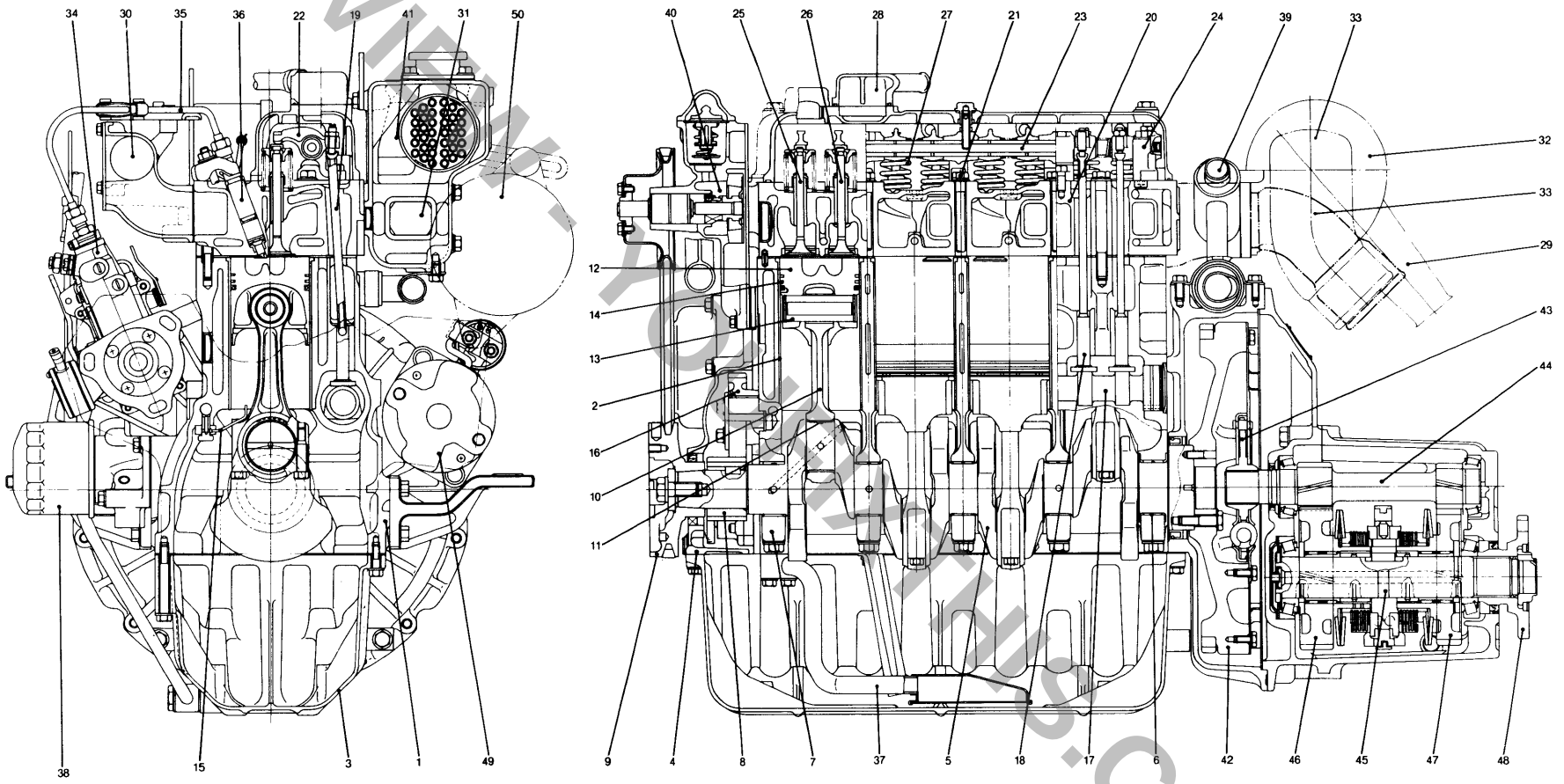
5. Engine Cross Section

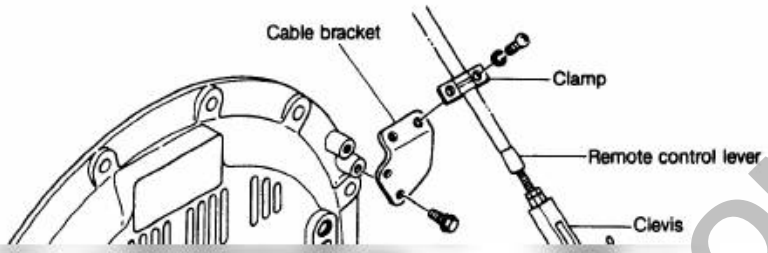


1. Cylinder block
2. Cylinder liner
3. Oil pan
4. Timing gear case
5. Crankshaft
6. Main bearing bushing
7. Main bearing cap
8. Crank gear
9. Crankshaft V-pulley
10. Connecting rod
11. Crank pin bushing
12. Piston
13. Piston pin
14. Piston ring
15. Piston cooling nozzle
16. Idle gear
17. Camshaft
18. Tappet
19. Push rod
20. Cylinder head
21. Cylinder head bolt
22. Valve rocker arm
23. Valve rocker arm shaft
24. Valve rocker arm shaft support
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26. Exhaust valve
27. Valve spring
28. Breather
29. Intake silencer
30. Intake manifold
31. Exhaust manifold
32. Turbocharger
33. Mixing elbow
34. Fuel injection pump
35. Fuel pressure pipe
36. Fuel injection nozzle
37. Lubricating oil inlet pipe
38. Lubricating oil filter
39. Lubricating oil cooler
40. Cooling water pump
41. Heat exchanger
42. Flywheel
43. Damper disc
44. Input shaft
45. Output shaft
46. Forward gear
47. Reverse gear
48. Output shaft coupling
49. Starting motor
50. Alternator

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2-2 Clutch control



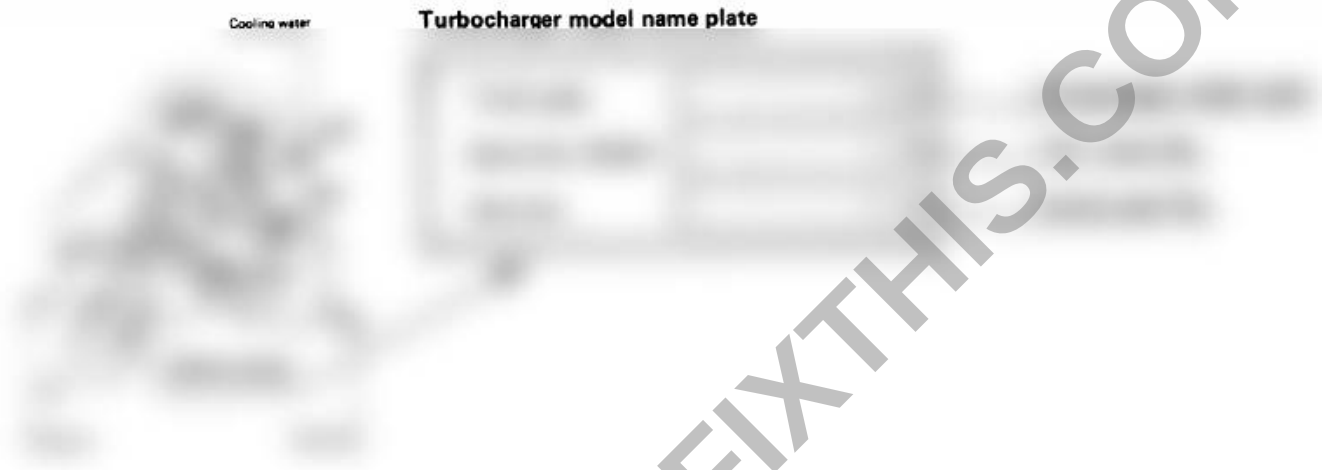
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4-4 Interchangeability of turbochargers

The IHI-make turbocharger used for the 4JH serieses differ according to the engine model. Care should therefore be taken to assemble only components for the turbocharger used in your engine when replacing parts. The use of incorrect turbocharger components will detract from the performance of the engine.
Turbocharger models can be distinguished by their name plates.



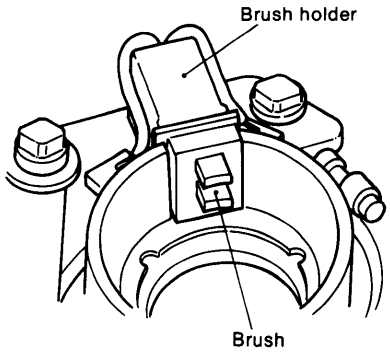
Turbocharger model name plate

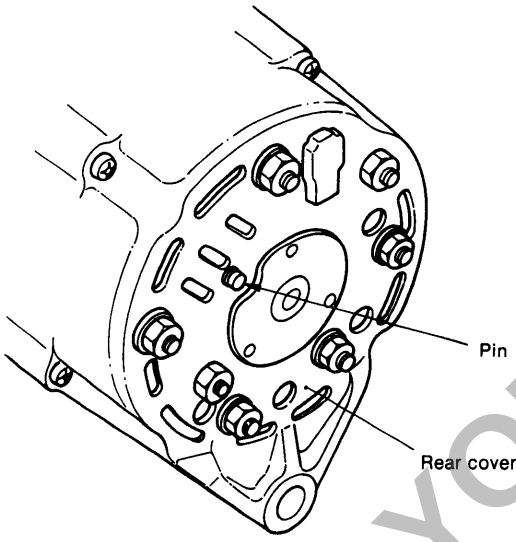
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(3) Assembling the rear cover
Insert pins from the outside of the rear cover. Install the brush on the brush holder, then attach the rear cover. After assembly, pull out the pins.



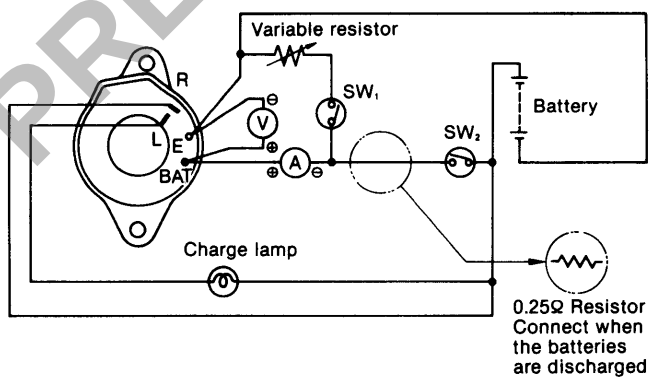


(4) Tightening torques

Positions	Tightening torque kg-cm (ft-lb)
Brush holder fixing	32—40 (2.31 ~ 2.89)
Diode fixing	32—40 (2.31 ~ 2.89)
Bearing retainer fixing	32—40 (2.31 ~ 2.89)
Pulley nut tightening	400—600 (28.93 ~ 43.40)
Through-bolt tightening	32—40 (2.31 ~ 2.89)

4-10 Performance test

Conduct a performance test on the reassembled AC generator as follows. The following is the circuit for the performance test.



(1) Measuring devices

DC voltmeter	0—15V or 0—30V, 0.5 Class, 1pc.
DC ammeter	0—100A, 1.0 Class, 1pc.
Variable resistor	0—0.25Ω, 1kW, 1pc.
Lamp	12V, 3W
100Ω resistor	3W
0.25Ω resistor	25W

(2) Measuring the regulating voltage
1) When measuring devices are connected in the performance test circuit as shown above, the charge lamp lights.
2) Close SW_2 while keeping SW_1 open and run the AC generator. When the revolutions of the generator are gradually raised, the charge lamp goes off.
3) Raise the revolutions of the AC generator, and read the voltmeter gauge when the revolutions reach about 5,000 rpms.

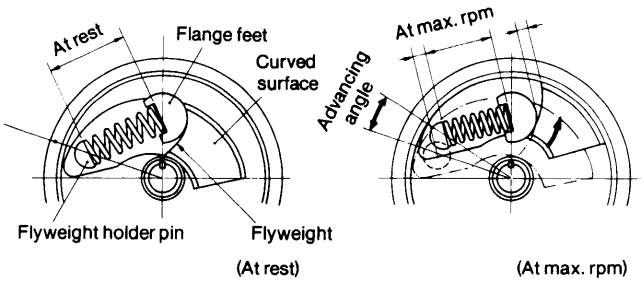
NOTES: 1. Make sure that the ammeter indication at this time is less than 5A. If the indication is over 5A, connect the 0.25Ω resistor. The voltmeter indication at this time must be within the prescribed regulating voltage value.
2. Raise the AC generator revolutions high to make sure the regulating voltage does not fluctuate along with changes in the revolution speed.

(3) Precautions for measuring the regulating voltage
1) When measuring the voltage, measure the voltage between the AC generator BAT terminal, or Battery + terminal, and AC generator E-terminal.
2) Use a fully charged battery.
3) Measure the voltage quickly.
4) Keep SW_1 open for measurement.

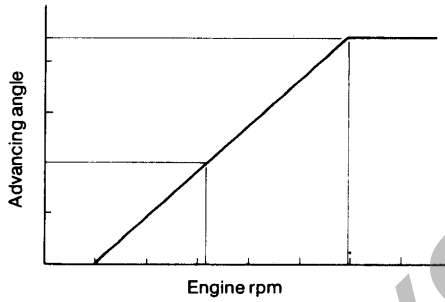
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5-2 Functioning and characteristics of timer

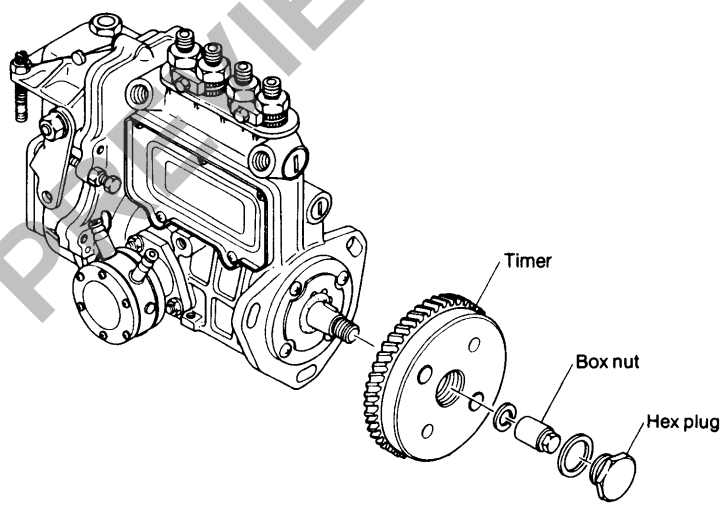


The spring is pressed against the center of the flyweight. As rpm increases, the centrifugal force of the two flyweights increases, compresses the timer spring, and the position of the weight holder and flange changes due to the movement of the curved surface of the weight, changing the injection timing. Accordingly, as the spring is compressed (according to the rise in rpm advancing the timing), the advancing angle remains proportional to rpm.



The advancing characteristics can be changed by changing the profile of the side of the weight and the spring constant of the spring.

5-3 Timer disassembly



(1) Remove the hex plugs from both ends of timer.
(2) Use a box spanner to remove the cam shaft box nut.
(3) Use a gear pulling tool to remove the timer assembly.
(4) The spring, shim and weight can be removed when you take off the gear circlip and separate the timer and weight holder.

NOTE: As the advancing angle has been set at the factory, do not disassemble the timer unless necessary.

5-4 Timer inspection

(1) Inspect the timer ring, and replace if there is excessive settling or corrosion.
(2) Inspect the curved surface of the timer weight and the portion of drive pin it comes in contact with, and replace if wear is excessive or movement is not smooth.

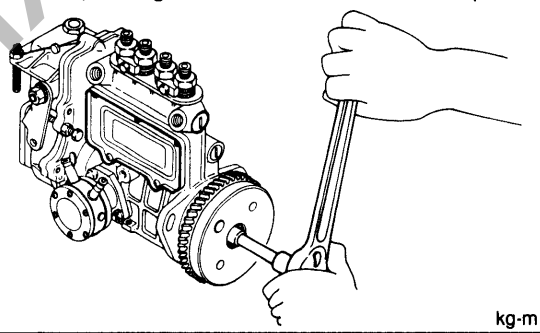
NOTE: 1. Recheck advancing angle when replacing weight or spring, and readjust as necessary with adjusting shims.
2. If you change weight holders, measure the shaft side clearance, and adjust with washers.

mm (in.)

Standard side clearance	0.02 ~ 0.10 (0.0007 ~ 0.0039)

5-5 Timer reassembly

(1) Mount the timer assembly on the fuel injection pump camshaft, and tighten the box nut with a box spanner.

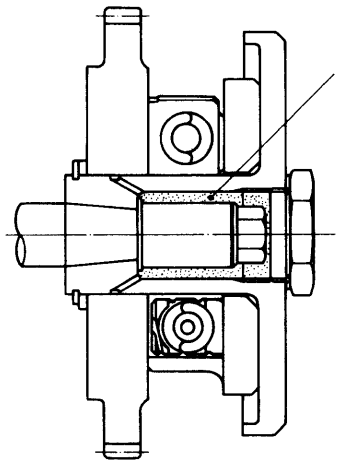


kg-m (ft-lb)

Tightening torque	6 ~ 7 (43.3 ~ 50.6)

NOTE: The box nut is tightened by turning it right looking from the drive side.

(2) Apply grease around the box nut, and tighten the hex plug.



kg-m (ft-lb)

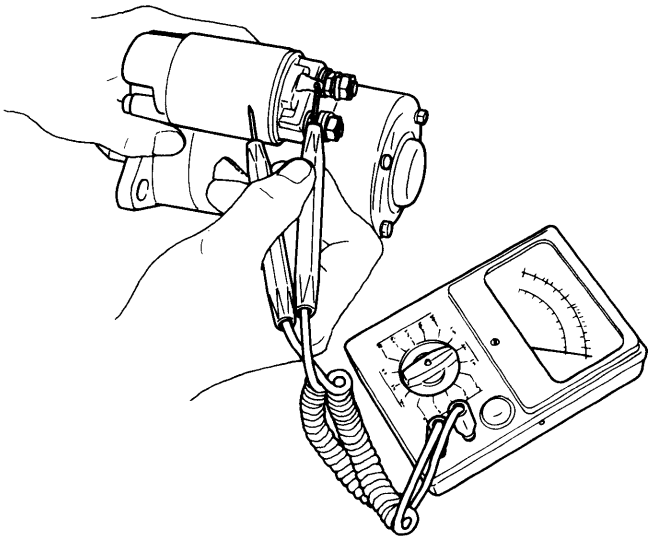
Tightening torque	0.8 ~ 1.20 (1.30 ~ 8.67)

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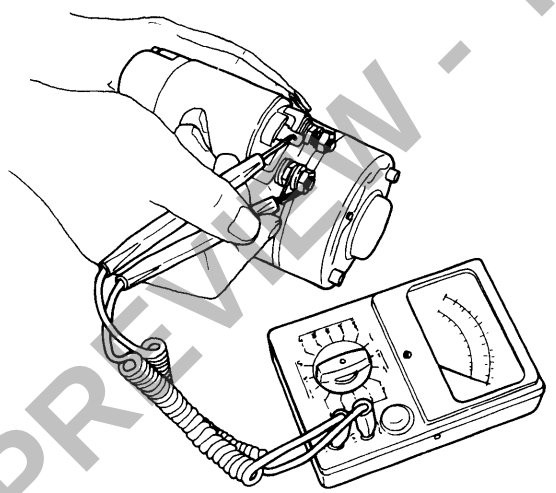
3-6.4 Magnetic switch

(1) Shunt coil continuity test
Check for continuity between the S terminal and the magnetic switch body (metal part). Continuity indicates that the coil is open and that the switch must be replaced.



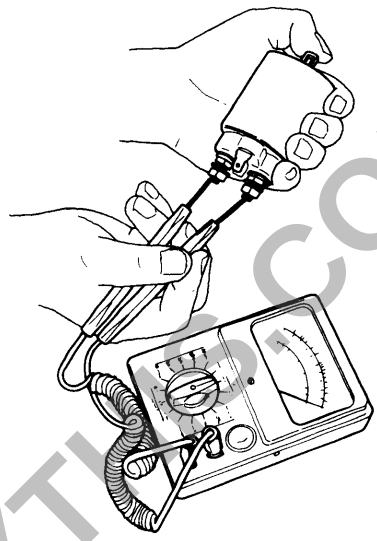
	S12-77A
Coil resistance (at 20°C)	0.590Ω

(2) Series coil continuity test
Check for continuity between the S terminal and M terminal. Continuity indicates that the coil is open and that it must be replaced.



	S12-77A
Resistance value (at 20°C)	0.267Ω

(3) Contactor contact test
Push the plunger with your finger and check for continuity between the M terminal and B terminal. Continuity indicates that the contact is faulty and that the contactor must be replaced.



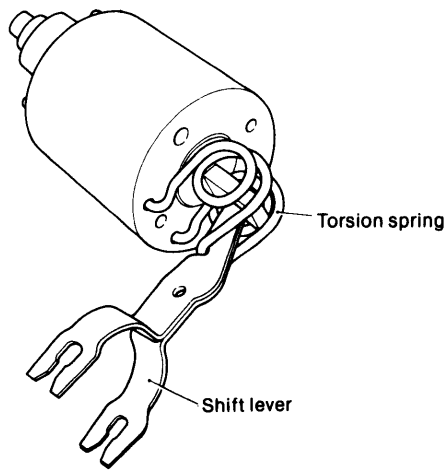
3-6.5 Pinion

(1) Inspect the pinion teeth and replace the pinion if the teeth are excessively worn or damaged.
(2) Check if the pinion slides smoothly; replace the pinion if faulty.
(3) Inspect the springs and replace if faulty.
(4) Replace the clutch if it slips or seizes.

3-7 Reassembly precautions

Reassemble the starter motor in the reverse order of disassembly, paying particular attention to the following:

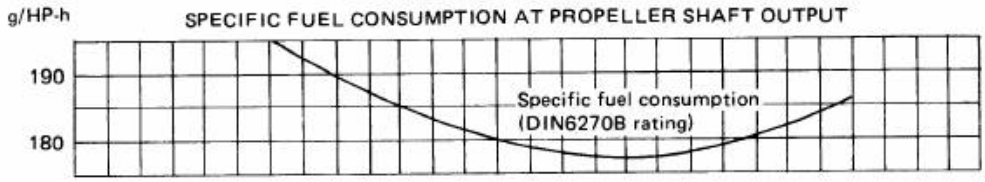
(1) Torsion spring and shift lever
Hook the torsion spring into the hole in the magnetic switch and insert the shift lever into the notch in the plunger of the magnetic switch (through the torsion spring).



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4-3 4JH-HTE



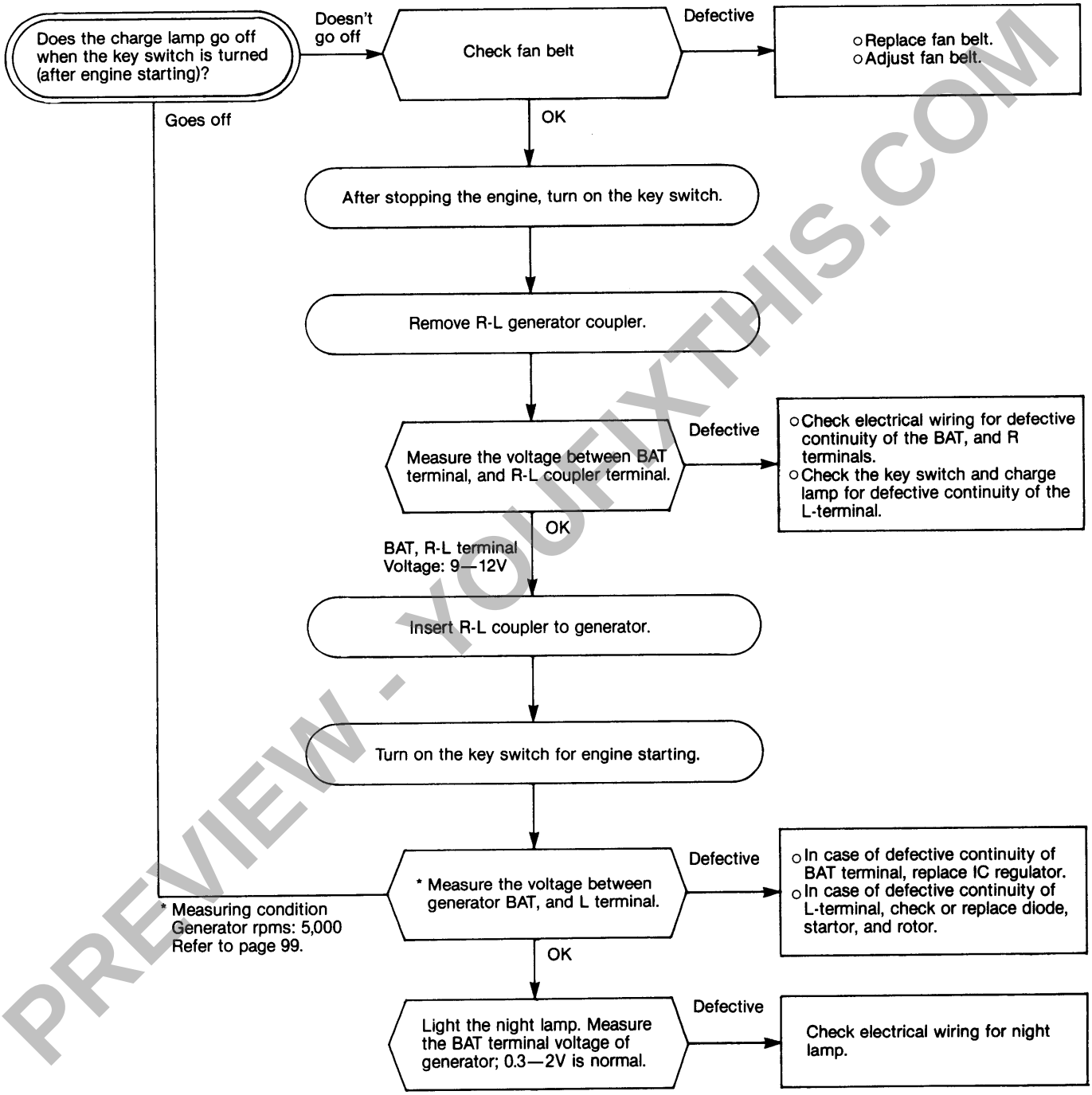
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4-11 Troubleshooting

(1) Charging failure



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CHAPTER 2

INSPECTION AND SERVICING OF BASIC ENGINE PARTS

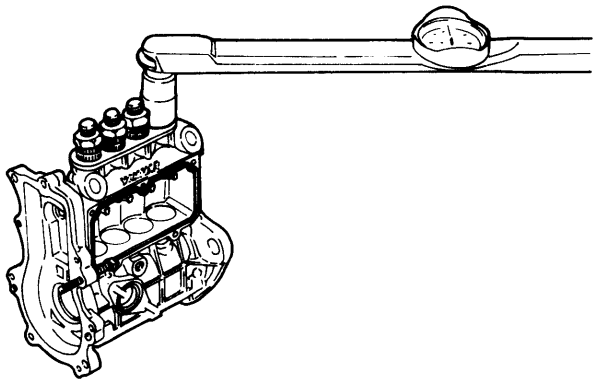
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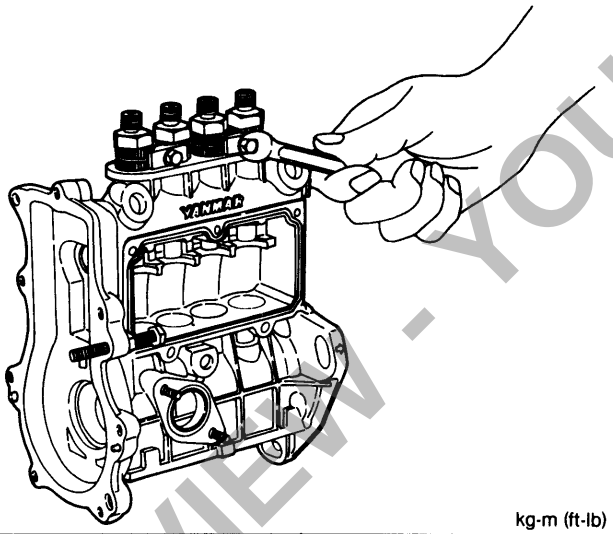
(18) Tighten delivery valve retainer.



	kg-m (ft-lb)
Tightening torque	3.5 ~ 4.0 (25.31 ~ 28.93)

NOTE: 1. Tighten the retainer as far as possible by hand—if the bolt gets hard to turn part way, the packing or delivery valve are out of place. Remove, correct, and start tightening again.
2. Overtightening can result in malfunctioning of the rack.

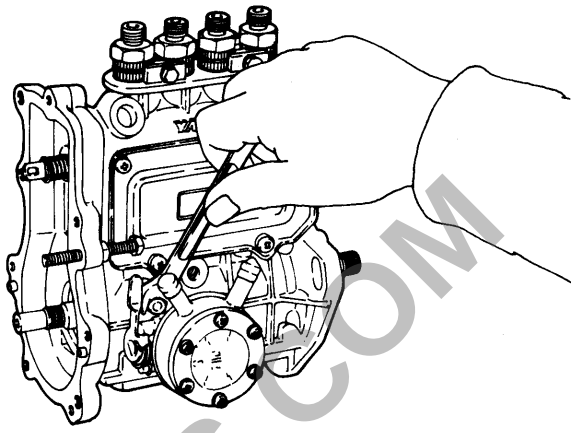
(19) Fit the delivery retainer stop and tighten the stop bolt.



	kg-m (ft-lb)
Tightening torque	0.3 (2.16)

NOTE: Overtightening can upset the delivery retainer and cause oil leakage.

(20) Mount the fuel feed pump



NOTE: See the item explaining reassembly of the fuel feed pump.

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Models 4JH(B)E • 4JH-T(B)E
4JH-HT(B)E • 4JH-DT(B)E

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CHAPTER 1

GENERAL

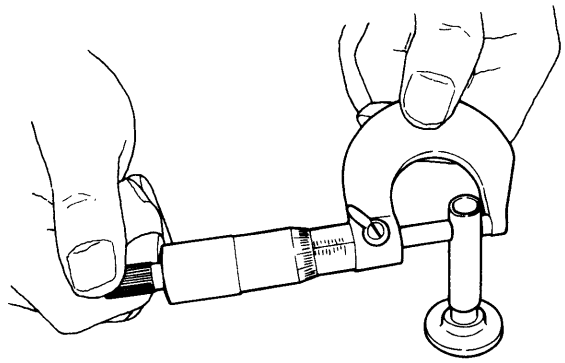
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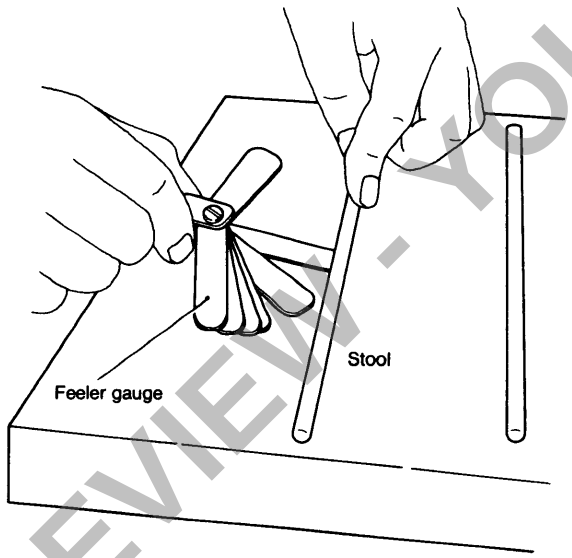
(2) Measure the outer diameter of the tappet, and replace if worn beyond the limit.



mm (in.)

	Standard	Wear limit
Tappet stem outside dia.	11.975 ~ 11.990 (0.4714 ~ 0.4720)	11.93 (0.4696)
Tappet guide hole inside dia. (cylinder block)	12.000 ~ 12.018 (0.4724 ~ 0.4731)	12.05 (0.4744)
Tappet stem and guide hole oil clearance	0.010 ~ 0.043 (0.0003 ~ 0.0016)	0.10 (0.0039)

(3) Measuring push rods.
Measure the length and bending of the push rods.



mm (in.)

	Standard	Wear limit
Push rod length	178.25 ~ 178.75 (7.0177 ~ 7.0374)	—
Push rod bend	Less than 0.03 (0.0011)	0.3 (0.0118)
Push rod dia.	8 (0.3149)	—

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6-3 Disassembly and reassembly of fuel feed pump

6-3. 1 Disassembly

(1) Remove the fuel feed pump mounting nut, and take the fuel feed pump off the fuel injection pump.
(2) Clean the fuel feed pump assembly with fuel oil.
(3) After checking the orientation of the arrow on the cover, make match marks on the upper body and cover, remove the small screw, and disassemble the cover, upper body and lower body.

6-3. 2 Reassembly

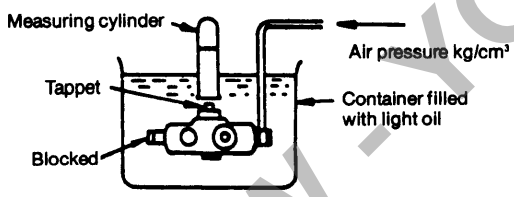
(1) Clean all parts with fuel oil, inspect, and replace any defective parts.
(2) Replace any packings on parts that have been disassembled.
(3) Make sure that the intake valve and discharge valve on upper body are mounted in the proper direction, and that you don't forget the valve packing.
(4) Assemble the diaphragm into the body, making sure the diaphragm mounting holes are lined up (do not force).
(5) Align the match marks on the upper body of the pump and cover, and tighten the small screws evenly.

kg-cm (ft-lb)

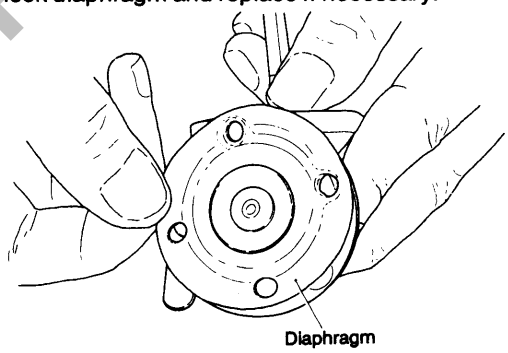
Tightening torque	15 ~ 25 (1.08 ~ 1.80)

6-4 Fuel feed pump inspection

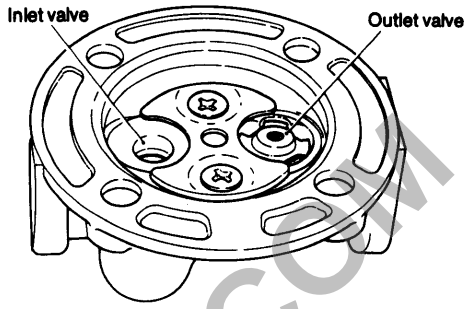
(1) Place the fuel feed pump in kerosene, cover the discharge port with your finger, move the priming lever and check for air bubbles (Repair or replace any part which emits air bubbles).



(2) Attach a vinyl hose to the fuel feed pump intake, keep the pump at the specified depth from the fuel oil surface, move the priming lever by hand and check for sudden spurts of fuel oil from the discharge port. If oil is not spurted out, inspect the diaphragm and diaphragm spring and repair/replace as necessary.
(3) Diaphragm inspection
Parts of the diaphragm that are repeatedly burned will become thinner or deteriorate over a long period of time. Check diaphragm and replace if necessary.



(4) Valve contact/mounting
Clean the valve seat and valve with air to remove any foreign matter.



(5) Inspect the diaphragm spring and piston spring for settling and the piston for wear, and replace as necessary.

NOTE: Replace parts as an assembly.

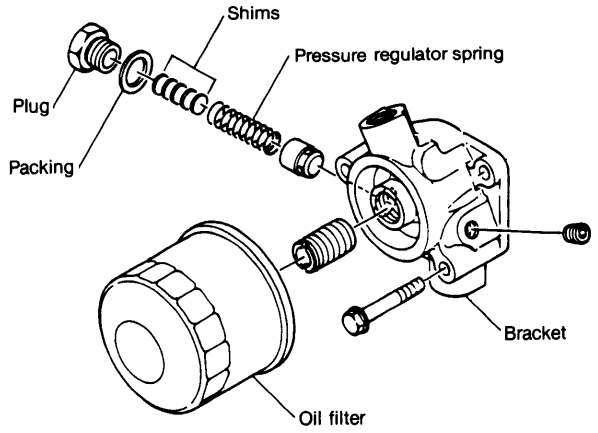
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4. Oil Pressure Control Valve

4-1 Oil pressure control valve construction

The oil pressure control valve built into the oil filter bracket controls the oil pressure from the time the lube oil leaves the filter and is cooled in the lube oil cooler until just before it enters the cylinder body main gallery.
When the pressure of lube oil entering the cylinder body main gallery exceeds the setting, the control valve piston opens the bypass hole and lube oil flows back into the oil pan.



Regulating pressure	3.5 ~ 4.5 kg/cm² (49.78 ~ 64.00 lb/in.²)

4-2 Oil pressure control valve replacement

The control valve has been adjusted and assembled at the factory, so it should not be disassembled without good reason.
If the oil pressure control valve is disassembled due to spring trouble, etc., mount a pressure gauge on the oil pressure sender unit mounting washer, and adjust the pressure with adjustment shims until it is at the specified value.

Shim thickness	Shim part No.
0.2mm (0.0078 in.)	121850-35210
0.5mm (0.0196 in.)	121850-35220
1.0mm (0.0393 in.)	121850-35230

4-3 Vibration preventing damper

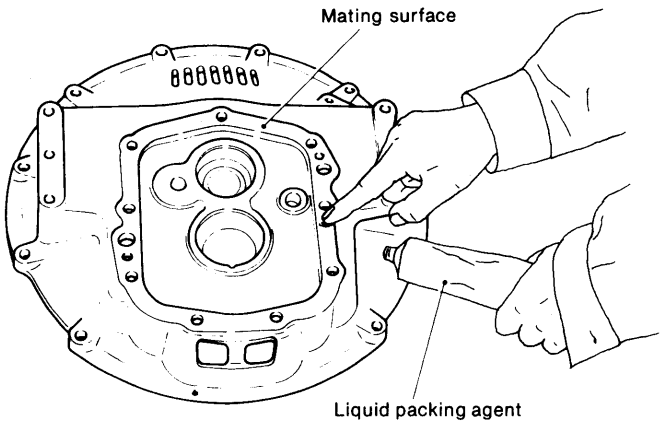
The filter bracket hydraulic (oil pressure) sender unit mount is constructed so that a vibration preventing damper can be mounted on it.
The hydraulic sender unit is mounted on the damper.

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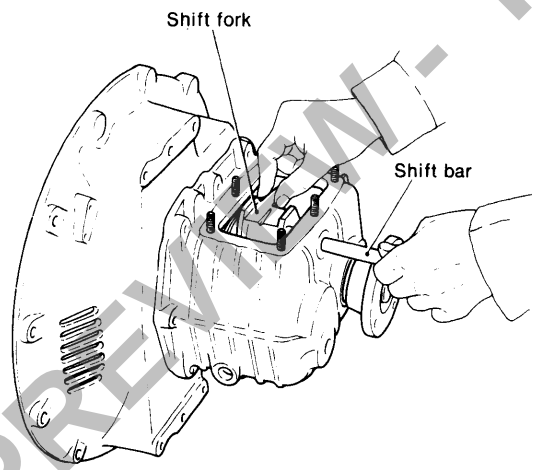
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(4) Coat the mating surfaces of the mounting flange and case with a liquid packing agent.
Wipe off oil and dirt on the mating surface of the case and coat with a thin film of liquid packing agent.

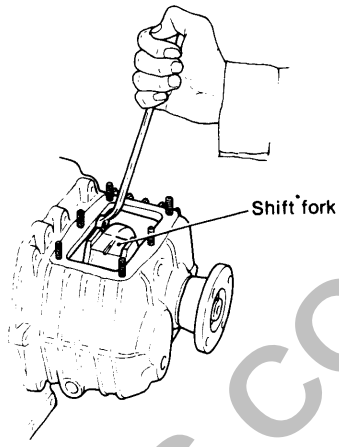


(5) Insert the input shaft into the case, assemble the intermediate shaft as described in section 6-4 and then insert the output shaft into the case, mounted with shift fork and shift ring.
(6) Align the mounting flange with the case, and insert the parallel pin by tapping the mounting flange with a plastic hammer.
(7) Insert the super lock washer and tighten the M10 bolt.
(8) Install the dipstick and packing.
(9) Install the drain plug and packing.

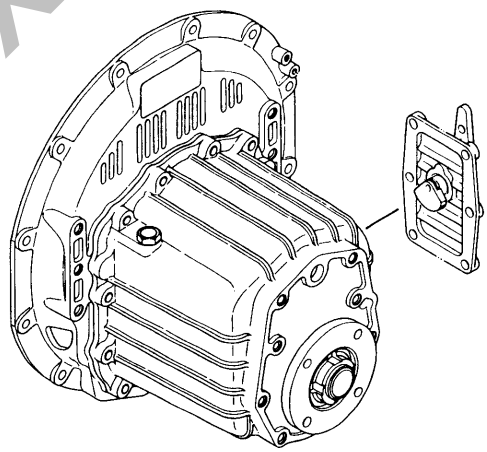
6-6 Reassembling and installing the operating system



(1) Put the shift fork into neutral before installing.



(3) Coat the circumference of the oil seal with a liquid packing agent and press the seal against the case cover.
(4) Insert the spring into the shift cam.
(5) Insert the knock pin into the shift cam from the front end, and lock with the circlip.
(6) Insert the assembled shift cam into the case cover.



(7) Fit the shift lever to the shift cam, and tighten the M8 bolt.

NOTE: The shift cam must rotate smoothly.

(8) Replace the packing if it is damaged.
(9) Attach the case side cover with operating system in the case body.
At this time, make sure that the shift cam is fitted to the shift fork, and that the shift lever is in neutral.

NOTE: Put the shift fork into neutral before installing.

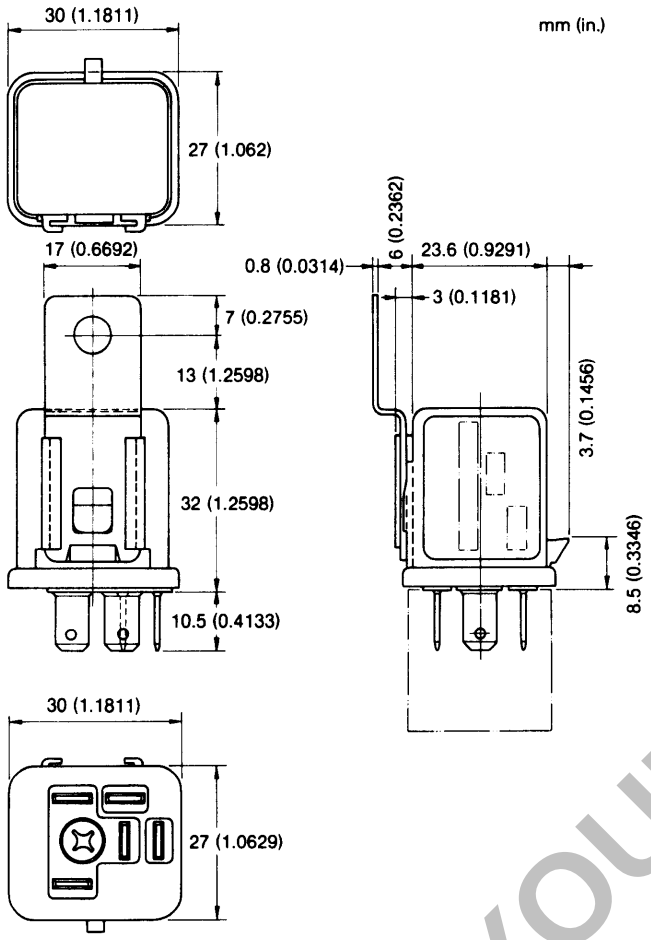
(10) Insert the super lock washer, and tighten the M8 nut.
(11) Shift the shift lever to forward and reverse to make sure that the lever operates normally.
If the lever does not operate normally, loosen the M8 nut, slide the case side cover forward, backward, and to the left and right, then re-tighten with the M8 nut in the position at which the lever operates normally.

NOTE: If the lever operates normally a click will be heard when it is put into forward and reverse.

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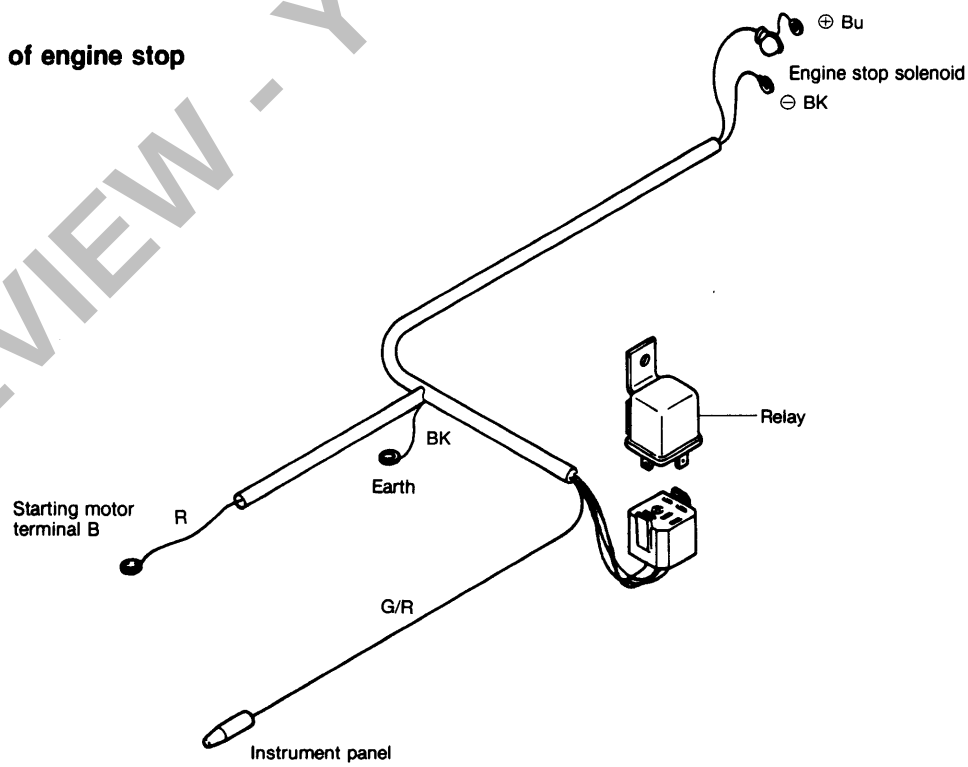
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8-2 Relay



Rated voltage	12V
Contact current	Lamp: 20A, extra-lamp: 25A
Range of operation	−30°C ∼ +90°C (−22°F ∼ 194°F)
Part code No.	124617-91850

8-3 Wire harness of engine stop



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