
INTAKE AND EXHAUST

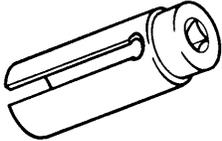
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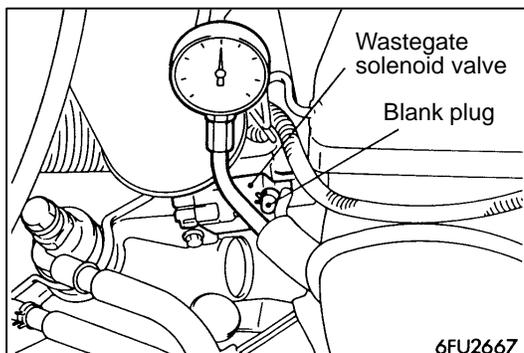
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SERVICE SPECIFICATIONS

Items	Standard value	Limit
Turbocharger boost pressure kPa {kg/cm ² }	53 – 87 {0.54 – 0.89}	–
Wastegate actuator activation pressure kPa {kg/cm ² }	Approx. 100 {1.02}	–
Wastegate solenoid valve coil resistance (at 20°C) Ω	62 – 74	–
Air bypass valve activation pressure kPa {mmHg}	Approx. 53 {400}	–
Secondary air control solenoid valve coil resistance (at 20°C) Ω	28 – 36	–
Intake manifold and exhaust manifold mounting surface distortion mm	Within 0.15	0.20

SPECIAL TOOL

Tool	Number	Name	Application
	MB998770	Oxygen sensor wrench	Removal and installation of oxygen sensor



ON-VEHICLE SERVICE

1. TURBOCHARGER BOOST PRESSURE CHECK

Caution

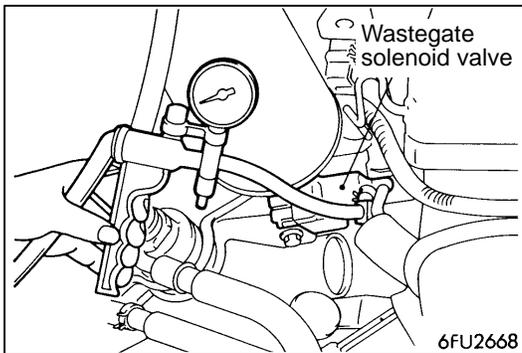
Carry out driving tests in a location where full-throttle acceleration is possible with utmost safety. Two persons should be in the vehicle during the test, the assistant in the front passenger seat reading the pressure gauge.

- (1) Disconnect the hose (black) from the boost pressure control solenoid valve and fit the pressure gauge to this hose.
After the hose (black) has been disconnected, fit a blank plug to the solenoid valve nipple.
- (2) Drive at full-throttle acceleration in second gear and measure the boost pressure when the engine speed exceeds about 3,000 r/min.

Standard value:

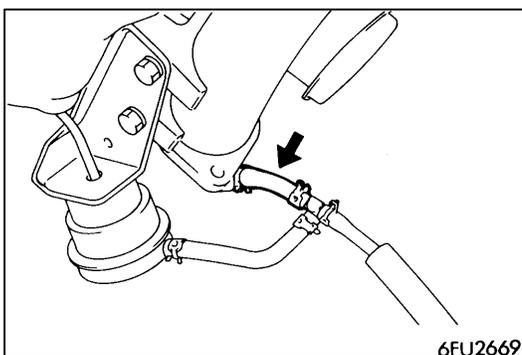
53 – 87 kPa {0.54 – 0.89 kg/cm²} <EVOLUTION-IV>
59 – 84 kPa {0.61 – 0.86 kg/cm²} <EVOLUTION-V>

- (3) If the boost pressure is lower than the standard value, check for following which are probably the cause:
 - Wastegate actuator inoperative
 - Boost pressure leak
 - Turbocharger defective
- (4) If the boost pressure is higher than the standard value, boost pressure control is probably faulty. Make the following checks:
 - Wastegate actuator inoperative
 - Wastegate valve inoperative
 - Wastegate actuator rubber hose disconnected or cracked



2. BOOST PRESSURE CONTROL SYSTEM CHECK

- (1) Disconnect the hose (black) from the wastegate solenoid valve and connect a three-way joint between the hose and solenoid valve.
- (2) Connect a hand vacuum pump to the three-way joint.

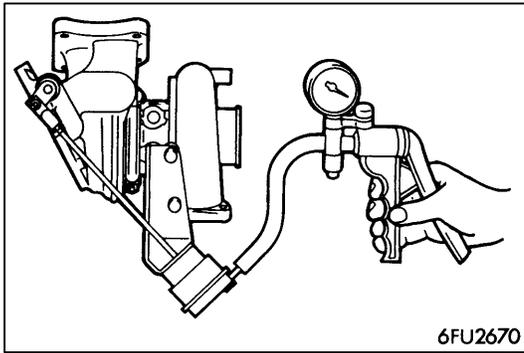


- (3) Disconnect the hose (black) from the intake pipe nipple connected to the turbocharger compressor housing and fit a blank plug to this nipple.
- (4) Disconnect the negative cable from the battery, keep it disconnected for 10 sec. or more, and then reconnect it back again.
- (5) Block and unblock the end of the vacuum hose (black) with a finger to apply vacuum and check for the vacuum condition.

Engine condition	Hose (black) end	Normally
Stationary (ignition switch: ON)	Unblocked	Vacuum leaks.
	Blocked	Vacuum retained.
Idling after warmup		Vacuum leaks.

NOTE

If the vacuum condition is faulty, the wastegate actuator, wastegate solenoid valve, or hose is probably defective.



3. WASTEGATE ACTUATOR CHECK

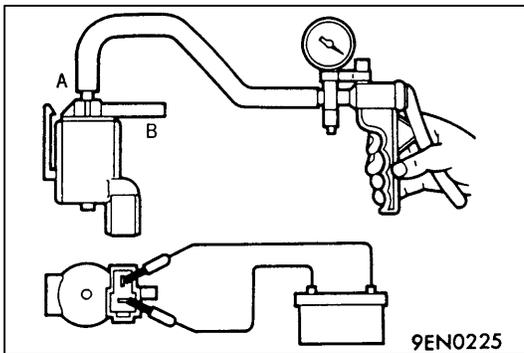
- (1) Connect a hand pump (pressure type) to the nipple.
- (2) Gradually increase the pressure being applied to check for the pressure at which the wastegate actuator rod starts moving (approx. 1 mm stroke).

Standard value: Approx. 100 kPa {1.02 kg/cm²}

Caution

Do not apply a pressure more than 120 kPa {1.23 kg/cm²} to prevent the diaphragm from being damaged.

- (3) If the pressure drastically deviates from the standard value, check the actuator or wastegate valve and, if necessary, replace the actuator or turbocharger assembly.

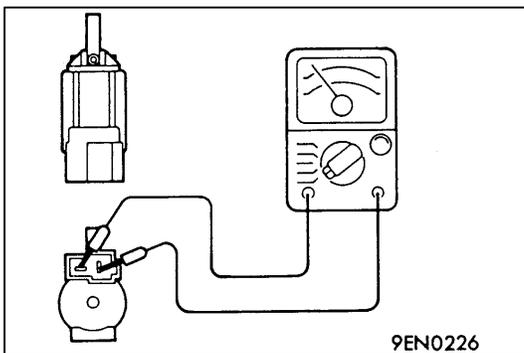


4. WASTEGATE SOLENOID VALVE CHECK

4-1 OPERATION CHECK

- (1) Connect a hand vacuum pump to nipple A of the solenoid valve.
- (2) Using jumper wires, connect the solenoid valve terminal to battery terminals.
- (3) Disconnecting and reconnecting the jumper wire on the (-) terminal side, apply vacuum to check for airtightness.

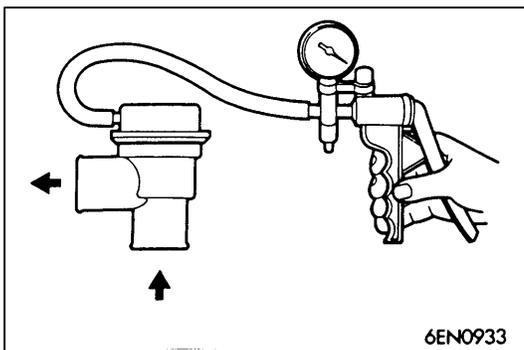
Jumper wire	Nipple B condition	Normally
Connected	Open	Vacuum leaks.
	Plugged	Vacuum retained.
Disconnected	Open	Vacuum retained.



4-2 COIL RESISTANCE CHECK

Measure the resistance across solenoid valve terminals.

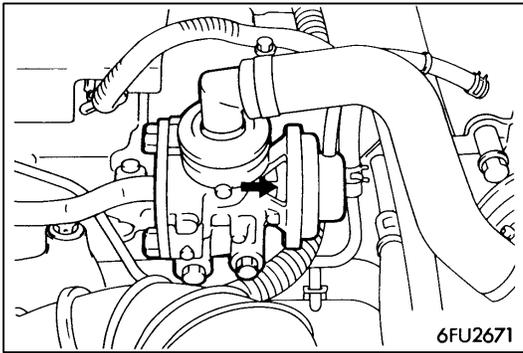
Standard value: 62 – 74 Ω (at 20°C)



5. AIR BYPASS VALVE CHECK

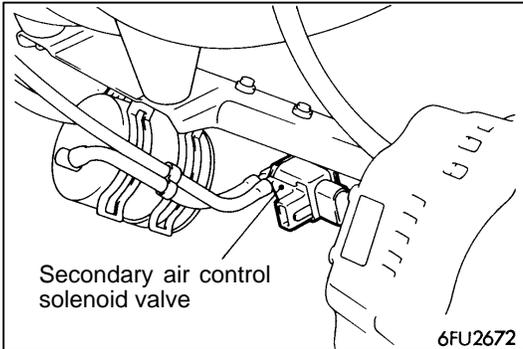
- (1) Remove the air bypass valve.
- (2) Connect a hand vacuum pump to the air bypass valve nipple.
- (3) Apply a vacuum of approx. 45 kPa {340 mmHg} and check that the valve is airtight.
- (4) Increase the vacuum and check for valve operation.

Vacuum	Valve operation
Approx. 53 kPa {400 mmHg}	Starts moving



6. SECONDARY AIR CONTROL SYSTEM CHECK

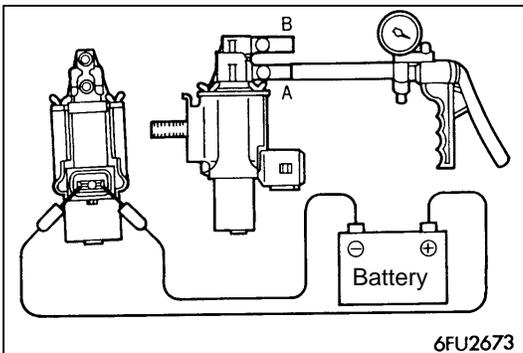
- (1) Start the engine and let it run at idle speed.
- (2) Short-circuit the no. 6 terminal of the engine ECU connector using a jumper wire and check at this time that the secondary air valve lifts.
At this time, the engine ECU connector should be connected.



7. SECONDARY AIR CONTROL SOLENOID VALVE CHECK

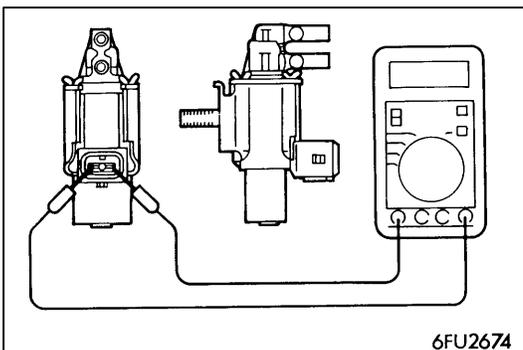
7-1 OPERATION CHECK

- (1) Disconnect the vacuum hose (white stripe, yellow stripe) from the solenoid valve.
- (2) Disconnect the harness connector.



- (3) Connect a hand vacuum pump to nipple A of the solenoid valve.
- (4) Using jumper wires, connect the solenoid valve terminal to battery terminals.
- (5) Disconnecting and reconnecting the jumper wire on the (-) terminal side, apply vacuum to check for airtightness.

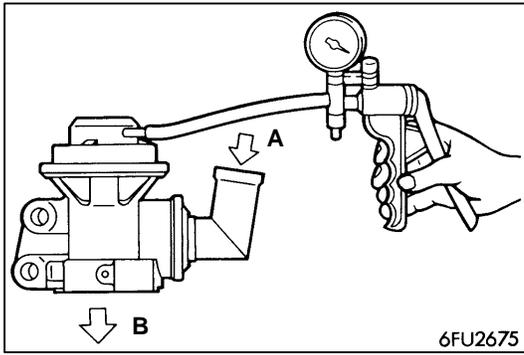
Jumper wire	Nipple B condition	Normally
Connected	Open	Vacuum leaks.
	Plugged	Vacuum retained.
Disconnected	Open	Vacuum leaks.



7-2 COIL RESISTANCE CHECK

Measure the resistance across solenoid valve terminals.

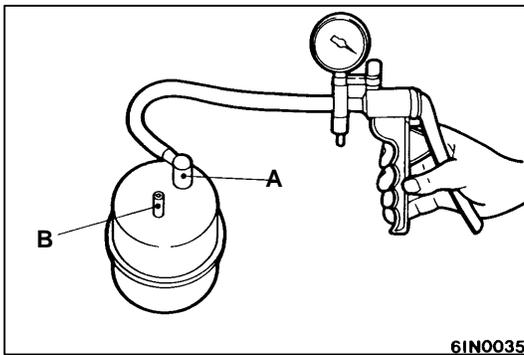
Standard value: 28 – 36 Ω (at 20°C)



8. SECONDARY AIR VALVE CHECK

- (1) Remove the secondary air valve.
- (2) Connect a hand vacuum pump to the secondary air valve nipple.
- (3) Apply a vacuum of 67 kPa {500 mmHg} and check that the vacuum is retained.
- (4) Blow air from side (A) and side (B) of the secondary air valve to check for air passage.

Vacuum	Air blowing direction	Air passage
0 kPa (vacuum not applied)	(A) → (B)	No
40 kPa {300 mmHg} or more	(A) → (B)	Yes
	(B) → (A)	No



9. VACUUM TANK CHECK

- (1) Connect a hand vacuum pump to nipple A of the vacuum tank. Applying a vacuum of 67 kPa {500 mmHg}, check that the vacuum is retained.
- (2) Connect a hand vacuum pump to nipple B of the vacuum tank.
- (3) Apply a vacuum of 67 kPa {500 mmHg] with nipple A plugged with a finger. Check that the vacuum leaks when the finger is then released.

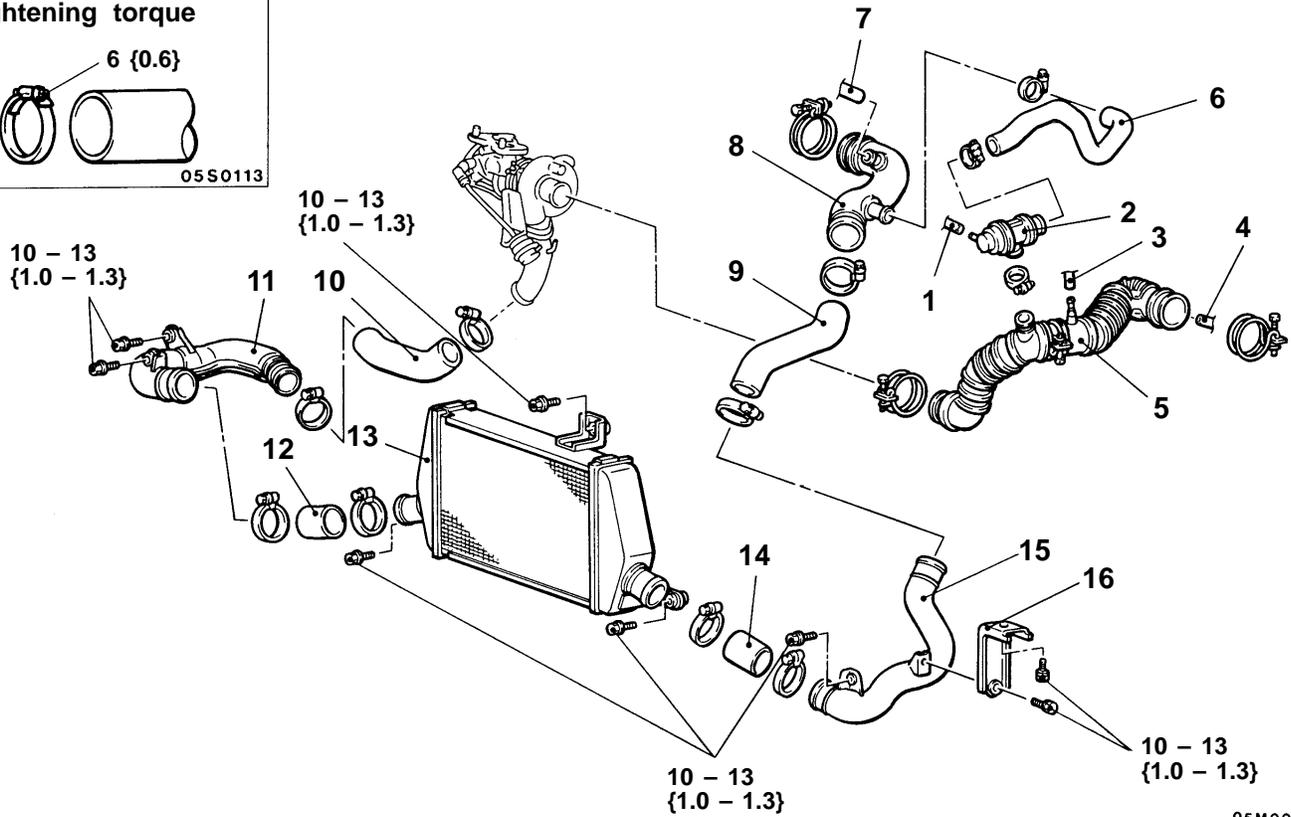
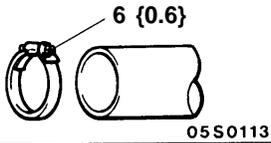
INTERCOOLER

REMOVAL AND INSTALLATION

Pre-removal and Post-installation Operation

- Front Bumper Removal and Installation
(Refer to GROUP 51.)

Hose clamp tightening torque



05M0090

Unit: Nm {kgf·m}

Removal steps

- | | | | |
|-----|------------------------------|-----|--------------------------|
| ▶A◀ | 1. Vacuum hose connection | ▶A◀ | 9. Air hose C |
| ▶A◀ | 2. Air bypass valve assembly | ▶A◀ | 10. Air hose A |
| ▶A◀ | 3. Breather hose connection | ▶A◀ | 11. Air pipe A |
| ▶A◀ | 4. Vacuum hose connection | ▶A◀ | 12. Air hose B |
| ▶A◀ | 5. Air intake hose assembly | ▶A◀ | 13. Intercooler assembly |
| ▶A◀ | 6. Air bypass hose | ▶A◀ | 14. Air hose B |
| ▶A◀ | 7. Air hose connection | ▶A◀ | 15. Air pipe B |
| ▶A◀ | 8. Air hose D | ▶A◀ | 16. Air pipe bracket |

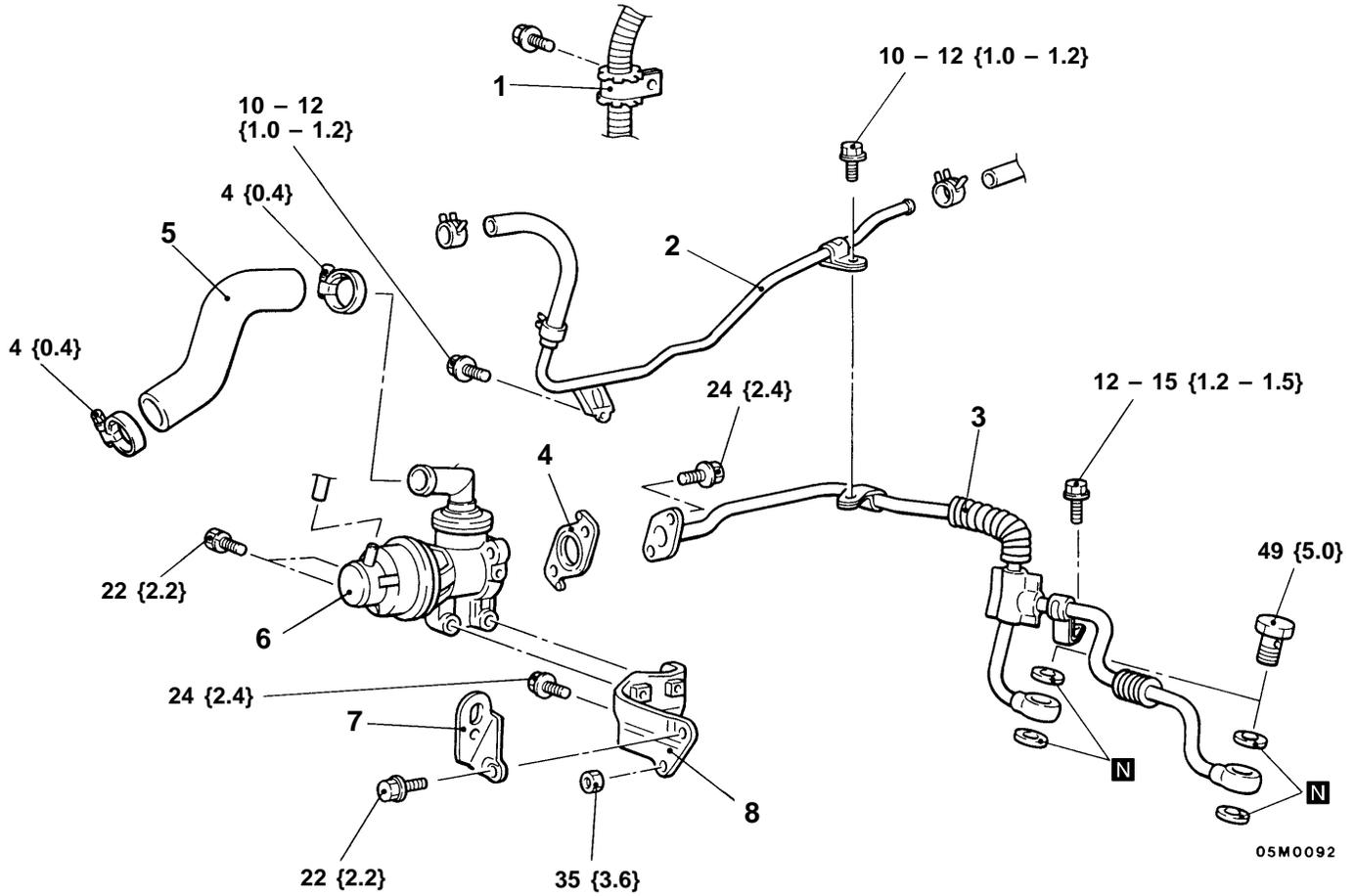
INSTALLATION SERVICE POINT

▶A◀ AIR HOSE B / AIR HOSE A / AIR HOSE C / AIR HOSE D / AIR BYPASS HOSE INSTALLATION

Align the alignment mark (white paint) on each hose with the protrusion on each pipe.

AIR CONTROL VALVE

REMOVAL AND INSTALLATION

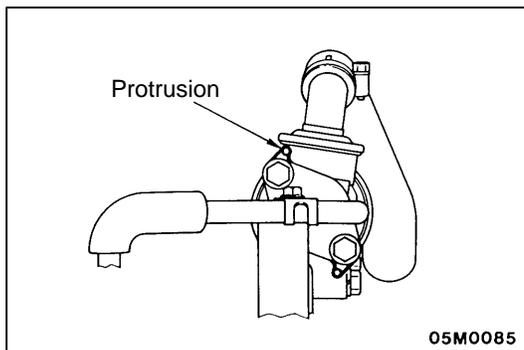


05M0092

Unit: Nm {kgf·m}

Removal steps

1. Control harness connection
2. Vacuum pipe hose assembly
3. Air pipe assembly
4. Gasket
5. Air hose
6. Air control valve
7. Engine hanger
8. Air control valve bracket



INSTALLATION SERVICE POINT

▶◀ GASKET INSTALLATION

Install the gasket so that its protrusion is located as shown.

INTAKE MANIFOLD

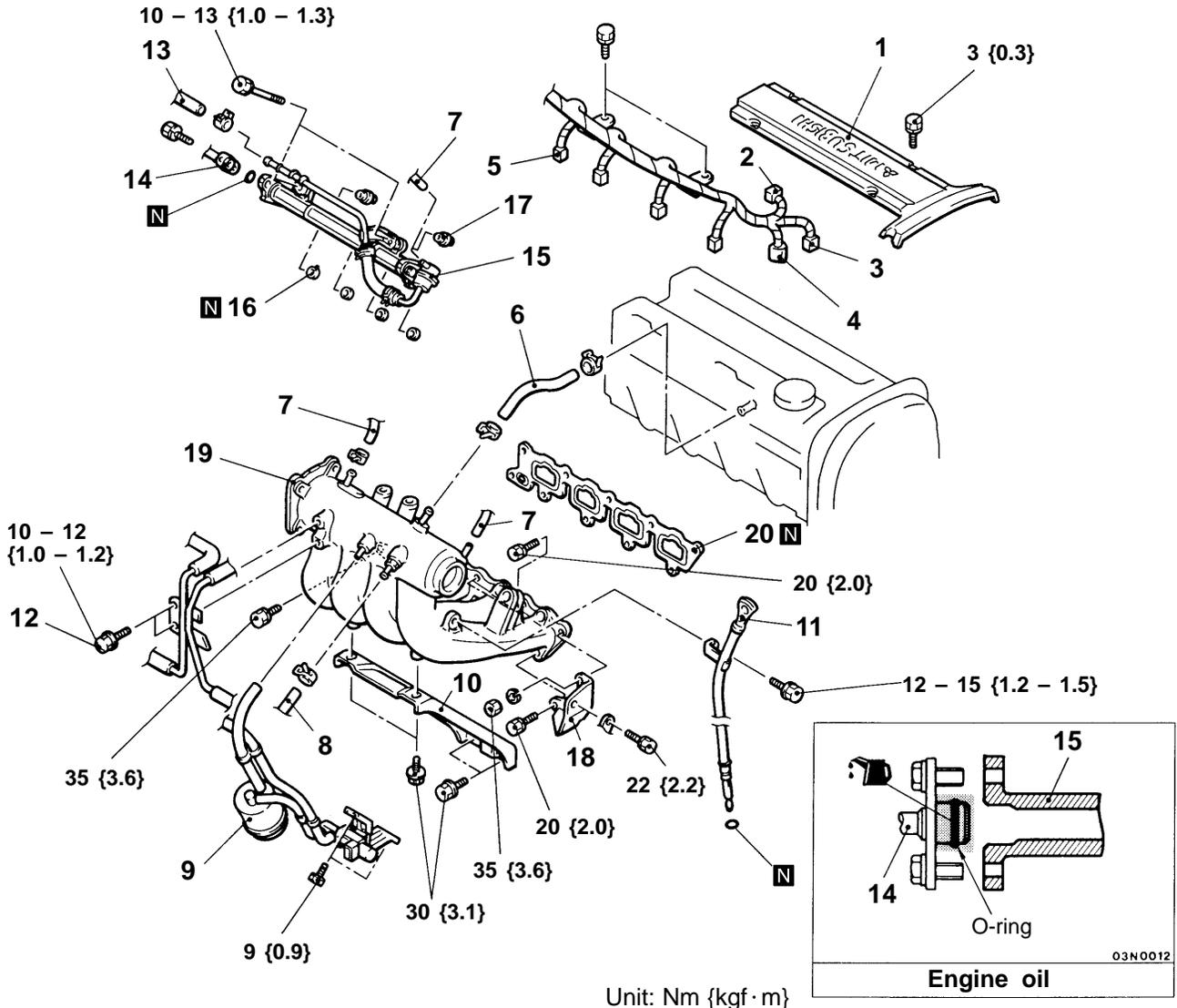
REMOVAL AND INSTALLATION

Pre-removal Operation

- (1) Fuel Discharge Prevention
- (2) Throttle Body Removal (Refer to GROUP 13.)
- (3) Front Exhaust Pipe Removal (Refer to P.15-14.)
- (4) Air Control Valve Bracket Removal (Refer to P.15-8.)
- (5) Strut Tower Bar Removal

Post-installation Operation

- (1) Strut Tower Bar Installation
- (2) Air Control Valve Bracket Installation (Refer to P.15-8.)
- (3) Front Exhaust Pipe Installation (Refer to P.15-14.)
- (4) Throttle Body Installation (Refer to GROUP 13.)



Removal steps

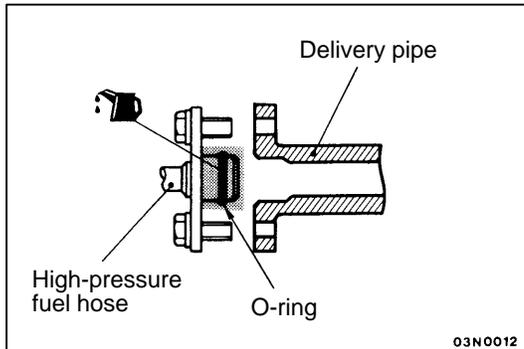
- | | |
|--|---|
| <ol style="list-style-type: none"> 1. Center cover 2. Ignition coil connector connection 3. Oxygen sensor connector connection 4. Crank angle sensor connector connection 5. Injector connector connection 6. PCV hose 7. Vacuum hose connection 8. Brake booster vacuum hose connection 9. Vacuum tank, solenoid valve, and vacuum hose assembly | <ol style="list-style-type: none"> 10. Intake manifold stay 11. Oil level gauge guide assembly 12. Vacuum hose and pipe mounting bolt 13. Fuel return hose connection 14. Fuel high pressure hose connection 15. Delivery pipe, injector, and pressure regulator assembly 16. Insulator 17. Insulator 18. Alternator brace stay 19. Intake manifold 20. Intake manifold gasket |
|--|---|

REMOVAL SERVICE POINT**◀A▶ DELIVERY PIPE, INJECTOR AND PRESSURE REGULATOR REMOVAL**

Remove the delivery pipe with the injectors and pressure regulator attached to it.

Caution

Care must be taken, when removing the delivery pipe, not to drop the injector.

**INSTALLATION SERVICE POINT****▶A◀ HIGH-PRESSURE FUEL HOSE INSTALLATION**

- (1) When connecting the high-pressure fuel hose to the delivery pipe, apply a small amount of new engine oil to the O-ring and then insert the high-pressure fuel hose, being careful not to damage the O-ring.

Caution

Be careful not to let any engine oil get into the delivery pipe.

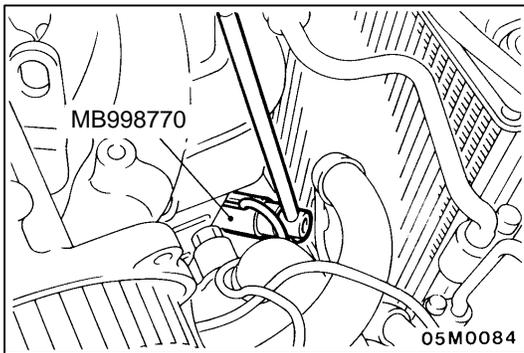
- (2) Check to be sure that the high pressure hose turns smoothly.
If it does not turn smoothly, the O-ring may be trapped. Remove the high-pressure fuel hose to check for damaged O-ring and then re-insert it into the delivery pipe and check once again.
- (3) Tighten the mounting bolts to the specification.

INSPECTION**INTAKE MANIFOLD CHECK**

- (1) Check the intake manifold for damage or cracking and replace it if defective.
- (2) Using a straight edge and feeler gauge, check for distortion of the cylinder head installation surface.

Standard value: 0.15 mm or less

Limit: 0.2 mm



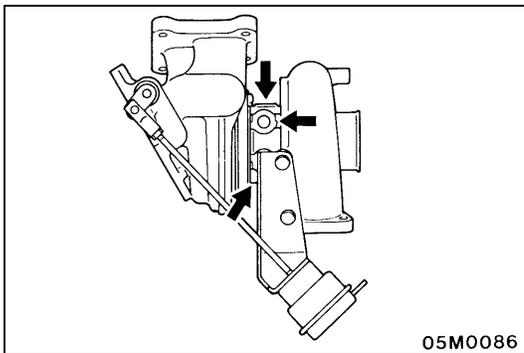
REMOVAL SERVICE POINTS

◀A▶ OXYGEN SENSOR REMOVAL

◀B▶ OIL PIPE REMOVAL

Caution

After the oil pipe has been removed, ensure that no foreign matter will get into the oil passage holes in turbocharger.



INSTALLATION SERVICE POINTS

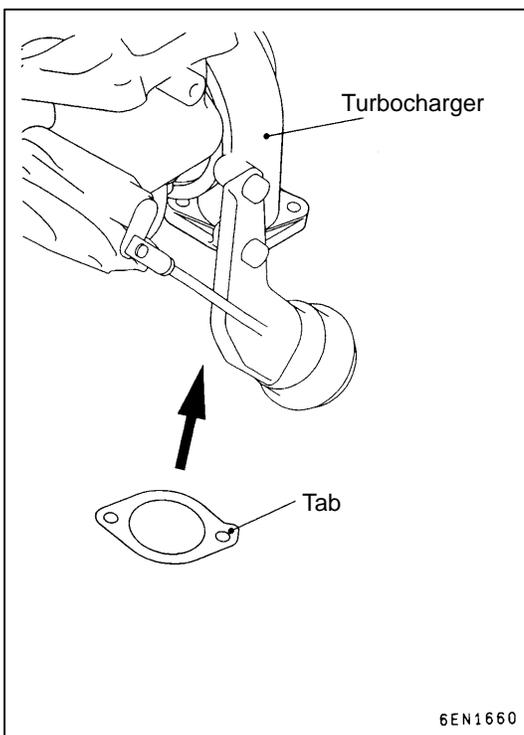
▶A◀ TURBOCHARGER INSTALLATION

- (1) Clean the connections between oil pipe, oil return pipe, and water pipe.

Caution

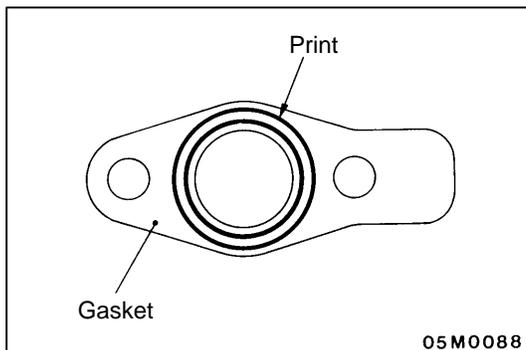
Ensure that no foreign matter will get into the turbocharger.

- (2) Through the oil pipe mounting hole in the turbocharger, add fresh engine oil.



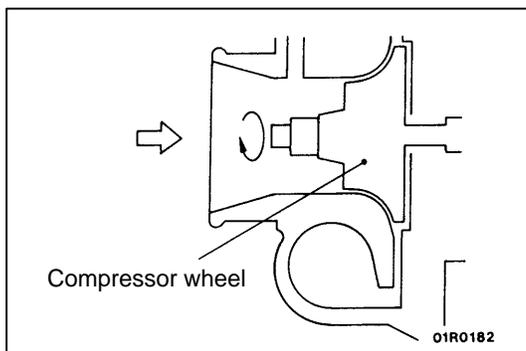
▶B◀ AIR OUTLET FITTING GASKET INSTALLATION

Install the gasket so that its tab is located as shown.



▶◀ OIL RETURN PIPE GASKET INSTALLATION

Install the gasket so that its print part is on the oil pan side.



INSPECTION

1. TURBOCHARGER CHECK

- (1) Visually check the turbine wheel and compressor wheel for damage and cracking.
- (2) Check that the turbine wheel and compressor wheel can be turned manually with a light force.
- (3) Check that there is no oil leak from the turbocharger.
- (4) Check to see if the wastegate valve remains open. If any of these faulty symptoms is evident, disassemble the turbocharger and replace the defective part.

NOTE

For the disassembly procedure, refer to ENGINE WORKSHOP MANUAL.

2. EXHAUST MANIFOLD CHECK

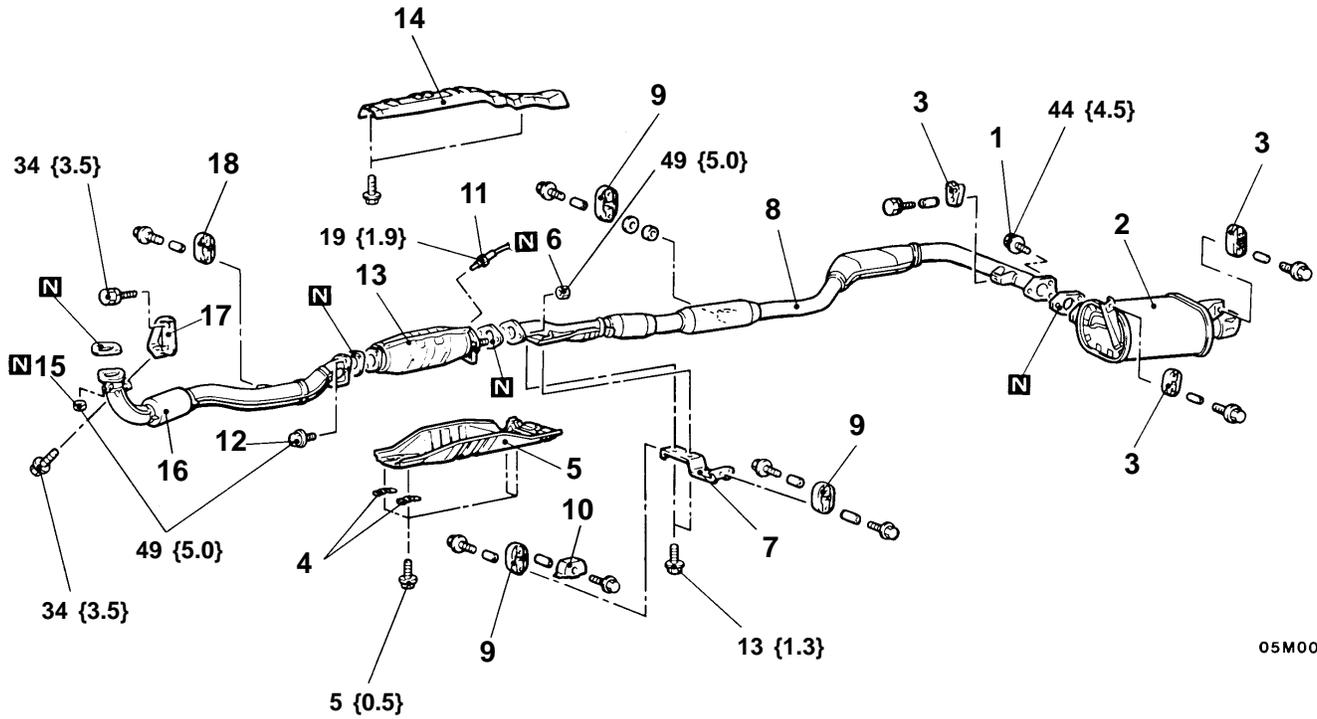
- (1) Check the exhaust manifold for damage and cracking and replace it as necessary.
- (2) Using a straightedge and feeler gauge, check the cylinder head mounting surface for distortion and replace as necessary.

Standard value: Within 0.15 mm

Limit: 0.2 mm

EXHAUST PIPE AND MUFFLER

REMOVAL AND INSTALLATION



05M0093

Hanger mounting bolt tightening torque

3, 9, 18
13 {1.3}

05M0037

Unit: Nm {kgf·m}

Main muffler removal steps

1. Bolt
2. Main muffler
3. Hanger

Center exhaust pipe removal steps

1. Bolt
4. Spring
5. Heat protector
6. Self-locking nut
7. Hanger bracket
8. Center exhaust pipe
9. Hanger
10. Protector

11. High-temperature sensor
12. Bolt
13. Catalytic converter
14. Front floor heat protector panel

Front exhaust pipe removal steps

4. Spring
5. Heat protector
12. Bolt
15. Self-locking nut
16. Front exhaust pipe
17. Front exhaust pipe bracket
18. Hanger