

Use the scraper carefully and don't let it slip and dig into the piston skirt.

After bearings are cleaned, dry them immediately with low pressure (three to five pounds) air and coat at once with SAE 30 motor oil to protect them from corrosion. Because of the type of steel used in bearings, this protection is most important! Keep the roller needles in the sieve when drying and oil-coating them.

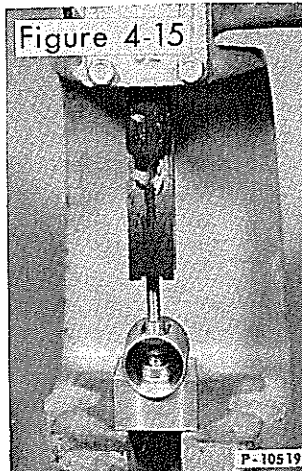
INSPECTION

Inspect the crankcase cylinder and crankcase bottom for cracks or damaged surfaces inside and outside. Look for scored, gouged or out-of-round bearing surfaces. Make sure the cylinder bore is smooth and that the chromium surface has no discoloration. Discoloration is a sign that the chromium is wearing thin and the cylinder must be replaced. Check the screw holes for stripped threads. Make sure the crankcase cylinder and bottom are thoroughly clean and that no metal particles remain.

Inspect the crankshaft bearing surfaces for scoring and galling. Look for a worn or broken flywheel keyway and for stripped or damaged threads at each end of the crankshaft. Any burring around the keyway can be removed with a fine file and dressed with crocus cloth. Uneven wear or other damage is cause for installing a new crankshaft.

Inspect the bearings for wear and for burned and damaged rollers. Place the crankshaft bearings on the shaft and spin them by hand to make sure there is no binding or roughness. The twenty connecting rod rollers must be replaced as a set if any of them are worn or damaged.

Inspect the piston for a scuffed or scored skirt and for nicked, cracked or distorted ring lands. If the ring grooves are merely worn, check the width of the ring grooves by installing a new ring and measuring clearance with a thickness gauge. Maximum allowable clearance is 0.0045 inch between the ring and the edge of the groove.

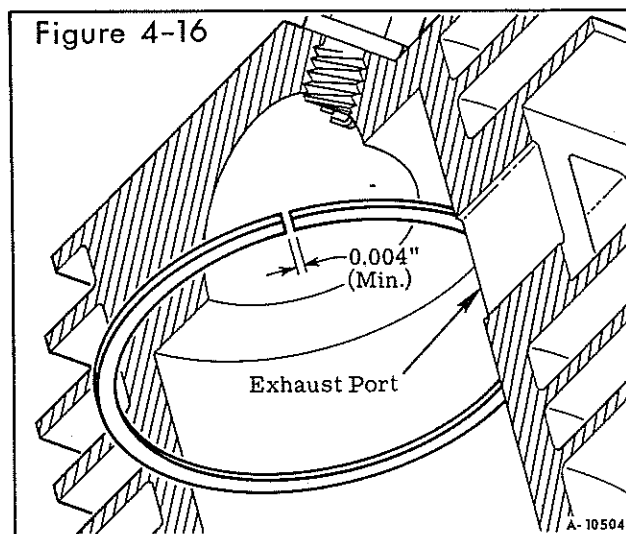


Inspect the connecting rod for scoring of the bearing surfaces and twisting or bending of the rod shaft. If the piston pin is worn or damaged, install a new pin.

Inspect the oil seals for cuts and wear. Any damage to the sealing edge will result in oil leakage. Make sure the spring inside the seal is undamaged and that the rubber portion of the seal is securely bonded to the metal shell.

ASSEMBLY OF POWERHEAD

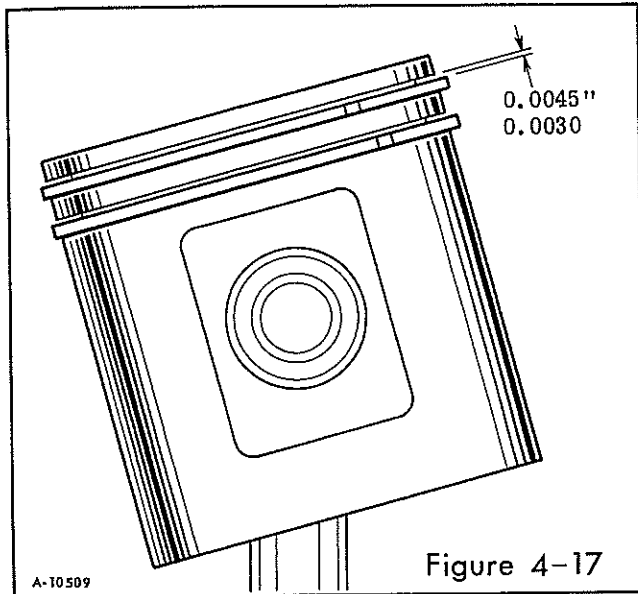
Use only thoroughly cleaned parts which have passed inspection or new parts during assembly of the powerhead.



a. "Wearing-in" New Piston Rings

In normal use with a new crankcase cylinder and new rings, the sliding surfaces of the crankcase cylinder bore and the rings will "wear-in" until both are polished and smooth. When new piston rings are installed in a cylinder which has already had use, the sliding surfaces of the bore are too smooth to "wear-in" or polish the sliding surfaces of the rings. As a result, compression will be lowered until the surfaces of the rings have become polished through use. This condition can be corrected so that compression will be in the proper range by artificially "wearing-in" the rings.

1. Mount the new rings on an old piston that is relatively undamaged.
2. Coat the inside of the bore of an old crankcase cylinder (which is undamaged in the bore area) with a soupy mixture of SAE 30 oil and Bon Ami or other "can't scratch" kitchen cleaner.
3. Insert the piston and rings into the bore and run the piston up and down in the bore for four or five minutes or as long as is necessary to put a polish on the sliding surface of the rings. The length of time will depend on the brand of kitchen cleanser used.



Check the condition of the rings frequently and add additional compound as necessary.

4. When the rings are polished, thoroughly clean them in solvent and blow dry with low pressure (three to five pounds) air. Coat them with SAE 30 oil to preserve the polish and prevent corrosion.

b. Fitting Piston Rings to Piston and Cylinder Bore

1. Push one of the piston rings down into the cylinder bore with the piston to make sure the ring is square in the bore. Push the ring to a point just above the exhaust ports (Figure 4-16). Withdraw the piston.
2. Check the ring end gap with a thickness gauge without moving the piston ring. End gap must be at least 0.004 inch. If the gap is less than 0.004 inch, remove the ring and dress both ends of the ring with a fine file until the gap is greater than 0.004 inch when inserted into the cylinder bore.

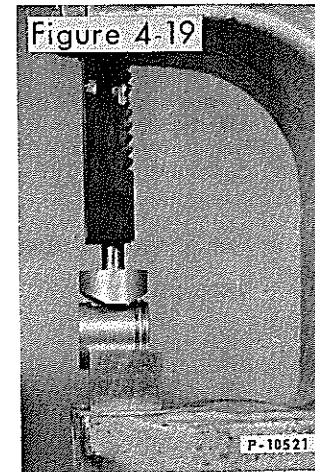
3. Repeat the fitting with the second ring.

4. Install the rings on the piston. Rotate the rings to make sure that they move freely in the ring grooves. Check the clearance between each ring and the top of its groove with a thickness gauge (Figure 4-17). Clearance must be between 0.003 and 0.0045 inch. If clearance is not within these limits, use a new piston. It is not advisable to try to lap the rings to fit the clearance limits.

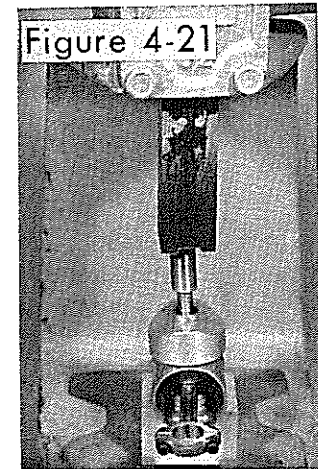
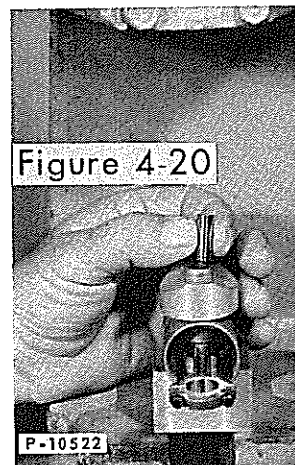
c. Installing Connecting Rod in Piston

If you are using a new piston, use a new piston pin. Do not use an old pin with a new piston.

1. Lightly coat the pin and connecting rod bearings with SAE 30 oil.
2. Place the piston on the holding block with the ring



end of the piston toward the closed end of the block. Place the first bearing, closed end up, on the piston. Place the short leg of the guide on the bearing (Figure 4-18) and gently press the bearing into the piston until the guide is just flush with the surface of the piston. (Figure 4-19). **DO NOT OVERPRESS AS THE PISTON CAN BE DAMAGED AND THE BEARING CAN BE PRESSED INTO THE PISTON TOO FAR.**



3. Turn the piston over on the holding block with the other bearing bore up. Put the connecting rod in position in the piston. Insert the long leg of the guide into the piston with the bottom of the leg resting on the connecting rod. Drop the piston pin into the guide (Figure 4-20).
4. Place the thin end of the driver on the pin (Figure 4-21). Press the pin into place until the driver shoulders on the guide (Figure 4-22). Move the connecting rod back and forth to make sure it moves freely. Remove the guide.
5. Place the second bearing, closed end up, on the piston. Place the short leg of the guide on the bearing (Figure 4-23) and press gently into place until the guide is just flush with the surface of the piston. Recheck movement of the connecting rod.

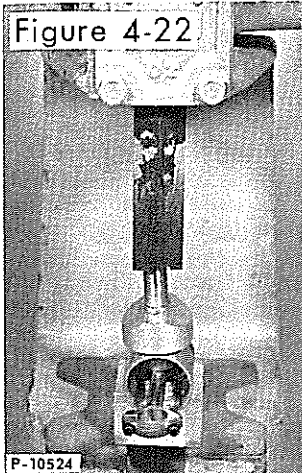


Figure 4-22

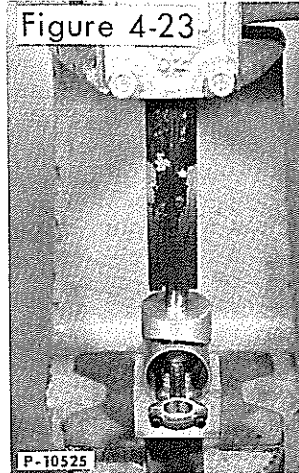


Figure 4-23

d. Installing Connecting Rod on Crankshaft

1. Place a coating of grease on the bearing surfaces of the connecting rod and rod cap.
2. Align the pips on the rod and cap (Figure 4-24). Make sure the rod and cap mate properly. If they do not, the cap is the wrong cap and the correct cap will have to be found and used or a new rod and cap used.
3. Place ten of the bearing rollers in the grease on the connecting rod and the ten other rollers in the grease on the cap. Make sure you use all twenty rollers.
4. Place the connecting rod on the crankshaft. Add the cap and install it with the screws. Make sure the pips align. Tighten the screws to a torque value of 35 to 40 inch pounds. Make sure that none of the rollers fell out of the grease during installation and that the connecting rod moves freely around the crankshaft.

e. Installing Crankshaft Thrust Plates, Bearings, Rings and Seals

1. Lightly oil the bearing surfaces of the crankshaft with SAE 30 motor oil.

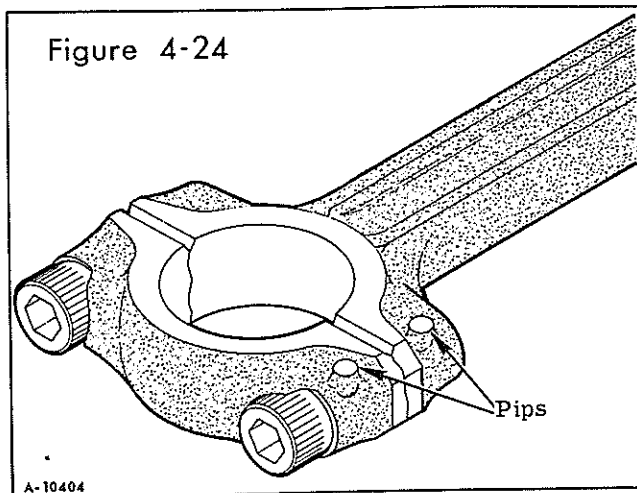


Figure 4-24

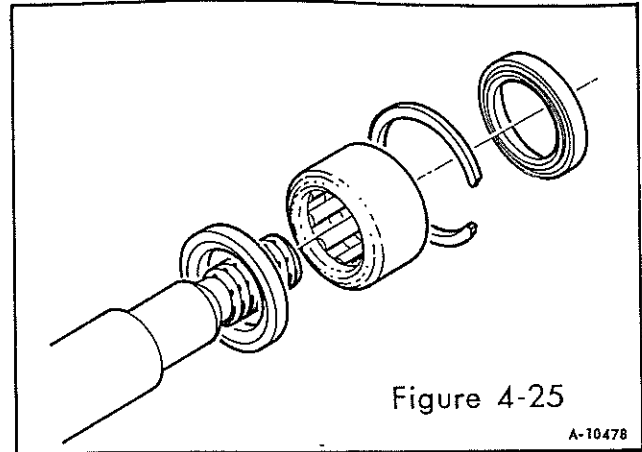


Figure 4-25

2. Place the thrust plates on the crankshaft with the chamfered side of the thrust plates against the crankshaft throw (Figure 4-25).
 3. Place the roller bearings on the crankshaft with the rounded side of each bearing case against the thrust plates.
 4. Put the retaining rings on the crankshaft against the bearings.
 5. Lightly coat the oil seals with a light automotive chassis grease (but not a cup grease). Put the oil seals on the crankshaft with the open side of the seals against the retaining rings.
- f. Installing the Piston and Crankshaft in the Crankcase

1. Lightly coat the cylinder bore and the bearing surfaces of the crankcase cylinder and crankcase bottom with SAE 30 motor oil.
2. Line up the assembled piston, connecting rod and crankshaft so that the flywheel end of the shaft is on the opposite side of the cylinder crankcase from the exhaust port.
3. Insert the piston into the cylinder bore. Press the rings against the piston with a thin, blunt tool and

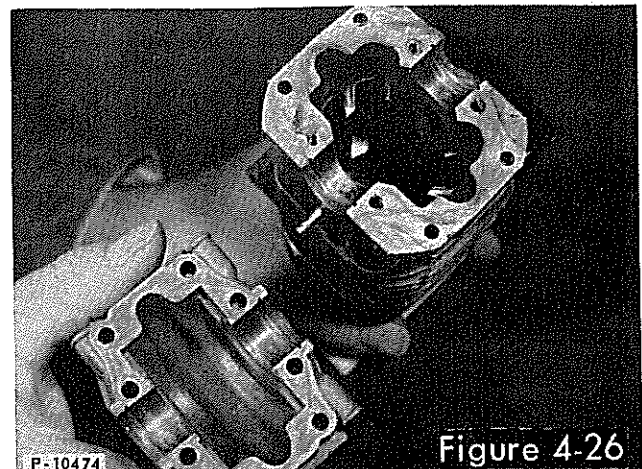


Figure 4-26

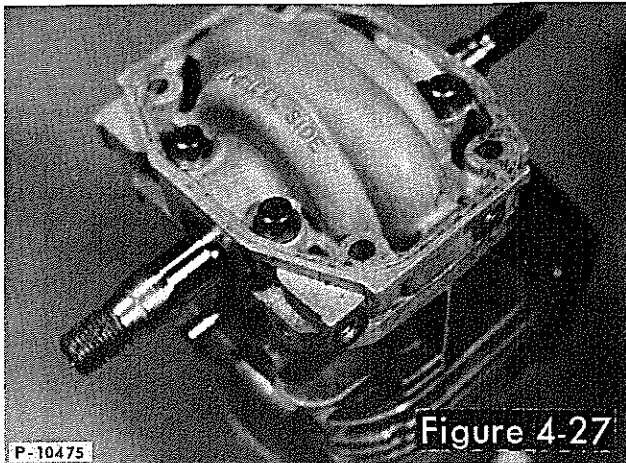


Figure 4-27

work the piston down into the cylinder bore. Seat the crankshaft on the bearing surface of the crankcase cylinder, so that the open portion of each retaining ring is seated in the ring grooves of the crankcase cylinder.

4. Coat the mating surfaces of the crankcase cylinder and crankcase bottom with a sealant (Figure 4-26). Do not get the sealant on any other surfaces.
5. Place the crankcase bottom on the crankcase cylinder with the marked flywheel side toward the flywheel end of the crankshaft (Figure 4-27). Make sure the retaining rings fit into the ring grooves in the crankcase bottom.
6. Coat each of the four Allen head screws with a drop of Loctite. Install the screws to a torque value of 45 to 50 inch pounds.
7. Turn the crankshaft several times in each direction to check for binding, hitting, or rubbing. The shaft must rotate freely. Check for end play of the shaft. End play should not exceed 0.010 inch.

g. Installing Air Filter Housing on Powerhead

1. Coat each of the two air filter housing attaching screws with a drop of Loctite.
2. Place the air filter housing on the powerhead with the opening for the air duct on the left side of the powerhead. Install the two screws to a torque value of 35 to 40 inch pounds.

h. Additional Part Installation

Detailed descriptions of the installation of all other parts of the saw are carried in paragraphs dealing with the parts or assemblies concerned. Reference should be made to these paragraphs. In general, the following provides a method for final assembly and completion of service on the engine.

1. Install the muffler, carburetor, coil and lamination

assembly and air duct.

2. Install the oil tank, condenser, oiler pump, top shroud and handle. Make sure the throttle rod doesn't bind and that the oiler pump operates correctly.
3. Install the breaker assembly and adjust the breaker point gap.
4. Install the flywheel key and flywheel and adjust the lamination gap.
5. Install the lower shroud, fan housing, spark plug and clutch guard.
6. Touch-up paint any parts requiring repainting during the assembly process.
7. Adjust the carburetor.

AUTOMATIC OILER

The automatic oiler is operated by crankcase pressure acting upon a piston assembly which has a fixed travel distance. Adjustment of the oil delivery rate of the automatic oiler is made by turning the slotted head of the oil pump cylinder assembly. The automatic oiler is mounted in the discharge line of the manual oiler and the manual oiler should be used to prime the automatic oiler after each refilling of the oil tank.

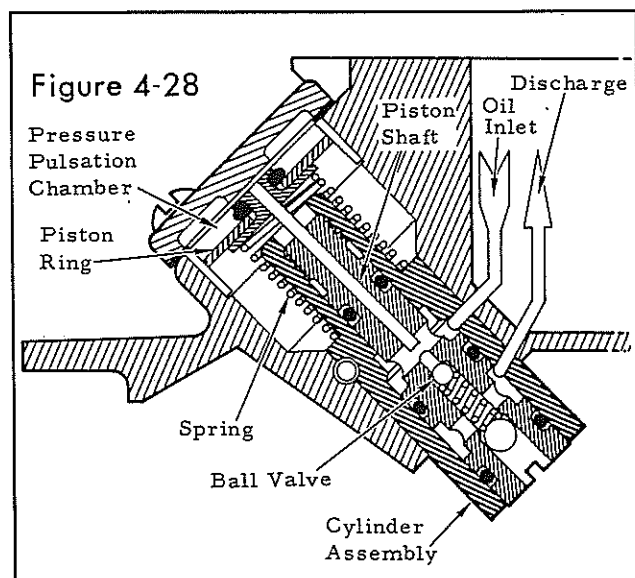


Figure 4-28

OPERATION

The automatic oiler consists of a spring-loaded piston and a cylinder assembly containing a valve. Both are mounted in a housing pressed into the oil tank assembly (Figure 4-28). The upper end of the piston has a large, flat washer-like piston ring mounted on it with an "O" ring. The piston ring functions in the same fashion as