

5. Push the connecting rod and piston assembly upward and out through the top of the cylinder (Fig. 7A-17).
6. Put cap back on connecting rod to keep them together.

7A-16 REMOVAL OF VALVES AND SEAT INSERTS

1. Remove the valve tappet inspection plate and push the valve spring together with an automotive valve lifting tool (Fig. 7A-18).
2. Put a rag into the opening at the bottom of the valve chamber so the holding locks do not fall into the engine oil pan.
3. Remove the holding locks, seats, springs, valves and clean them in solvent.

NOTE: Mark valves so that they will be put in the same guide during assembly as they were when removed.

4. Remove the inlet and exhaust valve inserts when badly worn (Fig. 7A-26).
5. Inspect the valve guides for wear and remove when the valve stem clearance is more than .006 inch (.152 mm) (Fig. 7A-19). Use a driver to push out the old guides.

7A-17 REMOVAL OF CYLINDER BLOCK

1. Remove the six nuts which hold each cylinder block (Fig. 7A-20).
2. Lift off the cylinder blocks.

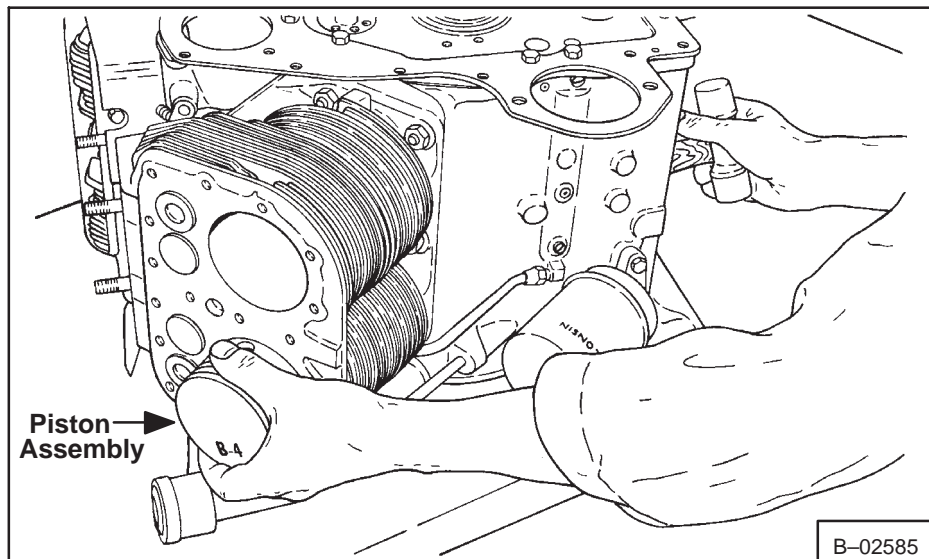


Fig. 7A-17 Remove Rod and Piston

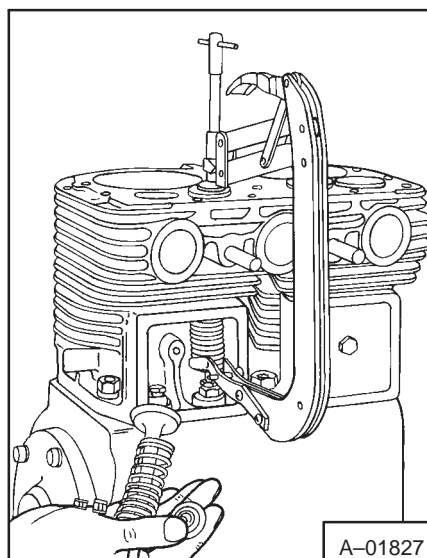


Fig. 7A-18 Remove Valves

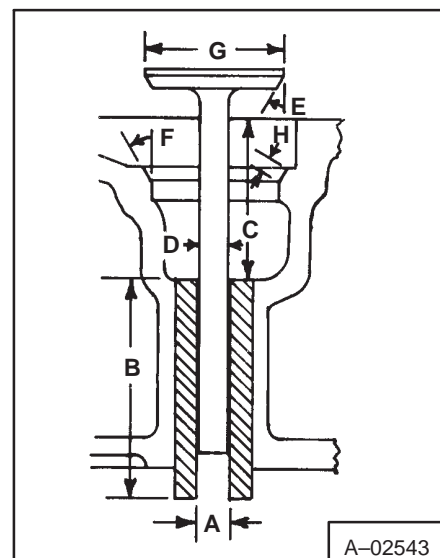


Fig. 7A-19 Checking Valve Guides

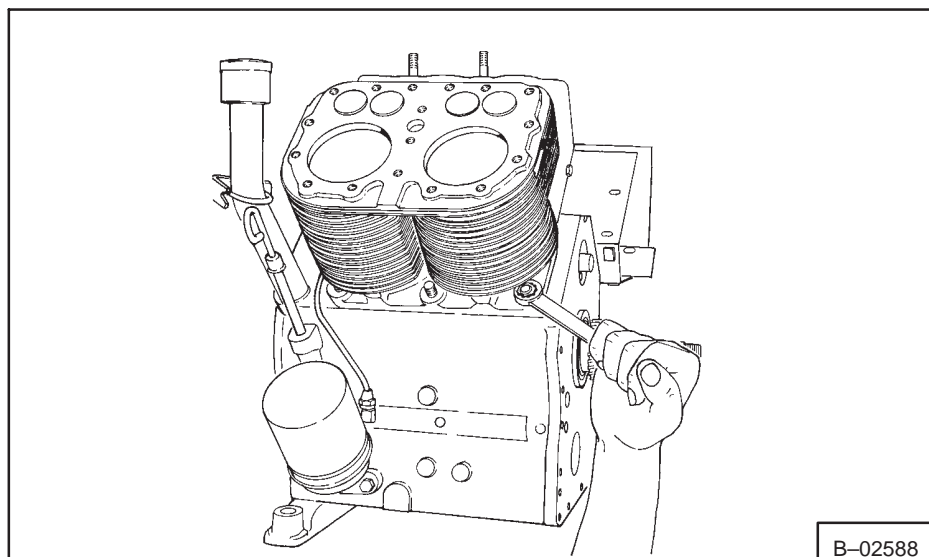


Fig. 7A-20 Remove Cylinder Block Nuts

7A-18 REMOVAL OF CRANKSHAFT

1. Remove the six bolts in the main bearing plate and remove the plate (Fig. 7A-21).
2. Pull the crankshaft from the end of the housing (Fig. 7A-21).

7A-19 REMOVAL OF CAMSHAFT

1. Pull the camshaft from the flywheel end of the engine (Fig. 7A-22).

7A-20 REMOVAL OF VALVE TAPPETS

1. After the camshaft has been taken out, remove the valve tappets (Fig. 7A-22).

7A-21 INSTALLATION OF VALVE TAPPETS

1. Install the valve tappets into correct position before the camshaft is installed (Fig. 7A-22).

NOTE: Valve tappet adjustment is made after cylinder blocks have been installed. Correct clearance is .008" (0,2 mm) for the inlet and .016 (0,4 mm) for the exhaust valves.

7A-22 INSTALLATION OF CAMSHAFT

1. Install the spring and plunger at the end of the camshaft.
2. Push the camshaft in thru the flywheel end of the engine (Fig. 7A-22).

7A-22 INSTALLATION OF CRANKSHAFT

1. Put the crankshaft in thru the end of the housing (Fig. 7A-21).
2. Install the main bearing plate using the same quantity and thickness gaskets as shims as when removed. End play must be .002" to .004" (0,05 to 0.10 mm) when the engine is cold.

NOTE: The main bearing plate cannot be installed wrong. The mounting holes are offset so that the plate is correct for bearing lubrication.

3. Install the six bolts in the main bearing plate and tighten to 25–30 ft.-lbs. (34–41 Nm) torque.

7A-23a Three Bearing Crankshaft

1. Crankshaft seal (Fig. 7A-22a, Item 1) must be installed so the end of the seal is even with the end of the bearing support.
2. Put Loctite on the inside diameter of the bearing race before installing the race.
3. When installing the third bearing, push on the number side of the bearing until it is even with the inside of the bearing support (Fig. 7A-22b).
4. If a new bearing support is installed, crankshaft end play must be checked. If end play adjustment is necessary, add or remove gaskets from the front bearing plate of the engine.

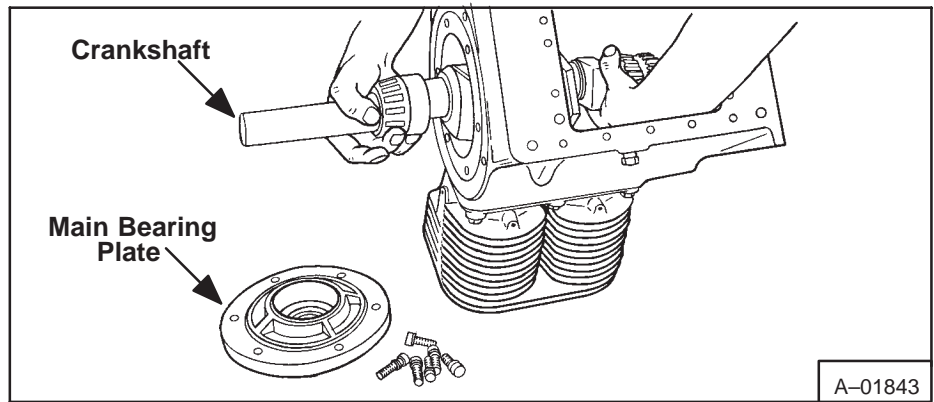


Fig. 7A-21 Remove Crankshaft

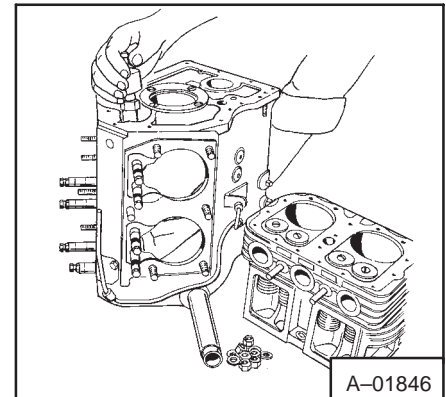


Fig. 7A-22 Installing Camshaft

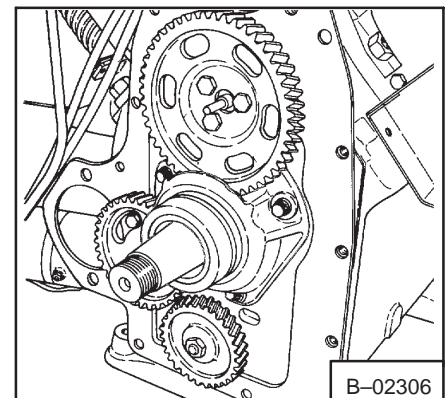


Fig. 7A-22a Crankshaft Seal Location (3 Bearings)

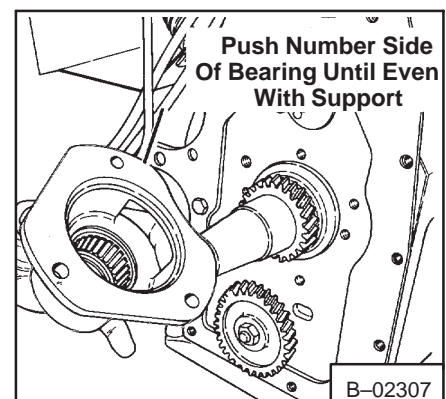


Fig. 7A-22b Bearing Location (3 Bearings)

7A-24 INSTALLATION OF CYLINDER BLOCKS

1. Install the cylinder blocks and fasten each with six nuts (Fig. 7A-23).
2. Tighten nuts to 40–50 ft.-lbs. (54–68 Nm) torque.

7A-25 INSTALLATION OF PISTON RINGS

1. Put the open end of the piston ring on first and spread to fit in groove (Fig. 7A-24).
2. There are rings to each piston. The bottom ring is the oil ring. The 2nd ring is the scraper ring and the 1st ring is the compression ring (See Fig. 7A-25).
3. Install the scraper ring with the scraper edge down (Fig. 7A-25).

7A-26 INSTALLATION OF VALVES AND SEAT INSERTS

1. Inspect all valve inserts and install new inserts when necessary.
2. Install each valve into the same guide from which each was removed.
3. Install the seat and spring and fasten with the valve locks (Fig. 7A-26).
4. Make adjustment of the valve tappet clearance (See Section 8 "Technical Data" for valve tappet clearance).
5. Install the inspection plate for the valve tappets.

7A-27 INSTALLATION OF PISTONS AND CONNECTING RODS

NOTE: Identical numbers are stamped on the side of each connecting rod and its cap. These numbers must all be on the same side of the connecting rods when installed in the engine. Be sure that the hole in the cap is facing toward the oil spray nozzle (Fig. 7A-27). Install new nuts on the connecting rod bolts and tighten them to 20–28 ft.-lbs. (27–38 Nm) torque.

1. Install the piston and connecting rod assembly in the same bore as when removed.

NOTE: Put oil on the pistons, rings, piston pins, rod bearings and cylinder walls before assembly.

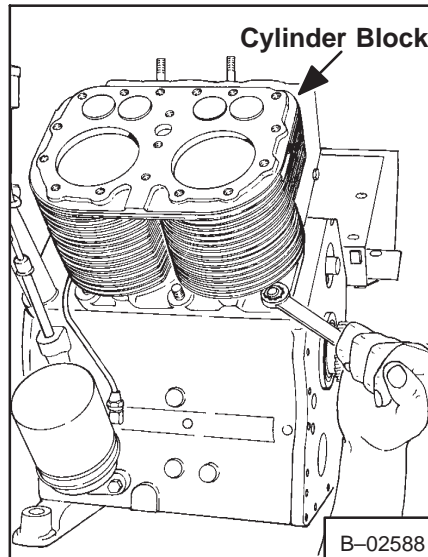


Fig. 7A-23 Install Cylinder Block

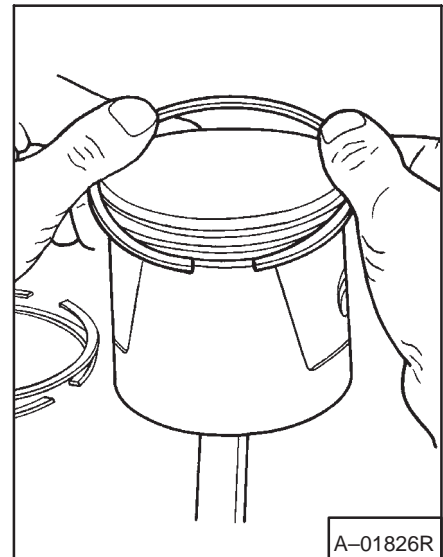


Fig. 7A-24 Install Piston Rings

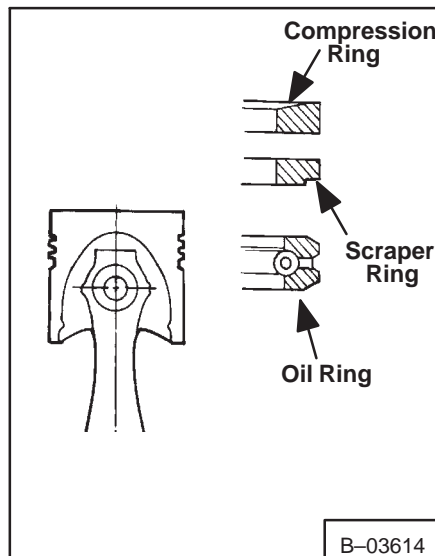


Fig. 7A-25 Piston Ring Sequence

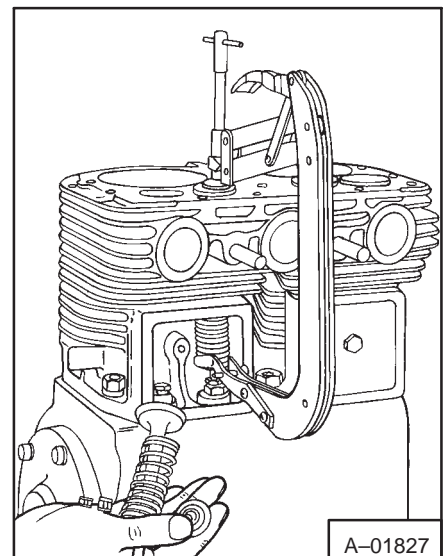


Fig. 7A-26 Install Valves

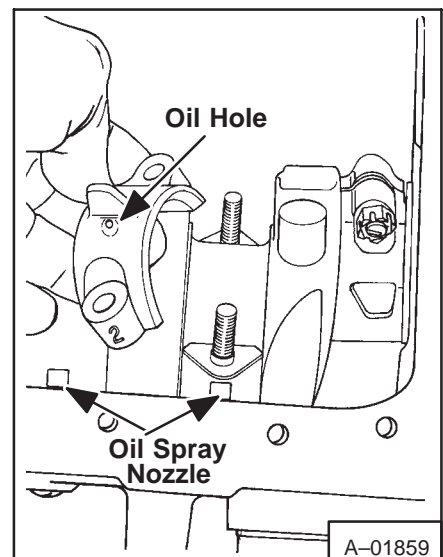


Fig. 7A-27 Install Rod Caps

2. Use a ring compressor and check that the ring gaps are 90 degrees apart, around the piston (Fig. 7A-28).
3. Check that the wide sections of the piston skirt are toward the maximum thrust side (Opposite the crankshaft rotation) (Fig. 7A-29).
4. Insert the connecting rod cap with the bearing half installed (Fig. 7A-27).
5. Install the rod bearing nuts and tighten them to 20–28 ft.-lbs. (27–38 Nm) torque.

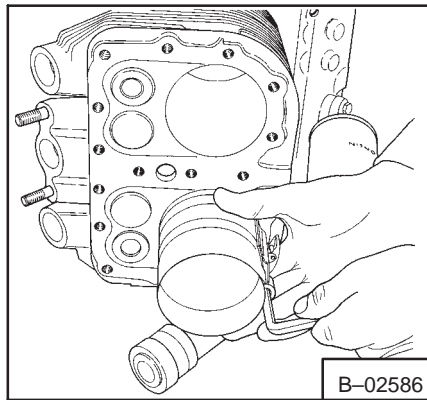


Fig. 7A-28 Install Pistons

7A-28 INSTALLATION OF OIL PUMP

1. Install the oil pump into the crankshaft housing (Fig. 7A-30). Be sure that the seat for the lock screw is in line with the hole for the screw in the crankshaft housing.
2. Install the lock screw into the pipe plug hole (Fig. 7A-31). Use an Allen wrench to tighten the lock screw.
3. Install the grooved pipe plug from the bottom of the housing (Fig. 7A-31).

7A-29 OIL PAN INSTALLATION

1. Install the oil pan and install the bolts. Tighten the bolts to 6–9 ft.-lbs. (8–12 Nm) torque.

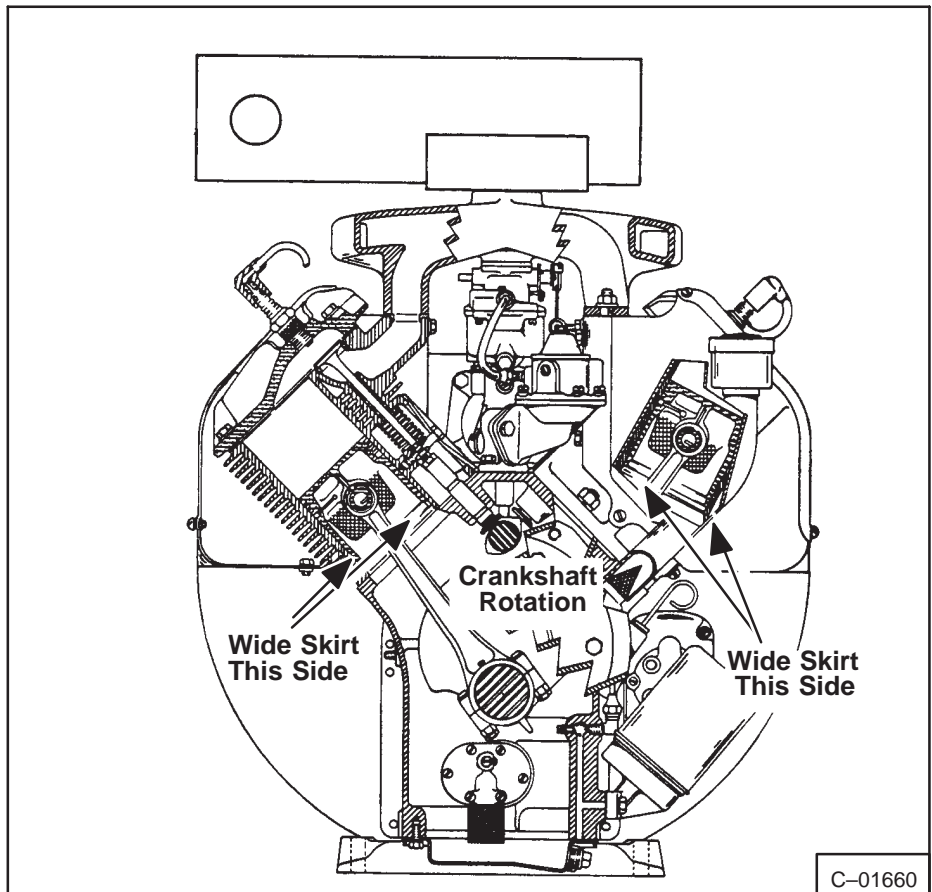


Fig. 7A-29 Correct Piston Installation

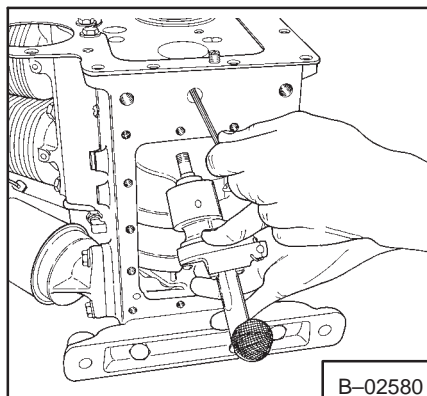


Fig. 7A-30 Install Oil Pump

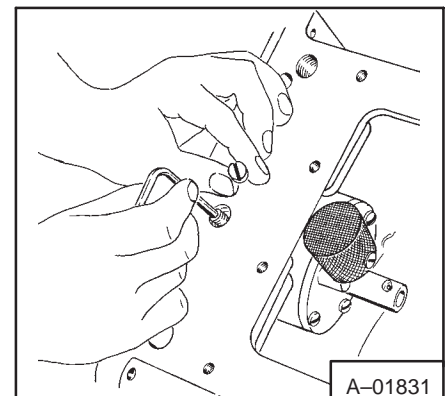


Fig. 7A-31 Fasten Oil Pump

7A-30 INSTALLATION OF IDLER GEAR AND SHAFT

1. Install the idler gear and shaft (Fig. 7A-32).
2. Install the allen set screw (Fig. 7A-33).

NOTE: Check that the oil groove and shaft is in the up position, and that the clearance between the idler gear and the shoulder of the shaft is .003-.004" (.08-.1 mm).

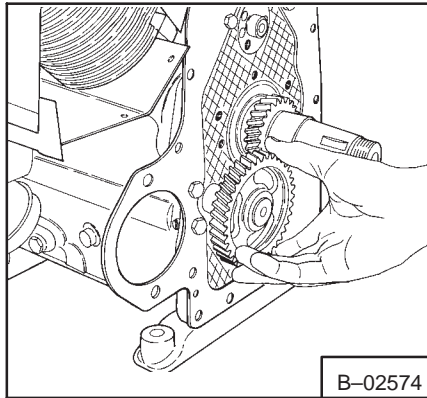


Fig. 7A-32 Install Gear and Shaft

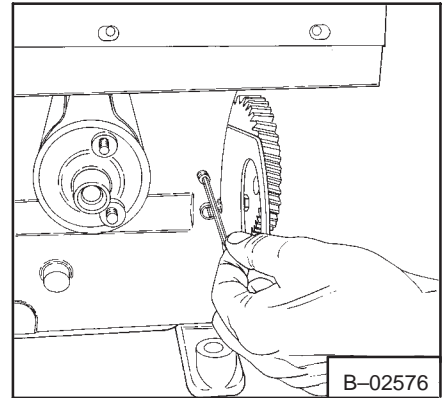


Fig. 7A-33 Install Set Screw

7A-31 INSTALLATION OF CAMSHAFT GEAR

1. Put the camshaft gear on the shaft so that the holes are in correct alignment (Fig. 7A-34).

NOTE: Be sure that the spring, plunger and thrust button are in correct position (Fig. 7A-35).

2. Install the three bolts and lock washers (Fig. 7A-34).

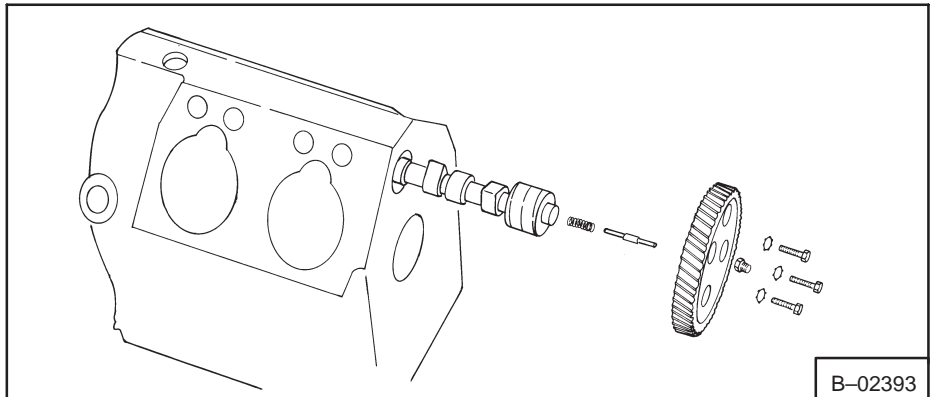


Fig. 7A-34 Install Gear and Camshaft

7A-32 INSTALLATION OF GEAR COVER

1. Install the gear cover.
2. Install the gear cover bolts and two dowel pins. Tighten the bolts to 14-18 ft.-lbs. (19-24 Nm) torque (Fig. 7A-36).
3. Connect the governor linkage rod.

7A-33 INSTALLATION OF CYLINDER HEAD

1. Install the cylinder heads.
2. Install the head bolts, using bolts by length, according to the bosses on the cylinder heads (Fig. 7A-37).

NOTE: Put oil on all of the cylinder head bolts to protect them from rust.

3. Tighten the head bolts in the sequence shown in figure 7A-37.
4. Tighten the cylinder head bolts to 22-24 ft.-lbs. (30-33 Nm) torque.

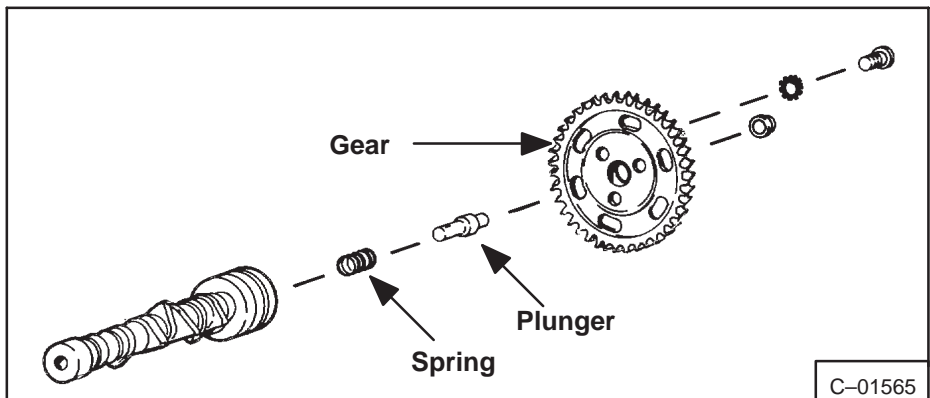


Fig. 7A-35 Install Spring Plunger and Gear

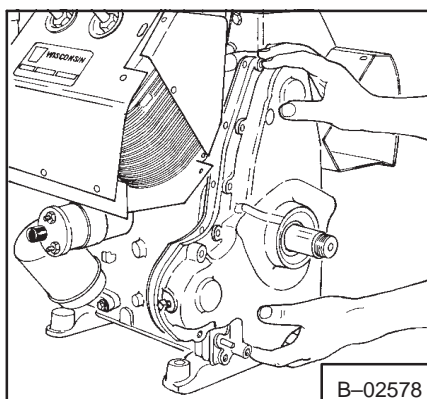


Fig. 7A-36 Install Cover

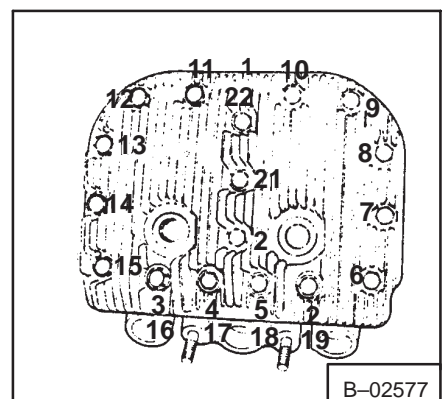


Fig. 7A-37 Install Cylinder Head