

GROUP 17

ENGINE AND EMISSION CONTROL

CONTENTS

ENGINE CONTROL	17-3	ACCELERATOR CABLE AND PEDAL	17-5
GENERAL DESCRIPTION	17-3	REMOVAL AND INSTALLATION	17-5
ENGINE CONTROL SYSTEM DIAGNOSIS	17-3	AUTO-CRUISE CONTROL ...	17-6
INTRODUCTION TO ENGINE CONTROL SYSTEM DIAGNOSIS	17-3	GENERAL DESCRIPTION	17-6
ENGINE CONTROL SYSTEM DIAGNOSTIC TROUBLESHOOTING STRATEGY ...	17-3	SPECIAL TOOLS	17-7
SYMPTOM CHART	17-3	AUTO-CRUISE CONTROL SYSTEM DIAGNOSIS	17-7
SYMPTOM PROCEDURES	17-3	INTRODUCTION TO AUTO-CRUISE CONTROL SYSTEM DIAGNOSIS	17-7
ON-VEHICLE SERVICE	17-4	AUTO-CRUISE CONTROL SYSTEM DIAGNOSTIC TROUBLESHOOTING STRATEGY	17-7
ACCELERATOR CABLE CHECK AND ADJUSTMENT	17-4		

Continued on next page

⚠ WARNING

- *Improper service or maintenance of any component of the SRS, or any SRS-related component, can lead to personal injury or death to service personnel (from inadvertent firing of the air bag) or to the driver and passenger (from rendering the SRS inoperative).*
- *Service or maintenance of any SRS component or SRS-related component must be performed only at an authorized MITSUBISHI dealer.*
- *MITSUBISHI dealer personnel must thoroughly review this manual, and especially its GROUP 52B - Supplemental Restraint System (SRS) before beginning any service or maintenance of any component of the SRS or any SRS-related component.*

NOTE

The SRS includes the following components: SRS air bag control unit, SRS warning light, front impact sensors, air bag module, clock spring, and interconnecting wiring. Other SRS-related components (that may have to be removed/installed in connection with SRS service or maintenance) are indicated in the table of contents by an asterisk (*).

AUTO-CRUISE CONTROL SYSTEM		GENERAL INFORMATION	17-92
DIAGNOSTIC TROUBLE CODE		COMPONENT LOCATION	17-93
DIAGNOSIS	17-8	PURGE CONTROL SYSTEM CHECK	
DIAGNOSTIC TROUBLE CODE		(PURGE FLOW CHECK)	17-94
CHART	17-11	EVAPORATIVE EMISSION PURGE	
DIAGNOSTIC TROUBLE CODE		SOLENOID CHECK	17-95
PROCEDURES	17-12	VOLUME AIR FLOW SENSOR CHECK	17-95
SYMPTOM CHART	17-46	BAROMETRIC PRESSURE SENSOR	
SYMPTOM PROCEDURES	17-47	CHECK	17-95
DATA LIST REFERENCE TABLE	17-78	ENGINE COOLANT TEMPERATURE	
CHECK AUTO-CRUISE CONTROL-ECU		SENSOR CHECK	17-96
TERMINALS	17-79	INTAKE AIR TEMPERATURE SENSOR	
		CHECK	17-96
ON-VEHICLE SERVICE	17-81	FUEL TANK DIFFERENTIAL PRESSURE	
AUTO-CRUISE CONTROL SWITCH		SENSOR CHECK	17-96
CHECK	17-81	EVAPORATIVE EMISSION VENTILATION	
AUTO-CRUISE CONTROL SYSTEM		SOLENOID CHECK	17-96
COMPONENT CHECK	17-83		
AUTO-CRUISE CONTROL*	17-84	EXHAUST GAS RECIRCULATION	
REMOVAL AND INSTALLATION	17-84	(EGR) SYSTEM	17-96
AUTO-CRUISE CONTROL SWITCH		GENERAL INFORMATION	17-96
CHECK	17-86	COMPONENT LOCATION	17-97
		EGR SYSTEM CHECK	17-98
EMISSION CONTROL	17-87	VACUUM CONTROL VALVE CHECK	17-98
GENERAL DESCRIPTION	17-87	EGR VALVE CHECK	17-99
DIAGNOSIS	17-87	EGR PORT VACUUM CHECK	17-99
SPECIAL TOOLS	17-87	EGR SOLENOID CHECK	17-100
VACUUM HOSES	17-88	VOLUME AIR FLOW SENSOR CHECK	17-100
VACUUM HOSE ROUTING	17-88	ENGINE COOLANT TEMPERATURE	
VACUUM CIRCUIT DIAGRAM	17-90	SENSOR CHECK	17-100
VACUUM HOSE INSTALLATION	17-90	CRANKSHAFT POSITION SENSOR	
VACUUM HOSE CHECK	17-90	CHECK	17-100
POSITIVE CRANKCASE		EVAPORATIVE EMISSION	
VENTILATION SYSTEM	17-91	CANISTER AND FUEL TANK	
GENERAL INFORMATION (POSITIVE		PRESSURE RELIEF VALVE	17-101
CRANKCASE VENTILATION SYSTEM)	17-91	REMOVAL AND INSTALLATION	17-101
COMPONENT LOCATION	17-91	INSPECTION	17-102
CRANKCASE VENTILATION SYSTEM			
CHECK	17-92	CATALYTIC CONVERTER	17-102
POSITIVE CRANKCASE VENTILATION		GENERAL DESCRIPTION	17-102
(PCV) VALVE CHECK	17-92	REMOVAL AND INSTALLATION	17-102
EVAPORATIVE EMISSION CONTROL		SPECIFICATIONS	17-103
SYSTEM	17-92	FASTENER TIGHTENING	
		SPECIFICATIONS	17-103
		SERVICE SPECIFICATIONS	17-103

ENGINE CONTROL

GENERAL DESCRIPTION

M1171000100200

A cable-type accelerator mechanical suspended-type pedal has been adopted.

ENGINE CONTROL SYSTEM DIAGNOSIS

INTRODUCTION TO ENGINE CONTROL SYSTEM DIAGNOSIS

M1171002000191

If there is a malfunction in the engine control system, the accelerator cable, accelerator pedal or throttle lever may be faulty.

ENGINE CONTROL SYSTEM DIAGNOSTIC TROUBLESHOOTING STRATEGY

M1171002100217

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

1. Gather information from the customer.

2. Verify that the condition described by the customer exists.

3. Find the malfunction by following the Symptom Chart.

4. Verify that the malfunction is eliminated.

SYMPTOM CHART

M1171002200225

SYMPTOM	INSPECTION PROCEDURE	REFERENCE PAGE
Throttle valve will not fully open or close.	1	P.17-3
Accelerator pedal operation is not smooth (over acceleration).	2	P.17-4

SYMPTOM PROCEDURES

INSPECTION PROCEDURE 1: Throttle Valve will not Fully Open or Close.

DIAGNOSIS

STEP 1. Check the accelerator cable adjustment.

Q: Is the accelerator cable properly adjusted?

YES : Go to Step 2.

NO : Adjust the accelerator cable by referring to P.17-4, and then go to Step 4.

STEP 2. Check the return spring.

Q: Is the return spring damaged or deformed?

YES : Go to Step 3.

NO : Replace, then go to Step 4.

STEP 3. Check the throttle lever.

Q: Is the throttle lever damaged or deformed?

YES : Replace, then go to Step 4.

NO : There is no action to be taken.

STEP 4. Retest the system.

Q: Does the throttle valve fully open and close?

YES : This procedure is complete.

NO : Return to Step 1.

INSPECTION PROCEDURE 2: Accelerator Pedal Operation is not Smooth (Over Acceleration)**DIAGNOSIS****STEP 1. Check the accelerator pedal.**

Q: Is the accelerator pedal loose?
YES : Tighten, then go to Step 4.
NO : Go to Step 2.

STEP 2. Check the accelerator cable wiring.

Q: Is the accelerator cable routing bent sharply?
YES : Repair, then go to Step 4.
NO : Go to Step 3.

STEP 3. Check the accelerator cable lubricant.

Q: Is the accelerator cable lubricated sufficiently?
YES : There is no action to be taken.
NO : Refill or replace the lubricant, then go to Step 4.

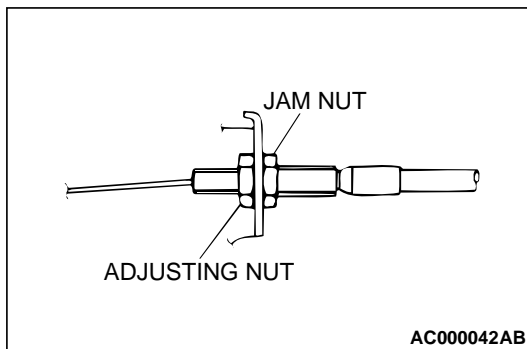
STEP 4. Retest the system.

Q: Does the accelerator pedal work normally?
YES : This procedure is complete.
NO : Go to Step 1.

ON-VEHICLE SERVICE**ACCELERATOR CABLE CHECK AND ADJUSTMENT**

M1171000900239

1. Turn off air conditioning and all lights.
Inspect and adjust at no load.
2. Start engine and allow to idle until it reaches normal operating temperature.
3. Confirm the idle speed is at standard value.
Standard value: 700 ± 100 r/min
4. Stop the engine [ignition switch the "LOCK" (OFF) position].
5. Confirm there are no sharp bends in the accelerator cable.
6. Check the inner cable for correct slack.
Standard value: 1 – 2 mm (0.04 – 0.08 inch)
7. If there is too much slack or no slack, adjust the cable as follows:
 - (1) Loosen the jam nut and fully close the throttle lever.
 - (2) Tighten the adjusting nut until just before the throttle lever starts to move.
 - (3) By loosening the adjusting nut one turn, the accelerator cable slack will be brought to the standard value.
 - (4) Fix the adjusting nut with the jam nut.
 - (5) After adjusting, check that the throttle lever is touching the stopper.

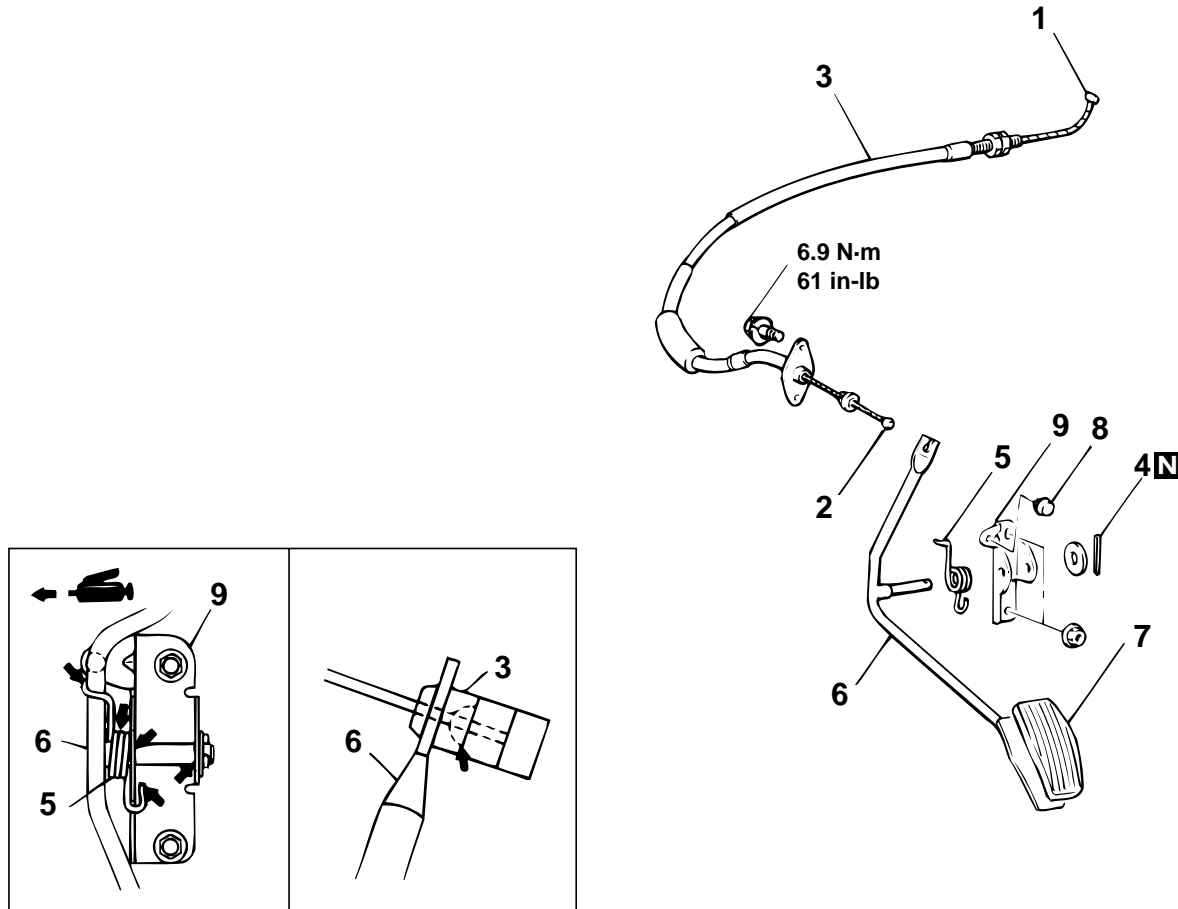


ACCELERATOR CABLE AND PEDAL REMOVAL AND INSTALLATION

M1171001200255

Post-installation Operation

Adjusting the Accelerator Cable (Refer to [P.17-4.](#))



AC004509AB

ACCELERATOR CABLE REMOVAL STEPS

1. INNER CABLE CONNECTION (THROTTLE BODY SIDE)
2. INNER CABLE CONNECTION (ACCELERATOR PEDAL SIDE)
3. ACCELERATOR CABLE

ACCELERATOR PEDAL REMOVAL STEPS

2. INNER CABLE CONNECTION (ACCELERATOR PEDAL SIDE)
4. COTTER PIN
5. SPRING
6. ACCELERATOR ARM
7. PEDAL PAD
8. STOPPER
9. BRACKET

AUTO-CRUISE CONTROL

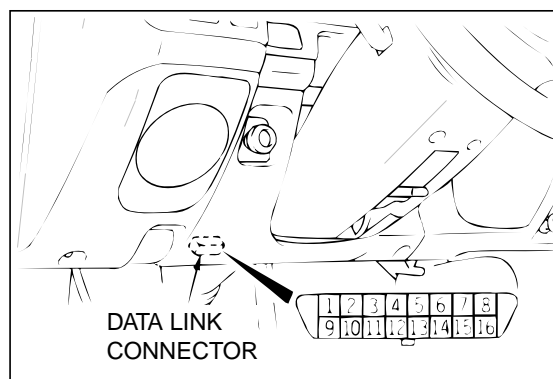
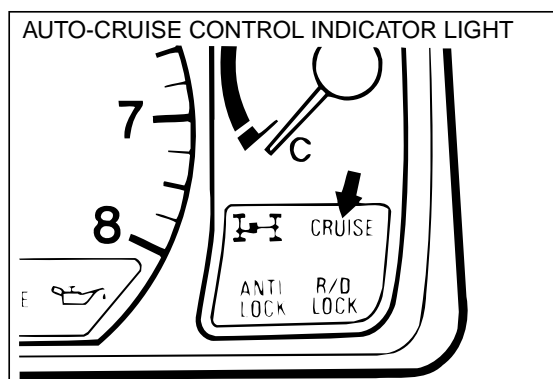
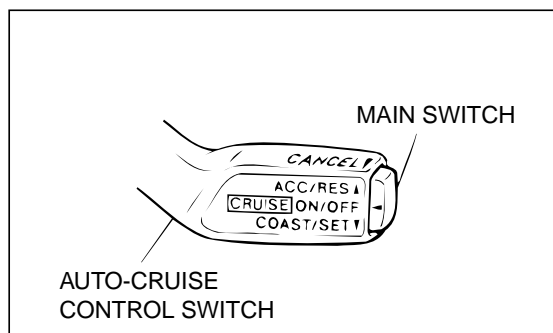
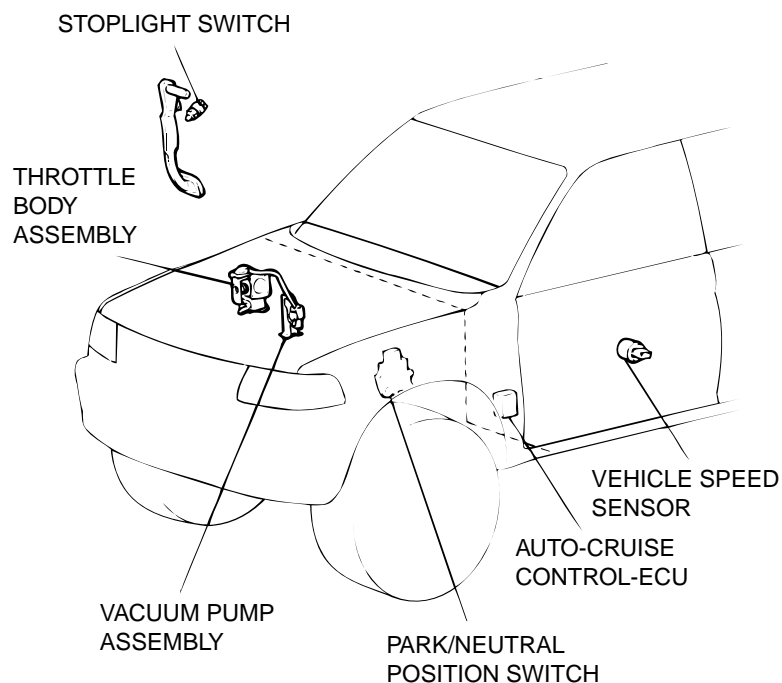
GENERAL DESCRIPTION

By using the auto-cruise control, the driver can select and maintain a desired cruising speed [approximately 40 km/h (25 mph) or more] without depressing the accelerator pedal.

The throttle body with integrated vacuum actuator is incorporated.

M1172000100203

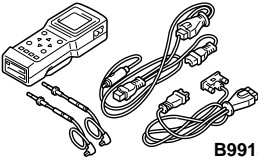
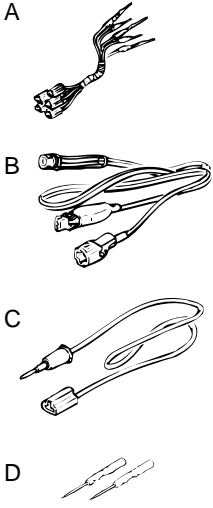
CONSTRUCTION DIAGRAM



AC004510 AB

SPECIAL TOOLS

M1172000600208

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 B991502	MB991502 Scan tool (MUT-II)	MB991496-OD	Diagnostic trouble code check.
 MB991223AD	MB991223 A: MB991219 B: MB991220 C: MB991221 D: MB991222 Harness set A: Test harness B: LED harness C: LED harness adapter D: Probe	-	Checking the continuity and measuring the voltage at the harness connector

AUTO-CRUISE CONTROL SYSTEM DIAGNOSIS

INTRODUCTION TO AUTO-CRUISE CONTROL SYSTEM DIAGNOSIS

M1172003300198

The auto-cruise control system allows driving without stepping on the accelerator pedal by setting a random speed between 40 km/h (25 mph) and 200 km/h (124 mph).

Troubles in this system can be investigated by the following methods.

Auto-cruise control system diagnostic trouble codes

The auto-cruise control system consists of the auto-cruise control-ECU, control switches, sensors, and vacuum pump. If the auto-cruise control-ECU detects a problem on any of those components, the ECU estimates where the problem may be occurring, and will output a diagnostic trouble code.

The control switches and sensors monitor the state of the vehicle.

Based on input signals from those switches and sensors, the auto-cruise control-ECU activates the vacuum pump.

Diagnostic trouble codes cover the throttle position sensor, auto-cruise control switch, vehicle speed sensor, auto-cruise control-ECU and vacuum pump.

AUTO-CRUISE CONTROL SYSTEM DIAGNOSTIC TROUBLESHOOTING STRATEGY

M1172002000202

Use these steps to plan your diagnostic strategy. If you follow them carefully, you will check most of the possible causes of an auto-cruise control system problem.

1. Gather information from the customer.

2. Verify that the condition described by the customer exists.

3. Check the vehicle for any auto-cruise control system DTC.

4. If you can verify the condition and there are no auto-cruise control system DTCs, and the malfunction is intermittent, refer to GROUP 00, How to Use Troubleshooting/Inspection Service Points – How to Cope with Intermittent Malfunctions P.00-6.
5. If you can verify the condition but there are no auto-cruise control system DTCs, or the system cannot communicate with the scan tool, check that the auto-cruise control system is operating properly.
 - If the auto-cruise control system is operating properly, refer to P.17-78, Auto-cruise Control System Data List Reference Table.
6. If the auto-cruise control system is operating properly, refer to P.17-11, Auto-cruise Control System Diagnostic Trouble Code Chart.
7. Re-create the auto-cruise control system DTC set conditions to see if the same Auto-cruise Control System DTC will set again.
 - If the same Auto-cruise Control System DTC sets again, perform the diagnostic procedures for the set code. Refer to P.17-11, Auto-cruise Control System Diagnostic Trouble Code Chart.

AUTO-CRUISE CONTROL SYSTEM DIAGNOSTIC TROUBLE CODE DIAGNOSIS

M1172002100191

Retrieving Auto-cruise Control System Diagnostic Trouble Codes.

Using scan tool MB991502

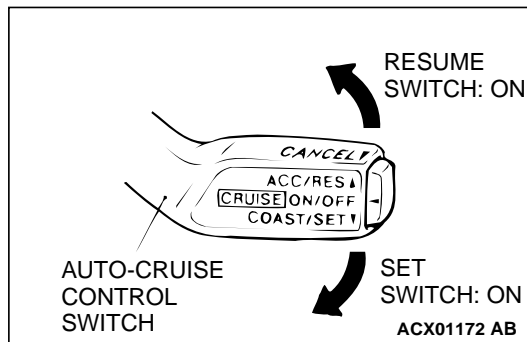
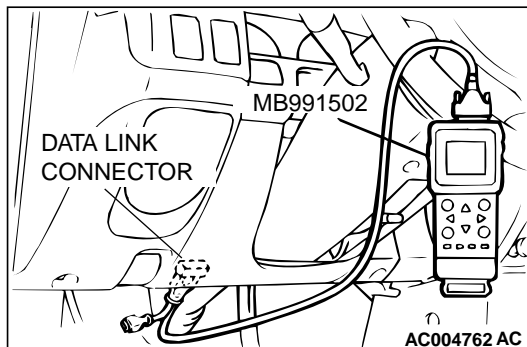
Required Special Tool:

- MB991502: Scan Tool (MUT-II)

CAUTION

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

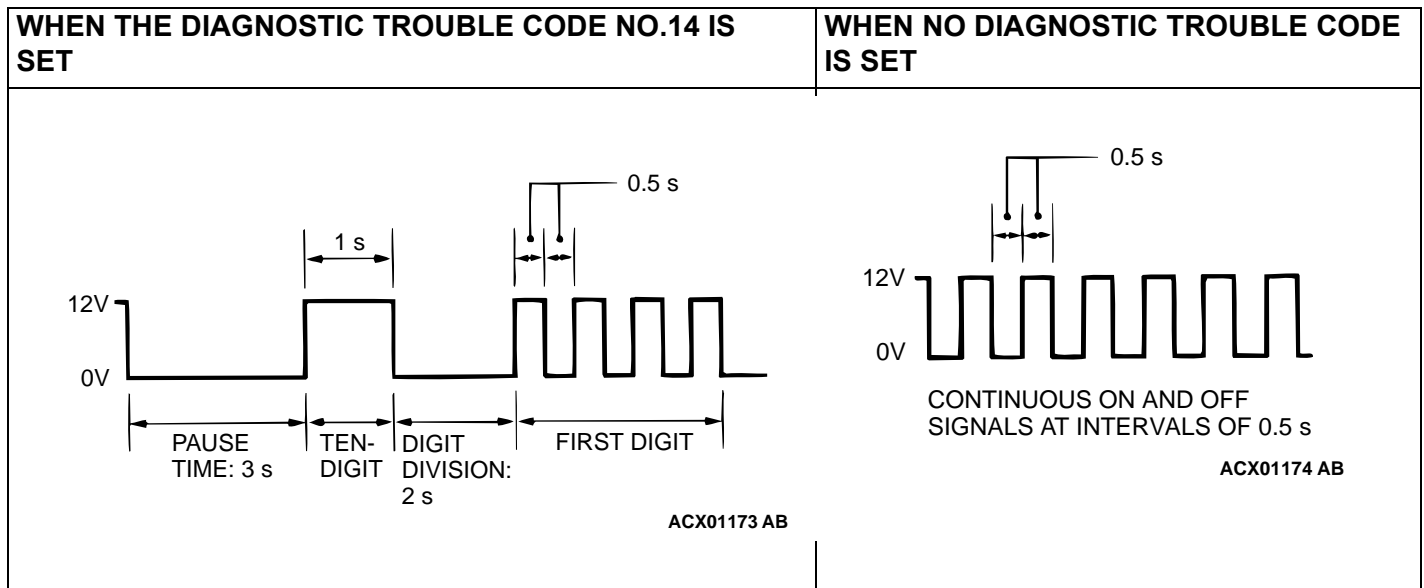
1. Connect scan tool MB991502 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Use scan tool MB991502 to check for auto-cruise control system diagnostic trouble codes.
4. Turn the ignition switch to the "LOCK" (OFF) position.
5. Disconnect scan tool MB991502.



Using a Auto-cruise Control Indicator Light

1. Turn the ignition switch to the "ON" position while holding the auto-cruise control switch in the "SET" (down) position. Then, within one second, move the cruise control switch up to the "RES" position.
2. Read a diagnostic trouble code by observing the flash display pattern of the auto-cruise control indicator light in the combination meter.

DIAGNOSTIC RESULT DISPLAY METHOD WHEN USING THE AUTO-CRUISE CONTROL INDICATOR LIGHT



NOTE: Other on-board diagnostic items are also output as voltage waveforms corresponding to diagnostic trouble code numbers.

Erasing Diagnostic Trouble Codes

The diagnostic trouble codes can be erased by the following procedure.

NOTE: The diagnostic trouble code will not be erased even if the negative battery terminal is disconnected.

Using scan tool MB991502

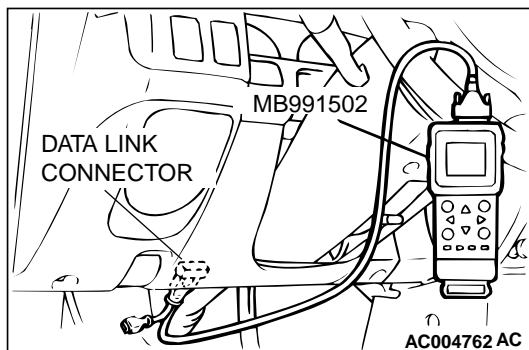
Required Special Tool:

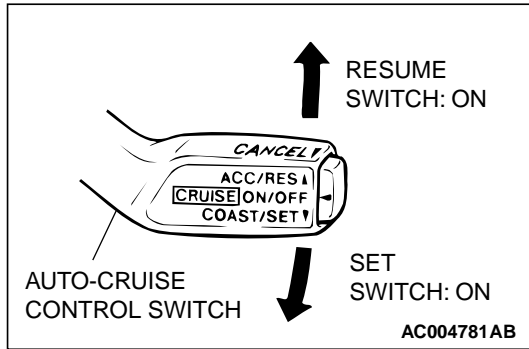
- MB991502: Scan Tool (MUT-II)

CAUTION

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

1. Connect scan tool MB991502 to the data link connector.
2. Turn the ignition switch to the "ON" position.
3. Use scan tool MB991502 to check for auto-cruise control system diagnostic trouble codes.
4. Turn the ignition switch to the "LOCK" (OFF) position.
5. Disconnect scan tool MB991502.





Without using scan tool MB991502

1. Turn the ignition switch to the "ON" position with the "SET" (down) switch ON. Then, turn the "RESUME" switch ON within one second.
2. Depress the brake pedal for 5 seconds or more with the "SET" (down) switch ON again.

INSPECTION USING SCAN TOOL MB991502 DATA LIST

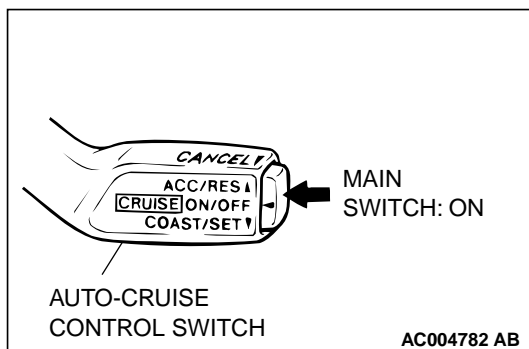
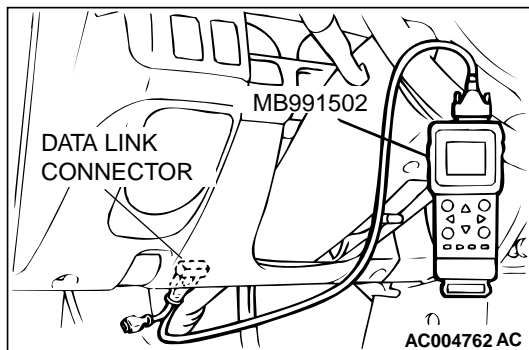
Required Special Tool:

- MB991502: Scan Tool (MUT-II)

CAUTION

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

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



2. Turn the ignition switch to the "ON" position and then turn on the main switch.
3. Carry out inspection by means of the data list.
If there is an abnormality, check and repair the chassis harnesses and components. (Refer to P.17-78, Data List Reference Table.)
4. Re-check using scan tool MB991502 and check to be sure that the abnormal input and output have returned to normal because of the repairs.
5. Erase the diagnostic trouble code(s).
6. Turn the ignition switch to the "LOCK" (OFF) position.
7. Disconnect scan tool MB991502 from the data link connector.
8. Start the engine again and do a test drive to confirm that the problem is eliminated.

DIAGNOSTIC TROUBLE CODE CHART

M1172002200228

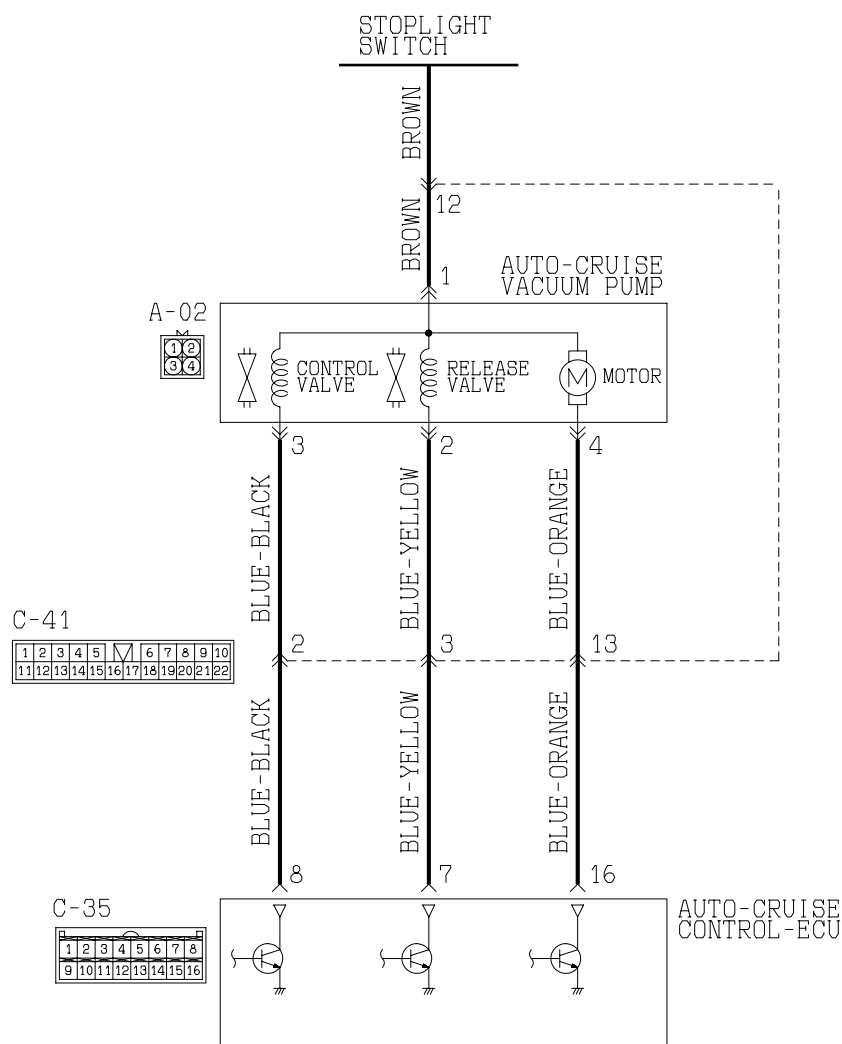
Check according to the inspection chart that is appropriate for the diagnostic trouble code.

DIAGNOSTIC TROUBLE CODE NO.	INSPECTION ITEM	REFERENCE PAGE
11	Auto-cruise vacuum pump drive system	P.17-12
12	Vehicle speed sensor system	P.17-17
14	Stoplight switch system	P.17-21
15	Auto-cruise control switch system	P.17-30
16	Auto-cruise control-ECU system	P.17-37
17	Throttle position sensor, Idle position signal system	P.17-38

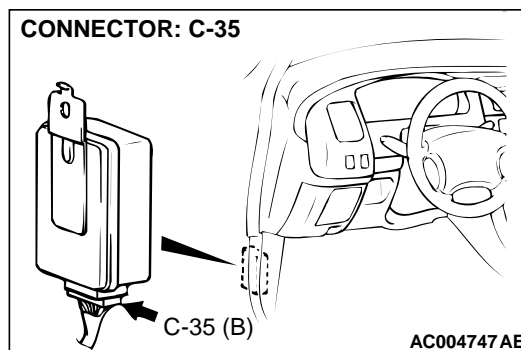
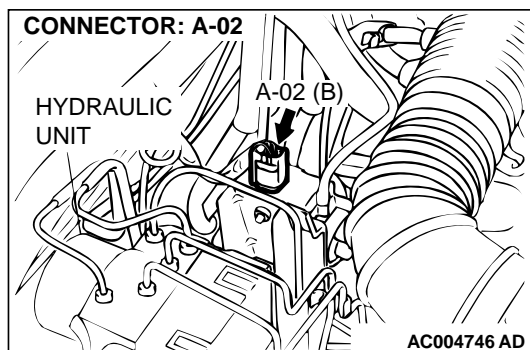
DIAGNOSTIC TROUBLE CODE PROCEDURES

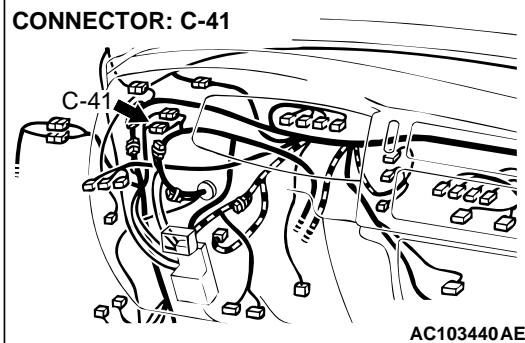
DTC 11: Auto-cruise Vacuum Pump Drive System

Auto-cruise Vacuum Pump Drive System Circuit



9P15M04AA





CIRCUIT OPERATION

This circuit activates the vacuum pump used to accelerate/decelerate, set, and cancel the vehicle speed.

The auto-cruise control-ECU controls the control valve, release valve, and motor by turning the transistor in the ECU on and off.

DTC SET CONDITIONS

Any drive signal for the release valve, control valve or motor is not input to the auto-cruise control-ECU.

TROUBLESHOOTING HINTS

The most likely causes for this code to be set are:

- Malfunction of the auto-cruise vacuum pump.
- Damaged harness or connector.
- Malfunction of the auto-cruise control-ECU.

DIAGNOSIS

Required Special Tool:

- MB991223: Harness Set

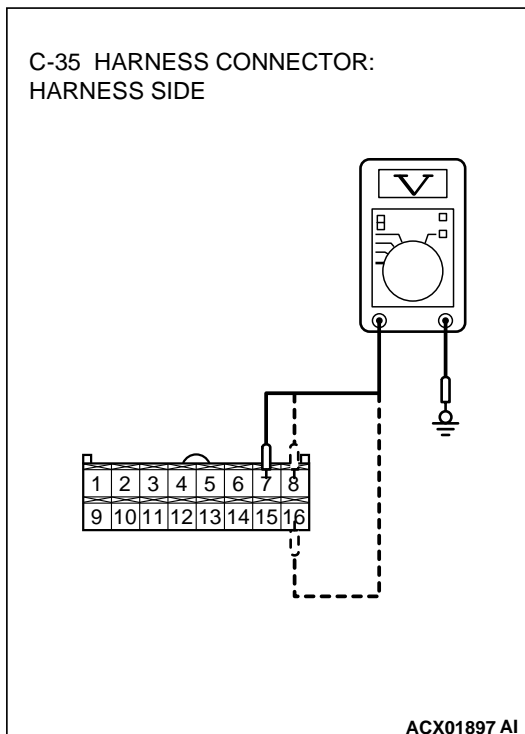
STEP 1. Measure the output circuit voltage at auto-cruise control-ECU connector C-35 by backprobing.

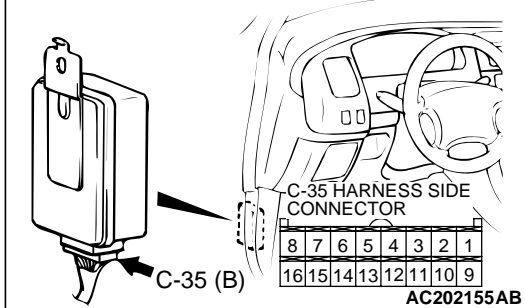
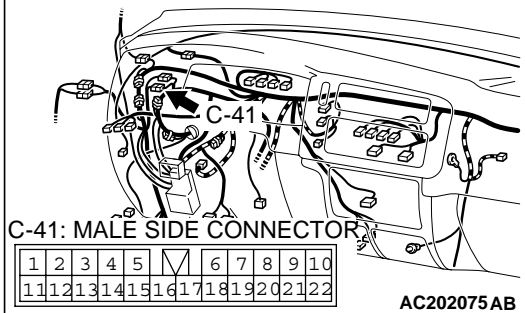
- (1) Do not disconnect auto-cruise control-ECU connector C-35.
- (2) Turn the ignition switch to the "ON" position and the auto-cruise control main switch to the "ON" position.
- (3) Measure the voltage between terminal 7 and ground by backprobing.
 - Voltage should be battery positive voltage.
[When decelerating with the "SET" switch while driving at constant speed (Release valve open).]
- (4) Measure the voltage between terminal 8 and ground by backprobing.
 - Voltage should be battery positive voltage.
[When decelerating with the "SET" switch while driving at constant speed. (Control valve open).]
- (5) Measure the voltage between terminal 16 and ground by backprobing.
 - Voltage should be battery positive voltage.
(When the motor is stopped during a constant road speed.)
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are all of the above values satisfied?

YES : Check that DTC 11 is not set. If DTC 11 is set, replace the auto-cruise control-ECU. (Refer to P.17-84.) Then check that DTC 11 is not.

NO : Go to Step 2.



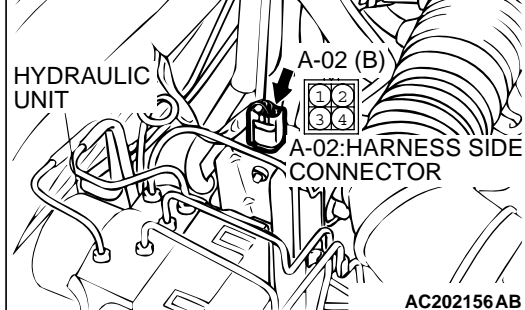
CONNECTOR: C-35**CONNECTOR: C-41**

STEP 2. Check auto-cruise control-ECU connector C-35 and intermediate connector C-41 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Then check that DTC 11 is not set. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#).

NO : Go to Step 3.

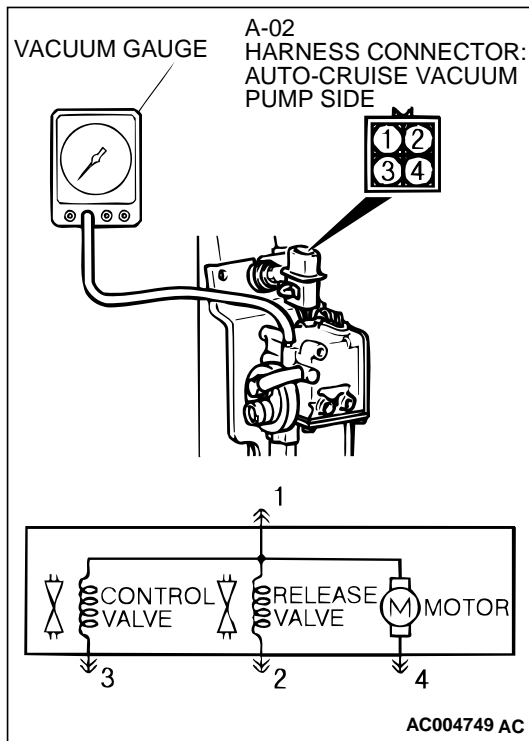
CONNECTOR: A-02

STEP 3. Check auto-cruise control vacuum pump connector A-02 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E Harness Connector Inspection [P.00E-2](#). Then check that DTC 11 is not set.

NO : Go to Step 4.



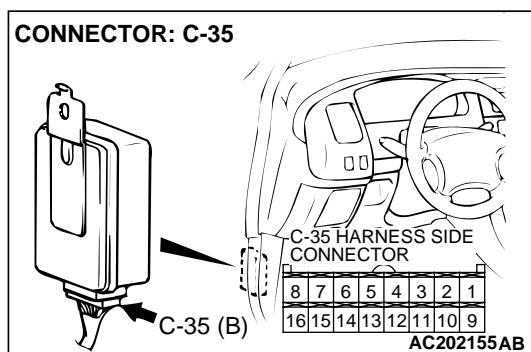
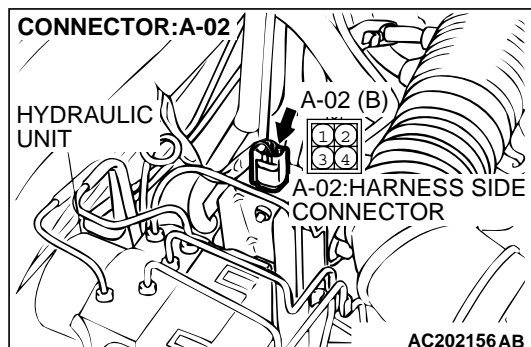
STEP 4. Check the auto-cruise vacuum pump.

- (1) Disconnect the vacuum hose from the auto-cruise vacuum pump and connect a vacuum gauge to the vacuum pump.
- (2) Disconnect the vacuum pump connector.
- (3) Check the auto-cruise vacuum pump and valves according to the following procedure:
 - Connect the positive battery terminal to auto-cruise vacuum pump connector terminal 1, and the negative battery terminal to terminals 2, 3, and 4. The vacuum gauge should read 27 kPa (8.0 in Hg) or more.
 - The vacuum should be maintained when terminal 4 is disconnected from the negative battery terminal while terminals 1, 2, and 3 remain connected. Then the vacuum gauge should read 0 kPa (0 in Hg) when terminal 2 is disconnected from the negative battery terminal while terminals 1, and 3 remain connected.
 - The vacuum should be maintained when terminal 4 is disconnected from the negative battery terminal while terminals 1, 2, and 3 remain connected. Then the vacuum gauge should read 0 kPa (0 in Hg) when terminal 3 is disconnected from the negative battery terminal while terminals 1, and 2 remain connected.

Q: Are all of the above values satisfied?

YES : Go to Step 5.

NO : Replace the auto-cruise vacuum pump. (Refer to [P.17-84.](#)) Then check that DTC 11 is not set.



STEP 5. Check the harness wire between auto-cruise control vacuum pump connector A-02 (terminal No.2, 3 and 4) and auto-cruise control-ECU connector C-35 (terminal No.7, 8 and 16).

Q: Is any harness wire between auto-cruise control vacuum pump connector A-02 (terminal No.2, 3 and 4) and auto-cruise control-ECU connector C-35 (terminal No.7, 8 and 16) good condition?

YES : Check that DTC 11 is not set. If DTC 11 is not set, 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.17-84](#)). If DTC 11 is set, replace the auto-cruise control-ECU (Refer to [P.17-84](#)), and then go to Step 6.

NO : Repair the damaged harness wire. Go to Step 6.

STEP 6. Check the diagnostic trouble codes.

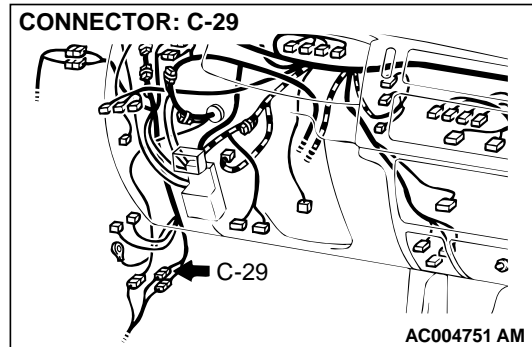
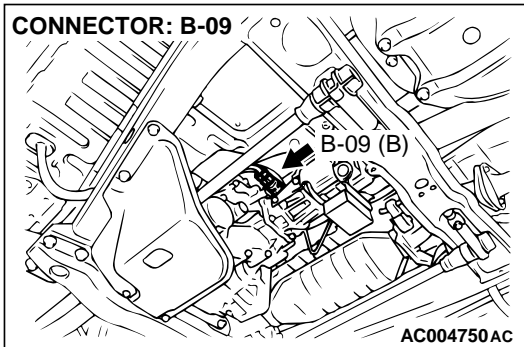
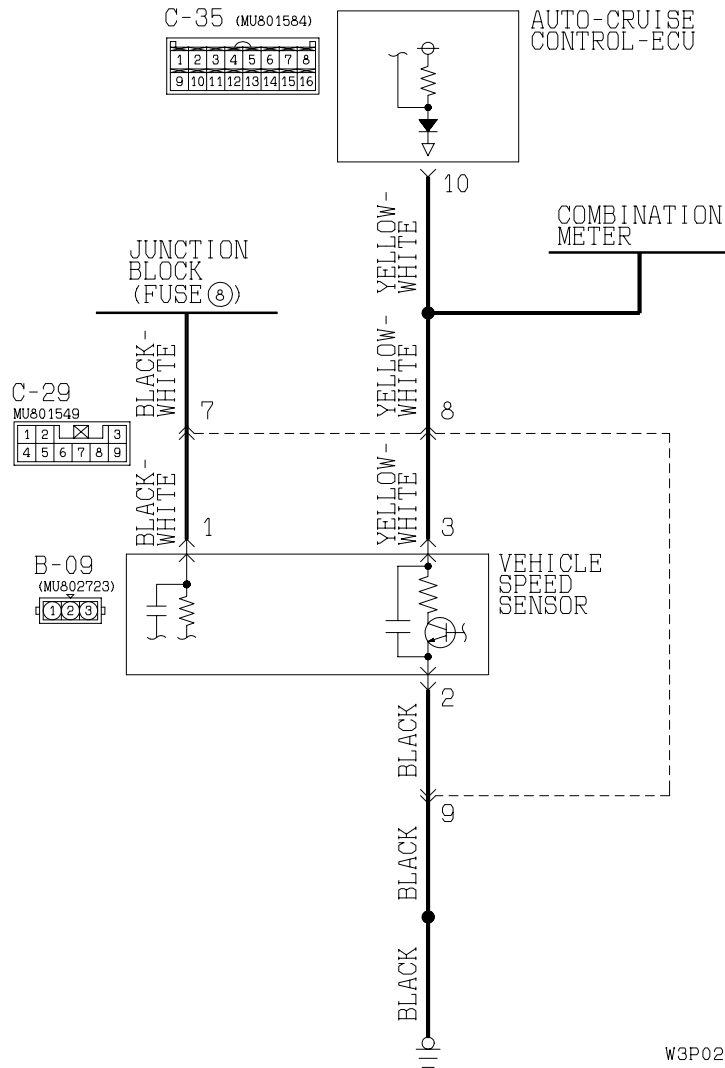
Q: Is DTC 11 set?

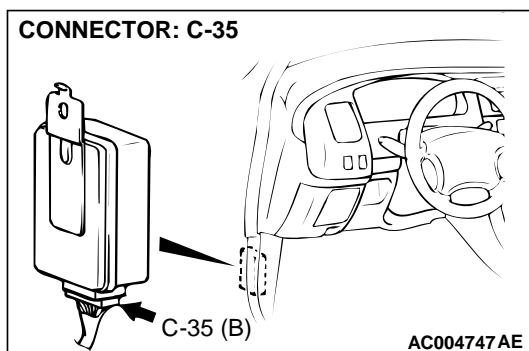
YES : Go to Step 1.

NO : This procedure is complete.

DTC 12: Vehicle Speed Sensor System

Vehicle Speed Sensor System Circuit



**CIRCUIT OPERATION**

This circuit checks the operation of the vehicle speed sensor.

When the vehicle moves forward and reverses, the sensor turns ON and OFF repeatedly.

DTC SET CONDITIONS

The vehicle speed signals from the vehicle speed sensor are not input to the auto-cruise control-ECU when the vehicle speed is 40 km/h (25 mph) or more.

TROUBLESHOOTING HINTS

The most likely causes for this code to be set are:

- Malfunction of the vehicle speed sensor.
- Damaged harness or connector.
- Malfunction of the auto-cruise control-ECU.

DIAGNOSIS**Required Special Tool:**

- MB991223: Harness Set

STEP 1. Check the speedometer.**Q: Does the speedometer work normally?**

YES : Go to Step 2.

NO : Check the speedometer circuit and repair or replace as required. (Refer to GROUP 54, Combination Meter Assembly and Vehicle Speed Sensor [P.54-69.](#))

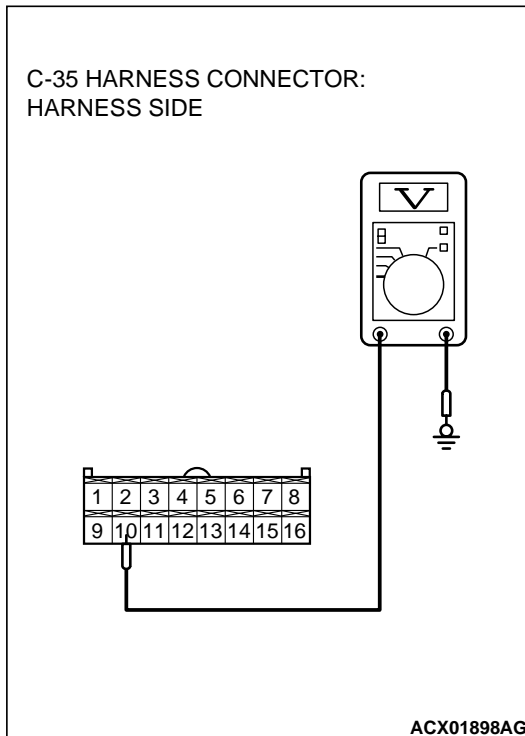
STEP 2. Measure the circuit voltage at auto-cruise control-ECU connector C-35 by backprobing.

- (1) Do not disconnect auto-cruise control-ECU connector C-35.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 10 and ground by backprobing.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the voltage approximately between 8 and 12 volts?

YES : Check that DTC 12 is not set. If DTC 12 is set, replace the auto-cruise control-ECU. (Refer to [P.17-84.](#)) Then check that DTC 12 is not set.

NO : Go to Step 3.

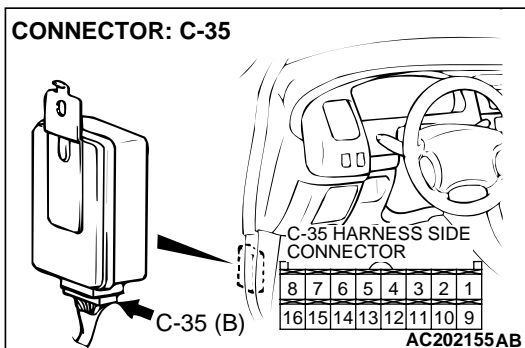


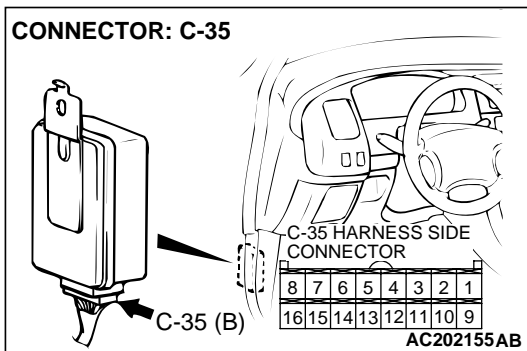
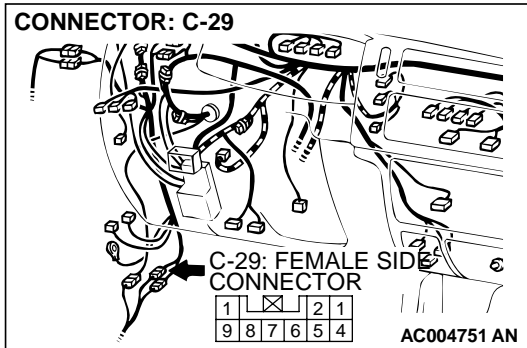
STEP 3. Check auto-cruise control-ECU connector C-35 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2.](#) Then check that DTC 12 is not set.

NO : Go to Step 4.





STEP 4. Check the harness wire between intermediate connector C-29 (terminal No. 8) and auto-cruise control-ECU connector C-35 (terminal No.10).

Q: Is the harness wire between intermediate connector C-29 (terminal No. 8) and auto-cruise control-ECU connector C-35 (terminal No.10) in good condition?

YES : Check that DTC 12 is not set. If DTC 12 is not set, 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.17-84](#)). If DTC 12 is set, replace the auto-cruise control-ECU (Refer to [P.17-84](#)), and then go to Step 5.

NO : Repair the damaged harness wire. Go to Step 5.

STEP 5. Check the diagnostic trouble codes.

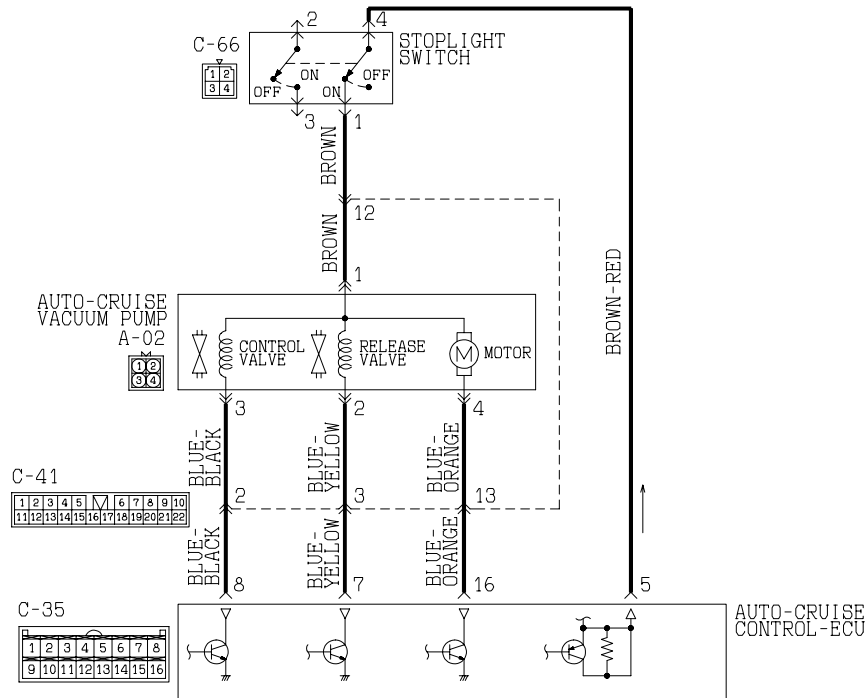
Q: Is DTC 12 set?

YES : Go to Step 1.

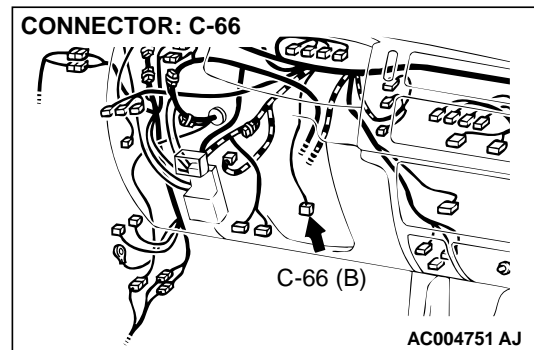
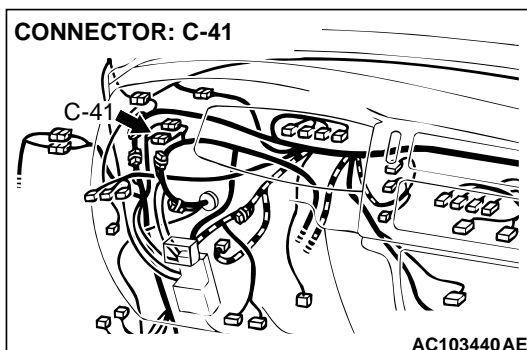
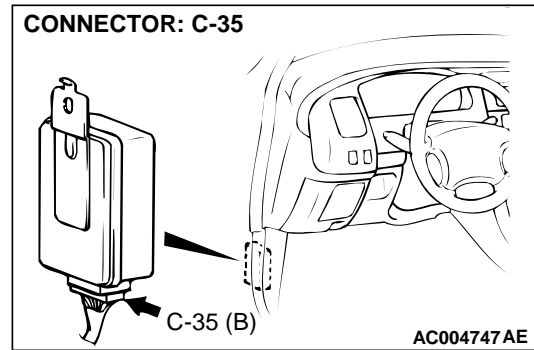
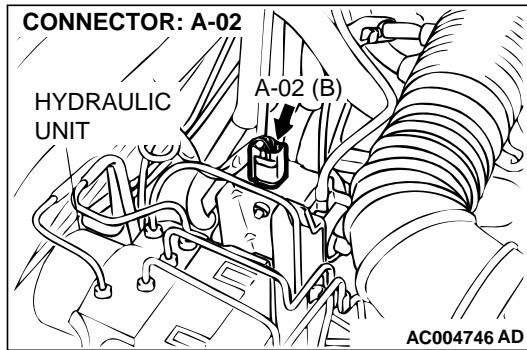
NO : This procedure is complete.

DTC14 : Stoplight Switch System

Stoplight Switch System Circuit



9P15M06AA
AC103739AB



CIRCUIT OPERATION

This circuit supplies the power to the vacuum pump. The battery positive voltage is supplied to the auto-cruise control vacuum pump by turning on the transistor at terminal number 16 of the auto-cruise control-ECU.

The conditions for turning on the transistor at terminal number 16 of the auto-cruise control-ECU are as follows.

- Ignition switch "ON"
- Auto-cruise control main switch "ON"
- Stoplight switch ON

DTC SET CONDITIONS

None of the drive signals from release valve, control valve and motor of the auto-cruise vacuum pump are input to the auto-cruise control-ECU.

TROUBLESHOOTING HINTS

The most likely causes for this code to be set are:

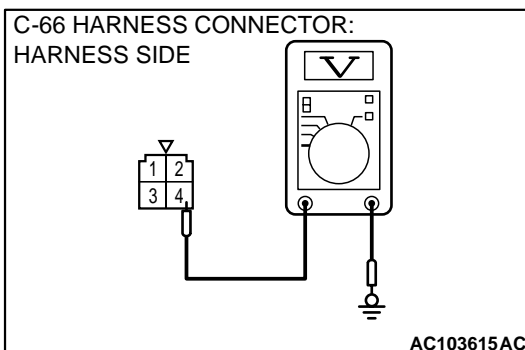
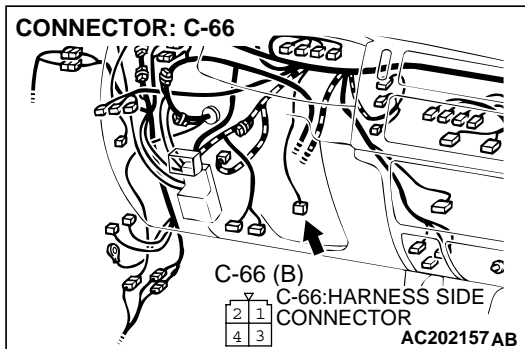
- Malfunction of the stoplight switch
- Malfunction of the auto-cruise vacuum pump
- Damaged harness or connector.
- Malfunction of the auto-cruise control-ECU

DIAGNOSIS**Required Special Tool:**

- MB991223: Harness Set

STEP 1. Measure the output circuit voltage at stoplight switch connector C-66 by backprobing.

- (1) Do not disconnect stoplight switch connector C-66.
- (2) Turn the ignition switch to the "ON" position.

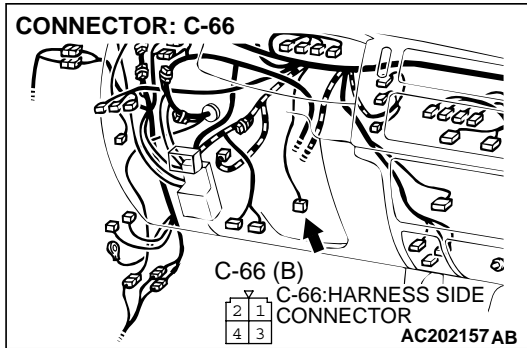


- (3) Measure the voltage between terminal 4 and ground by backprobing.
 - The measured voltage should measure battery positive voltage. (When brake pedal is depressed).
 - The measured voltage should measure 0 V. (When brake pedal is not depressed).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are all of the measured voltage satisfied?

YES : Go to Step 3.

NO : Go to Step 2.

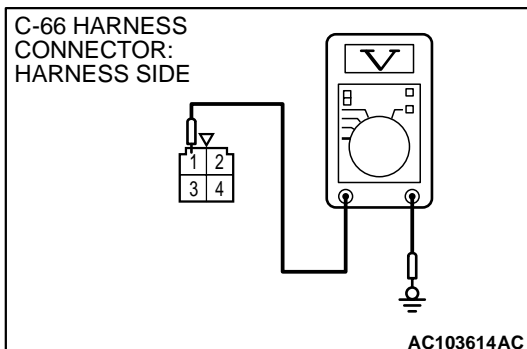


STEP 2. Check stoplight switch connector C-66 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that DTC 14 is not set.

NO : Go to Step 13.



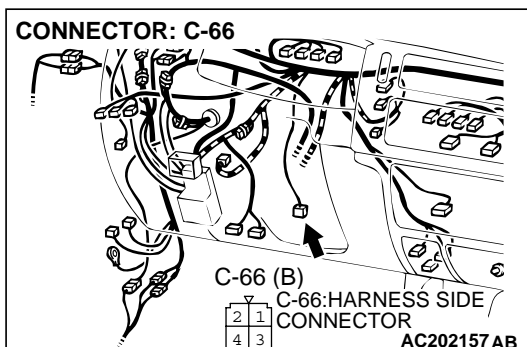
STEP 3. Measure the output circuit voltage at stoplight switch connector C-66 by backprobing.

- (1) Do not disconnect stoplight switch connector C-66.
- (2) Turn the ignition switch to the "ON" position and the auto-cruise control main switch to the "ON" position.
- (3) Measure the voltage between terminal 1 and ground by backprobing.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage approximately battery positive voltage?

YES : Go to Step 6.

NO : Go to Step 4.

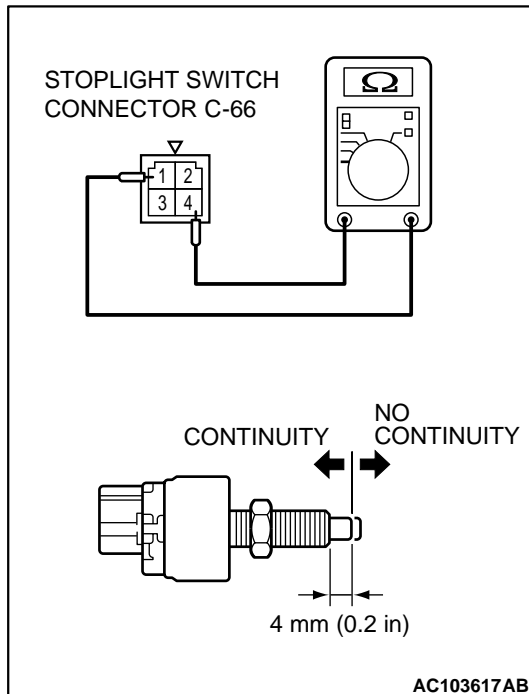


STEP 4. Check stoplight switch connector C-66 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that DTC 14 is not set.

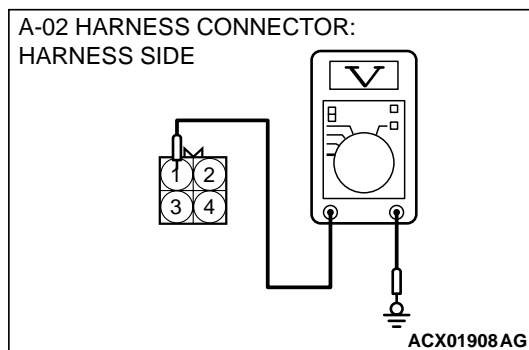
NO : Go to Step 5.

**STEP 5. Check the stoplight switch.**

- (1) Disconnect stoplight switch connector C-66.
- (2) Connect an ohmmeter to the stoplight switch between terminals 4 and 1, and check whether there is continuity when the plunger of the stoplight switch is pushed in and an open circuit when it is released.
- (3) The stoplight switch is in good condition if there is continuity when the plunger is pushed in to a depth of within 4 mm (0.2 inch) from the outer case edge surface, and if the circuit is open when it is released.

Q: Is the circuit is open?

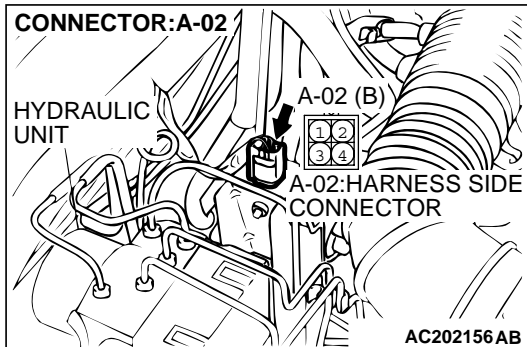
- YES :** Replace the stoplight switch. Refer to GROUP 35A, Brake Pedal [P.35A-32](#). Then check that a DTC 14 is not set.
- NO :** Check that DTC 14 is not set. If DTC 14 is set, replace the auto-cruise control-ECU. (Refer to [P.17-84](#).) Then check that DTC 14 is not set.

**STEP 6. Measure the output circuit voltage at auto-cruise control vacuum pump connector A-02 by backprobing.**

- (1) Do not disconnect auto-cruise control vacuum pump connector A-02.
- (2) Turn the ignition switch to the "ON" position and the auto-cruise control main switch to the "ON" position.
- (3) Measure the voltage between terminal 1 and ground by backprobing.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage approximately battery positive voltage?

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

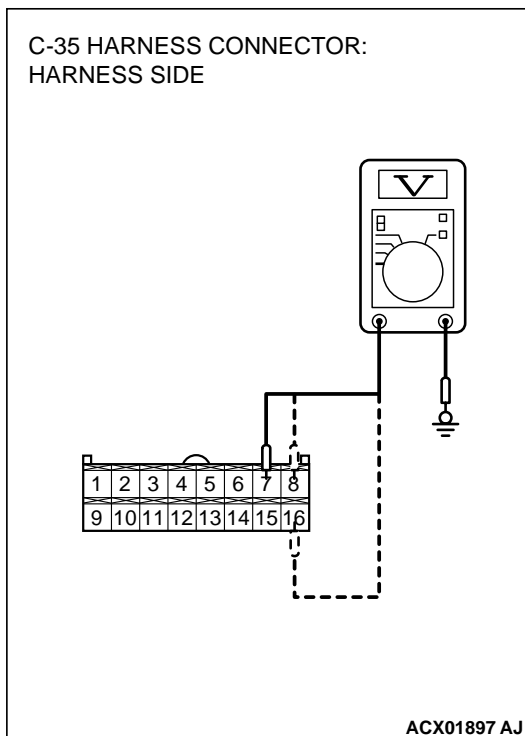


STEP 7. Check auto-cruise control vacuum pump connector A-02 and intermediate connector C-41 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is any connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that DTC 14 is not set.

NO : Check the harness wire between stoplight switch connector C-66 and auto-cruise control vacuum pump connector A-02 for open circuit or damage. Then repair if necessary. Then check that DTC 14 is not set.



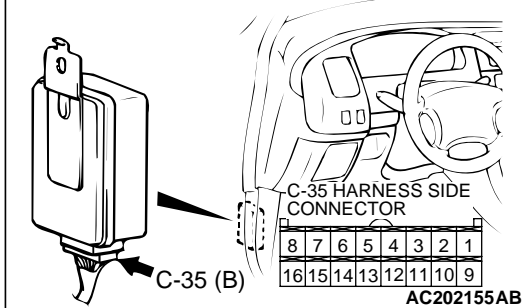
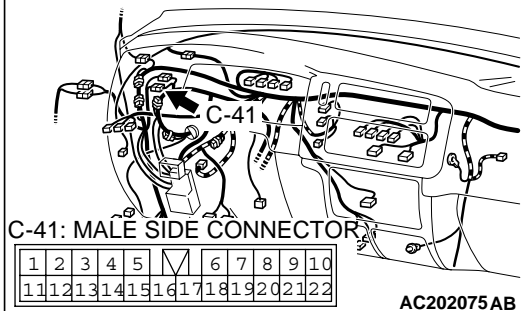
STEP 8. Measure the output circuit voltage at auto-cruise control-ECU connector C-35 by backprobing.

- (1) Do not disconnect auto-cruise control-ECU connector C-35.
- (2) Turn the ignition switch to the "ON" position and the auto-cruise control main switch to the "ON" position.
- (3) Measure the voltage between terminal 7 and ground by backprobing.
 - Voltage should measure battery positive voltage. [When decelerating with the "SET" switch while driving at constant speed (Release valve open).]
- (4) Measure the voltage between terminal 8 and ground by backprobing.
 - Voltage should measure battery positive voltage. [When decelerating with the "SET" switch while driving at constant speed. (Control valve open).]
- (5) Measure the voltage between terminal 16 and ground by backprobing.
 - Voltage should measure battery positive voltage. (When the motor is stopped during a constant road speed.)
- (6) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are all of the above values satisfied?

YES : Check that DTC 14 is not set. If DTC 14 is set, replace the auto-cruise control-ECU. (Refer to [P.17-84](#).) Then check that DTC 14 is not.

NO : Go to Step 9.

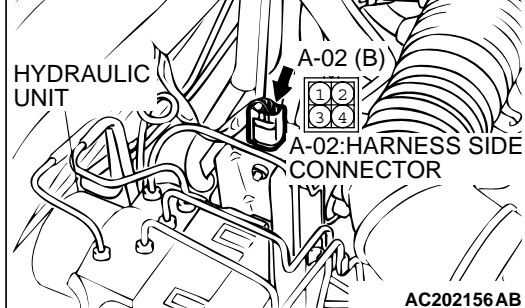
CONNECTOR: C-35**CONNECTOR: C-41**

STEP 9. Check auto-cruise control-ECU connector C-35 and intermediate connector C-41 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that DTC 14 is not set.

NO : Go to Step 10.

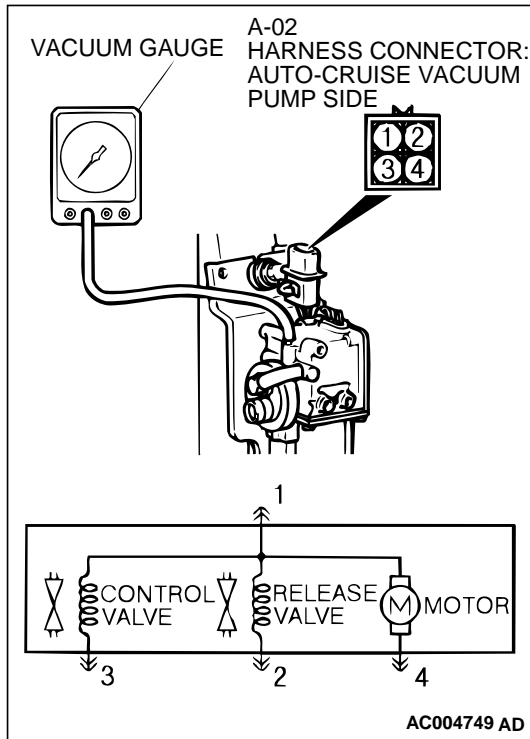
CONNECTOR: A-02

STEP 10. Check auto-cruise control vacuum pump connector A-02 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that DTC 14 is not set.

NO : Go to Step 11.



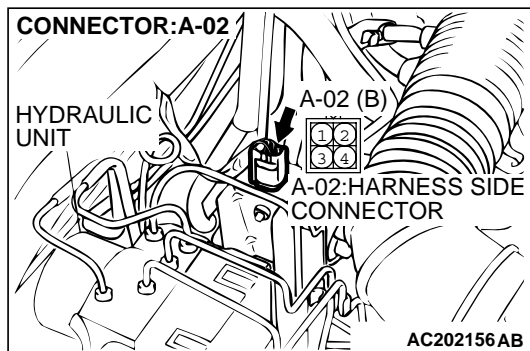
STEP 11. Check the auto-cruise vacuum pump.

- (1) Disconnect the vacuum hose from the auto-cruise vacuum pump and connect a vacuum gauge to the vacuum pump.
- (2) Disconnect the vacuum pump connector.
- (3) Check the auto-cruise vacuum pump and valves according to the following procedure:
 - Connect the positive battery terminal to auto-cruise vacuum pump connector terminal 1, and the negative battery terminal to terminals 2, 3, and 4. The vacuum gauge should read 27 kPa (8.0 in Hg) or more.
 - The vacuum should be maintained when terminal 4 is disconnected from the negative battery terminal while terminals 1, 2, and 3 remain connected. Then the vacuum gauge should read 0 kPa (0 in Hg) when terminal 2 is disconnected from the negative battery terminal while terminals 1, and 3 remain connected.
 - The vacuum should be maintained when terminal 4 is disconnected from the negative battery terminal while terminals 1, 2, and 3 remain connected. Then the vacuum gauge should read 0 kPa (0 in Hg) when terminal 3 is disconnected from the negative battery terminal while terminals 1, and 2 remain connected.

Q: Are all of the above values satisfied?

YES : Go to Step 12.

NO : Replace the auto-cruise vacuum pump. (Refer to [P.17-84.](#)) Then check that DTC 14 is not set.

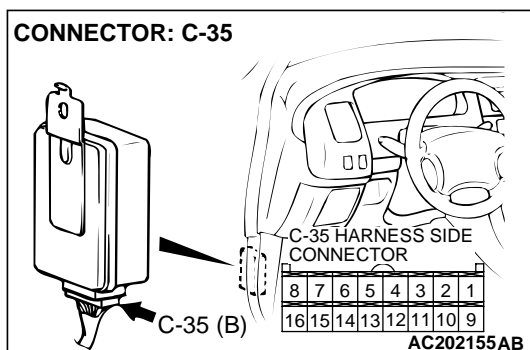


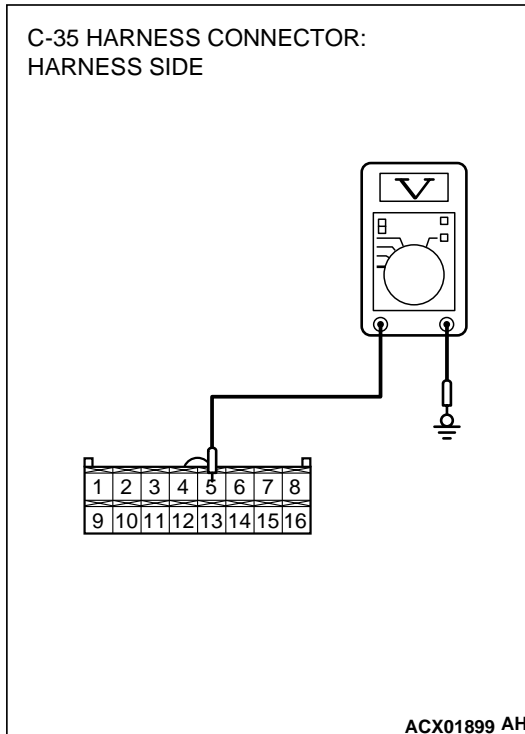
STEP 12. Check the harness wire between auto-cruise control vacuum pump connector A-02 (terminal No.2, 3 and 4) and auto-cruise control-ECU connector C-35 (terminal No.7, 8 and 16).

Q: Is any harness wire between auto-cruise control vacuum pump connector A-02 (terminal No.2, 3 and 4) and auto-cruise control-ECU connector C-35 (terminal No.7, 8 and 16) damaged?

YES : Repair or replace the harness wire, and then check that DTC 14 is not set.

NO : Check that DTC 14 is not set. If DTC 14 is set, replace the auto-cruise control-ECU. (Refer to [P.17-84.](#)) Then check that DTC 14 is not set.



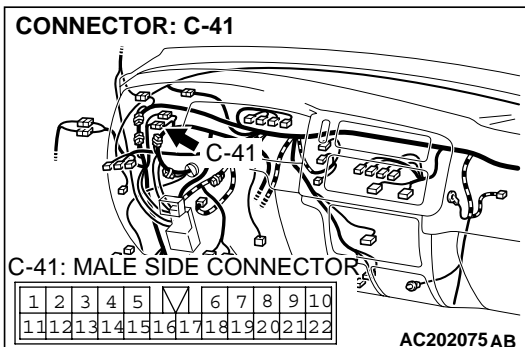
**STEP 13. Measure the output circuit voltage at auto-cruise control-ECU connector C-35 by backprobing.**

- (1) Do not disconnect auto-cruise control-ECU connector C-35.
- (2) Turn the ignition switch to the "ON" position and the auto-cruise control main switch to the "ON" position.
- (3) Measure the voltage between terminal 5 and ground by backprobing.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is measured voltage approximately battery positive voltage?

YES : Go to Step 14.

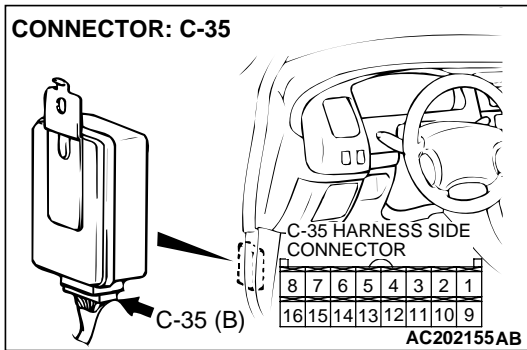
NO : Go to Step 15.

**STEP 14. Check intermediate connector C-41 for loose, corroded or damaged terminals, or terminals pushed back in the connector.**

Q: Is any connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that DTC 14 is not set.

NO : Check the harness wire between auto-cruise control-ECU connector C-35 and stoplight switch connector C-66 for open circuit or damage. Then repair if necessary. Then check that DTC 14 is not set.



STEP 15. Check auto-cruise control-ECU connector C-35 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damage connector. (Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#)). Go to Step 16.

NO : Check that DTC 14 is not set. If DTC 14 is not set, 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.17-84](#)). If DTC 14 is set, replace the auto-cruise control-ECU (Refer to [P.17-84](#)), and then go to Step 16.

STEP 16. Check the diagnostic trouble codes.

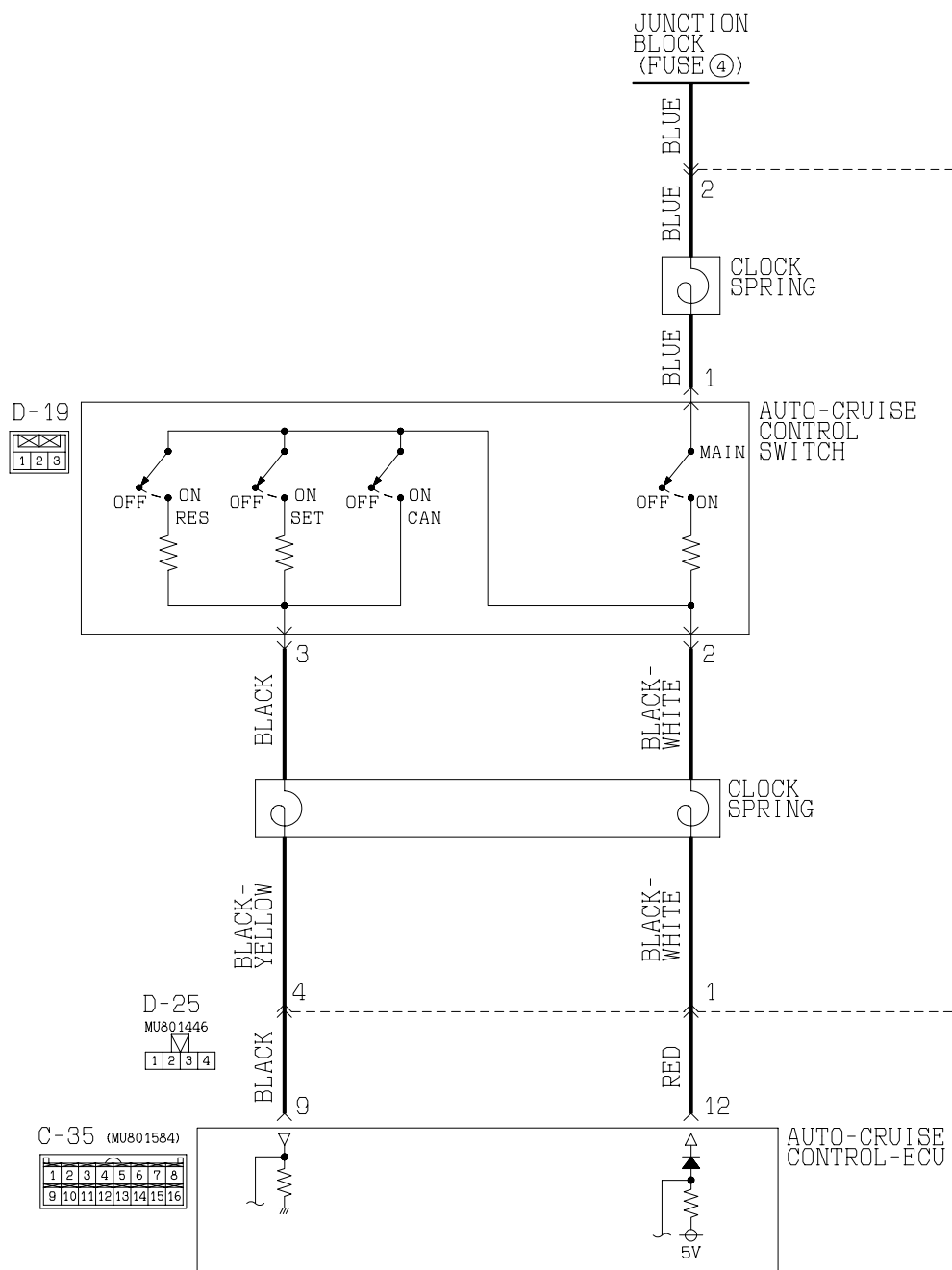
Q: Is DTC 14 set?

YES : Go to Step 1.

NO : This procedure is complete.

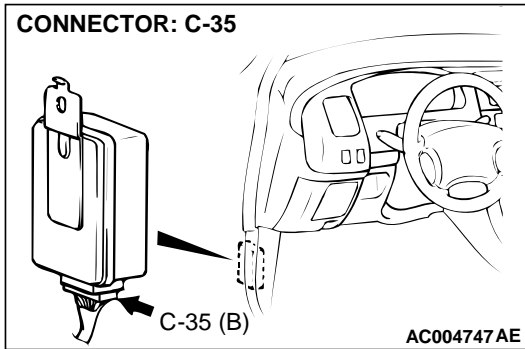
DTC15 : Auto-cruise Control Switch System

Auto-cruise Control Switch System Circuit



W3P02M02AA

CONNECTOR: C-35



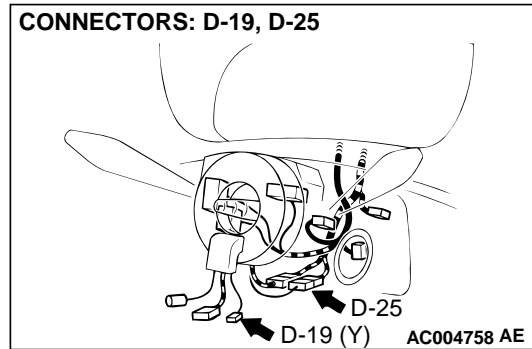
CIRCUIT OPERATION

This circuit judges the signals of each switch ("OFF," "SET," "RESUME," "CANCEL" and "MAIN") of the auto-cruise control switch.

The auto-cruise control-ECU detects the state of the auto-cruise control switch by sensing the voltages shown below.

- When all switches are OFF, the ECU detects 3.5 – 5.0 volts.
- When the "SET" switch is ON, the ECU detects 0.4 – 2.3 volts.
- When the "RESUME" switch is ON, the ECU detects 2.3 – 3.5 volts.
- When the "CANCEL" switch is ON, the ECU detects 0.4 volts or less.

CONNECTORS: D-19, D-25



- When the main switch is ON, the ECU detects 7.0 volts.

DTC SET CONDITIONS

This code is set when the auto-cruise control switch "RESUME" switch, "SET" switch or "CANCEL" switch stays ON.

TROUBLESHOOTING HINTS

The most likely causes for this code to be set are:

- Malfunction of the auto-cruise control switch
- Malfunction of the clock spring
- Damaged harness or connector
- Malfunction of the auto-cruise control-ECU

DIAGNOSIS**Required Special Tool:**

- MB991223: Harness Set

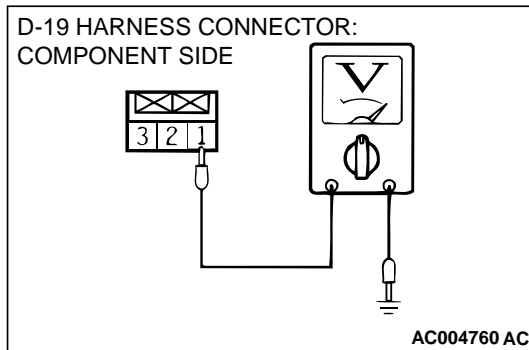
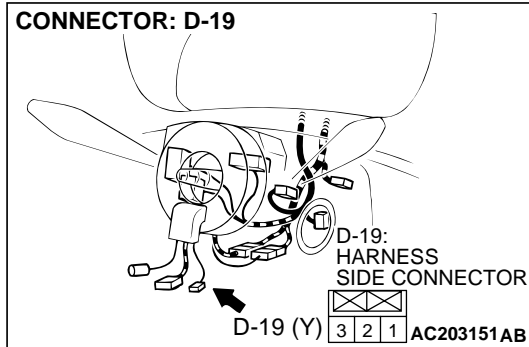
STEP 1. Measure the 12-Volt supply circuit voltage at auto-cruise control switch connector D-19.

- (1) Disconnect auto-cruise control switch connector D-19 and measure at the harness side.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 1 and ground.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage approximately battery positive voltage?

YES : Go to Step 5.

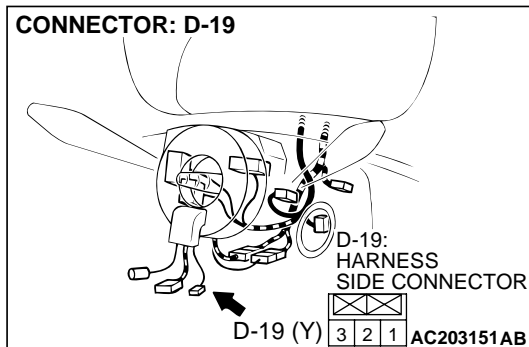
NO : Go to Step 2.

**STEP 2. Check auto-cruise control switch connector D-19 for loose, corroded or damaged terminals, or terminals pushed back in the connector.**

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that DTC 15 is not set.

NO : Go to Step 3.

**STEP 3. Check the clock spring.**

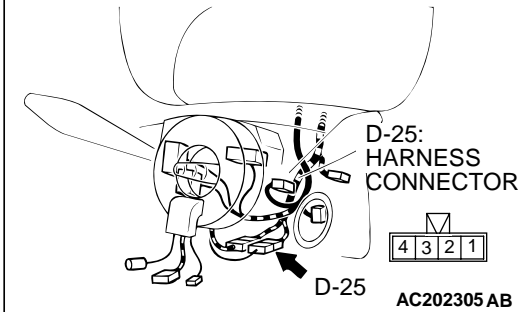
Refer to GROUP 52B, Air Bag Modules and Clock Spring [P.52B-72](#).

Q: Is the clock spring damaged?

YES : Replace the clock spring. Refer to GROUP 52B, Air Bag Modules and Clock Spring [P.52B-72](#). Then check that DTC 15 is not set.

NO : Go to Step 4.

CONNECTOR: D-25

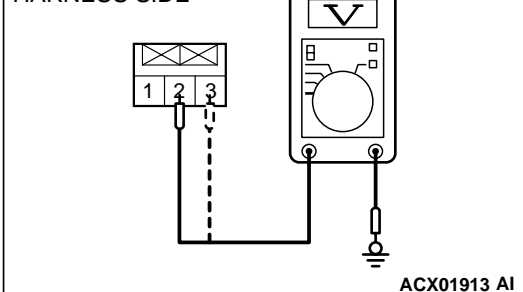


STEP 4. Check clock spring connector D-25 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is any connector damaged?

- YES :** Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that DTC 15 is not set.
- NO :** Check the harness wire between multi-purpose fuse No.4 and auto-cruise control switch connector D-19 for open circuit or damage. Then repair if necessary. Then check that DTC 15 is not set.

D-19 HARNESS CONNECTOR:
HARNESS SIDE

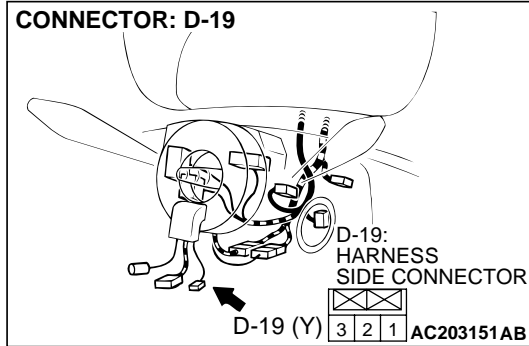


STEP 5. Measure the output circuit voltage at auto-cruise control switch connector D-19 by backprobing.

- (1) Do not disconnect auto-cruise control switch connector D-19.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 2 and ground by backprobing.
 - Voltage should be battery positive voltage. (MAIN switch is at the "ON" position.)
- (4) Measure the voltage between terminal 3 and ground by backprobing.
 - Voltage should measure between 6.8 and 7.2 volts. (MAIN switch is at the "ON" position.)
 - Voltage should measure between 3.5 and 5.0 volts. (All switches are at the "OFF" position.)
 - Voltage should measure between 0.4 and 2.3 volts. ("SET" switch is at the "ON" position)
 - Voltage should measure between 2.3 and 3.5 volts. ("RESUME" switch is at the "ON" position.)
 - Voltage should measure 1 volt or less. ("CANCEL" switch is at the "ON" position.)
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are all of the measured voltage satisfied?

- YES :** Go to Step 8.
- NO :** Go to Step 6.

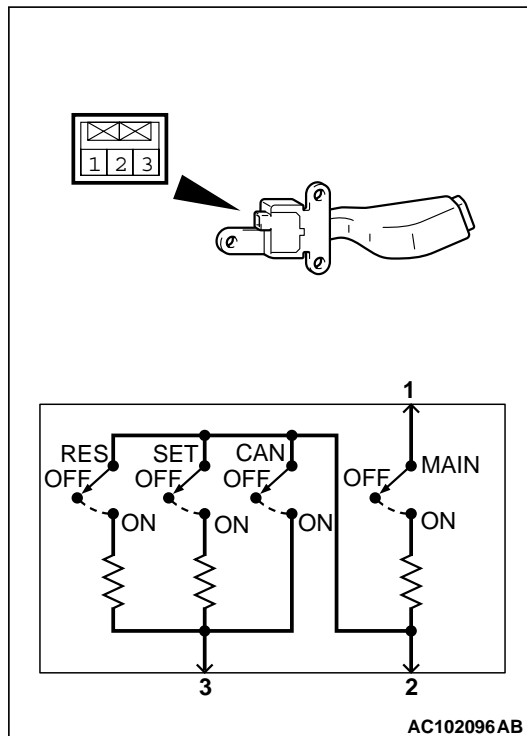


STEP 6. Check auto-cruise control switch connector D-19 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that DTC 15 is not set.

NO : Go to Step 7.



STEP 7. Check the auto-cruise control switch.

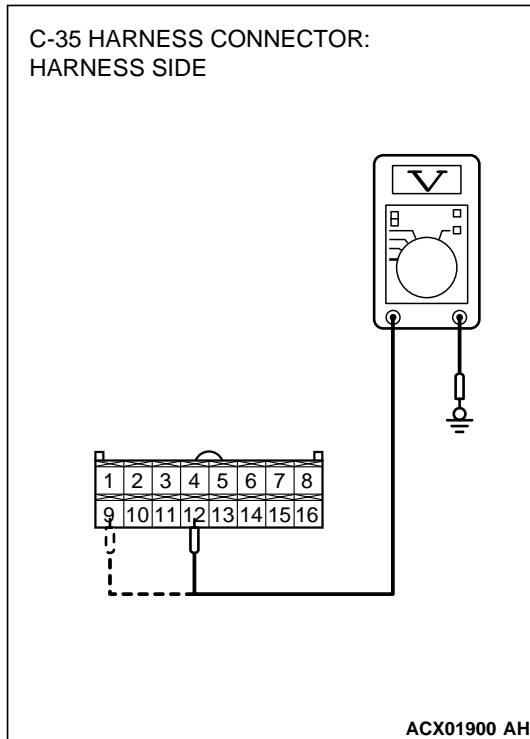
- (1) Disconnect auto-cruise control switch.
- (2) Measure the resistance between the terminals when each of the "SET," "RESUME," "CANCEL" and "MAIN" switch is pressed.

SWITCH POSITION	RESISTANCE BETWEEN TERMINALS	
MAIN switch "OFF"	Terminal 1 and 2	Less than 2 ohms
MAIN switch "ON"	Terminal 1 and 2	Approximately 3.9 kΩ
"CANCEL" switch "ON"	Terminal 2 and 3	Approximately 0 Ω
"RESUME" switch "ON"	Terminal 2 and 3	Approximately 910 Ω
"SET" switch "ON"	Terminal 2 and 3	Approximately 220 Ω

Q: Is the values measured correspond to those in the table below?

YES : Check that DTC 15 is not set. If DTC 15 is set, replace the auto-cruise control-ECU. (Refer to [P.17-84.](#)) Then check that DTC 15 is not set.

NO : Replace the auto-cruise control switch. (Refer to [P.17-84.](#)) Then check that DTC 15 is not set.



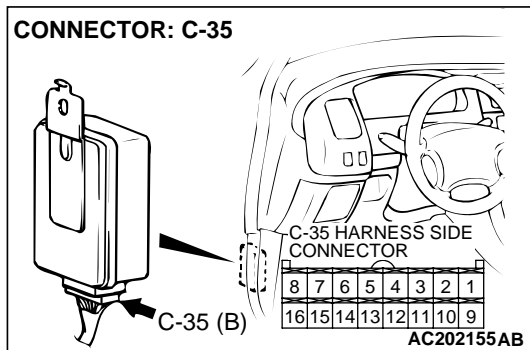
STEP 8. Measure the output circuit voltage at auto-cruise control-ECU connector C-35 by backprobing.

- (1) Do not disconnect auto-cruise control-ECU connector C-35.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 12 and ground by backprobing.
 - Voltage should be battery positive voltage.
(The MAIN switch is at the "ON" position.)
- (4) Measure the voltage between terminal 9 and ground by backprobing.
 - Voltage should measure between 6.8 and 7.2 volts.
(MAIN switch is at the "ON" position.)
 - Voltage should measure between 3.5 and 5.0 volts.
(All switches are at the "OFF" position.)
 - Voltage should measure between 0.4 and 2.3 volts.
("SET" switch is at the "ON" position.)
 - Voltage should measure between 2.3 and 3.5 volts.
("RESUME" switch is at the "ON" position.)
 - Voltage should measure 1 volt or less.
("CANCEL" switch is at the "ON" position.)
- (5) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the voltage within specifications?

YES : Check that DTC 15 is not set. If DTC 15 is set, replace the auto-cruise control-ECU. (Refer to [P.17-84.](#)) Then check that DTC 15 is not set.

NO : Go to Step 9.



STEP 9. Check auto-cruise control-ECU connector C-35 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2.](#) Then check that DTC 15 is not set.

NO : Go to Step 10.

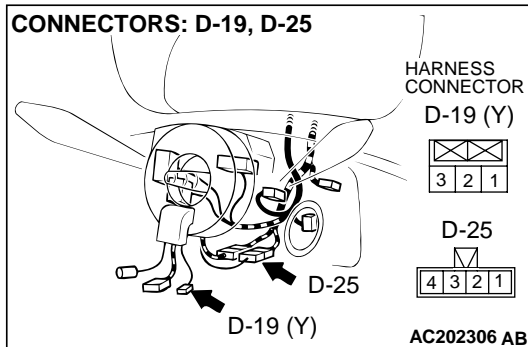
STEP 10. Check the clock spring.

Refer to GROUP 52B, Air Bag Modules and Clock Spring [P.52B-72.](#)

Q: Is the clock spring damaged?

YES : Replace the clock spring. Refer to GROUP 52B, Air Bag Modules and Clock Spring [P.52B-72.](#) Then check that DTC 15 is not set.

NO : Go to Step 11.

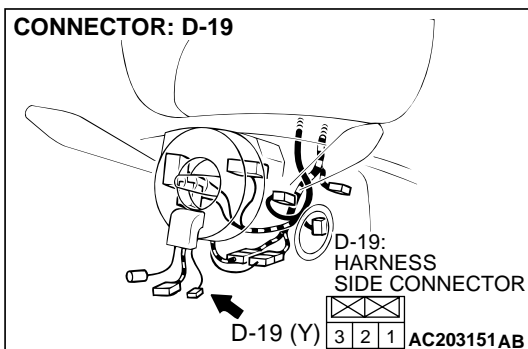


STEP 11. Check auto-cruise control switch connector D-19, clock spring connector D-25 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is any connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that DTC 15 is not set.

NO : Go to Step 12.

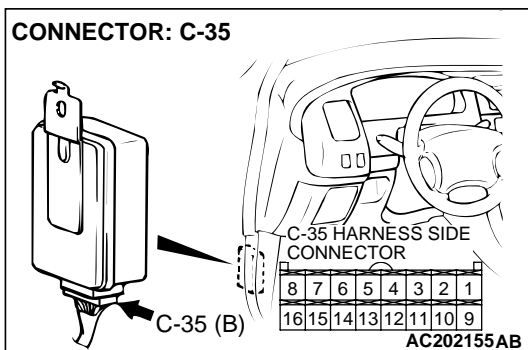


STEP 12. Check the harness wire between auto-cruise control switch connector D-19 (terminal No.2 and 3) and auto-cruise control-ECU connector C-35 (terminal No.9 and 12).

Q: Is any harness wire between auto-cruise control switch connector D-19 (terminal No.2 and 3) and auto-cruise control-ECU connector C-35 (terminal No.9 and 12) damaged?

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.17-84](#)). Go to Step 13.

NO : Repair the damaged harness wire. Go to Step 13.



STEP 13. Check the diagnostic trouble codes.

Q: Is DTC 15 set?

YES : Go to Step 1.

NO : This procedure is complete.

DTC 16: Auto-cruise Control-ECU

DTC SET CONDITIONS

This code is output when a problem is found on the cancel status hold circuit or microcomputer operation monitor circuit, which is incorporated in the auto-cruise control-ECU.

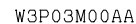
TROUBLESHOOTING HINTS

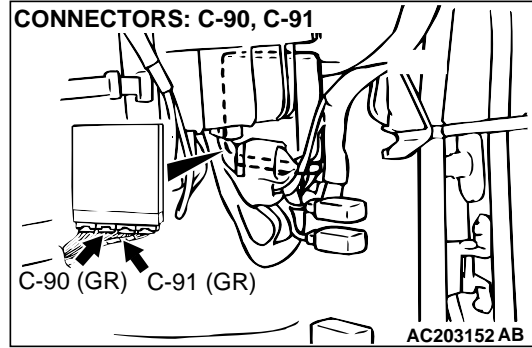
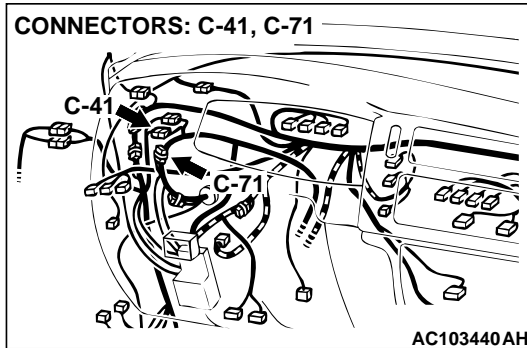
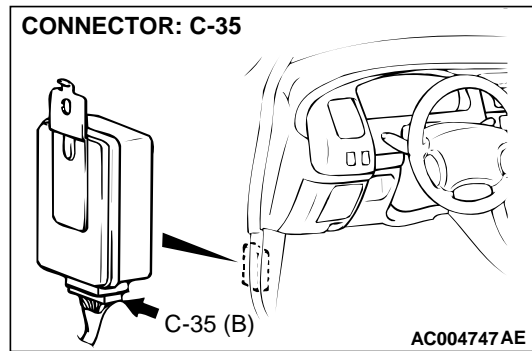
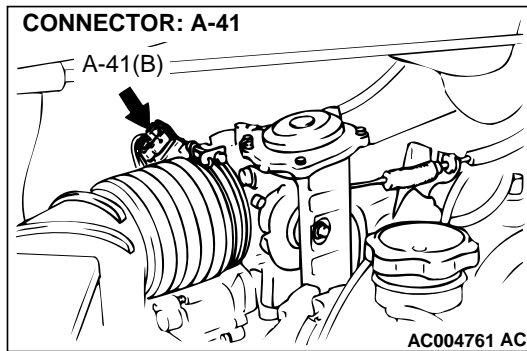
Malfunction of the auto-cruise control-ECU.

DIAGNOSIS

Replace the auto-cruise control-ECU. (Refer to [P.17-84.](#))
DTC 16 is not set.

Throttle Position Sensor, Idle Position Signal System Circuit





CIRCUIT OPERATION

The throttle position sensor signal and idle position signal are sent to the auto-cruise control-ECU through this circuit.

The throttle position sensor sends a voltage signal to terminal 1 of the auto-cruise control-ECU. The voltage depends on throttle opening angle.

The auto-cruise control-ECU receives an idle position signal from the PCM at terminal 2. The signal is OFF when the accelerator pedal is depressed, and ON when the accelerator pedal is released.

DTC SET CONDITIONS

- The Idle position signal is ON and the throttle position sensor voltage is 2.5 volts or more for four seconds or more.
- The Idle position signal is OFF and the throttle position sensor voltage is 0.2 volts or less for four seconds or more.

TROUBLESHOOTING HINTS

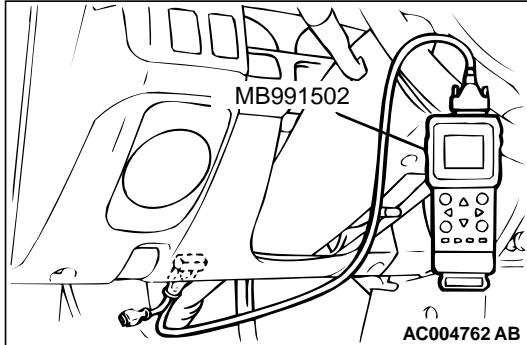
The most likely causes for this code to be set are:

- Malfunction of the throttle position sensor
- Damaged harness or connector
- Malfunction of the auto-cruise control-ECU
- Malfunction of the PCM

DIAGNOSIS

Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991223: Harness Set

**STEP 1. Check the throttle position sensor.****⚠ CAUTION**

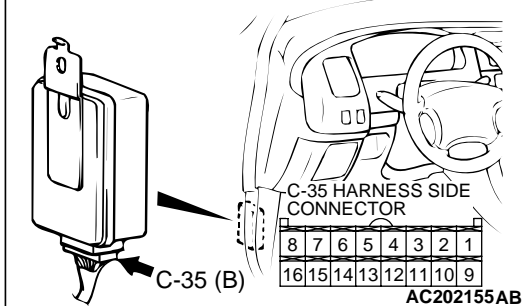
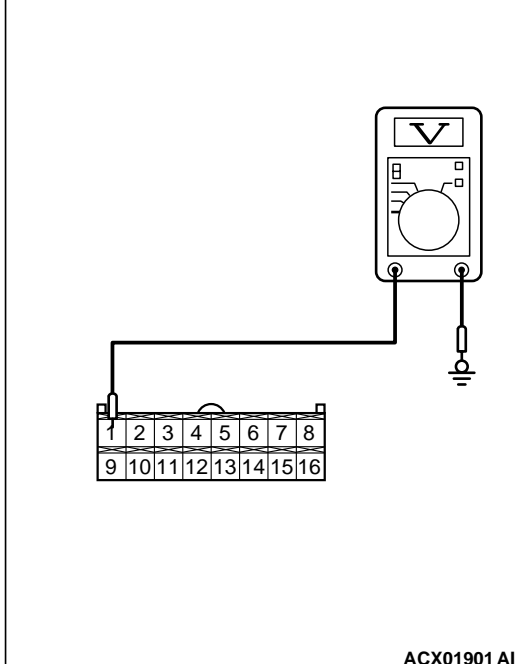
To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

- (1) Connect scan tool MB991502 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.
- (3) Read the MFI-DTC.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are the MFI-DTC P0121, P122 or P123 set?

YES : Refer to GROUP 13A, Diagnosis – Diagnostic Trouble Code Chart [P.13Ab-21](#).

NO : Go to Step 2.

CONNECTOR: C-35**C-35 HARNESS CONNECTOR:
HARNESS SIDE****STEP 2. Measure the output circuit voltage at auto-cruise control-ECU connector C-35 by backprobing.**

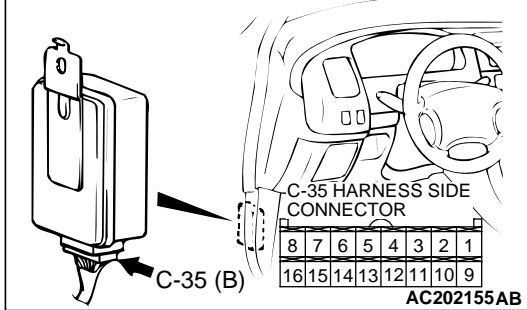
- (1) Do not disconnect auto-cruise control-ECU connector C-35.
- (2) Turn the ignition switch to the "ON" position and the auto-cruise control main switch to the "ON" position.
- (3) Measure the voltage between terminal 1 and ground by backprobing.
 - Voltage should measure between 4.0 and 5.5 volts. (When accelerator pedal is fully depressed.)
 - Voltage should measure between 0.4 and 1.0 volts. (When accelerator pedal is released.)
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are all of the measured voltage satisfied?

YES : Go to Step 5.

NO : Go to Step 3.

CONNECTOR: C-35



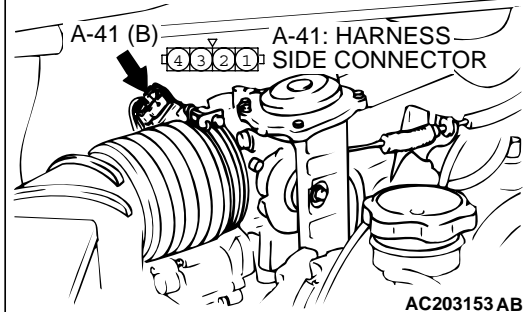
STEP 3. Check auto-cruise control-ECU connector C-35 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.17-84](#). Then check that DTC 17 is not set.

NO : Go to Step 4.

CONNECTOR: A-41



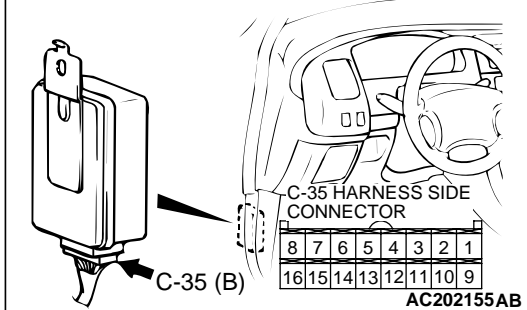
STEP 4. Check the harness wire between throttle position sensor connector A-41 (terminal No.3) and auto-cruise control-ECU connector C-35 (terminal No.1).

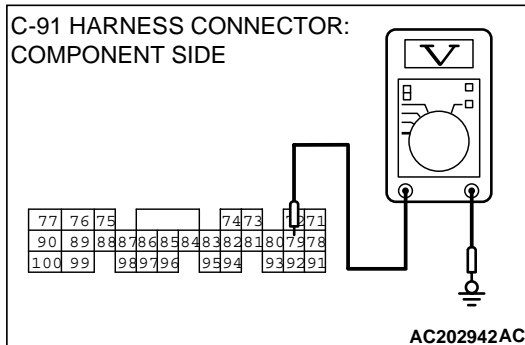
Q: Is the harness wire between throttle position sensor connector A-41 and auto-cruise control-ECU connector C-35 damaged?

YES : Repair or replace the harness wire then check that DTC 17 is not set.

NO : Check that DTC 17 is not set. If DTC 17 is set, replace the auto-cruise control-ECU. (Refer to [P.00E-2](#).) Then check that DTC 17 is not set.

CONNECTOR: C-35



C-91 HARNESS CONNECTOR:
COMPONENT SIDE**STEP 5. Measure the output circuit voltage at PCM connector C-91 (terminal No.79).**

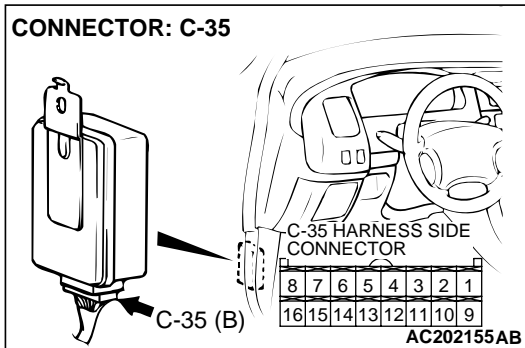
- (1) Disconnect PCM connector C-91.
- (2) Turn the ignition switch to the "ON" position and the auto-cruise control main switch to the "ON" position.
- (3) Measure the voltage between terminal 79 and ground.
 - Voltage should measure between 4.0 and 5.5 volts.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are the voltage within specifications?**YES :** Replace the PCM. Then check that DTC 17 is not set.**NO :** Go to Step 6.**STEP 6. Check PCM connector C-91 and auto-cruise control-ECU connector C-35 for damage for loose, corroded or damaged terminals, or terminals pushed back in the connector.**

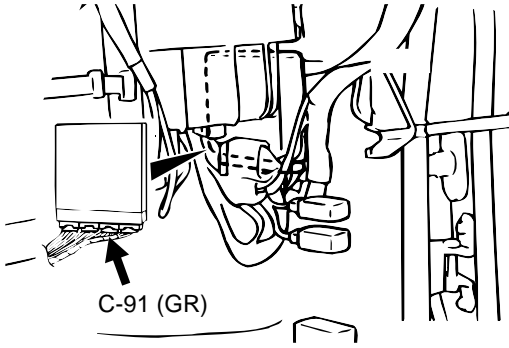
NOTE: If intermediate connector C-41, joint connector (4) C-71 are damaged, repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.17-84. Then check that a DTC is not set.

Q: Are the connectors damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then check that DTC 17 is not set.

NO : Go to Step 7.**CONNECTOR: C-35**

CONNECTOR: C-91

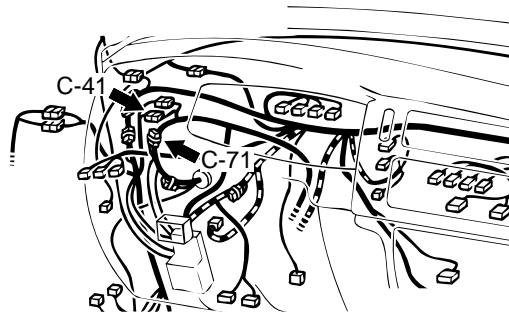


C-91: HARNESS CONNECTOR

71	72	73	74				75	76	77		
78	79	80	81	82	83	84	85	86	87	88	89
90	91	92	93		94	95	96			97	98

AC202188AB

CONNECTORS: C-41, C-71



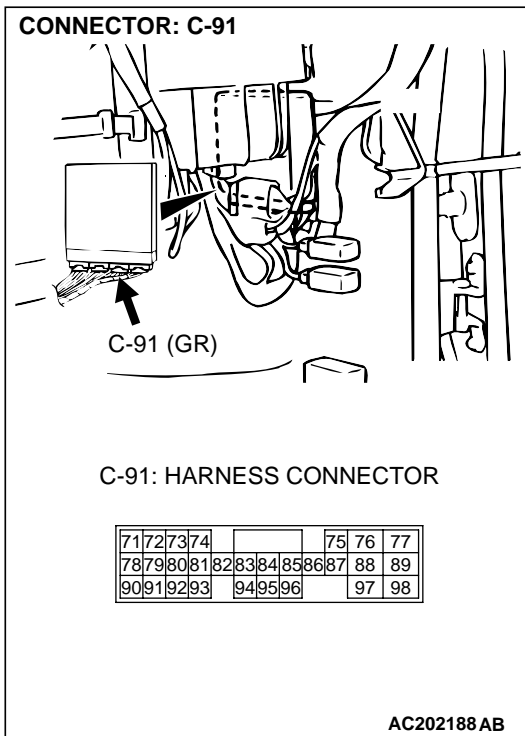
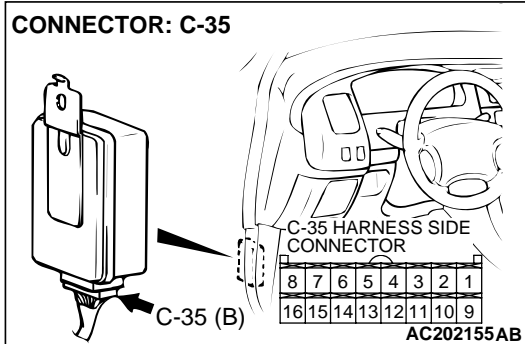
C-41: HARNESS CONNECTOR

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

C-71: HARNESS CONNECTOR

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

AC202162AB



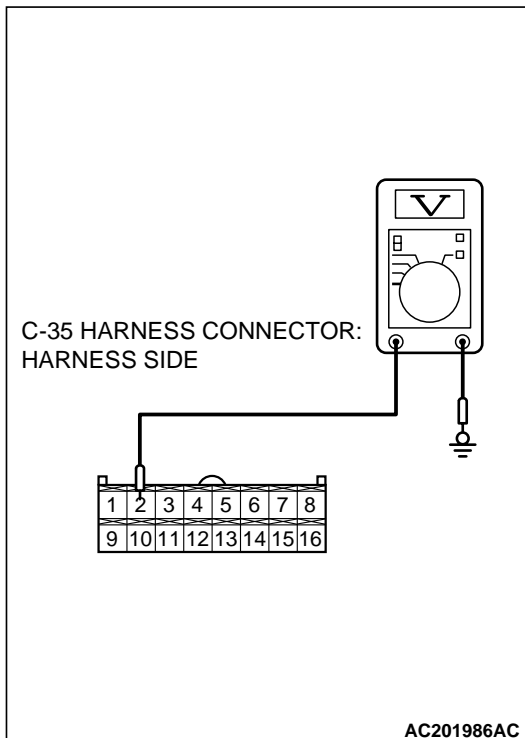
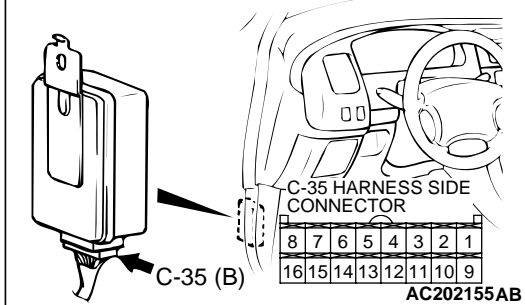
STEP 7. Check the harness wire between PCM connector C-91 (terminal No.79) and auto-cruise control-ECU connector C-35 (terminal No.2) for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the harness wire between PCM connector C-91 (terminal No.79) and auto-cruise control-ECU connector C-35 (terminal No.2) damaged?

YES : Check that DTC 17 is not set. If DTC 17 is not set, 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](#)). If DTC 17 is set, replace the auto-cruise control-ECU (Refer to [P.17-84](#)), and then go to Step 9.

NO : Replace the auto-cruise control-ECU (Refer to [P.17-84](#)). Go to Step 8.

CONNECTOR: C-35



STEP 8. Measure the output circuit voltage at auto-cruise control-ECU connector C-35 by backprobing.

- (1) Do not disconnect auto-cruise control-ECU connector C-35.
- (2) Turn the ignition switch to the "ON" position and the auto-cruise control main switch to the "ON" position.

- (3) Measure the voltage between terminal 2 and ground by backprobing.

- Voltage should measure between 4.0 and 5.5 volts. (When accelerator pedal is depressed.)
- Voltage should measure between 2.5 volts or less. (When accelerator pedal is released.)

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

Q: Are the voltage within specifications?

YES : Check that DTC 17 is not set. If DTC 17 is set, replace the auto-cruise control-ECU. (Refer to [P.17-84](#).) Then check that DTC 17 is not set.

NO : Replace the auto-cruise control-ECU (Refer to [P.17-84](#)). Go to Step 9.

STEP 9. Check the diagnostic trouble codes.

Q: Is DTC 17 set?

YES : Go to Step 1.

NO : This procedure is complete.

SYMPTOM CHART

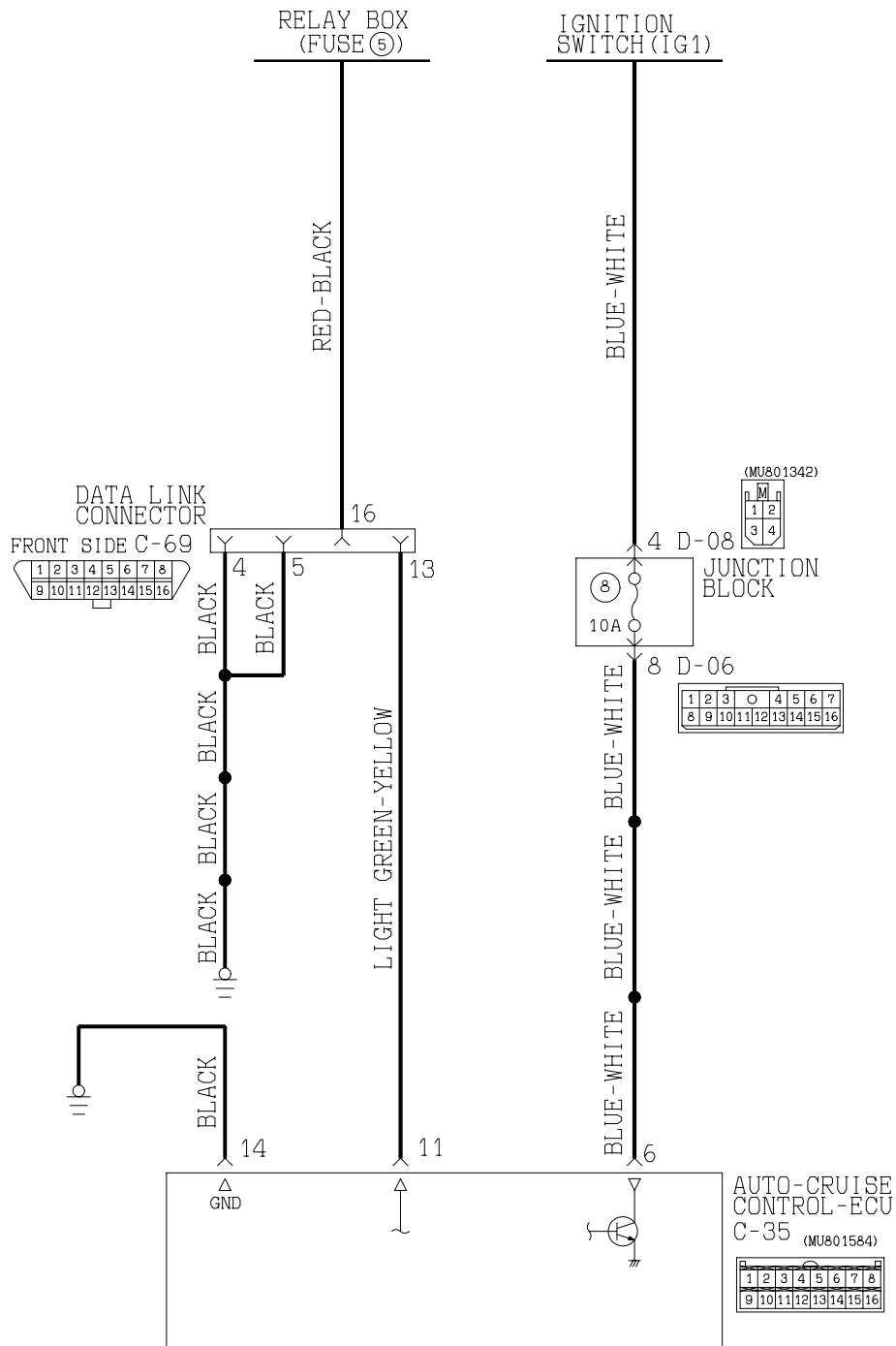
M1172002300269

SYMPTOM		INSPECTION PROCEDURE NO.	REFERENCE PAGE
Communication with scan tool MB991502 is not possible	Communication with all systems is not possible	-	P.13Ad-2
	Communication with auto-cruise control-ECU only is not possible	1	P.17-47
Auto-cruise control is not cancelled.	When brake pedal is depressed	2	P.17-55
	When selector lever is moved to "N" range	3	P.17-62
	When "CANCEL" switch is turned ON	4	P.17-68
Auto-cruise control cannot be set.		5	P.17-68
Hunting (repeated acceleration and deceleration) occurs at the set vehicle speed.		6	P.17-70
Auto-cruise control indicator light inside combination meter does not illuminate. (However, auto-cruise control is normal.)		7	P.17-72

SYMPTOM PROCEDURES

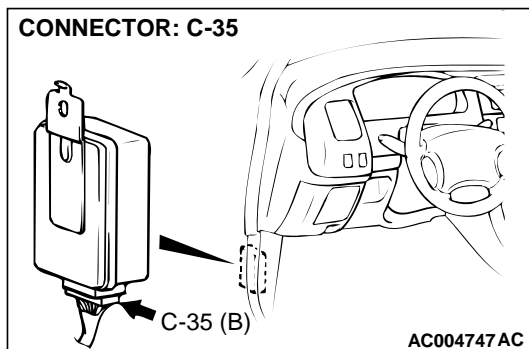
**INSPECTION PROCEDURE 1: Communication with Scan Tool MB991502 is not Possible
(Communication with the Auto-cruise Control-ECU Only is not Possible.)**

Auto-cruise Control-ECU Power Supply. Ground and Data Link Circuit



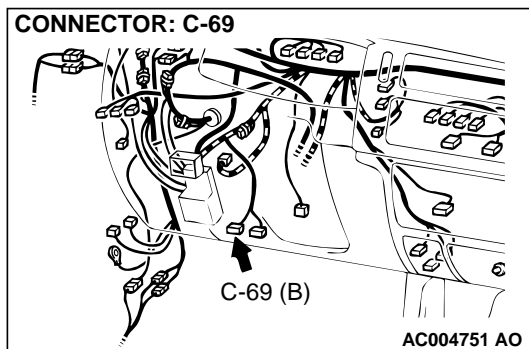
W3P02M03AA

CONNECTOR: C-35



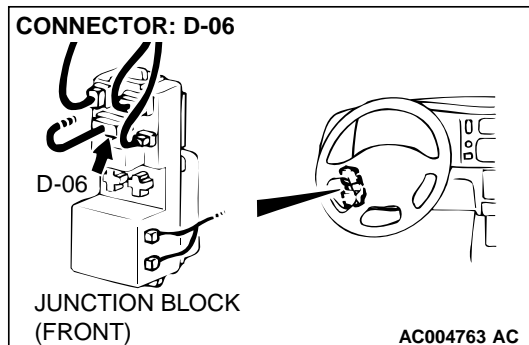
AC004747 AC

CONNECTOR: C-69



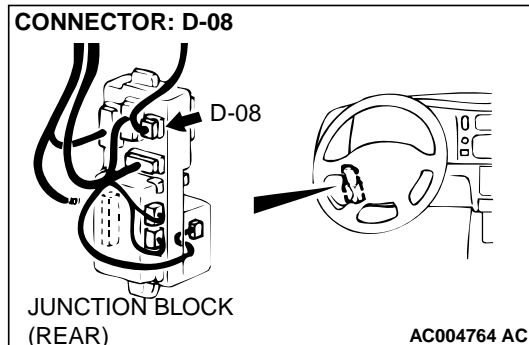
AC004751 AO

CONNECTOR: D-06



AC004763 AC

CONNECTOR: D-08



AC004764 AC

CIRCUIT OPERATION

Power of the auto-cruise control-ECU is transmitted from the ignition switch (IG1) to the auto-cruise control-ECU through fuse 8 in the junction block.

TECHNICAL DESCRIPTION (COMMENT)

The cause is probably a malfunction of the auto-cruise control-ECU power supply circuit or the auto-cruise control-ECU ground circuit.

TROUBLESHOOTING HINTS

- Damaged harness or connector
- Malfunction of the auto-cruise control-ECU

DIAGNOSIS

Required Special Tool:

- MB991223: Harness Set

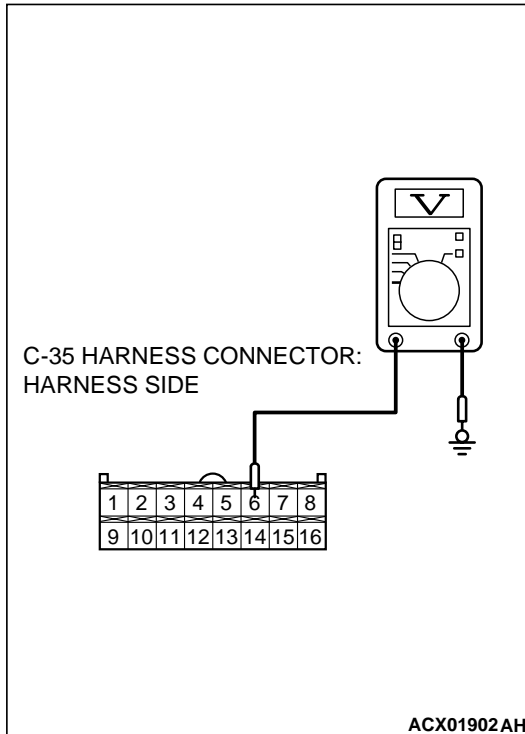
STEP 1. Measure the output circuit voltage at auto-cruise control-ECU connector C-35 by backprobing.

- (1) Do not disconnect auto-cruise control-ECU connector C-35.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 6 and ground by backprobing.
- (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 2.

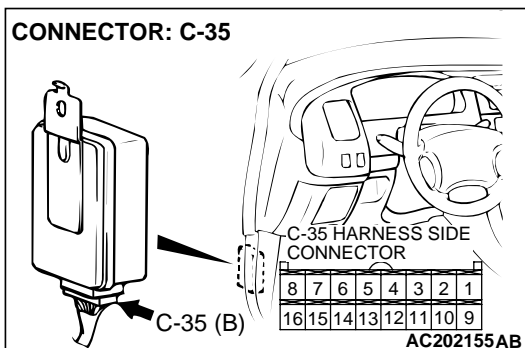


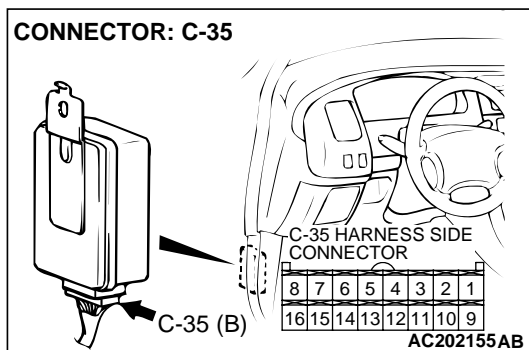
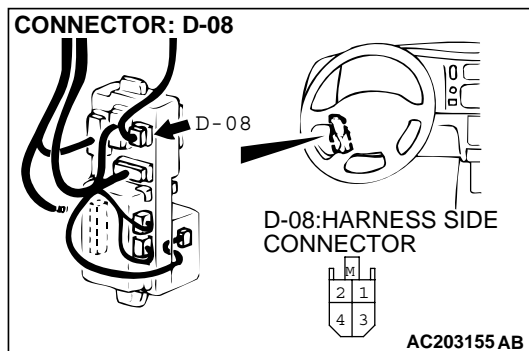
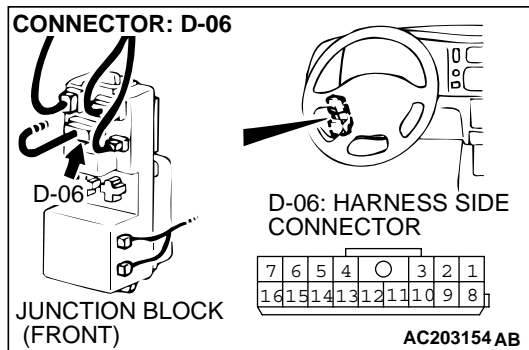
STEP 2. Check auto-cruise control-ECU connector C-35 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that the malfunction is eliminated.

NO : Go to Step 3.





STEP 3. Check junction block connector D-08 and D-06 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is any connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that the malfunction is eliminated.

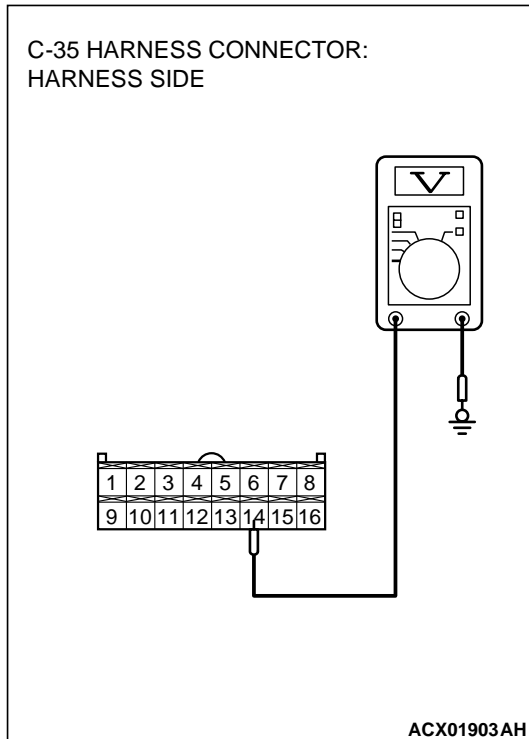
NO : Go to Step 4.

STEP 4. Check the harness wire between ignition switch and auto-cruise control-ECU connector C-35 (terminal No.6) for damage.

Q: Is any harness wire between ignition switch and auto-cruise control-ECU connector C-35 (terminal No.6) damaged?

YES : Repair or replace the harness wire and then check that the malfunction is eliminated. Go to Step 11 .

NO : 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.17-84](#)). Go to Step 11.



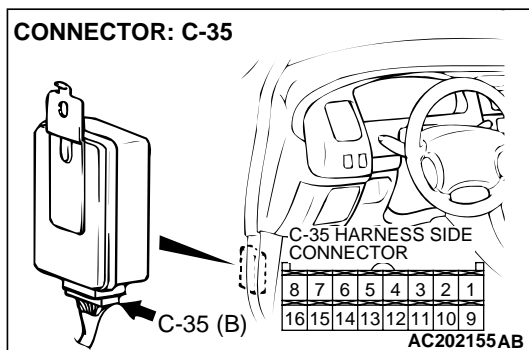
STEP 5. Measure the ground circuit voltage at auto-cruise control-ECU connector C-35 by backprobing.

- (1) Do not disconnect auto-cruise control-ECU connector C-35.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 14 and ground by backprobing.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage 0.5 volts or less?

YES : Go to Step 8.

NO : Go to Step 6.



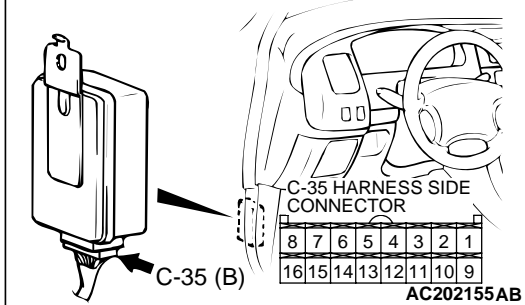
STEP 6. Check auto-cruise control-ECU connector C-35 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that the malfunction is eliminated.

NO : Go to Step 7.

CONNECTOR: C-35



STEP 7. Check the harness wire between auto-cruise control-ECU connector C-35 (terminal No.14) and ground.

Q: Is any harness wire between auto-cruise control-ECU connector C-35 (terminal No.14) and ground damaged?

YES : Repair or replace the harness wire and then check that the malfunction is eliminated.

NO : 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.17-84](#)). Go to Step 9.

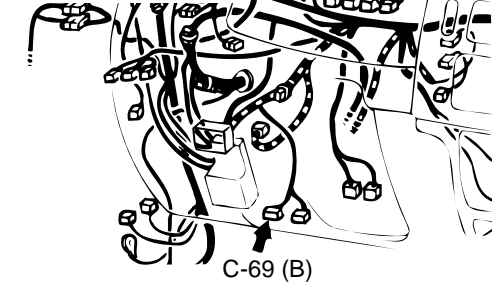
STEP 8. Check data link connector C-69 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.17-84](#). Then check that the malfunction is eliminated.

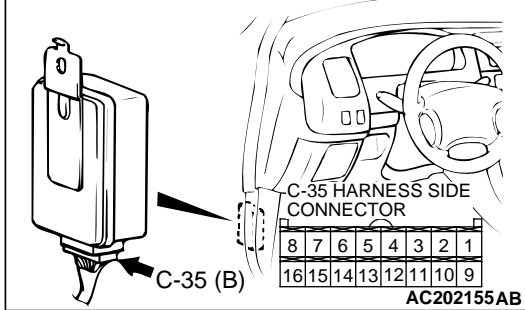
NO : Go to Step 9.

CONNECTOR: C-69

C-69 HARNESS CONNECTOR:
COMPONENT SIDE

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

CONNECTOR: C-35



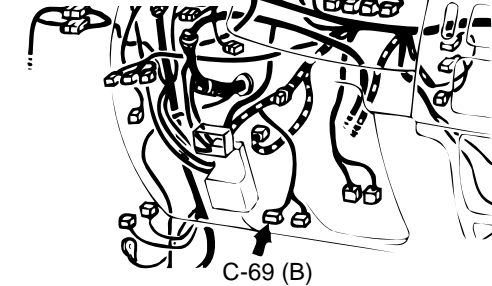
STEP 9. Check the harness wire between auto-cruise control-ECU connector C-35 (terminal No.11) and data link connector C-69 (terminal No. 13).

Q: Is any harness wire between auto-cruise control-ECU connector C-35 (terminal No.11) and data link connector C-69 (terminal No. 13) damaged?

YES : Repair or replace the damaged components. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that the malfunction is eliminated.

NO : Go to Step 10 .

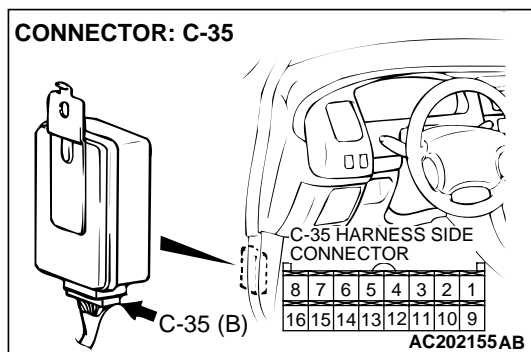
CONNECTOR: C-69



C-69 HARNESS CONNECTOR:
COMPONENT SIDE

1	2	3	4	5	6	7	8
9	10	11	12	13	14	15	16

AC200763AB



STEP 10. Check auto-cruise control-ECU connector C-35 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged components. (Refer to GROUP 00E, Harness Connector Inspection [P.17-84](#)) and then Go to Step 11.

NO : Check that the malfunction is eliminated. If the malfunction is eliminated, 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.00E-2](#)). If the malfunction is not eliminated, replace the auto-cruise control-ECU (Refer to [P.17-84](#)), and then go to Step 11.

STEP 11. Check that the malfunction is eliminated.

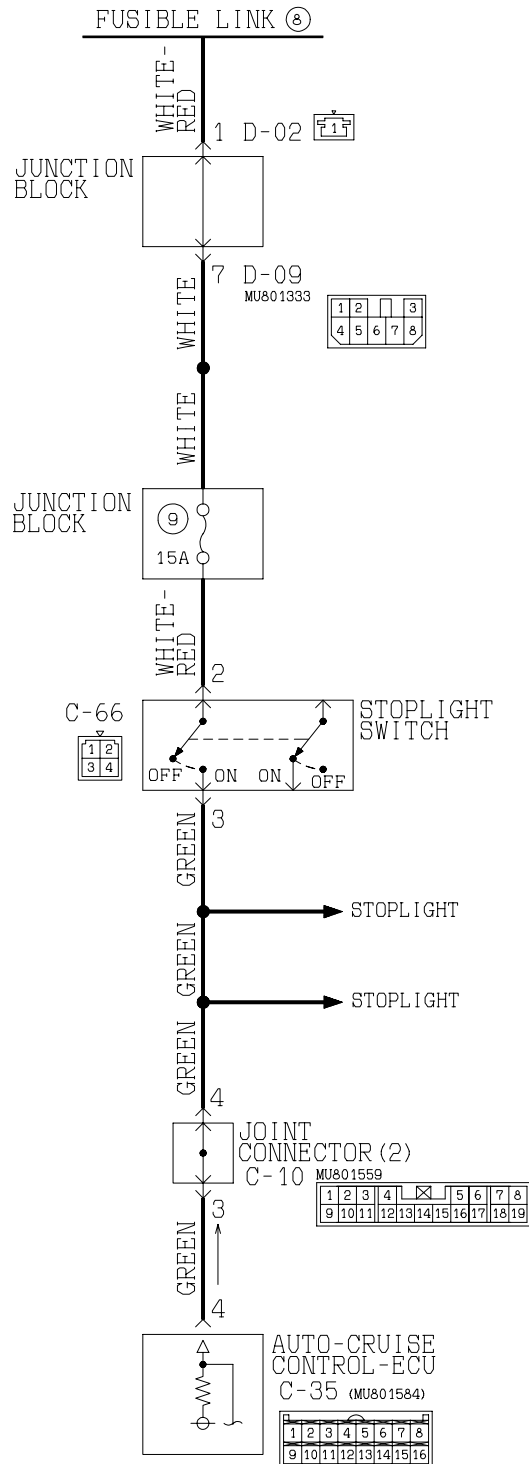
Q: Is the malfunction eliminated?

YES : This procedure is complete.

NO : Go to Step 1.

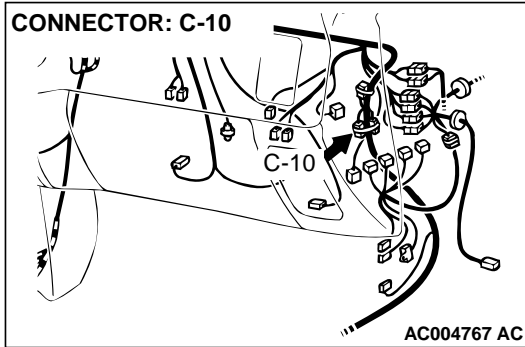
INSPECTION PROCEDURE 2: When the Brake Pedal is Depressed, Auto-cruise Control is not Cancelled.

Stoplight Switch circuit

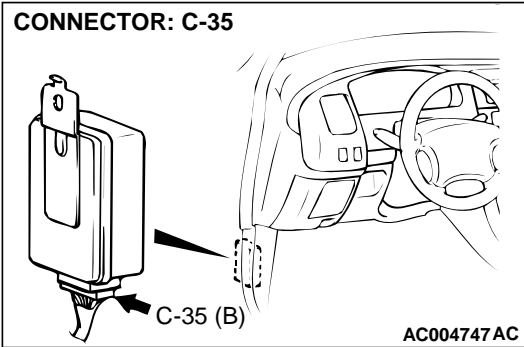


W3P02M04AA

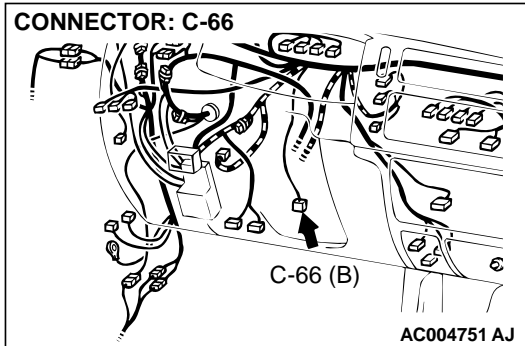
CONNECTOR: C-10



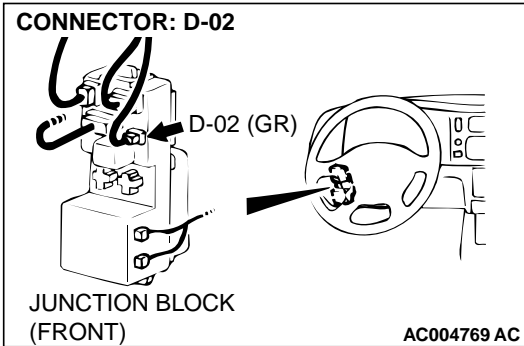
CONNECTOR: C-35



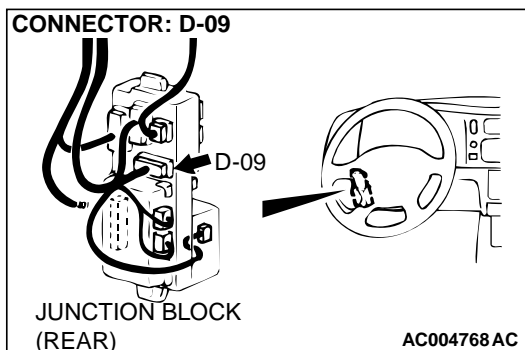
CONNECTOR: C-66



CONNECTOR: D-02



CONNECTOR: D-09

**CIRCUIT OPERATION**

This is the stoplight switch input signal circuit. The signal is sent to the stoplight switch from fuse 9, and is then sent to the auto-cruise control-ECU.

TECHNICAL DESCRIPTION (COMMENT)

The cause is probably a malfunction of the stoplight switch circuit.

TROUBLESHOOTING HINTS

- Malfunction of the stoplight switch.
- Damaged harness or connector.
- Malfunction of the auto-cruise control-ECU.

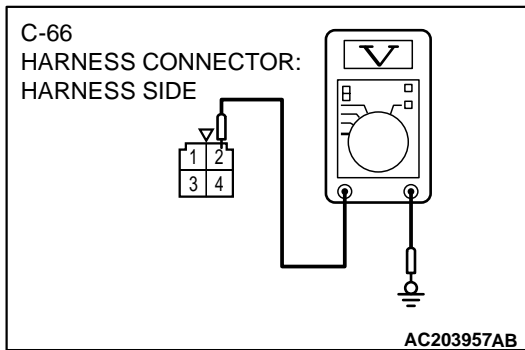
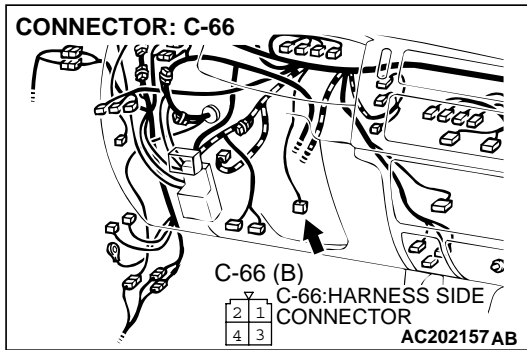
DIAGNOSIS**Required Special Tool:**

- MB991223: Harness Set

STEP 1. Check if the stoplight illuminates.**Q: Is the stoplight illuminated?**

YES : Go to Step 7.

NO : Go to Step 2.



STEP 2. Measure the output circuit voltage at stoplight switch connector C-66 by backprobing.

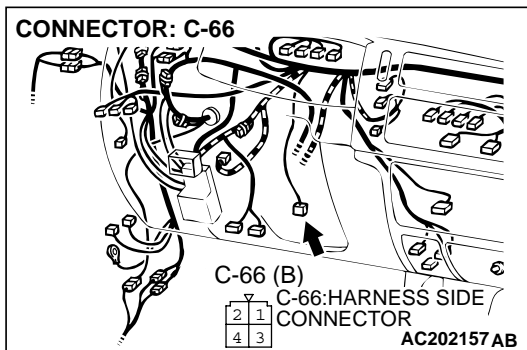
- (1) Do not disconnect stoplight switch connector C-66.
- (2) Turn the ignition switch to the "ON" position and the auto-cruise control main switch to the "ON" position.

- (3) Measure the voltage between terminal 2 and ground by backprobing.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is the measured voltage approximately battery positive voltage?

YES : Go to Step 6.

NO : Go to Step 3.

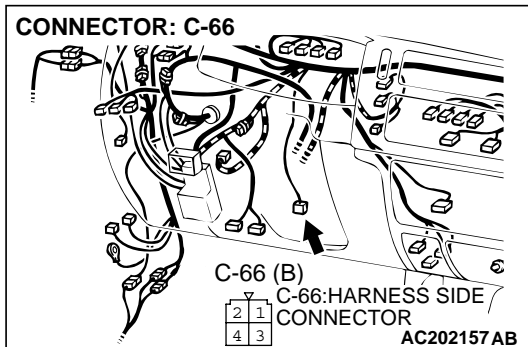
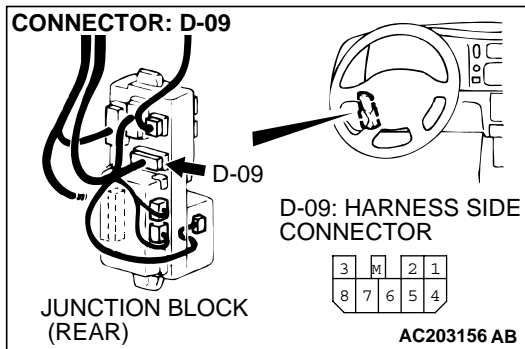
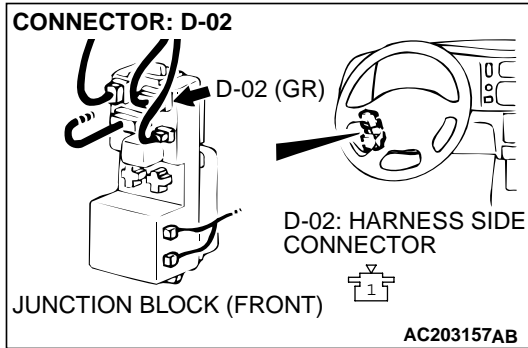


STEP 3. Check stoplight switch connector C-66 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged connector. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that the malfunction is eliminated.

NO : Go to Step 4.



STEP 4. Check junction connector D-02 and D-09 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is any connectors damaged?

YES : Repair or replace the damaged connector. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that the malfunction is eliminated.

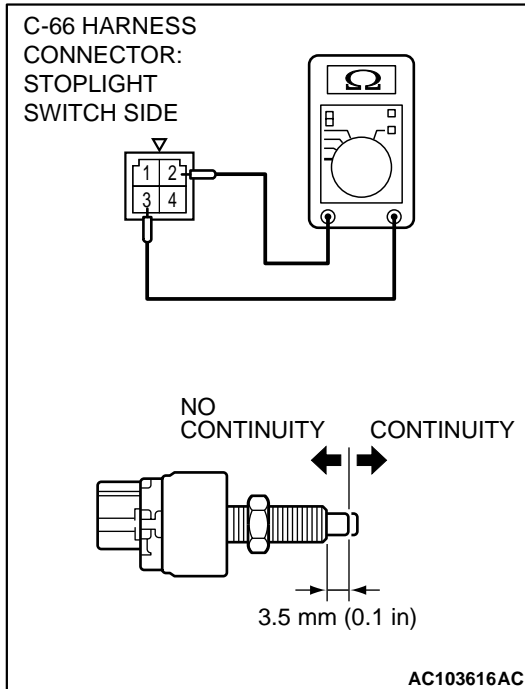
NO : Go to Step 5.

STEP 5. Check the harness wire between fusible link No.8 and stoplight switch connector C-66 (terminal No.2).

Q: Is any harness wire between fusible link No.8 and stoplight switch connector C-66 (terminal No.2) damaged?

YES : Repair the harness wire (Refer to GROUP 00E, Harness Connector Inspection [P.17-84](#)) and then check that the malfunction is eliminated.

NO : Check that the malfunction is eliminated. If the malfunction is eliminated, replace the auto-cruise control-ECU. (Refer to [P.35A-32](#).) Then check that the malfunction is eliminated.



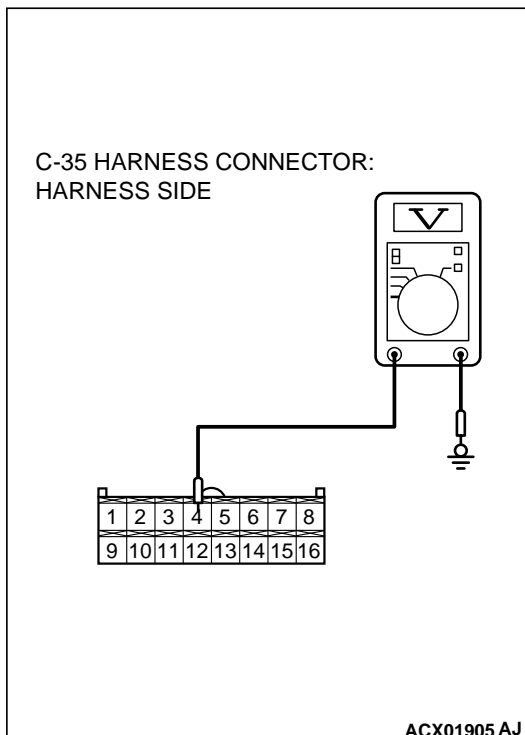
STEP 6. Check the stoplight switch.

- (1) Disconnect harness connector C-66 at the stoplight switch.
- (2) Connect an ohmmeter to the stoplight switch, and check continuity when the plunger of the stoplight switch is pushed in and when it is released.
- (3) The stoplight switch is in good condition if the circuit is open when the plunger is pushed in to a depth of within 3.5 mm (0.1 inch) from the outer case edge surface, and if the resistance value is less than 2 ohm when it is released.
- (4) The check for continuity should be made at terminals 2 and 3 of the stoplight switch.

Q: Is the circuit open?

YES : Replace the stoplight switch. Refer to GROUP 35A, Brake Pedal [P.17-84](#). Then check that the malfunction is eliminated.

NO : Go to Step 7.



STEP 7. Measure the output circuit voltage at auto-cruise control-ECU connector C-35 by backprobing.

- (1) Do not disconnect auto-cruise control-ECU connector C-35.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 4 and ground by backprobing.
 - Voltage should measure battery positive volts. (When brake pedal is depressed.)
 - Voltage should measure 0.5 volts or less. (When brake pedal is not depressed.)
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is measured the voltage within specifications?

YES : Check that the malfunction is eliminated. If the malfunction is eliminated, replace the auto-cruise control-ECU. (Refer to [P.00E-2](#).) Then check that the malfunction is eliminated.

NO : Go to Step 8.

STEP 8. Check auto-cruise control-ECU connector C-35 and stoplight switch connector C-66 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

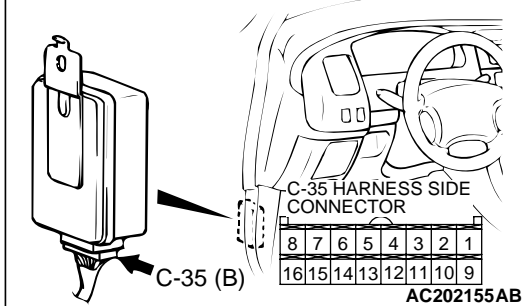
NOTE: After checking joint connector C-10, inspect the wire. If joint connector is damaged, repair or replace the damage connector. Refer to GROUP 00E, Harness Connector Inspection P.17-84. Then check that the malfunction is eliminated.

Q: Is the connector damaged?

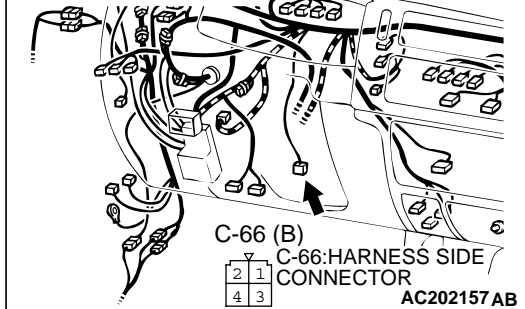
YES : Repair or replace the damaged connector. Refer to GROUP 00E, Harness Connector Inspection P.00E-2. Then check that the malfunction is eliminated.

NO : Go to Step 9.

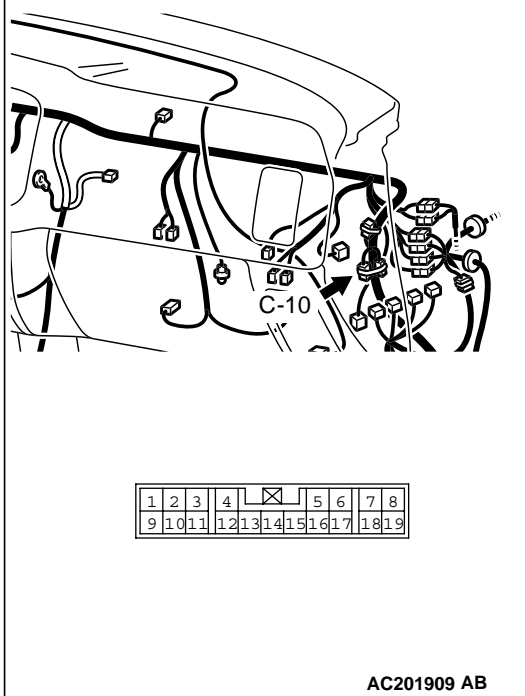
CONNECTOR: C-35

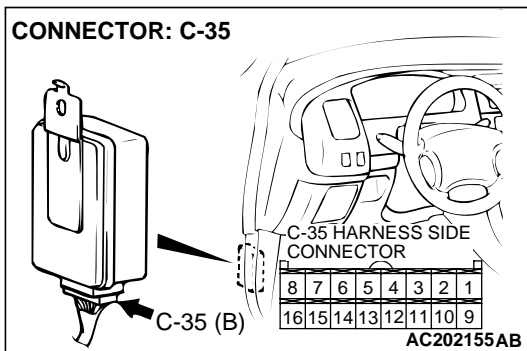
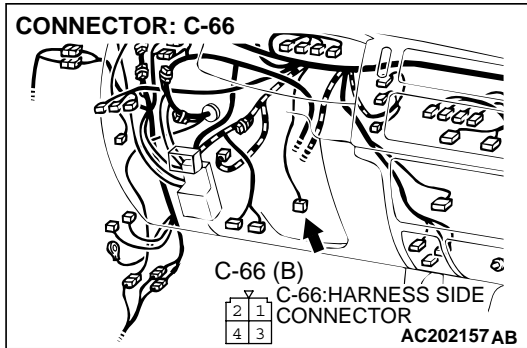


CONNECTOR: C-66



CONNECTOR: C-10





STEP 9. Check the harness wire between stoplight switch connector C-66 (terminal No.3) and auto-cruise control-ECU connector C-35 (terminal No.4).

Q: Is any harness wire between stoplight switch connector C-66 (terminal No.3) and auto-cruise control-ECU connector C-35 (terminal No.4) damaged?

YES : Repair the harness wire and then Go to Step 10.

NO : Check that the malfunction is eliminated. If the malfunction is eliminated, 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](#)). If the malfunction is not eliminated, replace the auto-cruise control-ECU (Refer to [P.17-84](#)), and then go to Step 10.

STEP 10. Check that the malfunction is eliminated.

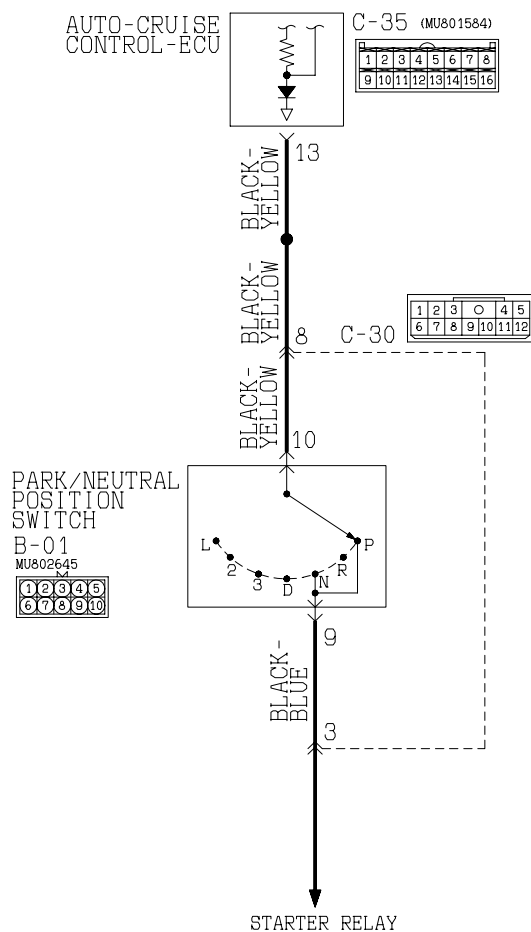
Q: Is the malfunction eliminated?

YES : This procedure is complete.

NO : Go to Step 1.

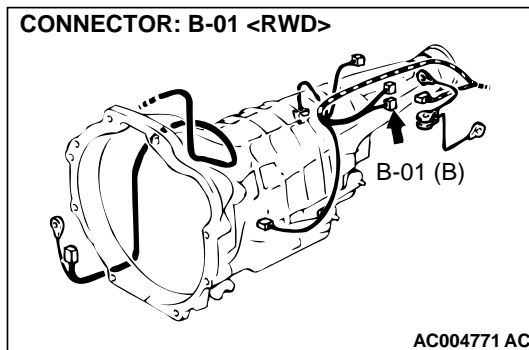
INSPECTION PROCEDURE 3: When the Selector Lever is Moved to "N" Range, Auto-cruise Control is not Cancelled.

Park/neutral Position Switch Circuit

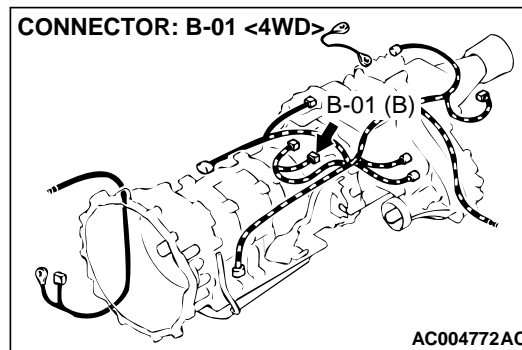


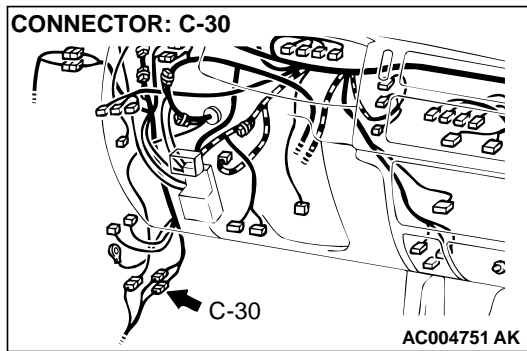
W2P02M06AA
AC103595AB

CONNECTOR: B-01 <RWD>



CONNECTOR: B-01 <4WD>

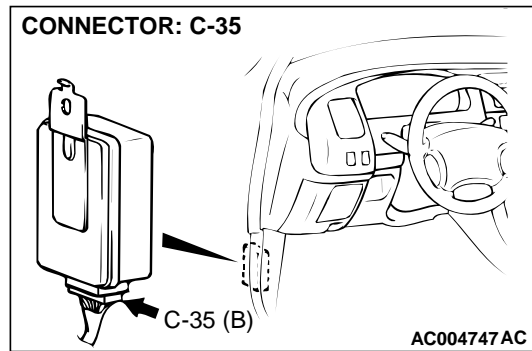




CIRCUIT OPERATION

This circuit transmits the "N" or "P" position signal of the park/neutral position switch to the auto-cruise control-ECU.

When the park/neutral position switch is at the "N" or "P" position, auto-cruise control-ECU terminal number 13 will receives 0 volt.



TECHNICAL DESCRIPTION (COMMENT)

The cause is probably an open-circuit in the output signal circuit in "N" range.

TROUBLESHOOTING HINTS

- Malfunction of the park/neutral position switch
- Damaged harness or connector
- Malfunction of the auto-cruise control-ECU

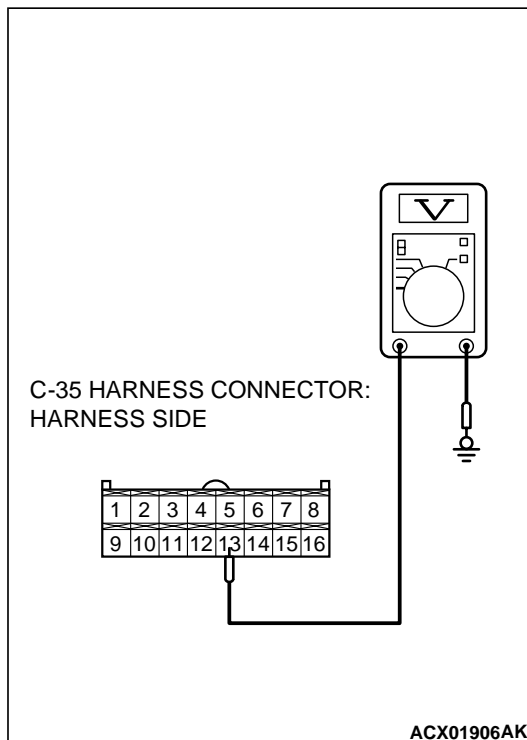
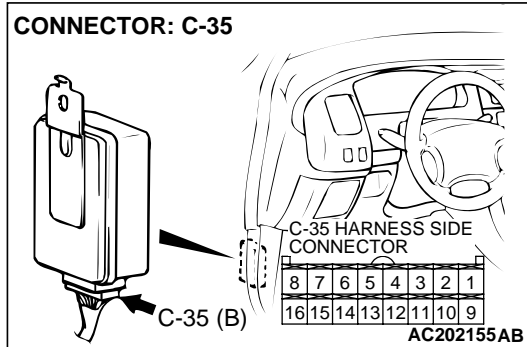
DIAGNOSIS

Required Special Tool:

- MB991223: Harness Set

STEP 1. Measure the signal voltage at auto-cruise control-ECU connector C-35 by backprobing.

- (1) Do not disconnect auto-cruise control-ECU connector C-35.
- (2) Turn the ignition switch to the "ON" position.



- (3) Measure the voltage between auto-cruise control-ECU connector C-35 terminal 13 and ground by backprobing.
 - The measured voltage should measure battery positive voltage. (When select lever is in a position other than "N" range).
 - The measured voltage should measure 0.5 volts or less. (When select lever is in "N" range).
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Are all of the measured voltage satisfied?

YES : Check that the malfunction is eliminated. If the malfunction is eliminated, 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.17-84](#)). If the malfunction is not eliminated, replace the auto-cruise control-ECU (Refer to [P.00E-2](#)), and then go to Step 5.

NO : Go to Step 2.

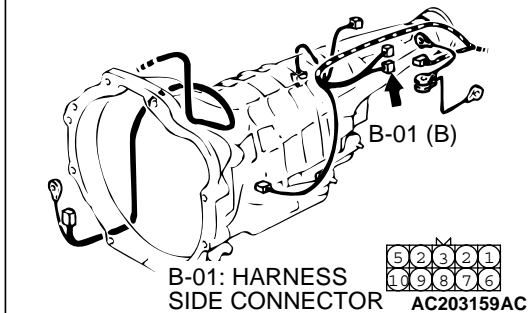
STEP 2. Check park/neutral position switch connector B-01, intermediate connector C-30 and auto-cruise control-ECU connector C-35 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Are the connectors and terminals in good condition?

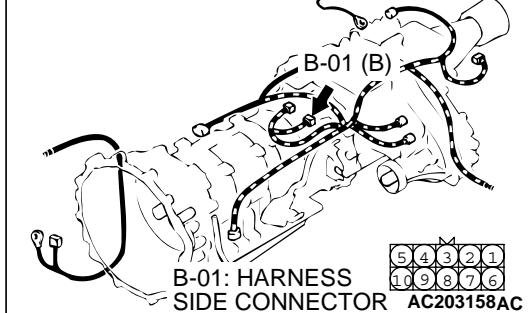
YES : Go to Step 3.

NO : Repair or replace the faulty connector. (Refer to GROUP 00E, Harness Connector Inspection [P.23Aa-38](#)). Go to Step 5.

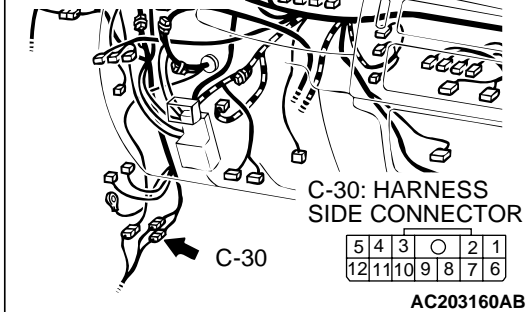
CONNECTOR: B-01 <RWD>



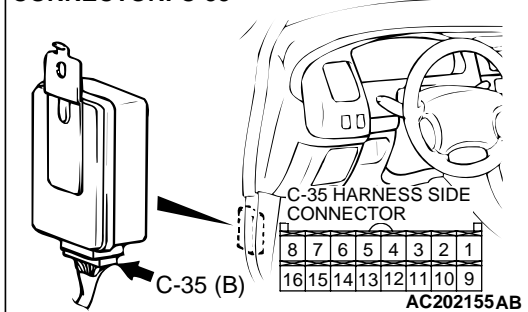
CONNECTOR: B-01 <4WD>



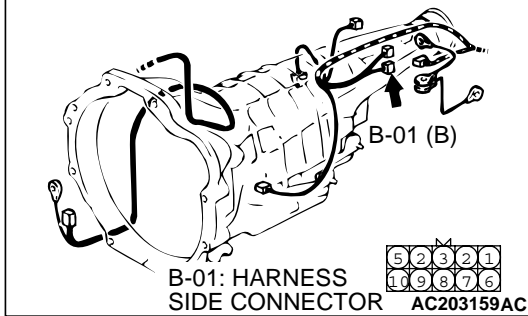
CONNECTOR: C-30



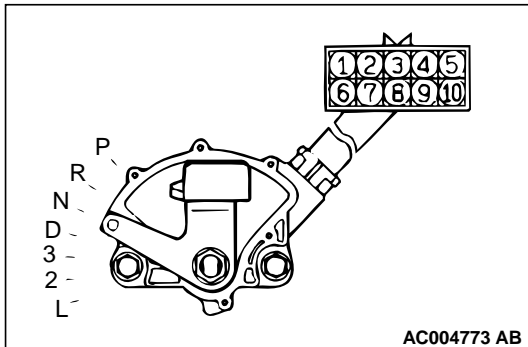
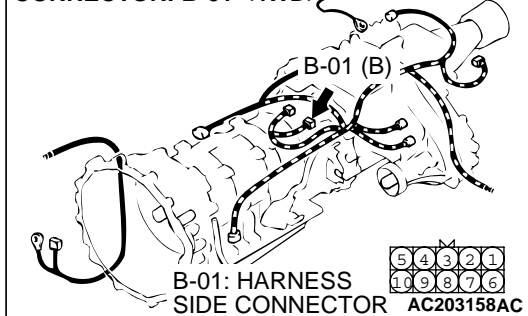
CONNECTOR: C-35



CONNECTOR: B-01 <RWD>



CONNECTOR: B-01 <4WD>

**STEP 3. Check the circuit at the park/neutral position switch.**

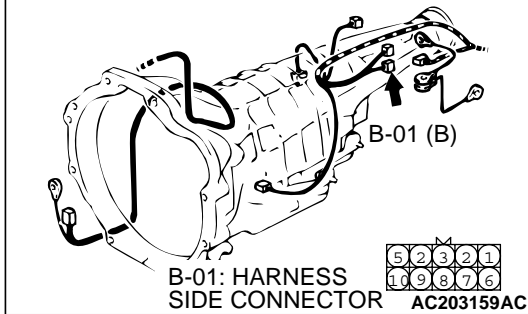
(1) Disconnect the park/neutral position switch connector B-01.

(2) Measure the continuity park/neutral position switch connector terminals.

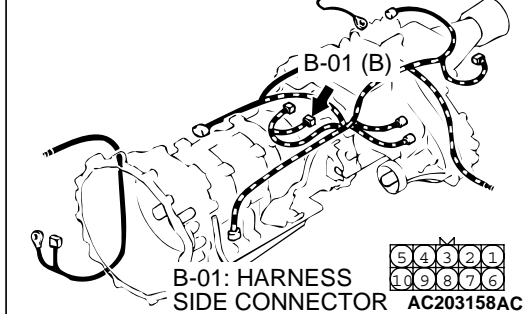
ITEM	TERMINAL CONNECTOR OF TESTER	SPECIFIED CONDITION
P	1 – 7, 9 – 10	Less than 2 ohms.
N	2 – 7, 9 – 10	

Q: Is the continuity meet the table above?**YES :** Go to Step 4.**NO :** Replace the park/neutral position switch. Refer to GROUP 23A, Transmission [P.17-84](#). Go to Step 5.

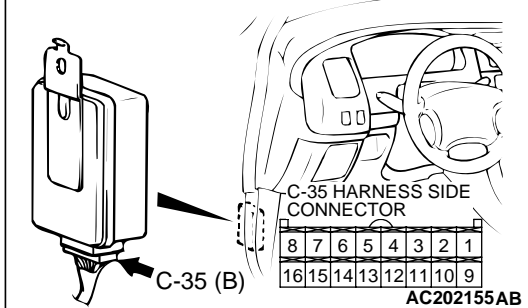
CONNECTOR: B-01 <RWD>



CONNECTOR: B-01 <4WD>



CONNECTOR: C-35



STEP 4. Check the harness wire between park/neutral position switch connector B-01 (terminal No.10) and auto-cruise control-ECU connector C-35 (terminal No.13).

Q: Is any harness wire between park/neutral position switch connector B-01 (terminal No.10) and auto-cruise control-ECU connector C-35 (terminal No.13) damaged?

YES : Repair the damaged harness wire. Go to Step 5.

NO : Check that the malfunction is eliminated. If the malfunction is eliminated, 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.00E-2](#)). If the malfunction is not eliminated, replace the auto-cruise control-ECU (Refer to [P.00E-2](#)), and then go to Step 5.

STEP 5. Check that the malfunction is eliminated

Q: Is the malfunction eliminated?

YES : This procedure is complete.

NO : Go to Step 1.

INSPECTION PROCEDURE 4: When the Auto-cruise Control "CANCEL" Switch is Set to ON, Auto-cruise Control is not Cancelled.

TECHNICAL DESCRIPTION (COMMENT)

The cause is probably an open-circuit in the output in the circuit inside the "CANCEL" switch.

TROUBLESHOOTING HINTS

- Malfunction of the auto-cruise control switch

DIAGNOSIS

Replace the auto-cruise control switch. (Refer to [P.17-84.](#))
Then check the malfunction is eliminated.

INSPECTION PROCEDURE 5: Auto-cruise Control cannot be Set.**TECHNICAL DESCRIPTION (COMMENT)**

The fail-safe function is probably cancelling auto-cruise control.

In this case, scan tool MB991502 can be used to check the trouble symptoms in each system by checking the diagnostic trouble codes.

The scan tool can also be used to check if the circuits of each input switch are normal or not by checking the input switch codes.

TROUBLESHOOTING HINTS

- Malfunction of the auto-cruise control switch.
- Malfunction of the auto-cruise control-ECU.
- Malfunction of the auto-cruise control switch.
- Malfunction of the auto-cruise control-ECU.

DIAGNOSIS**Required Special Tools:**

- MB991502: Scan Tool (MUT-II)
- MB991223: Harness Set

STEP 1. Can the auto-cruise control-ECU communicate with scan tool MB991502?**⚠ CAUTION**

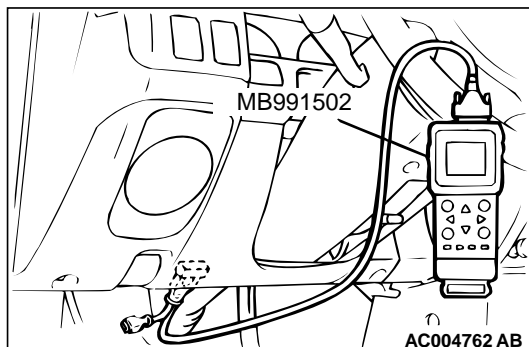
To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

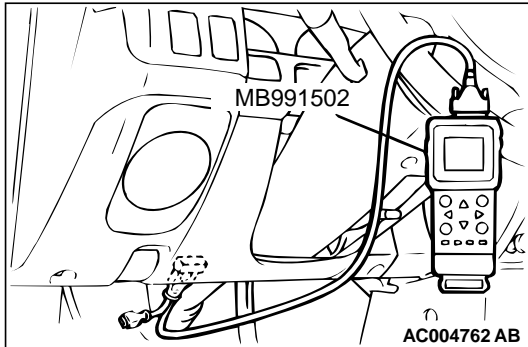
- (1) Connect scan tool MB991502 to the data link connector.
- (2) Turn the ignition switch to the "ON" position.

Q: Can the auto-cruise control-ECU communicate with the scan tool?

YES : Go to Step 2.

NO : Inspect each trouble symptom. (Refer to Inspection Procedure number 1 [P.17-47.](#))





STEP 2. Using scan tool MB991502, check the any DTC 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) Using scan tool MB991502.
- (2) Connect scan tool MB991502 to the data link connector.
- (3) Turn the ignition switch to the "ON" position.
- (4) Read the DTC.
- (5) Turn the ignition switch to the "LOCK" (OFF) position.
- (6) Disconnect scan tool MB991502.

Q: Is any DTC set?

YES : DTC 11, 12, 14, 15, 16 or 17 is set, (Refer to [P.17-12](#), Diagnostic Trouble Code Chart).

NO : Go to Step 3.

STEP 3. Using scan tool MB991502, check data list.

⚠ CAUTION

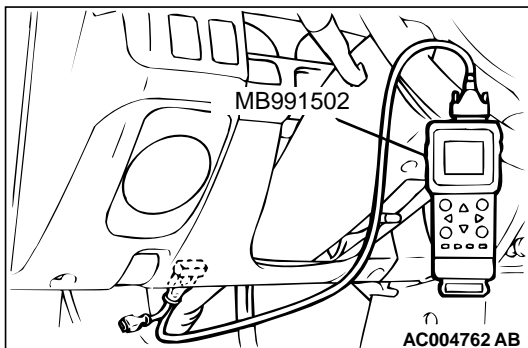
To prevent damage to scan tool MB991502, always turn the ignition switch to the "LOCK" (OFF) position before connecting or disconnecting scan tool MB991502.

- (1) Using scan tool MB991502.
- (2) Connect scan tool MB991502 to the data link connector.
- (3) Check the following items in the data list.
Refer to [P.17-17](#), Data List Reference Table.
 - Item 04: Auto-cruise control "CANCEL" switch.
 - Item 05: Stoplight switch.
 - Item 14: Park/neutral position switch.
- (4) Turn the ignition switch to the "ON" position.

Q: Is the check above meet the specifications?

YES : Check that the malfunction is eliminated. If the malfunction is eliminated, replace the auto-cruise control-ECU. (Refer to [P.17-21](#).) Then that the malfunction is eliminated.

NO : Follow the diagnostic trouble code procedures and the symptom procedures below. • Item 04: Refer to Diagnostic Trouble Code Procedures number 15 [P.17-30](#). • Item 05: Refer to Symptom Procedures number 2 [P.17-37](#). • Item 14: Refer to Symptom Procedures number 3 [P.17-38](#).



INSPECTION PROCEDURE 6: Hunting (Repeated Acceleration and Deceleration) Occurs at the Set Vehicle Speed.**TECHNICAL DESCRIPTION (COMMENT)**

The cause is probably the malfunction of the vehicle speed sensor or incorrect vacuum in the auto-cruise control vacuum pump or actuator.

TROUBLESHOOTING HINTS

- Malfunction of the vehicle speed sensor
- Malfunction of the auto-cruise control vacuum pump
- Malfunction of the actuator
- Malfunction of the auto-cruise control-ECU

DIAGNOSIS**Required Special Tool:**

- MB991223: Harness Set

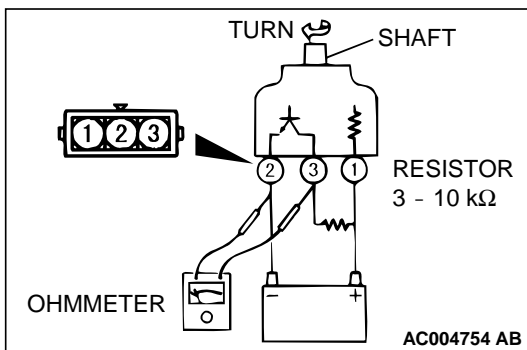
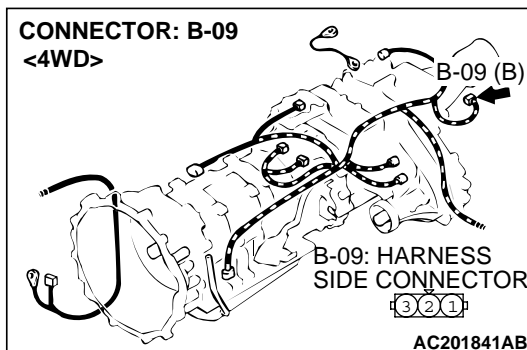
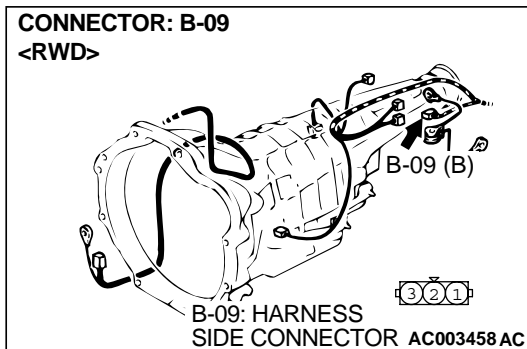
STEP 1. Check the vehicle speed sensor.

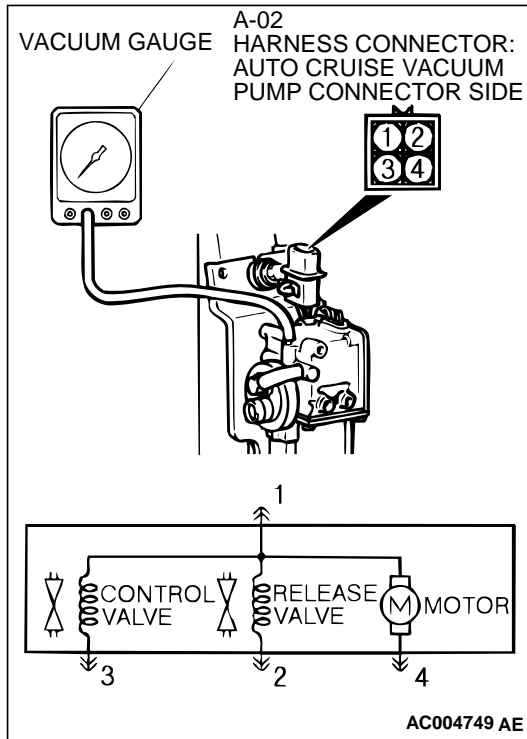
- (1) Remove the vehicle speed sensor.
- (2) Remove the vehicle speed sensor and connect a 3 – 10 k Ω resistor as shown in the illustration.
- (3) Turn the shaft of the vehicle speed sensor and check that there is voltage between terminals 2 – 3. (one turn = four pulses)

Q: Is the voltage within specifications?

YES : Go to Step 2.

NO : Replace the vehicle speed sensor. Refer to GROUP 54, Combination Meter Assembly and Vehicle Speed Sensor [P.54-107](#). Then check that the malfunction is eliminated.





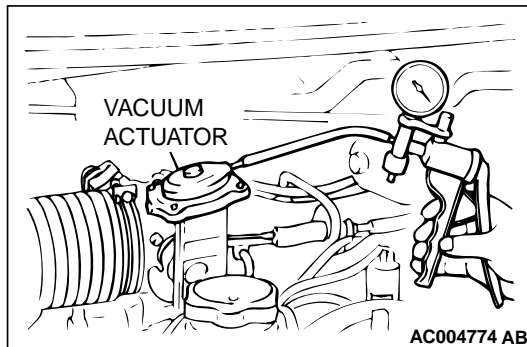
STEP 2. Check the auto-cruise vacuum pump.

- (1) Disconnect the vacuum hose from the auto-cruise vacuum pump and connect a vacuum gauge to the vacuum pump.
- (2) Disconnect the vacuum pump connector.
- (3) Check the auto-cruise vacuum pump and valves according to the following procedure:
 - Connect the positive battery terminal to auto-cruise vacuum pump connector terminal 1, and the negative battery terminal to terminals 2, 3, and 4. Then the vacuum gauge should read 27 kPa (8.0 in Hg) or more.
 - The vacuum should be maintained when terminal 4 is disconnected from the negative battery terminal while terminals 1, 2, and 3 remain connected. Then the vacuum gauge should read 0 kPa (0 in Hg) when terminal 2 is disconnected from the negative battery terminal while terminals 1, and 3 remain connected.
 - The vacuum should be maintained when terminal 4 is disconnected from the negative battery terminal while terminals 1, 2, and 3 remain connected. Then the vacuum gauge should read 0 kPa (0 in Hg) when terminal 3 is disconnected from the negative battery terminal while terminals 1, and 2 remain connected.

Q: Are all of the above values satisfied?

YES : Go to Step 3.

NO : Replace the auto-cruise vacuum pump. (Refer to [P.17-84.](#)) Then that the malfunction is eliminated.



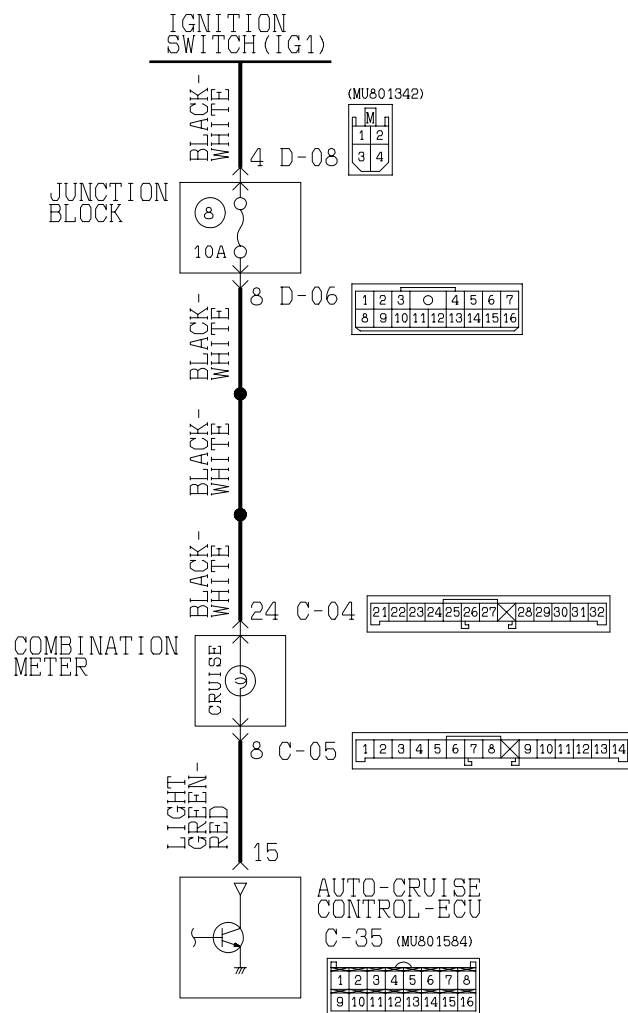
STEP 3. Check the vacuum actuator.

- (1) Disconnect the vacuum hose from the vacuum actuator, and then connect a hand vacuum pump to the vacuum actuator.
- (2) Apply a vacuum and check that the throttle lever moves and the vacuum is maintained.

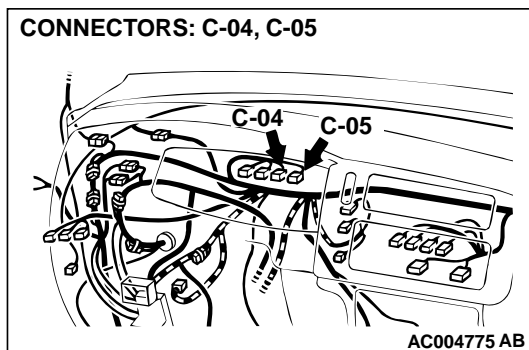
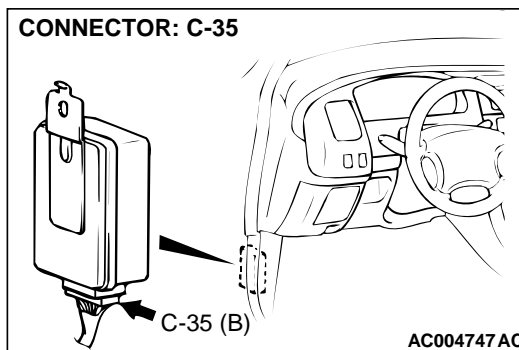
Q: Is the vacuum actuator damaged?

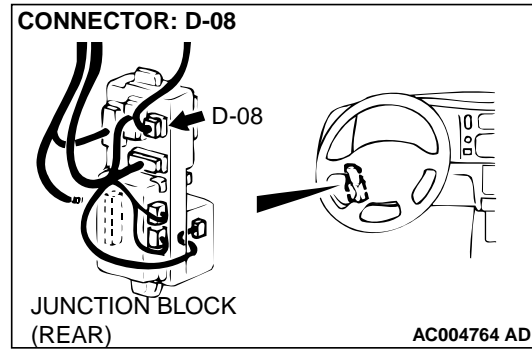
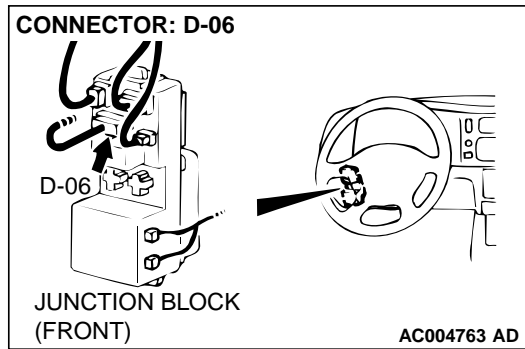
YES : Replace the vacuum actuator. Refer to GROUP 13A, Throttle Body Assembly [P.13Aa-33](#). Then check that the malfunction is eliminated.

NO : Check that the malfunction is eliminated. If the malfunction is eliminated, replace the auto-cruise control-ECU. (Refer to [P.17-84.](#)) Then check that the malfunction is eliminated.

INSPECTION PROCEDURE 7: Auto-cruise Control Indicator Light inside Combination Meter does not Illuminate. (However, Auto-cruise Control is Normal.)**Auto-cruise Control Indicator Light Drive Circuit**

W3P02M05AA

CONNECTORS: C-04, C-05**CONNECTOR: C-35**



CIRCUIT OPERATION

The power for the auto-cruise indicator in the combination meter is supplied from the ignition switch (IG1). When the auto-cruise control system is operating, the transistor inside the auto-cruise control-ECU illuminates the auto-cruise indicator through ECU terminal number 15.

TECHNICAL DESCRIPTION (COMMENT)

The cause is probably the malfunction of the indicator bulb or the malfunction of the connector or harness.

TROUBLESHOOTING HINTS

- Malfunction of the indicator bulb
- Damaged harness or connector
- Malfunction of the auto-cruise control-ECU

DIAGNOSIS

Required Special Tool:

- MB991223: Harness Set

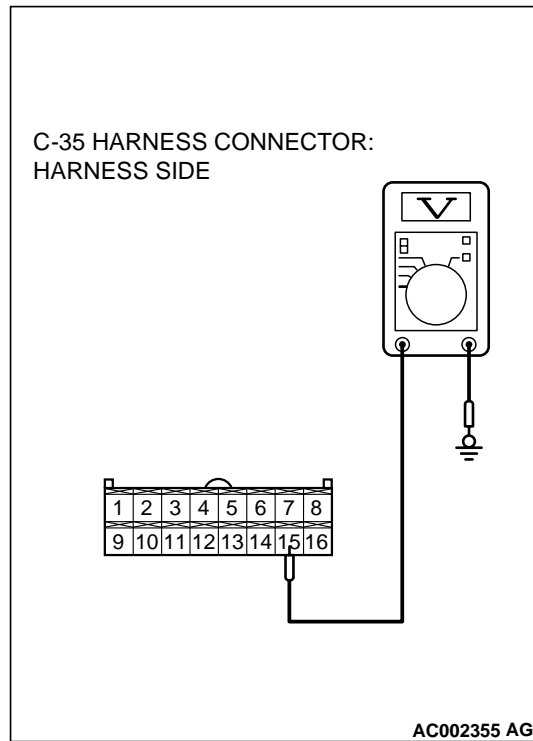
STEP 1. Check the auto-cruise control indicator bulb.

- (1) Remove the combination meter. Refer to GROUP 54, Combination Meter Assembly and Vehicle Speed Sensor [P.54-107](#).
- (2) Check the auto-cruise control indicator bulb.

Q: Is the bulb blown?

YES : Replace the bulb. Then check that the malfunction is eliminated.

NO : Go to Step 2.

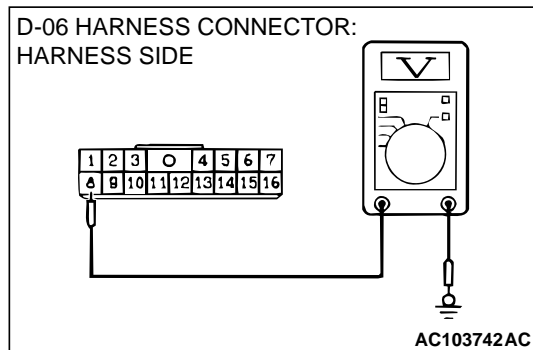
**STEP 2. Measure the output circuit voltage at auto-cruise control-ECU connector C-35 by backprobing.**

- (1) Do not disconnect auto-cruise control-ECU connector C-35.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 15 and ground by backprobing.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is measure voltage approximately battery positive voltage?

YES : Check that the malfunction is eliminated. If the malfunction is eliminated, replace the auto-cruise control-ECU. (Refer to [P.17-84.](#)) Then check that the malfunction is eliminated.

NO : Go to Step 3.

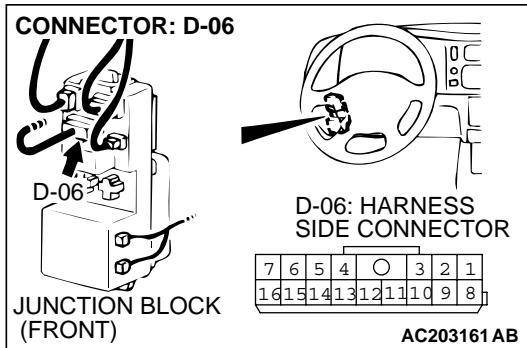
**STEP 3. Measure the output circuit voltage at junction block connector D-06 by backprobing.**

- (1) Do not disconnect junction block connector D-06.
- (2) Turn the ignition switch to the "ON" position.
- (3) Measure the voltage between terminal 8 and ground by backprobing.
- (4) Turn the ignition switch to the "LOCK" (OFF) position.

Q: Is measure voltage approximately battery positive voltage?

YES : Go to Step 5.

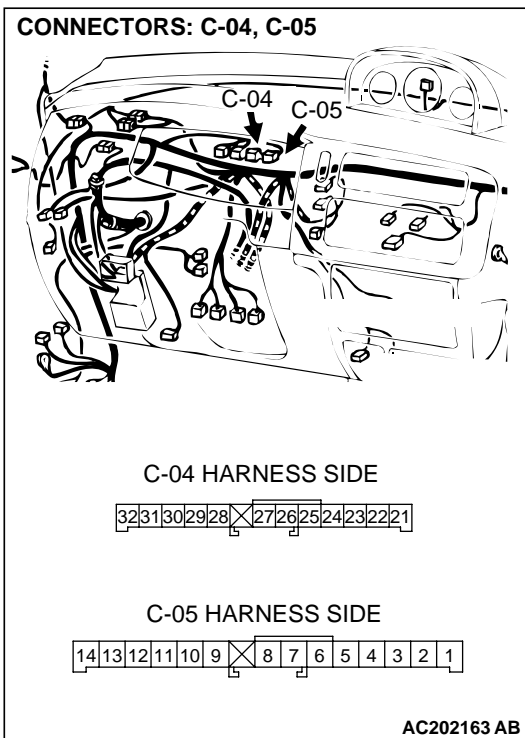
NO : Go to Step 4.



STEP 4. Check junction block connector D-06 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

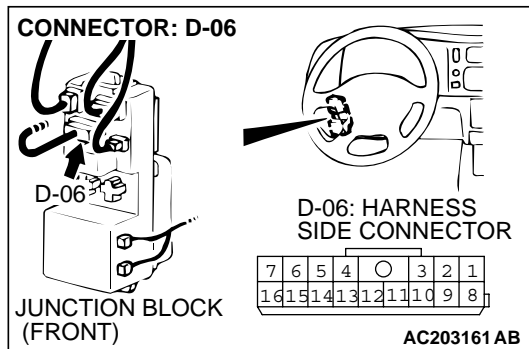
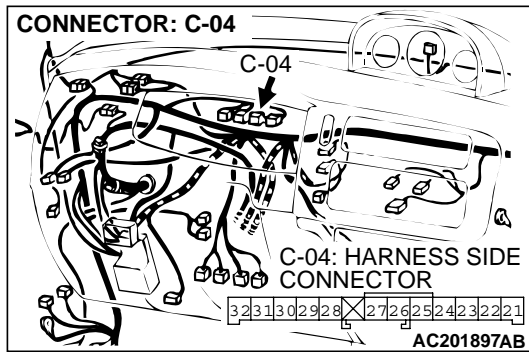
- YES :** Repair or replace the damaged connector. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that the malfunction is eliminated.
- NO :** Replace the junction block. Then check that the malfunction is eliminated.



STEP 5. Check combination meter connector C-04 and C-05 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is any connector damaged?

- YES :** Repair or replace the damaged connector. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that the malfunction is eliminated.
- NO :** Go to Step 6.

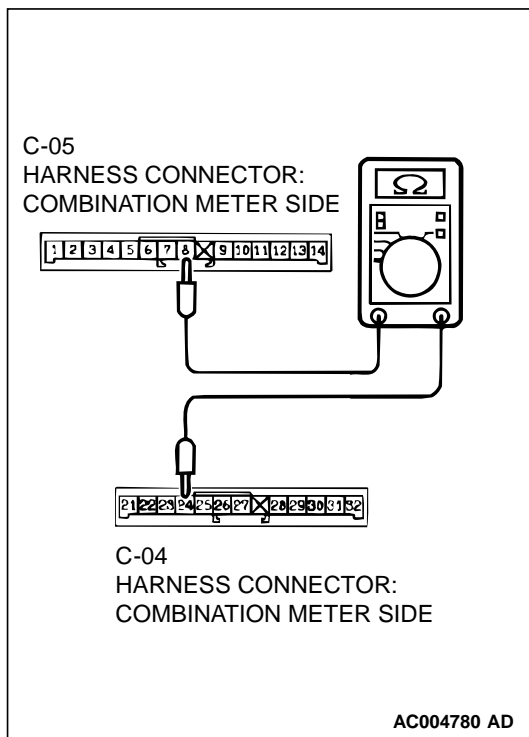


STEP 6. Check the harness wire between combination meter connector C-04 (terminal No.24) and junction block connector D-06 (terminal No.8).

Q: Is any harness wire between combination meter connector C-04 (terminal No.24) and junction block connector D-06 (terminal No.8) damaged?

YES : Repair the harness wire and then check that the malfunction is eliminated.

NO : Go to Step 7.



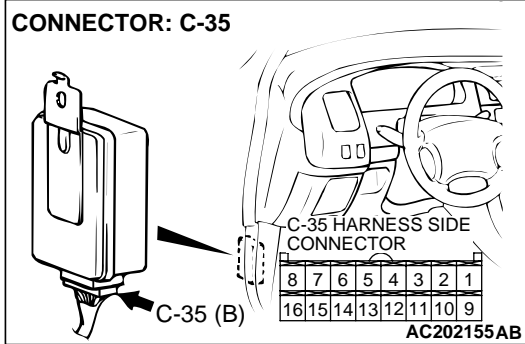
STEP 7. Check the combination meter.

- (1) Remove the combination meter and measure at the combination meter side. (Refer to GROUP 54, Combination Meter Assembly and Vehicle Speed Sensor P.54-107.)
- (2) Measure the continuity between terminal 24 at conductor C-04 and terminal 8 at connector C-05.

Q: Is the measured continuity less than 2 ohms?

YES : Go to Step 8.)

NO : Replace the combination meter. Refer to GROUP 54, Combination Meter Assembly and Vehicle Speed Sensor P.54-107. Then check that the malfunction is eliminated.

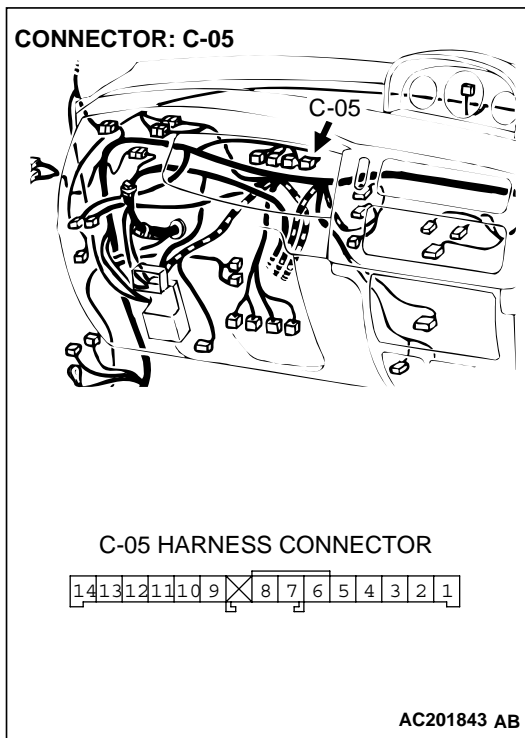


STEP 8. Check auto-cruise control-ECU connector C-35 for loose, corroded or damaged terminals, or terminals pushed back in the connector.

Q: Is the connector damaged?

YES : Repair or replace the damaged connector. Refer to GROUP 00E, Harness Connector Inspection [P.00E-2](#). Then check that the malfunction is eliminated.

NO : Go to Step 9.

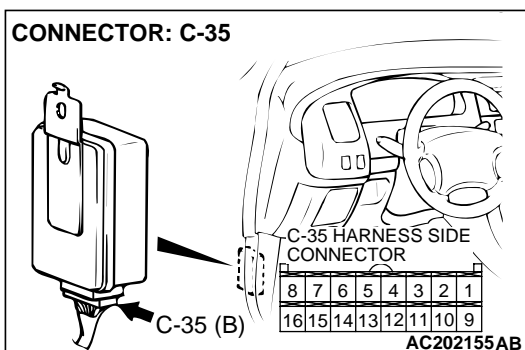


STEP 9. Check the harness wire between combination meter connector C-05 (terminal No.8) and auto-cruise control-ECU connector C-35 (terminal No.15).

Q: Is any harness wire between combination meter connector C-05 (terminal No.8) and auto-cruise control-ECU connector C-35 (terminal No.15) damaged?

YES : Repair or replace the harness wire and then Go to Step10.

NO : Check that the malfunction is eliminated. If the malfunction is eliminated, replace the auto-cruise control-ECU. (Refer to [P.17-84](#).) Then go to Step 10.



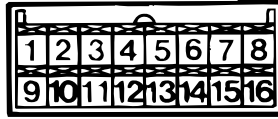
STEP 10. Check that the malfunction is eliminated.**Q: Is the malfunction eliminated?****YES :** This procedure is complete.**NO :** Go to Step 1.**DATA LIST REFERENCE TABLE**

M1172002400222

MUT-II SCAN TOOL DISPLAY	ITEM NO.	INSPECTION ITEM		INSPECTION REQUIREMENT	NORMAL CONDITION
CANCEL SWITCH	04	Auto-cruise control switch	CANCEL	CANCEL switch: "ON"	ON
				CANCEL switch: "OFF"	OFF
IDLE SW SIG	08	Idle position signal		Accelerator pedal: Depressed	OFF
				Accelerator pedal: Released	ON
MAIN SW	01	Auto-cruise control switch	MAIN	MAIN switch: "ON"	ON
				MAIN switch: "OFF"	OFF
OD OFF	15	A/T control signal		Driving on level road	OFF
				Driving on uphill grade	ON
PNP SW/ CLUTCH	14	Park/neutral position switch		Selector lever: "P" or "N" position	ON
				Selector lever: Other than "P" or "N" position	OFF
RESUME SWITCH	03	Auto-cruise control switch	RESUME	RESUME switch: "ON"	ON
				RESUME switch: "OFF"	OFF
SET SWITCH	02	Auto-cruise control switch	SET	SET switch: "ON"	ON
				SET switch: "OFF"	OFF
STOPLIGHT SW	05	Stoplight switch		Brake pedal: Depressed	ON
				Brake pedal: Released	OFF
TP SENSOR	13	Throttle position sensor		Accelerator pedal: Released	300 – 1,000 mV <3.0L ENGINE> 535 – 735 mV <3.5L ENGINE>
				Accelerator pedal: Depressed	The more deeply the pedal is depressed, the higher value the scan tool (MUT-II) displays.
				Accelerator pedal: Fully depressed	4,500 – 5,500 mV
VSS	10	Vehicle speed sensor		Road test the vehicle	The speedometer and MUT-II display the same value.

CHECK AUTO-CRUISE CONTROL-ECU TERMINALS

M1172002700267



ACX02234

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION		NORMAL CONDITION
1	Throttle position sensor input	When accelerator pedal is fully depressed		4.0 – 5.5 V
		When accelerator pedal is released		0.3 – 1.0 V <3.0L Engine> 0.535 – 0.735 V <3.5L Engine>
2	Idle position signal	When accelerator pedal is depressed		4 V or more
		When accelerator pedal is not depressed		0 – 1 V
3	A/T control output	Driving on level load		Battery positive voltage
		Driving on uphill grade		0 V
4	Stoplight switch input	When brake pedal is depressed	When stoplight switch is ON	Battery positive voltage
		When brake pedal is not depressed	When stoplight switch is OFF	0 V
5	Pump power supply	Ignition switch: ON Main switch: ON Stoplight switch: ON (When brake pedal is not depressed)		Battery positive voltage
6	ECU power supply	Ignition switch: ON		Battery positive voltage
7	Release valve	When decelerating with the "SET" switch while driving at constant speed		Battery positive voltage
8	Control valve			Battery positive voltage
7	Release valve	When cancelling constant speed driving with the "CANCEL" switch		Battery positive voltage
8	Control valve			Battery positive voltage
9	Auto-cruise control switch output	At any time		0 V
10	Vehicle speed sensor input	When vehicle is moved forwards and backwards, sensor turns ON and OFF repeatedly	When sensor is ON	0 V
			When sensor is OFF	8 - 12 V*

TERMINAL NO.	INSPECTION ITEM	INSPECTION CONDITION		NORMAL CONDITION
12	ACC power supply	When main switch is ON		Approximately 9.0 V
		When input switch has not been operated	When all switches are OFF	Approximately 4.5 V
		When input switch is pushed down	When "SET" switch is ON	Approximately 1.5 V
		When input switch is pushed up	When "RESUME" switch is ON	Approximately 3.0 V
		When input switch is pulled forward	When "CANCEL" switch is ON	Approximately 0 V
13	Park/neutral position switch input	When select lever is in a position other than "N" or "P" range	When park/neutral position switch is OFF	Battery positive voltage
		When select lever is in "N" or "P" range	When park/neutral position switch is ON	0 V
14	Ground	At any time		0 V
15	Indicator light input (inside combination meter)	When main switch is ON	When indicator light is illuminated	0 V
		When main switch is OFF	When indicator light is switch off	Battery positive voltage
16	Auto-cruise vacuum pump motor input	When driving with the constant speed control	Motor stopped/running	Battery positive voltage/0 V
		When accelerating with the "ACCELERATOR" switch while driving at constant speed	Motor stopped/running	Battery positive voltage/0 V
		When decelerating with the "COAST" switch while driving at constant speed	Motor stopped	Battery positive voltage
		When cancelling constant speed driving with the "CANCEL" switch	Motor stopped	Battery positive voltage

NOTE: *: The No. 10 terminal of the auto-cruise control-ECU outputs a voltage of 5 V, but actually indicates 8 to 12 V, because a voltage circulates through the speedometer circuit.

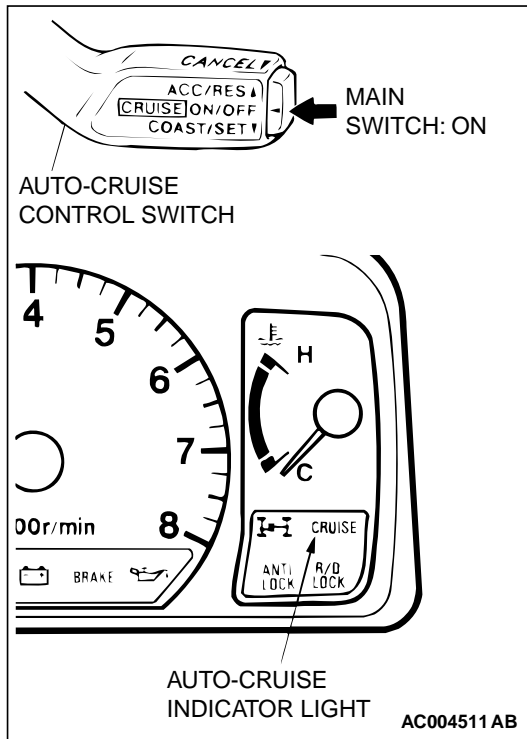
ON-VEHICLE SERVICE

AUTO-CRUISE CONTROL SWITCH CHECK

M1172001100206

AUTO-CRUISE CONTROL MAIN SWITCH CHECK

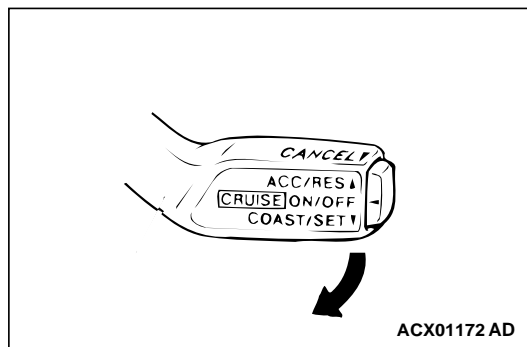
1. Turn the ignition switch to the "ON" position.
2. Check that the indicator light within the combination meter illuminates when the main switch is switched "ON".



AUTO-CRUISE CONTROL SETTING

1. Switch "ON" the main switch.
2. Drive at the desired speed, above approximately 40 km/h. (25 mph)
3. Push the auto-cruise control switch in the direction of arrow.
4. Check to be sure that when the switch is released the speed is the desired constant speed.

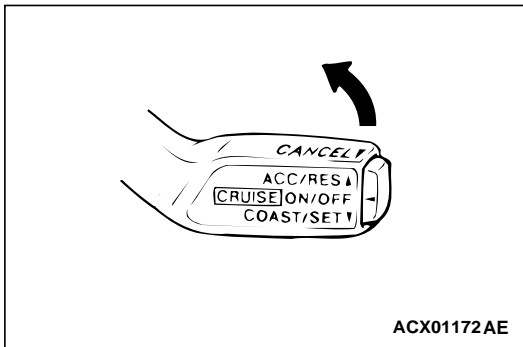
NOTE: If the vehicles speed decreases to approximately 15 km/h (9 mph) below the set speed because of climbing a hill for example, the auto-cruise control will be cancelled.



SPEED-INCREASE SETTING

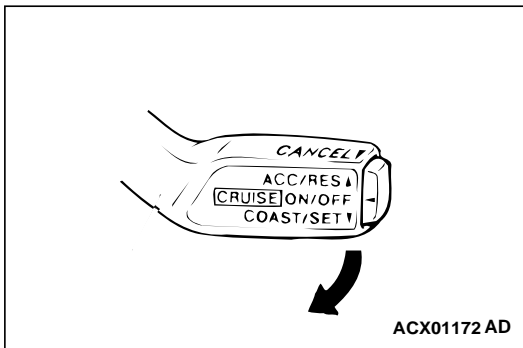
1. Set to the desired speed.
2. Push the auto-cruise control switch in the direction of arrow.
3. Check to be sure that acceleration continues while the switch is held, and that after it is released the constant speed at the time when it was released becomes the driving speed.

NOTE: Acceleration can be continued even if the vehicle speed has passed the high-speed limit [approximately 200 km/h (124 mph)]. But the speed when the auto-cruise control switch is released will be recorded as the high-speed limit.

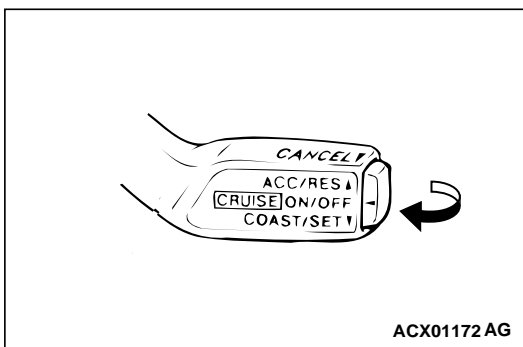
**SPEED-REDUCTION SETTING**

1. Set to the desired speed.
2. Push the auto-cruise control switch in the direction of arrow.
3. Check to be sure that deceleration continues while the switch is pressed, and that after it is released the constant speed at the time when it was released becomes the driving speed.

NOTE: When the vehicle speed reaches the low limit [approximately 40 km/h (25 mph)] during deceleration, the auto-cruise control will be cancelled.

**RETURN TO THE SET SPEED BEFORE CANCELLATION AND AUTO-CRUISE CONTROL CANCELLATION**

1. Set the auto-cruise speed control.
2. When any of the following operations are performed while at constant speed during auto-cruise control, check if normal driving is resumed and deceleration occurs.
 - (1) The auto-cruise control switch is pushed in the direction of arrow.
 - (2) The brake pedal is depressed.
 - (3) The selector lever is moved to the "N" range.
3. At a vehicle speed of 40 km/h (25 mph) or higher, check if when the "RESUME" switch is switched "ON," the vehicle speed returns to the speed before auto-cruise control driving was cancelled, and constant speed driving occurs.
4. When the main switch is turned to "OFF" while driving at constant speed, check if normal driving is resumed and deceleration occurs.



AUTO-CRUISE CONTROL SYSTEM COMPONENT CHECK

M1172001700219

STOPLIGHT SWITCH

Refer to GROUP 35A, On-vehicle Service – Essential Service
[P.35A-20](#).

PARK/NEUTRAL POSITION SWITCH ("N" POSITION)

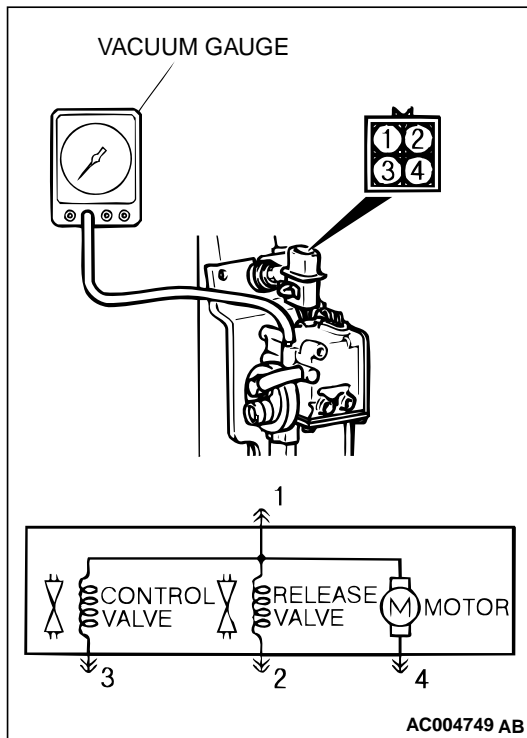
Refer to GROUP 23A, On-vehicle Service – Essential Service
[P.23Aa-21](#).

THROTTLE POSITION SENSOR

Refer to GROUP 13A, On-vehicle Service – Essential Service
[P.13Aa-20](#).

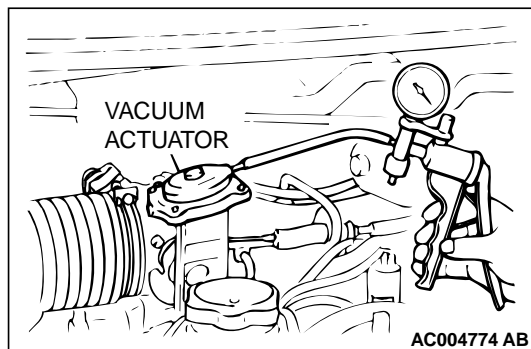
AUTO-CRUISE VACUUM PUMP

1. Disconnect the vacuum hose from the auto-cruise vacuum pump and connect a vacuum gauge to the vacuum pump.
2. Disconnect the vacuum pump connector.
3. Check the auto-cruise vacuum pump and valves according to the following procedure:
 - (1) Connect the positive battery terminal to auto-cruise vacuum pump connector terminal 1, and the negative battery terminal to terminals 2, 3, and 4. Then the vacuum gauge should read 27 kPa (8.0 in Hg) or more.
 - (2) The vacuum should be maintained when terminal 4 is disconnected from the negative battery terminal while terminals 1, 2, and 3 remain connected. Then the vacuum gauge should read 0 kPa (0 in Hg) when terminal 2 is disconnected from the negative battery terminal while terminals 1, and 3 remain connected.
 - (3) The vacuum should be maintained when terminal 4 is disconnected from the negative battery terminal while terminals 1, 2, and 3 remain connected. Then the vacuum gauge should read 0 kPa (0 in Hg) when terminal 3 is disconnected from the negative battery terminal while terminals 1, and 2 remain connected.



ACTUATOR CHECK

1. Disconnect the vacuum hose from the vacuum actuator, and connect a hand vacuum pump to the actuator.
2. Check that the throttle lever operates when applying vacuum, and the vacuum is maintained.

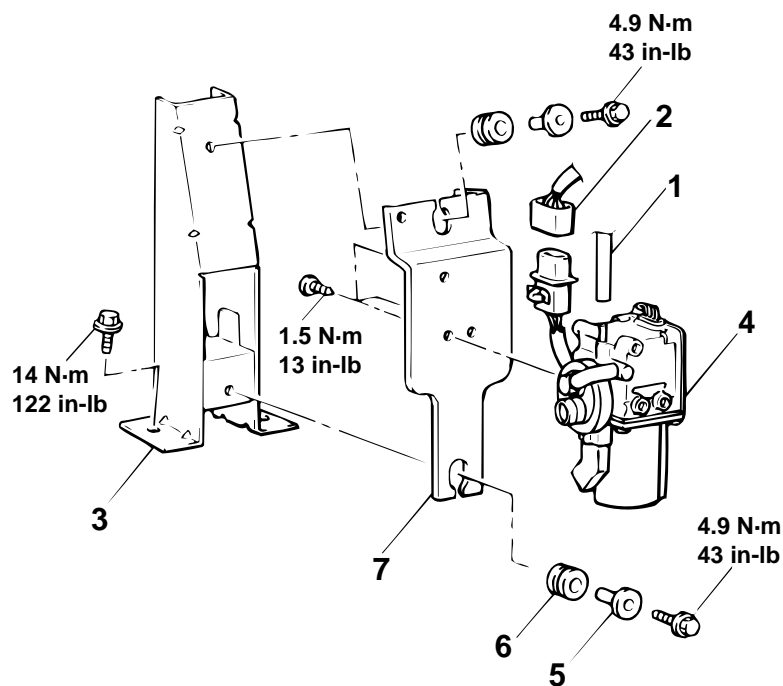
**VEHICLE SPEED SENSOR CHECK**

Refer to GROUP 54, Combination Meters Assembly and Vehicle Speed Sensor [P.54-108](#).

AUTO-CRUISE CONTROL REMOVAL AND INSTALLATION

<VACUUM PUMP>

M1172001400199



AC004514 AB

REMOVAL STEPS

1. VACUUM HOSE CONNECTION
2. VACUUM PUMP CONNECTOR
3. ACTUATOR BRACKET
4. VACUUM PUMP ASSEMBLY

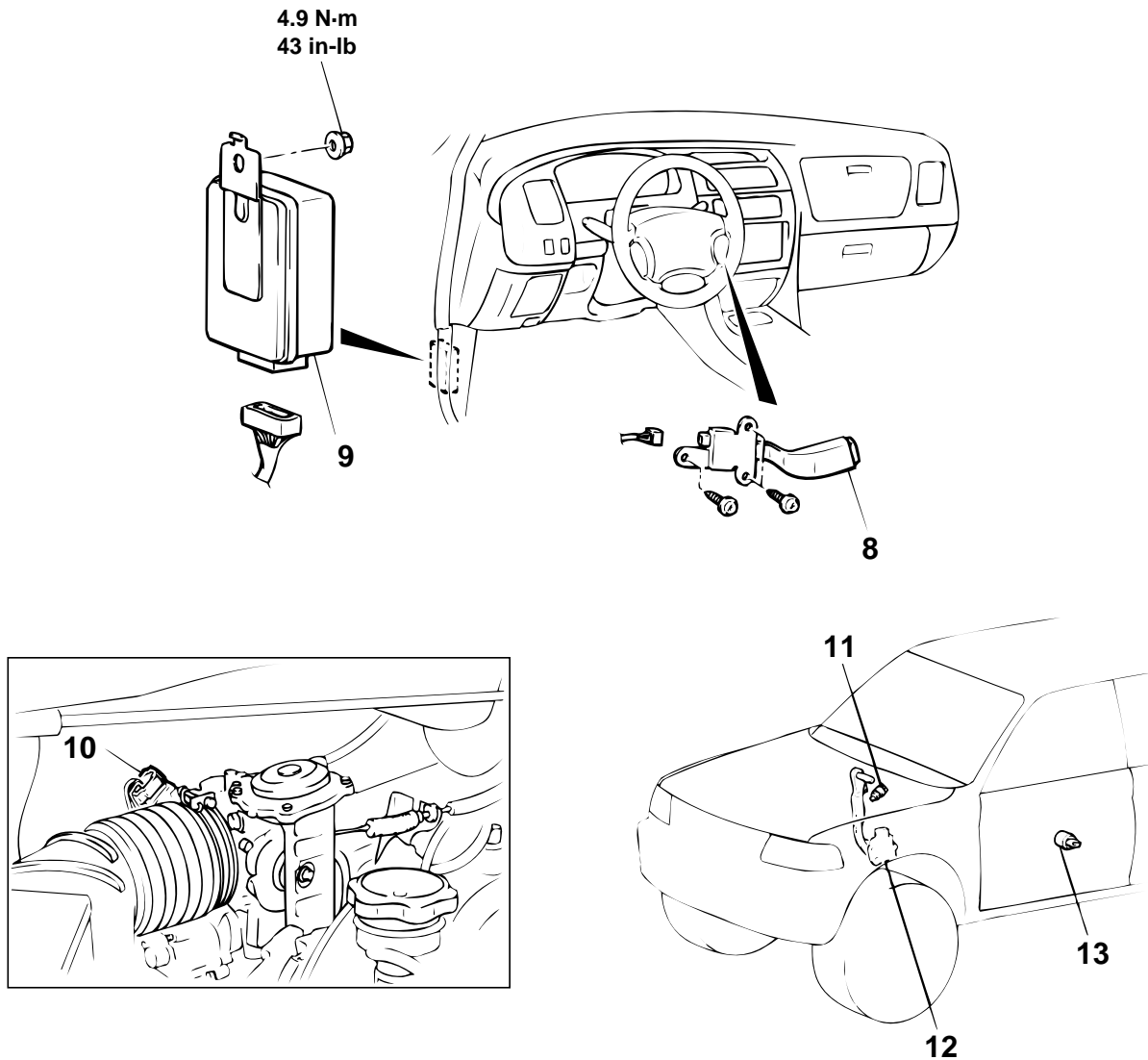
REMOVAL STEPS (Continued)

5. DISTANCE PIECE
6. RUBBER MOUNT
7. PUMP BRACKET

<SWITCHES, CONTROL UNIT AND SENSORS>

⚠ WARNING

Before removal of the air bag module, refer to **GROUP 52B, SRS Service Precautions and GROUP 52B, Air Bag Module and Clock Spring.**



AC004515 AB

CONTROL SWITCH REMOVAL STEPS

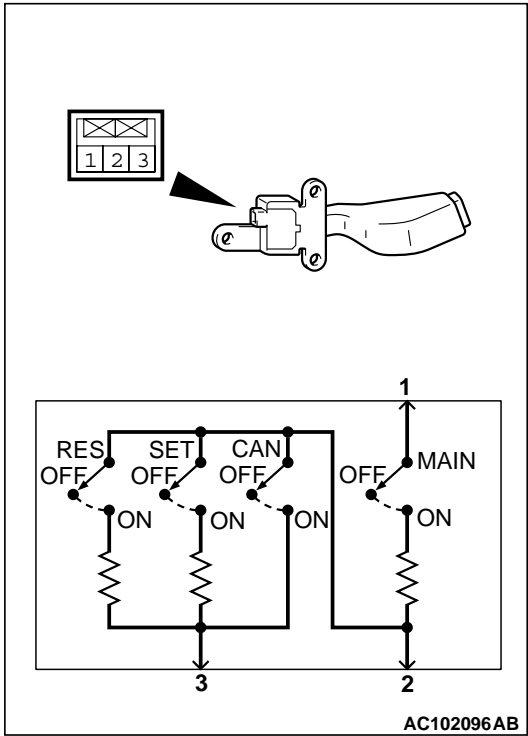
- AIR BAG MODULE (REFER TO GROUP 52B, AIR BAG MODULE AND CLOCK SPRING [P.52B-72.](#))
- 8. AUTO-CRUISE CONTROL SWITCH

CONTROL UNIT REMOVAL STEPS

- COWL SIDE TRIM (REFER TO GROUP 52A, TRIM [P.52A-36.](#))
- 9. AUTO-CRUISE CONTROL-ECU

SENSOR REMOVAL STEPS

10. THROTTLE POSITION SENSOR
11. STOPLIGHT SWITCH (REFER TO GROUP 35A, BRAKE PEDAL [P.35A-32.](#))
12. PARK/NEUTRAL POSITION SWITCH
13. VEHICLE SPEED SENSOR



AUTO-CRUISE CONTROL SWITCH CHECK

M1172001500077

Measure the resistance between the terminals when each of the "SET," "RESUM," "CANCEL" and "MAIN" switches is pressed. If the values measured at the time correspond to those in the table below, the resistance values are correct.

SWITCH POSITION	RESISTANCE BETWEEN TERMINALS	
"MAIN" switch "OFF"	Terminals 1 and 2	Open circuit
"MAIN" switch "ON"	Terminals 1 and 2	Approximately 3.9 kΩ
"CANCEL" switch ON	Terminals 2 and 3	Approximately 0 Ω
"RESUME" switch ON	Terminals 2 and 3	Approximately 910 Ω
"SET" switch ON	Terminals 2 and 3	Approximately 220 Ω

EMISSION CONTROL

GENERAL DESCRIPTION

M1173000100109

The emission control system consists of the following subsystems:

- Positive crankcase ventilation system
- Evaporative emission control system
- Exhaust emission control system

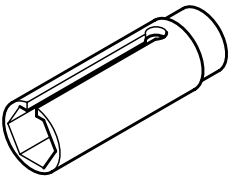
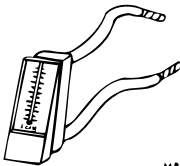
DIAGNOSIS

M1173000700093

SYMPTOM	PROBABLE CAUSE	REMEDY
Engine will not start or hard to start	Vacuum hose disconnected or damaged	Repair or replace
	The EGR valve is not closed.	Repair or replace
	Malfunction of the evaporative emission purge solenoid	Repair or replace
Rough idle or engine stalls	The EGR valve is not closed.	Repair or replace
	Vacuum hose disconnected or damaged.	Repair or replace
	Malfunction of the positive crankcase ventilation valve	Replace
	Malfunction of the purge control system	Check the system; If there is a problem, check its component parts.
Engine hesitates or poor acceleration	Malfunction of the exhaust gas recirculation system	Check the system; If there is a problem, check its component parts.
Excessive oil consumption	Positive crankcase ventilation line clogged	Check positive crankcase ventilation system
Poor fuel mileage	Malfunction of the exhaust gas recirculation system	Check the system; If there is a problem, check its component parts.

SPECIAL TOOLS

M1173000600115

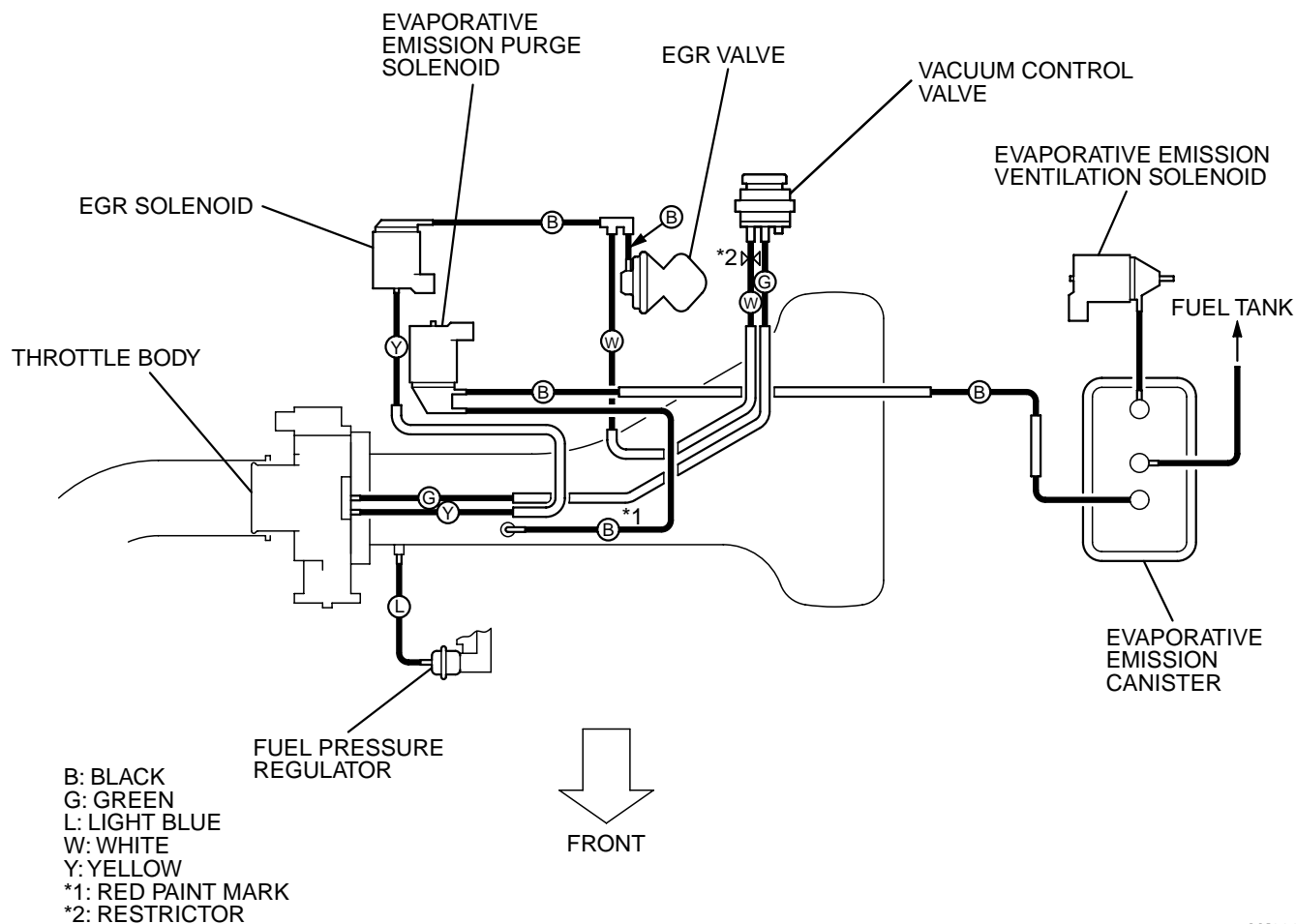
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MD998770 Oxygen sensor wrench	MD998770-01 or General service tool	Removal/installation of heated oxygen sensor
 MB991700	MB995061 Purge flow indicator	MLR6890A	Inspection of purge control system

VACUUM HOSES

VACUUM HOSE ROUTING

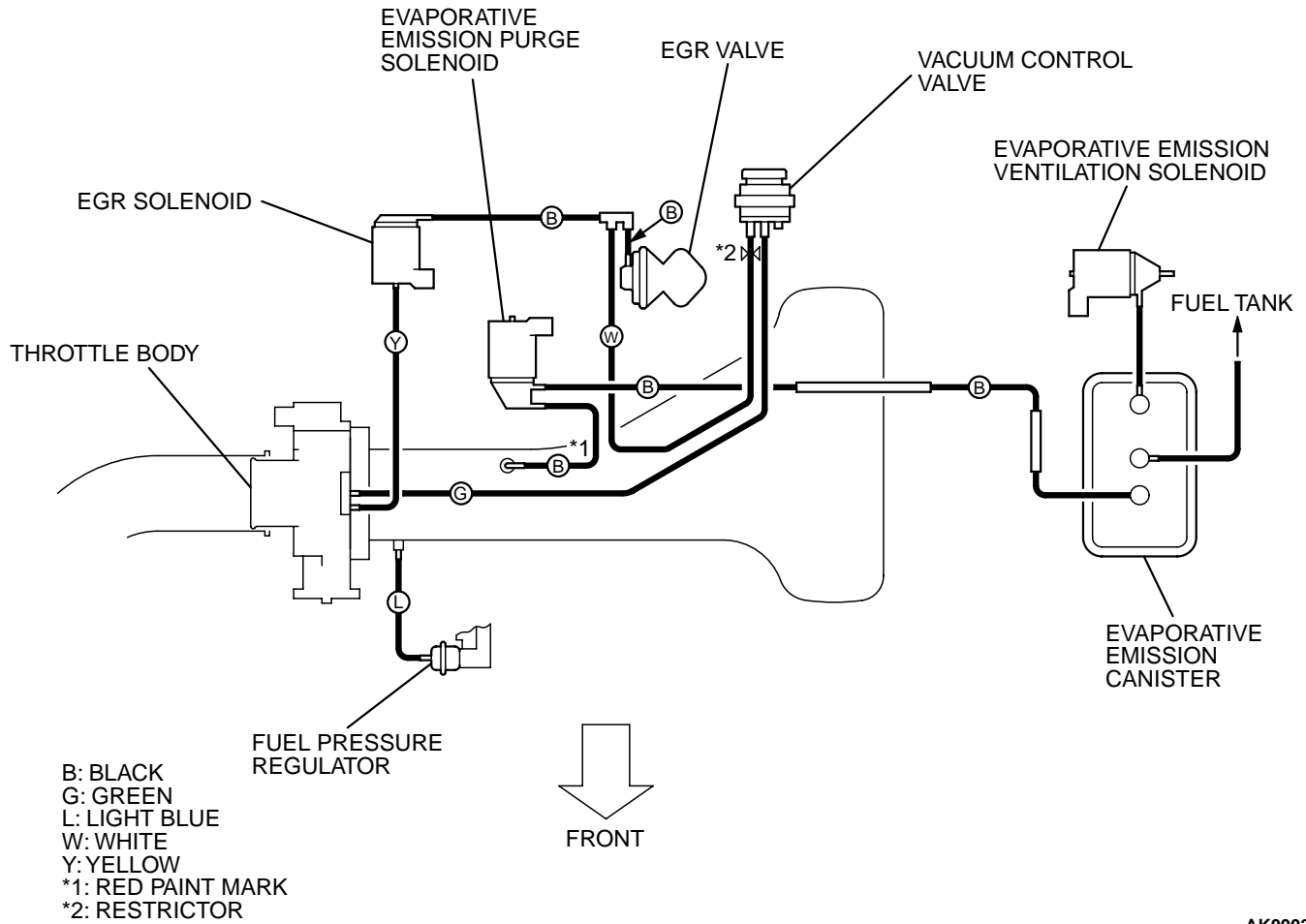
M1173000900161

<3.0 L ENGINE>



AK000264A

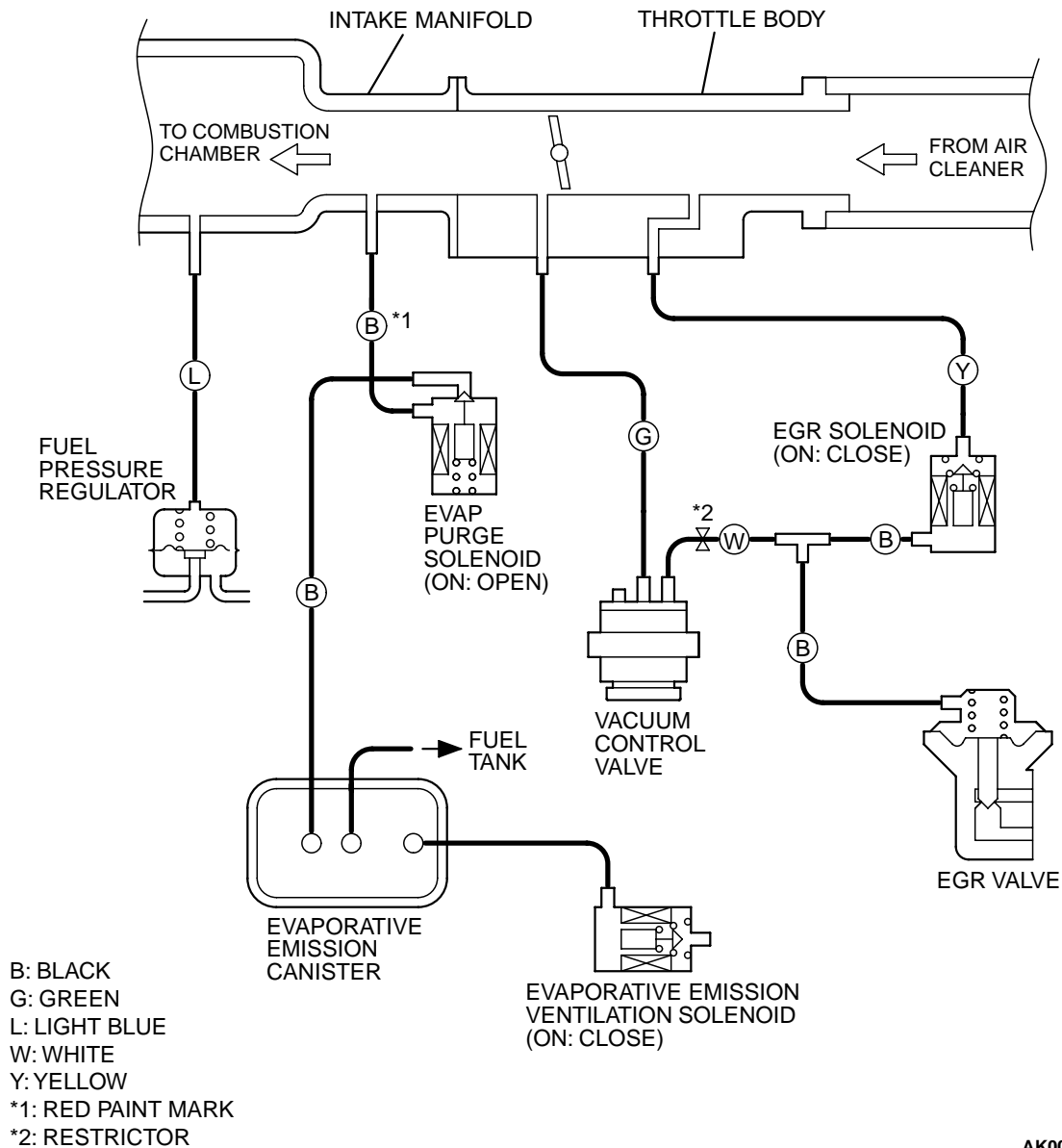
<3.5 L ENGINE>



AK000266A

VACUUM CIRCUIT DIAGRAM

M1173007100122



AK000267AB

VACUUM HOSE INSTALLATION

M1173007200055

1. When connecting the vacuum hoses, they should be securely inserted onto the nipples.
2. Connect the hoses correctly, using the VACUUM HOSE ROUTING as a guide.

VACUUM HOSE CHECK

M1173007300074

1. Using the VACUUM HOSE ROUTING as a guide, check that the vacuum hoses are correctly connected.
2. Check the connection of the vacuum hoses, (removed, loose, etc.) and check that there are no sharp bends or damage.

POSITIVE CRANKCASE VENTILATION SYSTEM

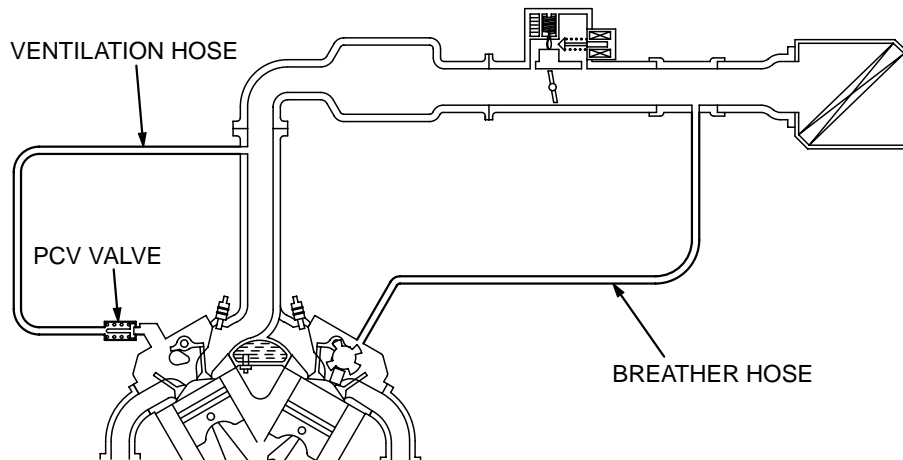
GENERAL INFORMATION (POSITIVE CRANKCASE VENTILATION SYSTEM)

M1173005000118

The positive crankcase ventilation system is a system for preventing the escape of blow-by gases from inside the crankcase into the atmosphere. Fresh air is sent from the cleaner into the crankcase through the breather hose to be mixed with the blow-by gas inside the crankcase. The blow-by gas inside the crankcase is drawn into the intake manifold through the positive crankcase ventilation (PCV) valve.

The PCV valve is designed to lift the plunger according to the intake manifold vacuum so as to regulate the flow of blow-by gas properly. In other words, the blow-by gas flow is regulated during low load engine operation to maintain engine stability, while the flow is increased during high load operation to improve the ventilation performance.

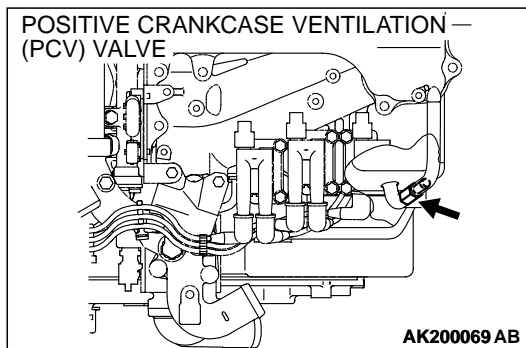
SYSTEM DIAGRAM



AKX00334 AB

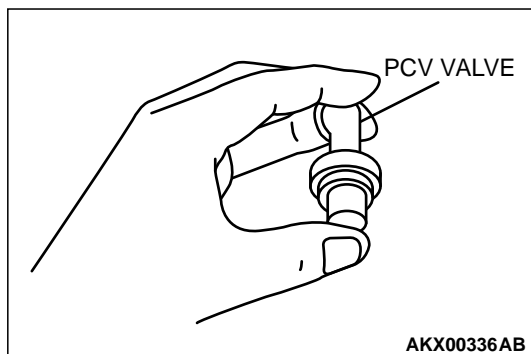
COMPONENT LOCATION

M1173007400101



CRANKCASE VENTILATION SYSTEM CHECK

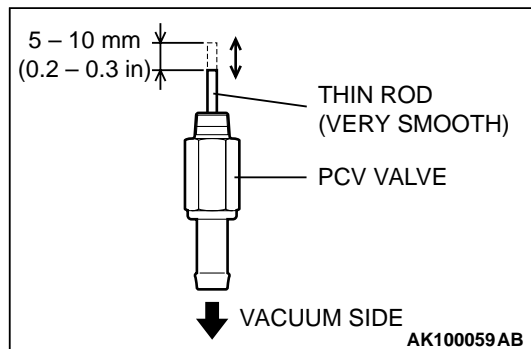
M1173001100113



1. Remove the positive crankcase ventilation (PCV) valve from the rocker cover, then reconnect the PCV valve to the vacuum supply hose.
2. With the engine idling, put your finger on the open end of the PCV valve, and check for negative pressure (vacuum).
NOTE: At this time, the plunger in the PCV valve should move back and forth as the open end is covered and uncovered.
3. If negative pressure is not felt, clean or replace the PCV valve. Inspect the vacuum supply hose and vacuum supply hose port for restriction or plugged condition.

POSITIVE CRANKCASE VENTILATION (PCV) VALVE CHECK

M1173001200143



1. Hold the PCV valve with the vacuum side down. Insert a thin rod, and using light pressure, depress the end of the PCV valve spring by 5 – 10 mm (0.2 – 0.3 inch). Release pressure on the rod to see if the PCV valve spring will lift the rod to its original position.
2. If the rod returns quickly to its original position, the PCV valve is OK. If the stick does not return quickly, clean or replace the PCV valve.

EVAPORATIVE EMISSION CONTROL SYSTEM**GENERAL INFORMATION**

M1173005100171

The evaporative emission control system prevents fuel vapors generated in the fuel tank from escaping into the atmosphere.

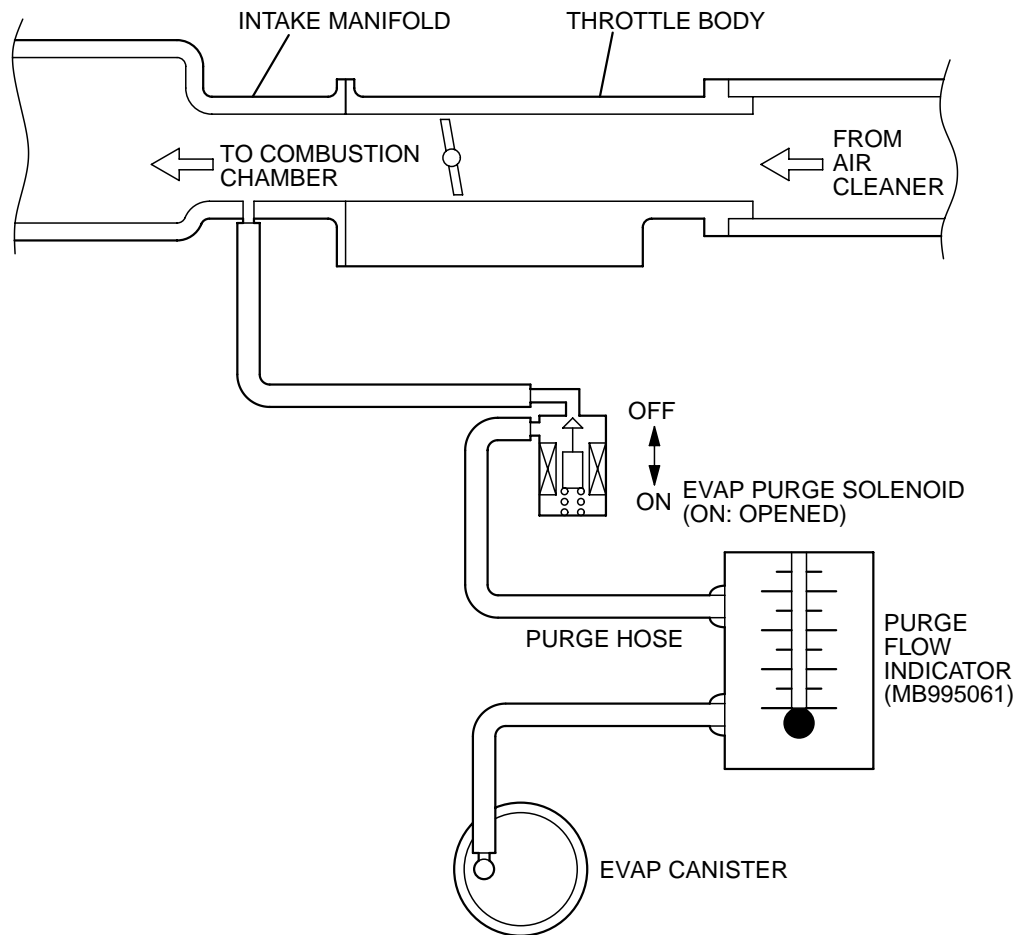
Fuel vapors from the fuel tank flow through the vapor pipe/hose to be stored temporarily in the evaporative emission (EVAP) canister. When the vehicle is in operation, fuel vapors stored in the EVAP canister flow through the EVAP purge solenoid, purge port and intake manifold plenum to the combustion chamber.

When the engine coolant temperature is low or when the intake air quantity is small (when the engine is at idle, for example), the powertrain control module (PCM) brings the EVAP purge solenoid into the OFF state to shut off the fuel vapor flow to the intake manifold plenum. This ensures the driveability when the engine is cold or running under low load and also stabilizes the emission level.

An EVAP ventilation solenoid is provided between the EVAP canister and atmosphere, and used to monitor for OBD-II EVAP leaks. This solenoid is normally OFF. However, it turns ON when monitoring the OBD-II EVAP leaks and shuts off the atmosphere flow to the EVAP canister. Then the fuel tank differential pressure sensor monitors the fuel vapor pressure to detect OBD-II EVAP leaks. The fuel vent valve and the leveling valve prevent fuel from being overfilled. The fuel cut off valve prevents fuel leaks just if the vehicle is rolled over in an accident. The vent valve releases the air from the fuel tank through the EVAP canister into the atmosphere when the fuel tank pressure increases due to refueling, etc. The vent valve and the air filter supply the atmospheric air to the EVAP canister when the fuel tank pressure decreases.

PURGE CONTROL SYSTEM CHECK (PURGE FLOW CHECK)

M1173001400114



AKX00340AB

Required Special Tool:

MB995061: Purge flow indicator

1. Disconnect the purge hose from the evaporative emission (EVAP) purge solenoid, and connect the special tool MB995061 between the EVAP purge solenoid and the purge hose.
2. Before inspection and adjustment, set the vehicle in the following conditions:
 - Engine coolant temperature: 80 – 95°C (176 – 203°F)
 - Lights and accessories: OFF
 - Transmission: P range
3. Run the engine at idle for more than four minutes.
4. Check the purge flow volume when the engine is revved several times.

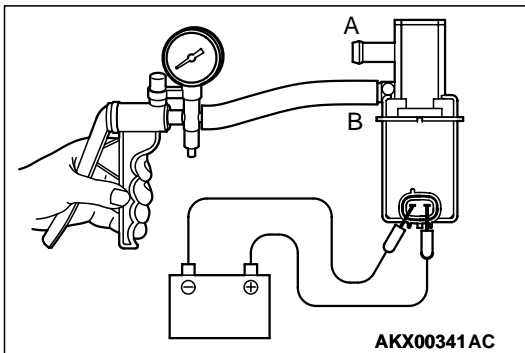
Standard value: Momentarily 20 cm³/sec. (2.5 SCFH) or more.

- If the purge flow volume is less than the standard value, check it again with the vacuum hose disconnected from the EVAP canister. If the purge flow volume is less than the standard value, check the vacuum port and the vacuum hose for clogging. Also check the evaporative emission purge solenoid. If the purge flow volume is at the standard value, replace the EVAP canister.

EVAPORATIVE EMISSION PURGE SOLENOID CHECK

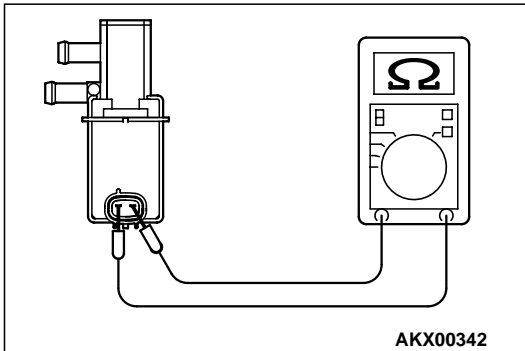
M1173001700148

- Disconnect the vacuum hose (black, black with red paint mark) from the EVAP purge solenoid valve.
NOTE: When disconnecting the vacuum hose, always place an identification mark so that it can be reconnected at its original position.



- Disconnect the harness connector.
- Connect a hand vacuum pump to nipple (B) of the EVAP purge solenoid valve (refer to the illustration at left).
- As described in the chart below, check airtightness by applying a vacuum with voltage applied directly from the battery to the EVAP purge solenoid valve and without applying voltage.

BATTERY POSITIVE VOLTAGE	NORMAL CONDITION
Applied	Vacuum leaks
Not applied	Vacuum maintained



- Measure the resistance between the terminals of the EVAP purge solenoid valve.

Standard value: 30 – 34 Ω [at 20°C (68°F)]

- Replace solenoid if resistance is out of specification.

VOLUME AIR FLOW SENSOR CHECK

M1173007900418

To inspect these parts, refer to GROUP 13A, Multiport Fuel Injection (MFI) Diagnosis – Diagnostic Trouble Code Chart [P.13Ab-21](#).

BAROMETRIC PRESSURE SENSOR CHECK

M1173008000203

To inspect these parts, refer to GROUP 13A, Multiport Fuel Injection (MFI) Diagnosis – Diagnostic Trouble Code Chart [P.13Ab-21](#).

ENGINE COOLANT TEMPERATURE SENSOR CHECK

M1173008100404

To inspect these parts, refer to GROUP 13A, Multiport Fuel Injection (MFI) Diagnosis – Diagnostic Trouble Code Chart [P.13Ab-21](#).

INTAKE AIR TEMPERATURE SENSOR CHECK

M1173008200207

To inspect these parts, refer to GROUP 13A, Multiport Fuel Injection (MFI) Diagnosis – Diagnostic Trouble Code Chart [P.13Ab-21](#).

FUEL TANK DIFFERENTIAL PRESSURE SENSOR CHECK

M1173007700135

To inspect the sensor, refer to GROUP 13B, Fuel tank – Fuel tank inspection [P.13B-10](#).

EVAPORATIVE EMISSION VENTILATION SOLENOID CHECK

M1173007800109

Refer to GROUP 17, Evaporative emission canister and fuel tank pressure relief valve – Fuel tank pressure relief valve inspection [P.17-102](#).

EXHAUST GAS RECIRCULATION (EGR) SYSTEM**GENERAL INFORMATION**

The exhaust gas recirculation (EGR) system lowers the nitrogen oxide (NOx) emission level. When the air/fuel mixture combustion temperature is high, a large quantity of NOx is generated in the combustion chamber. Therefore, this system recirculates part of exhaust gas from the exhaust port of the cylinder head to the combustion chamber through the intake manifold to decrease the air/fuel mixture combustion temperature, resulting in reduction of NOx. The EGR flow rate is controlled by the EGR valve so as not to decrease the driveability.

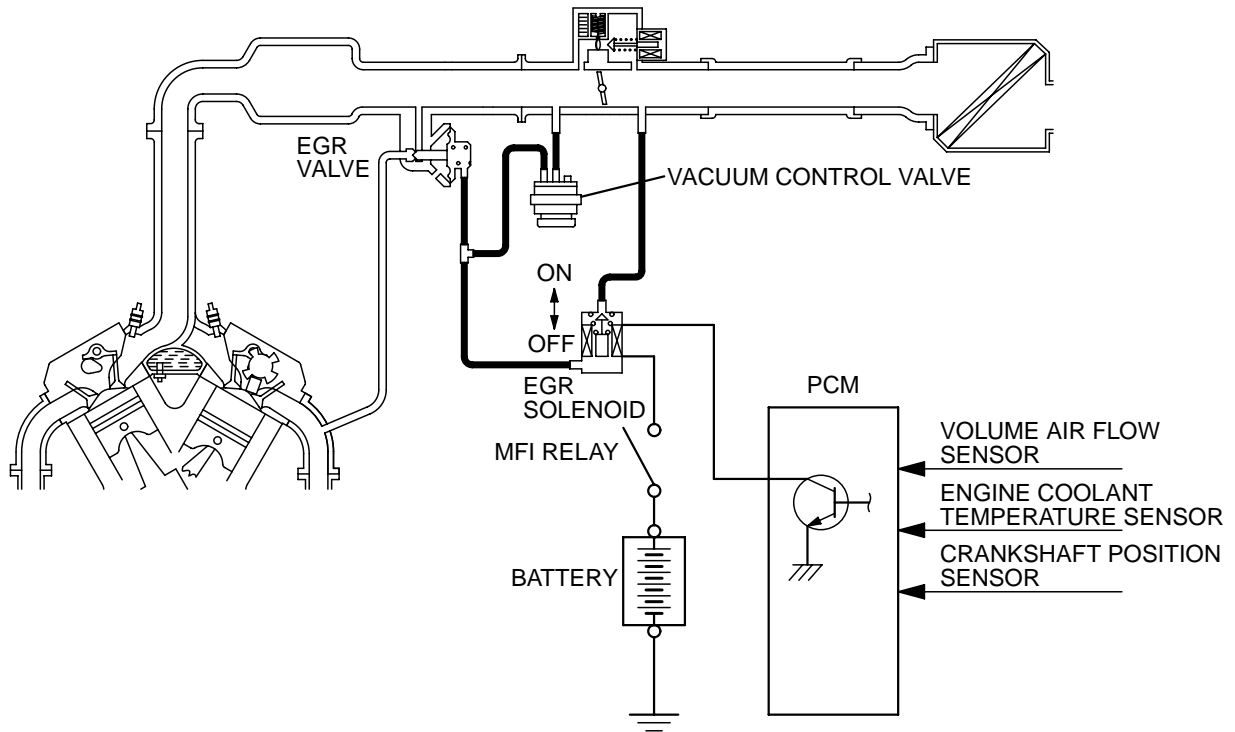
OPERATION

When the engine coolant temperature is low, when the engine is at idle or when a wide open throttle operation is performed, the EGR valve is kept closed, achieving no EGR. After warming up of the engine, the EGR valve can be opened by the powertrain control module.

The powertrain control module monitors the EGR system and illuminates the check engine/malfunction indicator lamp to indicate that there is a malfunction.

M1173005200112

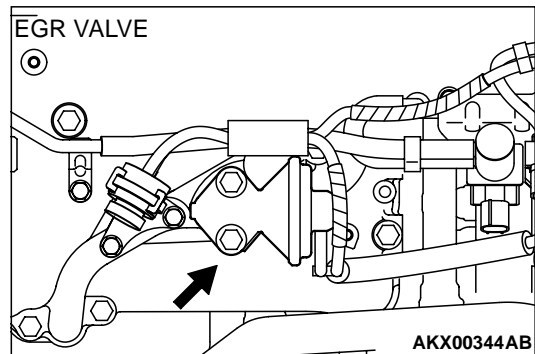
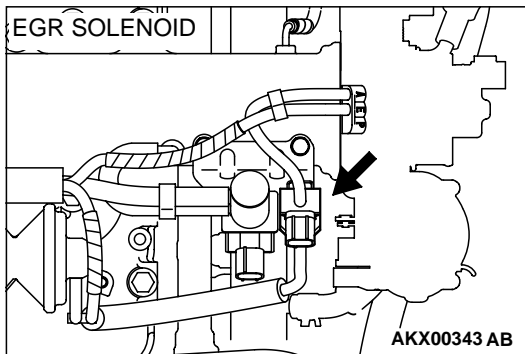
SYSTEM DIAGRAM

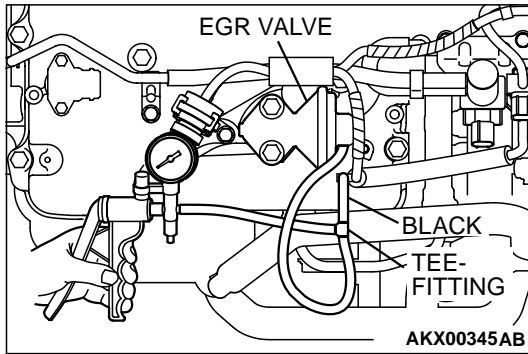


AKX00353AB

COMPONENT LOCATION

M1173007600097



**EGR SYSTEM CHECK**

M1173002600263

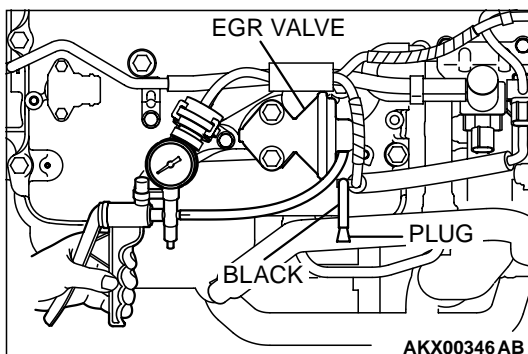
1. Disconnect the vacuum hose (green stripe or black) from the EGR valve, and then connect a hand vacuum pump via the tee-fitting terminal.
2. Start the engine. As described in the chart below, check the vacuum condition when the throttle valve is opened suddenly (revving) during cold and hot engine conditions. If the engine is hot and the vacuum dose not rise over 13 kPa (3.9 in Hg), perform the vacuum control valve check and EGR port vacuum check. Then continue to Step 3. If vacuum rises momentarily, proceed to Step 3.

When engine is cold [Engine coolant temperature: 20°C (68°F) or less]

THROTTLE VALVE	NORMAL VACUUM CONDITION
Open quickly	No vacuum (Remained as barometric pressure).

When engine is hot [Engine coolant temperature: 80°C (176°F) or less]

THROTTLE VALVE	NORMAL VACUUM CONDITION
Open quickly	Momentarily rise over 13 kPa (3.9 in Hg)



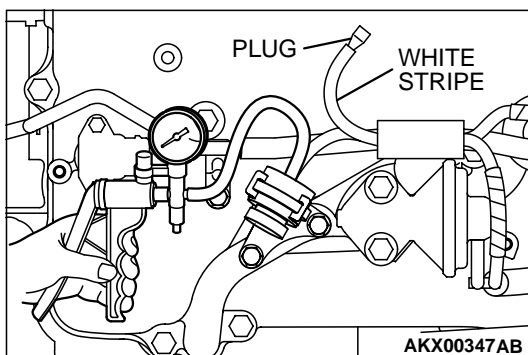
3. Stop the engine. Remove the tee-fitting and the hand vacuum pump.
4. Connect the hand vacuum pump directly to the EGR valve.
5. Start the engine and run at idle until warm.
6. The engine idling speed should be rough when a vacuum of 29 kPa (8.7 in Hg) or more is applied to the EGR valve.
7. If engine idles rough, EGR passage is open and the system is OK. If engine idle is not rough, the EGR passage and the valve must be checked for restrictions. Perform the EGR valve check. Then repeat the EGR system check.

VACUUM CONTROL VALVE CHECK

M1173002700163

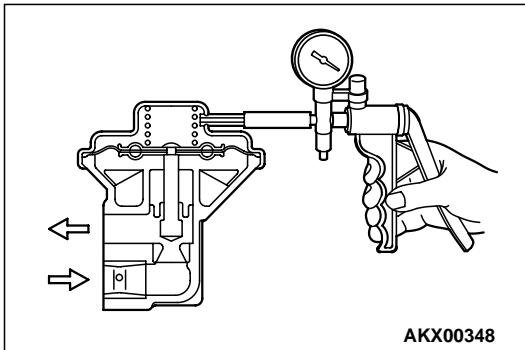
1. Disconnect the vacuum hose (white stripe) from the vacuum control valve and connect the hand vacuum pump to the vacuum control valve
2. Plug the end of the removed vacuum hose.
3. Start the engine and run at idle.
4. As described in the chart below, check the vacuum condition.

ENGINE CONDITION	NORMAL VACUUM CONDITION
Idling	Approximately 21.3 – 24.0 kPa (6.3 – 7.1 in Hg)



EGR VALVE CHECK

M1173002800171



1. Removal the EGR valve and inspect for sticking, carbon deposits, etc. If found, clean with a suitable solvent so that the valve seats correctly.
2. Connect a hand vacuum pump to the EGR valve.
3. Apply 67 kPa (20 in Hg) of vacuum, and check to be sure that the vacuum is maintained.
4. As described in the chart below, apply a vacuum and check the passage of air by blowing through one side of the EGR passage.

VACUUM	PASSAGE OF AIR
5.3 kPa (1.6 in Hg) or less	Air is not blown out
29 kPa (8.7 in Hg) or more	Air is blown out

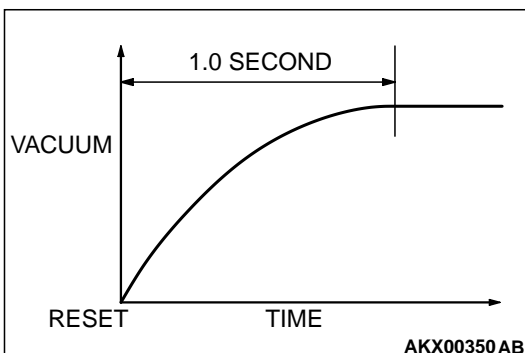
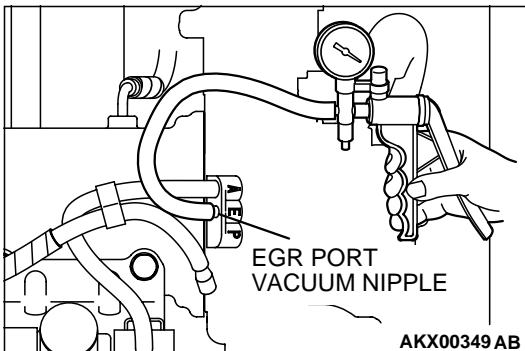
NOTE: Passage of air should be checked by blowing the valve port.

5. Reinstall the EGR valve, using a new gasket, and tighten to the specified torque.

Tightening torque: 22 ± 4 N·m (16 ± 3 ft-lb)

EGR PORT VACUUM CHECK

M1173002900093



1. Disconnect the vacuum hose (green stripe) from the throttle body EGR vacuum nipple and connect a hand vacuum pump to the nipple.

2. Start the engine.
3. Measure engine vacuum at idle.

Standard value: 51 kPa (15 in Hg) or more

4. Reset the vacuum pump to "0" (Release vacuum).
5. Using a stop watch, measure how long it takes for the vacuum gauge to reach 51 kPa (15 in Hg).

Standard value: 1.0 second or less

6. If it takes more than 1.0 second for the gauge to reach 51 kPa (15 in Hg), the EGR may be restricted and should be cleaned.

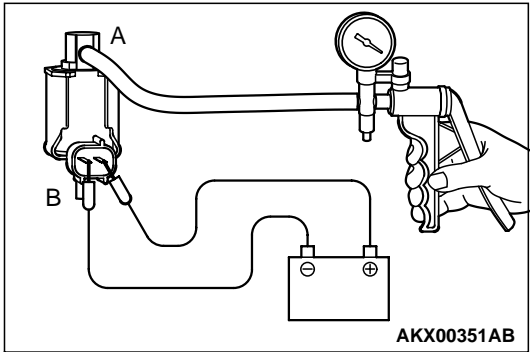
EGR SOLENOID CHECK

M1173003100164

1. Disconnect the vacuum hose (black, yellow stripe) from the EGR solenoid.

NOTE: When disconnecting the vacuum hose, always make sure that it can be reconnected at its original position.

2. Disconnect the harness connector.
3. Connect a hand vacuum pump to the nipple (A) of the EGR solenoid. (Refer to the illustration at left.)
4. As described in the chart below, check airtightness by applying a vacuum with voltage applied directly from the battery to the EGR solenoid and without applying voltage.

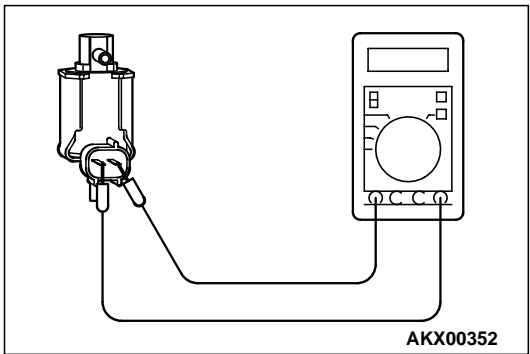


BATTERY POSITIVE VOLTAGE	NORMAL CONDITION
Not applied	Vacuum leaks
Applied	Vacuum maintained

5. Measure the resistance between the terminals of the EGR solenoid.

Standard value: 29 – 35 Ω [at 20°C (68°F)]

6. Replace solenoid if resistance is out of specification.



VOLUME AIR FLOW SENSOR CHECK

M1173007900429

To inspect these parts, refer to GROUP 13A, Multiport Fuel Injection (MFI) Diagnosis – Diagnostic Trouble Code Chart [P.13Ab-21](#).

ENGINE COOLANT TEMPERATURE SENSOR CHECK

M1173008100415

To inspect these parts, refer to GROUP 13A, Multiport Fuel Injection (MFI) Diagnosis – Diagnostic Trouble Code Chart [P.13Ab-21](#).

CRANKSHAFT POSITION SENSOR CHECK

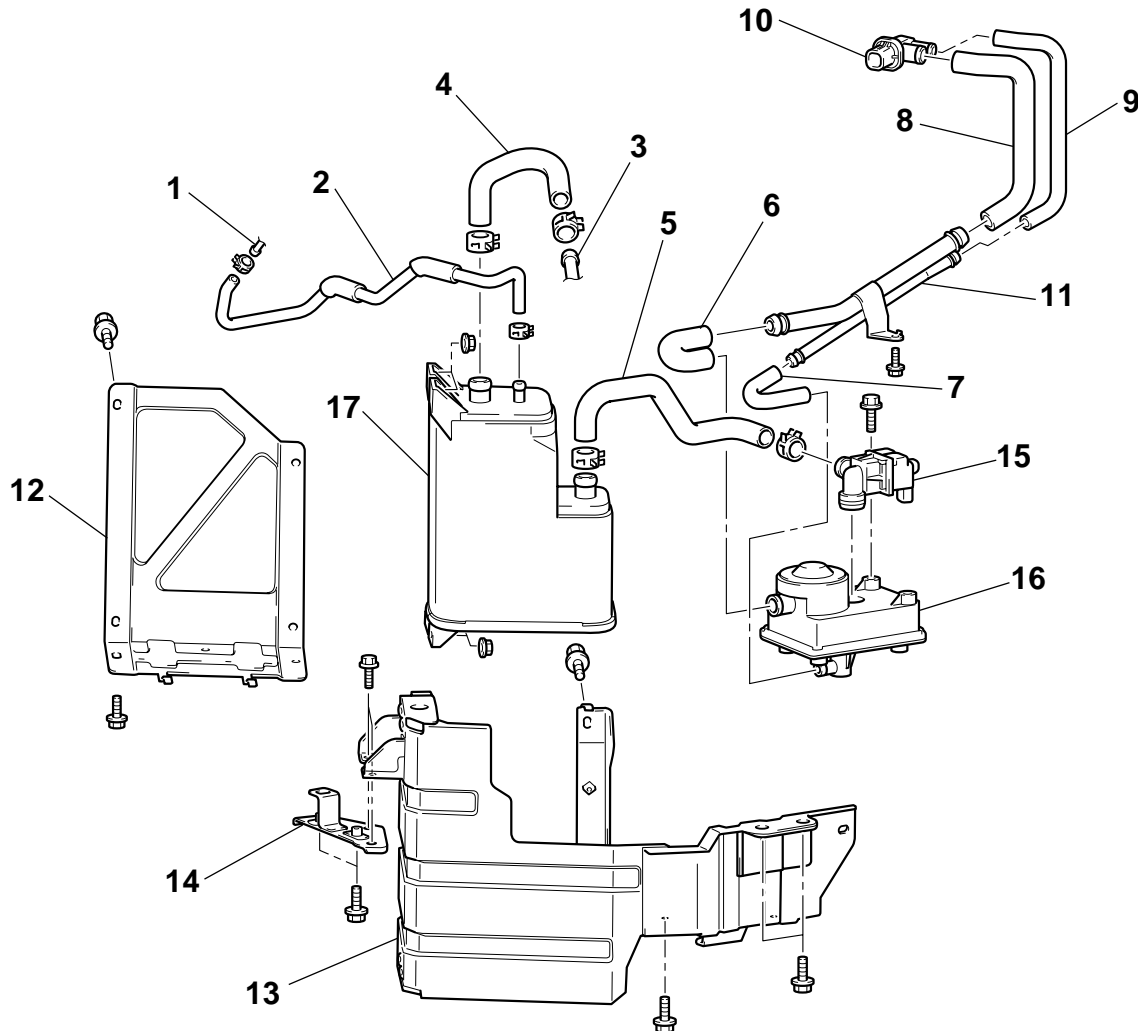
M1173008300215

To inspect these parts, refer to GROUP 13A, Multiport Fuel Injection (MFI) Diagnosis – Diagnostic Trouble Code Chart [P.13Ab-21](#).

EVAPORATIVE EMISSION CANISTER AND FUEL TANK PRESSURE RELIEF VALVE

REMOVAL AND INSTALLATION

M1173004800230



AC004550 AB

REMOVAL STEPS

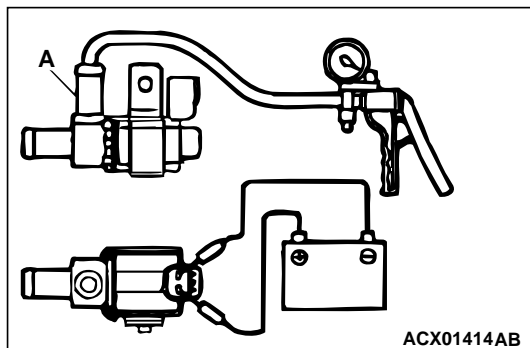
1. PURGE PIPE CONNECTION
2. PURGE HOSE
3. VAPOR PIPE CONNECTION
4. VAPOR HOSE
5. VENT HOSE A
6. VENT HOSE B
7. VENT HOSE C
8. VENT HOSE D
9. VENT HOSE E

REMOVAL STEPS (Continued)

10. VENT PIPE
11. VENT PIPE
12. CANISTER COVER
13. CANISTER COVER ASSEMBLY
14. CANISTER BRACKET D
15. SOLENOID VALVE
16. OVER VENT VALVE MODULE
17. CANISTER ASSEMBLY

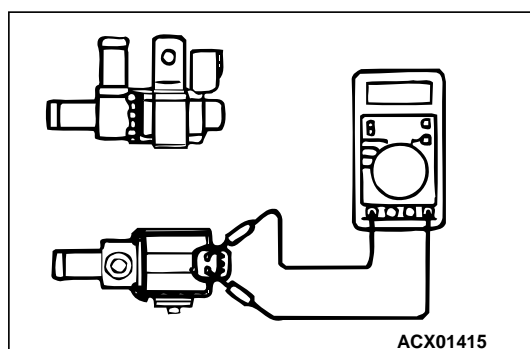
INSPECTION

M1173004900077

EVAPORATIVE EMISSION VENTILATION
SOLENOID CHECK

1. Connect a hand vacuum pump to nipple (A) of the solenoid.
2. Check air tightness by applying a vacuum with voltage applied directly from the battery to the evaporative emission ventilation solenoid and without applying voltage.

BATTERY VOLTAGE	NORMAL CONDITION
Applied	Vacuum maintained
Not applied	Vacuum leaks



3. Measure the resistance between the terminals of the solenoid.

Standard value: 17 – 21 Ω [at 20°C (68°F)]

CATALYTIC CONVERTER

GENERAL DESCRIPTION

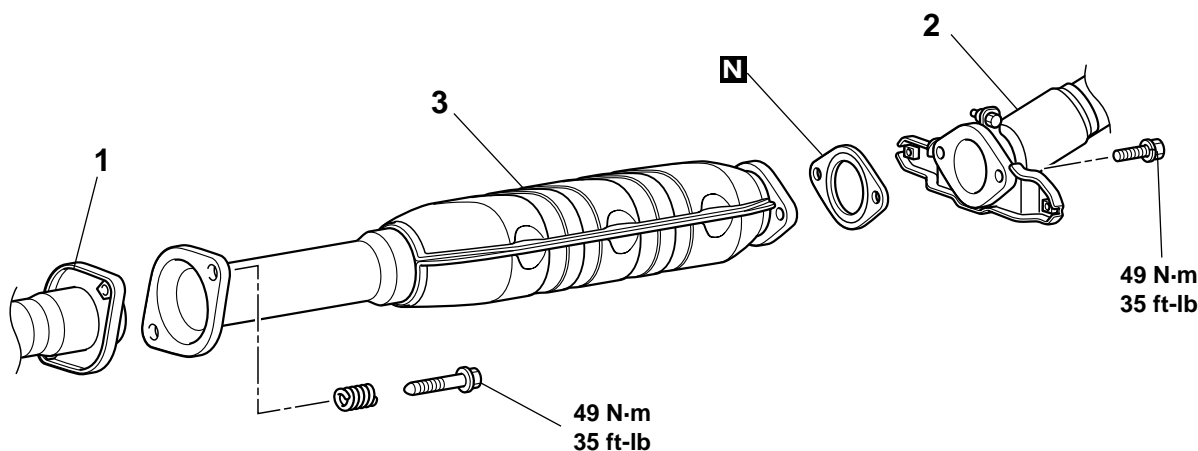
The three-way catalytic converter, together with the closed loop air-fuel ratio control based on the oxygen sensor signal, oxidizes carbon monoxides (CO) and hydrocarbons (HC) and reduces nitrogen oxides (NOx).

When the mixture is controlled at stoichiometric air-fuel ratio, the three-way catalytic converter provides the highest purification against the three constituents, namely, CO, HC and NOx.

M1173005300089

REMOVAL AND INSTALLATION

M1173003900267



AC004435 AB

REMOVAL STEPS

1. FRONT EXHAUST PIPE

REMOVAL STEPS (Continued)

2. CENTER EXHAUST PIPE
3. CATALYTIC CONVERTER

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1173006400227

ITEM	SPECIFICATION
Engine control system	
Accelerator cable attaching bolt	6.9 N·m (61 in-lb)
Auto-cruise control system	
Actuator bracket attaching bolt	14 N·m (122 in-lb)
Auto-cruise control-ECU attaching nut	4.9 N·m (43 in-lb)
Pump bracket attaching bolt	4.9 N·m (43 in-lb)
Vacuum pump attaching bolt	1.5 N·m (13 in-lb)
Emission control system	
Catalytic converter bolt	49 N·m (35 ft-lb)
EGR valve bolt	22 ± 4 N·m (16 ± 3 ft-lb)

SERVICE SPECIFICATIONS

M1173000300158

ITEMS		STANDARD VALUE
Emission control system	EGR solenoid coil resistance [at 20°C (68°F)] Ω	29 – 35
	Evaporative emission purge solenoid coil resistance [at 20°C (68°F)] Ω	30 – 34
	Evaporative emission ventilation solenoid coil resistance [at 20°C (68°F)] Ω	17 – 21

NOTES