GROUP 13Aa

MULTIPORT FUEL INJECTION (MFI)

CONTENTS

GENERAL DESCRIPTION

M1131000100455

The Multiport Fuel Injection System consists of sensors which detect the engine conditions, the POWERTRAIN CONTROL MODULE (PCM) which controls the system based on signals from these sensors, and actuators which operate under the control of the PCM.
The PCM carries out activities such as fuel injection control, idle air control, and ignition timing control. In addition, the PCM is equipped with several diagnostic test modes which simplify troubleshooting when a problem develops.

FUEL INJECTION CONTROL

The injector drive times and Injection timing are controlled so that the optimum air/fuel mixture is supplied to the engine to correspond to the continually-changing engine operation conditions.
A single injector is mounted at the intake port of each cylinder. Fuel is sent under pressure from the fuel tank to the fuel injectors by the fuel pump, with the pressure being regulated by the fuel pressure regulator. The regulated fuel is distributed to each of the injectors.
Fuel injection is normally carried out once for each cylinder for every two rotations of the crankshaft. The firing order is 1-2-3-4-5-6. Each cylinder has a dedicated fuel injector. This is called multiport.
The PCM provides a richer air/fuel mixture by carrying out "open-loop" control when the engine is cold or operating under high load conditions in order to maintain engine performance.In addition, when the engine is under normal operating temperature after warming-up, the PCM controls the air/fuel mixture by using the heated oxygen sensor signal to carry out "closed-loop" control. The closed-loop control achieves the theoretical air/fuel mixture ratio where the catalytic converter can obtains the maximum cleaning performance.

IDLE AIR CONTROL

The idle speed is kept at the optimum speed by controlling the amount of air that bypasses the throttle valve in accordance with changes in idling conditions and engine load during idling.
The PCM drives the idle air control (IAC) motor to keep the engine running at the pre-set idle target speed in accordance with the engine coolant temperature and A/C and other electrical load. In addition, when the A/C switch is turned off and on while the engine is idling, the IAC motor adjusts the throttle valve bypass air amount according to the engine load conditions to avoid fluctuations in the engine speed.

IGNITION TIMING CONTROL

The ignition power transistor located in the ignition primary circuit turns ON and OFF to control the primary current flow to the ignition coil. This controls the ignition timing to provide the optimum ignition timing with respect to the engine operating conditions. The ignition timing is determined by the PCM from engine speed, intake air volume, engine coolant temperature, and atmospheric pressure.

DIAGNOSTIC TEST MODE

- When an abnormality is detected in one of the sensors or actuators related to emission control, the Malfunction Indicator Lamp (SERVICE ENGINE SOON or Check Engine Lamp) illuminates to warn the driver.
- When an abnormality is detected in one of the sensors or actuators, a diagnostic trouble code corresponding to the abnormality is stored in the PCM.
- The RAM data inside the PCM that is related to the sensors and actuators can be read with the scan tool. In addition, the actuators can be controlled by scan tool MUT-II (MB991502) under certain circumstances.

OTHER CONTROL FUNCTIONS

Fuel Pump Control

- Turns the fuel pump relay ON so that current is supplied to the fuel pump while the engine is cranking or running.

A/C Compressor Clutch Relay Control

- Turns the compressor clutch of the A/C ON and OFF.

Evaporative Emission Purge Control

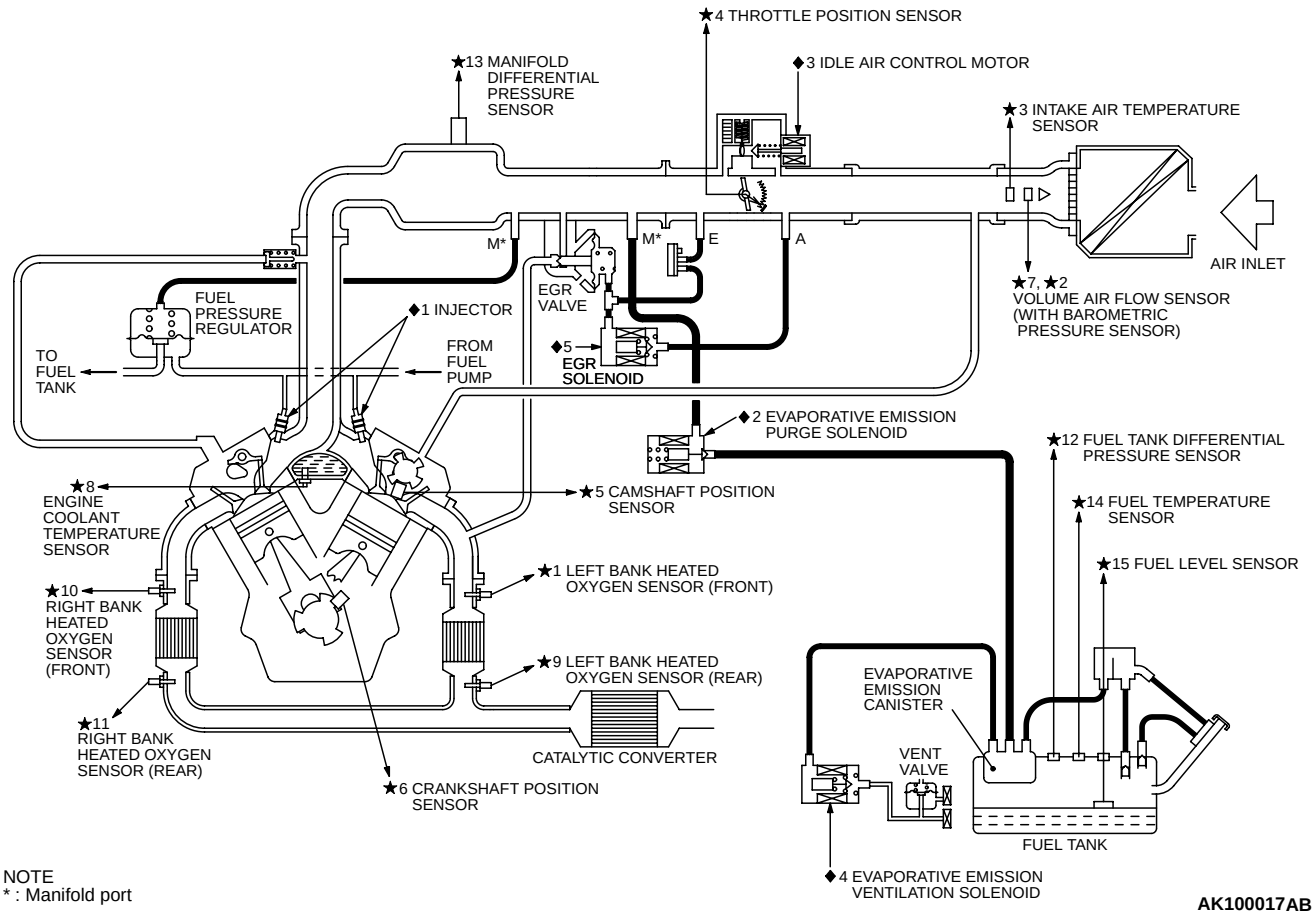
- (Refer to GROUP 17, Emission Control System – Evaporative Emission Control System – General DescriptionP.17-92.)

EGR Control

- (Refer to GROUP 17, Emission Control System – Exhaust Gas Recirculation (EGR) System - General DescriptionP.17-96.)

MULTIPORT FUEL INJECTION (MFI) SYSTEM DIAGRAM

SENSE	DECIDE	ACT
★1 LEFT BANK HEATED OXYGEN SENSOR (FRONT) ★2 VOLUME AIR FLOW SENSOR ★3 INTAKE AIR TEMPERATURE SENSOR ★4 THROTTLE POSITION SENSOR ★5 CAMSHAFT POSITION SENSOR ★6 CRANKSHAFT POSITION SENSOR ★7 BAROMETRIC PRESSURE SENSOR ★8 ENGINE COOLANT TEMPERATURE SENSOR ★9 LEFT BANK HEATED OXYGEN SENSOR (REAR) ★10 RIGHT BANK HEATED OXYGEN SENSOR (FRONT) ★11 RIGHT BANK HEATED OXYGEN SENSOR (REAR) ★12 FUEL TANK DIFFERENTIAL PRESSURE SENSOR ★13 MANIFOLD DIFFERENTIAL PRESSURE SENSOR ★14 FUEL TEMPERATURE SENSOR ★15 FUEL LEVEL SENSOR ● POWER SUPPLY ● VEHICLE SPEED SENSOR ● A/C SWITCH ● PARK/NEUTRAL POSITION SWITCH ● POWER STEERING PRESSURE SWITCH ● IGNITION SWITCH - ST ● KNOCK SENSOR	PCM	◆1 INJECTOR ◆2 EVAPORATIVE EMISSION PURGE SOLENOID ◆3 IDLE AIR CONTROL MOTOR ◆4 EVAPORATIVE EMISSION VENTILATION SOLENOID ◆5 EGR SOLENOID ● FUEL PUMP RELAY ● MULTIPORT FUEL INJECTION (MFI) RELAY ● A/C COMPRESSER CLUTCH RELAY ● SERVICE ENGINE SOON/ MALFUNCTION INDICATOR LAMP ● DIAGNOSTIC OUTPUT ● IGNITION COIL, IGNITION POWER TRANSISTER



NOTE: For the vacuum routing, refer to GROUP 17, Emission Control System – Vacuum Hoses – Vacuum Hose Routing P.17-88.

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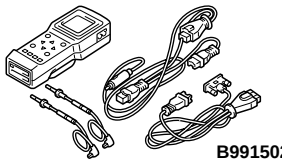
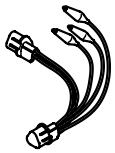
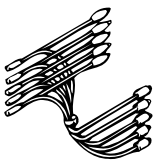
SPECIAL TOOLS

M1131000600137

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 B991502	MB991502 Scan tool <MUT-II>	MB991496-OD	• Reading diagnostic trouble code • MFI system inspection • Measurement of fuel pressure
 MB991348	MB991348 Test harness set	MB991348-01	• Adjustment of throttle position sensor • Inspection using an oscilloscope
	MB991709 Test harness set	MB991709-01	• Inspection using an oscilloscope • Inspection of idle air control motor
	MD998474 Test harness (8 pin, square)	MD998474-01	Inspection using an oscilloscope
	MD998464 Test harness (4 pin, square)	MD998464-01	Inspection of heated oxygen sensor
	MB991316 Test harness (4 pin, square)	Tool not available	Inspection of heated oxygen sensor
	MD998478 Test harness (3 pin, triangle)	MD998478-01	Inspection using an oscilloscope
 MB991658	MB991658 Test harness SET	Tool not available	Inspection using an oscilloscope

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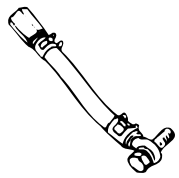
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
 MB991637	MB991637 Fuel pressure gauge set	Tool not available	Measurement of fuel pressure
	MD998709 Adaptor hose	MIT210196	Measurement of fuel pressure
	MD998742 Hose adaptor	MD998742-01	Measurement of fuel pressure

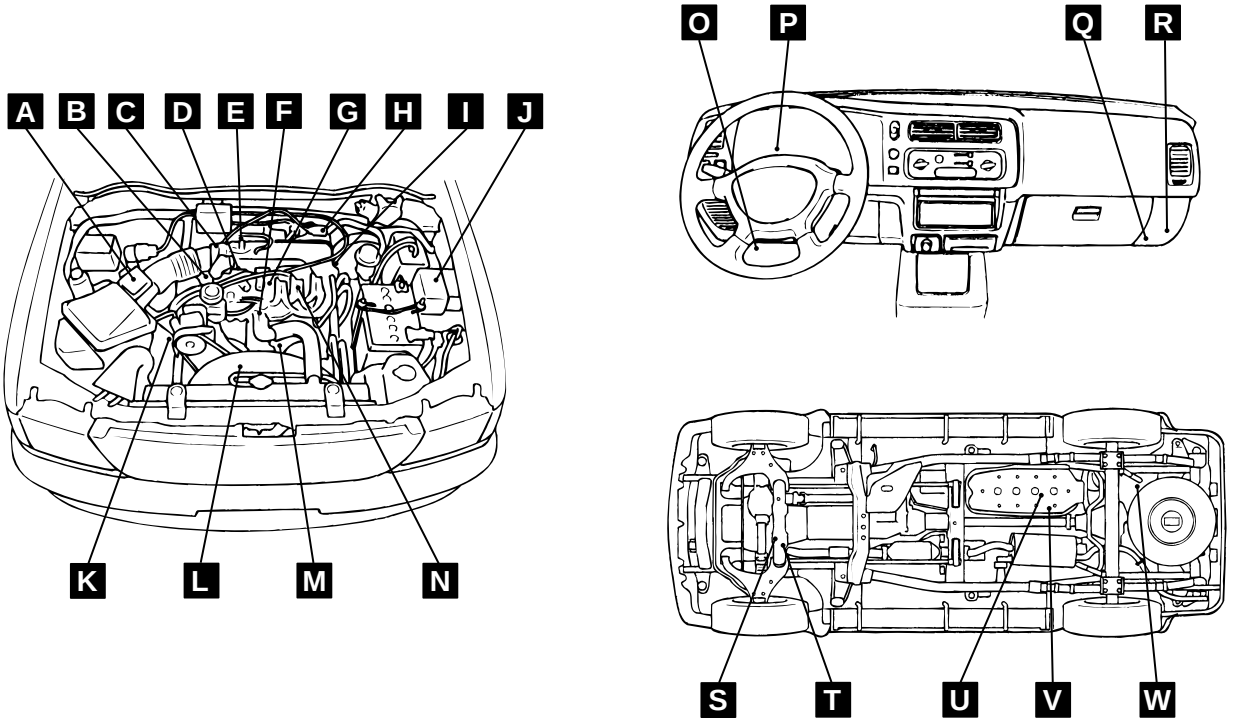
ON-VEHICLE SERVICE

COMPONENT LOCATION

M1131002100417

NAME	SYMBOL	NAME	SYMBOL
Air conditioning compressor clutch relay	J	Injector	G
Camshaft position sensor	M	Left bank heated oxygen sensor (front)	I
Crankshaft position sensor	L	Left bank heated oxygen sensor (rear)	T
Data link connector	O	Manifold differential pressure sensor	H
EGR solenoid	E	Multiport fuel injection (MFI) relay/ fuel pump relay	Q
Engine coolant temperature sensor	F	Power steering pressure switch	K
Evaporative emission purge solenoid	E	Powertrain control module	R
Evaporative emission ventilation solenoid	W	Right bank heated oxygen sensor (front)	D
Fuel tank differential pressure sensor	U	Right bank heated oxygen sensor (rear)	S

NAME	SYMBOL	NAME	SYMBOL
Fuel temperature sensor	V	Malfunction Indicator Lamp (SERVICE ENGINE SOON or Check Engine Lamp)	P
Idle air control motor	B	Throttle position sensor	C
Ignition coil/ignition power transistor	N	Volume air flow sensor (with built-in intake air temperature sensor and barometric pressure sensor	A



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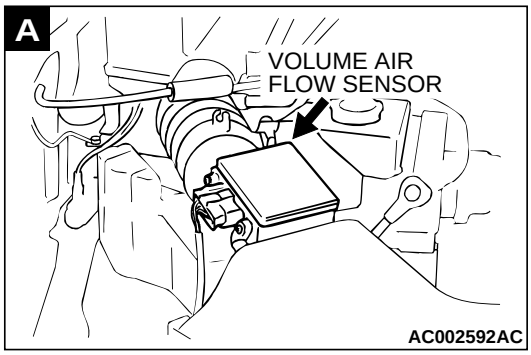

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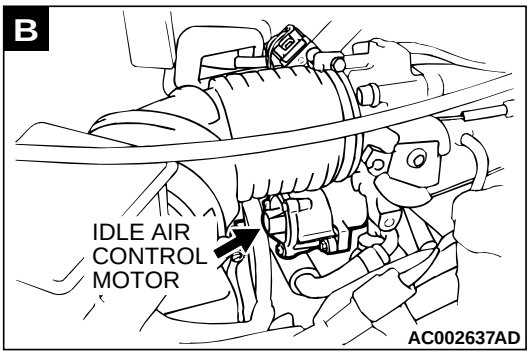

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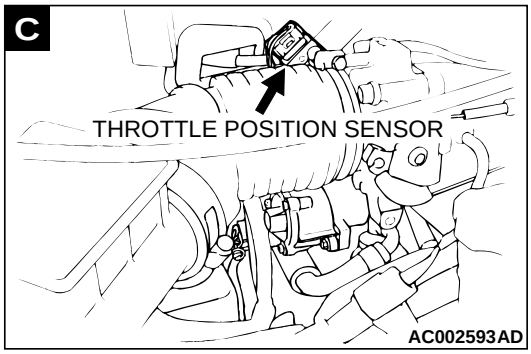
C


THROTTLE POSITION SENSOR
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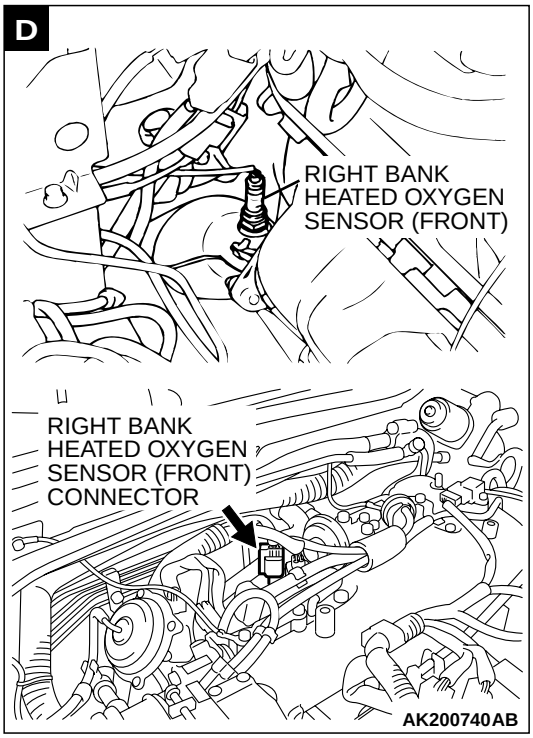
D


RIGHT BANK
HEATED OXYGEN
SENSOR (FRONT)
RIGHT BANK
HEATED OXYGEN
SENSOR (FRONT)
CONNECTOR
AK200740AB

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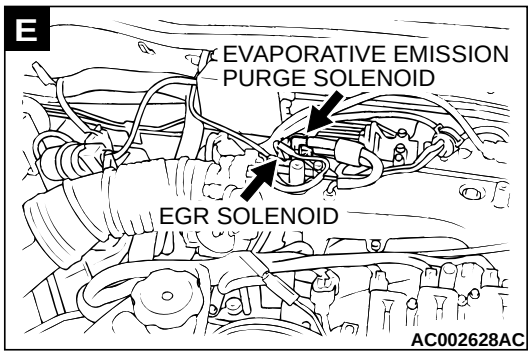
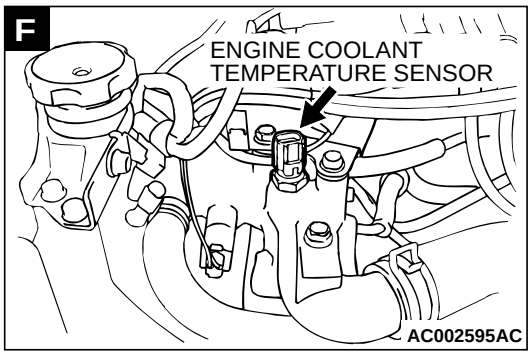

EVAPORATIVE EMISSION
PURGE SOLENOID
EGR SOLENOID
AC002628AC

F


ENGINE COOLANT
TEMPERATURE SENSOR
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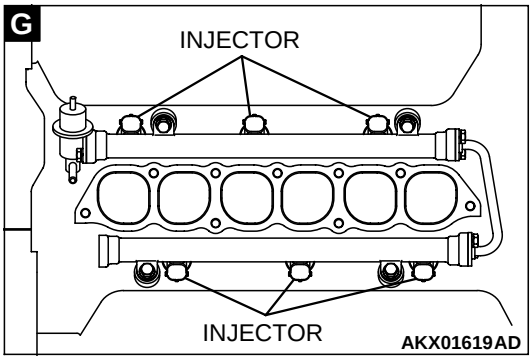
INJECTOR
INJECTOR
AKX01619AD

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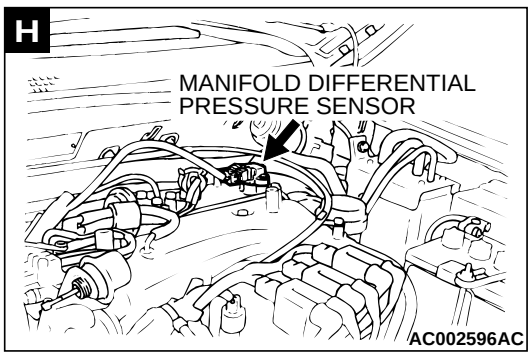
MANIFOLD DIFFERENTIAL
PRESSURE SENSOR
AC002596AC

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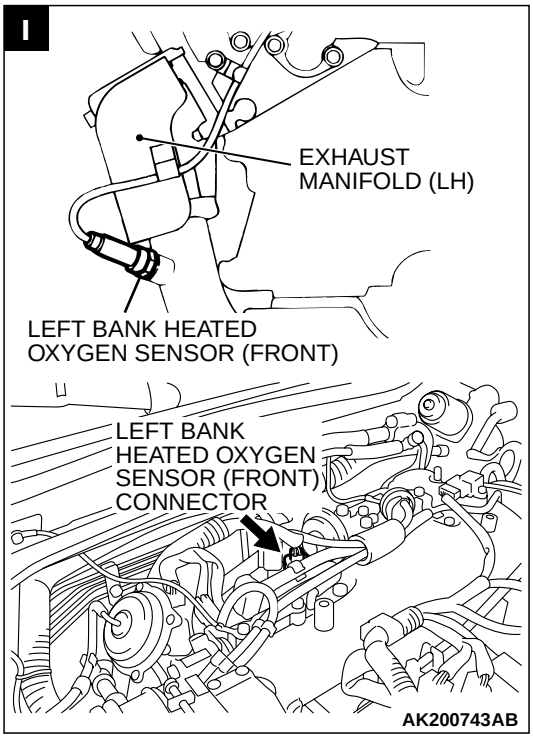
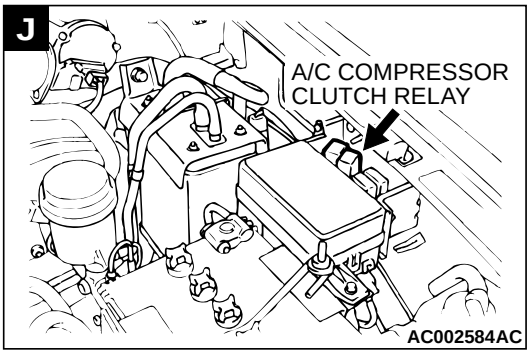

EXHAUST MANIFOLD (LH)
LEFT BANK HEATED OXYGEN SENSOR (FRONT)
LEFT BANK HEATED OXYGEN SENSOR (FRONT) CONNECTOR
AK200743AB

J


A/C COMPRESSOR CLUTCH RELAY
AC002584AC

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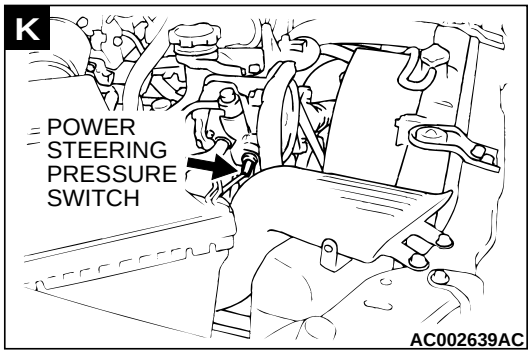
POWER STEERING PRESSURE SWITCH
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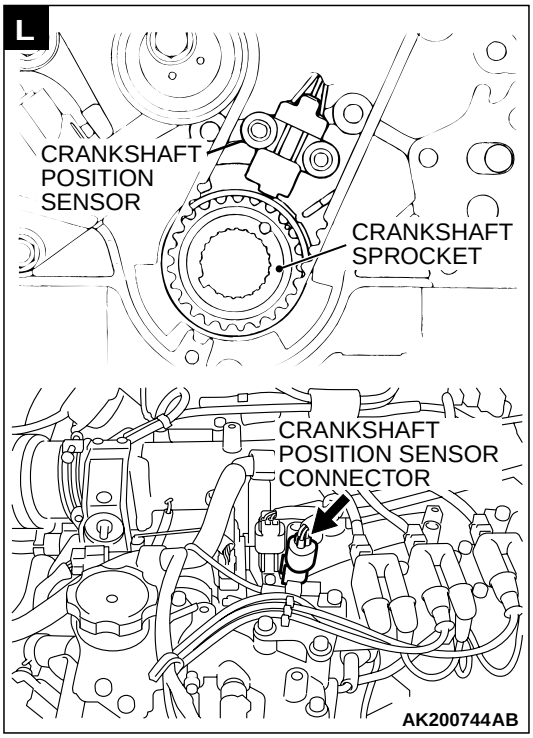
L


CRANKSHAFT POSITION SENSOR
CRANKSHAFT SPROCKET
CRANKSHAFT POSITION SENSOR CONNECTOR
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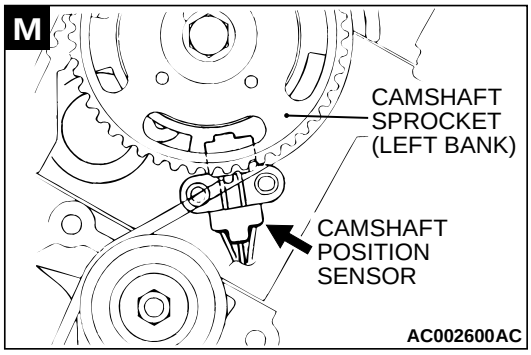
M



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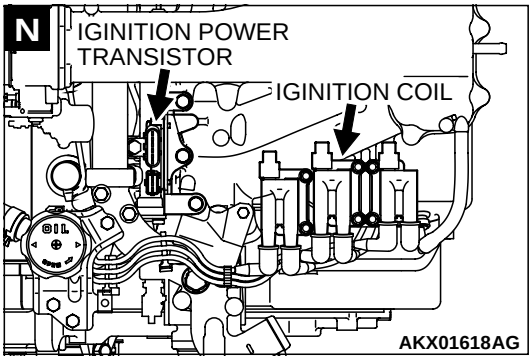

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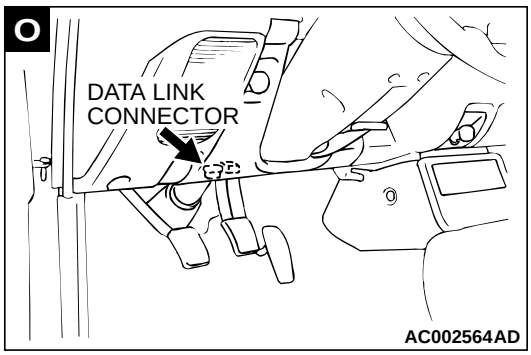

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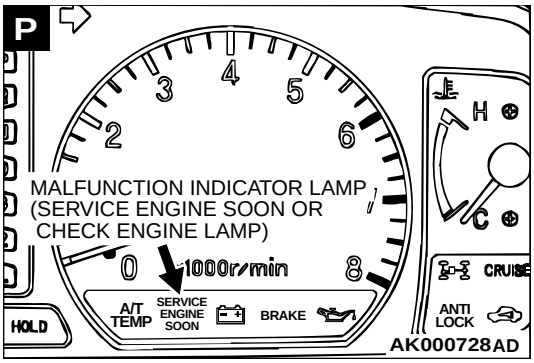

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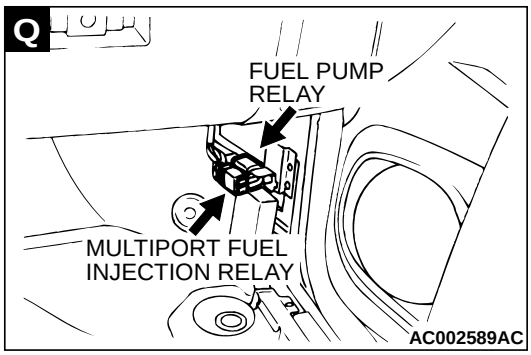

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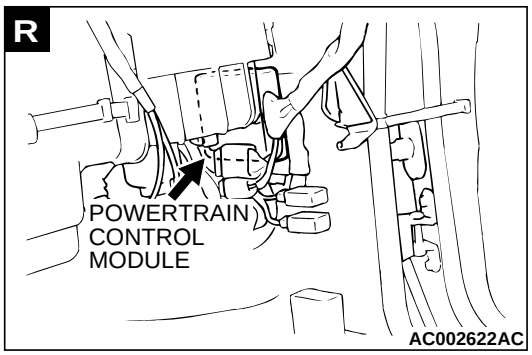

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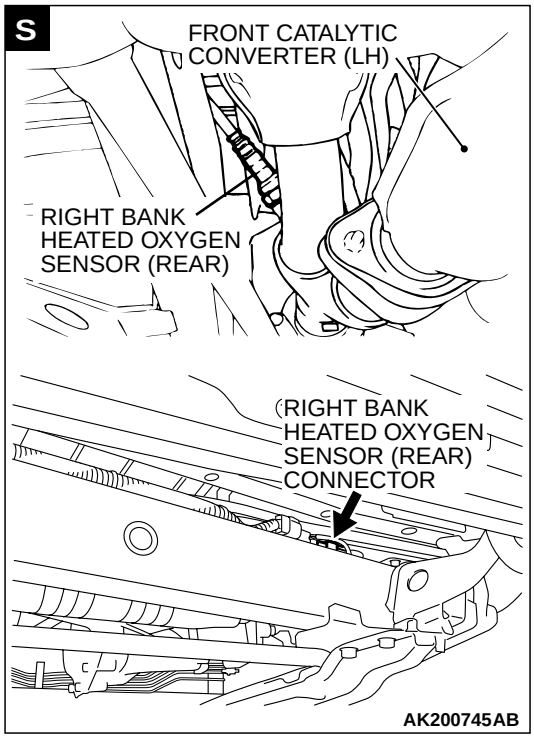

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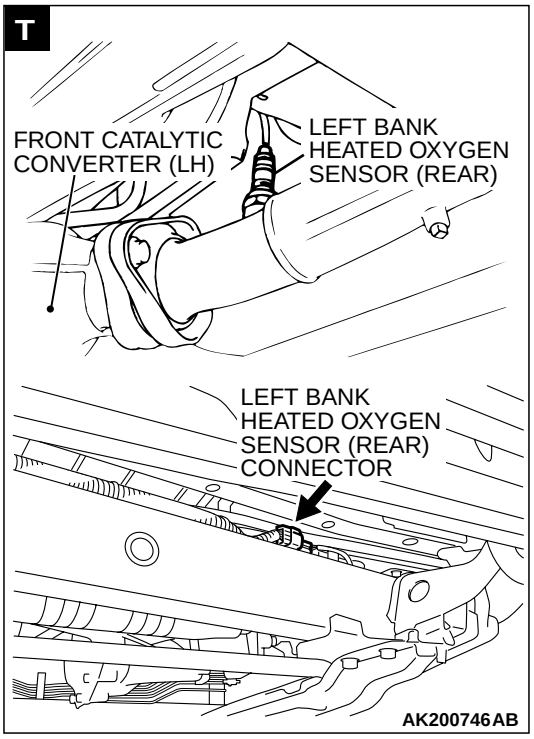

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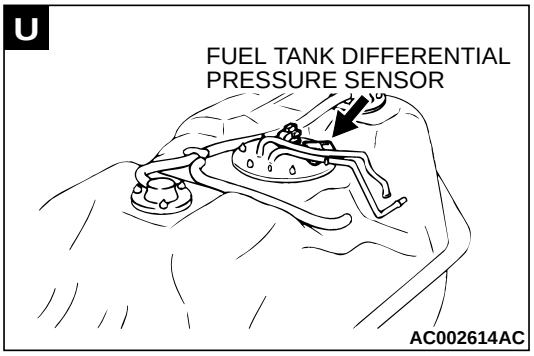

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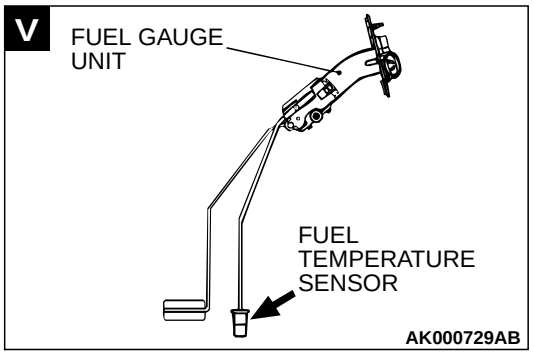

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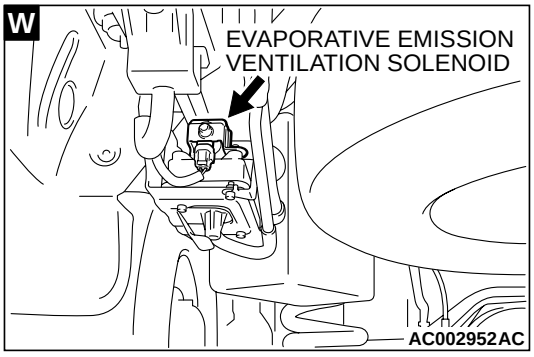

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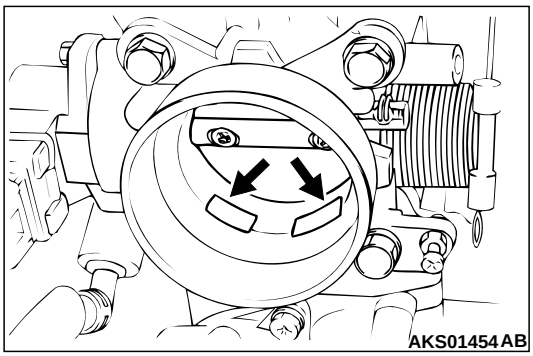
THROTTLE BODY CLEANING

M1131001000075

1. Start the engine and warm it up until the coolant is heated to 80°C (176°F) or higher. Stop the engine.
2. Remove the air intake hose from the throttle body.

⚠ CAUTION

Do not allow cleaning solvent to enter the bypass passage.



3. Plug the bypass passage inlet (arrow) of the throttle body.
4. Spray cleaning solvent into the valve through the throttle body intake port and leave it for approximately five minutes.
5. Start the engine, rev it several times and then idle it for about one minute. If the idling speed becomes unstable (or if the engine stalls) due to the bypass passage being plugged, slightly open the throttle valve to keep the engine running.
6. If the throttle valve deposits are not removed, repeat steps 4 and 5.
7. Unplug the bypass passage inlet.
8. Attach the air intake hose.
9. Use scan tool MB991502 to erase any diagnostic trouble code.
10. Adjust the basic idle speed. (Refer to P.13Aa-14.)

⚠ WARNING

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

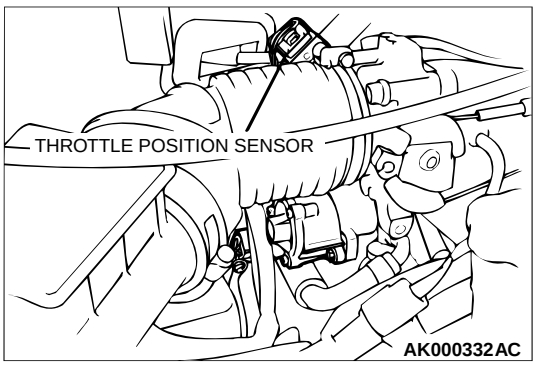
NOTE: If the engine hunts while idling after adjustment of the basic idle speed, disconnect the negative cable from the battery for 10 seconds or more, and then reconnect it and run the engine at idle for about 10 minutes after the engine is warmed up.

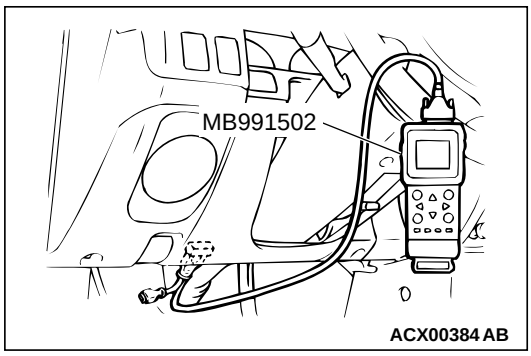
THROTTLE POSITION SENSOR ADJUSTMENT

M1131001100265

Required Special Tools:

- MB991502: Scan Tool (MUT-II)
- MB991348: Test Harness Set

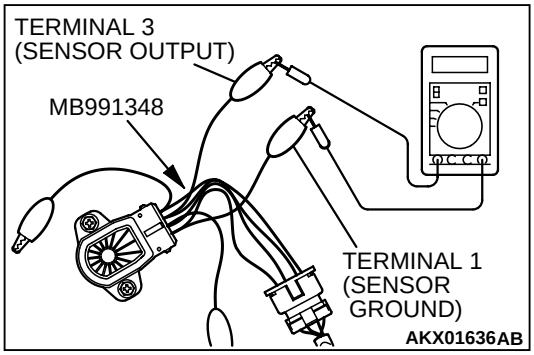




⚠ CAUTION

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

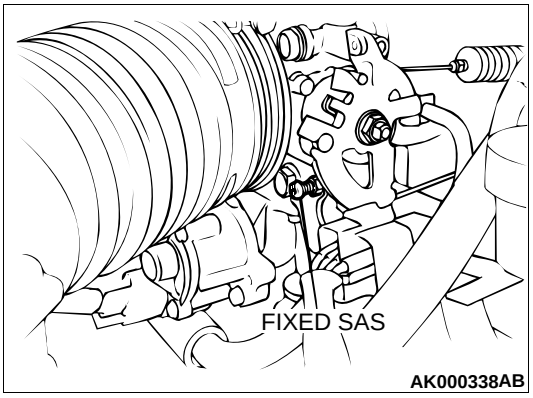
1. Connect scan tool MB991502 to the data link connector. When not using the scan tool MB991502, proceed as follows.



   (1))Disconnect the throttle position sensor connector, and connect the special tool MB991348 in between. (All terminals should be connected.)
   (2) Connect a digital voltmeter between throttle position sensor terminals No. 3 (sensor output) and No. 1 (sensor ground).
2. Turn the ignition switch to the "ON" position. (Do not start the engine.)
3. Check the throttle position sensor output voltage.

   Standard value: 535 – 735 mV
4. If not within the standard value range, adjust by loosening throttle position sensor mounting bolts and turning the throttle position sensor body. After adjusting, tighten the bolts securely.
5. Turn the ignition switch to the "LOCK" (OFF) position.
6. Disconnect scan tool MB991502.
   When the scan tool MB991502 is not used, remove special tool MB991348, and connect the throttle position sensor connector.

   NOTE: If a diagnostic trouble code is sent while adjusting the throttle position sensor, use scan tool MB991502 to erase the diagnostic trouble code.



FIXED SAS ADJUSTMENT <3.0L ENGINE>

M1131001500058

NOTE: The fixed speed adjusting screw (SAS) should not be moved unnecessarily; it has been precisely by the manufacturer.

NOTE: If the adjustment is disturbed for any reason, readjust as follows.

1. Loosen the tension of the accelerator cable sufficiently.
2. Back out the fixed SAS lock nut.
3. Turn the fixed SAS counterclockwise until it is sufficiently backed out, fully closing the throttle valve.
4. Turn the fixed SAS clockwise until the throttle lever is touched (i.e., the point at which the throttle valve begins to open).

   From that point, turn the fixed SAS clockwise another 1-1/4 turn.

   NOTE: Monitor the TPS value with the scan tool MB991502.
5. Hold the fixed SAS so that it does not move. Tighten the lock nut securely.
6. Adjust the tension of the accelerator cable.
7. Adjust the basic idle speed.
8. Adjust the throttle position sensor. (Refer to P.13Aa-12.)

BASIC IDLE SPEED ADJUSTMENT

M1131001800316

Required Special Tool:

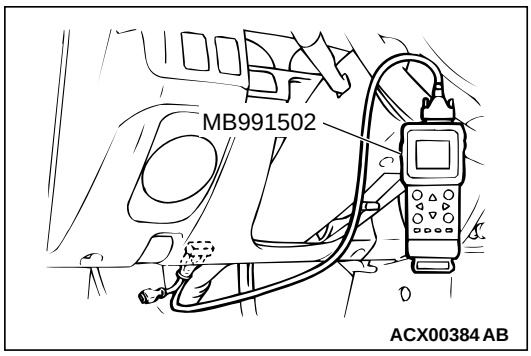
- MB991502: Scan Tool (MUT-II)

NOTE: The standard idling speed has been adjusted with the speed adjusting screw (SAS), by the manufacturer. There should be no need for readjustment.

NOTE: If the adjustment has been changed by mistake, the idle speed may become too high or the idle speed may drop too low when loads A/C, defogger, etc. are placed on the engine. If this occurs, adjust by the following procedure.

NOTE: The adjustment, if made, should be made after first confirming that the spark plugs, the injectors, the idle air control motor, compression, etc., are all normal.

1. The vehicle should be prepared as follows before the inspection and adjustment.
   - Engine coolant temperature: 80 – 95° C (176 – 203°F)
   - Lights and all accessories: OFF
   - Transmission: P range



⚠ 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.

2. Connect scan tool MB991502 to the data link connector (16-pin).

   NOTE: When scan tool MB991502 is connected, the diagnostic test mode control terminal should be grounded.

3. Start the engine and run at idle.
4. Select the item number 30 of the scan tool Actuator test.

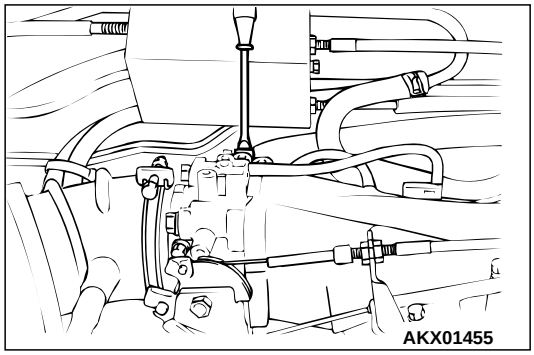
   NOTE: Use the scan tool to hold the IAC motor at the basic step to adjust the basic idle speed.

5. Check the idle speed.

   Standard value: 700 ± 50 r/min

   NOTE: The engine speed may be 20 to 100 r/min lower than indicated above for a new vehicle [driven approximately 500 km (300 mile) or less], but no adjustment is necessary.

   NOTE: If the engine stalls or the engine speed is low even though the vehicle has been driven approximately 500 km (300 mile) or more, it is probable that the throttle valve is dirty, so clean it. (Refer to P.13Aa-12.)



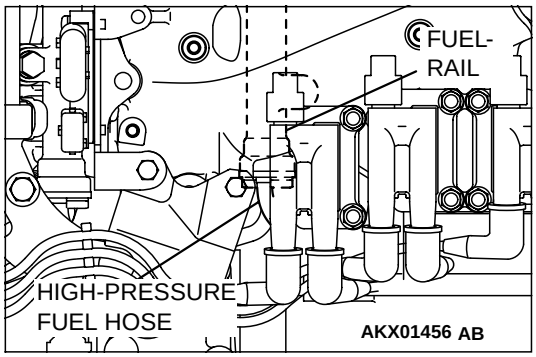
6. If not within the standard value range, turn the speed adjusting screw (SAS) to make the necessary adjustment.
7. Press the scan tool clear key, and release the IAC motor Actuator test mode.

   NOTE: Unless the A/C motor is released, the Actuator test mode will continue 27 minutes.

8. Turn the ignition switch to the "LOCK" (OFF) position.
9. Disconnect scan tool MB991502.
10. Start the engine again and let it idle for about 10 minutes. Check that the idling condition is normal.

FUEL PRESSURE TEST

M1131001900175



Required Special Tools:

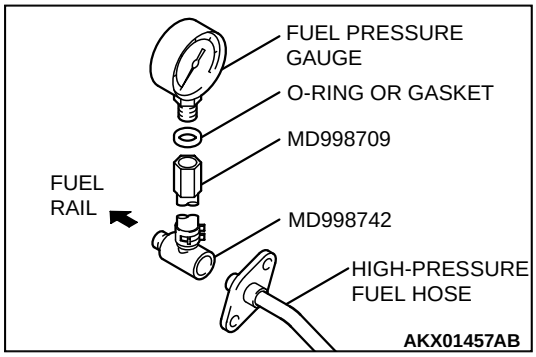
- MB991502: Scan Tool (MUT-II)
- MB991637: Fuel Pressure Gauge Set
- MD998709: Adaptor Hose
- MD998742: Hose Adaptor

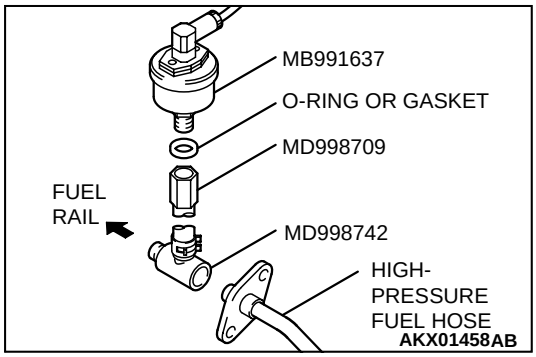
1. Release residual pressure from the fuel line to prevent fuel spray. (Refer to P.13Aa-18.)

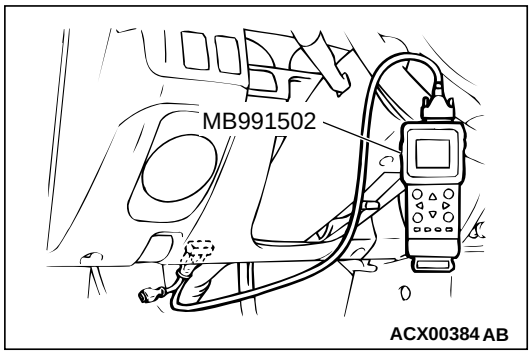
⚠ WARNING

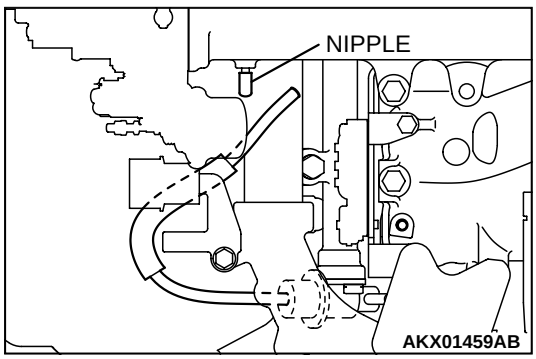
To prevent a fire, cover the hose connection with shop towels to prevent splashing of fuel that could be caused by some residual pressure in the fuel pipe line.

2. Disconnect the high-pressure fuel hose at the fuel rail side.
3. Assemble the fuel pressure measurement tools as follows.









<When using the fuel pressure gauge>

1. Remove the union joint and bolt from special tool MD998709 (adapter hose) and instead attach special tool MD998742 (hose adapter) to the adapter hose.
2. Place a suitable O-ring or gasket on the assembled special tools MD998709 and MD998742 and install the fuel pressure gauge.
3. Install the assembled fuel pressure measurement tools between the fuel rail and high-pressure fuel hose.

<When using special tool MB991637 (fuel pressure gauge set)>

1. Remove the union joint and bolt from special tool MD998709 (adapter hose) and instead attach special tool MD998742 (hose adapter) to the adapter hose.
2. Install special tool MB991637 (fuel pressure gauge set) into assembled special tools MD998709 and MD998742 via a gasket.
3. Install the assembled fuel pressure measurement tools between the fuel rail and high-pressure fuel hose.

⚠ 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.

4. Connect scan tool MB991502 to the data link connector.
5. Use Actuator test 07 to drive the fuel pump. Check that there is no fuel leaking from any section when the fuel pump is operating.
6. Stop the fuel pump.
7. Start the engine and run at idle.
8. Measure fuel pressure while the engine is running at idle.

   Standard value: Approximately 270 kPa (38 psi) at curb idle

9. Disconnect the vacuum hose (blue stripe) from the fuel pressure regulator and measure the fuel pressure with the hose end closed with your finger.

   Standard value: 330 – 350 kPa (47 – 50 psi) at curb idle

10. Check to see that fuel pressure at idle does not drop even after the engine has been revved several times.
11. Revving the engine repeatedly, hold the fuel return hose lightly with your fingers to feel that fuel pressure is present in the return hose.

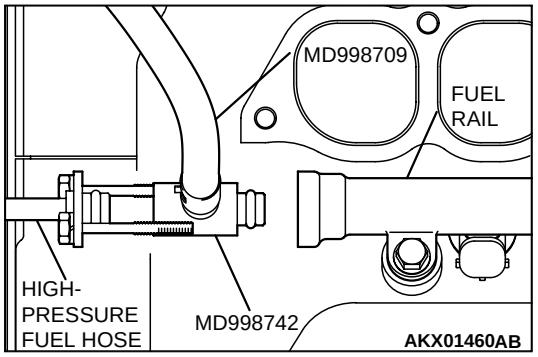
    NOTE: If the fuel flow rate is low, there will be no fuel pressure in the return hose.

12. If any of fuel pressure measured in steps 8 to 11 is out of specification, troubleshoot and repair according to the table below.

SYMPTOM	PROBABLE CAUSE	REMEDY
• Fuel pressure too low • Fuel pressure drops after racing • No fuel pressure in fuel return hose	Clogged fuel filter	Replace fuel filter
	Fuel leaking to return side due to poor fuel regulator valve seating or settled spring	Replace fuel pressure regulator
	Low fuel pump delivery pressure	Replace fuel pump
Fuel pressure too high	Binding valve in fuel pressure regulator	Replace fuel pressure regulator
	Clogged fuel return hose or pipe	Clean or replace hose or pipe
Same fuel pressure when vacuum hose is connected and when disconnected	Damaged vacuum hose or clogged nipple	Replace vacuum hose or clean nipple
	Defective fuel pressure regulator	Replace fuel pressure regulator

13. Stop the engine and observe fuel pressure gauge reading. It is normal if the reading does not drop within two minutes. If it does, observe the rate of drop and troubleshoot and repair according to the table below. Start, then stop the engine.
    (1) Squeeze the fuel return line closed to confirm leak-down occurs from defective fuel pressure regulator.
    (2) Squeeze the fuel supply line closed to confirm leak-down occurs from defective fuel pump check valve.
    (3) If pressure continues to drop with both fuel lines squeezed closed, injector(s) are leaking.

SYMPTOM	PROBABLE CAUSE	REMEDY
Fuel pressure drops gradually after engine is stopped	Leaky injector	Replace injector
	Leaky fuel regulator valve seat	Replace fuel pressure regulator
Fuel pressure drops sharply immediately after engine is stopped	Check valve in fuel pump is held open	Replace fuel pump



14. Release residual pressure from the fuel pipe line (Refer to P.13Aa-18.)

⚠ WARNING

Cover the hose connection with shop towels to prevent splash of fuel that could be caused by some residual pressure in the fuel pipe line.

15. Remove the fuel pressure gauge, and special tools MD998709, MD998742 and MB991637 from the fuel rail.
16. Replace the O-ring at the end of the high-pressure fuel hose with a new one.
17. Fit the high-pressure fuel hose into the fuel rail and tighten the bolts to specified torque.

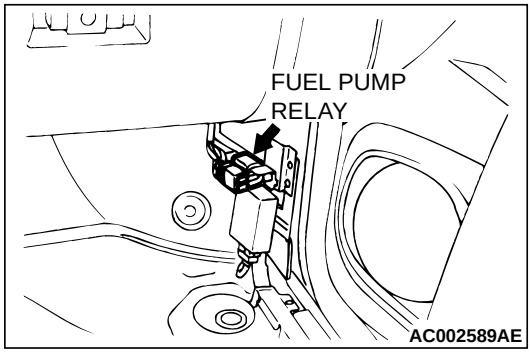
Tightening torque: 4.9 N·m (43 in-lb)

18.Check for fuel leaks.
(1) Use scan tool MB991502 to operate the fuel pump.
(2) Check the fuel line for leaks and repair as needed.
19.Turn the ignition switch to the "LOCK" (OFF) position.
20.Disconnect scan tool MB991502.

FUEL PUMP CONNECTOR DISCONNECTION (HOW TO REDUCE PRESSURIZED FUEL LINES)

M1131000900428

When removing the fuel pipe, hose, etc., release fuel pressure to prevent fuel splay.



1. Disconnect the fuel pump relay connector.
2. Start the engine and let it run until it stops naturally. Turn the ignition switch to "LOCK" (OFF).
3. Connect the fuel pump relay.

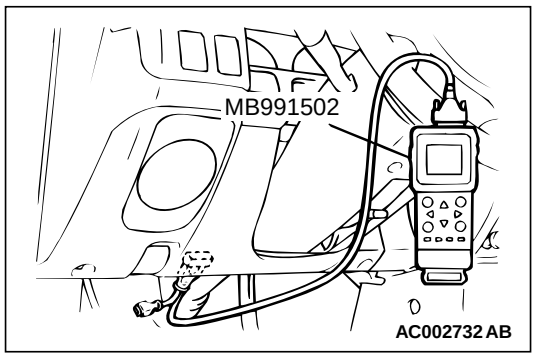
FUEL PUMP OPERATION CHECK

M1131002000443

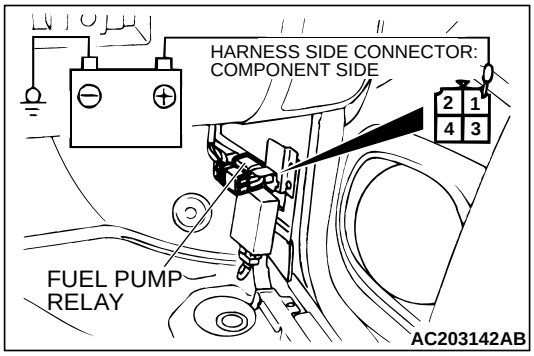
Required Special Tool:
- MB991502: Scan Tool (MUT-II)

⚠ 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.



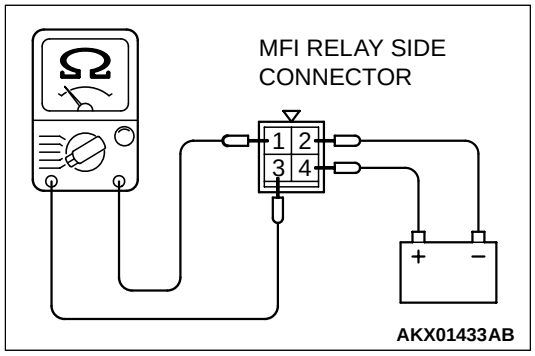
1. Check the operating of the fuel pump by using scan tool MB991502 to force-drive the fuel pump.
2. If the fuel pump will not operate, check by using the following procedure, and if it is normal, check the drive circuit.
   (1) Turn the ignition switch to the "LOCK" (OFF) position.



   (2) Remove the fuel pump relay connector.
   Connect the terminal number 1 of the harness-side connector to the battery.
   Check if the fuel pump operation sound can be heard at this time.
   NOTE: As the fuel pump is an in-tank type, the fuel pump sound is hard to hear, so remove the fuel filler cap and check from the tank inlet.
3. Check the fuel pressure by pinching the fuel hose with the fingertips.

MULTIPORT FUEL INJECTION RELAY AND FUEL RELAY CHECK

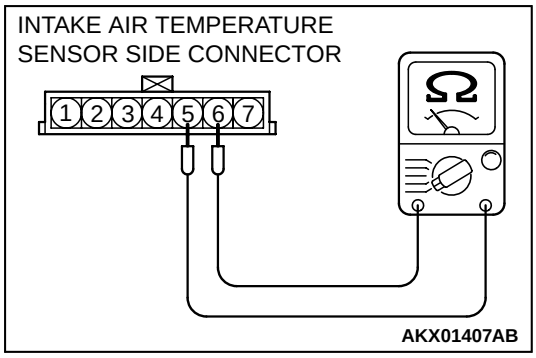
M1131009900027



BATTERY VOLTAGE	BATTERY POWER SUPPLY TERMINAL	SPECIFIED CONDITION
Supplied	2-4	1-3
Not supplied	-	2-4

INTAKE AIR TEMPERATURE SENSOR CHECK

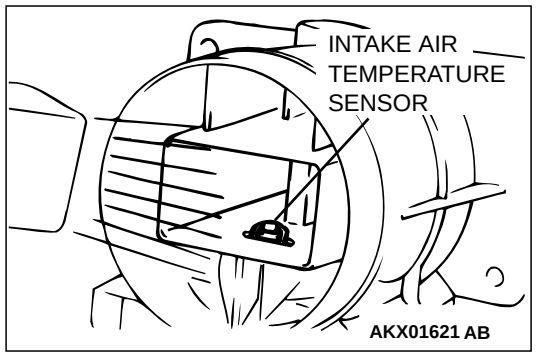
M1131002800245



1. Disconnect the volume air flow sensor connectors.
2. Measure resistance between terminals No. 5 and No. 6.

Standard value:
13 – 17 kΩ [at –20°C (–4°F)]
5.3 – 6.7 kΩ [at 0°C (32°F)]
2.3 – 3.0 kΩ [at 20°C (68°F)]
1.0 – 1.5 kΩ [at 40°C (104°F)]
0.56 – 0.76 kΩ [at 60°C (140°F)]
0.30 – 0.42 kΩ [at 80°C (176°F)]

3. If not within specifications, replace the volume air flow sensor.
4. Measure resistance while heating the sensor using a hair dryer.



Normal condition:

TEMPERATURE	RESISTANCE (kΩ)
Higher	Smaller

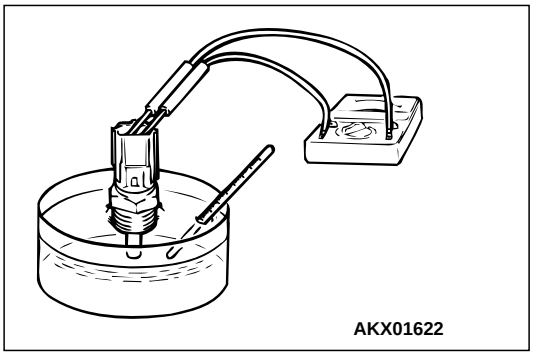
5. If resistance does not decrease as heat increases, replace the volume air flow sensor assembly.

ENGINE COOLANT TEMPERATURE SENSOR CHECK

M1131003100119

⚠ CAUTION
Be careful not to touch the connector (resin section) with the tool when removing and installing.

1. Drain engine coolant, then remove the engine coolant temperature sensor.

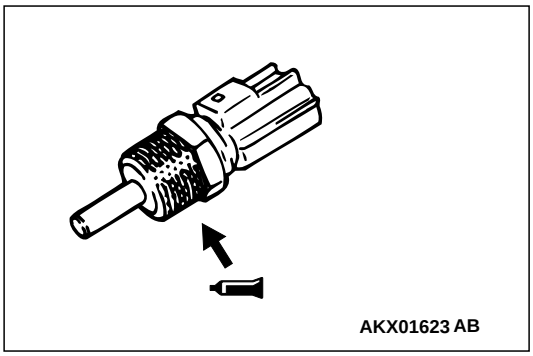

AKX01622

2. With the temperature sensing portion of engine coolant temperature sensor immersed in hot water, check the resistance.

   Standard value:
   14 – 17 kΩ [at -20°C (-4°F)]
   5.1 – 6.5 kΩ [at 0°C (32°F)]
   2.1 – 2.7 kΩ [at 20°C (68°F)]
   0.9 – 1.3 kΩ [at 40°C (104°F)]
   0.48 – 0.68 kΩ [at 60°C (140F)]
   0.26 – 0.36 kΩ [at 80°C (176°F)]

3. If resistance deviates from the standard value greatly, replace the sensor.
4. Apply 3M™ AAD part number 8731 or equivalent to threaded portion.
5. Install the engine coolant temperature sensor and tighten it to the specified torque.

   Tightening torque: 29 N·m (22 ft-lb)


AKX01623 AB

THROTTLE POSITION SENSOR CHECK

M1131003200279

Required Special Tool:
- MB991348: Test Harness Set

<Checking the Terminal Resistance>

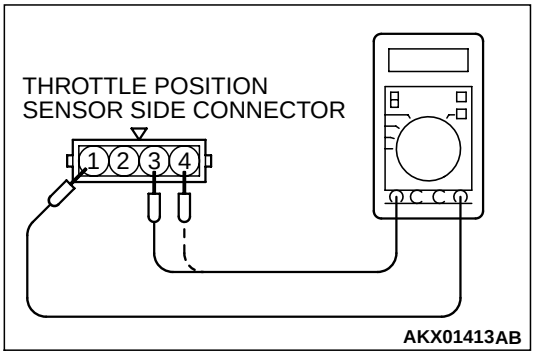
1. Disconnect the throttle position sensor connector.
2. Measure resistance between the throttle position sensor side connector terminal No. 1 and terminal No. 4.

   Standard value: 3.5 – 6.5 kΩ

3. Measure resistance between the throttle position sensor side connector terminal No. 1 and terminal No. 3.

Normal condition:

Throttle valve slowly open until fully open from the idle position	Changes smoothly in proportion to the opening angle of the throttle valve



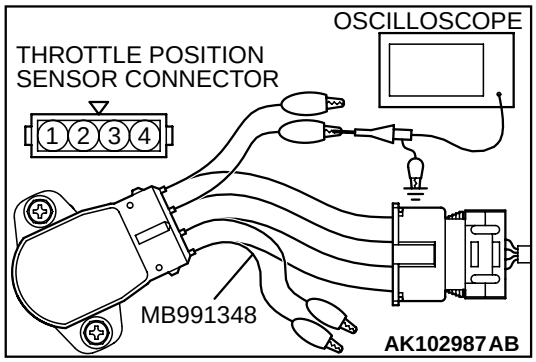
AKX01413AB

4. If resistance is outside the standard value, or if it doesn't change smoothly, replace the throttle position sensor.

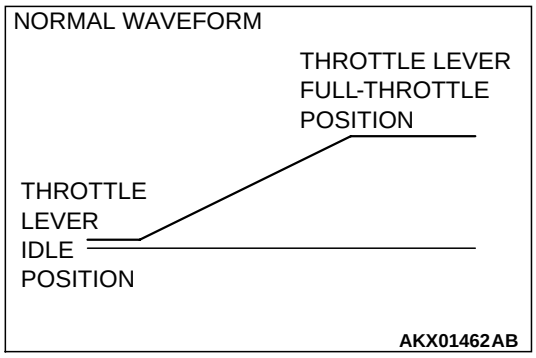
   NOTE: After replacement, the throttle position sensor should be adjusted. (Refer to P.13Aa-12.)

<Check using oscilloscope>

1. Disconnect the throttle position sensor connector and connect the test harness special tool (MB991348) in between.(All terminals should be connected.)



2. Connect the oscilloscope probe to the throttle position sensor side connector terminal No. 3.
3. Turn the ignition switch to the "ON" position.



4. Slowly move the throttle lever from the idle position to the full-throttle position and check then if the waveform is free from any noise.
5. If any noise is recognized, replace the throttle position sensor.

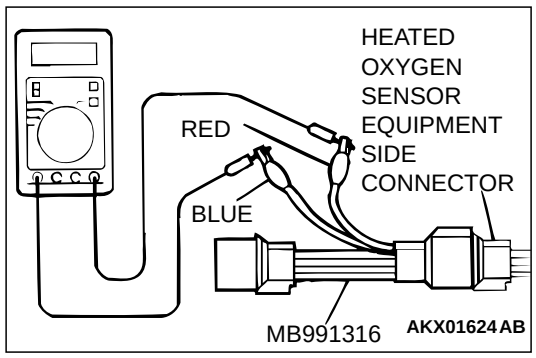
   NOTE: After replacement, the throttle position sensor should be adjusted. (Refer to P.13Aa-12.)

HEATED OXYGEN SENSOR CHECK

M1131005000301

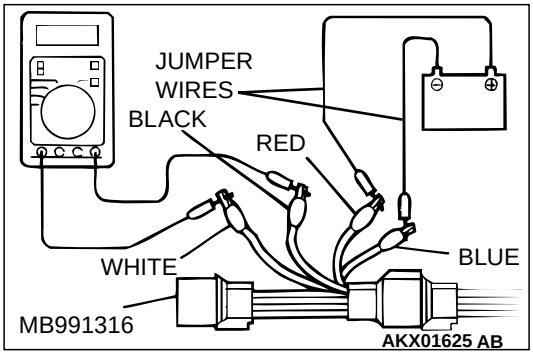
Required Special Tools:

- MB991316: Test Harness Set
- MD998464: Test Harness



<Left bank heated oxygen sensor (front)>

1. Using scan tool MB991502, observe HO_2S reading. If values are unsatisfactory, or if a scan tool is not available, use the following procedure:
   (1) Disconnect the heated oxygen sensor connector and connect special tool MB991316 to the connector on the heated oxygen sensor side.
   (2) Make sure that there is continuity [4.5 – 8.0 Ω at 20°C (68°F)] between terminal No. 1 (red clip of special tool) and terminal No. 3 (blue clip of special tool) on the heated oxygen sensor connector
   (3) If there is no continuity, replace the heated oxygen sensor.
   (4) Warm up the engine until engine coolant is 80°C (176°F) or higher.



⚠ CAUTION

Be very careful when connecting the jumper wires; incorrect connection can damage the heated oxygen sensor.

(5) Use the jumper wires to connect terminal No. 1 (red clip) of the heated oxygen sensor connector to the positive battery terminal and terminal No. 3 (blue clip) to the negative battery terminal.

(6) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).

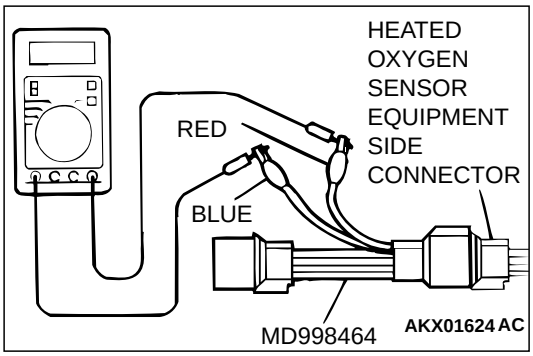
2. While repeatedly revving the engine, measure the heated oxygen sensor output voltage.

Standard value:

ENGINE	HEATED OXYGEN SENSOR OUTPUT VOLTAGE	REMARKS
When revving engine	0.6 – 1.0 V	If you make the air/fuel ratio rich by revving the engine repeatedly, a normal heated oxygen sensor will output a voltage of 0.6 – 1.0 V.

3. If the sensor is defective, replace the heated oxygen sensor.

NOTE: For removal and installation of the heated oxygen sensor, refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-14.



<Right bank heated oxygen sensor (front)>

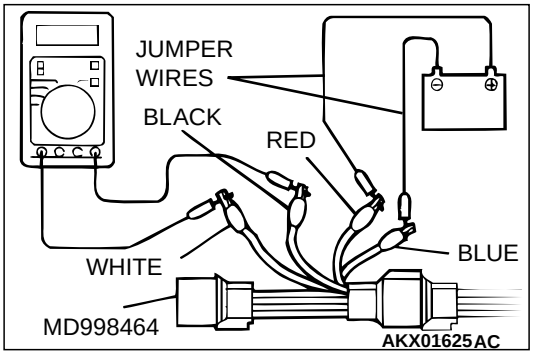
1. Using scan tool MB991502, observe HO_2S reading. If values are unsatisfactory, or if a scan tool is not available, use the following procedure:

(1) Disconnect the heated oxygen sensor connector and connect special tool MD998464 to the connector on the heated oxygen sensor side.

(2) Make sure that there is continuity [4.5 – 8.0 Ω at 20°C (68°F)] between terminal No. 1 (red clip of special tool) and terminal No. 3 (blue clip of special tool) on the heated oxygen sensor connector

(3) If there is no continuity, replace the heated oxygen sensor.

(4) Warm up the engine until engine coolant is 80°C (176°F) or higher.



⚠ CAUTION

Be very careful when connecting the jumper wires; incorrect connection can damage the heated oxygen sensor.

(5) Use the jumper wires to connect terminal No. 1 (red clip) of the heated oxygen sensor connector to the positive battery terminal and terminal No. 3 (blue clip) to the negative battery terminal.

(6) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).

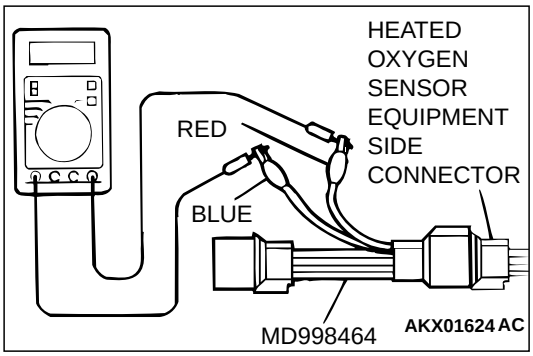
2. While repeatedly revving the engine, measure the heated oxygen sensor output voltage.

Standard value:

ENGINE	HEATED OXYGEN SENSOR OUTPUT VOLTAGE	REMARKS
When revving engine	0.6 – 1.0 V	If you make the air/fuel ratio rich by revving the engine repeatedly, a normal heated oxygen sensor will output a voltage of 0.6 – 1.0 V.

3. If the sensor is defective, replace the heated oxygen sensor.

NOTE: For removal and installation of the heated oxygen sensor, refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-14.



<Left bank heated oxygen sensor (rear)>

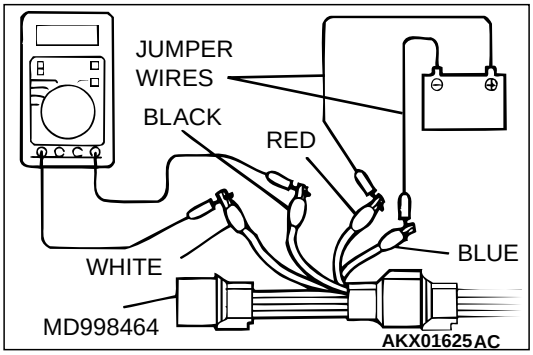
1. Using scan tool MB991502, observe HO_2S reading. If values are unsatisfactory, or if a scan tool is not available, use the following procedure:

(1) Disconnect the heated oxygen sensor connector and connect special tool MD998464 to the connector on the heated oxygen sensor side.

(2) Make sure that there is continuity [11 – 18 Ω at 20°C (68°F)] between terminal No. 1 (red clip of special tool) and terminal No. 3 (blue clip of special tool) on the heated oxygen sensor connector

(3) If there is no continuity, replace the heated oxygen sensor.

(4) Warm up the engine until engine coolant is 80°C (176°F) or higher.



⚠ CAUTION

Be very careful when connecting the jumper wires; incorrect connection can damage the heated oxygen sensor.

(5) Use the jumper wires to connect terminal No. 1 (red clip) of the heated oxygen sensor connector to the positive battery terminal and terminal No. 3 (blue clip) to the negative battery terminal.

(6) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).

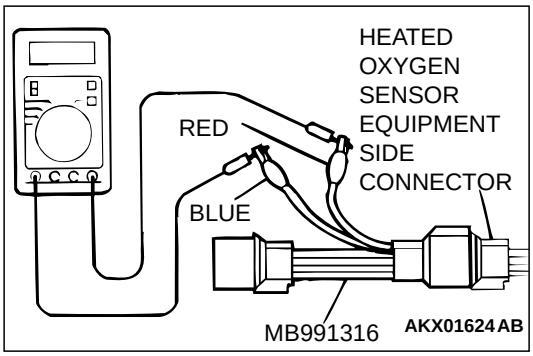
2. While repeatedly revving the engine, measure the heated oxygen sensor output voltage.

Standard value:

ENGINE	HEATED OXYGEN SENSOR OUTPUT VOLTAGE	REMARKS
When revving engine	0.6 – 1.0 V	If you make the air/fuel ratio rich by revving the engine repeatedly, a normal heated oxygen sensor will output a voltage of 0.6 – 1.0 V.

3. If the sensor is defective, replace the heated oxygen sensor.

NOTE: For removal and installation of the heated oxygen sensor, refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-14.



<Right bank heated oxygen sensor (rear)>

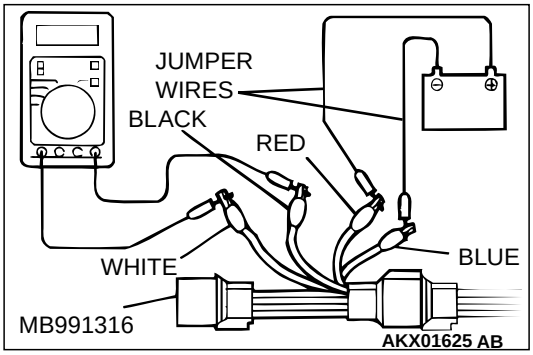
1. Using scan tool MB991502, observe HO_2S reading. If values are unsatisfactory, or if Scan tool is not available, use the following procedure:

(1) Disconnect the heated oxygen sensor connector and connect special tool MB991316 to the connector on the heated oxygen sensor side.

(2) Make sure that there is continuity [11 – 18 Ω at 20°C (68°F)] between terminal No. 1 (red clip of special tool) and terminal No. 3 (blue clip of special tool) on the heated oxygen sensor connector

(3) If there is no continuity, replace the heated oxygen sensor.

(4) Warm up the engine until engine coolant is 80°C (176°F) or higher.



⚠ CAUTION

Be very careful when connecting the jumper wires; incorrect connection can damage the heated oxygen sensor.

(5) Use the jumper wires to connect terminal No. 1 (red clip) of the heated oxygen sensor connector to the positive battery terminal and terminal No. 3 (blue clip) to the negative battery terminal.

(6) Connect a digital voltage meter between terminal No. 2 (black clip) and terminal No. 4 (white clip).

2. While repeatedly revving the engine, measure the heated oxygen sensor output voltage.

Standard value:

ENGINE	HEATED OXYGEN SENSOR OUTPUT VOLTAGE	REMARKS
When revving engine	0.6 – 1.0 V	If you make the air/fuel ratio rich by revving the engine repeatedly, a normal heated oxygen sensor will output a voltage of 0.6 – 1.0 V.

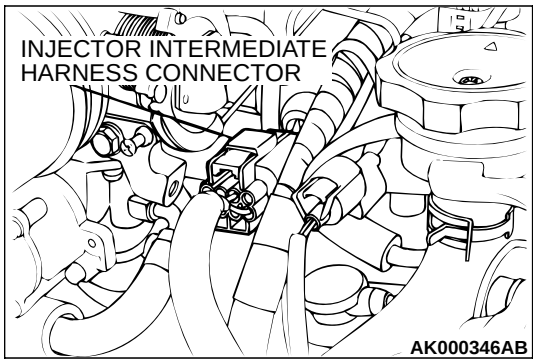
3. If the sensor is defective, replace the heated oxygen sensor.

NOTE: For removal and installation of the heated oxygen sensor, refer to GROUP 15, Exhaust Pipe and Main Muffler P.15-14.

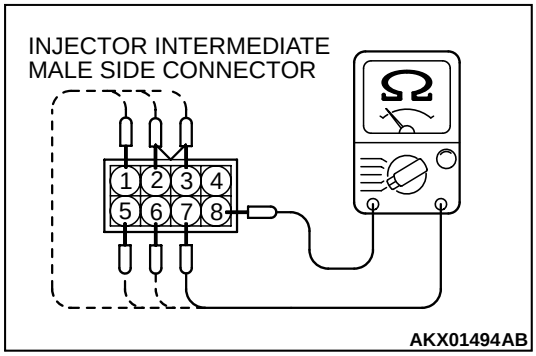
INJECTOR CHECK

M1131005200156

Measurement of Resistance between Terminals



1. Disconnect the injector intermediate connector.



2. Measure the resistor between the injector intermediate male side connector terminals.

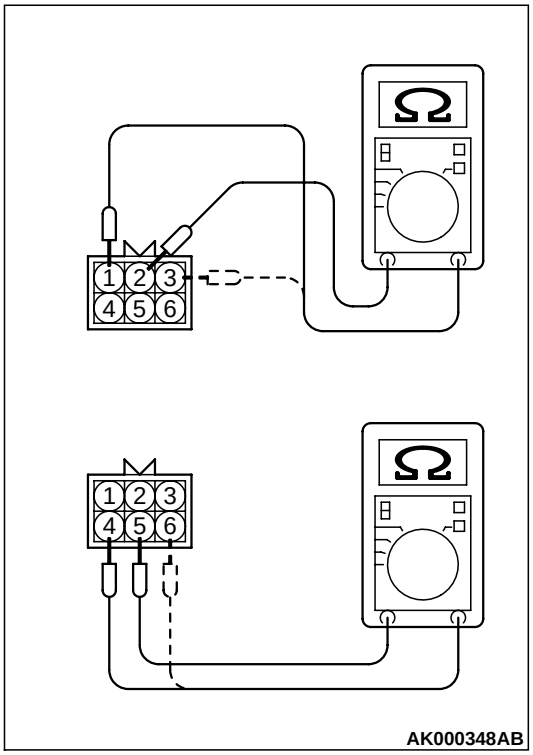
   Standard value:

INJECTOR NO.	MEASUREMENT TERMINAL	RESISTANCE
NO.1	8 – 3	13 – 16 Ω [20°C (68°F)]
NO.2	8 – 2	
NO.3	8 – 1	
NO.4	8 – 7	
NO.5	8 – 6	
NO.6	8 – 5	

3. Connect the injector intermediate connector.

IDLE AIR CONTROL MOTOR CHECK <3.0L ENGINE>

M1131005400310



Required Special Tool:
- MD998463: Test Harness Set

<Checking the Operation Sound>

1. Check that the engine coolant temperature is 20°C (68°F) or below.

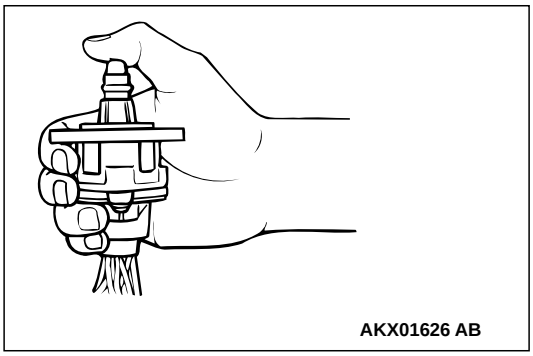
   NOTE: If necessary, you can disconnect the engine coolant temperature sensor connector and connect the harness-side of the connector to another engine coolant temperature sensor that is at 20°C (68°F) or below.
2. Check that the operation sound of the stepper motor can be heard after the ignition is switched ON (but do not start the engine).
3. If the operation sound cannot be heard, check the stepper motor's activation circuit. If the circuit is normal, it is probable that there is a malfunction of the stepper motor or powertrain control module.

<Checking the Coil Resistance>

1. Disconnect the idle air control motor connector.
2. Measure resistance between terminal No. 2 and either terminal No. 1 or terminal No. 3 of the connector at the idle air control motor side.

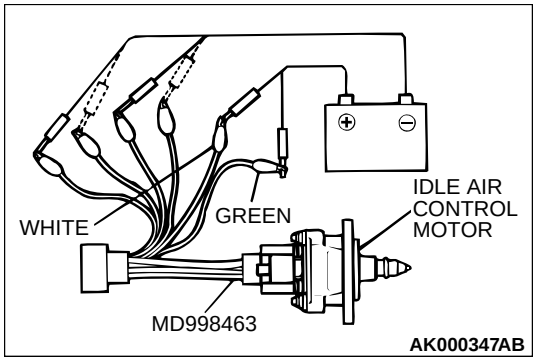
   Standard value: 28 – 33 Ω [at 20°C (68°F)]
3. Measure the resistance between terminal No. 5 and either terminal No. 4 or terminal No. 6 of the connector at the idle air control motor side.

   Standard value: 28 – 33 Ω [at 20°C (68°F)]
4. If resistance is not within the standard value, replace the IAC motor.


AKX01626 AB

<Operation Check>

1. Remove the throttle body.
2. Remove the idle air control motor.
3. Connect special tool MD998463 to the idle air control motor connector.



AK000347AB

4. Connect the positive terminal of a power supply (approximately 6 V) to terminal No. 2 (white clip of the special tool) and the terminal No. 5 (green clip of the special tool).
5. Connect the negative terminal of the power supply to each clip as described in the following steps. Then check whether or not the stepper motor vibrates slightly as it operates.
   (1) Connect the negative terminal of the power supply to terminal No. 1 (red clip) and terminal No. 4 (back clip).
   (2) Connect the negative terminal of the power supply to terminal No. 3 (blue clip) and terminal No. 4 (back clip).
   (3) Connect the negative terminal of the power supply to terminal No. 3 (blue clip) and terminal No. 6 (yellow clip).
   (4) Connect the negative terminal of the power supply to terminal No. 1 (red clip) and terminal No. 6 (yellow clip).
   (5) Connect the negative terminal of the power supply to terminal No. 1 (red clip) and terminal No. 4 (back clip).
   (6) Repeat the tests in sequence from (5) to (1) to test opposite movement of the IAC.
6. If vibration is detected during the test, the stepper motor can be considered to be normal.

IDLE AIR CONTROL MOTOR CHECK <3.5L ENGINE>

M1131005400321

Required Special Tool:

- MB991709: Test Harness Set

<Checking the Operation Sound>

1. Check that the engine coolant temperature is 20°C (68°F) or below.

   NOTE: If necessary, you can disconnect the engine coolant temperature sensor connector and connect the harness-side of the connector to another engine coolant temperature sensor that is at 20°C (68°F) or below.
2. Check that the operation sound of the stepper motor can be heard after the ignition is switched ON (but do not start the engine).

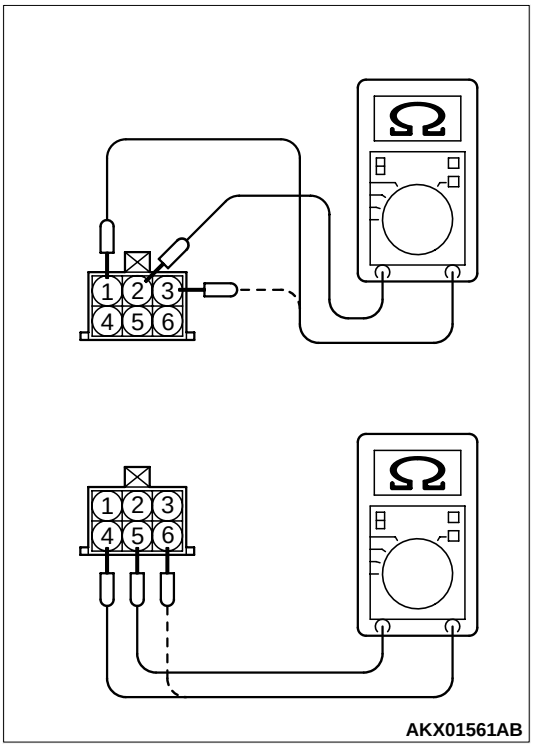
3. If the operation sound cannot be heard, check the stepper motor's activation circuit. If the circuit is normal, it is probable that there is a malfunction of the stepper motor or powertrain control module.

<Checking the Coil Resistance>

1. Disconnect the idle air control motor connector.
2. Measure resistance between terminal No. 2 and either terminal No. 1 or terminal No. 3 of the connector at the idle air control motor side.

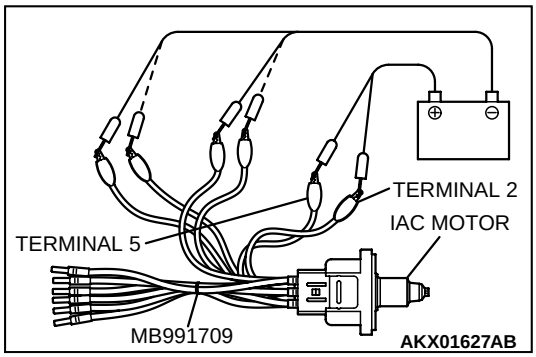
   Standard value: 28 – 33 Ω [at 20°C (68°F)]
3. Measure the resistance between terminal No. 5 and either terminal No. 4 or terminal No. 6 of the connector at the idle air control motor side.

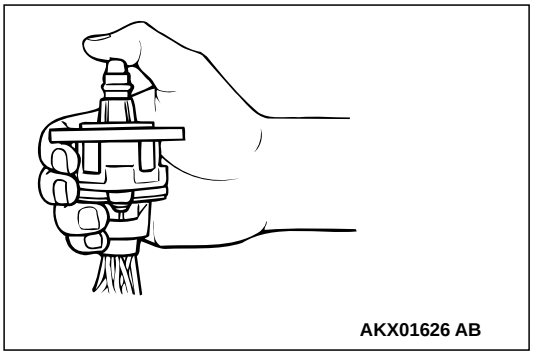
   Standard value: 28 – 33 Ω [at 20°C (68°F)]
4. If resistance is not within the standard value, replace the IAC motor.



<Operation Check>

1. Remove the throttle body.
2. Remove the idle air control motor.
3. Connect special tool MB991709 to the idle air control motor connector.
4. Connect the positive terminal of a power supply (approximately 6 V) to terminal No. 2 and the terminal No. 5.
5. Connect the negative terminal of the power supply to each clip as described in the following steps. Then check whether or not the stepper motor vibrates slightly as it operates.
   (1) Connect the negative terminal of the power supply to terminal No. 1 and terminal No. 4.
   (2) Connect the negative terminal of the power supply to terminal No. 3 and terminal No. 4.
   (3) Connect the negative terminal of the power supply to terminal No. 3 and terminal No. 6.
   (4) Connect the negative terminal of the power supply to terminal No. 1 and terminal No. 6.
   (5) Connect the negative terminal of the power supply to terminal No. 1 and terminal No. 4.
   (6) Repeat the tests in sequence from (5) to (1) to test opposite movement of the IAC.




AKX01626 AB

6. If vibration is detected during the test, the stepper motor can be considered to be normal.

EVAPORATIVE EMISSION PURGE SOLENOID CHECK

M1131005600024

Refer to GROUP 17, Emission Control System – Evaporative Emission Control System – Evaporative Emission Purge Solenoid Check P.17-95.

EGR SOLENOID CHECK

M1131005700021

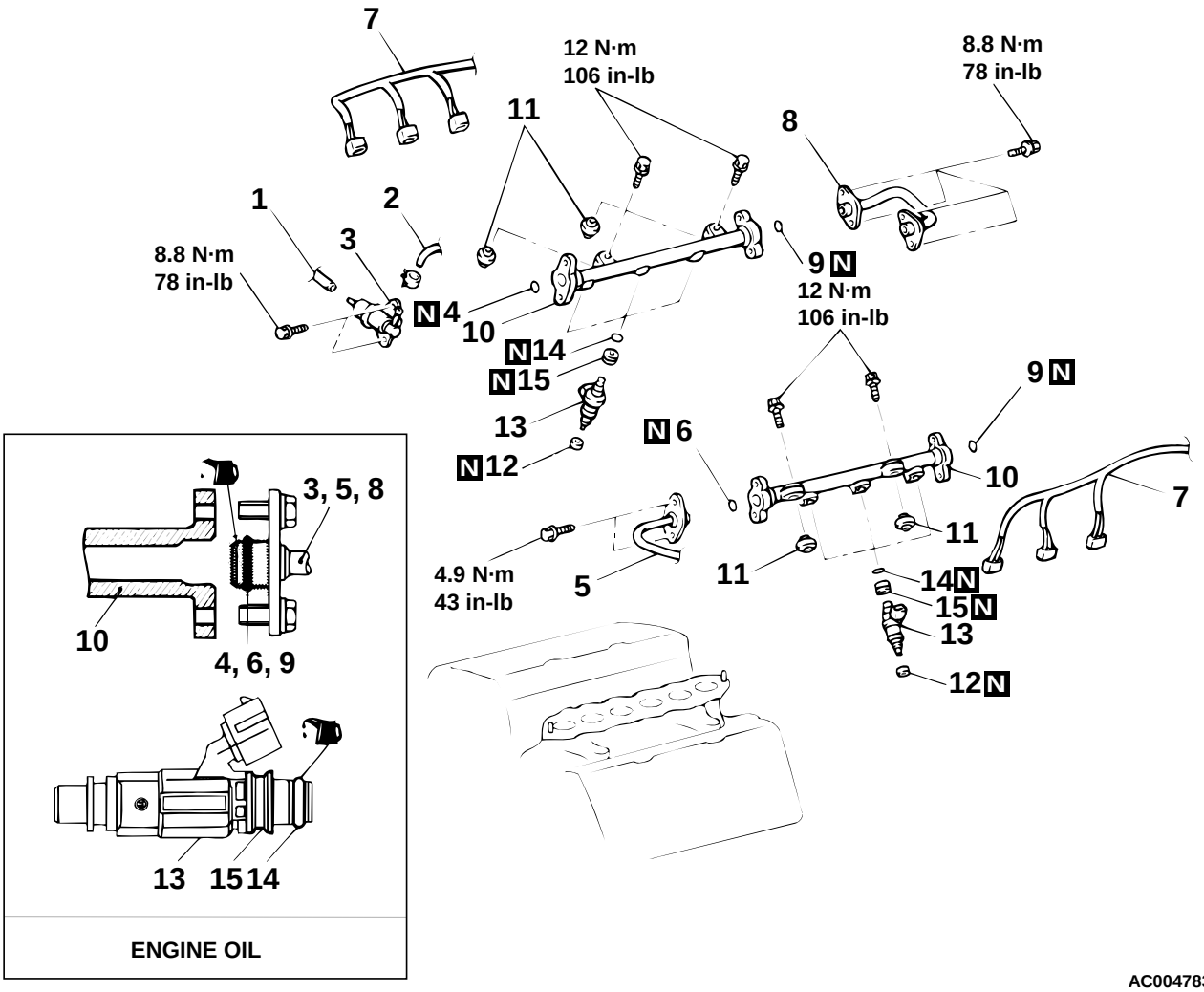
Refer to GROUP 17, Emission Control System – Exhaust Gas Recirculation (EGR) System – EGR Solenoid Check P.17-100.

INJECTOR

REMOVAL AND INSTALLATION

M1131007100382

Pre-removal Operation	Post-installation Operation
• Fuel Line Pressure Reduction (Refer to P.13Aa-18.) • Intake Manifold Plenum Removal (3.0L Engine: Refer to GROUP15 P.15-5.) (3.5L Engine: Refer to GROUP15 P.15-9.)	• Intake Manifold Plenum Removal (3.0L Engine: Refer to GROUP15 P.15-5.) (3.5L Engine: Refer to GROUP15 P.15-9.) • Accelerator Cable Adjustment (Refer to GROUP 17, On-vehicle Service P.17-4.) • Fuel Leakage Inspection



AC004783 AB

REMOVAL STEPS

1. VACUUM HOSE
2. FUEL RETURN HOSE CONNECTION
>>A<< 3. FUEL PRESSURE REGULATOR
4. O-RING
>>A<< 5. HIGH-PRESSURE FUEL HOSE CONNECTION
6. O-RING
7. INJECTOR CONNECTOR

REMOVAL STEPS (Continued)

<<A>> 8. FUEL PIPE
9. O-RINGS
<<A>> 10. FUEL RAIL
11. INSULATORS
12. INSULATORS
<<A>> >>A<< 13. INJECTORS
14. O-RINGS
15. GROMMETS

TSB Revision

REMOVAL SERVICE POINT

<<A>> FUEL RAIL/INJECTORS REMOVAL

⚠ CAUTION

Do not drop the injector.

Remove the fuel rail (with the injectors attached to it).

INSTALLATION SERVICE POINTS

>>A<< INJECTORS/HIGH-PRESSURE FUEL HOSE/FUEL PRESSURE REGULATOR INSTALLATION

⚠ CAUTION

Do not let the engine oil get into the fuel rail. Or the injectors will be damaged.

1. Apply a drop of new engine oil to the O-ring.
2. Turn the injector. To the right and left to install to the fuel rail. Repeat for fuel pressure regulator and high-pressure fuel hose.

   Be careful not to damage the O-ring. After installing, check that the item turns smoothly.
3. If it does not turn smoothly, the O-ring may be trapped, remove the item, re-install it into the fuel rail and check again.
4. Tighten the high-pressure fuel hose and fuel pressure regulator to the specified torque.

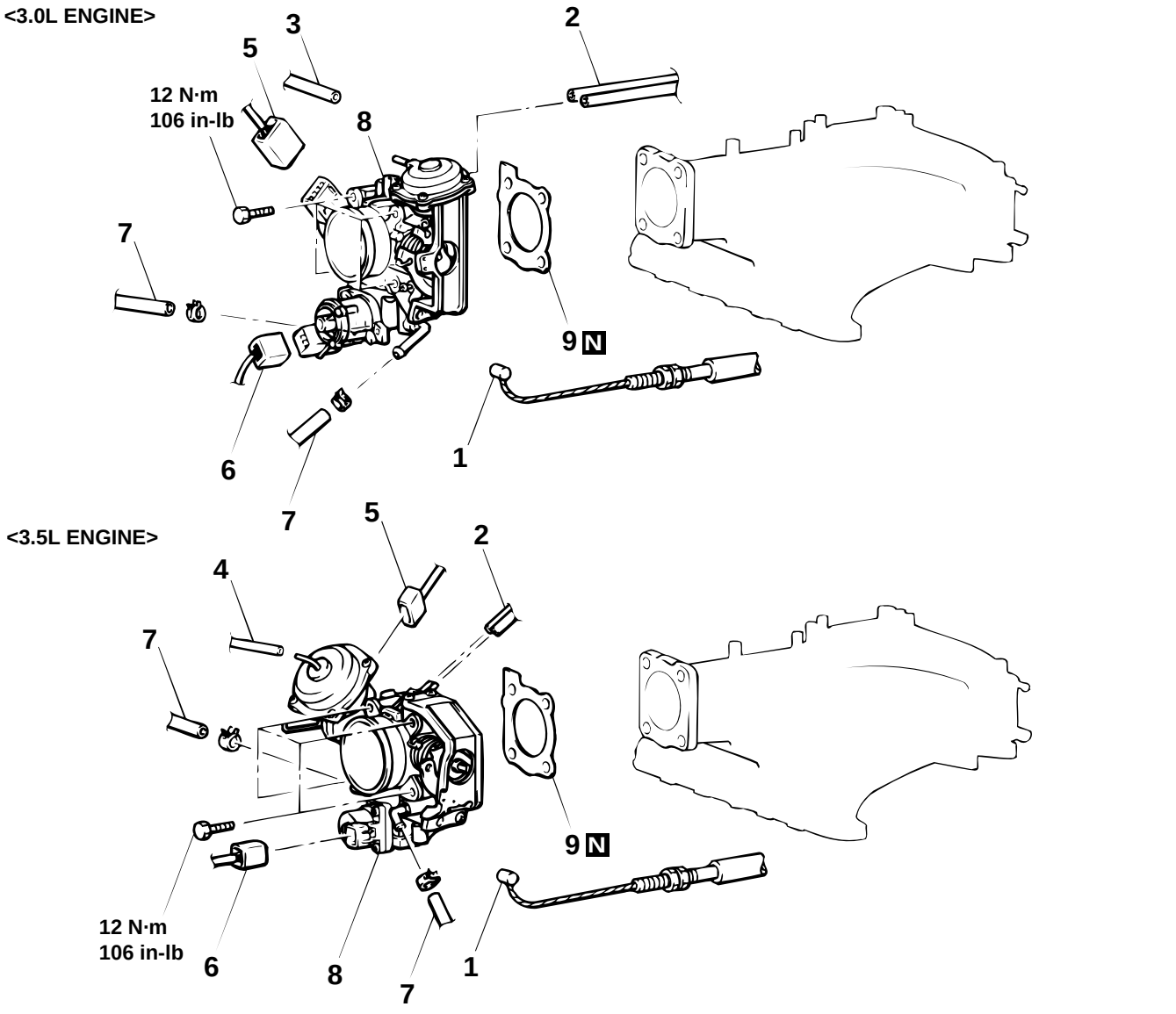
   Tightening torque:
   8.8 N·m (78 in-lb) <Fuel pressure regulator>
   4.9 N·m (43 in--lb) <High-pressure fuel hose>

THROTTLE BODY ASSEMBLY

REMOVAL AND INSTALLATION

M1131007700373

Pre-removal Operation	Post-installation Operation
• Engine Coolant Draining (Refer to GROUP 00, Maintenance Service P.00-50.) • Air Cleaner Removal (Refer to GROUP 15 P.15-4.)	• Air Cleaner Installation (Refer to GROUP 15 P.15-4.) • Engine Coolant Refilling (Refer to GROUP 00, Maintenance Service P.00-50.) • Accelerator Cable Adjustment (Refer to GROUP 17, On-vehicle Service P.17-4.)



AC004415 AB

REMOVAL STEPS
1. ACCELERATOR CABLE CONNECTION
2. VACUUM HOSE CONNECTION
3. VACUUM HOSE CONNECTION
4. VACUUM HOSE CONNECTION <VEHICLES WITH AUTO-CRUISE CONTROL>

REMOVAL STEPS (Continued)
5. TPS CONNECTOR
6. IAC MOTOR CONNECTOR
7. HEATER HOSE CONNECTOR
8. THROTTLE BODY

>>A<< 9. THROTTLE BODY GASKET

TSB Revision

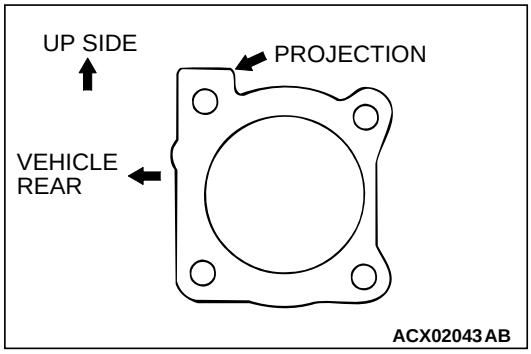
INSTALLATION SERVICE POINT

>>A<< THROTTLE BODY GASKET INSTALLATION

⚠ CAUTION

Poor idling etc. may result if the throttle body gasket is installed incorrectly.

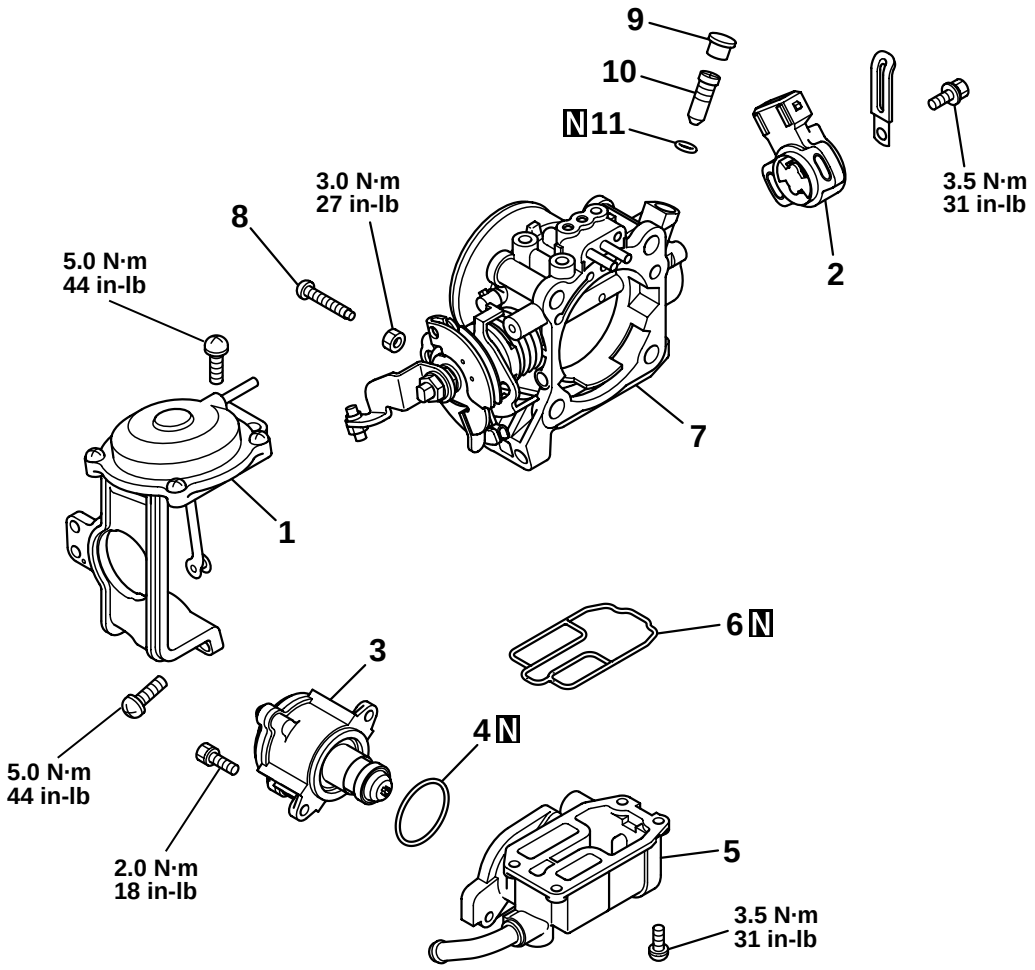
Install the throttle body gasket as shown in the illustration.



DISASSEMBLY AND ASSEMBLY

M1131009700324

<3.0L ENGINE>



AK000594AD

TSB Revision

REMOVAL STEPS

1. ACCELERATOR LEVER BODY ASSEMBLY <WITH AUTO-SPEED CONTROL>

<<A>> >>A<< 2. THROTTLE POSITION SENSOR

3. IDLE AIR CONTROL MOTOR
4. O-RING
5. FAST IDLE AIR VALVE
6. GASKET

<<B>> 7. THROTTLE BODY

8. FIXED SAS
9. CAP

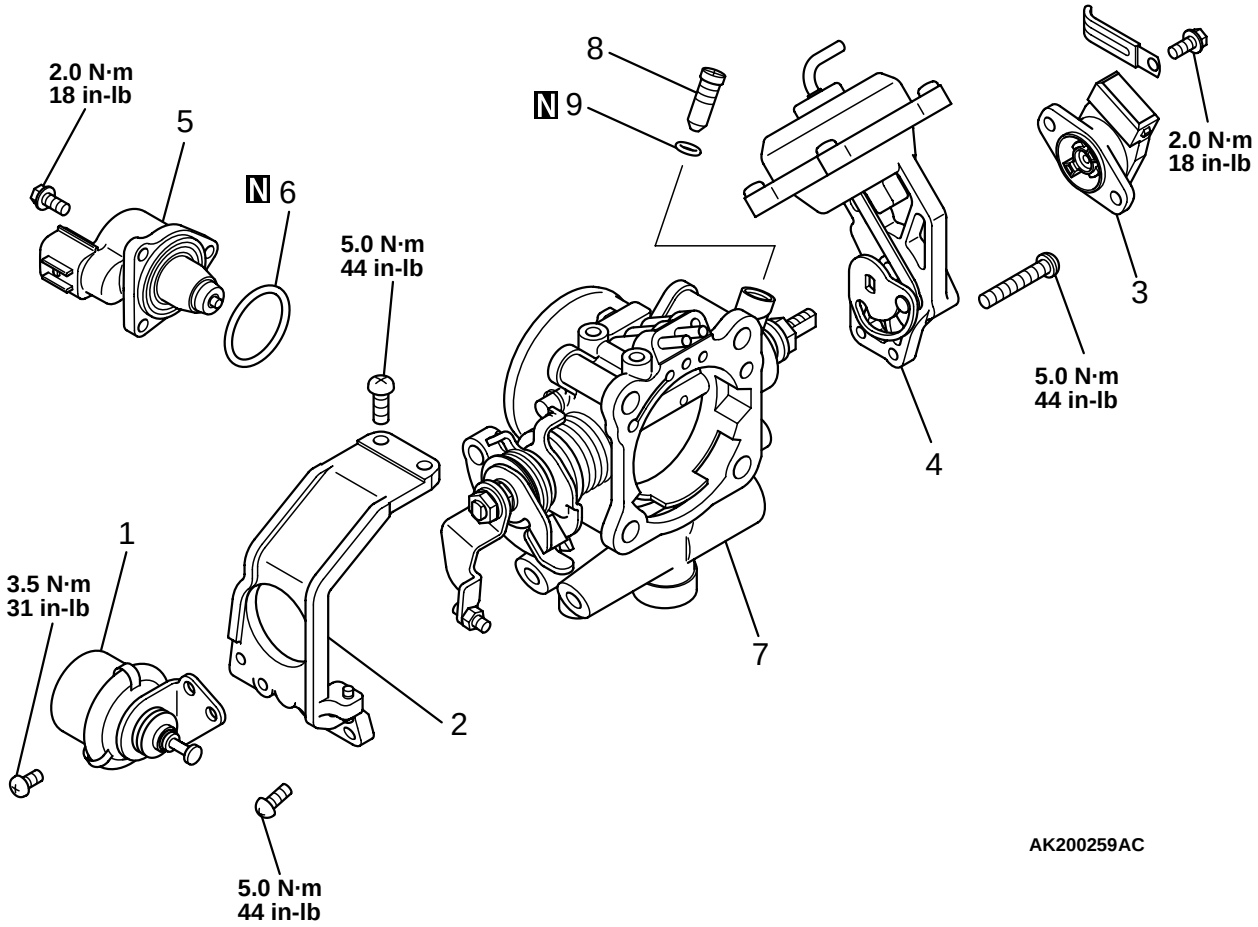
REMOVAL STEPS (Continued)

10. SPEED ADJUSTING SCREW
11. O-RING

NOTE: THE FIXED SAS AND SPEED ADJUSTING SCREW IS CORRECTLY ADJUSTMENT AT THE FACTORY AND SHOULD NOT BE REMOVED.

NOTE: IF THE FIXED SAS AND SPEED ADJUSTING SCREW SHOULD HAPPEN TO HAVE BEEN REMOVED, CARRY OUT FIXED SAS AND SPEED ADJUSTING SCREW ADJUSTMENT.

<3.5L ENGINE>



REMOVAL STEPS

1. DASH POT<FOR CALIFORNIA>
2. BRACKET

<<A>> >>B<< 3. THROTTLE POSITION SENSOR

4. ACCELERATOR LEVER BODY ASSEMBLY
5. IDLE AIR CONTROL MOTOR
6. O-RING

<<B>> 7. THROTTLE BODY

REMOVAL STEPS (Continued)

8. SPEED ADJUSTING SCREW
9. O-RING

NOTE: THE SPEED ADJUSTING SCREW IS CORRECTLY ADJUSTMENT AT THE FACTORY AND SHOULD NOT BE REMOVED.

NOTE: IF THE SPEED ADJUSTING SCREW SHOULD HAPPEN TO HAVE BEEN REMOVED, CARRY OUT SPEED ADJUSTING SCREW ADJUSTMENT.

DISASSEMBLY SERVICE POINTS

<<A>>THROTTLE POSITION SENSOR DISASSEBLY

1. Do not disassemble the sensor and motor.
2. Do not clean the sensor and motor by dipping them into cleaning solvent. Clean them with shop towel.

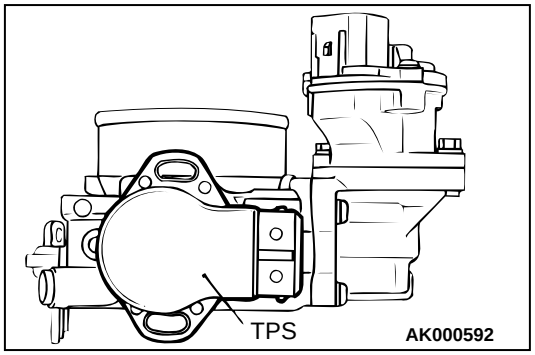
<<B>>THROTTLE BODY DISASSEBLY

1. Do not disassemble the throttle body.
2. Check if the vacuum port or passage is clogged. Use compressed air to clean the vacuum passage.

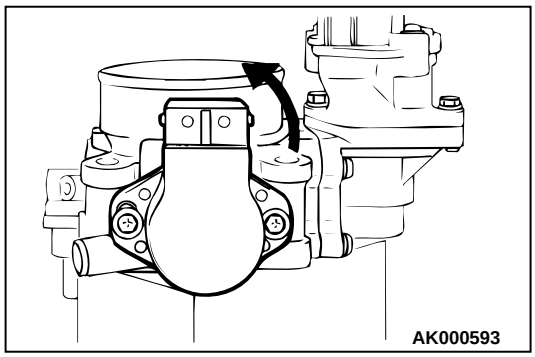
ASSEMBLY SERVICE POINTS

>>A<<THROTTLE POSITION SENSOR (TPS) INSTALLTION

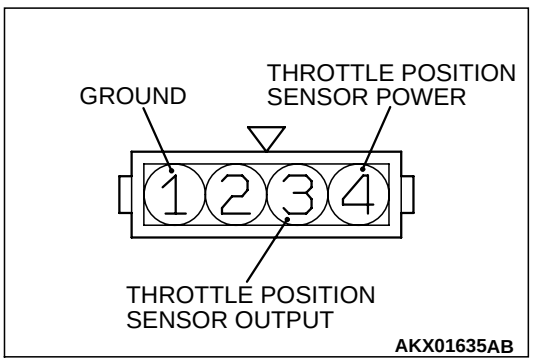
1. Install the throttle position sensor to the throttle body as shown in the illustration.

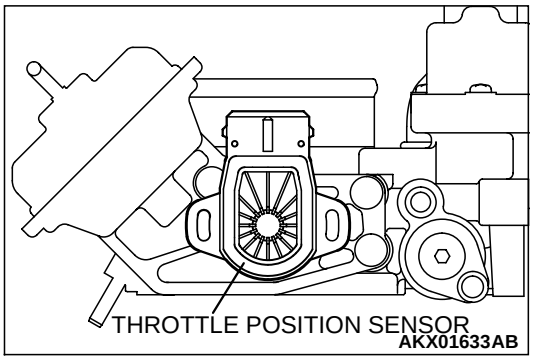


2. Turn the throttle position sensor 90 degree angle counterclockwise to set it, and tighten the screws.



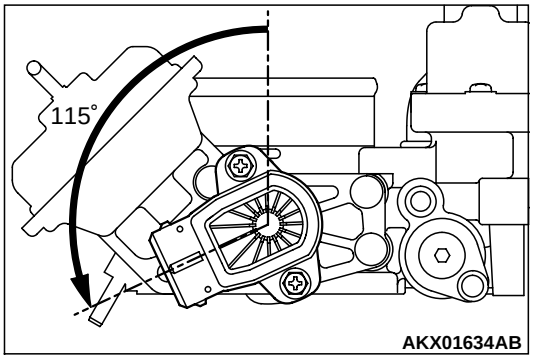
3. Connect an ohmmeter between terminals 1 (ground) and 3 (output), or between terminals 3 (output) and 4 (power). Then, make sure that the resistance changes smoothly when the throttle valve is slowly moved to the fully open position.
4. If the above specifications are not met, replace throttle position sensor.



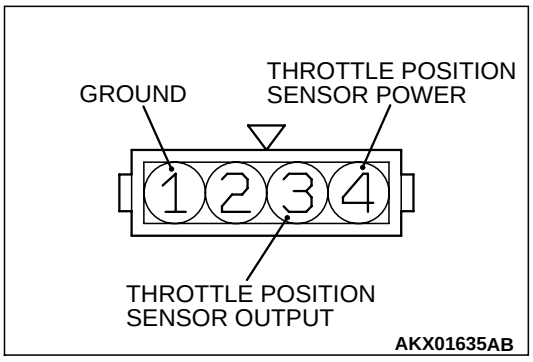


>>B<<THROTTLE POSITION SENSOR (TPS) INSTALLTION

1. Install the throttle position sensor to the throttle body as shown in the illustration.



2. Turn the throttle position sensor 115 degree angle counterclockwise to set it, and tighten the screws.



3. Connect an ohmmeter between terminals 1 (ground) and 3 (output), or between terminals 3 (output) and 4 (power). Then, make sure that the resistance changes smoothly when the throttle valve is slowly moved to the fully open position.
4. If the above specifications are not met, replace throttle position sensor.

INSPECTION

M1131009800042

DASH POT

1. Push the dash pot rod in lightly and confirm the resistance.

   NOTE: Resistance increases as the rod is pushed harder.

   NOTE: If the rod can be pushed in with no resistance, either the diaphragm or check valve is faulty.
2. Release finger and confirm that the rod returns to it's original position quickly.

   NOTE: If the rod returns slowly, the check valve is faulty.

SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1131011600409

ITEM	SPECIFICATION
Engine coolant temperature sensor	29 N·m (22 ft-lb)
Throttle body mounting bolt	12 N·m (106 in-lb)
Throttle position sensor <3.0L ENGINE>	3.5N·m (31 in-lb)
Idle air control motor <3.0L ENGINE>	2.0 N·m (18 in-lb)
Throttle body attaching nut <3.0L ENGINE>	3.0 N·m (27 in-lb)
Accelerator lever body assembly <3.0L ENGINE>	5.0 N·m (44 in-lb)
Fast idle air valve <3.0L ENGINE>	3.5 N·m (31 in-lb)
Dash pot <3.5L ENGINE>	3.5N·m (31 in-lb)
Fast idle air valve <3.5L ENGINE>	2.0 N·m (18 in-lb)
Idle air control motor <3.5L ENGINE>	2.0 N·m (18 in-lb)
Bracket <3.5L ENGINE>	5.0 N·m (44 in-lb)
Accelerator lever body assembly <3.5L ENGINE>	5.0 N·m (44 in-lb)
Throttle position sensor <3.5L ENGINE>	2.0 N·m (18 in-lb)
Fuel pipe attaching bolt	8.8 N·m (78 in-lb)
Fuel rail mounting bolt	12 N·m (106 in-lb)
High-pressure fuel hose	4.9 N·m (43 in-lb)

GENERAL SPECIFICATIONS

M1131000200388

ITEM		SPECIFICATION
Throttle body	Throttle bore mm (in.)	60 (2.4)
	Throttle position sensor	Variable resistor type
	Idle air control motor	Stepper motor (stepper motor type by-pass air control system with the air volume limiter)
Powertrain control module (PCM)	Identification model No.	E6T36071 <3.0L Engine RWD> E6T36072 <3.0L Engine 4WD> E6T36073 <3.5L Engine RWD> E6T36074 <3.5L Engine 4WD>
Sensors	Volume air flow sensor	Karman vortex type
	Barometric pressure sensor	Semiconductor type
	Intake air temperature sensor	Thermistor type
	Engine coolant temperature sensor	Thermistor type
	Heated oxygen sensor	Zirconia type
	Camshaft position sensor	Hall element type
	Crankshaft position sensor	Hall element type
	Power steering pressure switch	Contact switch type
	Manifold differential pressure sensor	Semiconductor type
	Fuel temperature sensor	Thermistor type

ITEM		SPECIFICATION
Actuators	Multiport fuel injection (MFI) relay	Contact switch type
	Fuel pump relay	Contact switch type
	Injector type and number	Electromagnetic type, 6
	Injector identification mark	EDH210
	EGR solenoid	Duty cycle type solenoid valve
	Evaporative emission purge solenoid	Duty cycle type solenoid valve
Fuel pressure regulator	Regulator pressure kPa (psi)	335 (47.6)

SERVICE SPECIFICATIONS

M1131000300136

ITEMS		STANDARD VALUE
Throttle position sensor adjusting voltage mV		535 – 735
Basic idle speed r/min		700 ± 50
Fuel pressure kPa (psi)	Vacuum hose disconnected	330 – 350 (47 – 50) at curb idle
	Vacuum hose connected	Approximately 270 (38) at curb idle
Intake air temperature sensor resistance kΩ	-20° C (-4° F)	13 – 17
	0° C (32° F)	5.3 – 6.7
	20° C (68° F)	2.3 – 3.0
	40° C (104° F)	1.0 – 1.5
	60° C (140° F)	0.56 – 0.76
	80° C (176° F)	0.30 – 0.42
Engine coolant temperature sensor resistance kΩ	-20° C (-4° F)	14 – 17
	0° C (32° F)	5.1 – 6.5
	20° C (68° F)	2.1 – 2.7
	40° C (104° F)	0.9 – 1.3
	60° C (140° F)	0.48 – 0.68
	80° C (176° F)	0.26 – 0.36
Throttle position sensor resistance kΩ		3.5 – 6.5
Heated oxygen sensor output voltage V		0.6 – 1.0
Heated oxygen sensor heater resistance Ω	HO_2S (front)	4.5 – 8.0
	HO_2S (rear)	11 – 18
Injector coil resistance Ω		13 – 16 [at 20° C (68° F)]
Idle air control motor coil resistance Ω		28 – 33 [at 20° C (68° F)]

SEALANT AND ADHESIVE

M1131000500022

ITEM	SPECIFIED SEALANT
Engine coolant temperature sensor threaded portion	3M™ AAD part number 8731or equivalent