

# JLO

## ONE CYLINDER MODELS CONDENSED SERVICE DATA

ENGINE MODEL	L99	L152	L197	L227, L230	L230	L252	L292
Bore—(mm)	55	59	66	70	70	69	75
Inches	2.165	2.323	2.60	2.756	2.756	2.716	2.953
Stroke—(mm)	42	54	58	58	58	66	66
Inches	1.653	2.126	2.28	2.283	2.283	2.598	2.598
No. of Cylinders	1	1	1	1	1	1	1
Displacement—(cc)	100	148	198	223	223	247	292
Cubic Inches	6.1	9	12.08	13.6	13.6	15.07	17.8
Horsepower @ RPM	4.75@5500	5.7@4500	7.3@4500	12.5@5500	14.0@6000	9.1@4250	14.6@4500
Cooling type	Centrifugal Fan						
Carburetor Model	HL	HL	HL	HR	HD	HL, HR	HR or HD
Number Used	1	1	1	1	1	1	1
Ignition:							
Type	E120	RB1 6V/17W	RB1 6V/17W	RB1 6V/17W	RCP1V 12V /40W	SB1 6V/16 (36)W	SB1 6V/16W
Point Gap—(mm)	0.3-0.5	0.35-0.45	0.35-0.45	0.35-0.45	0.35-0.45	0.35-0.45	0.35-0.45
Inch	0.015	0.016	0.016	0.016	0.016	0.016	0.016
Edge Gap—(mm)	8.5-12.5	14-18	11-14	14-18	14-18	15-19	15-19
Inch	0.334-0.492	0.551-0.709	0.433-0.551	0.471-0.708	0.471-0.708	0.59-0.75	0.590-0.748
Timing Advance?	No	No	No	No	No	No	No
Timing BTDC (mm)	2.1-2.5	2.3-2.8	2.3-2.8	2.75	2.8-3.2	2.8-3.2	3.5-3.8
Inch	0.082-0.098	0.091-0.110	0.091-0.110	0.108	0.091-0.126	0.110-0.126	0.138-0.150
Degrees	....	....	....	....	....	....	....
Measured at	....	....	....	....	....	....	....
Spark Plug:							
Bosch	M240T1	M225T1	M225T1	M225T1	M240T1	M225T1	M225T1
Champion	....	UK10	UK10	UK10	K57R	UK10	K9
Electrode Gap (mm)	0.4-0.5	0.4-0.5	0.4-0.5	0.4-0.5	0.4-0.5	0.4-0.5	0.4-0.5
Inch	0.018	0.018	0.018	0.018	0.018	0.018	0.018
Fuel/Oil Ratio	20:1	25:1	25:1	20:1	20:1	25:1	20:1

ENGINE MODEL	L295	L297	L300	L340	L372	L380	L395
Bore—(mm)	74.5	75	75	80	80	80	82.5
Inches	2.933	2.953	2.953	3.149	3.150	3.150	3.248
Stroke—(mm)	67	67	67	67	74	74	74
Inches	2.638	2.638	2.638	2.638	2.913	2.913	2.913
No. of Cylinders	1	1	1	1	1	1	1
Displacement—(cc)	292	296	296	336	372	372	396
Cubic Inches	17.8	18.1	18.1	20.5	22.7	22.7	24.16
Horsepower @ RPM	18.5@5500	17.5@5000	19.5@5500	22.0@5500	21@5000	23.5@5000	24.5@5000
Cooling Type	Centrifugal Fan						
Carburetor Model	HR, HD	HR, HD	HR, HD	HD	HD	HR, HD	HD
Number Used	1	1	1	1	1	1	1
Ignition:							
Type	SCP1V 12V /75W	SC1V 12V /40W	SC1 12V /40W	RCP1V 12V /75W	SC1V 12V /40W	SC1V or CP1V	RCP1V 12V /75W
Point Gap—(mm)	0.35-0.45	0.35-0.45	0.35-0.45	0.35-0.45	0.35-0.45	0.35-0.45	0.35-0.45
Inch	0.016	0.016	0.016	0.016	0.016	0.016	0.016
Edge Gap—(mm)	17.5-22.5	17.5-22.5	17.5-22.5	17.5-22.0	18-23	18-23	....
Inch	0.689-0.88	0.869-0.886	0.689-0.886	0.689-0.886	0.709-0.906	0.709-0.906	....
Timing Advance?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Timing BTDC (mm)	3.0-3.5	3.0-3.5	3.0-3.5	3.0-3.5	3.1-3.6	3.1-3.6	3.1-3.6
Inch	0.118-0.138	0.118-0.138	0.118-0.138	0.118-0.138	0.122-0.142	0.122-0.142	0.122-0.142
Degrees	....	21.7-23.5	21.7-23.5	....	21.1-22.8	21.1-22.8	....
Measured at	....	....	....	....	....	....	....
Spark Plug:							
Bosch	M240T1	M225T1	M225T1	M240T1	M225T1	M225T1	M240T1
Champion	K57R	UK10	K185	K57R	K9	K9	K57R
Electrode Gap (mm)	0.4-0.5	0.4-0.5	0.4-0.5	0.4-0.5	0.4-0.5	0.4-0.5	0.4-0.5
Inch	0.018	0.018	0.018	0.018	0.018	0.018	0.018
Fuel/Oil Ratio	20:1	20:1	20:1	20:1	20:1	20:1	20:1

### MAINTENANCE

**SPARK PLUG.** The recommended plug for normal service is given in CONDENSED SERVICE DATA Tables. Hotter or colder plugs may be

required for particular applications. CHAMPION Gold Palladium plugs are gapped at 0.015 which is the correct setting for this plug. Recommended spark plug tightening torque is 25 ft.-lbs.

**CARBURETOR.** Tillotson diaphragm type carburetors are used on all snowmobile engines. Most engines are equipped with an integral, pulse-type fuel pump built into carburetor, but some models may be equipped with



a carburetor without fuel pump. See Tillotson carburetor section for operation and overhaul procedure.

Refer also to Figs. 1 through 4 for views of pulse passages and induction ports. Internal pulse passage (1—Fig. 1 and P—Fig. 3 & 4) is not present in all engines. The tapped hole for plug (2—Fig. 1 or 3—Fig. 2 & 3) is always present. If internal pulse passage (P) is present and used, hole in gaskets, cylinder shield, adapter flange and carburetor must be open and aligned and plug (2—Fig. 1) must be installed.

On HL carburetors, initial adjustment is 3/4 turn open for idle adjustment screw and 1 1/4 turn open for main adjustment screw. On HR or HD series carburetors, initial adjustment is one turn open for both needles. Both needles must be readjusted for smoothest engine operation after unit reaches proper operating temperature. Refer to CARBURETOR SERVICE SECTION for overhaul and additional service information.

**IGNITION AND TIMING.** Timing specifications for individual engines

are given in CONDENSED SERVICE DATA TABLES. Timing can be checked on models with fixed timing using a light or buzzer, by connecting the tester to kill switch wire or external coil wire and a suitable ground, then measuring piston position through spark plug hole. Flywheel must be removed to adjust points or timing.

On models L227, L230, L295, L297, L300 and L340, recoil starter must be removed separately from fan cover as shown in Figs. 5 through 7. On all

models, the special puller (7—Fig. 9) is essential for flywheel removal.

On models with automatic timing advance, a hole is provided in fanwheel which can be used to block the weight in advance position for timing adjustment.

On some models with fixed timing, the breaker cam can be installed for clockwise or counter-clockwise crankshaft rotation. The cam may be marked

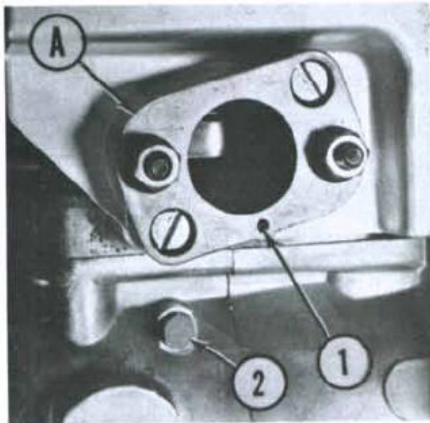


Fig. 1—Carburetor adapter flange of the type equipped with internal pulse passage for fuel pump operation. External passage port must be plugged as shown.

- A. Adapter flange
- 1. Pulse passage
- 2. External port plug

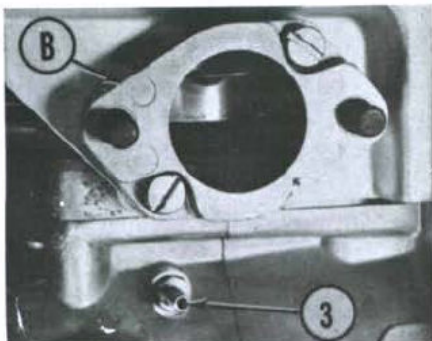


Fig. 2—Carburetor adapter flange (B) is type not equipped with internal pulse passage. Fitting (3) in external passage port operates fuel pump. Refer also to Figs. 1 and 3.

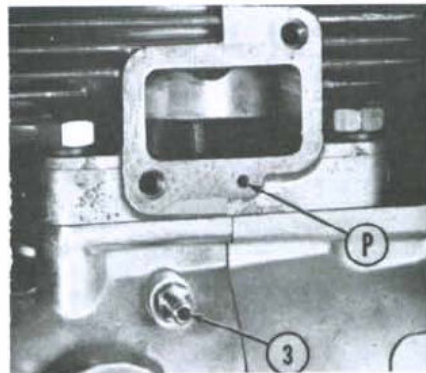


Fig. 3—Intake port of cylinder with adapter flange removed, showing the drilled pulse passage (P). Refer to Figs. 1 & 2 for assembled options.

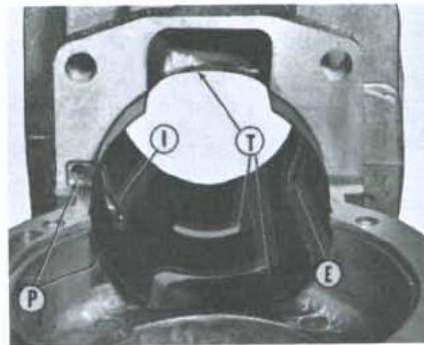


Fig. 4—Cylinder installed on crankcase half showing relative location of cylinder ports.

- E. Exhaust port
- I. Intake port
- P. Pulse passages
- T. Transfer ports

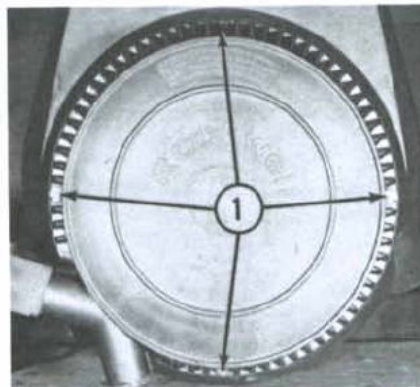


Fig. 5—Recoil starter is retained by four slotted screws (1). On some models, starter must be removed separately for access to flywheel.

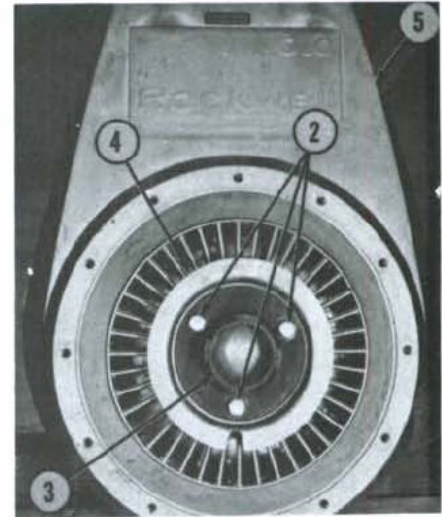


Fig. 6—With starter removed as shown in Fig. 5, remove the three screws (2) and lift off starter hub (3) and rope pulley (4). Fan cover (5) can now be unbolted and removed.

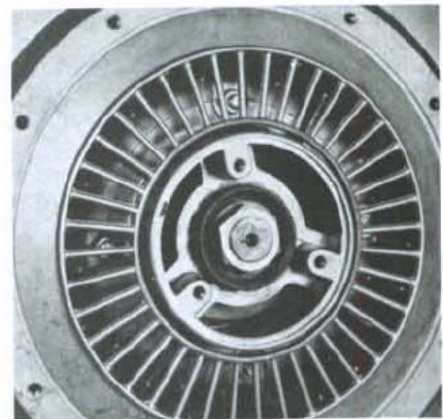


Fig. 7—View of fan cover with rope pulley removed, showing details of construction.

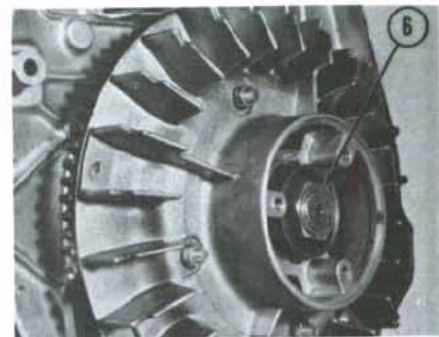


Fig. 8—Remove flywheel nut (6).



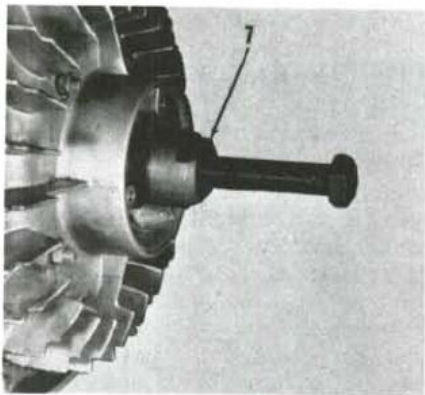


Fig. 9—The special puller (7) is a practical necessity for flywheel removal.

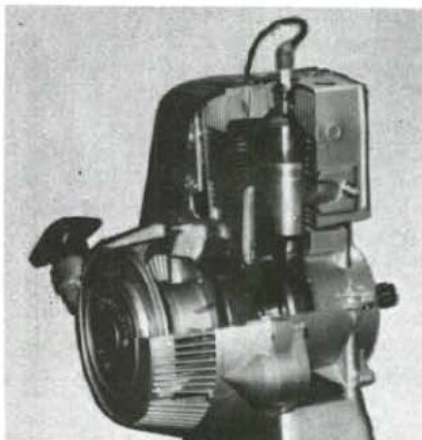


Fig. 10—Cutaway of JLO engine.

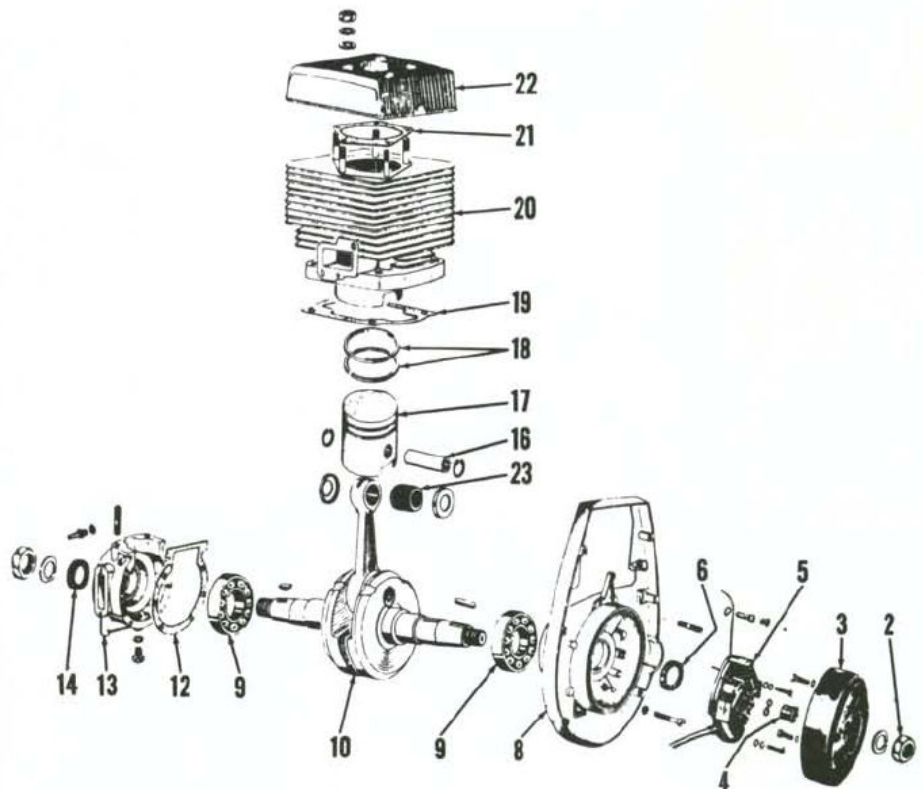


Fig. 12—Exploded view of JLO L297 engine. All engines except L252 and L152 are similar. For parts identification use Fig. 11 except for: 23. Needle roller bearing.

with the letters "R" and "L" which refers to direction of rotation when viewed from drive end; or by arrows which point to direction of rotation. Flywheel key must be installed in notch marked "L" for normal rotation on cams marked with the letters.

**LUBRICATION.** The engine is lubricated by mixing oil with the fuel. A suitable two-cycle, air cooled engine oil

is recommended. Standard grade SAE 30 Automotive Motor Oil may be used if two-cycle oil is not available.

Recommended fuel/oil mixture ratio for each engine model is given in CONDENSED SERVICE DATA Tables at the beginning of this section. Mix fuel and oil thoroughly in a separate container before pouring mixture into fuel tank. For cold weather blending, pre-mix the oil with a small amount of gasoline and shake thoroughly until the mixture is liquid, then blend with remainder of fuel. Do not use kerosene or fuel oil for pre-mixing.

**REPAIRS**

**TIGHTENING TORQUES.** Recommended tightening torques are as follows:

- Flywheel Nut
  - Model L99 ..... 29-32 ft.-lbs.
  - Model L152 ..... 20-25 ft.-lbs.
  - Model L197, L227, L230 32-36 ft.-lbs.
  - Model L252, L292 ..... 43-50 ft.-lbs.
  - Models L295, L297, L300, L340, L372, L380, L395 ... 79-86 ft.-lbs.

- Standard Nuts
  - 6mm ..... 80-85 in.-lbs.
  - 8mm ..... 16-18 ft.-lbs.
  - 10mm ..... 31-33 ft.-lbs.

**DISASSEMBLY AND REASSEMBLY.** Refer to Figs. 11 and 12 for exploded views of engines. When service is required, first remove engine as

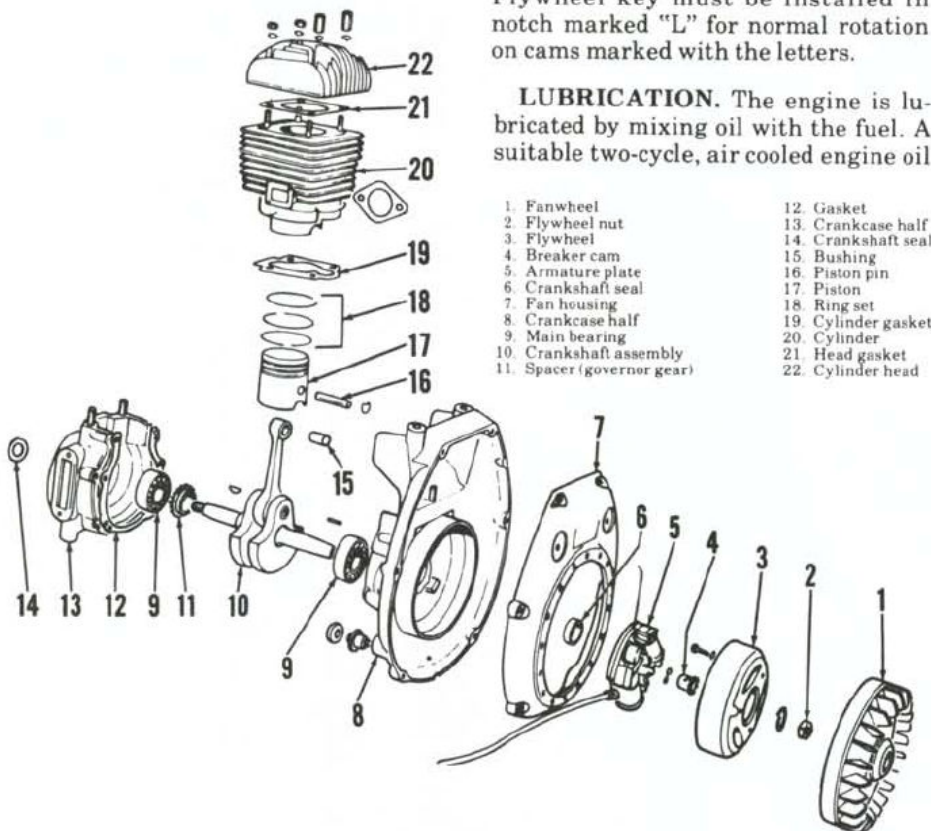


Fig. 11—Exploded view of JLO L252 engine. L152 is similar.



outlined in vehicle section of this manual and remove carburetor, drive sheave, recoil starter and muffler. NOTE: Some engines installed on BOLENS HUS-SKI are counter-rotating (clockwise, viewed from drive end). All other engines are normal (counter-clockwise) rotation.

Cylinder and/or cylinder head can be removed without further disassembly of engine. Crankshaft main bearings (9) are a tight press fit on crankshaft and in crankcase at room temperature. Bearing area of crankcase should be heated for disassembly. Some engines use the governor drive gear (11) as a spacer when engine is assembled. Crankshaft and connecting rod are available only as an assembled unit.

When assembling the crankcase, heat main bearings (9) in oil to approximately 160°-200° F. and install on shaft, supporting shaft underneath the counterweight to prevent misalignment. Heat bearing area of crankcase halves, being careful not to damage oil seals. Assemble by reversing the disassembly procedure. Refer to the appropriate following paragraphs for further disassembly and inspection procedure.

**PISTON, RINGS & CYLINDER.** Piston pin is a floating fit in piston and connecting rod. Piston rings are pinned in place as shown in Fig. 13. Three ring pistons or pistons with one ring are sometimes used.

Pistons are marked for size (S—Fig. 14) and for proper installation, the letter "V" and Arrow pointing toward exhaust port (E). Pins in ring grooves (P—Fig. 13) are installed toward flywheel end of crankshaft.

The cylinder head on some models contains a "Squish Area" (Fig. 15). The position of correct head installation is not marked, but flat area should go toward exhaust port as shown.

On snowmobile engines except earlier Model L372, the cylinder, gaskets and carburetor adapter flange are drilled to provide a pulse passage for operation of the diaphragm type fuel pump built into the carburetor. Be sure drilled passages are open and aligned when parts are installed.

Upper connecting rod bearing is bushing type on Models L152 and L252

and a needle roller bearing on other models.

**CRANKSHAFT & CONNECTING ROD ASSEMBLY.** The crankshaft and connecting rod unit is available only as an assembled unit and disassembly is not recommended. Bearings are a tight press fit on shaft and in crankcase bores at room temperature. Heat bearings in oil to a temperature of 160°-200° F. and support crankshaft between counterweights before installing bearings on shaft. On some engines, governor drive gear (11—Fig. 11) is used as a spacer for pto side bearing.

Figs. 17 & 18 show details of the "Piston Guided" rod used on many late models. The rod is positioned by piston bosses rather than by big end, and critical centering of crankshaft in crankcase is not necessary.

**RECOIL STARTER.** The basic recoil starters can be assembled for clockwise or counter-clockwise engine rotation, although some of the parts may not be machined for counter-rotation. Fig. 19 shows a removed starter correctly assembled for normal rotation (counter-clockwise viewed from drive end).

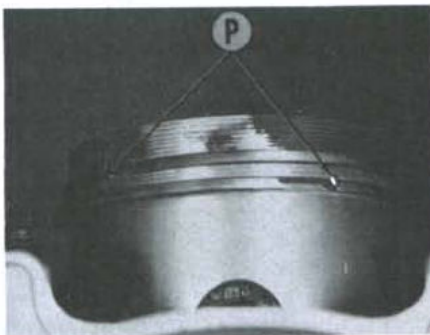


Fig. 13—Pins (P) in ring grooves prevent rotation of ring ends into cylinder ports and consequent ring breakage. Piston is installed with pins (P) toward flywheel end of crankshaft.

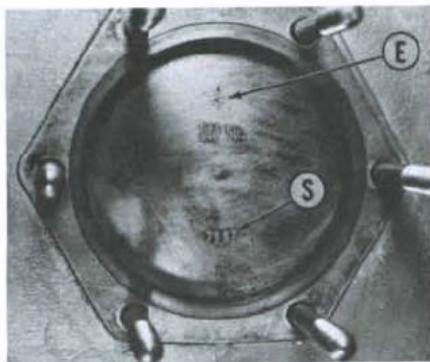


Fig. 14—Top of piston showing size marking (S) which gives exact diameter of piston at skirt; and letter & arrow marking (E) which must be installed toward exhaust side of cylinder. Other markings shown have no service significance.

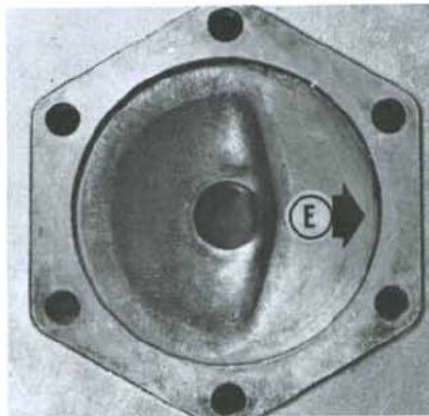


Fig. 15—On models with squish area built into combustion chamber, flat portion should be installed toward exhaust ports as shown.

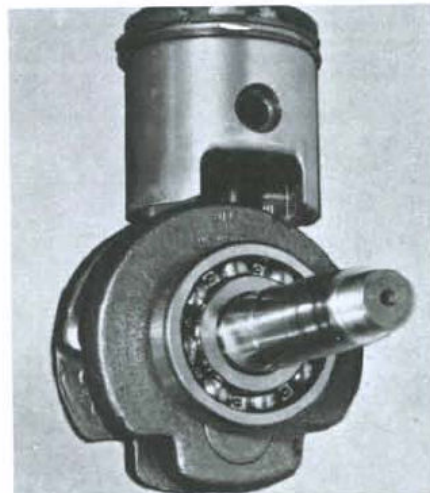


Fig. 16—Crankshaft and piston unit used on L340 engine. Other models with full circle crank are similar.

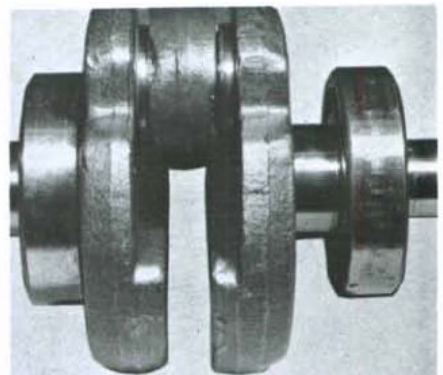


Fig. 17—Crankshaft end of "Piston Guided" connecting rod. Refer also to Fig. 18.

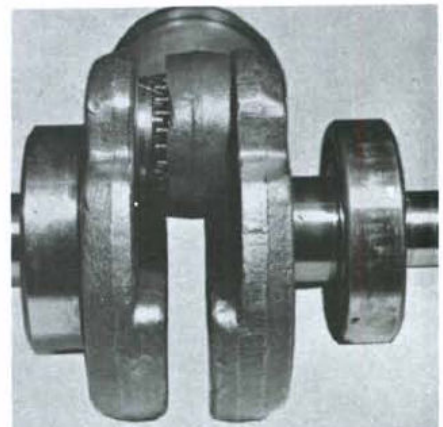


Fig. 18—"Piston Guided" connecting rod pushed forward to expose bearing rollers. Lower end of rod is centered on crankshaft by the piston.



To disassemble the removed starter unit, remove the four screws and lift off

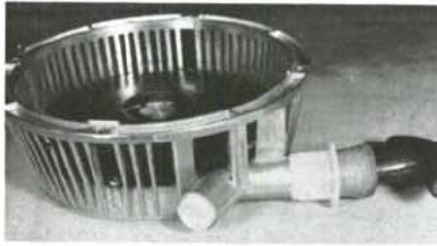


Fig. 19—Recoil starter of the type used on most models.

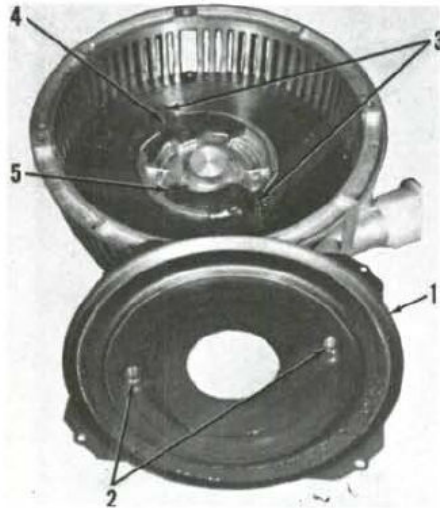


Fig. 20—To disassemble the starter; remove the retaining screws and lift off cover plate (1). Engaging brake units consist of friction cups (2 & 4) and spring (3) which fit holes in pawls and may fall out when cover (1) is removed.

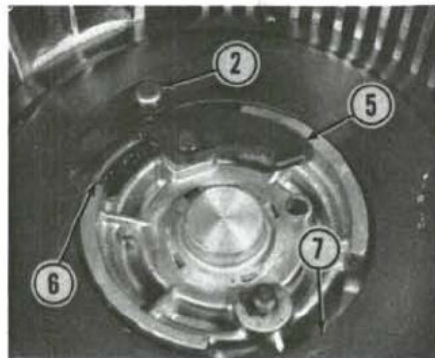


Fig. 21—Springs (6) return pawls (5) to running (disengaged) position. Pawls may be lifted off after removing cover plate (1—Fig. 20) and unhooking springs (6). Inner cover (7) can be lifted off after pawls are removed.

cover plate (1—Fig. 20). Items (2, 3 & 4) comprise an engaging brake which overcomes tension of return spring (6—Fig. 21) and causes pawl engagement when starter rope is pulled. Be careful not to lose these parts when cover plate is removed. Unhook springs (6) at pulley end, then lift off pawls, engaging brake and inner cover (7).

If rope is intact, remove handle grip and wind rope end into housing. Working through pulley anchor hole (C—Fig. 24) disengage inner end of spring from pulley and carefully lift off pulley. Spring (9—Fig. 23) will remain in recess of housing as shown if inner end is properly disengaged.

When assembling, unseat inner rope anchor from hole (R—Fig. 24) in pulley

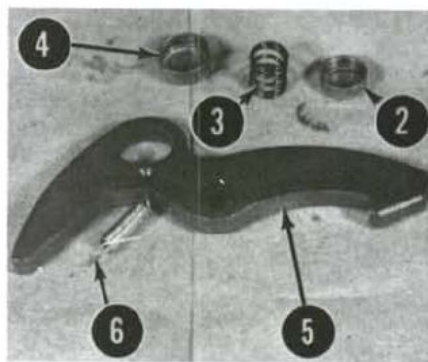


Fig. 22—Disassembled view of pawl (5), engaging brake (2, 3 & 4) and return spring (6). Refer to Fig. 20 or 21 for correct installed position.

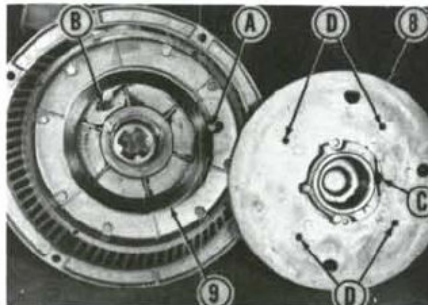


Fig. 23—View of starter housing with pulley removed, showing proper installation of recoil spring. Loop (B) in inner end anchors in hole (C) in pulley. Outer end is installed over anchor pin (A).

- 8. Pulley
- 9. Spring
- A. Anchor pin
- B. Inner loop
- C. Anchor hole
- D. Installation tool holes

and withdraw the rope. Make sure spring is installed as shown in Fig. 23. Working through anchor hole (C) with a suitable punch to make sure spring is anchored in pulley, reinstall the pulley without the rope. Insert a punch (P—Fig. 25) part way into pulley and completely wind the spring. Allow spring to uncoil until anchor hole (R) is aligned with outlet hole (X—Fig. 24), then block pulley from further rotation by wedging punch (P) against spring anchor pin (A—Fig. 23). With pulley correctly positioned, install rope from inside as shown in Fig. 24 and 25. Complete the assembly by reversing the disassembly procedure.

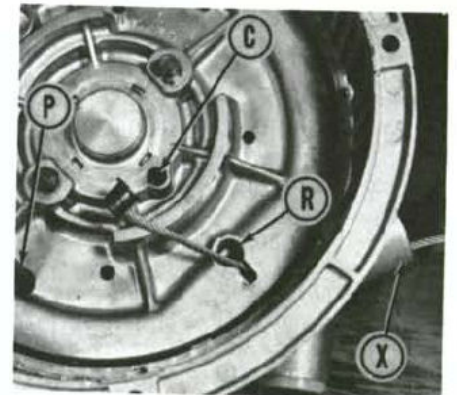


Fig. 24—Opposite side of spring anchor hole (C) (See Fig. 23) permits insertion of punch for aligning spring end. Insert punch (P) and wind recoil spring completely; then back off until rope anchor hole (R) aligns with outlet hole (X) in housing. Insert rope cable from inside as shown.

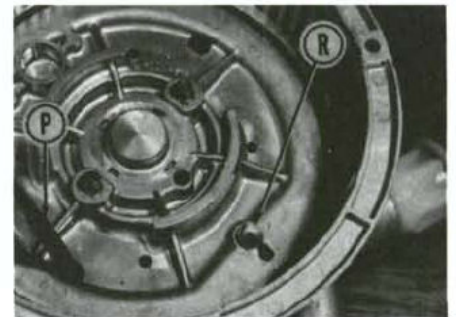


Fig. 25—Rope anchor (R) properly seated in pulley. Install starter grip, then allow spring to slowly recoil.