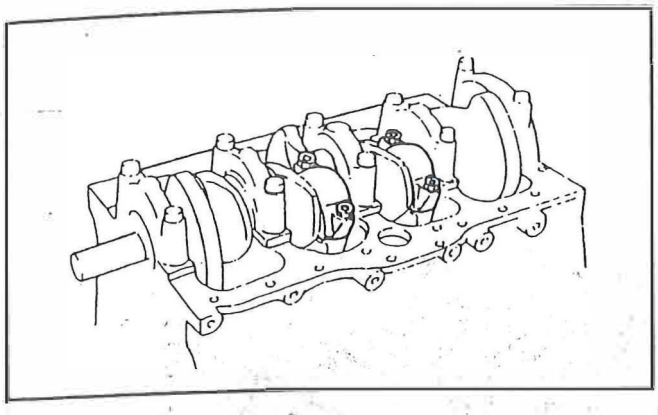
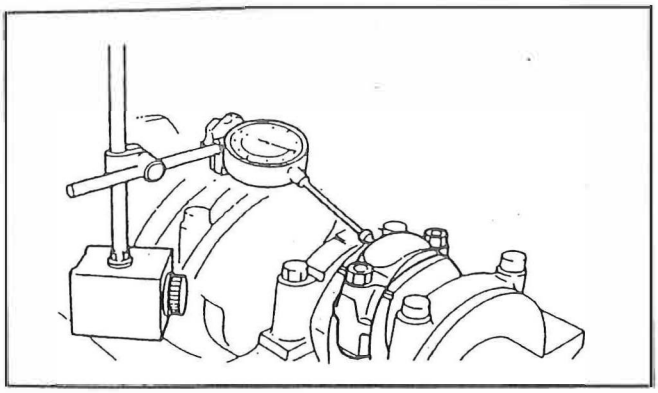


18. Check the end play of the large end of the connecting rod with the following procedure:

a. Position the dial gauge as shown in the illustration
b. Move the large end back and forth, and measure the end play.

Standard value: 0.200-0.400 mm / (.0079-.0157 in)
Limit value: 0.50 mm / (.0197 in)

If the limit value is exceeded, replace the connecting rod, connecting rod cap and connecting rod bolts and nuts.



END PLATE AND REAR OIL SEAL INSTALLATION

WARNING: The end plate is heavy. Be sure that all lifting devices (hoists, cables, chains, slings etc.) are suitable and of adequate capacity to lift the end plate. The end plate can weigh approximately 16 kg (36 lb).

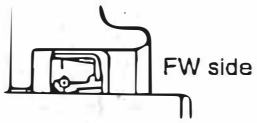
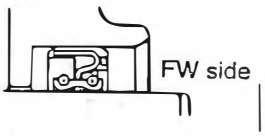
1. Different engine rear oil seals are used for the automatic transmission (A/T) truck and the manual transmission (M/T) truck. Be sure to install the correct seal. Identification illustrations are shown in the following table.

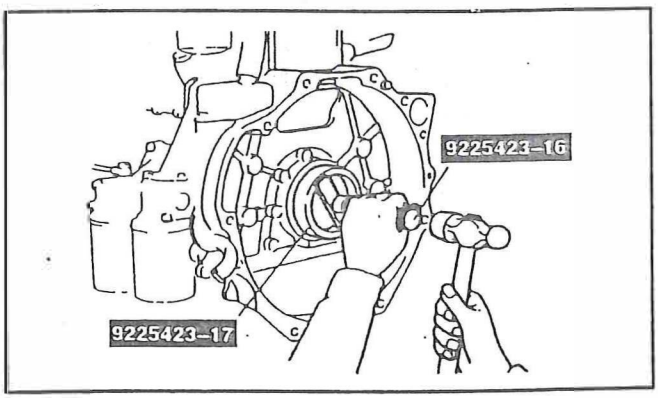
NOTE: All trucks manufactured for the North American market are only available with automatic transmissions.

2. Always install a new oil seal.

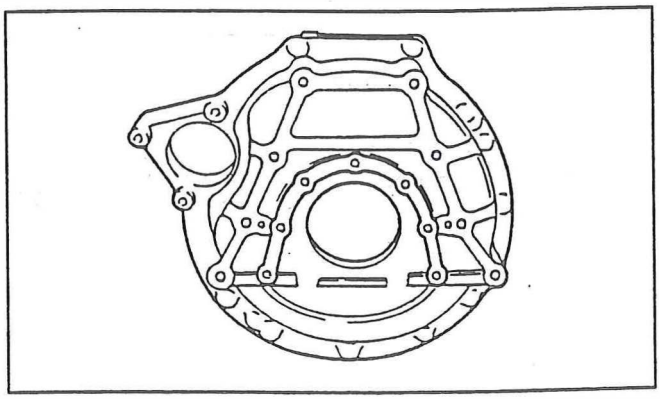
3. Apply engine oil to the press-in surface of the oil seal, to the end plate and to the lip of the oil seal.

4. Install the oil seal using the special seal installation tool. Be sure to seat the oil seal against the rib on the engine plate.

Transmission type	Engine rear seal	End plate Identification mark
A/T	Single lip seal 	A
M/T	Double lip seal 	M



5. Apply SH780 liquid gasket P/N 9010858-20 to the machined mating surfaces of the end plate shown in the illustration. Install the end plate on the cylinder block.

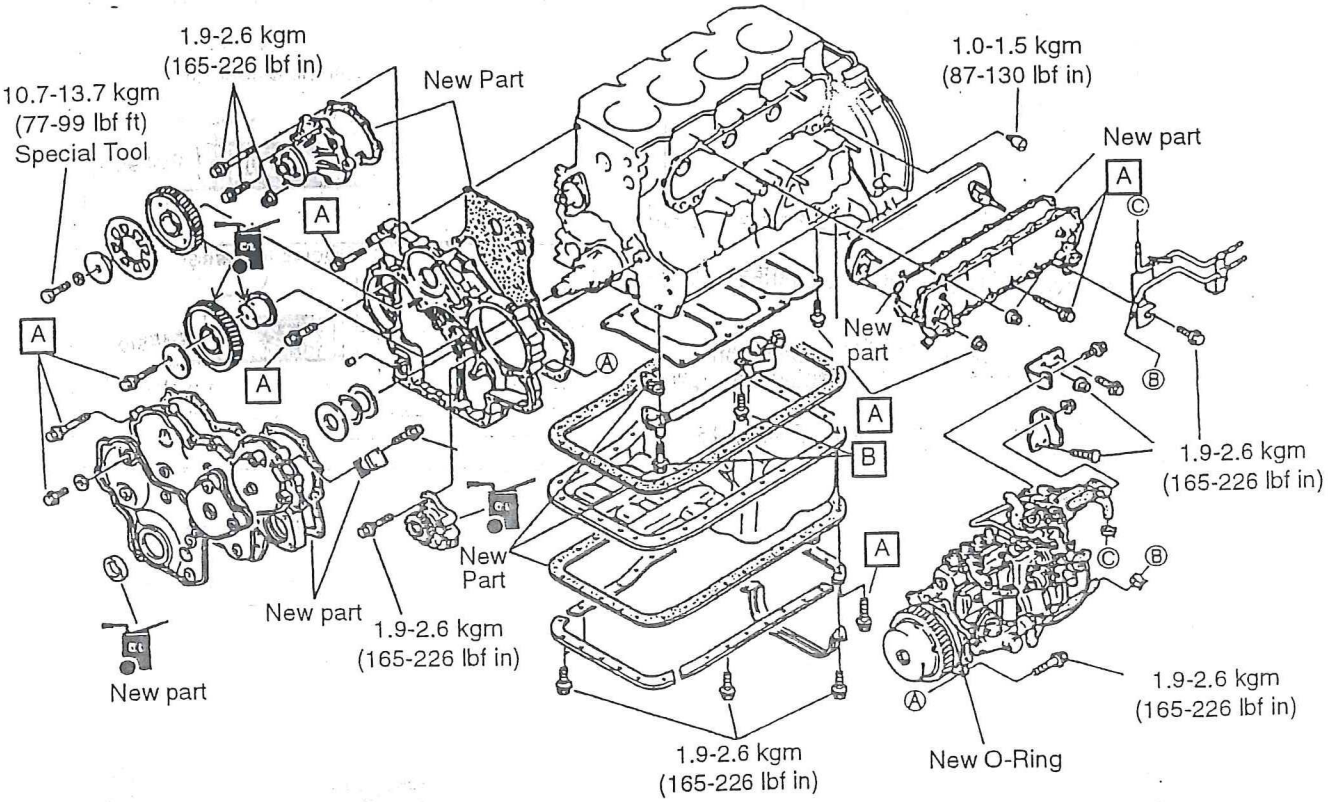


Use new seal washers (M8, M14), and tighten to the following torque.

Tightening torque:
M8: 1.6-2.3 kgm / (139-200 lbf in)
M14: 7.7-10.5 kgm / (56-76 lbf ft)

CYLINDER BLOCK REASSEMBLY-EXTERNAL COMPONENTS

ASSEMBLY AND TORQUE VALUE ILLUSTRATION

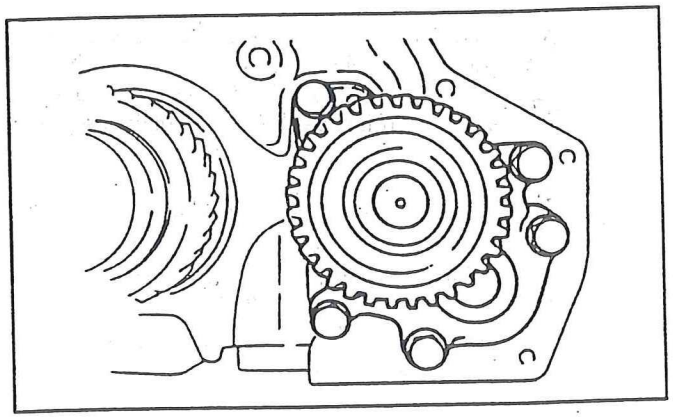


A 1.9-2.6 kgm
(165-226 lbf in)

B M6 0.8-1.1 kgm / (70-96 lbf in)
M8 1.9-2.6 kgm / (165-226 lbf in)

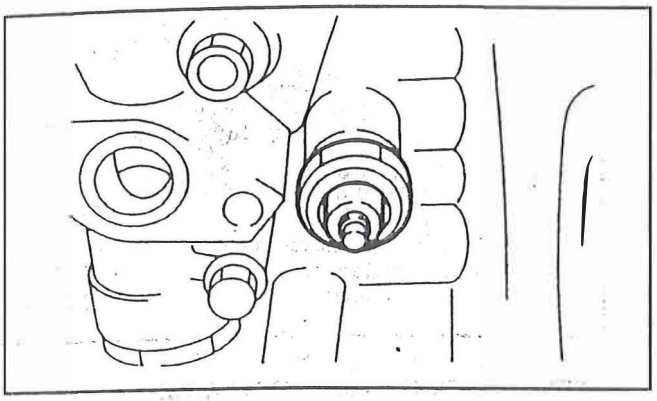
OIL PUMP INSTALLATION

1. Apply engine oil to the bearing and rotor gear, and install. Bolt the pump assembly to the cylinder block.
   Tightening torque: 1.9-2.6 kgm / (165-226 lbf in)



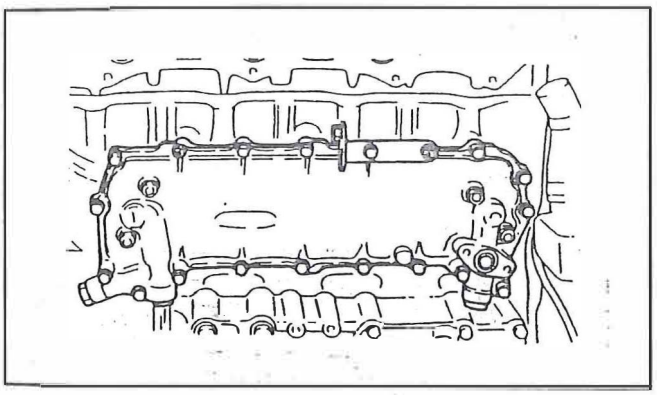
OIL PRESSURE SWITCH INSTALLATION

1. Install the oil pressure switch.
   Tightening torque: 1.0-1.5 kgm / (87-130 lbf in)

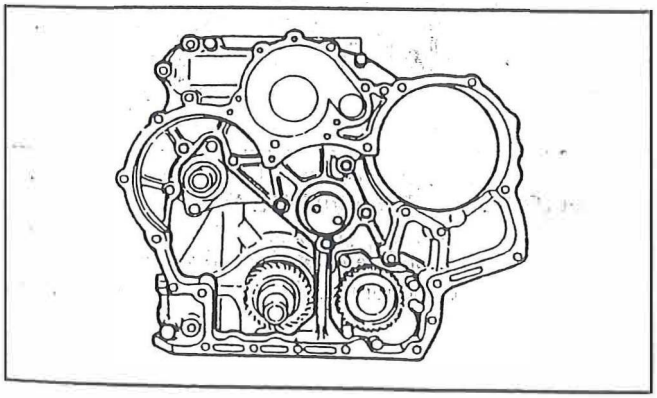


OIL COOLER ASSEMBLY INSTALLATION

1. Install the oil cooler assembly, using a new gasket.
   Tightening torque: 1.9-2.6 kgm / (165-226 lbf in)

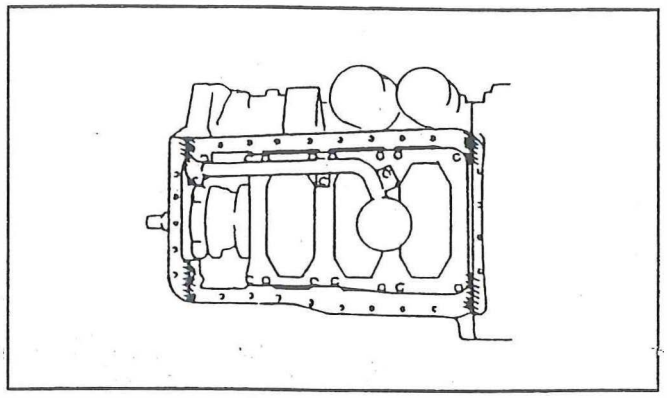


TIMING GEAR CASE INSTALLATION



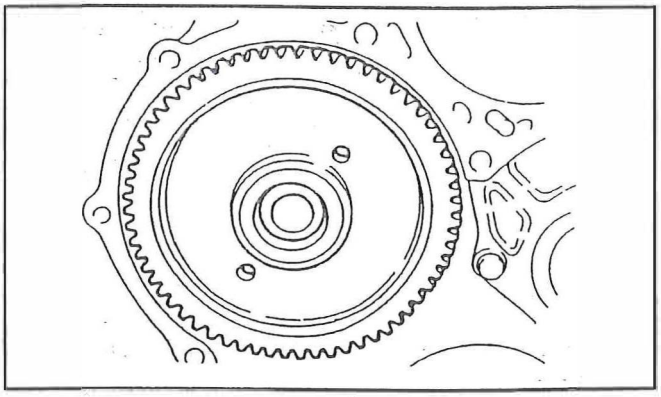
1. Install the timing gear case, using a new gasket.
   Tightening torque: 1.9-2.6 kgm / (165-226 lbf in)

NOTE: Apply SH780 liquid gasket P/N 9010858-20 to the mating surfaces of the timing gear case and the cylinder block.

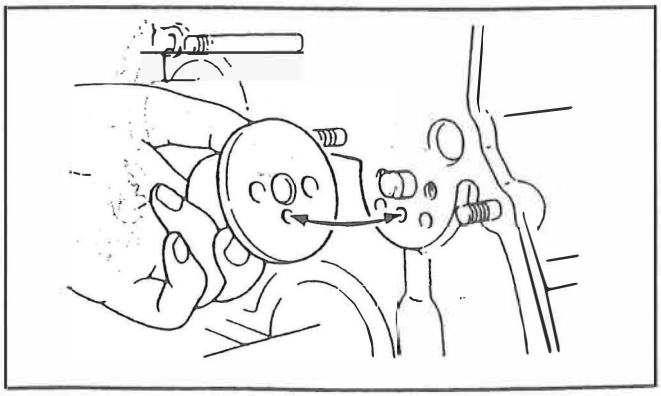


TIMING GEAR INSTALLATION

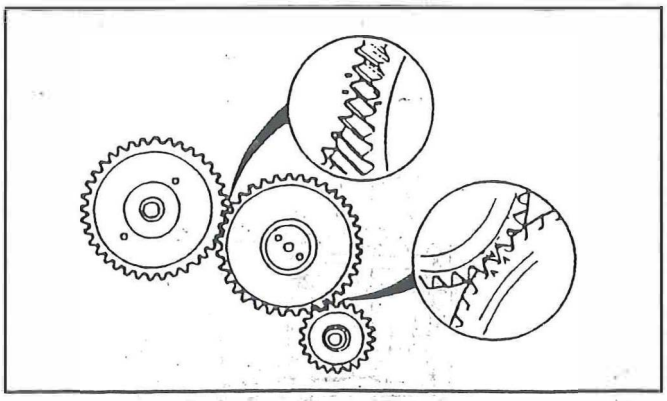
1. Align the cam gear with the woodruff key in the camshaft. Install the gear.



2. Install the idler gear spindle. Be sure that the oil hole in the idler gear spindle and the oil hole in the cylinder block are aligned.

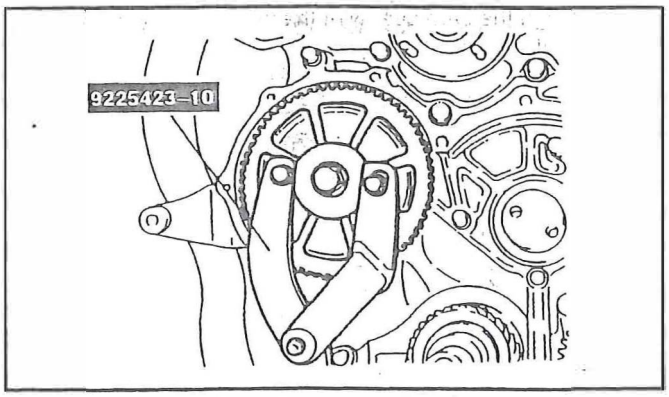


3. Align the idler gear with the other gears so the timing marks are as shown in the illustration.



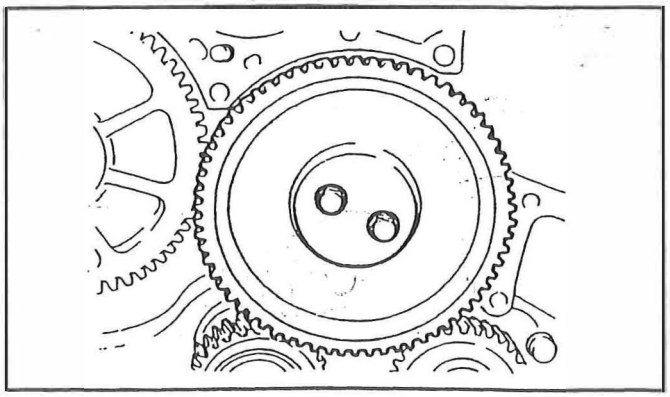
4. Install the friction gear and plain washer on the cam gear. Hold the cam gear stationary with the special holder (wrench). Install and tighten the retaining bolt.

Tightening torque: 10.7-13.7 kgm / (77-99 lbf ft)

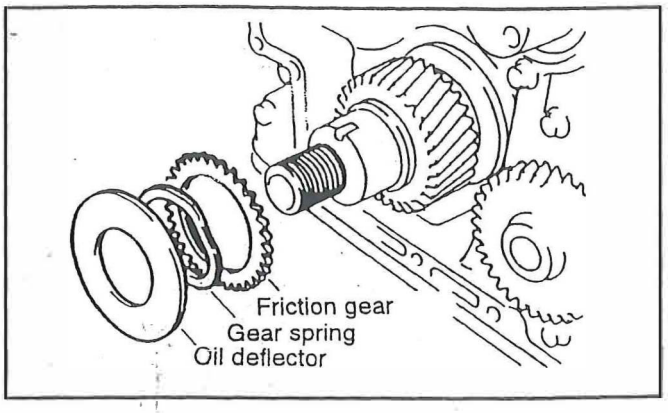


5. Install the thrust plate on the idler gear. Install and tighten the retaining bolts.

Tightening torque: 1.9-2.6 kgm / (165-226 lbf in)



6. Install the friction gear, gear spring and oil deflector on the crankshaft.



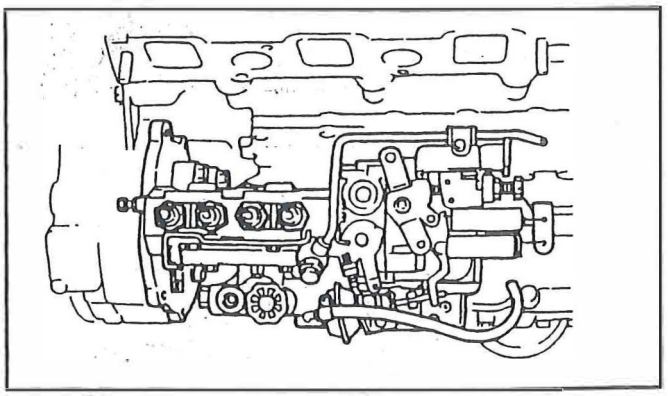
FUEL INJECTION PUMP INSTALLATION

1. Install the fuel injection pump. Be sure to align the mark on the fuel injection pump gear to the mark on the idler gear.

Tightening torque: 1.9-2.6 kgm / (165-226 lbf in)

WARNING: The fuel injection pump is heavy. Be sure that all lifting devices (hoists, cables, chains, slings etc.) are suitable and of adequate capacity to lift the fuel injection pump. The fuel injection pump can weigh approximately 17 kg (38 lb).

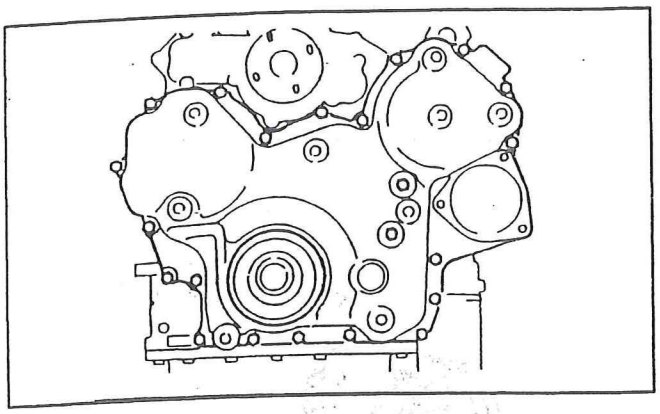
See: **"INJECTION PUMP INSTALLATION"** for the complete installation and adjustment procedure.



TIMING GEAR COVER INSTALLATION

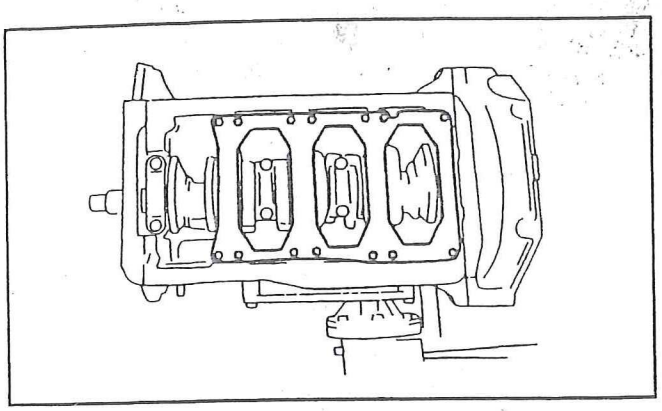
1. Install the timing gear cover using a new gasket.

Tightening torque: 1.9-2.6 kgm / (165-226 lbf in)



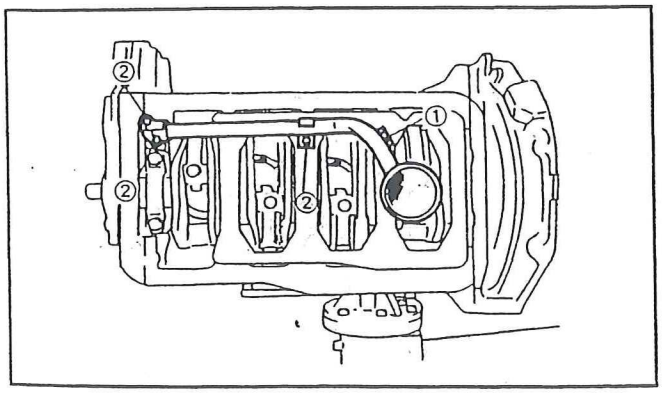
STIFFENER PLATE INSTALLATION

1. Install the stiffener plate.
   Tightening torque: 1.9-2.6 kgm / (165-226 lbf in)



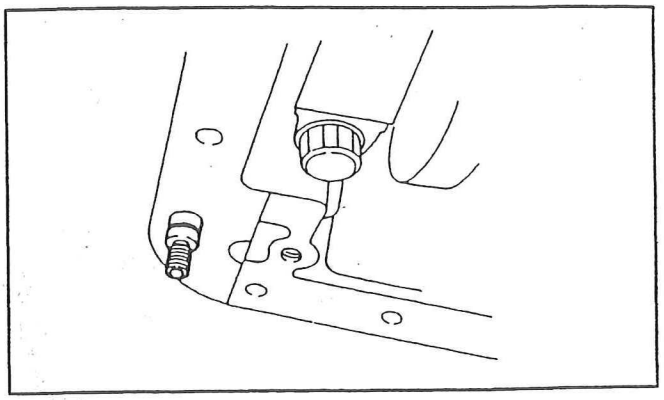
OIL STRAINER INSTALLATION

1. Install the oil strainer, using a new gasket.
   Tightening torque:
   ① 1.9-2.6 kgm / (165-226 lbf in) M8)
   ② 0.8-1.1 kgm / (69-95 lbf in) (M6)

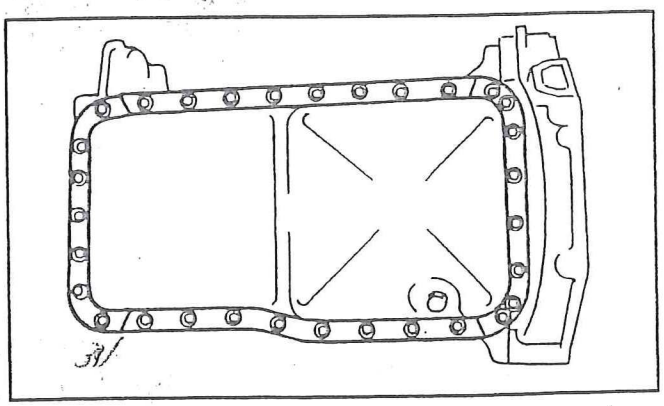


OIL PAN INSTALLATION

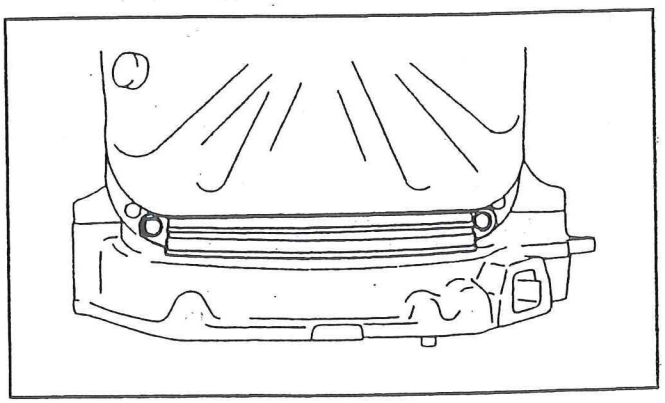
1. Install a new O-ring on each stud bolt.



2. Install the gasket.
3. Install the oil pan.
4. Install the stiffener, and stiffener gasket.
   Tightening torque: 1.9-2.6 kgm / (165-226 lbf in)

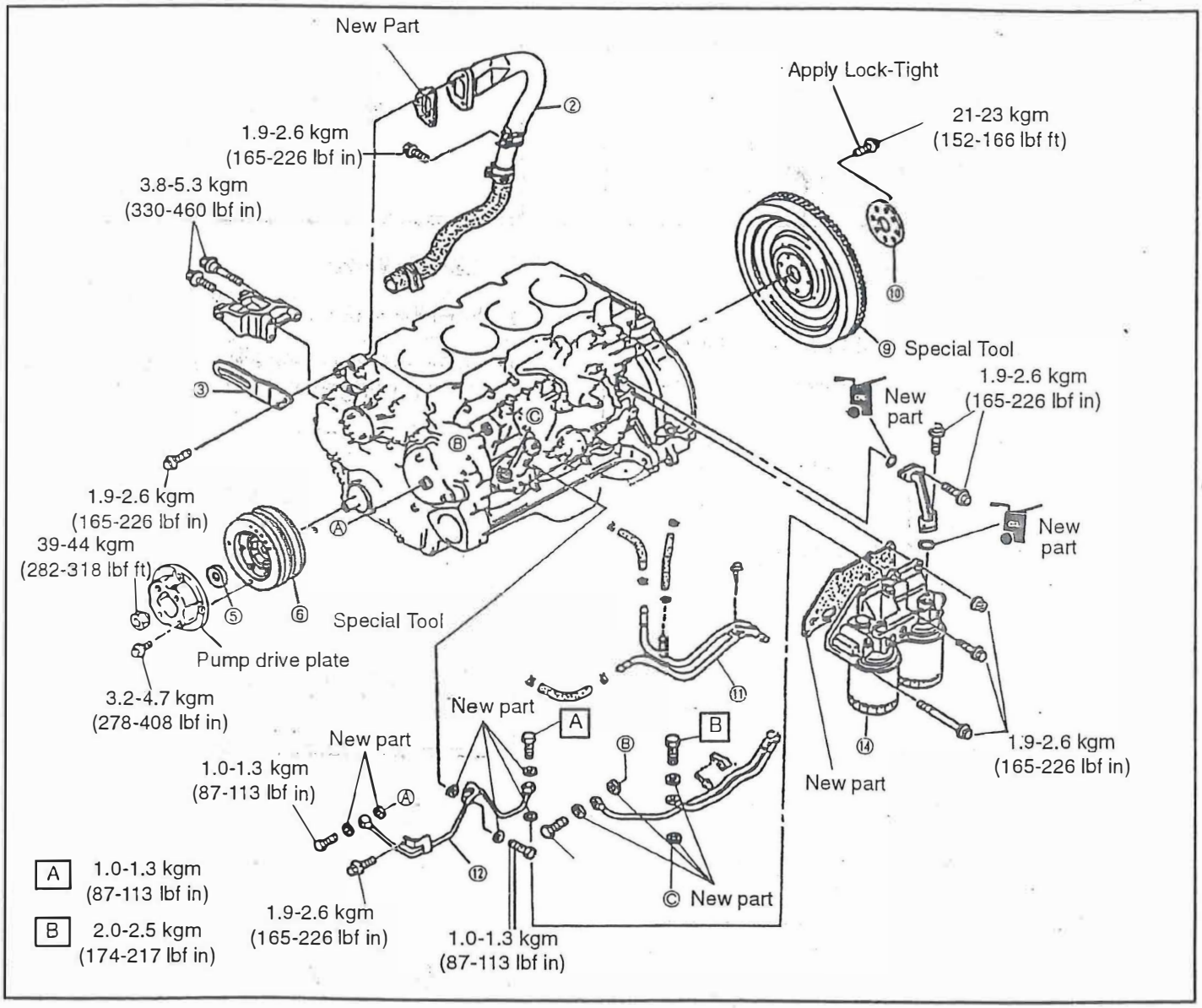


5. Install the seal plate.
   Tightening torque: 1.9-2.6 kgm / (165-226 lbf in)



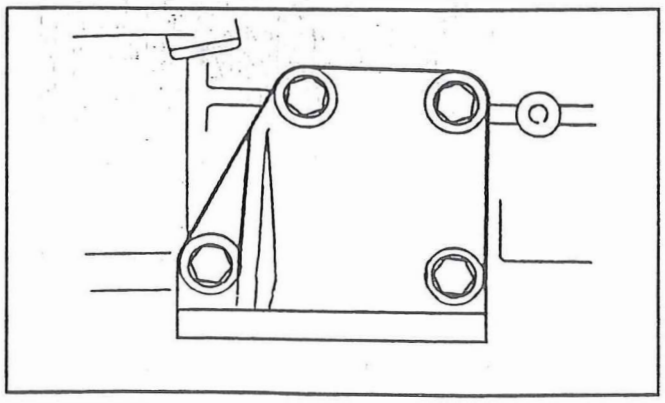
CYLINDER BLOCK REASSEMBLY-ACCESSORY COMPONENTS

ASSEMBLY AND TORQUE VALUE ILLUSTRATION



ENGINE MOUNT INSTALLATION

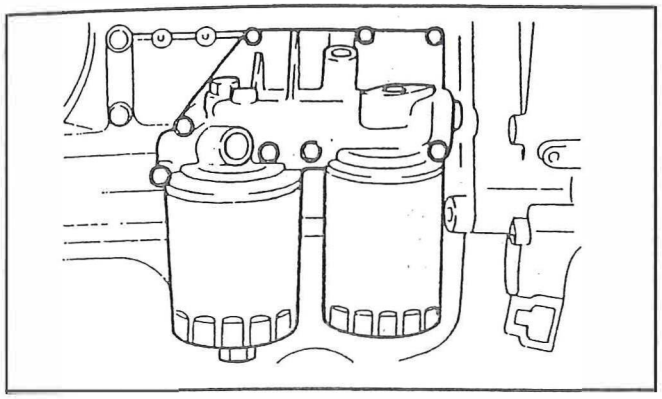
1. Install the engine mount.
   Tightening torque: 4.2-5.0 kgm / (33-36 lbf ft)



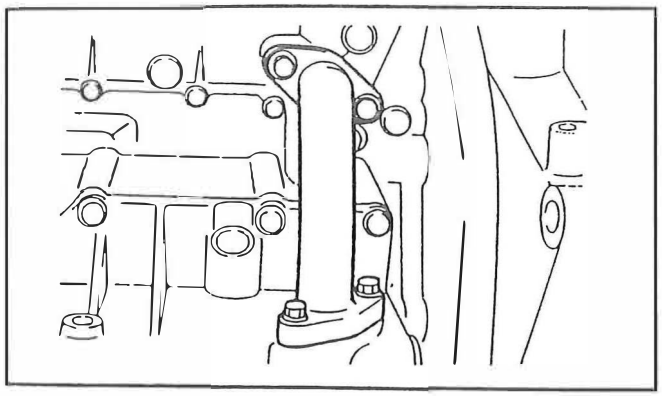
OIL FILTER ASSEMBLY INSTALLATION

1. Install the oil filter assembly on the block, using a new gasket.
   Tightening torque: 1.9-2.6 kgm / (165-226 lbf in)

See: **"MAIN AND BYPASS OIL FILTER REPLACEMENT" (LUBRICATION SECTION)** for the oil filter replacement procedure.

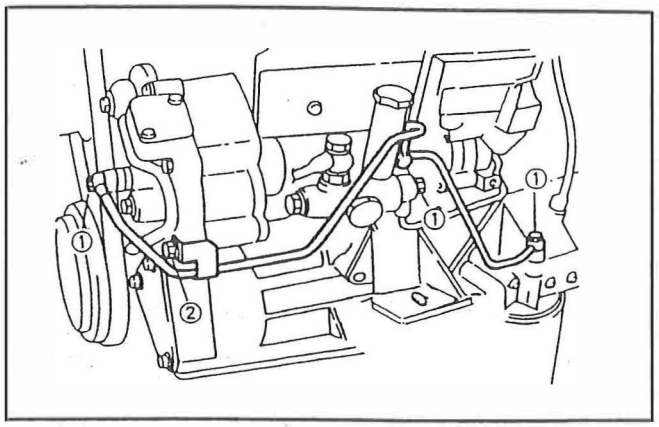


2. Install the oil by-pass pipe, using new O-rings.
   Tightening torque: 1.9-2.6 kgm / (165-226 lbf in)



OIL PIPE INSTALLATION

1. Install the oil pipe, using new sealing washers.
   Tightening torque:
   - ① 1.0-1.3 kgm / (87-113 lbf in)
   - ② 1.9-2.6 kgm / (165-226 lbf in)



FUEL LINE INSTALLATION

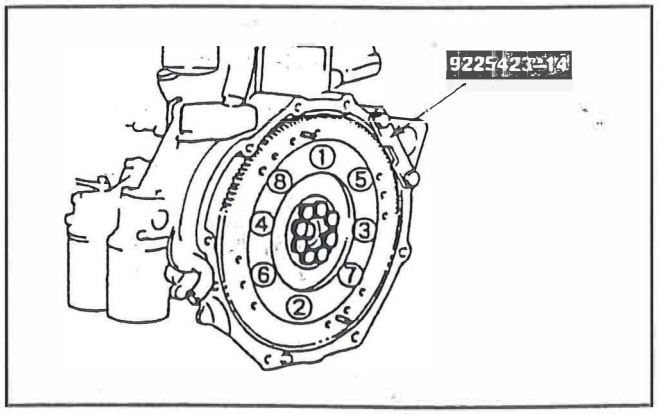
1. Install the fuel lines, using new sealing washers.
   Tightening torque: 2.0-2.5 kgm / (174-217 lbf in)

FLYWHEEL INSTALLATION

1. Apply "Lock-Tight" to the flywheel retaining bolt threads.

2. Install the flywheel on the crankshaft. Install the flywheel retaining bolts and washers and hand tighten them.

3. Install the flywheel brake to stop the flywheel from rotating. Tighten the flywheel bolts in several steps. Tighten the bolts in the order shown in the illustration.
   Tightening torque: 21.0-23.0 kgm / (152-166 lbf ft)



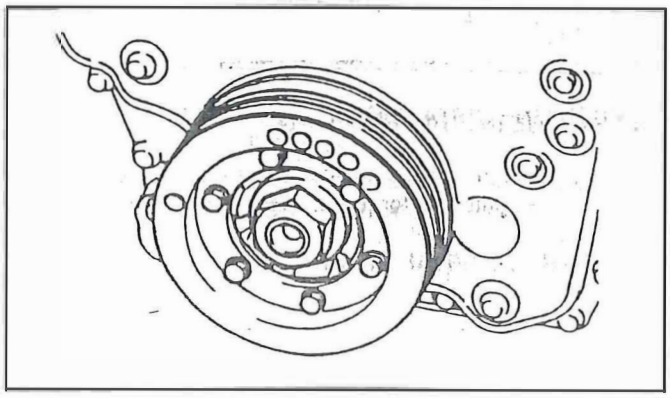
CRANKSHAFT PULLEY INSTALLATION

1. Install the flywheel brake to prevent flywheel rotation.

2. Install the pulley, tapered ring, and spacer in that order, on the crankshaft.

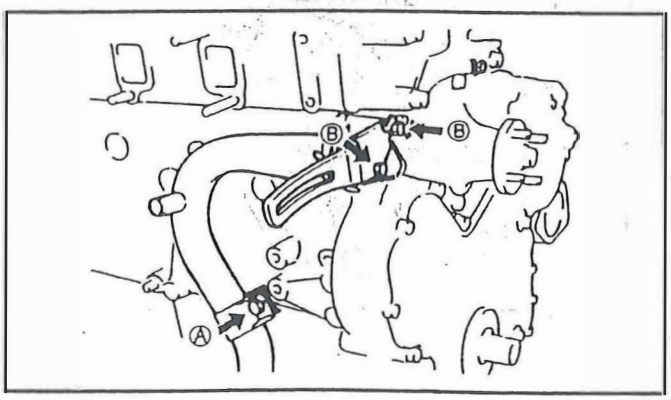
3. Tighten the pulley lock nut.
   Tightening torque: 39-44 kgm / (282-318 lbf ft)

4. Remove the flywheel brake from the flywheel.

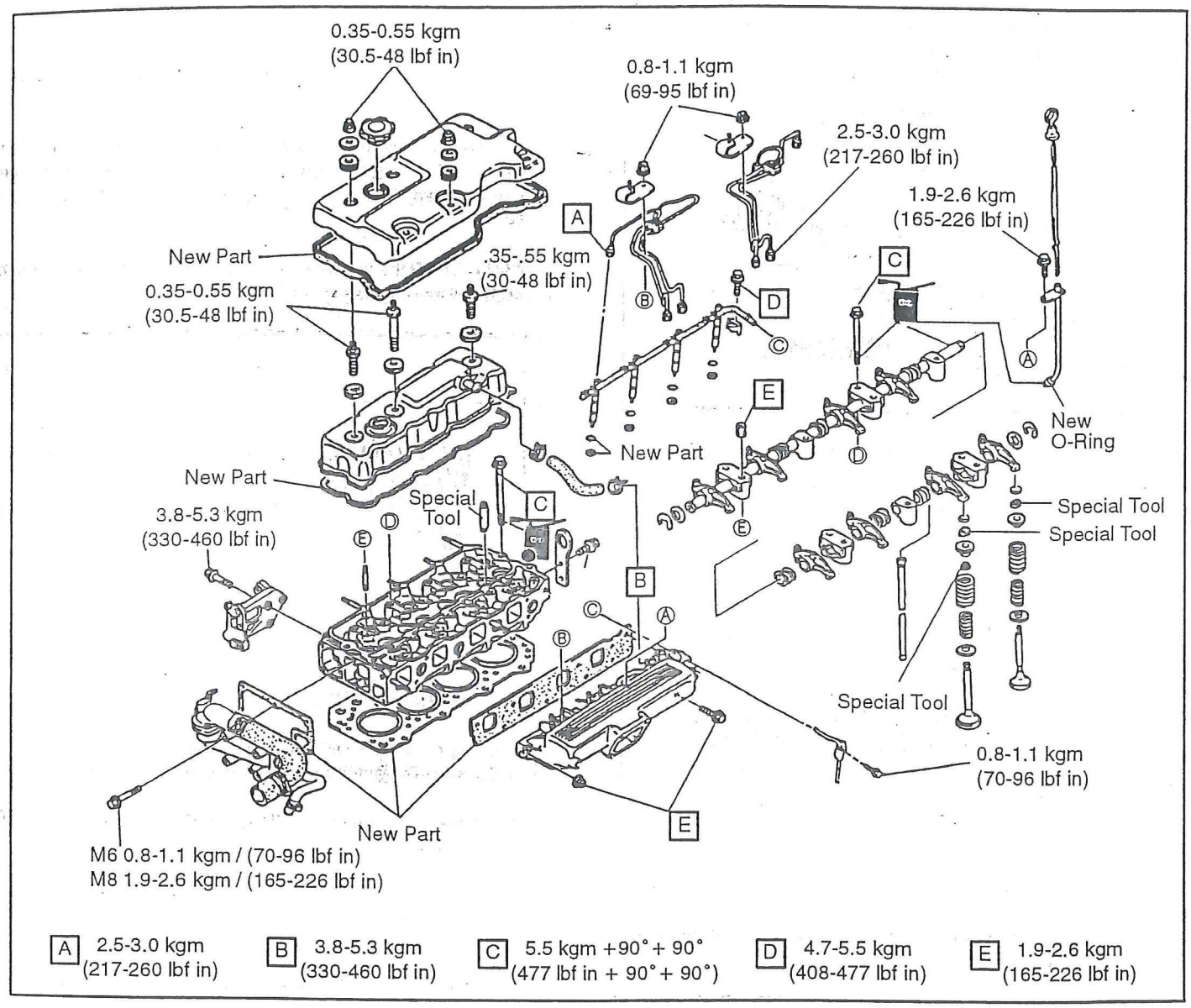


WATER PIPE INSTALLATION

1. Bolt the water pipe and the alternator bracket to the block as an assembly. Use a new gasket when installing the water pipe.
   Tightening torque:
   - Ⓐ 3.2-4.7 kgm / (23-34 lbf ft)
   - Ⓑ 1.9-2.6 kgm / (165-226 lbf in)



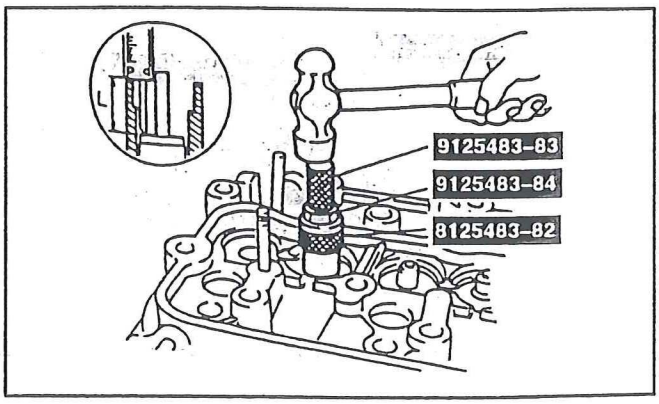
CYLINDER HEAD REASSEMBLY
ASSEMBLY AND TORQUE VALUE ILLUSTRATION



VALVE GUIDE INSTALLATION

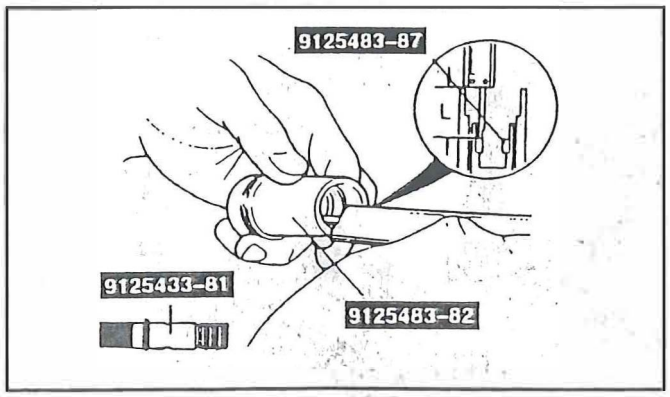
1. Adjust the special tool so that the "L" dimension in the illustration is the standard value.
   Standard value: 14.3 mm / (.563 in)

2. Install the valve guide as shown in the illustration. Be sure the bottom of the valve guide is seated in the cylinder head.



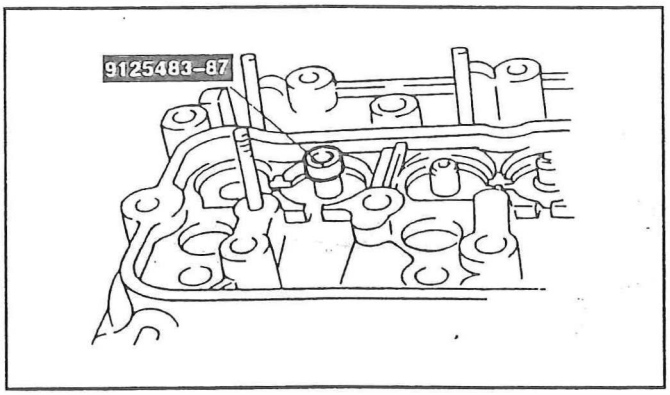
VALVE SEAL INSTALLATION

1. Adjust the valve seal installation tool so that the "L" dimension in the illustration is the standard value.
Standard value: 15.5-15.9 mm / (.610-.626 in)

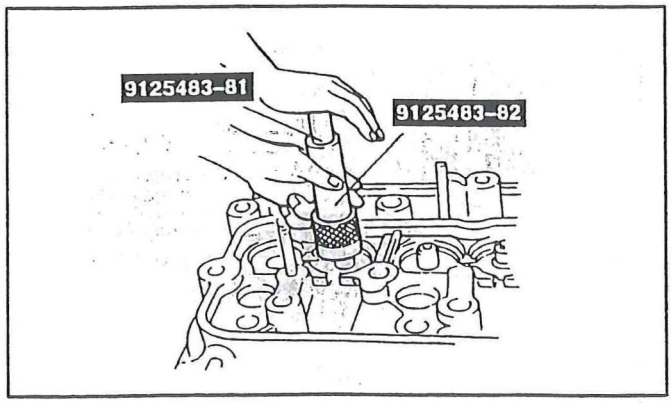


2. Install a new valve seal on the valve guide by hand.

3. Install the the valve seal installation tool on top of the valve seal.



4. Install the valve seal into the cylinder head with the valve seal installation tool.



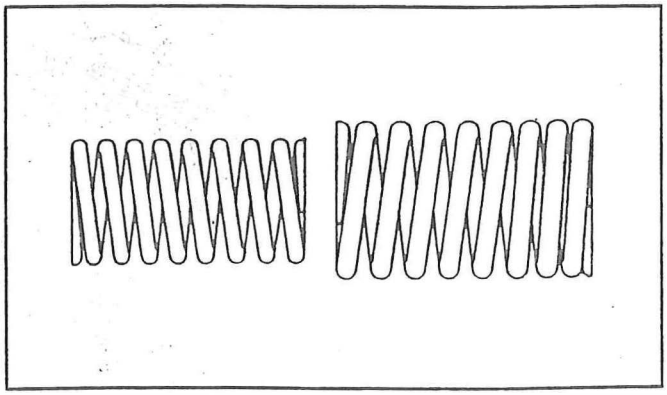
VALVE-VALVE SPRING-VALVE SPRING SEAT INSTALLATION

1. Apply a small amount of engine oil to the valve stem.

2. Insert the valve into the valve guide, from the combustion chamber side.

3. Install the following parts over the valve stem and onto the cylinder head in the following order: lower valve spring seat, inner valve spring, outer valve spring, and upper valve spring seat.

NOTE: Install the inner and outer valve springs so that the coil directions are opposite as illustrated.



VALVE RETAINER INSTALLATION

1. Compress the spring with the valve spring compressor so that the valve retainer notch on the valve stem is visible.

2. Install the valve retainer, and release the spring compression.

3. Remove the valve spring compressor, and lightly tap the top of the valve stem with a plastic hammer to ensure that the valve retainer is seated properly in the notch.