

**INDUSTRIAL
DIESEL ENGINE**

AI-4JJ1X

AJ-4JJ1T

BJ-4JJ1X

BU-4JJ1T

MODEL

WORKSHOP MANUAL

ISUZU MOTORS LIMITED

Taper screw from connectors (brass)

				N·m {kgf·m}
Screw size	PT (R) 1/8	PT (R) 1/4	PT (R) 3/8	PT (R) 1/2
—	2.0 — 14.7 {0.2 — 1.5}	4.9 — 15.7 {0.5 — 1.6}	9.8 — 16.7 {1.0 — 1.7}	9.8 — 17.7 {1.0 — 1.8}

Special tool classification**A; Essential tool**

Servicing operation cannot be done with any other tools than the essential tool.

B; Recommend tool

Servicing work can be done with a general-purpose tool commercially available. However, it is advisable to use the recommended tool as much as possible for a reduced work time and an improved safety in work operations.

C; Available tool

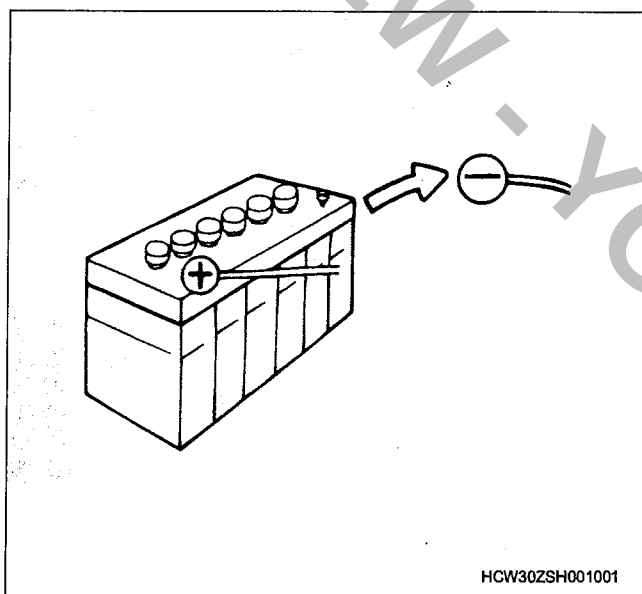
Although it takes a more working time, servicing operations can be made with a tool commercially available as substitute for the available tool.

General Information

Service Precautions

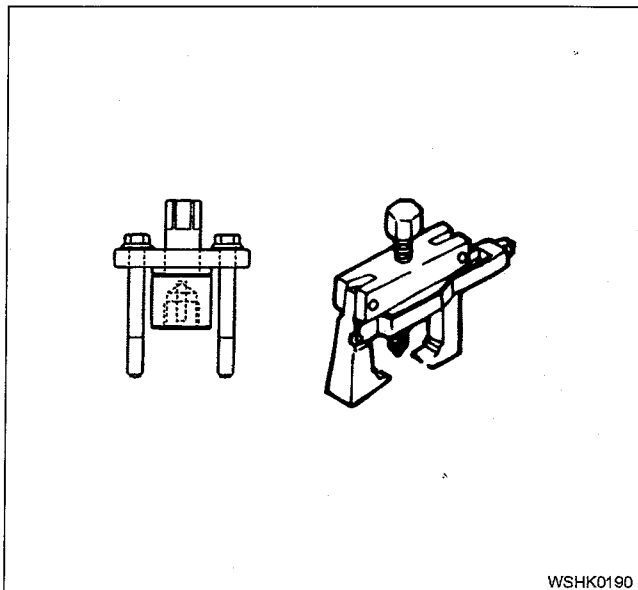
In order to carry out work safely

1. Always use an engine stand when taking the engine down from the vehicle.
Do not place the engine directly onto the ground, or place in a manner that interferes with the oil pan.
2. If you are working together with others, always pay attention to each other's safety.
3. If you are repairing any part of the electrical system, always remove the minus side cable from the battery terminal before starting work. If you are removing the battery cover, always remove the cover in a place that is away from sources of fire/heat.

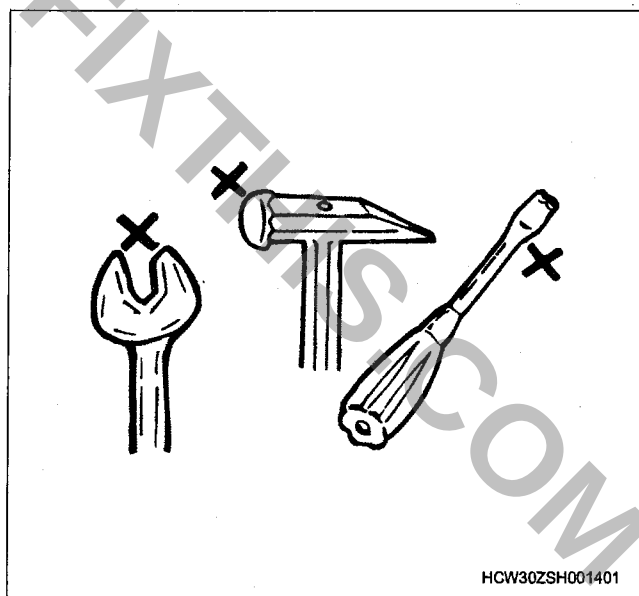


4. Do not perform painting work or leave the engine running for long periods of time in an enclosed or badly ventilated indoor workshop.

5. Always use the correct specialized tool indicated in the instructions. Using the incorrect tool may cause damage to the parts or injury to the person using the tool.

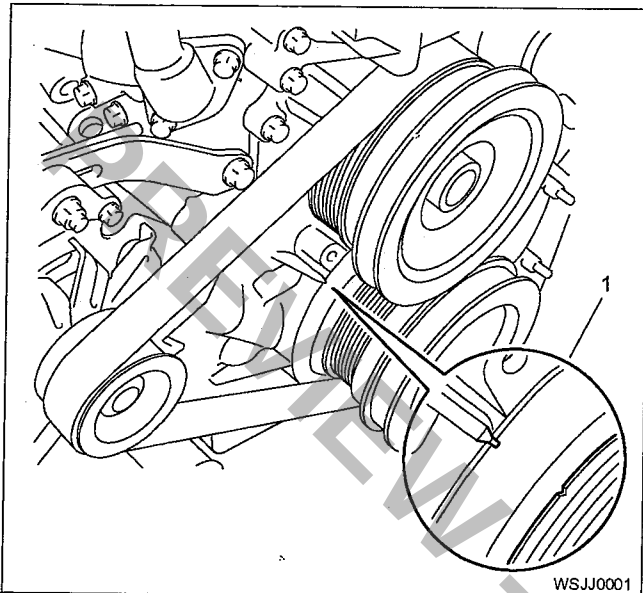


6. All regular tools, gauges and special tools should be regularly inspected, and prepared before starting work. Do not use bent spanners, hammers with damaged edges, chipped chisels, or any other faulty or damaged tools.



Installation

1. Rotate the crankshaft to make the No.1 cylinder meet the compression TDC.

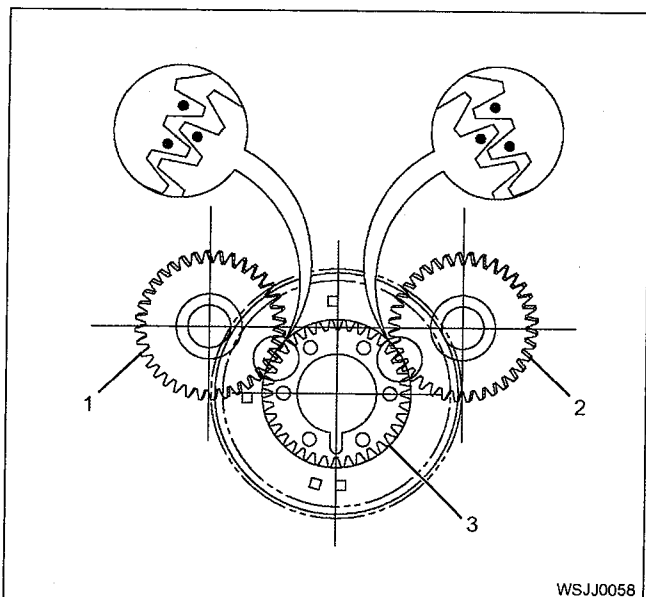


Name

1. TDC

2. Install the camshaft ASM.

- Before installing the camshaft, completely loosen all of the rocker arm adjusting nuts and adjusting screws.
- Put together the camshaft ASM so as to make the "•" mark of the camshaft gear aligned with the "•" mark of the idle gear.

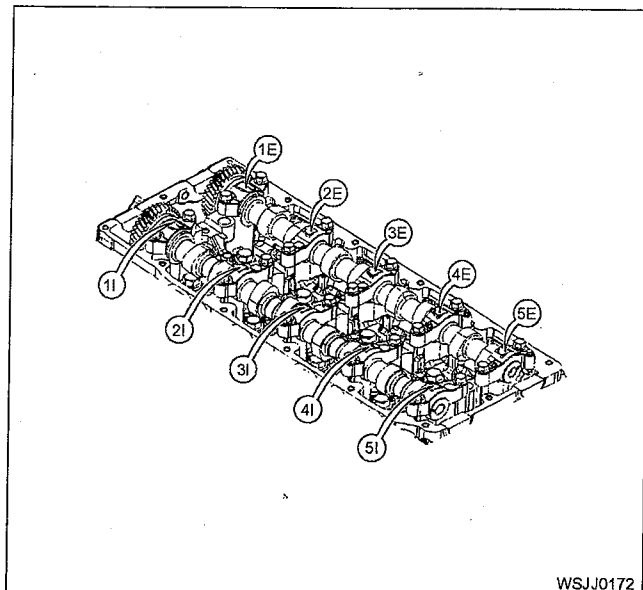


Name

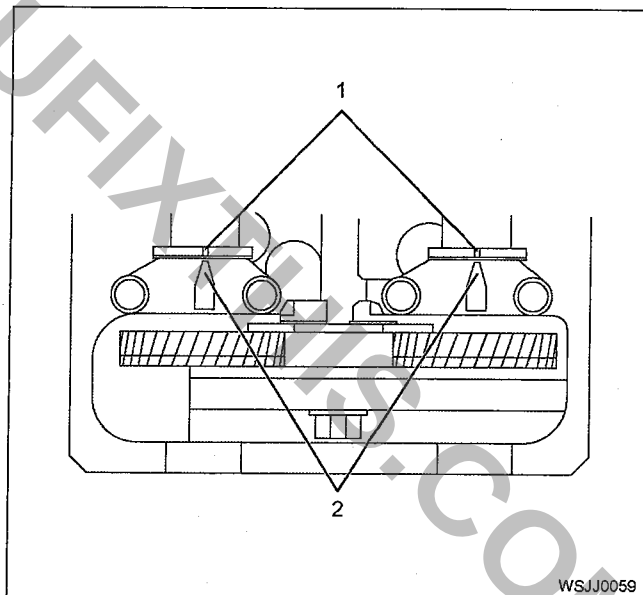
1. Exhaust Camshaft Gear
2. Intake Camshaft Gear
3. Idle Gear D

3. Install the bearing cap.

- Apply engine oil to the camshaft journal portion and the bearing surface of the bearing cap.
- Confirm the stamp mark on the top of the bearing cap and install it on the cylinder head.



- Check that the alignment marks on the camshaft and bearing cap are aligned.



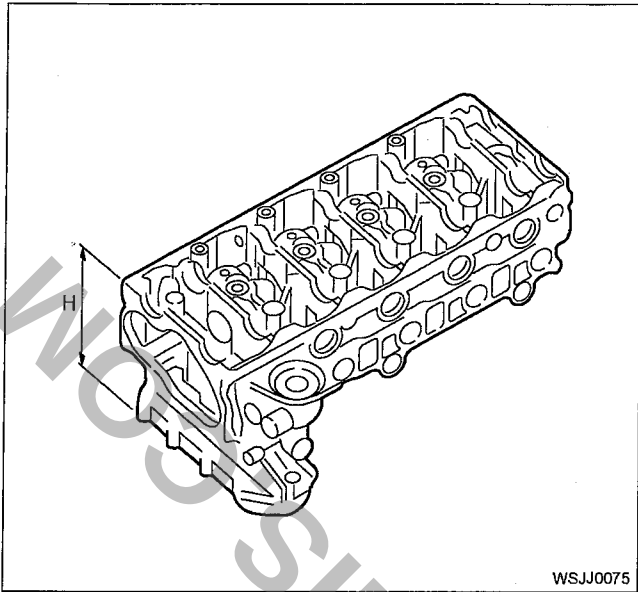
Name

1. Camshaft Alignment Marks
2. Bearing Cap Alignment Marks

- Apply engine oil to the threads and seating surface, and tighten the bearing cap to the specified torque.

Tightening torque:

18 N·m {1.8 kg·m/13 lb·ft}

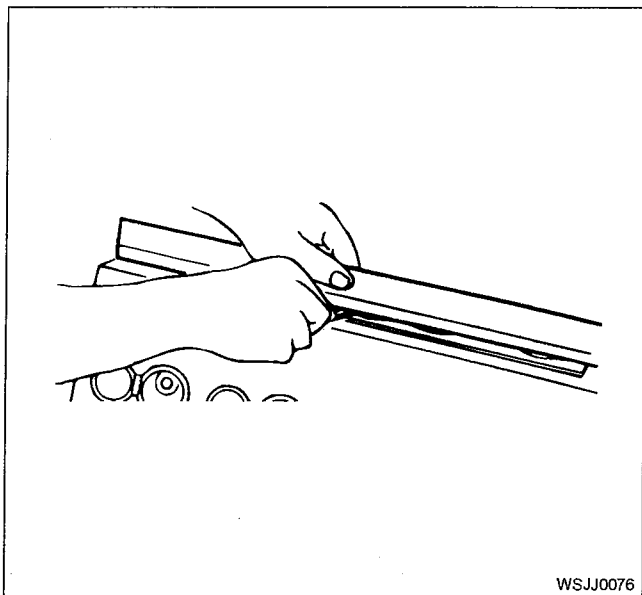


WSJJ0075

Flatness of the installation surfaces of the exhaust manifold and intake manifold

- Use a straightedge and thickness gauge to measure the four sides (right, left, top, and bottom) and diagonal lines as shown in the illustration. If the measurement exceeds the limit value but is less than the maximum allowable grinding value, grind the manifold installation surface of the cylinder head. If the measurement exceeds the maximum allowable grinding value, replace it.

Distortion of the installation surface of the manifold		mm {in}
Standard	0.05 {0.002} or less	
Limit	0.2 {0.0079}	
Maximum allowable grinding value	0.4 {0.0157}	

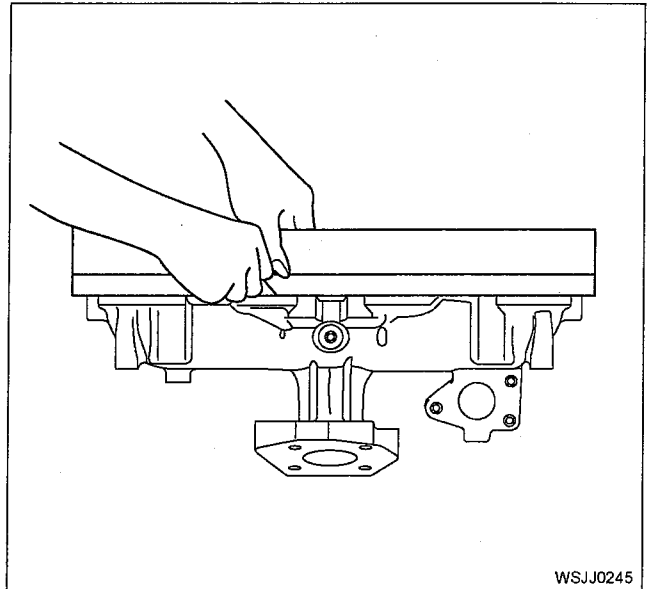


WSJJ0076

Flatness of the exhaust manifold

- Use a straightedge and thickness gauge to measure the flatness. If it exceeds the limit, replace the exhaust manifold.

Distortion of the exhaust manifold		mm {in}
Standard	0.05 {0.002} or less	
Limit	0.2 {0.0079}	



WSJJ0245

Inspection of valve stem end cap

- Inspect for excessive abrasion and damage on the surface where the cap and the rocker arm adjusting bolt contact, and replace as required.

Inspection of valve guide

CAUTION:

If there is a scratch or abnormal abrasion on the valve stem and the inside diameter part of the valve guide, replace the valve and valve guide together.

1. Measure the valve guide clearance.

- Measure the diameter of the valve stem with a micrometer.

If the diameter of the valve stem is smaller than the limit, replace the valve and valve guide together.

Outside diameter of the valve stem		mm {in}
	Standard	Limit
Intake valve	6.955 — 6.970 {0.2738 — 0.2744}	6.935 {0.2730}
Exhaust valve	6.939 — 6.949 {0.2732 — 0.2736}	6.920 {0.2724}

0A-8 General Information

Abbrevia- tion	Description
PM	Particulate Matter
PS	Pre-Stroke
PTO	Power Take Off
QOS	Quick On System
Rr, RR	Rear
R/H, RH	Right Hand
R/L	Relay
STD	Standard
SW	Switch
TICS	Timing & Injection rate Control System
VGS Turbo	Variable Geometry turbocharger System
W/L	Warning Lamp

SI (International System of Units)

With regards the conversion to SI (International System of Units)

The introduction of the SI systems aims to internationally unify the metric system and the various units used by different countries (traditional weights and measures, the foot pound method etc.), and to curb the confusion that occurs between the different units (conversion calculations etc.).

The new calculating method which adopted SI units was completely adopted in Japan in 1992, and is standardized by JIS-Z-8203.

All of the units in this manual are written in line with the International System of Units SI units, and conventional units are written in { } brackets.

SI

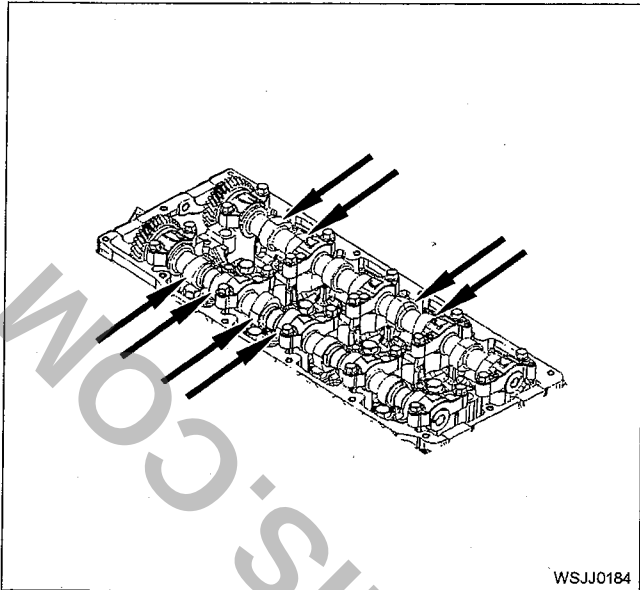
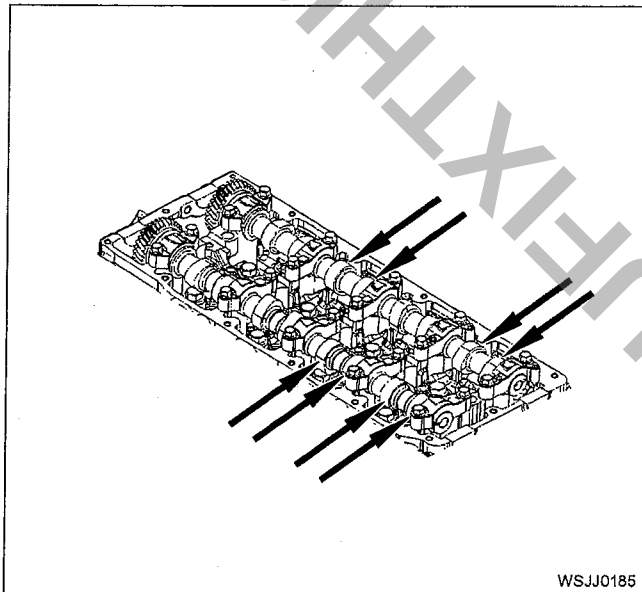
Abbreviation of French word "Le Systeme International d'Unites"

Connection between main SI units and conventional units

	SI	Conventional unit	Item, unit conversion
Length	m	m	Same as the conventional unit
Weight (Mass)	kg	kg	Same as the conventional unit
Force	N	* kg, kgf	1 kgf = 9.80665 N
Torque	N·m	* kg·m, kgf·m	1 kgf·m = 9.80665 N·m
Pressure	Pa	* kg/cm ² , mmHg	1 kgf/cm ² = 9.80665 kPa, 1 mmHg = 133.3 Pa
Power output, horsepower	W	PS	1 PS = 0.74 kW
Capacity, air volume displacement	m ³	Liter, L, cc	1 Liter = 1 dm ³ , 1 cc = 1 m Liter = 1 cm ³
Fuel consumption	g/(kW·h)	g/(PS·h)	1 g/(PS·h) = 1.360 g/(kW·h)

*1 Published service data may conveniently use kg for force and mass (weight) instead of kgf.

*2 Some conversion results may be rounded off to 1 or 2 decimal places.



- Install the cylinder head cover. Refer to 1A-16, "Installation, Cylinder Head Cover".
- Connect the leak-off hose.
- Connect the fuel injector connector.

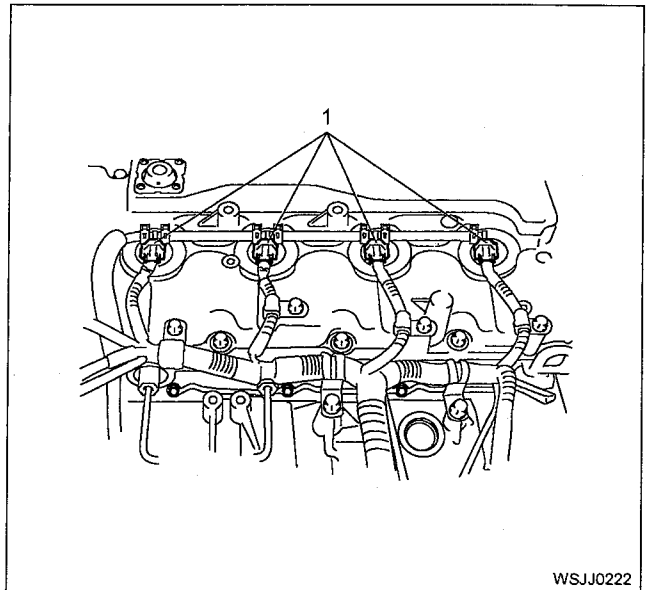
Compression pressure inspection

- Warm-up the engine.
- Remove a negative terminal of the battery and remove all the glow plugs.
- Remove the connector of the fuel injector (no fuel will be injected).

CAUTION:

When the harness connector is removed, ECM judges that it broke down and DTC is recorded. Upon completion of measurement, never fail to clear memory of ECM.

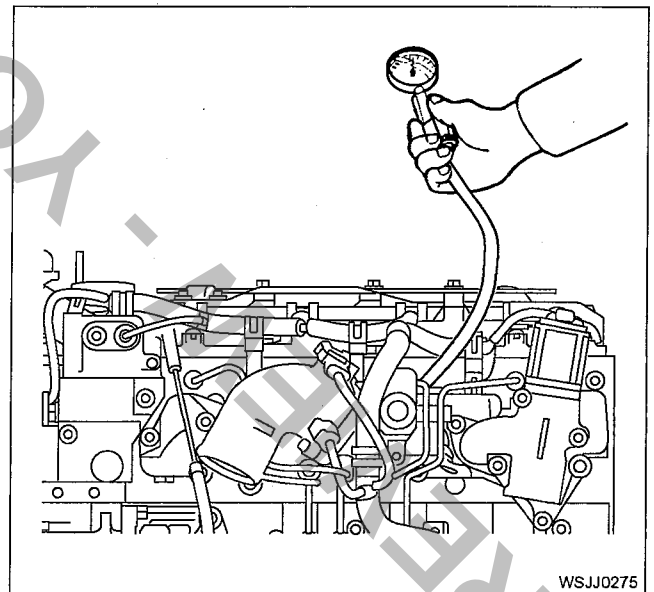
(For how to clear memory of ECM, refer to the Engine Control System section)



Name

1. Fuel Injector Connector

- Install the negative terminal of the battery.
- Turn on the starter to emit foreign matter within the cylinders.
- Install an adapter and a gauge of a compression gauge (special tool).



Compression gauge:

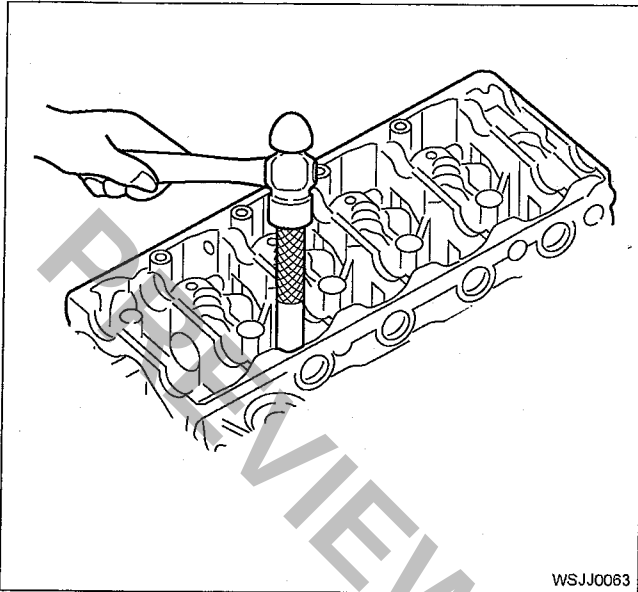
5-8840-2675-0 (J-26999-12)

Compression gauge adapter:

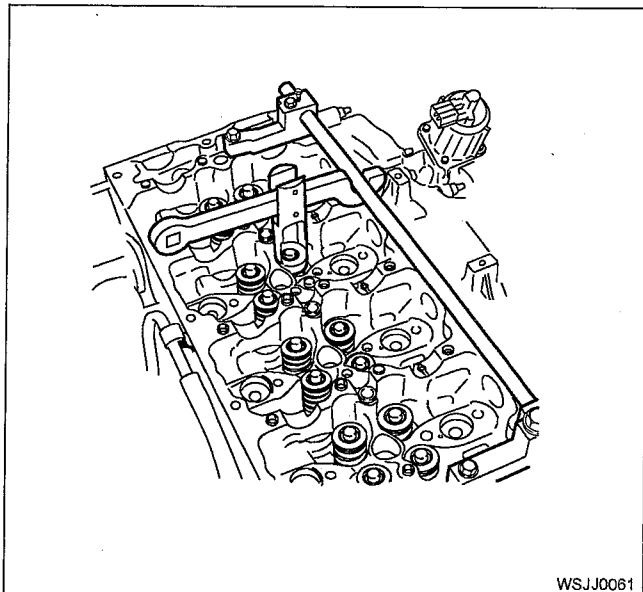
5-8840-2815-0

- Turn on the starter to inspect compression pressure.

Compression pressure	MPa {psi} / 200 rpm
Standard	2.84 — 3.24 {412 — 469}
Limit	1.96 {284}
Differences among the cylinders	294 kPa {43}

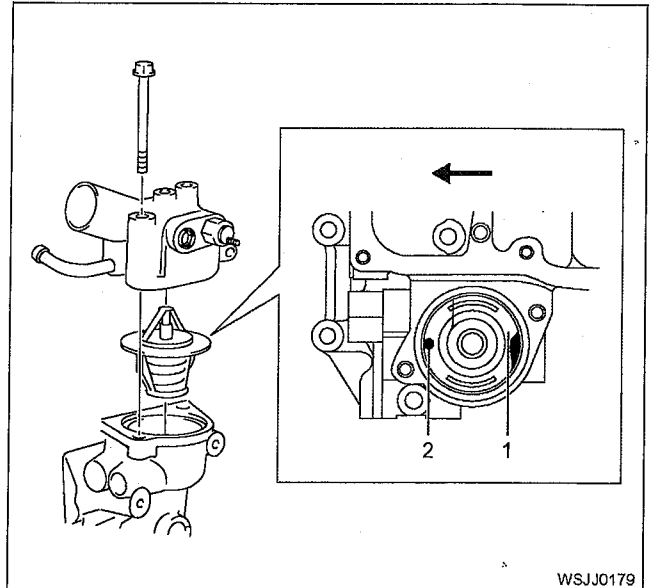


5. Install the intake and exhaust valves.
 - Apply engine oil on the valve stem part and install the valve.
 6. Install the valve spring.
 7. Install the spring upper seat.
 8. Install the split collar.
 - Use a remover to compress the valve spring and install the split collar.
- Special tool**
 Valve spring remover: 5-8840-2818-0
 Pivot: 5-8840-2819-0



9. Install the thermostat.

- Install the thermostat on the position shown in the illustration.



Name

1. Thermostat
2. Jiggle Valve

10. Connect the water outlet pipe.

- Tighten the water outlet pipe to the specified torque.

Tightening torque:

25 N·m {2.5 kg-m/18 lb-ft}

11. Install the exhaust manifold.

Refer to 1A-25, "Installation, Exhaust Manifold".

12. Install the turbocharger.

Refer to 1A-25, "Installation, Exhaust Manifold".

13. Install the intake manifold.

Refer to 1A-20, "Installation, Intake Manifold".

Installation

1. Install the cylinder head gasket.

- Select the cylinder head gasket.
- Clean the head of the piston and the upper surface of the cylinder block.
- Use a dial gauge to measure the extrusion amount of the piston at the location shown in the illustration.
- Measure as close to the cylinder bore as possible.

- Refer to 1H-10, "Installation, Oil Cooler".
13. Install the common rails.
Refer to 1C-18, "Installation, Common Rail".
 14. Install the fuel supply pump.
Refer to 1C-25, "Installation, Fuel Supply Pump".
 15. Install the cylinder head.
Refer to 1A-68, "Installation, Cylinder Head".
 16. Install the rocker arm shaft ASM.
Refer to 1A-49, "Installation, Rocker Arm".
 17. Install the camshaft ASM.
Refer to 1A-44, "Installation, Camshaft".
 18. Install the cylinder head cover.
Refer to 1A-16, "Installation, Cylinder Head Cover".
 19. Put the engine ASM on.

Engine

4JJ1 Cooling System

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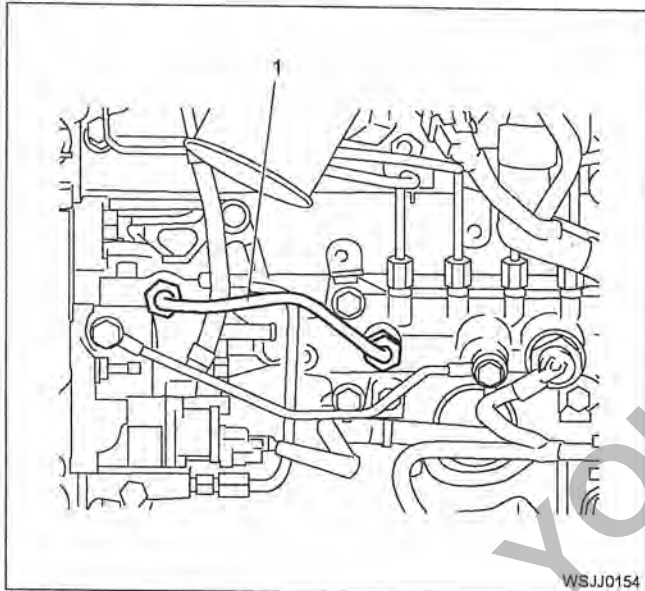
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Removal

1. Remove the starter motor.
24V model: Refer to 1D-24, "Removal, Starter (24V model)".
12V model: Refer to 1D-28, "Removal, Starter (12V model)".
2. Remove the fuel feed pipe from the fuel supply pump.

Note:

Cover the areas exposed during part removal to prevent the entry of foreign material into the fuel system.



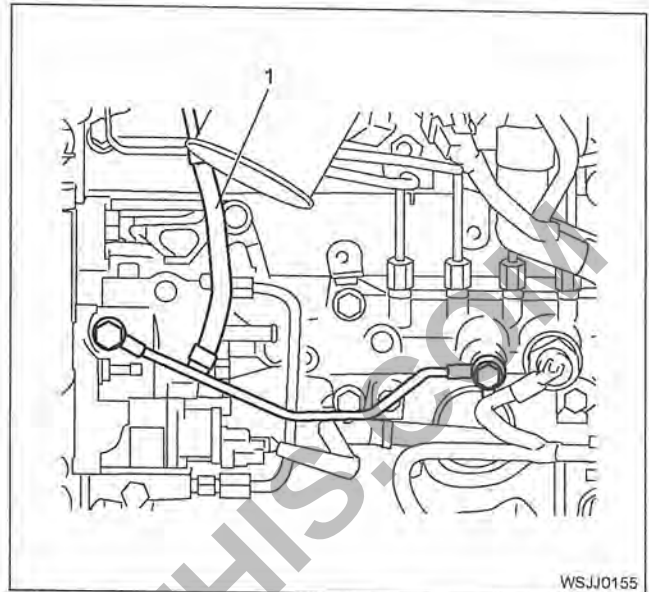
Name

1. Fuel Feed Pipe

3. Disconnect the fuel return hose.
4. Disconnect the leak-off pipe and hose.

Note:

Cover the areas exposed during part removal to prevent the entry of foreign material into the fuel system.



Name

1. Leak-off Pipe and Hose

5. Disconnect the common rail pressure sensor connector.
6. Disconnect the fuel injection pipe.

Important:

Do not reuse the high-pressure pipe in fuel system if it has been removed.

Refer to 1C-12, "Removal, Fuel Injector".

7. Remove the common rail and the common rail bracket.

CAUTION:

- Do not grasp the pressure sensor, during the common rail removal procedure.
- Take care not to damage the connector unit of the pressure sensor.

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