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# INTAKE AND EXHAUST

Click on the applicable bookmark to selected the required model year.

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# INTAKE AND EXHAUST

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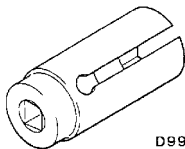
## SERVICE SPECIFICATIONS

15100030128

Items		Standard value	Limit
Waste gate actuator activation pressure kPa		Approx. 83	–
Intake air temperature switch °C	OFF (no continuity)	55 or less	–
	ON (continuity)	57 or more	–
Manifold distortion of the installation surface mm		0.15 or less	0.20

## SPECIAL TOOL

15100060172

Tool	Number	Name	Use
	MD998770	Oxygen sensor wrench	Removal/Installation of oxygen sensor <6G7>

## ON-VEHICLE SERVICE

15100180236

## INTAKE MANIFOLD VACUUM CHECK &lt;6G7&gt;

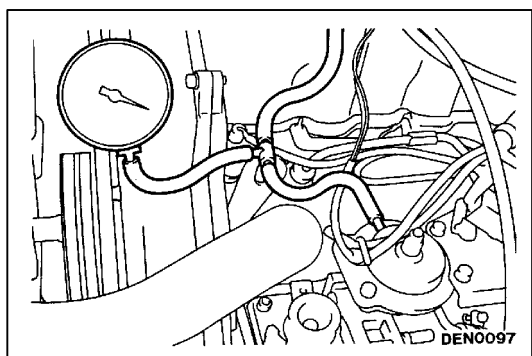
Refer to GROUP 11A – On-vehicle Service

TURBOCHARGER SUPERCHARGING CHECK  
<4D5>

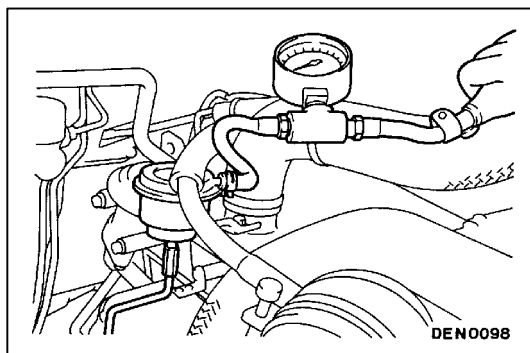
15100100102

## Caution

Conduct the driving test in a location where driving at full acceleration can be done with safety. Two person should be in the vehicle when the test is conducted; the person in the passenger seat should read the indications shown by the pressure meter.



1. Remove the boost compensator hose from the fuel injection pump, and install a pressure gauge as shown in the illustration.
2. Drive at full-throttle acceleration in second gear and then measure the supercharging when the engine speed in about 3,000 r/min.
3. When the indicated supercharging does not become positive pressure, check the following items.
  - Malfunction of the waste gate actuator.
  - Leakage of supercharging pressure.
  - Malfunction of the turbocharger.
4. When the indicated supercharging is 84 kPa or more, supercharging control may be faulty, therefore check the followings.
  - Disconnection or cracks of the waste gate actuator rubber hose.
  - Malfunction of the waste gate actuator.
  - Malfunction of the waste gate valve.



## WASTE GATE ACTUATOR CHECK <4D5>

15100120078

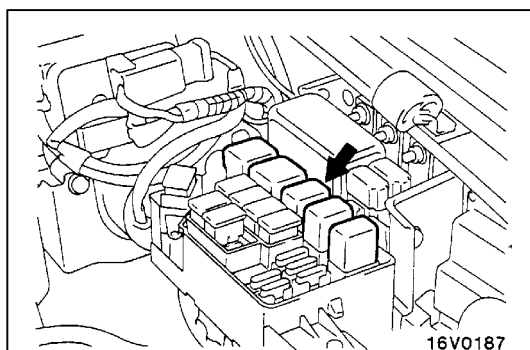
1. Connect a manual pump (pressure-application type) to nipple.
2. While gradually applying pressure, check the pressure that begins to activate (approx. 1 mm stroke) the waste gate actuator rod.

**Standard value: Approx. 83 kPa**

### Caution

**In order to avoid damage to the diaphragm, do not apply a pressure of 91 kPa or higher.**

3. If there is a significant deviation from the standard value, check the actuator or the waste gate valve: replace if necessary.

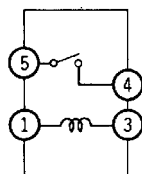
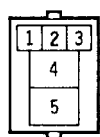


## POWER RELAY CHECK

15100620011

### INTERCOOLER FAN MOTOR RELAY CONTINUITY CHECK

Battery voltage	Terminal No.			
	1	3	4	5
Power is not supplied	○	○		
Power is supplied	⊕	⊖	○	○



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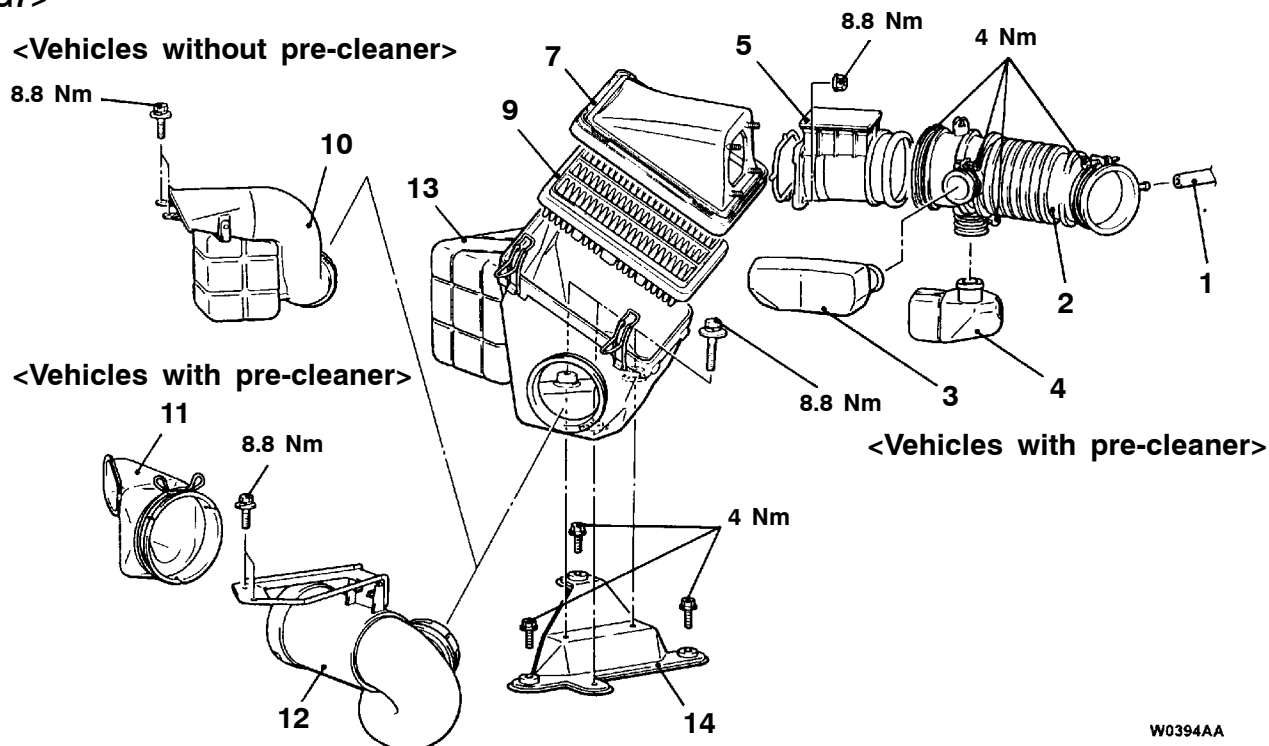
00005151

## AIR CLEANER

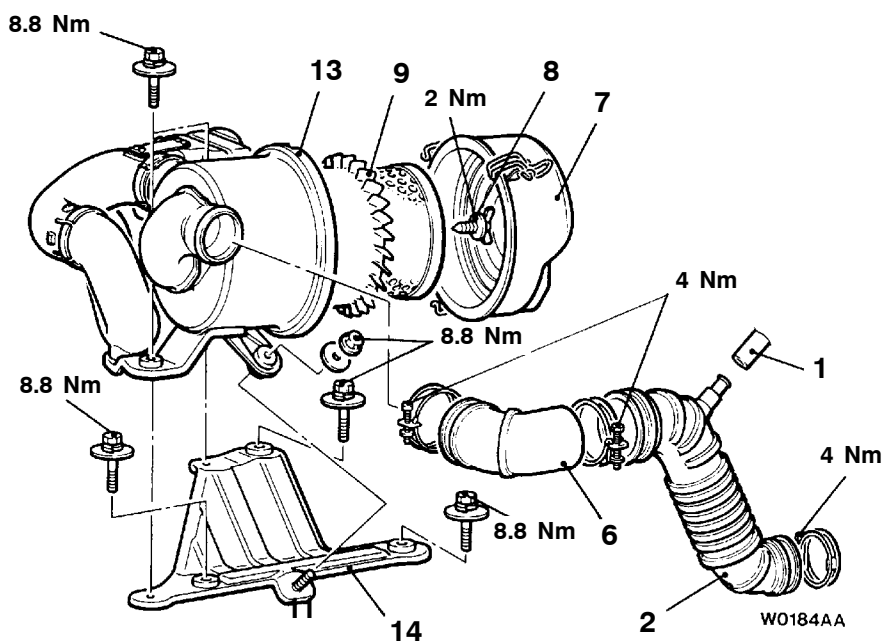
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## REMOVAL AND INSTALLATION

**<6G7>**



**<4D5>**



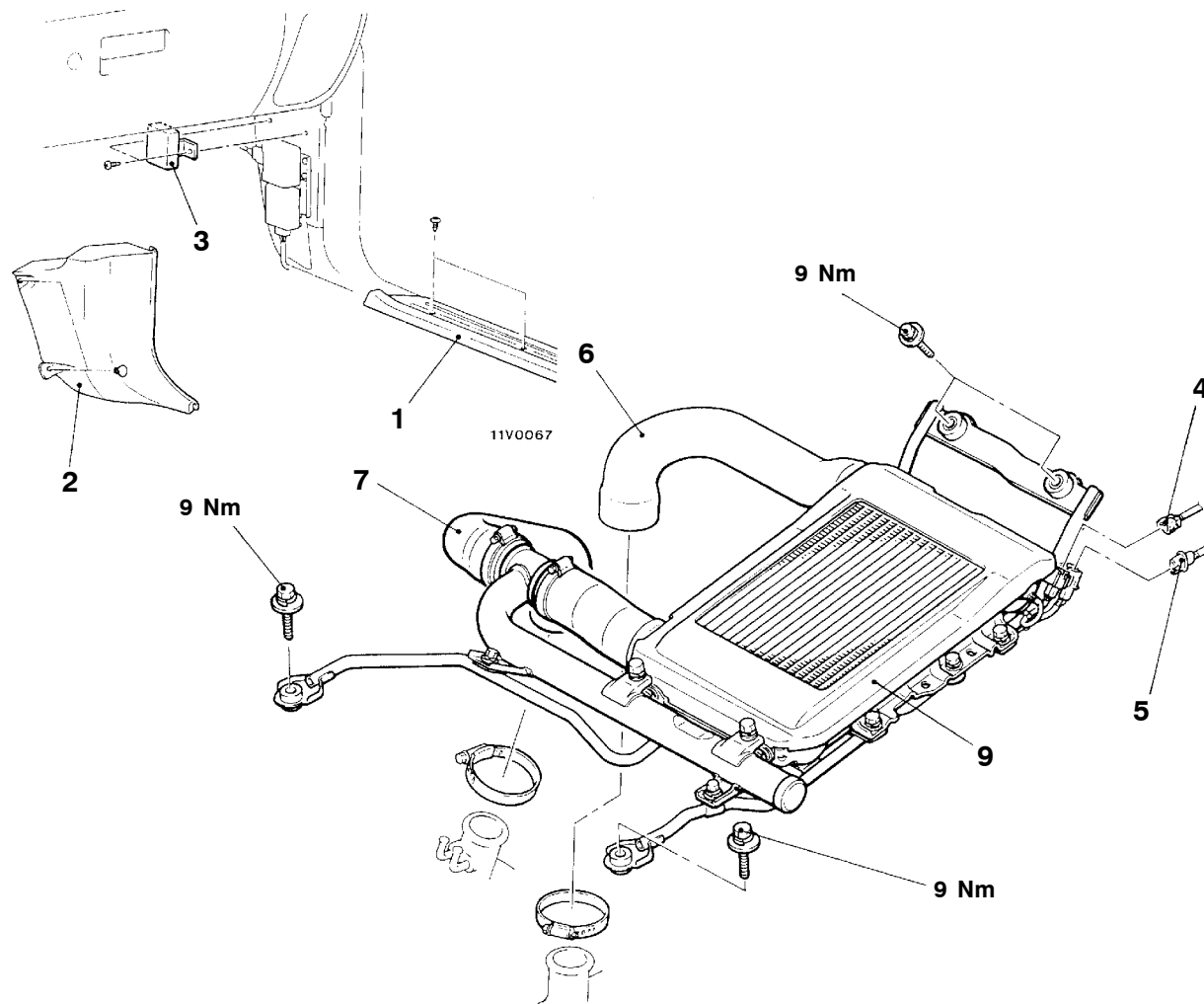
## Removal steps

1. Breather hose connection
2. Air intake hose
3. Resonator  
    <6G7-Vehicles with pre-cleaner>
4. Resonator <6G7>
5. Air flow sensor assembly <6G7>
6. Air intake hose <4D56>
7. Air cleaner cover
8. Bolt <4D5>
9. Air cleaner element
10. Air duct  
    <6G7-Vehicles without pre-cleaner>
11. Air duct  
    <6G7-Vehicles with pre-cleaner>
12. Pre-cleaner assembly  
    <6G7-Vehicles with pre-cleaner>
13. Air cleaner body
14. Air cleaner bracket

# INTERCOOLER AND INTERCOOLER FAN-ECU

15100420079

## REMOVAL AND INSTALLATION


05V0045  
00009215

### Intercooler fan-ECU removal steps

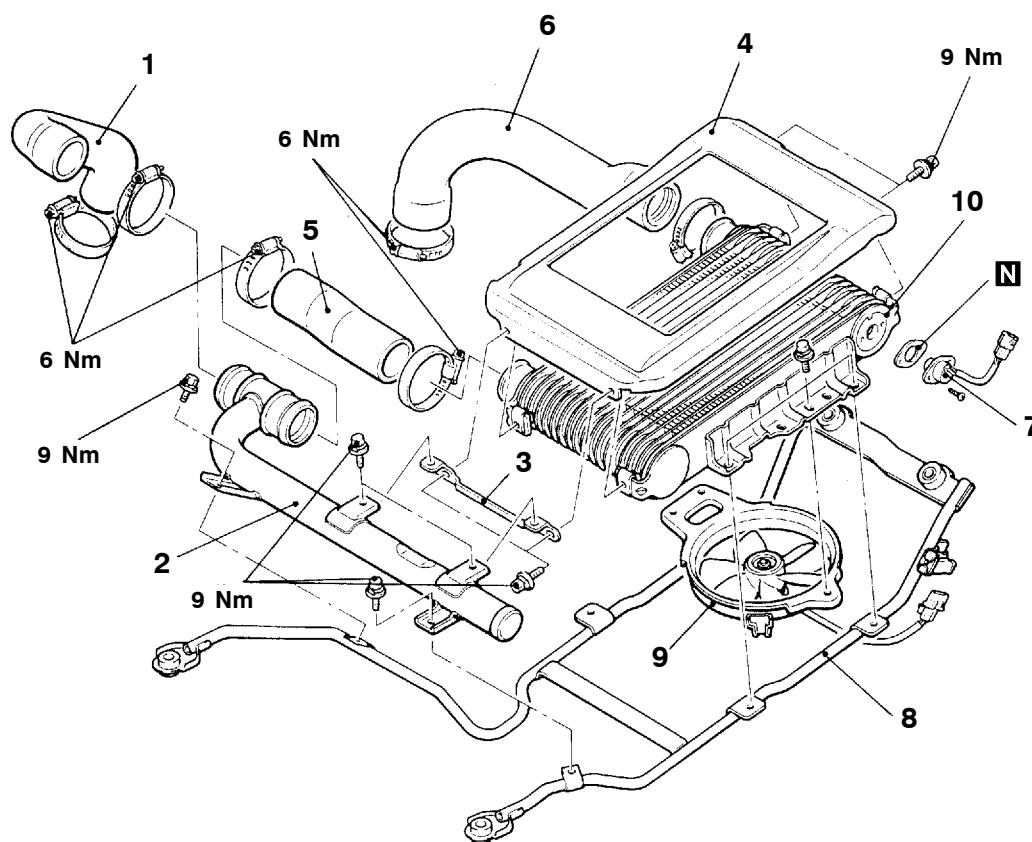
1. Scuff plate
2. Cowl side trim
3. Intercooler fan-ECU

### Intercooler removal steps

4. Intake air temperature switch connector
5. Intercooler fan motor connector
6. Air hose B connection (Intake manifold side)
7. Air hose A-2 connection (Turbocharger side)
8. Intercooler and bracket assembly

## DISASSEMBLY AND REASSEMBLY

15100660020



A05V0044

**Disassembly steps**

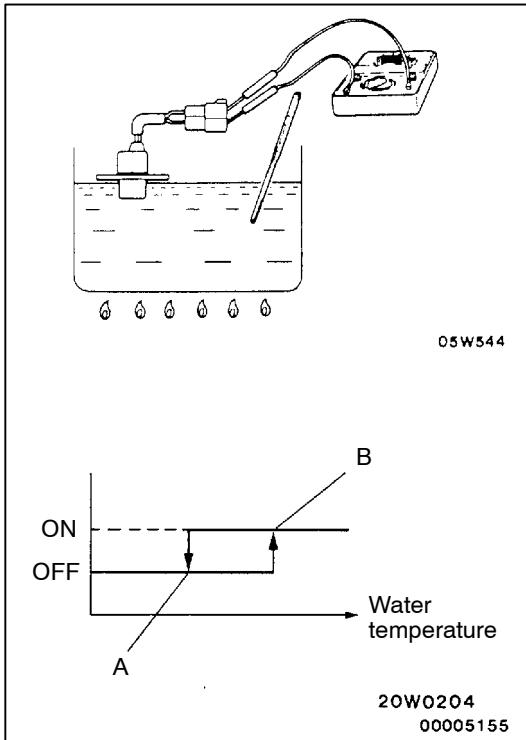
1. Air hose A-2
2. Blanch tube
3. Blanch tube bracket
4. Intercooler cover
5. Air hose A-1

6. Air hose B
7. Intake air temperature switch
8. Intercooler bracket
9. Fan and motor assembly
10. Intercooler

**INSPECTION**

15100430027

- Check the intercooler fins for bending damage or foreign matter.
- Check the intercooler hoses for cracking, damage or wear.



## INTAKE AIR TEMPERATURE SWITCH CHECK

15100630014

1. Immerse the intake air temperature switch in the hot water shown in the figure.
2. When changing the water temperature, check for continuity between the terminals with the circuit tester.

**Standard value:**

Temperature	Continuity
Less than 55 °C (Temperature at point A)	OFF (No continuity)
More than 57 °C (Temperature at point B)	ON (Continuity)



# INTAKE MANIFOLD <6G7>

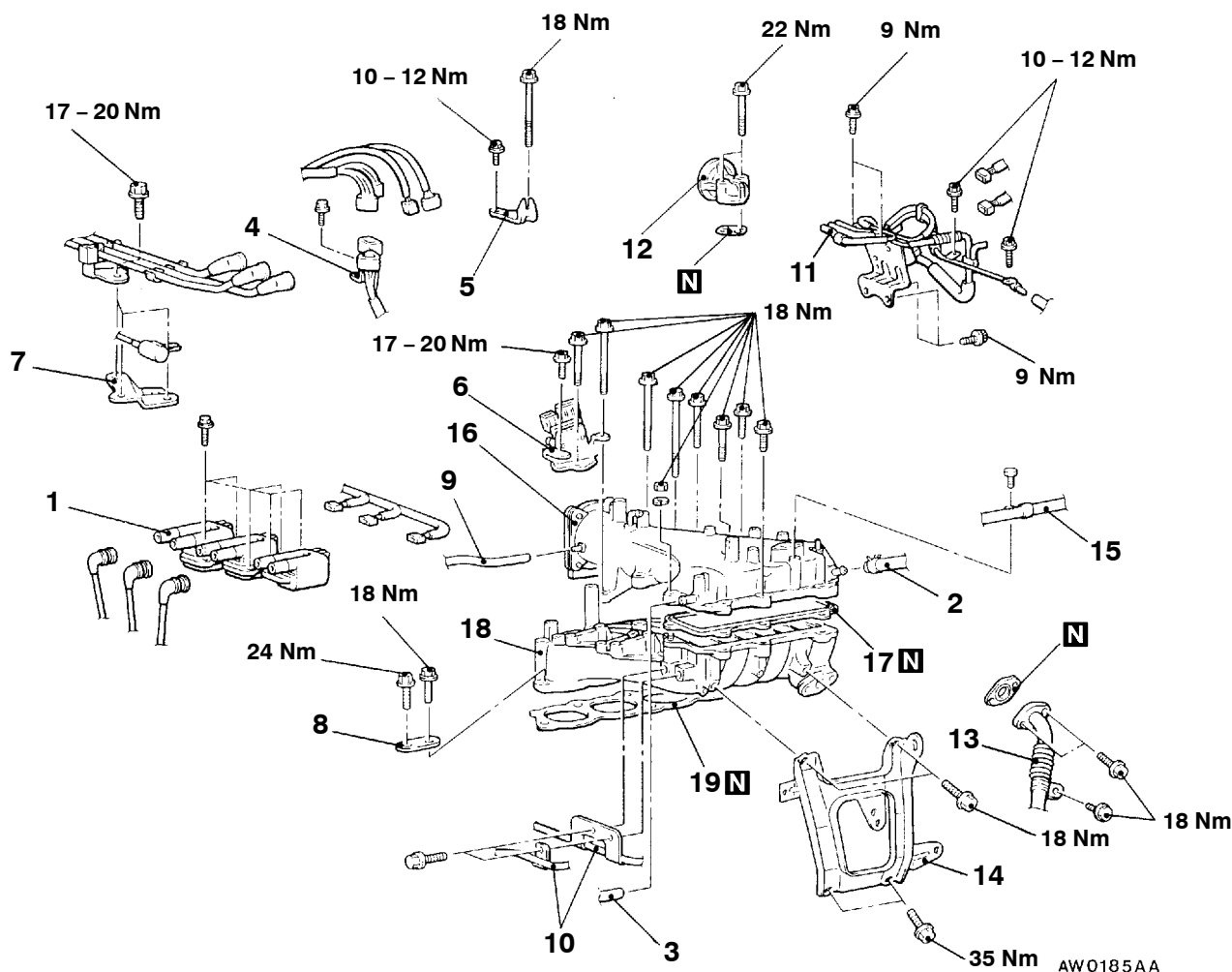
## REMOVAL AND INSTALLATION

### Pre-removal Operation

- Fuel Discharge Prevention (Refer to GROUP 13A – On-vehicle Service.)
- Throttle Body Removal (Refer to GROUP 13A – Throttle Body.)

### Post-installation Operation

- Throttle Body installation (Refer to GROUP 13A – Throttle Body.)

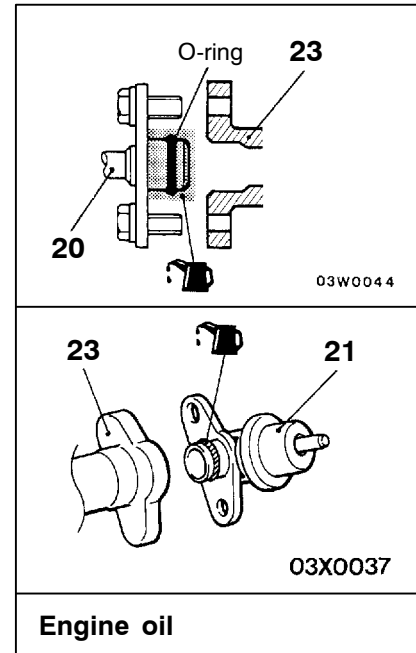
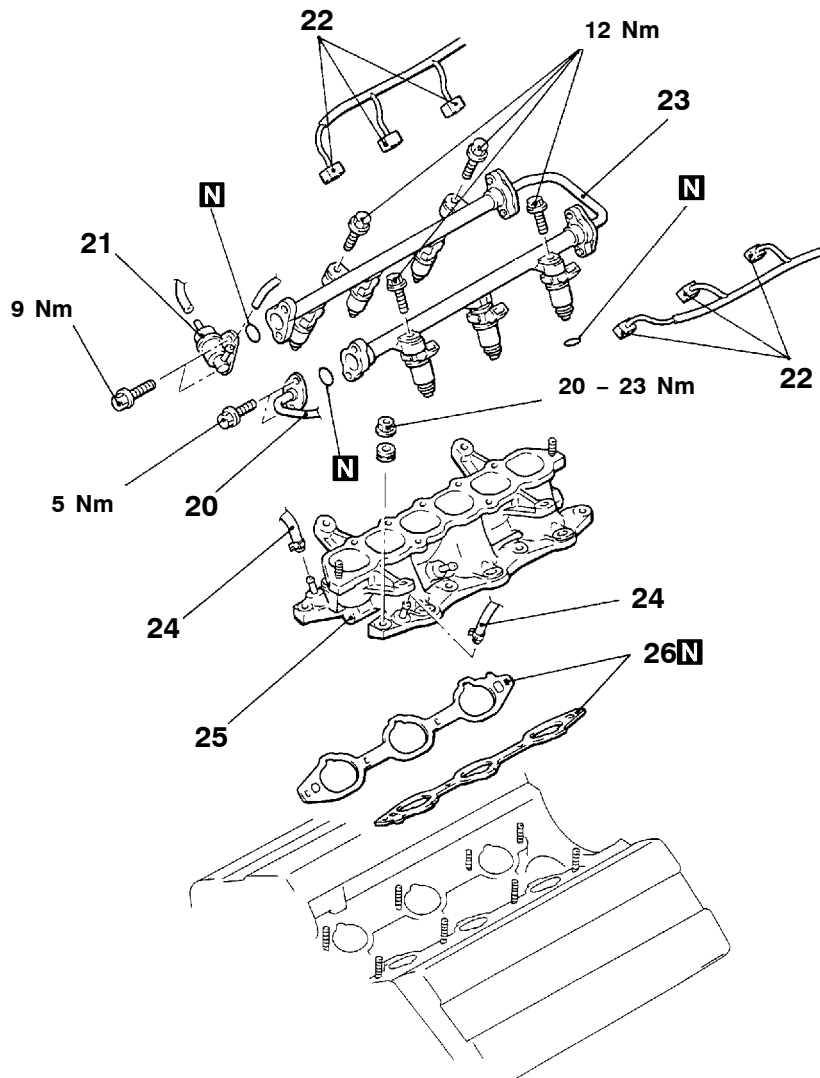


### Removal steps

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
12. EGR valve
13. EGR pipe connection
14. Surge tank stay
15. Throttle cable connection
16. Air intake fitting
17. Air intake fitting gasket
18. Upper intake manifold
19. Surge tank gasket



AW0185AA



05 W0018  
00005336

- ▶C◀ 20. High-pressure fuel hose
- ▶C◀ 21. Fuel pressure regulator
- ▶A▶ 22. Injector connector
- ▶A▶ 23. Injector and delivery pipe assembly
- ▶B▶ 24. Water hose connection
- ▶A▶ 25. Intake manifold
- ▶A▶ 26. Intake manifold gasket

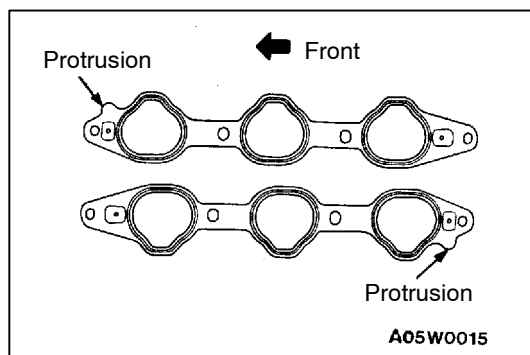
## REMOVAL SERVICE POINT

### ▶A▶ INJECTOR AND DELIVERY PIPE ASSEMBLY REMOVAL

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

#### Caution

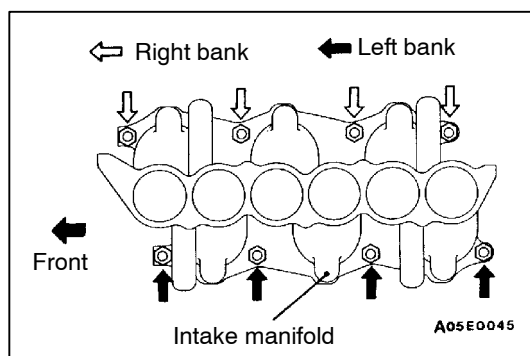
Care must be taken when removing the fuel rail not to drop the injector.



## INSTALLATION SERVICE POINTS

### ►A◄ INTAKE MANIFOLD GASKET INSTALLATION

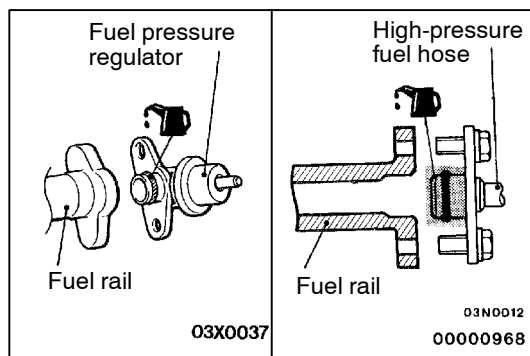
Install the gasket with the protrusions in the position illustrated.



### ►B◄ INTAKE MANIFOLD INSTALLATION

Tighten the nuts by the following procedure.

Order	Mounting Nuts	Tightening Torque
1	Right-bank nuts	7 Nm
2	Left-bank nuts	20–23 Nm
3	Right-bank nuts	20–23 Nm
4	Left-bank nuts	20–23 Nm
5	Right-bank nuts	20–23 Nm

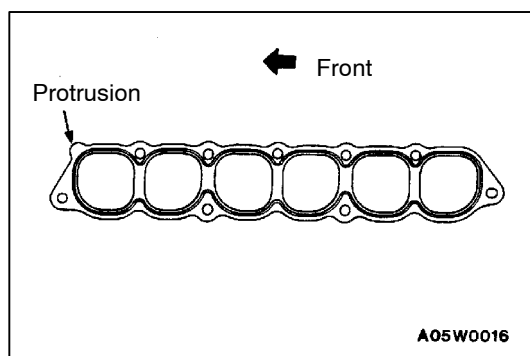


### ►C◄ FUEL PRESSURE REGULATOR/HIGH-PRESSURE FUEL HOSE INSTALLATION

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.

#### Caution

Be careful not to let any engine oil get into the fuel rail.



### ►D◄ SURGE TANK GASKET INSTALLATION

Install the gasket with the protrusion in the position illustrated.

**INSPECTION**

15100370039

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 gas passages.
3. Check deflection of installation surface with straight edge and feeler gauge.

**Standard value: 0.15 mm or less**

**Limit: 0.20 mm**

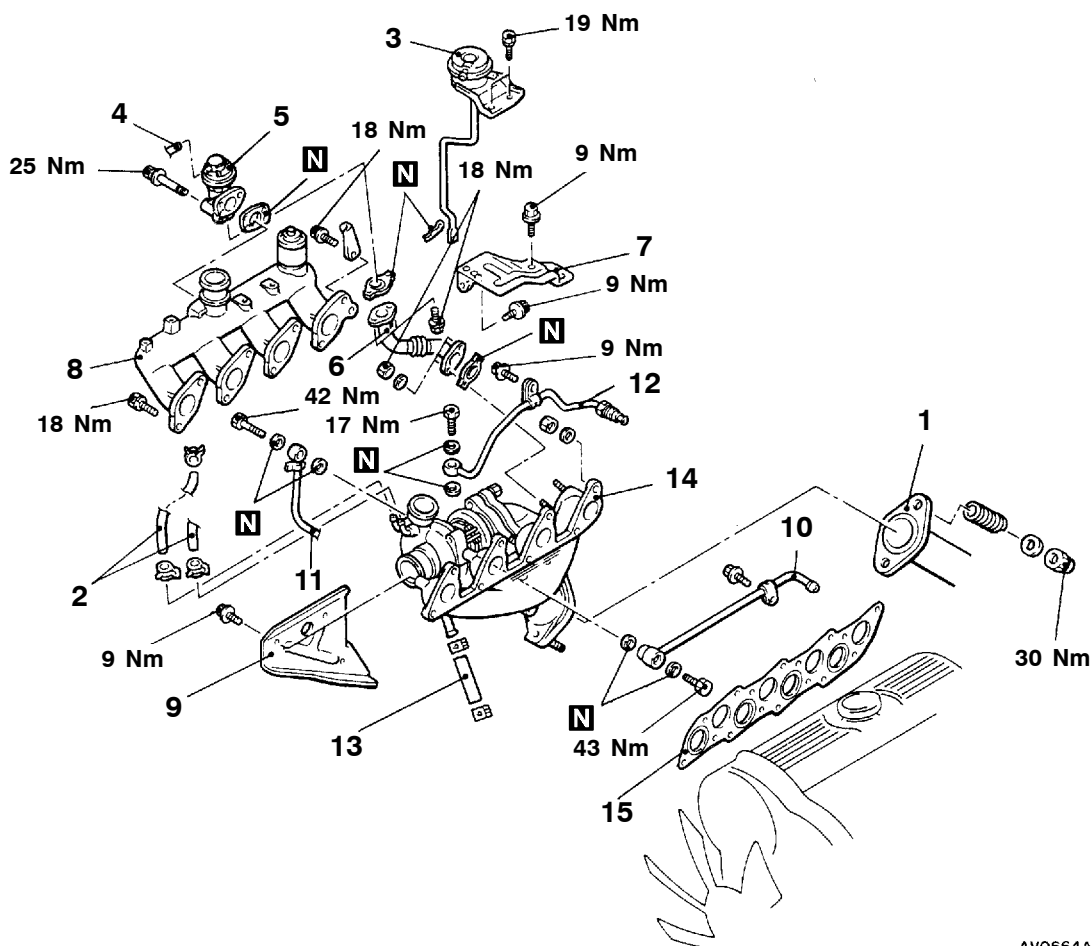
## TURBOCHARGER AND EXHAUST MANIFOLD &lt;4D5&gt;

15100450061

## REMOVAL AND INSTALLATION

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

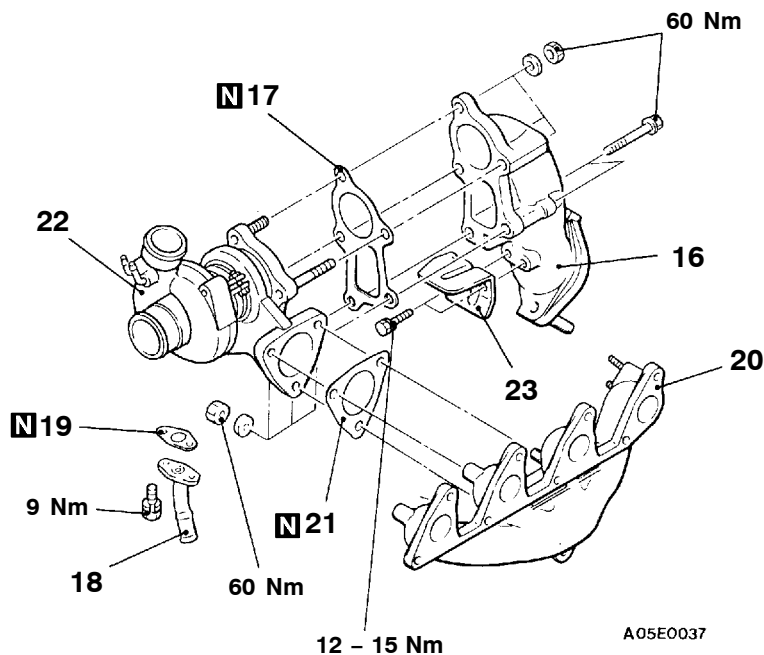
- Engine Coolant Draining and Supplying
- Air Cleaner Cover and Air Intake Hose Removal and Installation (Refer to P. 15-4.)
- Intercooler Removal and Installation (Refer to P. 15-5.)



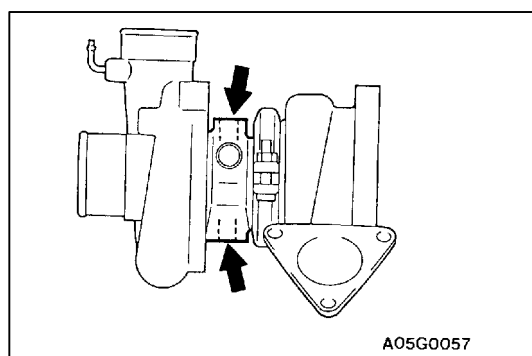
AV0664AA

**Removal steps**

1. Front exhaust pipe connection
2. Boost hose
3. Waste gate actuator
4. Vacuum hose
5. EGR valve
6. EGR pipe
7. Heat protector A
8. Intake manifold
9. Heat protector
10. Water pipe B
11. Water pipe A
12. Oil pipe
13. Oil return hose connection
14. Exhaust manifold and turbocharger assembly
15. Intake and exhaust manifold gasket



- 16. Exhaust fitting
- 17. Exhaust fitting gasket
- 18. Oil-return pipe
- 19. Oil-return pipe gasket
- 20. Exhaust manifold
- 21. Turbocharger gasket
- ▶A◀ 22. Turbocharger assembly
- 23. Heat protector



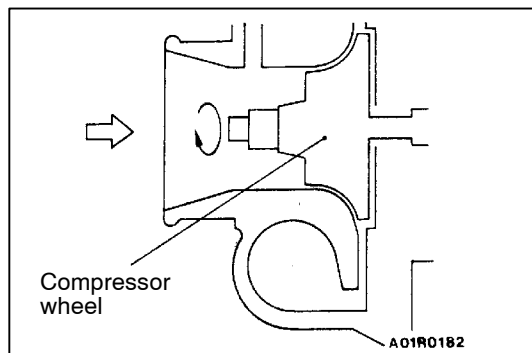
## INSTALLATION SERVICE POINT

### ▶A◀ TURBOCHARGER ASSEMBLY INSTALLATION

1. Clean the alignment surfaces shown in the illustration.
2. Supply clean engine oil from the oil pipe mounting hole of the turbocharger assembly.

#### Caution

**When cleaning, take care that no foreign material gets into the engine coolant or oil passages hole.**

**INSPECTION**

15100640017

**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 waste gate valve remains open.
- If any problem is found, replace the part after disassembly.

**OIL PIPE AND OIL RETURN PIPE CHECK**

15100650010

Check the oil pipe and oil return pipe for clogging, bending, or other damage. If there is clogging, clean it.

**EXHAUST MANIFOLD CHECK**

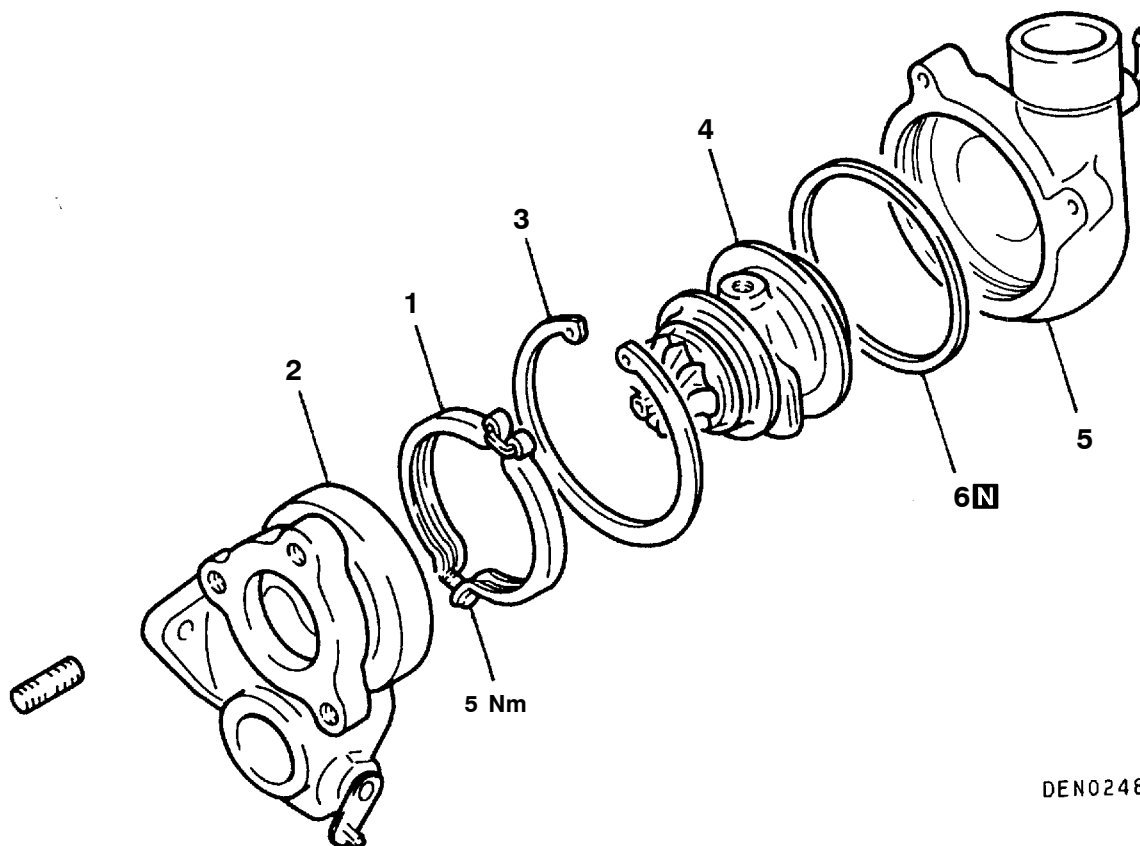
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Damage or cracking of any part.

# TURBOCHARGER

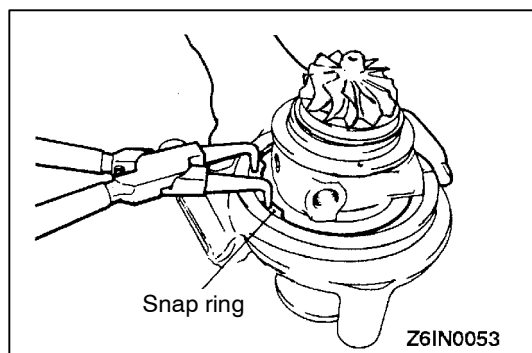
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## DISASSEMBLY AND REASSEMBLY



### Disassembly steps

- ▶E◀ 1. Coupling
- ▶D◀ 2. Turbine housing
- ▶C◀ 3. Snap ring
- ▶B◀ 4. Turbine wheel assembly
- ▶B◀ 5. Compressor cover
- ▶A◀ 6. O-ring



### DISASSEMBLY SERVICE POINTS

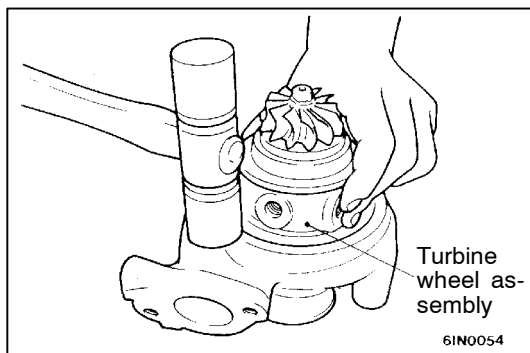
#### ◀A▶ SNAP RING REMOVAL

Lay the unit with the compressor cover side facing down and using snap ring pliers, remove the compressor cover attaching snap ring.

#### Caution

When removing the snap ring, hold it with fingers to prevent it from springing away.



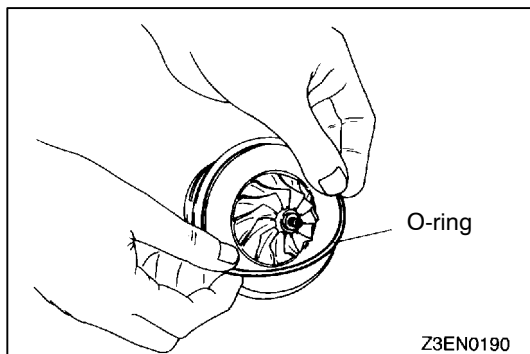


### ◀B▶ TURBINE WHEEL ASSEMBLY REMOVAL

Remove the turbine wheel assembly, striking the circumference of the compressor cover with a plastic hammer. The turbine wheel assembly may be a little hard to remove due to an O-ring put on the outer circumference.

### CLEANING

1. Use a clean cleaning oil commercially available. Do not use corrosive cleaning oils as they could damage some parts.
2. Use a plastic scraper or hard brush to clean aluminum parts.



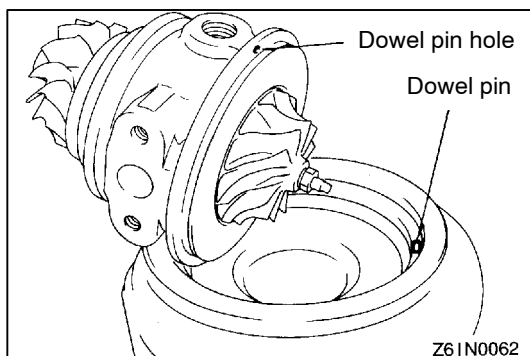
### REASSEMBLY SERVICE POINTS

#### ▶A◀ O-RING INSTALLATION

Apply a light coat of engine oil to a new O-ring and fit it in the turbine wheel assembly groove.

#### Caution

**When installing the O-ring, use care not to damage it. A damaged O-ring causes oil leaks.**

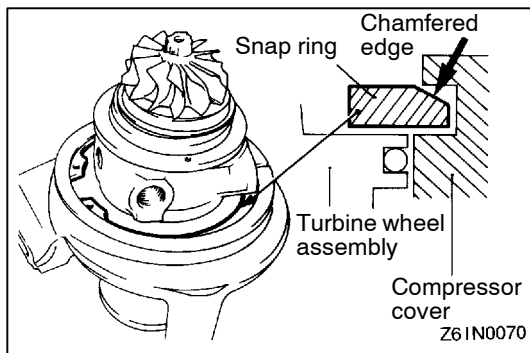


#### ▶B◀ TURBINE WHEEL ASSEMBLY

1. Apply a light coat of engine oil to the periphery of the O-ring.
2. Install the turbine wheel assembly to the compressor cover in relation to the dowel pin.

#### Caution

**Use care not to damage the blades of turbine wheel and compressor wheel.**

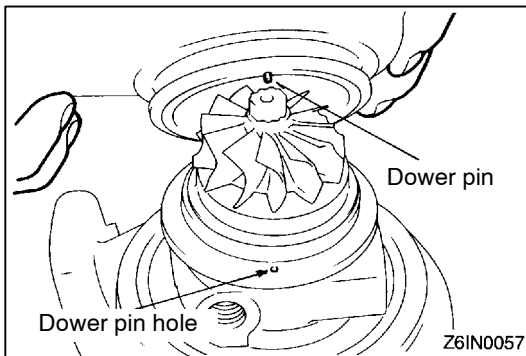


#### ▶C◀ SNAP RING INSTALLATION

Lay the assembly with the compressor cover facing down and fit the snap ring.

#### Caution

**Fit the snap ring with its chamfered side facing up.**

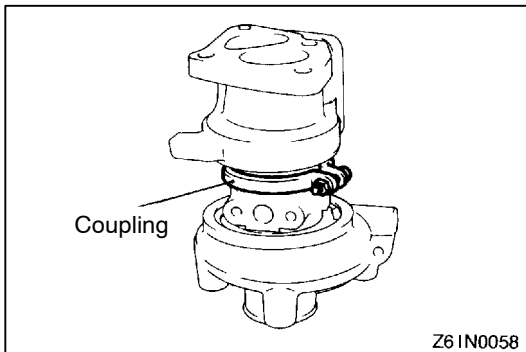


### ►D◄ TURBINE HOUSING INSTALLATION

Install the turbine housing in relation to the dowel pin.

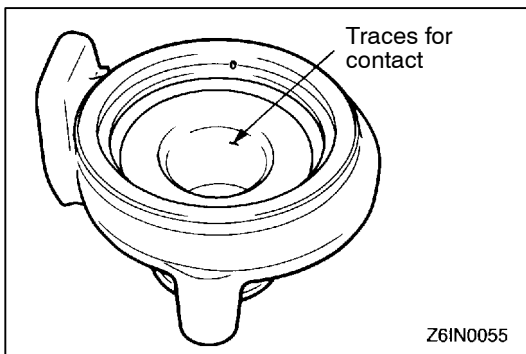
#### Caution

Use care not to damage the blades of turbine wheel.



### ►E◄ COUPLING INSTALLATION

Install the coupling and tighten to specified torque.

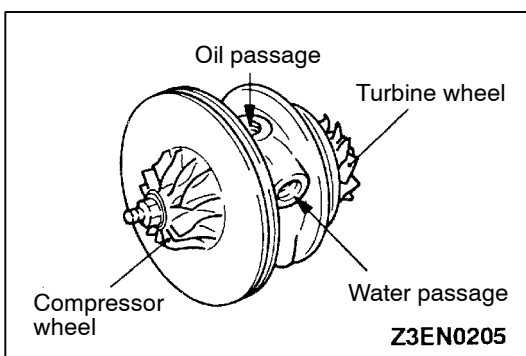


## INSPECTION

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### TURBINE HOUSING

1. Check the housing for traces of contact with the turbine wheel, cracks due to overheating, pitching, deformation and other damage. Replace with a new turbine housing if cracked.
2. Operate the waste gate valve lever manually to check that the gate can be operated and closed smoothly.



### COMPRESSOR COVER

Check the compressor cover for traces of contact with the compressor wheel and other damage.

### TURBINE WHEEL ASSEMBLY

1. Check the turbine and compressor wheel blades for bend, burr, damage, corrosion and traces of contact on the back side and replace if defective.
2. Check the oil passage of the turbine wheel assembly for deposit and clogging.
3. In the case of water cooled type, check also the water passage for deposit and clogging.
4. Check the turbine wheel and compressor wheel for light and smooth turning.

### OIL PIPE/OIL RETURN PIPE

Correct or replace the oil pipe and oil return pipe if clogged, collapsed, deformed or otherwise damaged.

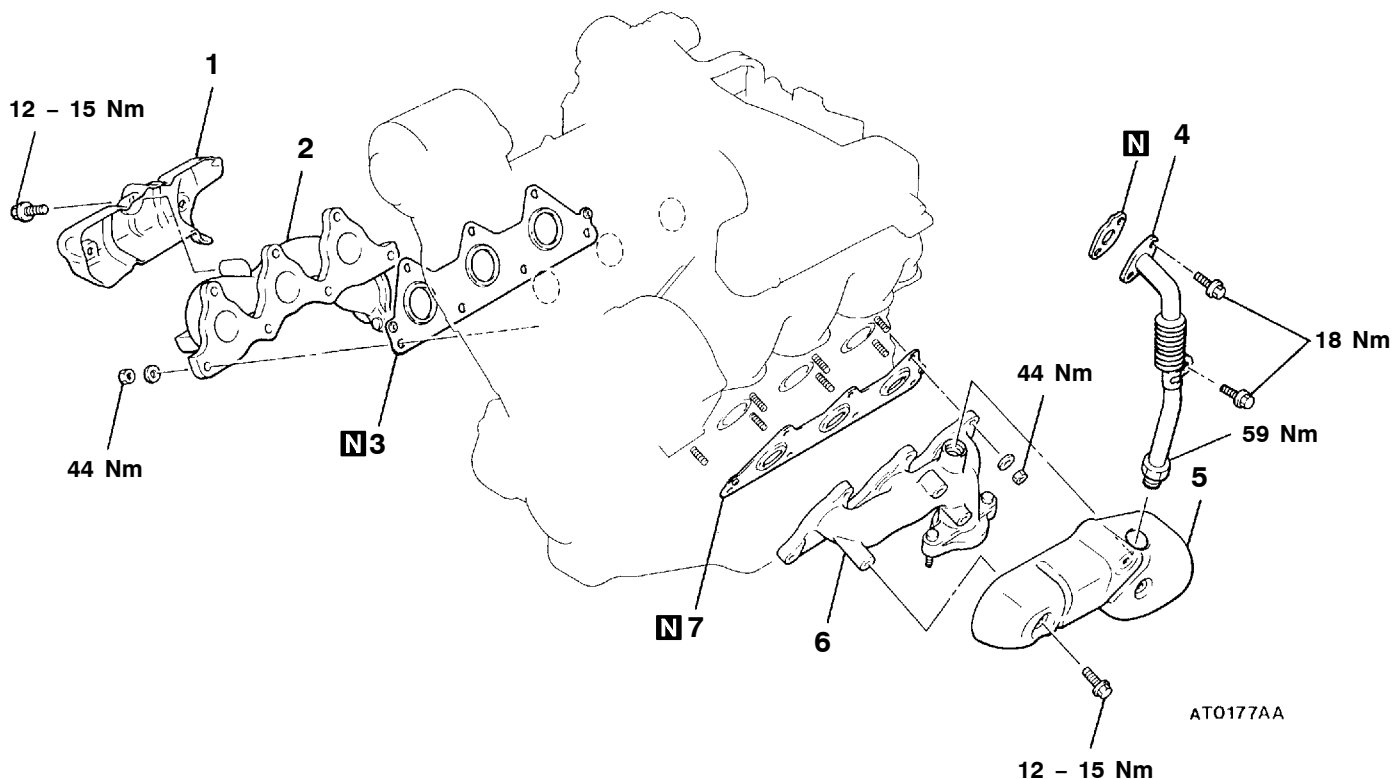
## EXHAUST MANIFOLD &lt;6G7&gt;

15100330587

## REMOVAL AND INSTALLATION

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

- Front Exhaust Pipe Removal and Installation (Refer to P.15-19.)
- Air Cleaner Removal and Installation (Refer to P.15-4.)
- Battery and Battery Tray Removal and Installation
- Engine Oil Dipstick Guide Removal and Installation

**Removal steps**

1. Heat protector (R.H.)
2. Exhaust manifold (R.H.)
3. Exhaust manifold gasket (R.H.)
4. EGR pipe

5. Heat protector (L.H.)
6. Exhaust manifold (L.H.)
7. Exhaust manifold gasket (L.H.)

**INSPECTION**

15100340160

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 or less**

**Limit: 0.20 mm**

## EXHAUST PIPE AND MAIN MUFFLER

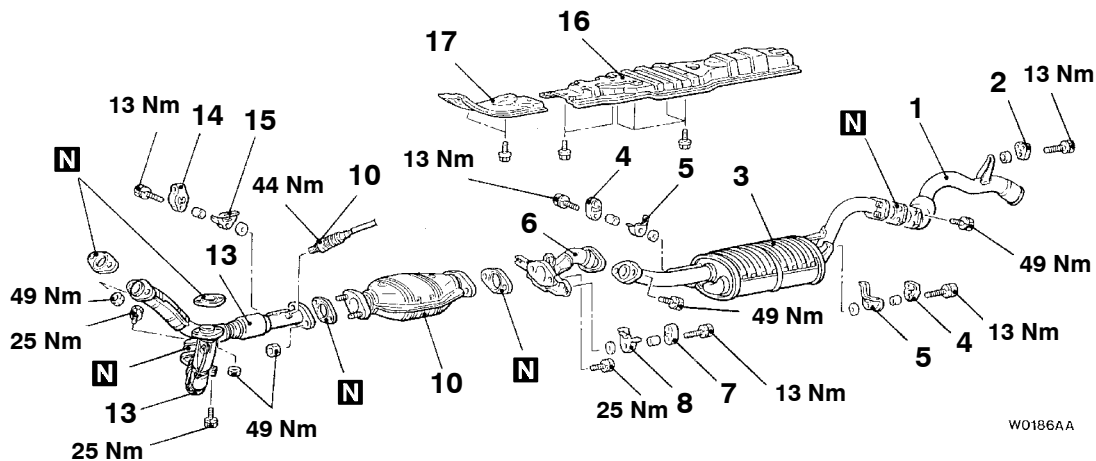
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## REMOVAL AND INSTALLATION

## Pre-removal and Post-installation Operation

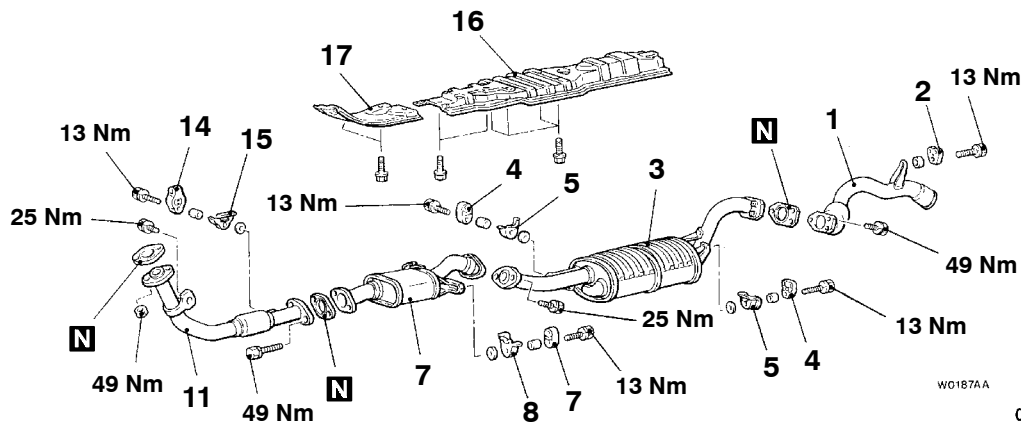
- Front Under Cover Removal and Installation

&lt;6G7&gt;



W0186AA

&lt;4D5&gt;



W0187AA

00009216

## Main muffler removal steps

1. Tail pipe
2. Hanger
3. Main muffler
4. Hanger
5. Protector

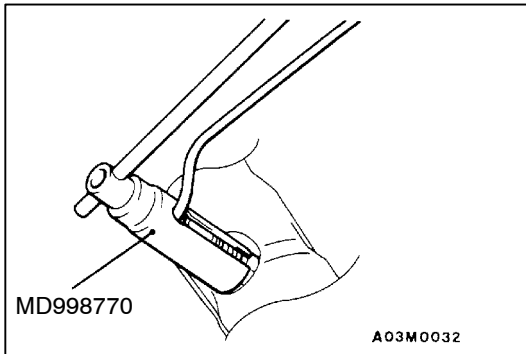
## Center exhaust pipe removal steps

6. Center exhaust pipe
7. Hanger
8. Protector

## 9. Catalytic converter &lt;6G7&gt;

## Front exhaust pipe removal steps

- ◀A▶▶A▶
10. Oxygen sensor <6G7>
  11. Front exhaust pipe <4D5>
  12. Front exhaust pipe (R.H.) <6G7>
  13. Front exhaust pipe (L.H.) <6G7>
  14. Hanger
  15. Protector
  16. Front floor heat protector B
  17. Front floor heat protector A

**REMOVAL SERVICE POINT****◀A▶ OXYGEN SENSOR REMOVAL**

Use special tool to remove the oxygen sensor.

**INSTALLATION SERVICE POINT****▶A◀ OXYGEN SENSOR INSTALLATION**

Use special tool to install the oxygen sensor.

## GROUP 15

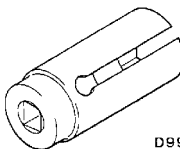
# INTAKE AND EXHAUST

## GENERAL

### OUTLINE OF CHANGE

- The following service procedures have been added due to the addition of vehicles with 6G7 <A/T>. The other service procedures are the same as before.

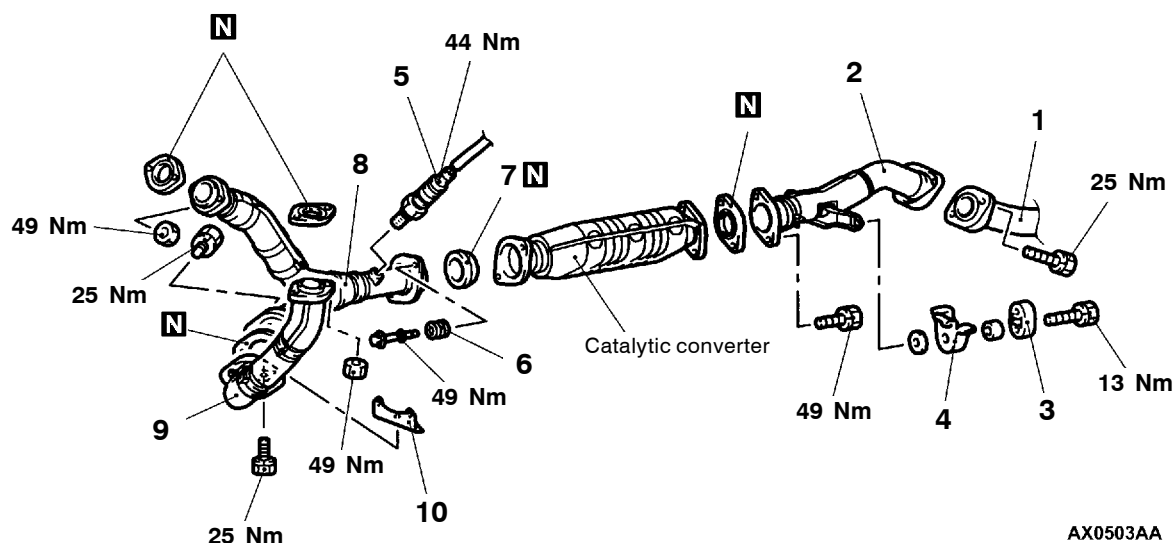
### SPECIAL TOOL

Tool	Number	Name	Use
	MD998770	Oxygen sensor wrench	Removal/Installation of oxygen sensor

## EXHAUST PIPE AND MAIN MUFFLER <6G7>

### REMOVAL AND INSTALLATION

**Pre-removal and Post-installation Operation**  
Under Cover and Skid Plate Removal and Installation



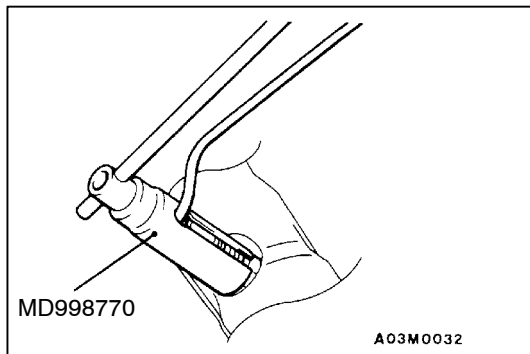
#### Center exhaust pipe removal steps

1. Main muffler
2. Center exhaust pipe
3. Hanger
4. Protector



#### Front exhaust pipe removal steps

5. Oxygen sensor
6. Compression spring
7. Seal ring
8. Front exhaust pipe (R.H.)
9. Front exhaust pipe (L.H.)
10. Exhaust bracket

**REMOVAL SERVICE POINT****◀A▶ OXYGEN SENSOR REMOVAL**

Use special tool to remove the oxygen sensor.

**INSTALLATION SERVICE POINT****▶A◀ OXYGEN SENSOR INSTALLATION**

Use special tool to install the oxygen sensor.

## GROUP 15

# INTAKE AND EXHAUST

## GENERAL

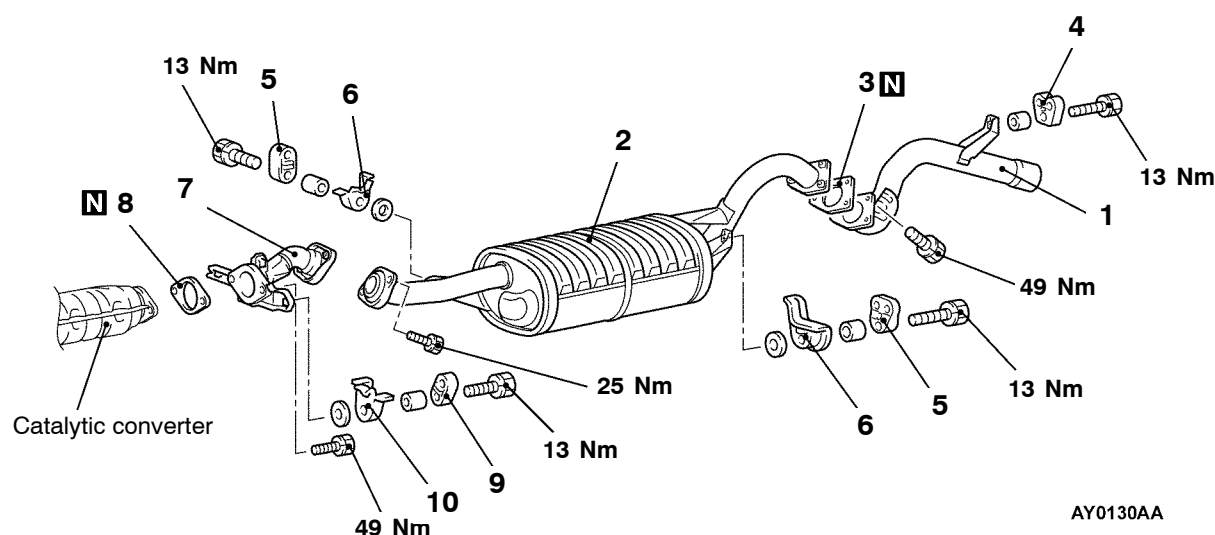
### OUTLINE OF CHANGE

Due to the addition of the front catalytic converter and the change on the catalytic converter, the removal and installation procedure of the exhaust pipe and main muffler has been established. Other service procedures are the same as before. <6G7>

## EXHAUST PIPE AND MAIN MUFFLER <6G7>

### REMOVAL AND INSTALLATION

**Pre-removal and Post-installation Operation**  
Skid Plate Removal and Installation



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#### Tail pipe removal steps

1. Tail pipe
3. Gasket
4. Hanger

#### Main muffler removal steps

2. Main muffler
3. Gasket
5. Hanger
6. Protector

#### Center exhaust pipe removal steps

7. Center exhaust pipe
8. Gasket
9. Hanger
10. Protector



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NOTES

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# INTAKE AND EXHAUST

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## GENERAL

### OUTLINE OF CHANGES

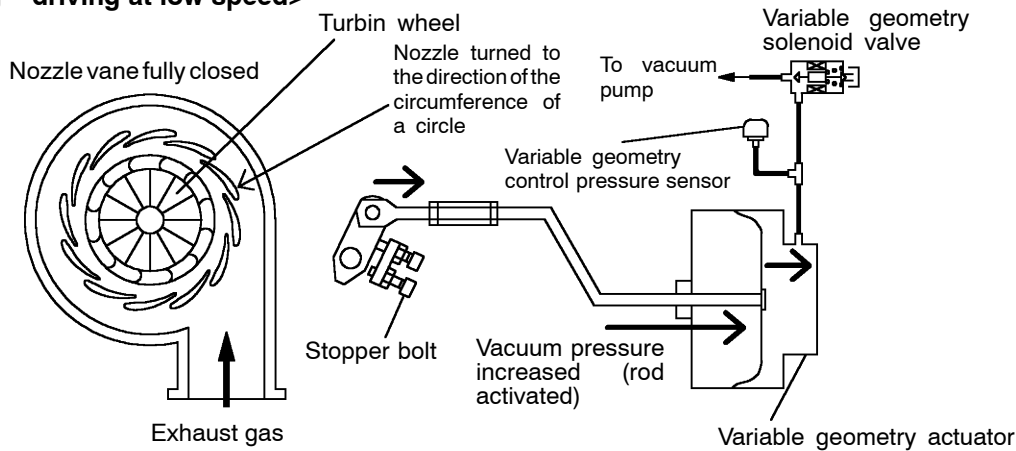
With the modification below by additional emission regulation step III compatible 4D56 engine, the service procedure of the part that is different from previous service procedure has been established.

- The turbocharger has been changed to a Variable Geometry (VG) type. As the variable geometry turbocharger cannot be disassembled, the service procedure for the variable geometry turbocharger is not described.
- A catalytic converter has been added.

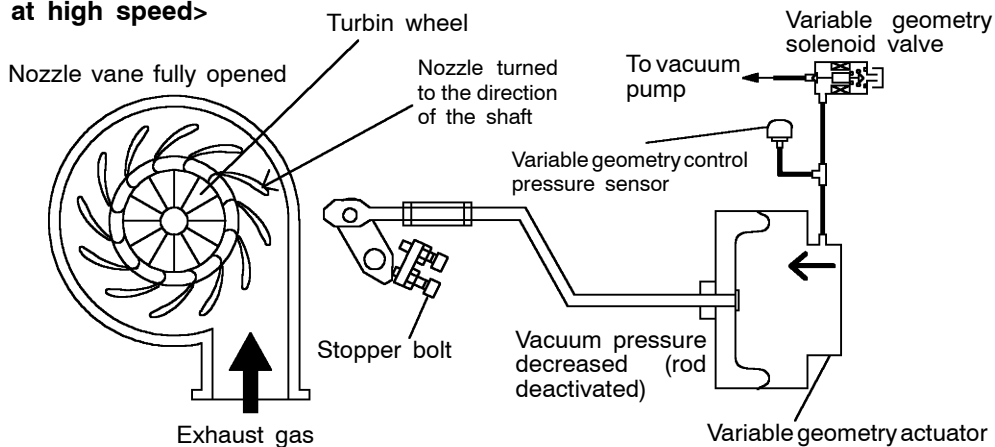
### GENERAL INFORMATION

The variable geometry solenoid valve is duty controlled to control the variable nozzle opening angle of the variable geometry turbocharger. This allows to obtain the characteristic of boost pressure corresponding to the engine operation status.

#### <At starting - driving at low speed>



#### <Driving at high speed>



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At starting and driving at low speed, the duty control value of the variable geometry solenoid valve is increased to apply the vacuum pressure of the vacuum pump to the variable geometry actuator. Applying the vacuum pressure to the variable geometry actuator pulls the actuator rod so that it can move towards the direction of closing the variable nozzle of the variable geometry turbocharger. As closing the nozzle reduces the exhaust gas mass, the speed of exhaust gas flow will be increased and efficiency will be improved. Since the characteristic of boost pressure becomes a low speed type, boost pressure will suddenly rise from low speed.

At driving at high speed, the duty control value of the variable geometry solenoid valve is decreased to reduce the vacuum pressure from the vacuum pump so that the actuator rod can return to the deactivated status and move towards the direction of opening the nozzle of the variable geometry turbocharger.

Opening the nozzle allows the characteristic of boost pressure to become a high speed type so that the appropriate boost pressure can be maintained.

Therefore, boost pressure can be controlled by appropriate duty control of the variable geometry solenoid valve. The engine-ECU calculates the correct boost pressure based on the engine speed and fuel injection amount. Furthermore, the duty control of the variable geometry solenoid valve is given feedback of the signals from the variable geometry control pressure sensor and the boost pressure sensor so that the variable nozzle opening angle of the variable geometry turbocharger can be quickly adjusted to obtain the desired boost pressure.

## SERVICE SPECIFICATIONS

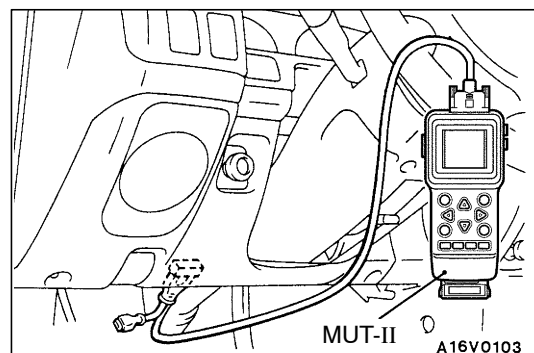
Items	Standard Value
Variable geometry actuator activation vacuum (Approximately 1 mm stroke) kPa	Approximately 10.5 - 12.5
Variable geometry solenoid valve coil resistance (at 20°C) Ω	29 - 35

## ON-VEHICLE SERVICE

### TURBOCHARGER SUPERCHARGING CHECK

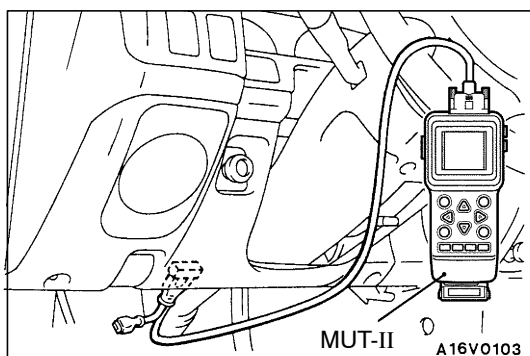
#### Caution

**Conduct the driving test in a location where driving at full acceleration can be done with safety. Two person should be in the vehicle when the test is conducted; the person in the passenger seat should read the indications shown by the MUT-II.**



1. Set the vehicle to the pre-inspection condition.
2. Turn the ignition switch to "LOCK" (OFF) position, and connect the diagnosis connector to the MUT-II.
3. Use the data list function named "Item No. 04" boost pressure sensor of the MUT-II to check the supercharging pressure when the engine speed increases to approximately 3,000 r/min or more by driving at full acceleration in 2nd.

4. When the indicated supercharger does not become positive pressure, check the following items.
  - Malfunction of the boost pressure sensor
  - Leakage of supercharging pressure
  - Malfunction of the turbocharger
5. When the indicated supercharger is 133 kPa or more, supercharging control may be faulty, therefore check the followings.
  - Malfunction of the variable geometry actuator
  - Malfunction of the variable nozzle
  - Malfunction of the variable geometry solenoid valve
  - Malfunction of the boost pressure sensor
  - Malfunction of the variable geometry control pressure sensor



### SUPERCHARGING PRESSURE CONTROL SYSTEM CHECK

1. Set the vehicle to the pre-inspection condition.
2. Turn the ignition switch to "LOCK" (OFF) position, and connect the diagnosis connector to the MUT-II.
3. Start the engine, and let it run at idle.
4. Select the actuator testing function named "Item No. 35 or No. 36" of the MUT-II to check that the variable geometry actuator vacuum and the supercharging pressure increase when the variable geometry solenoid valve is activated.

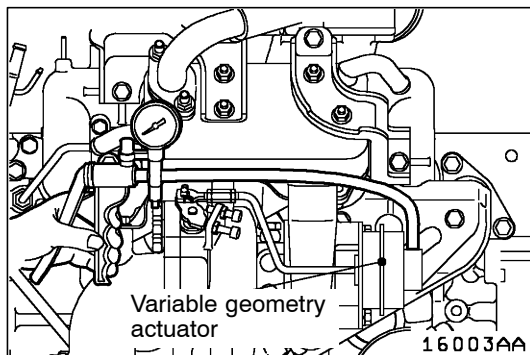
Variable geometry solenoid valve condition	Variable geometry actuator vacuum	Supercharging pressure
OFF	0 kPa	Approximately -1 kPa
ON	Approximately 80 kPa	Approximately 3 kPa

#### NOTE

- (1) If the variable geometry actuator vacuum is not in a normal condition, the variable geometry actuator, variable geometry solenoid valve, variable geometry control pressure sensor, vacuum pump or hose may be faulty.
- (2) If the variable geometry actuator vacuum is in a normal condition but the supercharging pressure is not in a normal condition, the variable geometry turbocharger nozzle, boost pressure sensor, or hose may be faulty.

#### Caution

**Be careful not to forcibly activate the variable geometry solenoid valve to the fullest degree when running at a high speed. Too much supercharging pressure could damage the engine or the turbocharger.**



## VARIABLE GEOMETRY ACTUATOR CHECK

1. Connect the hand vacuum pump to nipple.
2. While gradually applying vacuum, check the vacuum that begins to active (approximately 1 mm stroke) the variable geometry actuator rod.

**Standard value: Approximately 10.5 - 12.5 kPa**

### Caution

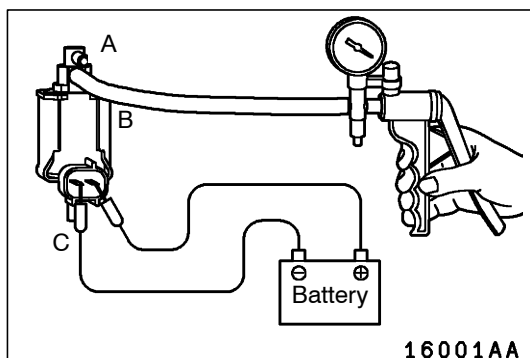
**In order to avoid damage to the diaphragm, do not apply a vacuum of 59 kPa or higher.**

3. If there is a significant deviation from the standard value, check the actuator or the variable nozzle: replace if necessary.

## VARIABLE GEOMETRY SOLENOID VALVE CHECK

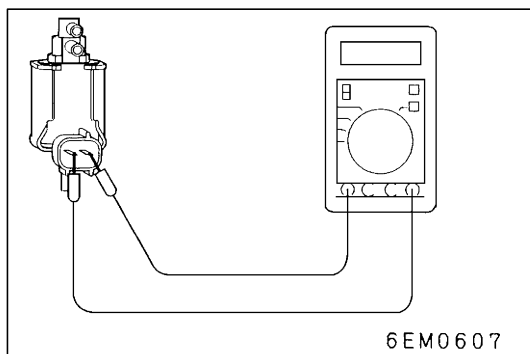
### NOTE

When disconnecting the vacuum hose, always make a mark so that it can be reconnected at original position.



1. Disconnect the vacuum hose (black, red stripe) from the solenoid valve.
2. Disconnect the harness connector.
3. Connect a hand vacuum pump to the nipple to which the red striped vacuum hose was connected.
4. Check airtightness by applying a vacuum with voltage applied directly from the battery to the variable geometry solenoid valve and without applying voltage.

Battery voltage	Nipple condition	Normal condition
Applied	Both nipples are opened.	Vacuum leaks.
	Nipple A is closed.	Vacuum is maintained.
Not applied	Both nipples are opened.	Vacuum leaks.
	Nipple C is closed.	Vacuum is maintained.



5. Measure the resistance between the terminals of the solenoid valve.

**Standard value: 29 - 35  $\Omega$  (at 20°C)**

## INTERCOOLER <4D56-Step III>

With additional air temperature sensor by adopting electronic-controlled injection pump, the air temperature switch of the intercooler is not adopted. The service procedure is same as previous service procedure except for the air temperature sensor.

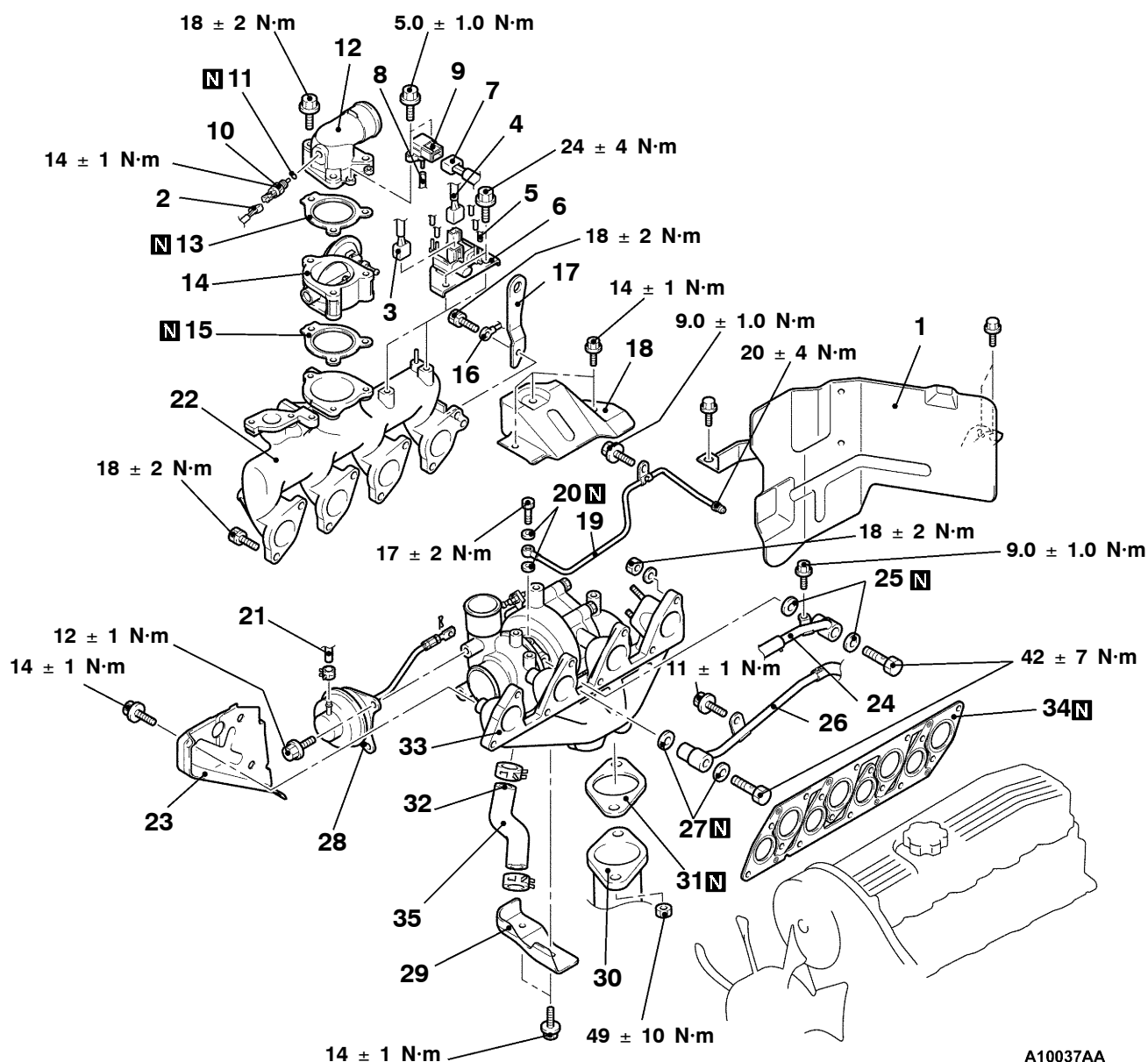
On new models, the engine-ECU controls the intercooler fan. Due to this change, the intercooler fan-ECU has been discontinued.

## INTAKE AND EXHAUST MANIFOLD AND TURBOCHARGER <4D56-Step III>

### REMOVAL AND INSTALLATION

#### Pre-removal and Post-installation Operation

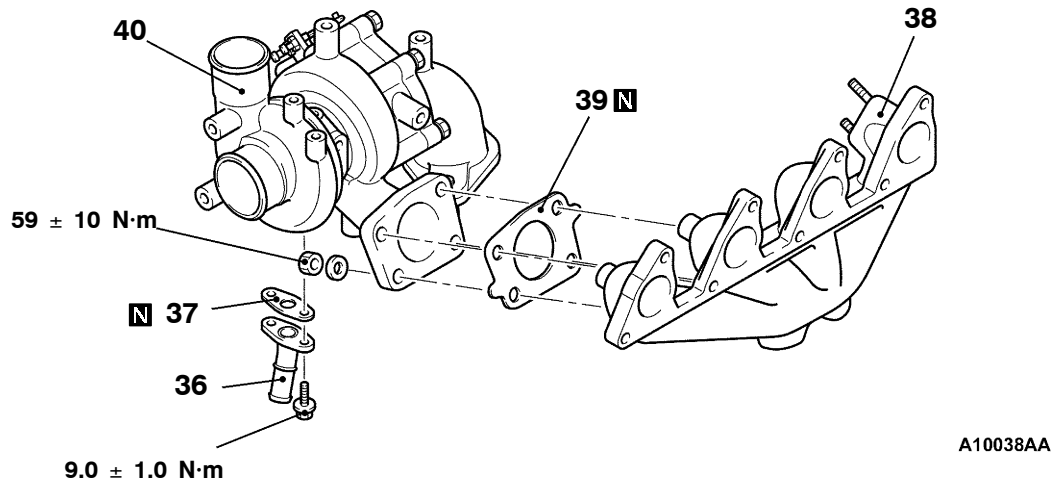
- Intercooler Removal and Installation (Refer to P.15-2.)
- Air Cleaner Cover and Air Intake Hose Removal and Installation
- EGR Valve and EGR Cooler Removal and Installation (Refer to GROUP 17.)



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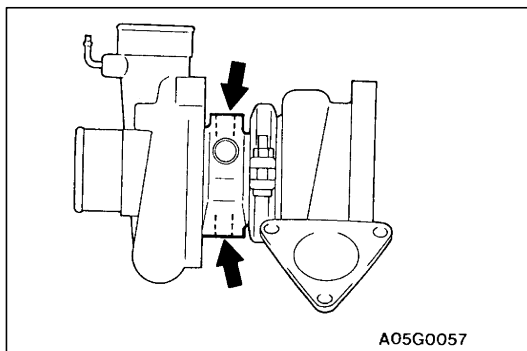
## Removal steps

1. Brake master cylinder heat protector
2. Air temperature sensor connector
3. Throttle solenoid valve connector
4. VGT solenoid valve connector
5. Vacuum hose connection
6. Solenoid valve assembly
7. VG control pressure sensor connector
8. Vacuum hose connection
9. VG control pressure sensor
10. Air temperature sensor
11. Gasket
12. Air intake fitting
13. Gasket
14. Throttle body assembly
15. Gasket
16. Earth cable connection
17. Engine hanger
18. Turbocharger upper heat protector
19. Oil pipe assembly
20. Gasket
21. Vacuum hose connection
22. Intake manifold
23. Exhaust manifold heat protector
24. Water pipe A and water hose assembly
25. Gasket
26. Water pipe B connection
27. Gasket
28. VG actuator
29. Turbocharger lower heat protector
30. Front exhaust pipe connection
31. Gasket
32. Oil return hose connection
33. Exhaust manifold and turbocharger assembly
34. Intake and exhaust manifold gasket
35. Oil return hose



36. Oil return pipe
37. Oil return pipe gasket
38. Exhaust manifold

39. Turbocharger gasket
- ▶A◀ 40. Turbocharger assembly



## INSTALLATION SERVICE POINT

### ▶A◀ TURBOCHARGER ASSEMBLY INSTALLATION

1. Clean the alignment surfaces shown in the illustration.
2. Supply clean engine oil from the oil pipe mounting hole of the turbocharger assembly.

### Caution

When cleaning, take care that no foreign material gets into the engine coolant or oil passages hole.

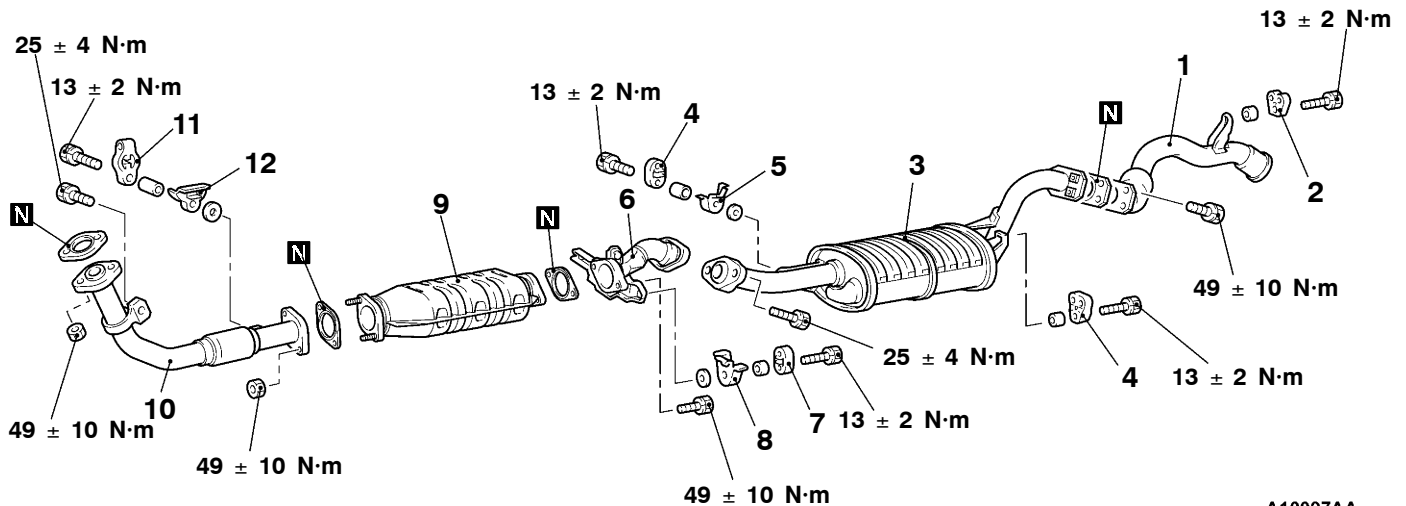


## EXHAUST PIPE AND MAIN MUFFLER &lt;4D56-Step III&gt;

## REMOVAL AND INSTALLATION

## Pre-removal and Post-installation Operation

- Front Under Cover Removal and Installation



## 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. Catalytic converter

## Front exhaust pipe removal steps

10. Front exhaust pipe
11. Hanger
12. Protector