

6M6 (for industrial use)

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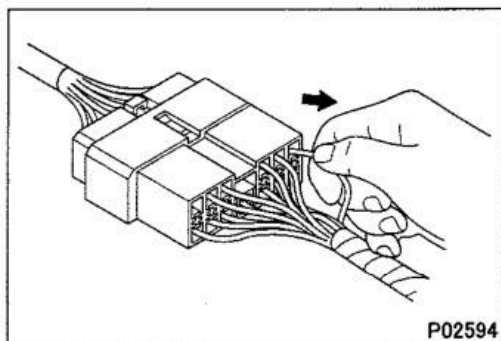
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Shop Manual

diesel engine

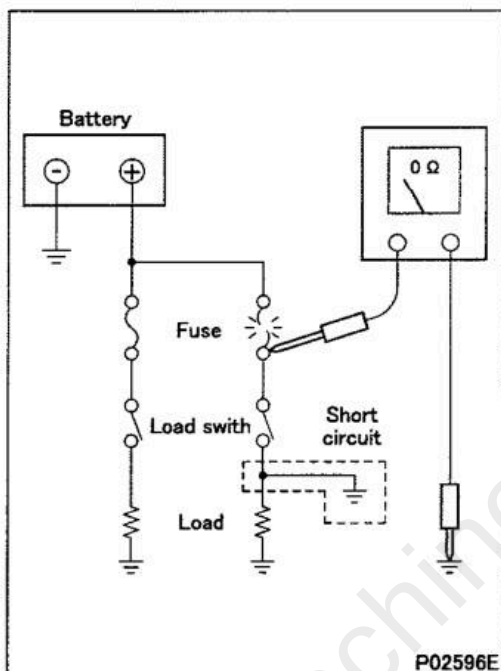


- Check for defective connections caused by loose terminals, by rust on terminals, or by contamination of terminals by foreign substances.



(2) Checking for loose terminals

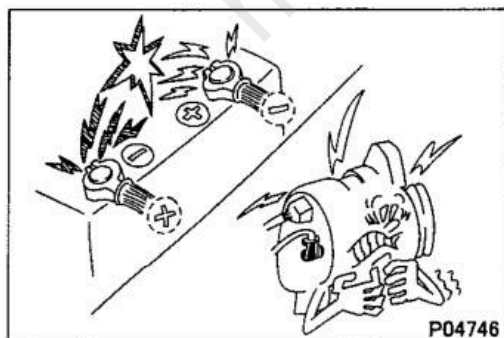
- If connector terminal retainers become damaged, male and female terminals may not mate with each other when the connector bodies are fitted together. To check for such terminals, gently pull each wire and see whether any terminals slip out of their connector housings.



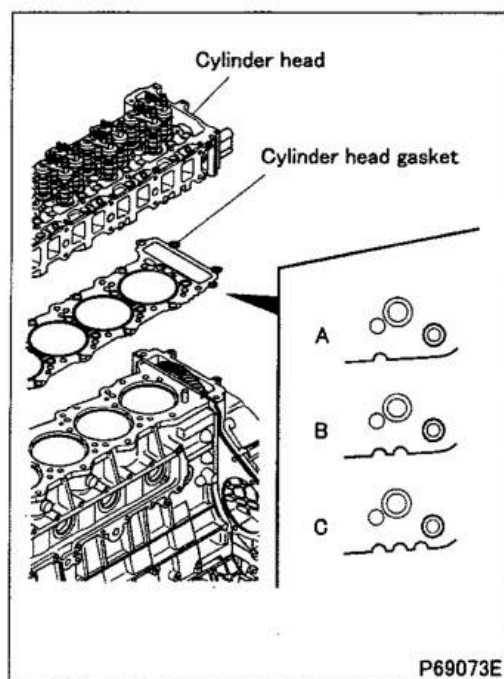
1.3 Inspections when a fuse blows

- Remove the fuse, then measure the resistance between ground and the fuse's load side. Next, close the switch of each circuit connected to the fuse. If the resistance measurement between any switch and ground is zero, there is a short circuit between the switch and the load. If the resistance measurement is not zero, the circuit is not currently short-circuited; the fuse probably blew due to a momentary short circuit.
- The main causes of short circuits are as follows:
 - Harnesses trapped between chassis parts
 - Harness insulation damage due to friction or heat
 - Moisture in connectors or circuitry
 - Human error (accidental short-circuiting of components)

2. Service Precautions for Alternators



- When servicing alternators, observe the following precautions:
 - Never reverse the polarity of battery connections. If the polarity of the battery connections were to be reversed, a large current would flow from the battery to the alternator, damaging the diodes and regulator.

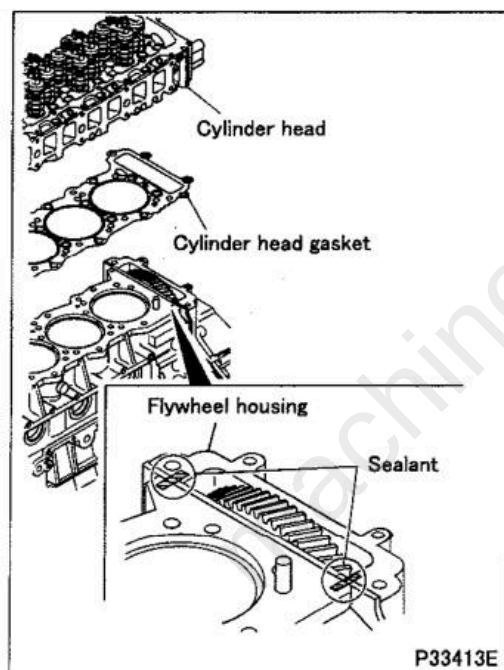


- The cylinder head gasket is a part that needs to be selected for use. Choose the appropriate gasket in the following manner.
- Measure the piston protrusion from each cylinder. (See Piston.)
- Then, from the table below, choose the cylinder head gasket having a thickness appropriate to the average protrusion of the pistons.
- If the cylinder head has even one cylinder that exceeds the largest of the measured piston protrusions by 0.05mm or more, use a gasket at least one size larger in thickness (A → B, B → C).

Unit: mm

Piston protrusion	Cylinder head gasket	
Average piston protrusion	Type by size (): No. of notches	Tightened thickness
0.804 to 0.872	A(1)	1.70 ± 0.05
0.873 to 0.941	B(2)	1.75 ± 0.05
0.942 to 1.011	C(3)	1.80 ± 0.05

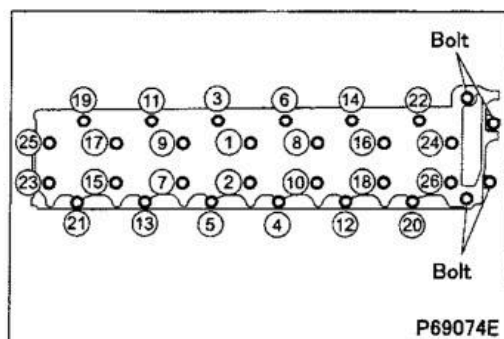
- Identify the appropriate type of cylinder head gasket according to the number of notches in its notched end.



- Remove oil and any other contamination from the surfaces where sealant is to be applied.
- Apply sealant onto the surfaces of the flywheel housing and crankcase that will be fitted together.
- Within three minutes following the sealant application, install the cylinder head onto the crankcase, with the cylinder head gasket in between them, using the cylinder head bolts. Take care so that the applied sealant is not displaced during installation. Be sure to install the gasket in the illustrated position.

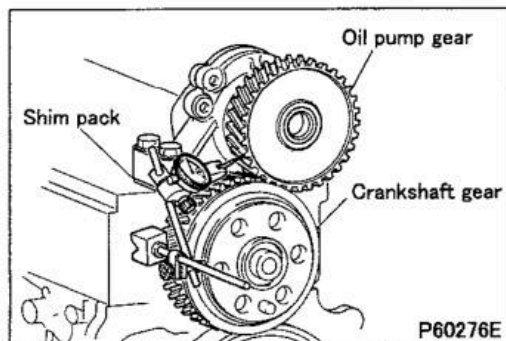
CAUTION ⚠

- Do not start the engine for at least an hour after installation.
- Whenever cylinder head bolts are loosened or removed after installation, the cylinder head gasket must be replaced and sealant reapplied.



- Tighten the cylinder head bolts to a torque of 78N.m {8kgf.m} in the order shown in the illustration.
- Further tighten the bolts in the illustrated order as follows.

◆ Inspection before removal ◆



■ Inspection: Backlash between oil pump gear and crankshaft gear

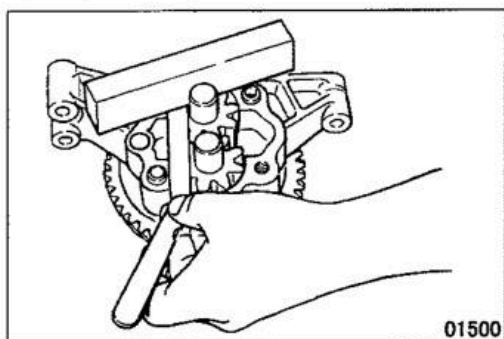
- If the measurement exceeds the limit, adjust by shimming.

Shim feeler	Change in backlash
0.1 mm	0.073 mm
0.2 mm	0.146 mm

CAUTION ⚠

- Perform shimming such that the shim packs on both sides will have the same feeler.

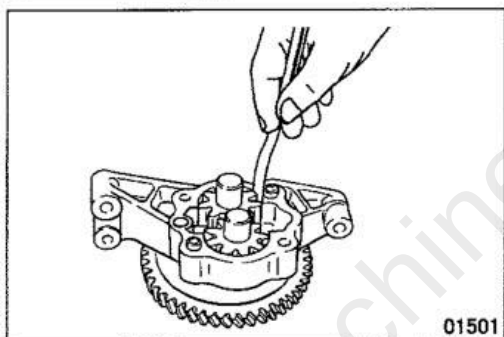
◆ Inspection procedure ◆



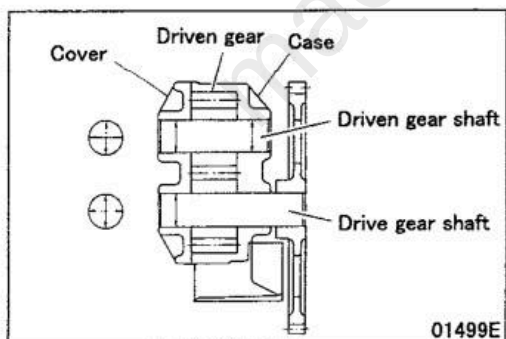
■ Inspection: Driven gear, Gear and case assembly

- Perform the following inspections. Replace the defective part(s) as required.

(1) Difference between case depth and height of each gear

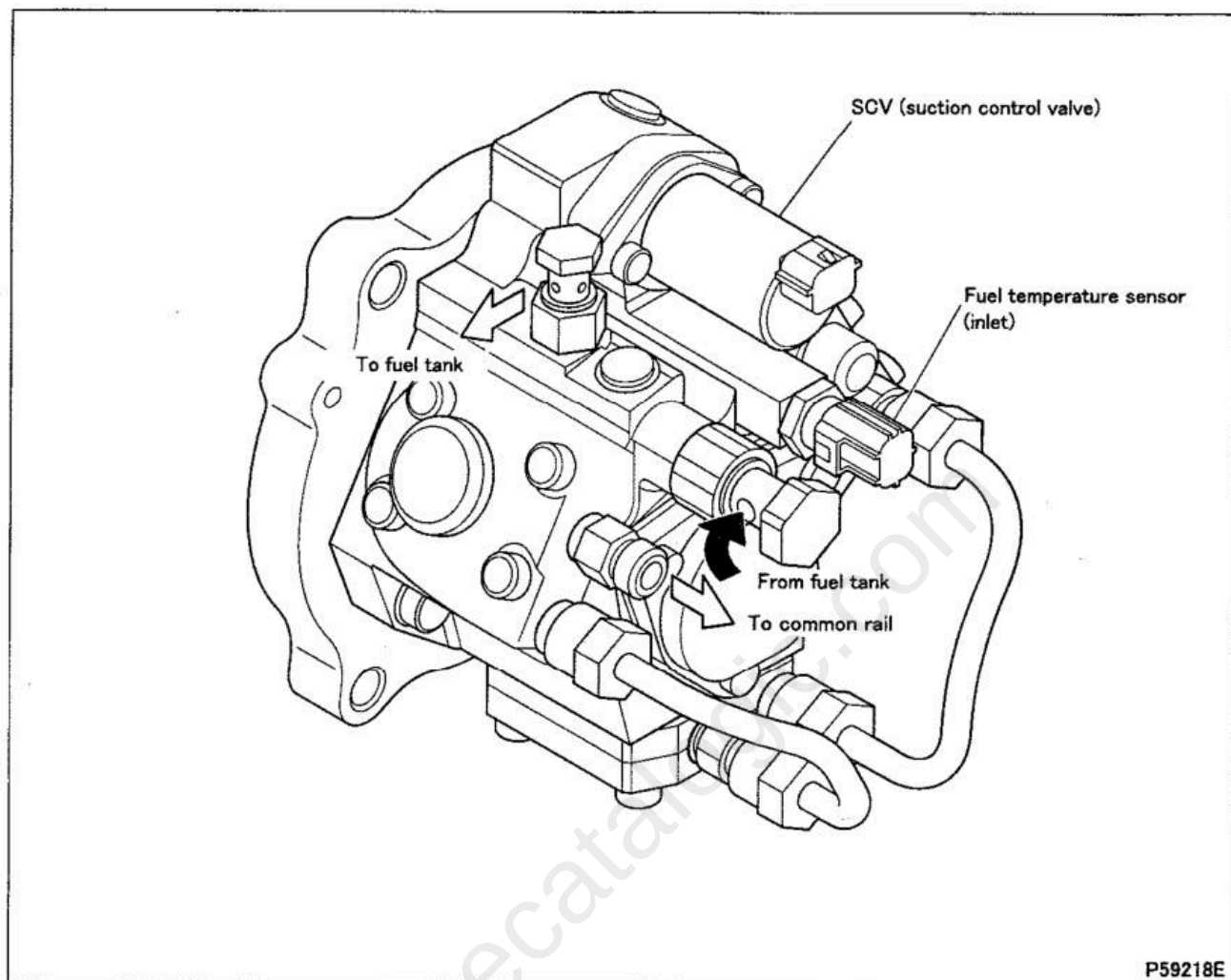


(2) Clearance between case and tooth tips of each gear



(3) Clearance between drive gear shaft and cover

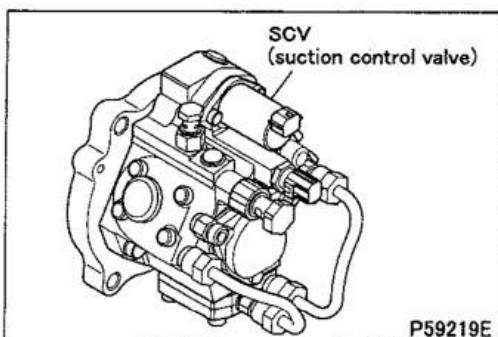
(4) Clearance between driven gear shaft and case, and that between the shaft and cover



CAUTION

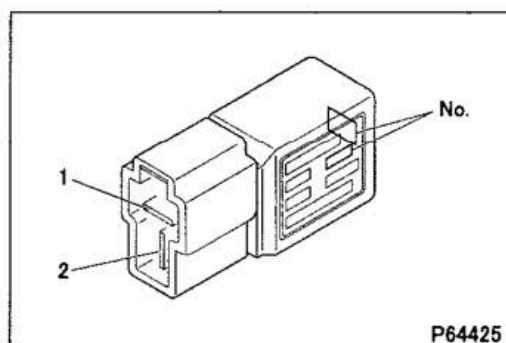
- Be sure to connect the SCV (suction control valve) connector to the engine harness before starting the engine. If the engine were started with the SCV (suction control valve) connector not connected, control of the supply pump by the engine electronic control unit would not be possible and a fault would ensue.

- The supply pump pressurizes fuel and supplies it in a highly pressurized state.
- Fuel drawn from the fuel tank by the feed pump is not supplied directly to the plungers. It is supplied first to the common rail pressure solenoid valve, which controls the amount of fuel reaching the plungers.
- If the fuel pressure exceeds a certain level, the regulating valve returns fuel to the inlet side of the feed pump. This operation keeps the pressure of the fuel fed to SVC (suction control valve), constant.
- Rotation of the camshaft causes (via the ring cam) up-down movement of the plungers. Fuel in the plunger chambers is thus highly pressurized.



(1) SCV (suction control valve)

- The SCV (suction control valve) receives fuel from the feed pump and feeds fuel toward the plungers of the supply pump in such a quantity that the fuel pressure corresponds to that required by the engine electronic control unit.
- When the SCV (suction control valve) is not operating, i.e., when current is not flowing, fuel flows at its maximum rate. When current flows, the piston in the common rail pressure solenoid valve is pressed down such that fuel is not fed toward the plungers.
- The engine electronic control unit controls the ratio of current-on time (duty ratio).



#828 Inspection of fuel injection rate adjustment resistor

- Measure the resistance of the resistor number marked on the fuel injection rate adjustment resistor.

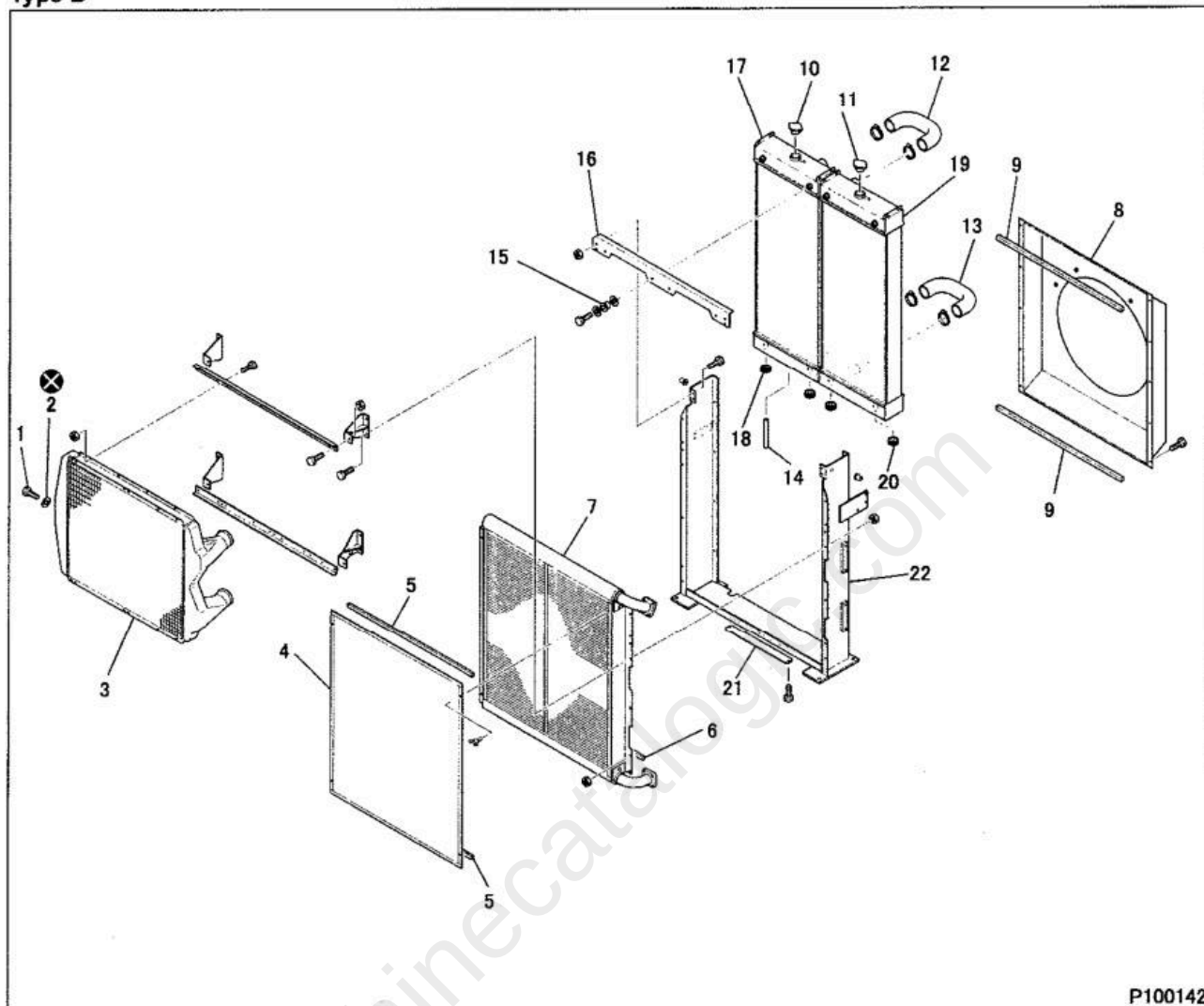
Standard value (at 20°C)	Resistor No.	1	$270 \pm 13.5 \Omega$
		2	$510 \pm 25.5 \Omega$
		3	$820 \pm 41 \Omega$
		4	$1300 \pm 65 \Omega$
		5	$2000 \pm 100 \Omega$
		6	$3300 \pm 165 \Omega$
		7	$5600 \pm 280 \Omega$
		8	$15000 \pm 750 \Omega$
		9	$390 \pm 19.5 \Omega$
		10	$4300 \pm 215 \Omega$
		11	$9100 \pm 455 \Omega$

- If the measurement is out of specification, replace the fuel injection rate adjustment resistor with one that has the same resistor number and same specified resistance.

CAUTION

- The fuel injection rate adjustment resistor is matched to the engine. If you replace it, be sure to replace it with one that has the same resistor number.

Type B



P100142

● Removal sequence

- | | | |
|---------------|-----------------|-------------|
| 1 Plug | 9 Packing | 17 Radiator |
| 2 Gasket | 10 Pressure cap | 18 Cushion |
| 3 Intercooler | 11 Pressure cap | 19 Radiator |
| 4 Protector | 12 Water hose | 20 Cushion |
| 5 Packing | 13 Water hose | 21 Plate |
| 6 Packing | 14 Hose | 22 Frame |
| 7 Oil cooler | 15 Cushion | |
| 8 Shroud | 16 Bracket | |

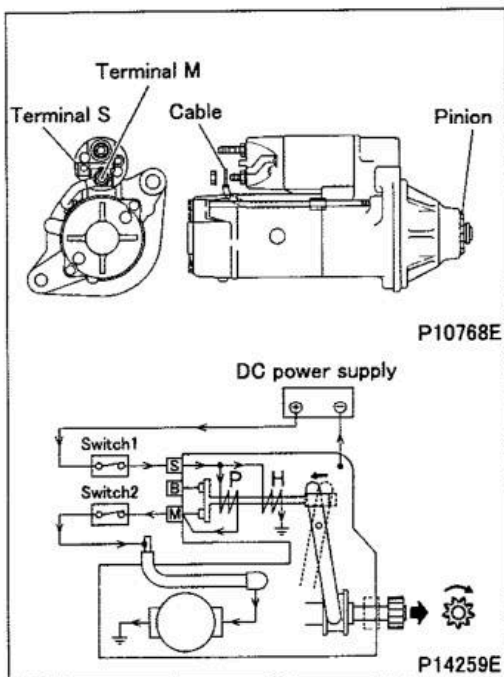
⊗: Non-reusable parts

● Installation sequence

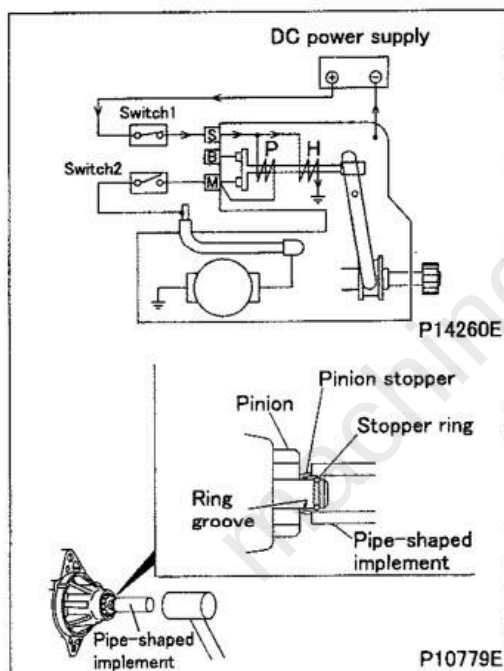
Follow the removal sequence in reverse.

Service standards

Location	Maintenance item	Standard value	Limit	Remedy
3	Air leaks from intercooler (air pressure: 1.5 MPa {15 kgf/cm ² })	0 cm ³ {0 mL}	—	Replace
7	Air leaks from oil cooler (air pressure: 150 kPa {1.5 kgf/cm ² })	0 cm ³ {0 mL}	—	Replace
10, 11	Pressure cap opening pressure	49 ± 9.8 kPa {0.5 ± 0.1 kgf/cm ² }	—	Replace
17, 19	Air leaks from radiator (air pressure: 100 kPa {1.0 kgf/cm ² })	0 cm ³ {0 mL}	—	Replace



- Connect the starter as illustrated.
- The following operations are performed with current supplied to the starter. Thus, the entire procedure for removal of the pinion must be completed within 30 seconds.
- Turn ON switches 1 and 2 to supply current to the starter. The pinion will spring out and rotate.



- After the pinion starts to rotate, quickly (within five seconds) turn OFF switch 2 to stop the pinion's rotation.

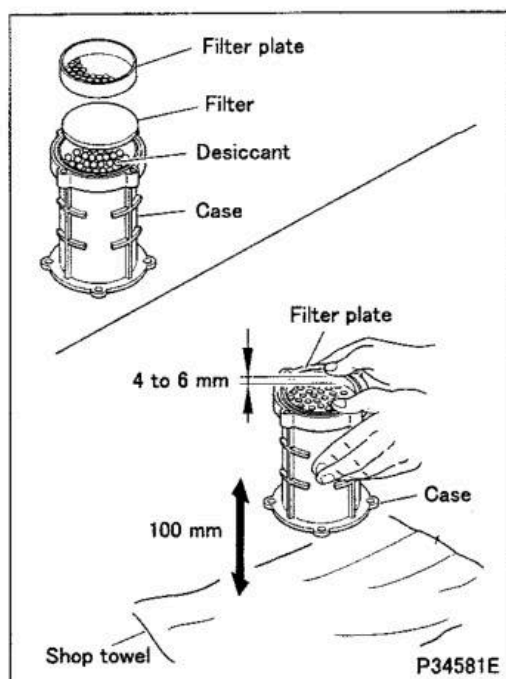
CAUTION ⚠

- When switches 1 and 2 are turned ON, the pull-in coil P and holding coil H are both energized. The circuit is connected such that no voltage is applied to starter terminal B, so current flows to the pull-in coil while the pinion rotates. To prevent the pull-in coil from burning out, it is essential to turn OFF switch 2 quickly (within five seconds) after the pinion starts to rotate.

- Apply a pipe-shaped implement to the pinion stopper.
- Using a hammer, lightly tap the pipe-shaped implement to remove the stopper ring from the ring groove of the pinion stopper.
- Remove the stopper ring and pinion.
- Turn OFF switch 1 to de-energize the starter.

CAUTION ⚠

- When the starter is de-energized, the mechanism will attempt to pull in the pinion. Thus, the stopper ring may slip back into the ring groove of the pinion stopper. If this happens, energize the starter and go through the pinion removal procedure again.

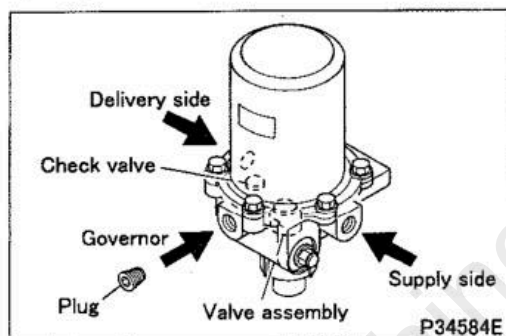


- Place the soft layer side of the filter on the desiccant, and place the filter plate on the case, then tap the desiccant down following the manners.
- Before tapping the case against the work surface, lay two or three layers of shop towel on the work surface to protect the bottom of the case from scratches.
- Holding down the filter plate with both hands, lift the case to a height of about 100 mm and tap it gently against the work surface.
- Tap the case about 30 more times. Make sure the filter plate drops by 4 to 6 mm from its original position.

WARNING

- Unless the tapping procedure is performed, particles of desiccant may escape and create blockages in brake lines, thus preventing normal brake operation.

◆ Inspection after installation ◆



■ Inspection: Air leakage

- Completely plug the delivery side of the air dryer, then apply air pressure of 49 kPa {0.5 kgf/cm²} or 780 kPa {8 kgf/cm²} to the supply side and check that no air leaks from any joint. Leakage from the valve assembly must not exceed 20 cm³ per minute.
- Increase the pressure applied to the supply side to 932 kPa {9.5 kgf/cm²} to cause purging (regeneration). Check that no air leaks from the check valve and from the air pressure governor (with the plug removed).
- If there is air leakage from the air pressure governor or the check valves, charging (pressure filling) and purging (regeneration) will be performed continuously. Therefore, carry out the inspection of the air pressure governor and check valve.

Full Version Available

Mitsubishi 6M60 Engine Service Manual (97821-06000)

Mitsubishi 6M60 engine service manual with repair procedures, adjustments and troubleshooting for the main systems. Instant PDF download.

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