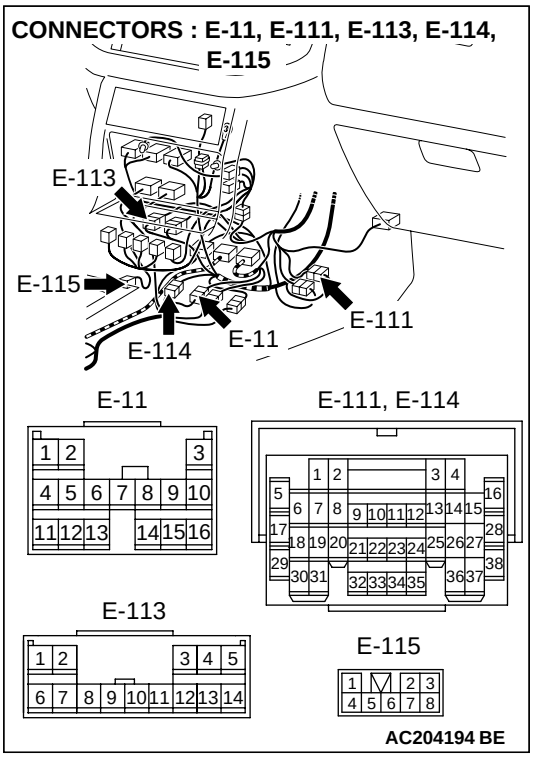
CONNECTOR: D-134



61	62							63	64
65	66	67	68	69	70	71	72	73	
74	75	76	77	78	79	80	81	82	
83	84		85	86	87		88	89	

AC204681AC





CIRCUIT OPERATION

- Battery positive voltage is applied to the transmission range switch (terminal 7) when the ignition switch is turned "ON."
- Battery positive voltage is applied to the PCM (terminal 66) when the selector lever is in the "P" range. The PCM judges that the selector lever is in the "P" range when the battery positive voltage is applied.
- Battery positive voltage is applied to the PCM terminal 67 (75 or 76) when the selector lever is in the "R" range ("N" or "D" range). The PCM judges that the selector lever is in the "R" range ("N" or "D" range) when the battery positive voltage is applied.

DTC SET CONDITIONS

If the PCM detects no Transmission Range switch input signal from any selector position for a continuous period of thirty seconds or more, it is judged that there is an open circuit in the transmission range switch and DTC 27 is set.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

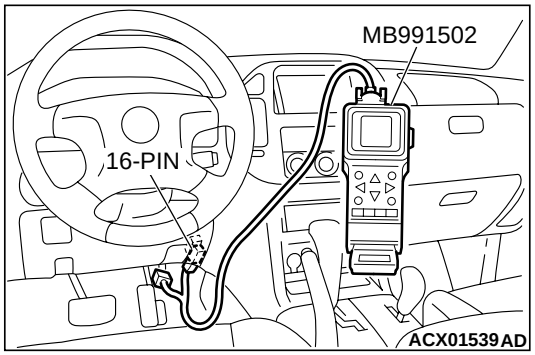
- Malfunction of the transmission range switch
- Malfunction of the ignition switch
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 61: Transmission Range Switch.

⚠ 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.



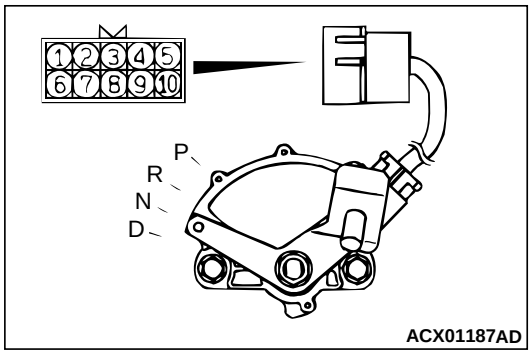
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 61, Transmission Range Switch.
- Move the selector lever to "P," "R," "N," "D" and sport mode positions and confirm that the selected transmission ranges match the positions shown on scan tool MB991502. (Sport mode is indicated as "D" on scan tool MB991502.)

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

Q: Is the switch operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : When the transmission range does not match any of the positions shown on scan tool MB991502: Go to Step 2. When the transmission range does not match the "P" position on scan tool MB991502: Go to Step 6. When the transmission range does not match the "R" position on scan tool MB991502: Go to Step 14 . When the transmission range does not match the "N" position on scan tool MB991502: Go to Step 21. When the transmission range does not match the "D" position on scan tool MB991502: Go to Step 28. When the transmission range does not match the sport mode position on scan tool MB991502 (agrees at "D" position): Go to Step 36.



STEP 2. Check the transmission range switch.

Measure the resistance between the terminals for each selector position as indicated in the table above

TRANSMISSION RANGE	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	1 – 7	Less than 2 ohms.
R	7 – 8	
N	2 – 7	
D	3 – 7	

Q: Does the resistance measure less than 2 ohms for each selector position?

YES : Go to Step 3.

NO : Replace the transmission range switch. Refer to GROUP 23B, Transmission P.23B-18.

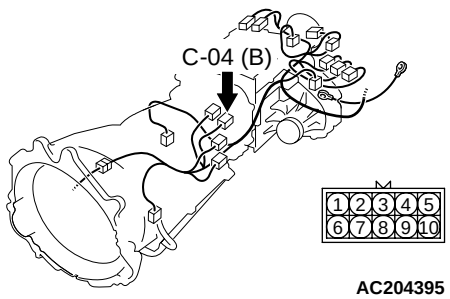
STEP 3. Check transmission range switch connector C-04, joint connector D-01, junction block connector D-212 and intermediate connector E-11 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

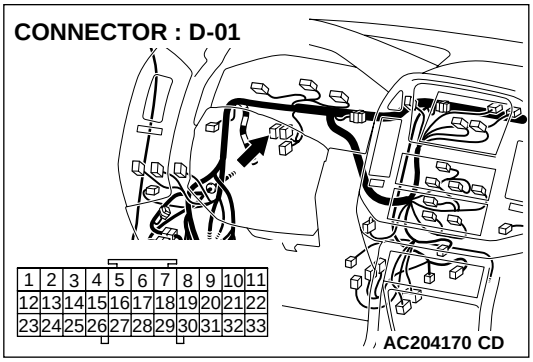
YES : Go to Step 4.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

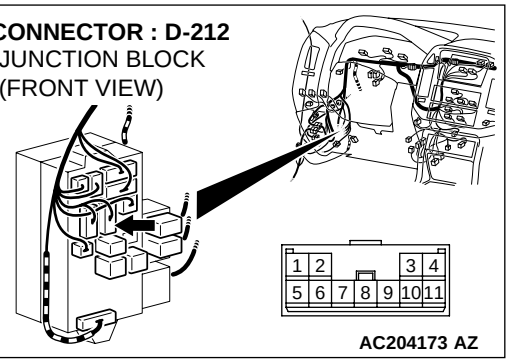
CONNECTOR : C-04



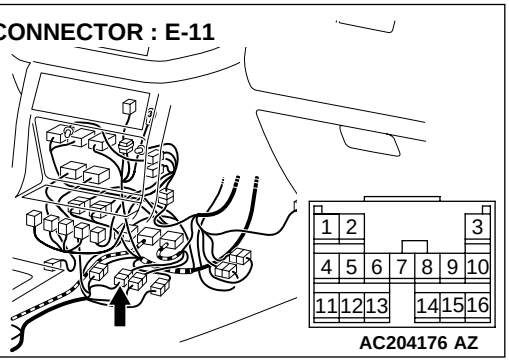
CONNECTOR : D-01



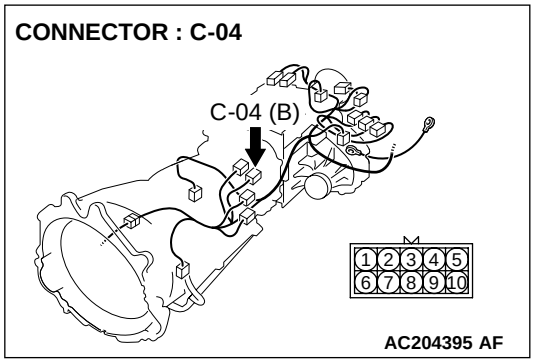
CONNECTOR : D-212
JUNCTION BLOCK
(FRONT VIEW)

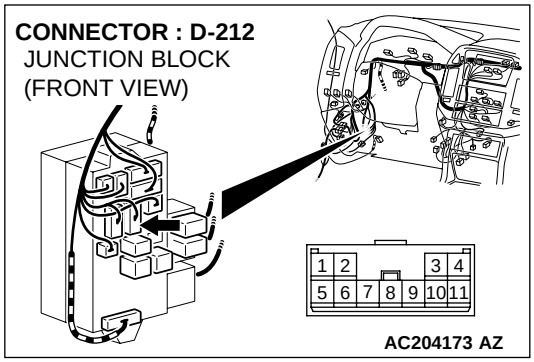


CONNECTOR : E-11



STEP 4. Check harness for open circuit or short circuit to ground between transmission range switch connector C-04 terminal 7 and junction block connector D-212 terminal 9.



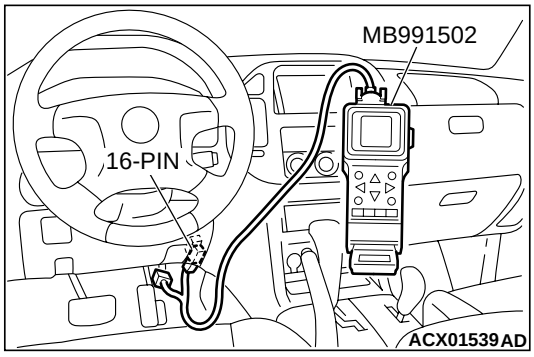


Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.

STEP 5. Using scan tool MB991502, check data list item 61: Transmission Range Switch.



⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.

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

(3) Set scan tool MB991502 to data reading mode for item 61, Transmission Range Switch.

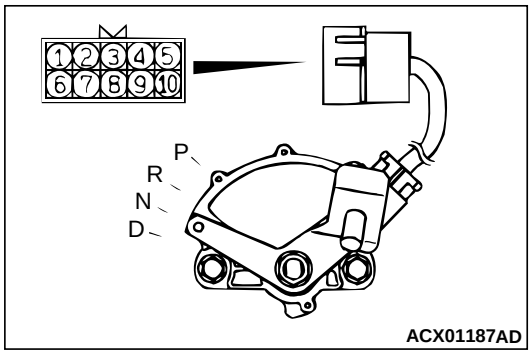
- Move the selector lever to "P," "R," "N," "D" and sport mode positions and confirm that the selected transmission ranges match the positions shown on scan tool MB991502. (Sport mode is indicated as "D" on scan tool MB991502.)

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

Q: Is the switch operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.



STEP 6. Check the transmission range switch.

Measure the resistance between the terminals for each selector position as indicated in the table above.

TRANSMISSION RANGE	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	1 – 7	Less than 2 ohms.
R	7 – 8	
N	2 – 7	
D	3 – 7	

Q: Does the resistance measure less than 2 ohms for each selector position?

YES : Go to Step 7.

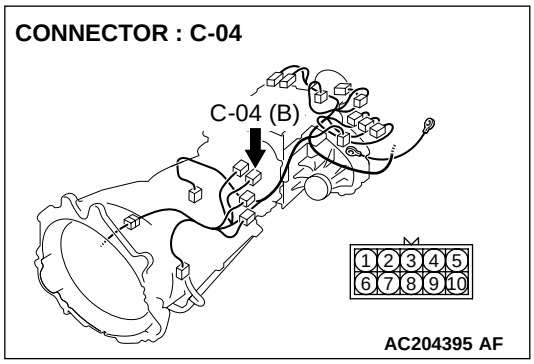
NO : Replace the transmission range switch. Refer to GROUP 23B, Transmission P.23B-18.

STEP 7. Check transmission range switch connector C-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

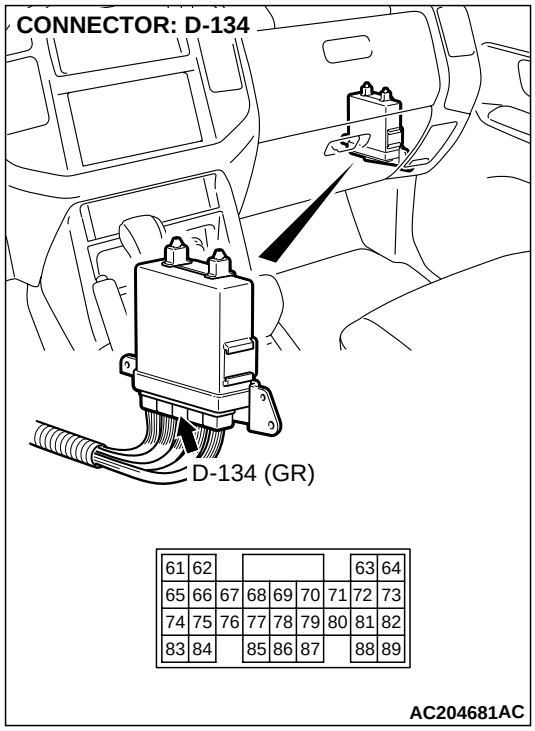
YES : Go to Step 8.

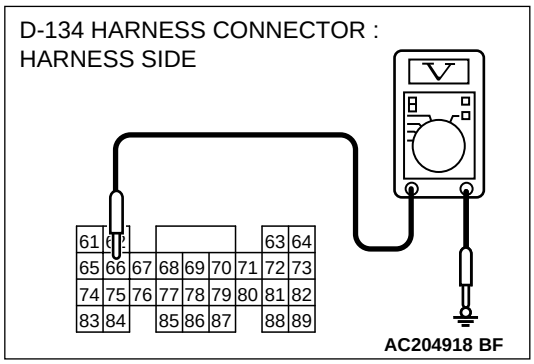
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 8. Measure the transmission range switch output voltage at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.
(2) Turn the ignition switch to the "ON" position.
(3) Move the selector lever to the "P" position.



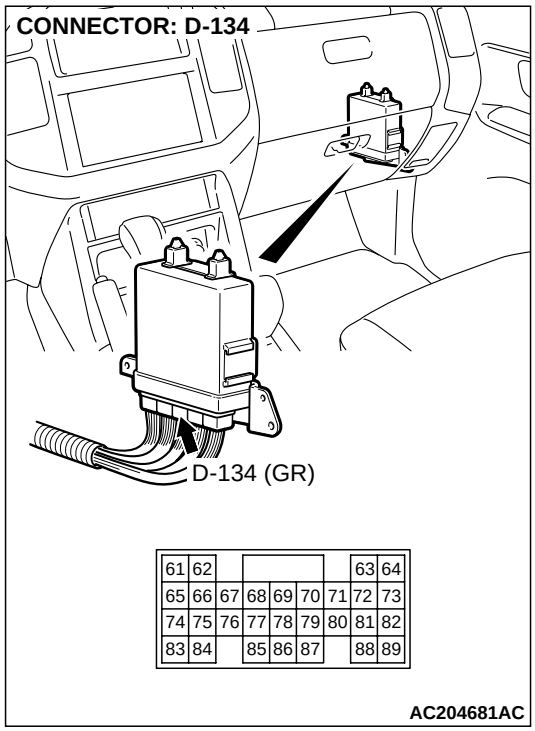


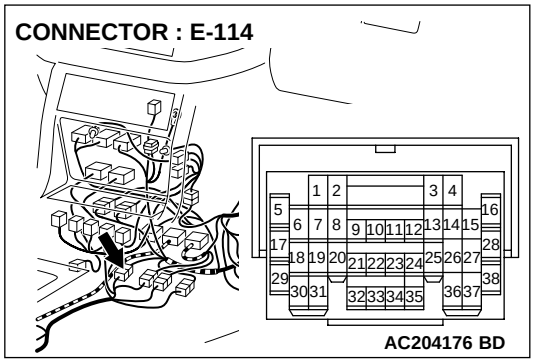
(4) Measure the voltage between terminal 66 and ground by backprobing.
- The voltage should measure battery positive voltage.

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

Q: Does the voltage measure battery positive voltage?

YES : Go to Step 13.
NO : Go to Step 9.





STEP 9. Check PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

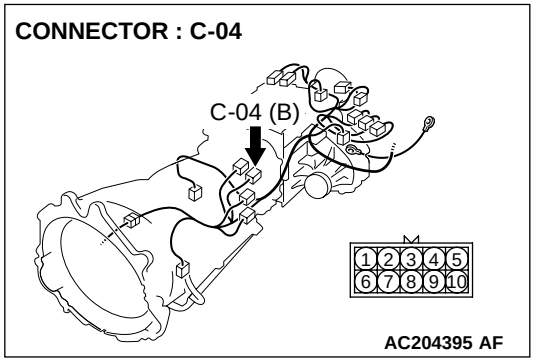
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

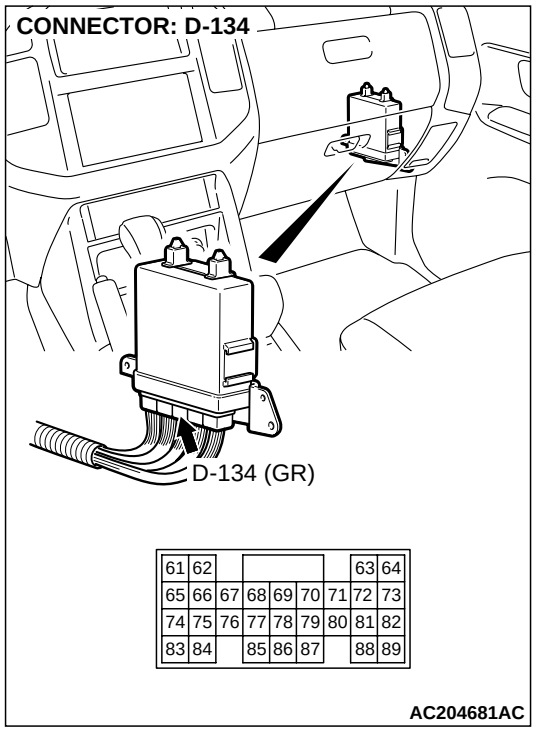
STEP 10. Check harness for open circuit or short circuit to ground between transmission range switch connector C-04 terminal 1 and PCM connector D-134 terminal 66.

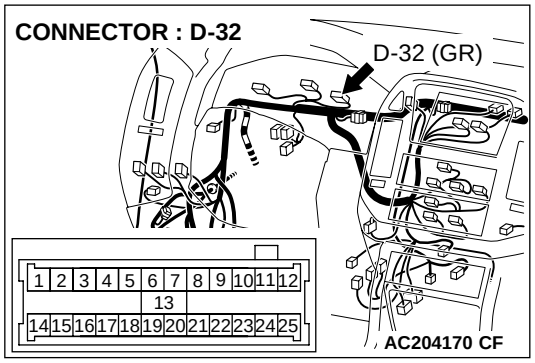
Q: Is the harness wire in good condition?

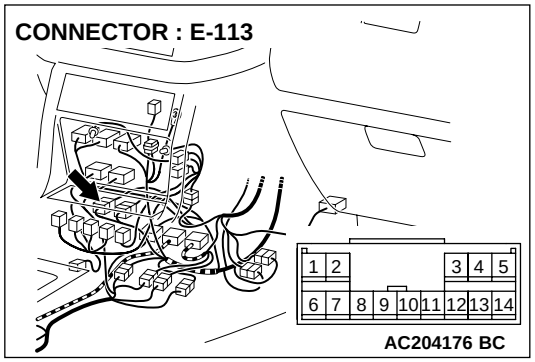
YES : Go to Step 11.

NO : Repair or replace the harness wire.







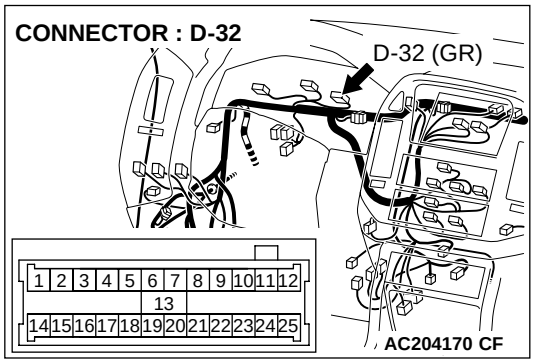


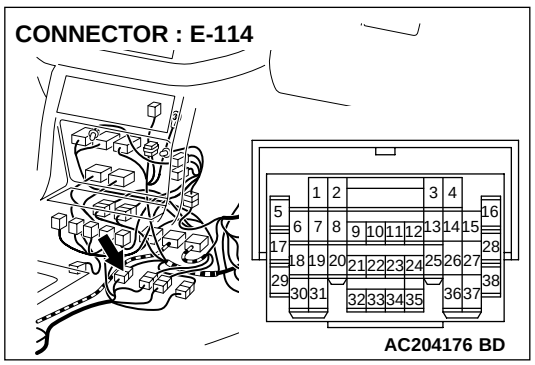
STEP 11. Check combination meter connector D-32 and intermediate connector E-113 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



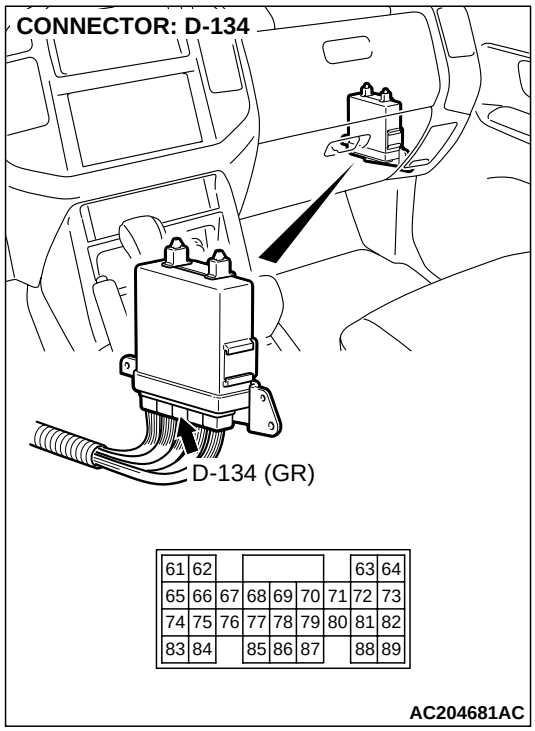


STEP 12. Check harness for short circuit to ground between combination meter connector D-32 terminal 1 and intermediate connector E-114 terminal 22.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.

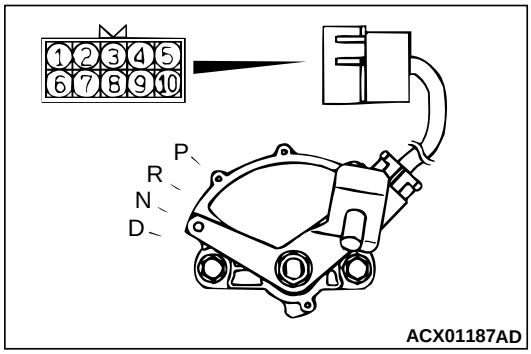


STEP 13. Check PCM connector D-134 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 14. Check the transmission range switch.

Measure the resistance between the terminals for each selector position as indicated in the table above.

TRANSMISSION RANGE	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	1 – 7	Less than 2 ohms.
R	7 – 8	
N	2 – 7	
D	3 – 7	

Q: Does the resistance measure less than 2 ohms for each selector position?

YES : Go to Step 15.

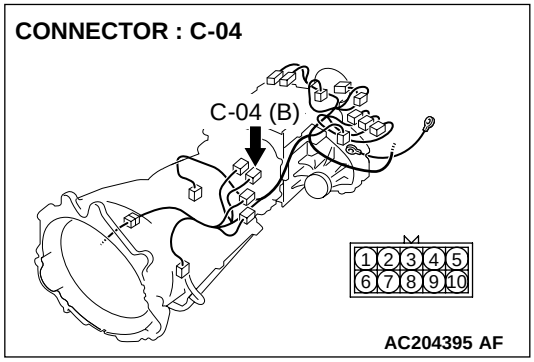
NO : Replace the transmission range switch. Refer to GROUP 23B, Transmission P.23B-18.

STEP 15. Check transmission range switch connector C-04 the for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

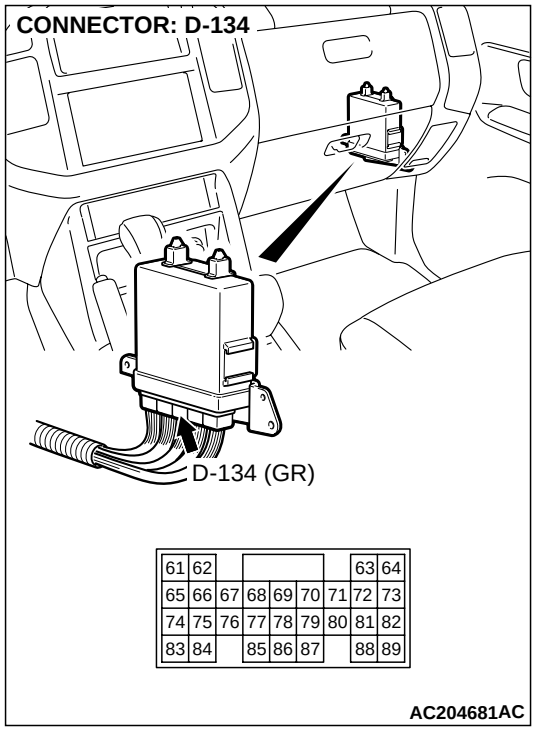
YES : Go to Step 16.

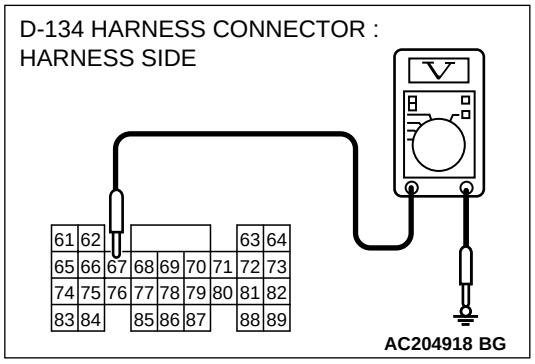
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 16. Measure the transmission range switch output voltage at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.
(2) Turn the ignition switch to the "ON" position.
(3) Move the selector lever to the "R" position.





(4) Measure the voltage between terminal 67 and ground by backprobing.
- The voltage should measure battery positive voltage.

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

Q: Does the voltage measure battery positive voltage?

YES : Go to Step 13.

NO : Go to Step 17.

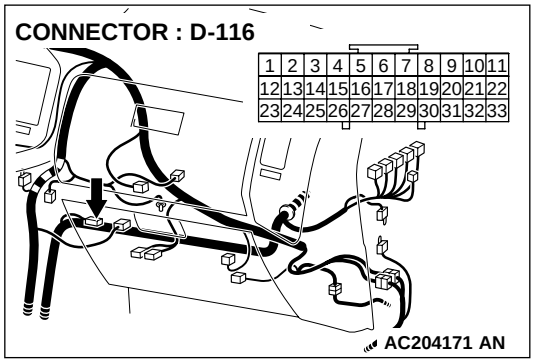
TSB Revision

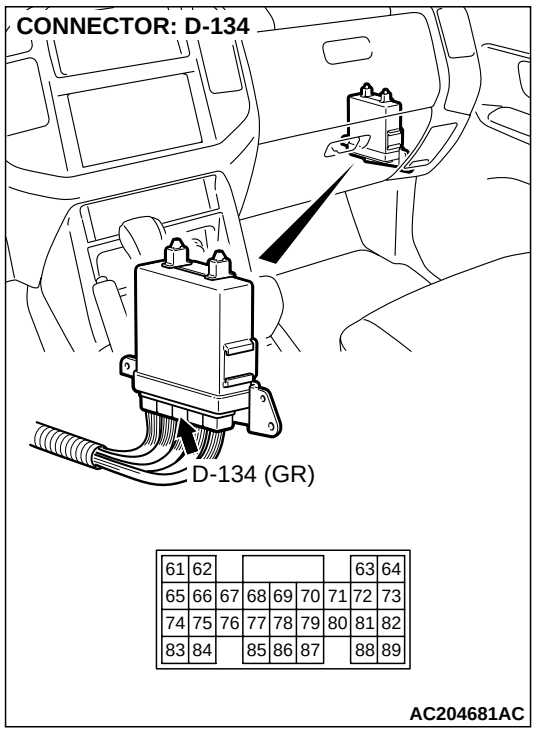
STEP 17. Check joint connector D-116, PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector

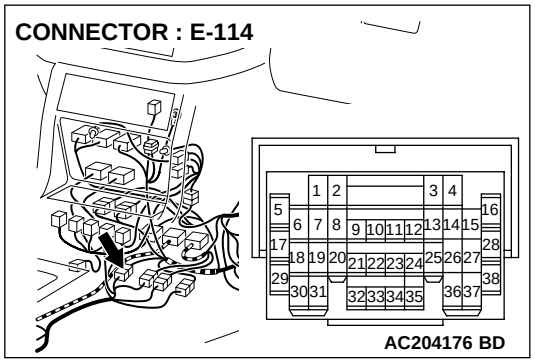
Q: Are the connectors and terminals in good condition?

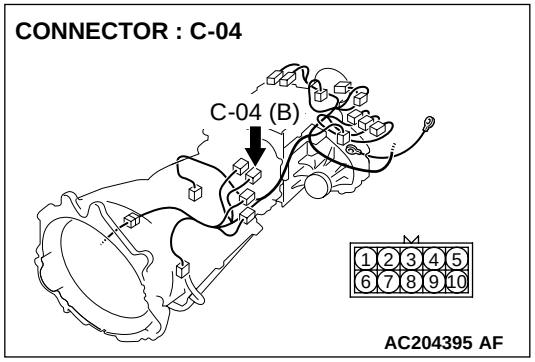
YES : Go to Step 18.

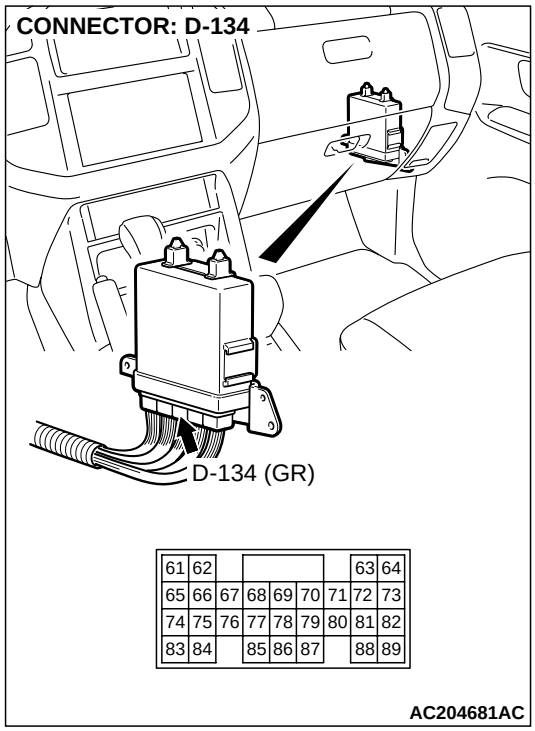
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.











STEP 18. Check harness for open circuit or short circuit to ground between transmission range switch connector C-04 terminal 8 and PCM connector D-134 terminal 67.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair or replace the harness wire.

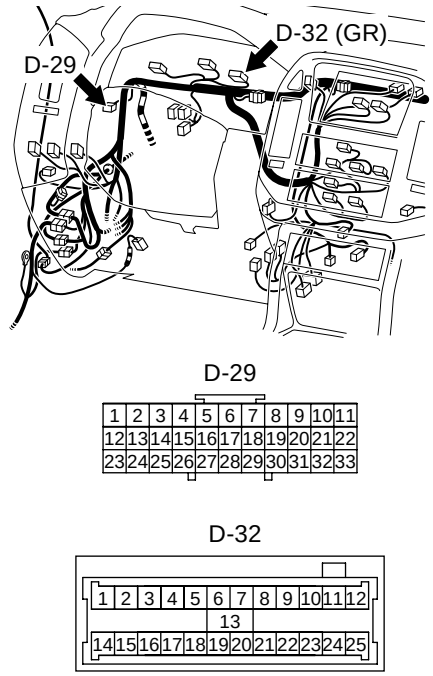
STEP 19. Check joint connector D-29, combination meter connector D-32 and intermediate connector E-111 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 20.

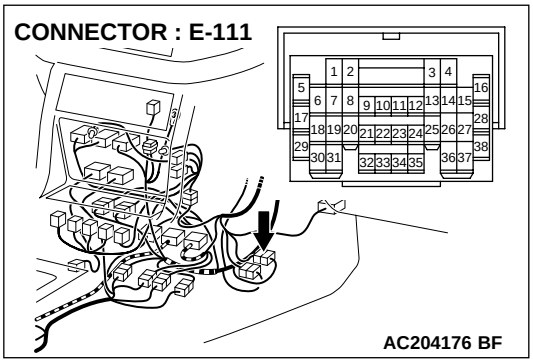
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTORS : D-29, D-32

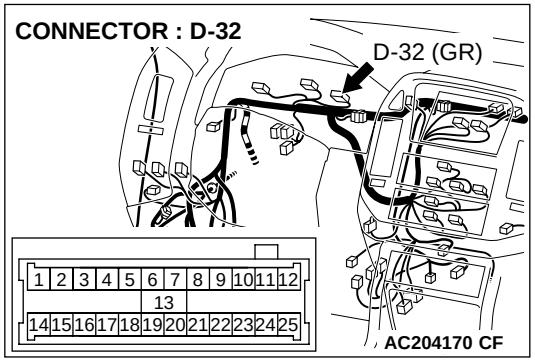


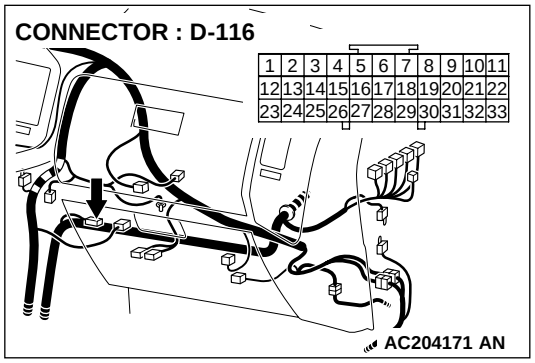
AC204188 BB

CONNECTOR : E-111



AC204176 BF



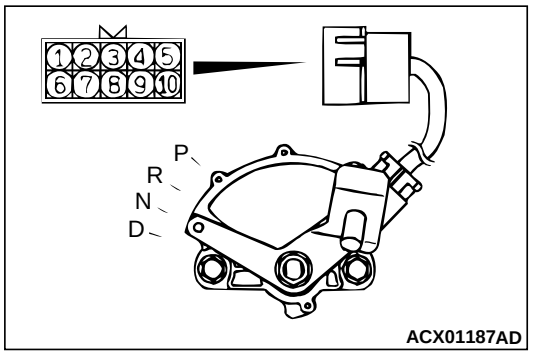


STEP 20. Check harness for short circuit to ground between combination meter connector D-32 terminal 2 and joint connector D-116 terminal 33.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.



STEP 21. Check the transmission range switch.

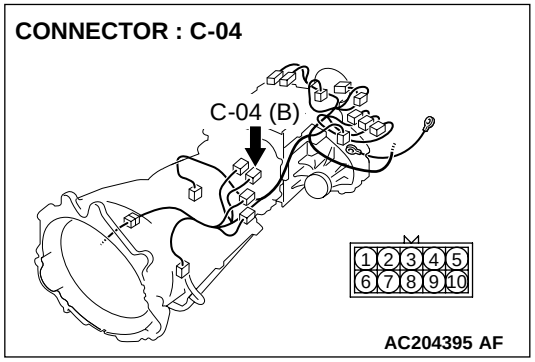
Measure the resistance between the terminals for each selector position as indicated in the table above.

TRANSMISSION RANGE	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	1 – 7	Less than 2 ohms.
R	7 – 8	
N	2 – 7	
D	3 – 7	

Q: Does the resistance measure less than 2 ohms for each selector position?

YES : Go to Step 22.

NO : Replace the transmission range switch. Refer to GROUP 23B, Transmission P.23B-18.

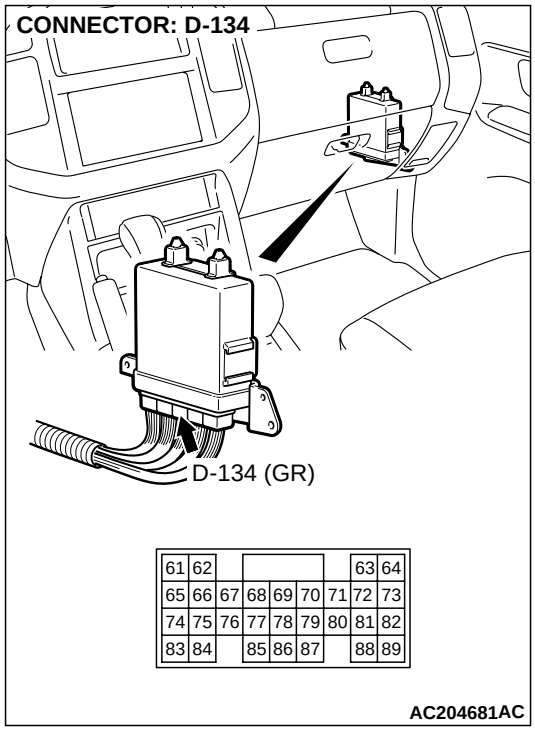


STEP 22. Check transmission range switch connector C-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

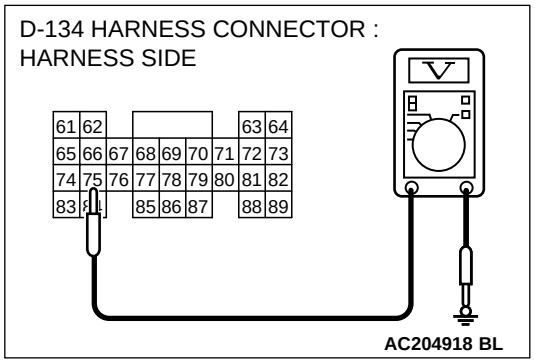
YES : Go to Step 23.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 23. Measure the transmission range switch output voltage at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.
(2) Turn the ignition switch to the "ON" position.
(3) Move the selector lever to the "N" position.



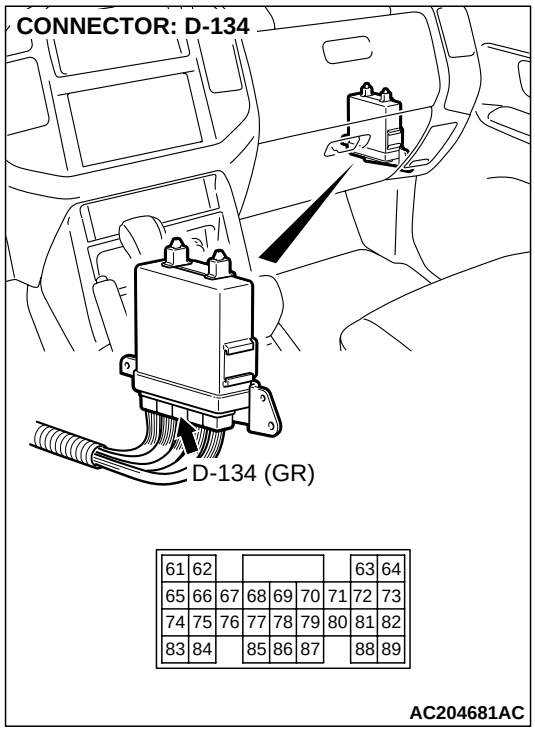
(4) Measure the voltage between terminal 75 and ground by backprobing.
- The voltage should measure battery positive voltage.

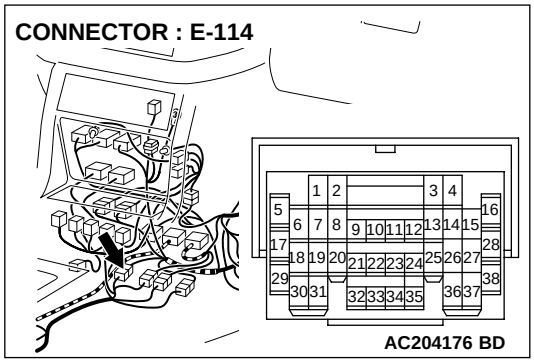
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Does the voltage measure battery positive voltage?

YES : Go to Step 13.

NO : Go to Step 24.





STEP 24. Check PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 25.

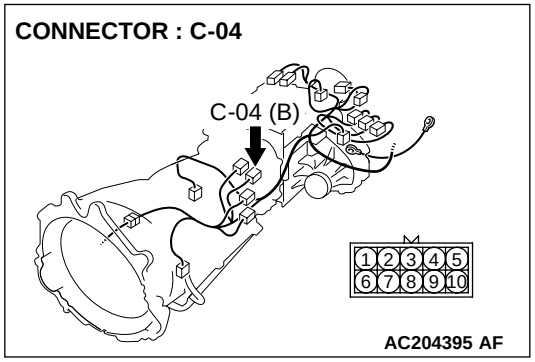
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

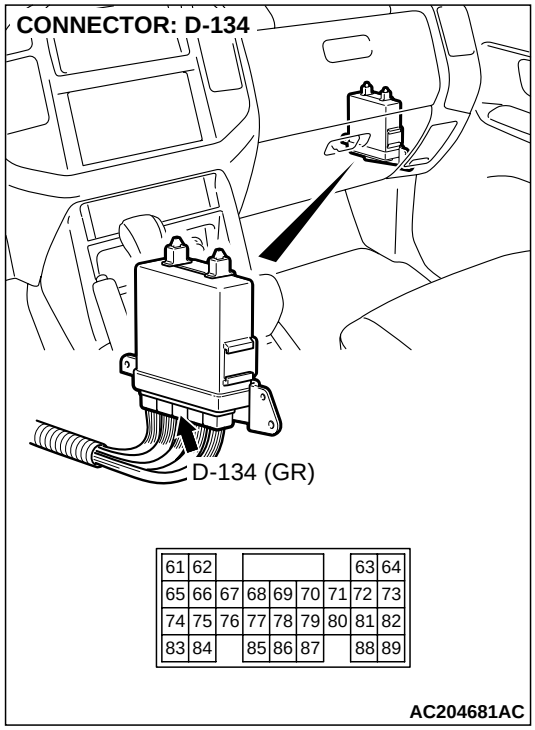
STEP 25. Check harness for open circuit or short circuit to ground between transmission range switch connector C-04 terminal 2 and PCM connector D-134 terminal 75.

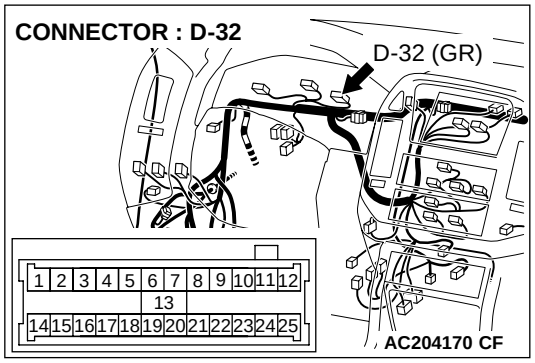
Q: Is the harness wire in good condition?

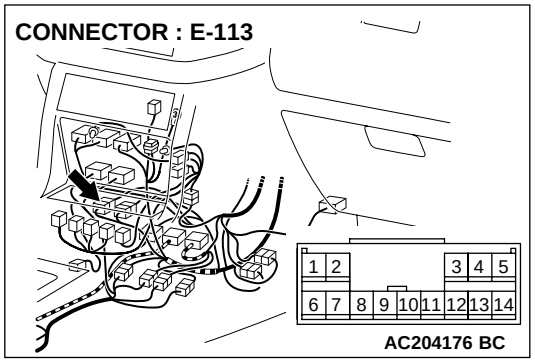
YES : Go to Step 26.

NO : Repair or replace the harness wire.







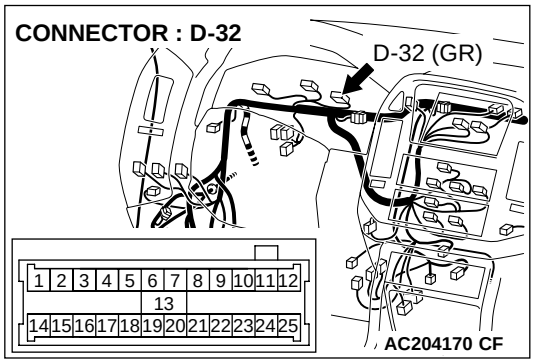


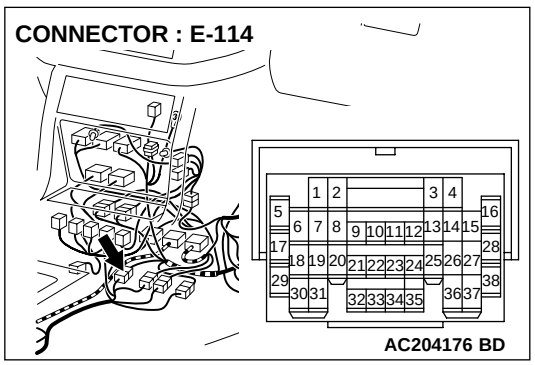
STEP 26. Check combination meter connector D-32 and intermediate connector E-113 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 27.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



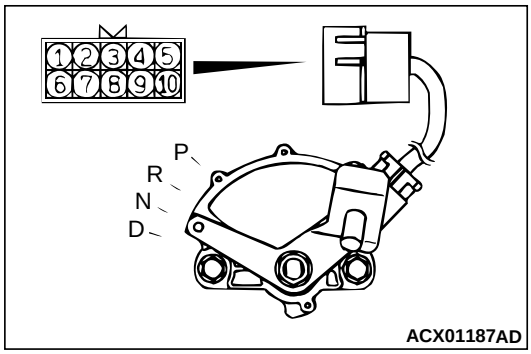


STEP 27. Check harness for short circuit to ground between combination meter connector D-32 terminal 3 and intermediate connector E-114 terminal 23.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.



STEP 28. Check the transmission range switch.

Measure the resistance between the terminals for each selector position as indicated in the tables above.

TRANSMISSION RANGE	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	1 – 7	Less than 2 ohms.
R	7 – 8	
N	2 – 7	
D	3 – 7	

Q: Does the resistance measure less than 2 ohms for each selector position?

YES : Go to Step 29.

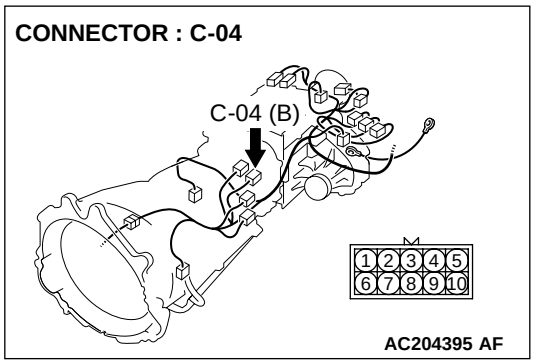
NO : Replace the transmission range switch. Refer to GROUP 23B, Transmission P.23B-18.

STEP 29. Check transmission range switch connector C-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector in good condition?

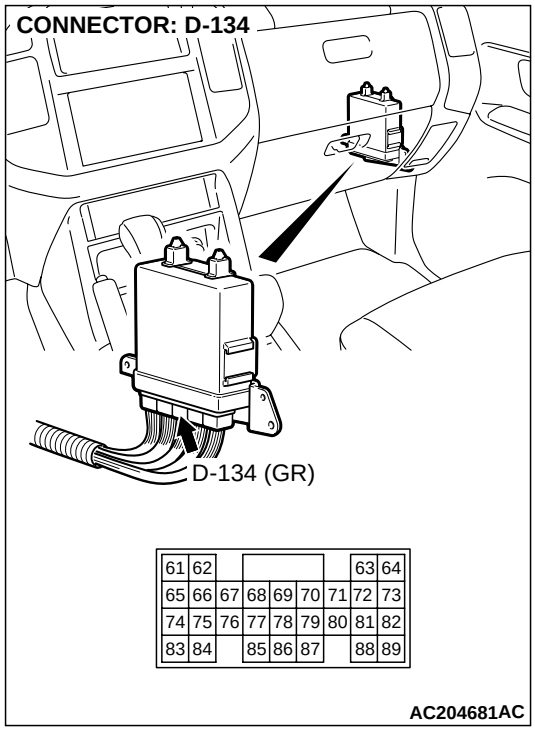
YES : Go to Step 30.

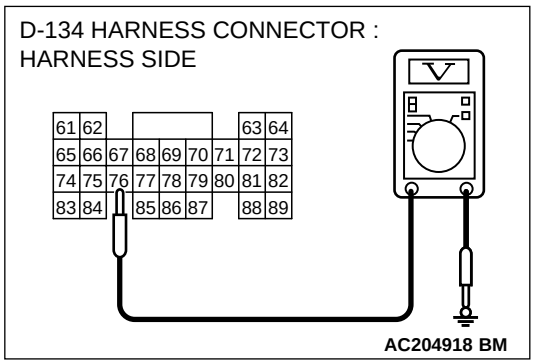
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 30. Measure the transmission range switch output voltage at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.
(2) Turn the ignition switch to the "ON" position.
(3) Move the selector lever to the "D" position.



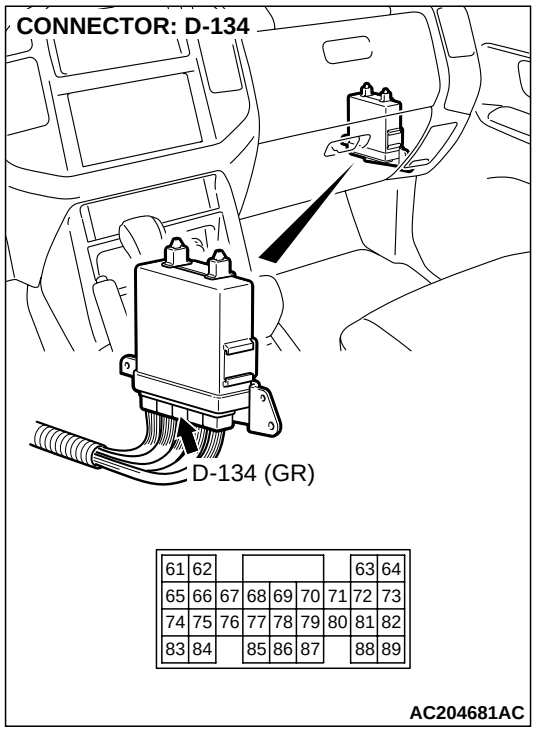


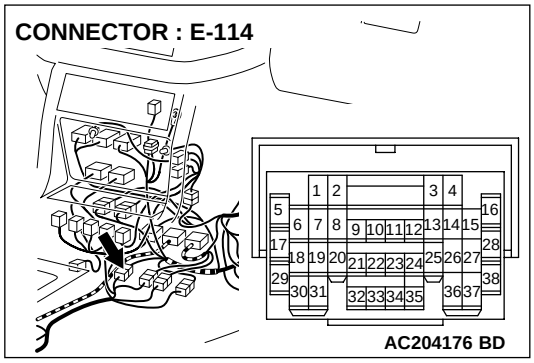
(4) Measure the voltage between terminal 76 and ground by backprobing.
- The voltage should measure battery positive voltage.

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

Q: Does the voltage measure battery positive voltage?

YES : Go to Step 13.
NO : Go to Step 31.

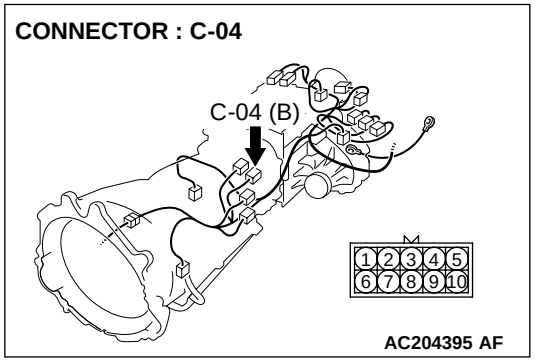


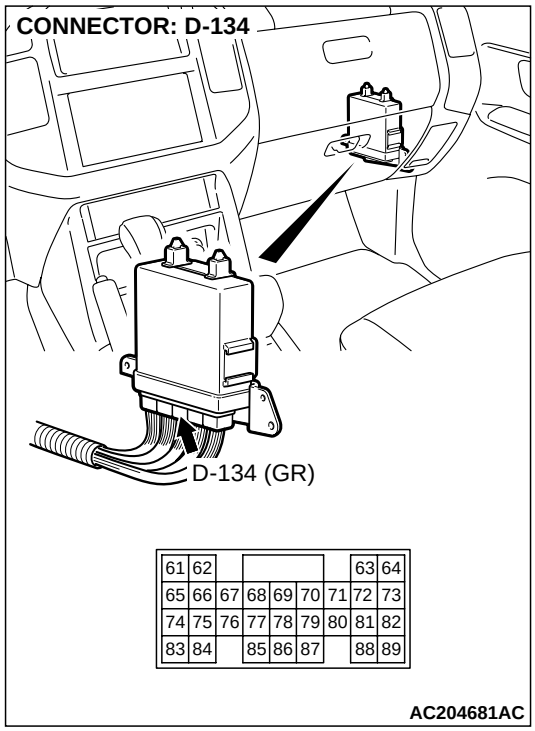


STEP 31. Check PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 32.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



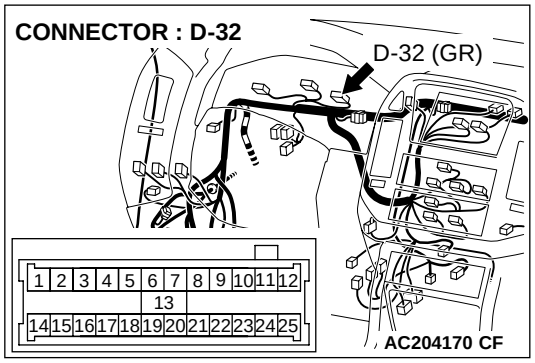


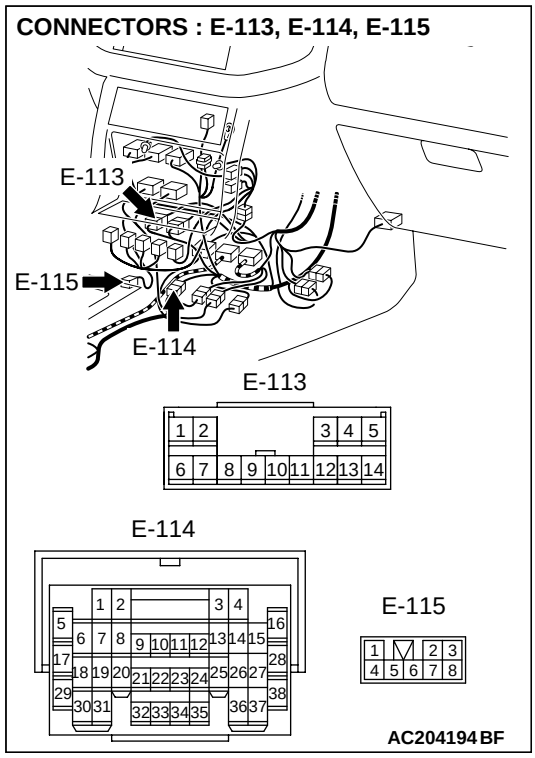
STEP 32. Check harness for open circuit or short circuit to ground between transmission range switch connector C-04 terminal 3 and PCM connector D-134 terminal 76.

Q: Is the harness wire in good condition?

YES : Go to Step 33.

NO : Repair or replace the harness wire.





STEP 33. Check combination meter connector D-32, intermediate connector E-113, E-114 and shift switch assembly connector E-115 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 34.

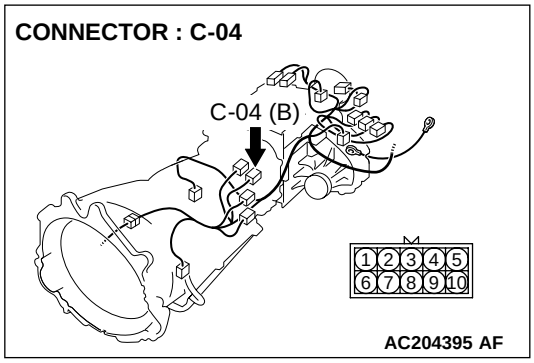
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

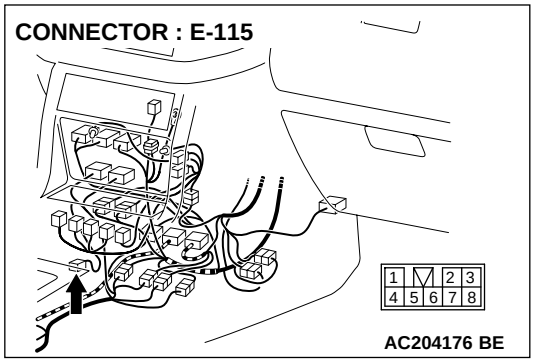
STEP 34. Check harness for short circuit to ground between transmission range switch connector C-04 terminal 3 and shift switch assembly connector E-115 terminal 1.

Q: Is the harness wire in good condition?

YES : Go to Step 35.

NO : Repair or replace the harness wire.



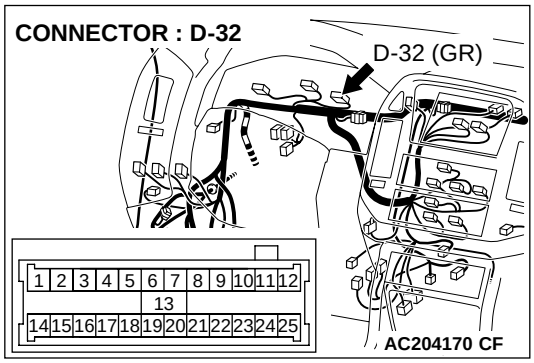


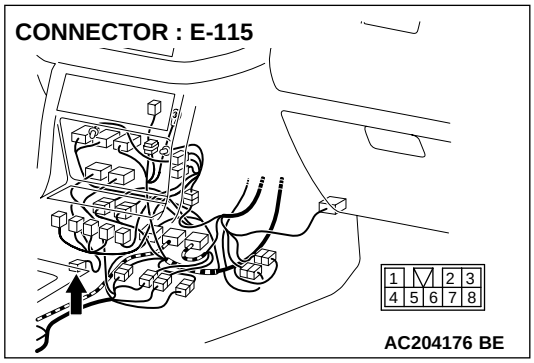
STEP 35. Check the harness for short circuit to ground between combination meter connector D-32 terminal 4 and shift switch assembly connector E-115 terminal 5.

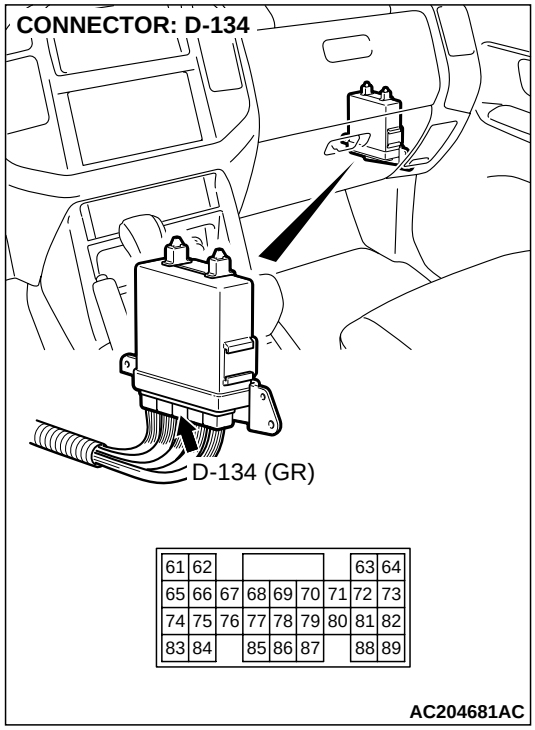
Q: Is the harness wire in good condition?

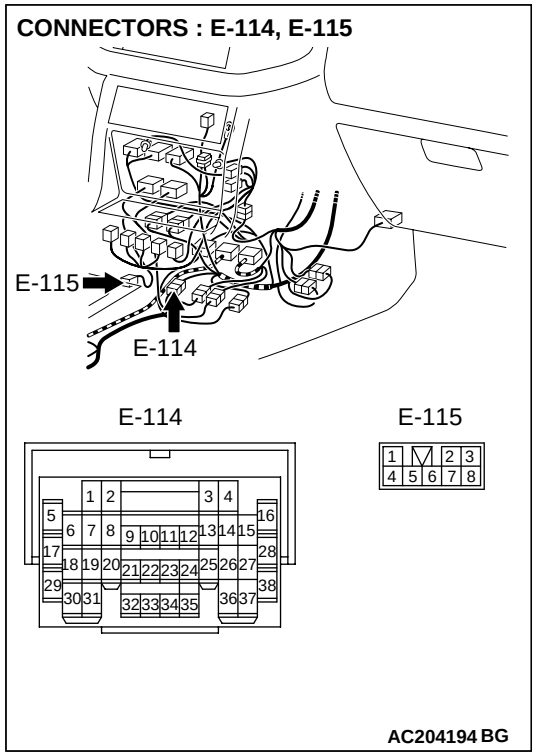
YES : Go to Step 5.

NO : Repair or replace the harness wire.







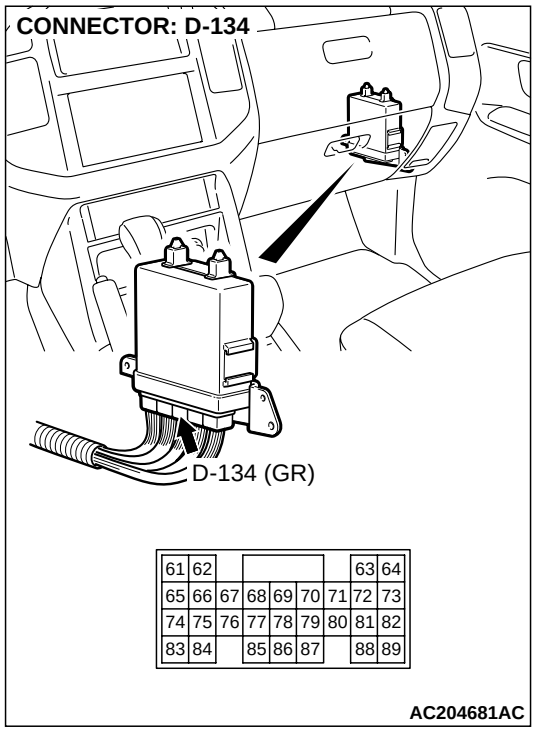


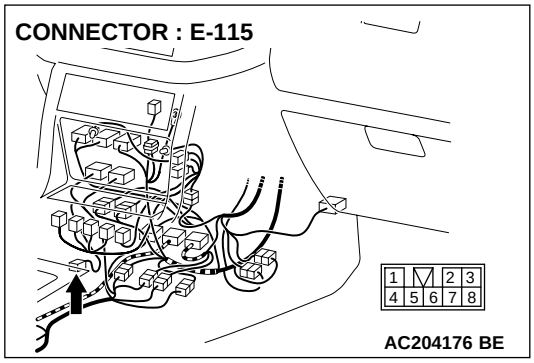
STEP 36. Check PCM connector D-134, intermediate connector E-114 and shift switch assembly connector E-115 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector in good condition?

YES : Go to Step 37.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 37. Check the harness for short circuit to ground between PCM connector D-134 terminal 85 and shift switch assembly connector E-115 terminal 4.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.

DTC 28: Transmission Range Switch System (Short Circuit)

Transmission Range Switch System Circuit
Refer to P.23Ac-93.

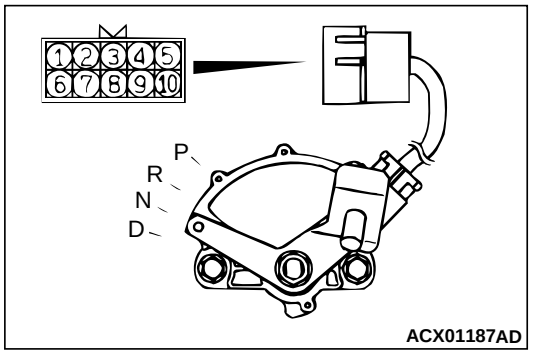
CIRCUIT OPERATION
Refer to P.23Ac-93.

DTC SET CONDITIONS
If the PCM detects more than one transmission range switch input signal for thirty seconds, it is determined that there is a short circuit in the transmission range switch and DTC 28 is set.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Malfunction of the transmission range switch
- Malfunction of the ignition switch
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

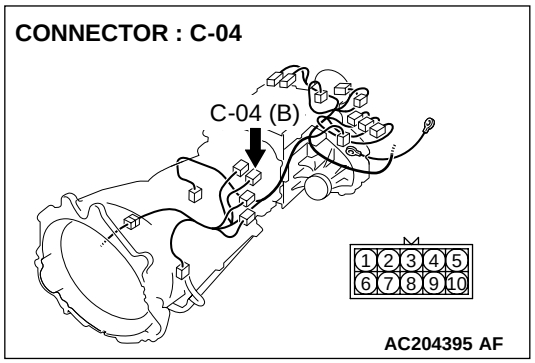


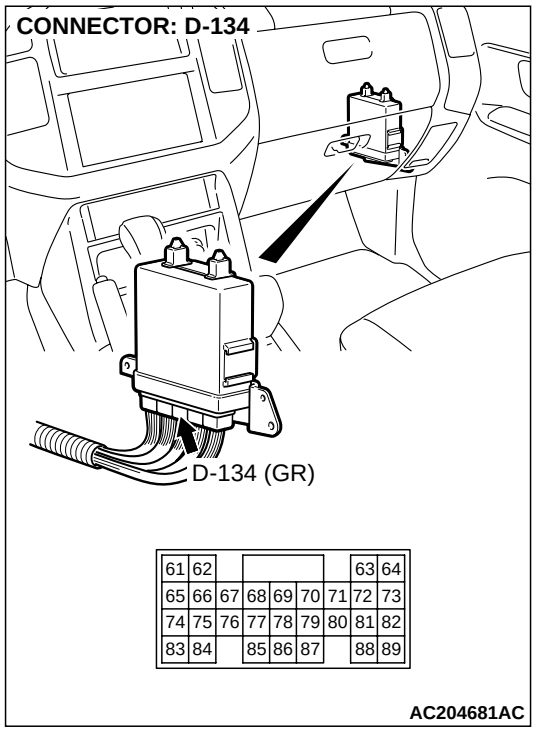
STEP 1. Check the transmission range switch.
Measure the resistance between the terminals for each selector position as indicated in the table above.

TRANSMISSION RANGE	TERMINAL CONNECTION OF TESTER	SPECIFIED CONDITION
P	1 – 7	Less than 2 ohms.
R	7 – 8	
N	2 – 7	
D	3 – 7	

Q: Does the resistance measure less than 2 ohms for each selector position?
YES : Go to Step 2.
NO : Replace the transmission range switch. Refer to GROUP 23B, Transmission P.23B-18.

STEP 2. Check transmission range switch connector C-04 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connector and terminals in good condition?
YES : Go to Step 3.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 3. Check PCM connector D-134 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

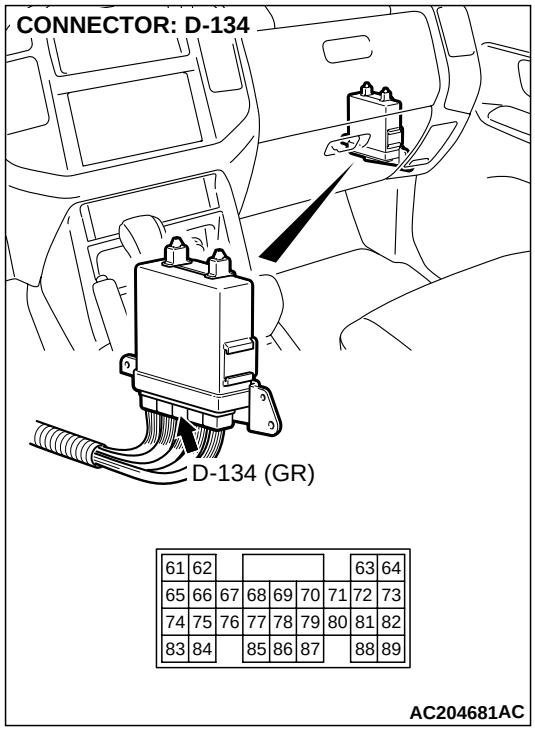
YES : Go to Step 4.

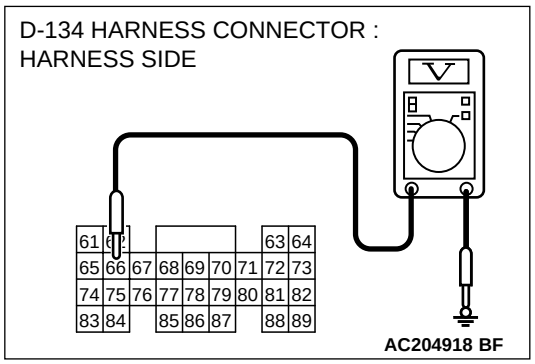
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 4. Measure the switch output voltage at PCM connector D-134 by backprobing. ("P" position)

(1) Do not disconnect connector D-134.

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





(3) Measure the voltage between terminal 66 and ground by backprobing.
- When transmission range is "P," voltage should measure battery positive voltage.
- When transmission range is "R," voltage should measure 0.5 volt or less.
- When transmission range is "N," voltage should measure 0.5 volt or less.
- When transmission range is "D," voltage should measure 0.5 volt or less.

Q: Is the measured voltage within the specified range?

YES : Go to Step 9.

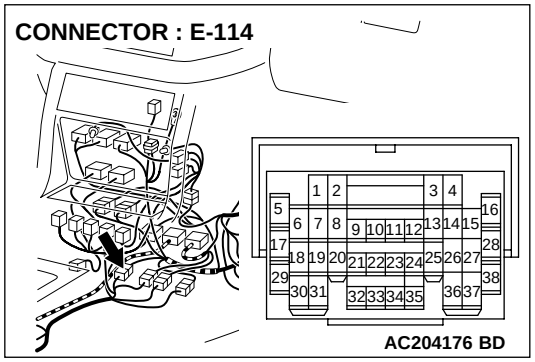
NO : Turn the ignition switch to the "LOCK" (OFF) position. Go to Step 5.

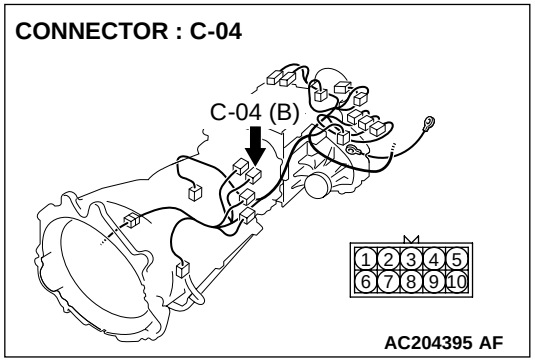
STEP 5. Check intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

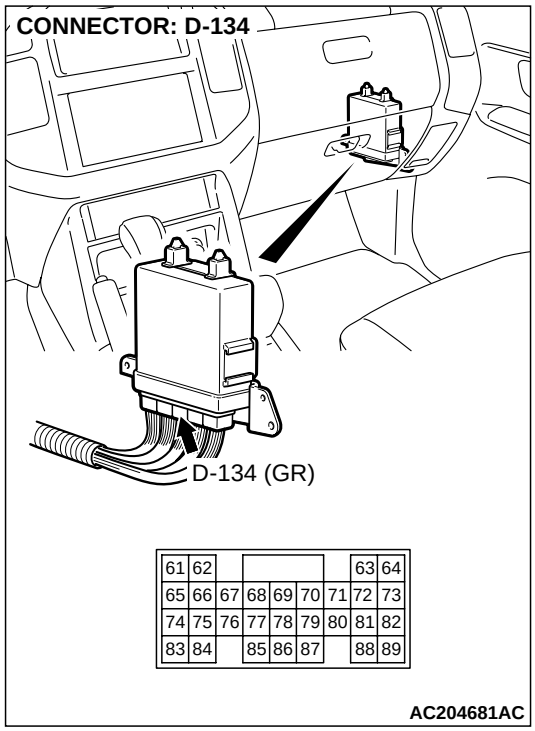
Q: Are the connector and terminals in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.







STEP 6. Check harness for open circuit or short circuit to ground between transmission range switch connector C-04 terminal 1 and PCM connector D-134 terminal 66.

Q: Is the harness wire in good condition?

YES : Go to Step 7.

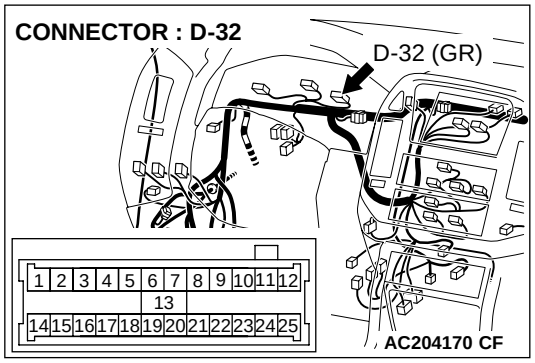
NO : Repair or replace the harness wire.

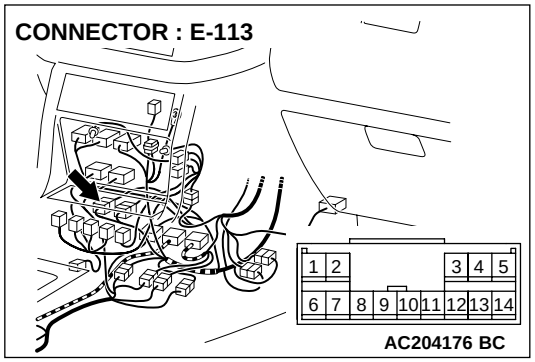
STEP 7. Check combination meter connector D-32 and intermediate connector E-113 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 8.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



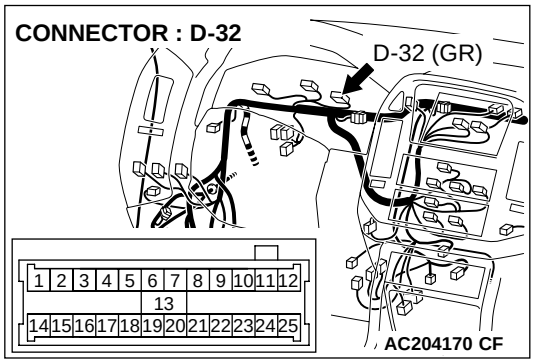


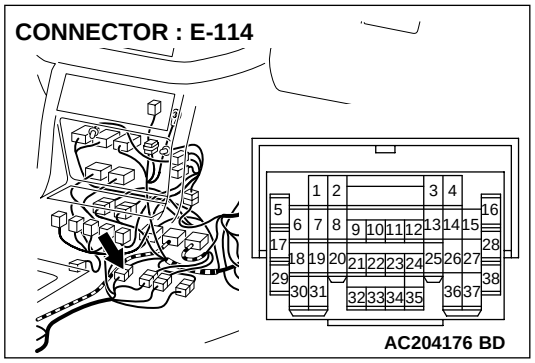
STEP 8. Check harness for damage or short circuit to ground between combination meter connector D-32 terminal 1 and intermediate connector E-114 terminal 22.

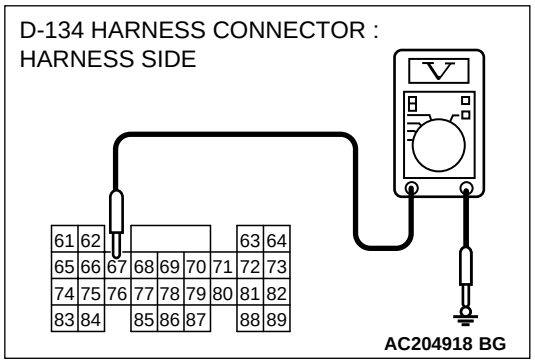
Q: Is the harness wire in good condition?

YES : Go to Step 25.

NO : Repair or replace the harness wire.







STEP 9. Measure the switch output voltage at PCM connector D-134 by backprobing. ("R" position)

Measure the voltage between terminal 67 and ground by backprobing.

- When transmission range is "P," voltage should measure 0.5 volt or less.
- When transmission range is "R," voltage should measure battery positive voltage.
- When transmission range is "N," voltage should measure 0.5 volt or less.
- When transmission range is "D," voltage should measure 0.5 volt or less.

Q: Is the measured voltage within the specified range?

YES : Go to Step 14.

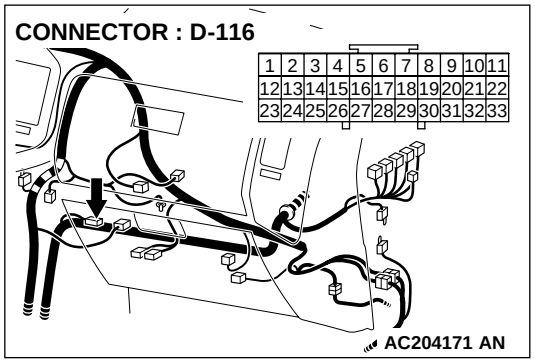
NO : Turn the ignition switch to the "LOCK" (OFF) position. Go to Step 10.

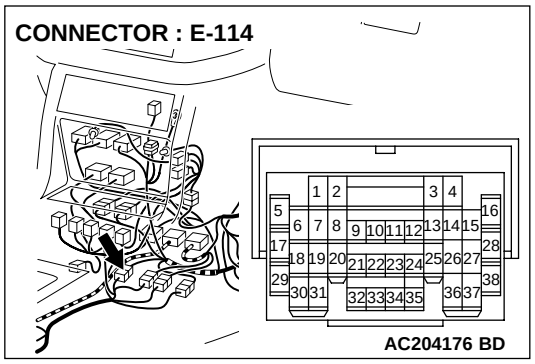
STEP 10. Check joint connector D-116 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector

Q: Are the connectors and terminals in good condition?

YES : Go to Step 11.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



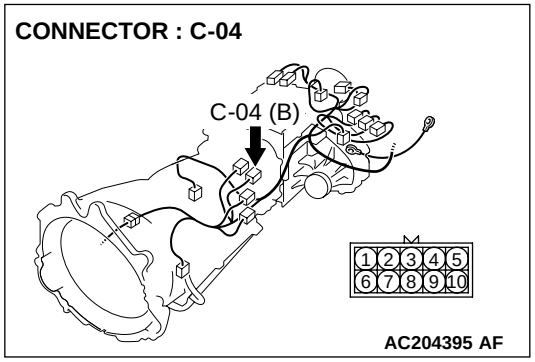


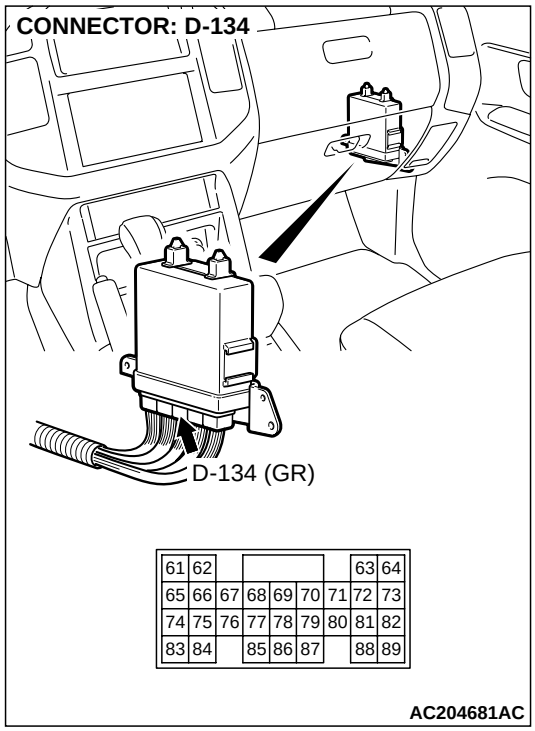
STEP 11. Check harness for open circuit or short circuit to ground between transmission range switch connector C-04 terminal 8 and PCM connector D-134 terminal 67.

Q: Is the harness wire in good condition?

YES : Go to Step 12.

NO : Repair or replace the harness wire.



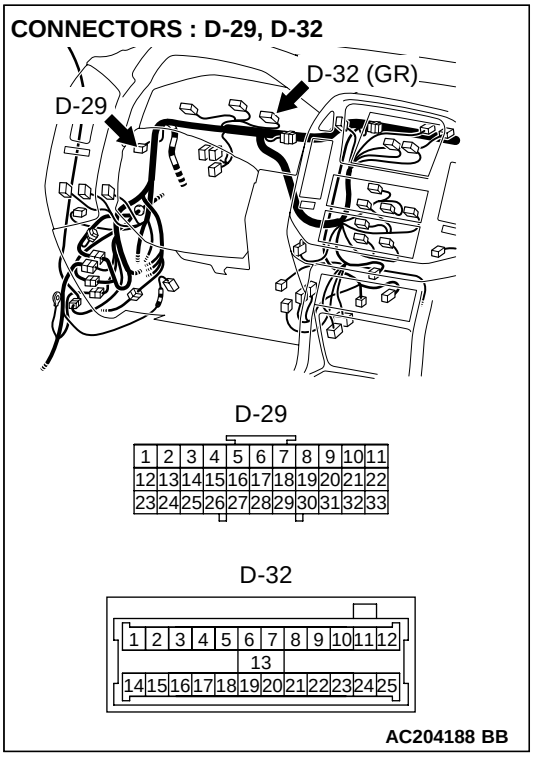


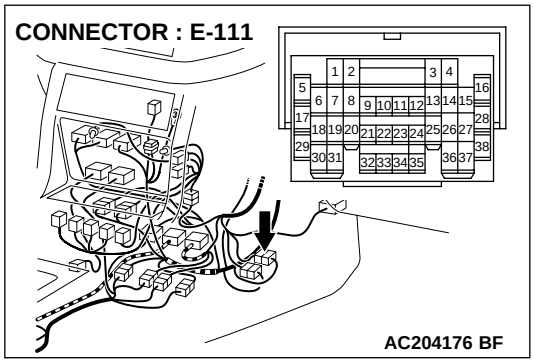
STEP 12. Check joint connector D-29, combination meter connector D-32 and intermediate connector E-111 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

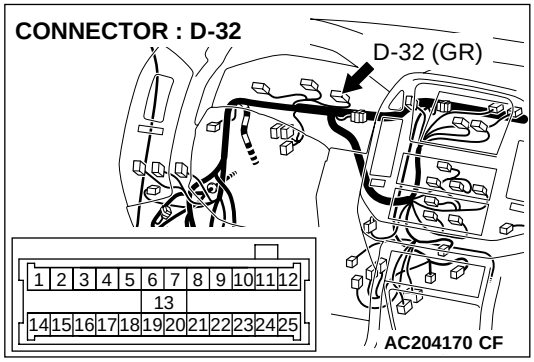
Q: Are the connectors and terminals in good condition?

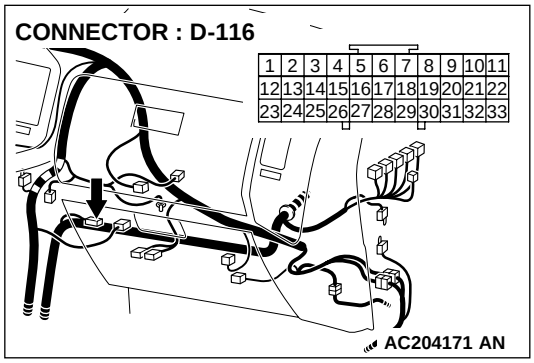
YES : Go to Step 13.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.







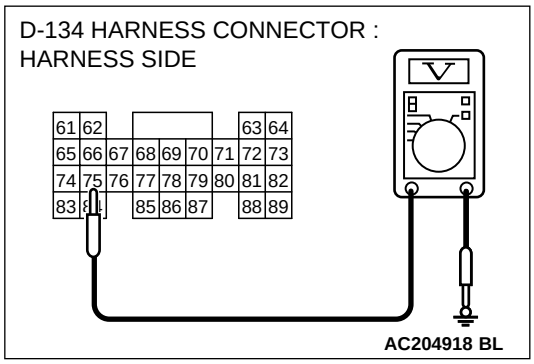


STEP 13. Check harness for damage or short circuit to ground between combination meter connector D-32 terminal 2 and joint connector D-116 terminal 33.

Q: Is the harness wire in good condition?

YES : Go to Step 25.

NO : Repair or replace the harness wire.



STEP 14. Measure the switch output voltage at PCM connector D-134 by backprobing. ("N" position)

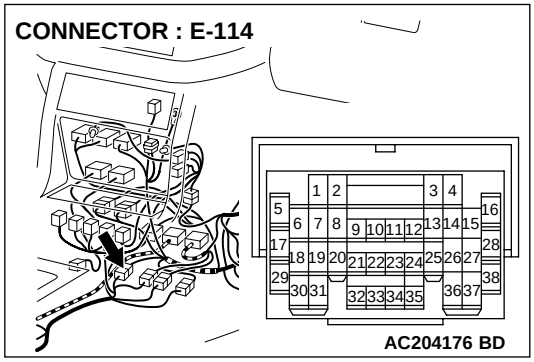
Measure the voltage between terminal 75 and ground by backprobing.

- When transmission range is "P," voltage should measure 0.5 volt or less.
- When transmission range is "R," voltage should measure 0.5 volt or less.
- When transmission range is "N," voltage should measure battery positive voltage.
- When transmission range is "D," voltage should measure 0.5 volt or less.

Q: Is the measured voltage within the specified range?

YES : Go to Step 19.

NO : Turn the ignition switch to the "LOCK" (OFF) position. Go to Step 15.

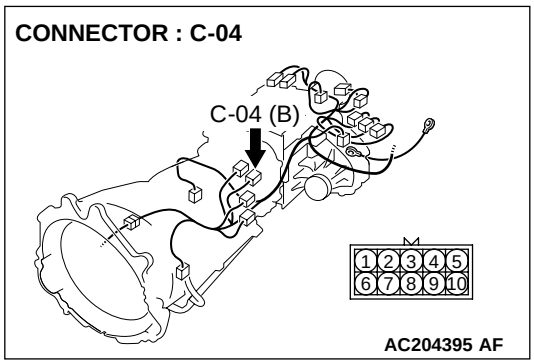


STEP 15. Check intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 16.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

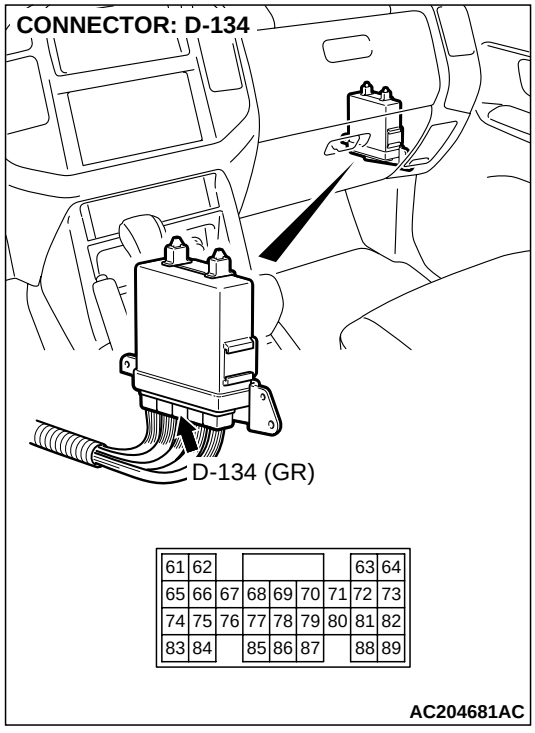


STEP 16. Check harness for open circuit or short circuit to ground between transmission range switch connector C-04 terminal 2 and PCM connector D-134 terminal 75.

Q: Is the harness wire in good condition?

YES : Go to Step 17.

NO : Repair or replace the harness wire.

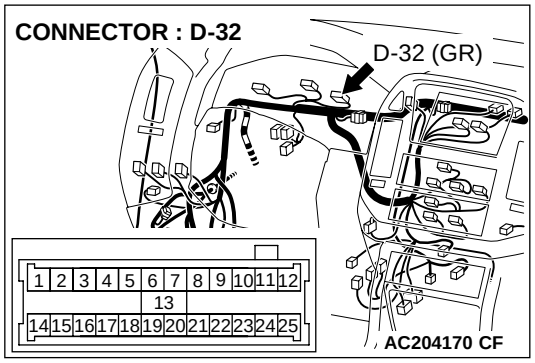


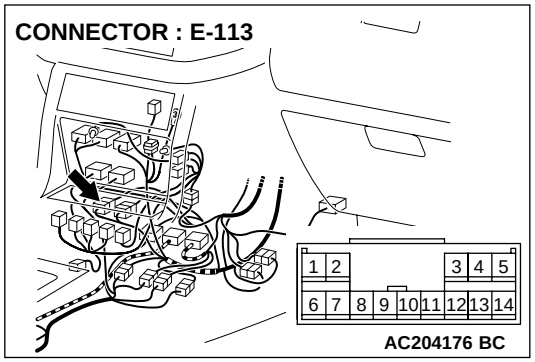
STEP 17. Check combination meter connector D-32 and intermediate connector E-113 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 18.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



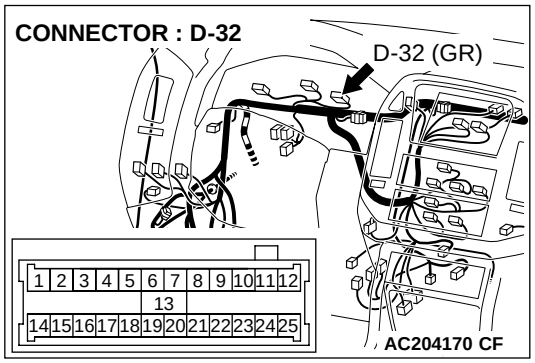


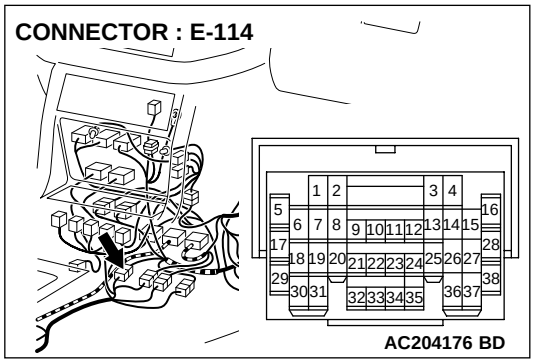
STEP 18. Check harness for damage or short circuit to ground between combination meter connector D-32 terminal 3 and intermediate connector E-114 terminal 23.

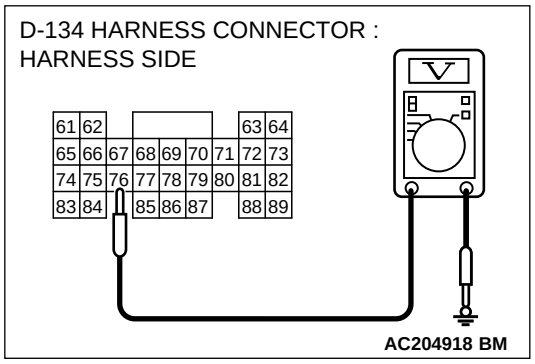
Q: Is the harness wire in good condition?

YES : Go to Step 25.

NO : Repair or replace the harness wire.







STEP 19. Measure the switch output voltage at PCM connector D-134 by backprobing. ("D" position)

Measure the voltage between terminal 76 and ground by backprobing.

- When transmission range is "P," voltage should measure 0.5 volt or less.
- When transmission range is "R," voltage should measure 0.5 volt or less.
- When transmission range is "N," voltage should measure 0.5 volt or less.
- When transmission range is "D," voltage should measure battery positive voltage.

Q: Is the measured voltage within the specified range?

YES : Go to Step 24.

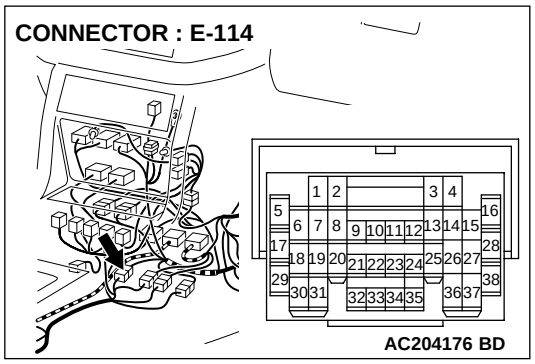
NO : Turn the ignition switch to the "LOCK" (OFF) position. Go to Step 20.

STEP 20. Check intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector

Q: Are the connector and terminals in good condition?

YES : Go to Step 21.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

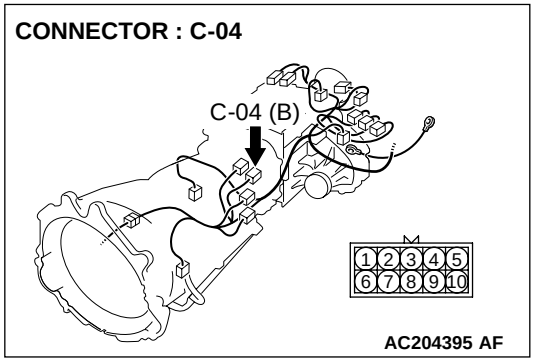


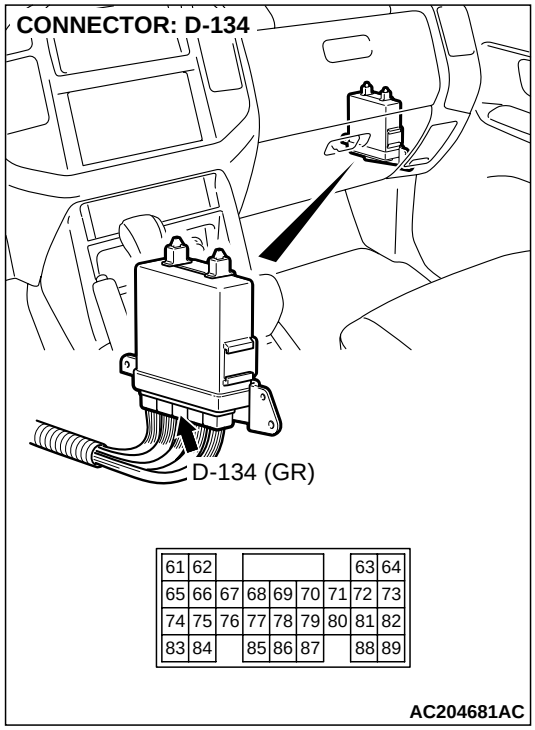
STEP 21. Check harness for open circuit or short circuit to ground between transmission range switch connector C-04 terminal 3 and PCM connector D-134 terminal 76.

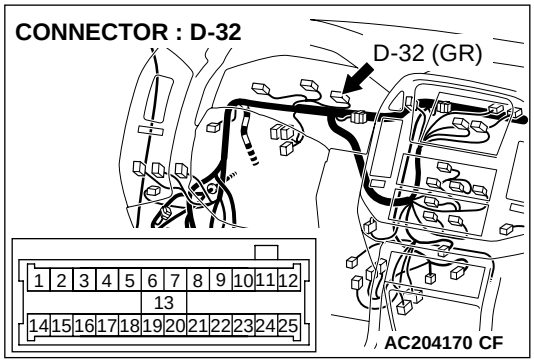
Q: Is the harness wire in good condition?

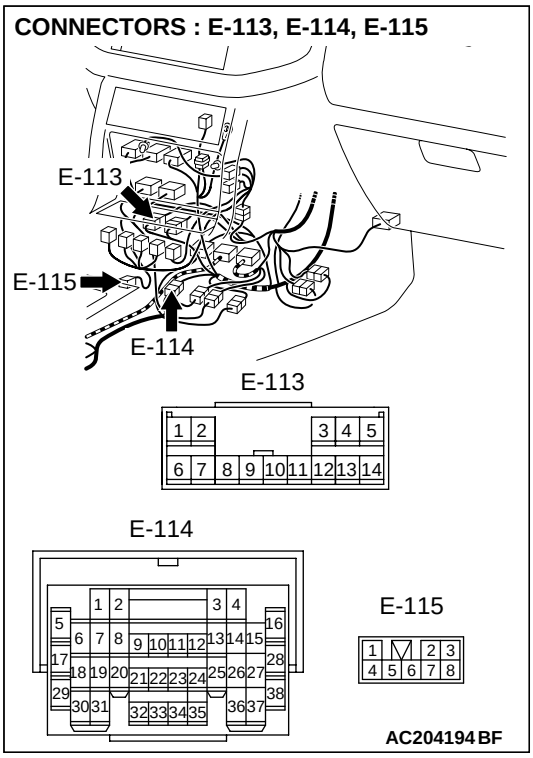
YES : Go to Step 22.

NO : Repair or replace the harness wire.







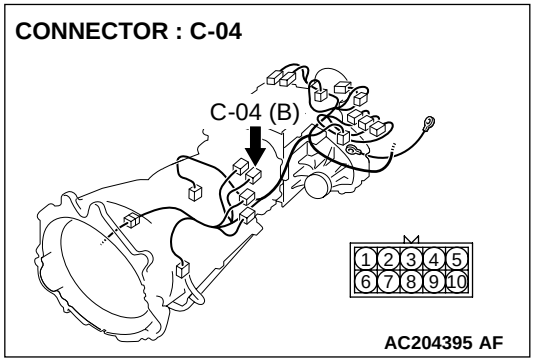


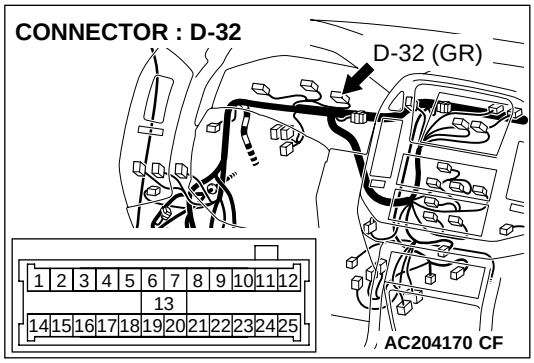
STEP 22. Check combination meter connector D-32, intermediate connector E-113, E-114 and shift switch assembly connector E-115 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 23.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



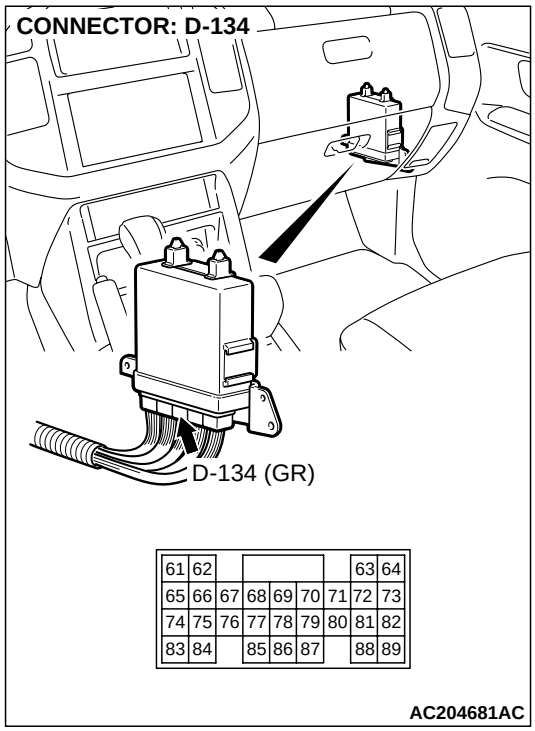


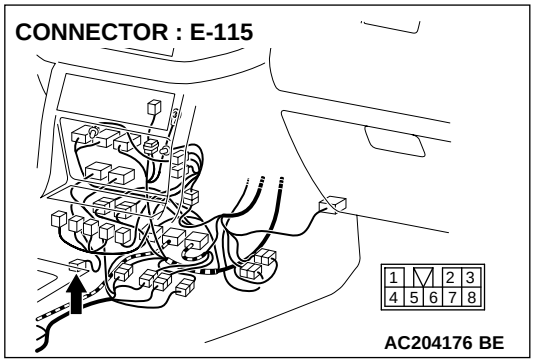
STEP 23. Check the harness for damage between transmission range switch connector C-04 terminal 3 and combination meter connector D-32 terminal 4.

Q: Is the harness wire in good condition?

YES : Go to Step 24.

NO : Repair or replace the harness wire.



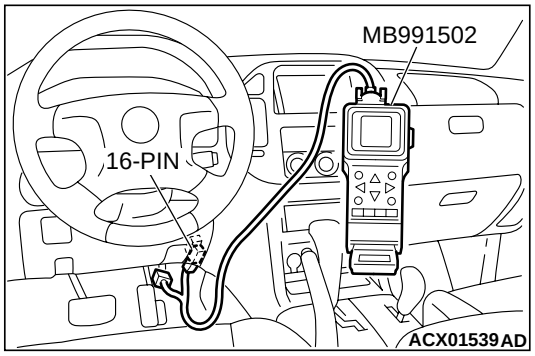


STEP 24. Check the harness for damage between PCM connector D-134 terminal 85 and shift switch assembly connector E-115 terminal 4.

Q: Is the harness wire in good condition?

YES : Go to Step 25.

NO : Repair or replace the harness wire.



STEP 25. Using scan tool MB991502, check data list item 61: Transmission Range Switch.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to the data reading mode for item 61, Transmission Range Switch.
- Move the selector lever to "P," "R," "N," "D" and sport mode positions and confirm that the selected transmission ranges match the positions. (Sport mode is indicated as "D" on scan tool MB991502.)

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

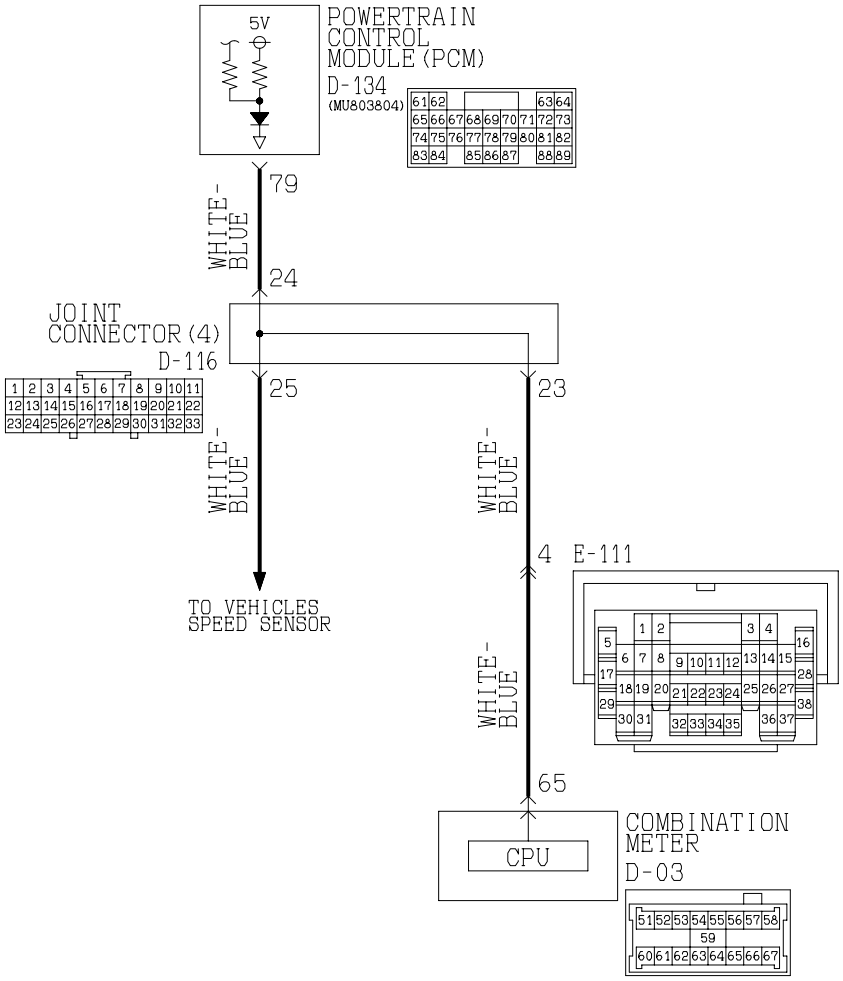
Q: Is the switch operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.

DTC 29: Vehicle Speed Sensor System

Vehicle Speed Sensor System Circuit



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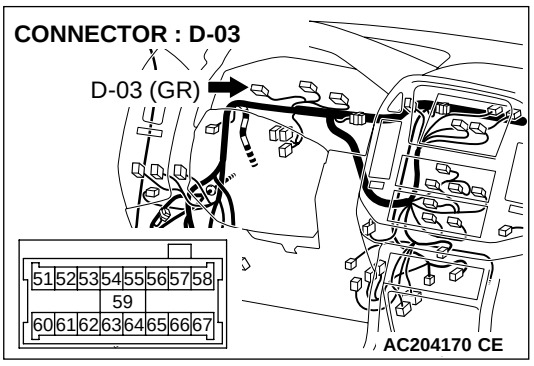
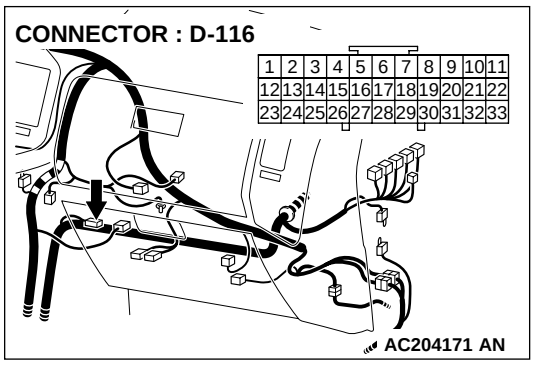
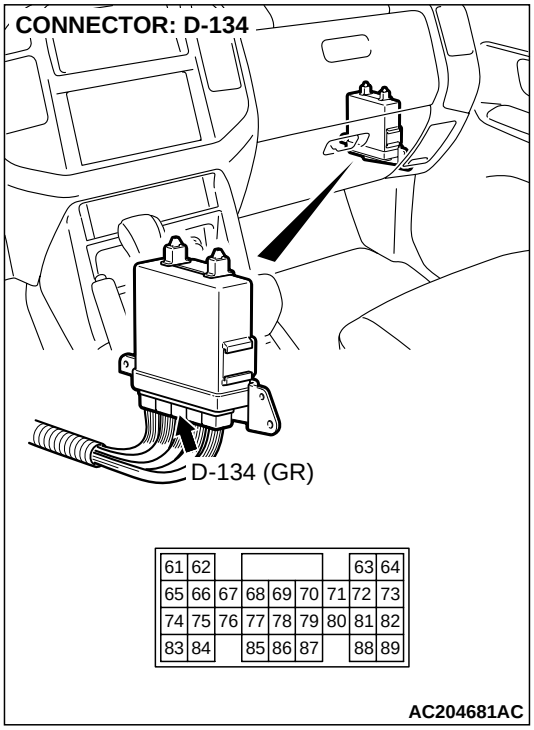
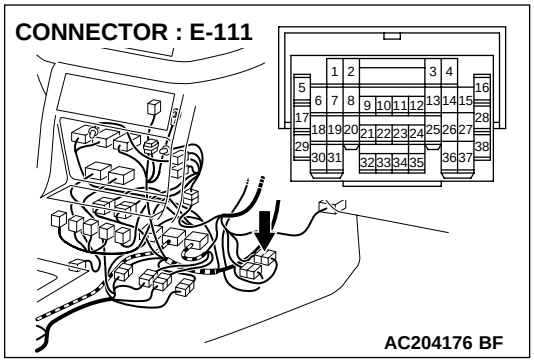
AC205193 AB





TSB Revision





CIRCUIT OPERATION

- 4.8 – 5.2 volts voltage is applied to the vehicle speed sensor from the PCM (terminal 79). The vehicle speed sensor generates a pulse signal when the output terminal is opened and ground.
- The PCM compares the vehicle speed sensor signal to input shaft and output shaft speed sensor signals.
- If the vehicle speed sensor becomes inoperative, the transmission will not shift normally.

DTC SET CONDITIONS

- If the PCM detects no pulse signal from the vehicle speed sensor for continuous period of 30 seconds under following conditions, it is judged as a vehicle sensor system malfunction and DTC 29 is set.
  - Driving forward
  - Output shaft speed is 900 r/min or more

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the vehicle speed sensor circuit
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

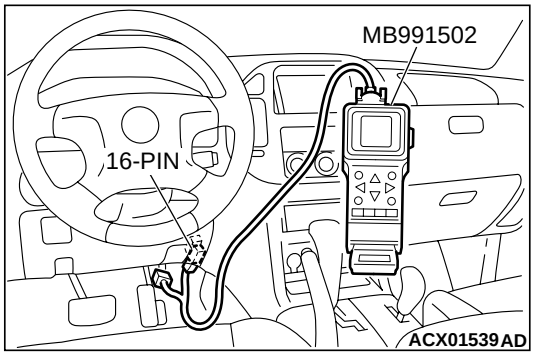
STEP 1. Check the speedometer.

Q: Is the speedometer operating properly?

YES : Go to Step 2.
NO : Check the vehicle speed sensor. Refer to GROUP 54A, Combination Meters Assembly and Vehicle Speed Sensor .

STEP 2. Using scan tool MB991502, check data list item 29: Vehicle Speed Sensor.

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



(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 29, Vehicle Speed Sensor.
- Check that the speedometer and scan tool MB991502 display speed match when driving at a vehicle speed of 40 km/h (25 mph).

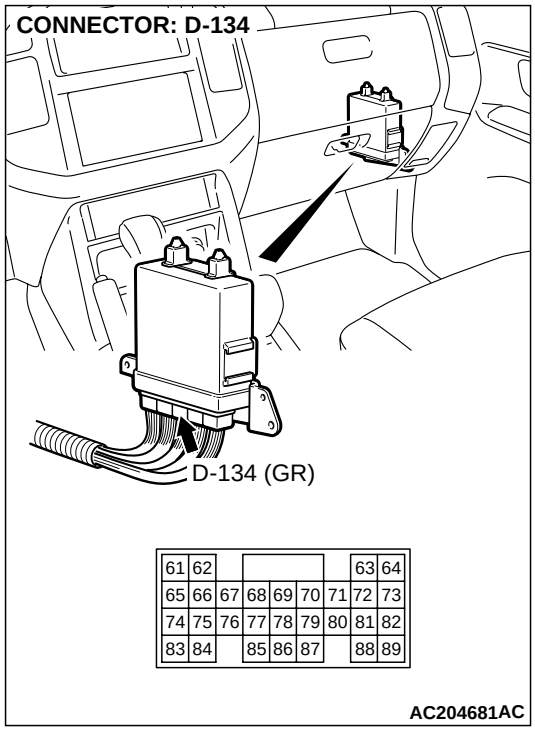
(4) Turn the ignition switch to the "LOCK" (OFF) position.

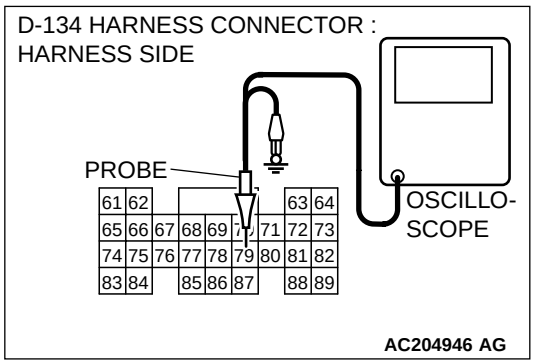
Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Go to Step 3.

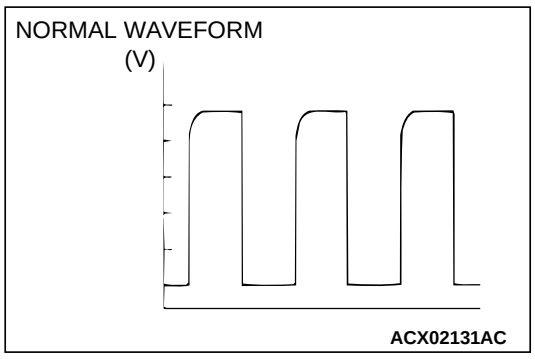
STEP 3. Using an oscilloscope, check the vehicle speed sensor waveform at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.





(2) Connect an oscilloscope probe to PCM connector D-134 terminal 79 by backprobing.
(3) Start the engine.

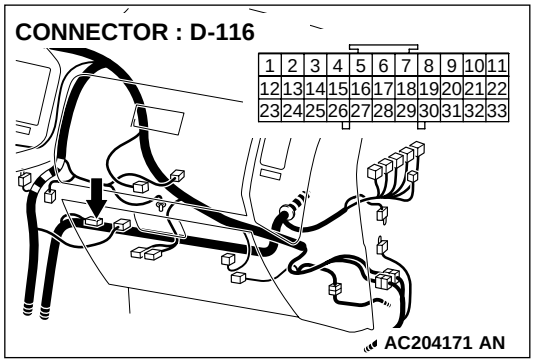


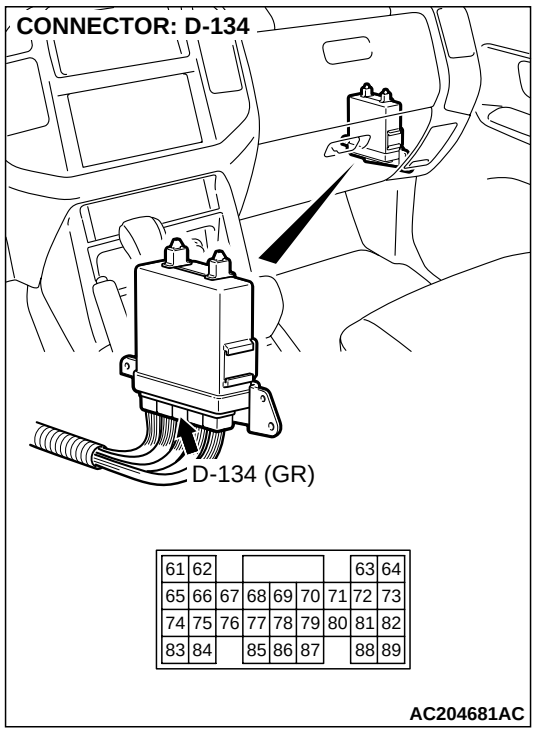
(4) Check the vehicle speed sensor waveform.
- The vehicle speed sensor waveform should show a pattern similar to the illustration when running the vehicle.

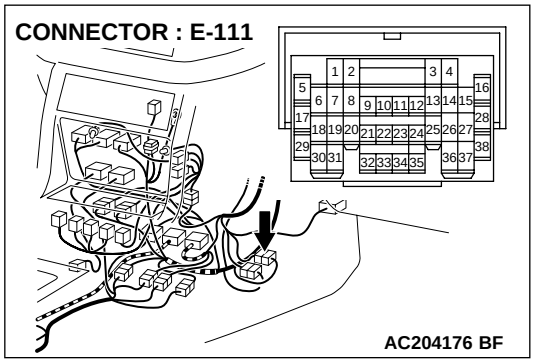
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the waveform normal?

YES : Go to Step 6.
NO : Go to Step 4.





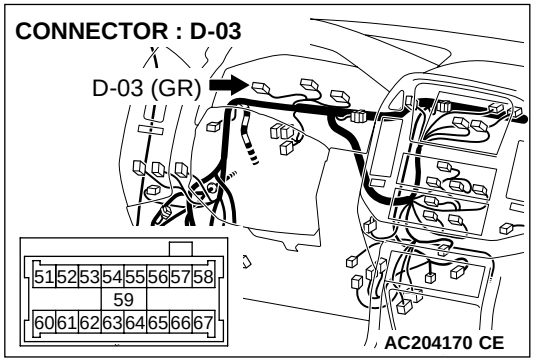


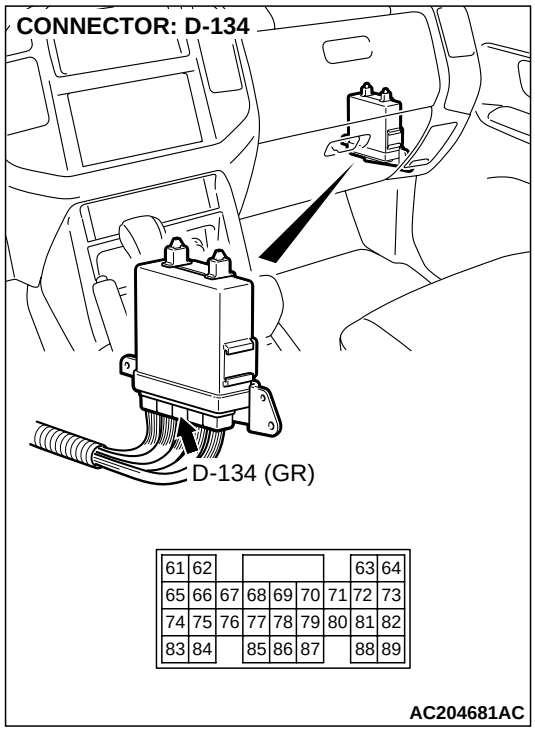
STEP 4. Check joint connector D-116, PCM connector D-134 and intermediate connector E-111 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



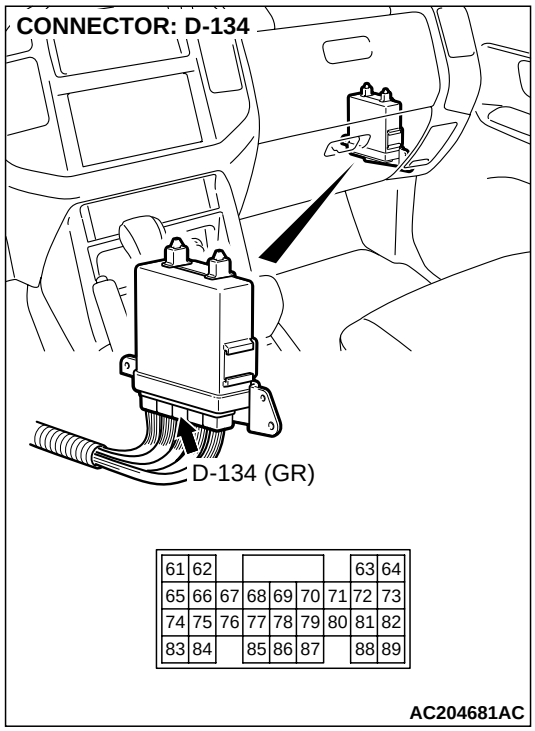


STEP 5. Check the harness for open circuit or short circuit to ground between combination meter connector D-03 terminal 65 and PCM connector D-134 terminal 79.

Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair or replace the harness wire.

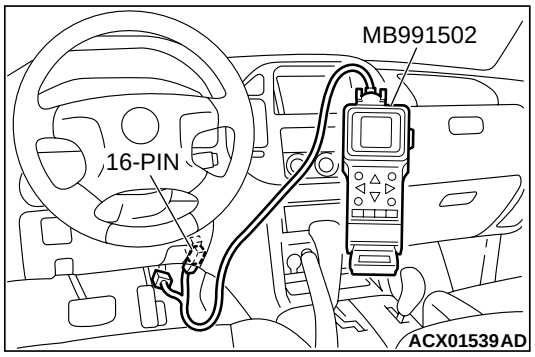


STEP 6. Check PCM connector D-134 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 7.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 7. Using scan tool MB991502, check data list item 29: Vehicle Speed Sensor.

⚠ CAUTION

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

(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 29, Vehicle Speed Sensor.
- Check that the speedometer and scan tool MB991502 display speed match when driving at a vehicle speed of 40 km/h (25 mph).

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

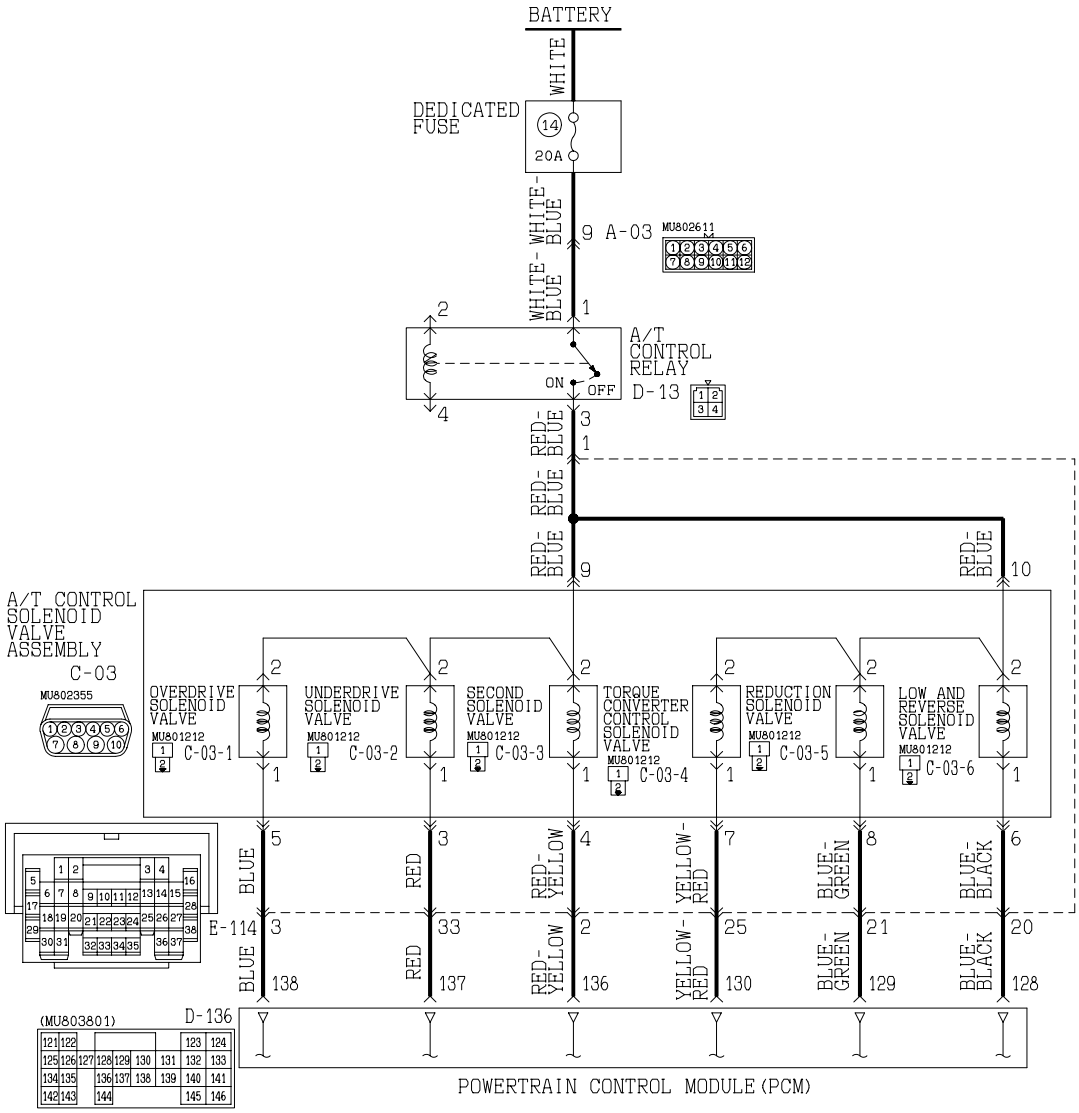
Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.

DTC 31: Low-Reverse Solenoid Valve System

Solenoid Valve System Circuit



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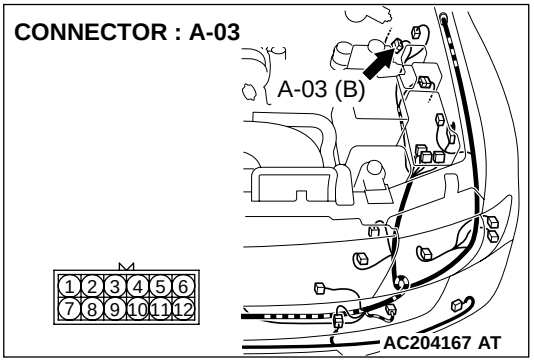
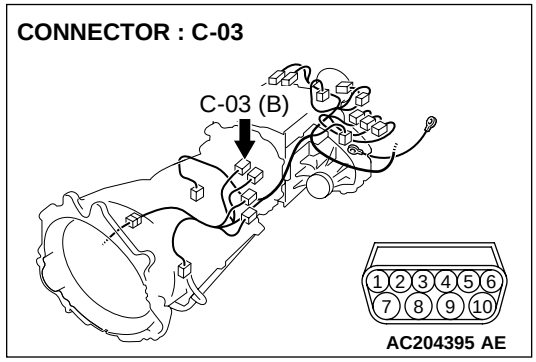
AC205195 AB

CONNECTOR : A-03



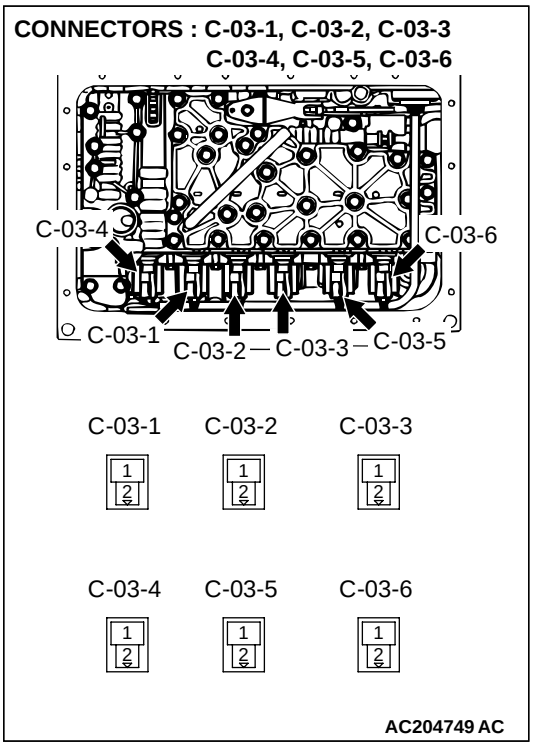
AC204167 AT

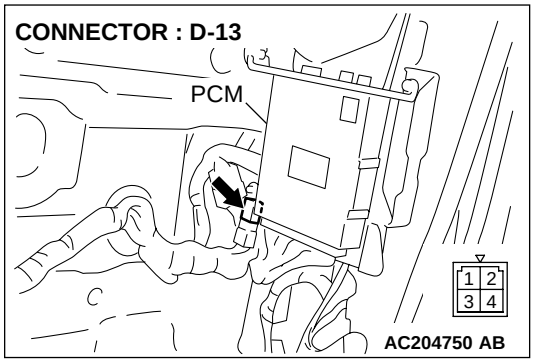
CONNECTOR : C-03

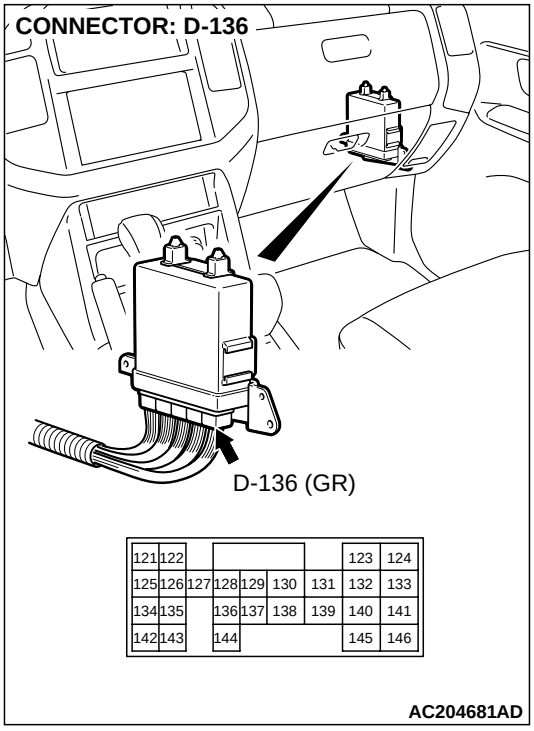


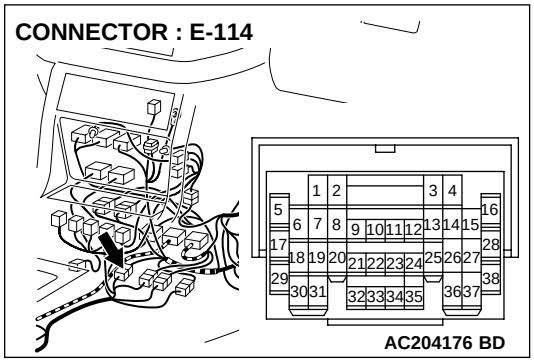
AC204395 AE

TSB Revision









CIRCUIT OPERATION

- The A/T control relay supplies battery positive voltage to the solenoid valve assembly (terminals 9 and 10).
- The solenoid valve closes when energized (on), and opens when not energized (off). The PCM energizes the solenoid valve based on input data from sensors such as the APP Sensor, Transmission Range Switch, Stoplight Switch, Vehicle Speed Sensor, Input Shaft Speed Sensor, Output Shaft Speed Sensor, and Transmission Fluid Temperature Sensor.

TSB Revision

- The PCM provides the ground to energize the solenoid. The amount of time that the circuit is grounded is displayed on scan tool MB991502 in percent.
- When the solenoid is energized or de-energized, fluid passes through the valve body and transmission passages to apply and release components.

DTC SET CONDITIONS

If the resistance value for the low-reverse solenoid valve circuit is greater than 3.5 Ω (open) or less than 2.6 Ω (short) for 4 seconds, DTC 31 is set. The transmission is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of low-reverse solenoid valve
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

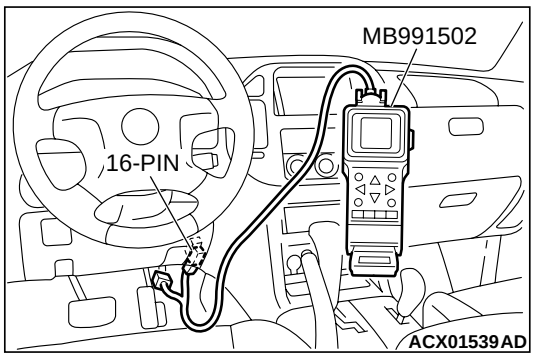
Required Special Tool:

- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check actuator test item 01: Low-Reverse Solenoid Valve.

⚠ 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.



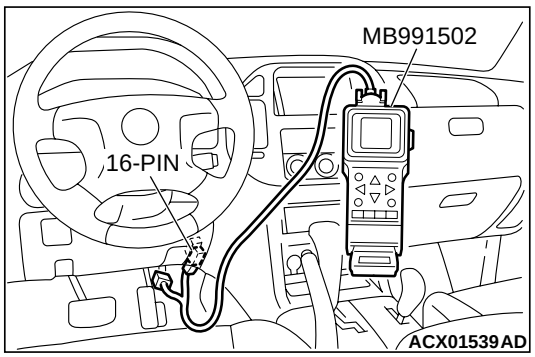
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 01, Low-Reverse Solenoid Valve.
  - An audible clicking or buzzing should be heard when the low-reverse solenoid valve is energized.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.

NO : Go to Step 2.

STEP 2. Using scan tool MB991502, read the A/T diagnostic trouble code.

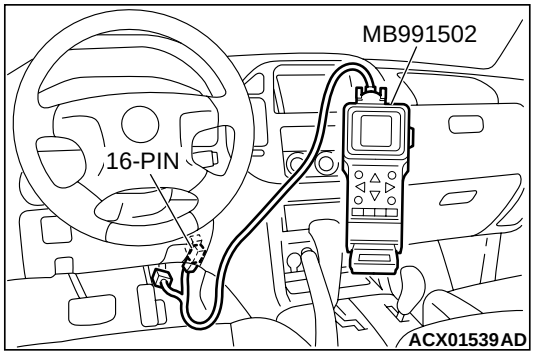


(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 54 set? (DTC 54 may be set along with multiple DTCs.)

YES : Refer to P.23Ac-237 DTC 54: A/T Control Relay System.

NO : Go to Step 3.

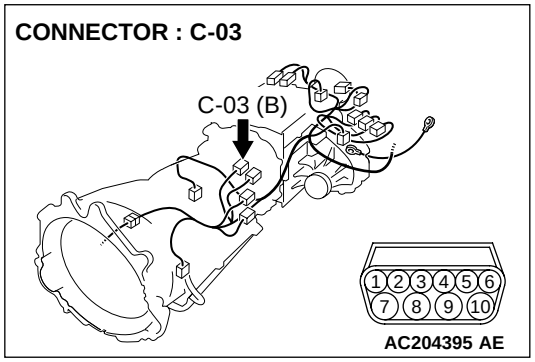


STEP 3. Using scan tool MB991502, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

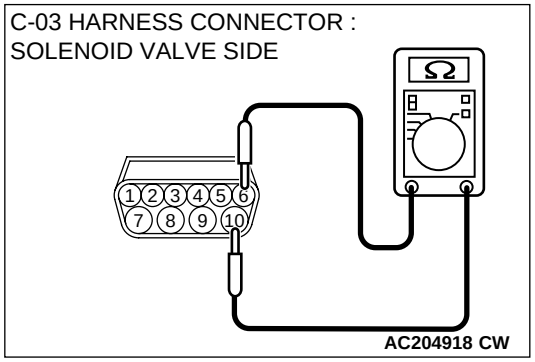
Q: Are DTC 35 and DTC 36 set? (Multiple DTCs may be set.)

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



STEP 4. Measure the low-reverse solenoid valve resistance at A/T control solenoid valve assembly connector C-03.

(1) Disconnect connector C-03 and measure at the solenoid valve side.



(2) Measure the resistance between solenoid valve assembly connector C-03 terminals 6 and 10.

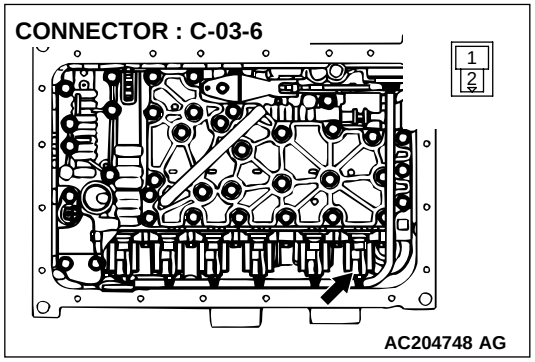
Resistance value: 2.7 – 3.4 ohms [at 20°C (68°F)]

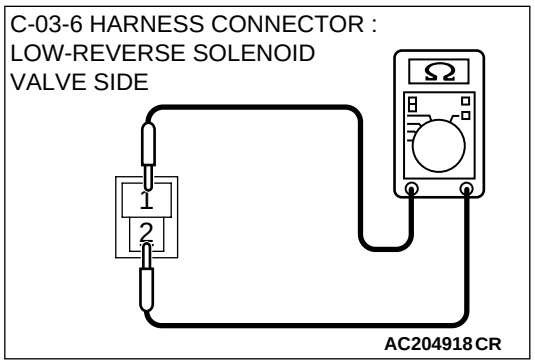
Q: Is the measured resistance 2.7 – 3.4 ohms [at 20°C (68°F)]?

YES : Go to Step 6.
NO : Go to Step 5.

STEP 5. Measure the solenoid valve resistance at the low-reverse solenoid valve connector C-03-6 inside the transmission.

(1) Disconnect solenoid valve connector C-03-6 and measure at the solenoid valve side.





(2) Measure the resistance between low-reverse solenoid valve terminals 1 and 2.

Resistance value: 2.7 – 3.4 ohms [at 20°C (68°F)]

Q: Is the measured resistance 2.7 – 3.4 ohms [at 20°C (68°F)?

YES : Replace the harness wire between A/T control solenoid valve assembly connector C-03 and the solenoid valves.

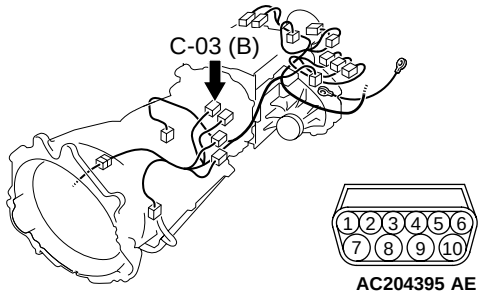
NO : Replace the low-reverse solenoid valve. Refer to GROUP 23B, Valve Body P.23B-80.

STEP 6. Check A/T control solenoid valve assembly connector C-03, PCM connector D-136 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

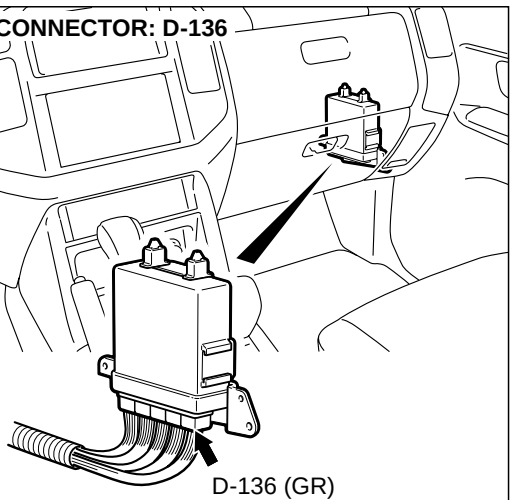
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



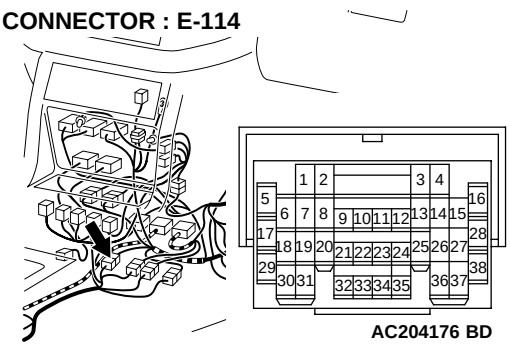
AC204395 AE

CONNECTOR: D-136



AC204681AD

CONNECTOR : E-114



AC204176 BD

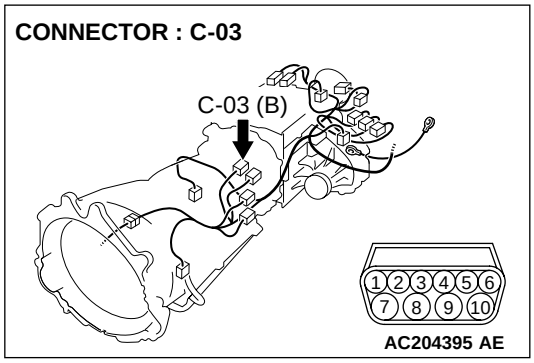
TSB Revision

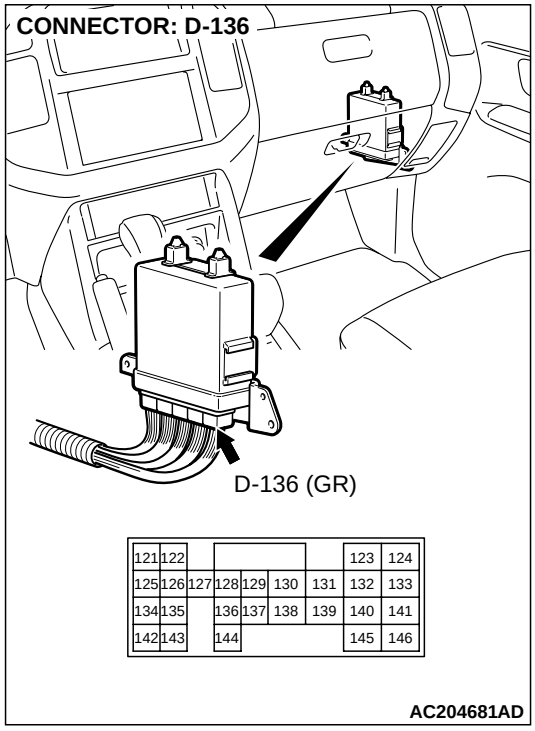
STEP 7. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 terminal 6 and PCM connector D-136 terminal 128.

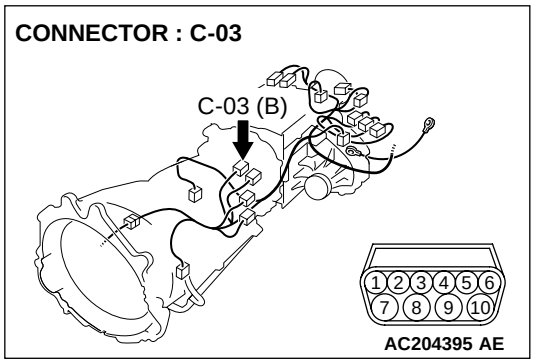
Q: Is the harness wire in good condition?

YES : Replace the PCM.

NO : Repair or replace the harness wire.



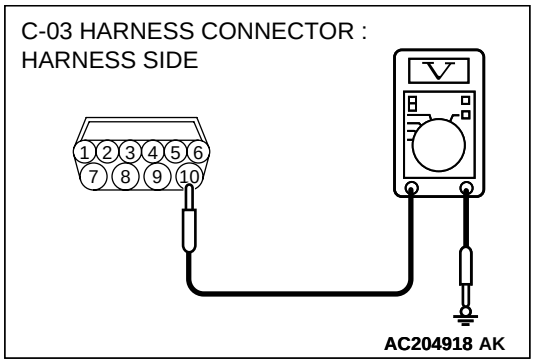




STEP 8. Measure the supply voltage at A/T control solenoid valve assembly connector C-03 by backprobing.

(1) Do not disconnect solenoid valve assembly harness connector C-03.

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



(3) Measure the voltage between harness connector C-03 terminal 10 and ground by backprobing.
- The voltage should equal battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.

NO : Go to Step 9.

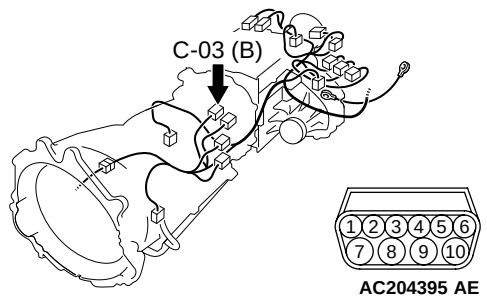
STEP 9. Check A/T control solenoid valve assembly connector C-03, A/T control relay connector D-13 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

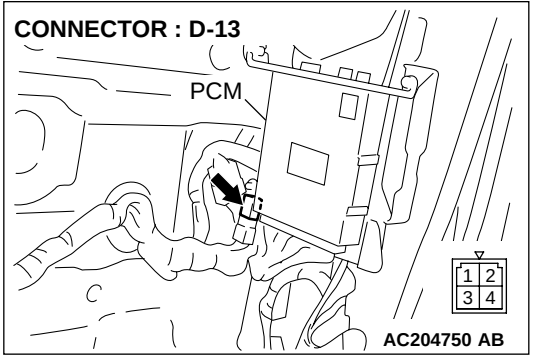
YES : Go to Step 10.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

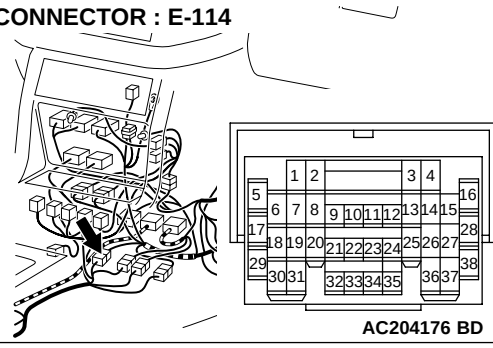
CONNECTOR : C-03



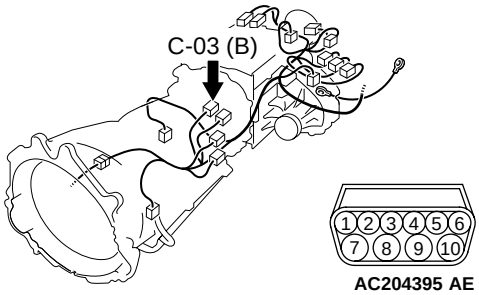
CONNECTOR : D-13



CONNECTOR : E-114



CONNECTOR : C-03



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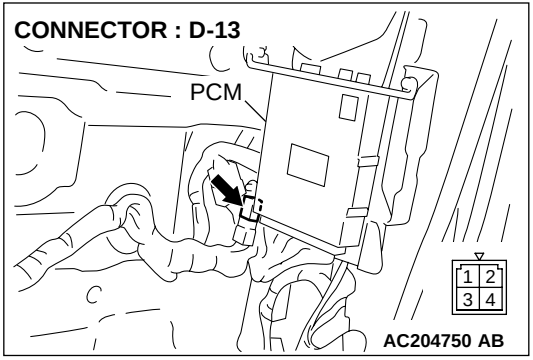
CONNECTOR : D-13



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STEP 10. Check the harness for an open circuit or short circuit to ground between A/T control solenoid valve assembly connector C-03 terminal 10 and A/T control relay connector D-13 terminal 3.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

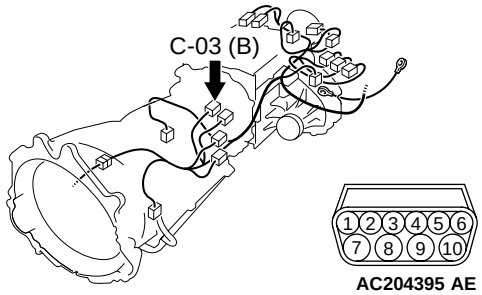
NO : Repair or replace the harness wire.

STEP 11. Check A/T control solenoid valve assembly connector C-03, PCM connector D-136 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

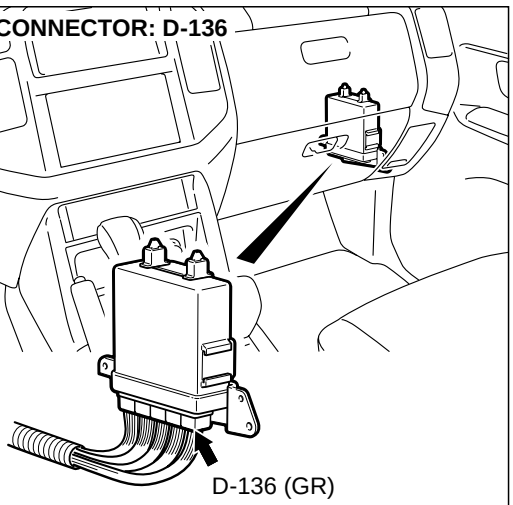
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



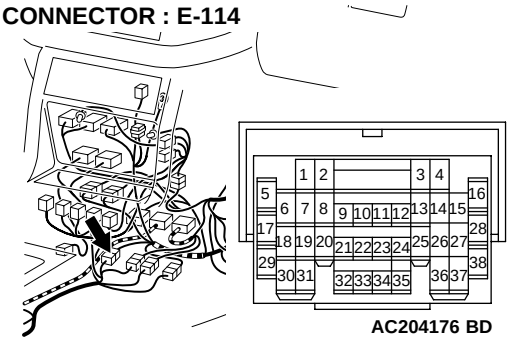
AC204395 AE

CONNECTOR: D-136



AC204681AD

CONNECTOR : E-114



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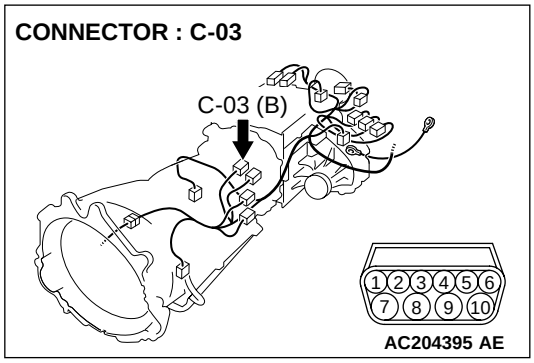
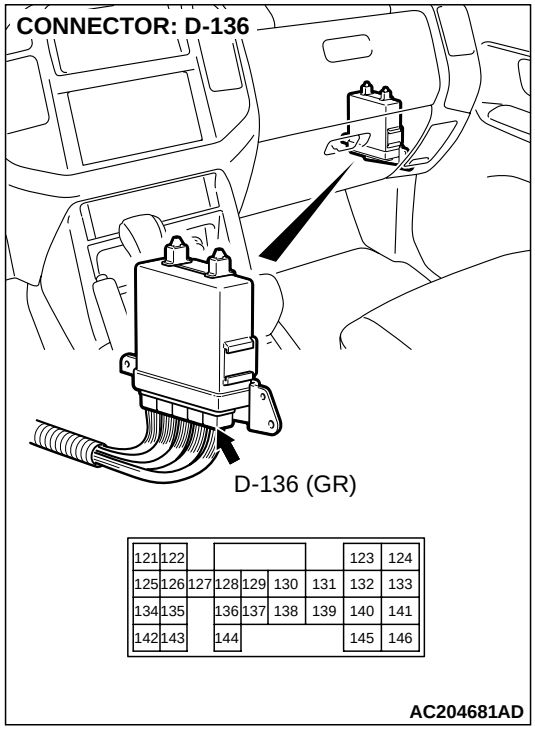
TSB Revision





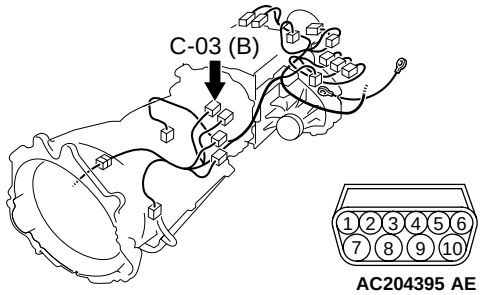
STEP 12. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 (terminals 6, 7 and 8) and PCM connector D-136 (terminals 128, 129 and 130).

Q: Are the harness wires in good condition?

YES : Go to Step 13.

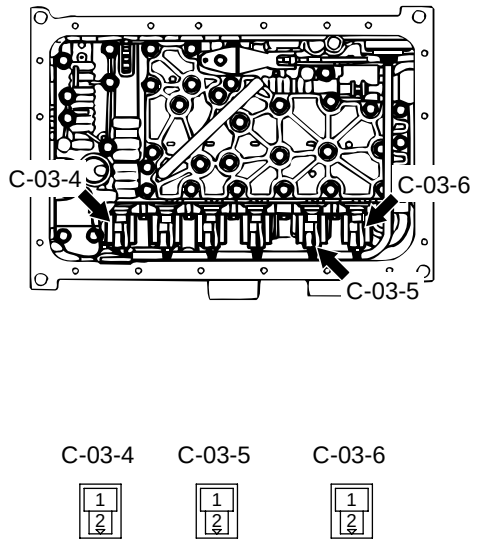
NO : Repair or replace the harness wire(s).

CONNECTOR : C-03



AC204395 AE

CONNECTORS : C-03-4, C-03-5, C-03-6



AC204749 AD

STEP 13. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 (terminals 6, 7, 8 and 10) and solenoid valve connectors C-03-4, C-03-5 and C-03-6.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

NO : Replace the harness wire.

DTC 32: Underdrive Solenoid Valve System

Solenoid Valve System Circuit
Refer to P.23Ac-147.

CIRCUIT OPERATION
Refer to P.23Ac-147.

DTC SET CONDITIONS
If the resistance value for the underdrive solenoid valve circuit is greater than 3.5 ohms (open) or less than 2.6 ohms (short) for 4 seconds, DTC 32 is set. The transmission is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

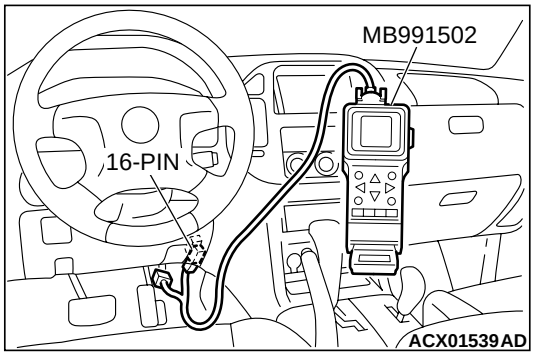
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Malfunction of underdrive solenoid valve
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check actuator test item 02: Underdrive Solenoid Valve.

⚠ 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.



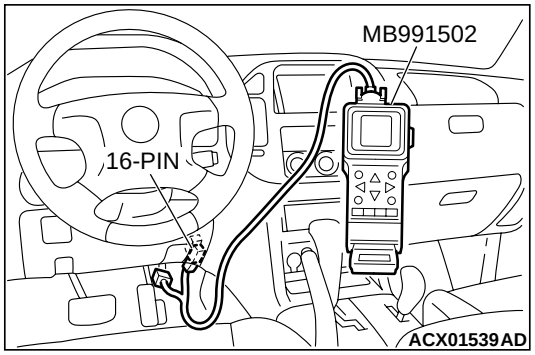
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 02, Underdrive Solenoid Valve.
- An audible clicking or buzzing should be heard when the underdrive solenoid valve is energized.

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

Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.

NO : Go to Step 2.

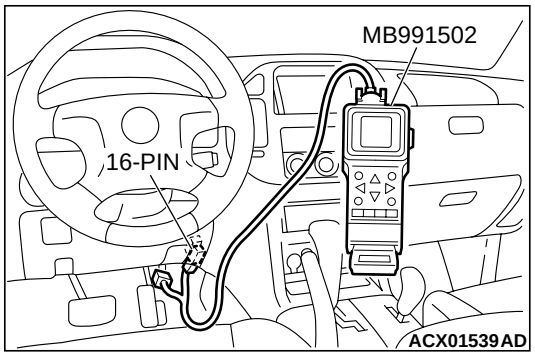


STEP 2. Using scan tool MB991502, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 54 set? (DTC 54 may be set along with multiple DTCs.)

YES : Refer to P.23Ac-237 DTC 54: A/T Control Relay System.
NO : Go to Step 3.



STEP 3. Using scan tool MB991502, read the A/T diagnostic trouble code.

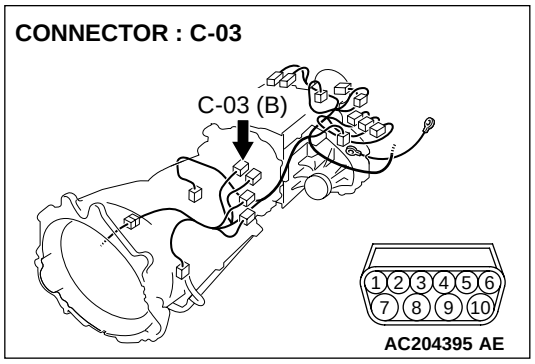
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

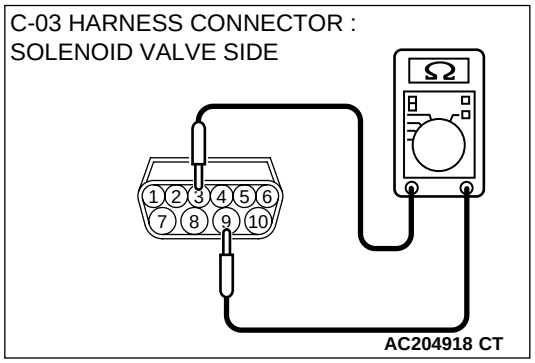
Q: Are DTC 33 and DTC 34 set? (Multiple DTCs may be set.)

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

STEP 4. Measure the underdrive solenoid valve resistance at A/T control solenoid valve assembly connector C-03.

(1) Disconnect connector C-03 and measure at the solenoid valve side.





(2) Measure the resistance between solenoid valve assembly connector C-03 terminals 3 and 9.

Resistance value: 2.7 – 3.4 ohms [at 20°C (68°F)]

Q: Is the measured resistance 2.7 – 3.4 ohms [at 20°C (68°F)]?

YES : Go to Step 6.
NO : Go to Step 5.

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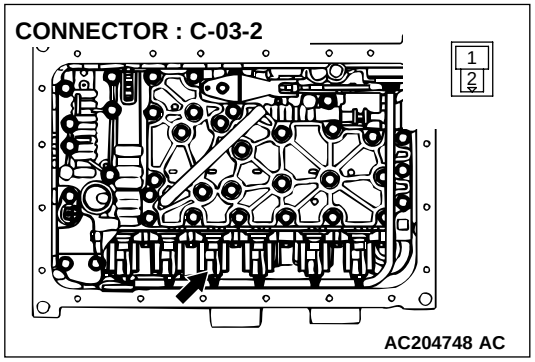
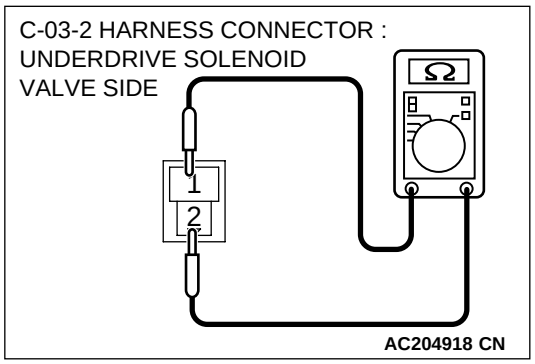
STEP 5. Measure the solenoid valve resistance at the underdrive solenoid valve connector C-03-2 inside the transmission.

(1) Disconnect solenoid valve connector C-03-2 and measure at the solenoid valve side.





(2) Measure the resistance between underdrive solenoid valve terminals 1 and 2.

Resistance value: 2.7 – 3.4 ohms [at 20°C (68°F)]

Q: Is the measured resistance 2.7 – 3.4 ohms [at 20°C (68°F)?

YES : Replace the harness wire between A/T control solenoid valve assembly connector C-03 and the solenoid valves.

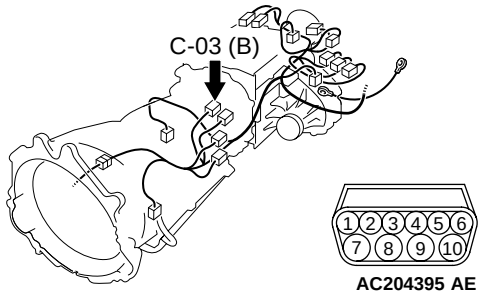
NO : Replace the underdrive solenoid valve. Refer to GROUP 23B, Valve Body P.23B-80.

STEP 6. Check A/T control solenoid valve assembly connector C-03, PCM connector D-136 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



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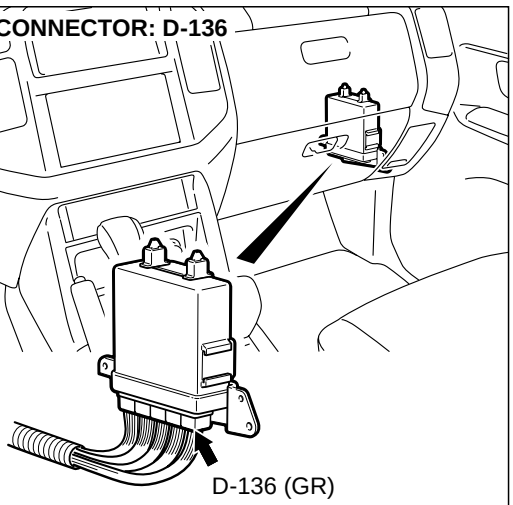
CONNECTOR: D-136



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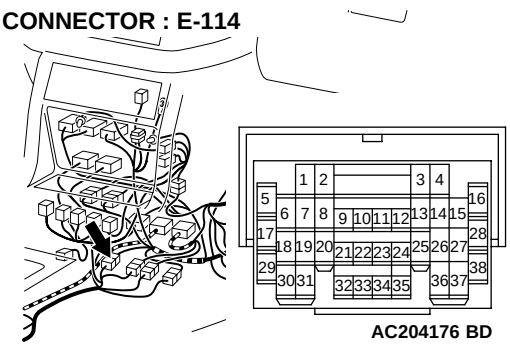
CONNECTOR : E-114



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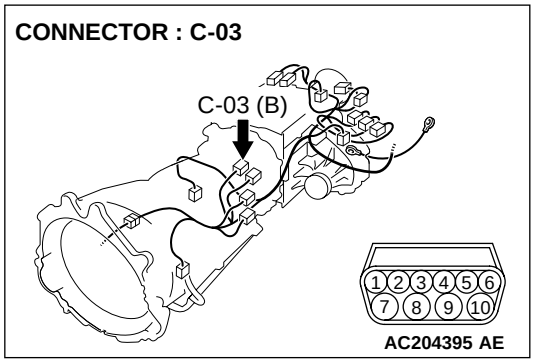
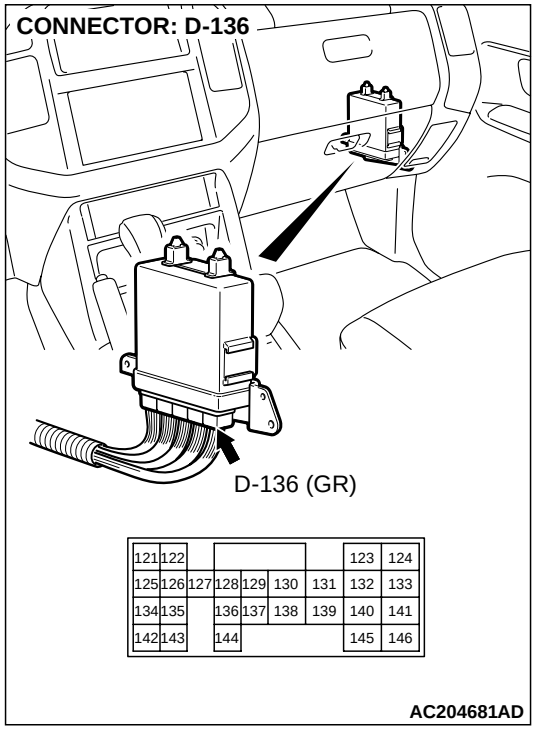
TSB Revision



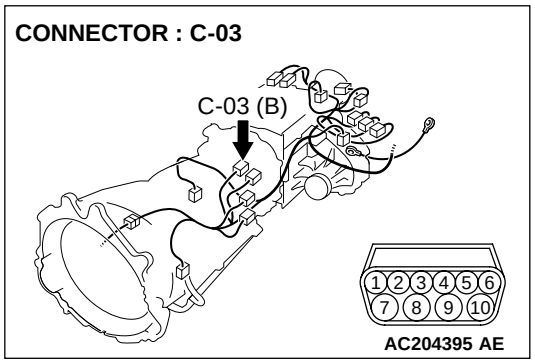


STEP 7. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 terminal 3 and PCM connector D-136 terminal 137.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

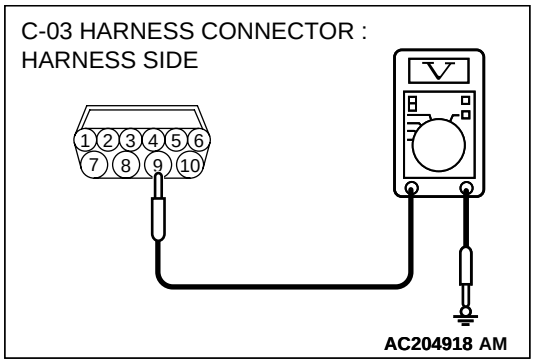
NO : Repair or replace the harness wire.



STEP 8. Measure the supply voltage at A/T control solenoid valve assembly connector C-03 by backprobing.

(1) Do not disconnect solenoid valve assembly harness connector C-03.

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



(3) Measure the voltage between harness connector C-03 terminal 9 and ground by backprobing.
- The voltage should equal battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.

NO : Go to Step 9.

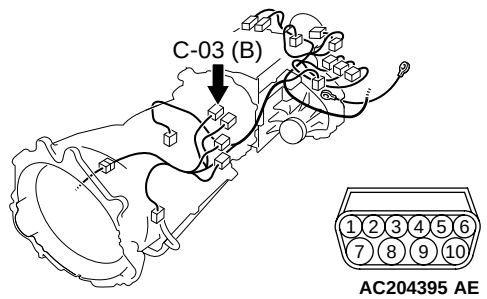
STEP 9. Check A/T control solenoid valve assembly connector C-03, A/T control relay connector D-13 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

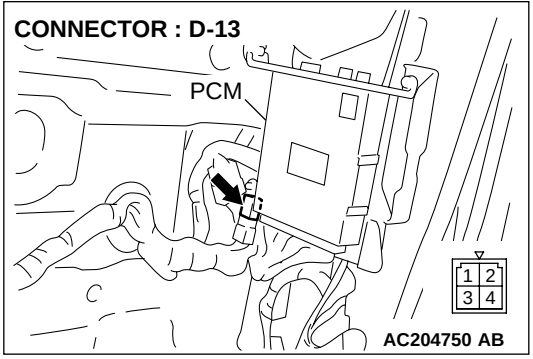
YES : Go to Step 10.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

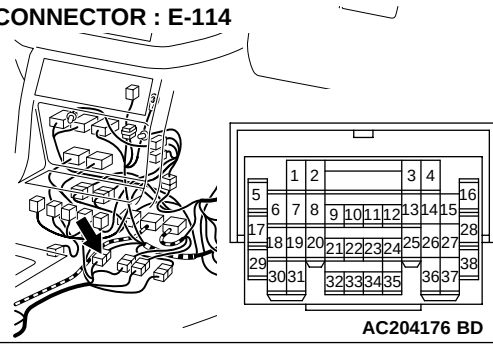
CONNECTOR : C-03



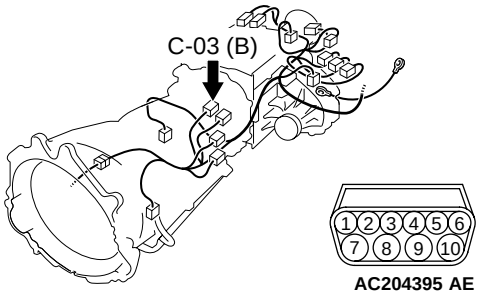
CONNECTOR : D-13



CONNECTOR : E-114



CONNECTOR : C-03



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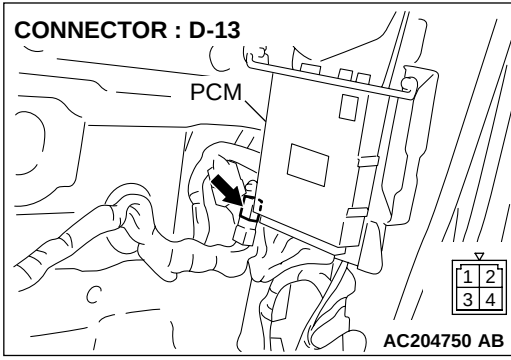
CONNECTOR : D-13



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STEP 10. Check the harness for an open circuit or short circuit to ground between A/T control solenoid valve assembly connector C-03 terminal 9 and A/T control relay connector D-13 terminal 3.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

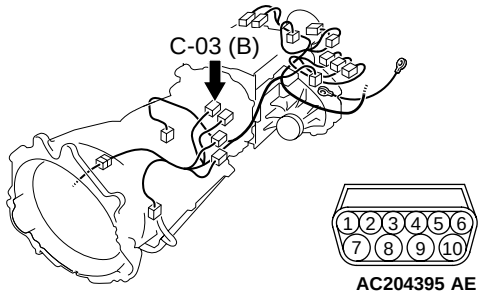
NO : Repair or replace the harness wire.

STEP 11. Check A/T control solenoid valve assembly connector C-03, PCM connector D-136 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



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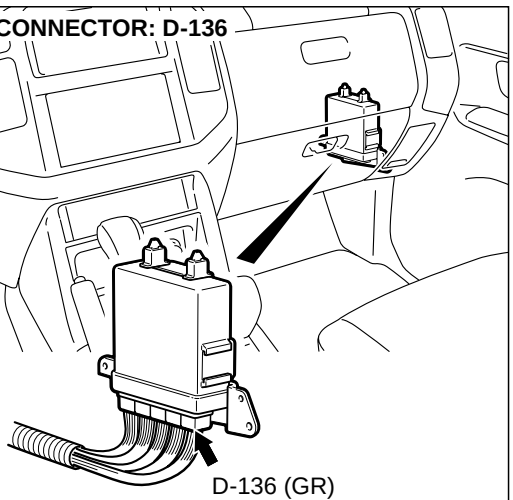
CONNECTOR: D-136



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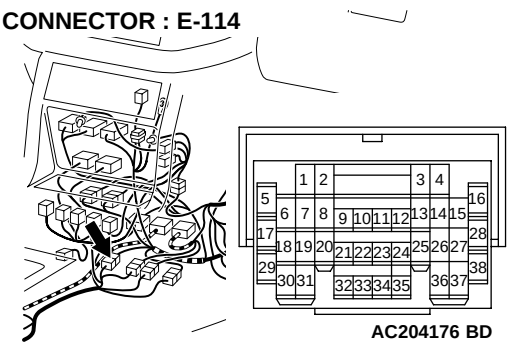
CONNECTOR : E-114



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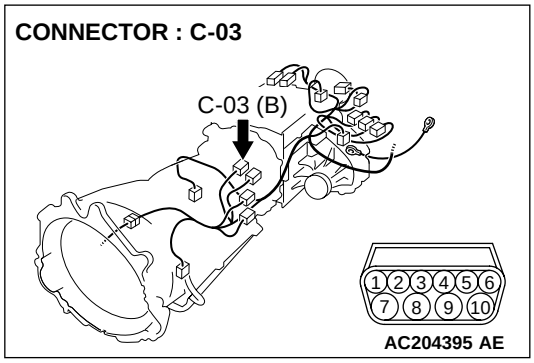
TSB Revision

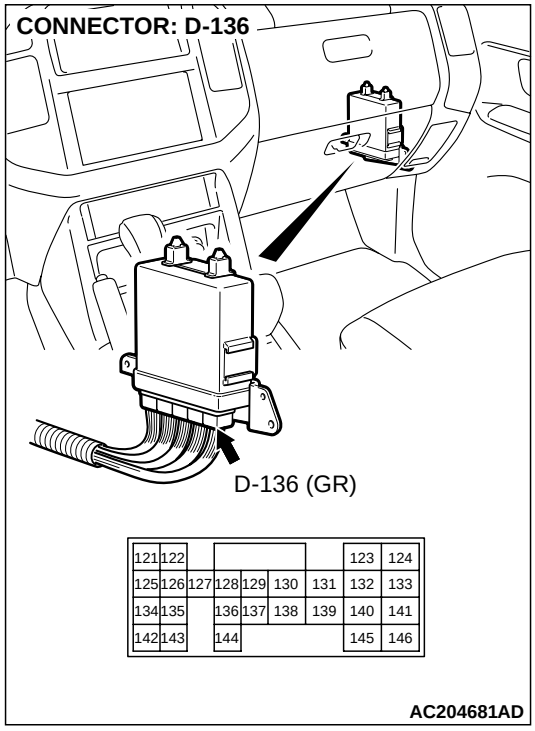
STEP 12. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 (terminals 3, 4 and 5) and PCM connector D-136 (terminals 136, 137 and 138).

Q: Are the harness wires in good condition?

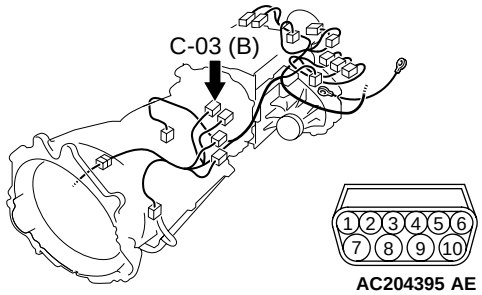
YES : Go to Step 13.

NO : Repair or replace the harness wire(s).



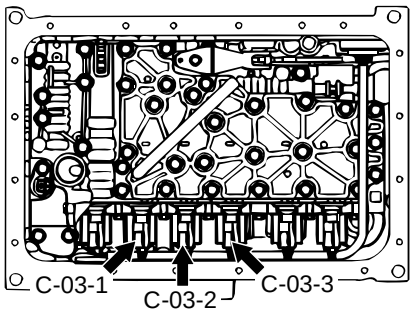


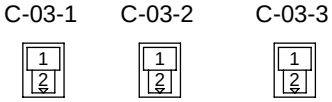
CONNECTOR : C-03



AC204395 AE

CONNECTORS : C-03-1, C-03-2, C-03-3





AC204749 AB

STEP 13. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 (terminals 3, 4, 5, and 9) and solenoid valve connectors C-03-1, C-03-2 and C-03-3.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

NO : Replace the harness wire.

DTC 33: Second Solenoid Valve System

Solenoid Valve System Circuit
Refer to P.23Ac-147.

CIRCUIT OPERATION
Refer to P.23Ac-147.

DTC SET CONDITIONS
If the resistance value for the second solenoid valve circuit is greater than 3.5 ohms (open) or less than 2.6 ohms (short) for 4 seconds, DTC 33 is set. The transmission is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

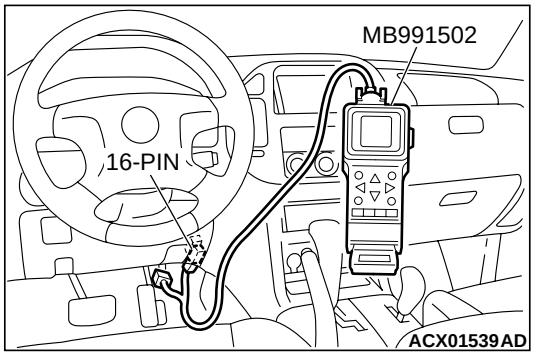
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Malfunction of second solenoid valve
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check actuator test item 03: Second Solenoid Valve.

⚠ 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.



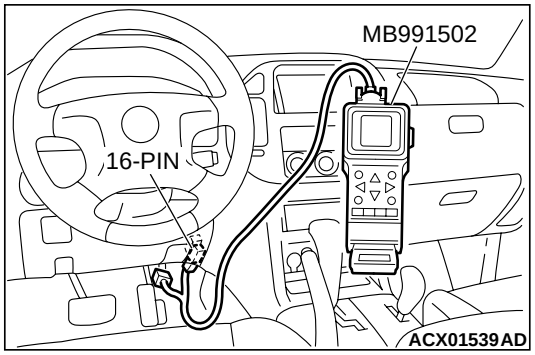
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 03, Second Solenoid Valve.
- An audible clicking or buzzing should be heard when the second solenoid valve is energized.

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

Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.

NO : Go to Step 2.

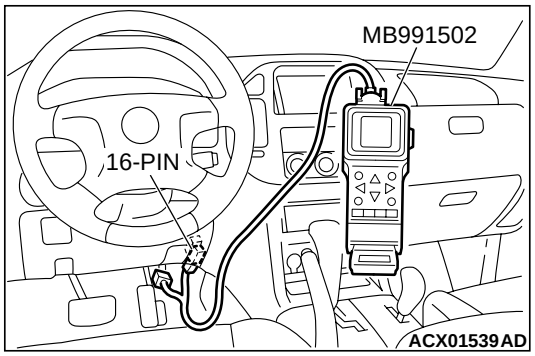


STEP 2. Using scan tool MB991502, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 54 set? (DTC 54 may be set along with multiple DTCs.)

YES : Refer to P.23Ac-237 DTC 54: A/T Control Relay System.
NO : Go to Step 3.

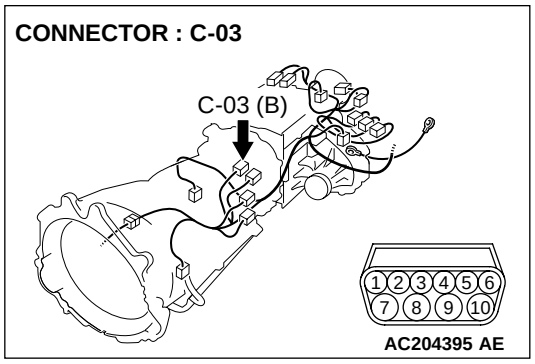


STEP 3. Using scan tool MB991502, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

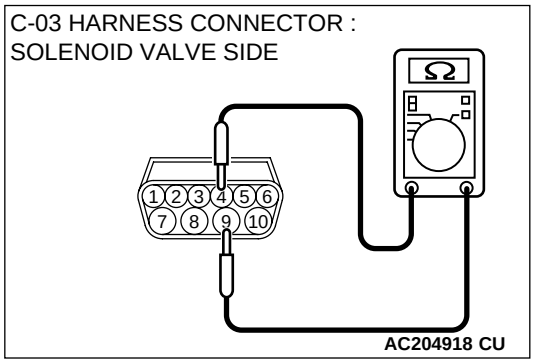
Q: Are DTC 32 and DTC 34 set? (Multiple DTCs may be set.)

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



STEP 4. Measure the second solenoid valve resistance at A/T control solenoid valve assembly connector C-03.

(1) Disconnect connector C-03 and measure at the solenoid valve side.



(2) Measure the resistance between solenoid valve assembly connector C-03 terminals 4 and 9.

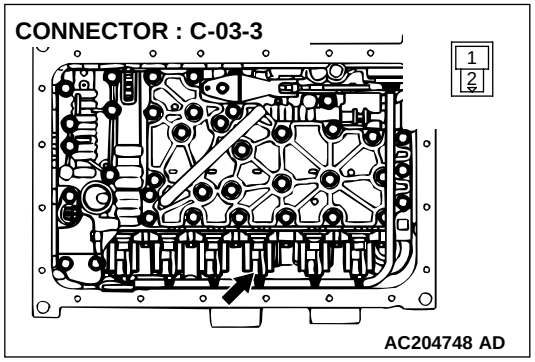
Resistance value: 2.7 – 3.4 ohms [at 20°C (68°F)]

Q: Is the measured resistance 2.7 – 3.4 ohms [at 20°C (68°F)]?

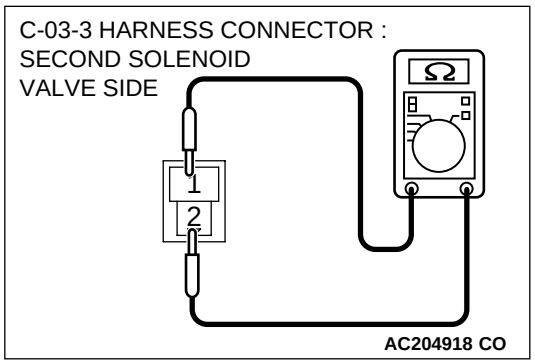
YES : Go to Step 6.
NO : Go to Step 5.

TSB Revision

STEP 5. Measure the solenoid valve resistance at the second solenoid valve connector C-03-3 inside the transmission.



(1) Disconnect solenoid valve connector C-03-3 and measure at the solenoid valve side.



(2) Measure the resistance between second solenoid valve terminals 1 and 2.

Resistance value: 2.7 – 3.4 ohms [at 20°C (68°F)]

Q: Is the measured resistance 2.7 – 3.4 ohms [at 20°C (68°F)?

YES : Replace the harness wire between A/T control solenoid valve assembly connector C-03 and the solenoid valves.

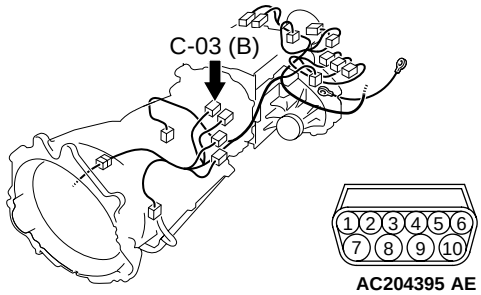
NO : Replace the second solenoid valve. Refer to GROUP 23B, Valve Body P.23B-80.

STEP 6. Check A/T control solenoid valve assembly connector C-03, PCM connector D-136 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

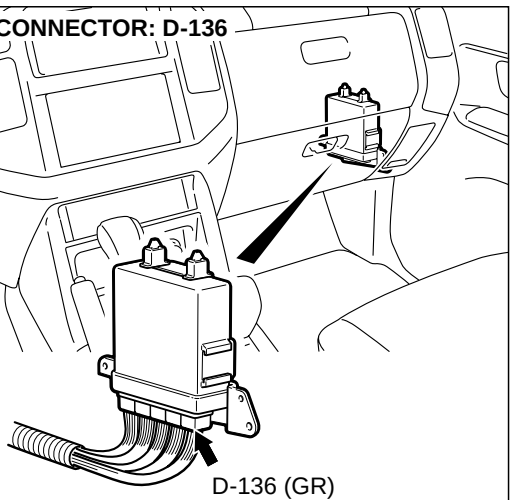
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



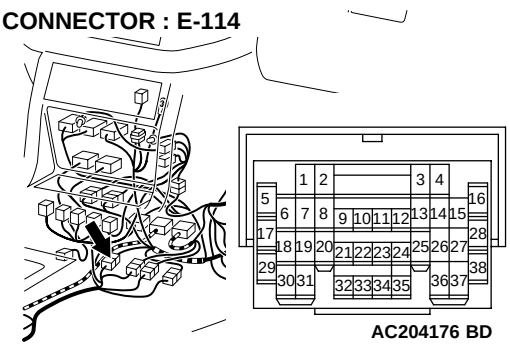
AC204395 AE

CONNECTOR: D-136



AC204681AD

CONNECTOR : E-114



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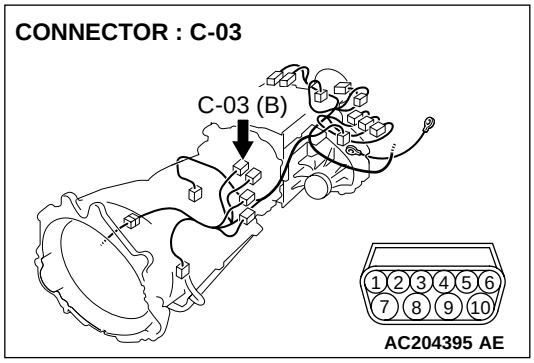
TSB Revision

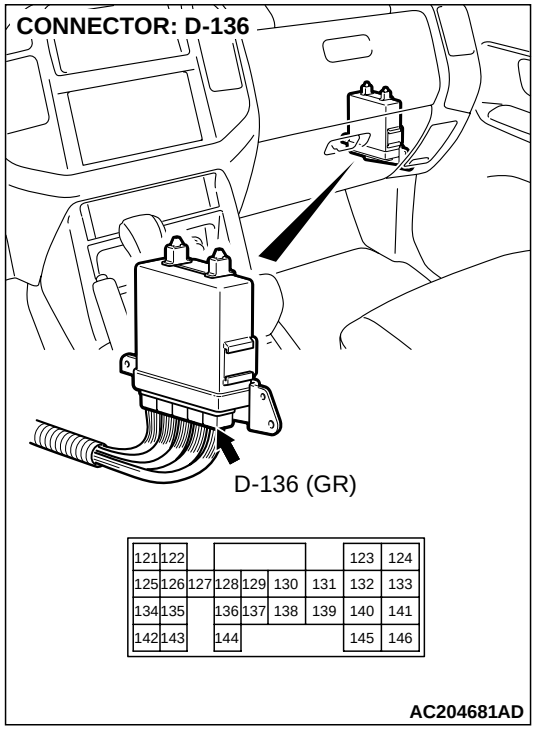
STEP 7. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 terminal 4 and PCM connector D-136 terminal 136.

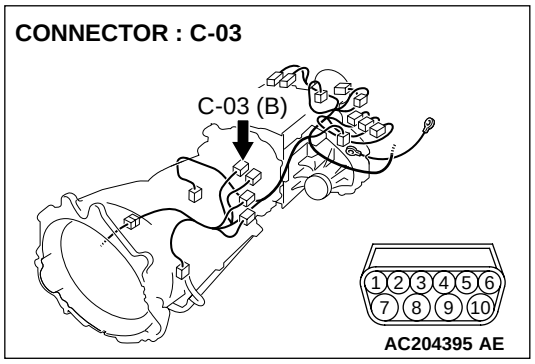
Q: Is the harness wire in good condition?

YES : Replace the PCM.

NO : Repair or replace the harness wire.



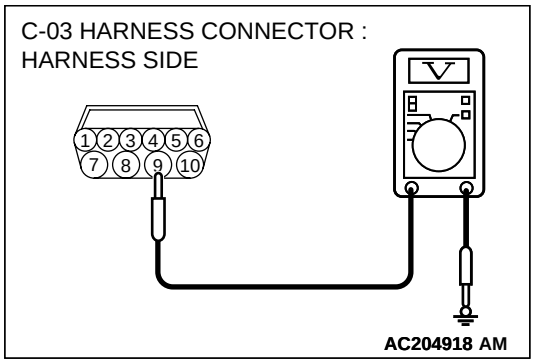




STEP 8. Measure the supply voltage at A/T control solenoid valve assembly connector C-03 by backprobing.

(1) Do not disconnect solenoid valve assembly harness connector C-03.

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



(3) Measure the voltage between harness connector C-03 terminal 9 and ground by backprobing.
- The voltage should equal battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.

NO : Go to Step 9.

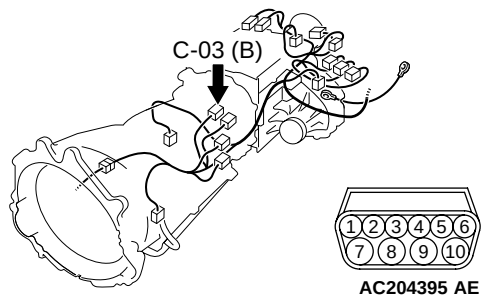
STEP 9. Check A/T control solenoid valve assembly connector C-03, A/T control relay connector D-13 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

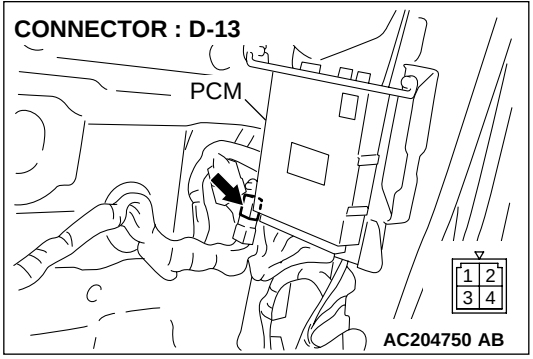
YES : Go to Step 10.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

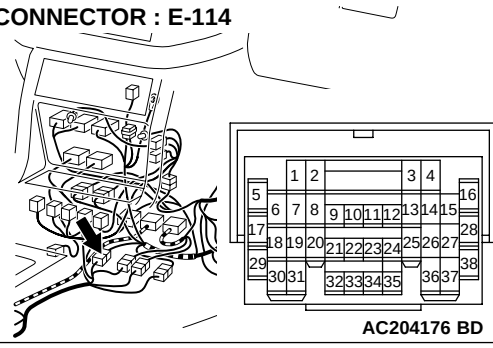
CONNECTOR : C-03

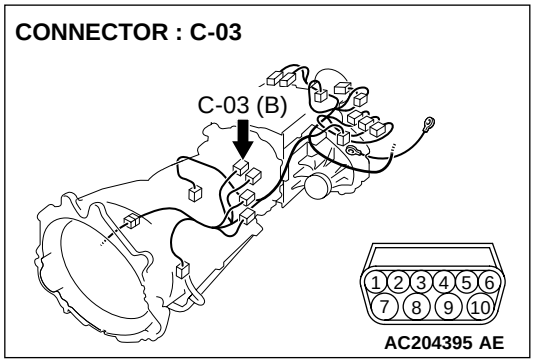


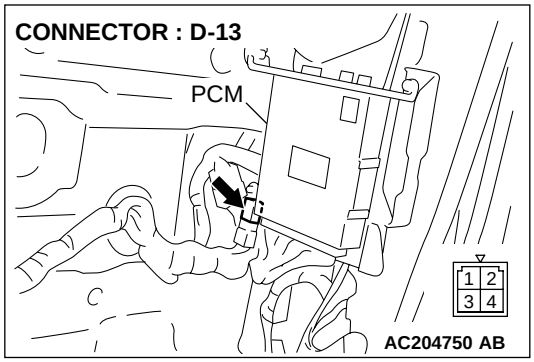
CONNECTOR : D-13



CONNECTOR : E-114







STEP 10. Check the harness for an open circuit or short circuit to ground between A/T control solenoid valve assembly connector C-03 terminal 9 and A/T control relay connector D-13 terminal 3.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

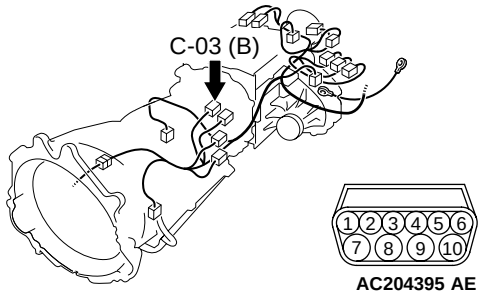
NO : Repair or replace the harness wire.

STEP 11. Check A/T control solenoid valve assembly connector C-03, PCM connector D-136 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

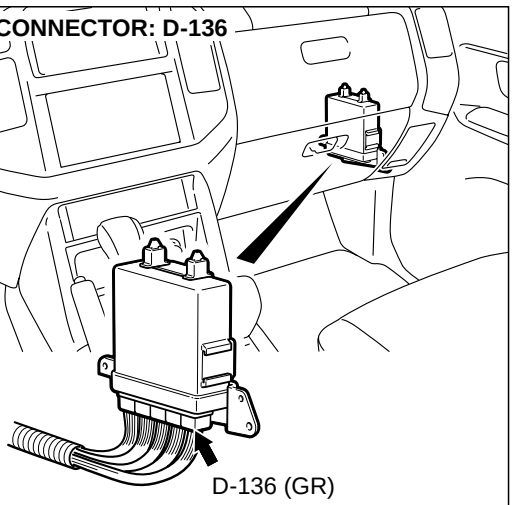
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



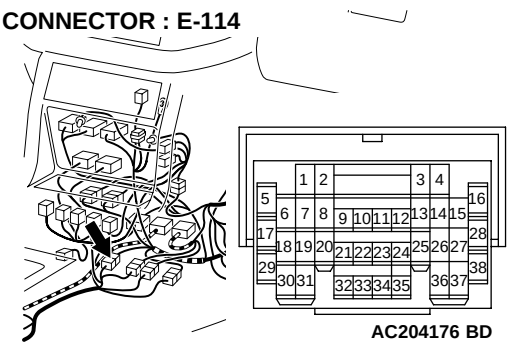
AC204395 AE

CONNECTOR: D-136



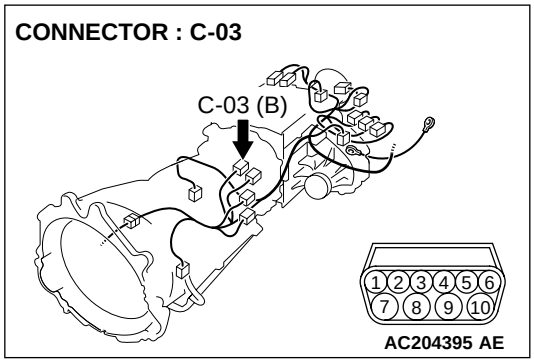
AC204681AD

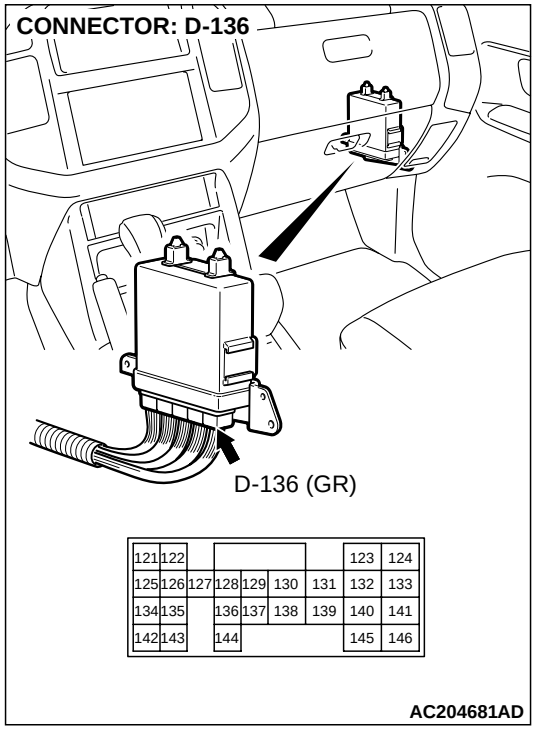
CONNECTOR : E-114



AC204176 BD

TSB Revision





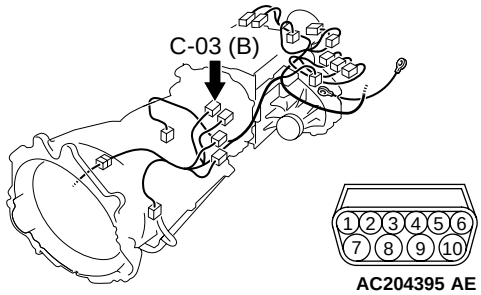
STEP 12. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 (terminals 3, 4 and 5) and PCM connector D-136 (terminals 136, 137 and 138).

Q: Are the harness wires in good condition?

YES : Go to Step 13.

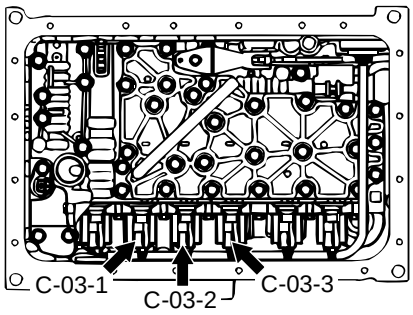
NO : Repair or replace the harness wire(s).

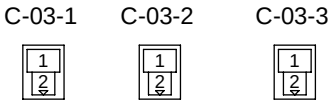
CONNECTOR : C-03



AC204395 AE

CONNECTORS : C-03-1, C-03-2, C-03-3





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STEP 13. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 (terminals 3, 4, 5 and 9) and solenoid valve connectors C-03-1, C-03-2 and C-03-3.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

NO : Replace the harness wire.

DTC 34: Overdrive Solenoid Valve System

Solenoid Valve System Circuit

Refer to P.23Ac-147.

CIRCUIT OPERATION

Refer to P.23Ac-147.

DTC SET CONDITIONS

If the resistance value for the overdrive solenoid valve circuit is greater than 3.5 ohms (open) or less than 2.6 ohms (short) for 4 seconds, DTC 34 is set. The transmission is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of overdrive solenoid valve

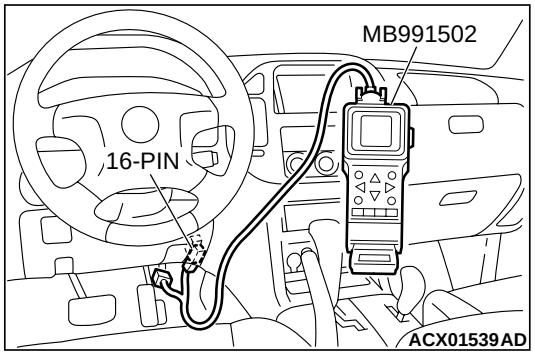
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check actuator test item 04: Overdrive Solenoid Valve.

⚠ 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.



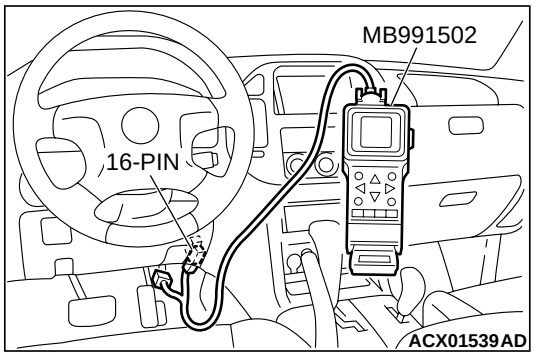
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 04, Overdrive Solenoid Valve.
  - An audible clicking or buzzing should be heard when the overdrive solenoid valve is energized.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.

NO : Go to Step 2.

STEP 2. Using scan tool MB991502, read the A/T diagnostic trouble code.

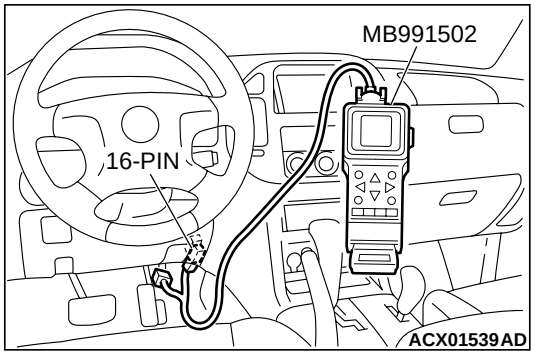


(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 54 set? (DTC 54 may be set along with multiple DTCs.)

YES : Refer to P.23Ac-237 DTC 54: A/T Control Relay System.

NO : Go to Step 3.



STEP 3. Using scan tool MB991502, read the A/T diagnostic trouble code.

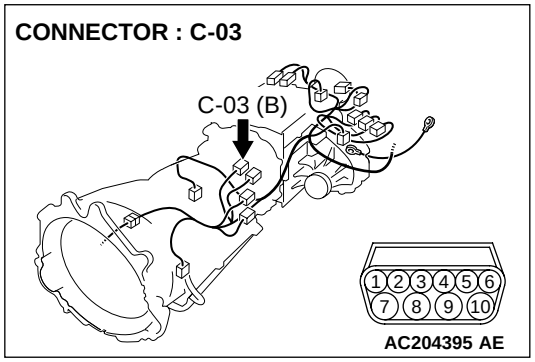
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

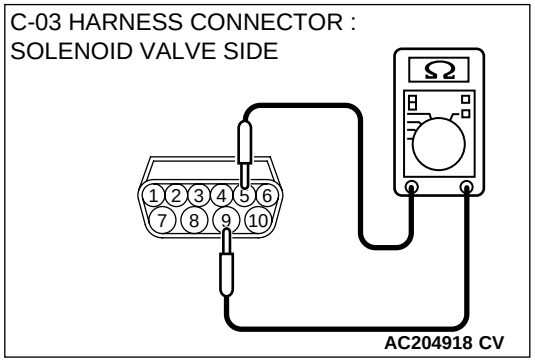
Q: Are DTC 32 and DTC 33 set? (Multiple DTCs may be set.)

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

STEP 4. Measure the overdrive solenoid valve resistance at A/T control solenoid valve assembly connector C-03.

(1) Disconnect connector C-03 and measure at the solenoid valve side.



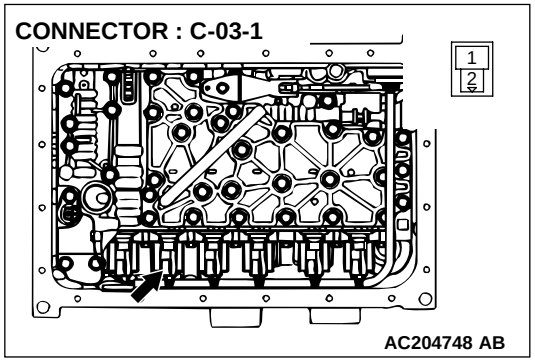


(2) Measure the resistance between solenoid valve assembly connector C-03 terminals 5 and 9.

Resistance value: 2.7 – 3.4 ohms [at 20°C (68°F)]

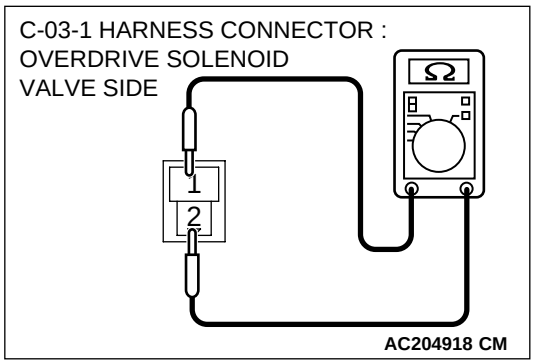
Q: Is the measured resistance 2.7 – 3.4 ohms [at 20°C (68°F)]?

YES : Go to Step 6.
NO : Go to Step 5.



STEP 5. Measure the solenoid valve resistance at the overdrive solenoid valve connector C-03-1 inside the transmission.

(1) Disconnect solenoid valve connector C-03-1and measure at the solenoid valve side.



(2) Measure the resistance between overdrive solenoid valve terminals 1 and 2.

Resistance value: 2.7 – 3.4 ohms [at 20°C (68°F)]

Q: Is the measured resistance 2.7 – 3.4 ohms [at 20°C (68°F)?

YES : Replace the harness wire between A/T control solenoid valve assembly connector C-03 and the solenoid valves.

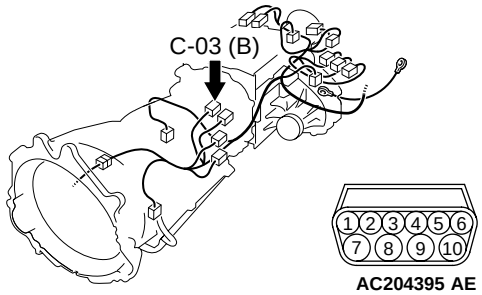
NO : Replace the overdrive solenoid valve. Refer to GROUP 23B, Valve Body P.23B-80.

STEP 6. Check A/T control solenoid valve assembly connector C-03, PCM connector D-136 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

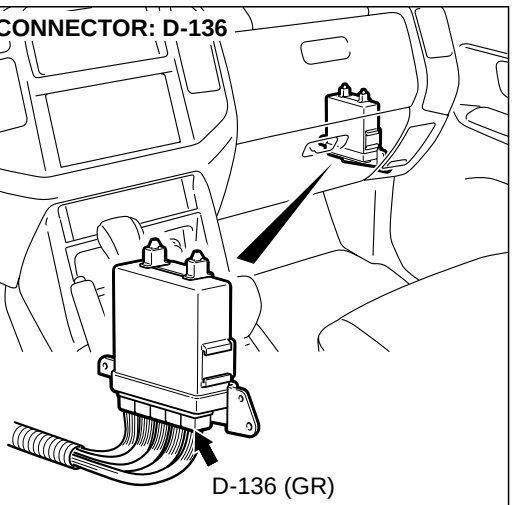
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



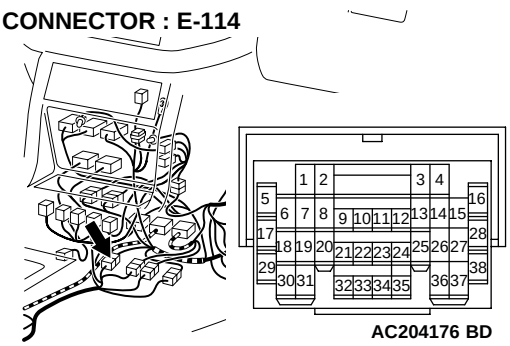
AC204395 AE

CONNECTOR: D-136



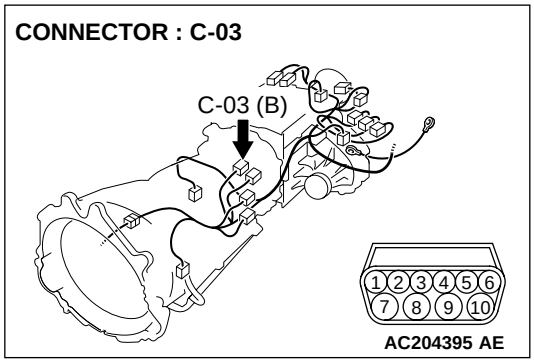
AC204681AD

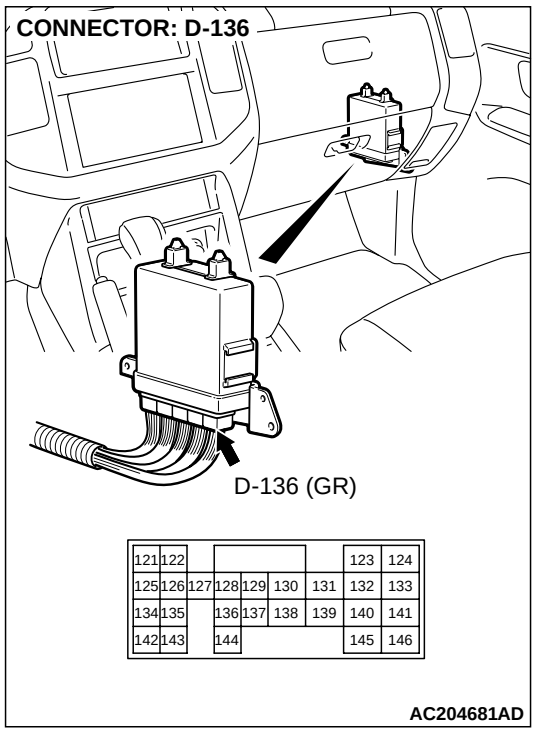
CONNECTOR : E-114



AC204176 BD

TSB Revision



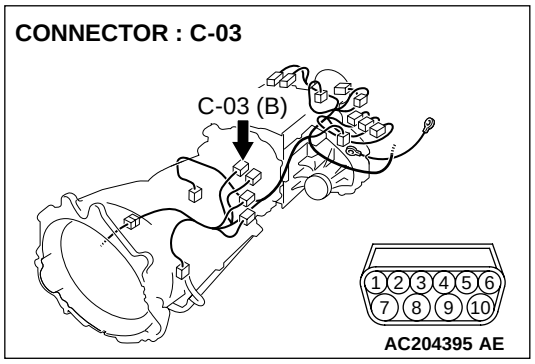


STEP 7. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 terminal 5 and PCM connector D-136 terminal 138.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

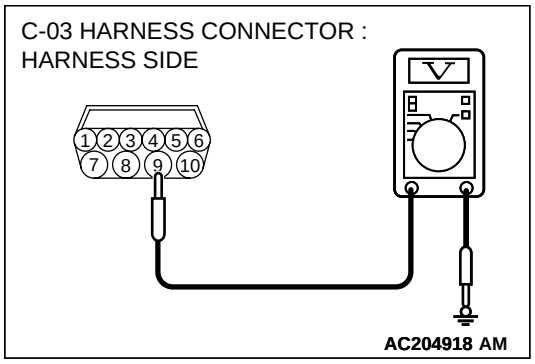
NO : Repair or replace the harness wire.



STEP 8. Measure the supply voltage at A/T control solenoid valve assembly connector C-03 by backprobing.

(1) Do not disconnect solenoid valve assembly harness connector C-03.

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



(3) Measure the voltage between harness connector C-03 terminal 9 and ground by backprobing.
- The voltage should equal battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.

NO : Go to Step 9.

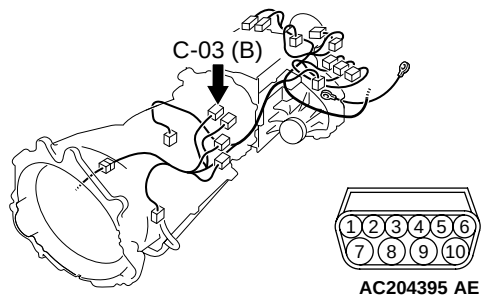
STEP 9. Check A/T control solenoid valve assembly connector C-03, A/T control relay connector D-13 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

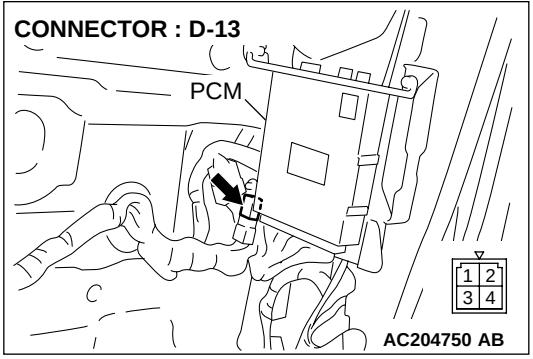
YES : Go to Step 10.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

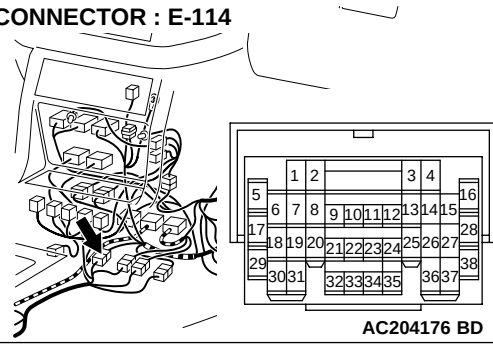
CONNECTOR : C-03



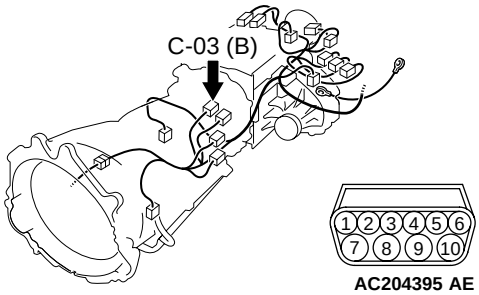
CONNECTOR : D-13



CONNECTOR : E-114

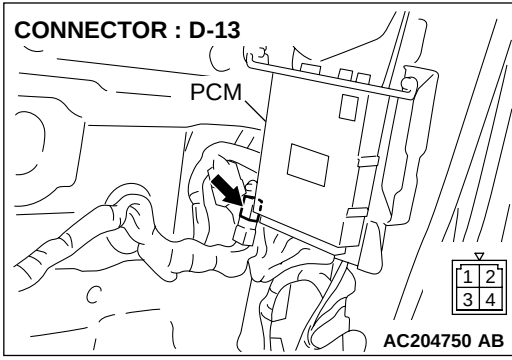


CONNECTOR : C-03



AC204395 AE

CONNECTOR : D-13



AC204750 AB

STEP 10. Check the harness for an open circuit or short circuit to ground between A/T control solenoid valve assembly connector C-03 terminal 9 and A/T control relay connector D-13 terminal 3.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

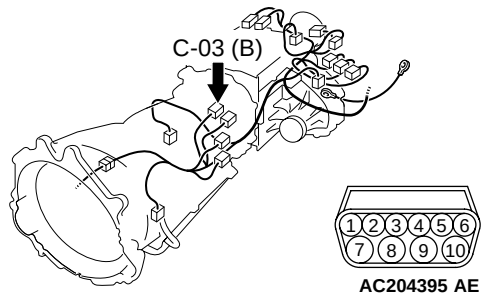
NO : Repair or replace the harness wire.

STEP 11. Check A/T control solenoid valve assembly connector C-03, PCM connector D-136 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

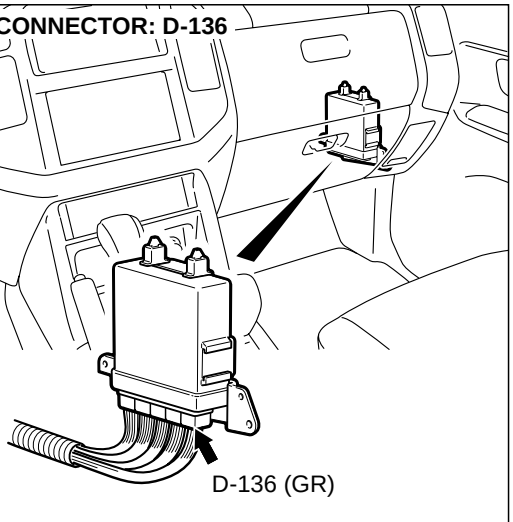
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



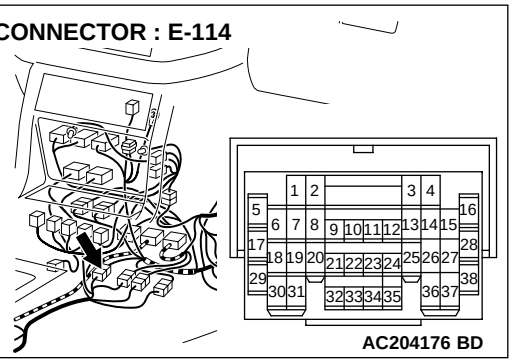
AC204395 AE

CONNECTOR: D-136



AC204681AD

CONNECTOR : E-114



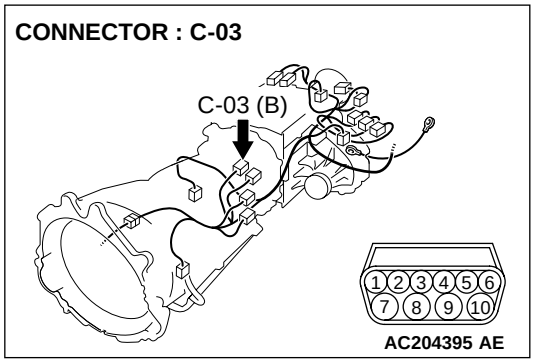
AC204176 BD

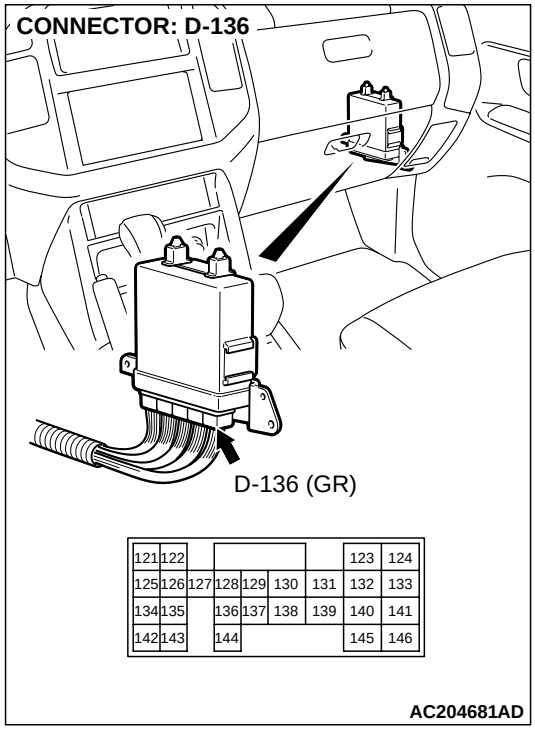
STEP 12. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 (terminals 3, 4 and 5) and PCM connector D-136 (terminals 136, 137 and 138).

Q: Are the harness wires in good condition?

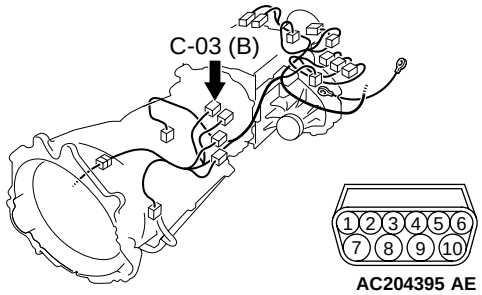
YES : Go to Step 13.

NO : Repair or replace the harness wire(s).



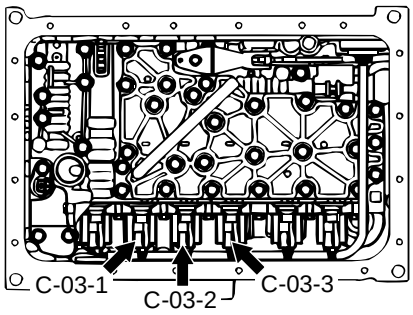


CONNECTOR : C-03

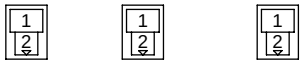


AC204395 AE

CONNECTORS : C-03-1, C-03-2, C-03-3



C-03-1 C-03-2 C-03-3



AC204749 AB

STEP 13. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 (terminals 3, 4, 5 and 9) and solenoid valve connectors C-03-1, C-03-2 and C-03-3.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

NO : Replace the harness wire.

DTC 35: Reduction Solenoid Valve System

Solenoid Valve System Circuit
Refer to P.23Ac-147.

CIRCUIT OPERATION
Refer to P.23Ac-147.

DTC SET CONDITIONS
If the resistance value for the reduction solenoid valve circuit is greater than 3.5 ohms (open) or less than 2.6 ohms (short) for 4 seconds, DTC 32 is set. The transmission is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

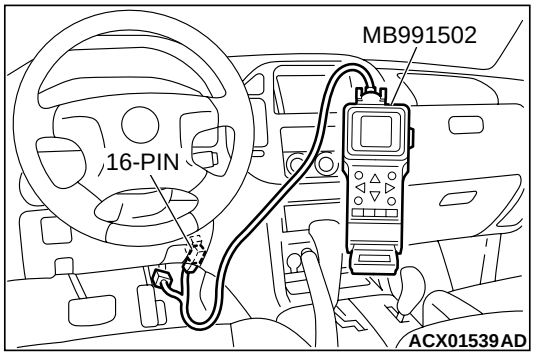
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Malfunction of reduction solenoid valve
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check actuator test item 05: Reduction Solenoid Valve.

⚠ 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.



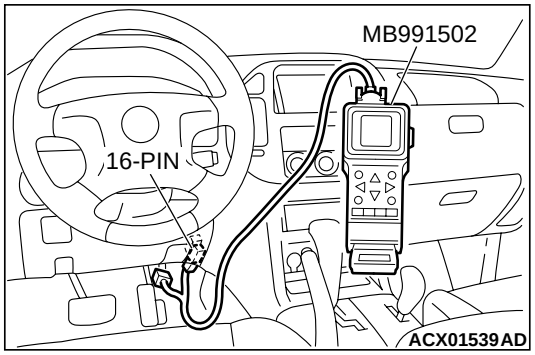
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 05, Reduction Solenoid Valve.
- An audible clicking or buzzing should be heard when the reduction solenoid valve is energized.

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

Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.

NO : Go to Step 2.

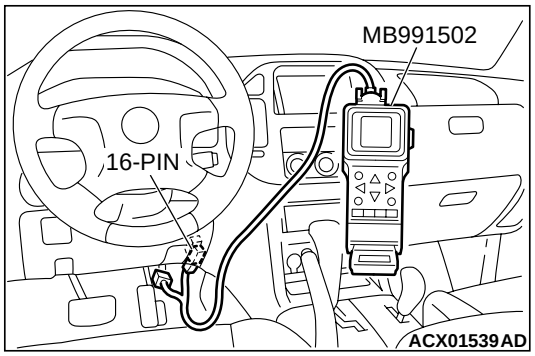


STEP 2. Using scan tool MB991502, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 54 set? (DTC 54 may be set along with multiple DTCs.)

YES : Refer to P.23Ac-237 DTC 54: A/T Control Relay System.
NO : Go to Step 3.

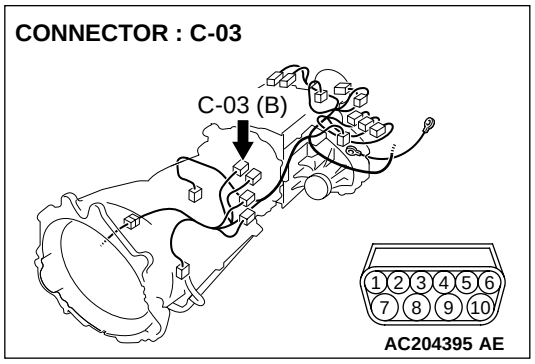


STEP 3. Using scan tool MB991502, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

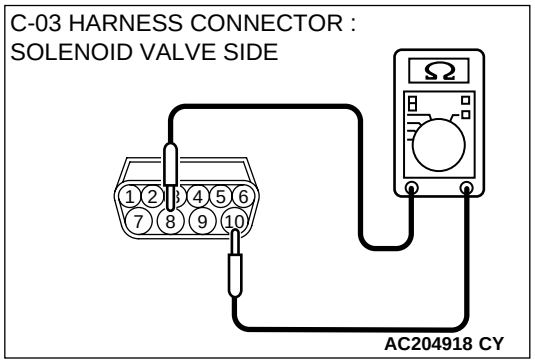
Q: Are DTC 31 and DTC 36 set? (Multiple DTCs may be set.)

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



STEP 4. Measure the reduction solenoid valve resistance at A/T control solenoid valve assembly connector C-03.

(1) Disconnect connector C-03 and measure at the solenoid valve side.



(2) Measure the resistance between solenoid valve assembly connector C-03 terminals 8 and 10.

Resistance value: 2.7 – 3.4 ohms [at 20°C (68°F)]

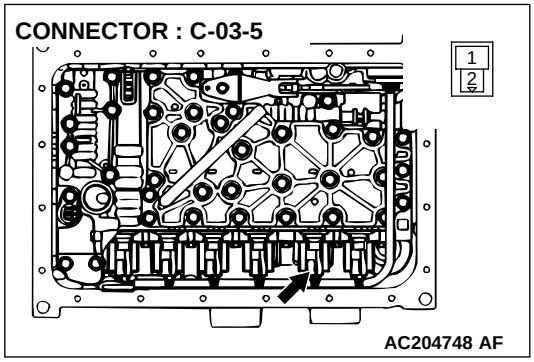
Q: Is the measured resistance 2.7 – 3.4 ohms [at 20°C (68°F)]?

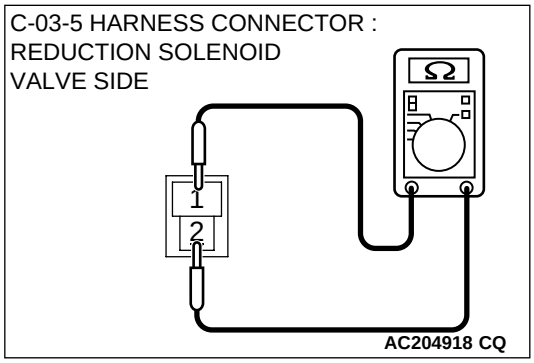
YES : Go to Step 6.
NO : Go to Step 5.

TSB Revision

STEP 5. Measure the solenoid valve resistance at the reduction solenoid valve connector C-03-5 inside the transmission.

(1) Disconnect solenoid valve connector C-03-5 and measure at the solenoid valve side.





(2) Measure the resistance between reduction solenoid valve terminals 1 and 2.

Resistance value: 2.7 – 3.4 ohms [at 20°C (68°F)]

Q: Is the measured resistance 2.7 – 3.4 ohms [at 20°C (68°F)?

YES : Replace the harness wire between A/T control solenoid valve assembly connector C-03 and the solenoid valves.

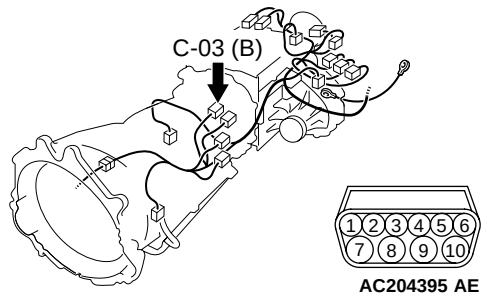
NO : Replace the reduction solenoid valve. Refer to GROUP 23B, Valve Body P.23B-80.

STEP 6. Check A/T control solenoid valve assembly connector C-03, PCM connector D-136 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

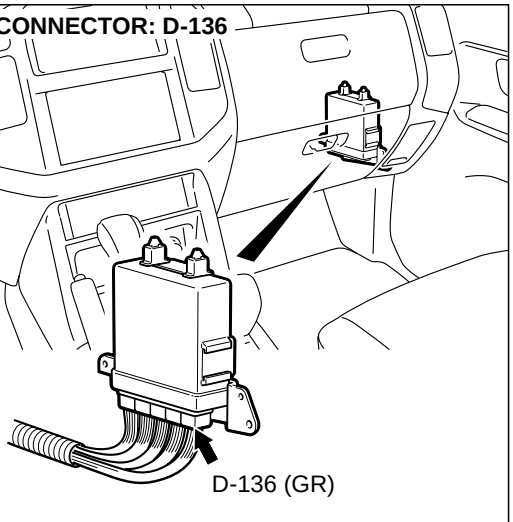
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



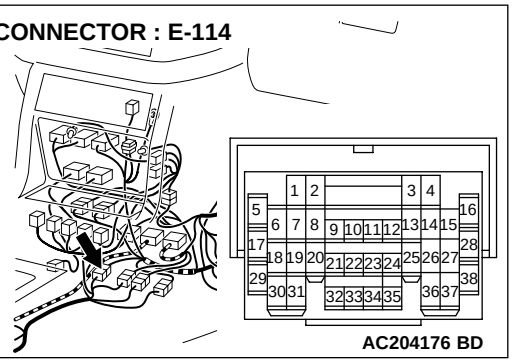
AC204395 AE

CONNECTOR: D-136



AC204681AD

CONNECTOR : E-114



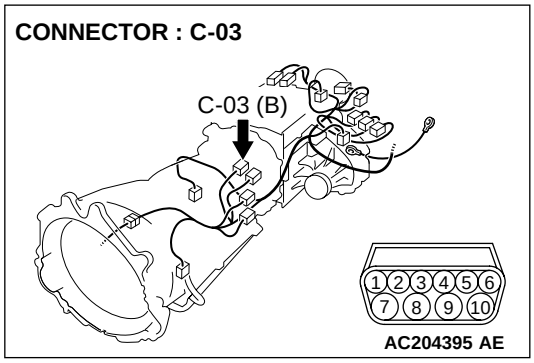
AC204176 BD

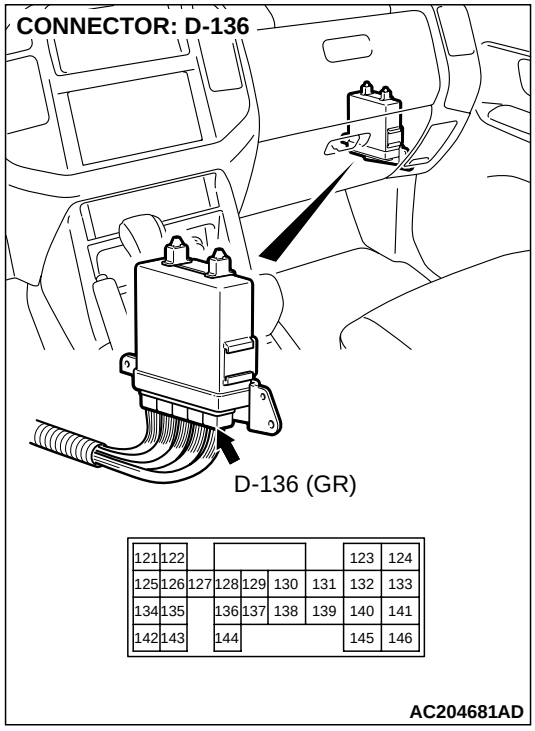
STEP 7. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 terminal 8 and PCM connector D-136 terminal 129.

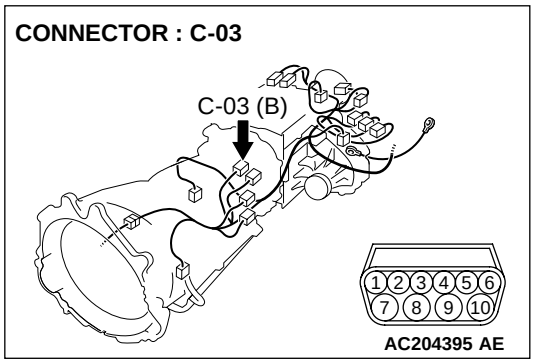
Q: Is the harness wire in good condition?

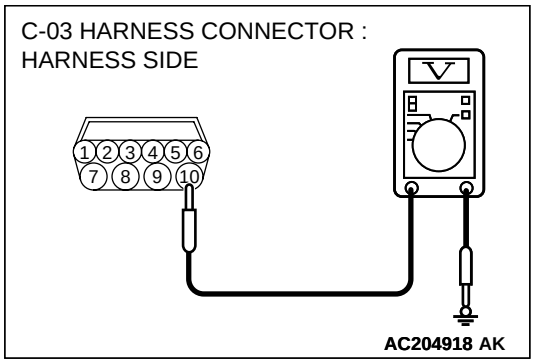
YES : Replace the PCM.

NO : Repair or replace the harness wire.









STEP 8. Measure the supply voltage at A/T control solenoid valve assembly connector C-03 by backprobing.

(1) Do not disconnect solenoid valve assembly harness connector C-03.

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

(3) Measure the voltage between harness connector C-03 terminal 10 and ground by backprobing.
- The voltage should equal battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.

NO : Go to Step 9.

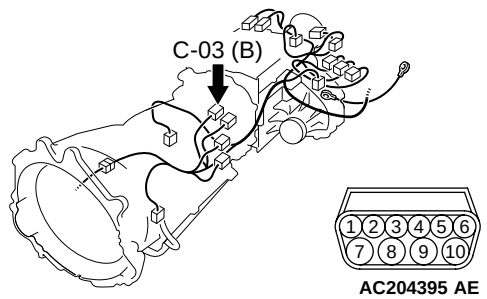
STEP 9. Check A/T control solenoid valve assembly connector C-03, A/T control relay connector D-13 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

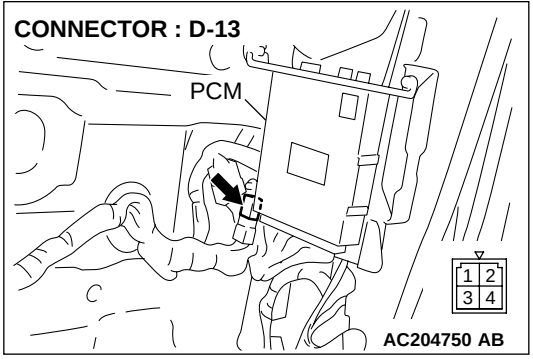
YES : Go to Step 10.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

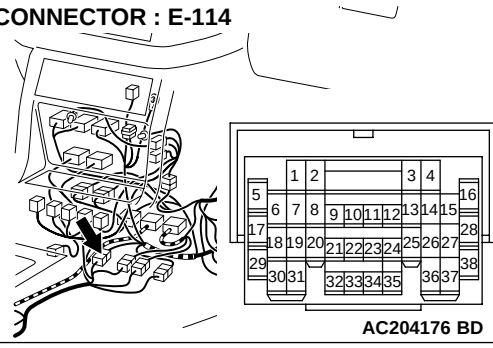
CONNECTOR : C-03



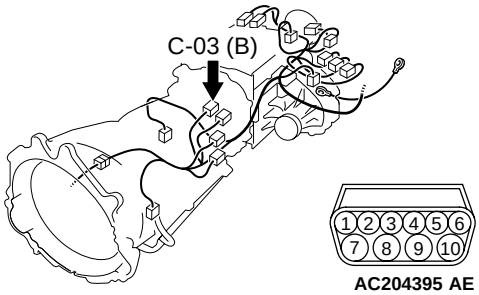
CONNECTOR : D-13



CONNECTOR : E-114

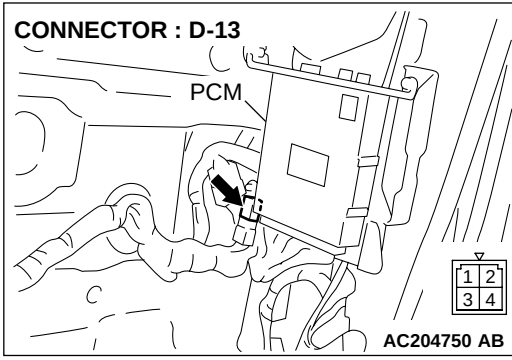


CONNECTOR : C-03



AC204395 AE

CONNECTOR : D-13



AC204750 AB

STEP 10. Check the harness for an open circuit or short circuit to ground between A/T control solenoid valve assembly connector C-03 terminal 10 and A/T control relay connector D-13 terminal 3.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

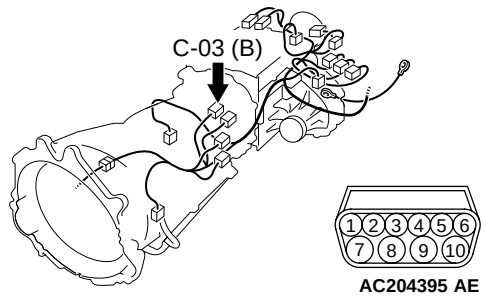
NO : Repair or replace the harness wire.

STEP 11. Check A/T control solenoid valve assembly connector C-03, PCM connector D-136 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

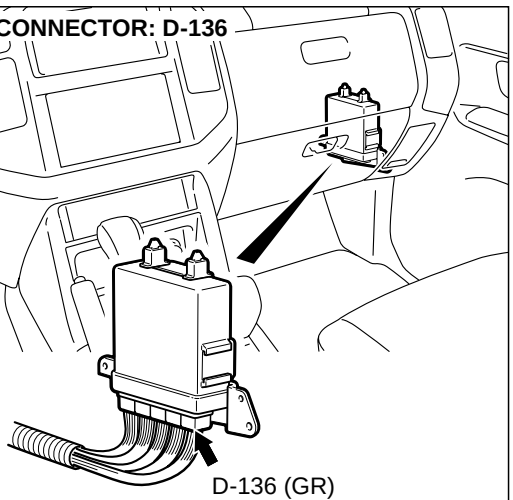
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



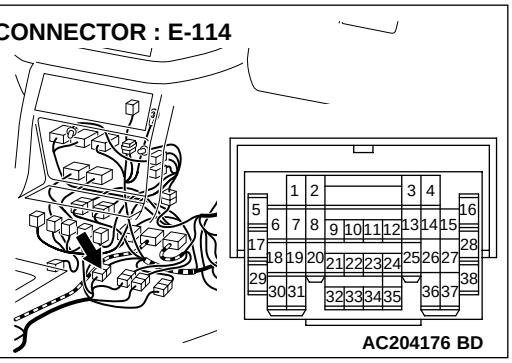
AC204395 AE

CONNECTOR: D-136



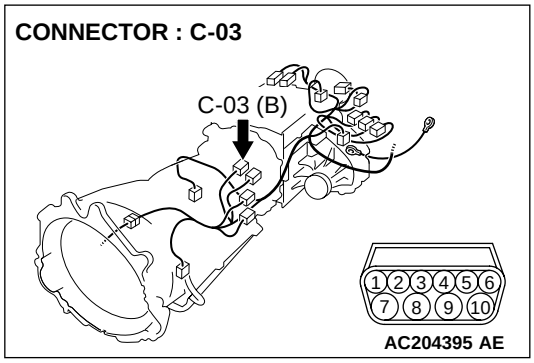
AC204681AD

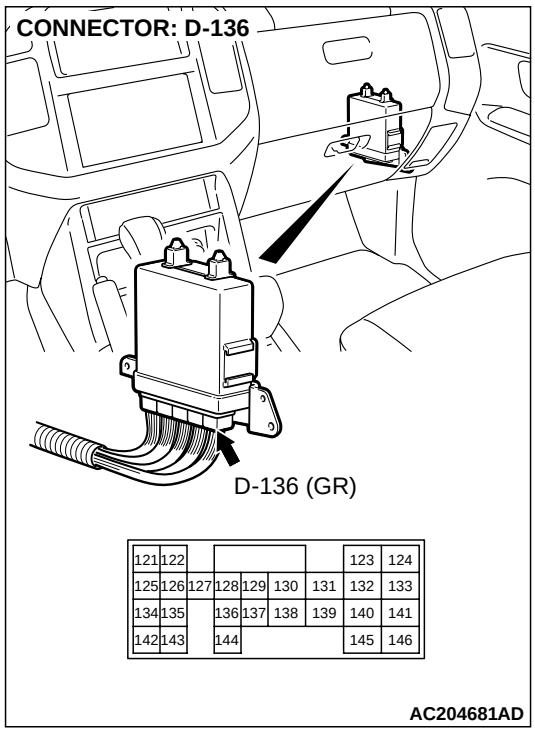
CONNECTOR : E-114



AC204176 BD

TSB Revision





STEP 12. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 (terminals 6, 7 and 8) and PCM connector D-136 (terminals 128, 129 and 130).

Q: Are the harness wires in good condition?

YES : Go to Step 13.

NO : Repair or replace the harness wire(s).

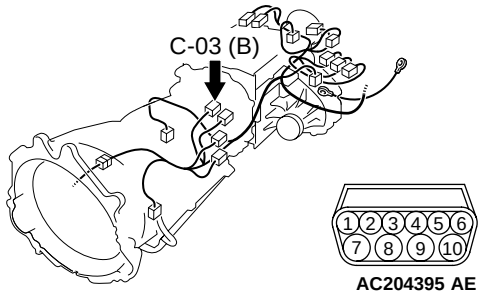
STEP 13. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 (terminals 6, 7, 8 and 10) and solenoid valve connectors C-03-4, C-03-5 and C-03-6.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

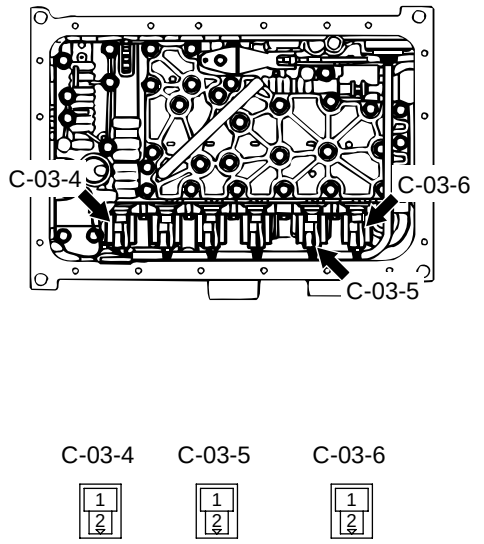
NO : Replace the harness wire.

CONNECTOR : C-03



AC204395 AE

CONNECTORS : C-03-4, C-03-5, C-03-6



AC204749 AD

DTC 36: Torque Converter Clutch Solenoid Valve System

Solenoid Valve System Circuit
Refer to P.23Ac-147.

CIRCUIT OPERATION
Refer to P.23Ac-147.

DTC SET CONDITIONS
If the resistance value for the torque converter clutch solenoid valve circuit is greater than 3.5 ohms (open) or less than 2.6 ohms (short) for 4 seconds, DTC 36 is set. The transmission is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

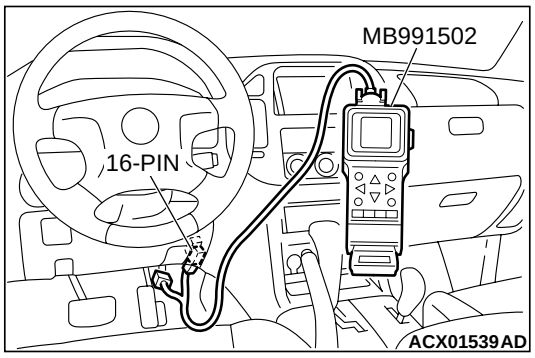
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Malfunction of torque converter clutch solenoid valve
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check actuator test item 06: Torque Converter Clutch Solenoid Valve.

⚠ 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.



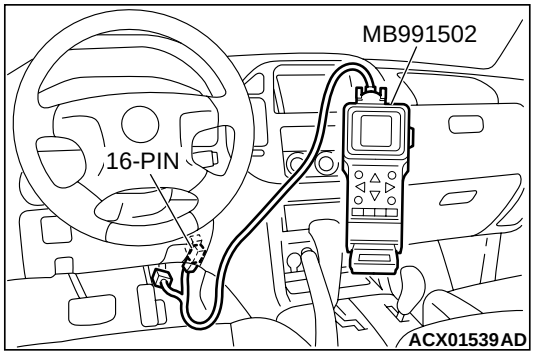
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 06, Torque Converter Clutch Solenoid Valve.
- An audible clicking or buzzing should be heard when the torque converter clutch solenoid valve is energized.

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

Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.

NO : Go to Step 2.

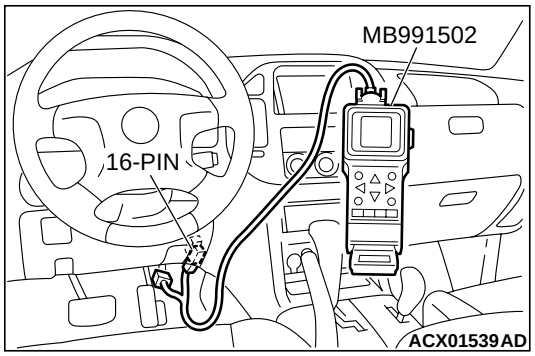


STEP 2. Using scan tool MB991502, read the A/T diagnostic trouble code.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 54 set? (DTC 54 may be set along with multiple DTCs.)

YES : Refer to P.23Ac-237 DTC 54: A/T Control Relay System.
NO : Go to Step 3.



STEP 3. Using scan tool MB991502, read the A/T diagnostic trouble code.

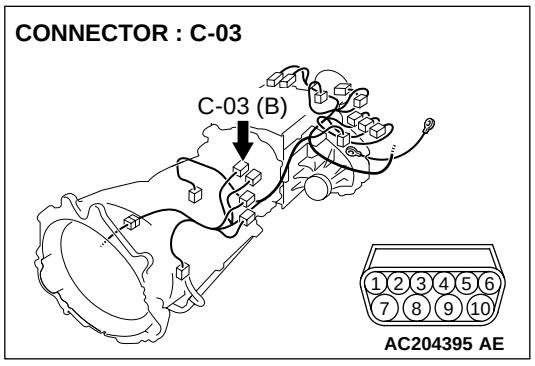
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

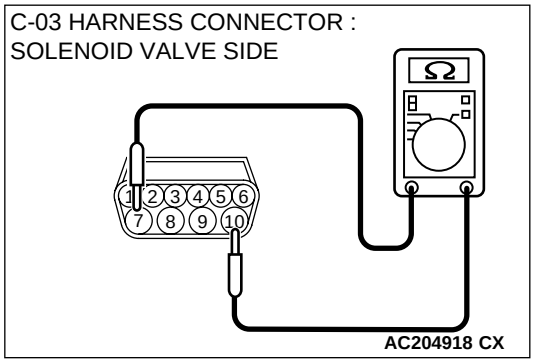
Q: Are DTC 31 and DTC 35 set? (Multiple DTCs may be set.)

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

STEP 4. Measure the torque converter clutch solenoid valve resistance at A/T control solenoid valve assembly connector C-03.

(1) Disconnect connector C-03 and measure at the solenoid valve side.





(2) Measure the resistance between solenoid valve assembly connector C-03 terminals 7 and 10.

Resistance value: 2.7 – 3.4 ohms [at 20°C (68°F)]

Q: Is the measured resistance 2.7 – 3.4 ohms [at 20°C (68°F)]?

YES : Go to Step 6.
NO : Go to Step 5.

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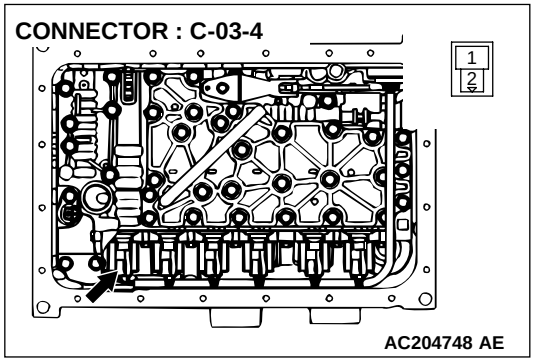
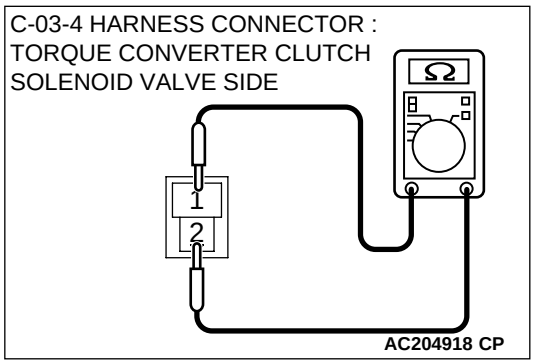
STEP 5. Measure the solenoid valve resistance at the torque converter clutch solenoid valve connector C-03-4 inside the transmission.

(1) Disconnect solenoid valve connector C-03-4 and measure at the solenoid valve side.





(2) Measure the resistance between torque converter clutch solenoid valve terminals 1 and 2.

Resistance value: 2.7 – 3.4 ohms [at 20°C (68°F)]

Q: Is the measured resistance 2.7 – 3.4 ohms [at 20°C (68°F)?

YES : Replace the harness wire between A/T control solenoid valve assembly connector C-03 and the solenoid valves.

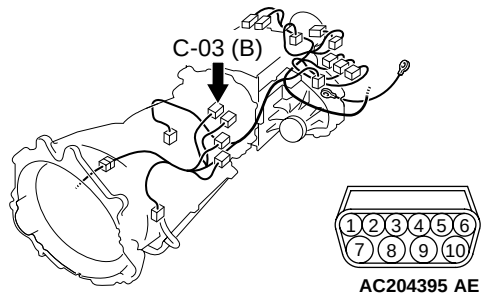
NO : Replace the torque converter clutch solenoid valve. Refer to GROUP 23B, Valve Body P.23B-80.

STEP 6. Check A/T control solenoid valve assembly connector C-03, PCM connector D-136 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



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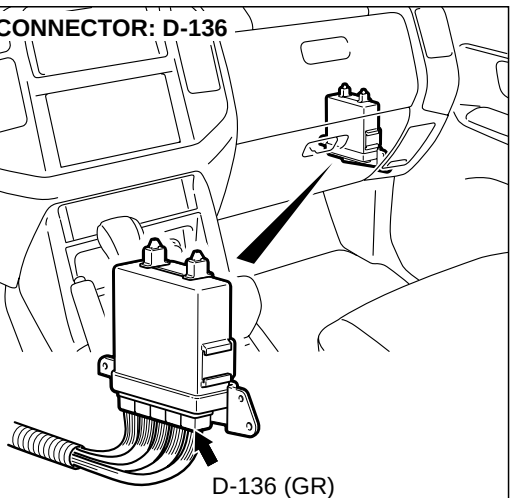
CONNECTOR: D-136



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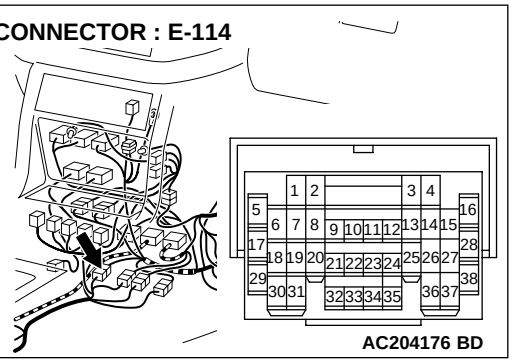
CONNECTOR : E-114



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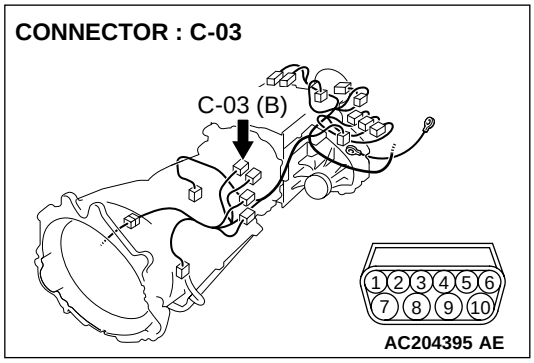
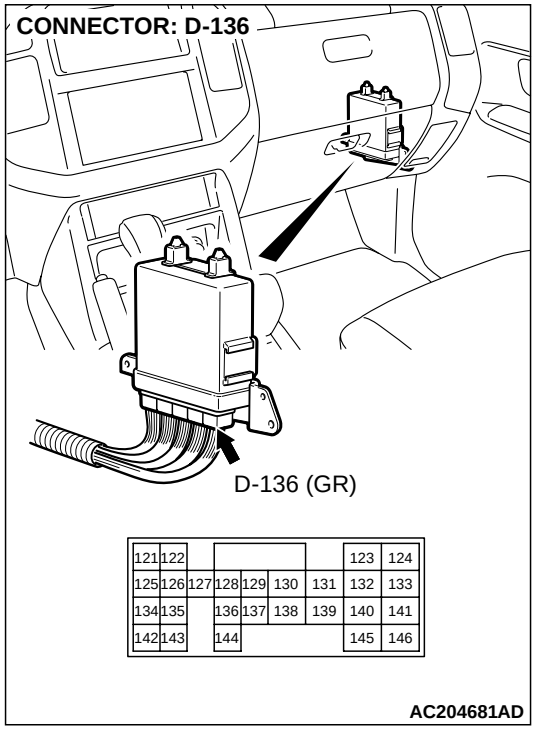
TSB Revision



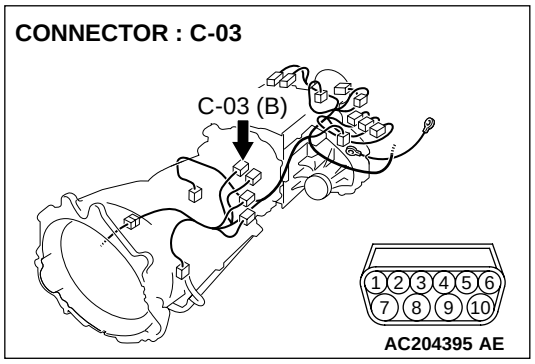


STEP 7. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 terminal 7 and PCM connector D-136 terminal 130.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

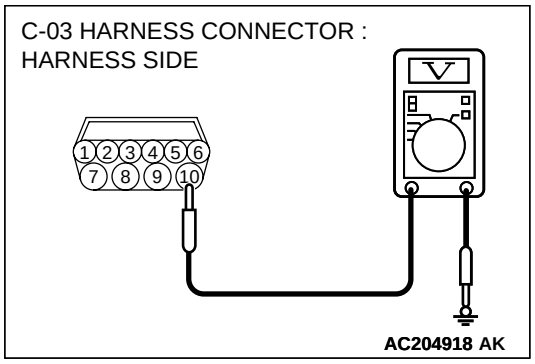
NO : Repair or replace the harness wire.



STEP 8. Measure the supply voltage at A/T control solenoid valve assembly connector C-03 by backprobing.

(1) Do not disconnect solenoid valve assembly harness connector C-03.

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



(3) Measure the voltage between harness connector C-03 terminal 10 and ground by backprobing.
- The voltage should equal battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 11.

NO : Go to Step 9.

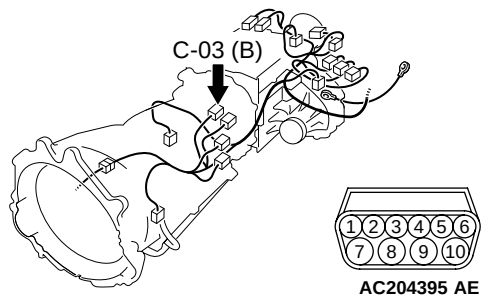
STEP 9. Check A/T control solenoid valve assembly connector C-03, A/T control relay connector D-13 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

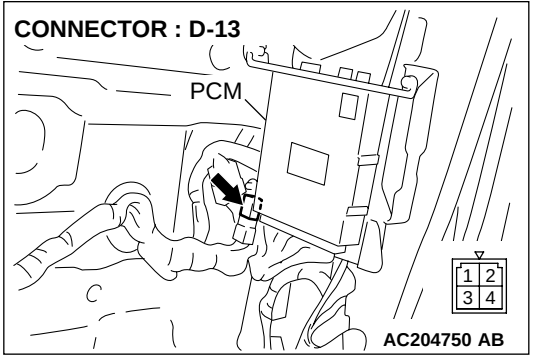
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



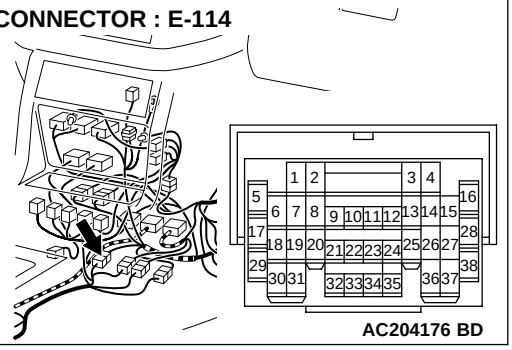
AC204395 AE

CONNECTOR : D-13



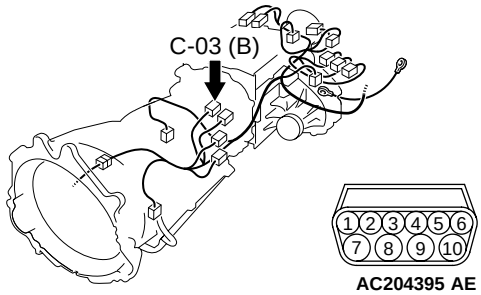
AC204750 AB

CONNECTOR : E-114



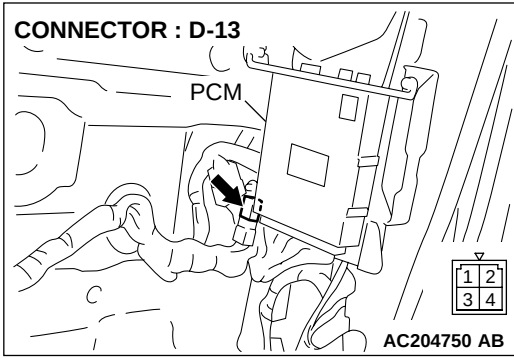
AC204176 BD

CONNECTOR : C-03



AC204395 AE

CONNECTOR : D-13



AC204750 AB

STEP 10. Check the harness for an open circuit or short circuit to ground between A/T control solenoid valve assembly connector C-03 terminal 10 and A/T control relay connector D-13 terminal 3.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

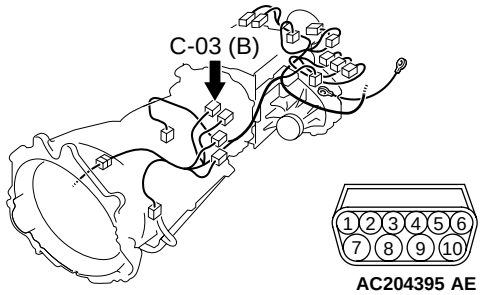
NO : Repair or replace the harness wire.

STEP 11. Check A/T control solenoid valve assembly connector C-03, PCM connector D-136 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : Go to Step 12.

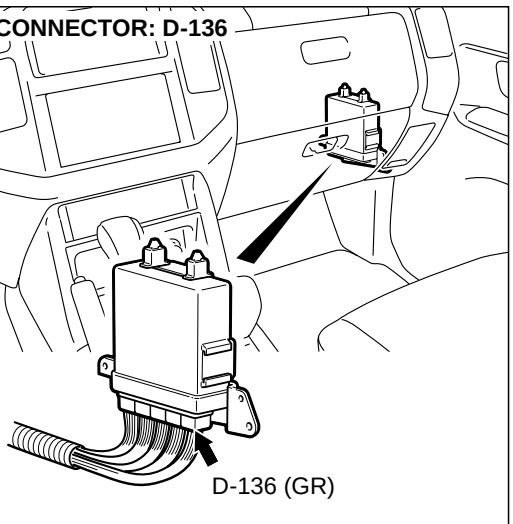
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : C-03



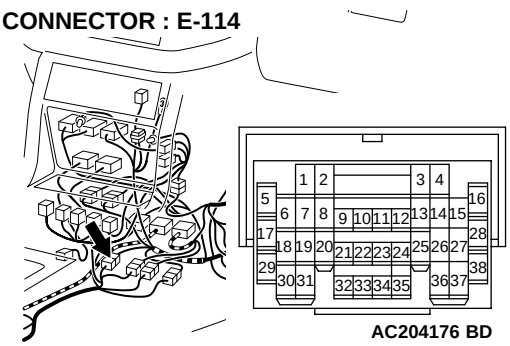
AC204395 AE

CONNECTOR: D-136



AC204681AD

CONNECTOR : E-114



AC204176 BD

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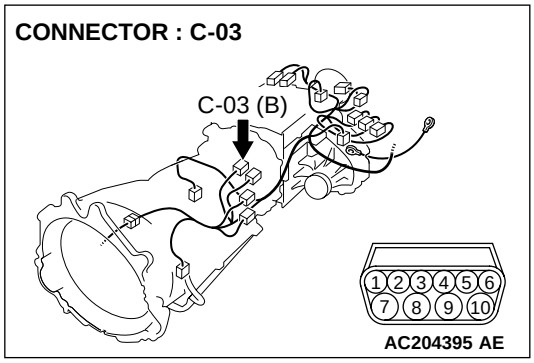
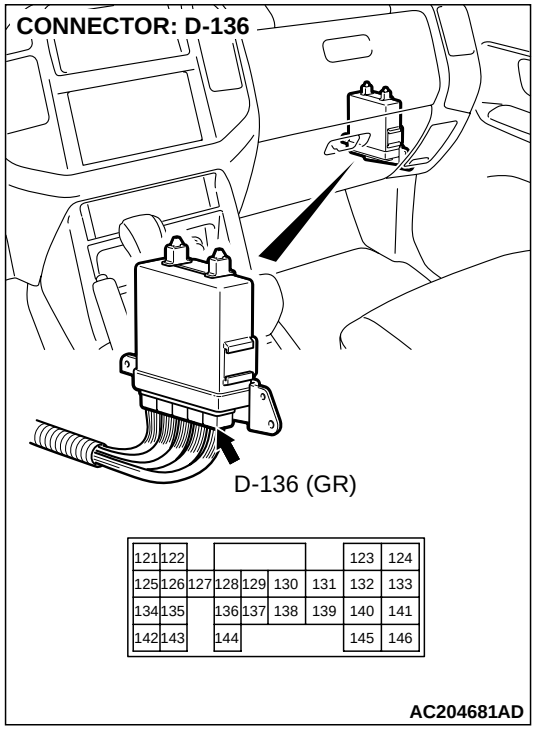
STEP 12. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 (terminals 6, 7 and 8) and PCM connector D-136 (terminals 128, 129 and 130).

Q: Are the harness wires in good condition?

YES : Go to Step 13.

NO : Repair or replace the harness wire(s).





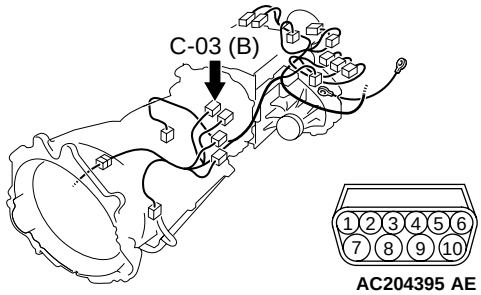
STEP 13. Check the harness for an open or short circuit to ground between A/T control solenoid valve assembly connector C-03 (terminals 6, 7, 8 and 10) and solenoid valve connectors C-03-4, C-03-5 and C-03-6.

Q: Is the harness wire in good condition?

YES : Replace the PCM.

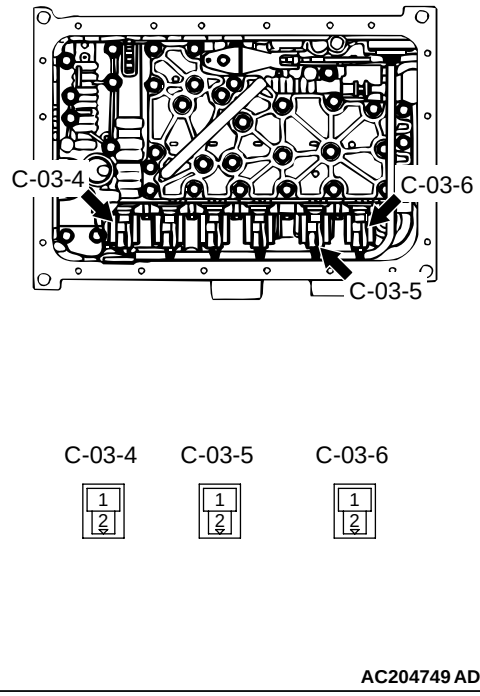
NO : Replace the harness wire.

CONNECTOR : C-03



AC204395 AE

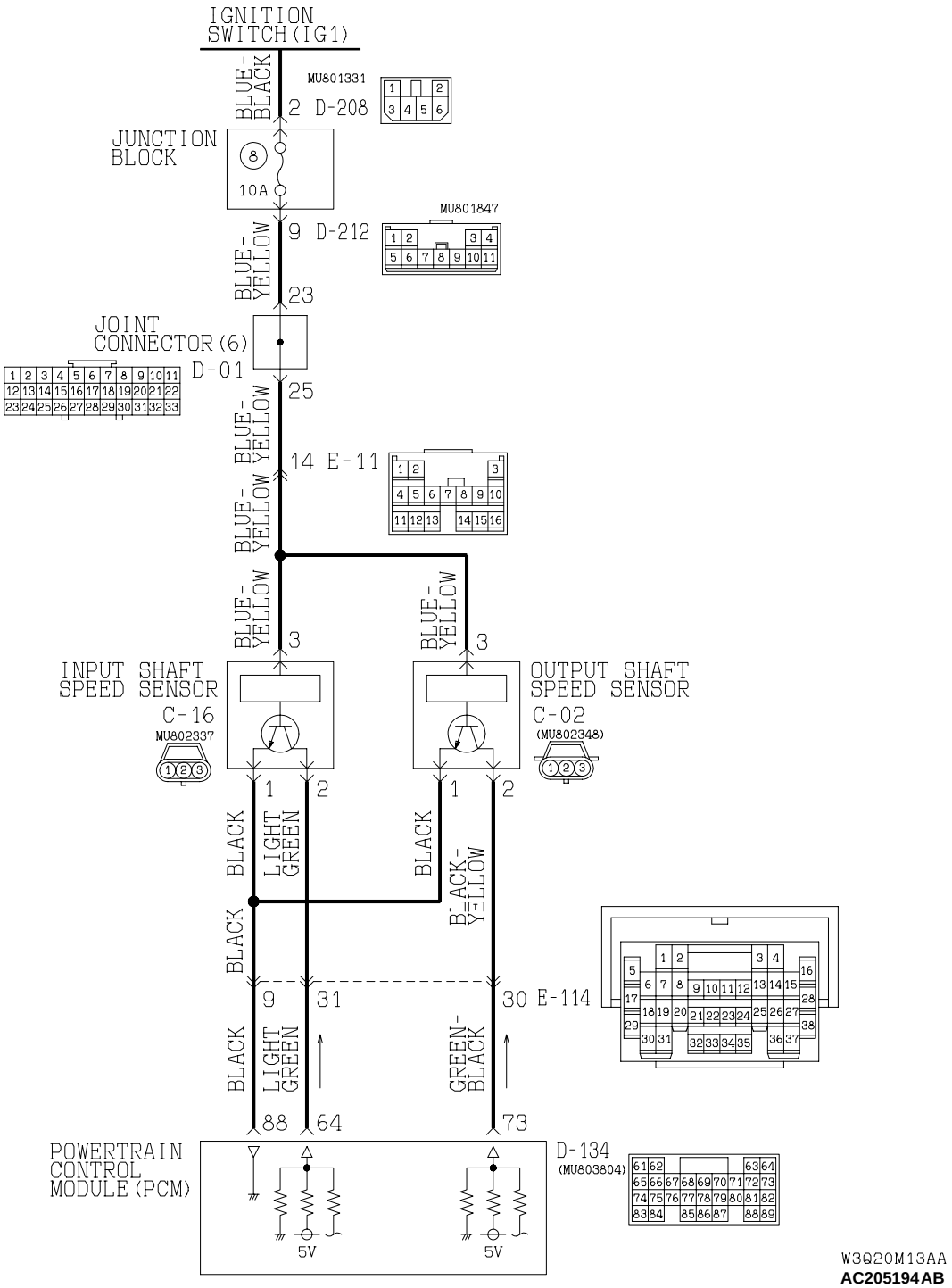
CONNECTORS : C-03-4, C-03-5, C-03-6



AC204749 AD

DTC 41: 1st Gear Incorrect Ratio
DTC 42: 2nd Gear Incorrect Ratio
DTC 43: 3rd Gear Incorrect Ratio
DTC 44: 4th Gear Incorrect Ratio
DTC 45: 5th Gear Incorrect Ratio
DTC 46: Reverse Gear Incorrect Ratio

Input Shaft Speed Sensor and Output Shaft Speed Sensor System Circuit



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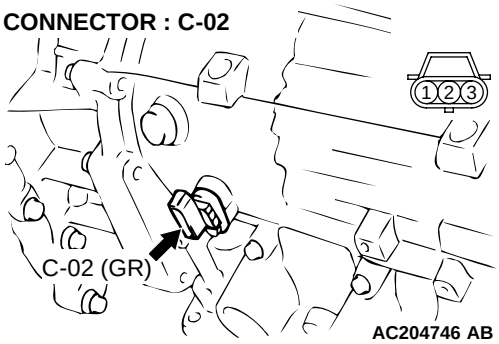
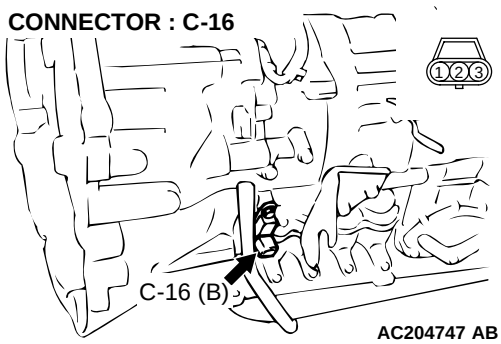
CONNECTOR : C-02



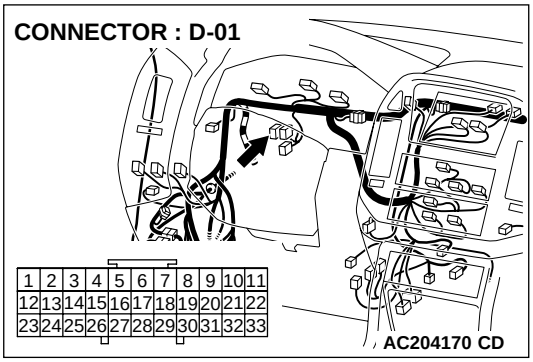
AC204746 AB

CONNECTOR : C-16



AC204747 AB

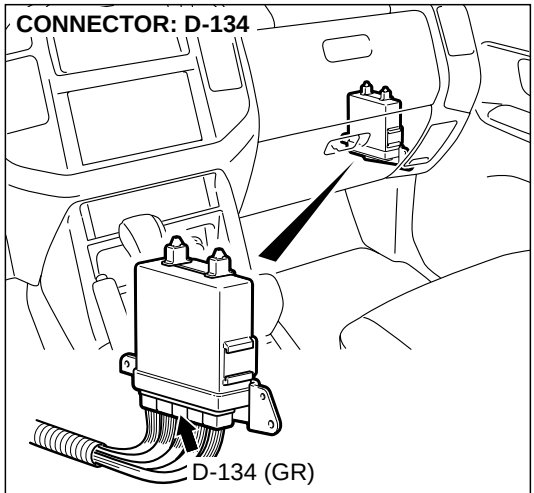
CONNECTOR : D-01



1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

AC204170 CD

CONNECTOR: D-134



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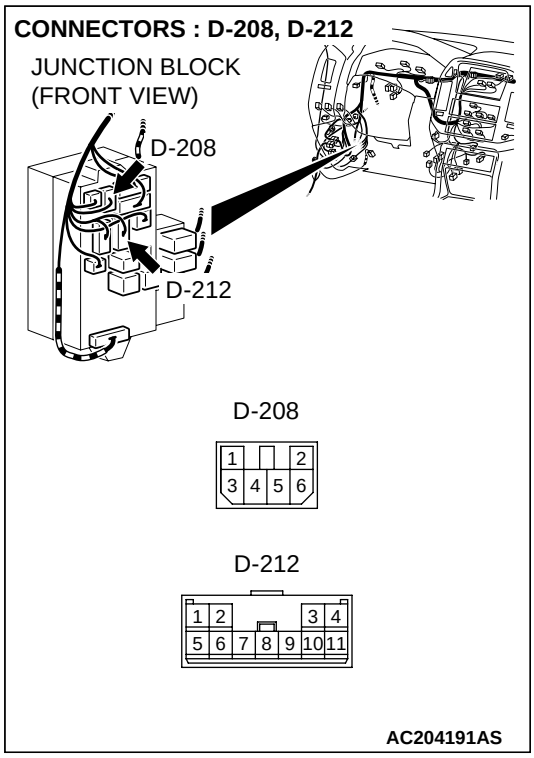
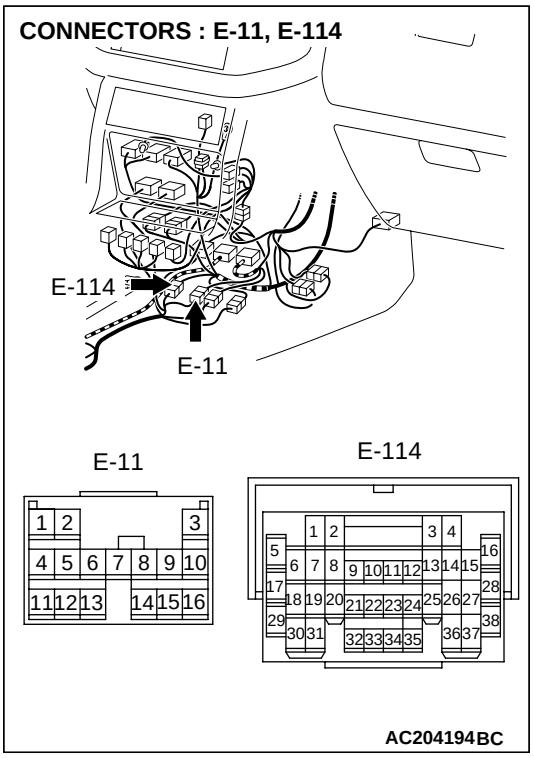
65	66	67	68	69	70	71	72	73	
74	75	76	77	78	79	80	81	82	
83	84		85	86	87		88	89	

AC204681AC





CIRCUIT OPERATION

- The input shaft speed sensor generates a pulsed signal of 0 ⇔ 5 volts. The pulsed signal frequency increases with an increase in the input shaft speed.
- The PCM (terminal 64) continuously monitors the input shaft speed signal.
- The output shaft speed sensor generates a pulsed signal of 0 ⇔ 5 volts. The pulsed signal frequency increases with an increase in the output shaft speed.
- The PCM (terminal 73) continuously monitors the output shaft speed signal.

DTC SET CONDITIONS

If the PCM receives a signal (multiplied by the 1st gear ratio) from the output shaft speed sensor that is not the same as the signal received from the input shaft speed sensor (while driving with the transmission in 1st gear), DTC 41 is set. If DTC 41 is set four times, the transmission is locked into 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the input shaft speed sensor
- Malfunction of the output shaft speed sensor
- Malfunction of the PCM
- Malfunction of the reverse clutch retainer
- Malfunction of the direct planetary carrier
- Malfunction of the low-reverse brake system (DTC 41 or DTC 46)
- Malfunction of the underdrive clutch system (DTC 41, DTC 42, DTC 43 or DTC 44)
- Malfunction of the second brake system (DTC 42 or DTC 45)
- Malfunction of the overdrive clutch system (DTC 43, DTC 44 or DTC 45)
- Malfunction of the reverse clutch system (DTC 46)
- Malfunction of the direct clutch system (DTC 44 or DTC 45)
- Malfunction of the reduction brake system (DTC 41, DTC 42, DTC 43 or DTC 46)
- Electrical noise generated

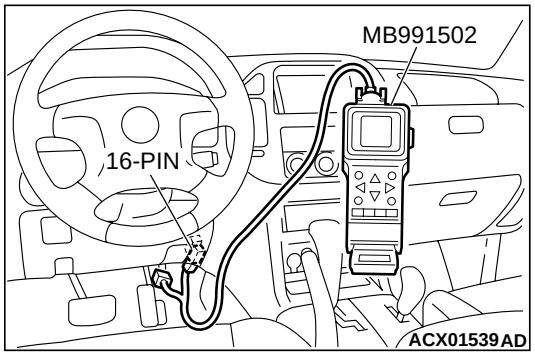
TSB Revision

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, read the A/T diagnostic trouble code.

⚠ 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.

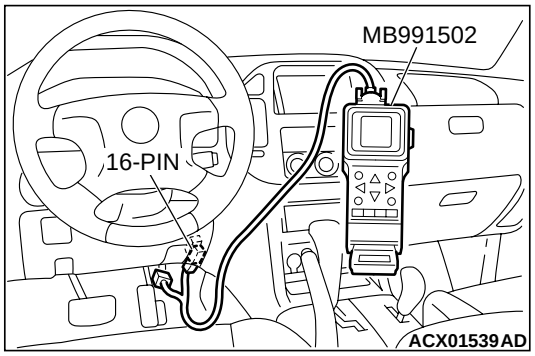


(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is A/T DTC 22 or 23 set?

YES : Refer to P.23Ac-47, DTC 22: Input Shaft Speed Sensor System, or refer to P.23Ac-65, DTC 23: Output Shaft Speed Sensor System.
NO : Go to Step 2.

STEP 2. Using scan tool MB991502, check actuator test.



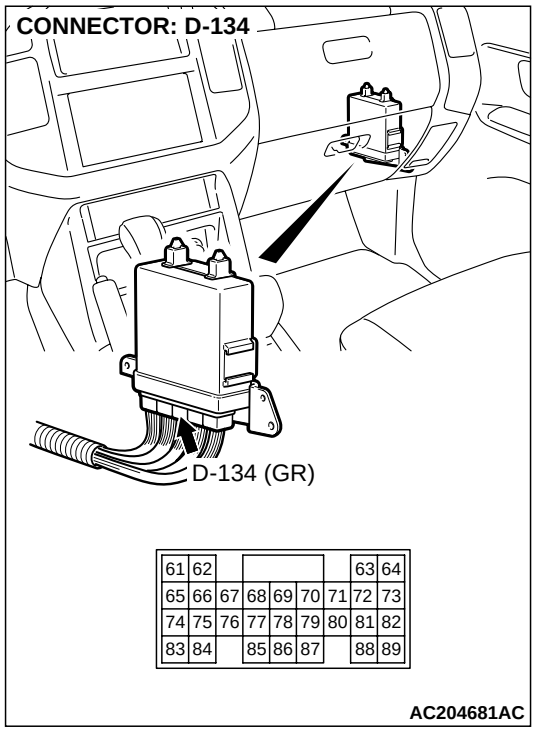
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to actuator test mode for following items.
   a. item 01: Low-reverse Solenoid Valve
   b. item 02: Underdrive Solenoid Valve
   c. item 03: Second Solenoid Valve
   d. item 04: Overdrive Solenoid Valve
   e. item 05: Reduction Solenoid Valve
      - An audible clicking or buzzing should be heard when the solenoid valves are energized.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

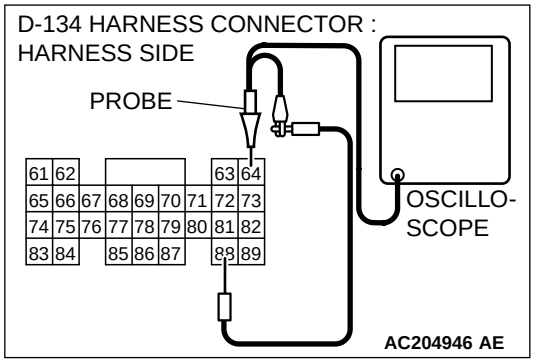
Q: Are the solenoid valves operating properly?

YES : Go to Step 3.
NO : Replace the defective solenoid valves. Refer to GROUP 23B, Valve Body P.23B-80.

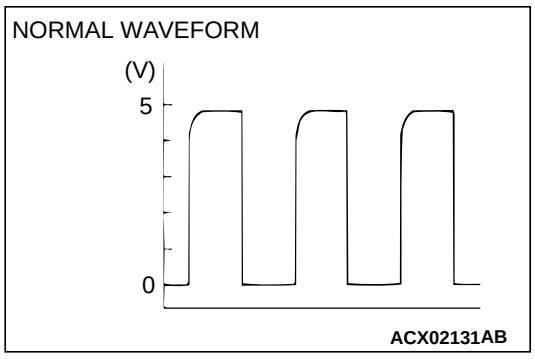
STEP 3. Using an oscilloscope, check the input shaft speed sensor waveform at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.





(2) Connect an oscilloscope probe to PCM connector D-134 terminal 64 and terminal 88 by backprobing.
(3) Start the engine and drive the vehicle at constant speed of 50 km/h (31 mph). (Gear range: 3rd gear)



(4) Check the input shaft speed sensor waveform.
- The input shaft speed sensor waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.8 volt and less. The output waveform should not contain electrical noise.

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

Q: Is the waveform normal?

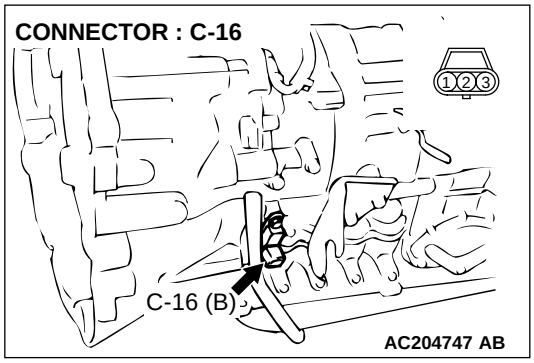
YES : Go to Step 8.
NO : Go to Step 4.

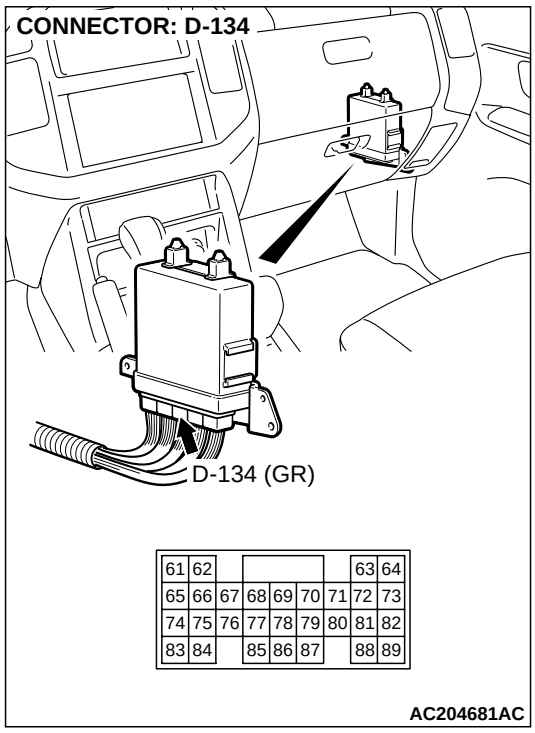
STEP 4. Check input shaft speed sensor connector C-16, PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

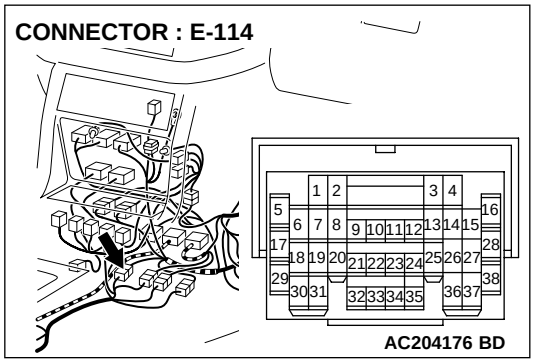
Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





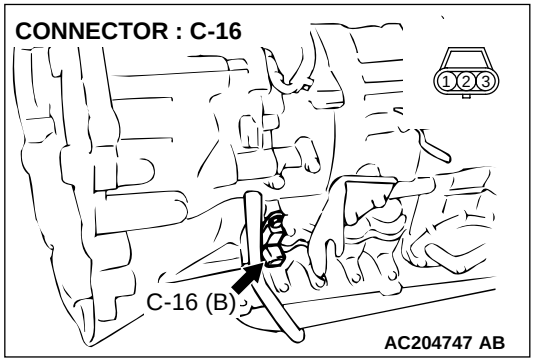


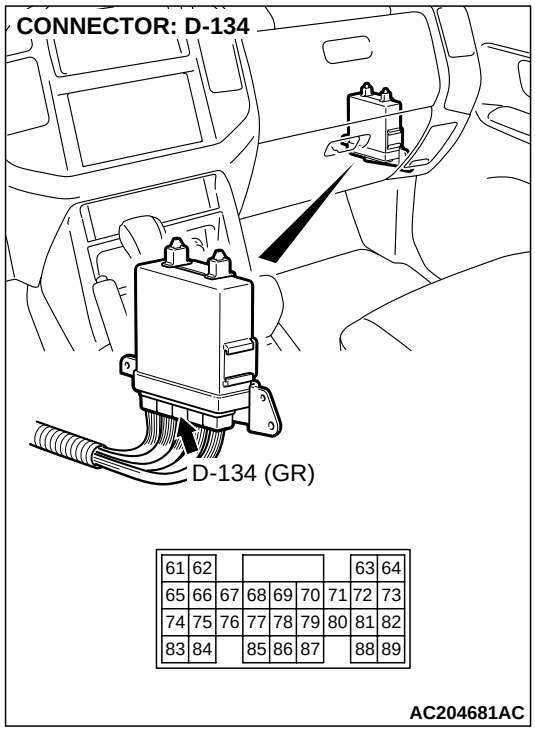
STEP 5. Check harness for damage between input shaft speed sensor connector C-16 terminal 2 and PCM connector D-134 terminal 64.

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair or replace the harness wire.





STEP 6. Replace the input shaft speed sensor.

(1) Replace the input shaft speed sensor. Refer to GROUP 23B, Transmission P.23B-18.

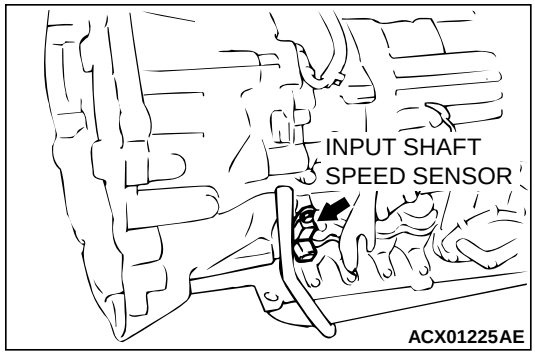
(2) Test drive the vehicle.

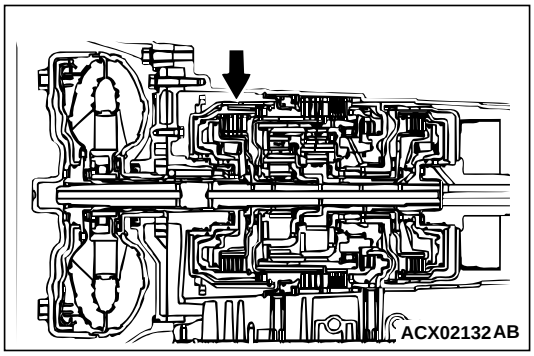
(3) Check for A/T diagnostic trouble code.

Q: Were any A/T DTCs set?

YES : Go to Step 7.

NO : The procedure is complete.





STEP 7. Replace the reverse clutch retainer.

(1) Replace the reverse clutch retainer. Refer to GROUP 23B, Reverse and Overdrive Clutches P.23B-67.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

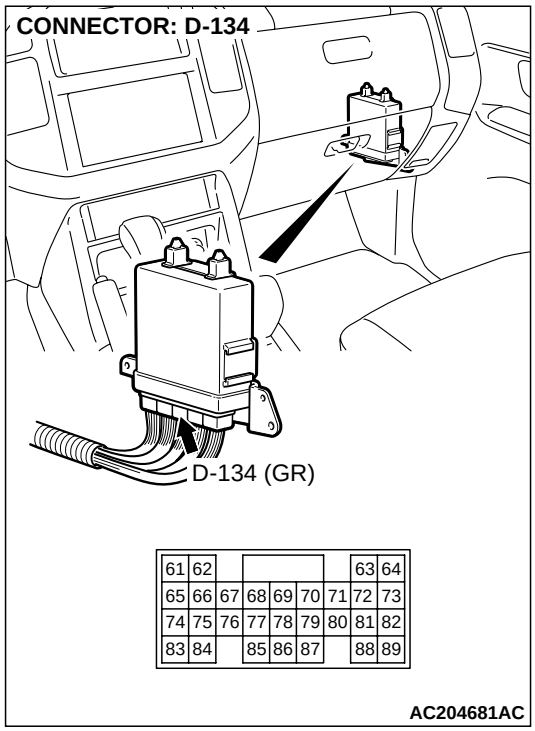
Q: Were any A/T DTCs set?

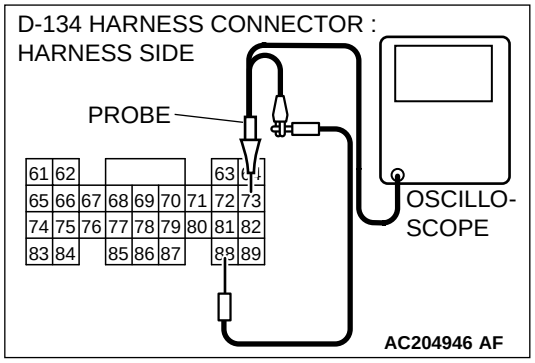
YES : An A/T DTC may have set due to external radio frequency interference (RFI) possibly caused by cellular phone activity, or aftermarket components installed on the vehicle.

NO : The procedure complete.

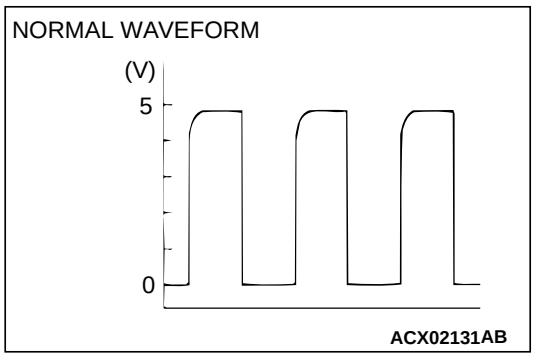
STEP 8. Using an oscilloscope, check the output shaft speed sensor waveform at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.





(2) Connect an oscilloscope probe to PCM connector D-134 terminal 73 and terminal 88 by backprobing.
(3) Start the engine and drive the vehicle at a constant speed of 50 km/h (31 mph). (Gear range: 3rd gear)



(4) Check the output shaft speed sensor waveform.
- The output shaft speed sensor waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.8 volt and less. The output waveform should not contain electrical noise.

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

Q: Is the waveform normal?

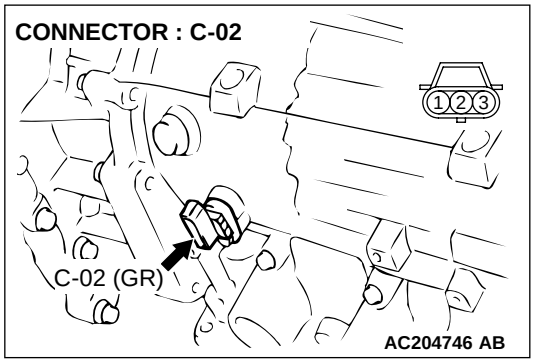
YES : Go to Step 13.
NO : Go to Step 9.

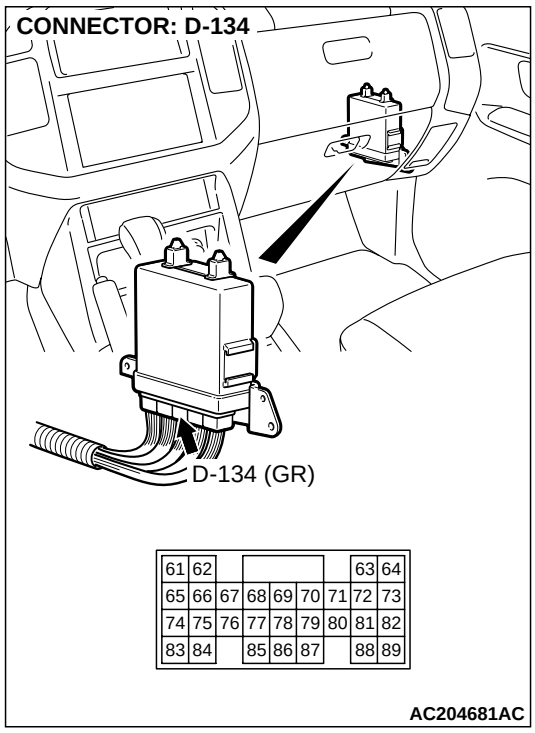
STEP 9. Check output shaft speed sensor connector C-02, PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

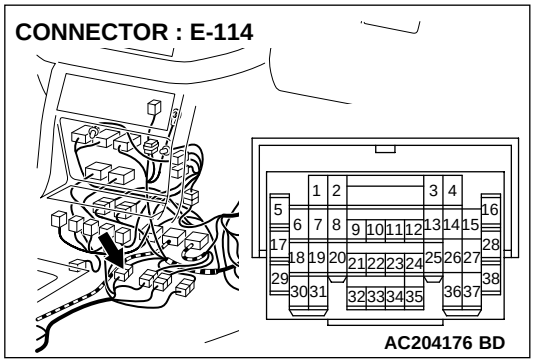
Q: Are the connectors and terminals in good condition?

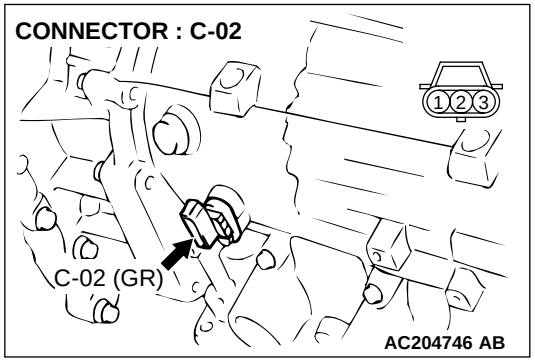
YES : Go to Step 10.

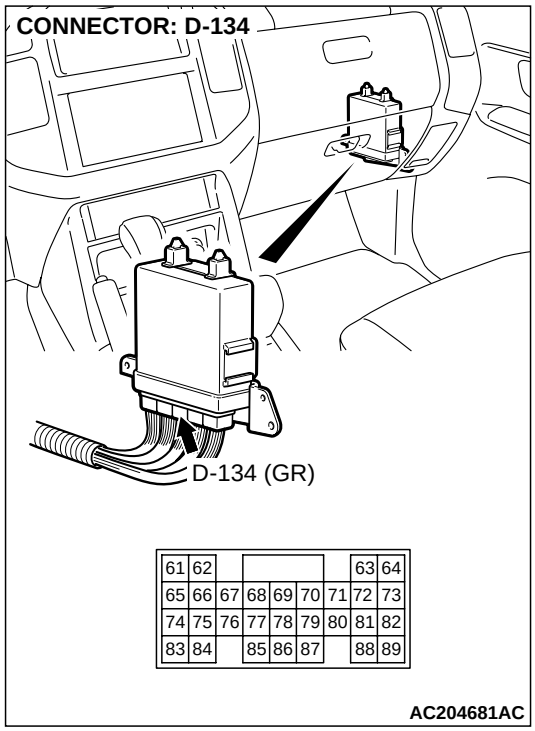
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.









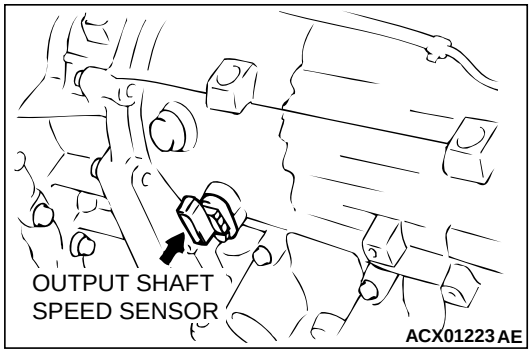


STEP 10. Check harness for damage between output shaft speed sensor connector C-02 terminal 2 and PCM connector D-134 terminal 73.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair or replace the harness wire.



STEP 11. Replace the output shaft speed sensor.

(1) Replace the output shaft speed sensor. Refer to GROUP 23B, Transmission P.23B-18.

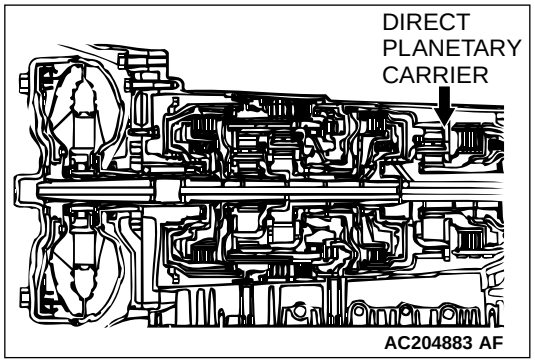
(2) Test drive the vehicle.

(3) Check for A/T diagnostic trouble code.

Q: Were any A/T DTCs set?

YES : Go to Step 12.

NO : The procedure is complete.



STEP 12. Replace the direct planetary carrier.

(1) Replace the direct planetary carrier. Refer to GROUP 23B, Transmission P.23B-18.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Were any A/T DTCs set?

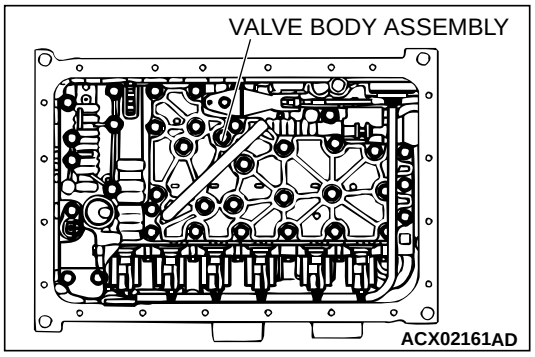
YES : An A/T DTC may have set due to external radio frequency interference (RFI) possibly caused by cellular phone activity, or aftermarket components installed on the vehicle.
NO : The procedure is complete.

STEP 13. Replace the PCM.

(1) Replace the PCM.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Were any A/T DTCs set?

YES : Go to Step 14.
NO : The procedure is complete.

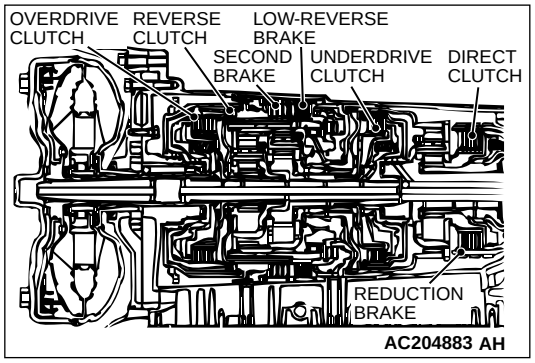


STEP 14. Replace the valve body.

(1) Replace the valve body. Refer to GROUP 23B, Transmission P.23B-18.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Were any A/T DTCs set?

YES : Go to Step 15.
NO : The procedure is complete.



STEP 15. Overhaul the A/T.

(1) Replace the following parts.

- If DTC 41, 42, 43 or 44 are set individually or in a group, replace the underdrive clutch. Refer to GROUP 23B, Underdrive Clutch P.23B-76.
- If DTC 43, 44 or 45 are set individually or in a group, replace the overdrive clutch. Refer to GROUP 23B, Reverse and Overdrive Clutch P.23B-67.
- If DTC 44 or 45 are set individually or in a group, replace the direct clutch. Refer to GROUP 23B, Direct Clutch P.23B-91.
- If DTC 46 is set individually or in a group, replace the reverse clutch. Refer to GROUP 23B, Reverse and Overdrive Clutch P.23B-67.
- If DTC 41 or 46 are set individually or in a group, replace the low-reverse brake. Refer to GROUP 23B, Transmission P.23B-18.
- If DTC 42 or 45 are set individually or in a group, replace the second brake. Refer to GROUP 23B, Transmission P.23B-18.
- If DTC 41, 42, 43 or 46 are set individually or in a group, replace the reduction brake. Refer to GROUP 23B, Transmission P.23B-18.
- If DTC 41 is set individually or in a group, replace the one-way clutch (OWC-L). Refer to GROUP 23B, Low Reverse Annulus Gear P.23B-72.
- If DTC 41, 42 or 43 are set individually or in a group, replace the one-way clutch (OWC-D). Refer to GROUP 23B, Output Shaft Support P.23B-94.

(2) Test drive the vehicle.

(3) Check for A/T diagnostic trouble code.

Q: Are any A/T DTCs set again?

YES : An A/T DTC may have set due to external radio frequency interference (RFI) possibly caused by cellular phone activity, or aftermarket components installed on the vehicle.

NO : The procedure is complete.

DTC 52: Torque Converter Clutch System

DTC SET CONDITIONS

If the input shaft speed sensor signal is abnormal and the drive duty rate for the torque converter clutch solenoid valve is 100 percent for a period of more than 4 seconds, it is judged that there is a problem in the torque converter clutch system and DTC 52 is set.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the torque converter clutch solenoid valve
- Malfunction of the input shaft speed sensor
- Malfunction of the reverse clutch retainer
- Malfunction of the valve body
- Damaged harness or connector
- Malfunction of the PCM
- Malfunction of the torque converter

DIAGNOSIS

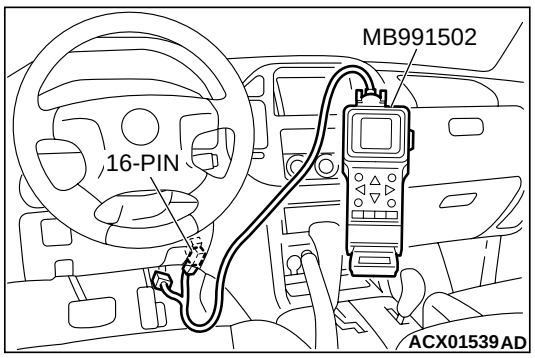
Required Special Tool:

- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, read the A/T diagnostic trouble code.

⚠ 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.

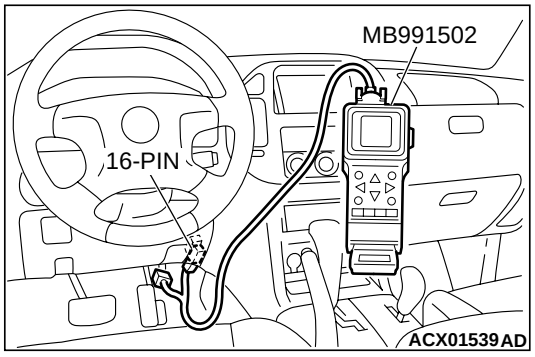


(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 22 set?

YES : Refer to P.23Ac-47, DTC 22: Input Shaft Speed Sensor System.
NO : Go to Step 2.

STEP 2. Using scan tool MB991502, check actuator test item 06: Torque Converter Clutch Solenoid Valve.



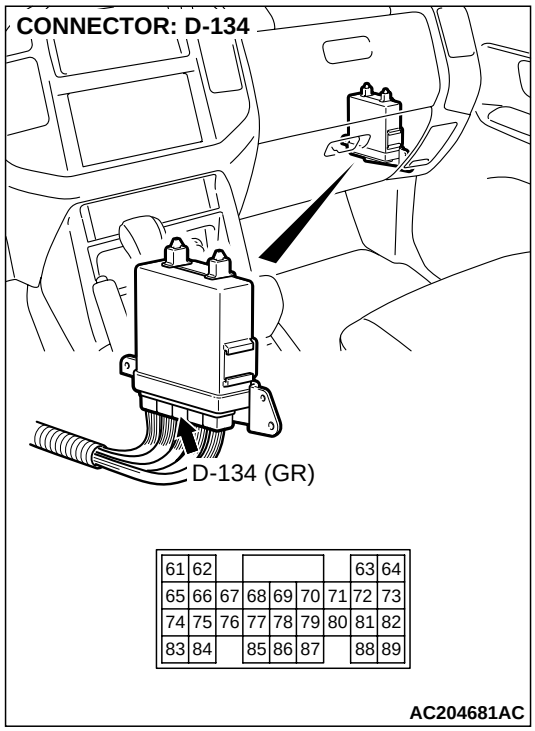
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 06, Torque Converter Clutch Solenoid Valve.
    - An audible clicking or buzzing should be heard when the torque converter clutch solenoid valve is energized.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

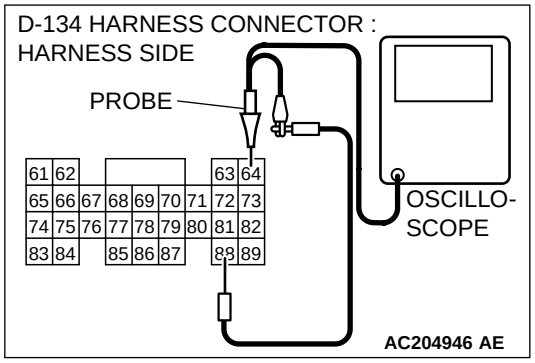
Q: Is the solenoid valve operating properly?

YES : Go to Step 3.
NO : Replace the torque converter clutch solenoid valve. Refer to GROUP 23B, Valve Body P.23B-80.

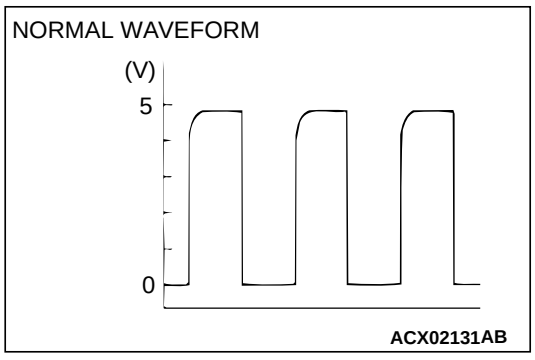
STEP 3. Using an oscilloscope, check the input shaft speed sensor waveform at PCM connector D-134 by backprobing.

(1) Do not disconnect connector D-134.





(2) Connect an oscilloscope probe to PCM connector D-134 terminal 64 and terminal 88 by backprobing.
(3) Start the engine and drive the vehicle at a constant speed of 50 km/h (31 mph). (Gear range: 3rd gear)



(4) Check the waveform.
- The input shaft speed sensor waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.8 volt and less. The output waveform should not contain electrical noise.

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

Q: Is the waveform normal?

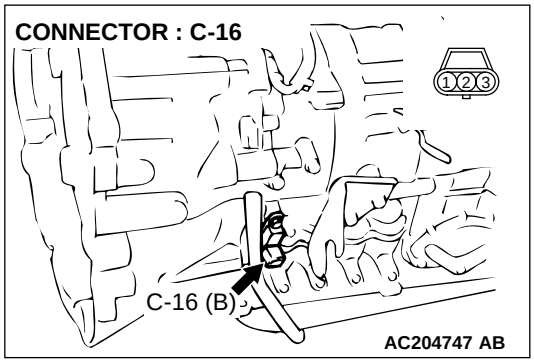
YES : Go to Step 8.
NO : Go to Step 4.

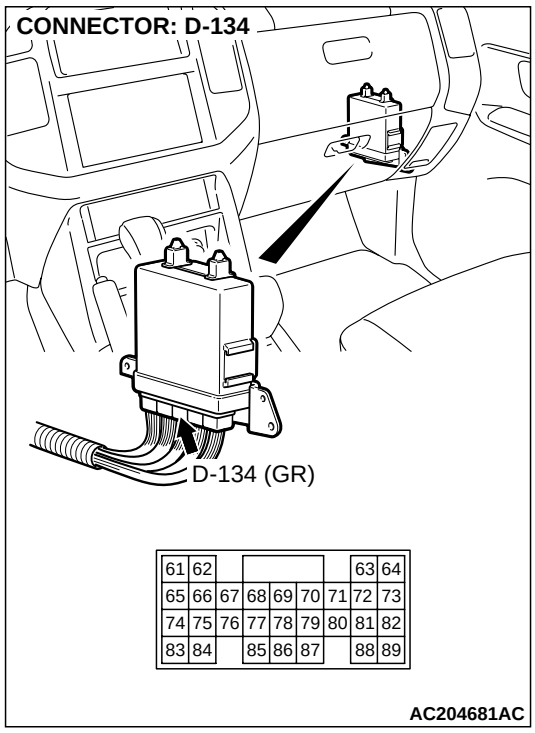
STEP 4. Check input shaft speed sensor connector C-16, PCM connector D-134 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

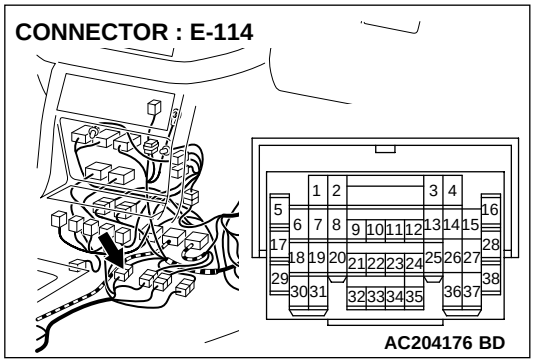
Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





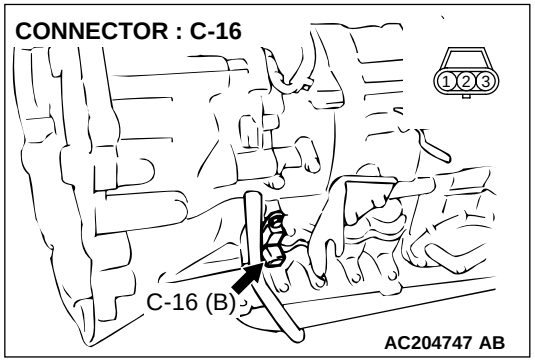


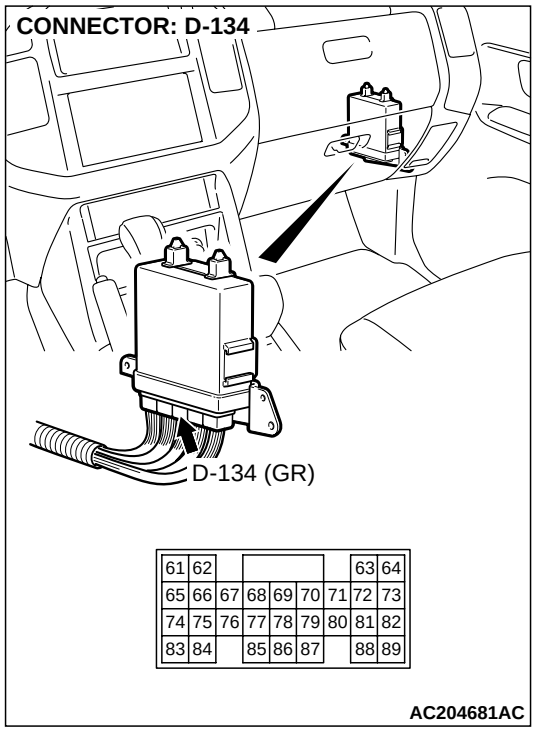
STEP 5. Check harness for damage between input shaft speed sensor connector C-16 terminal 2 and PCM connector D-134 terminal 64.

Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair or replace the harness wire.





STEP 6. Replace the input shaft speed sensor.

(1) Replace the input shaft speed sensor. Refer to GROUP 23B, Transmission P.23B-18.

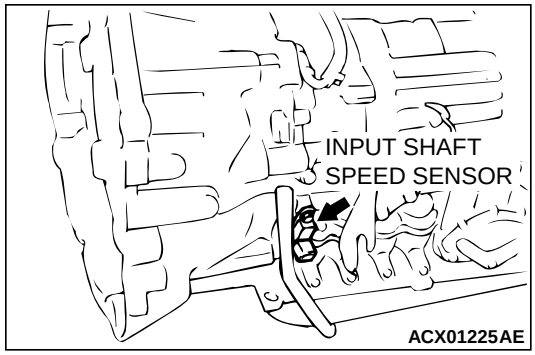
(2) Test drive the vehicle.

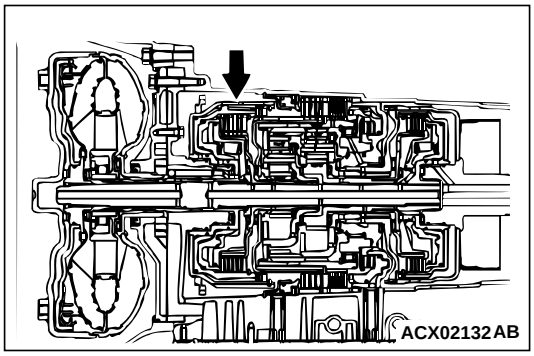
(3) Check for A/T diagnostic trouble code.

Q: Is DTC 52 set?

YES : Go to Step 7.

NO : The procedure is complete.





STEP 7. Replace the reverse clutch retainer.

(1) Replace the reverse clutch retainer. Replace the reverse clutch retainer. Refer to GROUP 23B, Reverse and Overdrive Clutch P.23B-67.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is DTC 52 set?

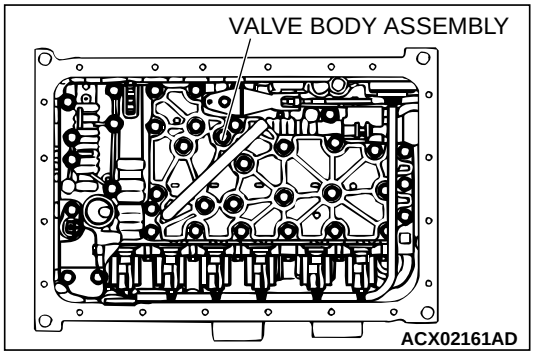
YES : The A/T DTC may have set due to external radio frequency interference (RFI) possibly caused by cellular phone activity or aftermarket components installed on the vehicle.
NO : The procedure is complete.

STEP 8. Replace the PCM.

(1) Replace the PCM.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is DTC 52 set?

YES : Go to Step 9.
NO : The procedure is complete.



STEP 9. Replace the valve body.

(1) Replace the valve body. Refer to GROUP 23B, Transmission P.23B-18.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is DTC 52 set?

YES : Replace the torque converter. Refer to P.23Aa-37, Transmission and Transfer Assembly.
NO : The procedure is complete.

DTC 53: Torque Converter Clutch is Stuck On

DTC SET CONDITIONS

If the torque converter clutch remains engaged for a continuous period of ten seconds or more when the PCM is attempting to disengage the torque converter clutch, DTC 53 is set.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

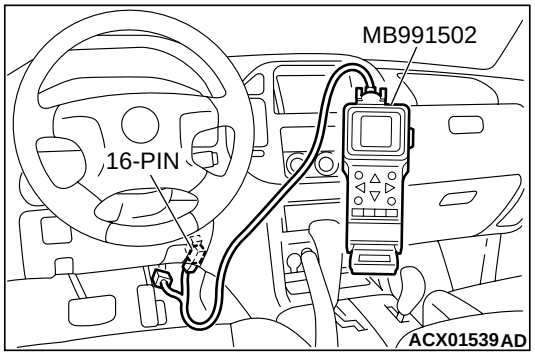
- Malfunction of the torque converter clutch solenoid valve
- Malfunction of the valve body
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 52: Amount of Torque Converter Clutch Slippage.

⚠ 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.



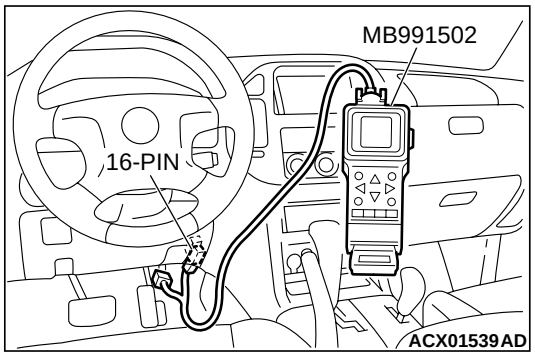
(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine and run at constant speed of 60 km/h (37 mph). (Gear range: 3rd gear)
(3) Set scan tool MB991502 to data reading mode for item 52, Amount of Torque Converter Clutch Slippage.
- Driving at constant speed of 60 km/h (37 mph), the display should be "–10 to 10 r/min."
- If the accelerator pedal is released, the display on the scan tool changes. (50 km/h (31 mph) and less).

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

Q: Is the torque converter clutch slippage within the specified range?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Go to Step 2.

STEP 2. Using scan tool MB991502, check actuator test item 06: Torque Converter Clutch Solenoid Valve.

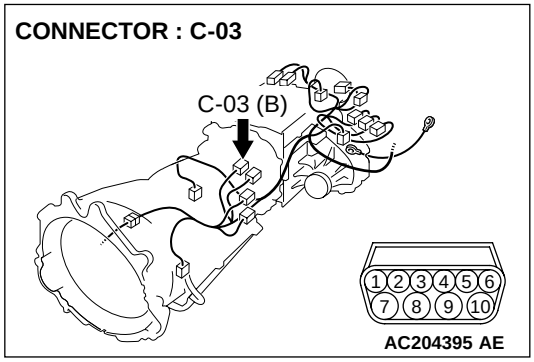


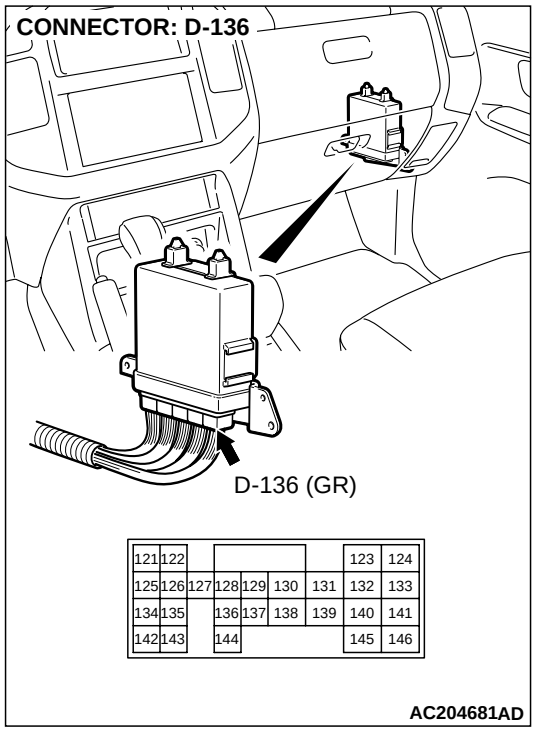
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to actuator test mode for item 06, Torque Converter Clutch Solenoid Valve.
- An audible clicking or buzzing should be heard when the torque converter clutch solenoid valve is energized.

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

Q: Is the solenoid valve operating properly?

YES : Go to Step 5.
NO : Go to Step 3.





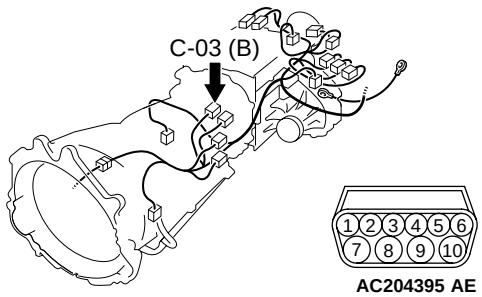
STEP 3. Check the harness for a short circuit to ground between A/T control solenoid valve assembly connector C-03 and PCM connector D-136.

(1) Disconnect A/T control solenoid valve assembly connector C-03 and PCM connector D-136.
(2) Check for continuity between the A/T control solenoid valve assembly connector C-03 terminal 7 and ground.
(3) The measurement should indicate an open circuit.

Q: Does continuity exist?

YES : Go to Step 4.
NO : Repair the harness short to ground.

CONNECTOR : C-03



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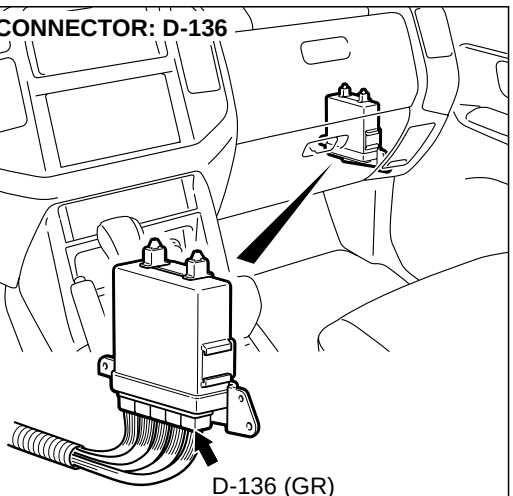
CONNECTOR: D-136



121	122						123	124
125	126	127	128	129	130	131	132	133
134	135		136	137	138	139	140	141
142	143		144				145	146

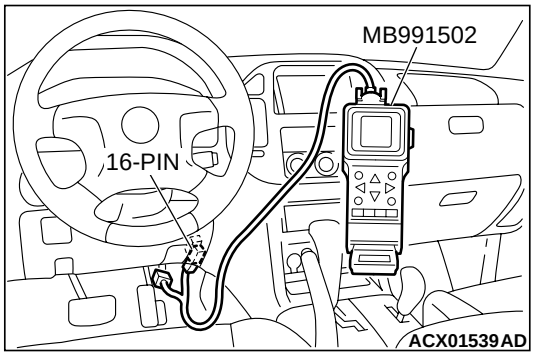
AC204681AD

STEP 4. Check A/T control solenoid valve assembly connector C-03 and PCM connector D-136 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Replace the torque converter clutch solenoid valve. Refer to GROUP 23B, Valve Body P.23B-80.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 5. Using scan tool MB991502, check data list item 52: Amount of Torque Converter Clutch Slippage. (Second check)

(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine and run at constant speed of 60 km/h (37 mph). (Gear range: 3rd gear)
(3) Set scan tool MB991502 to data reading mode for item 52, Amount of Torque Converter Clutch Slippage.
- Driving at constant speed of 60 km/h (31 mph), the display should be "–10 to 10 r/min."
- If the accelerator pedal is released, the display on the scan tool changes. (50 km/h (31 mph) and less).

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

Q: Is the torque converter clutch slippage within the specified range?

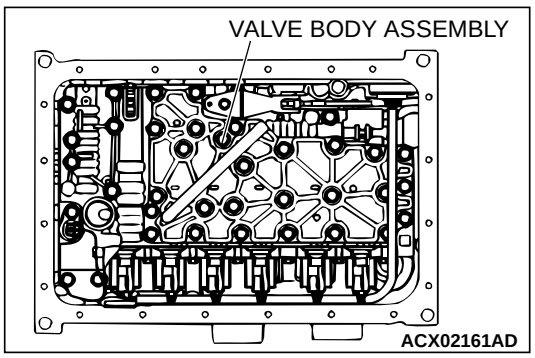
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Go to Step 6.

STEP 6. Replace the PCM.

(1) Replace the PCM.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is DTC 53 set?

YES : Go to Step 7.
NO : The procedure is complete.



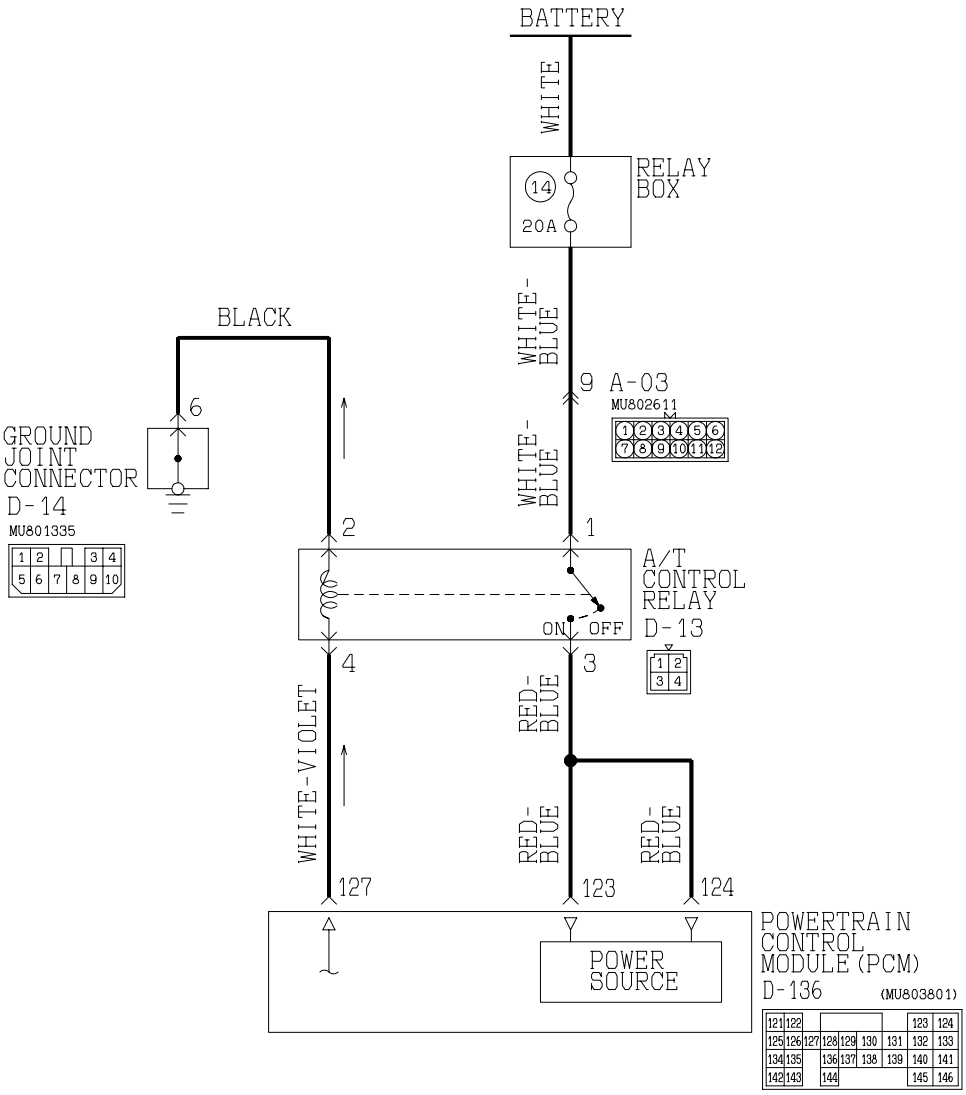
STEP 7. Replace the valve body.

(1) Replace the valve body. Refer to GROUP 23B, Transmission P.23B-18.
(2) Test drive the vehicle.
(3) Check for A/T diagnostic trouble code.

Q: Is DTC 53 set?

YES : Replace the Torque Converter. Refer to P.23Aa-37, Transmission and Transfer Assembly.
NO : The procedure is complete.

DTC 54: A/T Control Relay System



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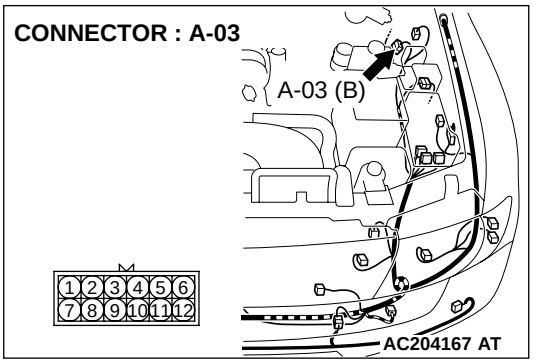
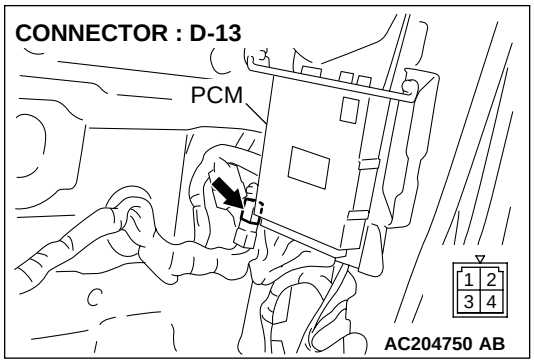
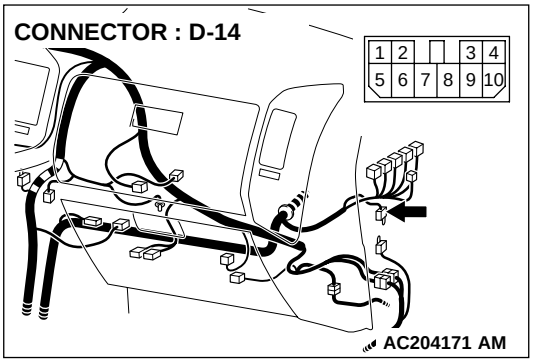
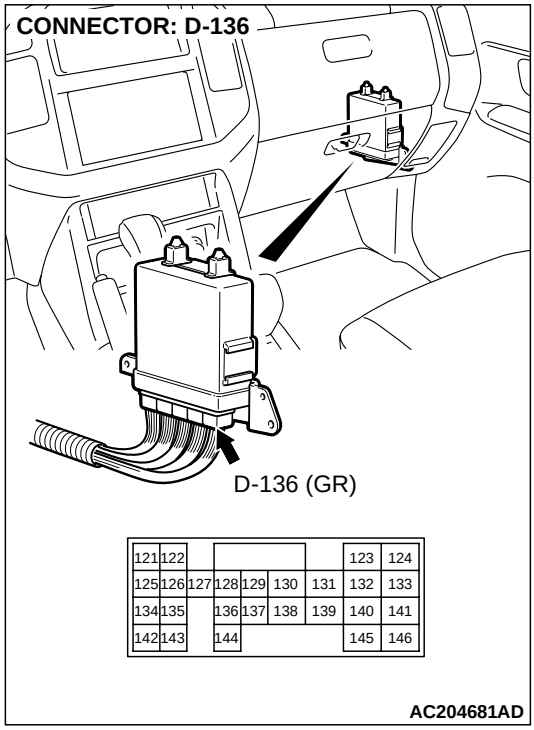




TSB Revision





CIRCUIT OPERATION

- A/T control relay (terminal 1) receives battery positive voltage through a battery.
- The PCM (terminal 127) applies voltage to energize the A/T control relay (terminal 4). With the A/T control relay energized, system voltage is applied to the PCM (terminals 123 and 124).

DTC SET CONDITIONS

If the A/T control relay voltage is less than 7 volts at the PCM (terminals 123 and 124) when the ignition switch is in the "ON" position, DTC 54 is set. The transmission is locked into the 3rd gear as a fail-safe measure, and the "N" range light flashes once per second.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

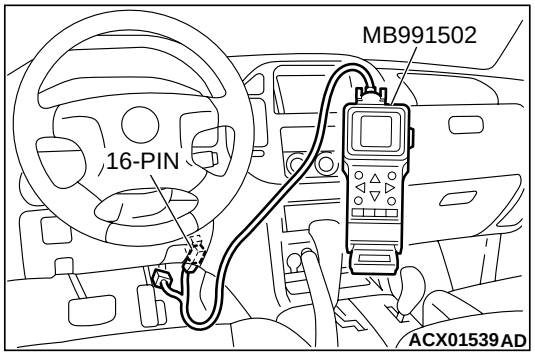
- Malfunction of the A/T control relay
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 54: A/T Control Relay Output Voltage.

⚠ 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.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 54, A/T Control Relay Output Voltage.
- The voltage should equal battery positive voltage.

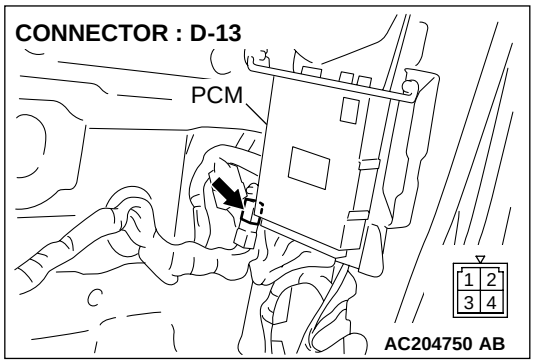
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage equal battery positive voltage?

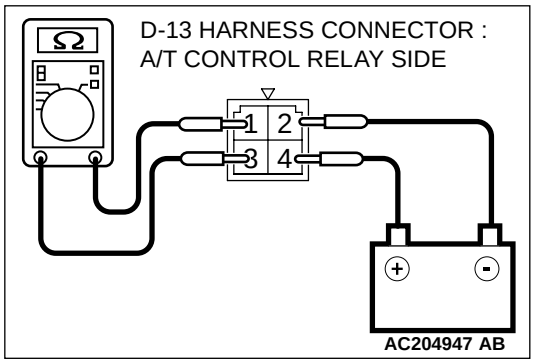
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

STEP 2. Check the A/T control relay.



(1) Remove the A/T control relay (A/T control relay connector D-13).

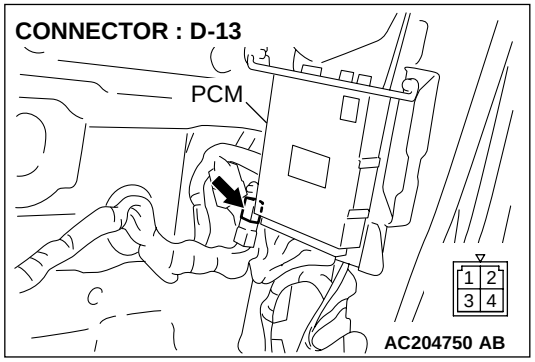


(2) Using jumper wires, connect terminal 2 to the negative battery terminal, and terminal 4 to the positive battery terminal.
(3) Measure the resistance between terminal 1 and 3 of the A/T control relay.
- The resistance should measure less than 2 ohms.
- Disconnect the jumper wires. The resistance between terminals 1 and 3 should measure over limits (open circuit).

Q: Does the resistance measure less than 2 ohms when the relay is energized, and open circuit when the relay is de-energized?

YES : Go to Step 3.

NO : Replace the A/T control relay.

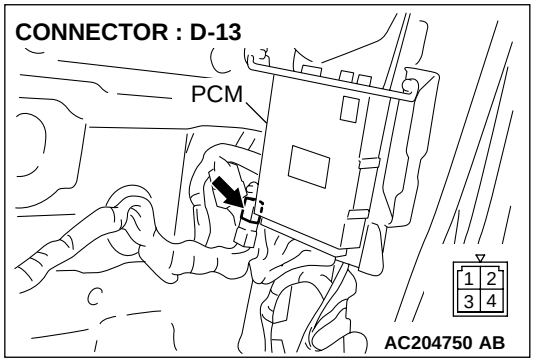


STEP 3. Check A/T control relay connector D-13 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

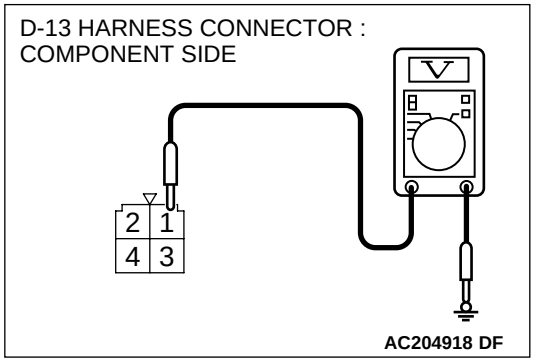
YES : Go to Step 4.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 4. Measure the supply voltage at A/T control relay connector D-13.

(1) Disconnect the A/T control relay and measure at the harness side.

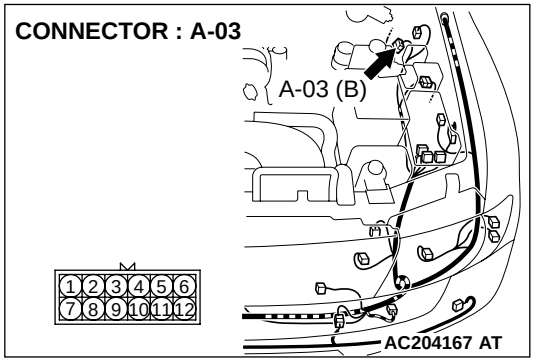


(2) Measure the voltage between terminal 1 and ground.
- The measured voltage should equal battery positive voltage.

Q: Is the measured voltage equal to battery positive voltage?

YES : Go to Step 7.

NO : Go to Step 5.

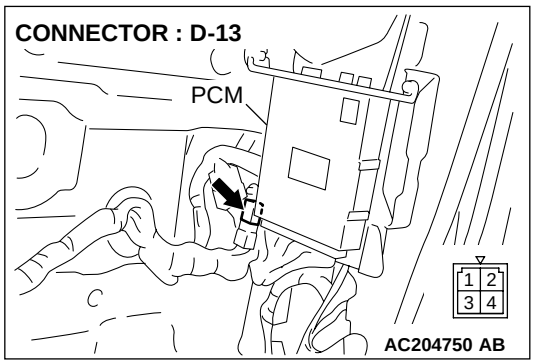


STEP 5. Check intermediate connector A-03 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

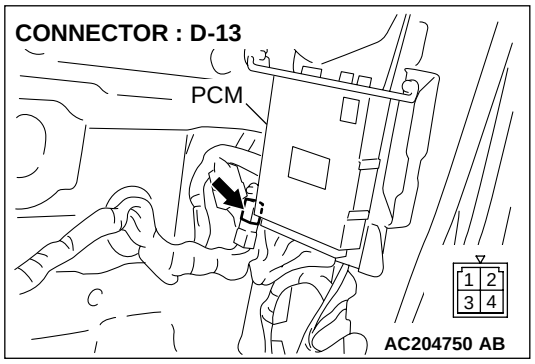


STEP 6. Check the harness for open circuit or short circuit to ground between A/T control relay connector D-13 terminal 1 and battery.

Q: Is the harness wire in good condition?

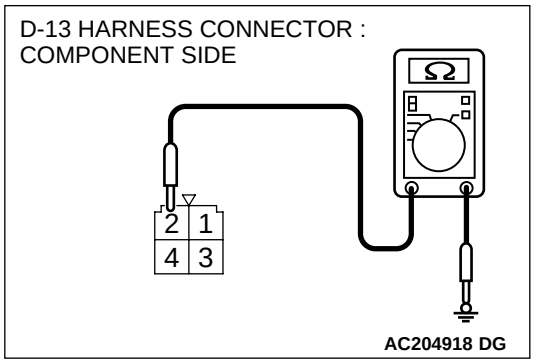
YES : Go to Step 19.

NO : Repair or replace the harness wire.



STEP 7. Measure the resistance at A/T control relay connector D-13.

(1) Disconnect the A/T control relay and measure at the harness side.

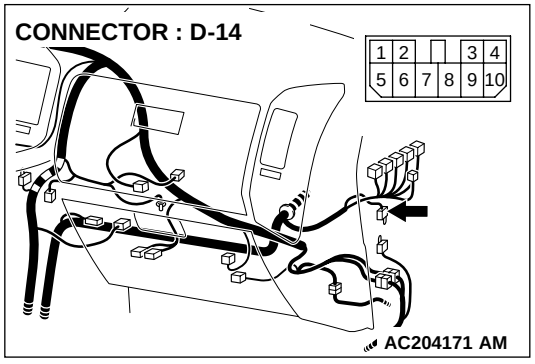


(2) Measure the resistance between terminal 2 and ground.
- The resistance should measure less than 2 ohms.

Q: Is the measured resistance less than 2 ohms?

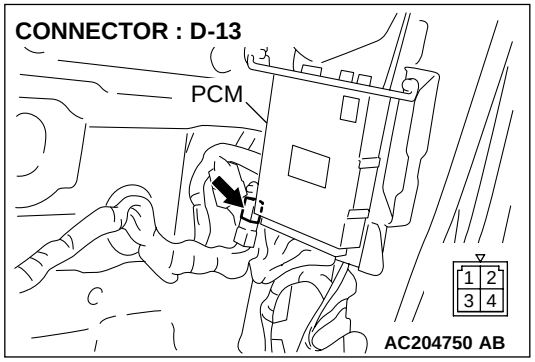
YES : Go to Step 10.
NO : Go to Step 8.

STEP 8. Check ground joint connector D-14 for loose, corroded or damaged terminals, or terminals pushed back in the connector.



Q: Are the connector and terminals in good condition?

YES : Go to Step 9.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

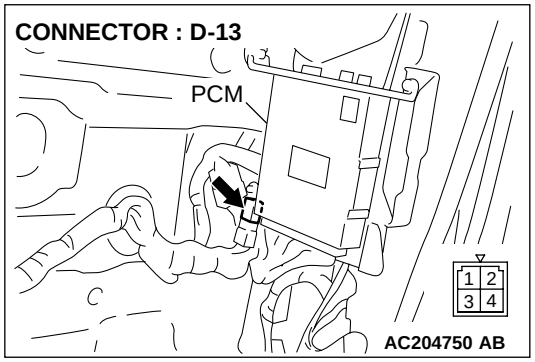


STEP 9. Check the harness for open circuit or damage between A/T control relay connector D-13 terminal 2 and ground.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair or replace the harness wire.

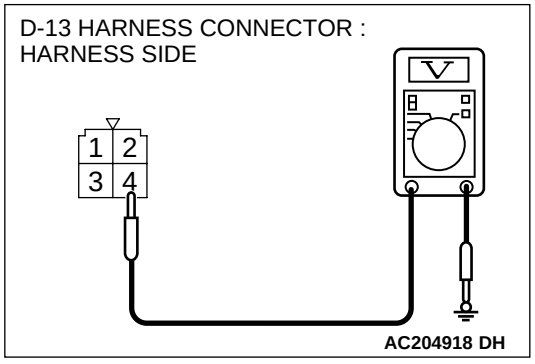


STEP 10. Measure the control voltage to A/T control relay connector D-13 by backprobing.

(1) Remove the A/T control relay.

(2) Do not disconnect the A/T control relay and measure at the connector side.

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



(4) Measure the voltage between terminal 4 and ground by backprobing.

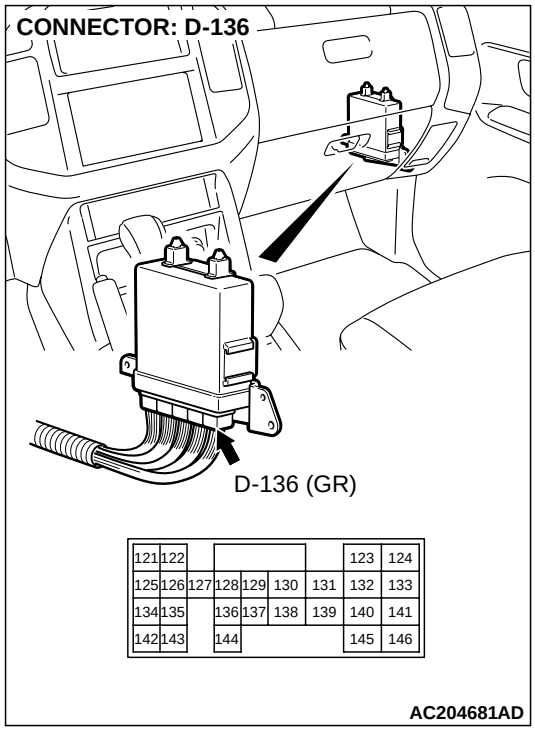
- The measured voltage should equal battery positive voltage.

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

Q: Is the measured voltage equal to battery positive voltage?

YES : Go to Step 16.

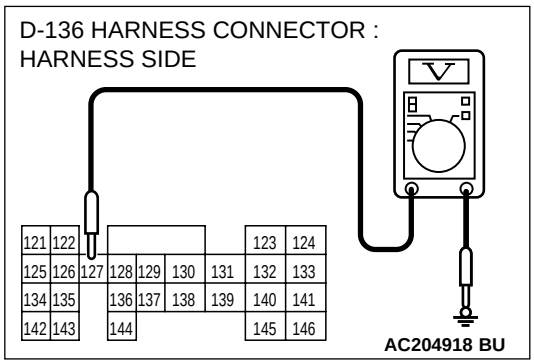
NO : Go to Step 11.



STEP 11. Measure the supply voltage at PCM connector D-136 by backprobing.

(1) Do not disconnect connector D-136.

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



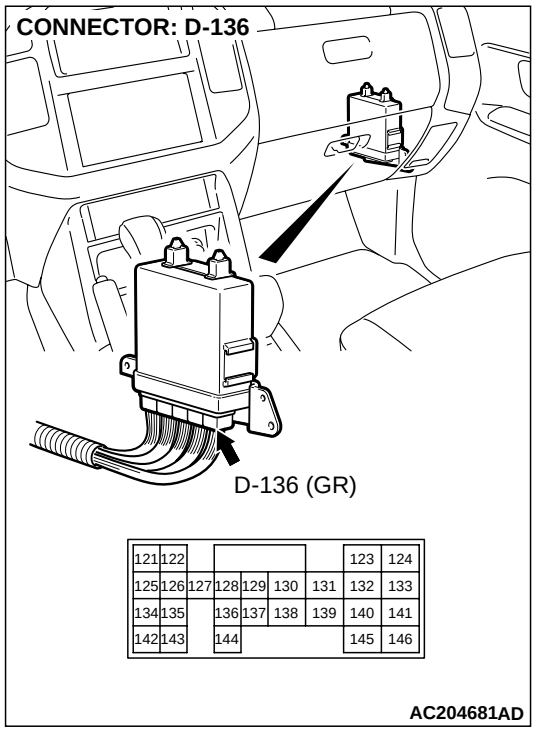
(3) Measure the voltage between terminal 127 and ground by backprobing.
- The measured voltage should equal battery positive voltage.

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

Q: Is the measured voltage equal to battery positive voltage?

YES : Go to Step 12.

NO : Go to Step 14.

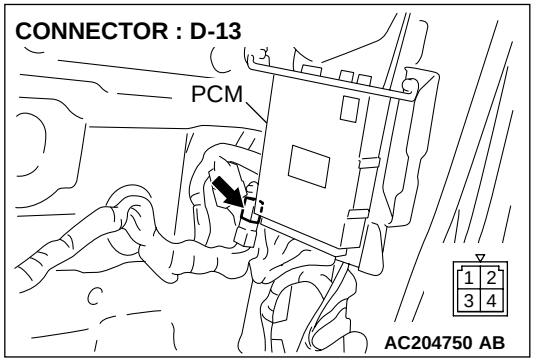


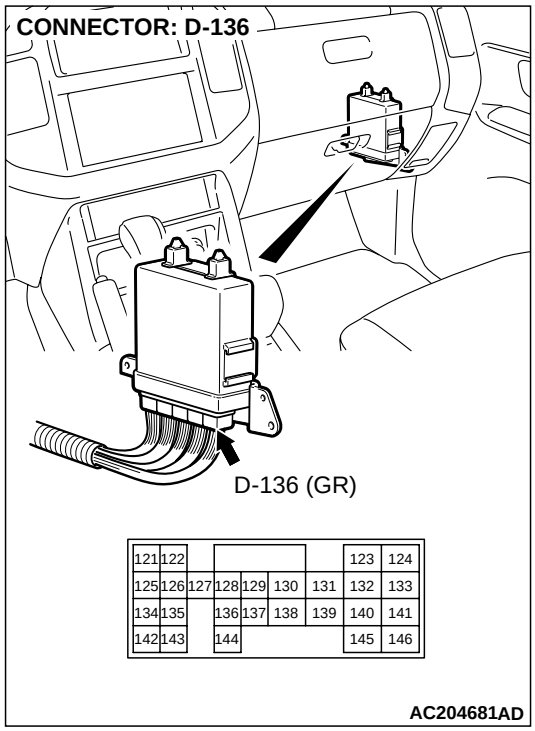
STEP 12. Check PCM connector D-136 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 13.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



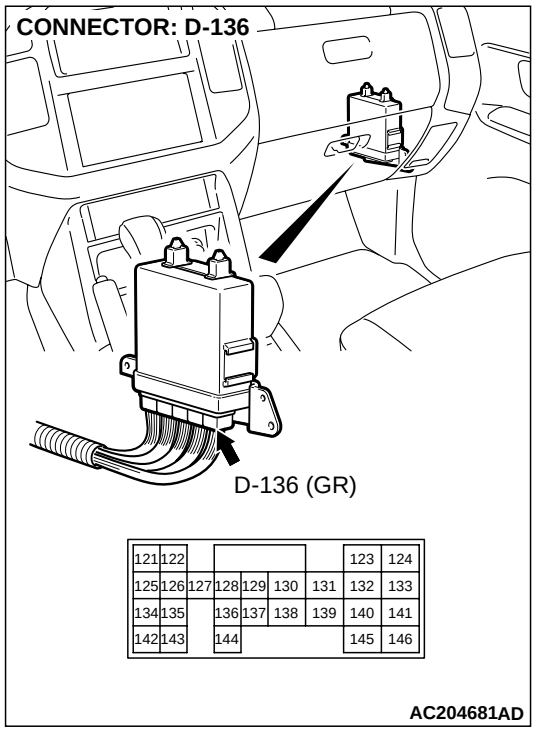


STEP 13. Check the harness for open circuit or damage between A/T control relay connector D-13 terminal 4 and PCM connector D-136 terminal 127.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair or replace the harness wire.

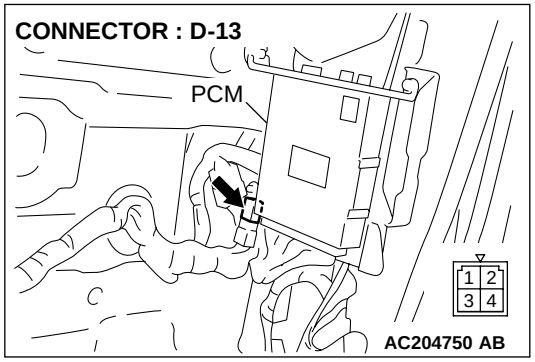


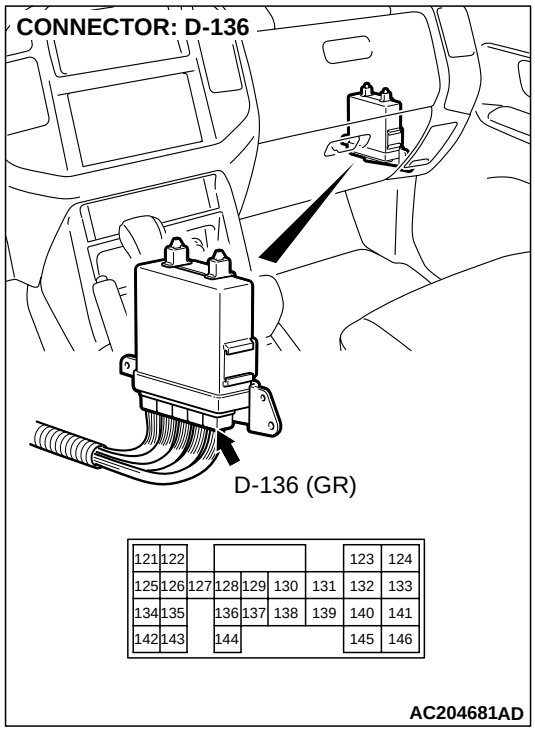
STEP 14. Check PCM connector D-136 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 15.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 15. Check for a short circuit to ground between A/T control relay connector D-13 terminal 4 and PCM connector D-136 terminal 127.

Q: Is the harness wire in good condition?

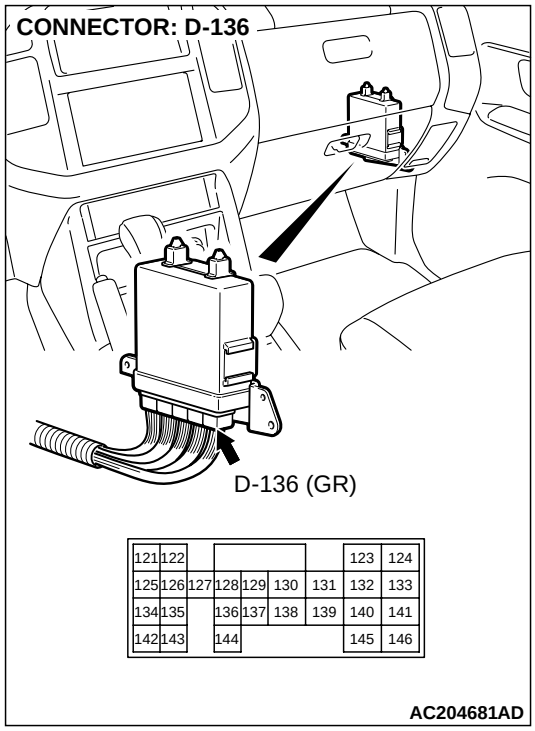
YES : Go to Step 19.

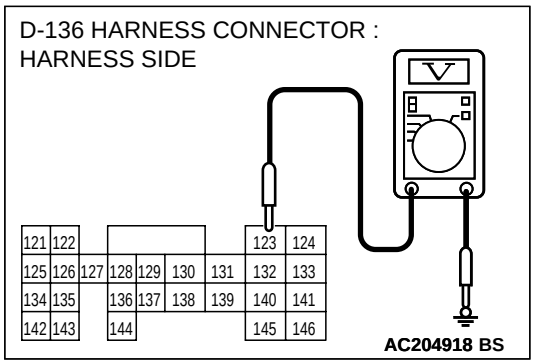
NO : Repair or replace the harness wire.

STEP 16. Measure the A/T control relay output voltage at PCM connector D-136 by backprobing.

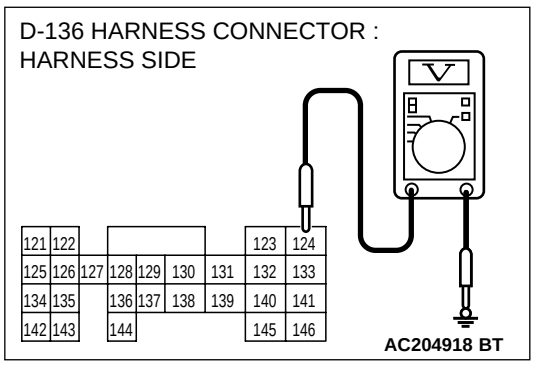
(1) Do not disconnect connector D-136.

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





(3) Measure the voltage between terminal 123 and ground by backprobing.
- The measured voltage should equal battery positive voltage.



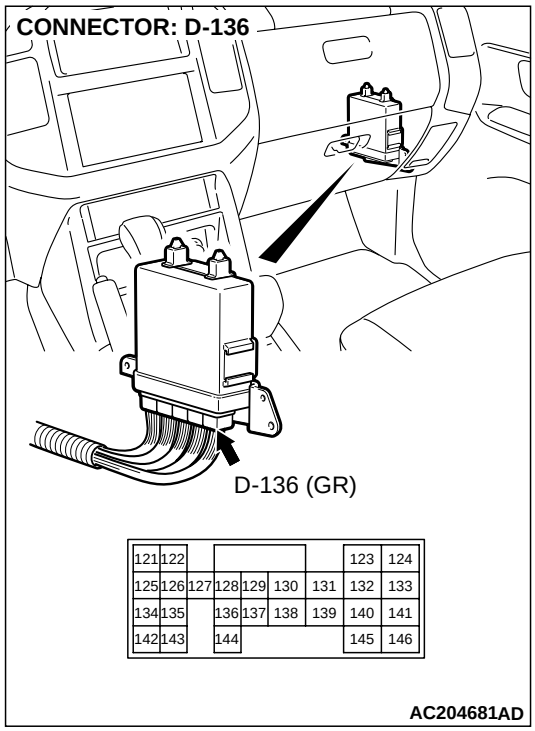
(4) Measure the voltage between terminal 124 and ground by backprobing.
- The measured voltage should equal battery positive voltage.

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

Q: Is the measured voltage equal to battery positive voltage between terminal 123 and ground, and between terminal 124 and ground?

YES : Go to Step 19.

NO : Go to Step 17.

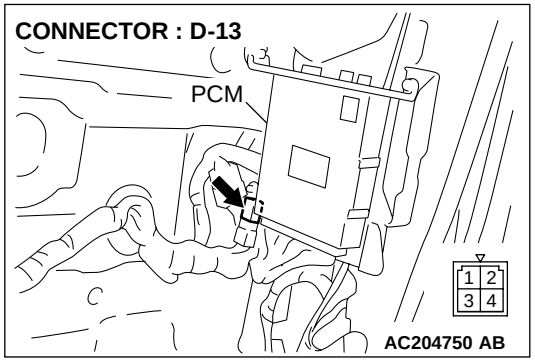


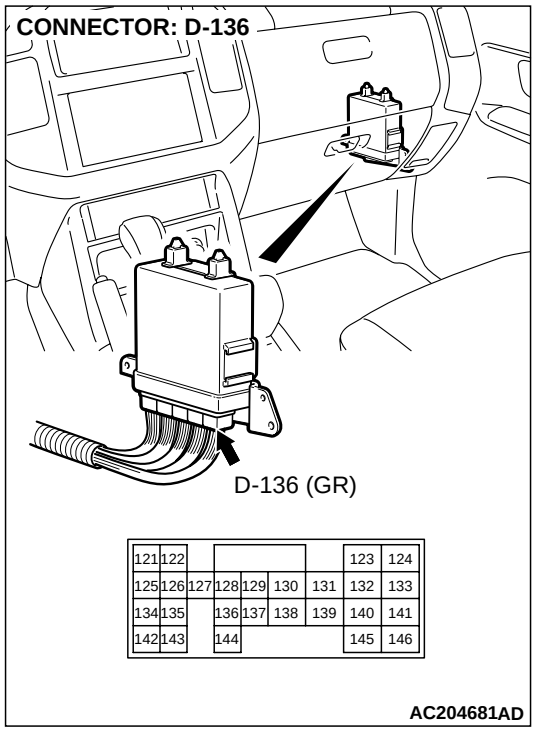
STEP 17. Check PCM connector D-136 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 18.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



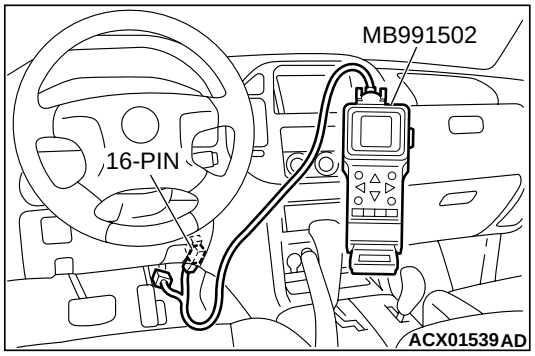


STEP 18. Check harness for open circuit or short circuit to ground between A/T control relay connector D-13 terminal 3 and PCM connector D-136 terminals 123, 124.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair or replace the harness wire.



STEP 19. Using scan tool MB991502, check data list item 54: A/T control relay output Voltage.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 54, A/T Control Relay Output Voltage.
- The voltage should equal battery positive voltage.

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

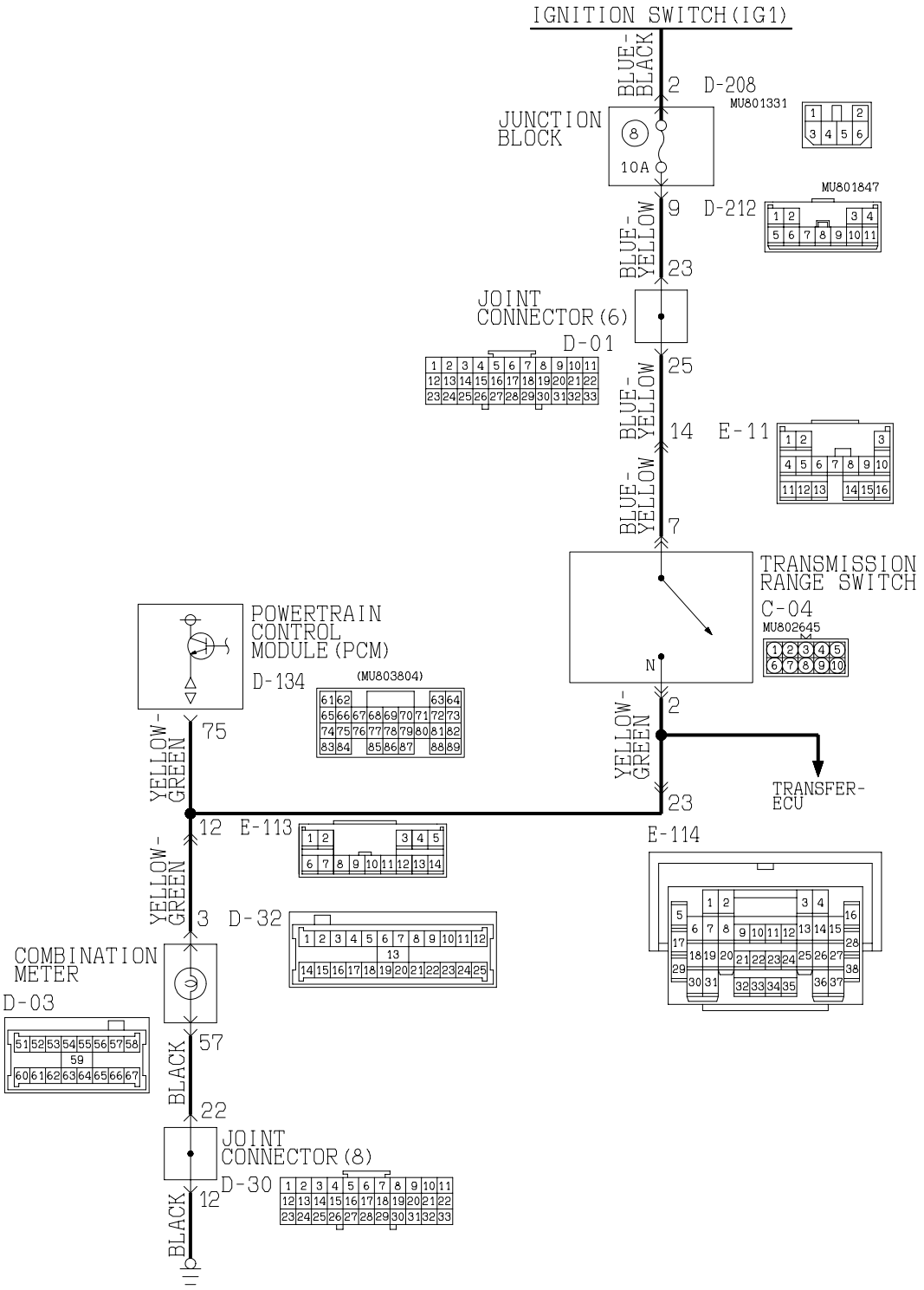
Q: Is the measured voltage equal to battery positive voltage?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the PCM.

DTC 56: "N" Range Light System

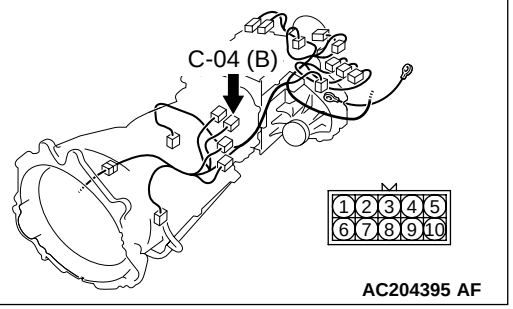
"N" Range Light System Circuit



W2Q01M04AA
AC100554AC

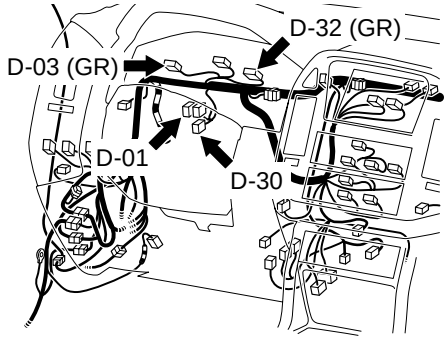
TSB Revision

CONNECTOR : C-04



AC204395 AF

CONNECTORS : D-01, D-03, D-30, D-32



D-01,D-30

1	2	3	4	5	6	7	8	9	10	11
12	13	14	15	16	17	18	19	20	21	22
23	24	25	26	27	28	29	30	31	32	33

D-03

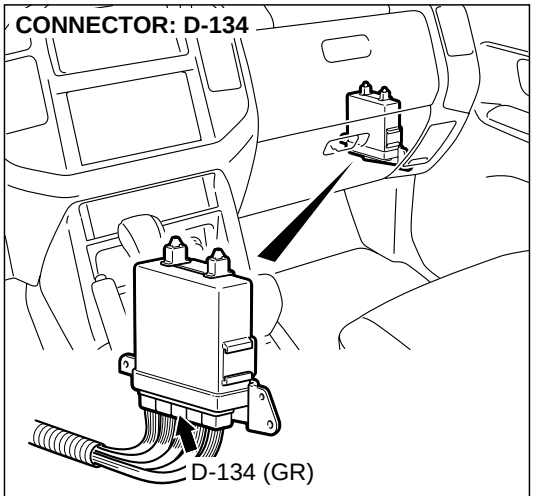
51	52	53	54	55	56	57	58
			59				
60	61	62	63	64	65	66	67

D-32

1	2	3	4	5	6	7	8	9	10	11	12	
						13						
14	15	16	17	18	19	20	21	22	23	24	25	

AC204188 AW

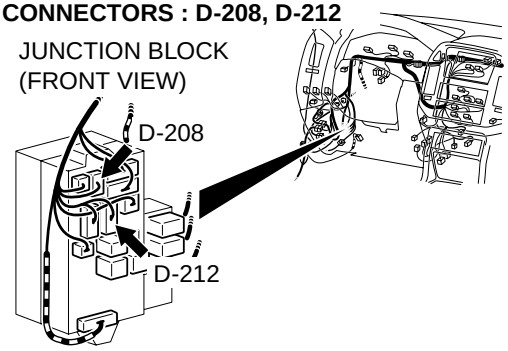
CONNECTOR: D-134



61	62						63	64	
65	66	67	68	69	70	71	72	73	
74	75	76	77	78	79	80	81	82	
83	84		85	86	87		88	89	

AC204681AC

CONNECTORS : D-208, D-212



D-208

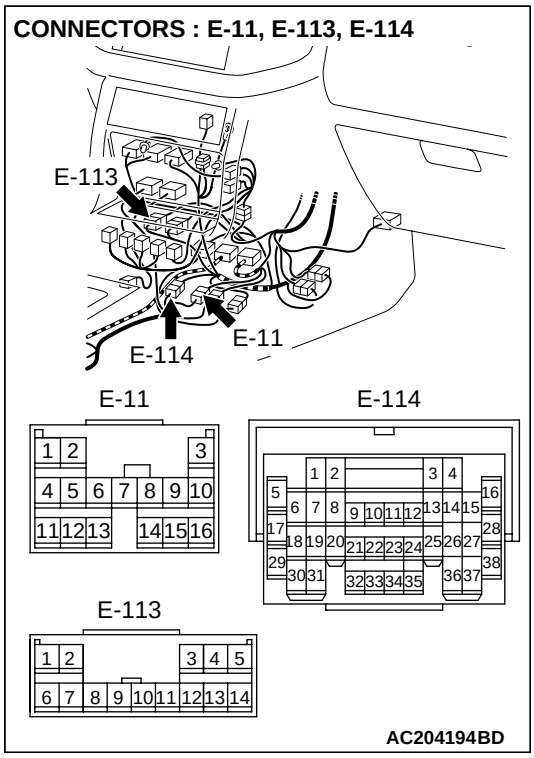
1			2
3	4	5	6

D-212

1	2						3	4
5	6	7	8	9	10	11		

AC204191AS

TSB Revision



CIRCUIT OPERATION

If a fail-safe is triggered while driving forward, the PCM flashes the "N" range light once per second (triggered fail-safe). The PCM does this by switching battery positive voltage to terminal 75.

DTC SET CONDITIONS

If the PCM detects a fail-safe condition, it will attempt to illuminate the "N" range light. The PCM sends a 12 volts pulse for 60 – 180 ms. If it does not detect a voltage drop during the pulse, it waits about 60 seconds and pulses 12 volts again for 60 – 180 ms. If the PCM does no detect the voltage drop before the ignition switch is turned the "LOCK" (OFF), the PCM will consider it as an short circuit of the "N" range light circuit and DTC 56 is set.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Defective "N" range light bulb
- Damaged harness, connector
- Malfunction of the PCM

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Check the "N" range light bulb.
(1) Turn the ignition switch to the "ON" position.
(2) Move the selector lever to "N" position.
- The "N" range light in the combination meter illuminates.

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

Q: Does the "N" range light illuminate?

YES : Go to Step 6.
NO : Go to Step 2.

STEP 2. Check the "N" range light bulb.
(1) Remove the combination meter. Refer to GROUP 54A, Chassis Electrical – Combination Meters Assembly and Vehicle Speed Sensor P.54A-65.
(2) Check the "N" range light bulb.

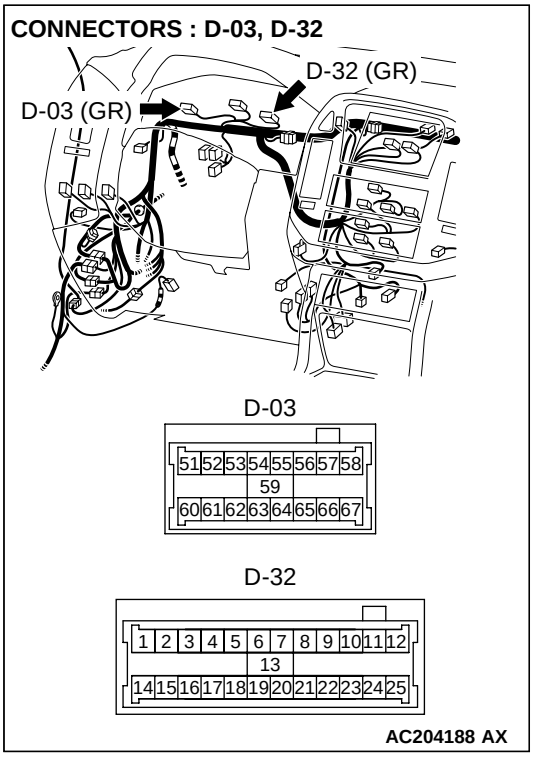
Q: Is the bulb in good condition?

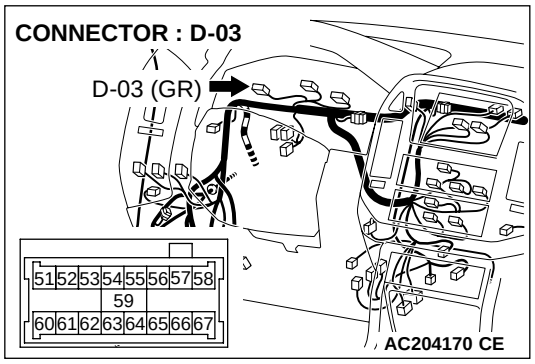
YES : Go to Step 3.
NO : Replace the "N" range light bulb.

STEP 3. Check combination meter connectors D-03 and D-32 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

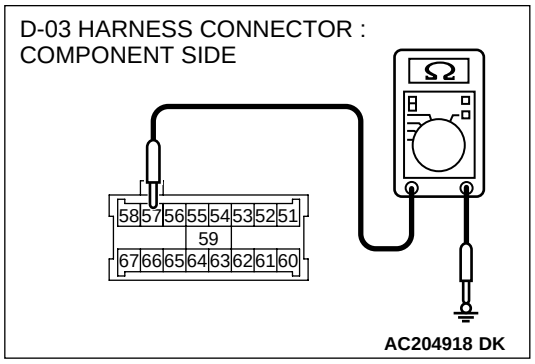
YES : Go to Step 4.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 4. Measure the resistance at combination meter connector D-03.

(1) Disconnect connector D-03 and measure at the harness side.



(2) Measure the resistance between terminal 57 and ground.
- The measured resistance should be less than 2 ohms.

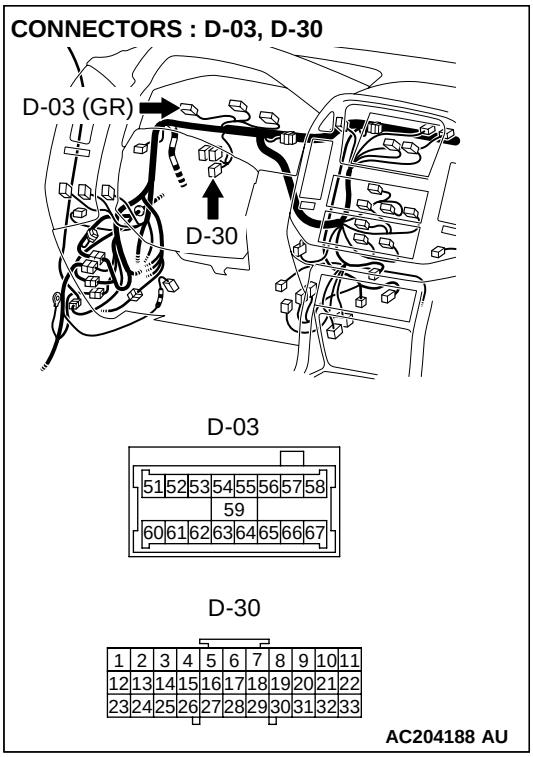
Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 7.
NO : Go to Step 5.

STEP 5. Check combination meter connector D-03 and joint connector D-30 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 6.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



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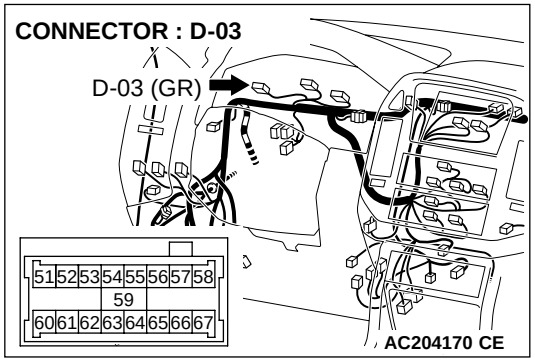


STEP 6. Check the harness for open circuit or damage between combination meter connector D-03 terminal 57 and body ground.

Q: Is the harness wire in good condition?

YES : Go to Step 9.

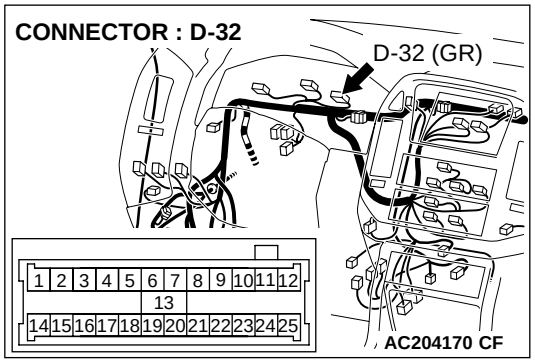
NO : Repair or replace the harness wire.

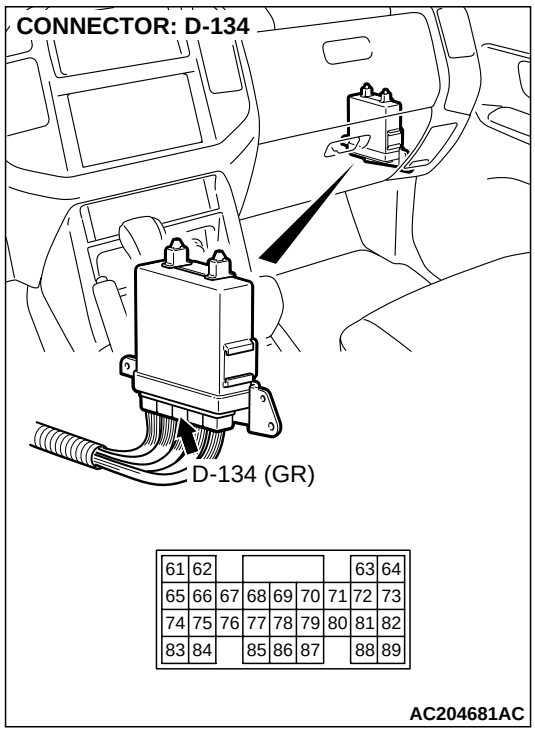
STEP 7. Check combination meter connector D-32, PCM connector D-134 and intermediate connectors E-113 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

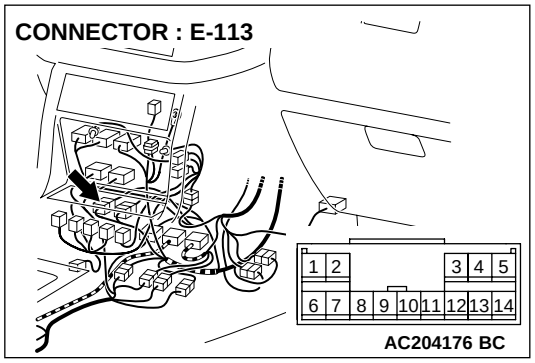
Q: Are the connectors and terminals in good condition?

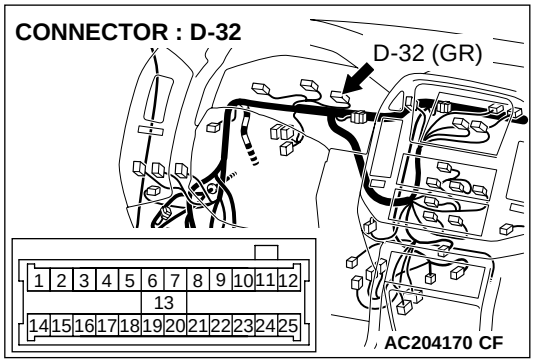
YES : Go to Step 8.

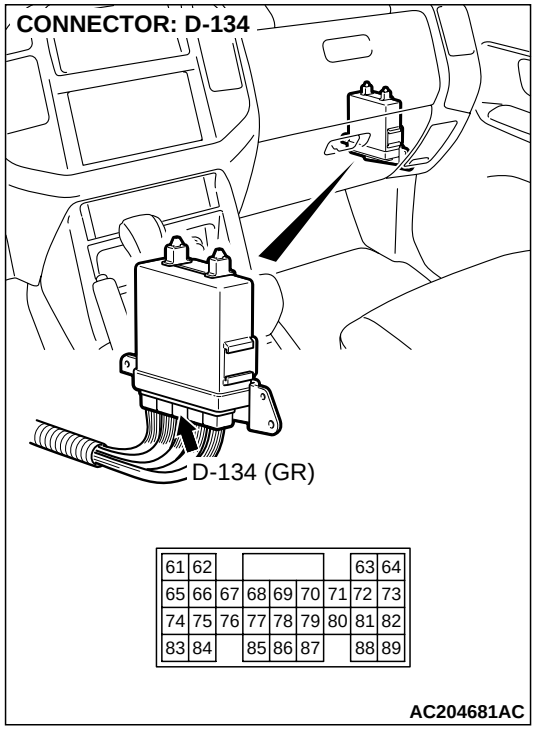
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.









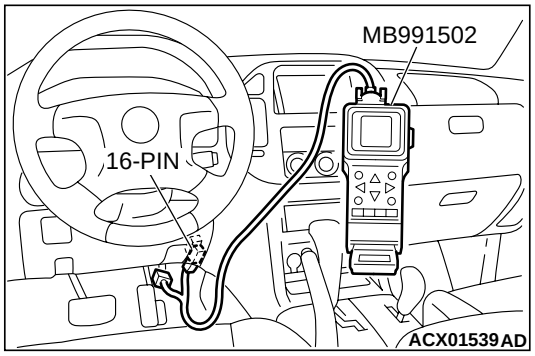


STEP 8. Check the harness for open circuit, short circuit to ground and damage between combination meter connector D-32 terminal 3 and PCM connector D-134 terminal 75.

Q: Is the harness wire in good condition?

YES : Go to Step 9.

NO : Repair or replace the harness wire.



STEP 9. Using scan tool MB991502, read the A/T diagnostic trouble code.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for A/T diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

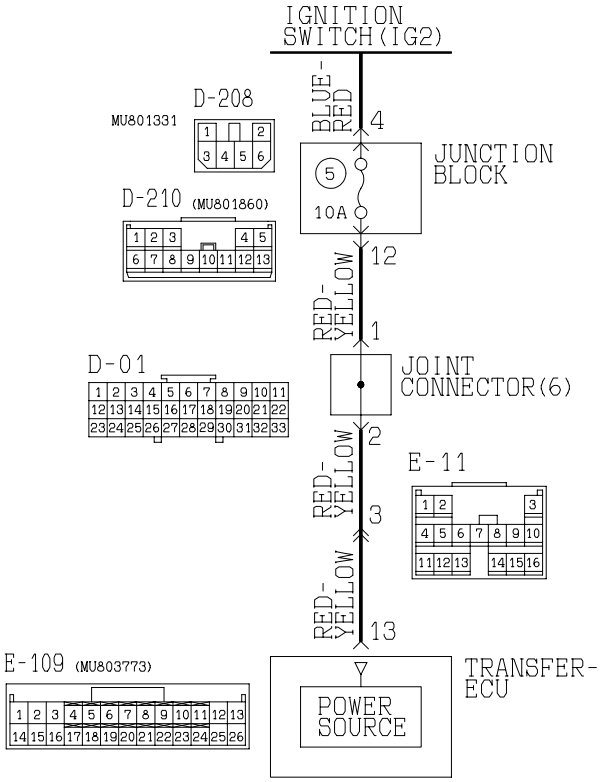
Q: Is DTC 56 set?

YES : Replace the PCM.
NO : The procedure is complete.

DIAGNOSTIC TROUBLE CODE PROCEDURES <TRANSFER>

DTC.11, 12: Power Supply Voltage System

Power Supply System Circuit



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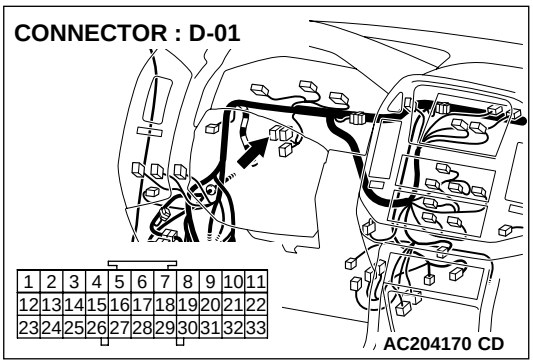

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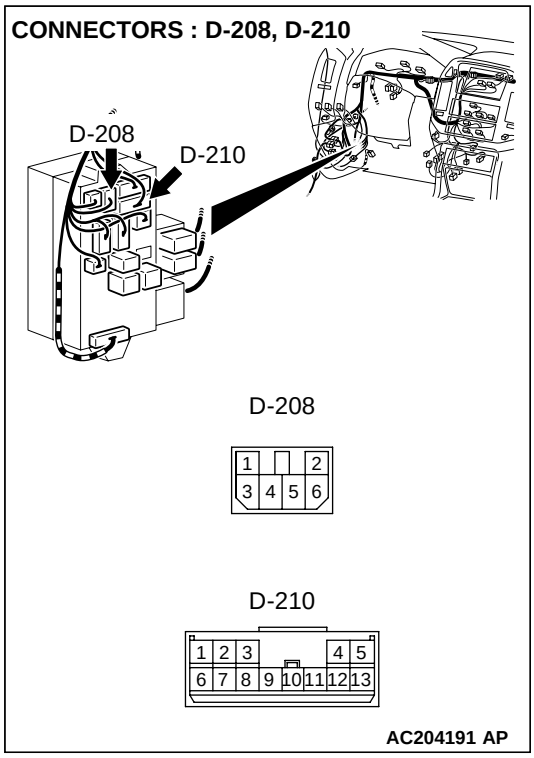
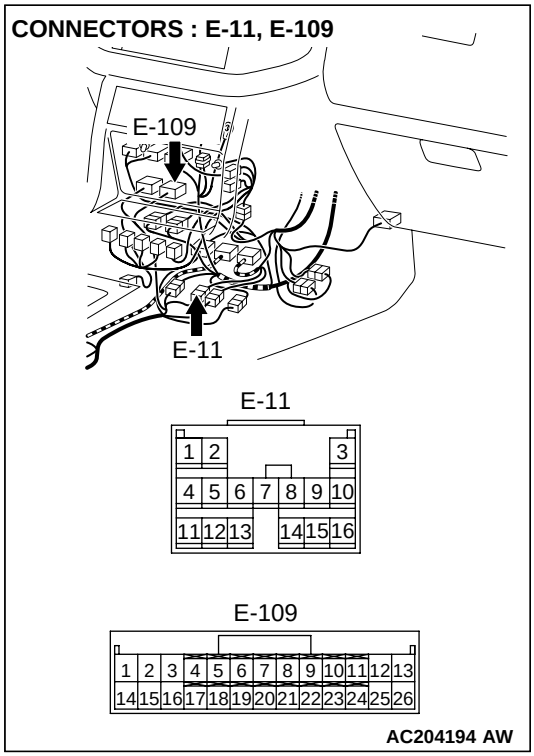




CIRCUIT OPERATION

When turning the ignition switch to "ON," the transfer-ECU (terminal number 13) receives battery voltage from the ignition switch.

DTC SET CONDITIONS

When power supply voltage drops to 9.5 volts and less, the DTC 11 is set as low voltage. When power supply voltage rises to 18 volts and over, the DTC 12 is set as high voltage.

TSB Revision

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the ignition switch
- Damaged harness, connector
- Malfunction of the transfer-ECU

DIAGNOSIS

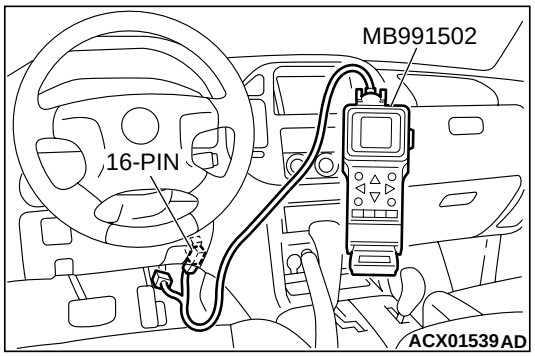
Required Special Tool:

- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 09: Ignition switch power supply.

⚠ 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.



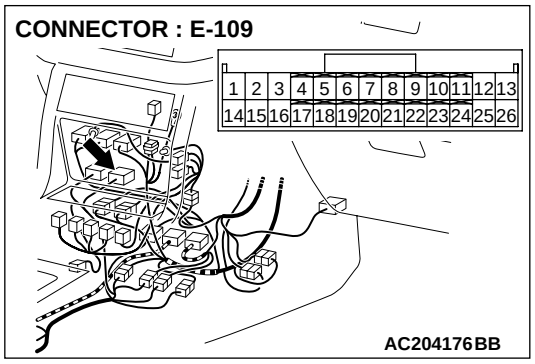
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 09, Ignition Switch Power Supply.
  - The voltage should equal battery positive voltage.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage equal battery positive voltage?

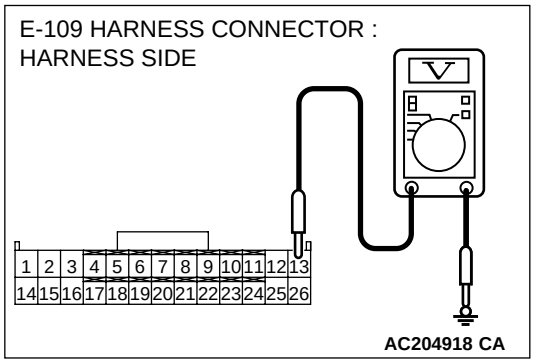
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

STEP 2. Measure the power supply voltage at transfer-ECU connector E-109 by backprobing.



(1) Do not disconnect connector E-109.
(2) Turn the ignition switch to the "ON" position.



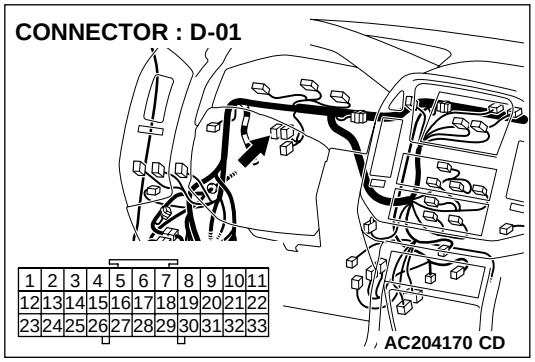
(3) Measure the voltage between terminal 13 and ground by backprobing.
  - The voltage should measure battery positive voltage.
(4) Turn the ignition switch to "LOCK" (OFF) position.

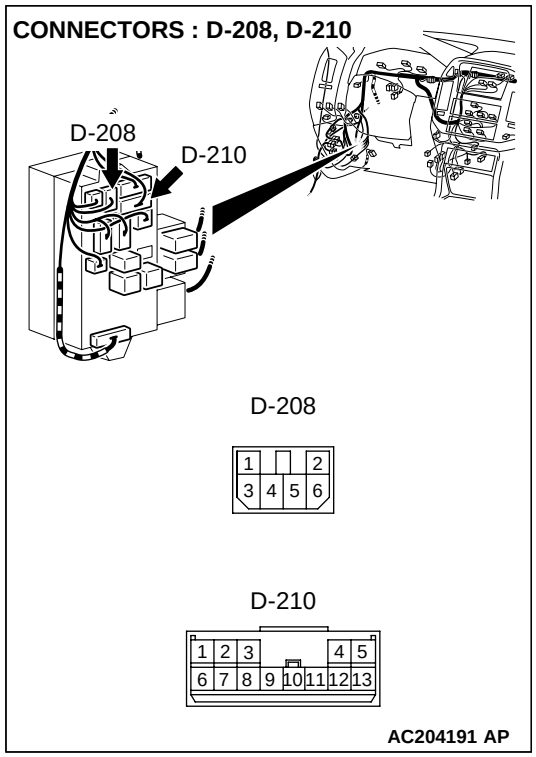
Q: Is the measured voltage battery positive voltage?

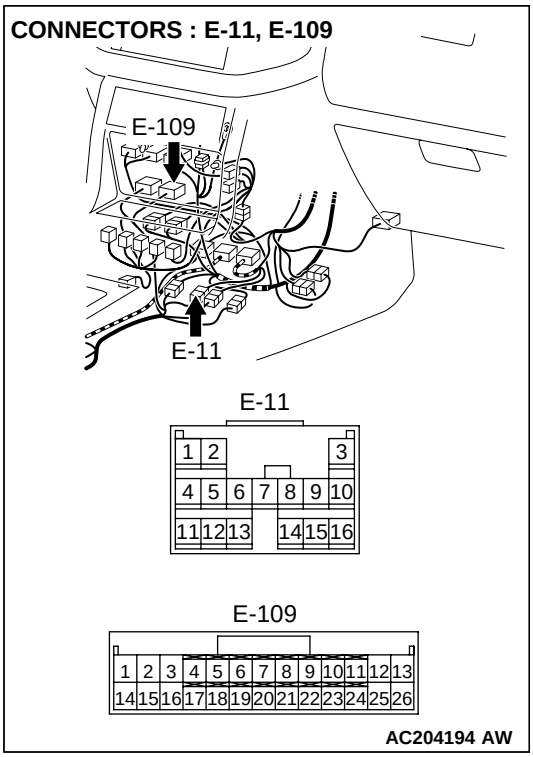
YES : Go to Step 5.

NO : Go to Step 3.

STEP 3. Check joint connector D-01, junction block connector D-208, D-210, intermediate connector E-11 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.







Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

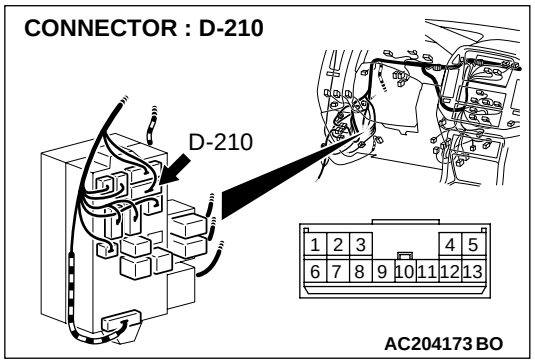
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

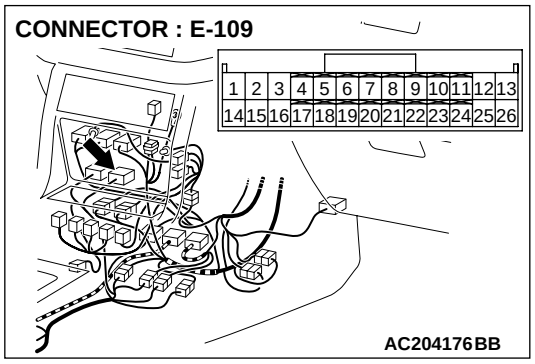
STEP 4. Check the harness for open circuit or short circuit to ground between junction block connector D-210 terminal 12 and transfer-ECU connector E-109 terminal 13.

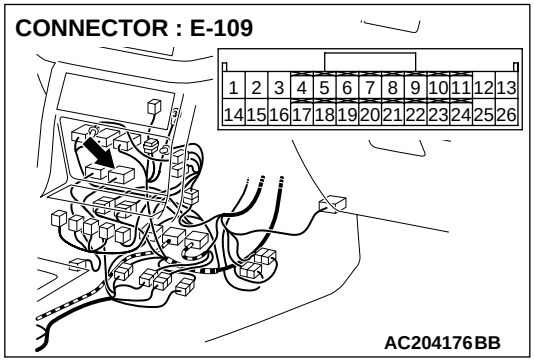
Q: Is the harness wire in good condition?

YES : Go to Step 6.

NO : Repair or replace the harness wire.





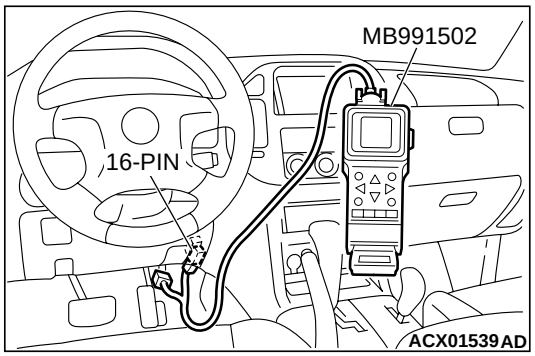


STEP 5. Check transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 6. Using scan tool MB991502, check data list item 09: Ignition switch power supply.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 09, Ignition Switch Power Supply.
- The voltage should equal battery positive voltage.

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

Q: Is the measured voltage equal battery positive voltage?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the transfer-ECU.

DTC 13: Main Relay System (Inside of ECU)

CIRCUIT OPERATION
The power supplied from the ignition switch is distributed to each part of ECU through the main relay located inside of ECU.

DTC SET CONDITIONS
When the voltage at main relay OFF is 6 volts and over, or the voltage at main relay ON is 6 volts and less, the DTC 13 is set as the main relay malfunction.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set:)
- Malfunction of the transfer-ECU

DIAGNOSIS

Replace the transfer-ECU.

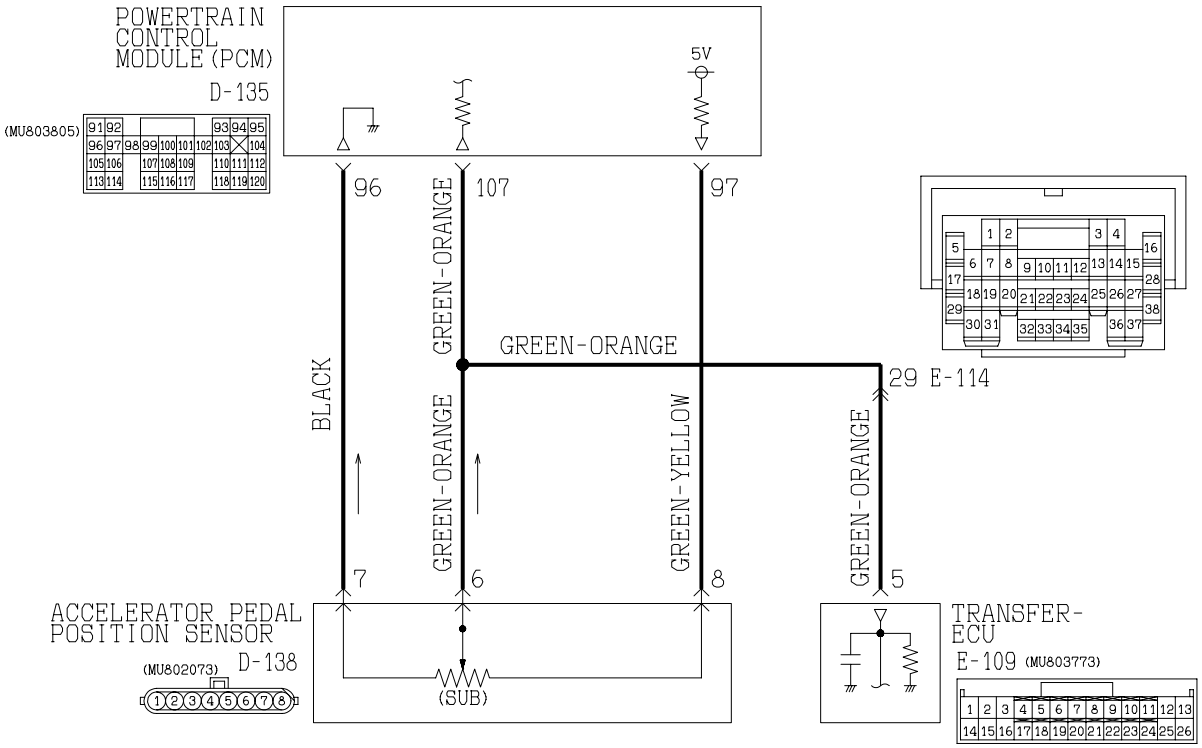
Q: Is the malfunction eliminated?

YES : The procedure is complete. (If no malfunction is not found 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 PCM.

DTC 21: Accelerator Pedal Position Sensor System

Accelrator Pedal Position Sensor System Circuit



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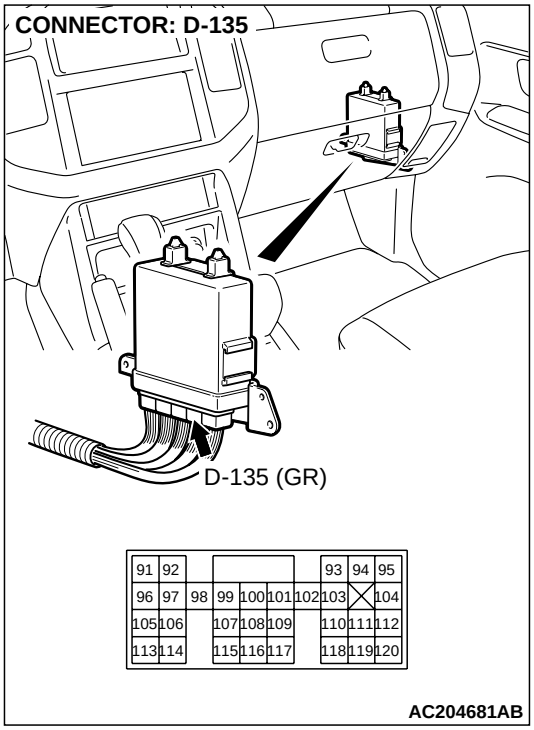
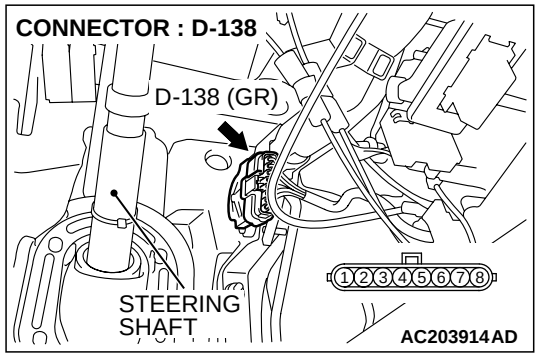
AC205258AB



AC204681AB



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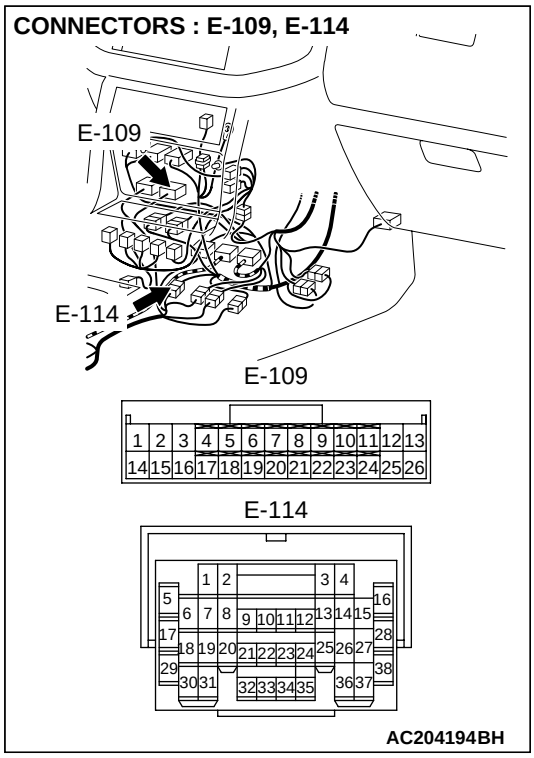
TSB Revision



CIRCUIT OPERATION

- When the throttle valve shaft rotates from the idle position to the fully opened position, the resistance between the accelerator pedal position sensor output terminal (terminal 6) and ground terminal (terminal 7) will increase according to the rotation.
- With the ignition switch in the "ON" position. Voltage at pin 5 increases from approximately 0.7 volt at closed throttle, to approximately 5 volts at wide open throttle.

DTC SET CONDITIONS

If accelerator pedal position sensor output voltage is 0.2 volt or lower at times other than when the engine is idling, the output is judged to be too low and DTC 21 is set.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

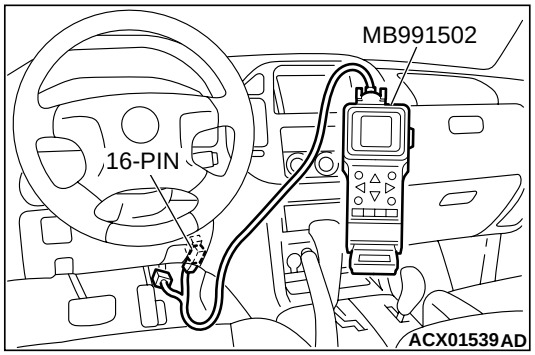
- Malfunction of the accelerator pedal position sensor circuit
- Damaged harness, connector
- Malfunction of the transfer-ECU

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 01: Accelerator Pedal Position Sensor.

⚠ 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.



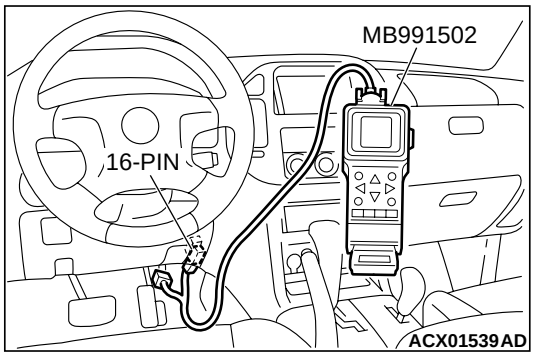
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 01, Accelerator Pedal Position Sensor – Active trac 4WD II.
- With the throttle valve in idle position, voltage should measure between 905 and 1,165 mV.
- With the throttle valve in full-open position, voltage should measure between 4,035 mV or more.

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

Q: Is the measured voltage between 905 and 1,165 mV at idle, and between 4,035 mV or more in the full-open position?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Go to Step 2.

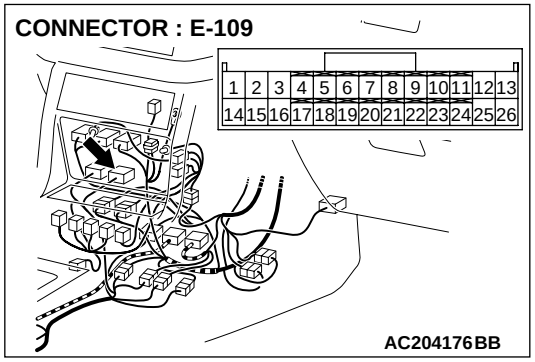
STEP 2. Using scan tool MB991502, read the MFI diagnostic trouble code.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for MFI diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are MFI DTCS P2126, P2127, P2128 set?

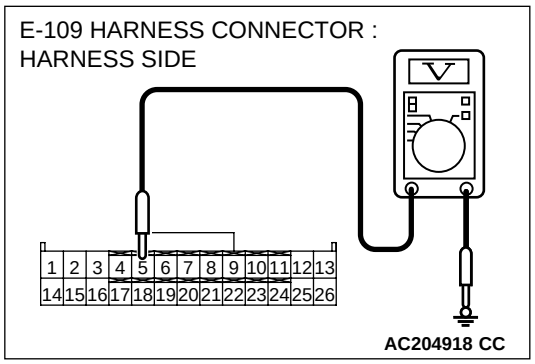
YES : Refer to GROUP 13A, Diagnosis – Diagnostic Trouble Code Chart P.13Ab-22.
NO : Go to Step 3.



STEP 3. Measure the accelerator pedal position sensor output voltage at transfer-ECU connector E-109 by backprobing.

(1) Do not disconnect connector E-109.

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



(3) Measure the voltage between terminal 5 and ground by backprobing.
- With the throttle valve in idle position, voltage should measure between 0.905 and 1.165 volts.
- With the throttle valve in full-open position, voltage should measure between 4.035 volts or more.

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

Q: Is the measured voltage between 0.535 and 0.735volt at idle, and between 4.5 and 5.5 volts in the full-open position?

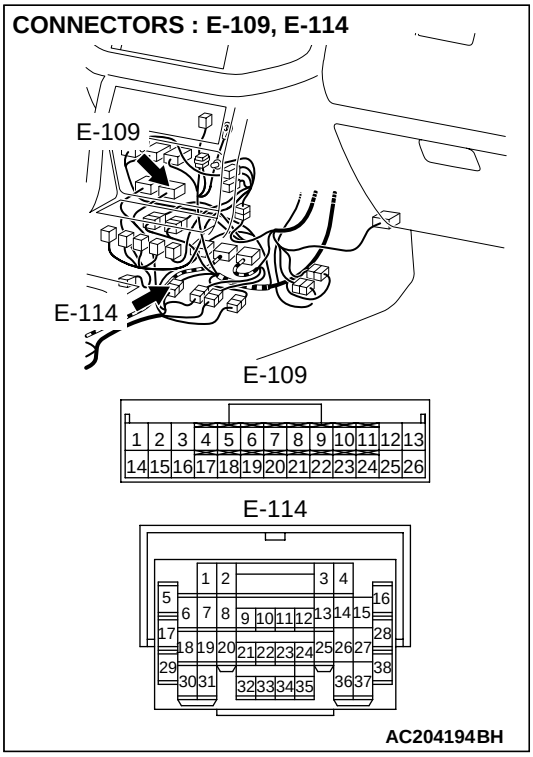
YES : Go to Step 6.
NO : Go to Step 4.

STEP 4. Check transfer-ECU connector E-109 and intermediate connector E-114 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

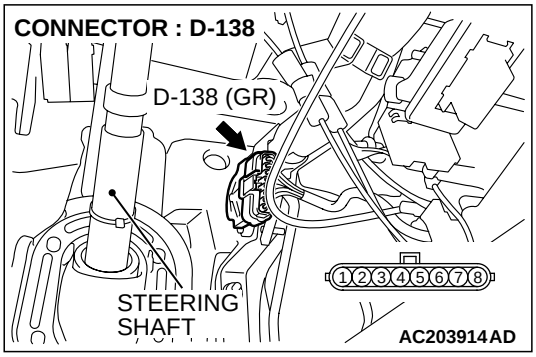


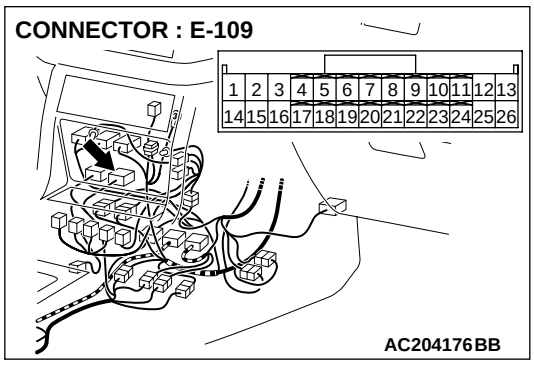
STEP 5. Check harness for open circuit or damage between accelerator pedal position sensor connector D-138 terminal 6 and transfer-ECU connector E-109 terminal 5.

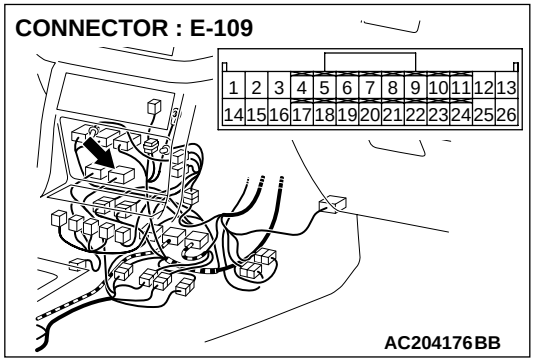
Q: Is the harness wire in good condition?

YES : Go to Step 7.

NO : Repair or replace the harness wire.





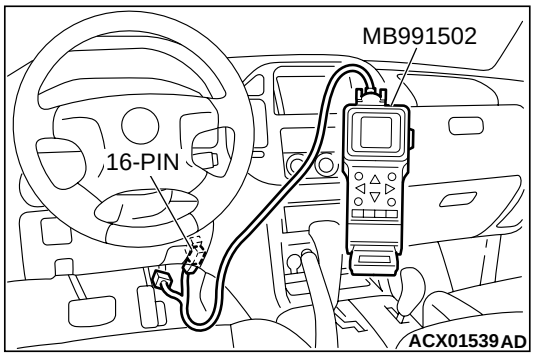


STEP 6. Check transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 7.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 7. Using scan tool MB991502, check data list item 01: Accelerator Pedal Position Sensor.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to the data reading mode for item 01, Accelerator Pedal Position Sensor – Active trac 4WD II.
- With the throttle valve in idle position, voltage should measure between 905 and 1,165 mV.
- With the throttle valve in full-open position, voltage should measure between 4,035 mV or more.

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

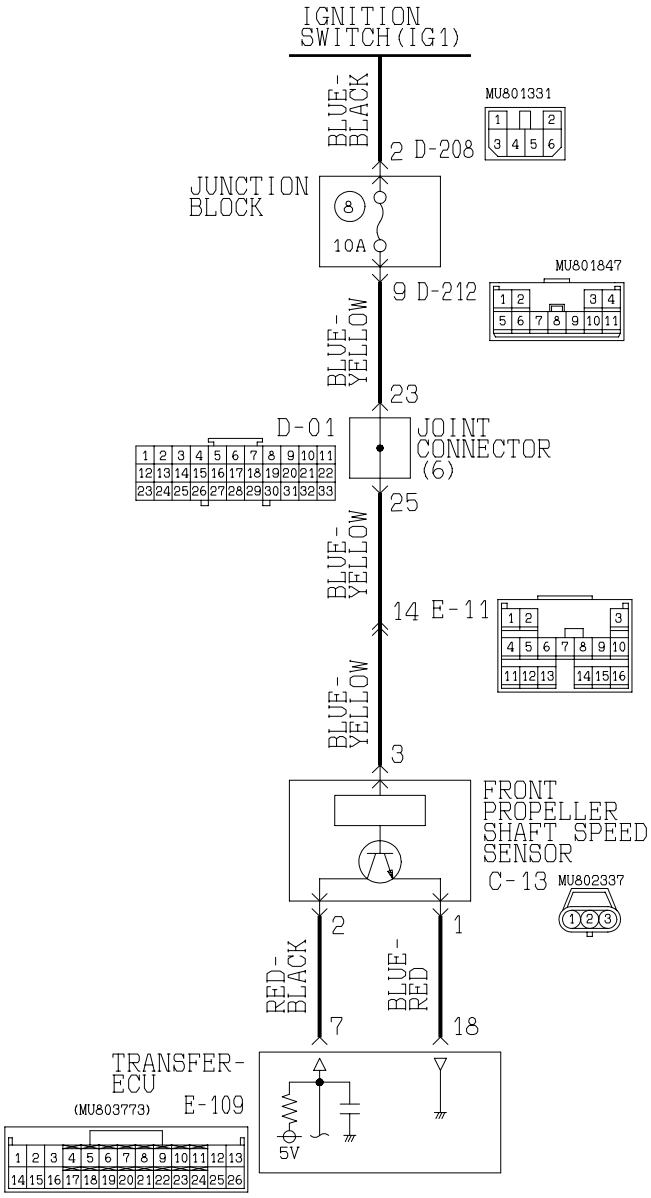
Q: Is the measured voltage between 905 and 1,165 mV at idle, and between 4,035 mV or more in the full-open position?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the transfer-ECU.

DTC 22, 23: Front Propeller Shaft Speed Sensor System

Front Propeller Shaft Speed Sensor System Circuit



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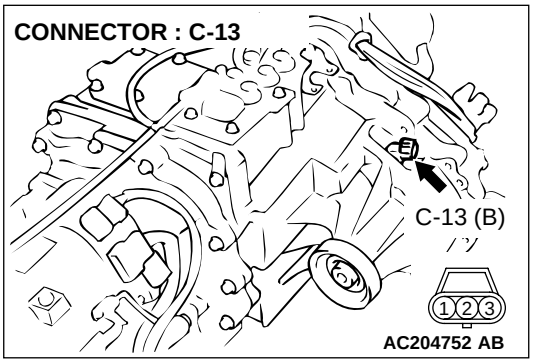
CONNECTOR : C-13



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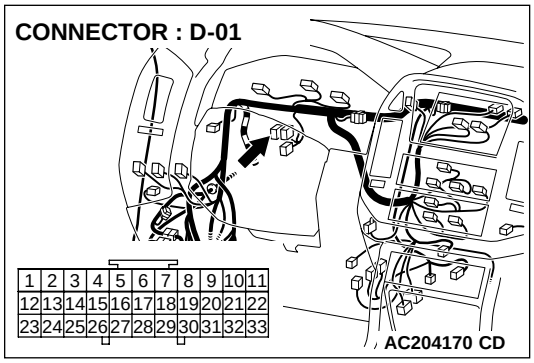
CONNECTOR : D-01



AC204170 CD

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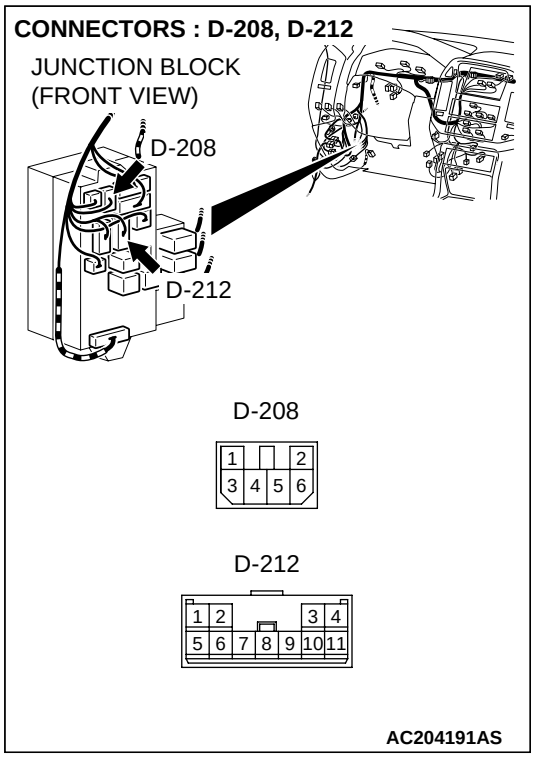
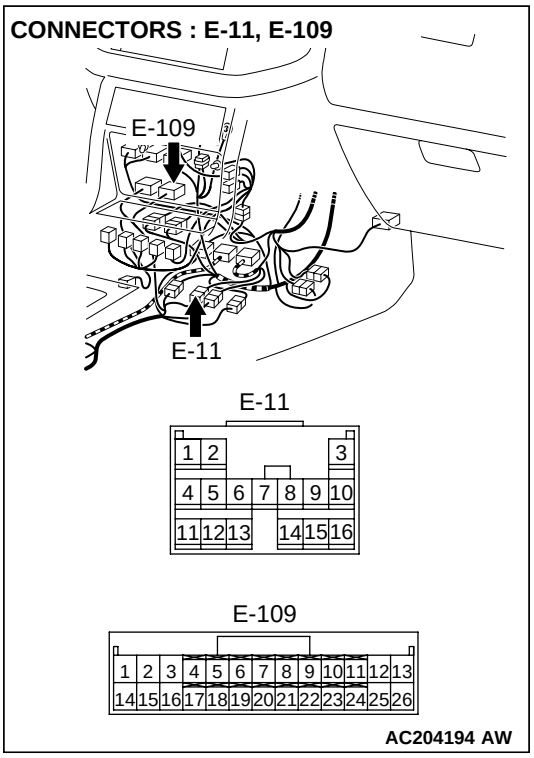




CIRCUIT OPERATION

- The front propeller shaft speed sensor generates 0 ⇔ 5 volts pulse signal when the front propeller shaft rotates. The pulse signal frequency increases with a rise in front propeller shaft speed.
- The front propeller shaft speed sensor is connected to the transfer-ECU (terminals 7 and 18) via the front propeller shaft speed sensor connector (terminals 1 and 2).
- The transfer-ECU detects the front propeller shaft speed by the signal input to terminal 7.
- The front propeller shaft speed sensor generates the pulse signal as the hole in the front output shaft pass the magnetic tip of the sensor.

DTC SET CONDITIONS

In the case that the input signal from the front propeller shaft speed sensor is not input during the shift from 2WD to 4WD, the DTC 22 is set as the open circuit or the short circuit of the front propeller shaft speed sensor. In the case that the input signal from the front propeller shaft speed sensor is unstable when the engage switch is ON condition, the code DTC 23 is set as the open circuit or the short circuit of the front propeller shaft speed sensor.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

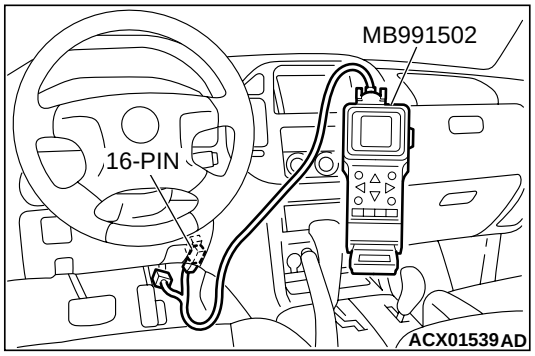
- Malfunction of the front propeller shaft speed sensor circuit
- Malfunction of the front output shaft
- Damaged harness, connector
- Malfunction of the transfer-ECU

DIAGNOSIS

Required Special Tool:

- MB991502: Scan Tool (MUT-II)

TSB Revision



STEP 1. Using scan tool MB991502, check data list item 02: Front Propeller Shaft Speed Sensor.

⚠ 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.

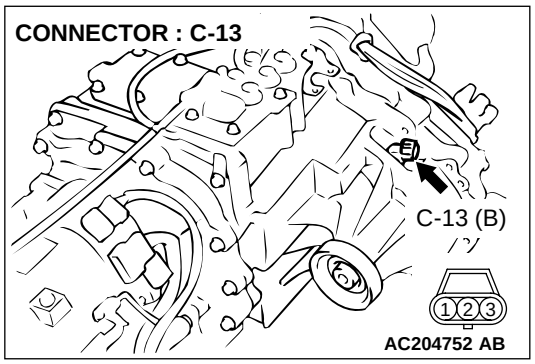
(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 02, Front Propeller Shaft Speed Sensor.
- When driving at constant speed of 30 km/h (19 mph), the display should be "30 km/h (19 mph)."

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

Q: Is the sensor operating properly?

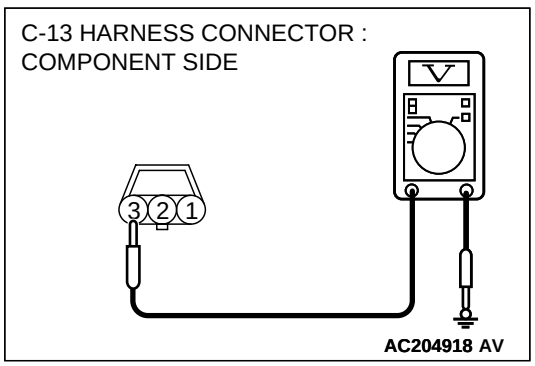
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.



STEP 2. Measure the power supply voltage at front propeller shaft speed sensor connector C-13.

(1) Disconnect connector C-13 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.

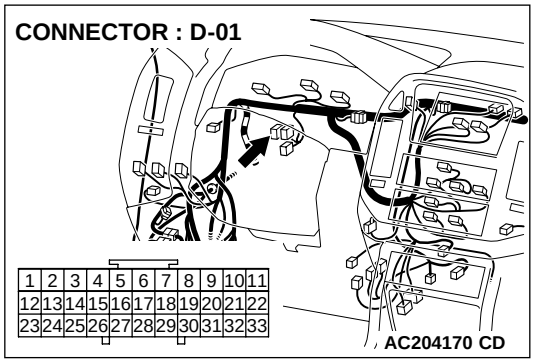


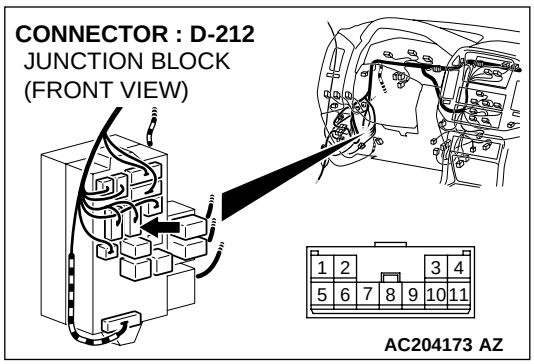
(3) Measure the voltage between terminal 3 and ground.
- The voltage should measure battery positive voltage.

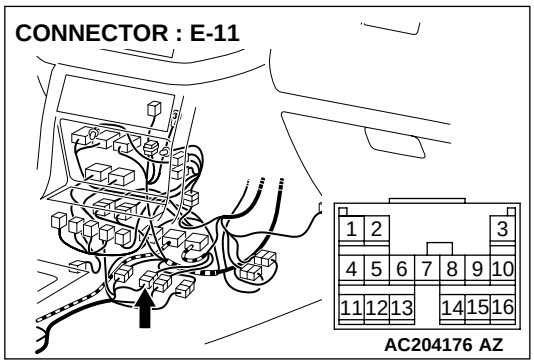
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 5.
NO : Go to Step 3.







STEP 3. Check joint connector D-01, junction block connector D-212 and intermediate connector E-11 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

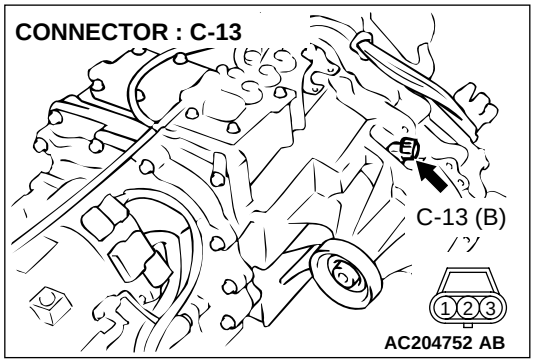
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

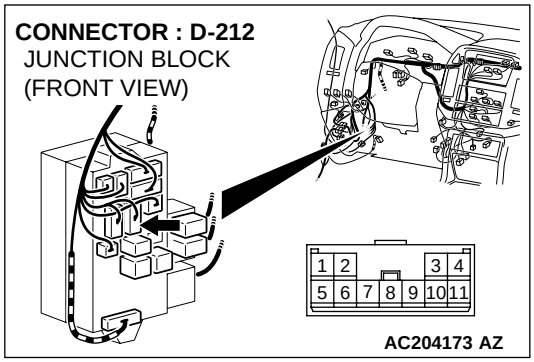
STEP 4. Check the harness for open circuit or short circuit to ground between front propeller shaft speed sensor connector C-13 terminal 3 and junction block connector D-212 terminal 9.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.

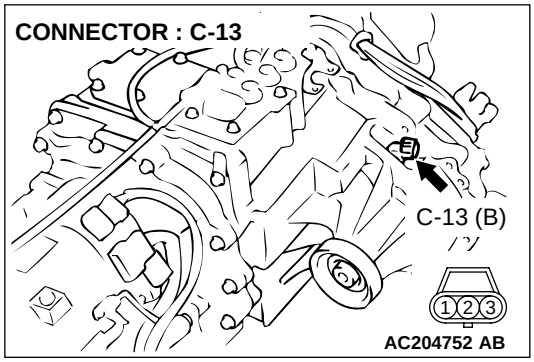


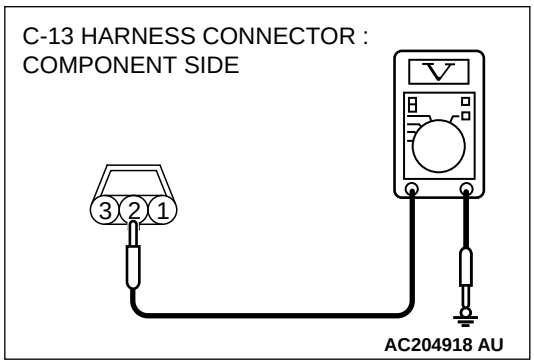


STEP 5. Measure the sensor output voltage at front propeller shaft speed sensor connector C-13.

(1) Disconnect connector C-13 and measure at the harness side.

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





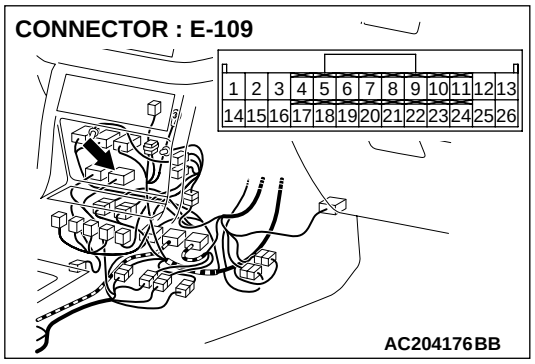
(3) Measure the voltage between terminal 2 and ground.
- The voltage should measure between 4.5 and 4.9 volts.

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

Q: Is the measured voltage between 4.5 and 4.9 volts?

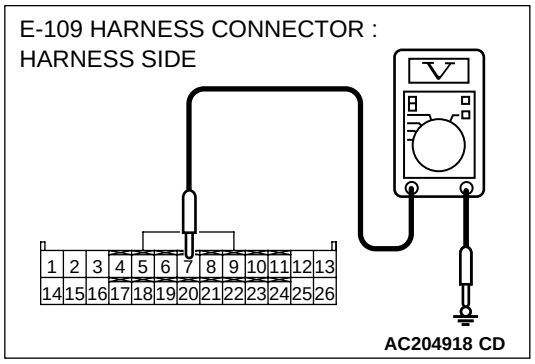
YES : Go to Step 11.

NO : Go to Step 6.



STEP 6. Measure the sensor output voltage at transfer-ECU connector E-109 by backprobing.

(1) Do not disconnect connector E-109.
(2) Disconnect connector C-13 at the front propeller shaft speed sensor.
(3) Turn the ignition switch to the "ON" position.



(4) Measure the voltage between terminal 7 and ground by backprobing.
- The voltage should measure between 4.5 and 4.9 volts.

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

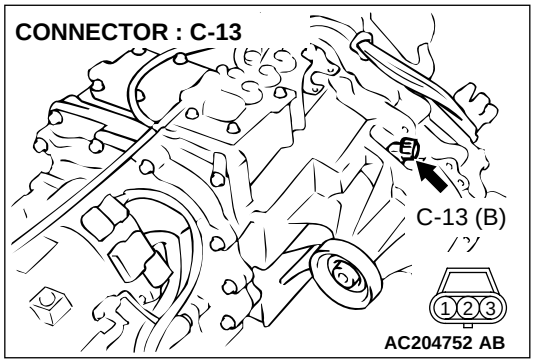
Q: Is the measured voltage between 4.5 and 4.9 volts?

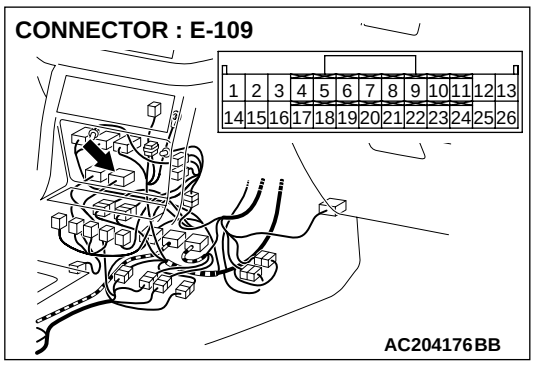
YES : Go to Step 7.
NO : Go to Step 9.

STEP 7. Check front propeller shaft speed sensor connector C-13 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 8.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



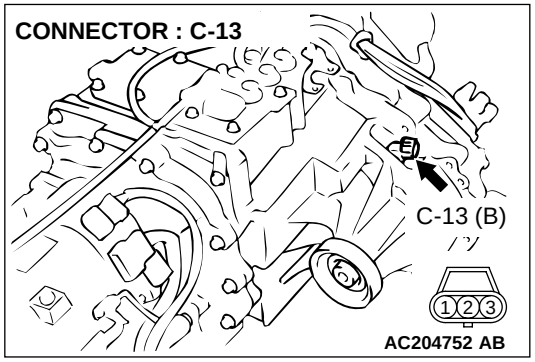


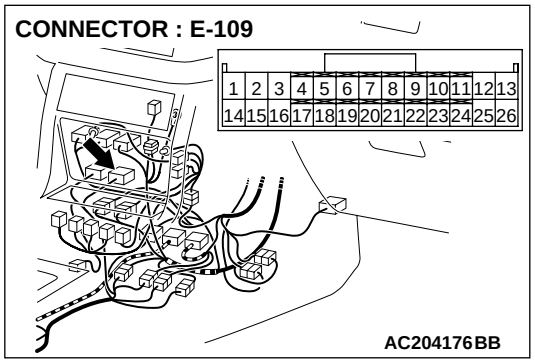
STEP 8. Check harness for open circuit or damage between front propeller shaft speed sensor connector C-13 terminal 2 and transfer-ECU connector E-109 terminal 7.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair or replace the harness wire.



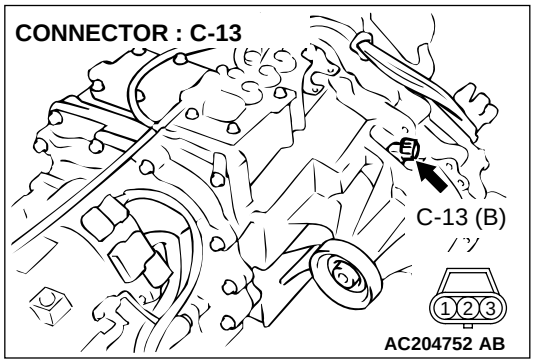


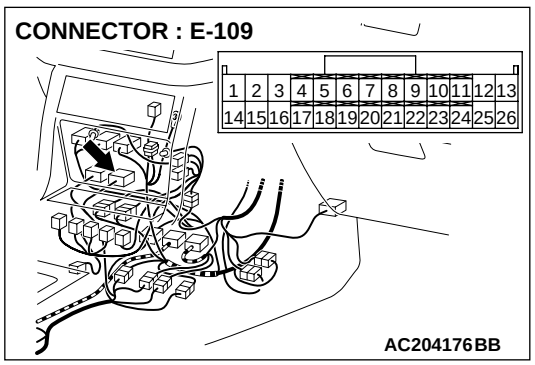
STEP 9. Check front propeller shaft speed sensor connector C-13 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

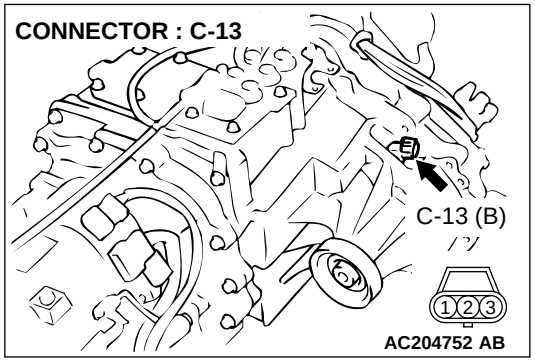
Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair or replace the damages components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





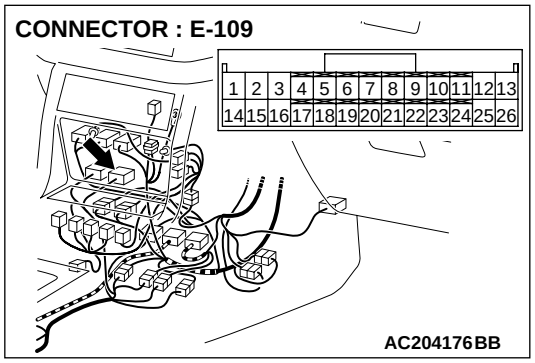


STEP 10. Check harness for short circuit to ground between front propeller shaft speed sensor connector C-13 terminal 2 and transfer-ECU connector E-109 terminal 7.

Q: Is the harness wire in good condition?

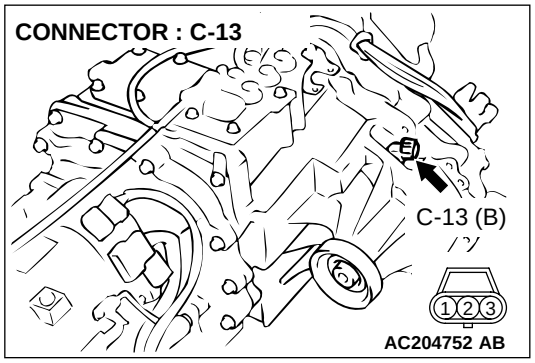
YES : Go to Step 11.

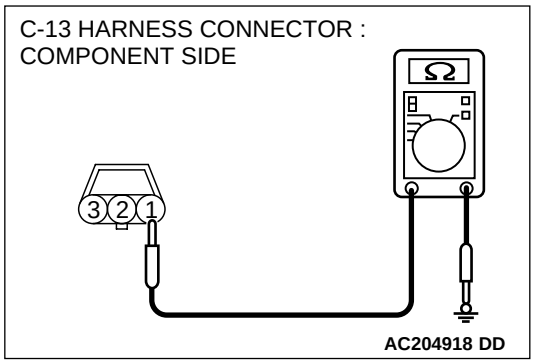
NO : Repair or replace the harness wire.



STEP 11. Measure the ground circuit for resistance at the front propeller shaft speed sensor connector C-13.

(1) Disconnect connector C-13 and measure at the harness side.





(2) Measure the resistance between terminal 1 and ground.
- The resistance should measure less than 2 ohms.

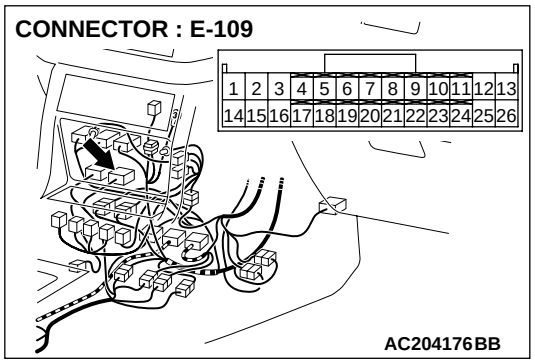
Q: Is the measured resistance less than 2 ohms?

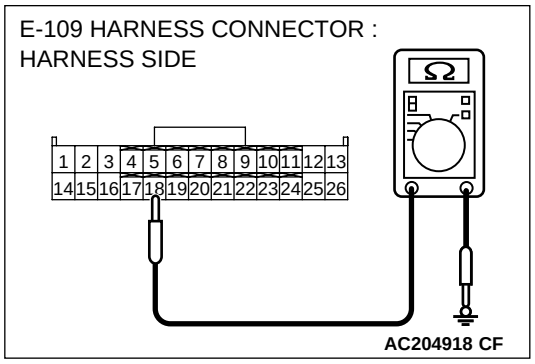
YES : Go to Step 16.

NO : Go to Step 12.

STEP 12. Measure the resistance at the transfer-ECU connector E-109 by backprobing.

(1) Do not disconnect connector E-109.





(2) Measure the resistance between terminal 18 and ground by backprobing.
- The resistance should measure less than 2 ohms.

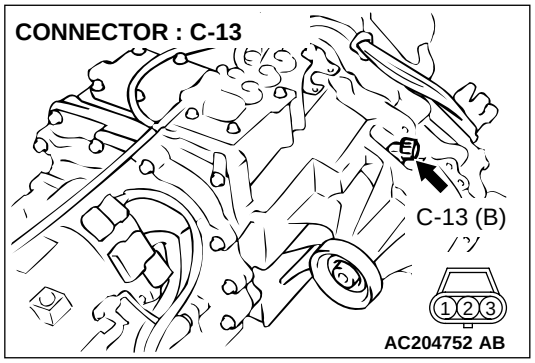
Q: Is the measured resistance less than 2 ohms?

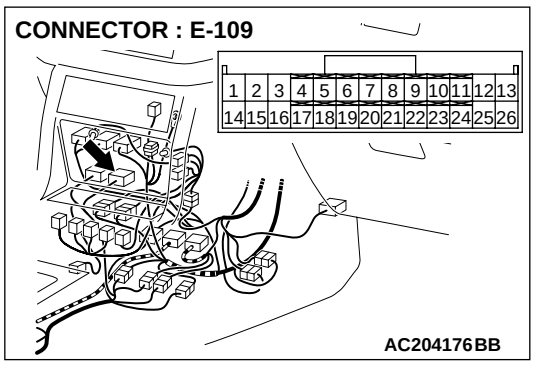
YES : Go to Step 13.
NO : Go to Step 15.

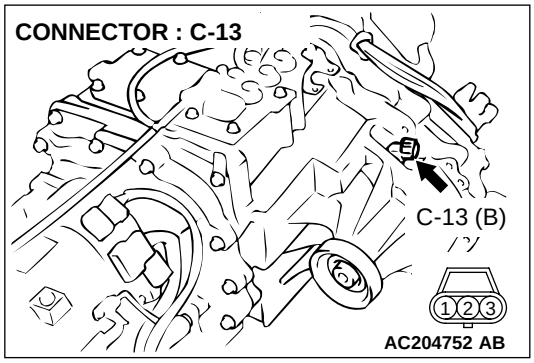
STEP 13. Check front propeller shaft speed sensor connector C-13 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

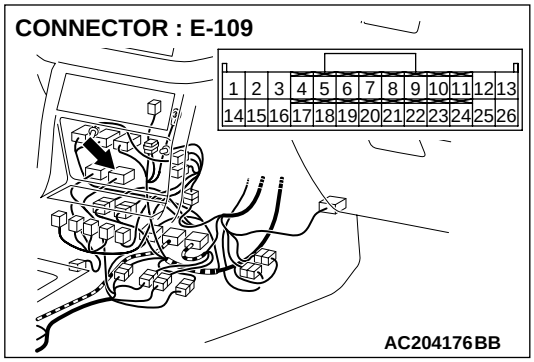
Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.







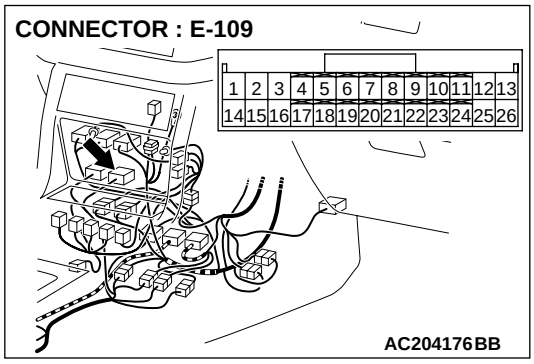


STEP 14. Check harness for open circuit or damage between front propeller shaft speed sensor harness side connector C-13 terminal 1 and transfer-ECU connector E-109 terminal 18.

Q: Is the harness wire in good condition?

YES : Go to Step 16.

NO : Repair or replace the harness wire.



STEP 15. Check transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

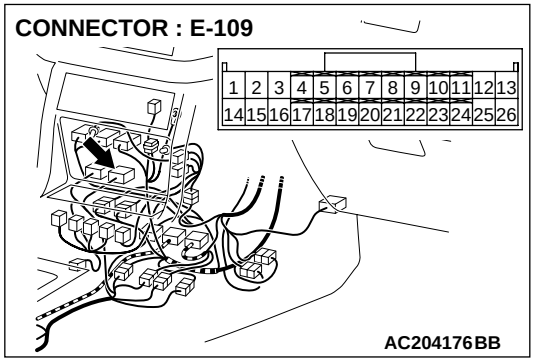
Q: Are the connector and terminals in good condition?

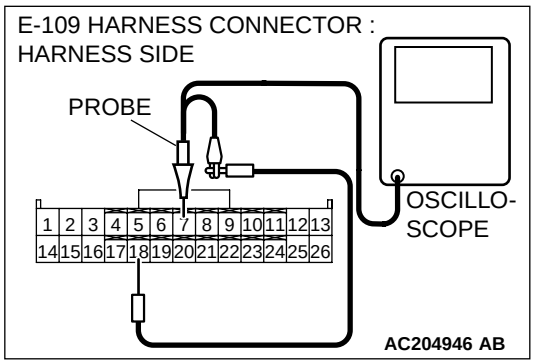
YES : Replace the PCM.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

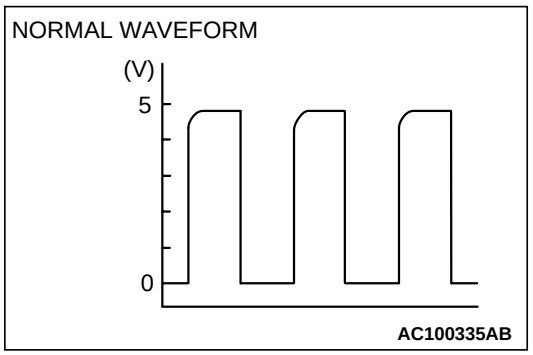
STEP 16. Using an oscilloscope, check the front propeller shaft speed sensor waveform at transfer-ECU connector E-109 by backprobing.

(1) Do not disconnect connector E-109.





(2) Connect an oscilloscope probe to transfer-ECU connector E-109 terminal 7 and 18 by backprobing.
(3) Start the engine and drive the vehicle at constant speed of 30 km/h (19 mph).



(4) Check the front propeller shaft speed sensor waveform.
- The front propeller shaft speed sensor waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.8 volt and less. The output waveform should not contain electrical noise.

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

Q: Is the waveform normal?

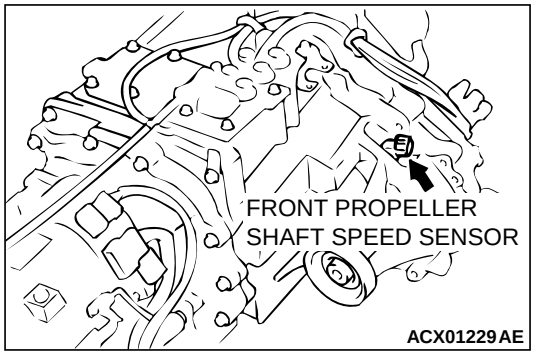
YES : Go to Step 19.
NO : Go to Step 17.

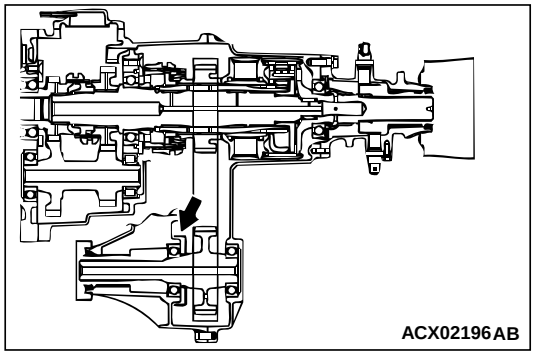
STEP 17. Replace the front propeller shaft speed sensor.

(1) Replace the front propeller shaft speed sensor. Refer to GROUP 23B, Transfer P.23B-103.
(2) Test drive the vehicle.
(3) Check for transfer diagnostic trouble code.

Q: Is transfer DTC 22 or 23 set?

YES : Go to Step 18.
NO : The procedure is complete.





STEP 18. Replace the sensor rotor.

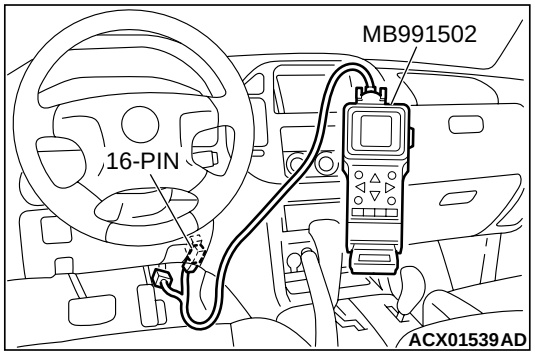
(1) Replace the sensor rotor. Refer to GROUP 23B, Front Output Shaft P.23B-128.
(2) Test drive the vehicle.
(3) Check for transfer diagnostic trouble code.

Q: Is transfer DTC 22 or 23 set?

YES : The transfer DTC may have set due to external radio frequency (RFI), possibly caused by cellular phone activity, or aftermarket components installed on the vehicle.
NO : The procedure is complete.

STEP 19. Using scan tool MB991502, check data list item 02: Front Propeller Shaft Speed Sensor.

⚠ 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.



(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 02, Front Propeller Shaft Speed Sensor.
- When driving at constant speed of 30 km/h (19 mph), the display should be "30 km/h (19 mph)."

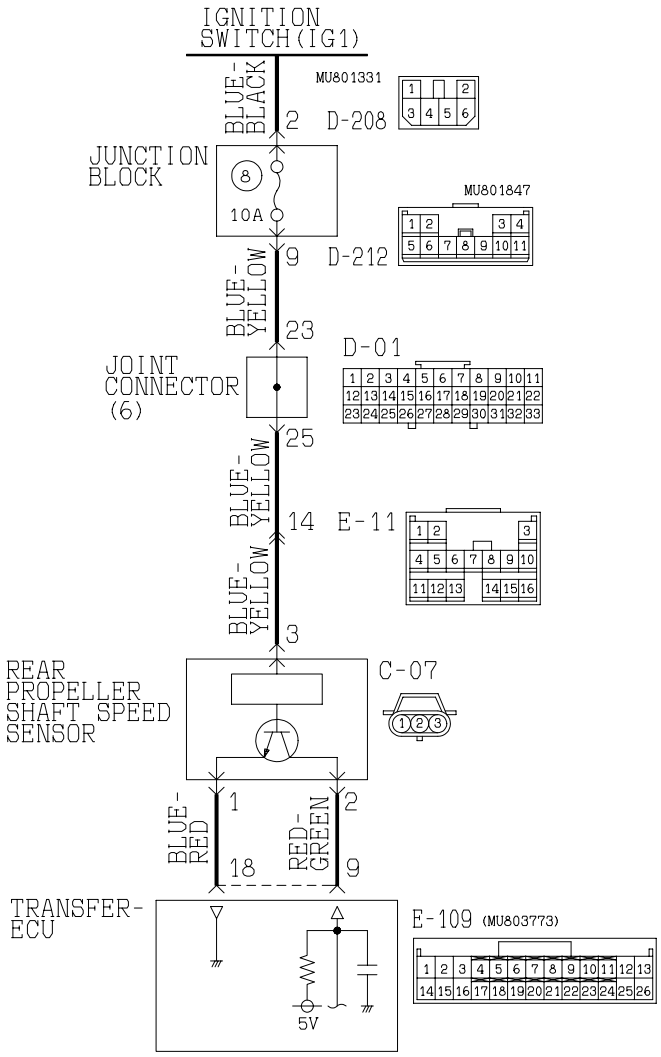
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Replace the transfer-ECU.

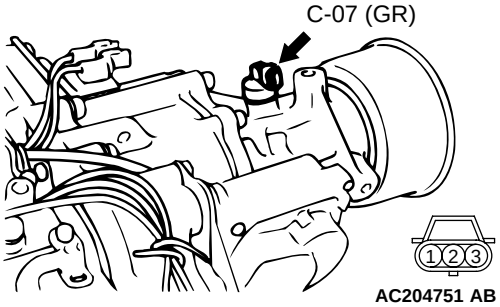
DTC 24, 25: Rear Propeller Shaft Speed Sensor System

Rear Propeller Shaft Speed Sensor System Circuit



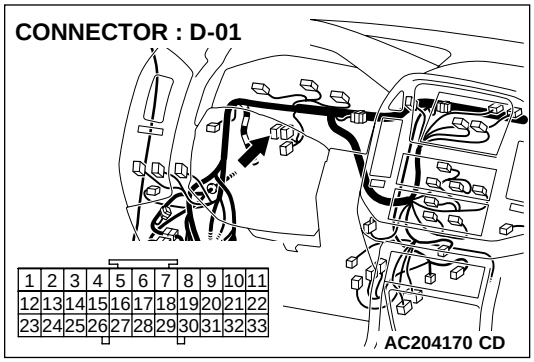
ACX02197AB

CONNECTOR : C-07



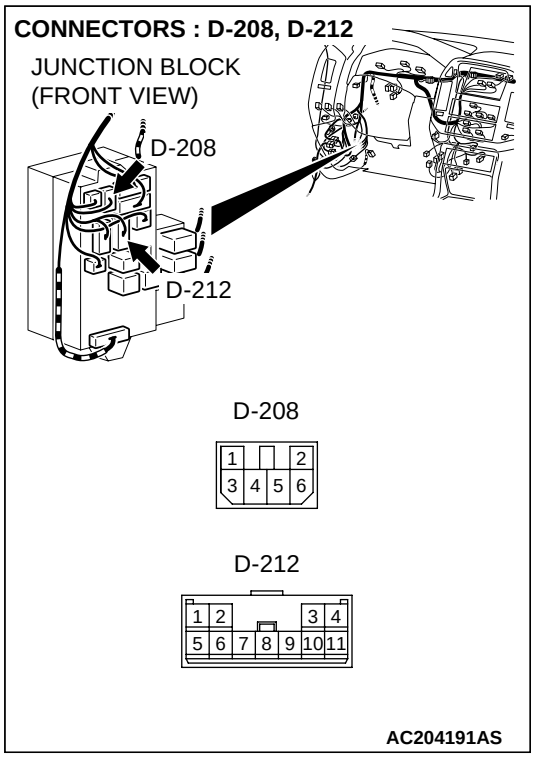
AC204751 AB

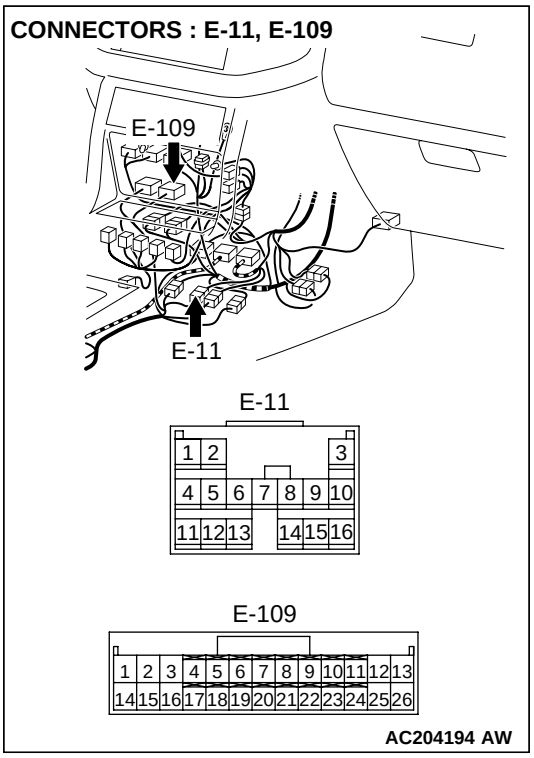
CONNECTOR : D-01



AC204170 CD

TSB Revision





CIRCUIT OPERATION

- The rear propeller shaft speed sensor generates 0 ⇔ 5 volts pulse signal when the rear propeller shaft rotates. The pulse signal frequency increases with a rise in rear propeller shaft speed.
- The ear propeller shaft speed sensor is connected to the transfer-ECU (terminals 9 and 18) via the rear propeller shaft speed sensor connector (terminals 1 and 2).
- The transfer-ECU detects the rear propeller shaft speed by the signal input to terminal 9.
- The rear propeller shaft speed sensor generates the pulse signal as the hole in the rear output shaft pass the magnetic tip of the sensor.

DTC SET CONDITIONS

In the case that the input signal from the rear propeller shaft speed sensor is unstable when the APP sensor voltage is 1.5 volts and over, the DTC 24 is set as the open circuit or the short circuit of the rear propeller shaft speed sensor. In the case that the input signal from the rear propeller shaft speed sensor is unstable when the freewheel engage switch is ON condition, the DTC 25 is set as the open circuit or the short circuit of the rear propeller shaft speed sensor.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

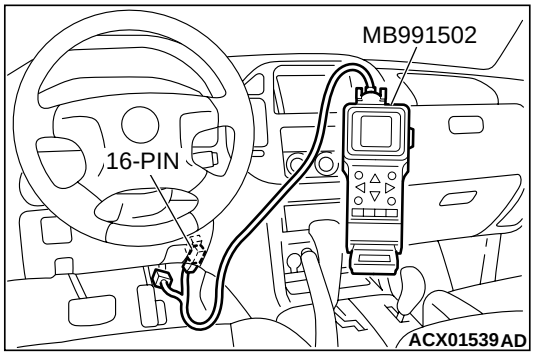
- Malfunction of the rear propeller shaft speed sensor circuit
- Malfunction of the rear output shaft
- Damaged harness, connector
- Malfunction of the transfer-ECU

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 03: Rear Propeller Shaft Speed Sensor.

⚠ 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.



(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 03, Rear Propeller Shaft Speed Sensor.
- When driving at constant speed of 30 km/h (19 mph), the display should be "30 km/h (19 mph)."

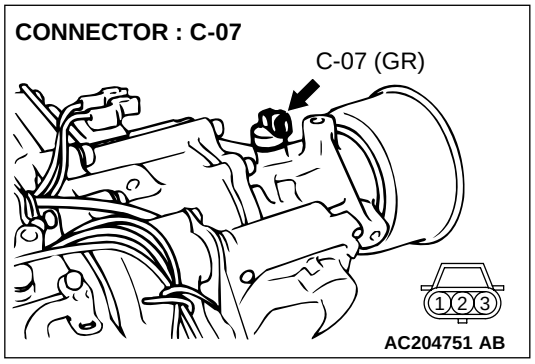
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the sensor operating properly?

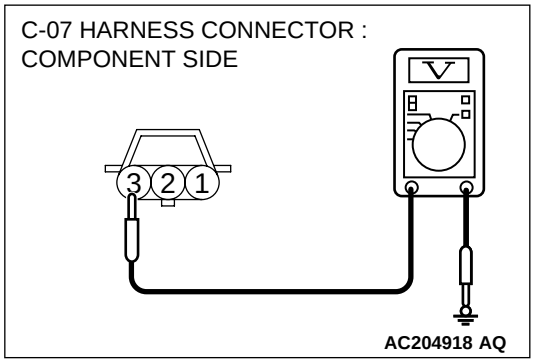
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

STEP 2. Measure the power supply voltage at rear propeller shaft speed sensor connector C-07.



(1) Disconnect connector C-07 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.



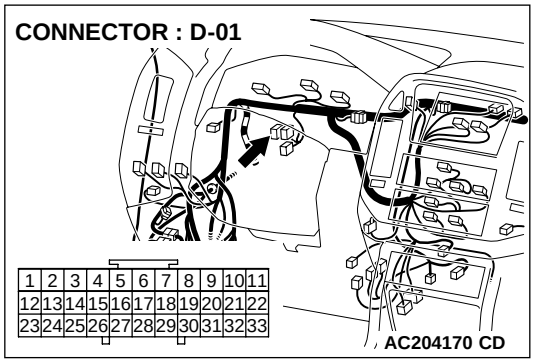
(3) Measure the voltage between terminal 3 and ground.
- The voltage should measure battery positive voltage.

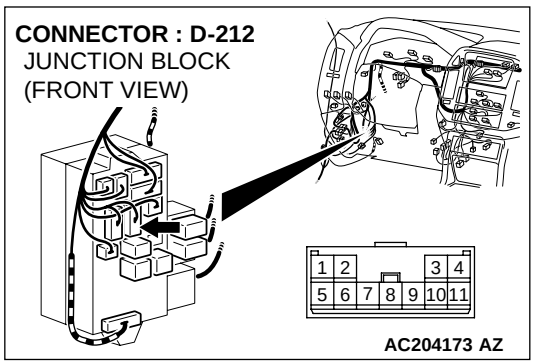
(4) Turn the ignition switch to the "LOCK" (OFF) position.

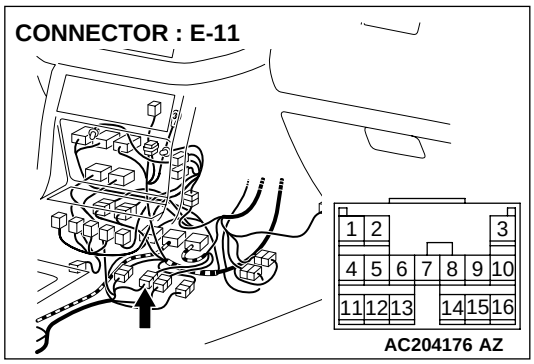
Q: Is the measured voltage battery positive voltage?

YES : Go to Step 5.

NO : Go to Step 3.







STEP 3. Check joint connector D-01, junction block connector D-212 and intermediate connector E-11 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.

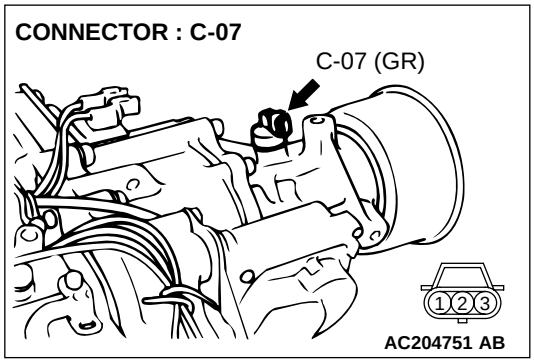
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

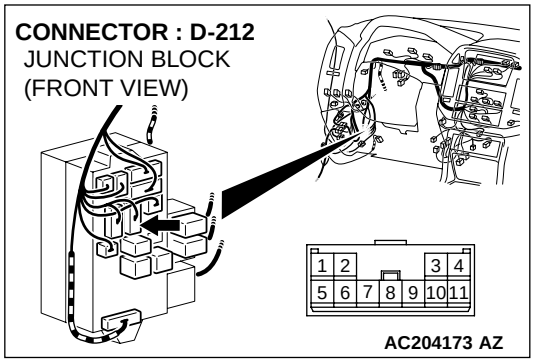
STEP 4. Check the harness for open circuit or short circuit to ground between rear propeller shaft speed sensor connector C-07 terminal 3 and junction block connector D-212 terminal 9.

Q: Is the harness wire in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire.

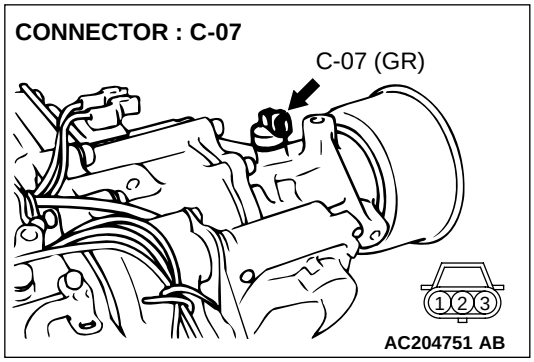


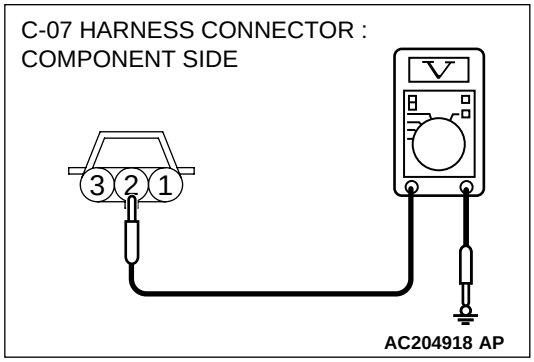


STEP 5. Measure the sensor output voltage at rear propeller shaft speed sensor connector C-07.

(1) Disconnect connector C-07 and measure at the harness side.

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





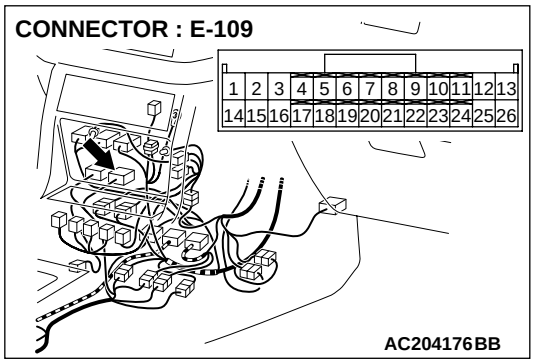
(3) Measure the voltage between terminal 2 and ground.
- The voltage should measure between 4.5 and 4.9 volts.

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

Q: Is the measured voltage between 4.5 and 4.9 volts?

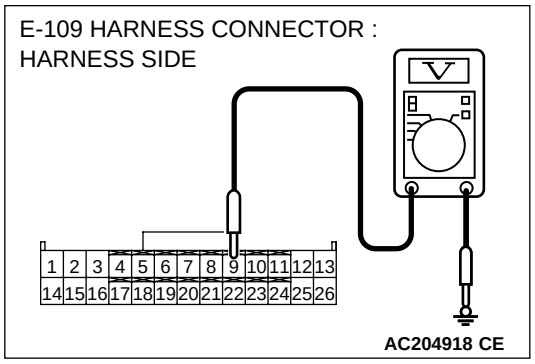
YES : Go to Step 11.

NO : Go to Step 6.



STEP 6. Measure the sensor output voltage at transfer-ECU connector E-109 by backprobing.

(1) Do not disconnect connector E-109.
(2) Disconnect connector C-07 at the rear propeller shaft speed sensor.
(3) Turn the ignition switch to the "ON" position.



(4) Measure the voltage between terminal 9 and ground by backprobing.
- The voltage should measure between 4.5 and 4.9 volts.

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

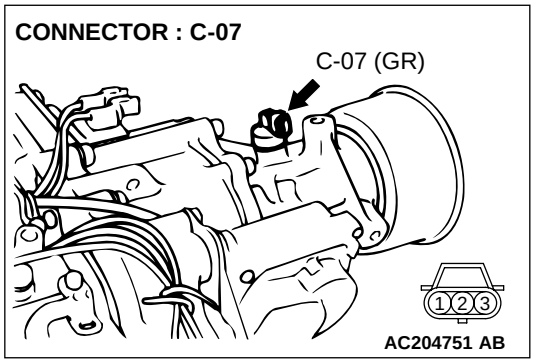
Q: Is the measured voltage between 4.5 and 4.9 volts?

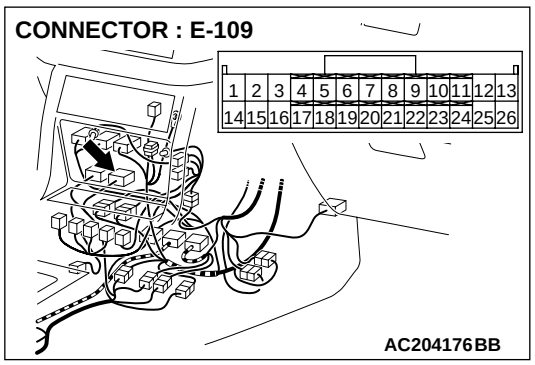
YES : Go to Step 7.
NO : Go to Step 9.

STEP 7. Check rear propeller shaft speed sensor connector C-07 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 8.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



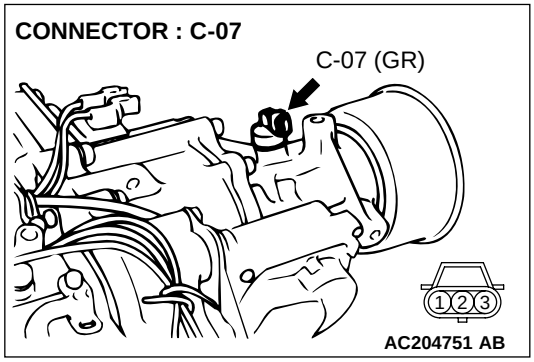


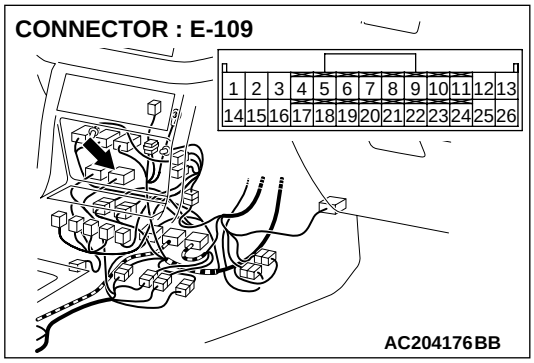
STEP 8. Check harness for open circuit or damage between rear propeller shaft speed sensor connector C-07 terminal 2 and transfer-ECU connector E-109 terminal 9.

Q: Is the harness wire in good condition?

YES : Go to Step 19.

NO : Repair or replace the harness wire.



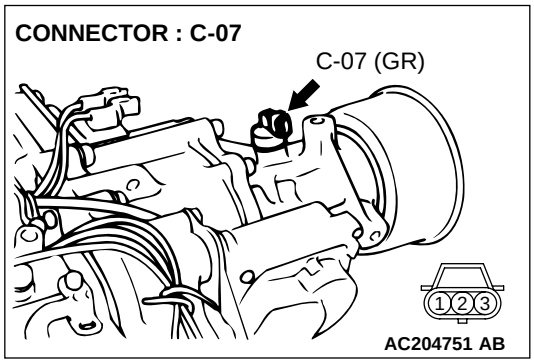


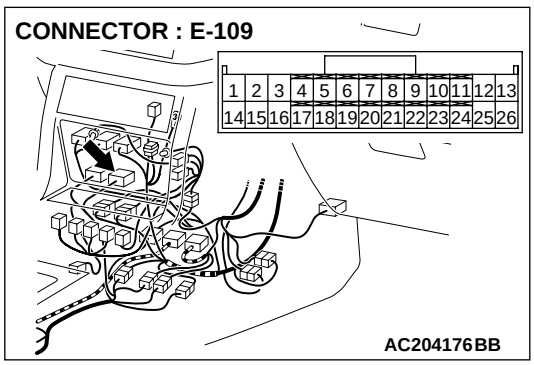
STEP 9. Check rear propeller shaft speed sensor connector C-07 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair or replace the damages components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



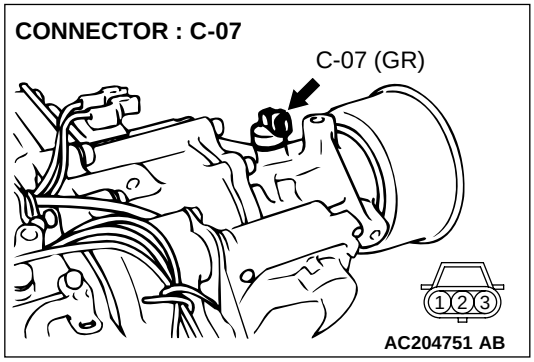


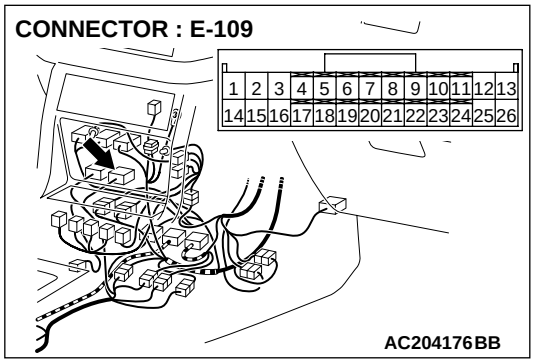
STEP 10. Check harness for short circuit to ground between rear propeller shaft speed sensor connector C-07 terminal 2 and transfer-ECU connector E-109 terminal 9.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

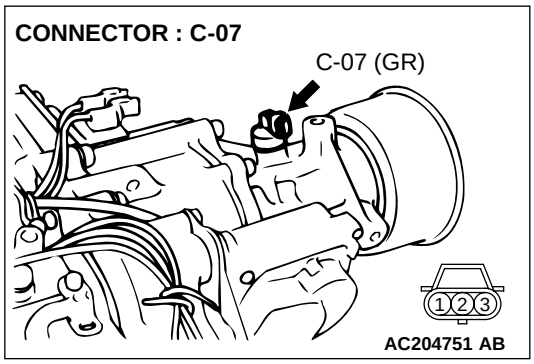
NO : Repair or replace the harness wire.

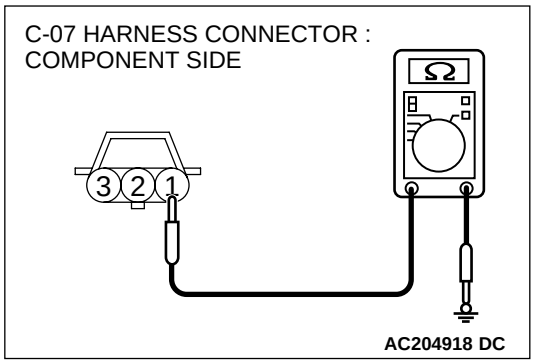




STEP 11. Measure the ground circuit for resistance at the rear propeller shaft speed sensor connector C-07.

(1) Disconnect connector C-07 and measure at the harness side.





(2) Measure the resistance between terminal 1 and ground.
- The resistance should measure less than 2 ohms.

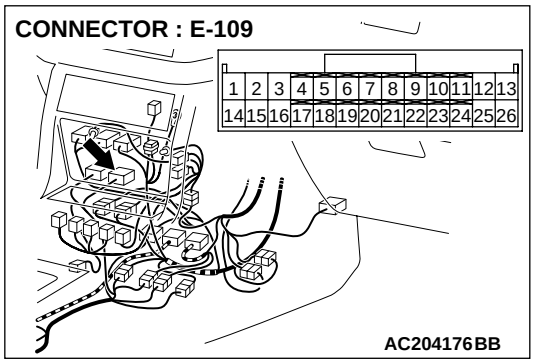
Q: Is the measured resistance less than 2 ohms?

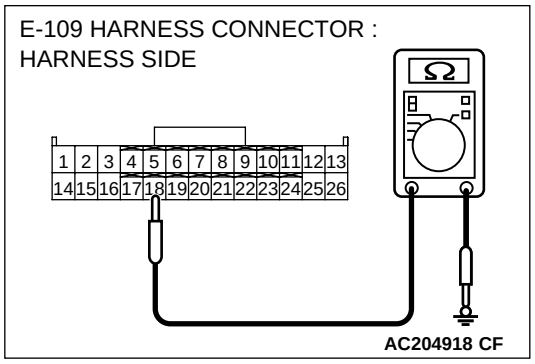
YES : Go to Step 16.

NO : Go to Step 12.

STEP 12. Measure the resistance at the transfer-ECU connector E-109 by backprobing.

(1) Do not disconnect connector E-109.





(2) Measure the resistance between terminal 18 and ground by backprobing.
- The resistance should measure less than 2 ohms.

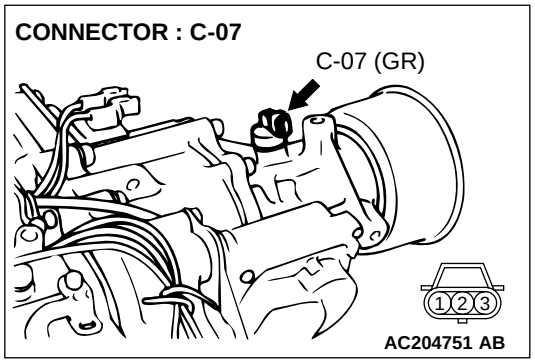
Q: Is the measured resistance less than 2 ohms?

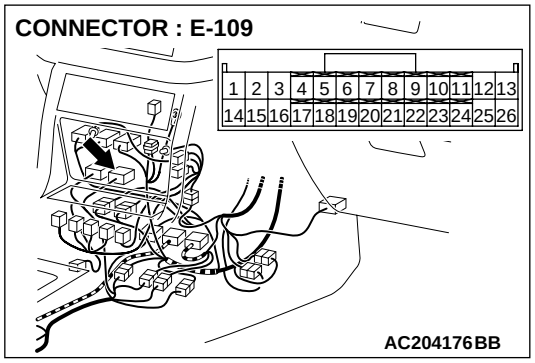
YES : Go to Step 13.
NO : Go to Step 15.

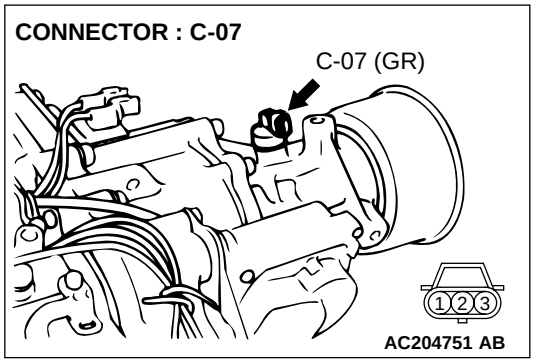
STEP 13. Check rear propeller shaft speed sensor connector C-07 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





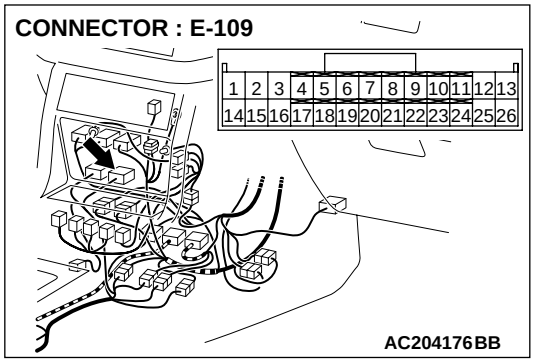


STEP 14. Check harness for open circuit or damage between rear propeller shaft speed sensor harness side connector C-07 terminal 1 and transfer-ECU connector E-109 terminal 18.

Q: Is the harness wire in good condition?

YES : Go to Step 16.

NO : Repair or replace the harness wire.

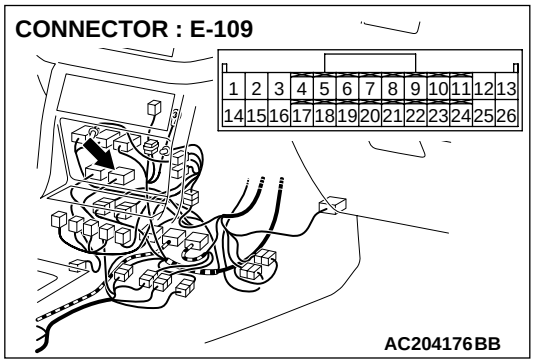


STEP 15. Check transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

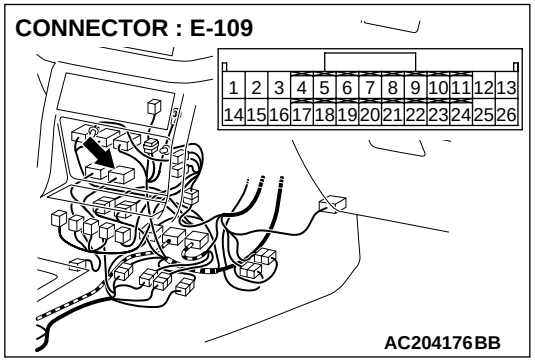
Q: Are the connector and terminals in good condition?

YES : Replace the PCM.

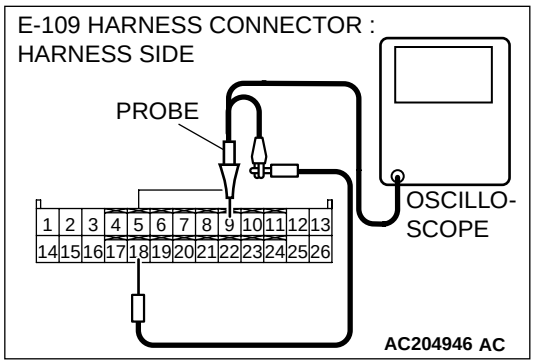
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



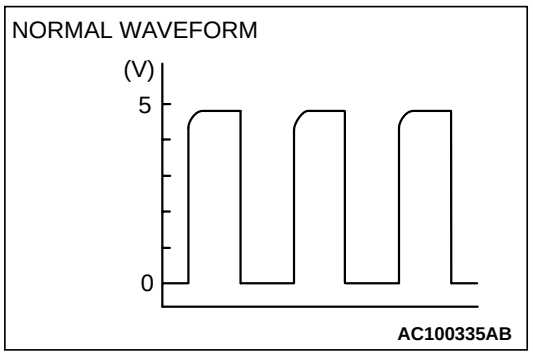
STEP 16. Using an oscilloscope, check the rear propeller shaft speed sensor waveform at transfer-ECU connector E-109 by backprobing.



(1) Do not disconnect connector E-109.



(2) Connect an oscilloscope probe to transfer-ECU connector E-109 terminal 9 and 18 by backprobing.
(3) Start the engine and drive the vehicle at constant speed of 30 km/h (19 mph).



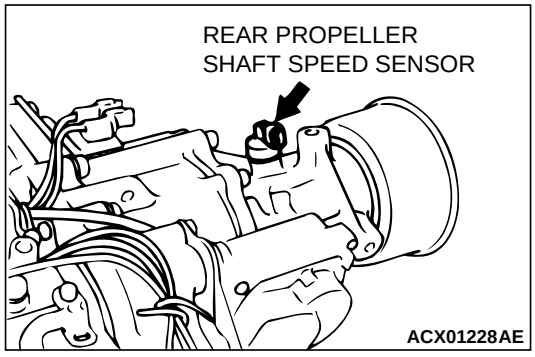
(4) Check the rear propeller shaft speed sensor waveform.
- The rear propeller shaft speed sensor waveform should show a pattern similar to the illustration. The maximum value should be 4.8 volts and more and the minimum value 0.8 volt and less. The output waveform should not contain electrical noise.

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

Q: Is the waveform normal?

YES : Go to Step 19.
NO : Go to Step 17.

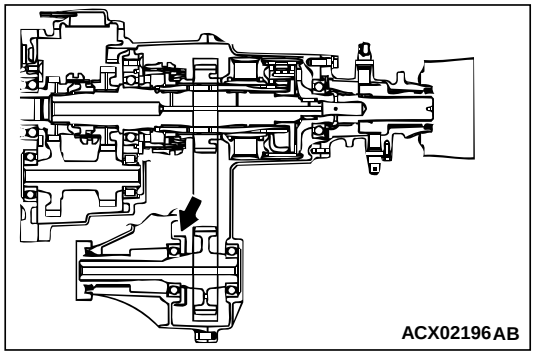
STEP 17. Replace the rear propeller shaft speed sensor.



(1) Replace the rear propeller shaft speed sensor. Refer to GROUP 23B, Transfer P.23B-103.
(2) Test drive the vehicle.
(3) Check for transfer diagnostic trouble code.

Q: Is transfer DTC 24 or 25 set?

YES : Go to Step 18.
NO : The procedure is complete.



STEP 18. Replace the sensor rotor.

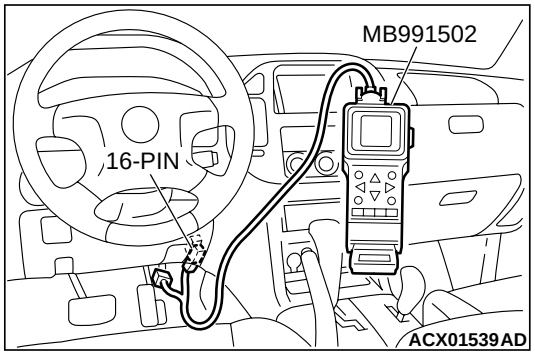
(1) Replace the sensor rotor. Refer to GROUP 23B, Transfer P.23B-103.
(2) Test drive the vehicle.
(3) Check for transfer diagnostic trouble code.

Q: Is transfer DTC 24 or 25 set?

YES : The transfer DTC may have set due to external radio frequency (RFI), possibly caused by cellular phone activity, or aftermarket components installed on the vehicle.
NO : The procedure is complete.

STEP 19. Using scan tool MB991502, check data list item 03: Rear Propeller Shaft Speed Sensor.

⚠ 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.



(1) Connect scan tool MB991502 to the data link connector.
(2) Start the engine.
(3) Set scan tool MB991502 to data reading mode for item 03, Rear Propeller Shaft Speed Sensor.
- When driving at constant speed of 30 km/h (19 mph), the display should be "30 km/h (19 mph)."

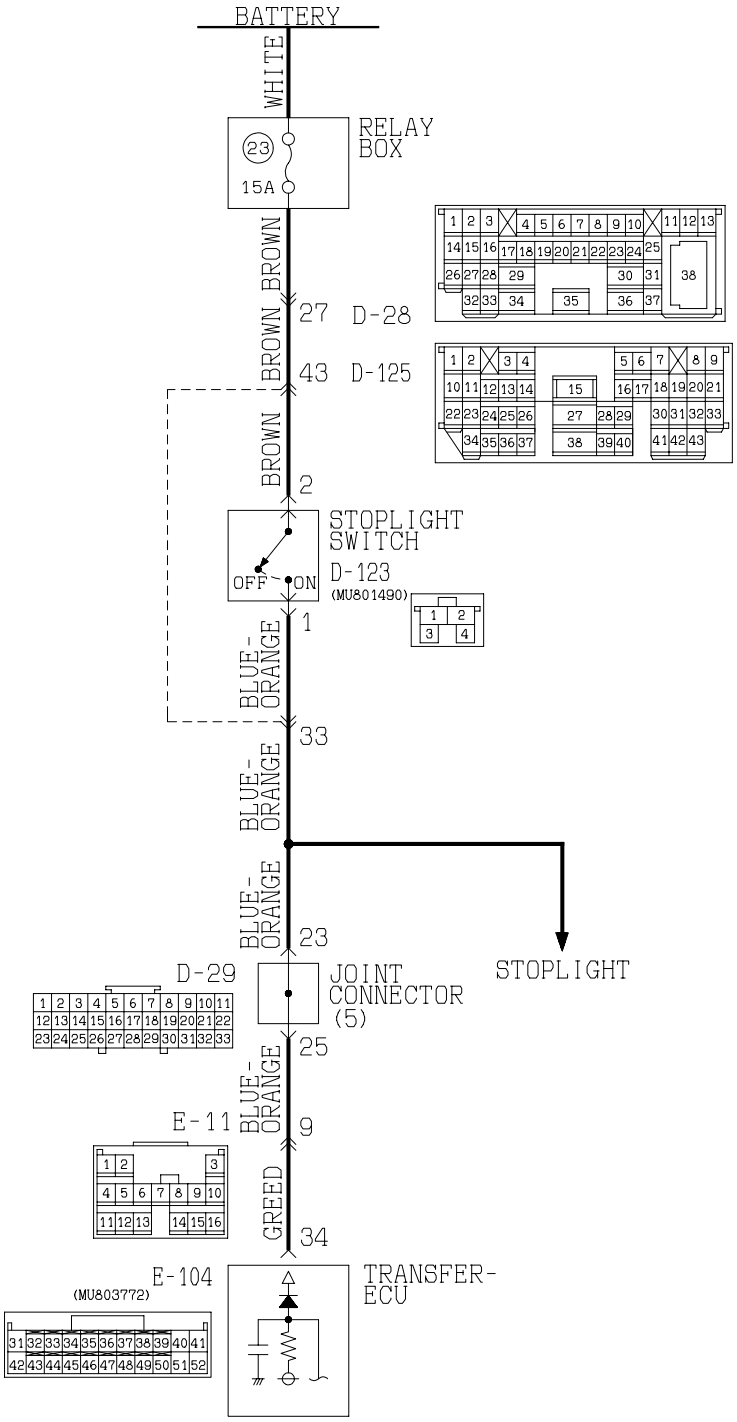
(4) Turn the ignition switch to the "LOCK" (OFF) position.

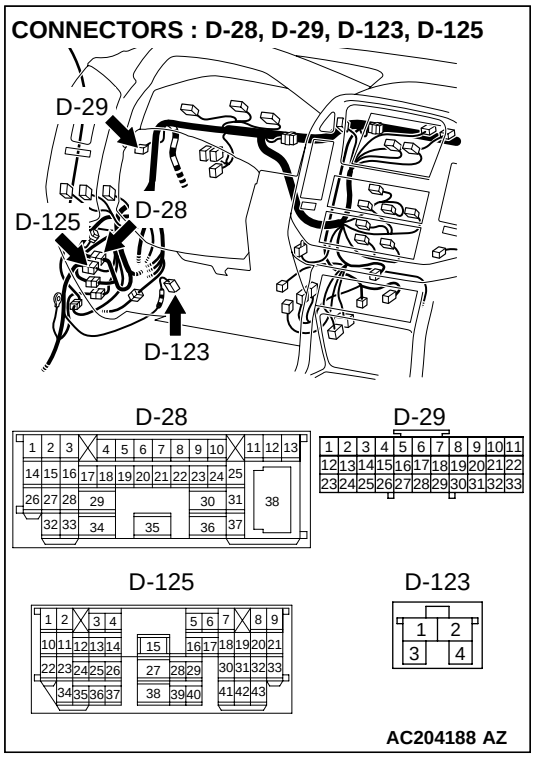
Q: Is the sensor operating properly?

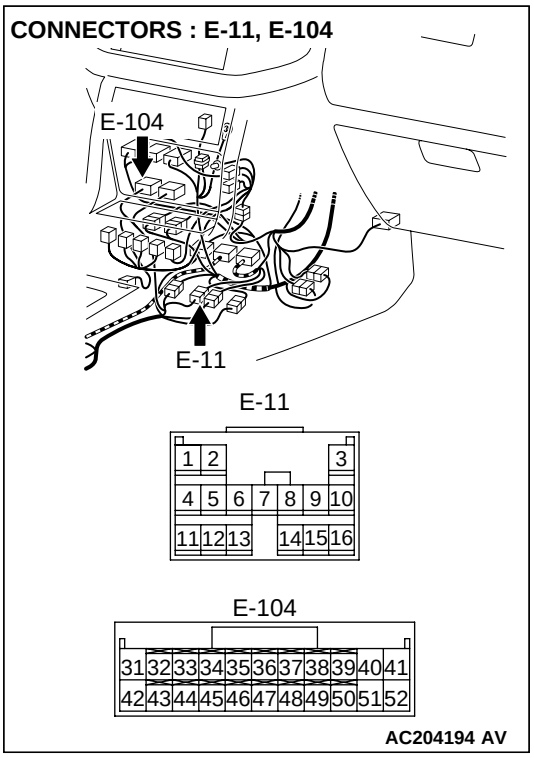
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Replace the transfer-ECU.

DTC 26: Stoplight Switch System

Stoplight Switch System Circuit







CIRCUIT OPERATION

- Battery positive voltage is supplied to the stoplight switch (terminal 2).
- When the brake pedal is depressed, battery positive voltage is applied to the transfer-ECU (terminal 34).

DTC SET CONDITIONS

In the case that the stoplight switch is continuously turned ON for 15 minutes at the vehicle speed of 15 km/h (9.3 mph) and over, the DTC 26 is set as the short circuit of the stoplight switch.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the stoplight switch circuit
- Damaged harness, connector
- Malfunction of the transfer-ECU

DIAGNOSIS

Required Special Tool:

- MB991502: Scan Tool (MUT-II)

STEP 1. Check the brake pedal height.

Refer to GROUP 35A, On-vehicle Service – Brake Pedal Check and Adjustment P.35A-115.

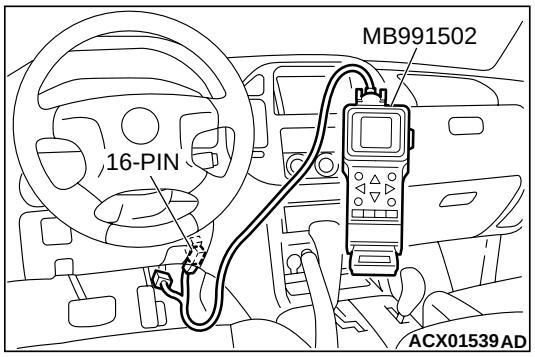
Q: Is the height adjusted properly?

YES : Go to Step 2.
NO : Adjust the brake pedal to the proper height.

STEP 2. Using scan tool MB991502, check data list item 23: Stoplight Switch.

⚠ 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.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 23, Stoplight Switch – Active Trac 4WD II.
- When the brake pedal is depressed, the display on scan tool MB991502 should be "ON."
- When the brake pedal is not depressed, the display on scan tool MB991502 should be "OFF."

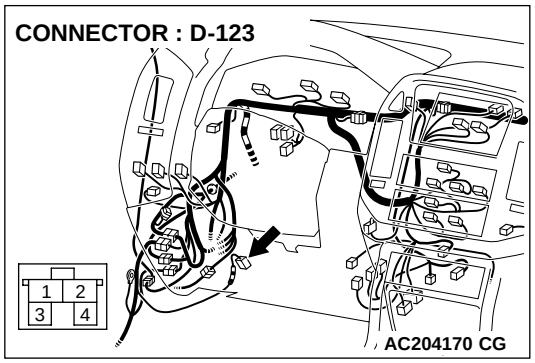
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the switch operating properly?

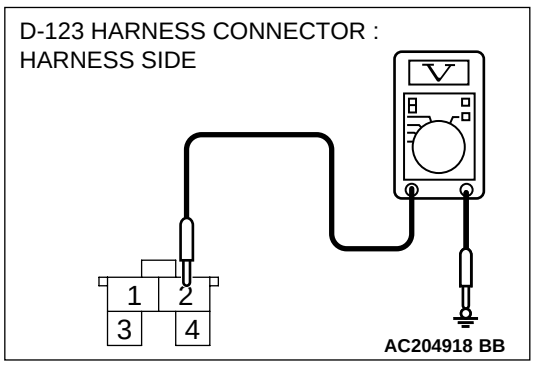
YES : If can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 3.

STEP 3. Measure the stoplight switch power supply voltage at connector D-123 by backprobing.



(1) Remove the stoplight switch from the mounting bracket.
(2) Do not disconnect connector D-123.

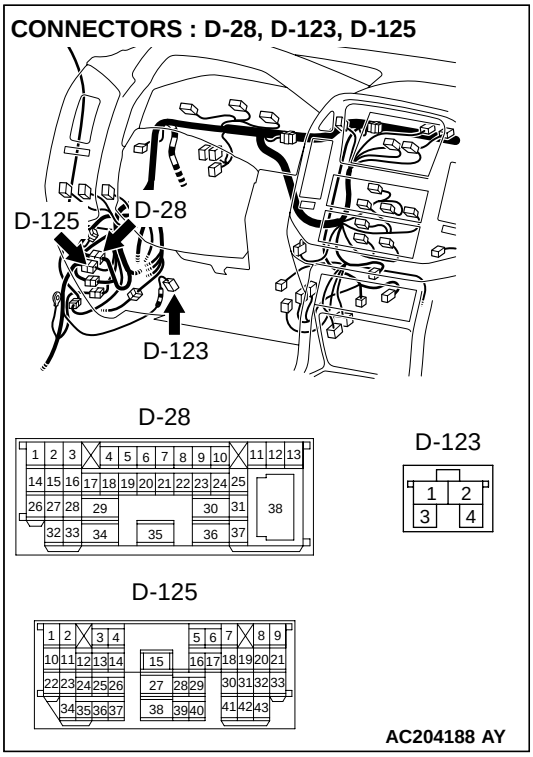


(3) Measure the voltage between terminal 2 and ground by backprobing.
- The voltage should measure battery positive voltage.

Q: Is the measured voltage battery positive voltage?

YES : Go to Step 6.

NO : Go to step 4.

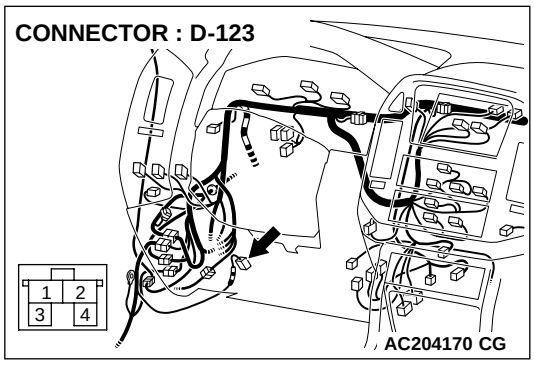


STEP 4. Check stoplight switch connector D-123, intermediate connector D-28 and D-125 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

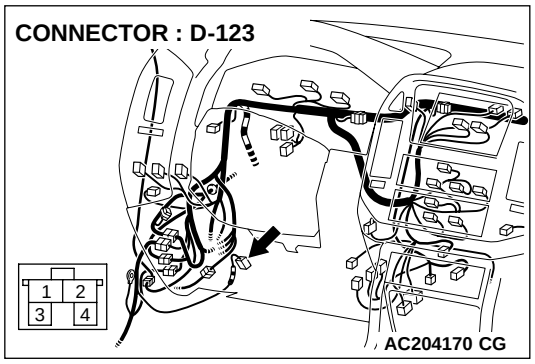


STEP 5. Check the harness for open circuit or short circuit to ground between stoplight switch connector D-123 terminal 2 and the power supply fuse.

Q: Is the harness wire in good condition?

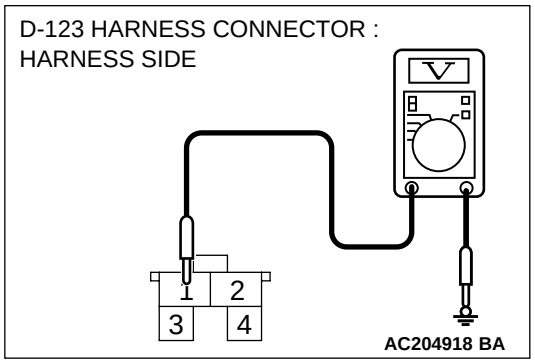
YES : Go to Step 6.

NO : Repair or replace the harness wire.



STEP 6. Measure the stoplight switch output voltage to the PCM at connector D-123 by backprobing.

(1) Remove the stoplight switch from the mounting bracket.
(2) Do not disconnect connector D-123.



(3) Measure the voltage between stoplight switch connector D-123 terminal 1 and ground by backprobing.
- When the switch button is out (closed circuit), voltage should equal battery positive voltage.
- When the switch button is depressed (open circuit), voltage should measure less than 1.0 volt.

Q: Is the measured voltage battery positive voltage with the switch button released (closed circuit), and less than 1.0 volt with the switch button depressed (open circuit)?

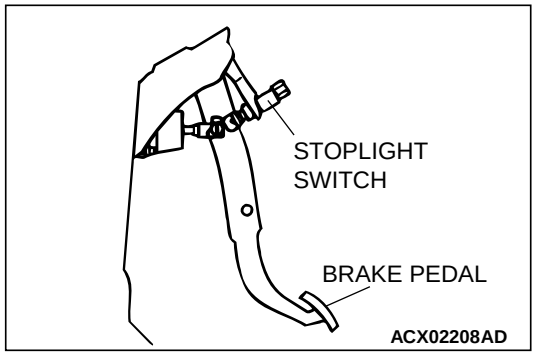
YES : Go to Step 8.
NO : Go to Step 7.

STEP 7. Check the stoplight switch.

Refer to GROUP 35A, On-vehicle Service – Stoplight Switch Check P.35A-116.

Q: Does the stoplight switch pass the checks?

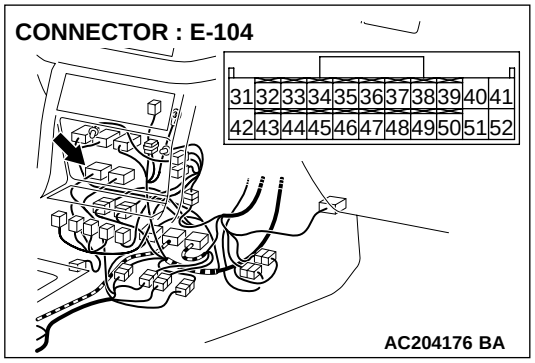
YES : Go to Step 8.
NO : Replace the stoplight switch. Refer to GROUP 35A, Brake Pedal P.35A-132.

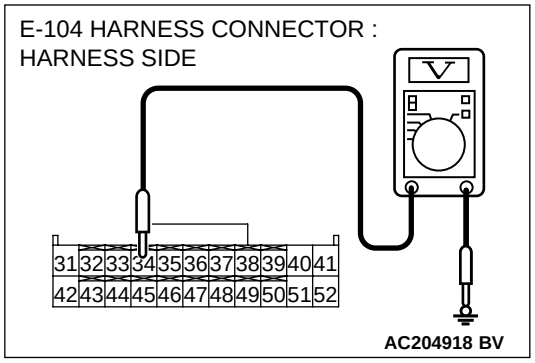


STEP 8. Measure the stoplight switch output voltage at transfer-ECU connector E-104 by backprobing.

(1) Install the stoplight switch into the mounting bracket if it was removed.

(2) Do not disconnect connector E-104.



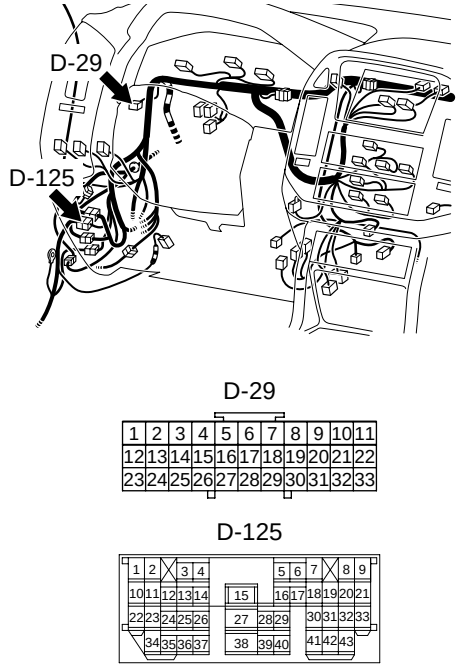


(3) Measure the voltage between terminal 34 and ground by backprobing.
- When the brake pedal is depressed, voltage should measure battery positive voltage.
- When the brake pedal is not depressed, voltage should measure less than 1.0 volt.

Q: Is the measured voltage battery positive voltage with the brake pedal depressed (closed circuit), and less than 1.0 volt with the brake pedal released (open circuit)?

YES : Go to Step 11.
NO : Go to Step 9.

CONNECTORS : D-29, D-125



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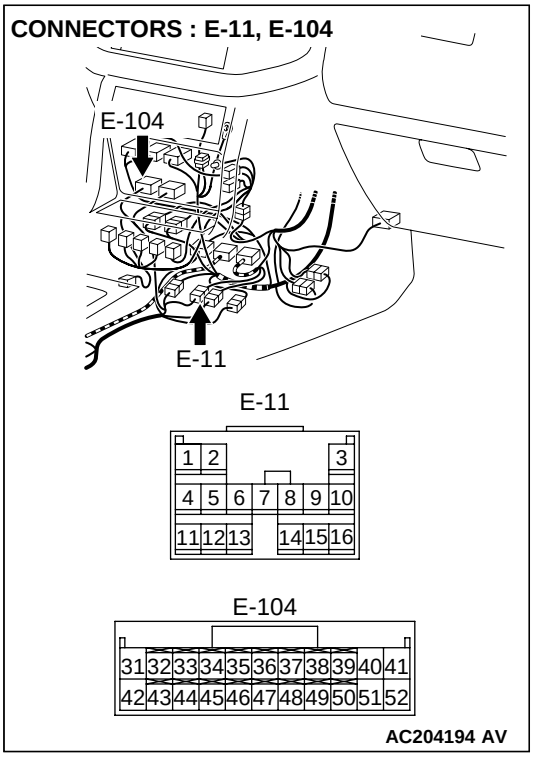
CONNECTORS : E-11, E-104



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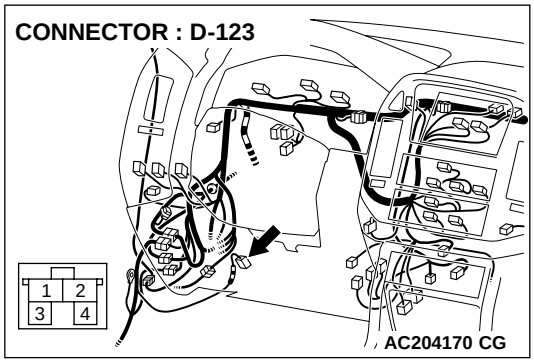
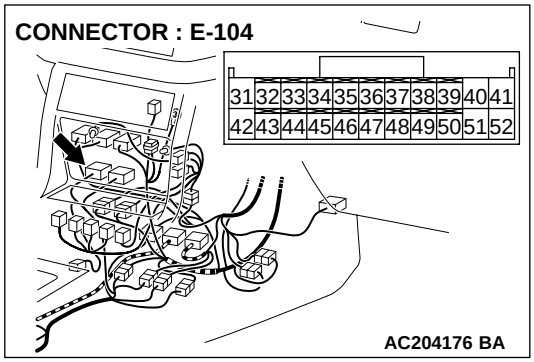
STEP 9. Check joint connector D-29, intermediate connector D-125, E-11 and transfer-ECU connector E-104 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 10.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



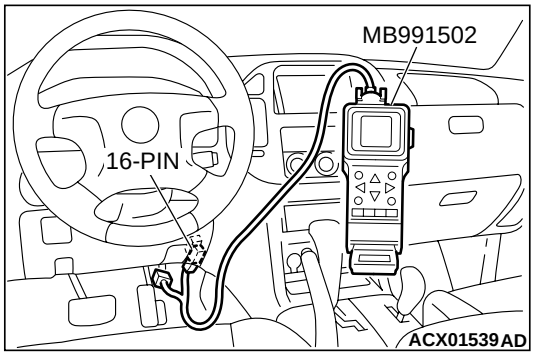


STEP 10. Check the harness for open circuit or short circuit to ground between stoplight switch connector D-123 terminal 1 and transfer-ECU connector E-104 terminal 34.

Q: Is the harness wire in good condition?

YES : Go to Step 11.

NO : Repair or replace the harness wire.



STEP 11. Using scan tool MB991502, check data list item 23: Stoplight Switch.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 23, Stoplight Switch – Active Trac 4WD II.
- When the brake pedal is depressed, the display on scan tool MB991502 should be "ON."
- When the brake pedal is not depressed, the display on scan tool MB991502 should be "OFF."

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

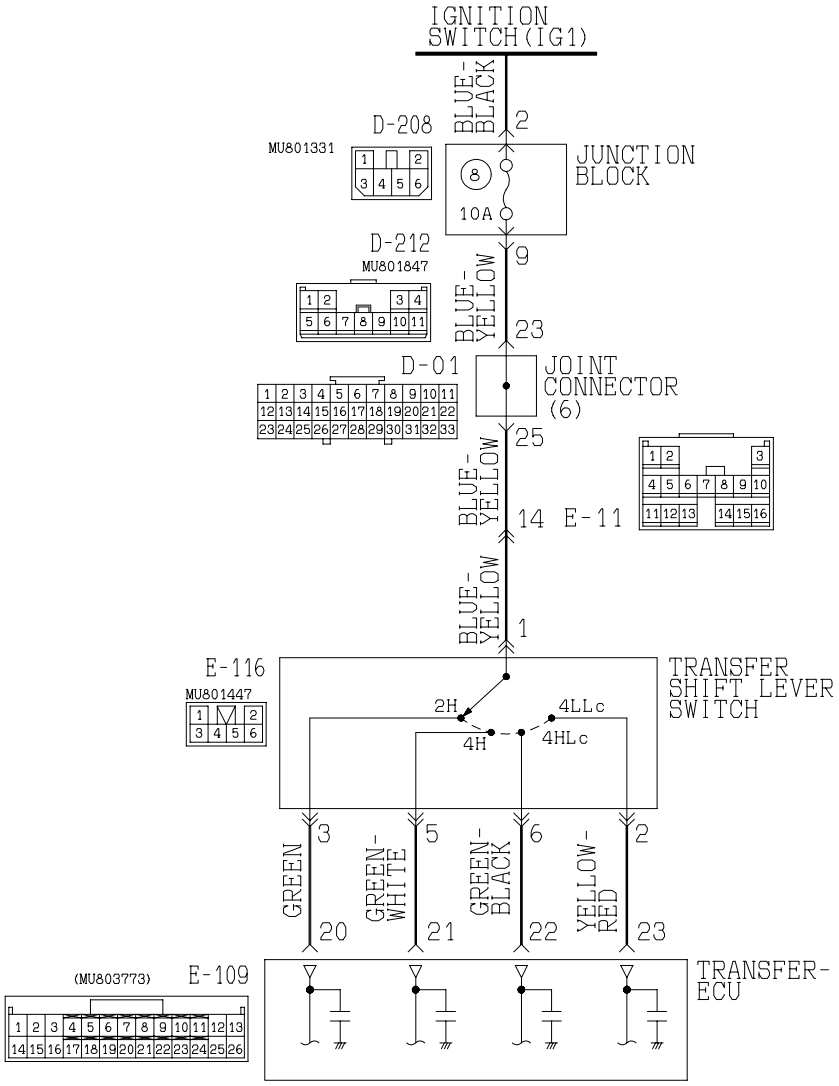
Q: Is the switch operating properly?

YES : If can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

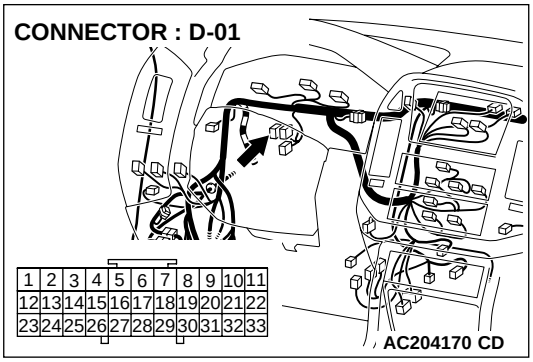
NO : Replace the PCM.

DTC 31: Tansfer Shift Lever Switch System

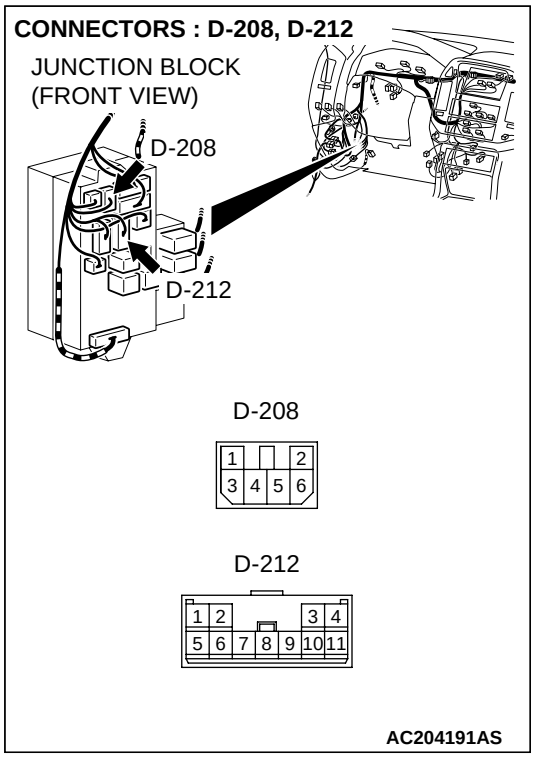
Transfer Shift Lever Switch System Circuit

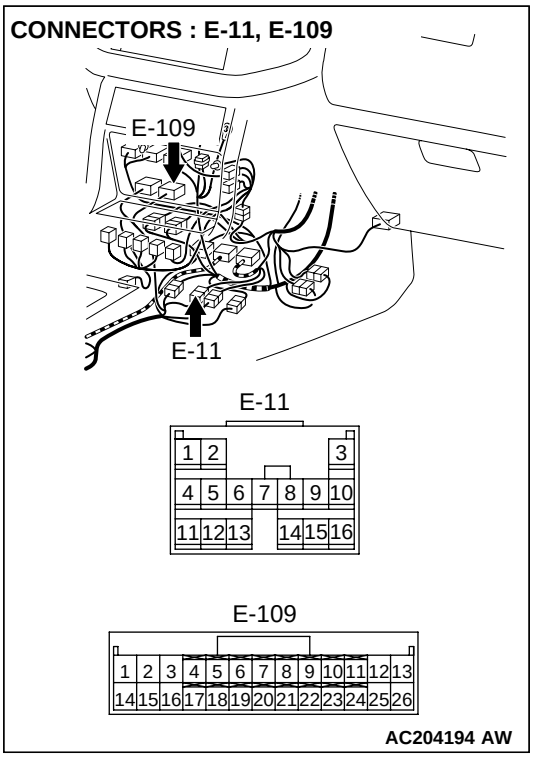


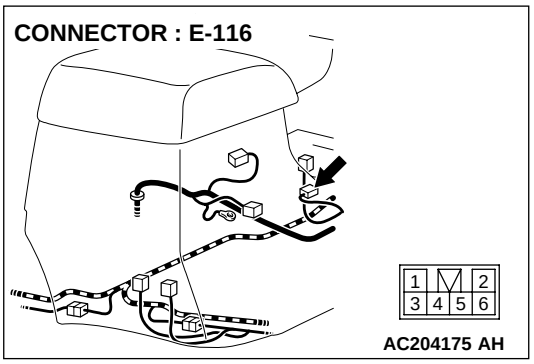
ACX02035AB



TSB Revision







CIRCUIT OPERATION

- Battery positive voltage is applied to the transfer shift lever switch (terminal 1) when the ignition switch is turned "ON."
- Battery positive voltage is applied to the transfer-ECU terminal 20, 21, 22, or 23 when the transfer shift lever is in the "2H," "4H," "4HLc" or "4LLc." The transfer-ECU judges that the transfer shift lever is in the "2H," "4H," "4HLc" or "4LLc" when the battery positive voltage is applied.

DTC SET CONDITIONS

In the case that the input signal from the transfer shift lever switch is open or shorted, the DTC 31 is set as the open circuit or the short circuit of the transfer shift lever switch system.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

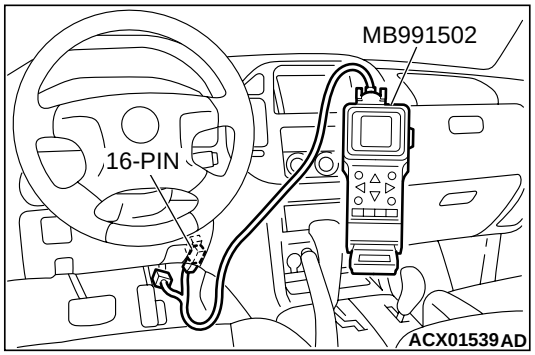
- Malfunction of the transfer shift lever switch
- Malfunction of the ignition switch
- Damaged harness, connector
- Malfunction of the transfer-ECU

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 06: Transfer Shift Lever Position.

⚠ 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.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 06, Transfer Shift Lever Position.
- Display should be the same as the actual transfer shift lever position.

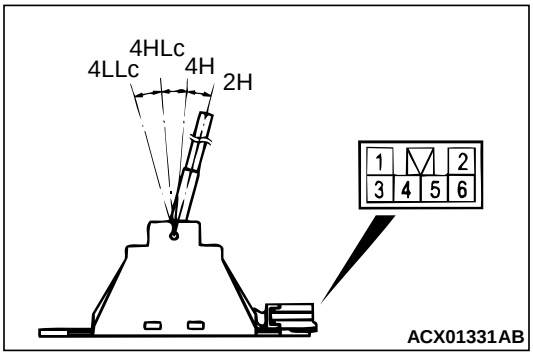
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is switch operating properly?

YES : If can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

STEP 2. Check the transfer shift lever switch.



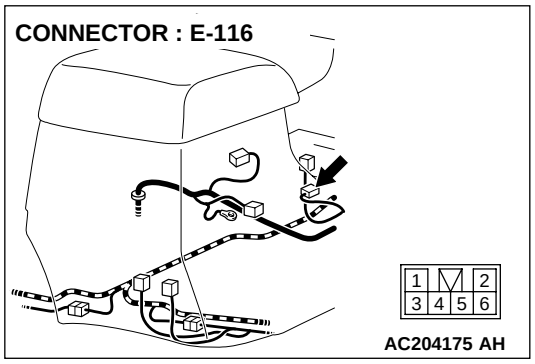
Check for resistance between terminals for each transfer shift lever position.

TRANSFER SHIFT LEVER POSITION	TERMINAL NUMBER	SPECIFIED CONDITION
2H	1 – 3	Less than 2 ohms.
4H	1 – 5	
4HLc	1 – 6	
4LLc	1 – 2	

Q: Is switch operating properly?

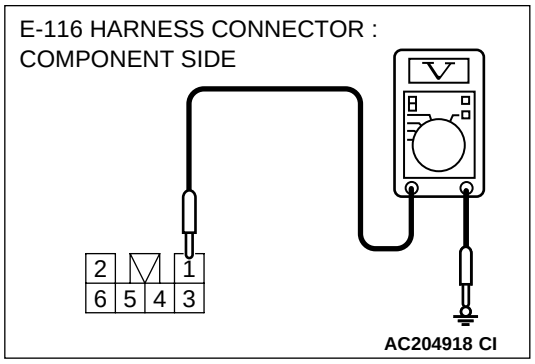
YES : Go to Step 3.

NO : Replace the transfer shift lever switch. Refer to, Transmission Control P.23Aa-37.



STEP 3. Measure the power supply voltage at transfer shift lever switch connector E-116.

(1) Disconnect connector E-116 and measure at harness side.
(2) Turn the ignition switch to the "ON" position.



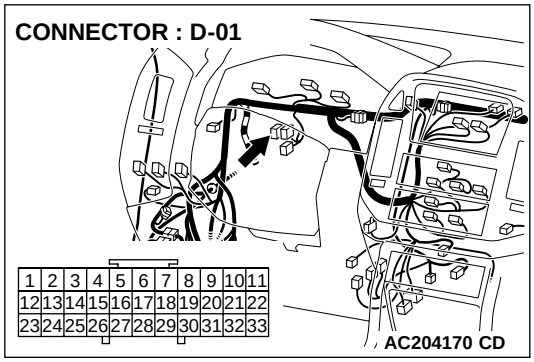
(3) Measure the voltage between terminal 1 and ground.
- The voltage should measure battery positive voltage.

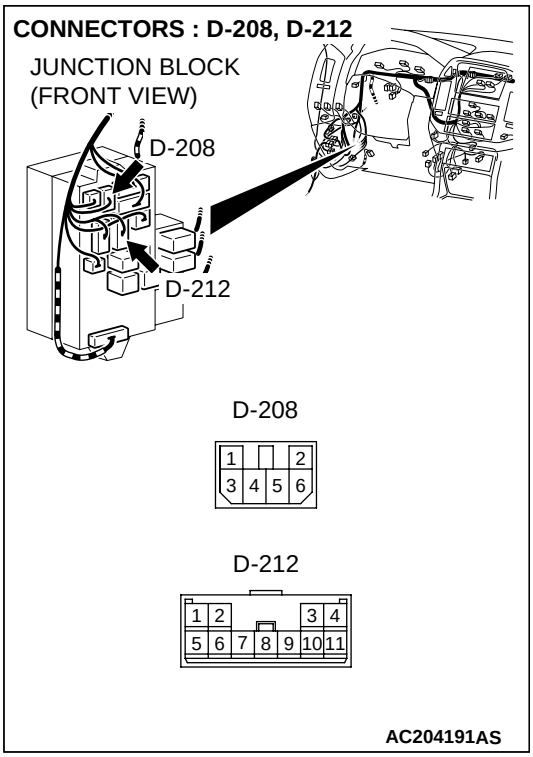
(4) Turn the ignition switch to the "LOCK" (OFF) position.

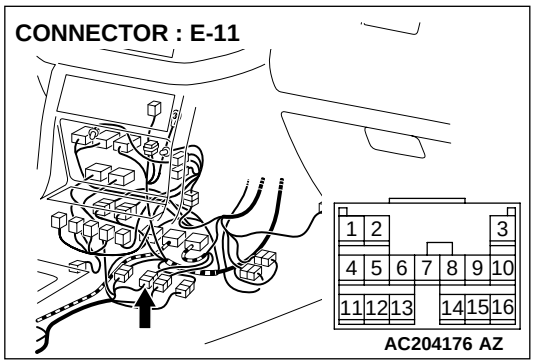
Q: Is the measured voltage battery positive voltage?

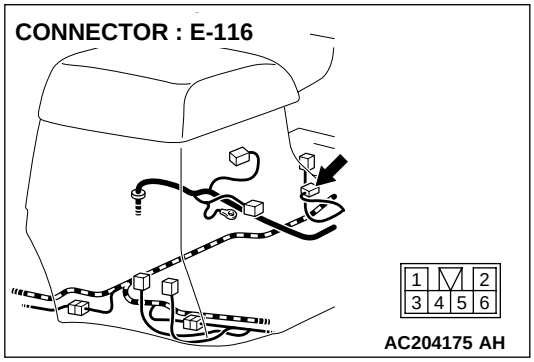
YES : Go to Step 6.
NO : Go to Step 4.

STEP 4. Check joint connector D-01, junction block connector D-208, D-212, intermediate connector E-11 and transfer shift lever switch connector E-116 for loose, corroded or damaged terminals, or terminals pushed back in the connector.









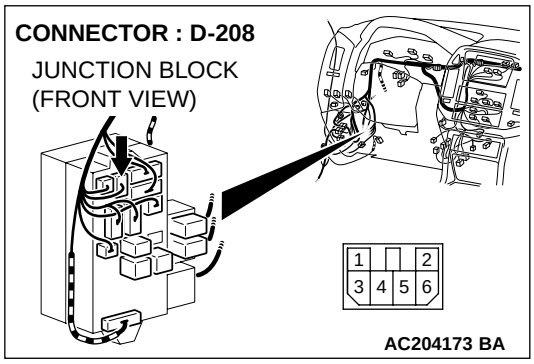
Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

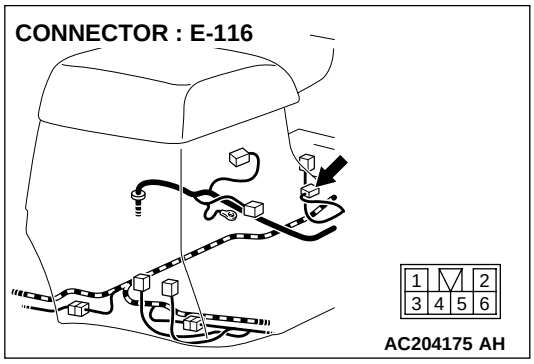
STEP 5. Check harness for open circuit or short circuit to ground between junction block connector D-208 terminal 2 and transfer shift lever switch connector E-116 terminal 1.

Q: Is the harness wire in good condition?

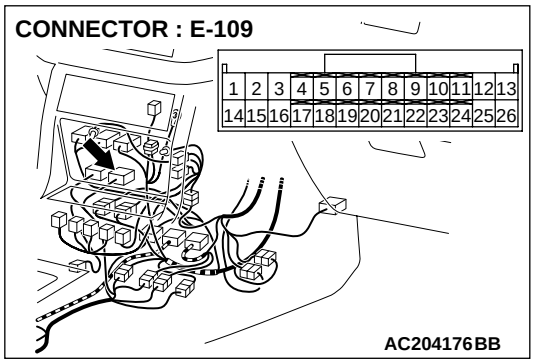


YES : Go to Step 10.

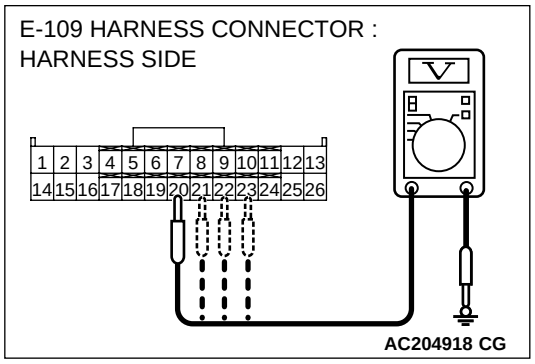
NO : Repair or replace the harness wire.



STEP 6. Measure the switch output voltage at transfer-ECU connector E-109 by backprobing.



(1) Disconnect connector E-109 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.



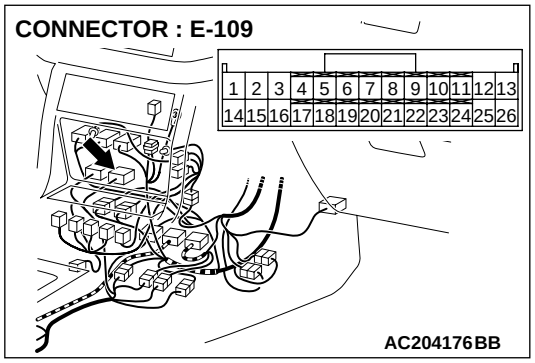
(3) Measure the voltage between terminal 20 (Transfer shift lever position: 2H) and ground by backprobing. [terminal 21 (Transfer shift lever position: 4H), terminal 22 (Transfer shift lever position: 4HLc), terminal 23 (Transfer shift lever position: 4LLc) and ground by backprobing.]
- The voltage should measure battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

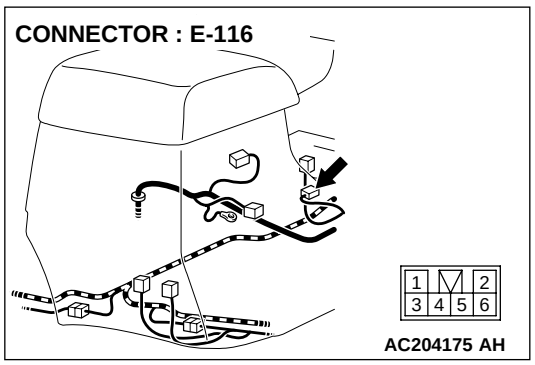
YES : Go to Step 9.
NO : Go to Step 7.

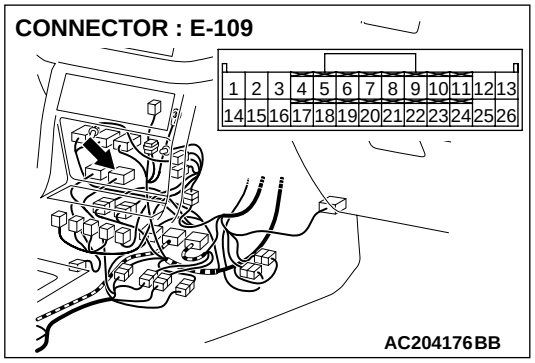
STEP 7. Check transfer-ECU connector E-109 and transfer shift lever switch connector E-116 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

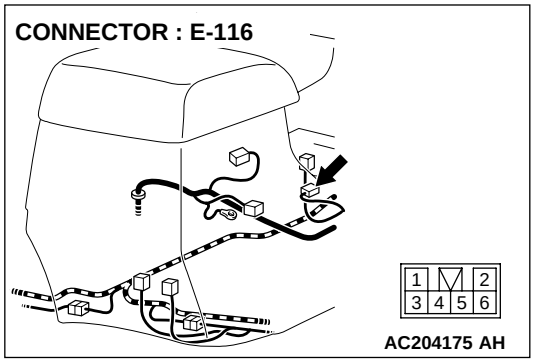


Q: Are the connectors and terminals in good condition?

YES : Go to Step 8.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





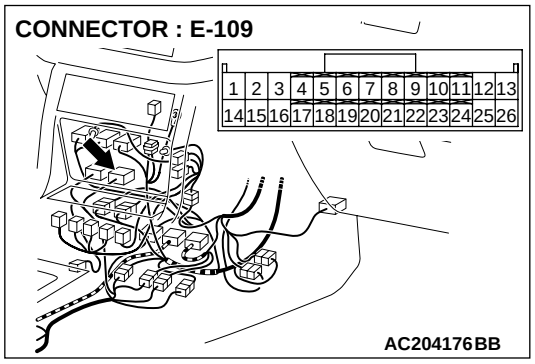


STEP 8. Check harness for open circuit or short circuit to ground between transfer-ECU connector E-109 terminal 20 (21, 22 and 23) and transfer shift lever switch connector E-116 terminal 3 (5, 6 and 2).

Q: Is the harness wire in good condition?

YES : Go to Step 10.

NO : Repair or replace the harness wire.

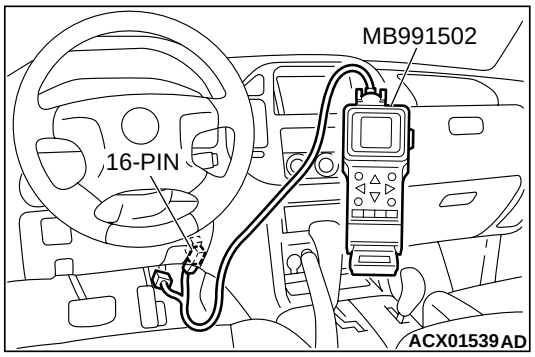


STEP 9. Check transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 10.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



STEP 10. Using scan tool MB991502, check data list item 06: Transfer Shift Lever Position.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Set scan tool MB991502 to data reading mode for item 06, Transfer Shift Lever Position.
- Display should be the same as the actual transfer shift lever position.

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

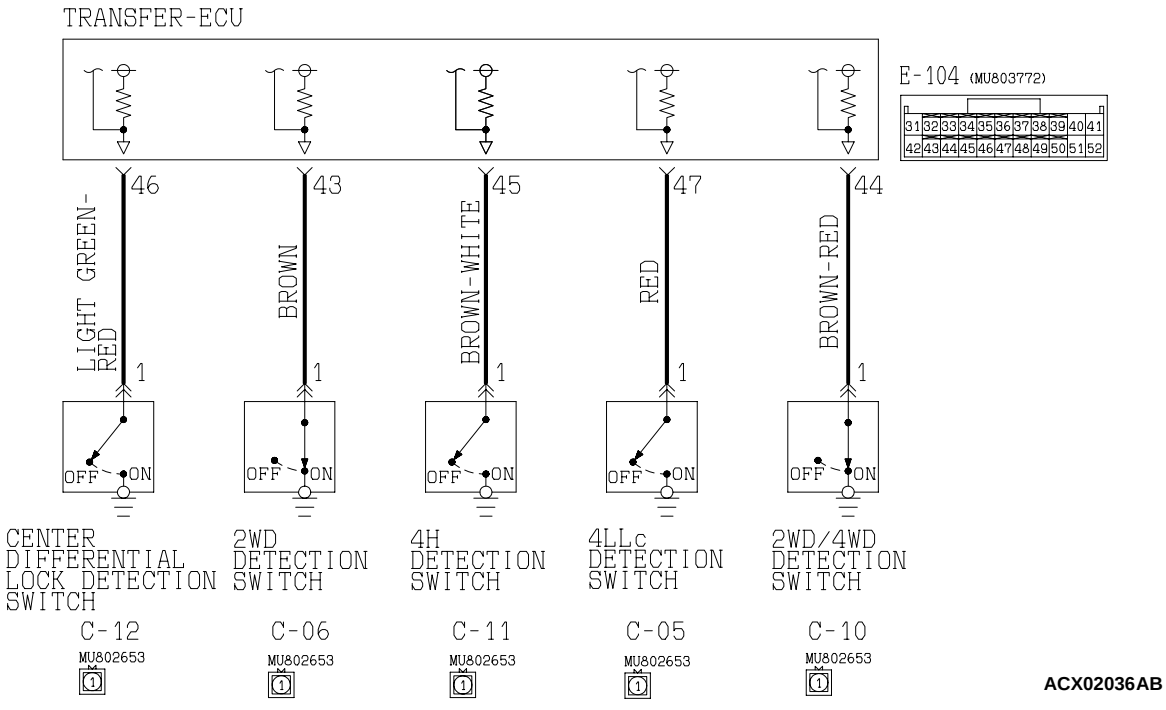
Q: Is switch operating properly?

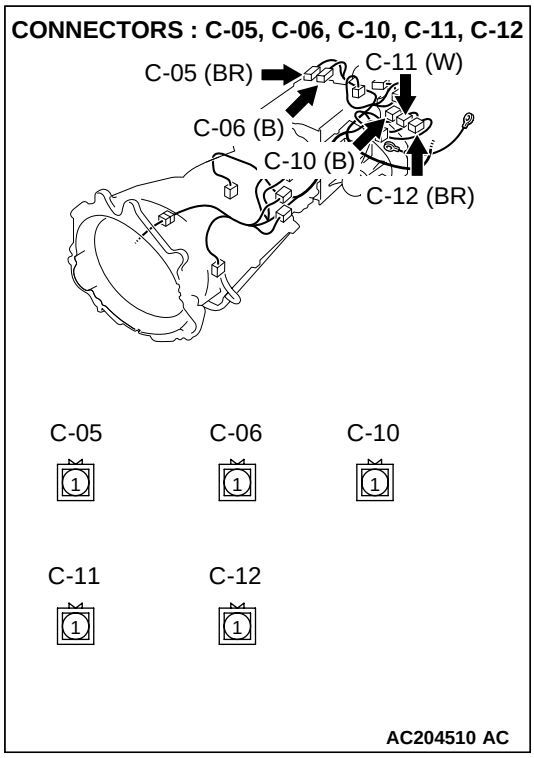
YES : If can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

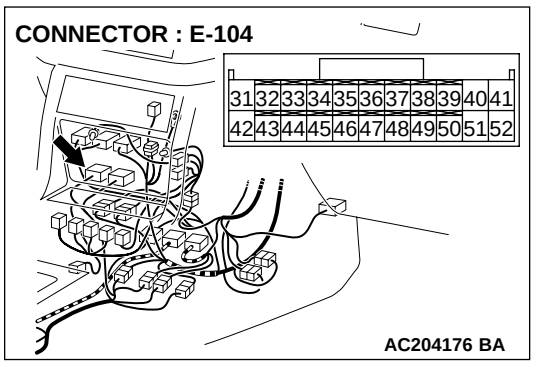
NO : Replace the transfer-ECU.

DTC 32, 33: Transfer Detection Switch System

Transfer Detection switch System Circuit







CIRCUIT OPERATION

- A battery positive voltage is applied to the each detection switch (terminal 1) from the transfer-ECU (terminal 43, 44, 45, 46 or 47).
- The each detection switch is grounded through the transfer case to the vehicle body.

DTC SET CONDITIONS

In the case that the transfer shifting has not been completed during driving, the DTC 32 is set as the open circuit or the short circuit of each transfer detection switch system, malfunction of the shift actuator or the malfunction of the transfer shift mechanism. In the case that the input signal from each transfer detection switch is unstable, the DTC 33 is set as the open circuit or the short circuit of each transfer detection switch system.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

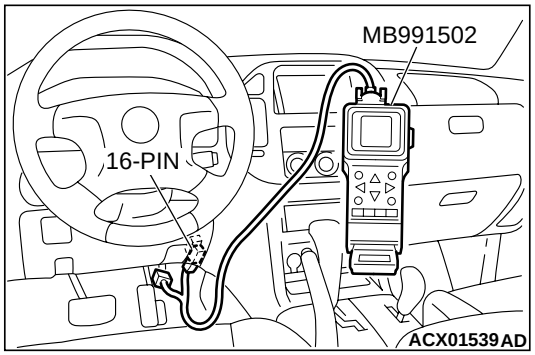
- Malfunction of the each transfer detection switch
- Damaged harness, connector
- Malfunction of the transfer-ECU
- Malfunction of the shift actuator
- Malfunction of the transfer shift mechanism

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check actuator test item 02 or 03: Shift Actuator <Only when DTC 32 is set>.

⚠ 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.



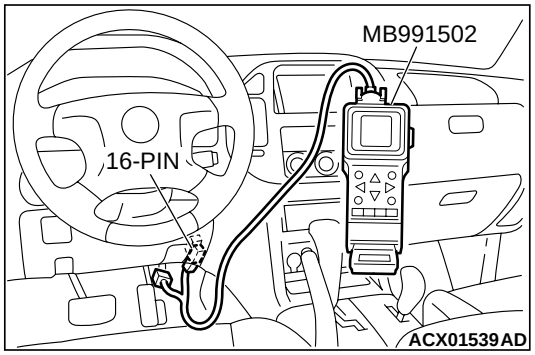
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to actuator testing mode for item 02 or 03, Shift Actuator.
- The shift actuator operate.

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

Q: Is the shift actuator operate?

YES : Go to Step 2.
NO : Replace the shift actuator. Refer to GROUP 23B, Transfer P.23B-103.

STEP 2. Using scan tool MB991502, check data list item 07: Transfer Mode Detected.

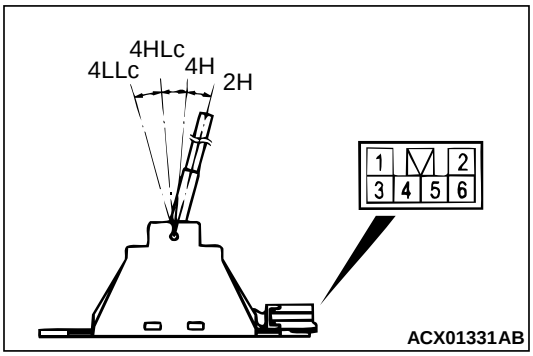


(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to data reading mode for item 07, Transfer Mode Detected.
- Display should be the same as the actual transfer shift lever position.

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

Q: Are all position operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Go to Step 3.



STEP 3. Check the transfer shift lever switch.

Check for resistance between terminals for each transfer shift lever position.

TRANSFER SHIFT LEVER POSITION	TERMINAL NUMBER	SPECIFIED CONDITION
2H	1 – 3	Less than 2 ohms.
4H	1 – 5	
4HLc	1 – 6	
4LLc	1 – 2	

Q: Is the switch operating properly?

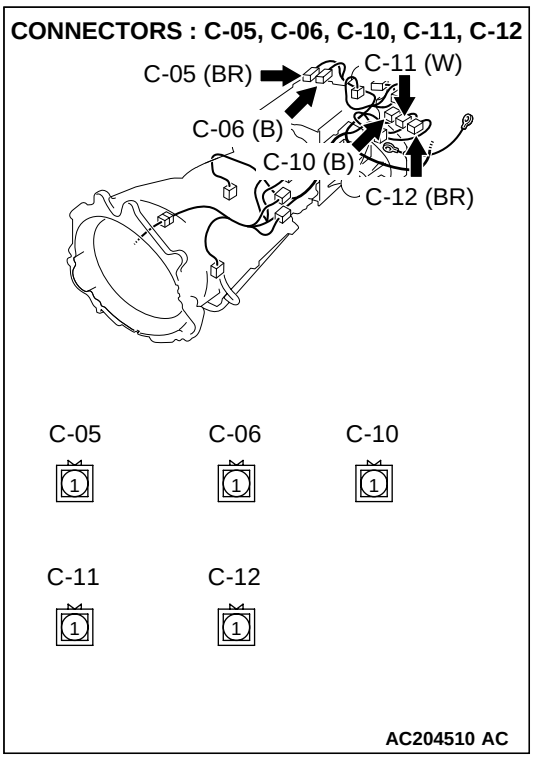
YES : Go to Step 4.

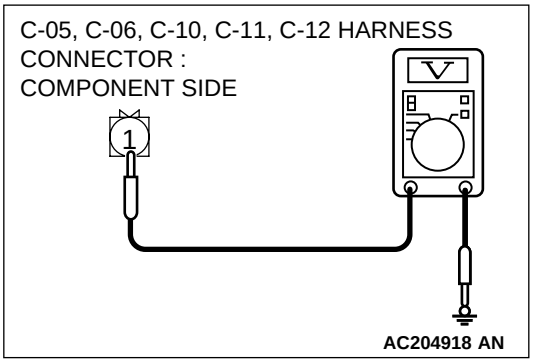
NO : Replace the transfer shift lever switch. Refer to P.23Aa-30, Transmission Control.

STEP 4. Measure the switch output voltage at each detection switch connectors C-05, C-06, C-10, C-11, C-12.

(1) Disconnect connectors C-05, C-06, C-10, C-11, C-12 and measure at the harness side.

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





(3) Measure the voltage between terminal 1 and ground.
- The voltage should measure between battery positive voltage.

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

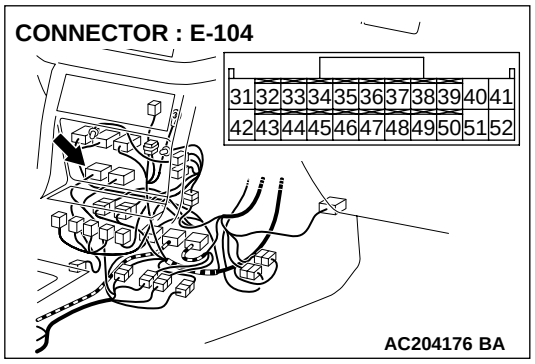
Q: Is the measured voltage battery positive voltage?

YES : Go to Step 10.

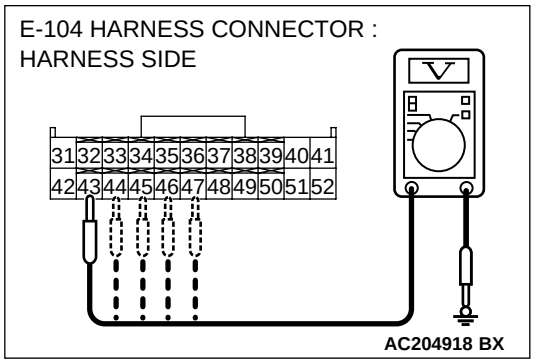
NO : Go to Step 5.

TSB Revision

STEP 5. Measure the switch output voltage at transfer-ECU connector E-104 by backprobing.



(1) Do not disconnect connector E-104.
(2) Turn the ignition switch to the "ON" position.



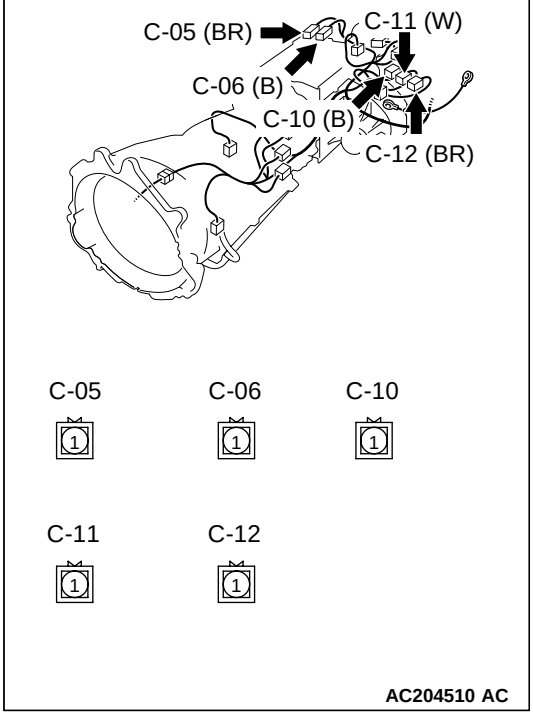
(3) Measure the voltage between terminals 43 44, 45, 46, 47 and ground by backprobing.
- The voltage should measure battery positive voltage.

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

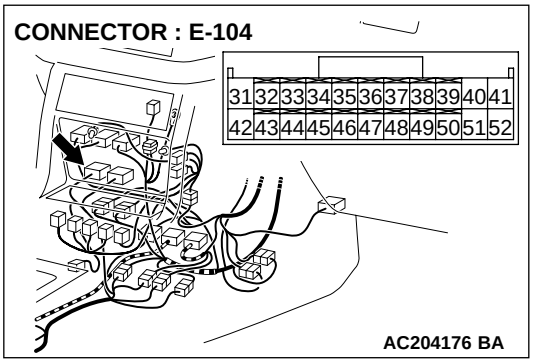
Q: Is the measured voltage battery positive voltage?

YES : Go to Step 8.
NO : Go to Step 6.

CONNECTORS : C-05, C-06, C-10, C-11, C-12



CONNECTOR : E-104



STEP 6. Check each detection switch connectors C-05, C-06, C-10, C-11, C-12 and transfer-ECU connector E-104 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 7.

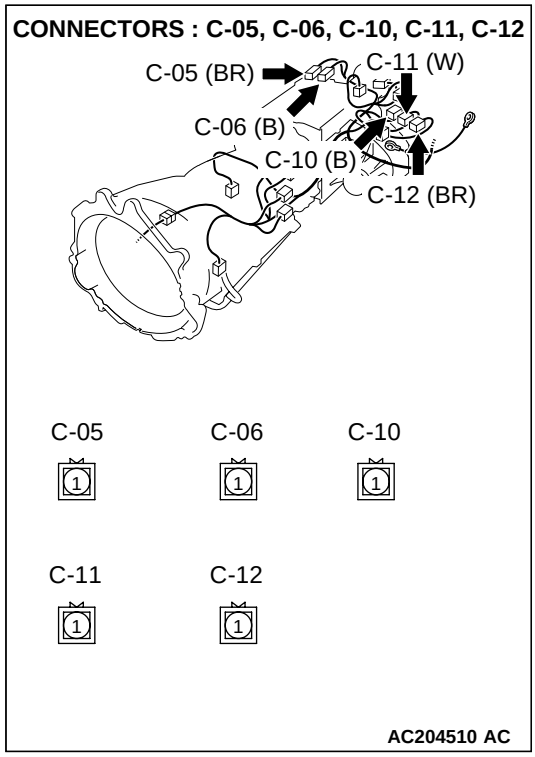
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

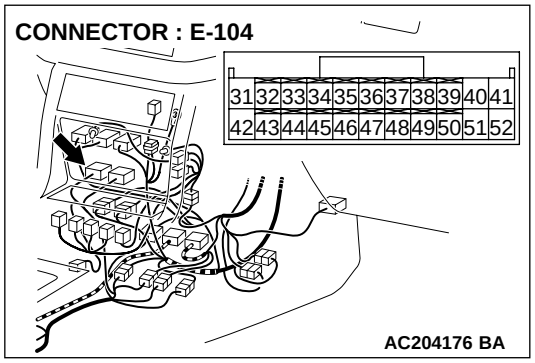
STEP 7. Check harnesses for short circuit to ground between each detection switch connectors C-05, C-06, C-10, C-11, C-12 terminal 1 and transfer-ECU connector E-104 terminals 43, 44, 45, 46, 47.

Q: Are the harnesses wire in good condition?

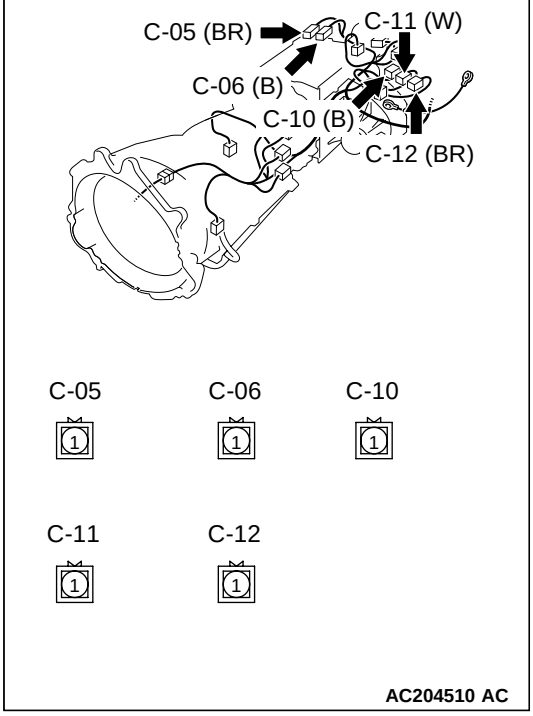
YES : Go to Step 11.

NO : Repair or replace the harness wire.

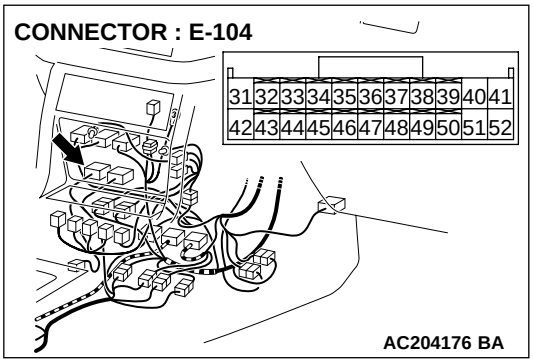




CONNECTORS : C-05, C-06, C-10, C-11, C-12



CONNECTOR : E-104



STEP 8. Check each detection switch connectors C-05, C-06, C-10, C-11, C-12 and transfer-ECU connector E-104 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 9.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

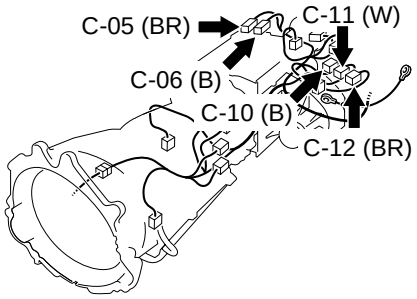
STEP 9. Check harnesses for open circuit between each detection switch connectors C-05, C-06, C-10, C-11, C-12 terminal 1 and transfer-ECU connector E-104 terminals 43, 44, 45, 46, 47.

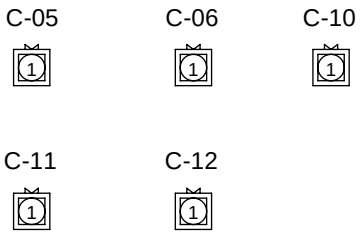
Q: Are the harnesses wire in good condition?

YES : Go to Step 11.

NO : Repair or replace the harness wire.

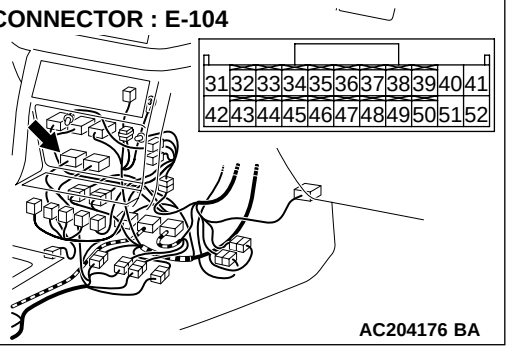
CONNECTORS : C-05, C-06, C-10, C-11, C-12





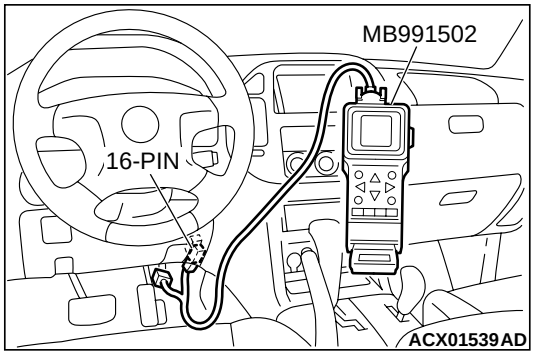
AC204510 AC

CONNECTOR : E-104

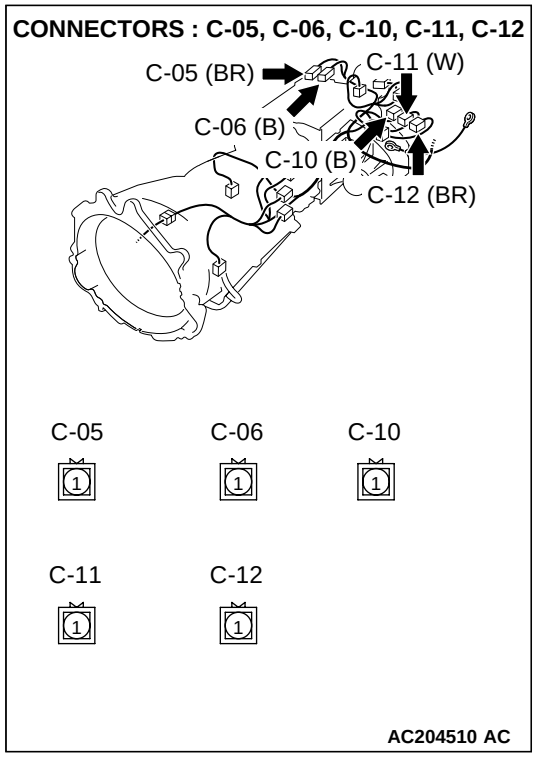


AC204176 BA

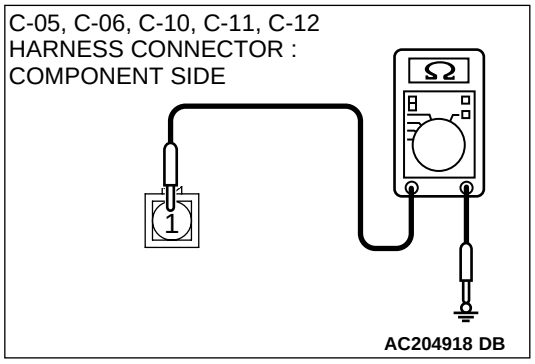
STEP 10. Measure the resistance at each detection switch connectors C-05, C-06, C-10, C-11, C-12.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to actuator testing mode for item 02 or 03, Shift Actuator.



(5) Disconnect connectors C-05, C-06, C-10, C-11, C-12 and measure at the switch side.



(6) Measure the resistance between terminal 1 and ground.
- When the transfer position is 2H, connector C-06 terminal 1 resistance should measure less than 2 ohms.
  When the transfer position is other than 2H, connector C-06 terminal 1 resistance should measure open circuit.
- When the transfer position is 2H or 4H, connector C-10 terminal 1 resistance should measure less than 2 ohms.
  When the transfer position is other than 2H or 4H, connector C-10 terminal 1 resistance should measure open circuit.
- When the transfer position is 4H or 4HLc, connector C-11 terminal 1 resistance should measure less than 2 ohms.
  When the transfer position is other than 4H or 4HLc, connector C-11 terminal 1 resistance should measure open circuit.
- When the transfer position is 4HLc or 4LLc, connector C-12 terminal 1 resistance should measure less than 2

ohms.
When the transfer position is other than 4HLc or 4LLc, connector C-12 terminal 1 resistance should measure open circuit.
- When the transfer position is 4LLc, connector C-05 terminal 1 resistance should measure less than 2 ohms. When the transfer position is other than 4LLc, connector C-05 terminal 1 resistance should measure open circuit.

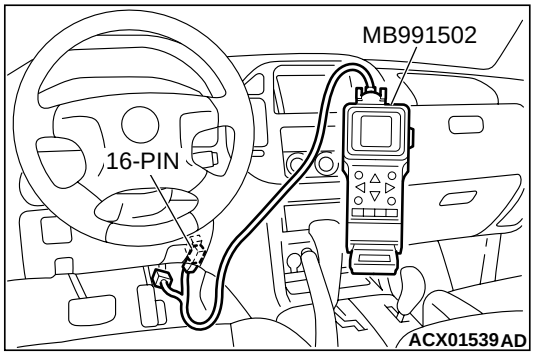
(7) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are the resistance normal?

YES : Go to Step 11.
NO : Replace the each detection switch. Refer to GROUP 23B, Transfer P.23B-103.

STEP 11. Using scan tool MB991502, check data list item 07: Transfer Mode Detected.

⚠ 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.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to data reading mode for item 07, Transfer Mode Detected.
- Display should be the same as the actual transfer shift lever position.

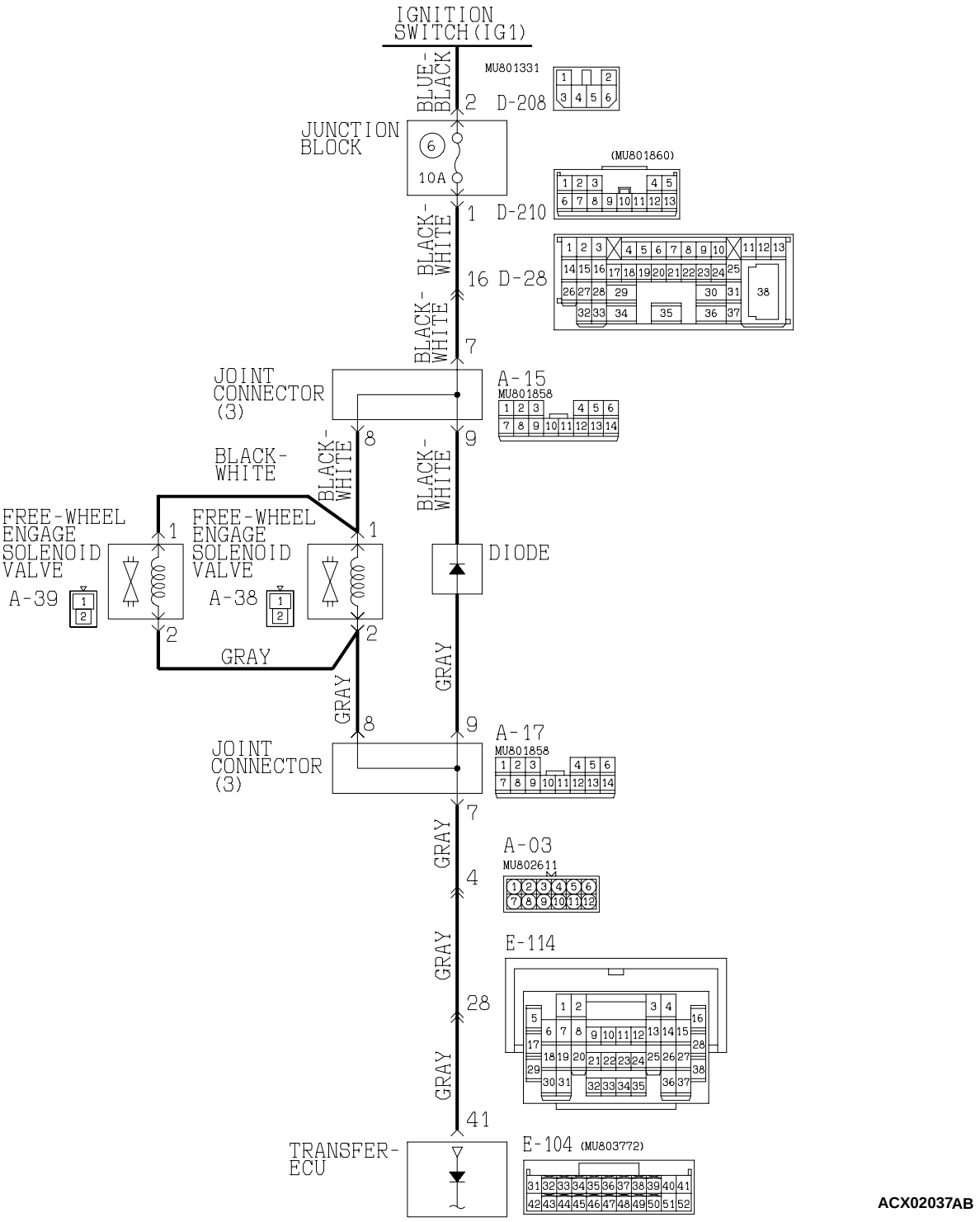
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are all position operating properly?

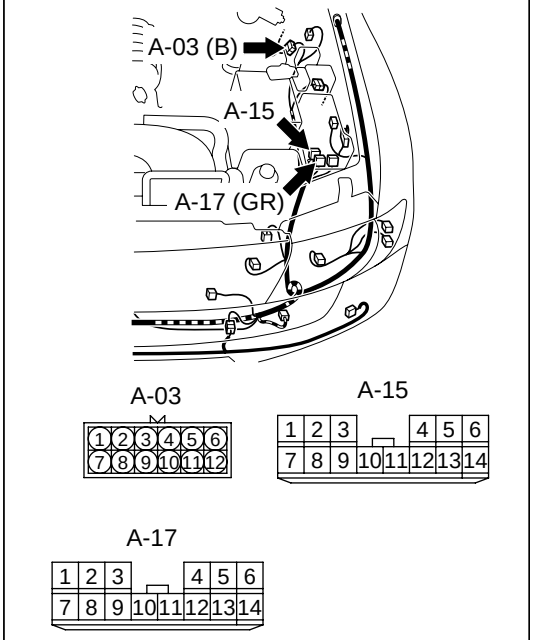
YES : If can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Replace the transfer-ECU.

DTC 34: Free-wheel Engage Solenoid Valve System

Free-wheel Engage Solenoid Valve System Circuit

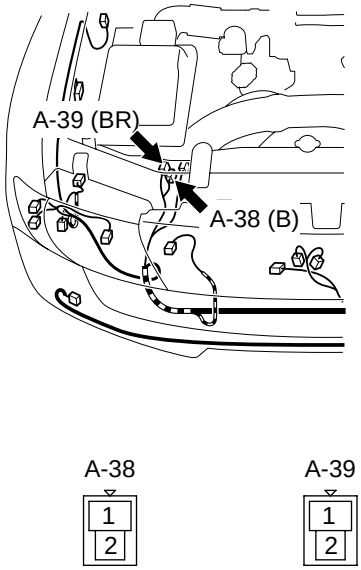


CONNECTORS : A-03, A-15, A-17



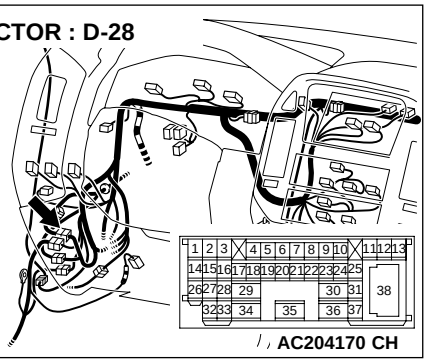
AC204185 AH

CONNECTORS : A-38, A-39



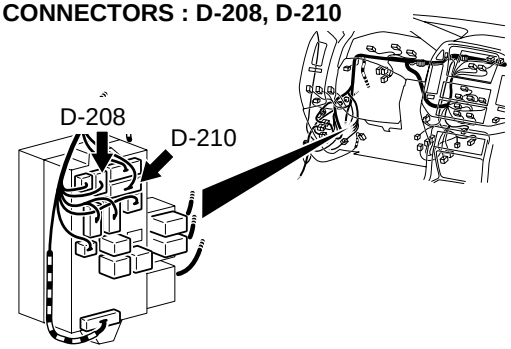
AC204184 AD

CONNECTOR : D-28

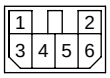


AC204170 CH

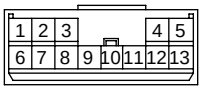
CONNECTORS : D-208, D-210



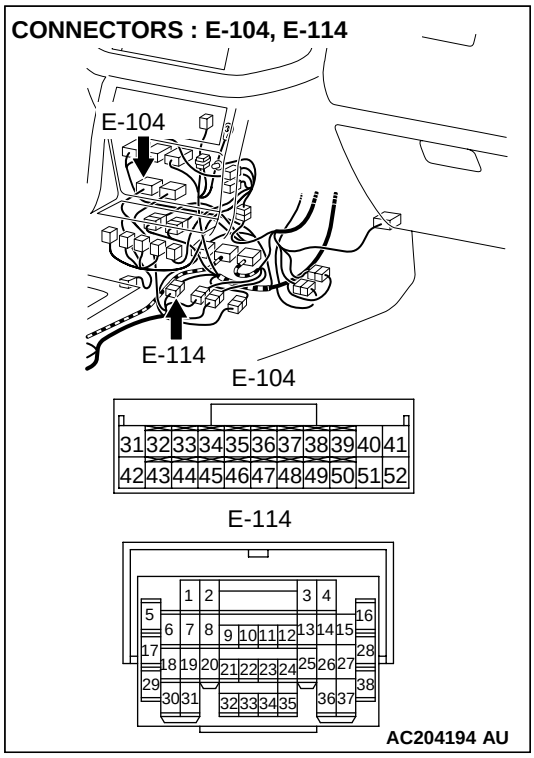
D-208



D-210



AC204191 AP



CIRCUIT OPERATION

The power voltage from the ignition switch is imposed to the free-wheel engage solenoid valves (terminal 1), when the driving condition is shifted to 2WD the terminal 41 of the transfer-ECU is grounded, which operates the free-wheel engage solenoid valves.

DTC SET CONDITIONS

In the case that the free-wheel engage solenoid valves operation and free-wheel engage solenoid valves operation command (transfer shift lever, front propeller shaft speed sensor and rear propeller shaft speed sensor) do not match, the DTC 34 is set as the open circuit or the short circuit of the free-wheel engage solenoid valve system.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

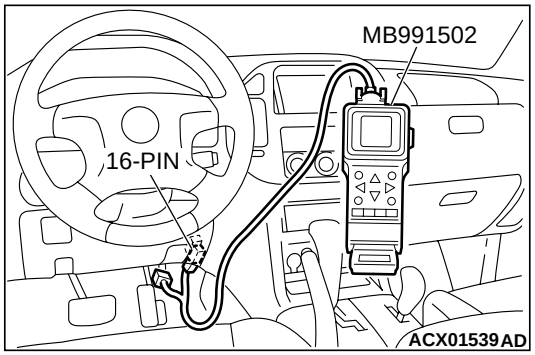
- Malfunction of free-wheel engage solenoid valve
- Damaged harness, connector
- Malfunction of the transfer-ECU

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 30: Free-wheel Engage Solenoid Valve.

⚠ 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.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to the data reading mode for item 30, Free-wheel Engage Solenoid Valve.
- When the transfer shift lever position is other than 2H, the display should be "ON."
- When the transfer shift lever position is 2H, the display should be "OFF."

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

Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

STEP 2. Check the free-wheel engage solenoid valve.
Refer to GROUP 26, On-vehicle Service – Solenoid Valve Operation Check P.26-16.

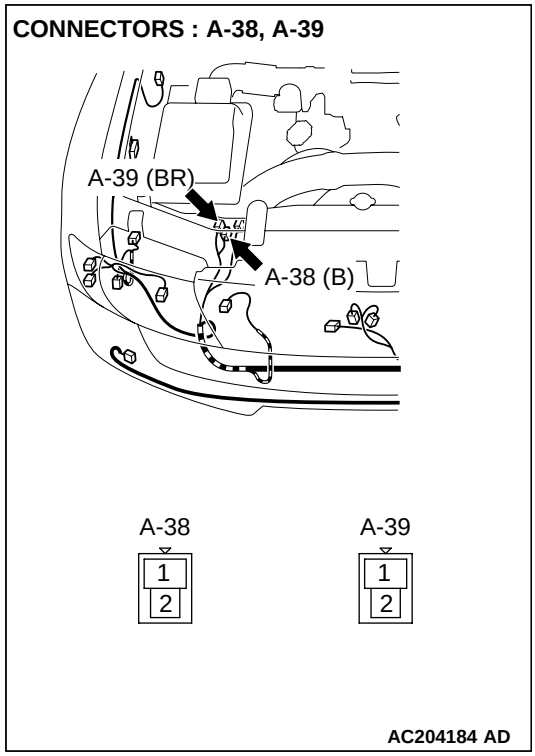
Q: Is the solenoid valve operating properly?

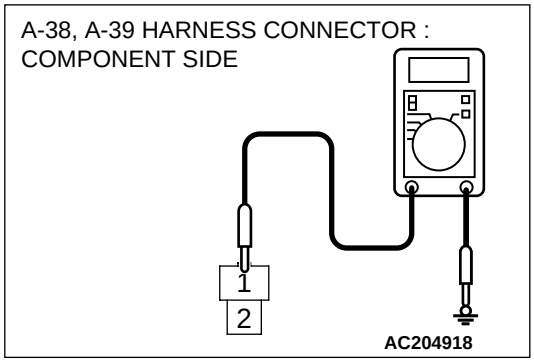
YES : Go to Step 3.

NO : Replace the free-wheel engage solenoid valve. Refer to GROUP 26, Solenoid Valve and Vacuum Hose P.26-57.

STEP 3. Measure the power supply voltage at free-wheel engage solenoid valve connectors A-38 and A-39.

(1) Disconnect connectors A-38 and A-39.
(2) Turn the ignition switch to the "ON" position.





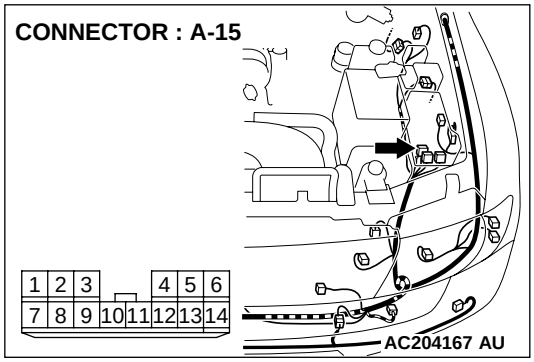
(3) Measure the voltage between terminal 1 and ground.
- The voltage should measure battery positive voltage.

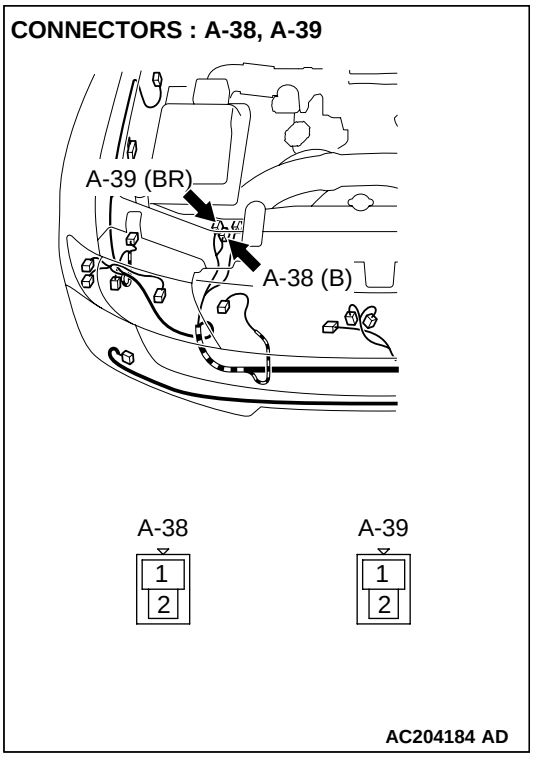
(4) Turn the ignition switch to the "LOCK" (OFF) position.

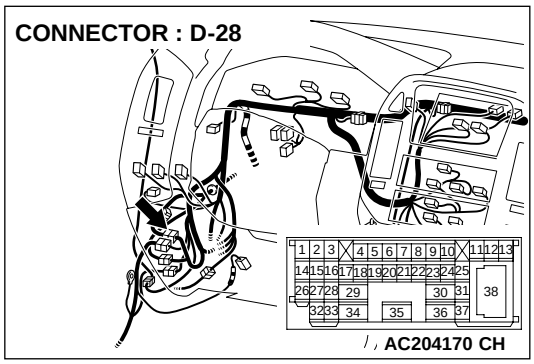
Q: Is the measured voltage battery positive voltage?

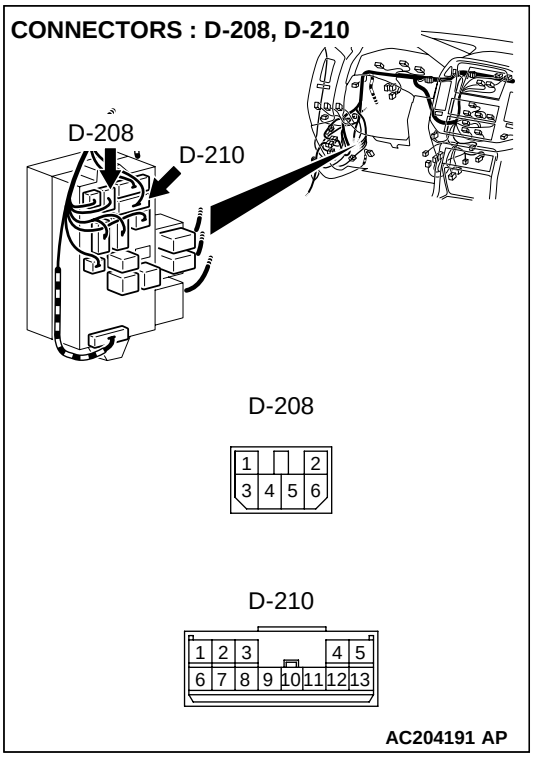
YES : Go to Step 6.
NO : Go to Step 4.

STEP 4. Check joint connector A-15, free-wheel engage solenoid valve connectors A-38, A-39, intermediate connector D-28, junction block connector D-210 and D-208 for loose, corroded or damaged terminals, or terminals pushed back in the connector.









Q: Are the connectors and terminals in good condition?

YES : Go to Step 5.

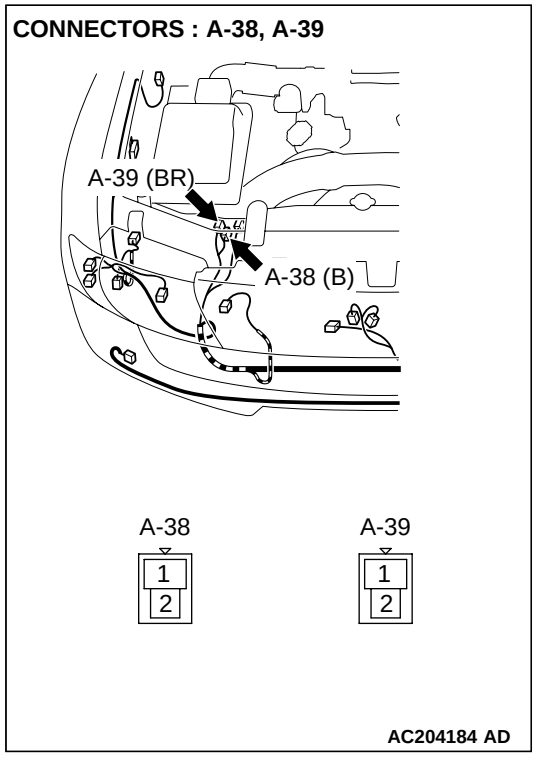
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

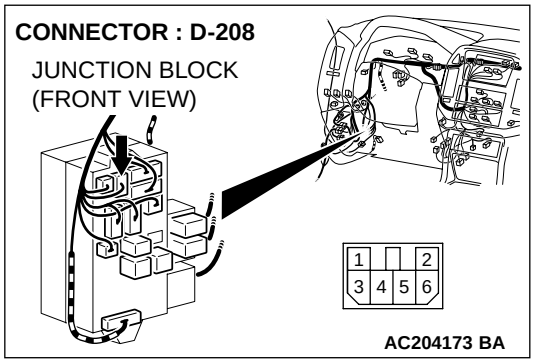
STEP 5. Check harness for open circuit or short circuit to ground between free-wheel engage solenoid valve connectors A-38, A-39 terminal 1 and junction block connector D-208 terminal 2.

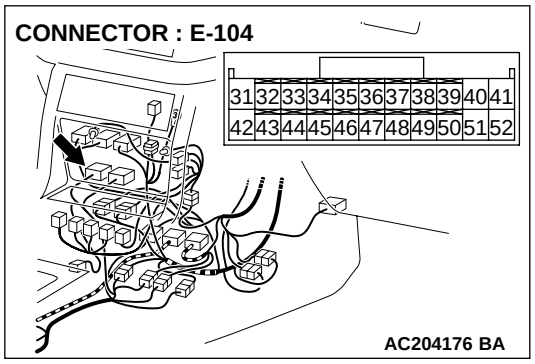
Q: Is the harness wire in good condition?

YES : Go to Step 10.

NO : Repair or replace the harness wire.

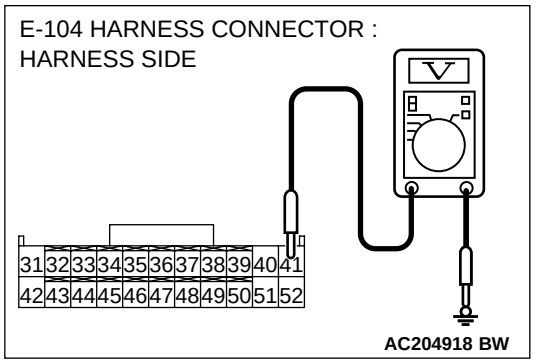






STEP 6. Measure the solenoid valve output voltage at the transfer-ECU connector E-104 by backprobing.

(1) Do not disconnect connector E-104.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.



(4) Measure the voltage between terminal 41 and ground by backprobing.
- When the transfer shift lever position is other than 2H, voltage should measure battery positive voltage.
- When the transfer shift lever position is 2H, voltage should measure less than 1.0 volt.

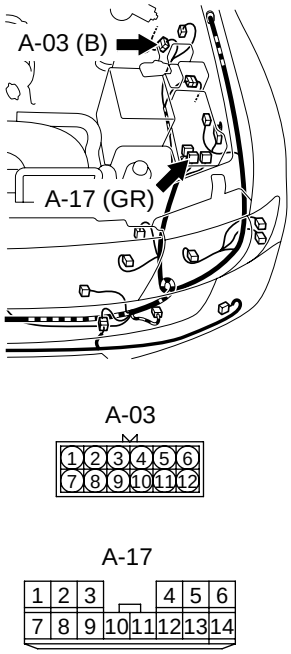
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage normal?

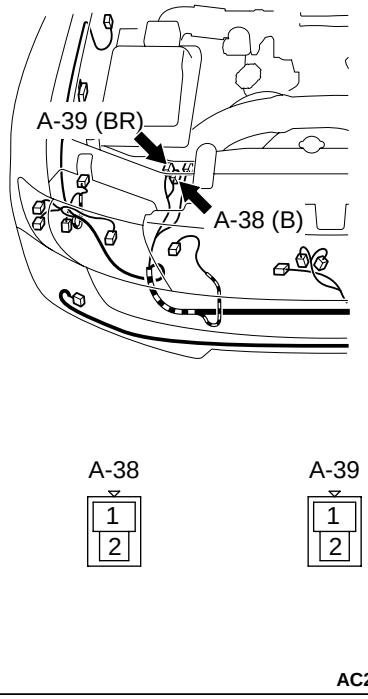
YES : Go to Step 9.
NO : Go to Step 7.

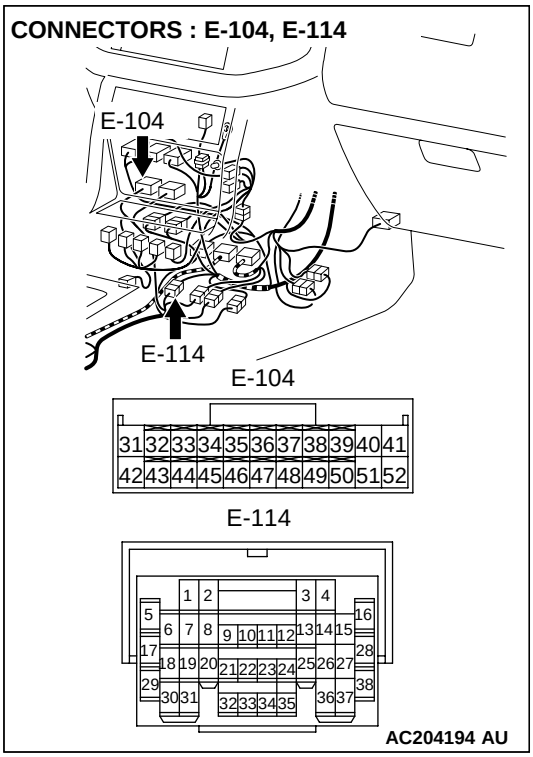
STEP 7. Check joint connector A-17, free-wheel engage solenoid valve connectors A-38, A-39, intermediate connectors A-03, E-114 and transfer-ECU connector E-104 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

CONNECTORS : A-03, A-17



CONNECTORS : A-38, A-39





Q: Are the connectors and terminals in good condition?

YES : Go to Step 8.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

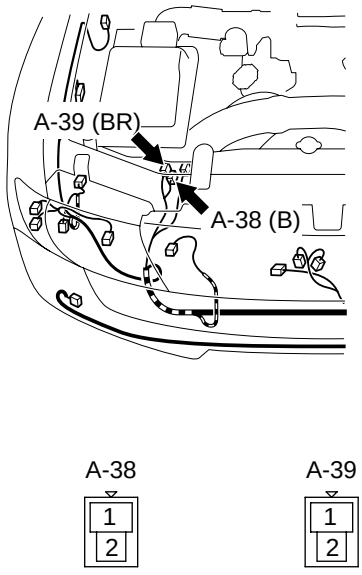
STEP 8. Check harness for damage between free-wheel engage solenoid valve connectors A-38, A-39 terminal 2 and transfer-ECU connector E-104 terminal 41.

Q: Is the harness wire in good condition?

YES : Go to Step 10.

NO : Repair or replace the harness wire.

CONNECTORS : A-38, A-39



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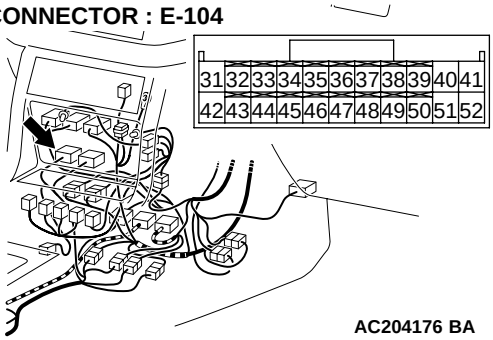
CONNECTOR : E-104



AC204176 BA

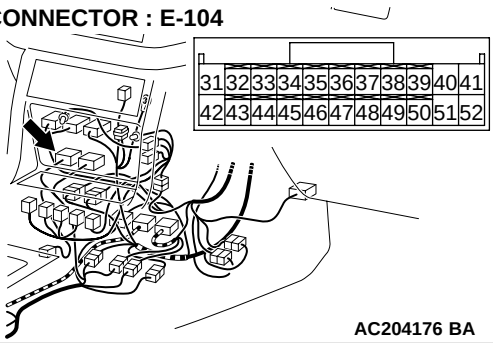
STEP 9. Check transfer-ECU connector E-104 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

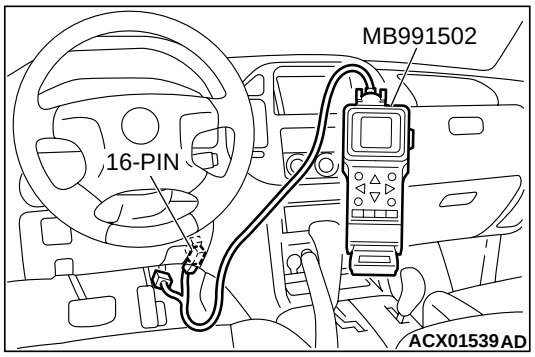
YES : Go to Step 10.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

CONNECTOR : E-104



AC204176 BA



STEP 10. Using scan tool MB991502, check data list item 30: Free-wheel Engage Solenoid Valve.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to the data reading mode for item 30, Free-wheel Engage Solenoid Valve.
- When the transfer shift lever position is other than 2H, the display should be "ON."
- When the transfer shift lever position is 2H, the display should be "OFF."

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

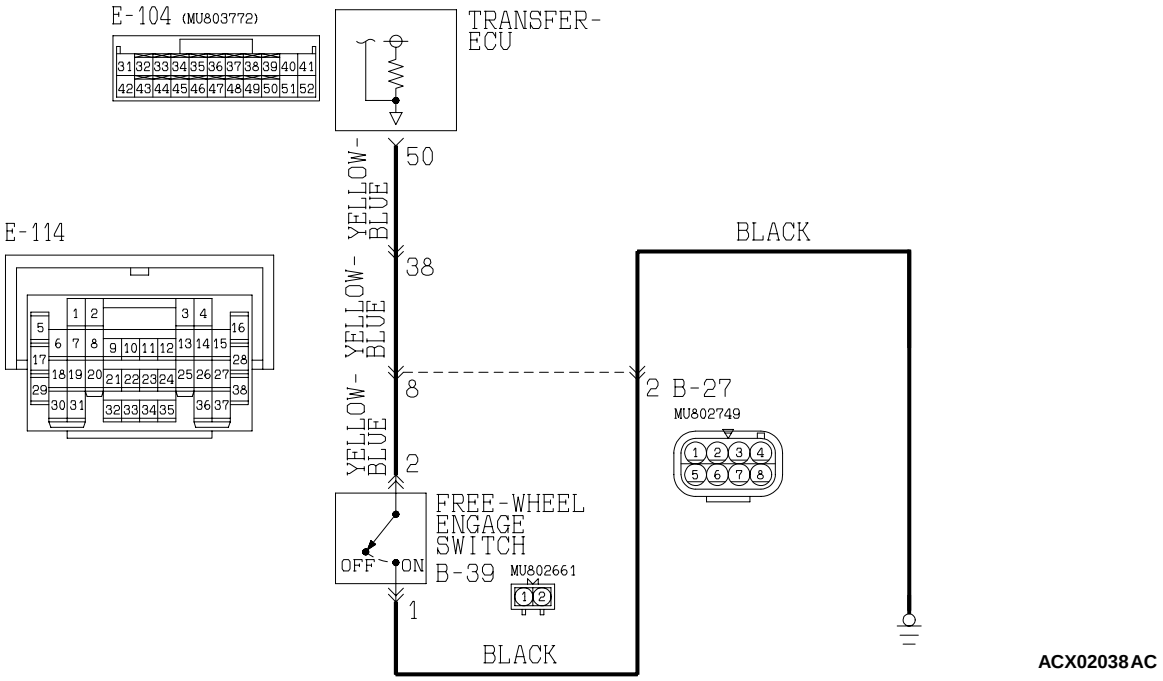
Q: Is the solenoid valve operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

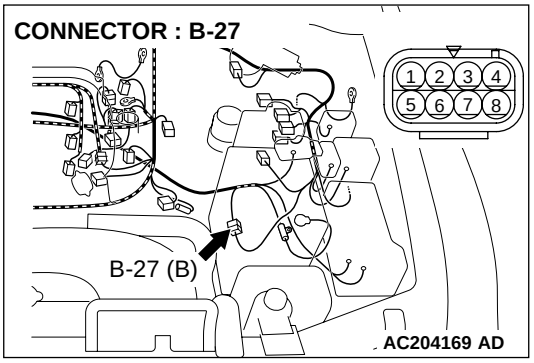
NO : Replace the transfer-ECU

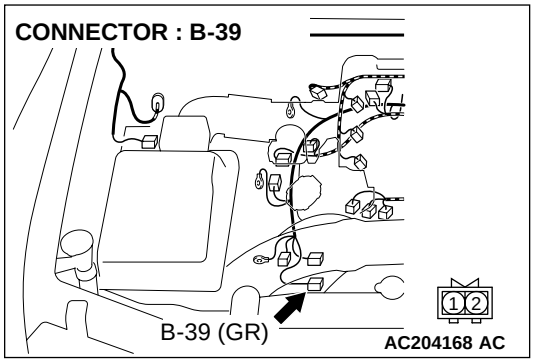
DTC 35: Free-wheel Engage Switch System

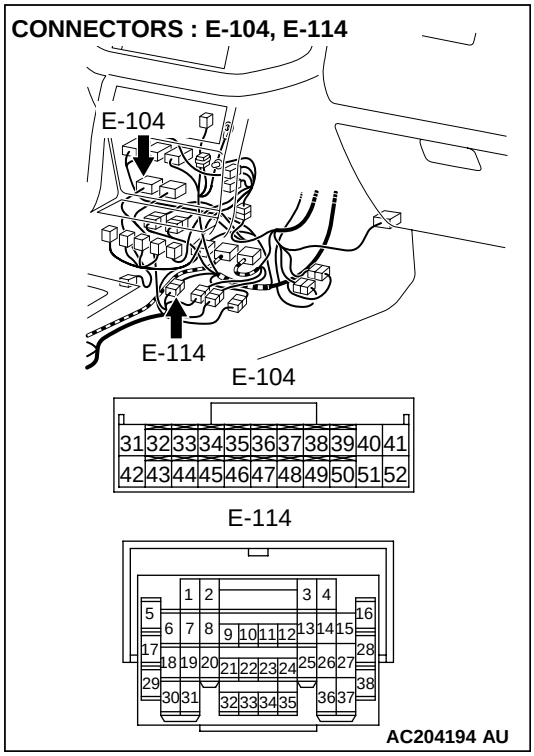
Free-wheel Engage Switch System Circuit



TSB Revision







CIRCUIT OPERATION

The free-wheel engage switch is turned ON when the freewheel engage solenoid valve is activated and the condition is shifted to the 4WD condition. The power supply voltage is imposed to the free-wheel engage switch from the transfer-ECU, and when the free-wheel engage switch is turned ON, the power supply voltage from the transfer-ECU is grounded.

DTC SET CONDITIONS

When the energizing condition to the free-wheel engage solenoid valve and the condition of free-wheel engage switch do not agree, DTC 35 is set as the open circuit or the short circuit on the free-wheel engage switch system.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

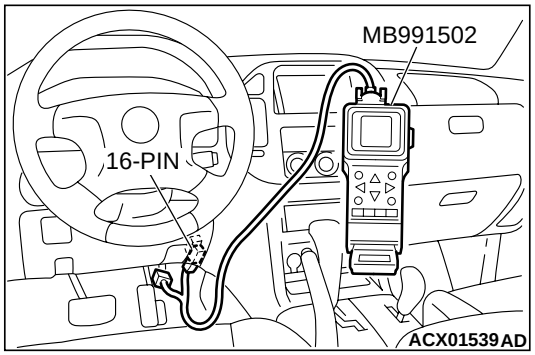
- Malfunction of the free-wheel engage switch
- Damaged harness, connector
- Malfunction of the transfer-ECU

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, read the transfer diagnostic trouble code.

⚠ 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.

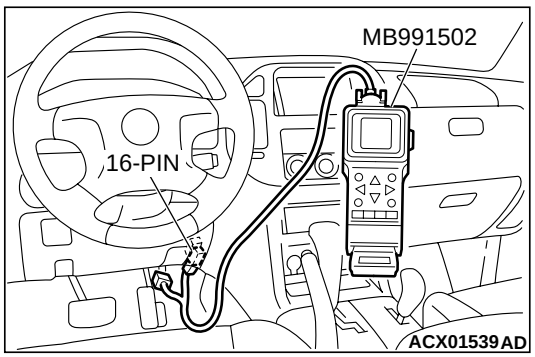


(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Check for transfer diagnostic trouble code.
(4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is DTC 34 set?

YES : Refer to P.23Ac-326, DTC 34: Free-wheel Engage Solenoid Valve System.
NO : Go to Step 2.

STEP 2. Using scan tool MB991502, check data list item 38: Free-wheel Engage Switch.



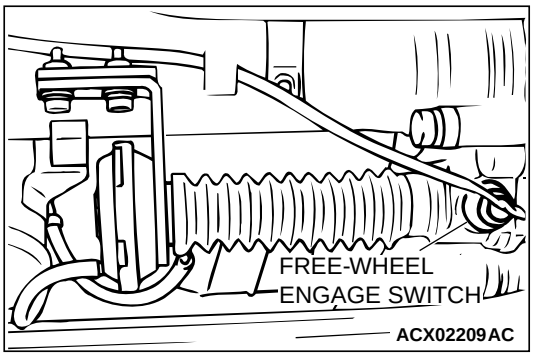
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) See scan tool MB991502 to data reading mode for item 38, Free-wheel Engage Switch.
- When the transfer shift lever position is other than 2H, the display should be "ON."
- When the transfer shift lever position is 2H, the display should be "OFF."

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

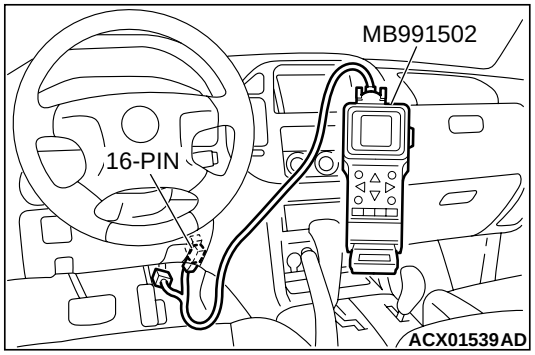
Q: Is the switch operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.
NO : Go to Step 3.

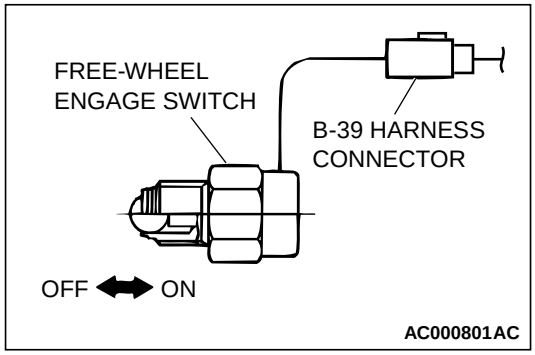
STEP 3. Using scan tool MB991502, check the free-wheel engage switch circuit.



(1) Remove the free-wheel engage switch.
(2) Do not disconnect connector B-39.



(3) Connect scan tool MB991502 to the data link connector.
(4) Turn the ignition switch to the "ON" position.



(5) Set scan tool MB991502 to data reading mode for item 38, Free-wheel Engage Switch.
- When the free-wheel engage switch is released (OFF), the display should be "OFF."
- When the free-wheel engage switch is pressed (ON), the display should be "ON."

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

Q: Is the switch operating properly?

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

STEP 4. Check the free-wheel engage solenoid valve.

Refer to GROUP 26, On-vehicle Service – Solenoid Valve Operation Check P.26-16.

Q: Is the solenoid valve normal?

YES : Repair or replace the actuator assembly and free-wheel engage clutch. Refer to GROUP 26, Differential Carrier and Free-wheel Clutch P.26-37.
NO : Repair or replace the free-wheel engage solenoid valve and vacuum hoses. Refer to GROUP 26, Solenoid Valve and Vacuum Hose P.26-57.

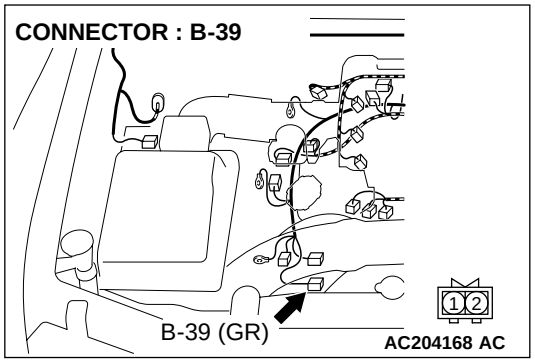
STEP 5. Check the free-wheel engage switch.
Refer to GROUP 26, Differential Carrier and Free-wheel Clutch P.26-37.

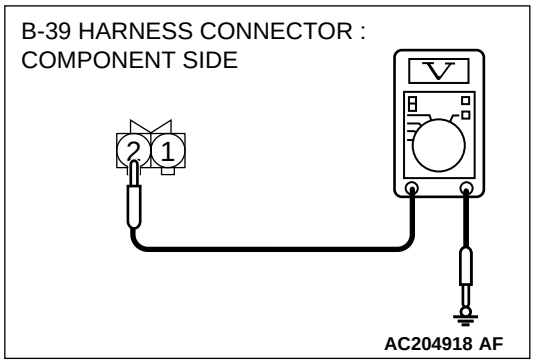
Q: Is the switch operating properly?

YES : Go to Step 6.
NO : Replace the free-wheel engage switch. Refer to GROUP 26, Differential Carrier and Free-wheel Clutch P.26-35.

STEP 6. Measure the power supply voltage at freewheel engage switch B-39.

(1) Disconnect connector B-39 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.





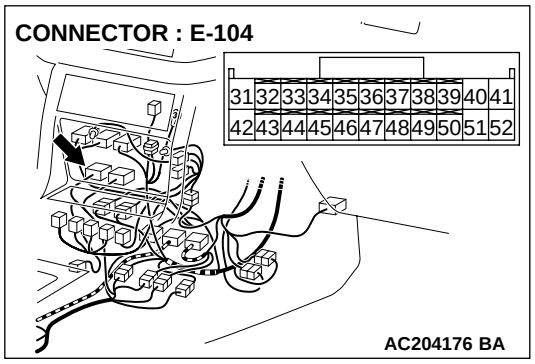
(3) Measure the voltage between terminal 2 and ground.
- The voltage should measure 10.5 volts.

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

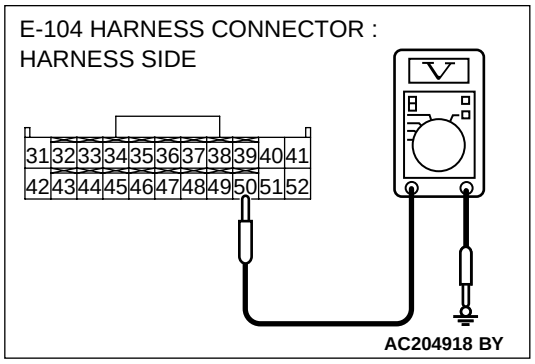
Q: Is the measured voltage 10.5 volts?

YES : Go to Step 12.
NO : Go to Step 7.

STEP 7. Measure the switch output voltage at transfer-ECU connector E-104 by backprobing.



(1) Do not disconnect connector E-104.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.

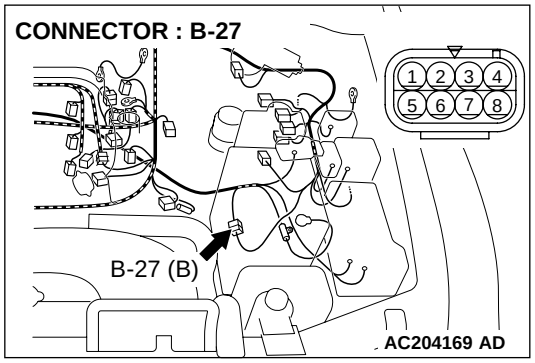


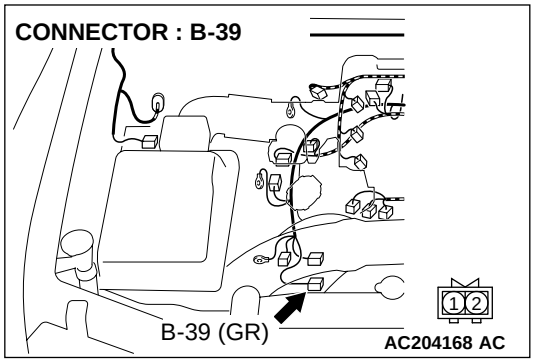
(4) Measure the voltage between terminal 50 and ground by backprobing.
- When the transfer shift lever position is 2H, voltage should measure 10.5 volts.
- When the transfer shift lever position is other than 2H, voltage should measure 0 volt.

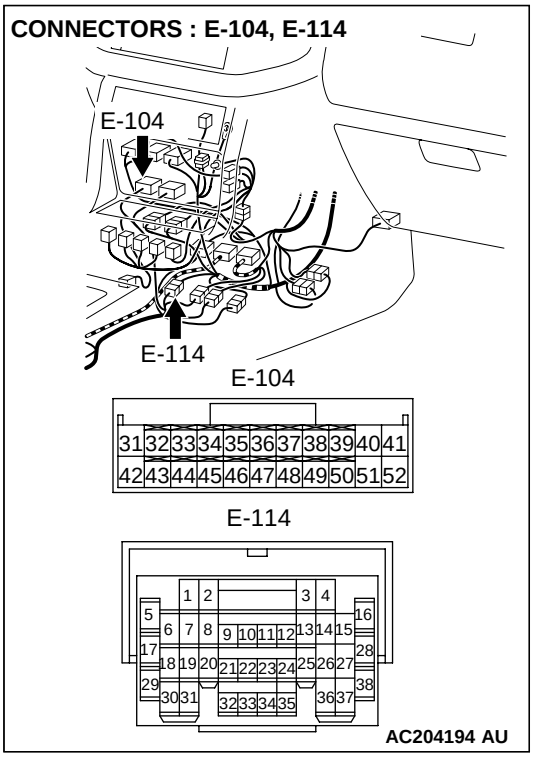
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage within the specified range?

YES : Go to Step 10.
NO : Go to Step 8.



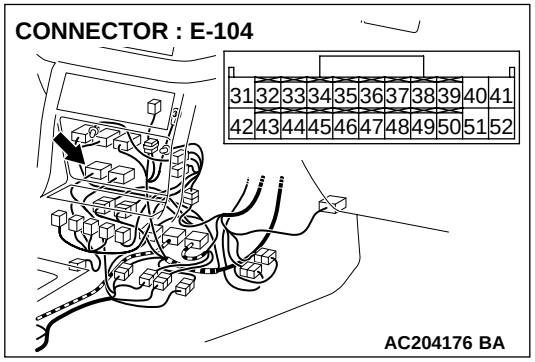


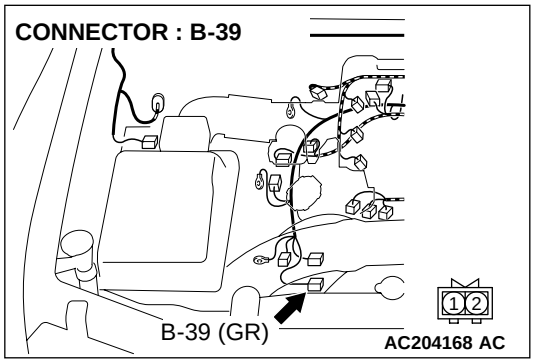


STEP 8. Check intermediate connectors B-27, E-114, free-wheel engage switch connector B-39 and transfer-ECU connector E-104 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

YES : go to Step 9.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.





STEP 9. Check harness for short circuit to ground between transfer-ECU connector E-104 terminal 50 and free-wheel engage switch connector B-39 terminal 2.

Q: Is the harness wire in good condition?

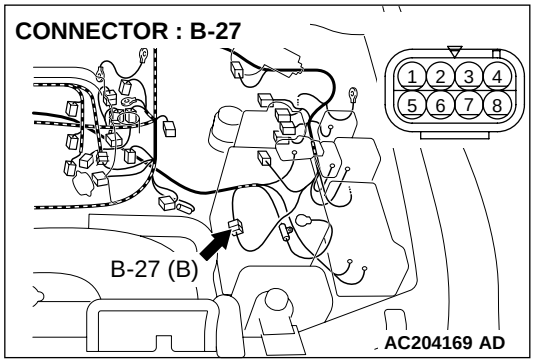
YES : Go to Step 15.

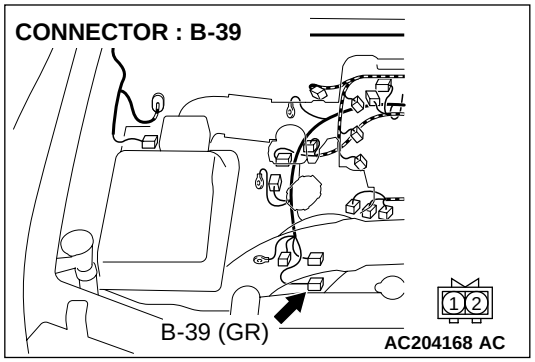
NO : Repair or replace the harness wire.

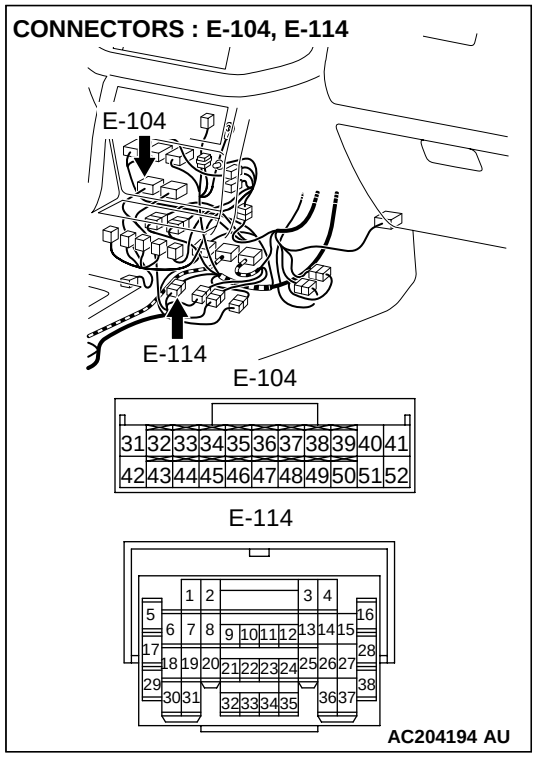
STEP 10. Check intermediate connectors B-27, E-114, free-wheel engage switch connector B-39 and transfer-ECU connector E-104 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

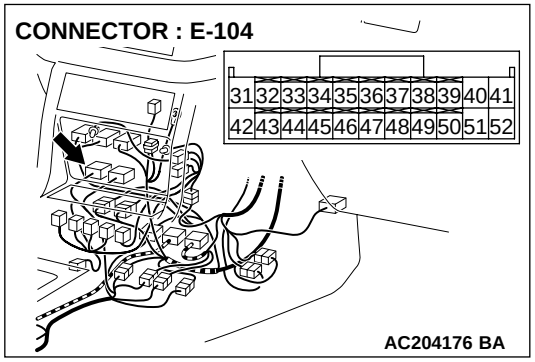
YES : go to Step 11.

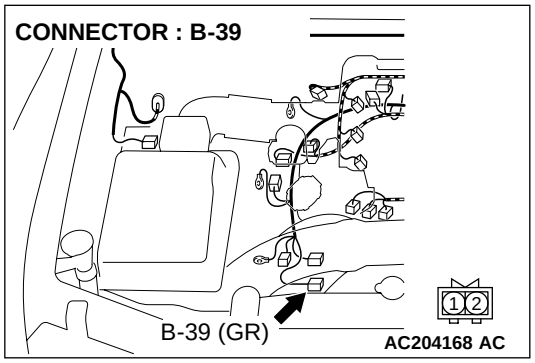
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.









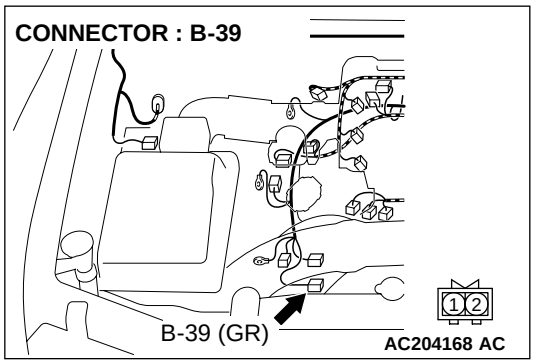


STEP 11. Check harness for open circuit between transfer-ECU connector E-104 terminal 50 and free-wheel engage switch connector B-39 terminal 2.

Q: Is the harness wire in good condition?

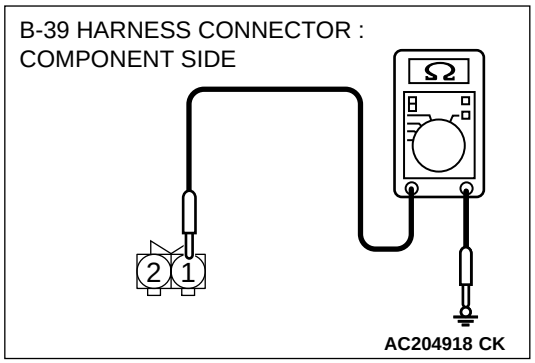
YES : Go to Step 15.

NO : Repair or replace the harness wire.



STEP 12. Measure the resistance at free-wheel engage switch.

(1) Disconnect connector B-39 and measure at the harness side.



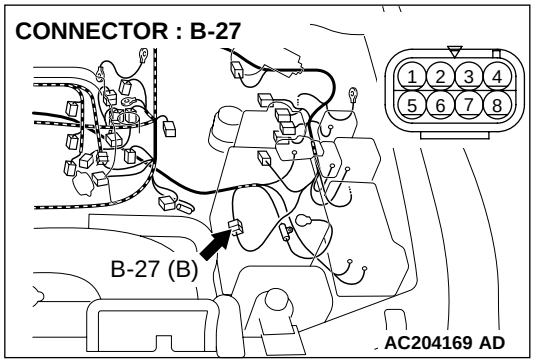
(2) Measure the resistance between terminal 1 and ground.

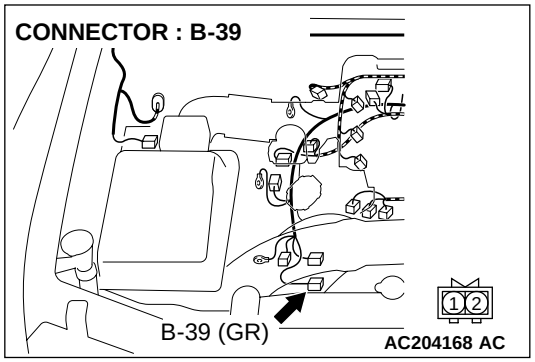
- The resistance should measure less than 2 ohms.

Q: Is the measured resistance less than 2 ohms?

YES : Go to Step 15.

NO : Go to Step 13.



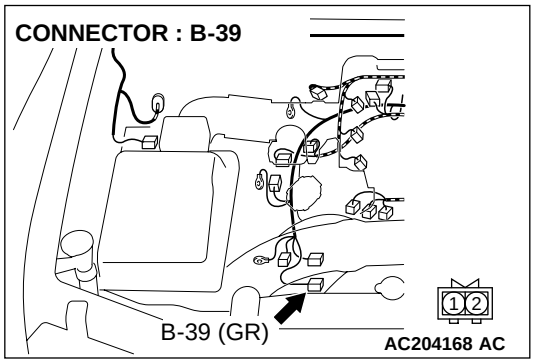


STEP 13. Check intermediate connector B-27 and free-wheel engage switch connector B-39 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 14.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

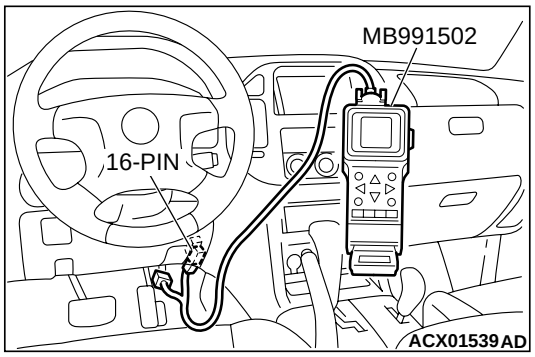


STEP 14. Check harness for open circuit between free-wheel engage switch connector B-39 terminal 1 and ground.

Q: Is the harness wire in good condition?

YES : Go to Step 15.

NO : Repair or replace the harness wire.



STEP 15. Using scan tool MB991502, check data list item 38: Free-wheel Engage Switch.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) See scan tool MB991502 to data reading mode for item 38, Free-wheel Engage Switch.
- When the transfer shift lever position is other than 2H, the display should be "ON."
- When the transfer shift lever position is 2H, the display should be "OFF."

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

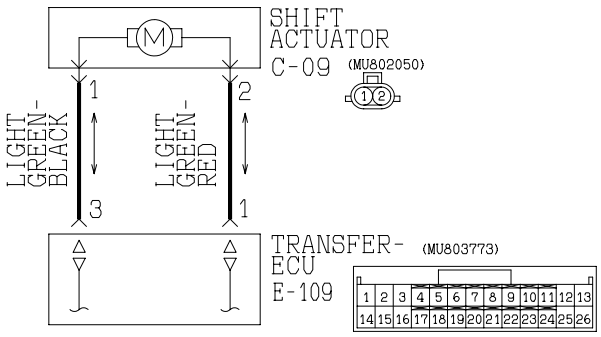
Q: Is the switch operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the transfer-ECU.

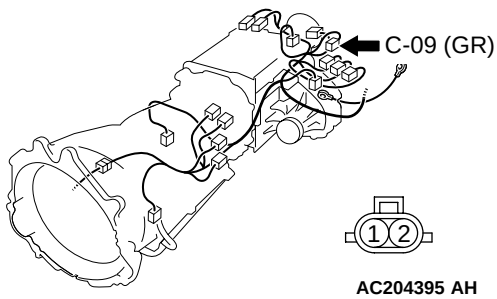
DTC 41: Shift Actuator System (Short/Open Circuit)

Shift Actuator System Circuit

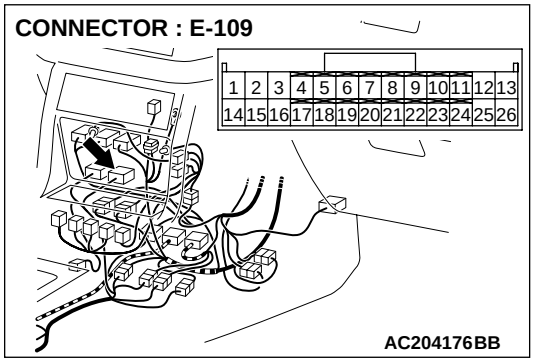


W2Q01M07AA
AC100559AB

CONNECTOR : C-09



CONNECTOR : E-109



TSB Revision

CIRCUIT OPERATION
When voltage is applied to the shift actuator terminal 2 from the transfer-ECU, the motor turns to the normal direction and the drive mode is shifted in the order of 2H → 4H → 4HLc → 4LLc. When voltage is applied to the shift actuator terminal 1, the motor turns to the reverse direction and the drive mode is shifted in the order of 4LLc → 4HLc → 4H → 2H.

DTC SET CONDITIONS
In the case that the transfer-ECU terminal voltage is more than the main relay voltage (90% of specified voltage) or lower than the main relay voltage (10% of specified voltage) when the shift is not operated, DTC 41 is set as the open circuit or the short circuit of the shift actuator system.

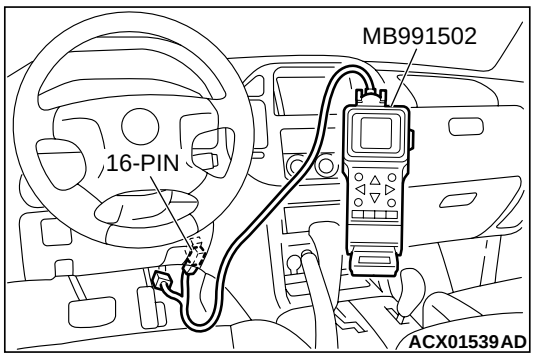
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Malfunction of the shift actuator
- Damaged harness, connector
- Malfunction of the transfer-ECU

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 12: Shift Actuator Voltage.

⚠ 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.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to data reading mode for item 12, Shift Actuator Voltage.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the display should be 1/2 battery voltage → battery positive voltage → 1.0 volt or less → 1/2 battery voltage.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the display should be 1/2 battery voltage → 1.0 volt or less → 1/2 battery voltage.

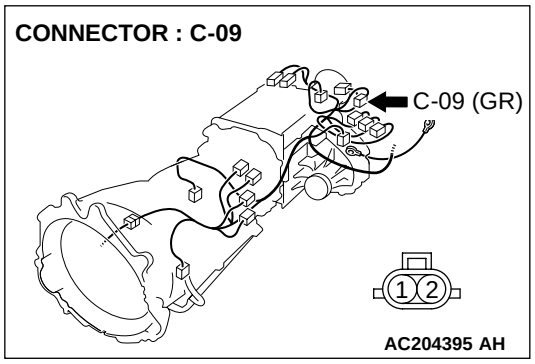
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator operating properly?

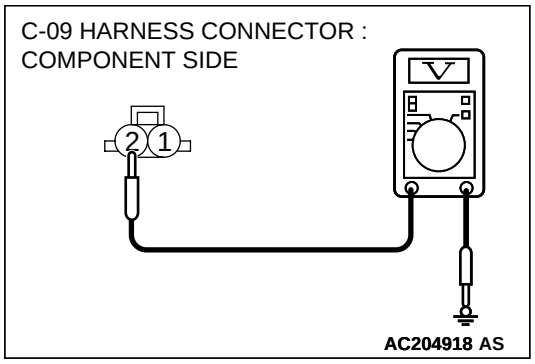
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent MalfunctionP.00-6 .

NO : Go to Step 2.

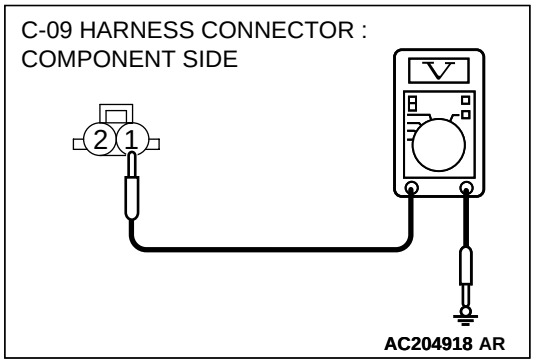
STEP 2. Measure the power supply voltage at shift actuator connector C-09.



(1) Disconnect connector C-09 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.



(4) Measure the voltage between terminal 2 and ground.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the voltage should measure battery positive voltage.



(5) Measure the voltage between terminal 1 and ground.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the voltage should measure battery positive voltage.

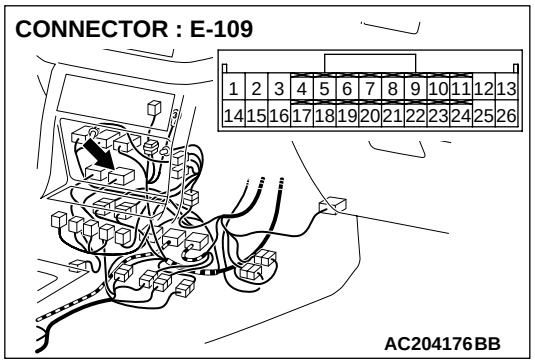
(6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage battery positive voltage?

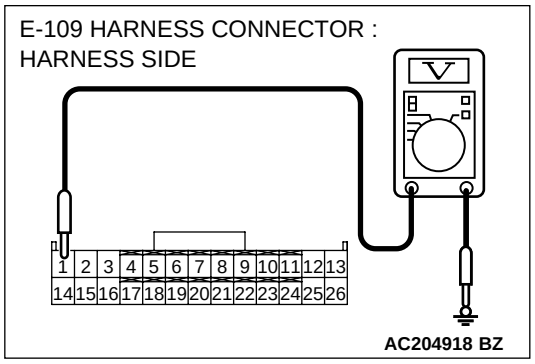
YES : Replace the shift actuator. Refer to GROUP 23B, Transfer P.23B-103.

NO : Go to Step 3.

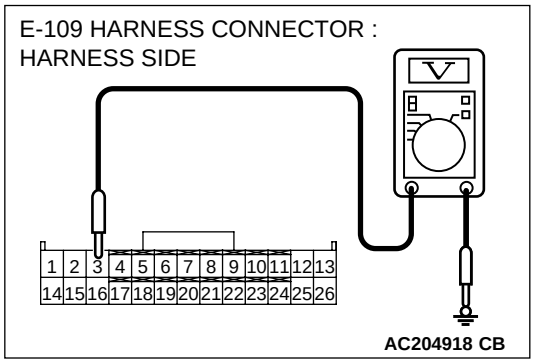
STEP 3. Measure the actuator output voltage at transfer-ECU connector E-109 by backprobing.



(1) Do not disconnect connector E-109.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.



(4) Measure the voltage between terminal 1 and ground by backprobing.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the voltage should measure 1/2 battery voltage → battery positive voltage → 1.0 volt or less → 1/2 battery voltage.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the voltage should measure 1/2 battery voltage → 1.0 volt or less → 1/2 battery voltage.



(5) Measure the voltage between terminal 3 and ground by backprobing.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the voltage should measure 1/2 battery voltage → 1.0 volt or less → 1/2 battery voltage.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the voltage should measure 1/2 battery voltage → battery positive voltage → 1.0 volt or less → 1/2 battery voltage.

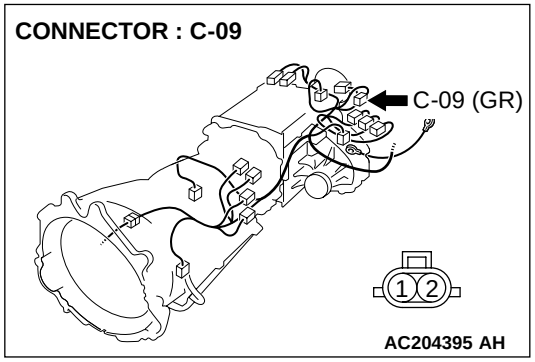
(6) Turn the ignition switch to the "LOCK" (OFF) position.

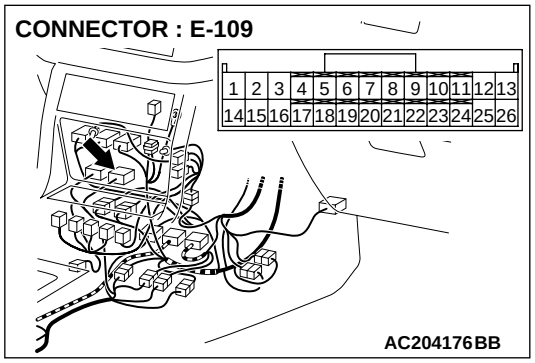
Q: Is the measured voltage within the specified range?

YES : Go to Step 6.
NO : Go to Step 4.

STEP 4. Check shift actuator connector C-09 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

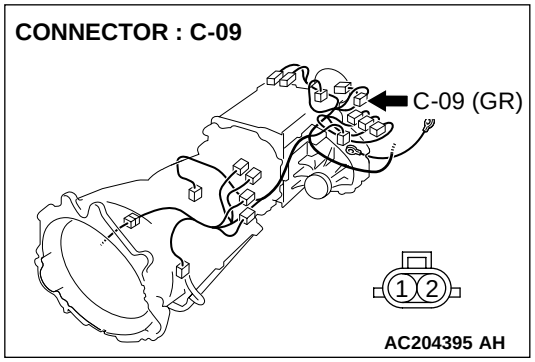
YES : Go to Step 5.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

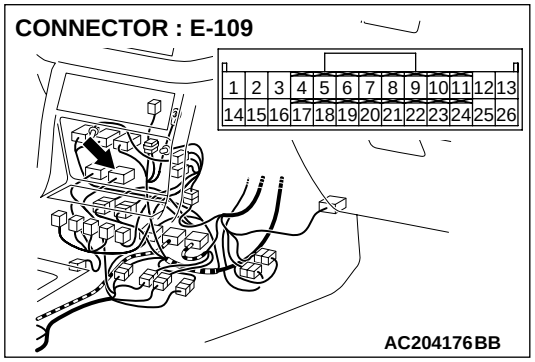




STEP 5. Check harnesses for short circuit to ground between shift actuator connector C-09 terminals 2, 1 and transfer-ECU connector E-109 terminals 1, 3.
Q: Are the harnesses wire in good condition?

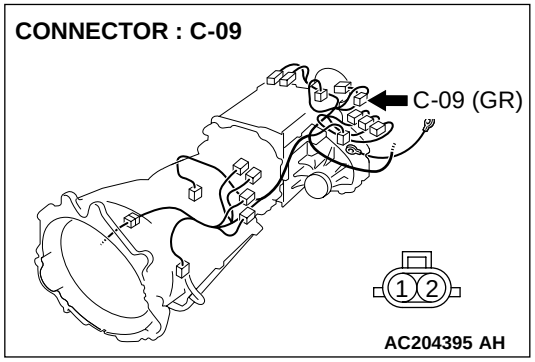
YES : Go to Step 8.
NO : Repair or replace the harness wire.

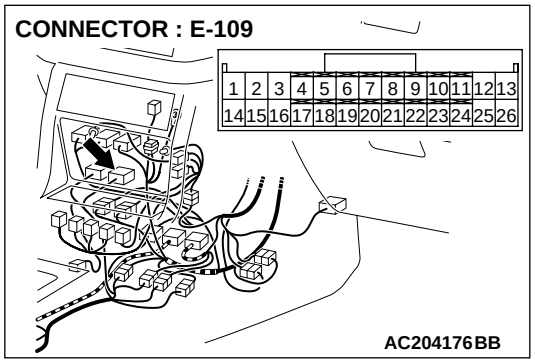




STEP 6. Check shift actuator connector C-09 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

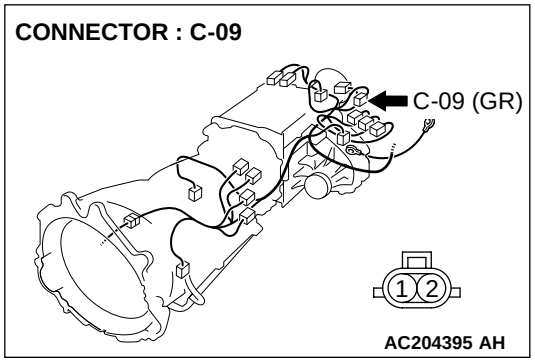
YES : Go to Step 7.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

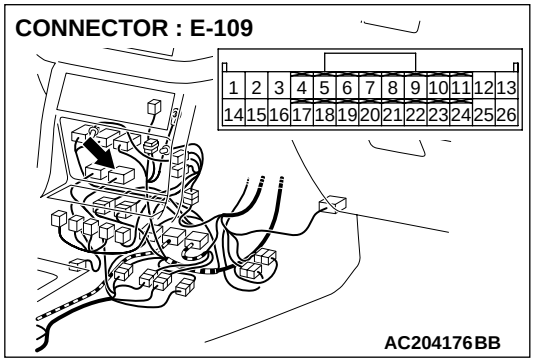


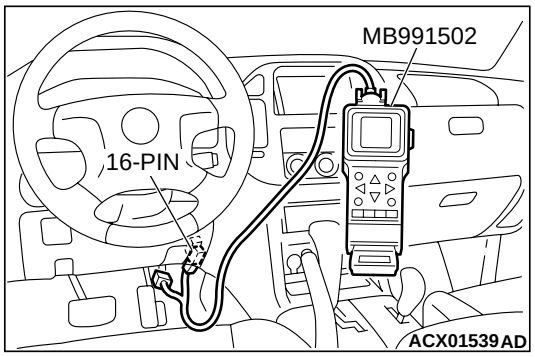


STEP 7. Check harnesses for open circuit between shift actuator connector C-09 terminals 2, 1 and transfer-ECU connector E-109 terminals 1, 3.
Q: Are the harnesses wire in good condition?

YES : Go to Step 8.
NO : Repair or replace the harness wire.







STEP 8. Using scan tool MB991502, check data list item 12: Shift Actuator Voltage.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to data reading mode for item 12, Shift Actuator Voltage.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the display should be 1/2 battery voltage → battery positive voltage → 1.0 volt or less → 1/2 battery voltage.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the display should be 1/2 battery voltage → 1.0 volt or less → 1/2 battery voltage.

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

Q: Is the actuator operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the transfer-ECU.

DTC 42: Shift Actuator System (Short Circuit)
DTC 43: Shift Actuator System (Open Circuit)

Shift Actuator System Circuit
Refer to P.23Ac-349.

CIRCUIT OPERATION
Refer to P.23Ac-349.

DTC SET CONDITIONS
When the shift actuator current is more than the target value +1 ampere during drive, the DTC 42 is set as the short circuit of the shift actuator system. When the main relay voltage is 6 volts or less or the actual value of the shift actuator current is less than 0.1 ampere, the DTC 43 is set as the open circuit of the shift actuator system.

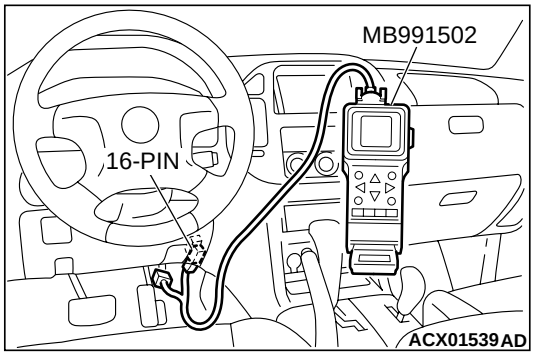
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Malfunction of the shift actuator
- Damaged harness, connector
- Malfunction of the transfer-ECU

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check data list item 10: Shift Actuator Amperage.

⚠ 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.



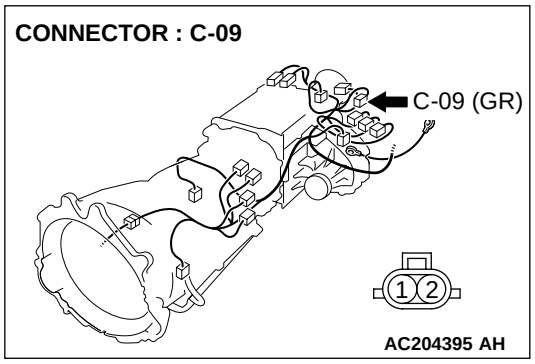
(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to data reading mode for item 10, Shift Actuator Amperage.
  - When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the display should be 0 ampere → 0.2 – 1.5 ampere → 0 ampere.
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator operating properly?

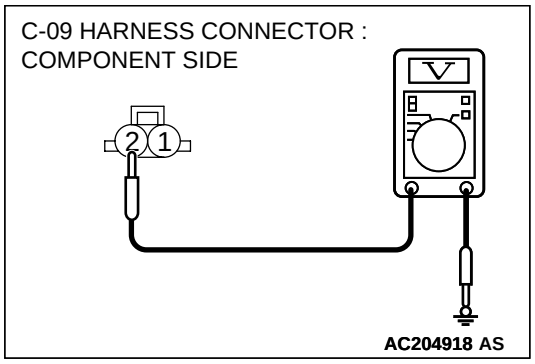
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

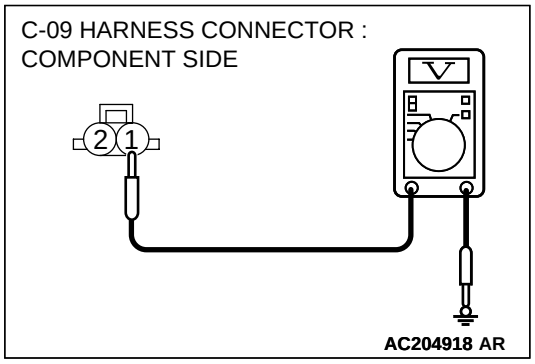
STEP 2. Measure the power supply voltage at shift actuator connector C-09.



(1) Disconnect connector C-09 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.



(4) Measure the voltage between terminal 2 and ground.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the voltage should measure battery positive voltage.



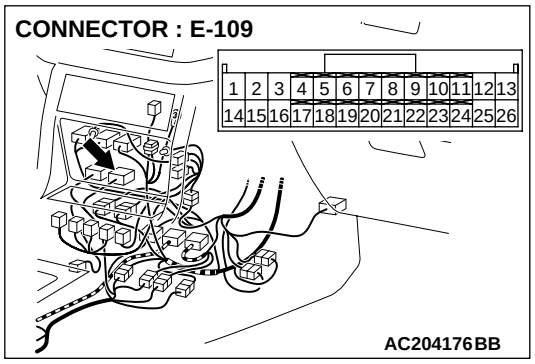
(5) Measure the voltage between terminal 1 and ground.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the voltage should measure battery positive voltage.

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

Q: Is the measured voltage battery positive voltage?

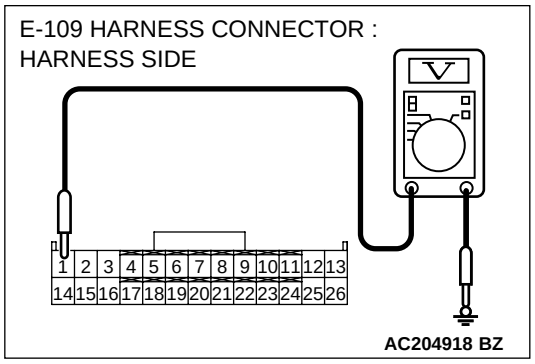
YES : Replace the shift actuator. Refer to GROUP 23B, Transfer P.23B-103.

NO : Go to Step 3.

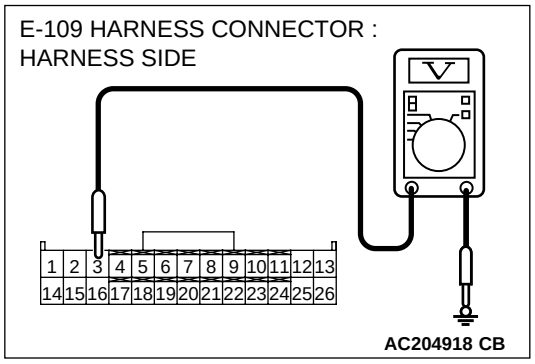


STEP 3. Measure the actuator output voltage at transfer-ECU connector E-109 by backprobing.

(1) Do not disconnect connector E-109.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.



(4) Measure the voltage between terminal 1 and ground by backprobing.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the voltage should measure 1/2 battery voltage → battery positive voltage → 1.0 volt or less → 1/2 battery voltage.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the voltage should measure 1/2 battery voltage → 1.0 volt or less → 1/2 battery voltage.



(5) Measure the voltage between terminal 3 and ground by backprobing.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the voltage should measure 1/2 battery voltage → 1.0 volt or less → 1/2 battery voltage.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the voltage should measure 1/2 battery voltage → battery positive voltage → 1.0 volt or less → 1/2 battery voltage.

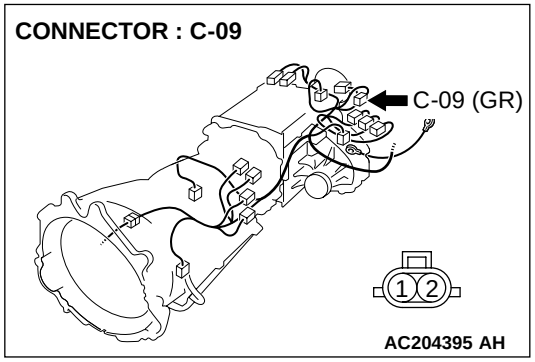
(6) Turn the ignition switch to the "LOCK" (OFF) position.

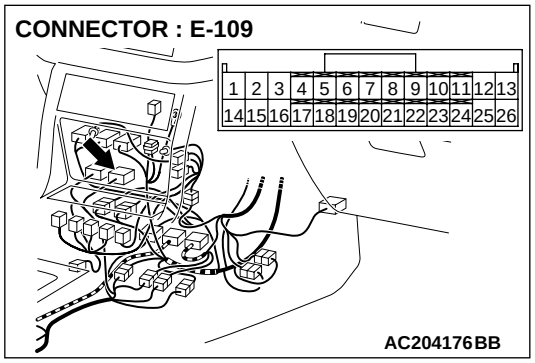
Q: Is the measured voltage within the specified range?

YES : Go to Step 6.
NO : Go to Step 4.

STEP 4. Check shift actuator connector C-09 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

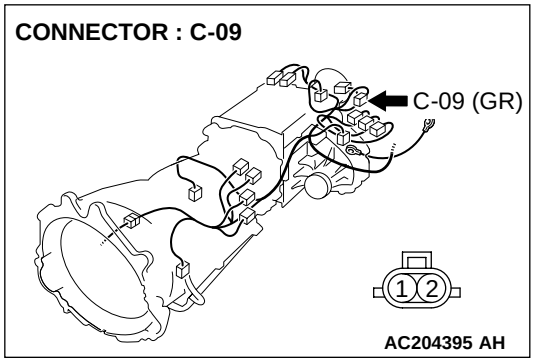
YES : Go to Step 5.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

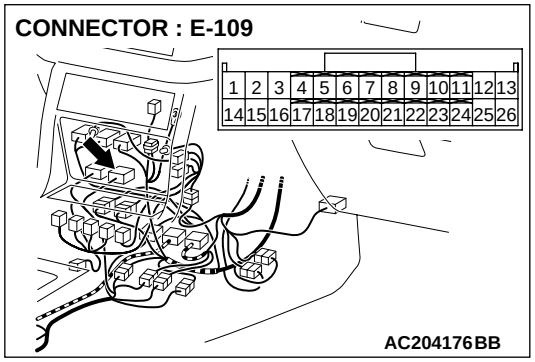




STEP 5. Check harnesses for short circuit to ground between shift actuator connector C-09 terminals 2, 1 and transfer-ECU connector E-109 terminals 1, 3.
Q: Are the harnesses wire in good condition?

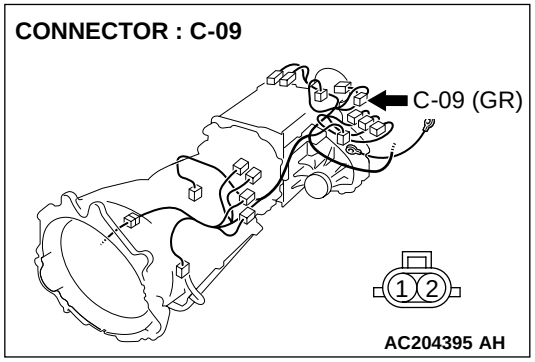
YES : Go to Step 8.
NO : Repair or replace the harness wire.

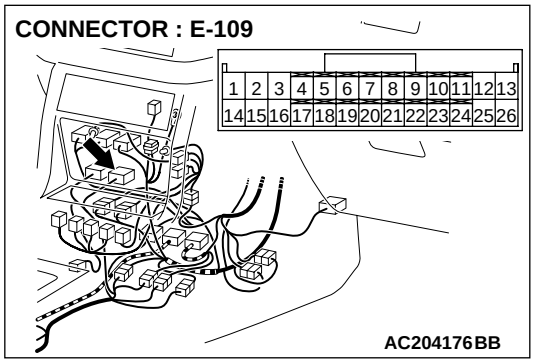




STEP 6. Check shift actuator connector C-09 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

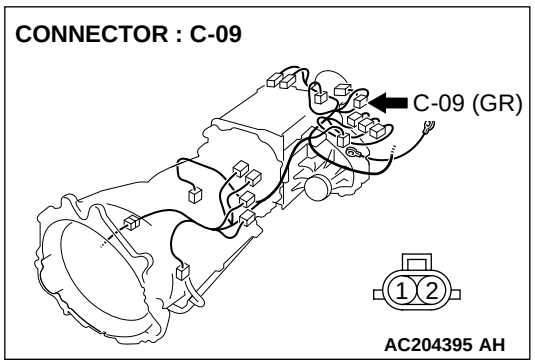
YES : Go to Step 7.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

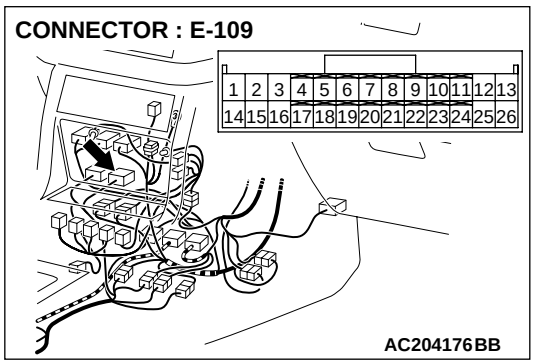


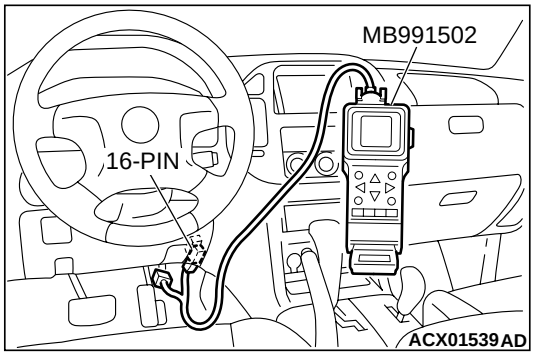


STEP 7. Check harnesses for open circuit between shift actuator connector C-09 terminals 2, 1 and transfer-ECU connector E-109 terminals 1, 3.
Q: Are the harnesses wire in good condition?

YES : Go to Step 8.
NO : Repair or replace the harness wire.







STEP 8. Using scan tool MB991502, check data list item 10: Shift Actuator Amperage.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to data reading mode for item 10, Shift Actuator Amperage.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the display should be 0 ampere → 0.2 – 1.5 ampere → 0 ampere.

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

Q: Is the actuator operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the transfer-ECU.

DTC 44: Shift Actuator System (Overload)

Shift Actuator System Circuit
Refer to P.23Ac-349.

CIRCUIT OPERATION
Refer to P.23Ac-349.

DTC SET CONDITIONS
When the accumulated time to operate the shift actuator exceeds five minutes, DTC 44 is set as the overload of the shift actuator.

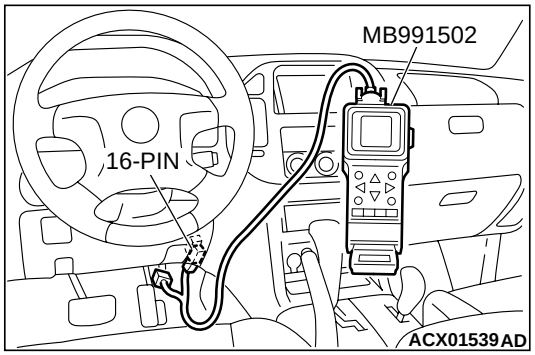
TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)
- Malfunction of the shift actuator
- Damaged harness, connector
- Malfunction of the transfer-ECU

DIAGNOSIS

Required Special Tool:
- MB991502: Scan Tool (MUT-II)

STEP 1. Using scan tool MB991502, check actuator test item 02 or 03: Shift Actuator.

⚠ 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.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to actuator testing mode for item 02 or 03, Shift Actuator.
- The shift actuator operate.

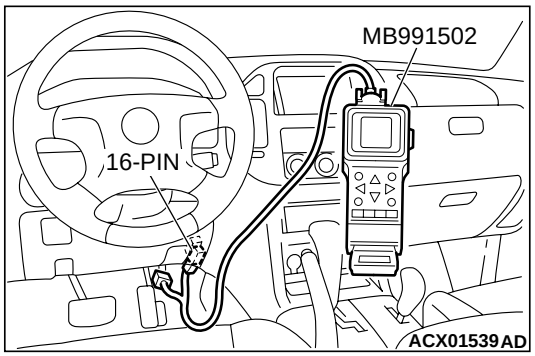
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 2.

STEP 2. Using scan tool MB991502, check data list item 12: Shift Actuator Voltage.



(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to data reading mode for item 12, Shift Actuator Voltage.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the display should be 1/2 battery voltage → battery positive voltage → 1.0 volt or less → 1/2 battery voltage.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the display should be 1/2 battery voltage → 1.0 volt or less → 1/2 battery voltage.

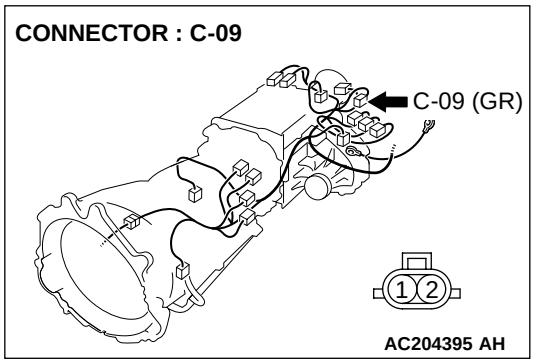
(5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the actuator operating properly?

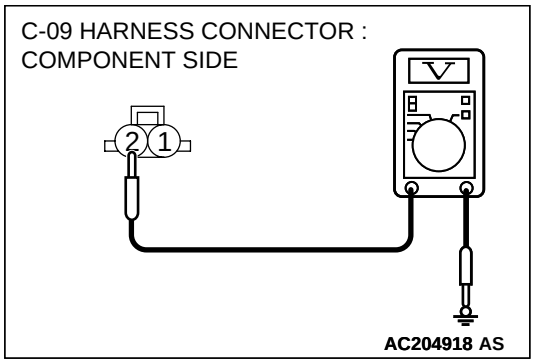
YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Go to Step 3.

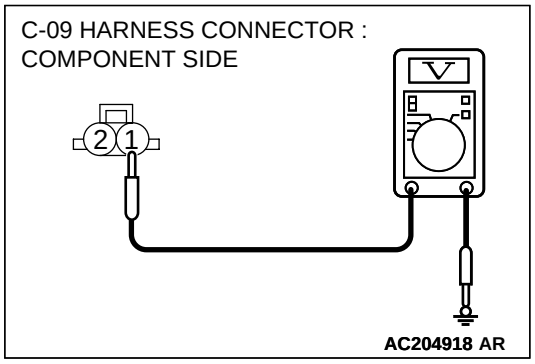
STEP 3. Measure the power supply voltage at shift actuator connector C-09.



(1) Disconnect connector C-09 and measure at the harness side.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.



(4) Measure the voltage between terminal 2 and ground.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the voltage should measure battery positive voltage.



(5) Measure the voltage between terminal 1 and ground.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the voltage should measure battery positive voltage.

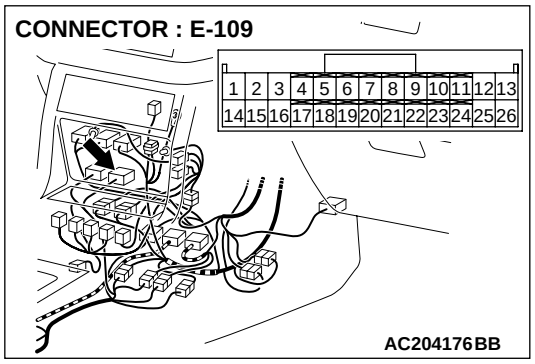
(6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage battery positive voltage?

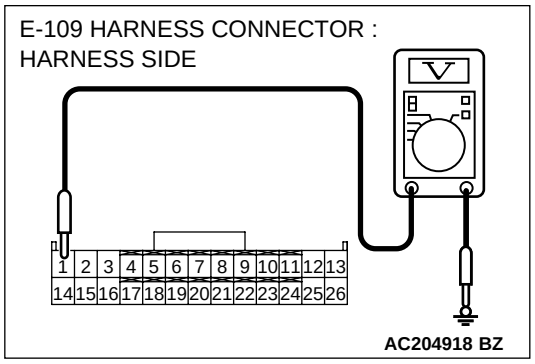
YES : Replace the shift actuator. Refer to GROUP 23B, Transfer P.23B-103.

NO : Go to Step 4.

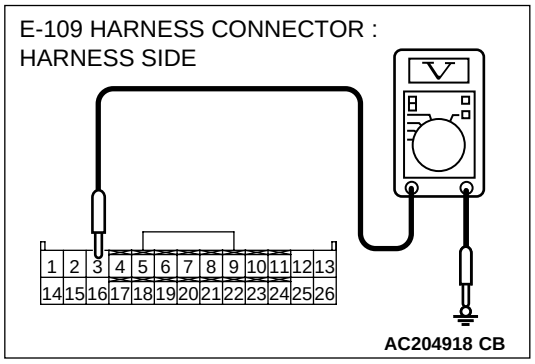
STEP 4. Measure the actuator output voltage at transfer-ECU connector E-109 by backprobing.



(1) Do not disconnect connector E-109.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.



(4) Measure the voltage between terminal 1 and ground by backprobing.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the voltage should measure 1/2 battery voltage → battery positive voltage → 1.0 volt or less → 1/2 battery voltage.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the voltage should measure 1/2 battery voltage → 1.0 volt or less → 1/2 battery voltage.



(5) Measure the voltage between terminal 3 and ground by backprobing.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the voltage should measure 1/2 battery voltage → 1.0 volt or less → 1/2 battery voltage.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the voltage should measure 1/2 battery voltage → battery positive voltage → 1.0 volt or less → 1/2 battery voltage.

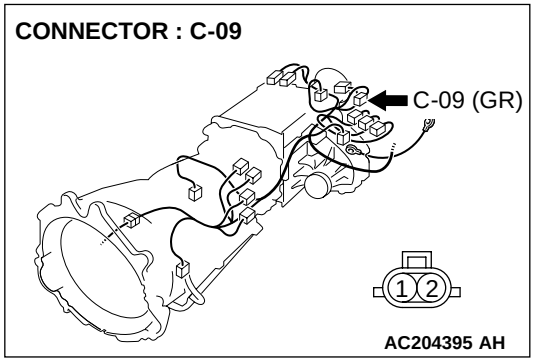
(6) Turn the ignition switch to the "LOCK" (OFF) position.

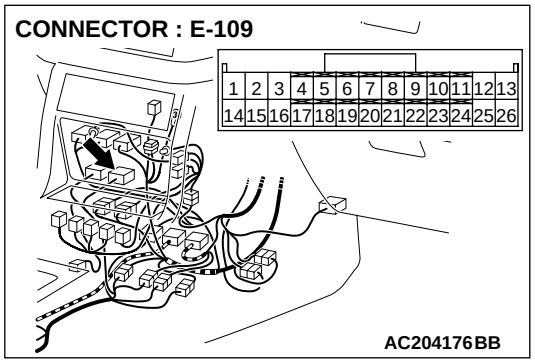
Q: Is the measured voltage within the specified range?

YES : Go to Step 7.
NO : Go to Step 5.

STEP 5. Check shift actuator connector C-09 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

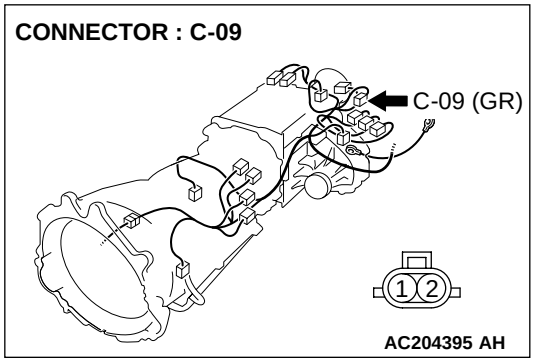
YES : Go to Step 6.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

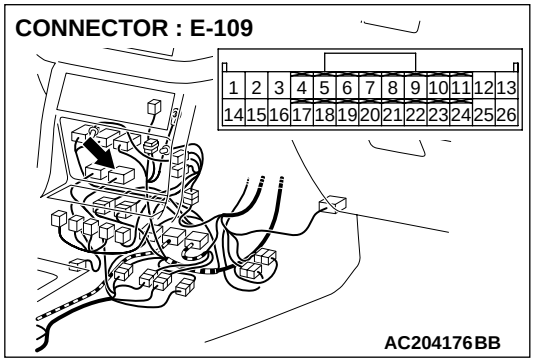




STEP 6. Check harnesses for short circuit to ground between shift actuator connector C-09 terminals 2, 1 and transfer-ECU connector E-109 terminals 1, 3.
Q: Are the harnesses wire in good condition?

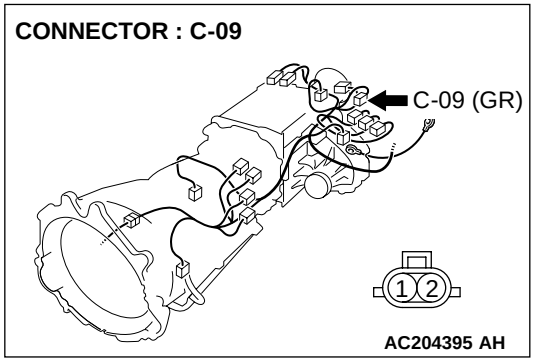
YES : Go to Step 9.
NO : Repair or replace the harness wire.

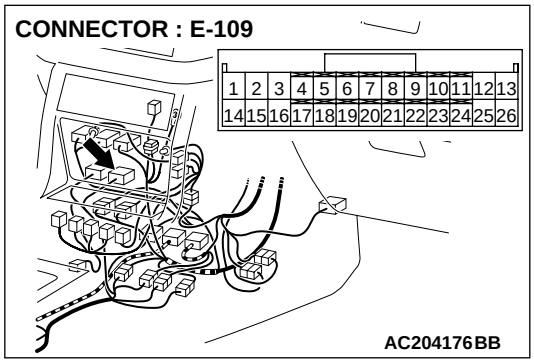




STEP 7. Check shift actuator connector C-09 and transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.
Q: Are the connectors and terminals in good condition?

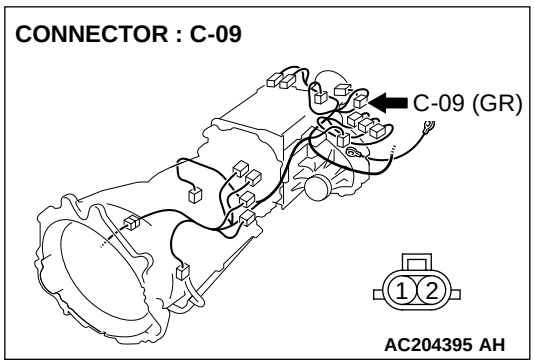
YES : Go to Step 8.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

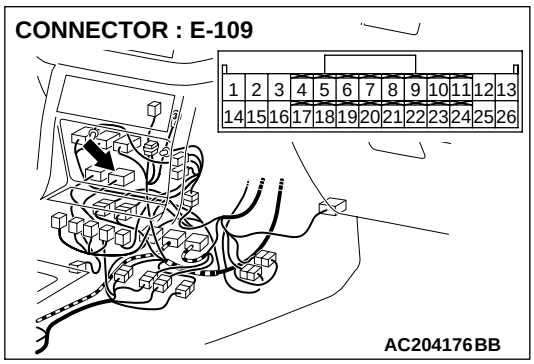


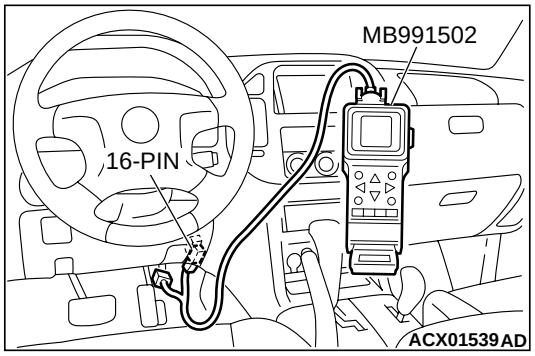


STEP 8. Check harnesses for open circuit between shift actuator connector C-09 terminals 2, 1 and transfer-ECU connector E-109 terminals 1, 3.
Q: Are the harnesses wire in good condition?

YES : Go to Step 9.
NO : Repair or replace the harness wire.







STEP 9. Using scan tool MB991502, check data list item 12: Shift Actuator Voltage.

⚠ 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.

(1) Connect scan tool MB991502 to the data link connector.
(2) Turn the ignition switch to the "ON" position.
(3) Transmission range should be "N" range.
(4) Set scan tool MB991502 to data reading mode for item 12, Shift Actuator Voltage.
- When the operating transfer shift lever 2H → 4H, 4H → 4HLc or 4HLc → 4LLc, the display should be 1/2 battery voltage → battery positive voltage → 1.0 volt or less → 1/2 battery voltage.
- When the operating transfer shift lever 4LLc → 4HLc, 4HLc → 4H or 4H → 2H, the display should be 1/2 battery voltage → 1.0 volt or less → 1/2 battery voltage.

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

Q: Is the actuator operating properly?

YES : It can be assumed that this malfunction is intermittent. Refer to GROUP 00, How to Use Troubleshooting/ Inspection Service Points – How to Cope with Intermittent Malfunction P.00-6.

NO : Replace the transfer-ECU.

DTC 45: Dissimilar Tire Diameter

CIRCUIT OPERATION

The condition of tire is detected by monitoring the speed difference between the front propeller shaft speed sensor and the rear propeller shaft speed sensor with the transfer-ECU at 4WD condition.

DTC SET CONDITIONS

If the speed difference between the front wheel and the rear wheel is larger than the set value at the free-wheel engage switch ON condition, the DTC 45 is set as the inadequate tire pressure, non-conformity of the tire size or the tire brand.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Malfunction of the tire
- Malfunction of the transfer-ECU

DIAGNOSIS

STEP 1. Tire pressure check.
Check the tire pressure, size and brand.

Q: Is the tire condition normal?

YES : Go to Step 2.
NO : Adjust or replace the tire.

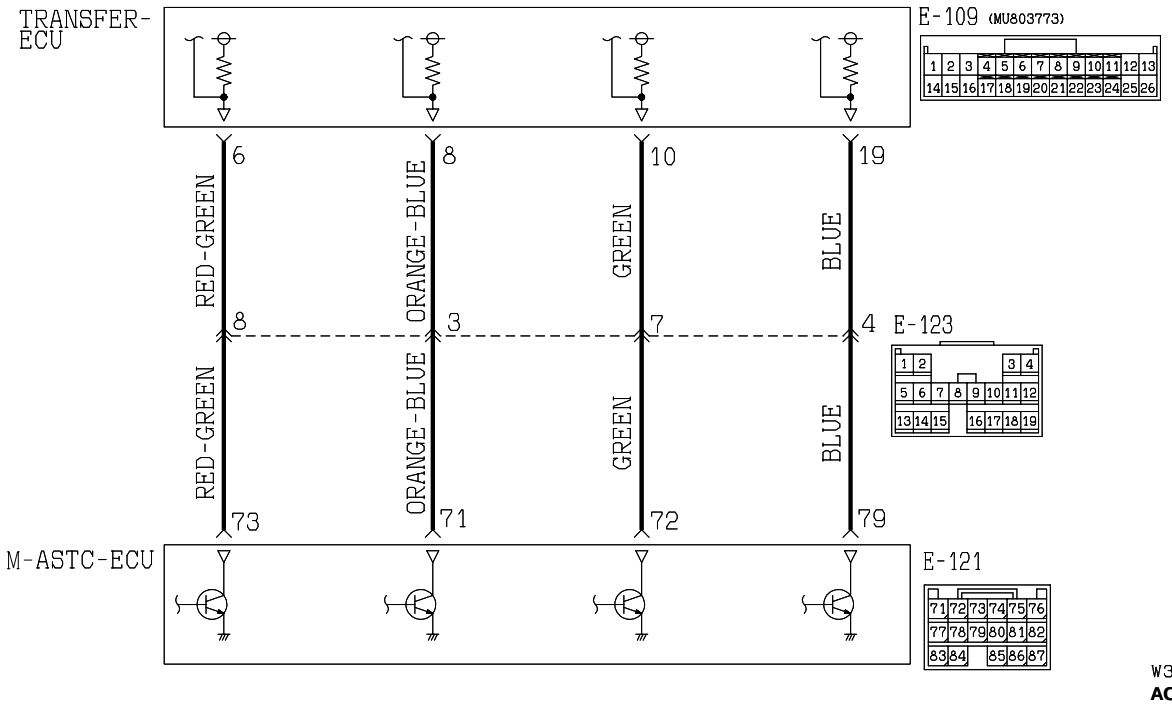
STEP 2. Check for transfer diagnostic trouble code.

Q: Is the transfer diagnostic trouble code reset?

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 Points - How to Cope with Intermittent Malfunction P.00-6.)
NO : Replace the transfer-ECU.

DTC 61: M-ASTC-ECU System

M-ASTC-ECU System Circuit



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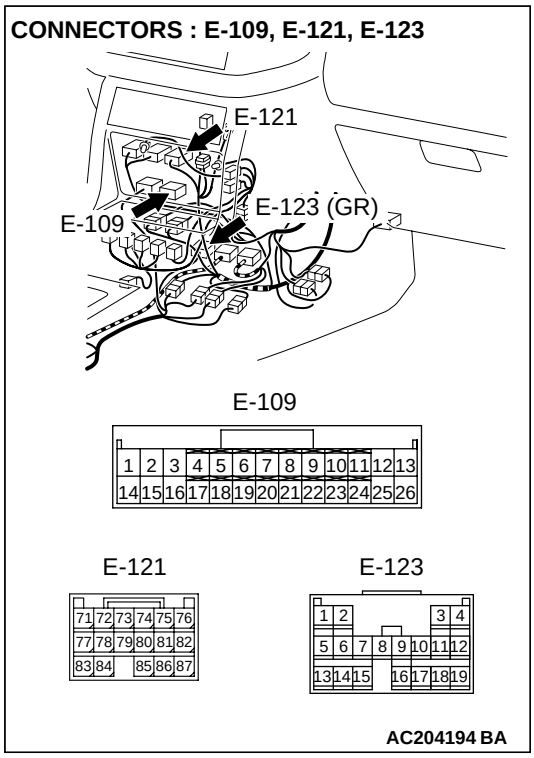


CIRCUIT OPERATION

If the Mitsubishi active skid and traction control system is activated, the M-ASTC-ECU sends a signal to the transfer-ECU. The transfer-ECU illuminates the relevant wheel of the 4WD indicator light according to the signal.

DTC SET CONDITIONS

If there is a communication error with the M-ASTC-ECU (i.e. simultaneous open circuit in all signal lines), DTC 61 will be set.

TROUBLESHOOTING HINTS (The most likely causes for this code to be set are:)

- Damaged harness, connector
- Malfunction of the M-ASTC
- Malfunction of the transfer-ECU

DIAGNOSIS

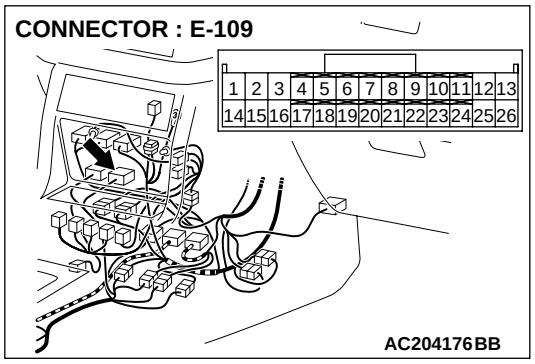
STEP 1. Check the Mitsubishi active skid and traction control system.

Refer to GROUP 35C, Troubleshooting Strategy P.35C-3.

Q: Is the inspection result good?

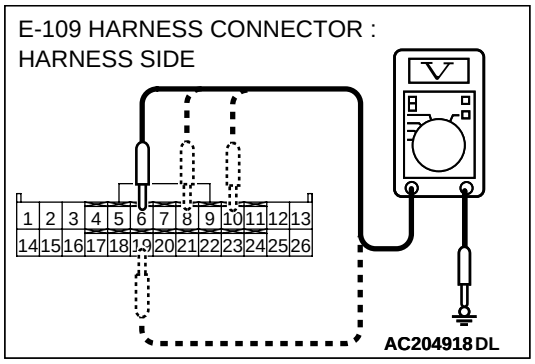
YES : Go to Step 2.

NO : Repair or replace the Mitsubishi active skid and traction control system component(s).



STEP 2. Measure the voltage at transfer-ECU connector E-109 by backprobing.

(1) Do not disconnect connector E-109.
(2) Turn the ignition switch to the "ON" position.



(3) Measure the voltage between terminals 6, 8, 10, 19 and ground by backprobing.
- The voltage should measure 1 volt or less.

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

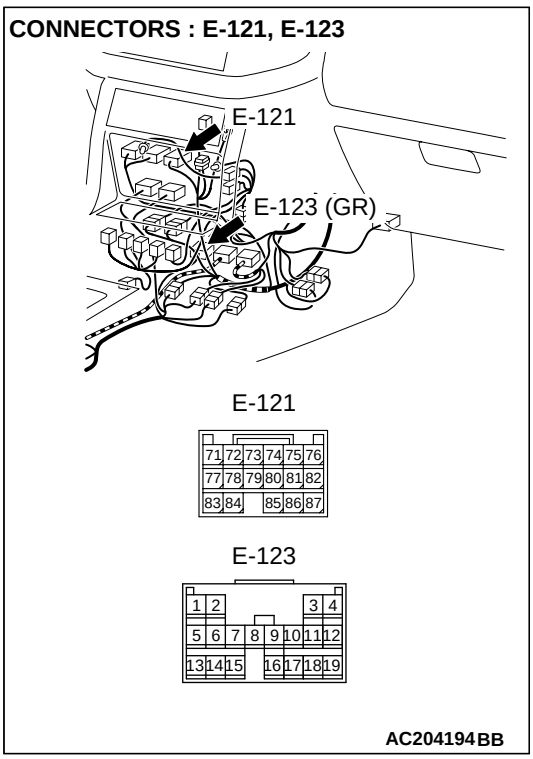
Q: Is the measured voltage 1 volt or less?

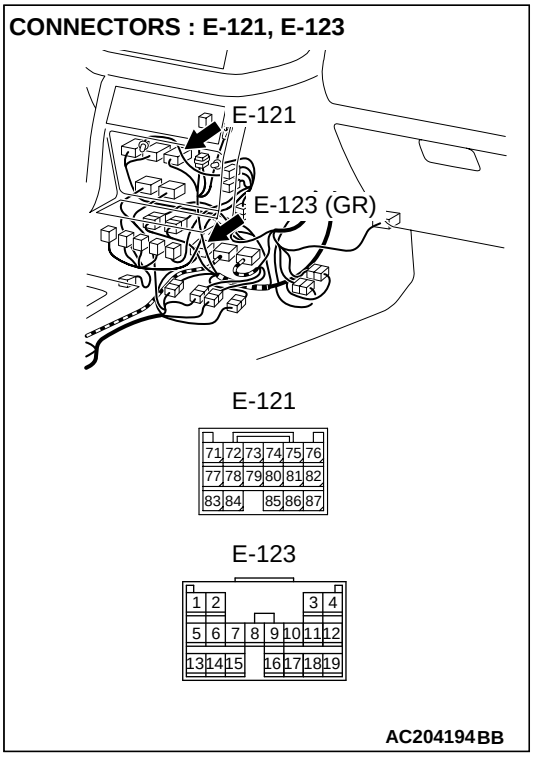
YES : Go to Step 5.
NO : Go to Step 3.

STEP 3. Check M-ASTC-ECU connector E-121 and intermediate connector E-123 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

YES : Go to Step 4.
NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.



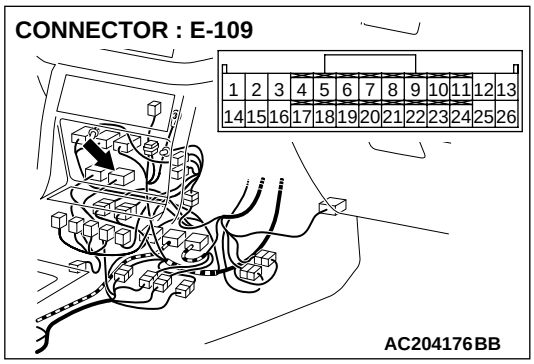


STEP 4. Check the harness for open circuit or damage between transfer-ECU connector E-109 (terminals 6, 8, 10 and 19) and M-ASTC-ECU connector E-121 (terminals 71, 72, 73 and 79).

Q: Are the harness wires in good condition?

YES : Go to Step 5.

NO : Repair or replace the harness wire(s).



STEP 5. Check transfer-ECU connector E-109 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connector and terminals in good condition?

YES : Go to Step 6.

NO : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2.

STEP 6. Replace the transfer-ECU.

(1) Replace the transfer-ECU.
(2) Test drive the vehicle.
(3) Check for transfer diagnostic trouble code.

Q: Is DTC 61 set?

YES : Start over at Step 1.

NO : The procedure is complete.

NOTES