

GROUP 15

INTAKE AND EXHAUST

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GENERAL DESCRIPTION

M1151000100286

The exhaust pipe is divided into four parts.

INTAKE AND EXHAUST DIAGNOSIS

INTRODUCTION

M1151006900235

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 when the exhaust pipe or muffler is damaged 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

M1151007000235

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 that the malfunction is eliminated.

SYMPTOM CHART

M1151007100232

SYMPTOM	INSPECTION PROCEDURE	REFERENCE PAGE
Exhaust Leakage	1	P.15-2
Abnormal Noise	2	P.15-3

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 Step 1.

NO : Go to Step 3.

STEP 3. Check for loosening in each coupling section.

Q: Is there any loosening in each 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 driver's 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, catalytic converters and muffler for damage.

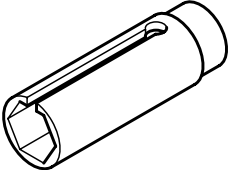
Q: Are the pipes, catalytic converters and muffler damaged?

YES : Replace, then go to Step 1. (For the removal of the catalytic converter, refer to GROUP 17 [P.17-102](#).)

NO : There is no action to be taken.

SPECIAL TOOL

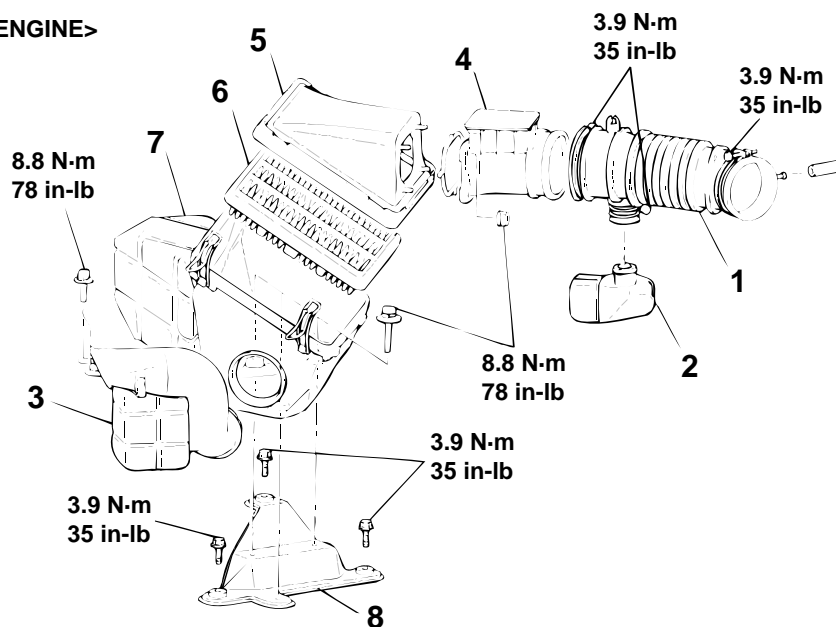
M1151000600247

TOOL	TOOL NUMBER AND NAME	SUPERSESSION	APPLICATION
	MD998770 Oxygen sensor wrench	MD998770-01 or General service tool	Removal and installation of heated oxygen sensor

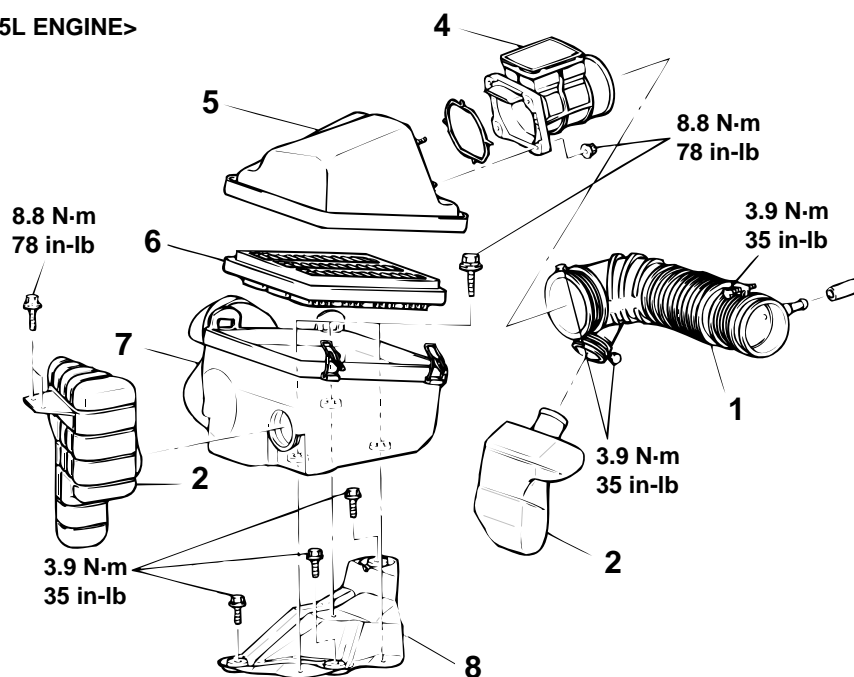
AIR CLEANER**REMOVAL AND INSTALLATION**

M1151002100259

<3.0L ENGINE>



<3.5L ENGINE>



AC004646 AB

REMOVAL STEPS

1. AIR INTAKE HOSE
2. RESONATOR
3. AIR DUCT
4. AIR FLOW SENSOR ASSEMBLY

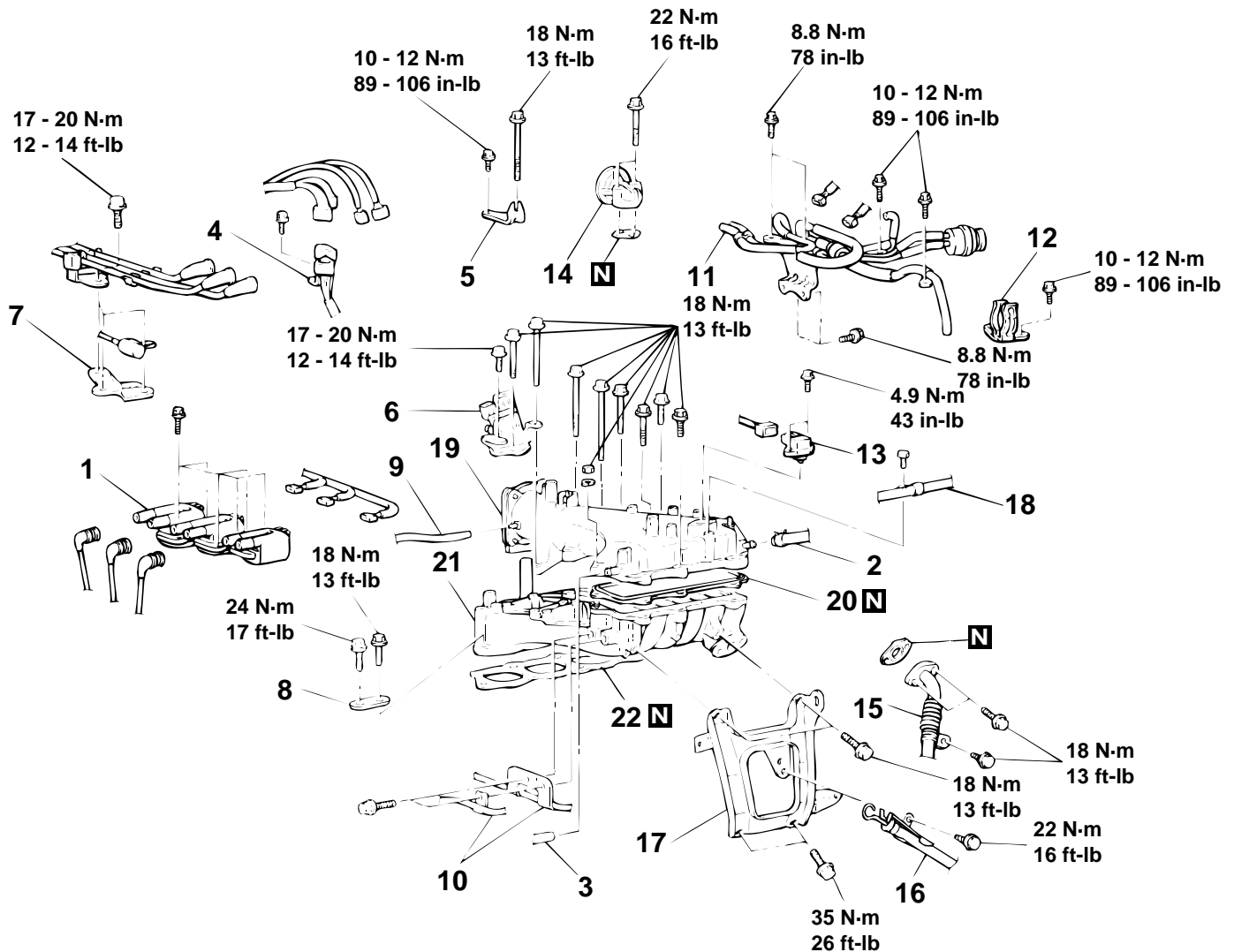
REMOVAL STEPS (Continued)

5. AIR CLEANER COVER
6. AIR CLEANER ELEMENT
7. AIR CLEANER BODY
8. AIR CLEANER BRACKET

INTAKE MANIFOLD <3.0L>

REMOVAL AND INSTALLATION

M1151003000460



AC004647AB

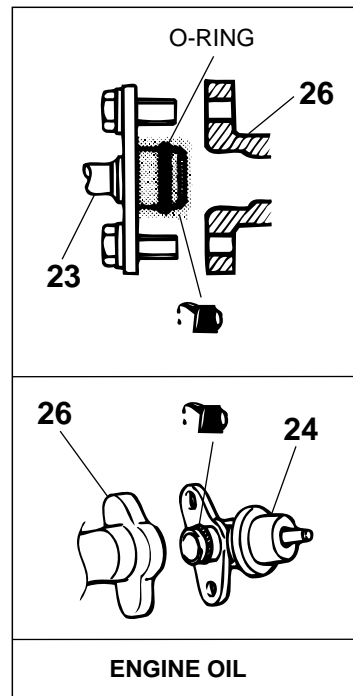
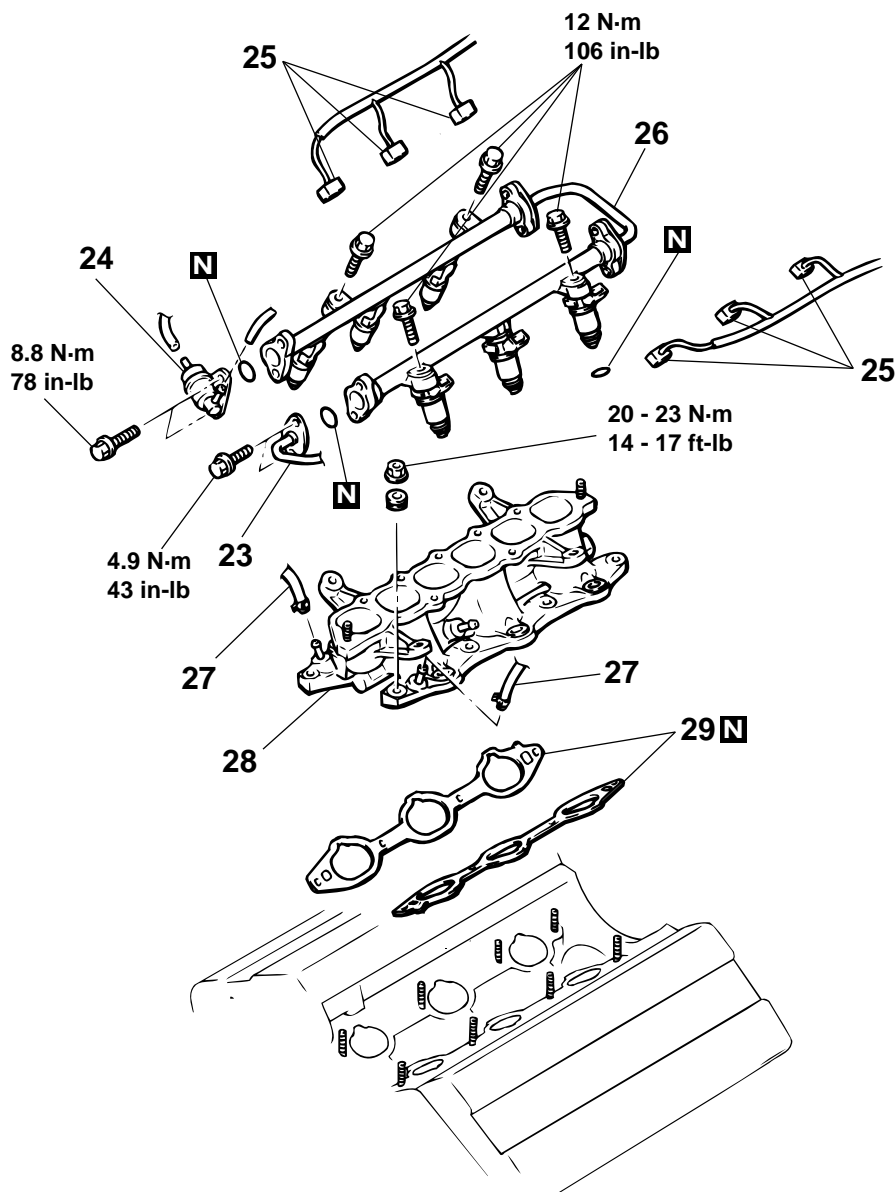
REMOVAL STEPS

1. IGNITION COILS
2. BRAKE BOOSTER VACUUM HOSE CONNECTION
3. PCV HOSE CONNECTION
4. CRANKSHAFT POSITION SENSOR AND CAM POSITION SENSOR CONNECTOR
5. ACCELERATOR CABLE BRACKET
6. IGNITION POWER TRANSISTOR
7. WATER OUTLET FITTING BRACKET
8. WATER PUMP STAY
9. VACUUM HOSE CONNECTION
10. FUEL PIPE CONNECTION
11. SOLENOID VALVE AND VACUUM HOSE ASSEMBLY

REMOVAL STEPS (Continued)

12. VACUUM CONTROL VALVE BRACKET
13. MDP SENSOR
14. EGR VALVE
15. EGR PIPE CONNECTION
16. A/T OIL DIPSTICK ASSEMBLY
17. INTAKE MANIFOLD PLENUM STAY
18. THROTTLE CABLE CONNECTION
19. AIR INTAKE FITTING
20. AIR INTAKE FITTING GASKET
21. UPPER INTAKE MANIFOLD
22. INTAKE MANIFOLD PLENUM GASKET

>>D<<



AC004648 AB

REMOVAL STEPS

- >>C<< 23. HIGH-PRESSURE FUEL HOSE CONNECTION
>>C<< 24. FUEL PRESSURE REGULATOR
25. INJECTOR CONNECTOR

<<A>>

REMOVAL STEPS (Continued)

26. FUEL RAIL (WITH INJECTORS)
27. WATER HOSE CONNECTION
>>B<< 28. INTAKE MANIFOLD
>>A<< 29. INTAKE MANIFOLD GASKET

REMOVAL SERVICE POINT

<<A>> FUEL RAIL (WITH INJECTORS) REMOVAL

CAUTION

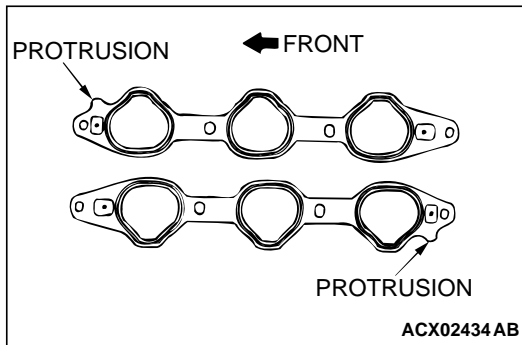
Care must be taken when removing the fuel rail: Do not drop the injectors.

Remove the fuel rail with the injectors attached to it.

INSTALLATION SERVICE POINTS

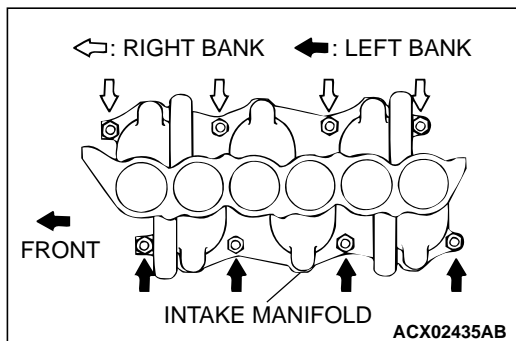
>>A<< INTAKE MANIFOLD GASKET INSTALLATION

Install the gasket with the protrusions in the position illustrated.



>>B<< INTAKE MANIFOLD INSTALLATION

Tighten the nuts by the following procedure.

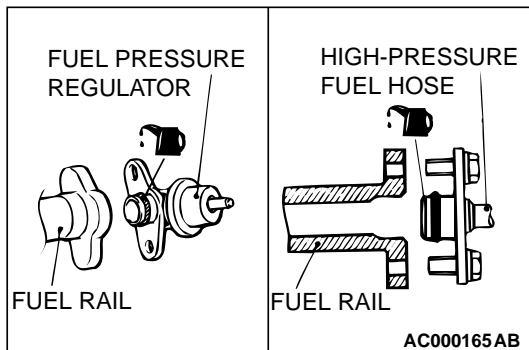


ORDER	MOUNTING NUT	TIGHTENING TORQUE
1st	Right-bank nuts	6.4 N·m (56 in-lb)
2nd	Left-bank nuts	20 – 23 N·m (14 – 17 ft-lb)
3rd	Right-bank nuts	20 – 23 N·m (14 – 17 ft-lb)
4th	Left-bank nuts	20 – 23 N·m (14 – 17 ft-lb)
5th	Right-bank nuts	20 – 23 N·m (14 – 17 ft-lb)

>>C<< FUEL PRESSURE REGULATOR/HIGH-PRESSURE FUEL HOSE INSTALLATION

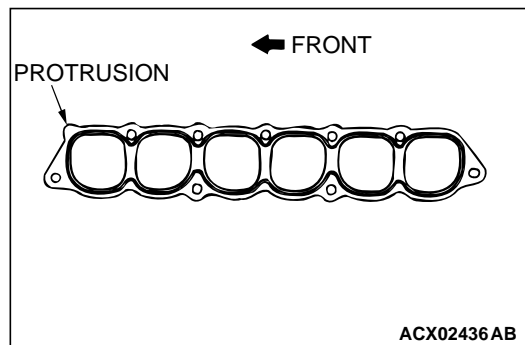
⚠ CAUTION

Be careful not to allow any engine oil to enter the fuel rail.
When connecting the fuel pressure regulator and the high-pressure fuel hose to the fuel rail, apply a small amount of new engine oil to the O-ring. Then insert the high-pressure fuel hose, being careful not to damage the O-ring.



>>D<< INTAKE MANIFOLD PLENUM GASKET
INSTALLATION

Install the gasket with the protrusion in the position illustrated.



INSPECTION

M1151003100401

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.

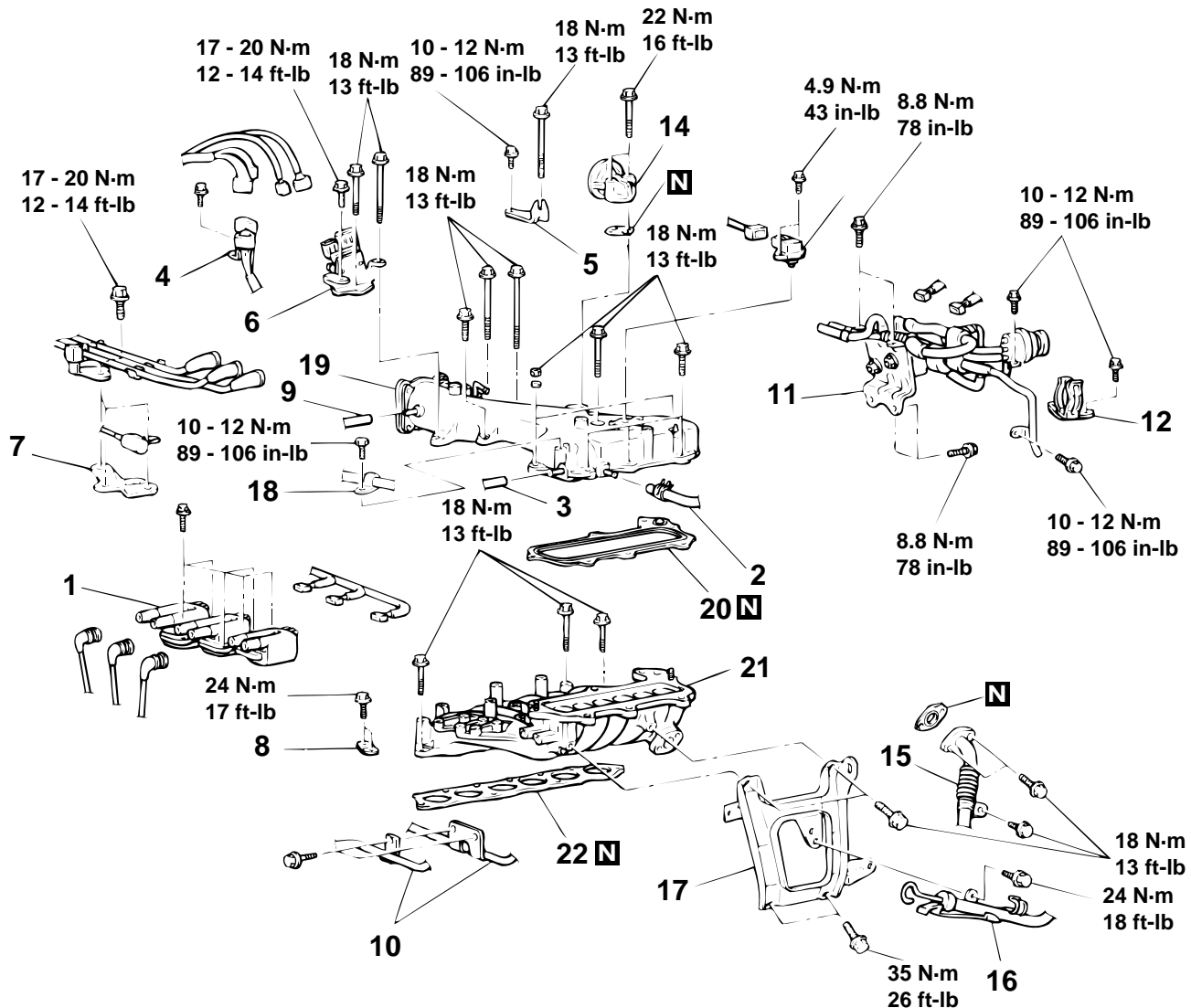
Standard value: 0.15 mm (0.006 inch) or less

Limit: 0.20 mm (0.008 inch)

INTAKE MANIFOLD <3.5L>

REMOVAL AND INSTALLATION

M1151003000459



AC004649 AB

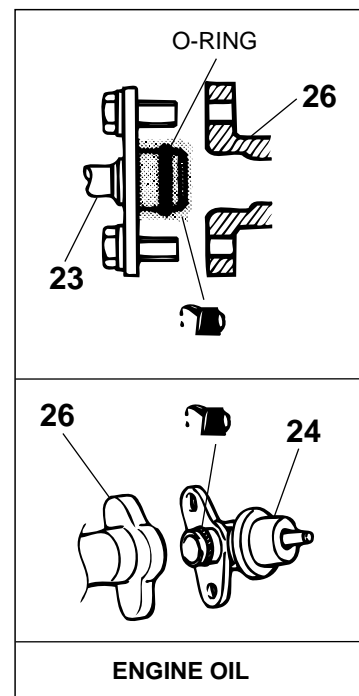
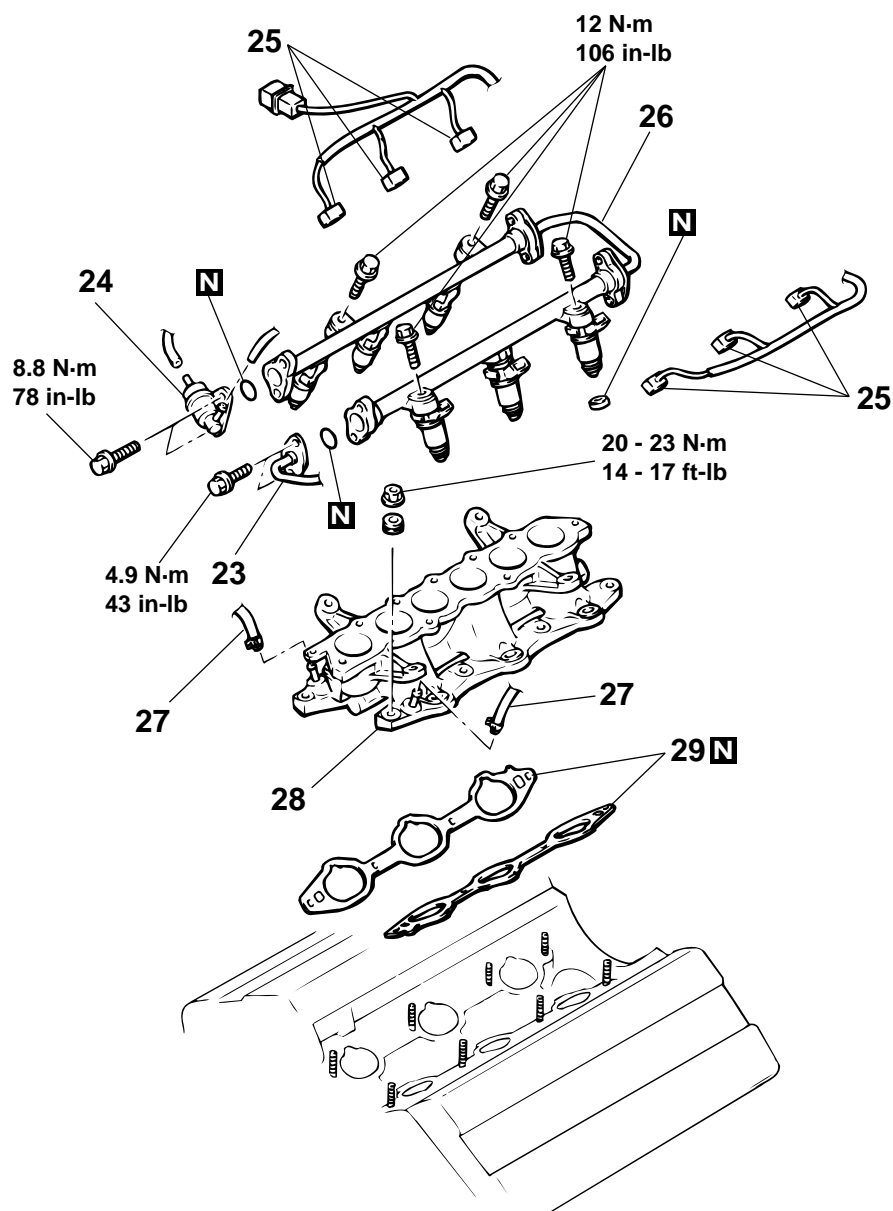
REMOVAL STEPS

1. IGNITION COILS
2. BRAKE BOOSTER VACUUM HOSE CONNECTION
3. PCV HOSE CONNECTION
4. CRANKSHAFT POSITION SENSOR AND CAM POSITION SENSOR CONNECTOR
5. ACCELERATOR CABLE BRACKET
6. IGNITION POWER TRANSISTOR
7. WATER OUTLET FITTING BRACKET
8. WATER PUMP STAY
9. VACUUM HOSE CONNECTION
10. FUEL PIPE CONNECTION
11. SOLENOID VALVE AND VACUUM HOSE ASSEMBLY

REMOVAL STEPS (Continued)

12. VACUUM CONTROL VALVE BRACKET
13. MDP SENSOR
14. EGR VALVE
15. EGR PIPE CONNECTION
16. A/T OIL DIPSTICK ASSEMBLY
17. INTAKE MANIFOLD PLENUM STAY
18. THROTTLE CABLE CONNECTION
19. AIR INTAKE FITTING
20. AIR INTAKE FITTING GASKET
21. UPPER INTAKE MANIFOLD
22. INTAKE MANIFOLD PLENUM GASKET

>>D<<



AC004650 AB

REMOVAL STEPS

- >>C<< 23. HIGH-PRESSURE FUEL HOSE CONNECTION
 >>C<< 24. FUEL PRESSURE REGULATOR
 25. INJECTOR CONNECTOR

<<A>>

REMOVAL STEPS (Continued)

26. FUEL RAIL (WITH INJECTORS)
 27. WATER HOSE CONNECTION
 >>B<< 28. INTAKE MANIFOLD
 >>A<< 29. INTAKE MANIFOLD GASKET

REMOVAL SERVICE POINT

<<A>> FUEL RAIL (WITH INJECTORS) REMOVAL

CAUTION

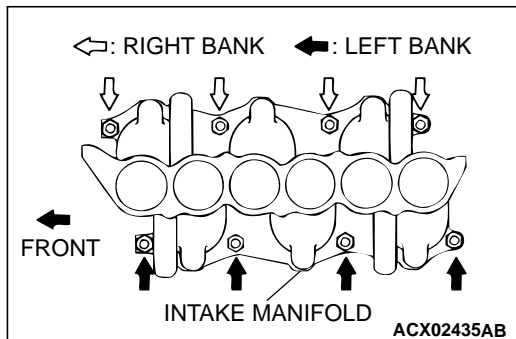
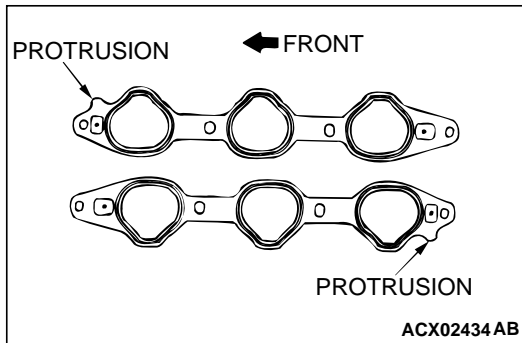
Care must be taken when removing the fuel rail: Do not drop the injectors.

Remove the fuel rail with the injectors attached to it.

INSTALLATION SERVICE POINTS

>>A<< INTAKE MANIFOLD GASKET INSTALLATION

Install the gasket with the protrusions in the position illustrated.



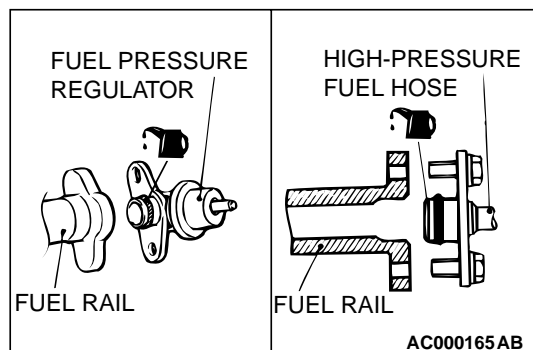
>>B<< INTAKE MANIFOLD INSTALLATION

Tighten the nuts by the following procedure.

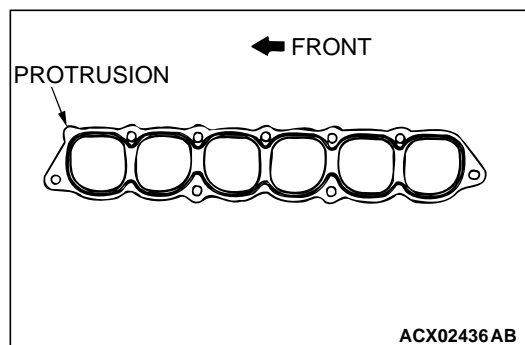
ORDER	MOUNTING NUT	TIGHTENING TORQUE
1st	Right-bank nuts	6.4 N·m (56 in-lb)
2nd	Left-bank nuts	20 – 23 N·m (14 – 17 ft-lb)
3rd	Right-bank nuts	20 – 23 N·m (14 – 17 ft-lb)
4th	Left-bank nuts	20 – 23 N·m (14 – 17 ft-lb)
5th	Right-bank nuts	20 – 23 N·m (14 – 17 ft-lb)

>>C<< FUEL PRESSURE REGULATOR/HIGH-PRESSURE
FUEL HOSE INSTALLATION**⚠ CAUTION**

Be careful not to allow any engine oil to enter the fuel rail.
When connecting the fuel pressure regulator and the high-pressure fuel hose to the fuel rail, apply a small amount of new engine oil to the O-ring. Then insert the high-pressure fuel hose, being careful not to damage the O-ring.

>>D<< INTAKE MANIFOLD PLENUM GASKET
INSTALLATION

Install the gasket with the protrusion in the position illustrated.

**INSPECTION**

M1151003100393

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.

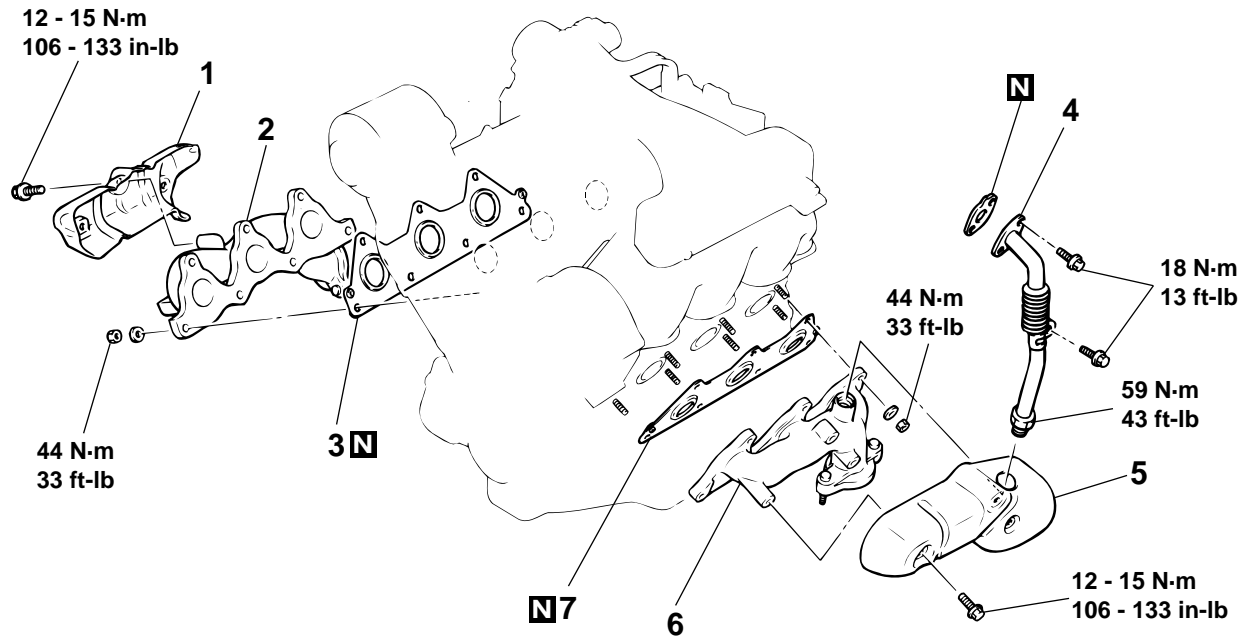
Standard value: 0.15 mm (0.006 inch) or less

Limit: 0.20 mm (0.008 inch)

EXHAUST MANIFOLD

REMOVAL AND INSTALLATION

M1151003300353



AC004651 AB

REMOVAL STEPS

1. HEAT PROTECTOR <RH>
2. EXHAUST MANIFOLD <RH>
3. EXHAUST MANIFOLD GASKET <RH>
4. EGR PIPE

REMOVAL STEPS (Continued)

5. HEAT PROTECTOR <LH>
6. EXHAUST MANIFOLD <LH>
7. EXHAUST MANIFOLD GASKET <LH>

INSPECTION

M1151003400349

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

Exhaust Manifold Check

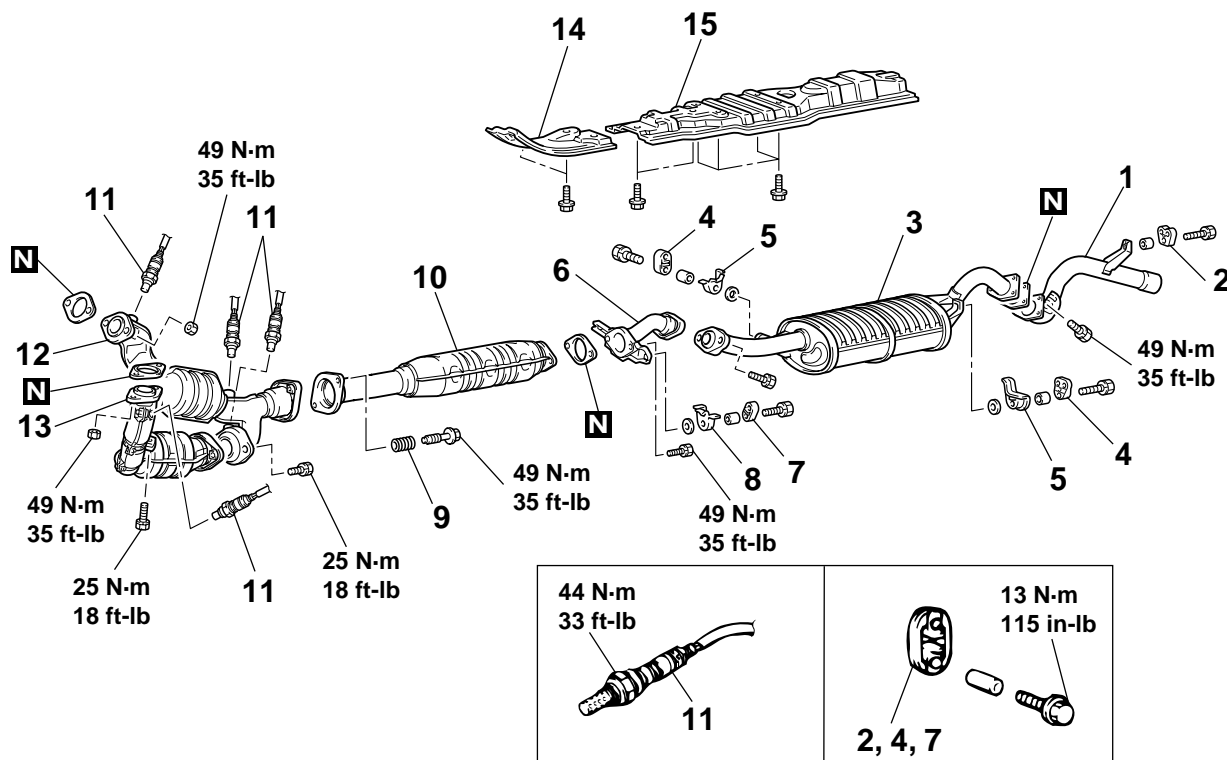
1. Check for damage or cracking of any part.
2. Using a straight edge and a feeler gauge, check for distortion of the cylinder head installation surface.

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**

M1151008700129



AC004389 AB

MAIN MUFFLER REMOVAL STEPS

1. TAIL PIPE
2. HANGER
3. MAIN MUFFLER
4. HANGER
5. PROTECTOR

**CENTER EXHAUST PIPE
REMOVAL STEPS**

6. CENTER EXHAUST PIPE
7. HANGER
8. PROTECTOR
9. COMPRESSION SPRING
10. CATALYTIC CONVERTER

MAIN MUFFLER REMOVAL STEPS

9. COMPRESSION SPRING
10. CATALYTIC CONVERTER
11. HEATED OXYGEN SENSOR
12. FRONT CATALYTIC CONVERTER (R.H.)
13. FRONT CATALYTIC CONVERTER (L.H.)

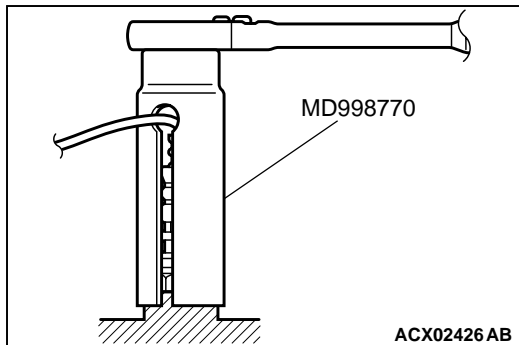
Required Special Tool:

- MD998770: Oxygen sensor wrench

REMOVAL SERVICE POINT

<<A>> HEATED OXYGEN SENSOR REMOVAL

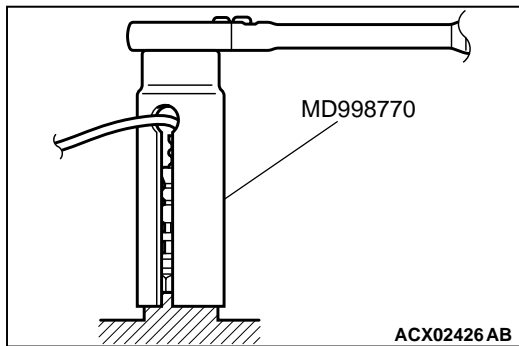
Use special tool MD998770 to remove the oxygen sensor.



INSTALLATION SERVICE POINT

>>A<< HEATED OXYGEN SENSOR INSTALLATION

Use special tool MD998770 to installation the oxygen sensor.



SPECIFICATIONS

FASTENER TIGHTENING SPECIFICATIONS

M1151006800238

ITEM		SPECIFICATION
Air cleaner		
Air cleaner, air duct and resonator bolt		8.8 N·m (78 in-lb)
Air cleaner bracket bolt		3.9 N·m (35 in-lb)
Air flow sensor nut		8.8 N·m (78 in-lb)
Air intake hose clamp bolt		3.9 N·m (35 in-lb)
Exhaust manifold		
EGR pipe bolt		18 N·m (13 ft-lb)
EGR pipe flare nut		59 N·m (43 ft-lb)
Exhaust manifold nut		44 N·m (33 ft-lb)
Heat protector bolt		12 – 15 N·m (106 – 133 in-lb)
Exhaust pipe and main muffler		
Center exhaust pipe bolt		49 N·m (35 ft-lb)
Exhaust bracket bolt		25 N·m (18 ft-lb)
Front catalytic converter bolt and nut		49 N·m (35 ft-lb)
Hanger bolt		13 N·m (115 in-lb)
Heated oxygen sensor		44 N·m (33 ft-lb)
Main muffler bolt		25 N·m (18 ft-lb)
Tail pipe bolt		49 N·m (35 ft-lb)
Intake manifold <3.0L Engine>		
Accelerator cable bracket bolt	M6	10 – 12 N·m (89 – 106 in-lb)
	M8	18 N·m (13 ft-lb)
Air intake fitting bolt and nut		18 N·m (13 ft-lb)
A/T oil dipstick assembly		22 N·m (16 ft-lb)
EGR pipe bolt		18 N·m (13 ft-lb)
EGR valve bolt		22 N·m (16 ft-lb)
Fuel pressure regulator bolt		8.8 N·m (78 in-lb)
Fuel rail bolt		12 N·m (106 in-lb)
High-pressure fuel hose bolt		4.9 N·m (43 in-lb)
Intake manifold nut		20 – 23 N·m (14 – 17 ft-lb)
Intake manifold plenum stay bolt	M8	18 N·m (13 ft-lb)
	M10	35 N·m (26 ft-lb)
Ignition power transistor bolt	M8 × 18	17 – 20 N·m (12 – 14 ft-lb)
	M8 × 80, M8 × 50	18 N·m (13 ft-lb)
MDP sensor bolt		4.9 N·m (43 in-lb)
Solenoid bracket bolt		8.8 N·m (78 in-lb)
VCV bracket and vacuum hose clamp bolt		10 – 12 N·m (89 – 106 in-lb)
Water outlet fitting bracket bolt		17 – 20 N·m (12 – 14 ft-lb)

ITEM		SPECIFICATION
Water pump stay bolt	M8 × 14	24 N·m (17 ft-lb)
	M8 × 30	18 N·m (13 ft-lb)
Intake manifold <3.5L Engine>		
Accelerator cable bracket bolt	M6	10 – 12 N·m (89 – 106 in-lb)
	M8	18 N·m (13 ft-lb)
Air intake fitting bolt and nut		18 N·m (13 ft-lb)
A/T oil dipstick assembly		24 N·m (18 ft-lb)
EGR pipe bolt		18 N·m (13 ft-lb)
EGR valve bolt		22 N·m (16 ft-lb)
Fuel pressure regulator bolt		8.8 N·m (78 in-lb)
Fuel rail bolt		12 N·m (106 in-lb)
High-pressure fuel hose bolt		4.9 N·m (43 in-lb)
Intake manifold nut		20 – 23 N·m (14 – 17 ft-lb)
Intake manifold plenum stay bolt	M8	18 N·m (13 ft-lb)
	M10	35 N·m (26 ft-lb)
Ignition power transistor bolt	M8 × 18	17 – 20 N·m (12 – 14 ft-lb)
	M8 × 80, M8 × 50	18 N·m (13 ft-lb)
MDP sensor bolt		4.9 N·m (43 in-lb)
Solenoid bracket bolt		8.8 N·m (78 in-lb)
VCV bracket and vacuum hose clamp bolt		10 – 12 N·m (89 – 106 in-lb)
Water outlet fitting bracket bolt		17 – 20 N·m (12 – 14 ft-lb)
Water pump stay bolt		24 N·m (17 ft-lb)

SERVICE SPECIFICATION

M1151000300257

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

NOTES