

## GROUP 15

# INTAKE AND EXHAUST

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## GENERAL DESCRIPTION

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The exhaust pipe is divided into four parts.

## INTAKE AND EXHAUST DIAGNOSIS

## INTRODUCTION

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Intake leaks usually create driveability issues that are not obviously related to the intake system. Exhaust leaks or abnormal noise is caused by cracks, gaskets and fittings, or by exhaust pipe or muffler damage due to impacts during travel. The exhaust leaks from these sections and causes the exhaust noise to increase. There may be cases when the system contacts the body and vibration noise is generated.

## TROUBLESHOOTING STRATEGY

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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 intake or exhaust 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 malfunction is eliminated.

## SYMPTOM CHART

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SYMPTOM	INSPECTION PROCEDURE	REFERENCE PAGE
Exhaust Leakage	1	<a href="#">P.15-2</a>
Abnormal Noise	2	<a href="#">P.15-3</a>

## SYMPTOM PROCEDURES

## INSPECTION PROCEDURE 1: Exhaust Leakage

## DIAGNOSIS

**STEP 1. Start the engine. Have an assistant stay in the driver's seat. Raise the vehicle on a hoist. Have the assistant rev the engine while searching for exhaust leaks.**

**Q: Is the exhaust leaking?**

YES : Go to Step 2.

NO : The procedure is complete.

## STEP 2. Check the gasket for cracks, damage.

**Q: Is the gasket damaged?**

YES : Replace the gasket, then go to Step 1.

NO : Go to Step 3.

## STEP 3. Check for loosening in each coupling section.

**Q: Is there any loosening in any section?**

YES : Tighten, then go to Step 1.

NO : There is no action to be taken.

## INSPECTION PROCEDURE 2: Abnormal Noise

## DIAGNOSIS

**STEP 1. Start the engine. Have an assistant stay in the drivers seat. Raise the vehicle on a hoist. Have the assistant rev the engine while searching for exhaust leaks.**

**Q: Is any abnormal noise generated?**

YES : Go to Step 2.

NO : The procedure is complete.

**STEP 2. Check for missing parts in the muffler. Tap the muffler lightly to check for loose baffles, etc.**

**Q: Are there any missing parts in the muffler?**

YES : Replace, then go to Step 1.

NO : Go to Step 3.

**STEP 3. Check the hanger for cracks.**

**Q: Is the hanger cracked?**

YES : Replace, then go to Step 1.

NO : Go to Step 4.

**STEP 4. Check for interference of the pipes and muffler with the body.**

**Q: Are the pipes and muffler interfering with the body?**

YES : Repair, then go to Step 1.

NO : Go to Step 5.

**STEP 5. Check the heat protectors.**

**Q: Are any heat protectors loose or damaged?**

YES : Tighten or replace, then go to Step 1.

NO : Go to Step 6.

**STEP 6. Check the pipes and muffler for damage.**

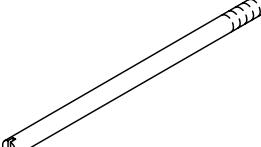
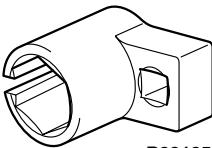
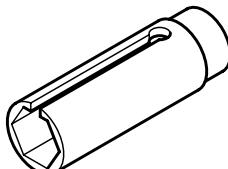
**Q: Are the pipes and muffler damaged?**

YES : Replace, then go to Step 1.

NO : There is no action to be taken.

## SPECIAL TOOLS

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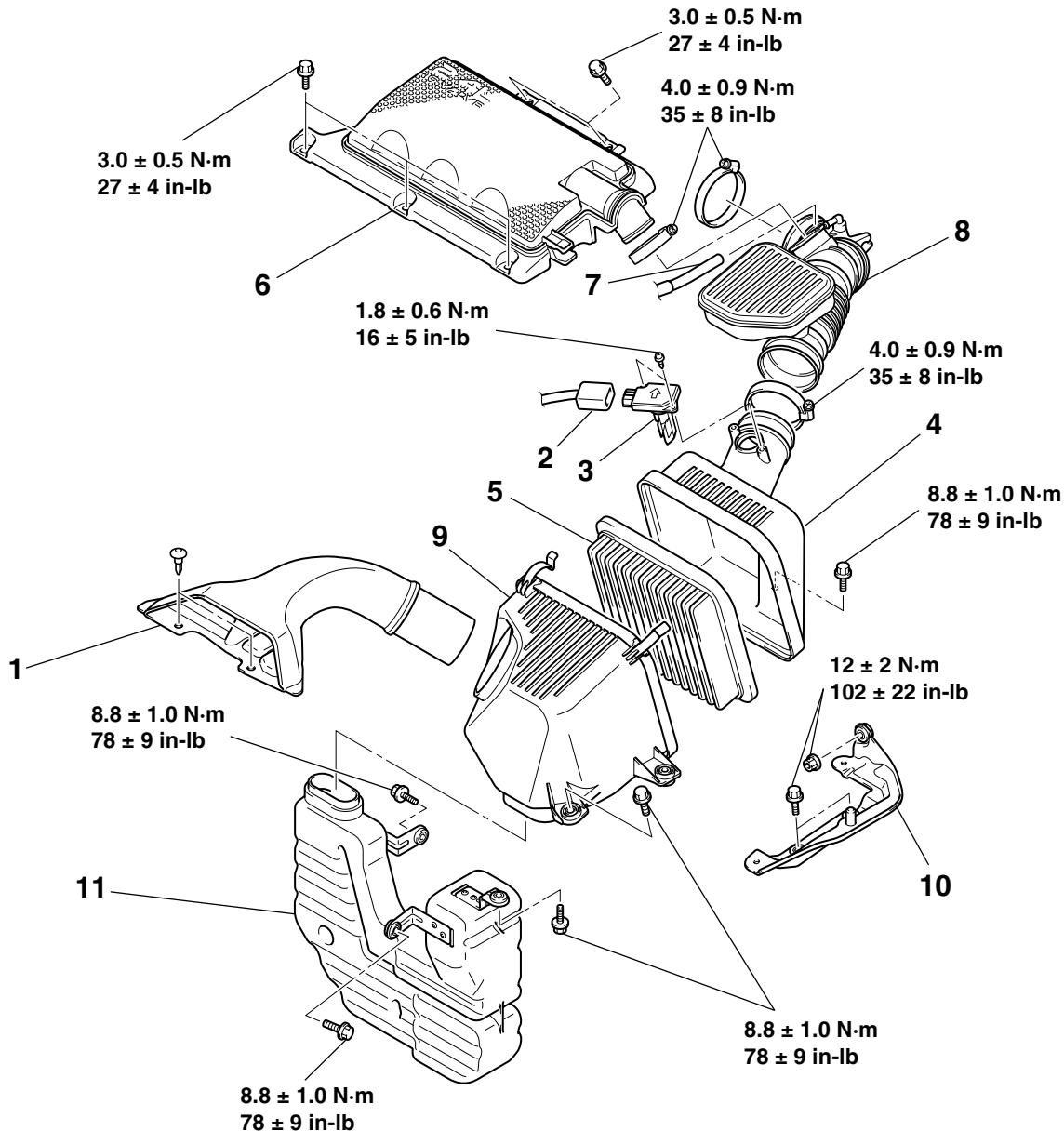
TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MD998412 Guide	MD998412	Installation of intake manifold plenum
	MB991953 Oxygen sensor wrench B991953	-	Removal and installation of heated oxygen sensor
	MD998770 Oxygen sensor wrench	MD998770-01 or General service tool	Removal and installation of heated oxygen sensor

## AIR CLEANER

## REMOVAL AND INSTALLATION

&lt;2.4L ENGINE&gt;

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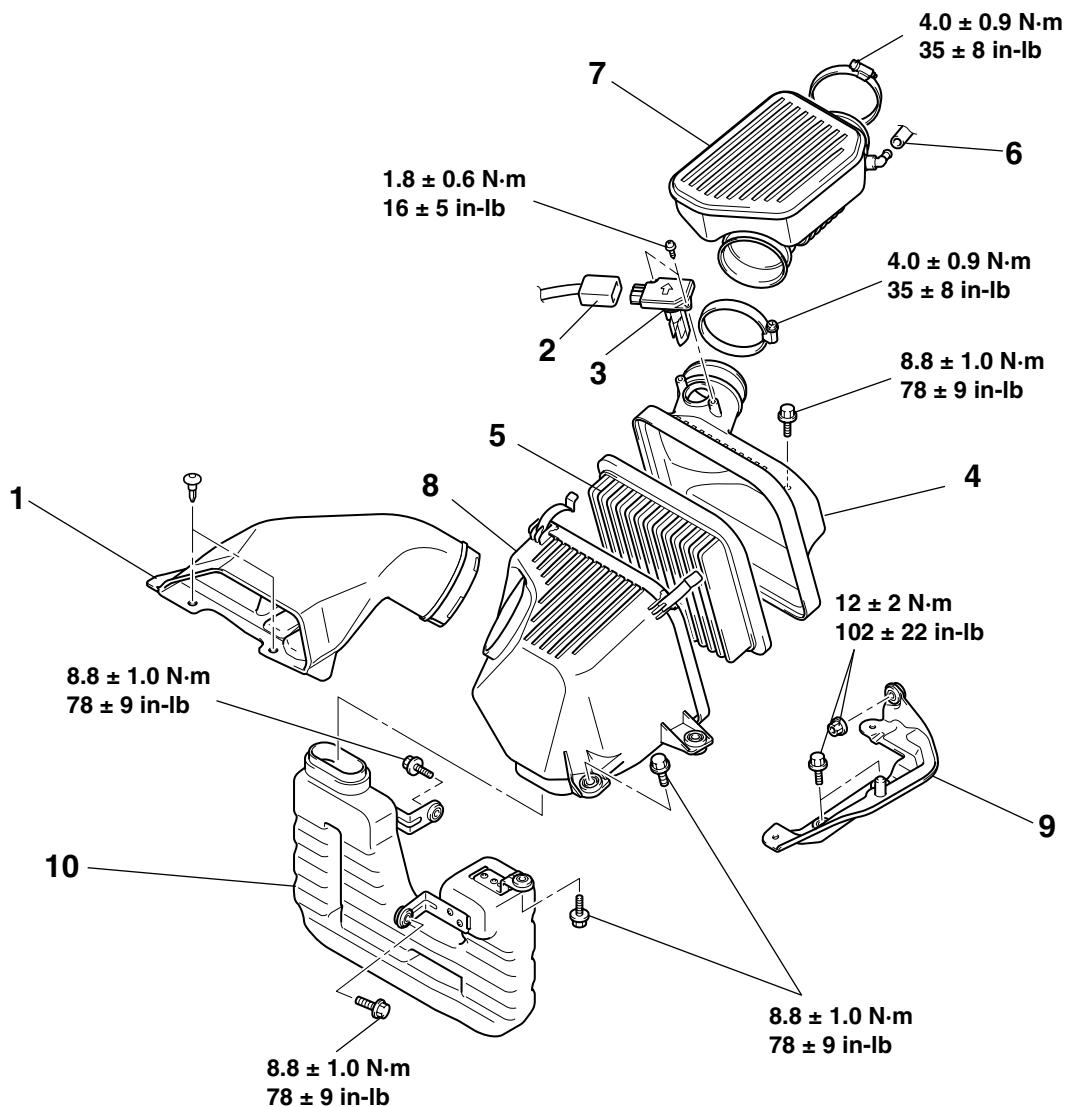
## REMOVAL STEPS

1. AIR DUCT
2. MASS AIRFLOW SENSOR CONNECTOR
3. MASS AIRFLOW SENSOR
4. AIR CLEANER COVER
5. AIR CLEANER ELEMENT
6. AIR CLEANER RESONATOR
7. BREather HOSE CONNECTION
8. AIR INTAKE HOSE

## REMOVAL STEPS (Continued)

- POWERTRAIN CONTROL MODULE (PCM) (REFER TO GROUP 13A, POWERTRAIN CONTROL MODULE (PCM) P.13A-1180).
- 9. AIR CLEANER BODY
- 10. AIR CLEANER BRACKET
- UNDER COVER (LH)
- 11. AIR CLEANER RESONATOR

## &lt;3.8L ENGINE (EXCEPT MIVEC)&gt;



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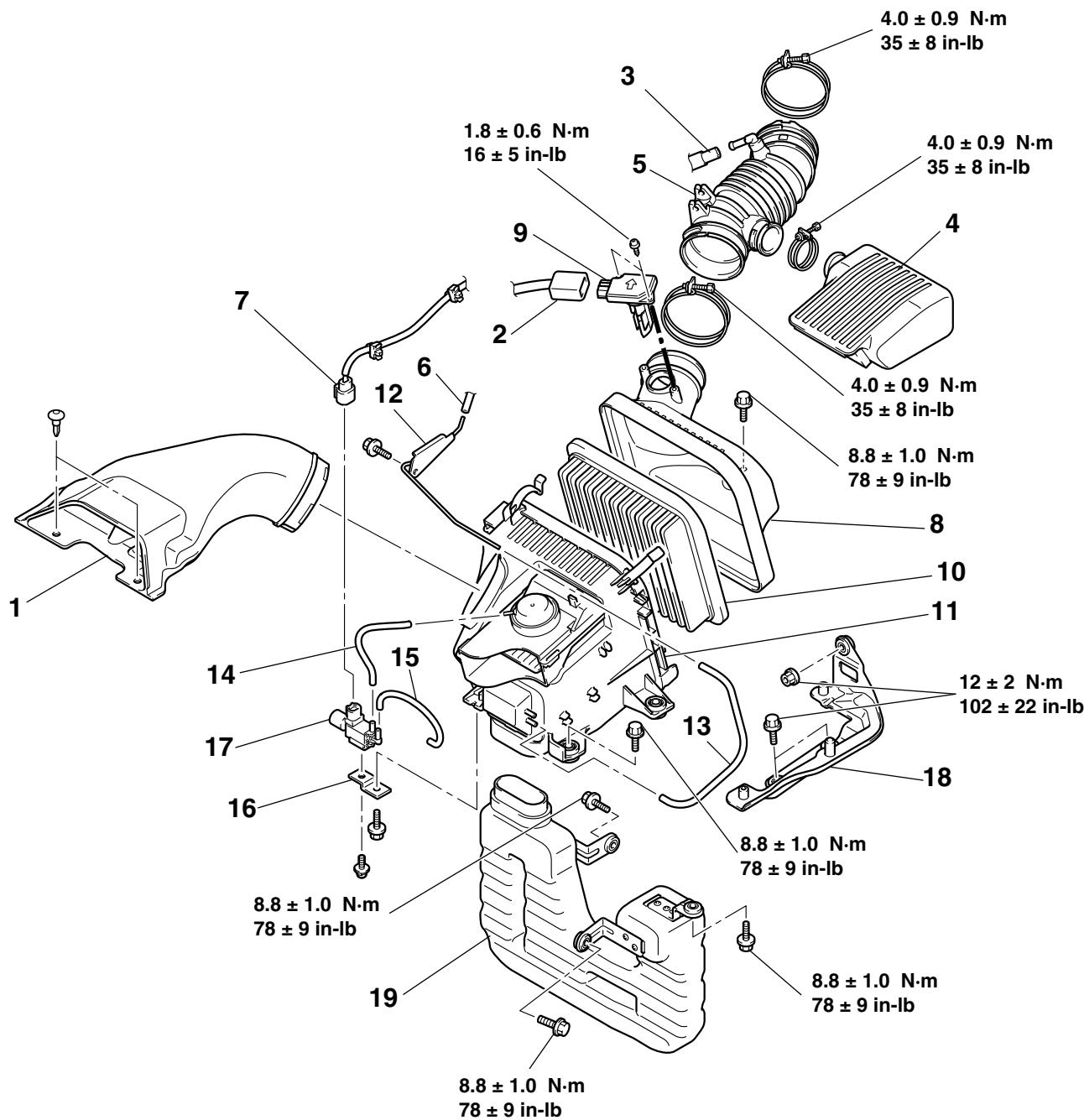
**REMOVAL STEPS**

1. AIR DUCT
2. MASS AIRFLOW SENSOR CONNECTOR
3. MASS AIRFLOW SENSOR
4. AIR CLEANER COVER
5. AIR CLEANER ELEMENT
6. BREATHER HOSE CONNECTION
7. AIR INTAKE HOSE

**REMOVAL STEPS (Continued)**

- POWERTRAIN CONTROL MODULE (PCM) (REFER TO GROUP 13B, POWERTRAIN CONTROL MODULE (PCM) [P.13B-1447](#)).
- 8. AIR CLEANER BODY
- 9. AIR CLEANER BRACKET
- UNDER COVER (LH)
- 10. AIR CLEANER RESONATOR

## &lt;3.8L ENGINE-MIVEC&gt;



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**REMOVAL STEPS**

1. AIR CLEANER INTAKE DUCT
2. MASS AIRFLOW SENSOR CONNECTOR
3. BREather HOSE CONNECTION
4. AIR CLEANER RESONATOR
5. AIR CLEANER TO THROTTLE BODY DUCT
6. VACUUM HOSE CONNECTION
7. VARIABLE INTAKE AIR CONTROL SOLENOID VALVE CONNECTOR

**REMOVAL STEPS (Continued)**

- POWERTRAIN CONTROL MODULE (PCM) (REFER TO GROUP 13B, POWERTRAIN CONTROL MODULE (PCM) [P.13B-1447](#)).
- 8. AIR CLEANER COVER
- 9. MASS AIRFLOW SENSOR
- 10. AIR CLEANER ELEMENT
- 11. AIR CLEANER BODY
- 12. VACUUM PIPE
- 13. VACUUM HOSE

## REMOVAL STEPS (Continued)

14. VACUUM HOSE
15. VACUUM HOSE
16. SOLENOID VALVE STAY
17. VARIABLE AIR INTAKE  
SOLENOID
18. AIR CLEANER BRACKET
  - UNDER COVER (LH)
  - TRANSMISSION FLUID COOLER  
LINE TUBE ASSEMBLY AND  
TRANSMISSION FLUID COOLER  
LINE HOSE ASSEMBLY B  
CONNECTION (REFER TO  
GROUP 23A, TRANSMISSION  
FLUID COOLER [P.23A-405](#)).
19. AIR CLEANER RESONATOR

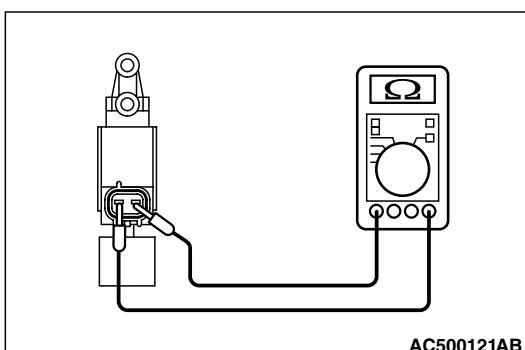
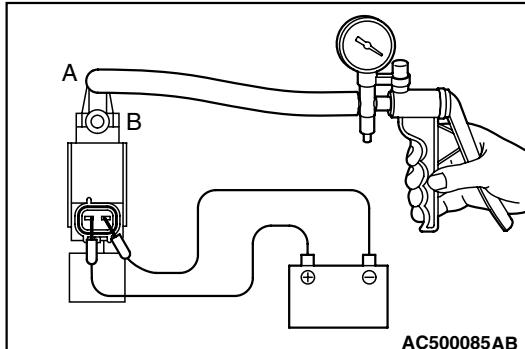
## INSPECTION

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## VARIABLE AIR INTAKE 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 variable air intake 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: 29 – 35 Ω [at 20°C (68°F)]**

## INTAKE MANIFOLD PLENUM

## REMOVAL AND INSTALLATION &lt;3.8L ENGINE (EXCEPT MIVEC)&gt;

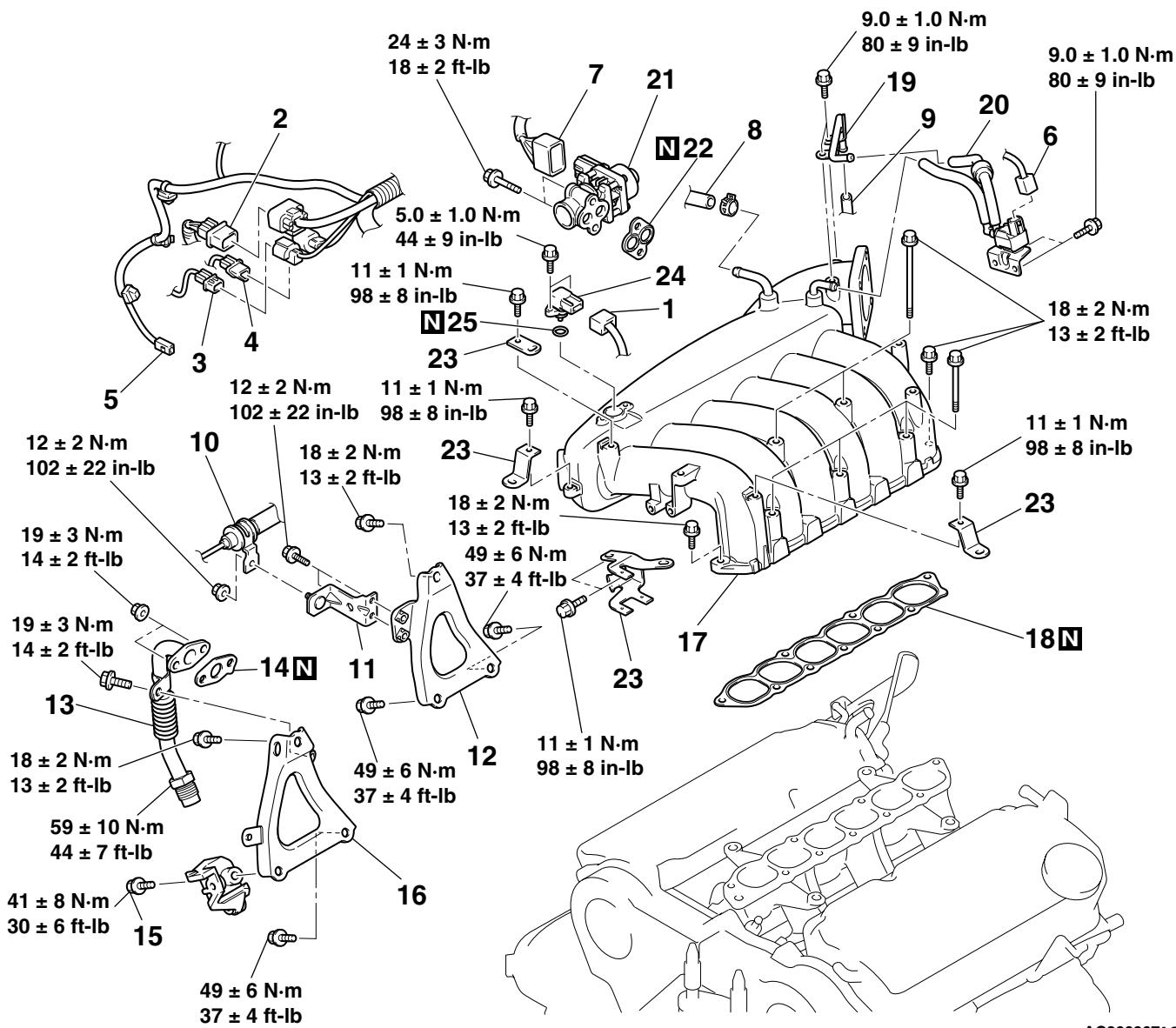
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## Pre-removal Operation

- Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service P.14-7).
- Engine Cover Removal (Refer to GROUP 11C, Engine Assembly P.11C-22).
- Air Cleaner Cover and Air Intake Hose Removal (Refer to P.15-4).
- Throttle Body Removal (Refer to GROUP 13B, Throttle Body P.13B-1444).

## Post-installation Operation

- Throttle Body Installation (Refer to GROUP 13B, Throttle Body P.13B-1444).
- Air Cleaner Cover and Air Intake Hose Installation (Refer to P.15-4).
- Engine Cover Installation (Refer to GROUP 11C, Engine Assembly P.11C-22).
- Engine Coolant Supplying (Refer to GROUP 14, On-vehicle Service P.14-7).



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**REMOVAL STEPS**

1. MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR
2. CONTROL WIRING HARNESS AND INJECTOR WIRING HARNESS COMBINATION CONNECTOR
3. CRANKSHAFT POSITION SENSOR CONNECTOR
4. KNOCK SENSOR CONNECTOR
5. POWER STEERING PRESSURE SWITCH CONNECTOR
6. EVAPORATIVE EMISSION PURGE SOLENOID CONNECTOR
7. EXHAUST GAS RECIRCULATION VALVE CONNECTOR
8. VACUUM HOSE CONNECTION
9. PURGE HOSE CONNECTION
10. POWER STEERING PRESSURE HOSE CLAMP
11. POWER STEERING PRESSURE HOSE CLAMP BRACKET
12. INTAKE MANIFOLD PLENUM STAY, REAR

**REMOVAL STEPS (Continued)**

- POWER STEERING GEAR AND LINKAGE PROTECTOR (REFER TO 37, POWER STEERING GEAR BOX AND LINKAGE [P.37-31](#))
- 13. EGR PIPE
- 14. EGR PIPE GASKET
- POWER STEERING OIL PUMP (REFER TO 37, POWER STEERING OIL PUMP ASSEMBLY [P.37-52](#))
- 15. POWER STEERING OIL PUMP BRACKET CONNECTING BOLT
- 16. INTAKE MANIFOLD PLENUM STAY, FRONT

>>A<<

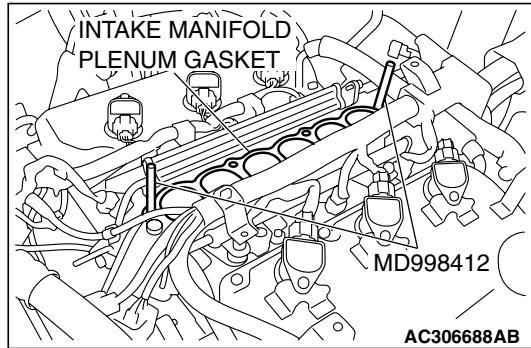
- 17. INTAKE MANIFOLD PLENUM
- 18. INTAKE MANIFOLD PLENUM GASKET
- 19. VACUUM PIPE
- 20. EVAPORATIVE EMISSION PURGE SOLENOID
- 21. EXHAUST GAS RECIRCULATION VALVE
- 22. GASKET
- 23. HARNESS BRACKET
- 24. MANIFOLD ABSOLUTE PRESSURE SENSOR
- 25. O-RING

**Required Special Tool:**

- MD998412: Guide

**INSTALLATION SERVICE POINT****>>A<< INTAKE MANIFOLD PLENUM INSTALLATION**

Use special tool MD998412 to install the intake manifold plenum.



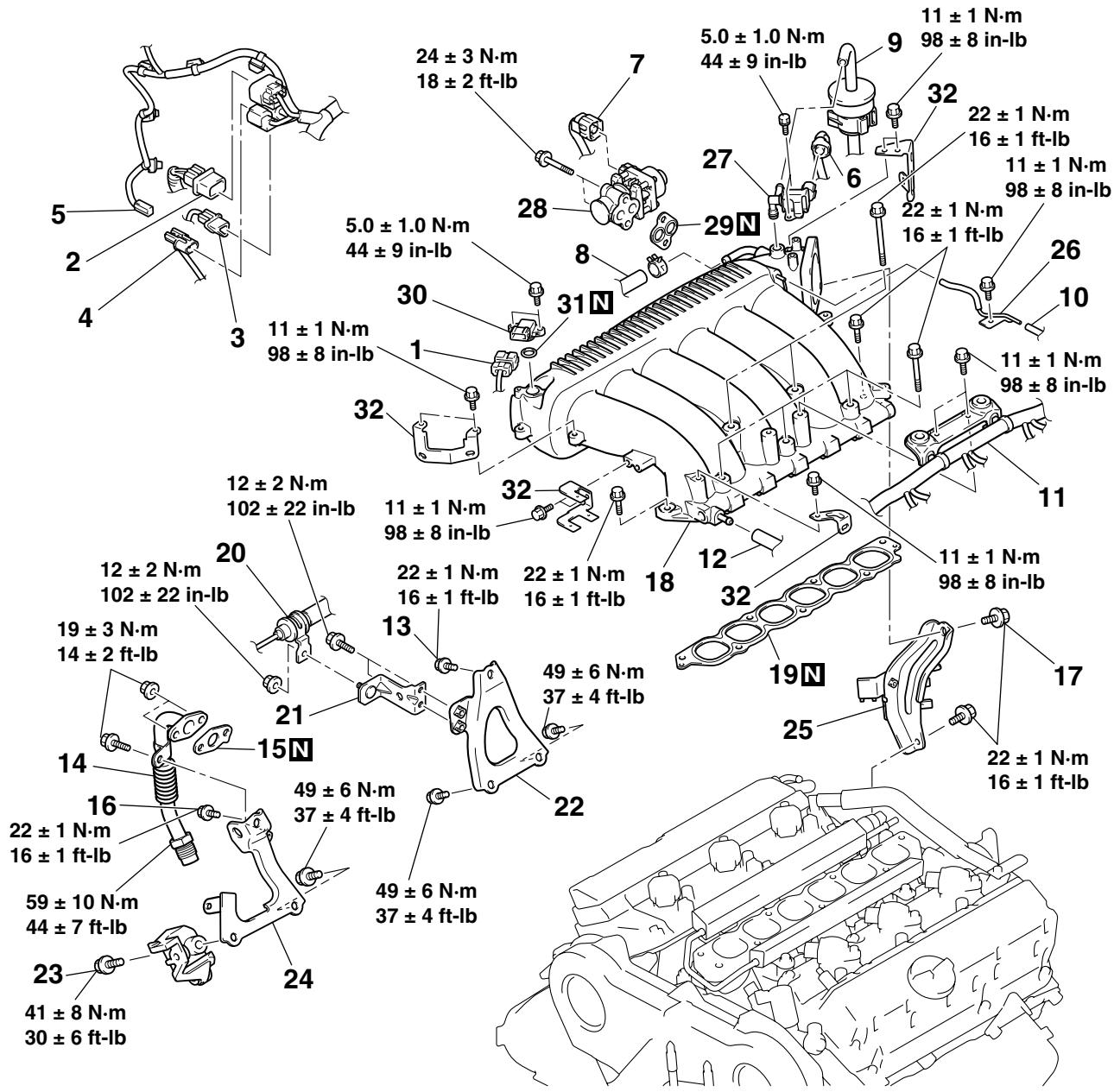
## REMOVAL AND INSTALLATION &lt;3.8L ENGINE-MIVEC&gt;

## Pre-removal Operation

- Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-7).
- Engine Cover Removal (Refer to GROUP 11E, Engine Assembly P.11E-25).
- Strut Tower Bar Removal (Refer to GROUP 42, Strut Tower Bar P.42-11).
- Air Cleaner Cover and Air Cleaner to Throttle Body Duct Removal (Refer to P.15-4).
- Throttle Body Removal (Refer to GROUP 13B, Throttle Body P.13B-1444).

## Post-installation Operation

- Throttle Body Installation (Refer to GROUP 13B, Throttle Body P.13B-1444).
- Air Cleaner Cover and Air Cleaner to Throttle Body Duct Installation (Refer to P.15-4).
- Strut Tower Bar Installation (Refer to GROUP 42, Strut Tower Bar P.42-11).
- Engine Cover Installation (Refer to GROUP 11E, Engine Assembly P.11E-25).
- Engine Coolant Supplying (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-7).



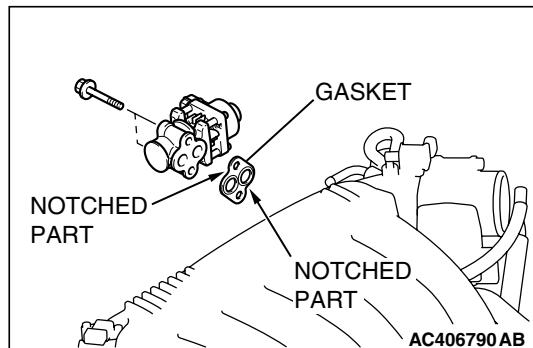
<b>REMOVAL STEPS</b>		<b>REMOVAL STEPS (Continued)</b>	
1. MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR	>>B<<	18. INTAKE MANIFOLD PLENUM	18. INTAKE MANIFOLD PLENUM
2. CONTROL WIRING HARNESS AND INJECTOR WIRING HARNESS COMBINATION CONNECTOR		19. INTAKE MANIFOLD PLENUM GASKET	19. INTAKE MANIFOLD PLENUM GASKET
3. CRANKSHAFT POSITION SENSOR CONNECTOR		20. POWER STEERING PRESSURE HOSE CLAMP	20. POWER STEERING PRESSURE HOSE CLAMP
4. KNOCK SENSOR CONNECTOR		21. POWER STEERING PRESSURE HOSE CLAMP BRACKET	21. POWER STEERING PRESSURE HOSE CLAMP BRACKET
5. POWER STEERING PRESSURE SWITCH CONNECTOR		22. INTAKE MANIFOLD PLENUM STAY (REAR)	22. INTAKE MANIFOLD PLENUM STAY (REAR)
6. EVAPORATIVE EMISSION PURGE SOLENOID CONNECTOR		• STEERING GEAR AND LINKAGE PROTECTOR (REFER TO GROUP 37, STEERING GEAR BOX AND LINKAGE P.37- 31).	• STEERING GEAR AND LINKAGE PROTECTOR (REFER TO GROUP 37, STEERING GEAR BOX AND LINKAGE P.37- 31).
7. EXHAUST GAS RECIRCULATION VALVE CONNECTOR		• POWER STEERING OIL PUMP (REFER TO GROUP 37, POWER STEERING OIL PUMP ASSEMBLY P.37-52).	• POWER STEERING OIL PUMP (REFER TO GROUP 37, POWER STEERING OIL PUMP ASSEMBLY P.37-52).
8. BRAKE BOOSTER VACUUM HOSE CONNECTION		23. POWER STEERING OIL PUMP BRACKET CONNECTING BOLT	23. POWER STEERING OIL PUMP BRACKET CONNECTING BOLT
9. EVAPORATIVE EMISSION PURGE HOSE CONNECTION		24. INTAKE MANIFOLD PLENUM STAY (FRONT)	24. INTAKE MANIFOLD PLENUM STAY (FRONT)
10. VACUUM HOSE CONNECTION		25. THROTTLE BODY STAY	25. THROTTLE BODY STAY
11. CONTROL WIRING HARNESS AND ENGINE COVER BRACKET ASSEMBLY		26. VACUUM PIPE AND HOSE ASSEMBLY	26. VACUUM PIPE AND HOSE ASSEMBLY
12. PCV HOSE CONNECTION		27. EVAPORATIVE EMISSION PURGE SOLENOID	27. EVAPORATIVE EMISSION PURGE SOLENOID
13. INTAKE MANIFOLD PLENUM STAY (REAR) CONNECTING BOLT		28. EXHAUST GAS RECIRCULATION VALVE	28. EXHAUST GAS RECIRCULATION VALVE
14. EGR PIPE	>>A<<	29. EXHAUST GAS RECIRCULATION VALVE GASKET	29. EXHAUST GAS RECIRCULATION VALVE GASKET
15. EGR PIPE GASKET		30. MANIFOLD ABSOLUTE PRESSURE SENSOR	30. MANIFOLD ABSOLUTE PRESSURE SENSOR
16. INTAKE MANIFOLD PLENUM STAY (FRONT) CONNECTING BOLT		31. O-RING	31. O-RING
17. THROTTLE BODY STAY CONNECTING BOLT		32. HARNESS BRACKET	32. HARNESS BRACKET

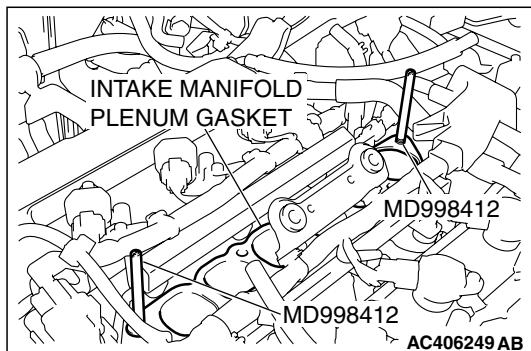
**Required Special Tool:**

- MD998412: Guide

**INSTALLATION SERVICE POINTS****>>A<< EXHAUST GAS RECIRCULATION VALVE GASKET  
INSTALLATION**

Install the exhaust gas recirculation valve gasket as shown in the illustration.





## &gt;&gt;B&lt;&lt; INTAKE MANIFOLD PLENUM INSTALLATION

Use special tool MD998412 to install the intake manifold plenum.

## INTAKE MANIFOLD

## REMOVAL AND INSTALLATION &lt;2.4L ENGINE&gt;

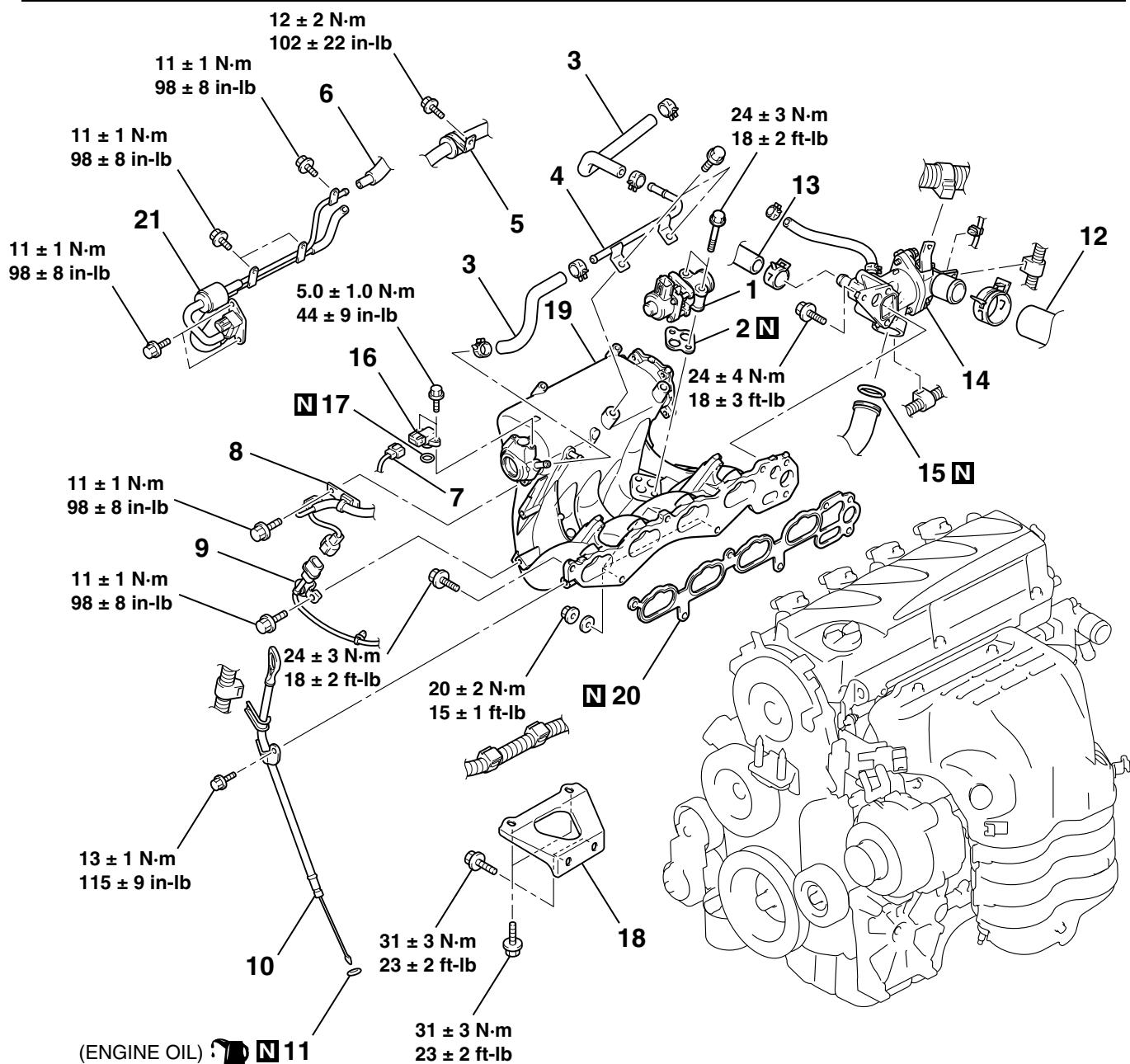
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## Pre-removal Operation

- Fuel Line Pressure Reduction [Refer to GROUP 13A, On-vehicle Service – Fuel Pump Connector Disconnection (How to Reduce Pressurized Fuel Lines) [P.13A-1166](#)].
- Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement [P.14-7](#)).
- Air Cleaner Cover and Air Intake Hose Removal (Refer to [P.15-4](#)).
- Throttle Body Removal (Refer to GROUP 13A, Throttle Body [P.13A-1178](#)).
- Delivery Pipe and Injector Assembly Removal (Refer to GROUP 13A, Injector [P.13A-1175](#)).

## Post-installation Operation

- Delivery Pipe and Injector Assembly Installation (Refer to GROUP 13A, Injector [P.13A-1175](#)).
- Throttle Body Installation (Refer to GROUP 13A, Throttle Body [P.13A-1178](#)).
- Air Cleaner Cover and Air Intake Hose Installation (Refer to [P.15-4](#)).
- Engine Coolant Refilling (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement [P.14-7](#)).



**REMOVAL STEPS**

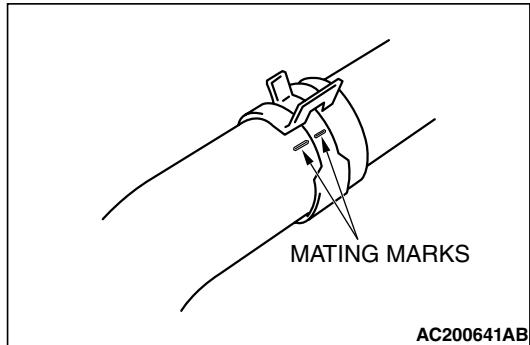
1. EXHAUST GAS RECIRCULATION VALVE
- >>D<< 2. EXHAUST GAS RECIRCULATION VALVE GASKET
- >>C<< 3. BRAKE BOOSTER VACUUM HOSE
4. BRAKE BOOSTER VACUUM PIPE
5. PRESSURE HOSE CLAMP
6. EVAPORATIVE EMISSION VACUUM HOSE CONNECTION
7. MANIFOLD ABSOLUTE PRESSURE SENSOR CONNECTOR
8. HARNESS CRAMP
9. KNOCK SENSOR CONNECTOR BRACKET
10. ENGINE OIL DIPSTICK AND DIPSTICK GUIDE
11. O-RING

**REMOVAL STEPS (Continued)**

- <<A>> >>B<< 12. RADIATOR LOWER HOSE CONNECTION
13. HEATER WATER HOSE CONNECTION
- >>A<< 14. THERMOSTAT CASE ASSEMBLY
15. O-RING
16. MANIFOLD ABSOLUTE PRESSURE SENSOR
17. O-RING
18. INTAKE MANIFOLD STAY
19. INTAKE MANIFOLD
20. INTAKE MANIFOLD GASKET
21. EVAPORATIVE EMISSION PURGE SOLENOID VALVE, EVAPORATIVE EMISSION VACUUM HOSE AND PIPE ASSEMBLY

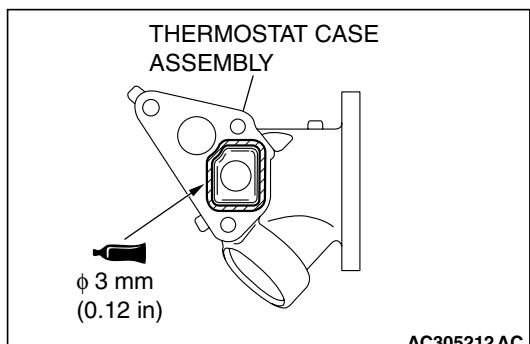
**REMOVAL SERVICE POINT****<<A>> RADIATOR LOWER HOSE DISCONNECTION**

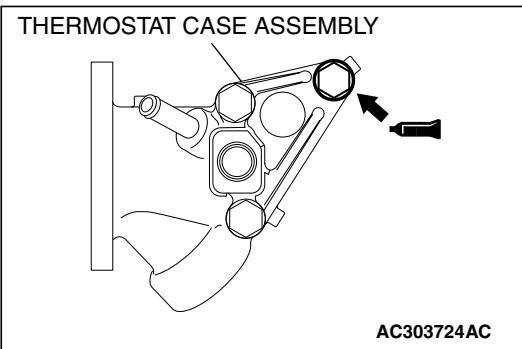
Make mating marks on the radiator hose and the hose clamp. Disconnect the radiator hose.

**INSTALLATION SERVICE POINTS****>>A<< THERMOSTAT CASE ASSEMBLY INSTALLATION**

1. Use a gasket scraper or wire brush to completely eliminate all gasket material on the gasket mounting surface.
2. Apply a bead of the sealant to the cylinder head mating surface of the thermostat case assembly as shown.

**Specified Sealant: 3M™ AAD Part No.8672, 3M™ AAD part No.8679/8678 or equivalent**

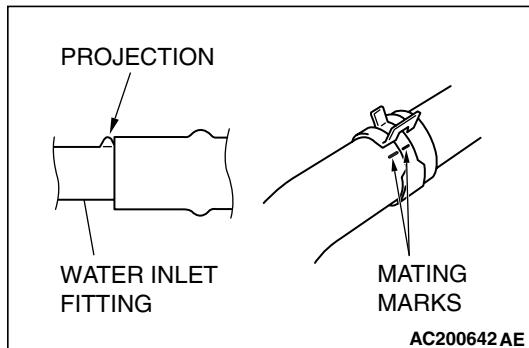




3. Apply sealant to the thread of the thermostat case assembly bolts as shown.

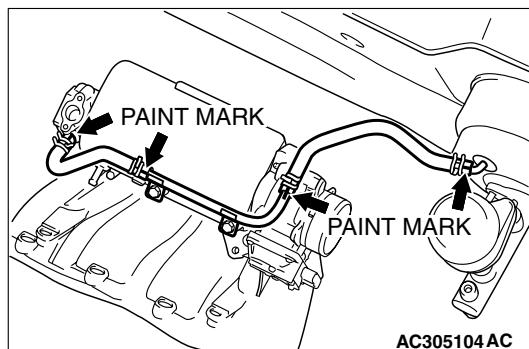
**Specified Sealant: 3M™ AAD Part No.8730, 8731 or equivalent**

4. With the sealant still wet (within 15 minutes after the sealant is applied), install the thermostat case assembly. Do not apply the sealant in an area more than the required.



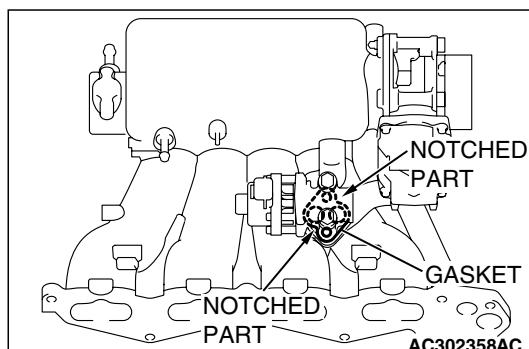
#### >>B<< RADIATOR LOWER HOSE CONNECTION

1. Insert each hose as far as the projection of the water inlet fitting.
2. Align the mating marks on the radiator hose and hose clamp, and then connect the radiator hose.



#### >>C<< BRAKE BOOSTER VACUUM HOSE CONNECTION

Insert vacuum hose with its paint mark facing upward.



#### >>D<< EXHAUST GAS RECIRCULATION VALVE GASKET INSTALLATION

Install the exhaust gas recirculation valve gasket as shown in the illustration.

## REMOVAL AND INSTALLATION &lt;3.8L ENGINE (EXCEPT MIVEC)&gt;

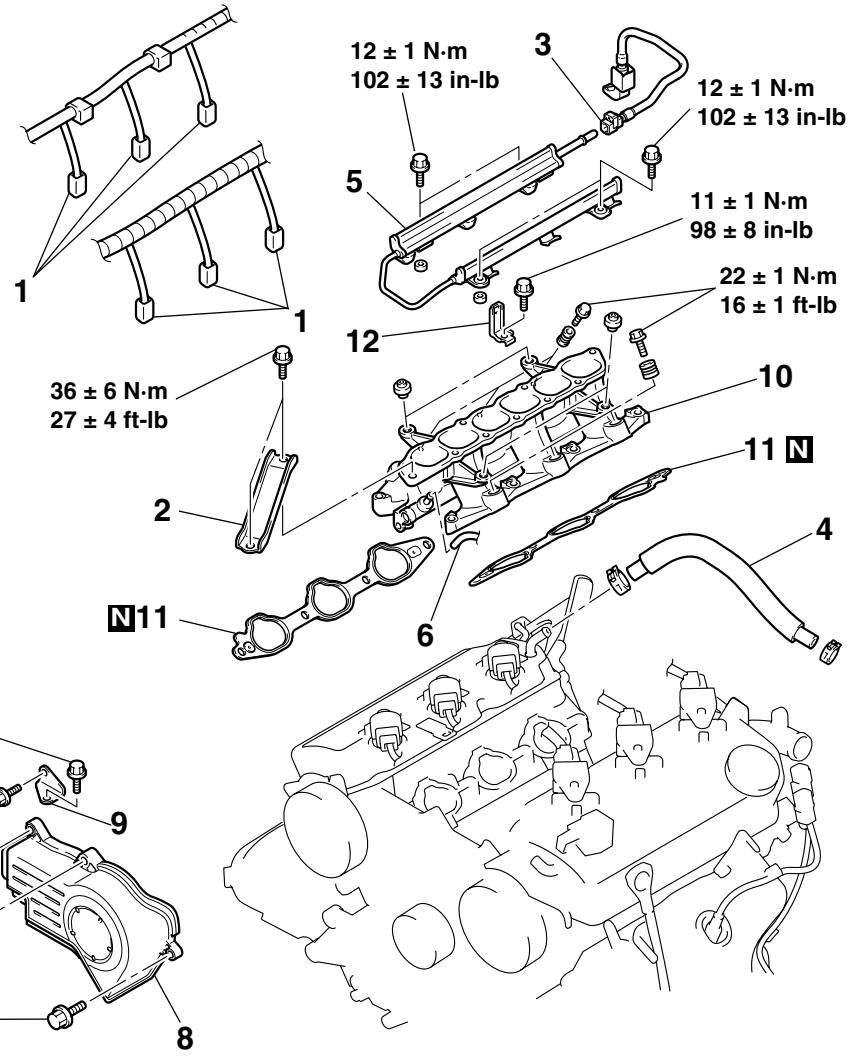
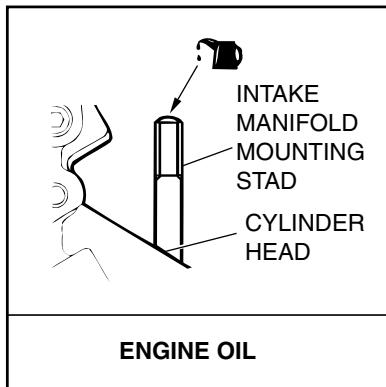
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## Pre-removal Operation

- Fuel Discharge Prevention [Refer to GROUP 13B, On-vehicle Service – Fuel Pump Relay Disconnection (How to Reduce Pressurized Fuel Lines) P.13B-1430.]
- Intake Manifold Plenum Removal (Refer to P.15-8.)

## Post-installation Operation

- Intake Manifold Plenum Installation (Refer to P.15-8.)
- Fuel Leakage Inspection



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## REMOVAL STEPS

<<A>> >>C<<

1. INJECTOR CONNECTOR
2. ENGINE MOUNTING STAY
3. FUEL HIGH-PRESSURE HOSE CONNECTION (FUEL RAIL SIDE)
4. BLOW-BY HOSE
5. FUEL RAIL AND FUEL INJECTOR ASSEMBLY
6. PCV HOSE CONNECTION

<<B>> >>A<<

## REMOVAL STEPS (Continued)

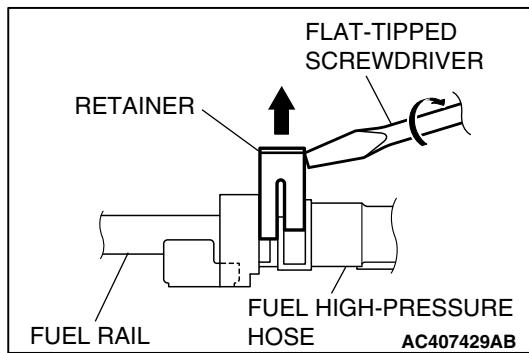
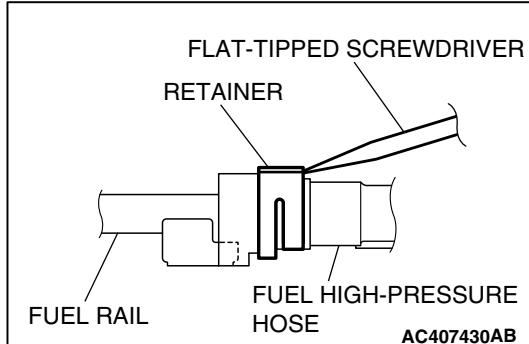
7. TIMING BELT FRONT UPPER COVER, RIGHT
8. TIMING BELT FRONT UPPER COVER, LEFT
9. WATER PUMP BRACKET
10. INTAKE MANIFOLD
11. INTAKE MANIFOLD GASKET
12. CONTROL HARNESS CLAMP

## REMOVAL SERVICE POINTS

## &lt;&lt;A&gt;&gt; FUEL HIGH-PRESSURE HOSE DISCONNECTION

**CAUTION**

Do not kink the fuel high-pressure hose as it is made of plastics.



1. Insert a flat-tipped screwdriver [width 6 mm (0.24 inch), thickness 1 mm (0.04 inch)] to the retainer.

2. Turn the flat-tipped screwdriver approximately 90° to the arrowed direction, and lift the retainer to unlock and disconnect the fuel high-pressure hose.

## &lt;&lt;B&gt;&gt; FUEL RAIL AND INJECTOR ASSEMBLY REMOVAL

**CAUTION**

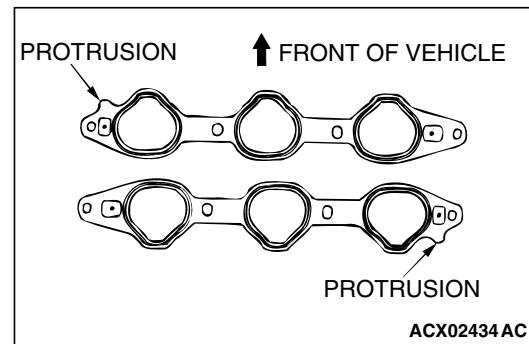
Care must be taken when removing the fuel rail not to drop the injector.

Remove the fuel rail with the injectors attached to it.

## INSTALLATION SERVICE POINTS

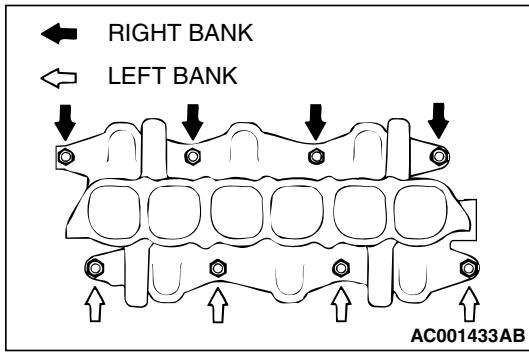
## &gt;&gt;A&lt;&lt; INTAKE MANIFOLD GASKET INSTALLATION

Install the gasket with the protrusions in the position illustrated.



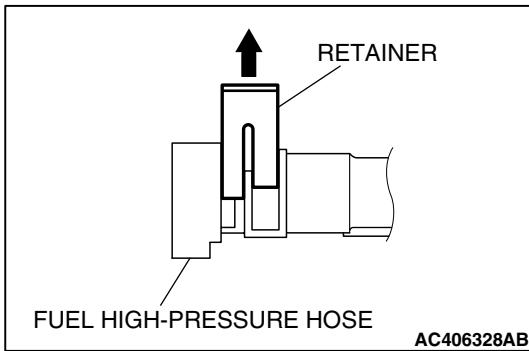
## &gt;&gt;B&lt;&lt; INTAKE MANIFOLD INSTALLATION

1. Coat the intake manifold mounting studs with engine oil.



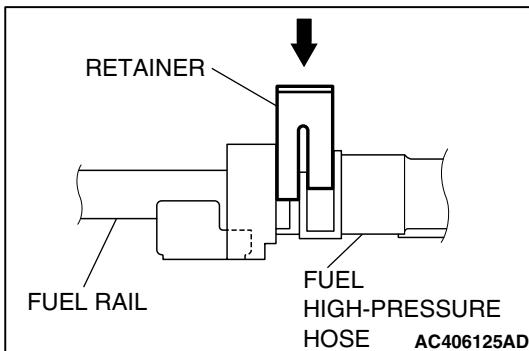
2. Tighten the intake manifold mounting nuts by the following procedure.

ORDER	MOUNTING NUTS	TIGHTENING TORQUE
1st	Right-bank nuts	$6.5 \pm 1.5 \text{ N}\cdot\text{m} (58 \pm 13 \text{ in-lb})$
2nd	Left-bank nuts	$22 \pm 1 \text{ N}\cdot\text{m} (16 \pm 1 \text{ ft-lb})$
3rd	Right-bank nuts	$22 \pm 1 \text{ N}\cdot\text{m} (16 \pm 1 \text{ ft-lb})$
4th	Left-bank nuts	$22 \pm 1 \text{ N}\cdot\text{m} (16 \pm 1 \text{ ft-lb})$
5th	Right-bank nuts	$22 \pm 1 \text{ N}\cdot\text{m} (16 \pm 1 \text{ ft-lb})$



#### >>C<< FUEL HIGH-PRESSURE HOSE CONNECTION

1. Pull up the lock of fuel high-pressure hose to unlock before installing.



2. Install the fuel high-pressure hose to the fuel rail securely and push the lock of fuel high-pressure hose downward and lock thoroughly.

3. After installing, slightly pull the fuel high-pressure hose and ensure that there is no disengaged fuel high-pressure hose. Also confirm that there is approximately 1 mm (0.04 inch) play at this time.

## REMOVAL AND INSTALLATION &lt;3.8L ENGINE-MIVEC&gt;

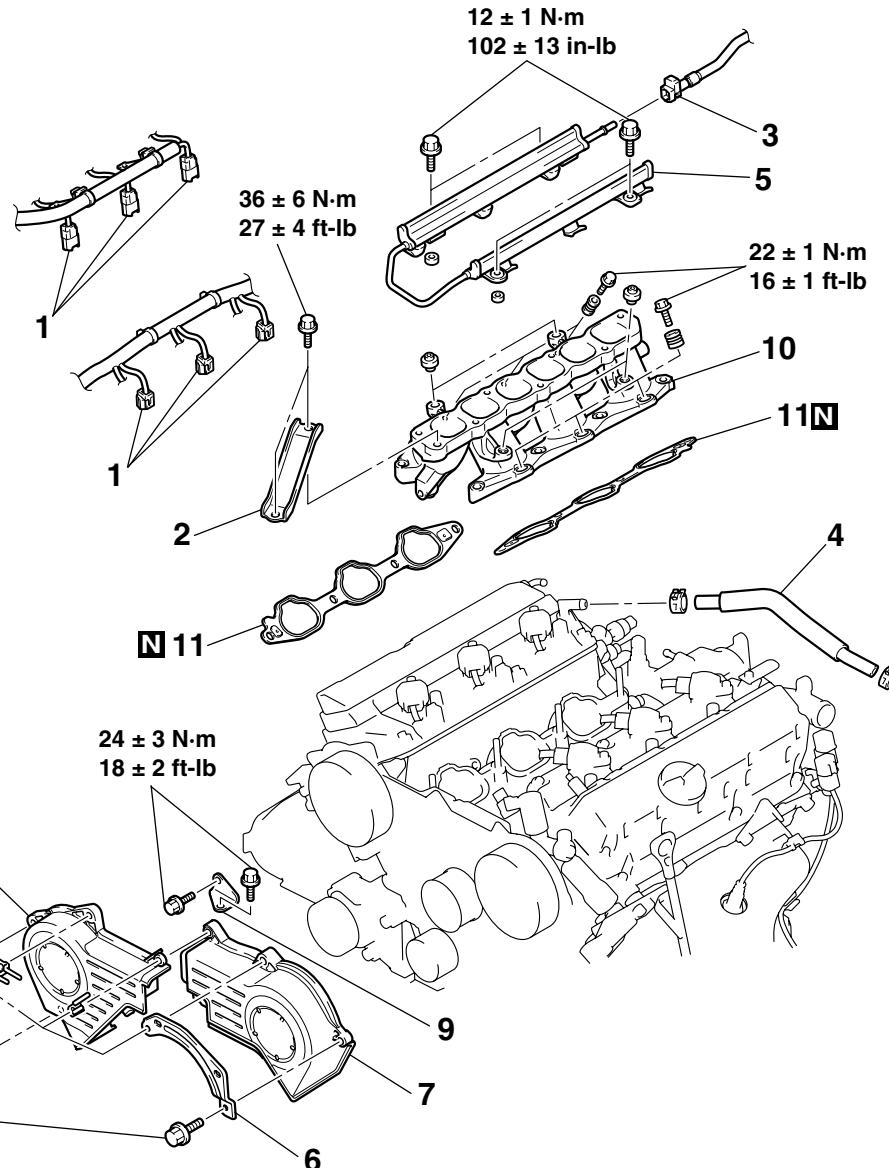
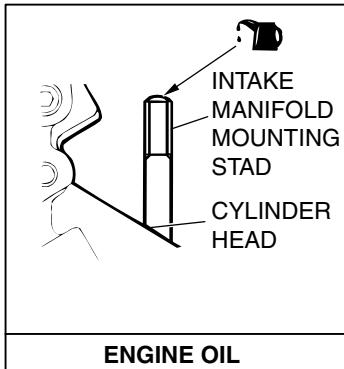
M1151003001753

## Pre-removal Operation

- Fuel Discharge Prevention [Refer to GROUP 13B, On-vehicle Service – Fuel Pump Relay Disconnection (How to Reduce Pressurized Fuel Lines) [P.13B-1430](#)].
- Intake Manifold Plenum Removal (Refer to [P.15-8](#)).

## Post-installation Operation

- Intake Manifold Plenum Installation (Refer to [P.15-8](#)).
- Fuel Leakage Inspection



AC406189AB

## REMOVAL STEPS

<<A>> >>C<<

1. INJECTOR CONNECTOR
2. ENGINE MOUNTING STAY
3. FUEL HIGH-PRESSURE HOSE CONNECTION
4. PCV HOSE CONNECTION
5. FUEL RAIL AND INJECTOR HARNESS BRACKET
6. HARNESS BRACKET

<<B>>

## REMOVAL STEPS (Continued)

7. TIMING BELT FRONT UPPER COVER, LEFT
8. TIMING BELT FRONT UPPER COVER, RIGHT
9. WATER PUMP BRACKET
10. INTAKE MANIFOLD
11. INTAKE MANIFOLD GASKET

>>B<<

>>A<<

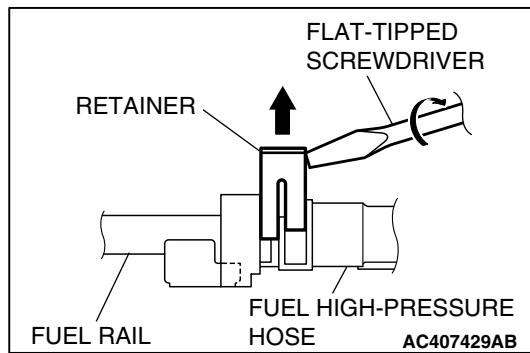
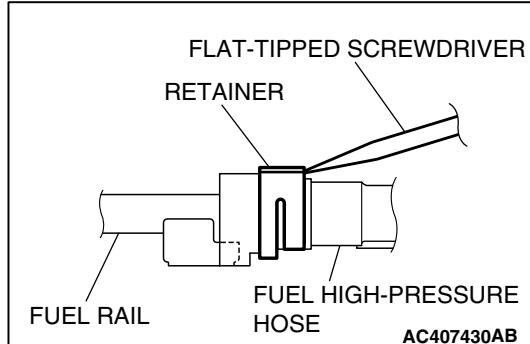
## REMOVAL SERVICE POINTS

## &lt;&lt;A&gt;&gt; FUEL HIGH-PRESSURE HOSE DISCONNECTION

**CAUTION**

Do not kink the fuel high-pressure hose as it is made of plastic and will become damage.

1. Insert a flat-tipped screwdriver [width 6 mm (0.24 inch), thickness 1 mm (0.04 inch)] to the retainer.



2. Turn the flat-tipped screwdriver approximately 90° to the arrowed direction, and lift the retainer to unlock and disconnect the fuel high-pressure hose.

## &lt;&lt;B&gt;&gt; FUEL RAIL AND INJECTOR REMOVAL

**CAUTION**

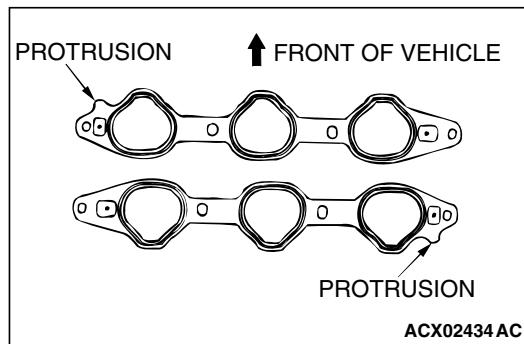
Care must be taken when removing the fuel rail not to drop the injector.

Remove the fuel rail with the injectors attached to it.

## INSTALLATION SERVICE POINTS

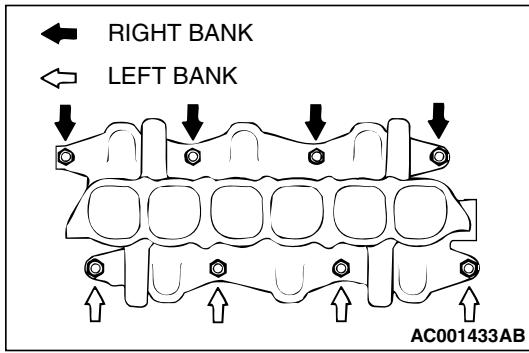
## &gt;&gt;A&lt;&lt; INTAKE MANIFOLD GASKET INSTALLATION

Install the gasket with the protrusions in the position illustrated.



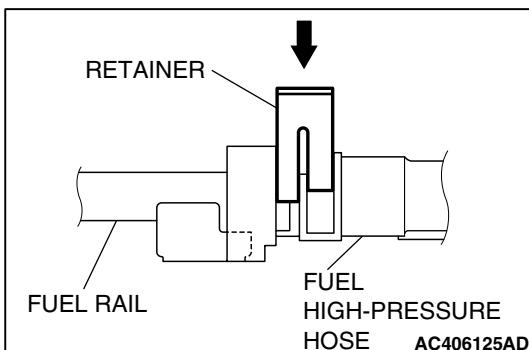
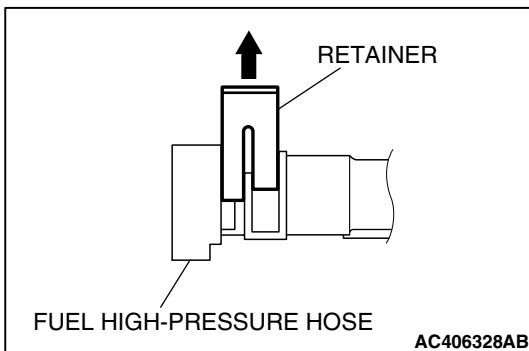
## &gt;&gt;B&lt;&lt; INTAKE MANIFOLD INSTALLATION

1. Coat the intake manifold mounting studs with engine oil.



2. Tighten the intake manifold mounting nuts by the following procedure.

ORDER	MOUNTING NUTS	TIGHTENING TORQUE
1st	Right-bank nuts	$6.5 \pm 1.5 \text{ N}\cdot\text{m} (58 \pm 13 \text{ in-lb})$
2nd	Left-bank nuts	$22 \pm 1 \text{ N}\cdot\text{m} (16 \pm 1 \text{ ft-lb})$
3rd	Right-bank nuts	$22 \pm 1 \text{ N}\cdot\text{m} (16 \pm 1 \text{ ft-lb})$
4th	Left-bank nuts	$22 \pm 1 \text{ N}\cdot\text{m} (16 \pm 1 \text{ ft-lb})$
5th	Right-bank nuts	$22 \pm 1 \text{ N}\cdot\text{m} (16 \pm 1 \text{ ft-lb})$



### >>C<< FUEL HIGH-PRESSURE HOSE CONNECTION

1. Pull up the lock of fuel high-pressure hose to unlock before installing.

2. Install the fuel high-pressure hose to the fuel rail securely and push the lock of fuel high-pressure hose downward and lock thoroughly.
3. After installing, slightly pull the fuel high-pressure hose and ensure that there is no disengaged fuel high-pressure hose. Also confirm that there is approximately 1 mm (0.04 inch) play at this time.

## INSPECTION

M1151003100672

Check the following points; replace the part if a problem is found.

### Intake Manifold Check

1. Check for damage or cracking of any part.
2. Clogging of the negative pressure (vacuum) outlet port, or clogging of the exhaust gas recirculation passages.
3. Using a straight edge and feeler gauge, check for distortion of the cylinder head installation surface.

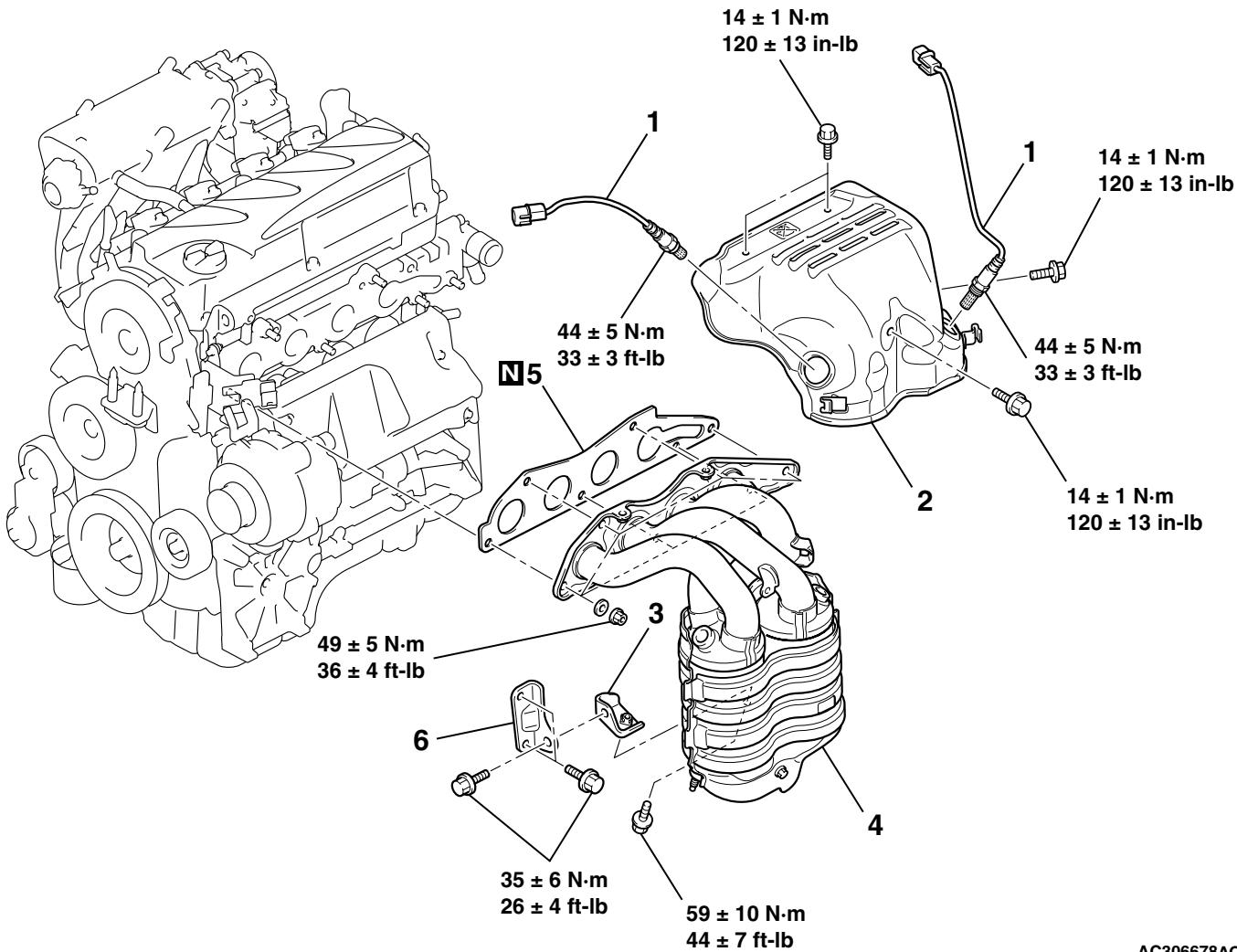
**Standard value: 0.15 mm (0.006 inch) or less**

**Limit: 0.20 mm (0.008 inch)**

## EXHAUST MANIFOLD

## REMOVAL AND INSTALLATION &lt;2.4L ENGINE&gt;

M1151003301237



AC306678AC

## REMOVAL STEPS

<<A>> >>A<< 1. HEATED OXYGEN SENSOR  
2. EXHAUST MANIFOLD COVER  
• FRONT NO.1 EXHAUST PIPE  
(REFER TO P.15-32).  
3. EXHAUST MANIFOLD BRACKET B

## REMOVAL STEPS (Continued)

4. EXHAUST MANIFOLD  
5. EXHAUST MANIFOLD GASKET  
6. EXHAUST MANIFOLD BRACKET A

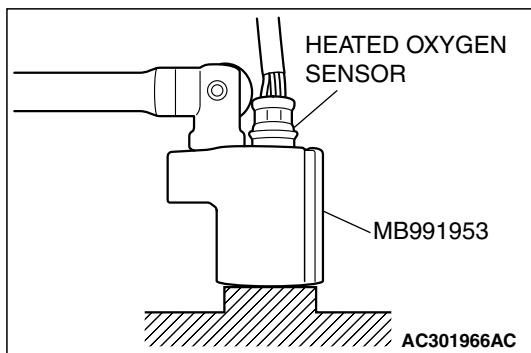
## Required Special Tool:

- MB991953: Oxygen Sensor Wrench

## REMOVAL SERVICE POINT

### <<A>> HEATED OXYGEN SENSOR REMOVAL

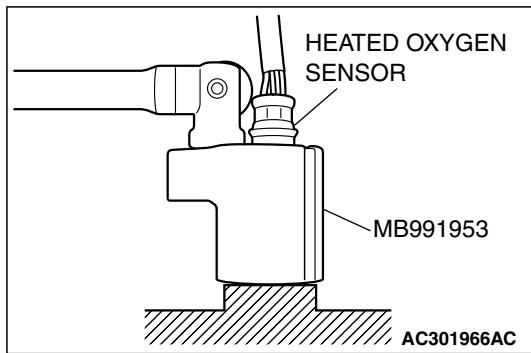
Use special tool MB991953 to remove the heated oxygen sensor.



## INSTALLATION SERVICE POINT

### >>A<< HEATED OXYGEN SENSOR INSTALLATION

Use special tool MB991953 to install the heated oxygen sensor.

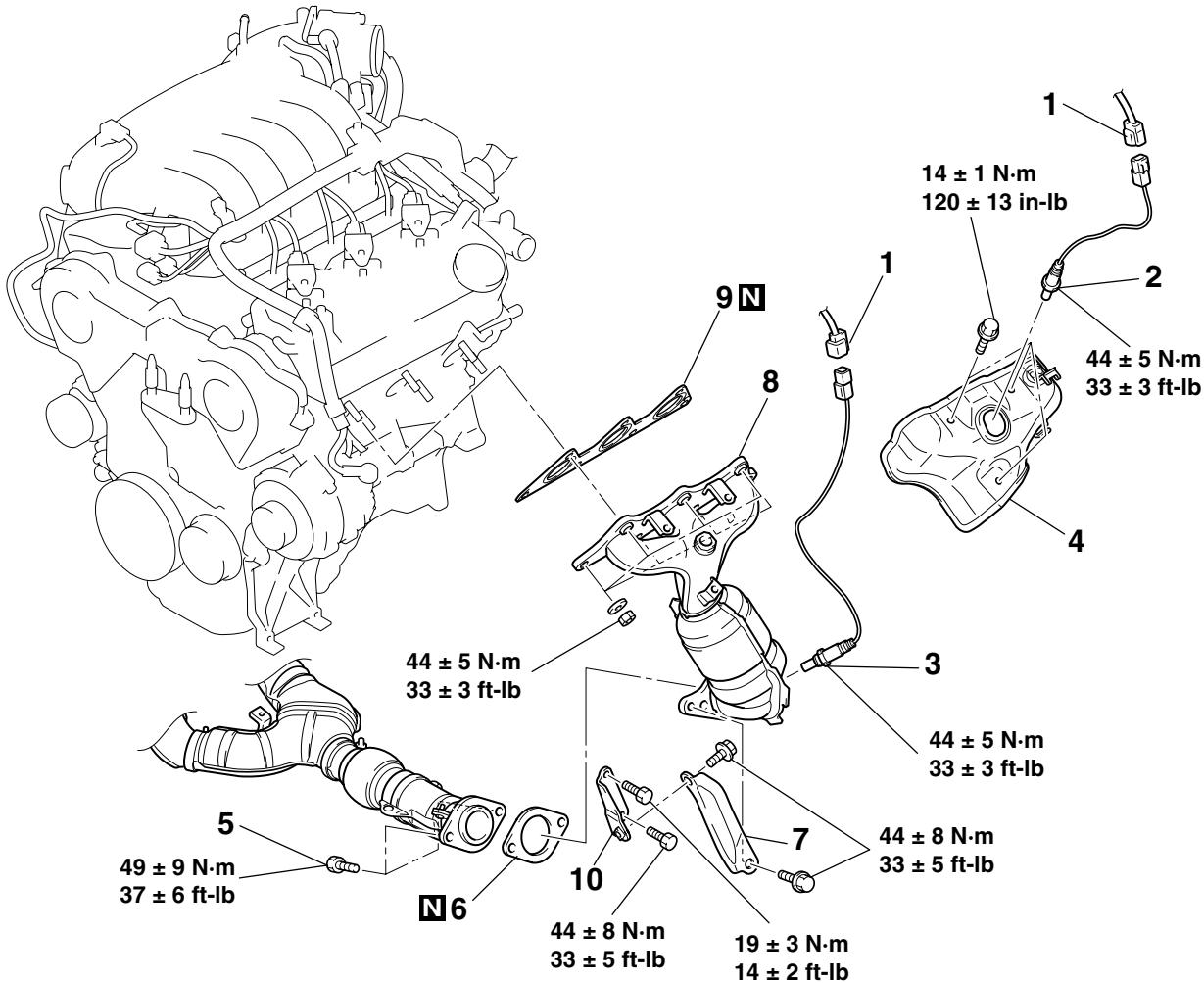


## REMOVAL AND INSTALLATION &lt;3.8L ENGINE (EXCEPT MIVEC)&gt;

M1151003301431

## &lt;LEFT BANK&gt;

Pre-removal Operation	Post-installation Operation
<ul style="list-style-type: none"> <li>Front Bumper Under Cover Removal (Refer to GROUP 51, Front Bumper P.51-2).</li> <li>Air Cleaner Intake Duct Removal (Refer to P.15-4).</li> </ul>	<ul style="list-style-type: none"> <li>Air Cleaner Intake Duct Installation (Refer to P.15-4).</li> <li>Front Bumper Under Cover Installation (Refer to GROUP 51, Front Bumper P.51-2).</li> </ul>



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## REMOVAL STEPS

1. LEFT HEATED OXYGEN SENSOR CONNECTOR
- <<A>> >>A<< 2. LEFT BANK HEATED OXYGEN SENSOR (FRONT)
- <<B>> >>B<< 3. LEFT BANK HEATED OXYGEN SENSOR (REAR)
4. HEAT PROTECTOR
5. FRONT EXHAUST PIPE CONNECTING BOLTS

## REMOVAL STEPS (Continued)

6. FRONT EXHAUST PIPE GASKET
7. EXHAUST MANIFOLD STAY, LEFT B
8. EXHAUST MANIFOLD
9. EXHAUST MANIFOLD GASKET
10. EXHAUST MANIFOLD STAY, LEFT A

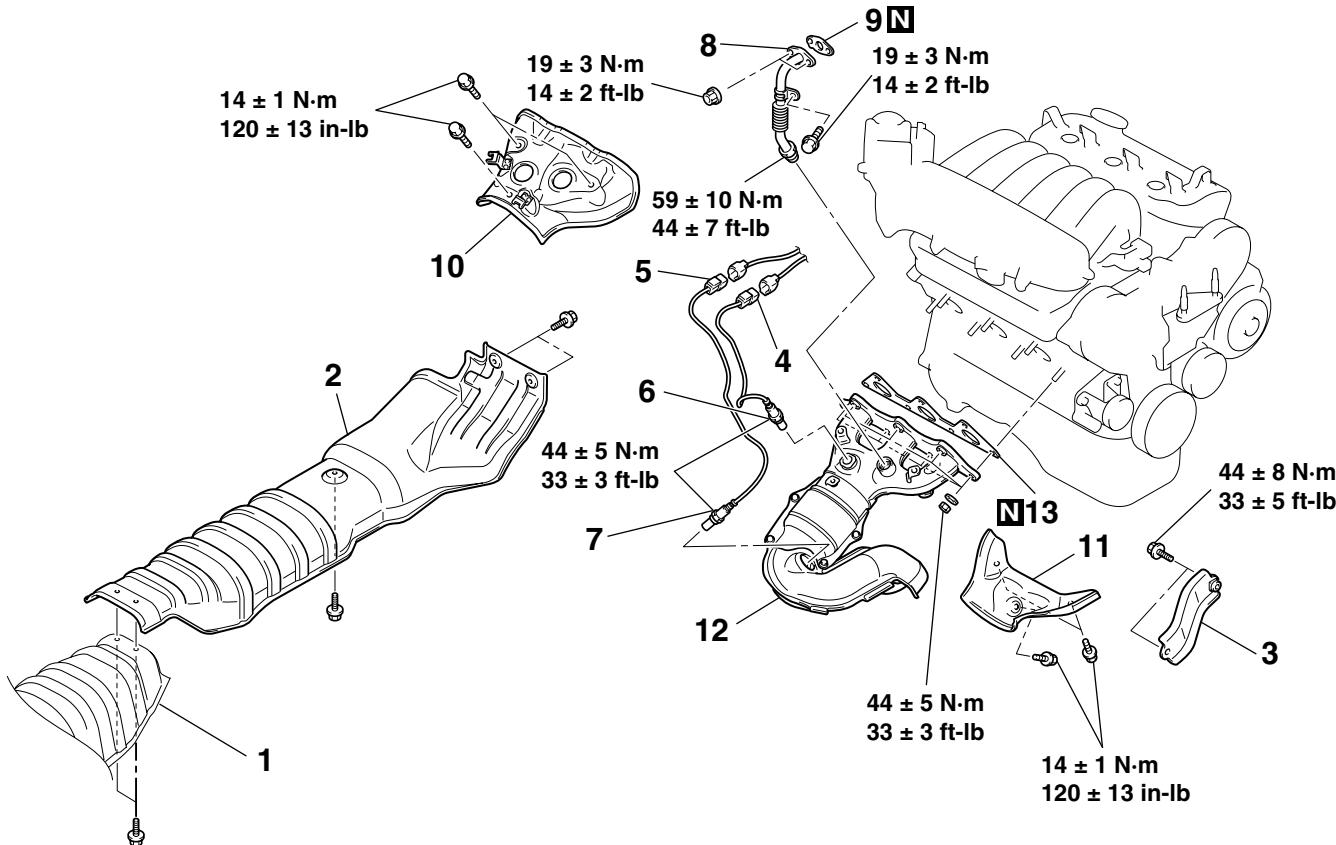
## &lt;RIGHT BANK&gt;

## Pre-removal Operation

- Air Cleaner Cover and Air Cleaner Air Intake Duct Removal (Refer to P.15-4).
- Battery Removal
- Front Exhaust Pipe, Center Exhaust Pipe Removal (Refer to P.15-32).
- Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-7).

## Post-installation Operation

- Engine Coolant Refilling (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-7).
- Front Exhaust Pipe, Center Exhaust Pipe Installation (Refer to P.15-32).
- Battery Installation
- Air Cleaner Cover and Air Cleaner Air Intake Duct Installation (Refer to P.15-4).



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## REMOVAL STEPS

1. CENTER UNDER FLOOR HEAT PROTECTOR
- STEERING GEAR AND LINKAGE PROTECTOR (REFER TO GROUP 37, POWER STEERING GEAR BOX AND LINKAGE P.37-31)
2. FRONT UNDER FLOOR HEAT PROTECTOR
3. EXHAUST MANIFOLD STAY, RIGHT B
4. RIGHT BANK HEATED OXYGEN SENSOR (FRONT) CONNECTOR

## REMOVAL STEPS (Continued)

5. RIGHT BANK HEATED OXYGEN SENSOR (REAR) CONNECTOR
- <<A>> >>A<<
6. RIGHT BANK HEATED OXYGEN SENSOR (FRONT)
- <<A>> >>A<<
7. RIGHT BANK HEATED OXYGEN SENSOR (REAR)
8. EGR PIPE
9. EGR PIPE GASKET
10. UPPER HEAT PROTECTOR
11. LOWER HEAT PROTECTOR
12. EXHAUST MANIFOLD
13. EXHAUST MANIFOLD GASKET

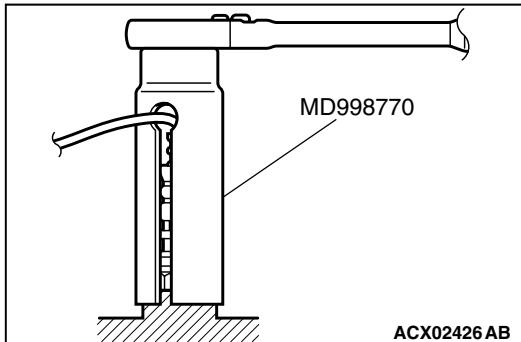
## Required Special Tools:

- MB991953: Oxygen Sensor Wrench
- MD998770: Oxygen Sensor Wrench

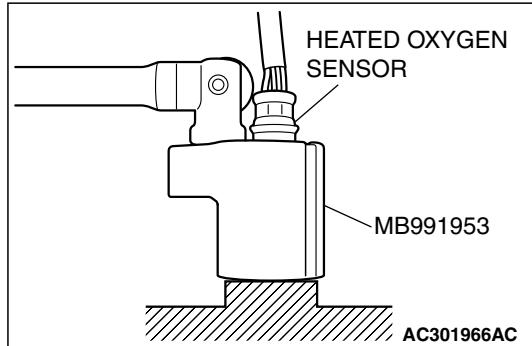
## REMOVAL SERVICE POINTS

<<A>> LEFT BANK HEATED OXYGEN SENSOR (FRONT)/  
RIGHT BANK HEATED OXYGEN SENSOR (FRONT)/RIGHT  
BANK HEATED OXYGEN SENSOR (REAR) REMOVAL

Use special tool MD998770 to remove the heated oxygen sensor.

<<B>> LEFT BANK HEATED OXYGEN SENSOR (REAR)  
REMOVAL

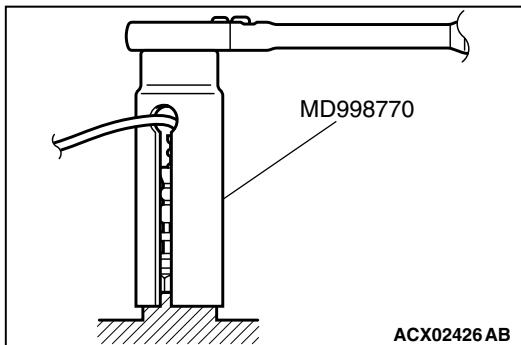
Use special tool MB991953 to remove the heated oxygen sensor.



## INSTALLATION SERVICE POINTS

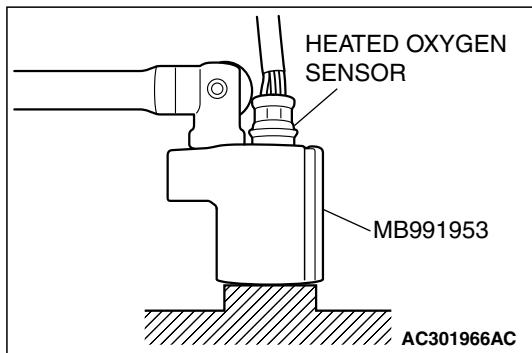
>>A<< RIGHT BANK HEATED OXYGEN SENSOR (REAR)/  
RIGHT BANK HEATED OXYGEN SENSOR (FRONT)/LEFT  
BANK HEATED OXYGEN SENSOR (FRONT) INSTALLA-  
TION

Use special tool MD998770 to install the heated oxygen sensor.



>>B<< LEFT BANK HEATED OXYGEN SENSOR (REAR)  
INSTALLATION

Use special tool MB991953 to install the heated oxygen sensor.



## REMOVAL AND INSTALLATION &lt;3.8L ENGINE-MIVEC&gt;

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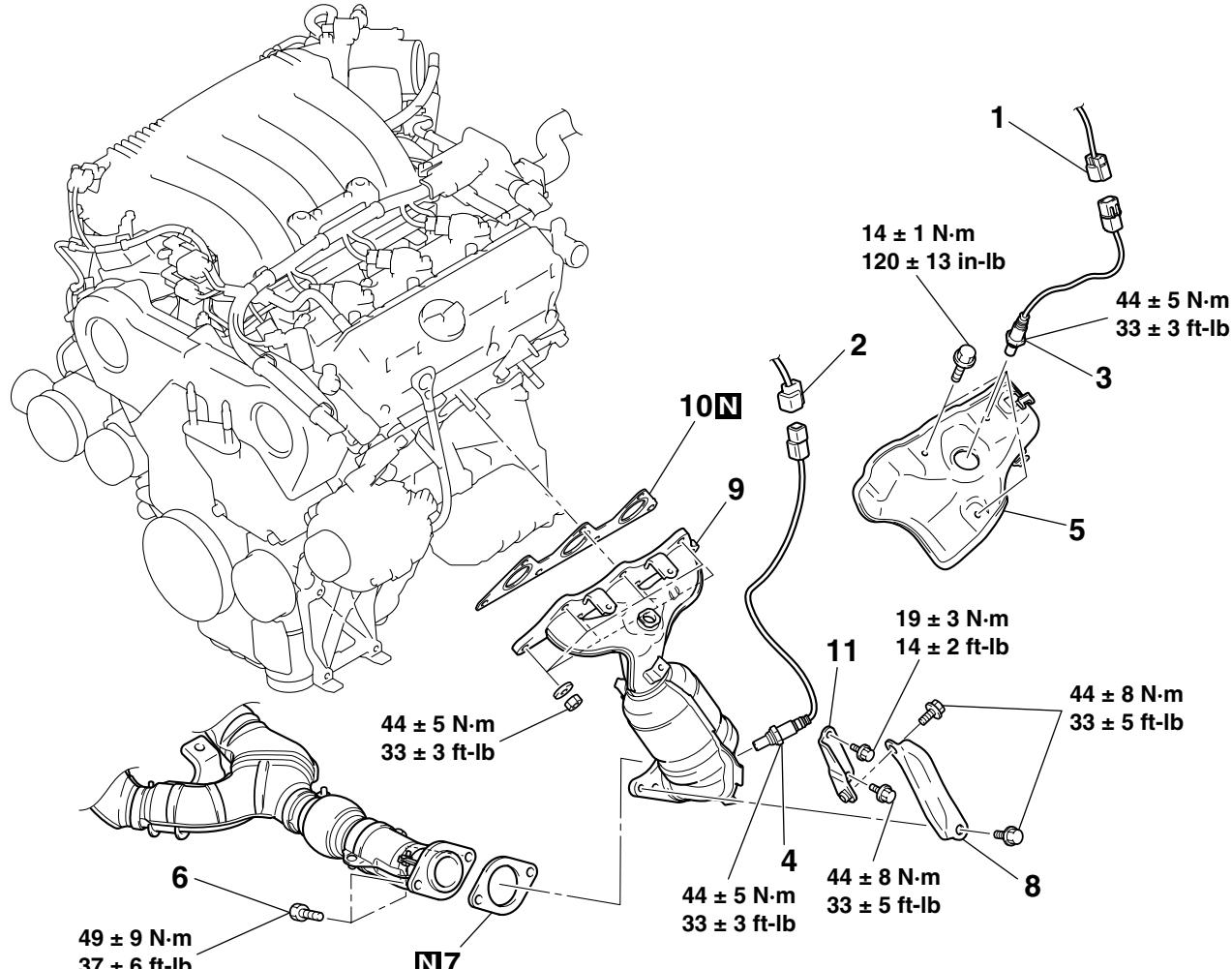
## &lt;LEFT BANK&gt;

## Pre-removal Operation

- Front Bumper Under Cover Removal (Refer to GROUP 51, Front Bumper P.51-2).
- Air Cleaner Intake Duct Removal (Refer to P.15-4).

## Post-installation Operation

- Air Cleaner Intake Duct Installation (Refer to P.15-4).
- Front Bumper Under Cover Installation (Refer to GROUP 51, Front Bumper P.51-2).



AC406190AB

**REMOVAL STEPS**

1. LEFT BANK HEATED OXYGEN SENSOR (FRONT) CONNECTOR
2. LEFT BANK HEATED OXYGEN SENSOR (REAR) CONNECTOR
- <<A>> >>B<< 3. LEFT BANK HEATED OXYGEN SENSOR (FRONT)
- <<B>> >>A<< 4. LEFT BANK HEATED OXYGEN SENSOR (REAR)
5. HEAT PROTECTOR

**REMOVAL STEPS (Continued)**

6. FRONT EXHAUST PIPE CONNECTING BOLTS
7. FRONT EXHAUST PIPE GASKET
8. EXHAUST MANIFOLD STAY, LEFT B
9. EXHAUST MANIFOLD
10. EXHAUST MANIFOLD GASKET
11. EXHAUST MANIFOLD STAY, LEFT A

**Required Special Tools:**

- MB991953: Oxygen Sensor Wrench
- MD998770: Oxygen Sensor Wrench

## &lt;RIGHT BANK&gt;

## Pre-removal Operation

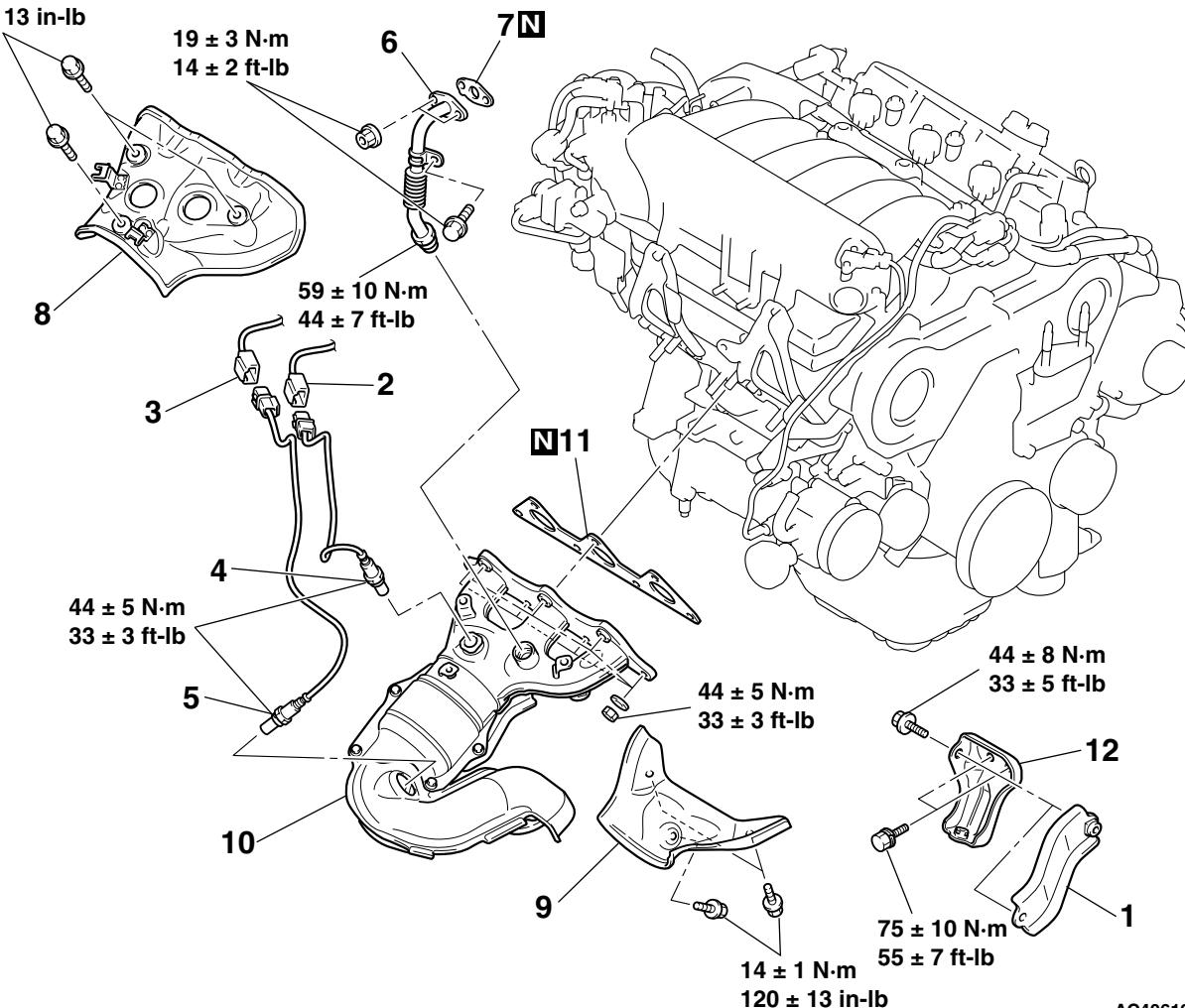
- Air Cleaner Cover and Air Cleaner Air Intake Duct Removal (Refer to P.15-4).
- Battery Removal
- Front Exhaust Pipe, Center Exhaust Pipe Removal (Refer to P.15-32).
- Strut Tower Bar Removal (Refer to GROUP 42, Strut Tower Bar P.42-11).
- Engine Coolant Draining (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-7).

## Post-installation Operation

- Engine Coolant Refilling (Refer to GROUP 14, On-vehicle Service – Engine Coolant Replacement P.14-7).
- Strut Tower Bar Installation (Refer to GROUP 42, Strut Tower Bar P.42-11).
- Front Exhaust Pipe, Center Exhaust Pipe Installation (Refer to P.15-32).
- Battery Installation
- Air Cleaner Cover and Air Cleaner Air Intake Duct Installation (Refer to P.15-4).

14 ± 1 N·m

120 ± 13 in-lb



AC406191AB

## REMOVAL STEPS

- STEERING GEAR AND LINKAGE PROTECTOR (REFER TO GROUP 37, POWER STEERING GEAR BOX AND LINKAGE P.37-31).
- CENTER UNDER FLOOR HEAT PROTECTOR (REFER TO P.15-32).
- FRONT UNDER FLOOR HEAT PROTECTOR (REFER TO P.15-32).

## REMOVAL STEPS (Continued)

1. EXHAUST MANIFOLD STAY, RIGHT B
2. RIGHT BANK HEATED OXYGEN SENSOR (FRONT) CONNECTOR
3. RIGHT BANK HEATED OXYGEN SENSOR (REAR) CONNECTOR
4. RIGHT BANK HEATED OXYGEN SENSOR (FRONT)
5. RIGHT BANK HEATED OXYGEN SENSOR (REAR)
6. EGR PIPE
7. EGR PIPE GASKET

<>A<> >>B<<

<<B>> >>A<<

**REMOVAL STEPS (Continued)**

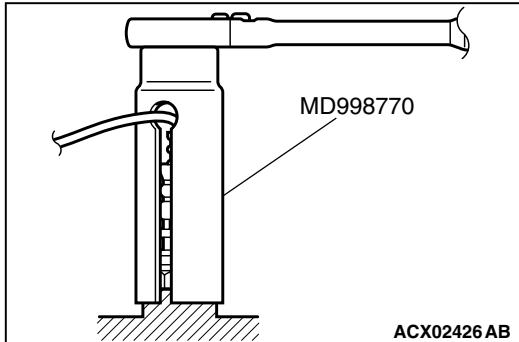
8. UPPER HEAT PROTECTOR
9. LOWER HEAT PROTECTOR
10. EXHAUST MANIFOLD
11. EXHAUST MANIFOLD GASKET
12. EXHAUST MANIFOLD STAY,  
RIGHT A

**Required Special Tools:**

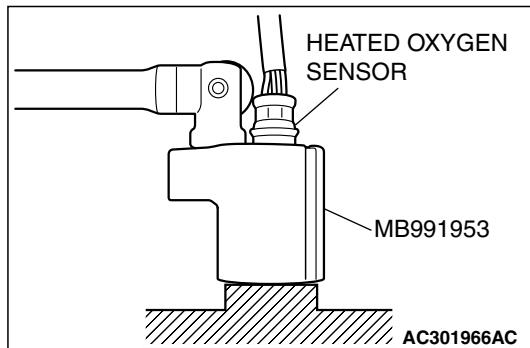
- MB991953: Oxygen Sensor Wrench
- MD998770: Oxygen Sensor Wrench

**REMOVAL SERVICE POINTS****<<A>> LEFT BANK HEATED OXYGEN SENSOR (FRONT)/  
RIGHT BANK HEATED OXYGEN SENSOR (FRONT)  
REMOVAL**

Use special tool MD998770 to remove the heated oxygen sensor.

**<<B>> LEFT BANK HEATED OXYGEN SENSOR (REAR)/  
RIGHT BANK HEATED OXYGEN SENSOR (REAR)  
REMOVAL**

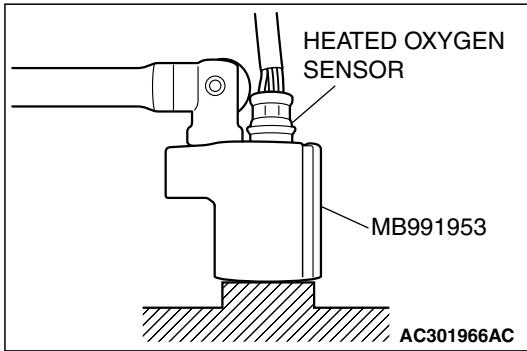
Use special tool MB991953 to remove the heated oxygen sensor.



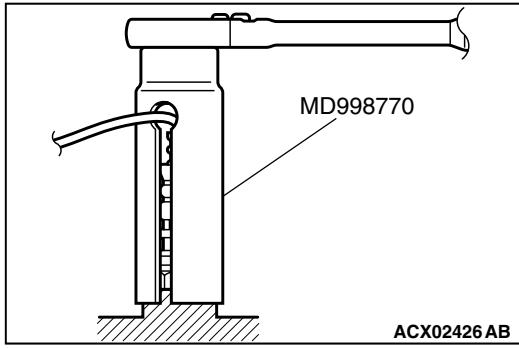
## INSTALLATION SERVICE POINTS

>>A<< RIGHT BANK HEATED OXYGEN SENSOR (REAR)/  
LEFT BANK HEATED OXYGEN SENSOR (REAR) INSTAL-  
LATION

Use special tool MB991953 to install the heated oxygen sensor.

>>B<< RIGHT BANK HEATED OXYGEN SENSOR (FRONT)/  
LEFT BANK HEATED OXYGEN SENSOR (FRONT)  
INSTALLATION

Use special tool MD998770 to install the heated oxygen sensor.



## INSPECTION

M1151003400587

Check the following points; replace the part if a problem is found.

## Exhaust Manifold Check

1. Check for damage or cracking of any part.
2. Using a straight edge and a feeler gauge, check for distortion of the cylinder head installation surface.

Standard value: 0.15 mm (0.006 inch) or less

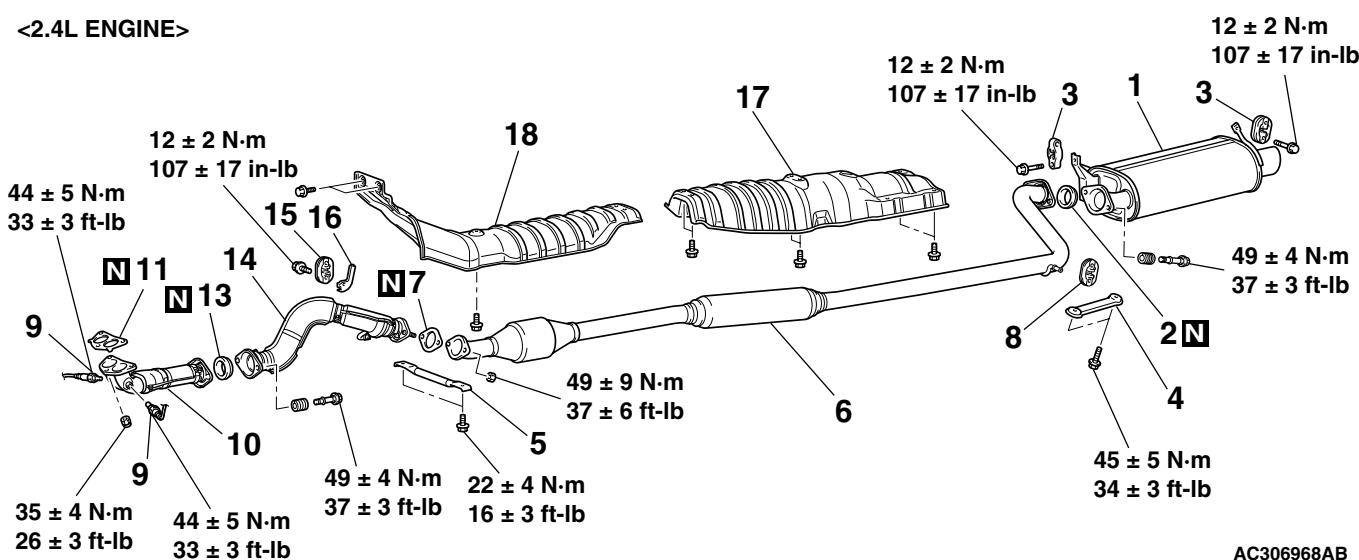
Limit: 0.20 mm (0.008 inch)

## EXHAUST PIPE AND MAIN MUFFLER

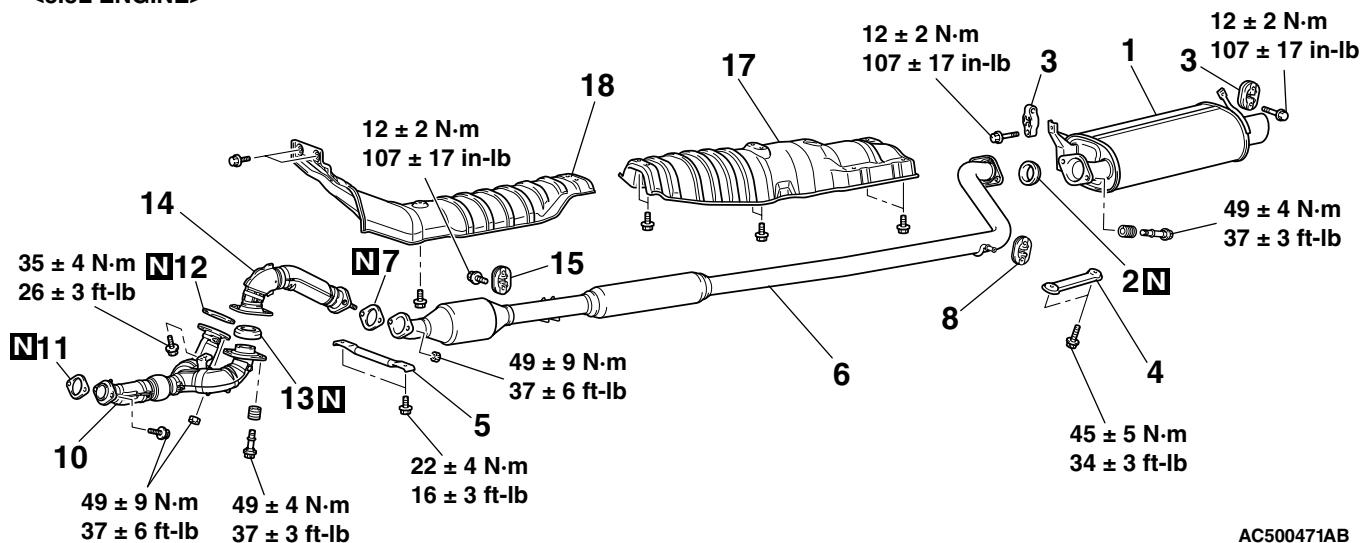
## REMOVAL AND INSTALLATION

M1151008700851

&lt;2.4L ENGINE&gt;



&lt;3.8L ENGINE&gt;

MAIN MUFFLER REMOVAL  
STEPS

1. MAIN MUFFLER
2. SEAL RING
3. HANGER

**CENTER EXHAUST PIPE  
REMOVAL STEPS**

4. CROSMEMBER STAY
5. FRONT FLOOR BACKBONE  
BRACE
6. CENTER EXHAUST PIPE
7. SEAL RING
8. GASKET
9. HANGER

<<A>> >>A<<

9. HEATED OXYGEN SENSOR  
<2.4L ENGINE>
10. FRONT NO.1 EXHAUST PIPE
11. GASKET
12. GASKET <3.8L ENGINE>
13. SEAL RING
14. FRONT NO.2 EXHAUST PIPE
15. GASKET
16. HANGER
17. PROTECTOR <2.4L ENGINE>
18. CENTER UNDER FLOOR HEAT  
PROTECTOR
19. FRONT UNDER FLOOR HEAT  
PROTECTOR

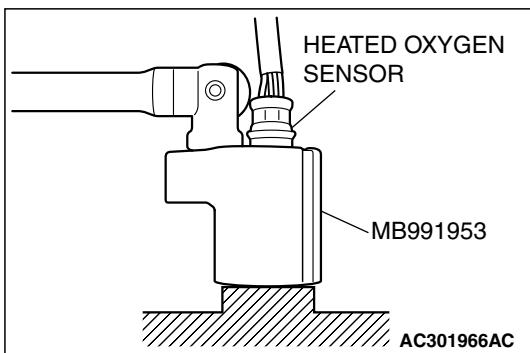
## Required Special Tool:

- MB991953: Oxygen Sensor Wrench

## REMOVAL SERVICE POINT

## &lt;&lt;A&gt;&gt; HEATED OXYGEN SENSOR REMOVAL

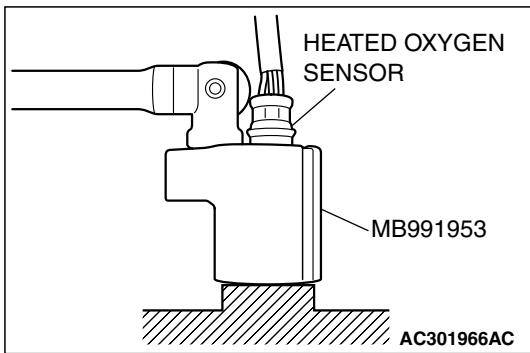
Use special tool MB991953 to remove the heated oxygen sensor.



## INSTALLATION SERVICE POINT

## &gt;&gt;A&lt;&lt; HEATED OXYGEN SENSOR INSTALLATION

Use special tool MB991953 to install the heated oxygen sensor.



## SPECIFICATION(S)

## FASTENER TIGHTENING SPECIFICATIONS

M1151006800614

ITEM	SPECIFICATION
<b>Air cleaner</b>	
Air cleaner bolt	$8.8 \pm 1.0 \text{ N}\cdot\text{m}$ ( $78 \pm 9 \text{ in-lb}$ )
Air cleaner bracket bolt and nut	$12 \pm 2 \text{ N}\cdot\text{m}$ ( $102 \pm 22 \text{ in-lb}$ )
Air cleaner resonator bolt <2.4L ENGINE>	$3.0 \pm 0.5 \text{ N}\cdot\text{m}$ ( $27 \pm 4 \text{ in-lb}$ )
Air cleaner resonator bolt	$8.8 \pm 1.0 \text{ N}\cdot\text{m}$ ( $78 \pm 9 \text{ in-lb}$ )
Air intake hose clamp bolt	$4.0 \pm 0.9 \text{ N}\cdot\text{m}$ ( $35 \pm 8 \text{ in-lb}$ )
Mass airflow sensor bolt	$1.8 \pm 0.6 \text{ N}\cdot\text{m}$ ( $16 \pm 5 \text{ in-lb}$ )
<b>Exhaust manifold &lt;2.4L ENGINE&gt;</b>	
Exhaust manifold bracket A bolt	$35 \pm 6 \text{ N}\cdot\text{m}$ ( $26 \pm 4 \text{ ft-lb}$ )
Exhaust manifold bracket B bolt	$59 \pm 10 \text{ N}\cdot\text{m}$ ( $44 \pm 7 \text{ ft-lb}$ )
Exhaust manifold cover bolt	$14 \pm 1 \text{ N}\cdot\text{m}$ ( $120 \pm 13 \text{ in-lb}$ )
Exhaust manifold nut	$49 \pm 5 \text{ N}\cdot\text{m}$ ( $36 \pm 4 \text{ ft-lb}$ )
Heated oxygen sensor	$44 \pm 5 \text{ N}\cdot\text{m}$ ( $33 \pm 3 \text{ ft-lb}$ )
<b>Exhaust manifold &lt;Left bank&gt; &lt;3.8L ENGINE&gt;</b>	

ITEM	SPECIFICATION	
Exhaust manifold nut	$44 \pm 5 \text{ N}\cdot\text{m}$ ( $33 \pm 3 \text{ ft-lb}$ )	
Front exhaust pipe bolt	$49 \pm 9 \text{ N}\cdot\text{m}$ ( $37 \pm 6 \text{ ft-lb}$ )	
Exhaust manifold stay, left A bolt	M8	$19 \pm 3 \text{ N}\cdot\text{m}$ ( $14 \pm 2 \text{ ft-lb}$ )
	M10	$44 \pm 8 \text{ N}\cdot\text{m}$ ( $33 \pm 5 \text{ ft-lb}$ )
Heat protector bolt	$14 \pm 1 \text{ N}\cdot\text{m}$ ( $120 \pm 13 \text{ in-lb}$ )	
Heated oxygen sensor	$44 \pm 5 \text{ N}\cdot\text{m}$ ( $33 \pm 3 \text{ ft-lb}$ )	
<b>Exhaust manifold &lt;Right bank&gt; &lt;3.8L ENGINE&gt;</b>		
EGR pipe	$59 \pm 10 \text{ N}\cdot\text{m}$ ( $44 \pm 7 \text{ ft-lb}$ )	
EGR pipe clamp bolt	$19 \pm 3 \text{ N}\cdot\text{m}$ ( $14 \pm 2 \text{ ft-lb}$ )	
EGR pipe connecting nut	$19 \pm 3 \text{ N}\cdot\text{m}$ ( $14 \pm 2 \text{ ft-lb}$ )	
Exhaust manifold nut	$44 \pm 5 \text{ N}\cdot\text{m}$ ( $33 \pm 3 \text{ ft-lb}$ )	
Exhaust manifold stay, right A bolt	$75 \pm 10 \text{ N}\cdot\text{m}$ ( $55 \pm 7 \text{ ft-lb}$ )	
Exhaust manifold stay, right B bolt	$44 \pm 8 \text{ N}\cdot\text{m}$ ( $33 \pm 5 \text{ ft-lb}$ )	
Heat protector bolt	$14 \pm 1 \text{ N}\cdot\text{m}$ ( $120 \pm 13 \text{ in-lb}$ )	
Heated oxygen sensor	$44 \pm 5 \text{ N}\cdot\text{m}$ ( $33 \pm 3 \text{ ft-lb}$ )	
<b>Exhaust pipe and main muffler</b>		
Crossmember stay bolt	$45 \pm 5 \text{ N}\cdot\text{m}$ ( $34 \pm 3 \text{ ft-lb}$ )	
Center exhaust pipe nut	$49 \pm 9 \text{ N}\cdot\text{m}$ ( $37 \pm 6 \text{ ft-lb}$ )	
Front floor backbone brace bolt	$22 \pm 4 \text{ N}\cdot\text{m}$ ( $16 \pm 3 \text{ ft-lb}$ )	
Front no.1 exhaust pipe nut <2.4L ENGINE>	$35 \pm 4 \text{ N}\cdot\text{m}$ ( $26 \pm 3 \text{ ft-lb}$ )	
Front no.2 exhaust pipe bolt <2.4L ENGINE>	$49 \pm 4 \text{ N}\cdot\text{m}$ ( $37 \pm 3 \text{ ft-lb}$ )	
Front no.1 exhaust pipe bolt <3.8L ENGINE>	$35 \pm 4 \text{ N}\cdot\text{m}$ ( $26 \pm 3 \text{ ft-lb}$ )	
Front no.1 exhaust pipe to front no.2 exhaust pipe bolt <3.8L ENGINE>	$49 \pm 4 \text{ N}\cdot\text{m}$ ( $37 \pm 3 \text{ ft-lb}$ )	
Front no.1 exhaust pipe to right bank exhaust manifold nut <3.8L ENGINE>	$49 \pm 9 \text{ N}\cdot\text{m}$ ( $37 \pm 6 \text{ ft-lb}$ )	
Front no.1 exhaust pipe to left bank exhaust manifold bolt <3.8L ENGINE>	$49 \pm 9 \text{ N}\cdot\text{m}$ ( $37 \pm 6 \text{ ft-lb}$ )	
Hanger bolt	$12 \pm 2 \text{ N}\cdot\text{m}$ ( $107 \pm 17 \text{ in-lb}$ )	
Heated oxygen sensor <2.4L ENGINE>	$44 \pm 5 \text{ N}\cdot\text{m}$ ( $33 \pm 3 \text{ ft-lb}$ )	
Main muffler bolt	$49 \pm 4 \text{ N}\cdot\text{m}$ ( $37 \pm 3 \text{ ft-lb}$ )	
<b>Intake manifold &lt;2.4L ENGINE&gt;</b>		
Engine oil dipstick guide bolt	$13 \pm 1 \text{ N}\cdot\text{m}$ ( $115 \pm 9 \text{ in-lb}$ )	
Evaporative emission purge solenoid valve bolt	$11 \pm 1 \text{ N}\cdot\text{m}$ ( $98 \pm 8 \text{ in-lb}$ )	
Evaporative emission vacuum pipe bolt	$11 \pm 1 \text{ N}\cdot\text{m}$ ( $98 \pm 8 \text{ in-lb}$ )	
Exhaust gas recirculation valve bolt	$24 \pm 3 \text{ N}\cdot\text{m}$ ( $18 \pm 2 \text{ ft-lb}$ )	
Harness clamp bolt	$11 \pm 1 \text{ N}\cdot\text{m}$ ( $98 \pm 8 \text{ in-lb}$ )	
Intake manifold bolt	$24 \pm 3 \text{ N}\cdot\text{m}$ ( $18 \pm 2 \text{ ft-lb}$ )	
Intake manifold nut	$20 \pm 2 \text{ N}\cdot\text{m}$ ( $15 \pm 1 \text{ ft-lb}$ )	
Intake manifold stay bolt	$31 \pm 3 \text{ N}\cdot\text{m}$ ( $23 \pm 2 \text{ ft-lb}$ )	
Knock sensor connector bracket bolt	$11 \pm 1 \text{ N}\cdot\text{m}$ ( $98 \pm 8 \text{ in-lb}$ )	
Manifold absolute pressure sensor bolt	$5.0 \pm 1.0 \text{ N}\cdot\text{m}$ ( $44 \pm 9 \text{ in-lb}$ )	
Pressure hose clamp bolt	$12 \pm 2 \text{ N}\cdot\text{m}$ ( $102 \pm 22 \text{ in-lb}$ )	

ITEM	SPECIFICATION	
Thermostat case assembly bolt	$24 \pm 4 \text{ N}\cdot\text{m}$ ( $18 \pm 3 \text{ ft-lb}$ )	
<b>Intake manifold &lt;3.8L ENGINE&gt;</b>		
Control harness clamp bolt	$11 \pm 1 \text{ N}\cdot\text{m}$ ( $98 \pm 8 \text{ in-lb}$ )	
Engine mounting stay bolt	$36 \pm 6 \text{ N}\cdot\text{m}$ ( $27 \pm 4 \text{ ft-lb}$ )	
Fuel rail and injector bolt	$12 \pm 1 \text{ N}\cdot\text{m}$ ( $102 \pm 13 \text{ in-lb}$ )	
Intake manifold bolt	$22 \pm 1 \text{ N}\cdot\text{m}$ ( $16 \pm 1 \text{ ft-lb}$ )	
Timing belt front upper cover bolt	M6	$11 \pm 1 \text{ N}\cdot\text{m}$ ( $98 \pm 8 \text{ in-lb}$ )
	M8	$14 \pm 1 \text{ N}\cdot\text{m}$ ( $120 \pm 13 \text{ in-lb}$ )
Water pump bracket bolt	$24 \pm 3 \text{ N}\cdot\text{m}$ ( $18 \pm 2 \text{ ft-lb}$ )	
<b>Intake manifold plenum</b>		
Exhaust gas recirculation valve bolt	$24 \pm 3 \text{ N}\cdot\text{m}$ ( $18 \pm 2 \text{ ft-lb}$ )	
EGR pipe	$59 \pm 10 \text{ N}\cdot\text{m}$ ( $44 \pm 7 \text{ ft-lb}$ )	
EGR pipe clamp bolt	$19 \pm 3 \text{ N}\cdot\text{m}$ ( $14 \pm 2 \text{ ft-lb}$ )	
EGR pipe connection nut	$19 \pm 3 \text{ N}\cdot\text{m}$ ( $14 \pm 2 \text{ ft-lb}$ )	
Evaporative emission purge solenoid bolt	$9.0 \pm 1.0 \text{ N}\cdot\text{m}$ ( $80 \pm 9 \text{ in-lb}$ )	
Harness bracket bolt	$11 \pm 1 \text{ N}\cdot\text{m}$ ( $98 \pm 8 \text{ in-lb}$ )	
Intake manifold plenum bolt <3.8L Engine (Except MIVEC)>	$18 \pm 2 \text{ N}\cdot\text{m}$ ( $13 \pm 2 \text{ ft-lb}$ )	
Intake manifold plenum bolt <3.8L Engine-MIVEC>	$22 \pm 1 \text{ N}\cdot\text{m}$ ( $16 \pm 1 \text{ ft-lb}$ )	
Intake manifold plenum stay bolt <3.8L Engine (Except MIVEC)>	M8	$18 \pm 2 \text{ N}\cdot\text{m}$ ( $13 \pm 2 \text{ ft-lb}$ )
	M10	$49 \pm 6 \text{ N}\cdot\text{m}$ ( $37 \pm 4 \text{ ft-lb}$ )
Intake manifold plenum stay bolt <3.8L Engine-MIVEC>	M8	$22 \pm 1 \text{ N}\cdot\text{m}$ ( $16 \pm 1 \text{ ft-lb}$ )
	M10	$49 \pm 6 \text{ N}\cdot\text{m}$ ( $37 \pm 4 \text{ ft-lb}$ )
Manifold absolute pressure sensor bolt	$5.0 \pm 1.0 \text{ N}\cdot\text{m}$ ( $44 \pm 9 \text{ in-lb}$ )	
Power steering pressure hose clamp nut	$12 \pm 2 \text{ N}\cdot\text{m}$ ( $102 \pm 22 \text{ in-lb}$ )	
Power steering pressure hose clamp bracket bolt	$12 \pm 2 \text{ N}\cdot\text{m}$ ( $102 \pm 22 \text{ in-lb}$ )	
Power steering oil pump bracket connecting bolt	$41 \pm 8 \text{ N}\cdot\text{m}$ ( $30 \pm 6 \text{ ft-lb}$ )	
Vacuum pipe bolt <3.8L Engine (Except MIVEC)>	$9.0 \pm 1.0 \text{ N}\cdot\text{m}$ ( $80 \pm 9 \text{ in-lb}$ )	
Vacuum pipe bolt <3.8L Engine-MIVEC>	$11 \pm 1 \text{ N}\cdot\text{m}$ ( $98 \pm 8 \text{ in-lb}$ )	

**SERVICE SPECIFICATION**

M1151000300462

ITEM	STANDARD VALUE	LIMIT
Manifold distortion of the installation surface mm (in)	0.15 (0.006) or less	0.20 (0.008)

**SEALANTS**

M1151000500187

ITEM	SPECIFIED SEALANT
Thermostat case assembly	3M™ AAD Part No.8672, 3M™ AAD Part No.8679/8678 or equivalent
Thermostat case assembly bolt	3M™ AAD Part No. 8730, 8731 or equivalent