

# INTAKE AND EXHAUST

## CONTENTS

M15AA--

AIR CLEANER .....	9	SERVICE ADJUSTMENT PROCEDURES ....	6
CHARGE AIR COOLER .....	12	Air Cleaner Element Inspection and Replacement .....	6
EXHAUST MANIFOLD <DOHC-Non-Turbo> .....	30	Intake Charge Pressure Control System Inspection .....	7
EXHAUST MANIFOLD <SOHC-8 VALVE> .....	27	Turbocharger Bypass Valve Inspection .....	8
EXHAUST MANIFOLD <SOHC-16 VALVE> .....	28	Turbocharger Supercharging Pressure Inspection .....	7
EXHAUST PIPE AND MAIN MUFFLER <DOHC> .....	33	Turbocharger Waste Gate Solenoid Inspection .....	8
EXHAUST PIPE AND MAIN MUFFLER <SOHC> .....	32	Intake Manifold Vacuum Inspection .....	Refer to GROUP 11
INTAKE MANIFOLD <DOHC> .....	21	SPECIAL TOOL .....	5
INTAKE MANIFOLD <SOHC-8 VALVE> .....	14	SPECIFICATIONS .....	2
INTAKE MANIFOLD <SOHC-16 VALVE> .....	18	General Specifications .....	2
		Service Specifications .....	2
		Torque Specifications .....	2
		TROUBLESHOOTING .....	5
		Abnormal Noise	
		Exhaust Gas Leakage	
		TURBOCHARGER .....	24

**SPECIFICATIONS****GENERAL SPECIFICATIONS**

M15CA--

Items	Specifications
Air cleaner Element	Unwoven cloth type
Exhaust system Front exhaust pipe <Non-Turbo> Front exhaust pipe <Turbo> Muffler Coupling Suspension system	Dual type Single type Expansion resonance type Flat coupling Rubber hangers and O-rings
Turbocharger Type Identification No. intake charge pressure control	Exhaust gas turbine type TD05H-14B-6 Turbocharger waste gate actuator and valve
Intercooler Type	Air cooled type

**SERVICE SPECIFICATIONS**

M15CB--

Items	Standard	Limit
Intake and exhaust manifolds Distortion of cylinder head contacting surface	mm (in.)	Less than 0.15 (.0059)
Turbocharger waste gate solenoid terminal resistance [at 20°C (68°F)]	$\Omega$ 3.6 - 4.4	0.3 (.012)
Turbocharger Supercharging pressure	kPa (psi)	31-70 (4.4-10.1)

**TORQUE SPECIFICATIONS**

M15CC--

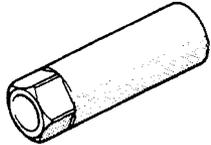
Items	Nm	ft.lbs.
Air cleaner Air cleaner to body Air duct Resonator Branch tube	8-10 8-10 8-10 8-10	6-7 6-7 6-7 6-7
Charge air cooler Air hose B Air pipe A Air pipe B Turbocharger by-pas valve to air pipe B Charge air cooler	8-10 12-15 12-15 15-22 12-15	6-7 9-11 9-11 11-16 9-11

Items	Nm	ft.lbs.
Intake manifold <SOHC>		
Accelerator cable to intake manifold plenum	<b>4-6</b>	<b>3-4</b>
Fuel high pressure hose to fuel rail	<b>4-6</b>	<b>3-4</b>
Fuel rail to intake manifold	10-13	7-9
Ignition coil <8 VALVE>	<b>12-15</b>	<b>9-11</b>
Intake manifold stay	<b>18-25</b>	<b>13-18</b>
Intake manifold to engine	15-20	11-14
Throttle body		
<8 VALVE>	10-13	<b>7-9</b>
<16 VALVE>	<b>15-22</b>	11-16
Intake manifold plenum stay	15-20	11-14
Intake manifold plenum to intake manifold	15-20	11-14
Water outlet fitting	17-20	<b>12-14</b>
EGR valve		
<8 VALVE>	10-15	<b>7-11</b>
<16 VALVE>	<b>17-26</b>	<b>13-18</b>
EGR temperature sensor <Vehicles for California>	10-12	7-9
Distributor	10-13	7-9
Thermo valve <Vehicles for Federal>	20-40	<b>14-28</b>
Control harness protector to intake manifold plenum	<b>4-6</b>	<b>3-4</b>
Vacuum pipe and hose assembly to intake manifold	<b>8-12</b>	<b>6-8</b>
Intake manifold <DOHC>		
Accelerator cable to intake manifold	<b>4-6</b>	<b>3-4</b>
Throttle body stay	<b>15-22</b>	11-16
Fuel high pressure hose to fuel rail	<b>4-6</b>	<b>3-4</b>
Fuel rail to engine	10-13	7-9
Intake manifold stay	25-30	<b>18-22</b>
Intake manifold to engine		
Mounting bolt (M8)	15-20	11-14
Mounting nut and bolt (M10)	30-42	22-30
Ignition coil	20-27	14-20
Ignition power transistor unit	10-12	7-9
Throttle body	<b>15-22</b>	11-16
EGR valve	15-22	11-16
EGR temperature sensor <Vehicles for California>	10-12	7-9
Control harness protector to intake manifold	<b>4-6</b>	<b>3-4</b>
Control harness clamp bolt	10-12	7-9
Exhaust manifold <SOHC>		
Heat protector to exhaust	<b>12-15</b>	9-11
Exhaust manifold to engine		
<8 VALVE>	15-20	11-14
<16 VALVE>	25-30 <b>27-33</b>	<b>18-22</b> 20-23
Oxygen sensor	40-50	29-36
Exhaust manifold <DOHC (Non-turbo)>		
Exhaust manifold cover (A), (B)	12-15	9-11
Engine hanger to engine mount	<b>12-15</b>	9-11
Engine manifold to engine	25-30	<b>18-22</b>
Oxygen sensor	40-50	29-36

Items	Nm	ft.lbs.
Exhaust manifold <DOHC (turbo)>		
Front exhaust pipe to exhaust fitting	40-60	29-43
Front exhaust pipe to engine	30-40	22-29
Heat protector (A),(B)	12-15	9-11
Engine oil level gauge guide mounting bolt	12-15	9-11
Engine hanger to engine	12-15	9-11
Exhaust manifold to engine	25-30	18-22
Exhaust manifold to turbocharger	55-65	40-47
Oil pipe to engine	14-19	10-14
Water pipe.(B) to water inlet pipe	40-50	29-36
Turbocharger waste gate actuator	10-13	7-9
Oxygen sensor	40-50	29-36
Water pipe (B) to turbocharger	35-50	25-36
Air outlet fitting	17-20	12-14
Oil pipe to turbocharger	28-34	20-25
Water pipe (A) to turbocharger	35-50	25-36
Water pipe (A) mounting bolt	10-12	7-9
Exhaust fitting	55-65	40-47
Oil return pipe	8-10	6-7
Exhaust manifold and turbocharger		
Front exhaust pipe to turbocharger	40-60	29-43
Front exhaust pipe to engine	30-40	22-29
Heat protector (A),(B)	12-15	9-11
Engine hanger to engine	12-15	9-11
Exhaust manifold to engine	25-30	18-22
Exhaust manifold to turbocharger	55-65	40-47
Oil pipe to engine	14-19	10-14
Water pipe (B) to water inlet pipe	40-50	29-36
Oxygen sensor	40-50	29-36
Water pipe (B) to turbocharger	35-50	25-36
Air outlet fitting	17-20	12-14
Oil pipe to turbocharger	28-34	20-25
Water pipe (A) to turbocharger	35-50	25-36
Water pipe (A) mounting bolt	10-12	7-9
Exhaust fitting	55-65	40-47
Oil return pipe	8-10	6-7
Exhaust pipe and main muffler		
Front exhaust pipe to exhaust manifold		
<FWD>	40-50	29-36
<AWD (Non-Turbo)>	30-40	22-29
<AWD (Turbo)>	40-60	29-43
Front exhaust pipe clamp	30-40	22-29
Rubber hanger	10-15	7-11
Front exhaust pipe to catalytic converter	40-60	29-43
Catalytic converter to center exhaust pipe	30-40	22-29
Hanger bracket to body	10-15	7-11
Hook to center exhaust pipe	10-15	7-11
Center exhaust pipe to main muffler	30-40	22-29
Moulding to main muffler	4-6	3-4

**SPECIAL TOOL**

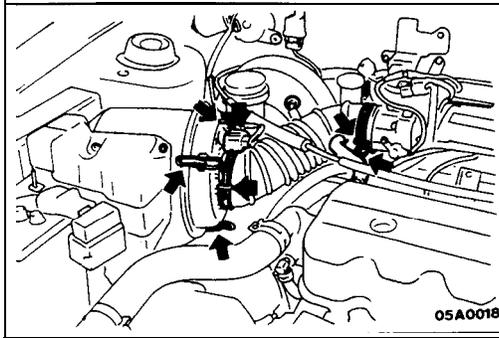
M15DA-

Tool	Number	Name	Use
	M 0998703	Oxygen sensor wrench	Removal/Installation of oxygen sensor < Non-Turbo >
	MD998748	Oxygen sensor wrench	Removal/Installation of oxygen sensor < Turbo >

**TROUBLESHOOTING**

M15EAAB

Symptom	Probable cause	Remedy
Exhaust gas leakage	Loose joints	Retighten
	Broken pipe or muffler	Repair or replace
Abnormal noise	Broken separator in muffler	Replace
	Broken rubber hangers	
	Interference of pipe or muffler with vehicle body	Correct
	Broken pipe or muffler	Repair or replace



## SERVICE ADJUSTMENT PROCEDURES

M15GBAF

### AIR CLEANER ELEMENT INSPECTION AND REPLACEMENT

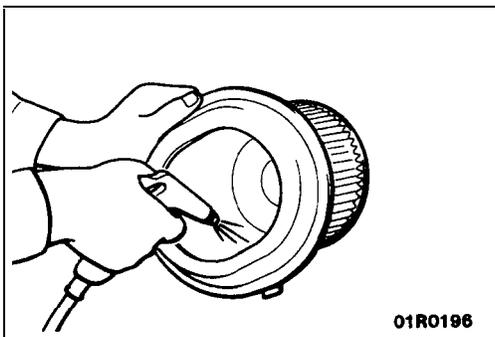
#### <Non-Turbo>

- (1) Disconnect the volume air flow sensor connector.
- (2) Disconnect the connection of the breather hose.
- (3) Remove the air intake hose.
- (4) Push the air intake hose backward, and remove the air cleaner cover.

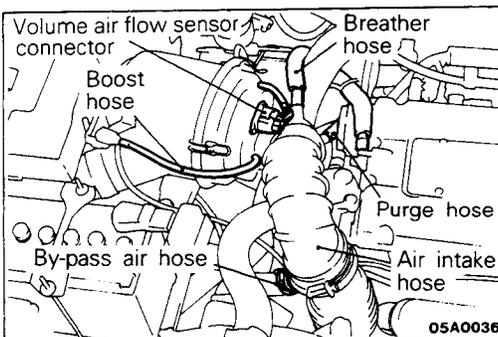
#### Caution

**Care must be taken when removing the air cleaner cover, because the volume air flow sensor is attached.**

- (5) Take out the air cleaner element.



- (6) Check the air cleaner element for dirt or clogging; if necessary, clean by using compressed air.
- (7) Replace the air cleaner element if the dirt or clogging is serious.
- (8) Insert the element into the air cleaner body and install the air cleaner cover.
- (9) Install the air intake hose.
- (10) Connect the breather hose and the volume air flow sensor connector.



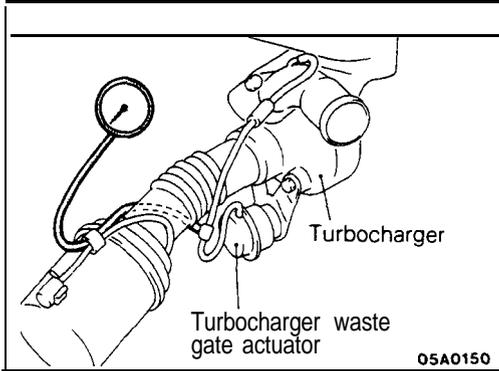
#### <Turbo>

- (1) Disconnect the volume air flow sensor connector.
- (2) Disconnect the breather hose, purge hose, by-pass air hose and boost hose connections.
- (3) Remove the air intake hose on the air cleaner cover side and then move the air intake hose to the front of the air cleaner body.
- (4) Unclamp the air cleaner cover.

#### Caution

**Care must be taken when removing the air cleaner cover, because the volume air flow sensor is attached.**

- (5) Take out the air cleaner element.
- (6) Check the air cleaner element for dirt or clogging; if necessary, clean by using compressed air.
- (7) Replace the air cleaner element if the dirt or clogging is serious.
- (8) Insert the element into the air cleaner body and install the air cleaner cover.
- (9) Install the air intake hose.
- (10) Connect the breather hose, purge hose, by-pass air hose and boost hose.
- (11) Connect the volume air flow sensor connector.



**TURBOCHARGER SUPERCHARGING PRESSURE INSPECTION**

M15GAA8

**Caution**

Perform running inspection with two passengers in the vehicle and where full throttle acceleration can be safely made.

The pressure gauge reading is taken by a front seat passenger.

- (1) Disconnect the supercharging pressure control hose at the solenoid valve (fixed to the air cleaner), and plug the nipple. Attach the pressure gauge to the hose.
- (2) Drive the vehicle with full throttle and accelerate the engine to a speed of more than 3,500 rpm at 2nd gear. Measure the supercharging pressure when the pointer is stabilized.

**Standard value: 31–70 kPa (4.4–10.1 psi)**

**Caution**

If the supercharging pressure deviates from the standard value, check the following items for possible causes.

**When pressure is high:**

Turbocharger waste gate actuator malfunction

**When pressure is low:**

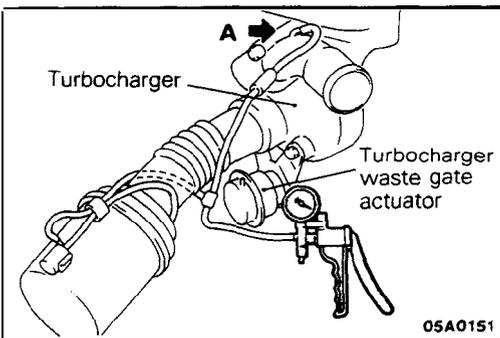
Turbocharger waste gate actuator malfunction

Supercharging pressure leaks

Faulty turbocharger

**INTAKE CHARGE PRESSURE CONTROL SYSTEM INSPECTION**

M15GFAAa

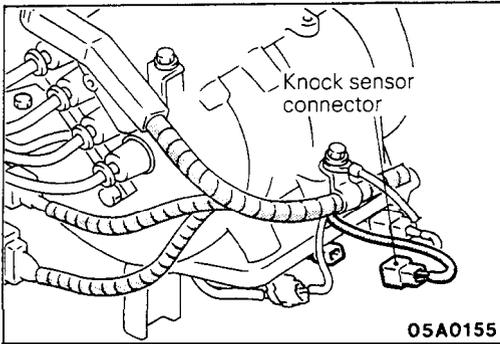


- (1) Disconnect the vacuum hose (white-striped) from the turbocharger waste gate actuator, and connect the hand vacuum pump to the vacuum hose.
- (2) Disconnect the vacuum hose (black) from the boost nipple which controls the turbocharger waste gate actuator.
- (3) Insert the blind plug into the nipple from which the vacuum hose was disconnected.
- (4) Keep the (-) terminal of the battery disconnected for 10 seconds or longer, and then reconnect the terminal.
- (5) Close and open the vacuum hose (black) end with your finger, and apply negative pressure to check the negative pressure state.

Engine state	Hose (black)	Normal state
stop (Ignition switch: ON)	Opened	Negative pressure leaks.
	Closed by finger	Negative pressure is maintained.
Idling		Negative pressure leaks.

**NOTE**

If negative pressure is not normal, it can be assumed that there is a malfunction in the turbocharger waste gate solenoid or vacuum hose.



- (6) Put a blind plug on the vacuum hose (black) end.
- (7) Apply negative pressure when idling. and check the negative pressure state when the knock sensor is connected and disconnected.

Engine state	Knock sensor connector	Normal state
Idling	Connection	Negative pressure leaks.
	Disconnection	Negative pressure is maintained.

**NOTE**

If negative pressure is not normal, it can be assumed that there is a malfunction in the knock sensor circuit.

- (8) Turn off the ignition switch, and connect the connector of the knock sensor.
- (9) Use scan tool to erase the diagnostic trouble code or disconnect the (-) terminal of the battery for 10 seconds or more.

**NOTE**

This erases the diagnostic memory of the knock sensor trouble by disconnecting the knock sensor connector.

**TURBOCHARGER WASTE GATE SOLENOID INSPECTION**

M15GGAA

- (1) Operation check

Using a hand vacuum pump, apply a negative pressure to the solenoid valve nipple on which the white vacuum hose is connected, and check air-tightness when the voltage is applied to the solenoid valve terminal and when it is released from the terminal.

Battery voltage	Other nipple of solenoid valve	Normal state
When applied	Opened	Negative pressure leaks.
	Closed by finger	Negative pressure is maintained.
When released	Opened	Negative pressure is maintained.

- (2) Continuity check of coil

Measure the solenoid valve terminal resistance.

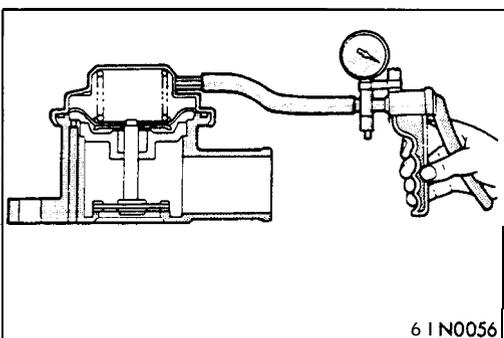
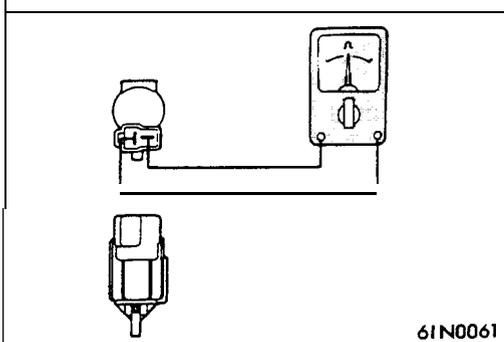
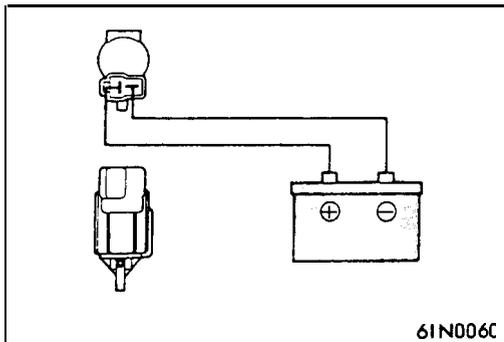
**Standard value: 36-44 Ω [at 20°C (68°F)]**

**TURBOCHARGER BYPASS VALVE INSPECTION**

M15GHAA

- (1) Remove the turbocharger bypass valve.
- (2) Connect the hand vacuum pump to the nipple of the turbocharger bypass valve.
- (3) Apply a negative pressure of approx. 53.3 kPa (7.7 psi), and check operation of the valve. Also check that air tightness is maintained.

Negative pressure	Valve operation	- 1
About 53.3 kPa (7.7 psi)	It starts opening.	

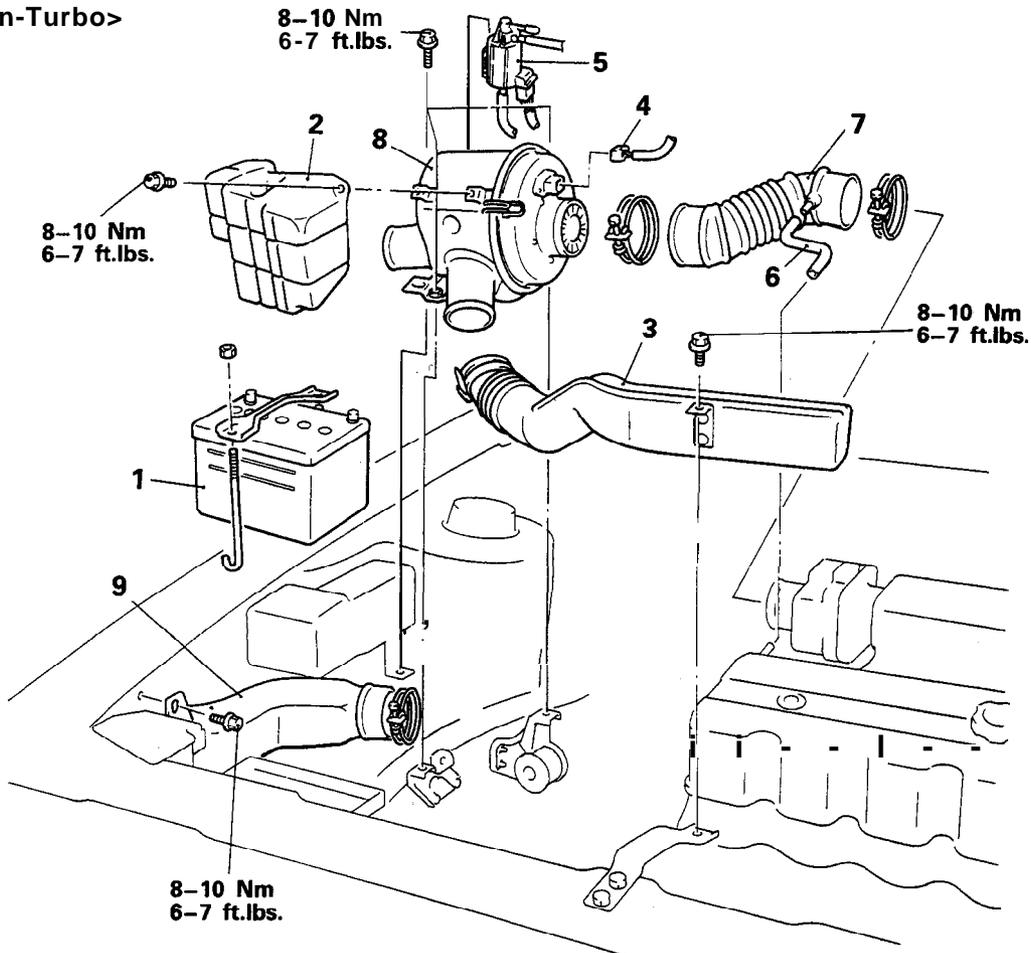


**AIR CLEANER**

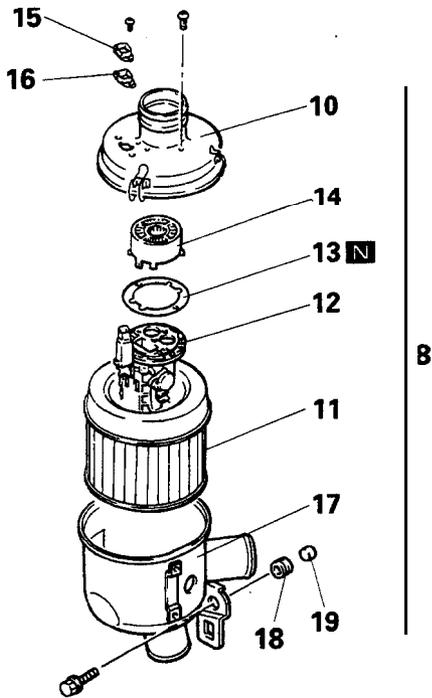
**REMOVAL AND INSTALLATION**

M15FA--

<Non-Turbo>



05A0097

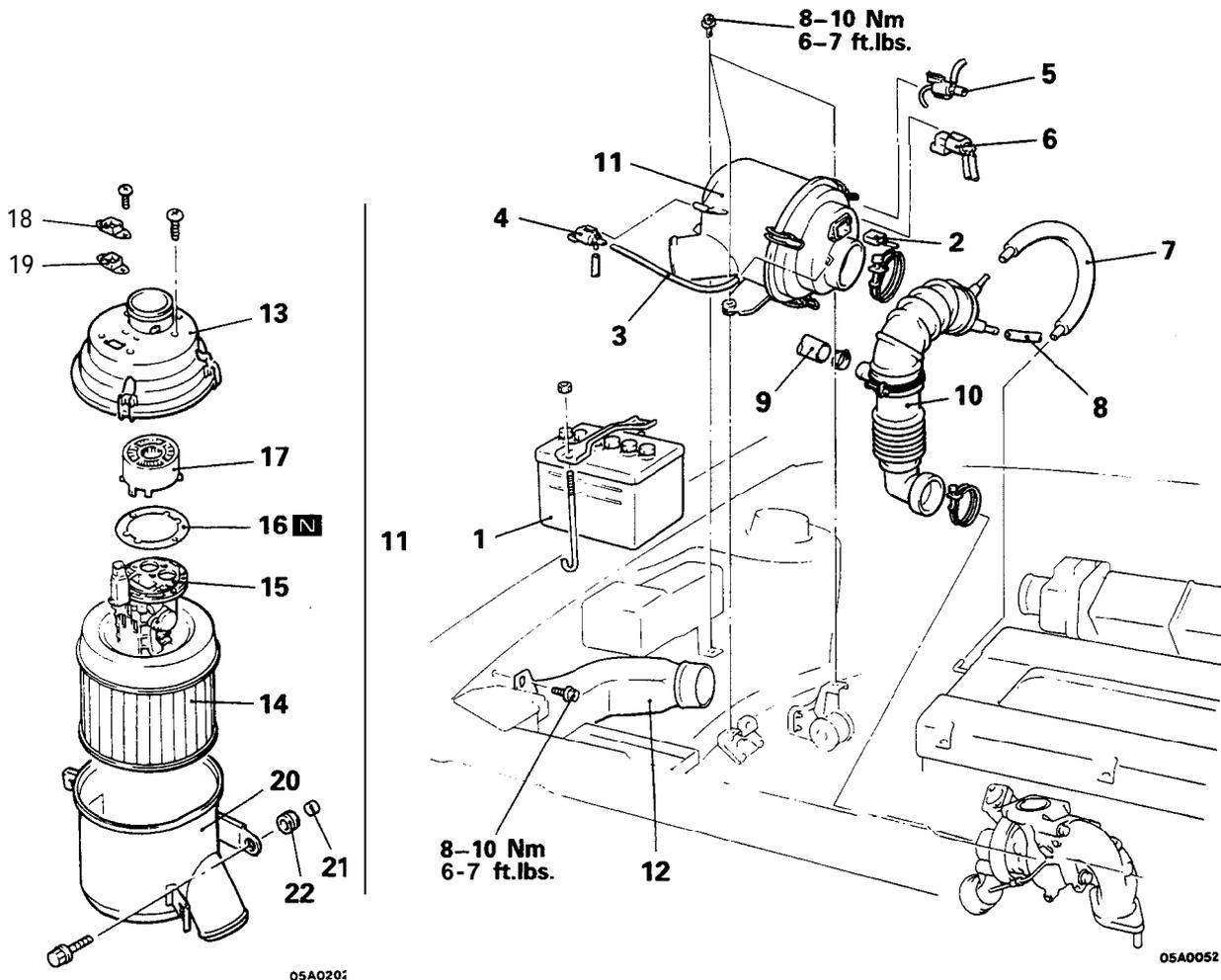


05A0064

**Removal steps**

1. Battery
2. Resonator
3. Branch tube
4. Connection for volume air flow sensor connector
5. EGR solenoid <Vehicles for California>
6. Breather hose
7. Air intake hose
8. Air cleaner
9. Air duct
10. Air cleaner cover
11. Air cleaner element
12. Volume air flow sensor assembly
13. Volume air flow sensor gasket
14. Noise reduction filter
15. Cover
16. Grommet
17. Air cleaner body
18. Insulator
19. Collar

<Turbo>

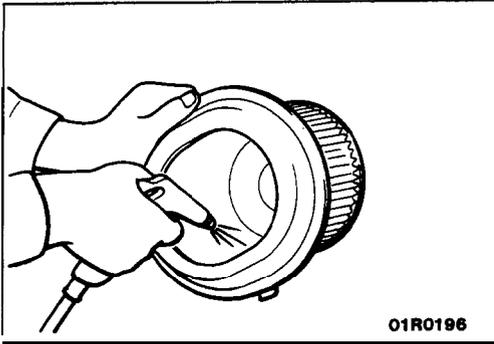


05A0201

05A0052

**Removal steps**

- |   |   |
|---|---|
| <ul style="list-style-type: none"> <li>1. Battery</li> <li>2. Connection for volume air flow sensor connector</li> <li>3. Connection for boost hose</li> <li>4. Turbocharger waste gate solenoid</li> <li>5. Fuel pressure solenoid</li> <li>6. EGR solenoid (Vehicles for California)</li> <li>7. Breather hose</li> <li>8. Purge hose</li> <li>9. By-pass air hose</li> <li>10. Air intake hose</li> <li>11. Air cleaner</li> <li>12. Air duct</li> <li>13. Air cleaner cover</li> <li>14. Air cleaner element</li> <li>15. Volume air flow sensor assembly</li> <li>16. Volume air flow sensor gasket</li> </ul> | <ul style="list-style-type: none"> <li>17. Noise reduction filter</li> <li>18. Cover</li> <li>19. Grommet</li> <li>20. Air cleaner body</li> <li>21. Insulator</li> <li>22. Collar</li> </ul> |
|---|---|

**INSPECTION**

M15FCABa

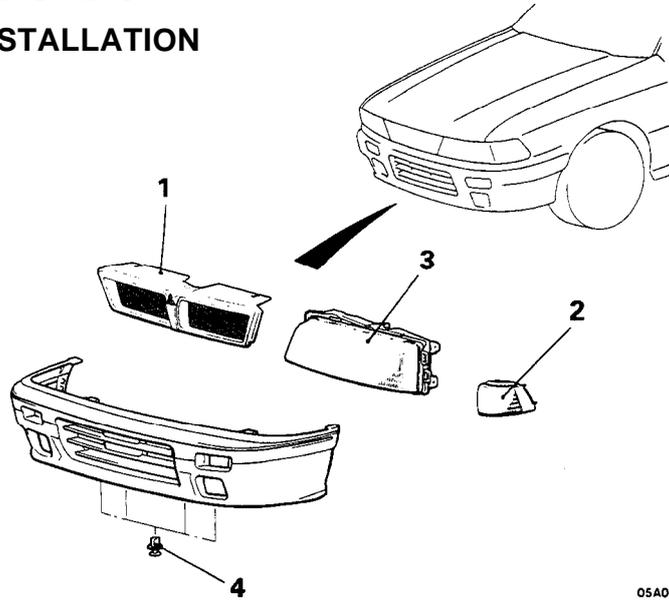
- Check the air cleaner body, cover or packing for deformation, corrosion or damage.
- Check the air duct for damage.
- Check the air cleaner element for clogging, contamination or damage.  
If element is slightly clogged, remove dust by blowing air from inside of element.

**VOLUME AIR FLOW SENSOR CHECK**

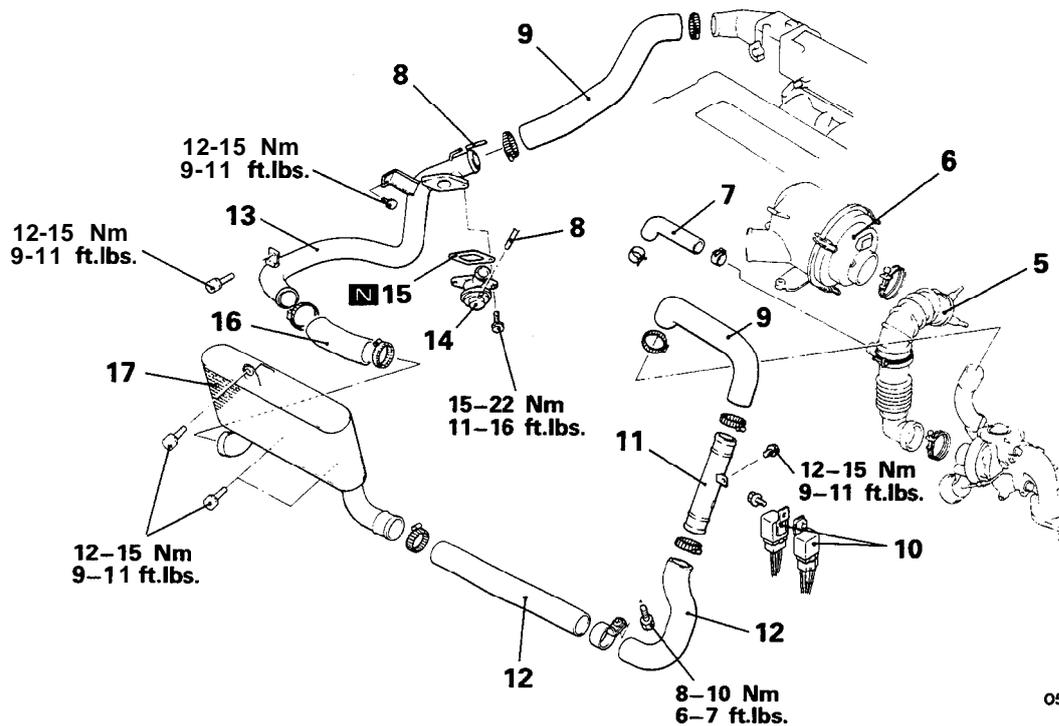
For inspection of volume air flow sensor, refer to GROUP 13-Volume Air Flow Sensor Check.

# CHARGE AIR COOLER

## REMOVAL AND INSTALLATION



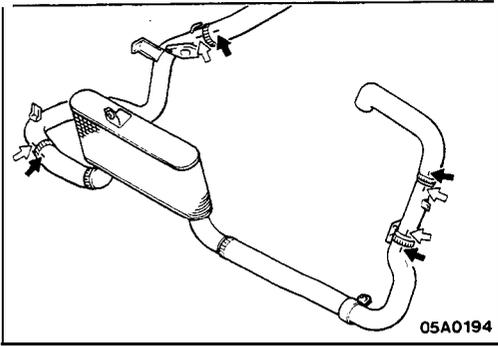
05A0200



05A0191

**Removal steps**

- ◆◆ 1. Radiator grille (Refer to GROUP 51 -Front Grille.)
- ◆◆◆◆ 2. Front combination light (Refer to GROUP 54-Headlight.)
- 3. Headlight
- 4. Front bumper face coupling clip
- 5. Air intake hose
- 6. Air cleaner (Refer to P.15-9.)
- 7. Air by-pass hose
- 8. Vacuum hose
- 9. Air hose A
- 10. Power relay assembly (for A/C)
- 11. Air pipe A
- 12. Air hose B
- 13. Air pipe B
- 14. Turbocharger by-pass valve
- 15. Gasket
- 16. Air hose C
- + 17. Charge air cooler



**INSPECTION**

M15TCAA

- Check the charge air cooler fins for bending, damage, or foreign matter.
- Check the charge air cooler hoses for cracking, damage, or wear.

**SERVICE POINTS OF INSTALLATION**

M15TDAB

**17. INSTALLATION OF CHARGE AIR COOLER**

Connect the air hoses and air pipes by aligning the paint marks on the hoses with the projections and indentations on the pipes.

**Caution**

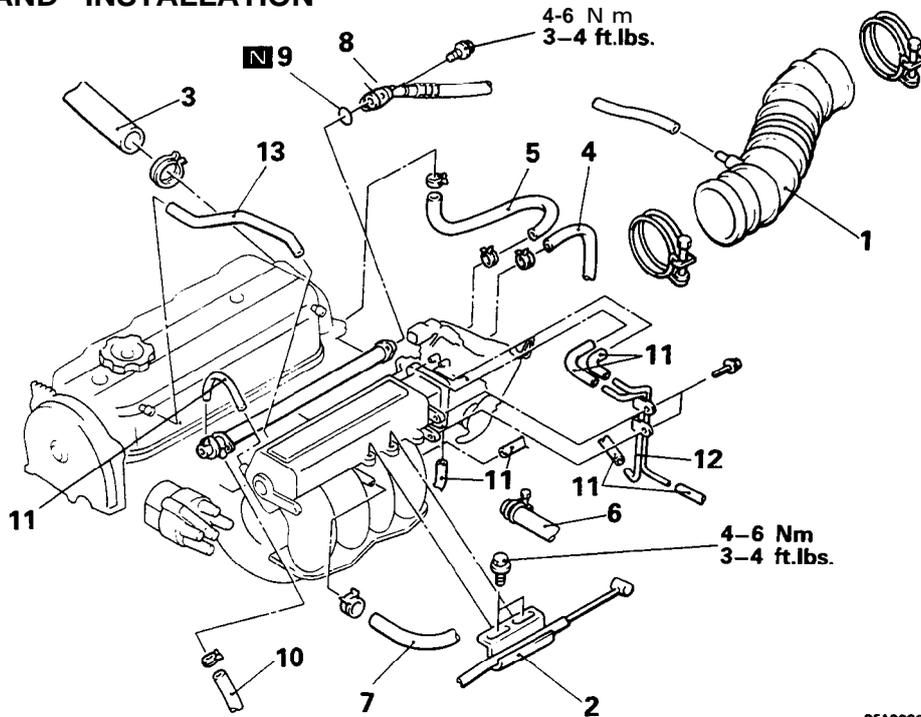
**Be careful not to allow any foreign matter to get into the hoses, pipes, or the charge air cooler itself.**

**NOTE**

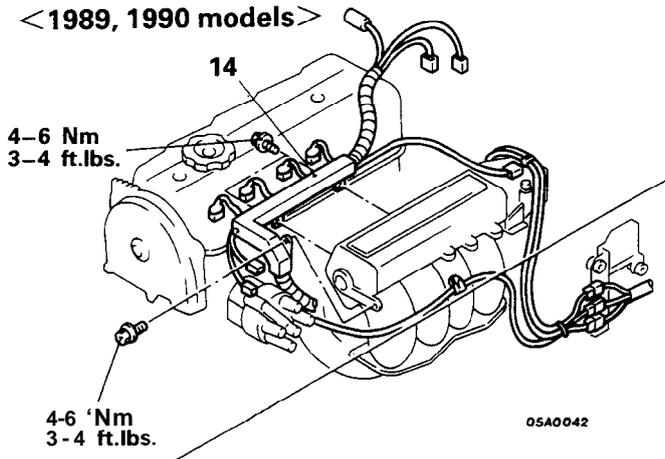
- ⇐: Projection or indentation (pipe)
- ◄: Paint mark (hose)

INTAKE MANIFOLD <SOHC-8 VALVE> <Up to 1992 models>  
REMOVAL AND INSTALLATION

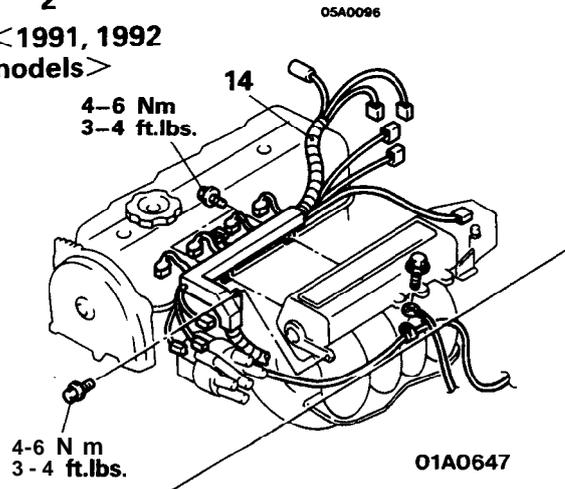
M15MA-A



<1989, 1990 models>



<1991, 1992 models>



**Removal steps**

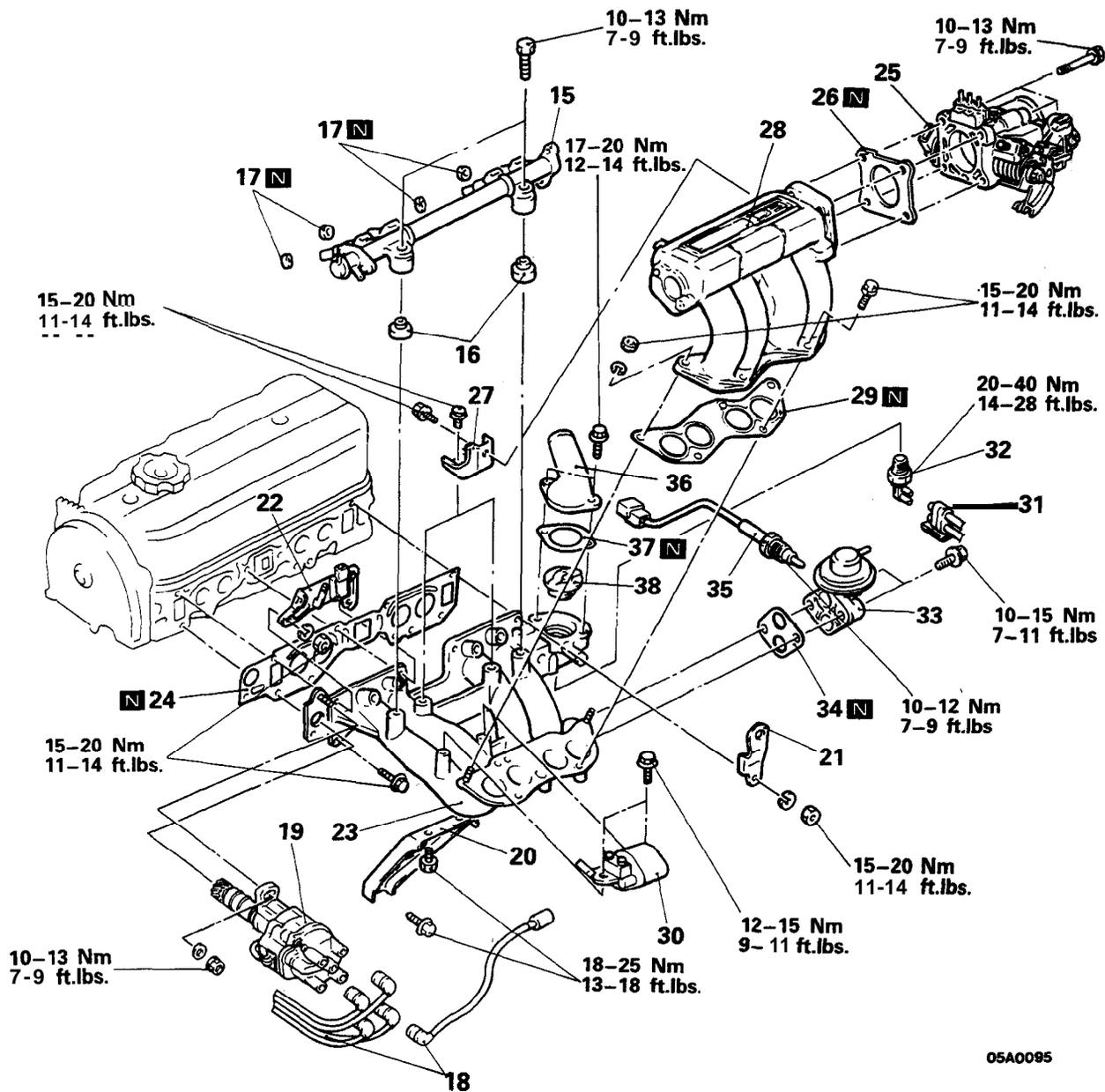
1. Air intake hose
2. Connection for accelerator cable
- ◆◆ ● + 3. Connection for radiator upper hose
4. Connection for water by-pass hose
5. Water hose
6. Connection for heater hose
7. Connection for brake booster vacuum hose
- ◆◆ 8. Connection for fuel high pressure hose
9. O-ring
10. Connection for fuel return hose
11. Connection for vacuum hoses
12. Vacuum pipe
13. PCV hose
14. Connection for control harness

**Pre-removal Operation**

- Draining of Engine Coolant (Refer to GROUP 00–Maintenance Service.)

**Post-installation Operation**

- Filling of Engine Coolant (Refer to GROUP 00–Maintenance Service.)
- Adjustment of Accelerator Cable (Refer to GROUP 13–Engine Control.)
- inspection of Fuel Pressure (Refer to GROUP 13–On-Vehicle Inspection of MFI Components.)

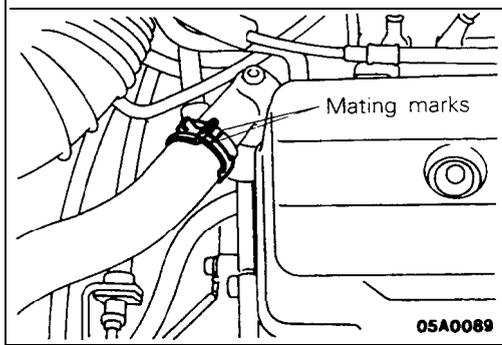


05A0095

- ◆◆◆◆ 15. Fuel rail, fuel injector and pressure regulator
- 16. Insulator
- 17. Insulator
- 18. High tension cable and spark plug cable
- 19. Distributor
- 20. Intake manifold stay
- 21. Engine hanger
- 22. Ignition power transistor bracket
- 23. Intake manifold
- 24. Intake manifold gasket
- 25. Throttle body assembly
- 26. Gasket  
(Refer to GROUP 13–Throttle Body.)

- 27. Intake manifold plenum stay
- 28. Intake manifold plenum
- 29. Intake manifold plenum gasket
- 30. Ignition coil
- 31. Thermal vacuum valve <Vehicles for Federal>
- 32. Thermo valve <Vehicles for Federal>
- 33. EGR valve
- 34. EGR gasket
- 35. EGR temperature sensor <Vehicles for California>
- 36. Water outlet fitting
- 37. Gasket
- 38. Thermostat

## 15-16 INTAKE AND EXHAUST – Intake Manifold <SOHC-8 VALVE>



### SERVICE POINTS OF REMOVAL

M15MBA1a

#### 3. DISCONNECTION OF RADIATOR UPPER HOSE

Make mating marks on the radiator hose and the hose clamp, and then remove the radiator hose.

#### 8. DISCONNECTION OF FUEL HIGH PRESSURE HOSE

Relieve pressure in the fuel pipe line to prevent fuel outflow.

(Refer to GROUP 13—Service Adjustment Procedures.)

#### Caution

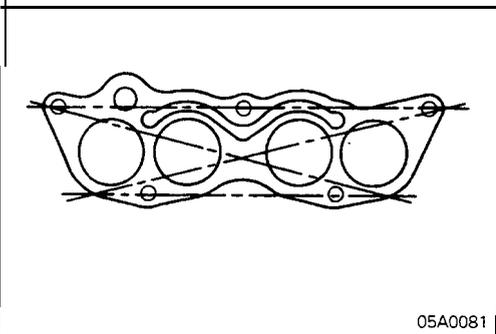
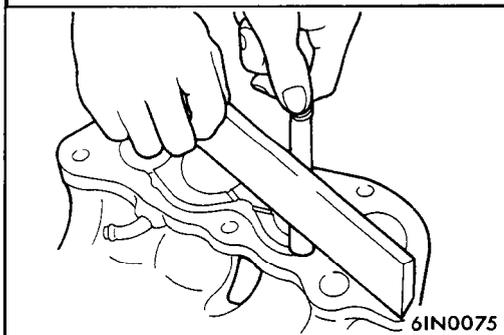
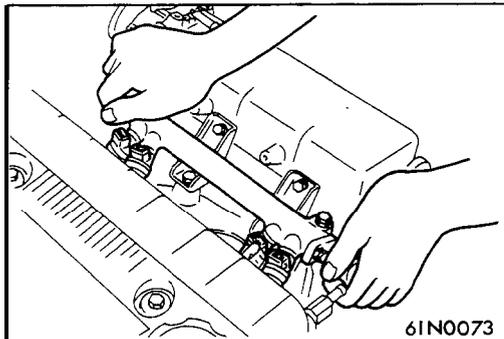
Cover fuel pipe line with rag after relieving pressure as certain pressure may still remain.

#### 15. REMOVAL OF FUEL RAIL, FUEL INJECTION AND PRESSURE REGULATOR

Remove fuel rail with fuel injector and pressure regulator.

#### Caution

Do not drop injector when removing fuel rail.



### INSPECTION

M15MCA1

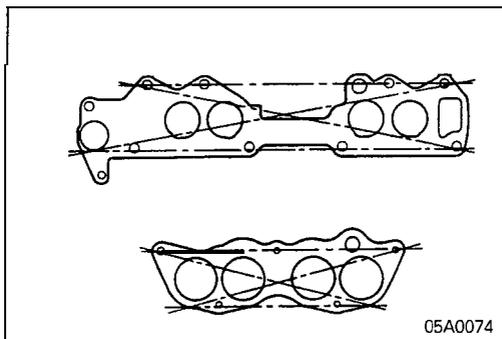
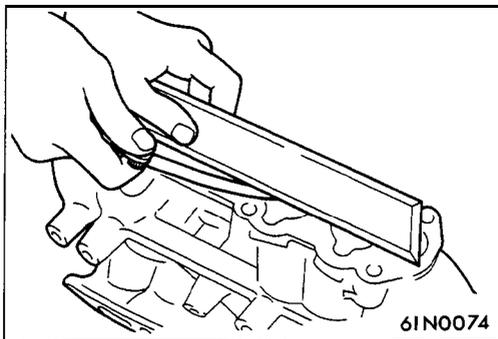
Check the following points; replace the part if a problem is found.

#### INTAKE MANIFOLD PLENUM

- (1) Check intake manifold plenum for defect or cracks. **Re-**place if defective or cracked.
- (2) Check load (negative pressure) of drain port. Check cooling water and jet air passages for clogging. Clean if required.
- (3) Check deflection of installation surface with straight edge and feeler gauge.

Standard value: 0.15 mm (.006 in.) or less

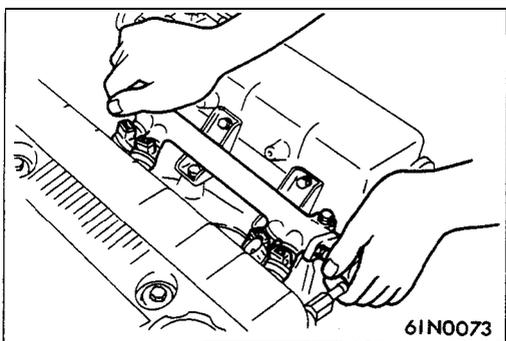
Limit: 0.3 mm (.012 in.)



**INTAKE MANIFOLD**

- (1) Check for damage or cracking of any part.
- (2) Check load (negative pressure) of drain port. Check cooling water and jet air passages for clogging. Clean if required.
- (3) Check deflection of installation surface with straight edge and feeler gauge.

**Standard value: 0.15 mm (.006 in.) or less**  
**Limit: 0.3 mm (.012 in.)**



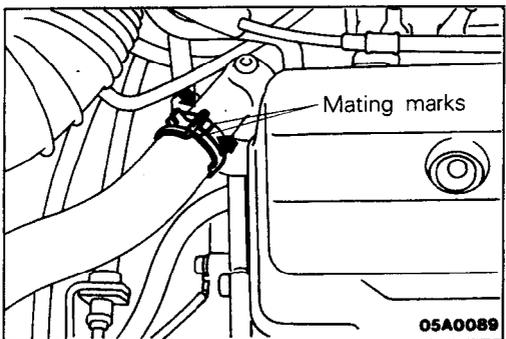
**SERVICE POINTS OF INSTALLATION**

M15MDAK

**15. INSTALLATION OF FUEL RAIL, FUEL INJECTOR AND PRESSURE REGULATOR**

**Caution**

**Be careful not to drop the injector when the fuel rail is installed.**



**3. CONNECTION OF RADIATOR UPPER HOSE**

Align the mating marks on the radiator hose and the hose clamp and install; then apply pressure where shown by the arrows in the illustration so that the clamp is correctly seated at the clamp's previous trace indentations.

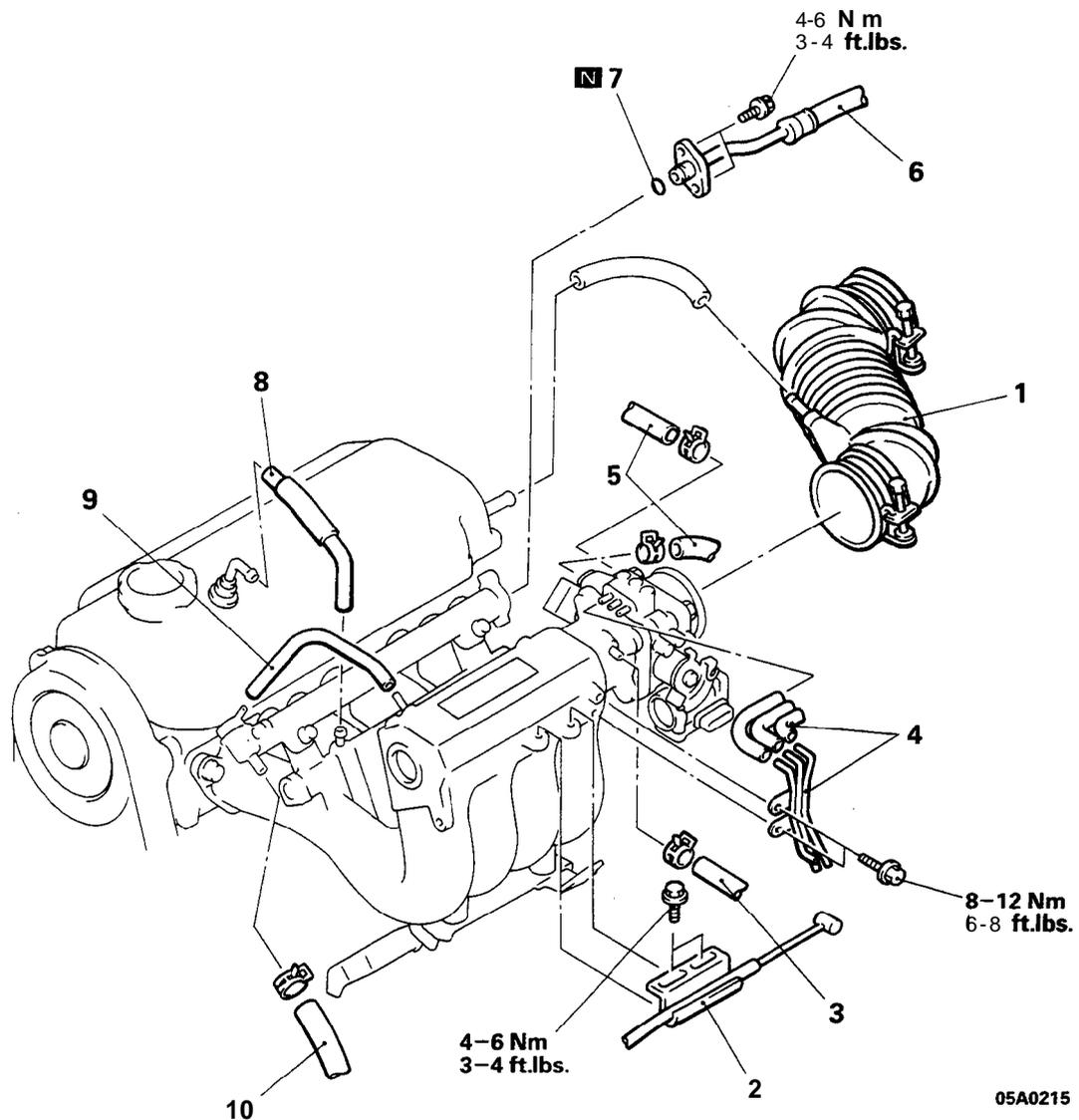
**Caution**

**Be absolutely sure that the hose clamp is correctly seated to its previous trace indentations.**

INTAKE MANIFOLD <SOHC-16 VALVE> < 1993 models>

REMOVAL AND INSTALLATION

M15MA-A



**Removal steps**

1. Air intake hose
2. Connection for accelerator cable
3. Connection for brake booster vacuum hose
4. Connection for vacuum pipe and hose assembly
5. Connection for water hose
6. Connection for fuel high pressure hose
7. O-ring
8. PCV hose
9. Connection for vacuum hose
10. Connection for fuel return hose

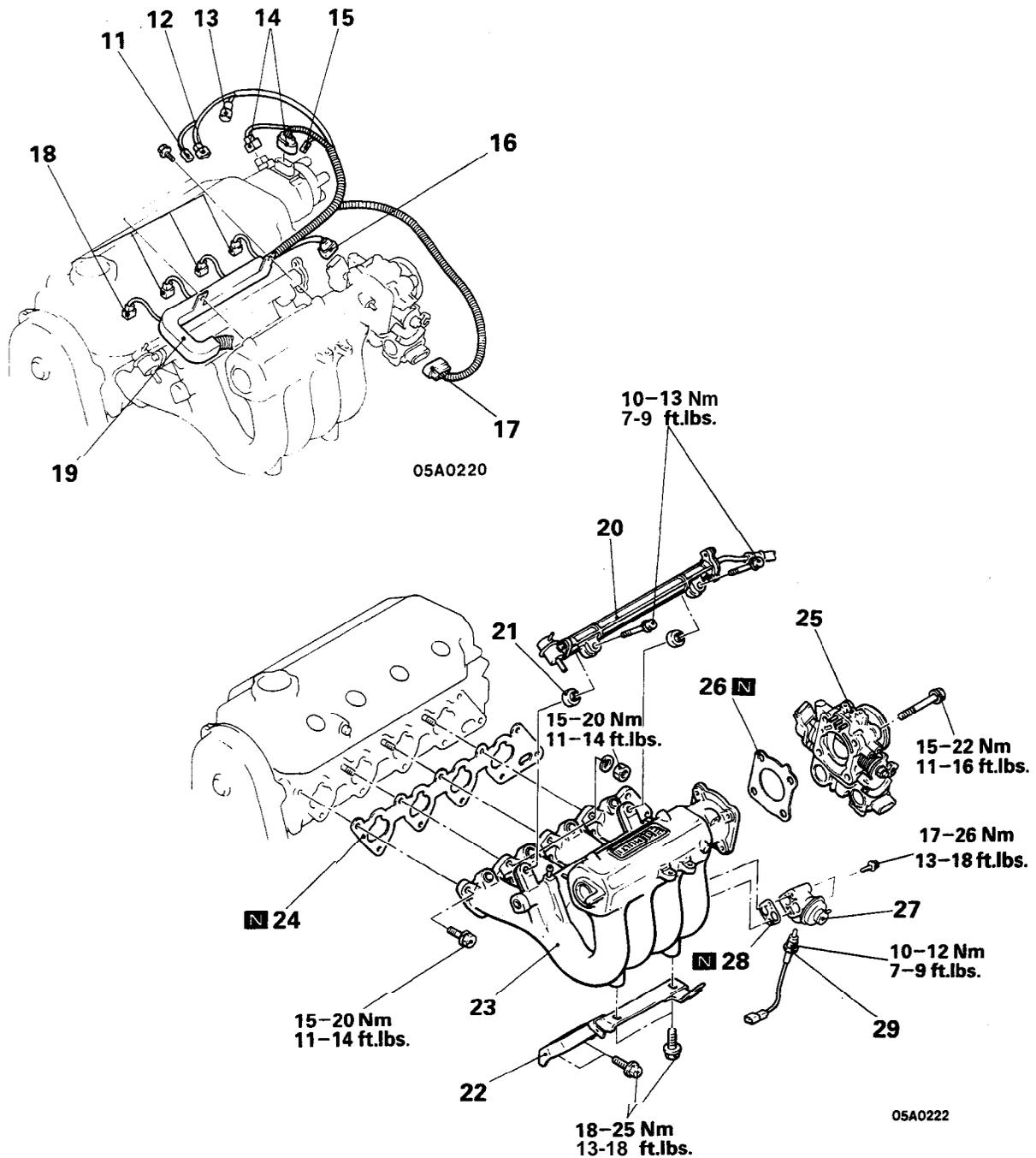


**Pre-removal Operation**

- Draining of Engine Coolant (Refer to GROUP 00-Maintenance Service.)

**Post-installation Operation**

- Filling of Engine Coolant (Refer to GROUP 00-Maintenance Service.)
- Adjustment of Accelerator Cable (Refer to GROUP 13-Engine Control.)
- Inspection of Fuel Pressure (Refer to GROUP 13-On-vehicle Inspection of MFI Components.)



- 11. Engine coolant temperature gauge unit connector
- 12. Engine coolant temperature sensor connector
- 13. Oxygen sensor connector
- 14. Distributor connector
- 15. Condenser connector
- 16. TPS connector
- 17. IAC connector
- 18. injector connector
- 19. Control harness

- ◆◆◆◆ 20. Fuel rail, injector and pressure regulator assembly
- 21. Insulator
- 22. Intake manifold stay
- 23. Intake manifold
- 24. Intake manifold gasket
- 25. Throttle body
- ◆◆ 26. Throttle body gasket
- 27. EGR valve
- 28. EGR gasket
- 29. EGR temperature sensor <Vehicles for California>

SERVICE POINTS OF REMOVAL

M15MBAJ

6. DISCONNECTION OF FUEL HIGH PRESSURE HOSE

Relieve pressure in the fuel pipe line to prevent fuel out-flow. (Refer to GROUP 13-Service Adjustment Procedures.)

Caution

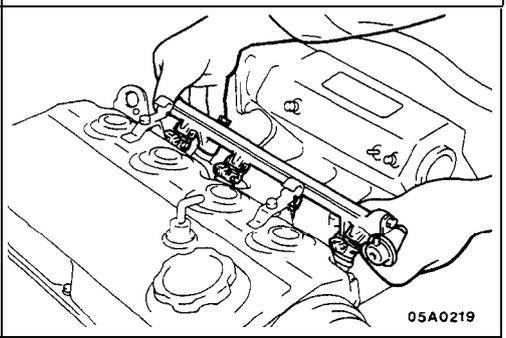
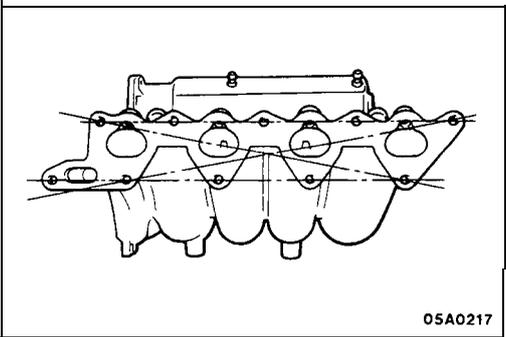
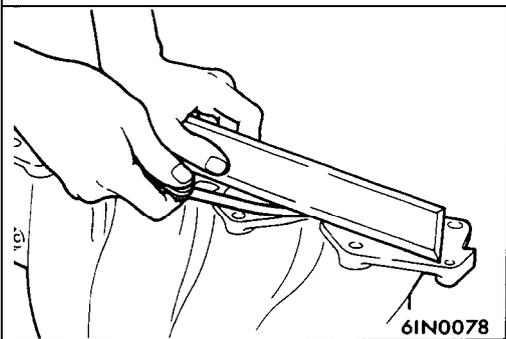
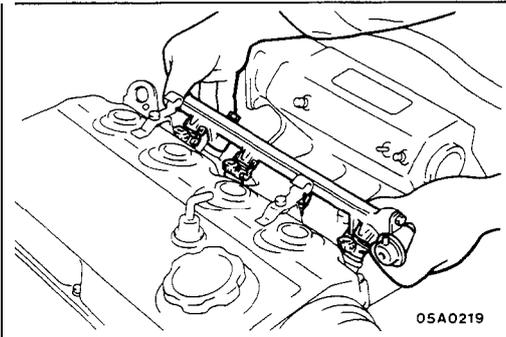
Cover fuel pipe line with rag after relieving pressure as certain pressure may still remain.

20. REMOVAL OF FUEL RAIL, FUEL INJECTOR AND PRESSURE REGULATOR

Remove fuel rail with fuel injector and pressure regulator on.

Caution

Do not drop injector when removing fuel rail.



INSPECTION

M15MCAJ

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

INTAKE MANIFOLD

1. Check for damage or cracking of any part.
2. Check for obstruction of the negative pressure (vacuum) outlet port, and for obstruction of the water passage or gas passage.
3. Using a straight edge and a thickness gage, check for distortion of the cylinder head installation surface.

Standard value: 0.15 mm (.006 in.) or less

Limit: 0.3 mm (.012 in.)

SERVICE POINTS OF INSTALLATION

M15MDAL

26. INSTALLATION OF GASKET

Refer to GROUP 13-Throttle Body.

20. INSTALLATION OF FUEL RAIL, FUEL INJECTOR AND PRESSURE REGULATOR

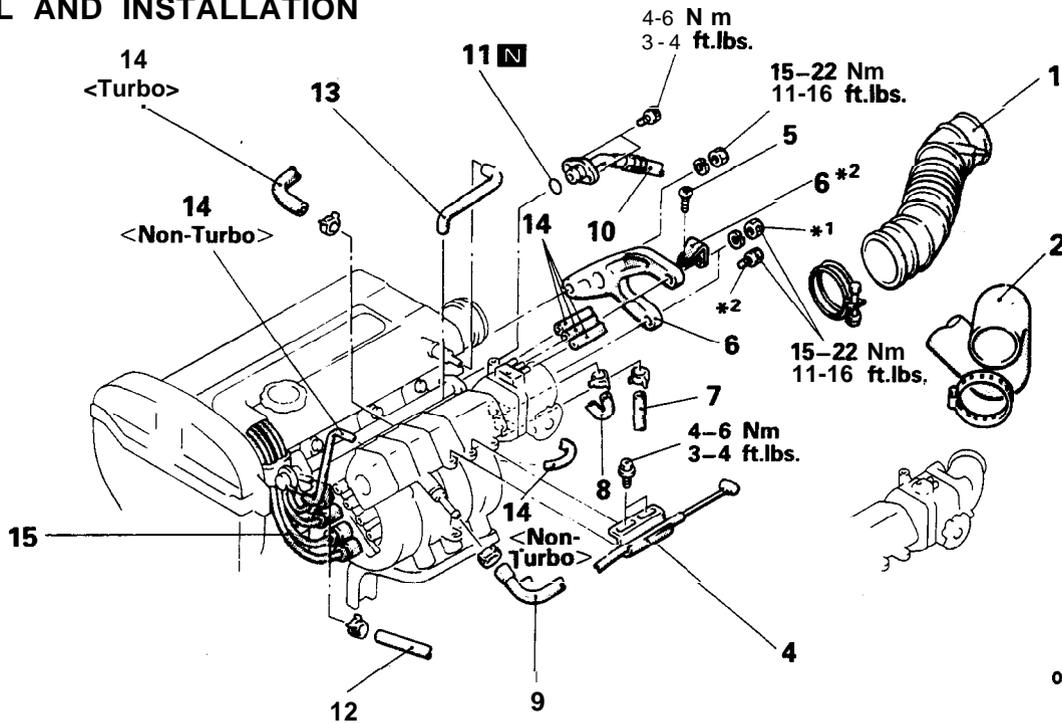
Caution

Be careful not to drop the injector when the fuel rail is installed.

**INTAKE MANIFOLD <DOHC>**

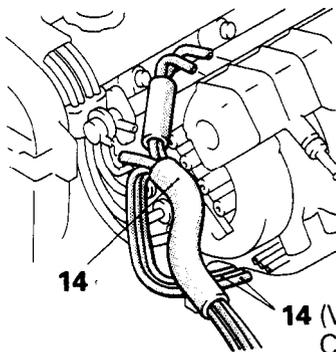
**REMOVAL AND INSTALLATION**

M15MA-B



05A0183

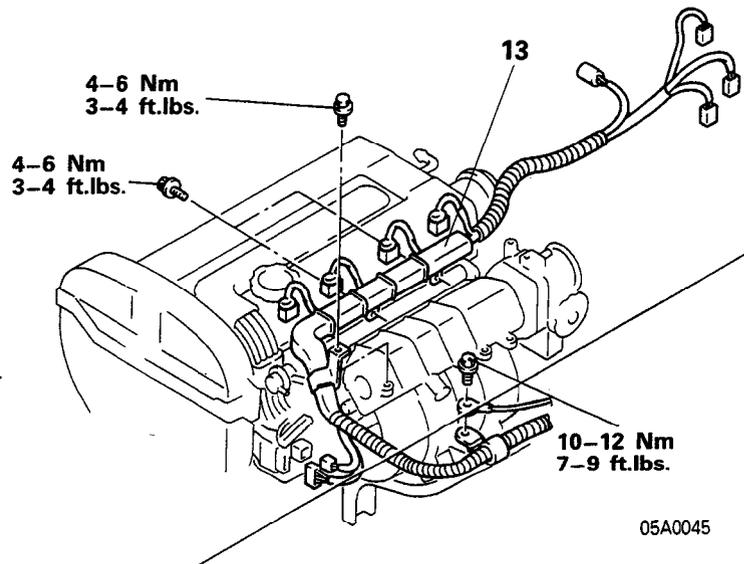
<Turbo>



14

14 (Vehicles for California)

05A0139



05A0045

**Removal steps**

1. Air intake hose <Non-Turbo>
2. Air hose D <Turbo>
3. Connection for control harness
4. Connection for accelerator cable
5. Ground plate installation screw
6. Throttle body stay and ground plate
7. Connection for water by-pass hose
8. Connection for water hose
9. Connection for brake booster vacuum hose
10. Connection for fuel high pressure hose
11. O-ring
12. Connection for fuel return hose
13. Connection for PCV hose
14. Connection for vacuum hoses
15. Connection for spark plug cable

**NOTE**

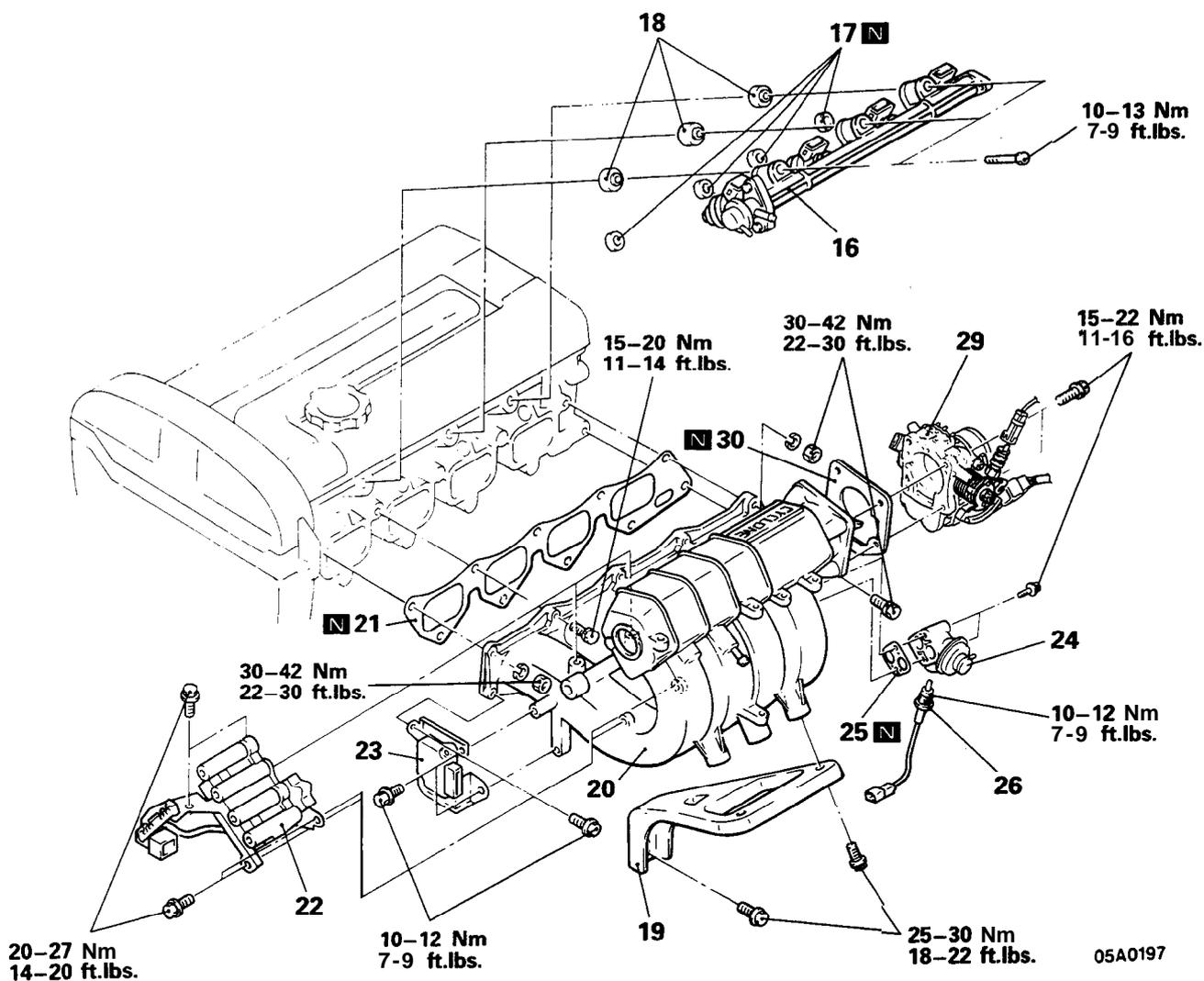
- I: <Non-Turbo>
- \*2: <Turbo>

**Pre-removal Operation**

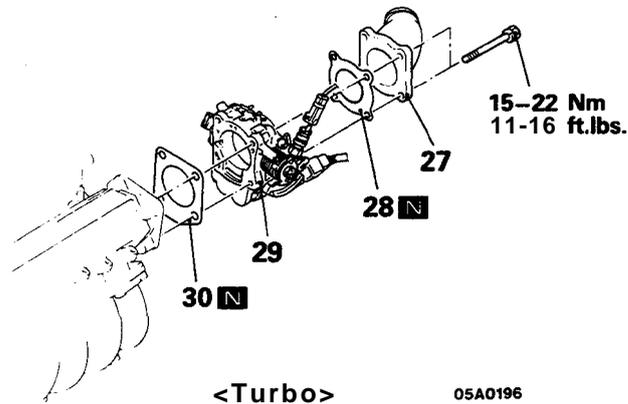
- Draining of Engine Coolant  
(Refer to GROUP 00–Maintenance Service.)

**Post-installation Operation**

- Filling of Engine Coolant  
(Refer to GROUP 00–Maintenance Service.)
- Adjustment of Accelerator Cable  
(Refer to GROUP 13–Engine Control.)
- Inspection of Fuel Pressure  
(Refer to GROUP 13–On-Vehicle Inspection of MFI Components.)



- ◆◆◆◆ 16. Fuel rail, fuel injector and pressure regulator
- 17. Insulator
- 18. Insulator
- 19. Intake manifold stay
- 20. Intake manifold
- 21. Intake manifold gasket
- 22. Ignition coil
- 23. Power transistor unit
- 24. EGR valve
- 25. Gasket
- 26. EGR temperature sensor <Vehicles for California>
- 27. Air fitting <Turbo>
- 28. Gasket <Turbo>
- 29. Throttle body
- 30. G a s k e t  
(Refer to GROUP 13–Throttle Body.)



**SERVICE POINTS OF REMOVAL**

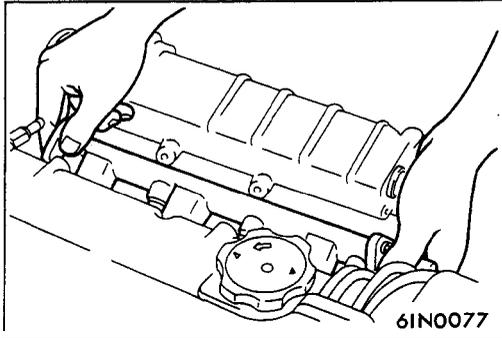
M15MBAJa

**10. DISCONNECTION OF FUEL HIGH PRESSURE HOSE**

Relieve pressure in the fuel pipe line to prevent fuel outflow. (Refer to GROUP 13–MFI Components on Vehicle Inspection.)

**Caution**

Cover fuel pipe line with rag after relieving pressure as certain pressure may still remain.

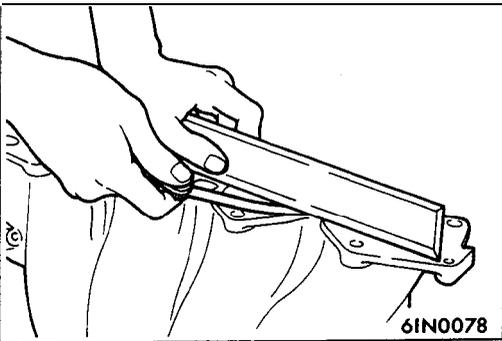


**16. REMOVAL OF FUEL RAIL, FUEL INJECTOR AND PRESSURE REGULATOR**

Remove fuel rail with fuel injector and pressure regulator on.

**Caution**

Do not drop injector when removing fuel rail.



**INSPECTION**

M15MCAJ

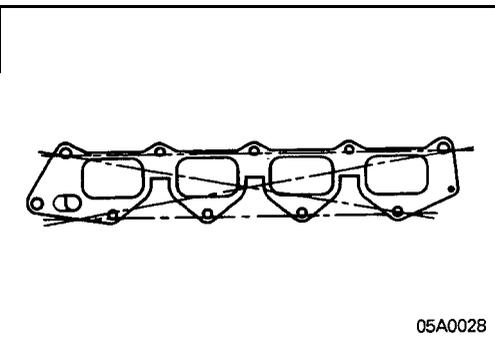
Check the following points; replace the part if a problem is found.

**INTAKE MANIFOLD**

1. Check for damage or cracking of any part.
2. Check for obstruction of the negative pressure (vacuum) outlet port, and for obstruction of the water passage or gas passage.
3. Using a straight edge and a thickness gage, check for distortion of the cylinder head installation surface.

**Standard value: 0.15 mm (.006 in.) or less**

**Limit: 0.3 mm (.012 in.)**



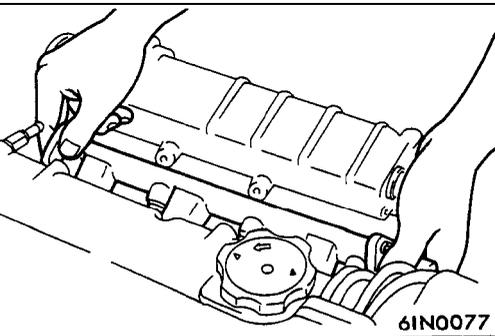
**SERVICE POINTS OF INSTALLATION**

M15MDAL

**16. INSTALLATION OF FUEL RAIL, FUEL INJECTOR AND PRESSURE REGULATOR**

**Caution**

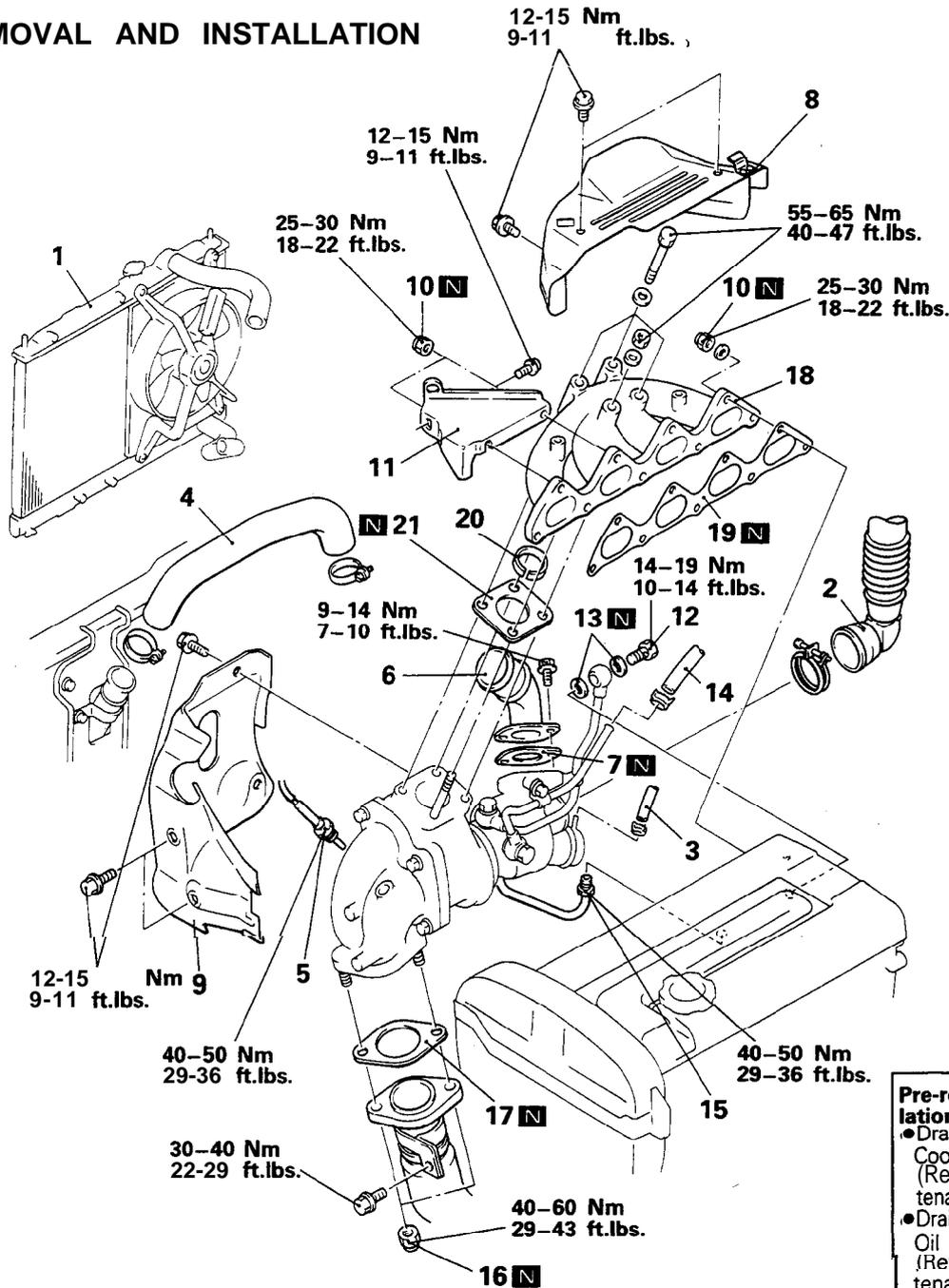
Be careful not to drop the injector when the fuel rail is installed.



**TURBOCHARGER**

**REMOVAL AND INSTALLATION**

M15LA--



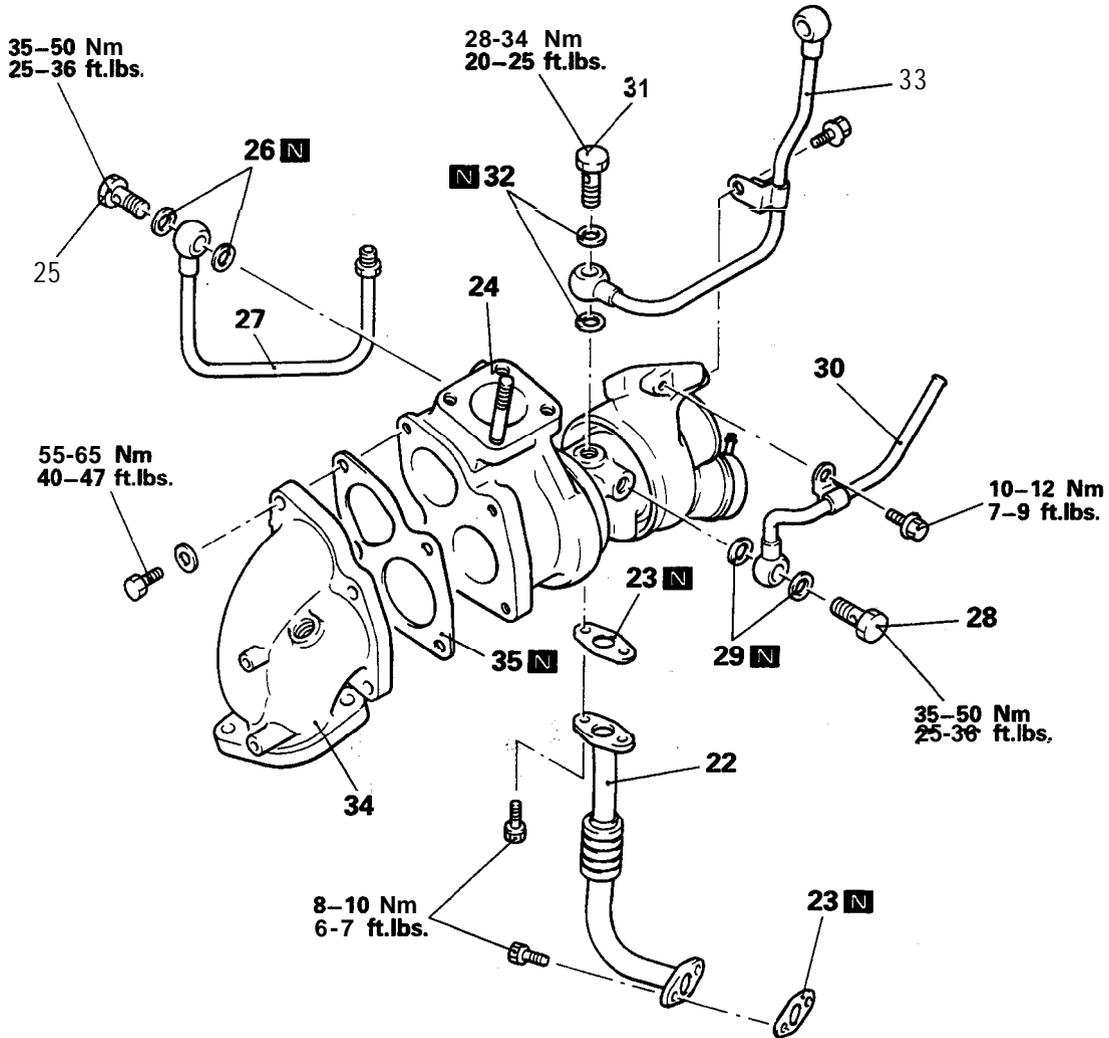
05A0193

**Pre-removal and Post-installation Operation**

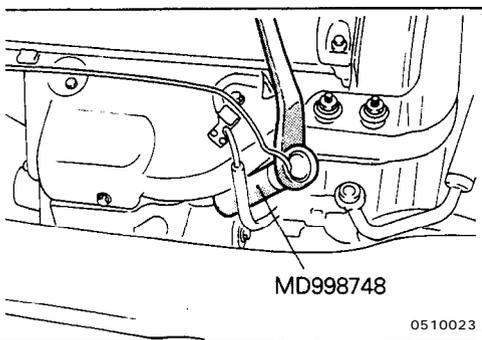
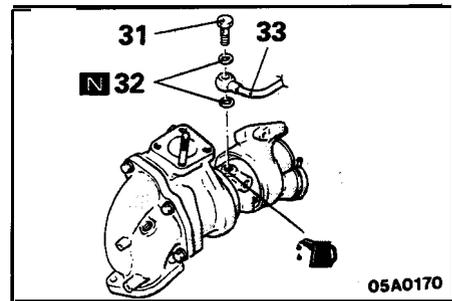
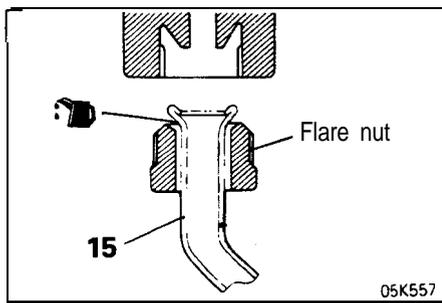
- Draining and Refilling Engine Coolant (Refer to GROUP 00—Maintenance Service.)
- Draining and Refilling Engine Oil (Refer to GROUP 00—Maintenance Service.)

**Removal steps**

- |   |  |
|---|--|
| <p>1. Radiator (Refer to GROUP 14—Radiator.)</p> <p>2. Connection for air intake hose</p> <p>3. Connection for vacuum hose</p> <p>4. Connection for air hose A</p> <p>5. Oxygen sensor</p> <p>6. Air outlet fitting</p> <p>7. Gasket</p> <p>8. Heat protector A</p> <p>9. Heat protector B</p> <p>10. Self-locking nut</p> <p>11. Engine hanger</p> <p>12. Eye bolt</p> | <p>13. Gasket</p> <p>14. Connection for water hose</p> <p>15. Connection for water pipe B</p> <p>16. Self-locking nut</p> <p>17. Gasket</p> <p>18. Exhaust manifold</p> <p>19. Exhaust manifold gasket</p> <p>20. Ring</p> <p>21. Gasket</p> |
|---|--|



- 22. Oil return pipe
- 23. Gasket
- |) • + 24. Turbocharger
- 25. Eye bolt
- 26. Gasket
- 27. Water pipe B
- 28. Eye bolt
- 29. Gasket
- 30. Water pipe A
- 31. Eye bolt
- 32. Gasket
- |) 33. Oil pipe
- 34. Exhaust fitting
- 35. Gasket



**SERVICE POINTS OF REMOVAL**

M15LEADa

**5. REMOVAL OF OXYGEN SENSOR**

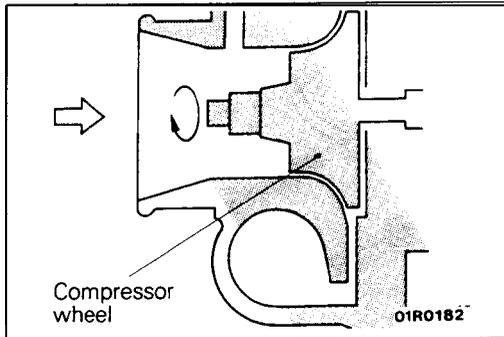
Disconnect the connector of the oxygen sensor, and install the special tool to the oxygen sensor. Then, using an offset (box-end) wrench, remove the oxygen sensor.

**24. REMOVAL OF TURBOCHARGER ASSEMBLY**

Remove the turbocharger assembly with the exhaust fitting, water pipe A, water pipe B and the oil pipe attached to it.

**33. REMOVAL OF OIL PIPE****Caution**

After disconnecting the oil pipe, take care that foreign material does not enter the oil passage hole of the turbocharger assembly.

**INSPECTION**

M15LCAC

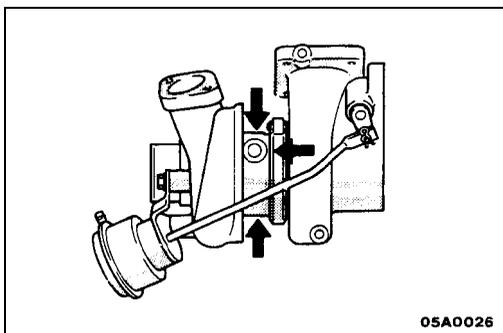
**TURBOCHARGER ASSEMBLY CHECK**

- Visually check the turbine wheel and the compressor wheel for cracking or other damage.
- Check whether the turbine wheel and the compressor wheel can be easily turned by hand.
- Check for oil leakage from the turbocharger assembly.
- Check whether or not the turbocharger waste gate valve remains open. If any problem is found, replace the part after disassembly.

**OIL PIPE AND OIL-RETURN PIPE CHECK**

Check the oil pipe and oil-return pipe for clogging, bending, or other damage.

If there is clogging, clean it.

**SERVICE POINTS OF INSTALLATION**

M15LDADa

**24. INSTALLATION OF TURBOCHARGER ASSEMBLY**

Clean the alignment surfaces shown in the illustration.

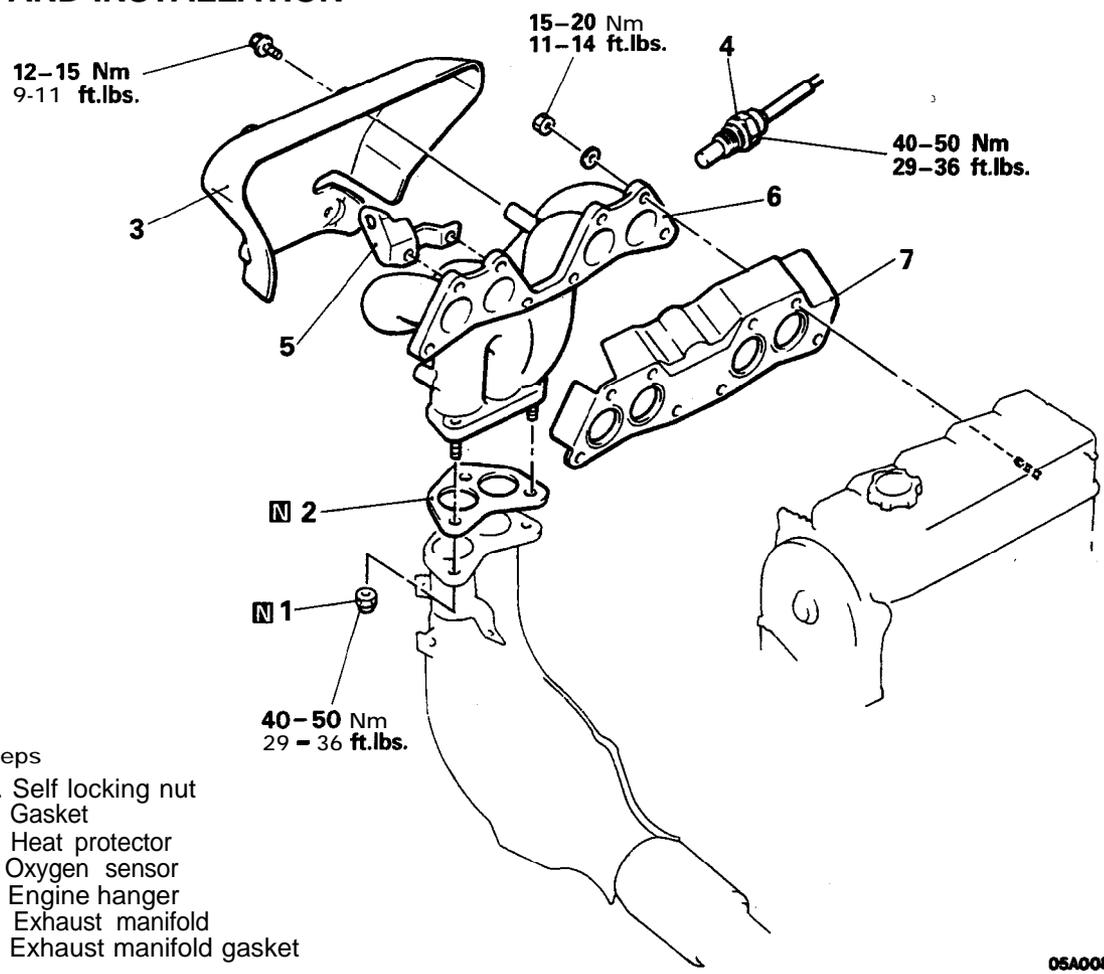
**Caution**

When cleaning, care must be taken so that a piece of the gasket does not enter the oil passage hole.

**EXHAUST MANIFOLD <SOHC-8 VALVE> <Up to 1992 models>**

**REMOVAL AND INSTALLATION**

M15NA-A

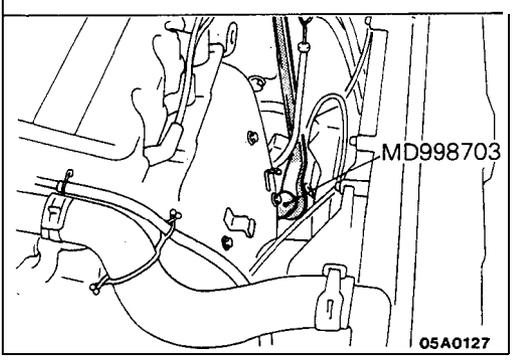


Removal steps

1. Self locking nut
2. Gasket
3. Heat protector
4. Oxygen sensor
5. Engine hanger
6. Exhaust manifold
7. Exhaust manifold gasket



05A0084



**SERVICE POINTS OF REMOVAL**

M15NBAG

**4. REMOVAL OF OXYGEN SENSOR**

Disconnect the connector of the oxygen sensor, and install the special tool to the oxygen sensor. Then, using an offset (box-end) wrench, remove the oxygen sensor.

**INSPECTION**

M15NCAL

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

**EXHAUST MANIFOLD**

Check for damage or cracking of any part.

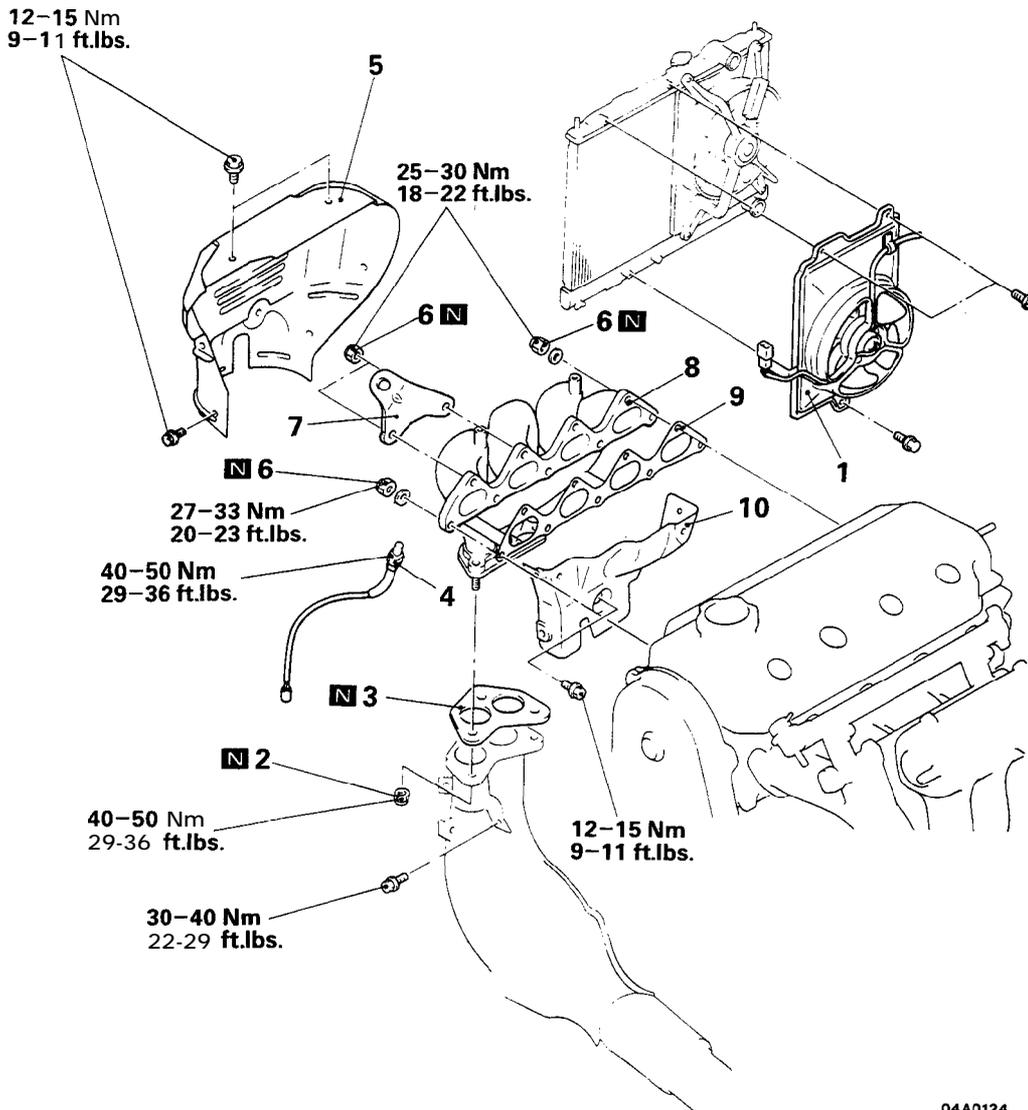
**EXHAUST MANIFOLD GASKET**

Check for flaking or damage of the gasket.

EXHAUST MANIFOLD <SOHC-16 VALVE> <1993 models>

REMOVAL AND INSTALLATION

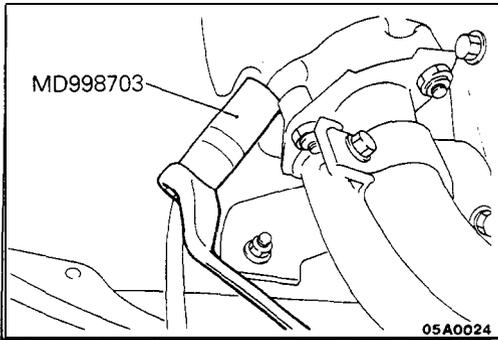
M15NA-B



04A0124

Removal steps

1. Condenser fan motor (Vehicles with air conditioning)
2. Self locking nut
3. Gasket
4. Oxygen sensor
5. Exhaust manifold cover (A)
6. Self locking nut
7. Engine hanger
8. Exhaust manifold
9. Exhaust manifold gasket
10. Exhaust manifold cover(B)



**SERVICE POINTS OF REMOVAL**

M15NBAF1

4. REMOVAL OF OXYGEN SENSOR

Disconnect the connector of the oxygen sensor, and install the special tool to the oxygen sensor. Then, using an offset (box-end) wrench, remove the oxygen sensor.

**INSPECTION**

M15NCAL1

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

EXHAUST MANIFOLD

Check for damage or cracking of any part.

EXHAUST MANIFOLD GASKET

Check for flaking or damage of the gasket.

# 15-30 INTAKE AND EXHAUST – Exhaust Manifold <DOHC-Non-Turbo>

## EXHAUST MANIFOLD <DOHC-Non-Turbo>

### REMOVAL AND INSTALLATION

M15NA-B

12-15 Nm  
9-11 ft.lbs.

25-30 Nm  
18-22 ft.lbs.

27-33 Nm  
20-23 ft.lbs.

40-50 Nm  
29-36 ft.lbs.

<FWD>  
40-50 Nm  
29-36 ft.lbs.  
<AWD>  
22-49 ft.lbs.

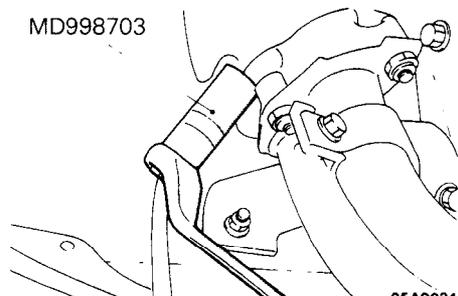
30-40 Nm  
22-29 ft.lbs.

12-15 Nm  
9-11 ft.lbs.

#### Removal steps

1. Condenser fan motor (Vehicles with air conditioning except AWD A/T)
2. Self locking nut
3. Gasket
4. Exhaust manifold cover (A)
5. Oxygen sensor
6. Self locking nut
7. Engine hanger
8. Exhaust manifold
9. Exhaust manifold gasket
10. Exhaust manifold cover (B)

MD998703



05A0024

### SERVICE POINTS OF REMOVAL

M15NBAH

#### 5. REMOVAL OF OXYGEN SENSOR

Disconnect the connector of the oxygen sensor, and install the special tool to the oxygen sensor. Then, using an offset (box-end) wrench, remove the oxygen sensor.

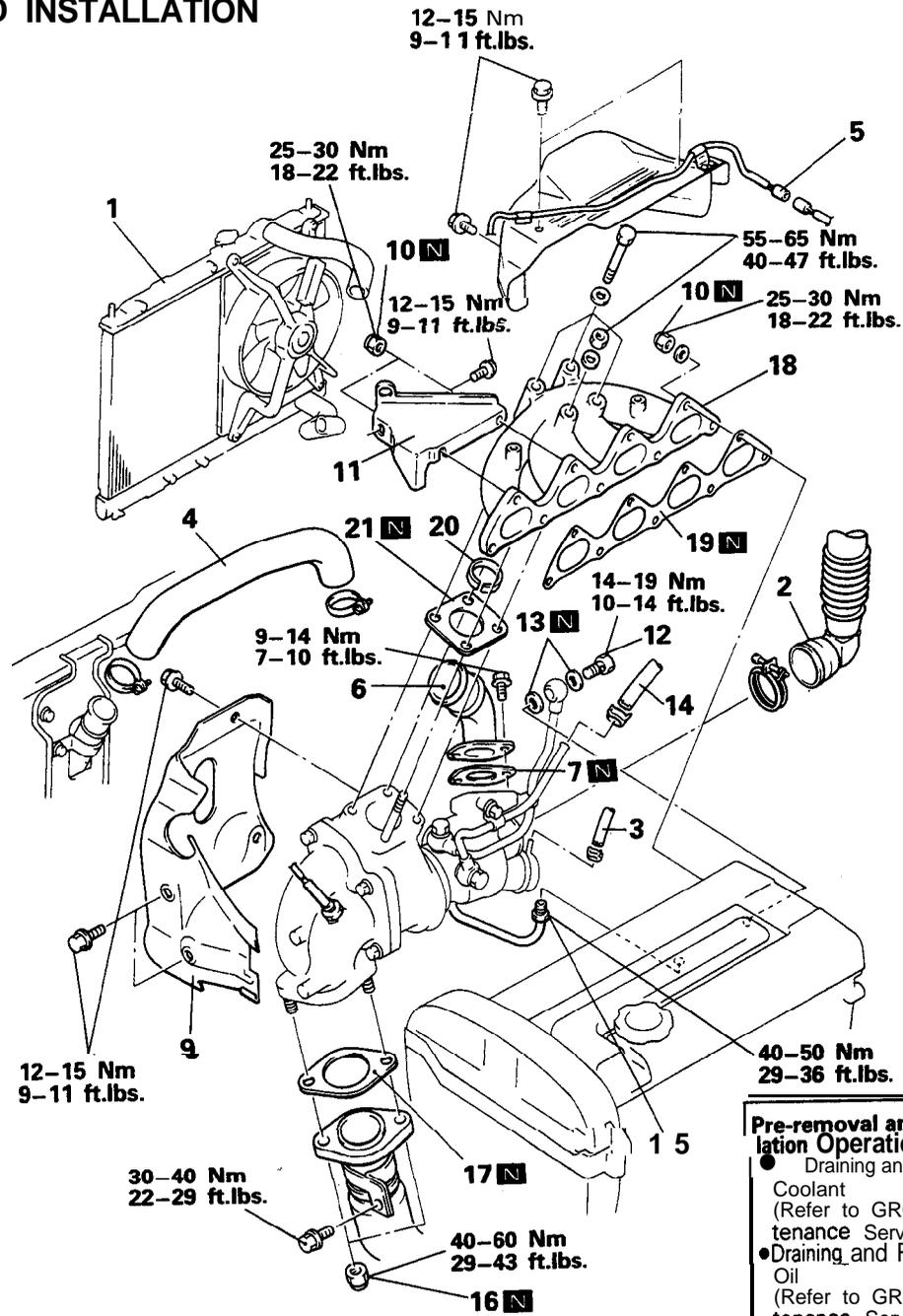
### INSPECTION

Refer to P.15-29

M15NCAT

**EXHAUST MANIFOLD <DOHC-TURBO>**

**REMOVAL AND INSTALLATION**



05A0192

**Pre-removal and Post-installation Operation**

- Draining and Refilling Engine Coolant (Refer to GROUP 00-Maintenance Service.)
- Draining and Refilling Engine Oil (Refer to GROUP 00-Maintenance Service.)

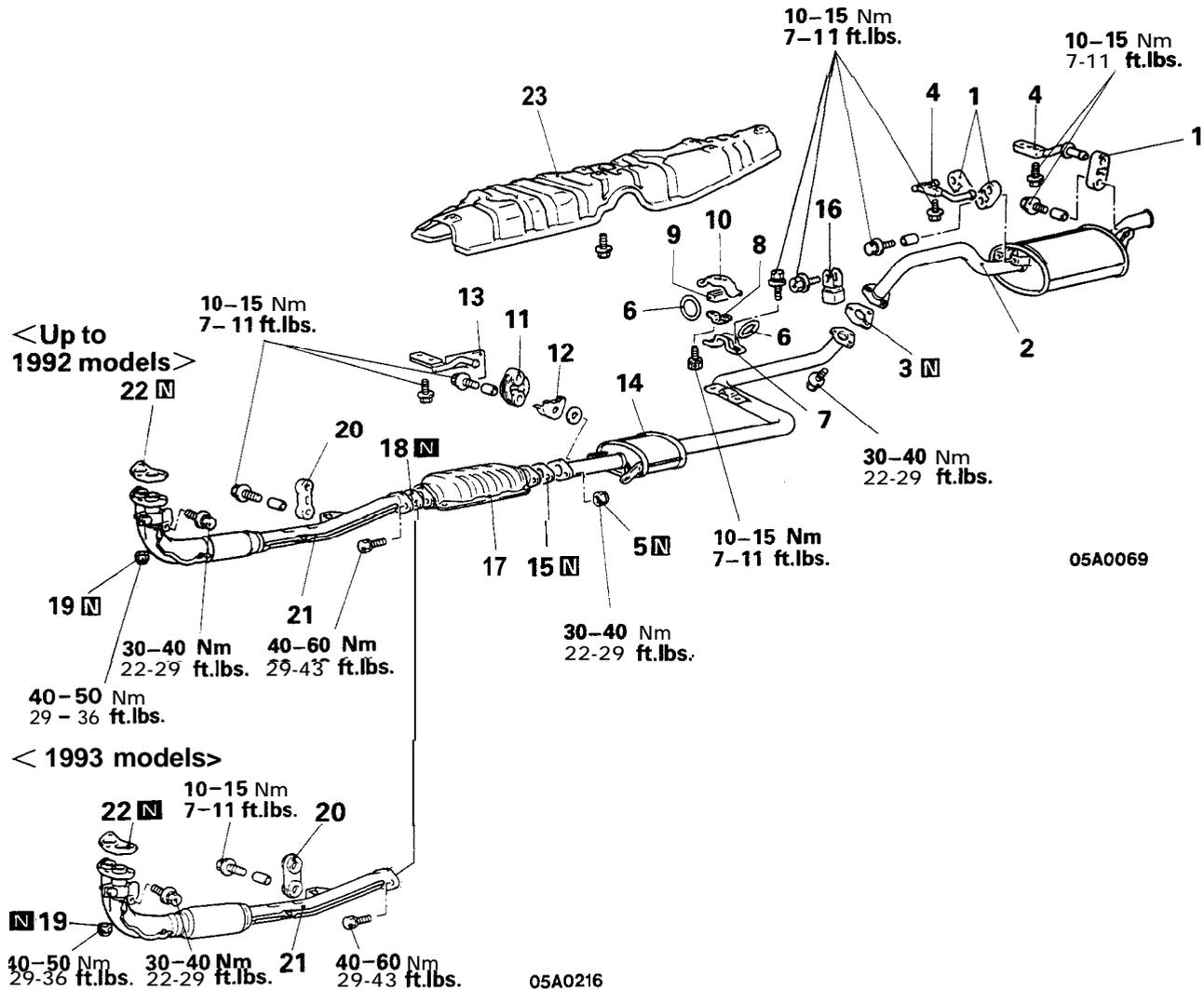
**Removal steps**



- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1. Radiator (Refer to GROUP 14-Radiator.)</li> <li>2. Connection for air intake hose</li> <li>3. Connection for vacuum hose</li> <li>4. Connection for air hose A</li> <li>5. Oxygen sensor connector</li> <li>6. Air outlet fitting</li> <li>7. Gasket</li> <li>8. Heat protector A</li> <li>9. Heat protector B</li> <li>10. Self-locking nut</li> <li>11. Engine hanger</li> <li>12. Eye bolt</li> </ol> | <ol style="list-style-type: none"> <li>13. Gasket</li> <li>14. Connection for water hose</li> <li>15. Connection for water pipe B</li> <li>16. Self-locking nut</li> <li>17. Gasket</li> <li>18. Exhaust manifold</li> <li>19. Exhaust manifold gasket</li> <li>20. Ring</li> <li>21. Gasket</li> </ol> |
|--|---|

**EXHAUST PIPE AND MAIN MUFFLER <SOHC>**

**REMOVAL AND INSTALLATION**



Removal steps

- |                     |                         |                                      |
|---------------------|-------------------------|--------------------------------------|
| 1. Hanger           | 9. Stopper              | 17. Catalytic converter              |
| 2. Main muffler     | 10. Hanger bracket      | 18. Gasket                           |
| 3. Gasket           | 11. Hanger              | 19. Self locking nut                 |
| 4. Hanger bracket   | 12. Protector           | 20. Hanger                           |
| 5. Self locking nut | 13. Hanger bracket      | 21. Front exhaust pipe               |
| 6. O-ring           | 14. Center exhaust pipe | 22. Gasket                           |
| 7. Hook             | 15. Gasket              | 23. Front floor heat protector panel |
| 8. Bracket          | 16. Dynamic damper      |                                      |

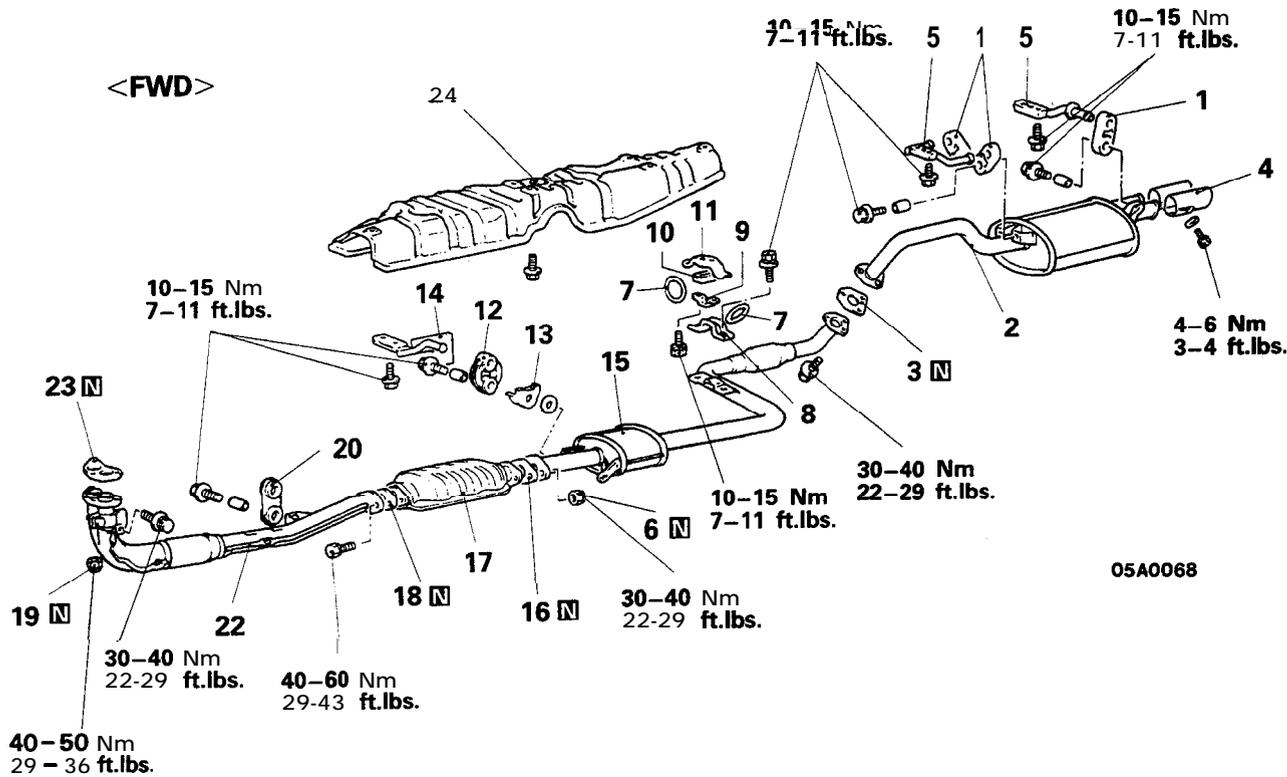
**INSPECTION**

- Check the mufflers and pipes for corrosion or damage.
- Check the rubber hangers and rubber O-rings for deterioration or damage.
- Check for gas leakage from mufflers and pipes.

M15RA-B

**EXHAUST PIPE AND MAIN MUFFLER <DOHC>**

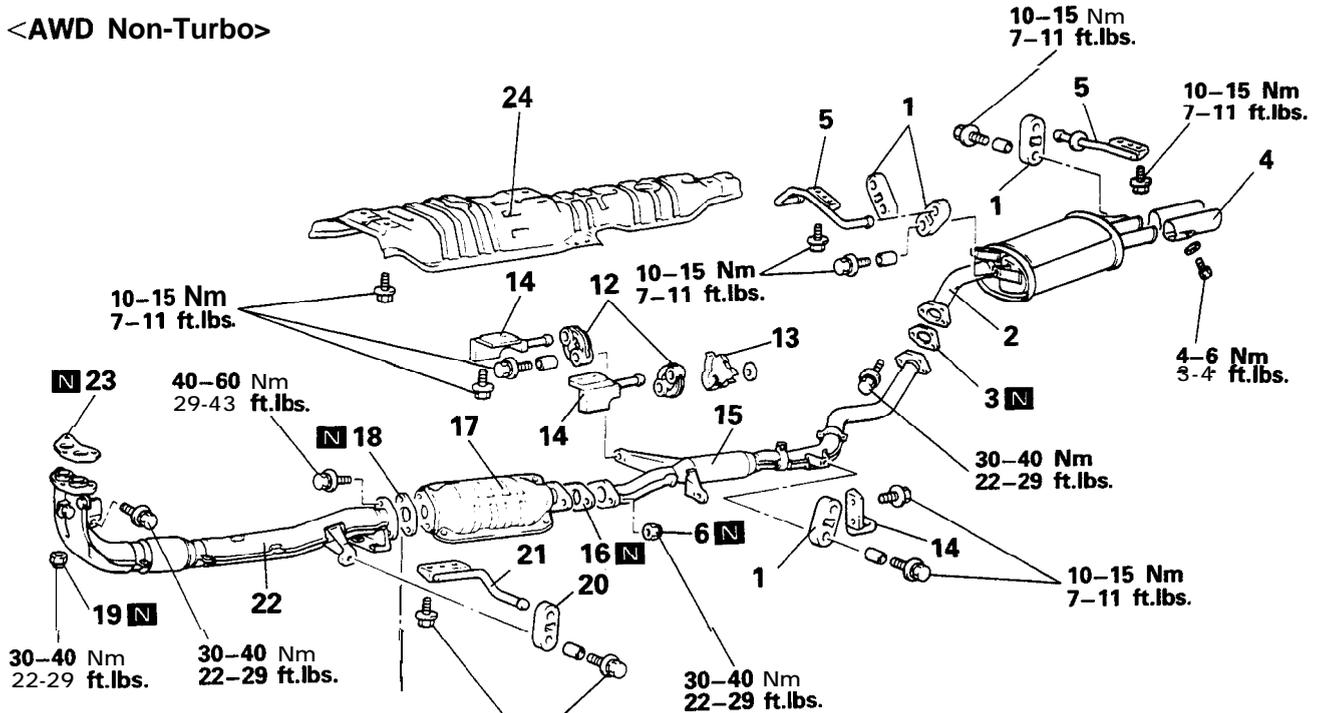
**REMOVAL AND INSTALLATION**



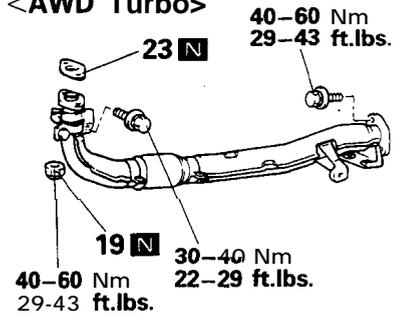
Removal steps

- |                     |                                      |
|---------------------|--------------------------------------|
| 1. Hanger           | 13. Protector                        |
| 2. Main muffler     | 14. Hanger bracket                   |
| 3. Gasket           | 15. Center exhaust pipe              |
| 4. Moulding         | 16. Gasket                           |
| 5. Hanger bracket   | 17. Catalytic converter              |
| 6. Self locking nut | 18. Gasket                           |
| 7. O-ring           | 19. Self locking nut                 |
| 8. Hook             | 20. Hanger                           |
| 9. Bracket          | 22. Front exhaust pipe               |
| 10. Stopper         | 23. Gasket                           |
| 11. Hanger bracket  | 24. Front floor heat protector panel |
| 12. Hanger          |                                      |

<AWD Non-Turbo>



<AWD Turbo>



05A0195

Removal steps

- |                         |                                      |
|-------------------------|--------------------------------------|
| 1. Hangers              | 17. Catalytic converter              |
| 2. Main muffler         | 18. Gasket                           |
| 3. Gasket               | 19. Self locking nut                 |
| 4. Moulding             | 20. Hanger                           |
| 5. Hanger bracket       | 21. Hanger bracket                   |
| 6. Self locking nut     | 22. Front exhaust pipe               |
| 12. Hanger              | 23. Gasket                           |
| 13. Protector           | 24. Front floor heat protector panel |
| 14. Hanger bracket      |                                      |
| 15. Center exhaust pipe |                                      |
| 16. Gasket              |                                      |

INSPECTION

Refer to P.15-32

M15RCAL