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$5.00

JLO Engines

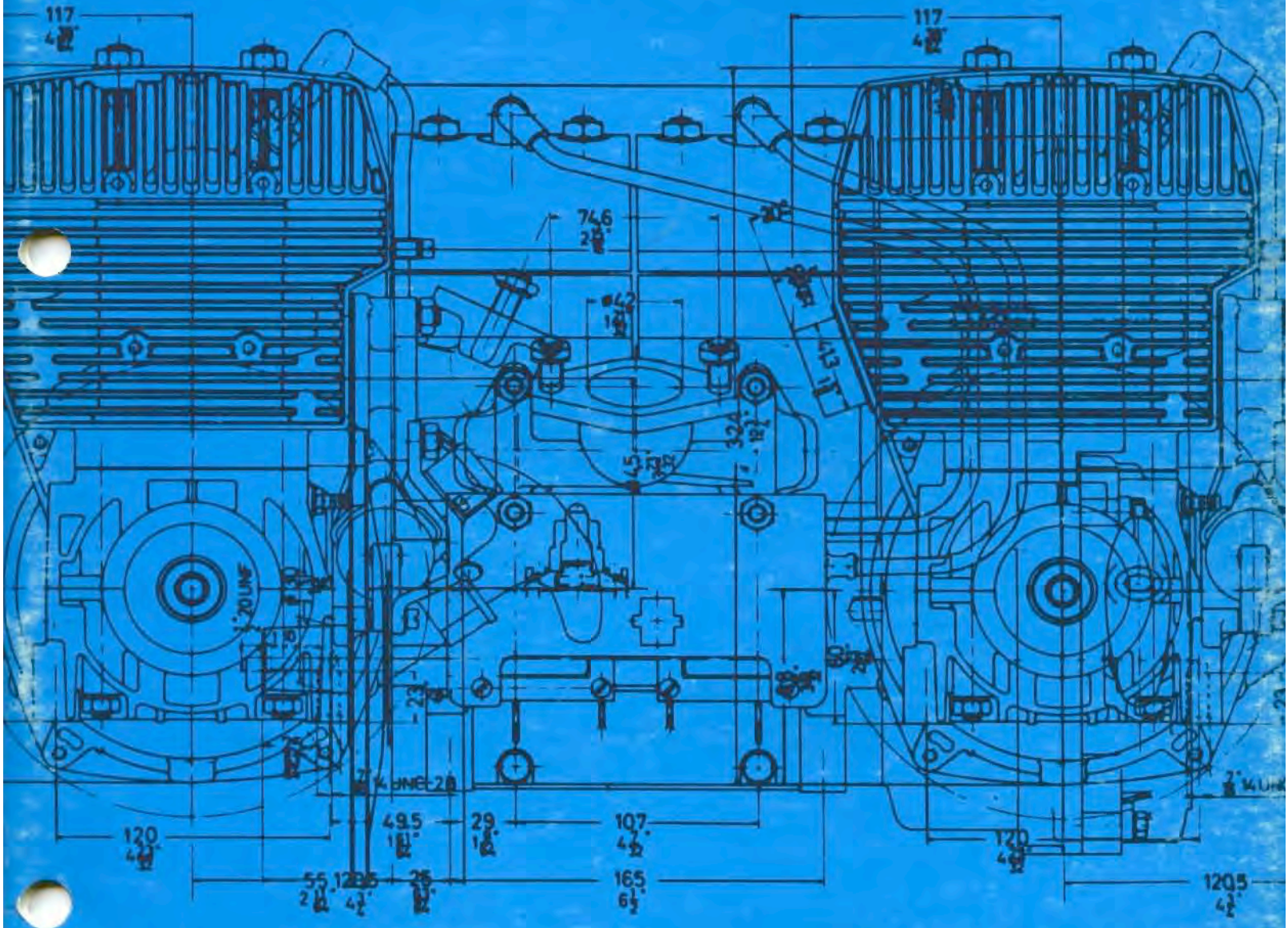
SERVICE MANUAL

SINGLE CYLINDER ENGINES

L-99 (IF-100-1)
L-230 (IF-250-1), L-227
L-295 (IF-295-1), R-295 (IF-295-2)
L-297, L-300
L-340 (IF-340-1), R-340 (IF-340-2)

TWIN CYLINDER ENGINES

LR-340/2 (2F-340-1)
LR-399/2 (2F-400-1)
LR-440/2 (2F-440-2)
LB-600/2 (2F-600-1)



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2-Cycle Engine Fundamentals

The 2-cycle, air-cooled gasoline engine has become very popular today for snowmobiles, ATV's and other recreational vehicles. It is uniquely qualified for these applications because of its relatively high power output, light weight, and ease of lubrication, with fewer moving parts than conventional 4-cycle engines.

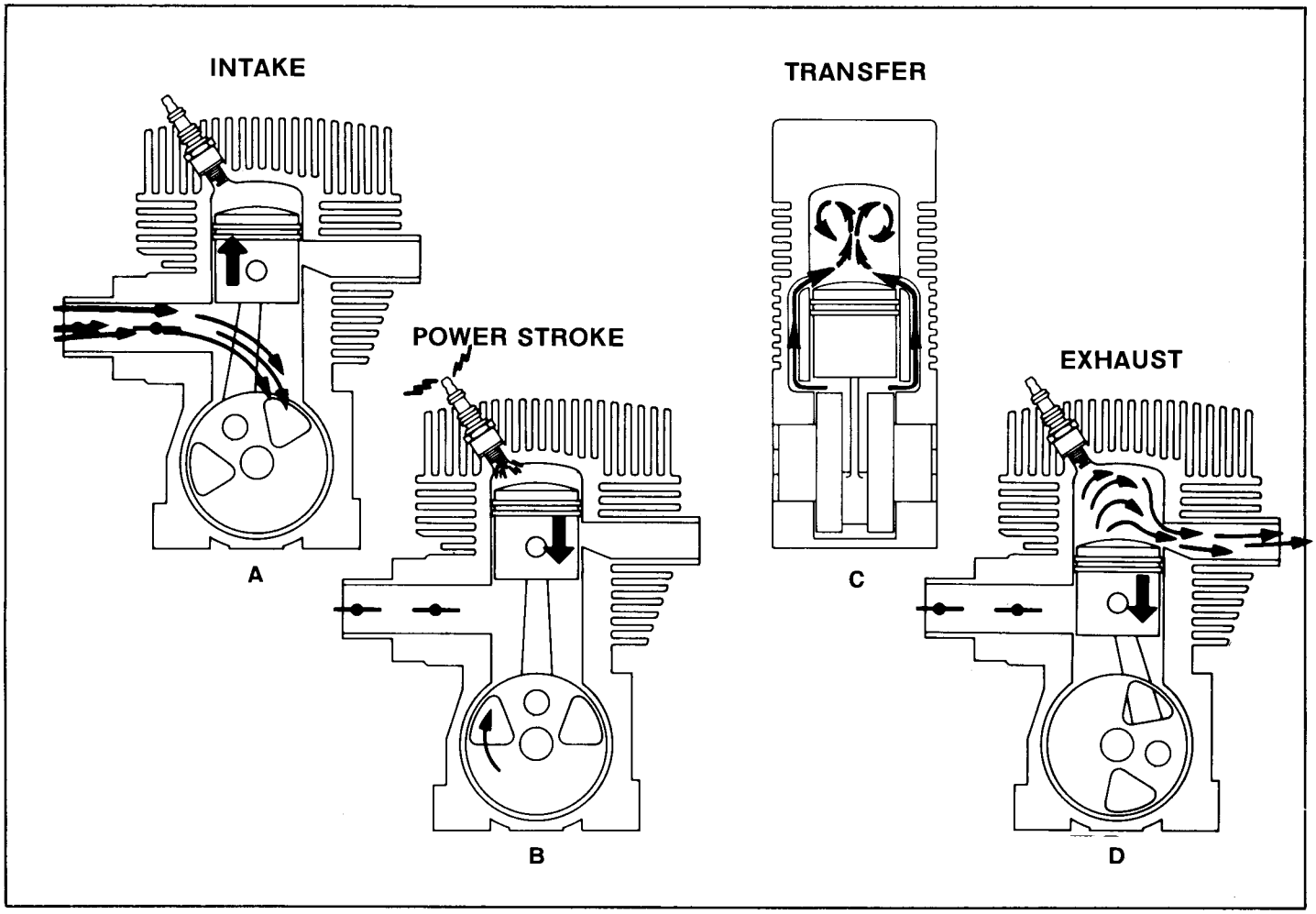
However, in order to get the best possible use, and assure that it retains its high degree of dependability and endurance, it must receive proper care and maintenance. Since the life expectancy of any 2-cycle gasoline engine depends to a great degree on the level of maintenance it receives, it is necessary for us to know something about the basic fundamentals of an engine and how it functions in order to determine and apply, the correct amount of maintenance.

Operation

The JLO 2-cycle engine is of the loop-scavenged, 3rd-port design type . . . the most widely used design today. It uses a mixture of gasoline and oil for combustion, lubrication and cooling. It fires on every second stroke of the piston. However, each down stroke of the piston is a power stroke, that is, a *power* stroke for every revolution of the crankshaft.

As the piston moves upward in the cylinder (Illustration A), it draws the fuel/air mixture into the lower crankcase while at the same time compressing the fuel already in the compression chamber above. As the piston completes its upward stroke, the spark plug ignites the compressed fuel and the burning fuel expands and forces the piston downward on its second, or power stroke (Illustration B). In this downward stroke the piston not only turns the crankshaft but compresses a new charge of fuel in the crankcase while continuing downward clearing the exhaust ports (Illustration C) in the cylinder wall to release the burned gasses through the ports and out into the exhaust system. The piston continues downward to uncover the transfer port and release the compressed fuel charge into the cylinder where it displaces the remaining burned gasses and forces them out through the exhaust ports (Illustration D).

Because lubrication of 2-cycle engines depends on mixing predetermined amounts of oil and fuel, it is extremely important that good quality oil be thoroughly mixed with fuel and in proper proportions. While there are different engines, as well as different oils, requiring different fuel mixtures, the correct oil-fuel ratio required for Rockwell-JLO engines is 20 to 1. Use of little oil may cause engine over-heating, piston or cylinder scoring and eventual engine seizure or failure. Too much oil, on the other hand, leads to incomplete combustion, carbon fouling of plugs and piston overload. Refer to page 5 for recommended oil-fuel mixture ratios.



Operating Instructions

Break-in, Starting/Stopping, Fuel Mixture

Break-In

During the first few hours do not operate the engine at full throttle. Run for short periods of time at varying speeds up to 3/4 throttle. Use 16:1 mixture ratio on first tank of fuel; 2 gallons of fuel to 16 ounces of oil.

Starting Procedure

1. Turn switch to "on" position.
2. Close choke (warm engine requires little or no choking).
3. Open throttle slightly when cranking the engine.
4. As soon as the engine starts open choke and release throttle.
5. Electric start: Turn switch to "start" position. Release as soon as the engine starts (switch will remain in "on" position). Do not continue cranking the engine if it fails to start after approximately 30 seconds. Allow the starter to cool before making another attempt. If the battery is low use the recoil starter.

Operation

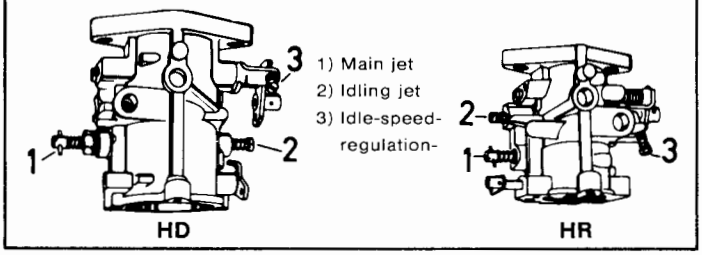
Before operating at full load, let engine warm up at moderate speed (1/2 to 3/4 throttle) for a few minutes. Avoid prolonged idling to prevent carbon build-up from fouling spark plugs or cause carburetor flooding. Engines put under severe strain, as in racing, may continue running after the ignition is turned off. To stop the engine under these conditions, shut off the air supply by closing the choke.

Stopping Procedure

Release the throttle to allow engine to idle. Turn switch to "off" position.

Do not use the choke to stop the engine. This can result in carburetor flooding, making it very difficult to restart.

TILLOTSON Carburetor



1) Main jet
2) Idling jet
3) Idle-speed-regulation-

Carburetor Adjustment:

Adjust carburetor prior to putting engine into service or if operating conditions have changed.

Before starting the engine close both jets and reopen as indicated below. Open main jet (1) 1¾ turn, open idle jet (2) 1½ turn.

a) Run vehicle under full load and at the same time slowly close the main jet (1) until engine runs smooth. Continue to close main jet until engine turns maximum rpm. For correct adjustment open main jet at least ⅛ of a turn to prevent engine from operating too lean.

b) Adjust idling jet (2) for smooth idling and transmission to load ranges. The actual idling speed however is adjusted by the idling speed-regulation screw (3).

c) When operating the engine at higher altitudes, a somewhat leaner setting may be required; close jets a little by turning clockwise.
At extremely low temperatures a somewhat richer adjustment may become necessary; open jets a little by turning counterclockwise.

Never run engine when adjusted too lean; it may result in severe damage.

Safety Precautions

1. Never add fuel while the engine is running as spilled fuel might ignite on contact with hot engine surfaces. Stop engine and allow to cool.
2. Always be sure ignition switch is in "off" position before working on engine.
3. Make sure all safety shields or guards on engine and driven equipment are in proper position and securely fastened.
4. When starting, keep hands, feet and clothing at a safe distance from moving parts.
5. Do not operate the engine in closed buildings unless exhaust pipe is vented to the exterior.
6. Fuel may escape from fuel tank vent when operating over rough terrain, on an incline, or from expansion, and can ignite from hot engine surfaces or an electrical spark. Stop engine and remove some fuel from the tank.

Fuel Mixture

Gas/Oil Ratio	Ounces Of Oil	Gasoline Required
20 to 1	32	5 Gallons
20 to 1	26	4 Gallons
20 to 1	19	3 Gallons
20 to 1	13	2 Gallons
20 to 1	6.5	1 Gallon

NOTE: Mix gasoline (high test preferable), with SAE 30-40 air-cooled engine oil. Premix thoroughly before pouring into vehicle tank by first mixing 1 gallon of gasoline with all the oil, shaking vigorously and then adding the rest of the gasoline. Always use fresh, clean gasoline to avoid gumming up or clogging the carburetor.

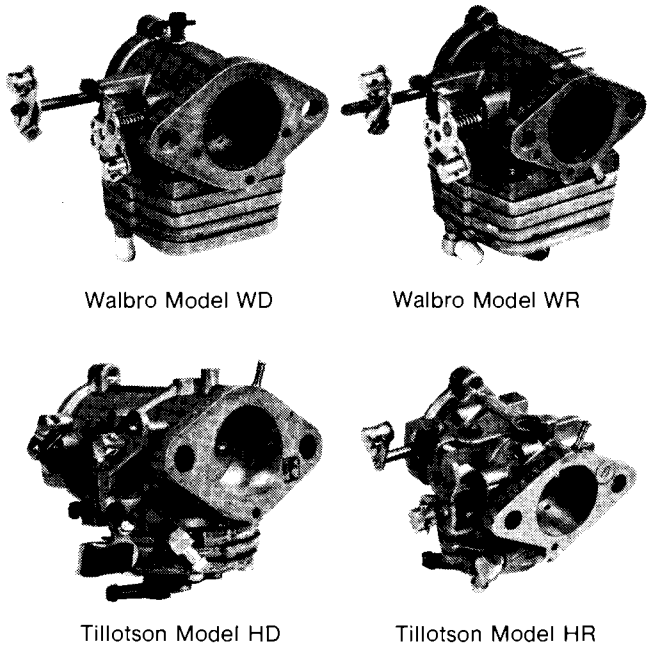
Carburetors

Diaphragm Type Carburetors

In order to atomize the oil-fuel mixture and mix it with proper proportions of air flowing to the intake port or intake manifold, it is necessary to utilize a carburetor. Carburetor design is based on the venturi principle whereby a gas or liquid flowing through a restricted or necked-down passage increases in velocity and decreases in pressure as compared to the velocity and pressure in the full size section of the passage.

There are various types of carburetors classified by method of delivery of fuel to the carburetor: float, suction lift and diaphragm type. JLO Engines mainly use diaphragm type carburetors, therefore, future references herein will be limited to this type of carburetor.

Diaphragm Type Carburetors



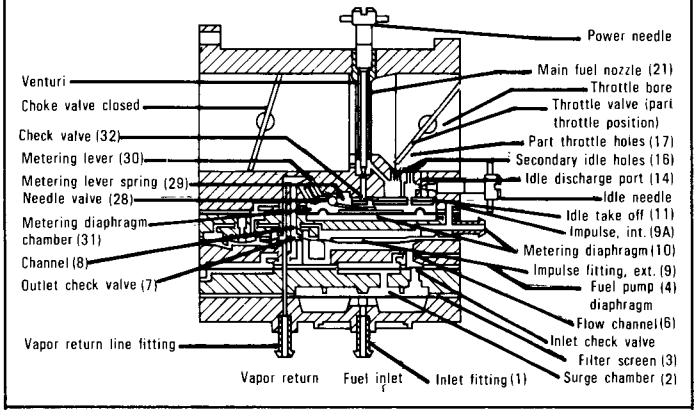
Walbro Model WD — Walbro Model WR

Tillotson Model HD — Tillotson Model HR

Basic Operation

Fuel from the supply tank is drawn in the fuel inlet (1) into the surge chamber (2) through the filter screen (3) by pulsations of the fuel pump diaphragm (4). The engine crankcase pulsations transmitted through the external impulse fitting (9) or internal impulse hole (9A) actuates the fuel pump diaphragm (4) which supplies pumping action for the fuel pump. The fuel is drawn from the surge chamber through the check valve (5) and the channel (6). The fuel continues past the fuel pump outlet check valve (7) and into channel (8). Fuel continues through fuel channel (8) and to the needle valve (28). The metering lever spring (29) transmits a force through the metering lever (30) and seats the inlet needle valve (28) against pressure. The metering diaphragm (10) is pulled upward by engine suction which is transmitted through the idle discharge port idle hole (14) secondary idle holes (16) and part throttle feed holes (17). The diaphragm action depresses the metering lever (30) and unseats the needle valve (28) and allows the fuel to enter the metering diaphragm chamber (31) and pass through the idle take off (11). Check valve (32) is forced open passing fuel into the main nozzle (21) which also feeds the part throttle holes (17). Fuel only is fed through all discharge holes.

Basic Operation



Courtesy of Walbro Corp.

Spark Plugs

Selection of Spark Plugs

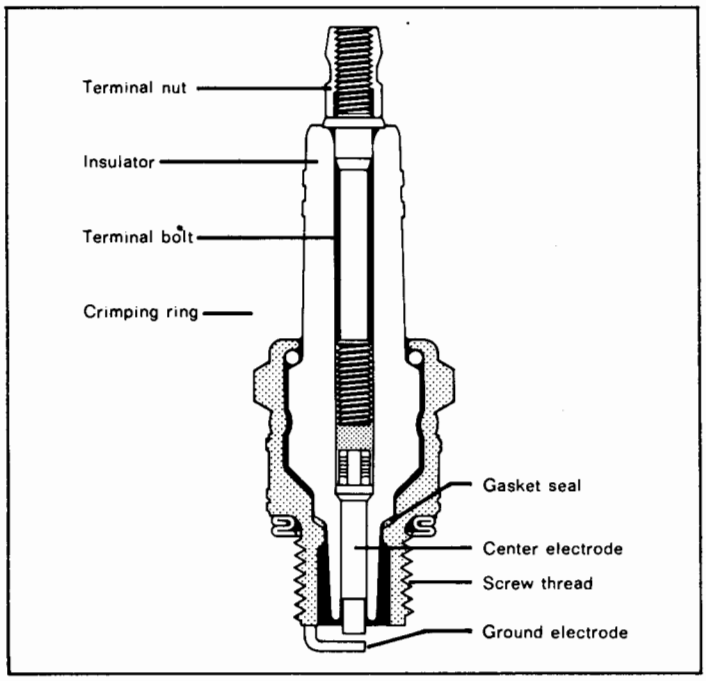
The use of the correct spark plug is vitally important in getting the most out of your engine. The spark plug recommended is balanced to the magneto or the ignition system and also designed to burn the fuel thoroughly in the engine.

If a spark plug has a colder heat range than recommended, carbon deposits will accumulate on the insulating surface in the bore. These deposits will cause the spark plug to misfire or "short out." A spark plug with a hotter heat range causes rapid erosion of the electrode and could cause a breakdown of the ignition system or can cause preignition and piston seizure. Many spark plugs are thrown away long before they should be. The plug is not always the answer to why the engine stopped. When an engine stops do not just replace the plug, but instead check the complete ignition system and *be sure you are using the correct spark plug.*

One simple way to test the ignition system is to remove the high tension lead wire from the tip of the spark plug and hold it approximately 3/16 in. away. Pulling on the starter cord should produce enough voltage to cause a spark to jump from the high tension lead wire to the tip of the spark plug. If this occurs, the ignition system is functioning and the problem is elsewhere.

What should you do if there is a spark and the engine won't start? Remove the spark plug from the engine and inspect its condition. The electrode should be free of any carbon deposits and the electrode should not be burned. At this stage check the gap of the plug. The carbon around the insulator should be light tan which signifies a complete burning of the fuel.

Oily black carbon signifies a deficiency in the ignition system. If you are using the correct spark plug in the correct heat range and these carbon deposits show, an inspection of the points should also be made. If you find the points burned, replace them.



Courtesy of Robert Bosch, GMBH.

NOTE: The carburetor adjustment has a direct effect on spark plug selection.

If, for instance, an overheated appearance of the electrode cannot be rectified by going to a richer carburetor adjustment, a colder plug should be selected. If, on the other hand, a fouled plug does not show improvement by leaner adjustment, select a hotter plug.

Using the standard spark plug supplied with the engine as a base, racing or high speed driving usually requires colder plugs, while low speed driving normally calls for a hotter plug. Keep the spark plug gap to specification.

Typical Spark Plug Conditions

Normal Condition

Plug has run at correct temperature; deposits are light in color. Electrode is not burnt. Plug can be cleaned, gapped and reused with good results. Compare this plug with those illustrated below.

Sooted

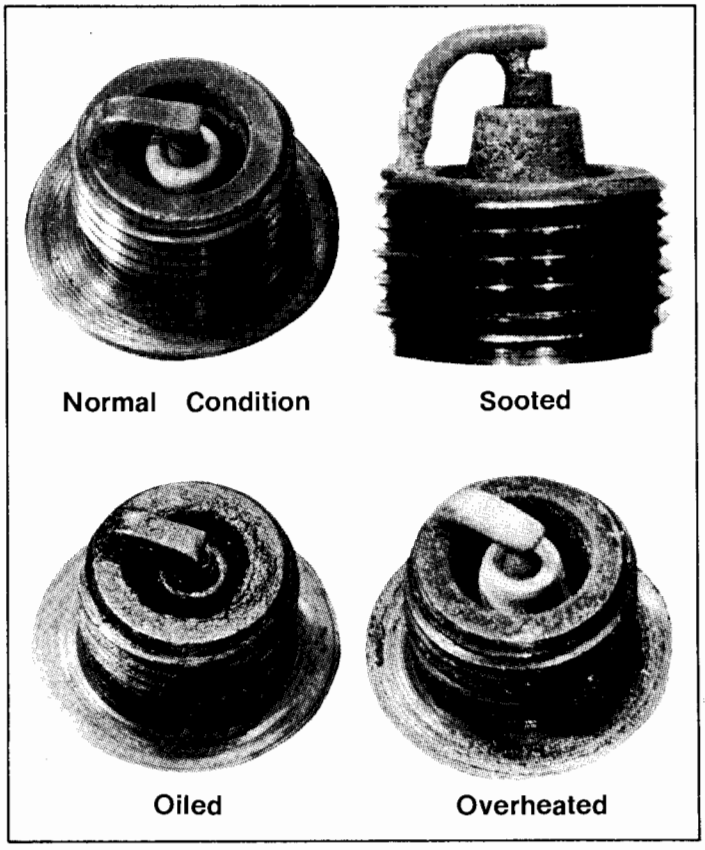
Mixture too rich, not enough air, spark gap too large, heat value too high.

Oiled

Too much oil in mixture; worn cylinders and piston rings.

Overheated

Mixture too lean, spark plug not gas-tight or not properly screwed in, or thermal value of spark plug too low resulting in spark plug becoming too hot.

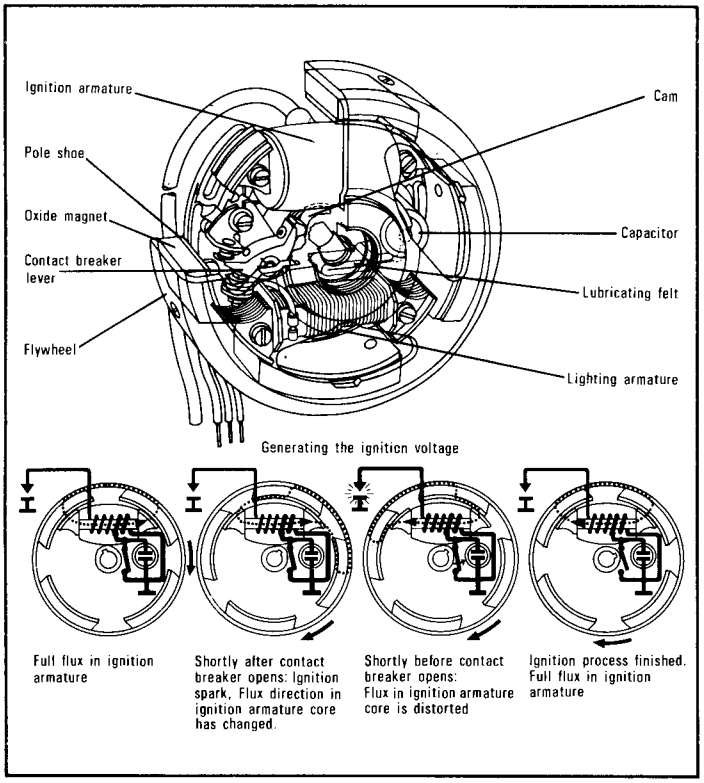


Ignition System

Magneto and Starters

Flywheel Magneto

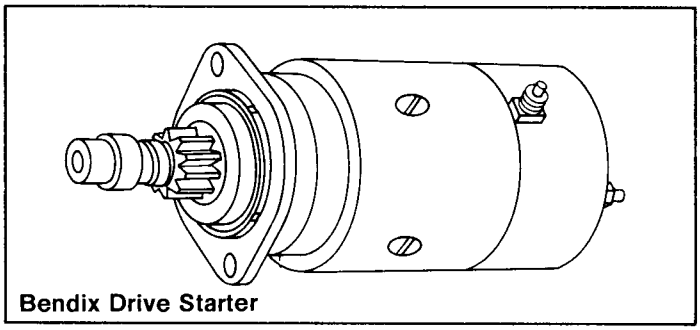
A flywheel type magneto along with a high tension wire and spark plug supplies energy to ignite the fuel-air mixture in the cylinder. Energy for ignition is induced in the ignition windings on stator by permanent magnets in the magnet ring mounted on the flywheel. The magnet ring also includes the automatic spark advance mechanism. As engine speed increases, centrifugal force moves the timing advance lever outward and shifts the ignition cam thereby causing the breaker points to open earlier. Rotation of the permanent magnets causes current to flow in the primary winding. When ignition is required, the breaker points are opened by the action of the breaker cam rod. This causes a halt in current flow in the primary winding and results in a sudden collapse of the magnetic field surrounding the coil windings. At this instant, the rapid change in the concentration of magnetism causes a voltage to be induced in every turn of both the primary and secondary windings. In the primary winding the energy, which may be as high as 250 volts, is quickly absorbed by the condenser. The condenser thus acts as a reservoir for the surge of energy in the primary coil winding. If this energy had nowhere to go, it would arc across the points and cause a complete breakdown of the entire function. The condenser holds this energy only for an instant after which time it is released back into the primary. The voltage built up in the secondary, which has up to 100 times as many turns as the primary, could go as high as 25,000 volts. Normally, however, voltage does not increase to this value. It increases only to the amount sufficient to bridge the spark gap. This is usually between 6,000 and 20,000 volts. The actual value depends upon such variables as compression, speed, shape and condition of electrodes, width of spark gap, etc.



Courtesy of Robert Bosch, GMBH.

Electric Starters

Most starters used on JLO engines are of the Bendix type and seldom need servicing. The oil impregnated, self-lubricating bushings require no attention. The brushes and commutator should be occasionally checked for wear or dirt. Problems which might arise from time to time are covered in the "Trouble Shooting the Starter" page 27.



Bendix Drive Starter

Brushes

The starter does not have to be removed from engine to service brushes. To gain access to the brushes on these starters, remove the bushing protective cap, the clip washer at end of the armature, then the commutator end (C.E.) cap or plate. Note that it may be necessary to loosen the lower nut on the terminal post so that the plastic terminal insulator will not crimp and hold the end cap. Tap end cap lightly to free it from the starter frame, then slip it off over the end of the commutator and armature. Use a small hook to lift springs then remove each brush from its holder for inspection and cleaning. If brushes are worn unevenly or worn down to less than 5/16" (about half original length) unsolder leads and replace all 4 brushes.

Clean commutator with coarse, lint free cloth—do not use emery cloth or sandpaper for this. If it is grooved, scored or extremely dirty, the commutator should be turned down on a lathe.

When reinstalling brush holder, leave brushes out and springs off until after the brush ring is over the commutator. Insert brushes then hook springs and position on brushes—CAUTION: Brushes can be damaged if the springs are allowed to "snap" against the top of the brushes. Align thru bolts and pull the end cap down tight then install clip (after making sure end play washers are in place). Reinstall and secure the bushing cap to complete brush service.

Bendix Drive

The starter must be removed from the engine to inspect Bendix drive assembly except in the case of Models LR-340/2, LR-399/2 and LR-440/2. If the splined shaft or pinion are dirty, clean with solvent which does not leave a film—the drive works best with only small amount of lubricant—use the dry spray type.

If it is damaged, replace the complete Bendix drive assembly. To remove, drive the ring stop back toward the pinion, then remove snap ring. Spring, bushing and pinion assembly can now be removed. Reverse this procedure to reinstall new Bendix.

Ignition System

Flywheel Alternator, Ignition Timing

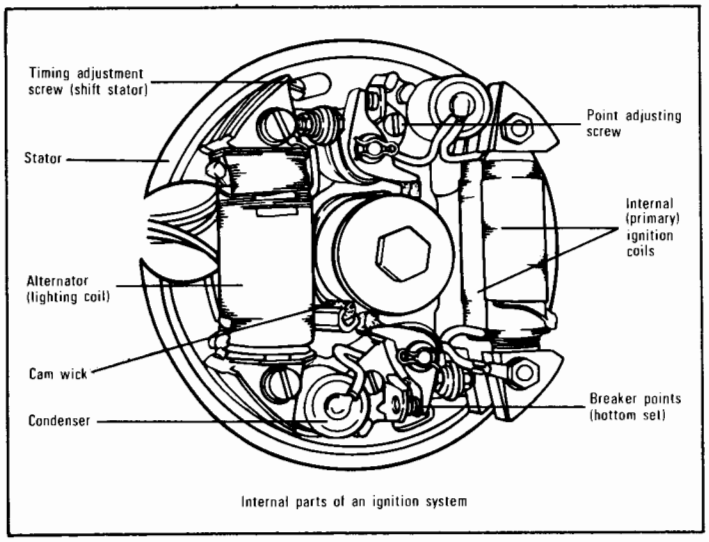
Flywheel Alternator

Except for the model L-99, all JLO engines are equipped with an electrical system that provides energy for head and tail lights and current to charge the battery. The source of this energy is an independent coil which is attached to the stator plate. Depending on the type of coil it can produce 40 or 75 watts. If the engine is not equipped with an electric starter, the lights can be connected to AC current direct. On electric start models both yellow leads must be connected to a rectifier in order to convert the AC current as produced by the coil to DC current for charging the battery.

On either system use a lamp load equal to the total output to prevent lights from burning out. On a 40 watt system use any combination totalling 40 watts. A manual 75 watt engine may need a load resistor to compensate for the extra current. When the lamp load, for instance, is 50 watt, use a 25 watt resistor; when it is 40 watt, use a 35 watt resistor. The resistor should be connected parallel to the lamps.

40 watt systems connected to batteries can do one of two things; charge the battery during daytime driving, or supply lights at night. If on a 75 watt system 60 watts are used for lights, the remaining current can still charge the battery. However do not exceed a lamp load of 60 watts.

The rectifier contains two fuses which blow whenever a short occurs in the wiring harness or when the polarity of the battery is changed. This prevents costly repairs. Make it a practice to check these fuses whenever you suspect a failure in your electrical system.



Internal parts of an ignition system

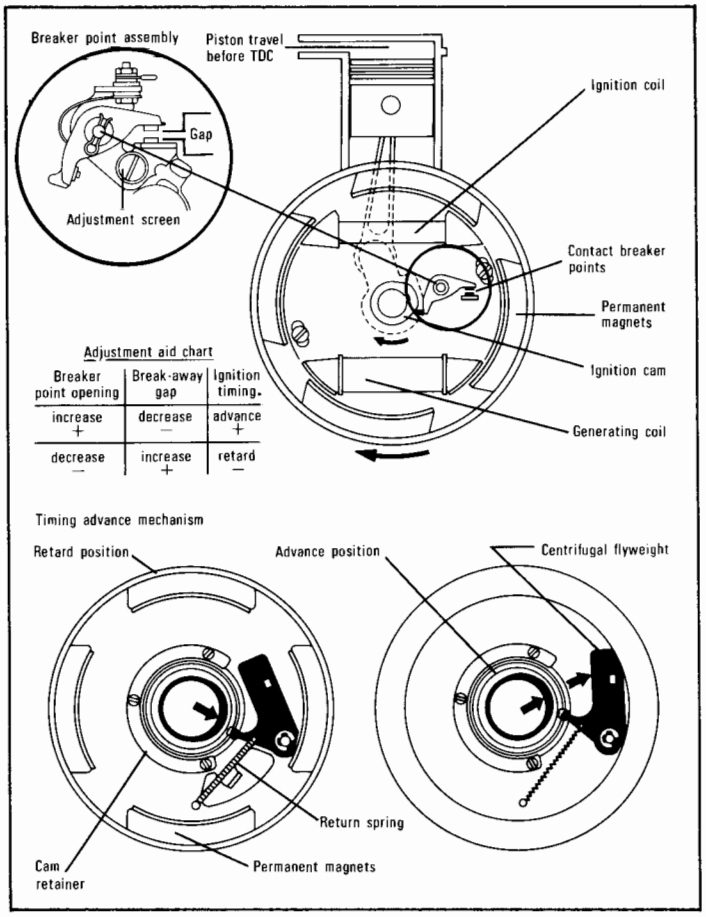
Courtesy of Robert Bosch, GMBH.

Ignition Timing

Ignition timing on 2-cycle engines is very important. It determines the time element necessary to expand the flame front in the combustion chamber. Pre-ignition occurs if the timing is too far advanced (early); loss of power and detonation may result if the timing is retarded (late).

Most high performance engines are equipped with an automatic advance mechanism. It consists of centrifugal fly weight connected to a freely rotating cam. The purpose of the automatic advance mechanism is to *start* the engine with its piston as close to top dead center as possible and thus prevent "kick-back". At starting, the spring attached to the lever holds the weight in the *retard* position. However, as soon as the rpm increases, the centrifugal forces shift the mechanism into the fully advanced position, in turn rotating the cam. The cam opens and closes the contact breaker points. Whenever an engine is equipped with this mechanism the ignition timing must be performed with the centrifugal weight locked in the fully advanced position.

Note: For detailed timing instructions, refer to Disassembly/ Assembly Section covering the specific engine model.



Exhaust Systems

Tuned Mufflers, Expansion Chambers

Selection

Selection of an exhaust system (including exhaust manifold, intermediate pipes, elbows and muffler), is a result of thorough test procedures involving measurement of fuel consumption, horsepower and noise level. Contrary to popular belief, the exhaust system is not only for quieting the engine, but also serves to increase the horsepower output (by as much as 25%). Changes made to the original equipment exhaust system by changing *any* component in the system can result in loss of power and/or *severe engine damage*. For these reasons, intermediate lengths of pipe between the cylinder and the muffler are particularly critical.

Tuned Mufflers

Tuned mufflers allow the engine to exhaust its spent charge into an adequate volume and properly matched muffling system. More important, the mufflers are "tuned", incorporate designs that "suck" the exhaust gas from the cylinder allowing fuel and air to rapidly replace it and also "cram" over-scavenged fuel and air mixture from the exhaust pipe back into the cylinder using sound waves and sound energy. This is accomplished at the speed of sound which allows the engine to produce higher torque at high RPM's.

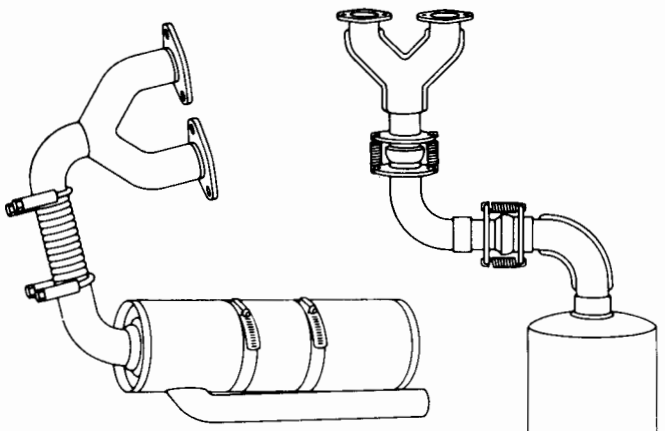
How Tuning Works

The megaphone effect of the expanded intake tube scavenges exhaust gas from the cylinder, allowing rapid replacement of the fuel-air mixture from the crankcase. Reflected sound waves and sound energy stop over-scavenging and return fuel-air mixture to the cylinder. It gives a "super-charging" effect even though it operates from the exhaust rather than the intake side. Over-scavenging is also retarded by moderate muffler back pressure. Silencing is accomplished after power is maximized, by acoustical packing in the resonator outlet tube plus chambering and baffling which gives an effective 2-pass muffler design.

Racing Expansion Chambers

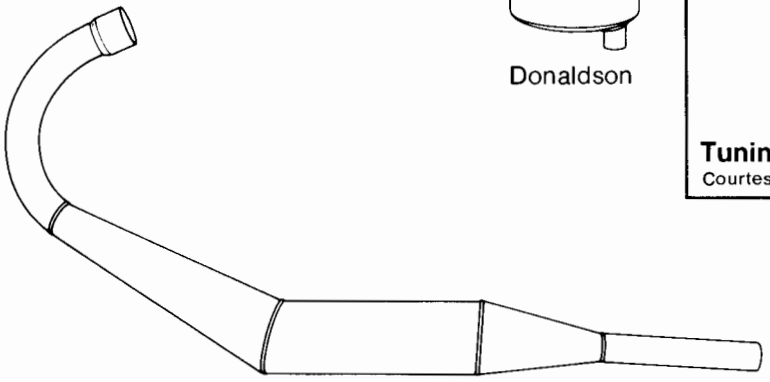
Expansion chamber incorporates power-tuning to increase horsepower of two-cycle engines up to 25 per cent.

Typical Exhaust Systems

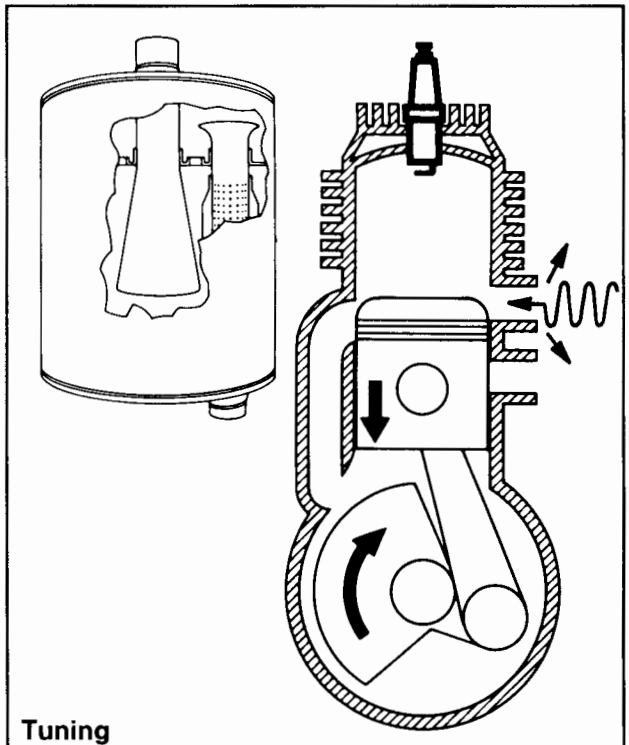


ACS

Donaldson



Expansion Chamber (Racing)



Tuning

Courtesy of Donaldson Muffler Co.

JLO Single Cylinder Engines

Disassembly and Assembly Procedure - Model L-99 (IF-100-1)

Disassembly

A. Fan Cover and Recoil Starter
Remove the five slotted screws holding fan cover to the crankcase. (Fan cover and recoil starter housing are integral unit.) For detailed service instructions, refer to Recoil Starter, Disassembly and Assembly.

B. Carrier Drum
With 17 mm. socket remove hex nut recessed in carrier assembly. Remove carrier drum from flywheel.

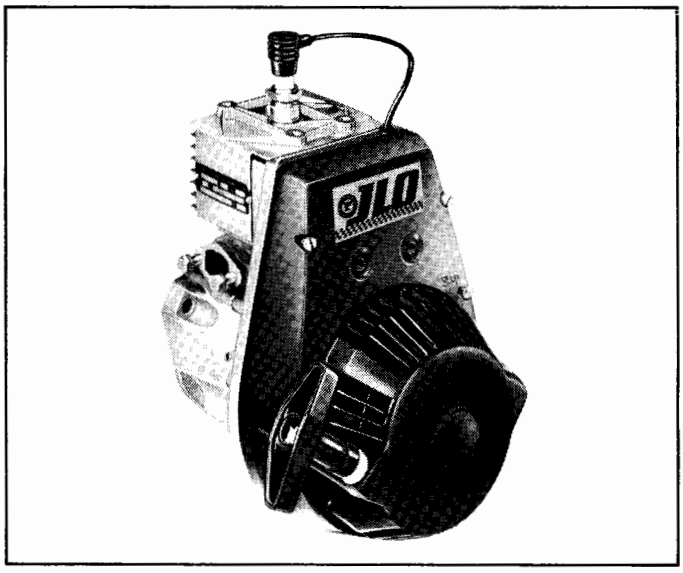
C. Spark Plug
Remove spark plug with socket wrench.

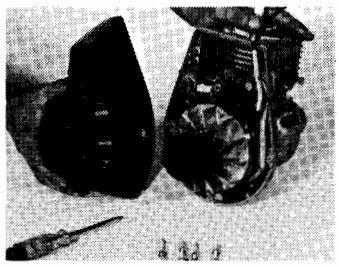
D. Flywheel
Remove flywheel with special flywheel puller. Turn threaded puller bolt until it touches tip of crankshaft. Continue turning bolt clockwise to extract the flywheel. Remove Woodruff key.

E. Ignition Coil
With 10 mm. wrench remove the two bolts holding coil to crankcase body. Disconnect wires from condenser and contact breaker.

F. Contact Breaker; Ignition Cam
Fixed Cam Models: remove slotted screw holding breaker points to crankcase; lift out points and backing plate.

Independent Cam Models: remove slotted screw holding points to crankcase; lift out Woodruff key, cam, spring washers and backing plate.

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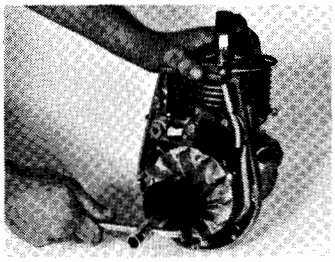
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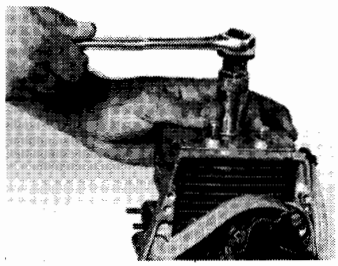
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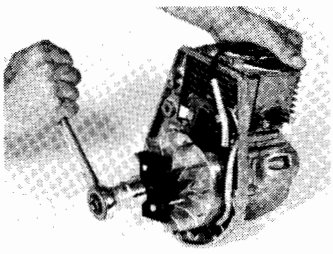
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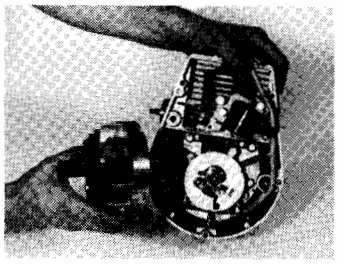
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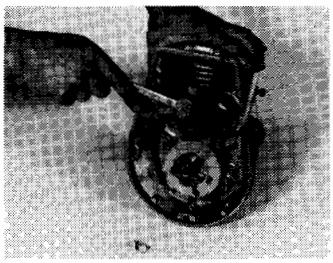
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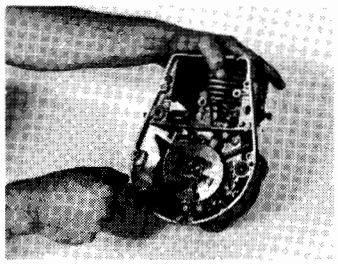
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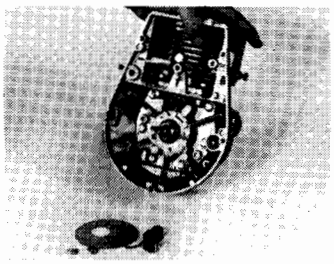
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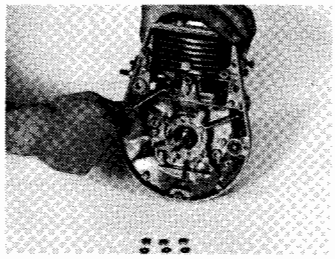
G. Cylinder
Remove four cylinder base nuts with 10 mm. wrench. Gently lift up cylinder until it clears the skirt. (Cylinder head and cylinder are integral.) Remove cylinder base gasket.

H. Piston
With needle nose pliers remove the wrist pin circlips—one on each side of pin. Gently drive out the wrist pin and lift off the piston. Remove connecting rod bearings.

I. Crankcase
To separate the crankcase: 1) remove six screws on the crankcase housing; 2) turn crankcase on its side (ignition side facing up); 3) slide hollow protective pipe over oil seal (pipe should have I.D. slightly larger than oil seal); 4) using protective gloves, apply heat around bearing seat (do not overheat); 5) lift off, separating casting; 6) turn crankcase so P.T.O. end is up and proceed as per points 3, 4 and 5. Important: do not cut oil seal on sharp edges of crankshaft keyway. Should crankcase separate without application of heat, it is an indication that both crankcase castings are worn out and should be replaced.

J. Crankshaft
Place crankshaft on work surface and use special puller to remove bearings: 1) slide puller over crankshaft and align bolt with crankshaft end; 2) slip half shells around the bearing and engage them with puller grooves; 3) slide retaining ring over half shells to keep them on bearing; 4) use 2 wrenches and turn puller bolt with one wrench while holding puller body with the other; 5) keep turning bolt clockwise until bearing comes to the end of crankshaft.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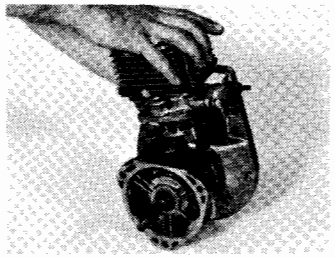
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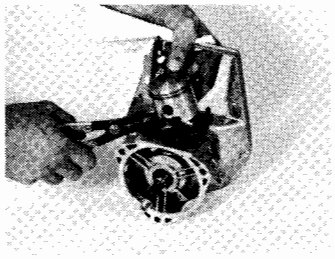
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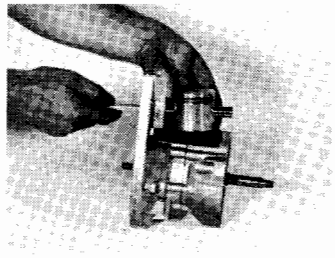
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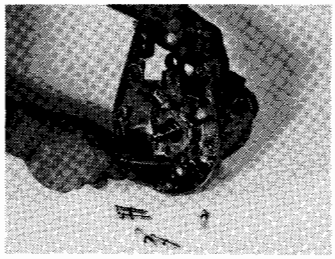
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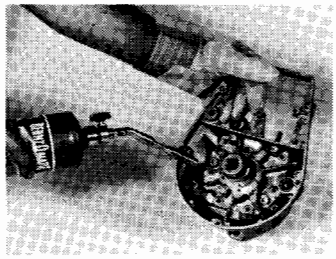
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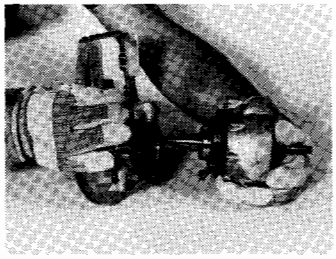
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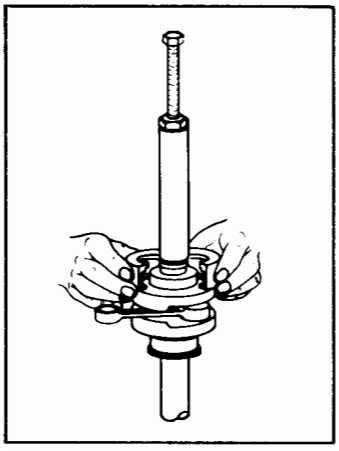
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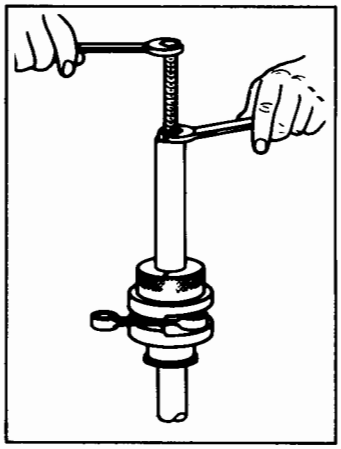
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JLO Single Cylinder Engines

Disassembly and Assembly Procedure - Model L-99 (IF-100-1)

Assembly

1. Crankshaft

Heat crankshaft bearings in oil preheated to 215°F. After reaching temperature, quickly slip bearing over end of crankshaft; it should fall freely on the counterweight. Using a hollow pipe with a diameter approximately that of the inner bearing race, hit pipe with a rubber hammer and seat the bearing on the shaft. The bearing should now rest securely and turn freely. Repeat procedure for bearing on other end of crankshaft.

2. Crankcase

Check both halves of crankcase and clean, carefully removing any left-over gasket material or burrs; 2) with the ignition side of the crankcase facing up, heat bearing seat area while protecting oil seal with a hollow pipe; 3) guide crankshaft through the oil seal until the bearing fits easily into its seat; 4) let casting cool, then install crankcase gasket; 5) to install the other half of the crankcase, repeat items 2, 3 and 4, as applicable; 6) insert the 6 Allen Head screws and tighten slightly; 7) check alignment of crankcase halves with a straight edge and 8) firmly tighten Allen Head screws, crosswise.

3. Piston and Cylinder

Clean carbon deposits from the piston. Check to see that rings move freely in their grooves. Install piston with the arrow pointing toward the exhaust port. Gently guide the piston over the connecting rod and insert the wrist pin. Snap circlips into each side of the piston using needle-nose pliers. Install cylinder-base gasket. Place a V-shaped wood block under the piston, resting it on the crankcase. After lining up the rings with the locating pins on the piston, compress them with a ring compressor. Rest piston on wood block and carefully slide cylinder over the piston until the rings disappear into the cylinder. Remove ring compressor and wood block. Install four cylinder base nuts and torque-down crosswise. (6/7 ft. lbs.).

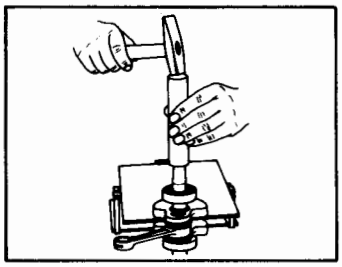
4. Contact Breaker

A. *Fixed cam models:*
Insert backing plate into crankcase housing and attach breaker points using lockwasher and slotted screw.

B. *Independent cam models:*
Install backing plate. Slide spring washers over crankshaft, insert Woodruff key and slide cam into position. Install breaker points using slotted screw and washer.

5. Ignition Coil

Attach ignition coil to crankcase with two 6 mm. bolts (use 10 mm. wrench). Connect wires to condenser and contact breaker terminals.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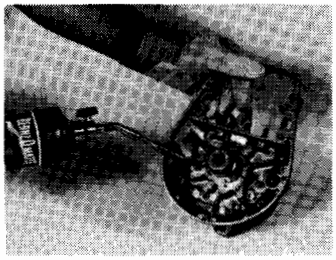
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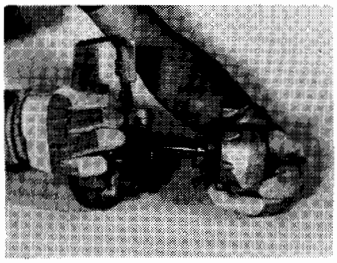
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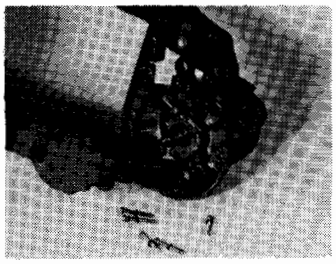
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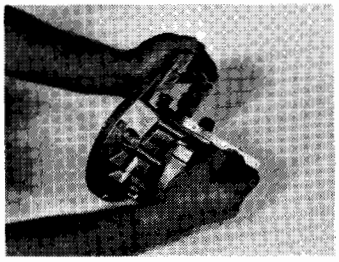
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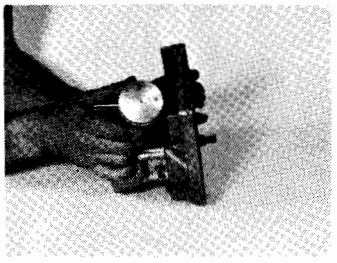
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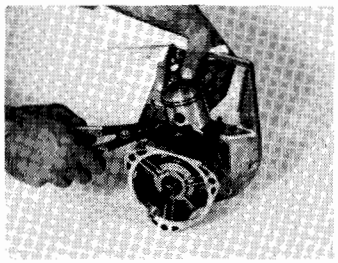
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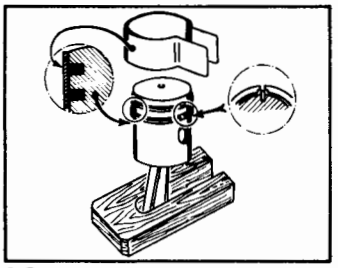
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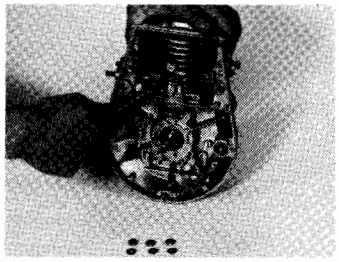
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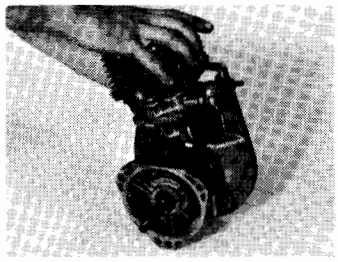
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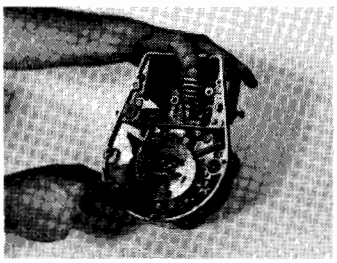
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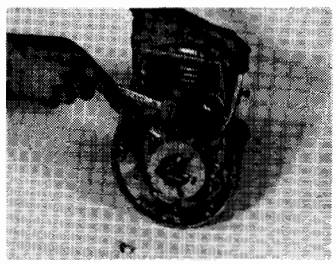
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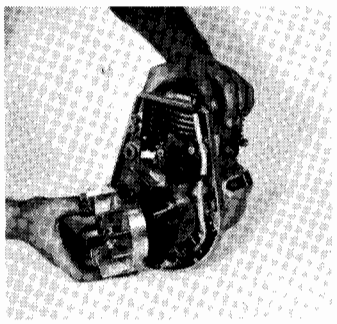
6. Flywheel
Insert and tap Woodruff key and align flywheel with keyway. Note: engine timing must be accomplished prior to installing the flywheel. Refer to Timing Procedure.

7. Spark Plug
Install spark plug using socket wrench.

8. Carrier Assembly
Insert carrier drum flush with flywheel, slipping the tabbed end of carrier into the interlocking flywheel recess (to prevent independent rotation of carrier drum). Install washer and hex nut and tighten against engine compression.

9. Fan Cover and Recoil Starter
Using five slotted screws, install fan cover—recoil starter housing. Do not overtighten or force screws.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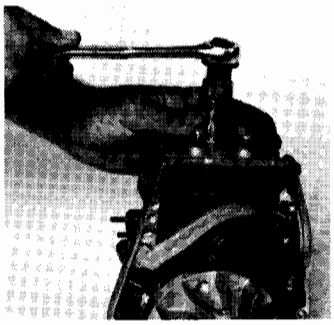
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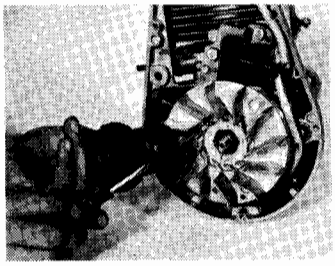
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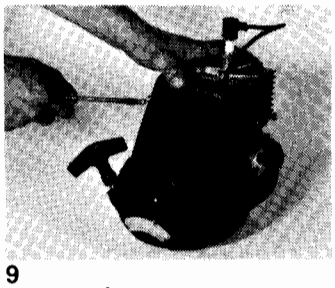
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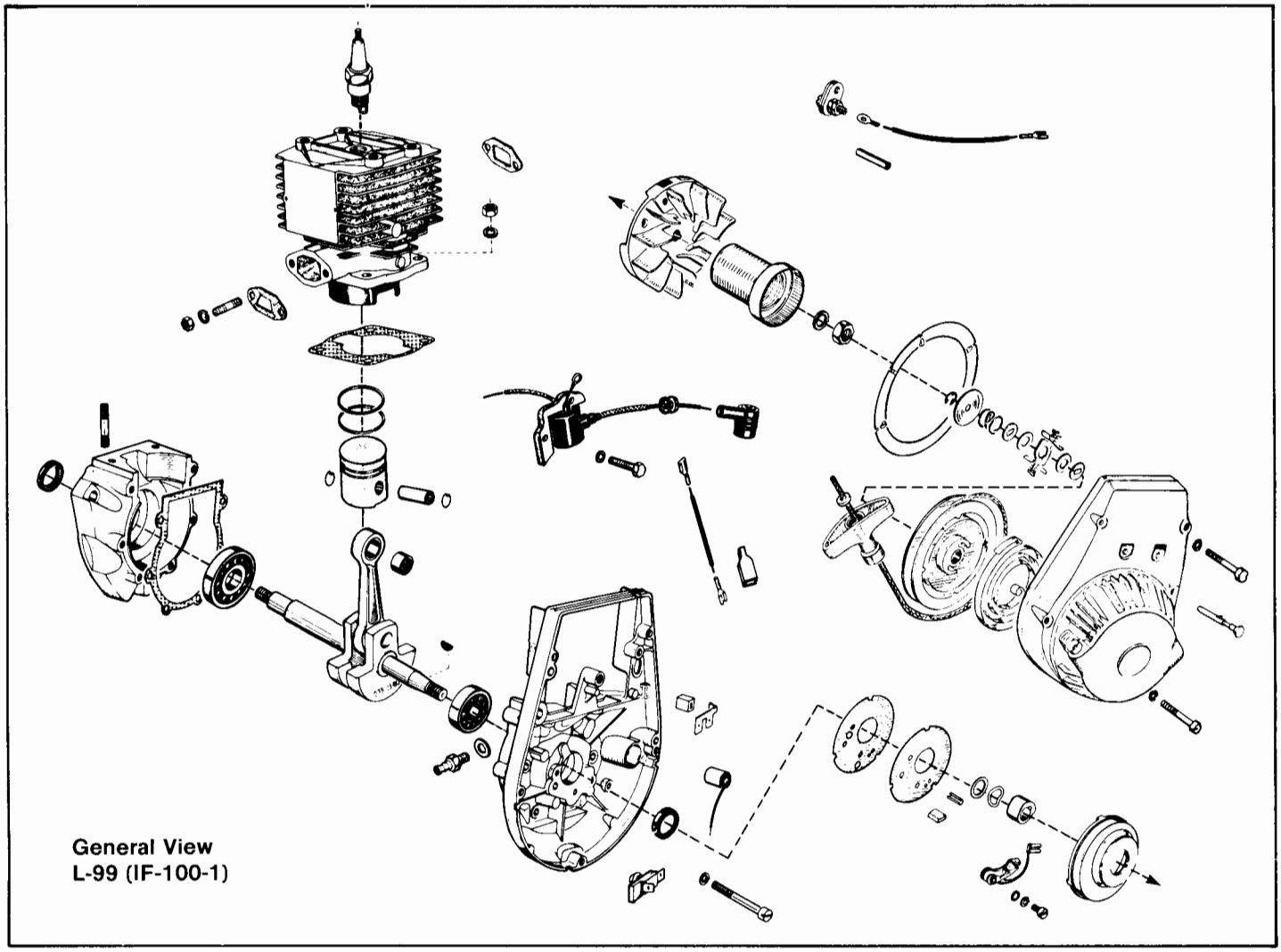


General View
L-99 (IF-100-1)

JLO Single Cylinder Engines

Disassembly and Assembly Procedure—Model L-99 (IF-100-1) Recoil Starter

Disassembly

A. Remove circlip with screwdriver; lift out friction washers, spring and pawl assembly.

B. Untie rope knot and remove handle.

C. Place unit face-down on the workbench and gradually release rope tension.

D. Remove rope pulley. Caution: recoil housing should face away from you to avoid injury from rapidly unwinding spring.

E. Smack recoil housing down sharply against the workbench to release spring tension and enable you to gradually and safely uncoil it.

Assembly

1. Place starter housing face-up on workbench. Hook end of spring onto the small boss cast in the housing and rotate housing clockwise, slowly guiding the spring into position. Keep hand pressure on housing until spring is completely coiled.

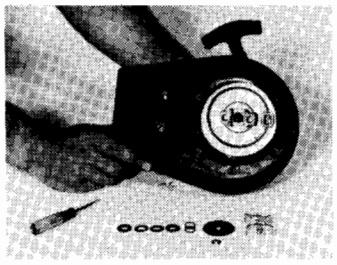
2. Insert starter rope into pulley. Install rope pulley into housing and engage with rewind spring.

3. Turn pulley counterclockwise to the limit while holding the rope tightly between the housing and the outer edge of pulley. Maintain a firm grip with one hand and release pulley slowly until rope is in alignment with rope bushing in fan housing. Feed rope thru bushing and tie a temporary knot.

4. Install handle assembly and secure with a knot. Untie the temporary knot and let rope return to recoil housing.

5. Insert friction washers, pawl assembly, spring and cover-plate and fasten with a circlip.

6. Check for trouble free movement.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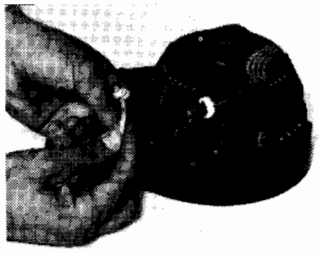
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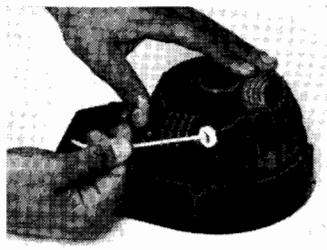
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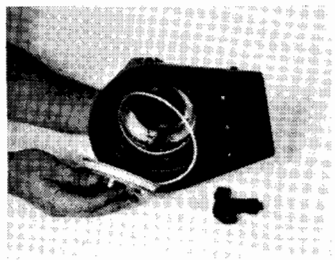
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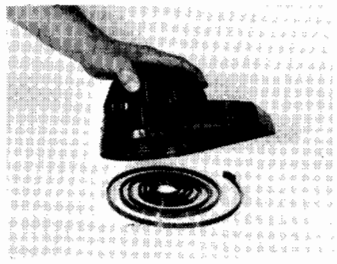
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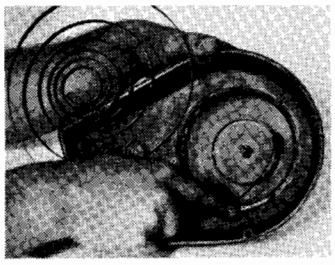
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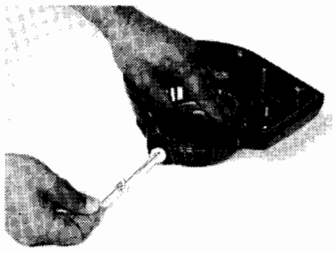
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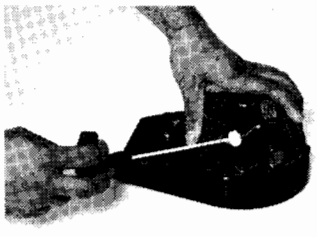
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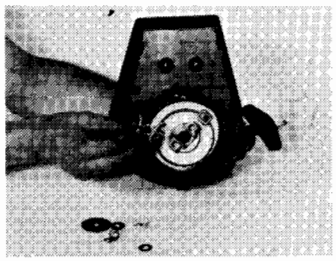

5

JLO Single Cylinder Engines

Timing Procedure - Model L-99 (IF-100-1)

NOTE: Flywheel must be removed before beginning timing procedure.

A. Attach dial indicator to the cylinder head.

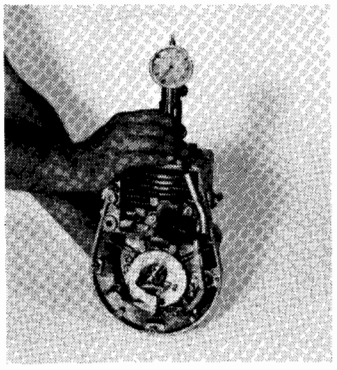
B. Attach one lead of the ignition timing light to the black "kill" wire, the other to ground (engine casting).

C. Bring piston to T.D.C.; adjust dial indicator to zero.

D. Turn crankshaft counterclockwise (away from T.D.C.), closely observing dial indicator and timing light. When the piston reaches the timing point the light will dim, indicating the opening of the points. Check the dial indicator and, if timing does not agree with specifications, adjust the breaker point gap. To retard ignition decrease point gap; to advance it, increase gap. For best results, make adjustment within recommended tolerances.

Contact Breaker Gap:	.011" to .019"	
Ignition Setting Before T.D.C.	.082" to .098"	
Spark Plug Gap:	.016" to .020"	
Spark Plug:	*Bosch*	*Champion*
	W-225-T-1	L-87-Y

E. Adjustment of Ignition Coil/Flywheel Magneto Gap
The magnets which energize the coil are cast into the flywheel. The space between the laminated core and the magnets should measure .010" to .012". Do not use a steel feeler gauge. (this will demagnetize the magnets). Adjust by first loosening the two bolts holding the coil to the crankcase. Rotate the flywheel until the magnets are opposite the laminated coil core. Place gauge between magnets and core. Press down on ignition coil while tightening the two screws holding the coil.



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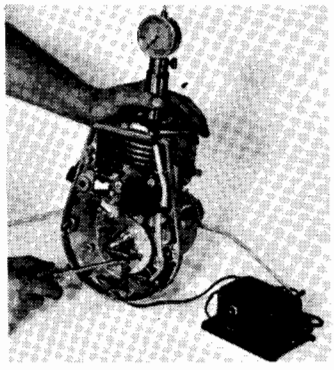

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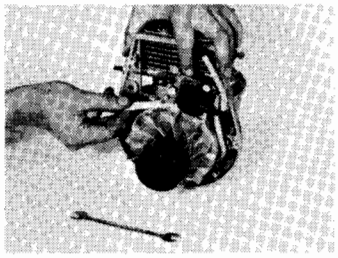

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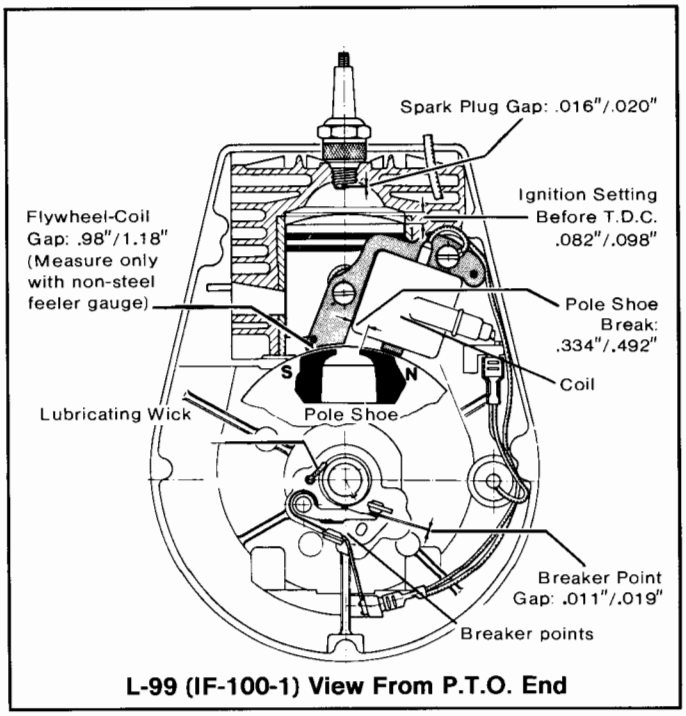


L-99 (IF-100-1) View From P.T.O. End

E

JLO Single Cylinder Engines

Disassembly and Assembly Procedure - Models L-230 (IF-250-1), L-227

Disassembly

A. Recoil Starter
Remove the three screws holding recoil to fan housing. Remove recoil assembly complete. For detailed service instructions, refer to Recoil Starter, Disassembly and Assembly.

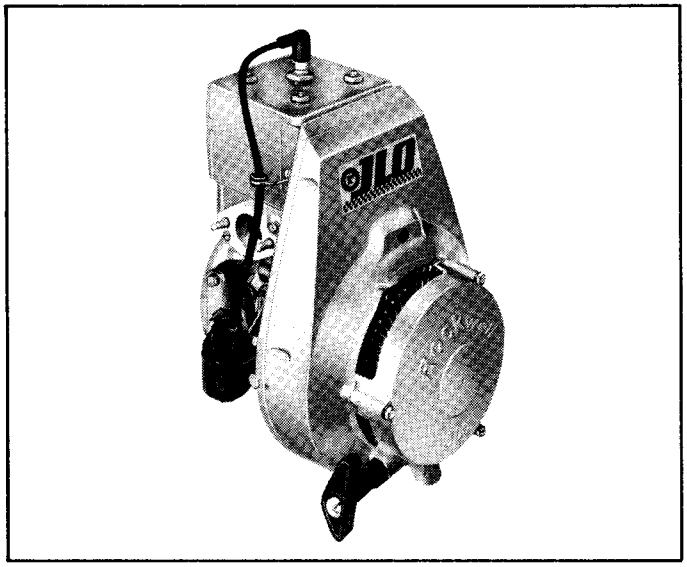
B. Emergency Pulley
Remove three hexhead nuts and lift out pulley and gasket.

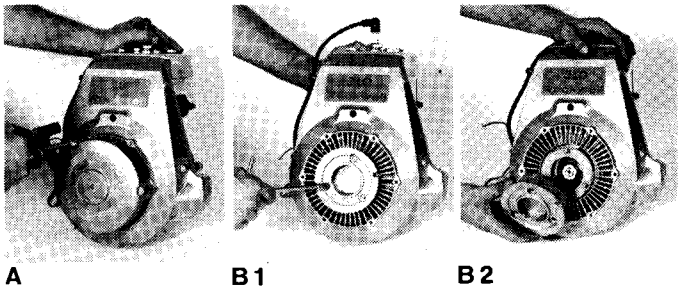
C. Air Shroud
Remove four nuts from cylinder head and lift off top of shroud. Remove exhaust and intake side shrouds by removing the exhaust flange and carburetor adapter.

D. Fan Housing
Remove six screws from the back of the fan house casting. (Use 10 mm. wrench for 4 screws, 13 mm. wrench for 2 screws). Note that one screw is slightly longer than the others; it holds the high tension wire clamp.

E. Flywheel Magneto
Make sure that spark plug is tight. Working against engine compression remove crankshaft nut with 24 mm. socket wrench by striking wrench a few sharp blows with a rubber or plastic hammer. Pull the flywheel with flywheel puller. Note that the threaded portion of the puller must be firmly engaged with that of the flywheel hub. Turn the puller bolt until it touches the tip of crankshaft. With a 24 mm. socket wrench, turn the puller bolt clockwise and extract the flywheel. Note that crankshaft key may come loose and stick to flywheel magnets.

F. Spark Plug
Remove spark plug with a socket wrench.

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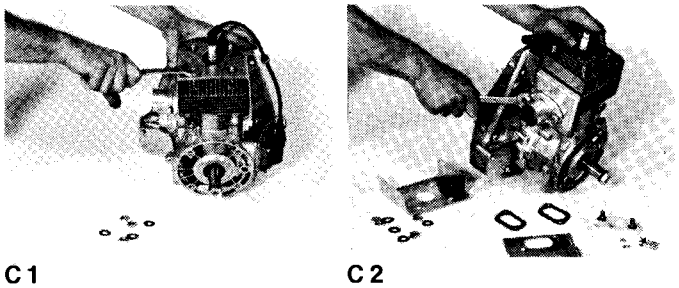
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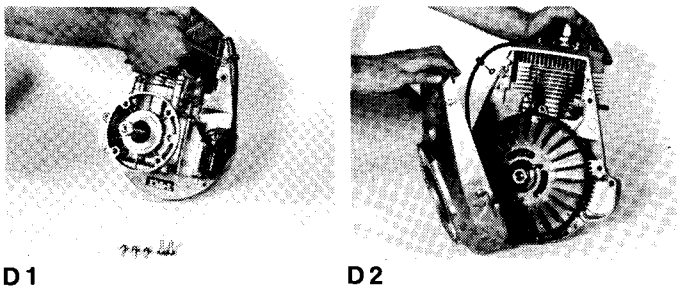
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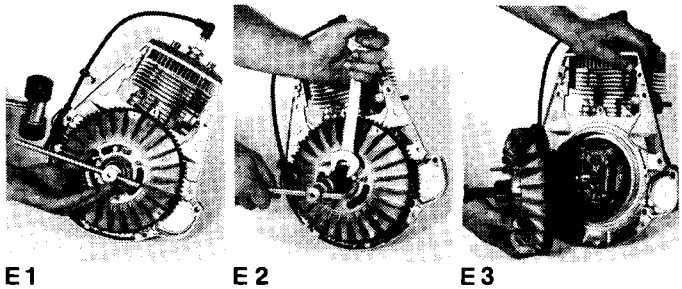

E1 E2 E3

G. Cylinder Head
With 17 mm. socket wrench, remove 4 cylinder head nuts; take off spacers and cylinder head and gasket.

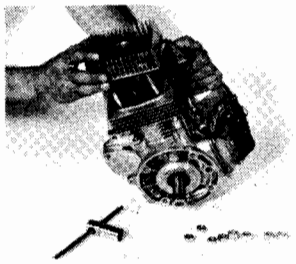
H. Cylinder
Remove the four cylinder base nuts with 13 mm. wrench. Gently lift up cylinder until piston clears the sleeve. Remove ignition coil.

I. Piston
With needle nose pliers remove the wrist pin circlips—one on each side of pin. Gently drive out the wrist pin and lift off the piston. Remove spacers and upper connecting rod bearing.

J. Armature Plate
Important: before pulling the armature plate make an alignment mark on it and on the crankcase to facilitate ignition timing. Remove the 2 slotted-head screws holding armature plate in place. Disconnect wire terminals from the external coil and clip them off. Put a drop of oil on the wires so they will slip easily through the protecting rubber grommet. Lift out the armature plate and pull wires through the grommet. Remove grommet.

K. Crankcase
To separate the crankcase: 1) remove 6 housing bolts (13 mm.); 2) turn crankcase on its side (ignition side facing up); 3) slide hollow protective pipe over oil seal (pipe should have I.D. slightly larger than oil seal); 4) using protective gloves, apply heat around bearing seat (do not overheat); 5) lift off, separating casting; 6) turn crankcase so P.T.O. end is up and proceed as per points 3, 4 and 5. Important: do not cut oil seal on sharp edges of crankshaft keyway. Should crankcase separate without application of heat, it is an indication that both crankcase castings are worn out and should be replaced.

L. Crankshaft
Place crankshaft on work surface and use special puller to remove bearings: 1) slide puller over crankshaft and align bolt with crankshaft end; 2) slip half shells around the bearing and engage them with puller grooves; 3) slide retaining ring over half shells to keep them on bearing; 4) use two 27 mm. wrenches and turn puller center bolt with one wrench while holding puller body with the other; 5) keep turning bolt clockwise until bearing comes to the end of crankshaft.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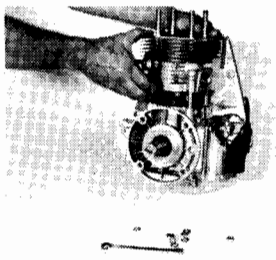
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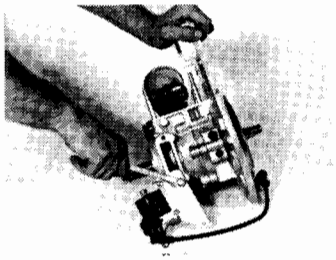
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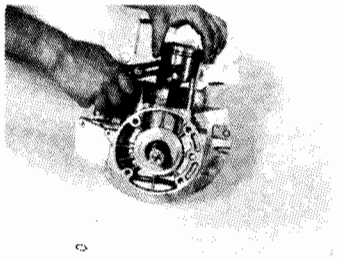
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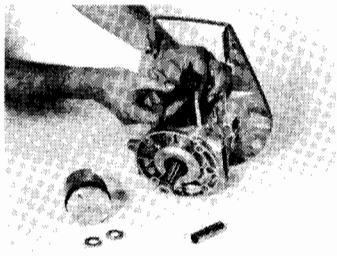
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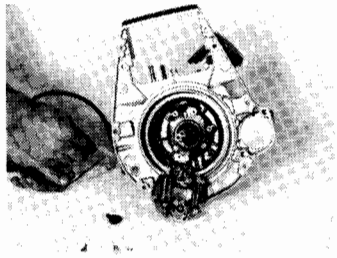
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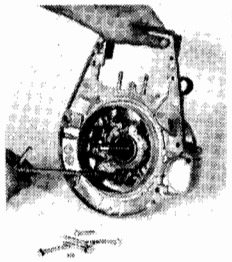
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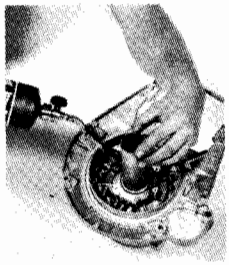
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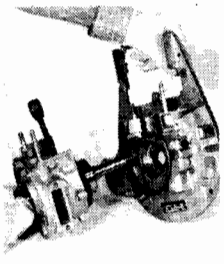
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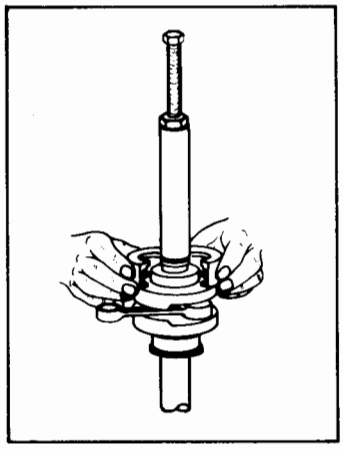
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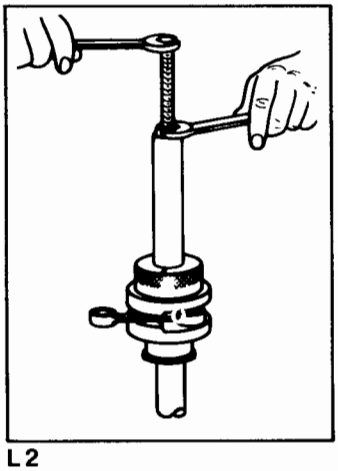

L2

JLO Single Cylinder Engines

Disassembly and Assembly Procedure - Models L-230 (IF-250-1), L-227

Assembly

1. Crankshaft

Heat crankshaft bearings in oil preheated to 215°F. After reaching temperature, quickly slip bearing over end of crankshaft; it should fall freely on the counterweight. Using a hollow pipe with a diameter approximately that of the inner bearing race, hit pipe with a rubber hammer and seat the bearing on the shaft. The bearing should now rest securely and turn freely. Repeat procedure for bearing on other end of crankshaft.

2. Crankcase

Check both halves of crankcase and clean, carefully removing any left-over gasket material or burrs; 2) with the ignition side of the crankcase facing up, heat bearing seat area while protecting oil seal with a hollow pipe (see instructions K-3 and K-4; *disassembly*); 3) guide crankshaft through the oil seal until the bearing fits easily into its seat; 4) let casting cool, then install crankcase gasket; 5) to install the other half of the crankcase, repeat items 2, 3 and 4, as applicable; 6) insert the 6 bolts and tighten slightly; 7) check alignment of crankcase halves with a straight edge and 8) complete tightening the bolts, crosswise (7 ft./lbs.)

3. Piston and Cylinder

Clean carbon deposits from the piston. Check to see that rings move freely in their grooves. Install piston with the arrow pointing toward the exhaust port. Insert needle bearings into the connecting rod, then put a daub of grease on the rod so that the spacers installed later will adhere to it. Gently guide the piston over the connecting rod and insert the wrist pin. Snap circlips into each side of the piston using a screwdriver or needle-nose pliers. Install cylinder-base gasket. Place a V-shaped wood block under the piston, resting it on the crankcase. After lining up the rings with the locating pins on the piston, compress them with a ring compressor. Rest piston on wood block and carefully slide cylinder over the piston until the rings disappear into the cylinder. Remove ring compressor and wood block. Install cylinder base nuts and torque-down to specifications, crosswise (16/18 ft. lbs.).

4. Cylinder Head

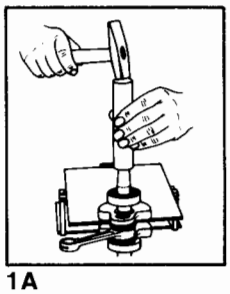
Install cylinder head gasket, with the wide side of the metal ring facing up, then the cylinder head (the cooling fins should face in the direction of air flow). Install washers and nuts. Tighten (28/32 ft. lbs.).

5. Spark Plug

Install and tighten spark plug.

6. Armature Plate

Before installing the armature plate inspect it for loose connections, pinched wires, worn out contact breakers and defective condenser. (Note: the condenser is pressed into the plate and can be removed and replaced with a special Bosch tool). Install the rubber grommet and feed wires through it. Place armature in the original position marked in disassembly (instruction J) and fasten it using the three slotted screws. Attach the terminal clips to the wires and connect to the external coil.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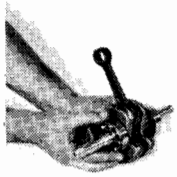
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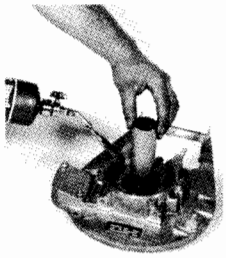
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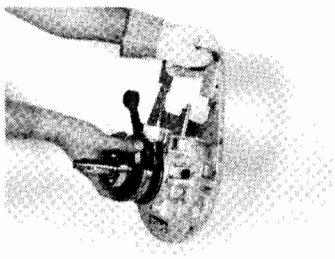
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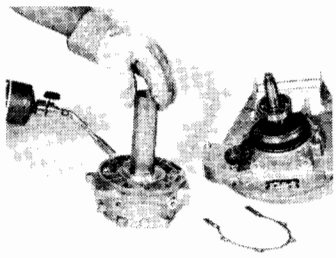
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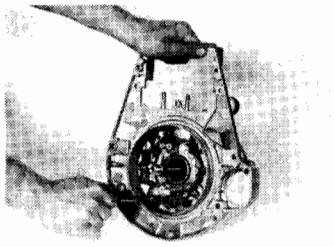
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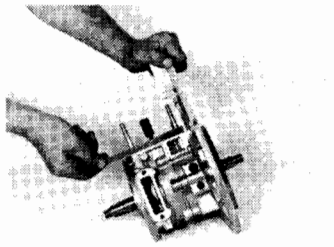
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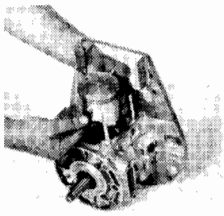
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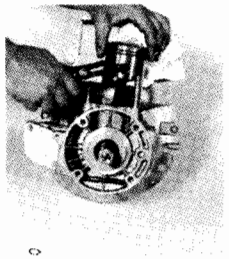
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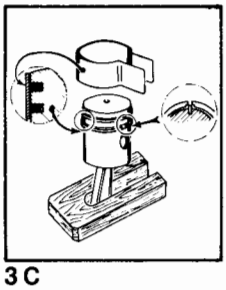
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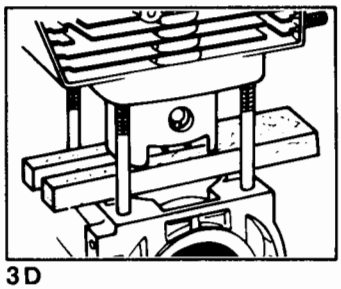
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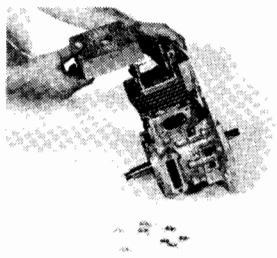
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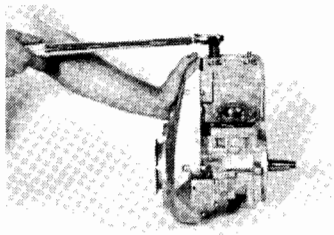
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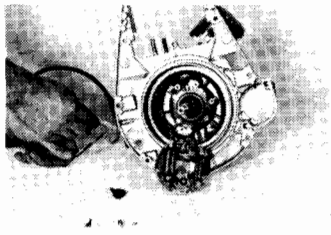
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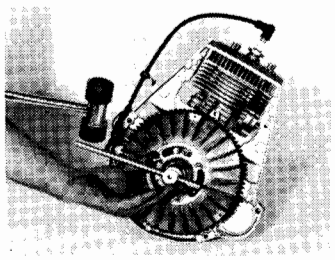
7. Flywheel Magneto; Ignition Timing
Insert and tap key into position. Align magnetic flywheel with keyway and install on crankshaft. Tighten flywheel nut. For timing refer to Timing Procedure.

8. Fan Housing
Insert the six screws through the back of the fan house casting. Install the longest of these screws on the upper right side of casting through the high tension wire clamp. Tighten all screws firmly and evenly.

9. Emergency Pulley
Install gasket and emergency rope pulley.

10. Airshrouds
Install top shroud first, using four 10 mm. nuts. Then, install the shroud for the intake side, making sure to place a gasket on both sides of the shroud and aligning the gaskets to prevent restriction of the impulse hole. Install shroud for the exhaust side, also placing one gasket on each side of shroud; attach the exhaust flange and tighten. (Note: Both the exhaust gasket and flange are of asymmetric design, therefore, exhaust gasket must be properly installed to avoid blocking exhaust.).

11. Recoil Starter
Assemble the recoil starter to the engine using three hexhead screws, and lockwashers. For detailed service instructions refer to Recoil Starter, Disassembly and Assembly.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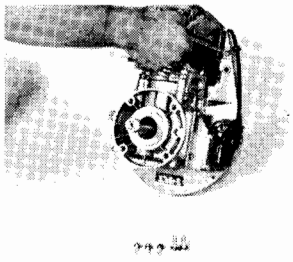
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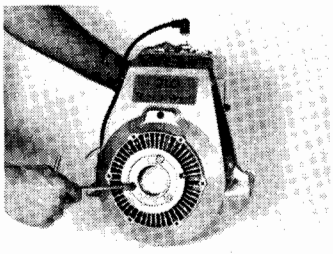
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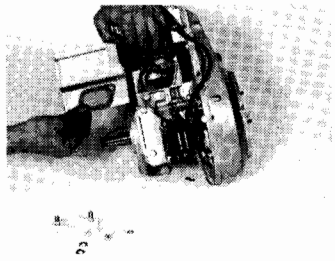
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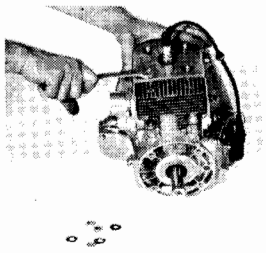
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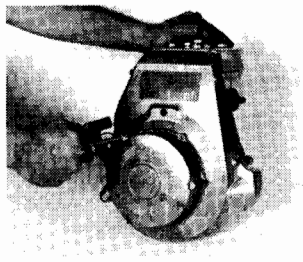
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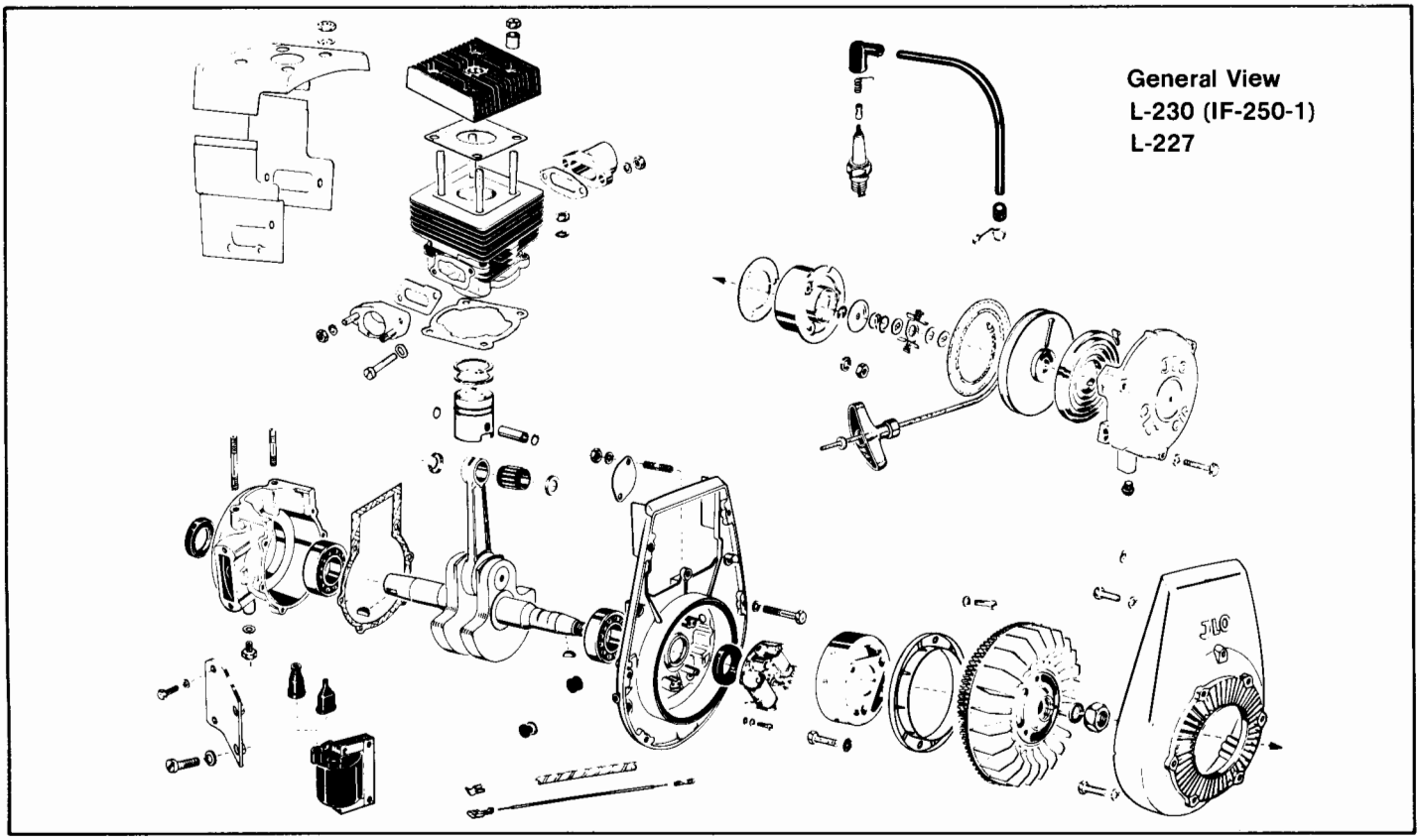


JLO Single Cylinder Engines

Disassembly and Assembly Procedure - Recoil Starter for Models L-230 (IF-250-1), L-227

Disassembly

A. Remove circlip with screwdriver; lift out friction washers, spring and pawl assembly.

B. Untie rope knot and remove handle.

C. Place unit on the workbench and gradually release rope tension. Remove rope pulley. Caution: recoil housing should face away from you to avoid injury from rapidly unwinding spring.

D. Turn recoil housing upside down in your hand and smack down sharply against the workbench to release spring tension and enable you to gradually and safely uncoil it.

Assembly

1. Place starter housing on workbench. Hook end of spring onto the small boss cast in the housing and rotate housing clockwise, slowly guiding the spring into position. Keep hand pressure on housing until spring is completely coiled.

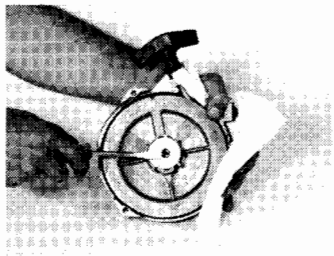
2. Insert starter rope into pulley. Install rope pulley into housing and engage with rewind spring.

3. Turn pulley counterclockwise to the limit while holding the rope tightly in the notch. Maintain a firm grip with one hand and release pulley slowly until notch is in alignment with rope outlet in fan housing. Feed rope thru outlet and tie a temporary knot.

4. Install handle assembly and secure with a knot. Untie the temporary knot and let rope return to recoil housing.

5. Insert friction washers, pawl assembly, spring and cover-plate and fasten with a circlip.

6. Check for trouble free movement.



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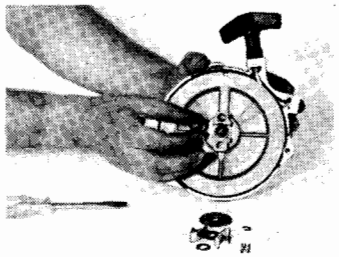

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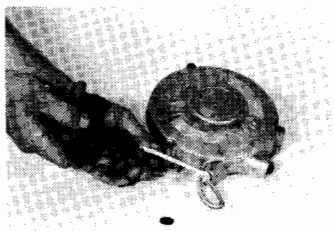

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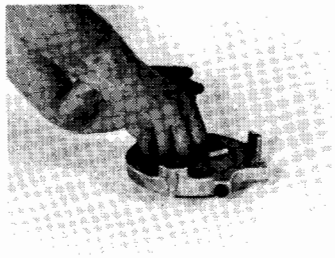

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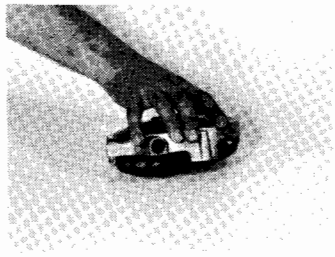

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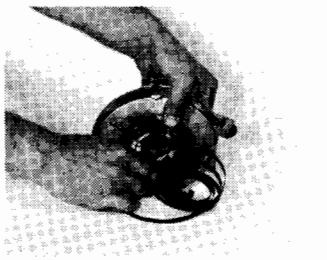

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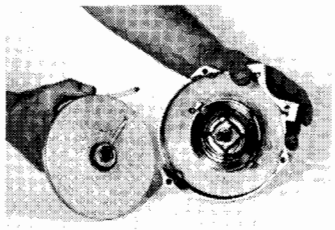

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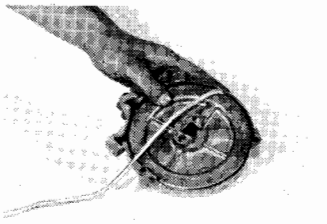

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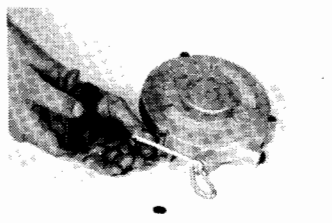

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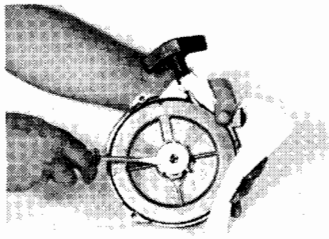


5

JLO Single Cylinder Engines

Timing Procedure For Models L-230 (IF-250-1), L-227

This engine has a fixed cam and it may be timed with flywheel on or off. Remove the recoil starter and emergency pulley and proceed as follows:

A. Attach dial indicator to cylinder head.

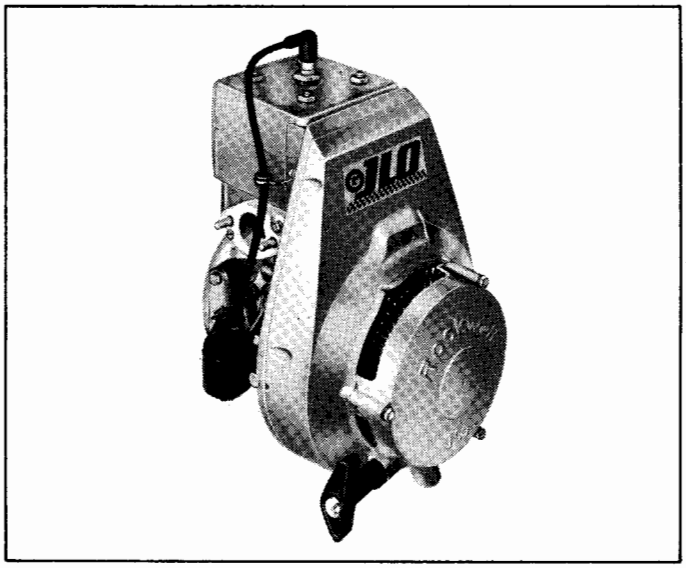
B. With flywheel on: turn flywheel clockwise until piston is at T.D.C. and adjust dial to zero. If the contact breaker is not accessible at this time, continue clockwise rotation until breaker points are visible through the flywheel opening. With clean feeler gage, check and adjust, if necessary, according to specifications.

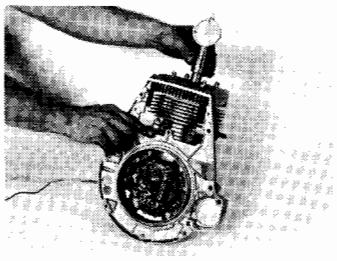
C. With flywheel removed: rotate crankshaft clockwise until piston is at T.D.C. and set dial to zero. Check breaker gap with feeler gage and adjust to specifications.

D. Attach one lead of timing light to the black "kill" wire, the other to ground (engine casting).

E. Turn crankshaft counterclockwise and away from T.D.C., closely observing dial indicator and timing light. When the piston reaches the timing point the light will dim indicating the opening of the points. Check the dial indicator and if timing does not agree with specifications, do not change the breaker point gap but, instead, adjust by loosening the armature plate and rotating complete assembly. Clockwise rotation will retard the ignition, counterclockwise will advance the ignition. Correct breaker gap will insure maximum ignition output.

Contact Breaker Gap:	.014" to .018"	
Ignition Setting Before T.D.C.	.110" to .126"	
Spark Plug Gap:	.016" to .020"	
Spark Plug:	*Bosch*	*Champion*
	M-260-T-1	K-7





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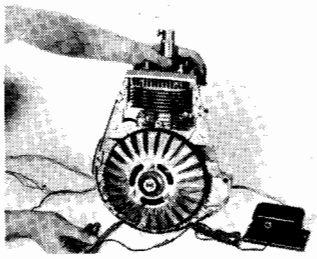

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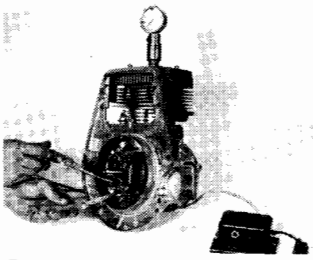

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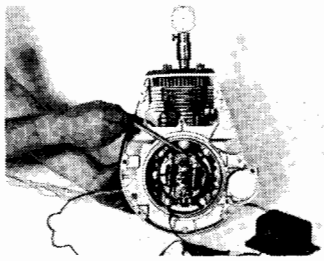


D

JLO Single Cylinder Engines

Disassembly and Assembly Procedure - Models L-295 (IF-295-1), L-340 (IF-340-1), R-295 (IF-295-2), R-340, (IF-340-2), L-297 and L-300.

Disassembly

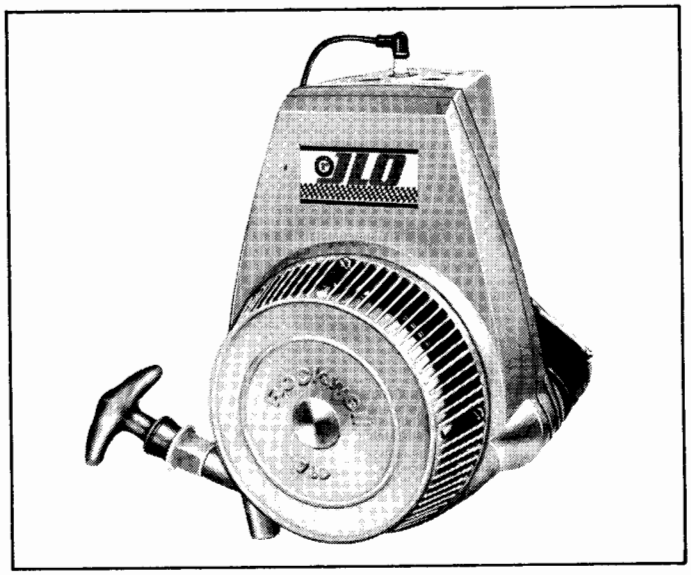
A. Recoil Starter
Remove the four slotted screws holding recoil to fan housing. Remove recoil assembly complete. For detailed service instructions, refer to Recoil Starter, Disassembly and Assembly.

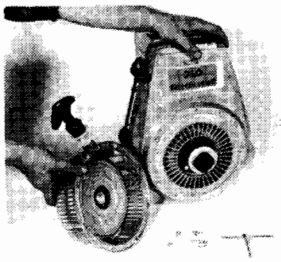
B. Emergency Pulley and Carrier Assembly
Remove three hexhead screws and pull out dust seal, carrier, emergency pulley and shims.

C. Air Shroud Assembly
Remove three nuts from cylinder head and lift off top of shroud. Remove exhaust and intake side shrouds by first removing the exhaust flange and carburetor adapter.

D. Fan Housing
With a 10 mm. wrench, remove six screws from the back of the fan house casting. Note that one screw is slightly longer than the others; it holds the high tension wire clamp. Be sure to insert it in the same hole when reassemblying.

E. Flywheel Magneto
Make sure that spark plug is tight. Working against engine compression, remove crankshaft nut with 27 mm. socket wrench by striking wrench a few sharp blows with a rubber or plastic hammer. Pull the flywheel with a special flywheel puller. Note that the threaded portion of the puller must be firmly engaged with that of the flywheel hub. Turn the puller bolt until it touches the tip of crankshaft. With a 24 mm. socket wrench, turn the puller bolt clockwise and extract the flywheel. Note that crankshaft key may come loose and stick to flywheel magnets.





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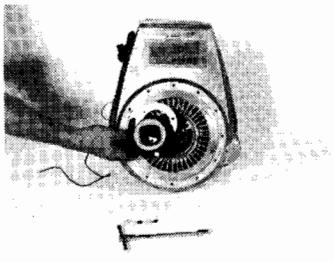

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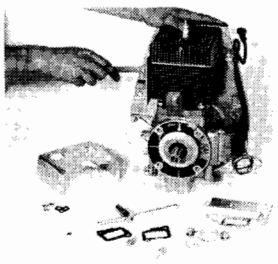

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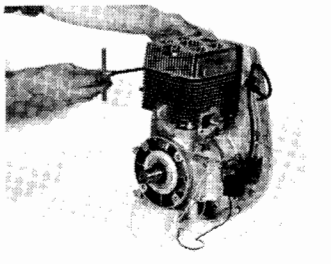

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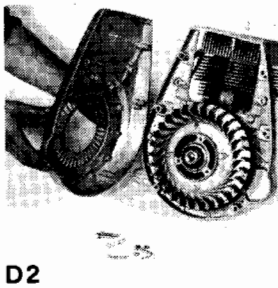

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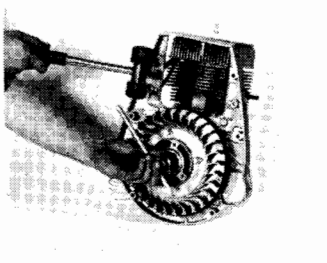

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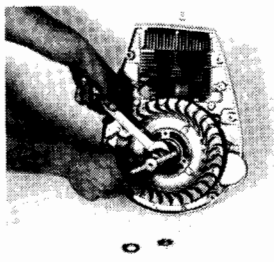

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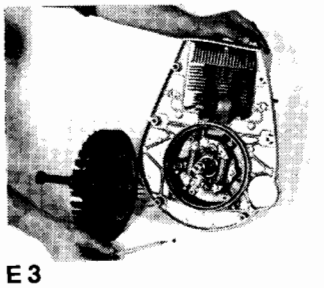


E3

F. Spark Plug
Remove spark plug.

G. Cylinder Head
With 13 mm. socket wrench, remove cylinder head nuts; take off spacers and washers and lift-off cylinder head and gasket.

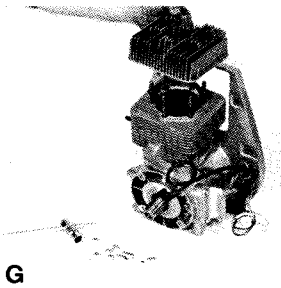
H. Cylinder
Remove the cylinder base nuts with 17 mm. wrench. Gently lift up cylinder until piston clears the sleeve.

I. Piston
With needle nose pliers remove the wrist pin circlips—one on each side of pin. Gently drive out the wrist pin and lift off the piston. Remove spacers and connecting rod bearing.

J. Armature Plate
Important: before pulling the armature plate make an alignment mark on it and on the crankcase to facilitate ignition timing. Remove the 3 slotted-head screws holding armature plate in place. Disconnect wire terminals from the external coil and clip them off. Put a drop of oil on the wires so they will slip easily through the protecting rubber grommet. Lift out the armature plate and pull wires through the grommet. Remove grommet.

K. Crankcase
To separate the crankcase: 1) remove the 6 Allen Head 8 mm. screws on the crankcase housing; 2) turn crankcase on its side (ignition side facing up); 3) slide hollow protective pipe over oil seal (pipe should have I.D. slightly larger than oil seal); 4) using protective gloves, apply heat around bearing seat (do not overheat); 5) lift off, separating casting; 6) turn crankcase so P.T.O. end is up and proceed as per points 3, 4 and 5. Important: do not cut oil seal on sharp edges of crankshaft keyway. Should crankcase separate without application of heat, it is an indication that both crankcase castings are worn out and should be replaced.

L. Crankshaft
Place crankshaft on work surface and use special puller to remove bearings: 1. slide puller over crankshaft and align bolt with crankshaft end; 2. slip half shells around the bearing and engage them with puller grooves; 3. slide retaining ring over half shells to keep them on bearing; 4. use two 27 mm. wrenches and turn puller center bolt with one wrench while holding puller body with the other; 5. keep turning bolt clockwise until bearing comes to the end of crankshaft. Note: On engines with internal threaded shafts use pressure piece (Part No. 444-31-690-00) to prevent damage to threads.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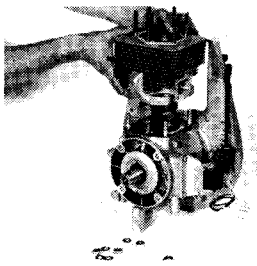
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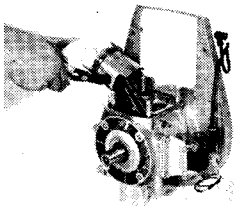
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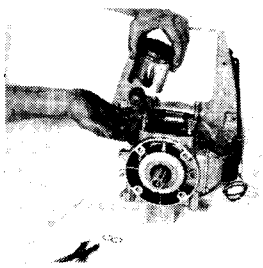
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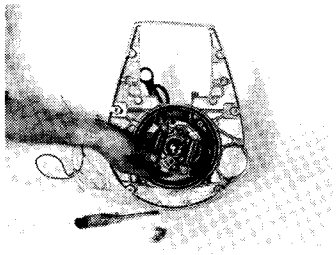
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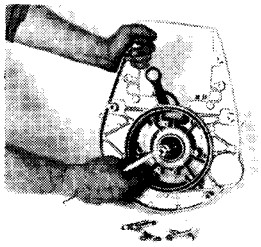
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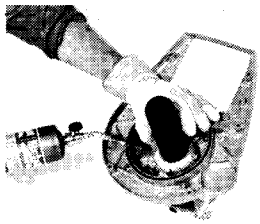
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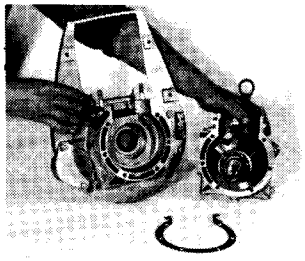
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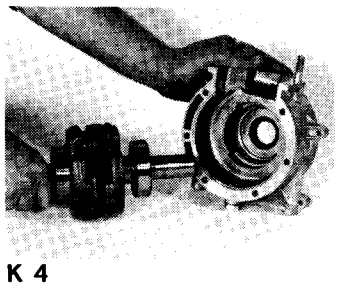
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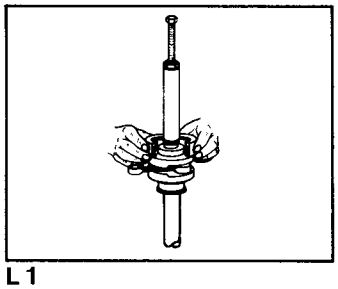
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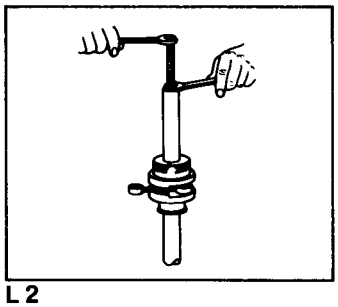

L 2

JLO Single Cylinder Engines

Disassembly and Assembly Procedure - Models L-295 (IF-295-1), L-340 (IF-340-1), R-295 (IF-295-2), R-340 (IF-340-2), L-297 and L-300.

Assembly

1. Crankshaft

Heat crankshaft bearings in oil preheated to 215°F. After reaching temperature, quickly slip bearing over end of crankshaft; it should fall freely on the counterweight. Using a hollow pipe with a diameter approximately that of the inner bearing race, hit pipe with a rubber hammer and seat the bearing on the shaft. The bearing should now rest securely and turn freely. Repeat procedure for bearing on other end of crankshaft.

2. Crankcase

Check both halves of crankcase and clean, carefully removing any left-over gasket material or burrs; 2) with the ignition side of the crankcase facing up, heat bearing seat area while protecting oil seal with a hollow pipe (see instructions K-3 and K-4; *disassembly*); 3) guide crankshaft through the oil seal until the bearing fits easily into its seat; 4) let casting cool, then install crankcase gasket; 5) to install the other half of the crankcase, repeat items 2, 3 and 4, as applicable; 6) insert the 6 Allen Head screws and tighten slightly; 7) check alignment of crankcase halves with a straight edge and 8) firmly tighten the Allen Head screws, crosswise.

3. Piston and Cylinder

Clean carbon deposits from the piston. Check to see that rings move freely in their grooves. Install piston with the arrow pointing toward the exhaust port. Insert needle bearings into the connecting rod, then put a daub of grease on the rod so that the spacers installed later will adhere to it. Gently guide the piston over the connecting rod and insert the wrist pin. Snap circlips into each side of the piston using needle-nose pliers. Install cylinder-base gasket. Place a V-shaped wood block under the piston, resting it on the crankcase. After lining up the rings with the locating pins on the piston, compress them with a ring compressor. Rest piston on wood block and carefully slide cylinder over the piston until the rings disappear into the cylinder. Remove ring compressor and wood block. Install cylinder base nuts and torque-down crosswise (28/32 ft. lbs.).

4. Cylinder Head

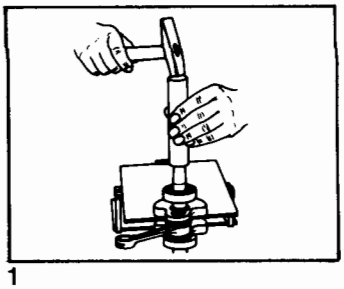
Install cylinder head gasket, with the wide side of the metal ring facing up, then the cylinder head with the flat portion of the combustion chamber facing toward the exhaust port. Install washers and nuts. Tighten to specifications (16/18 ft. lbs.).

5. Spark Plug

Install and tighten spark plug.

6. Armature Plate

Before installing the armature plate inspect it for loose connections, pinched wires, worn out contact breakers and defective condenser. Note: the condenser is pressed into the plate and can be removed and replaced with a special Bosch tool. Install the rubber grommet and feed wires through it. Place armature in the original position marked in disassembly (instruction I) and fasten it using the three slotted screws. Attach the terminal clips to the wires and connect to the external coil.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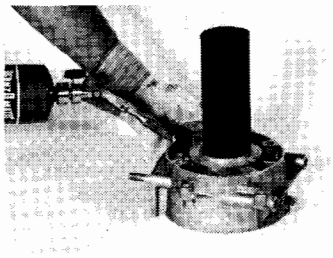
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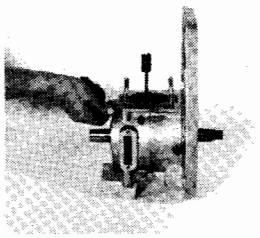
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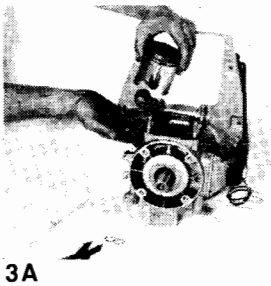
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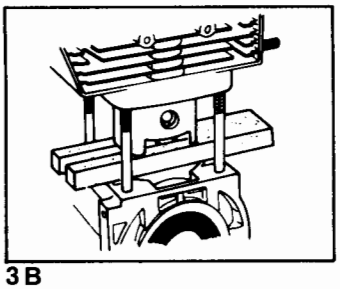
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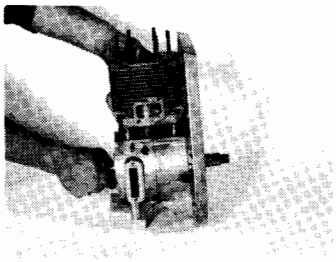
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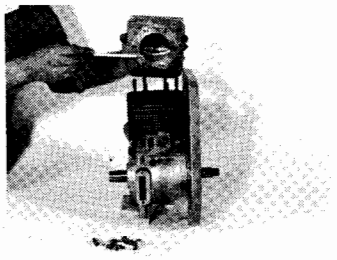
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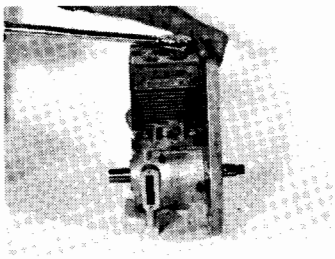
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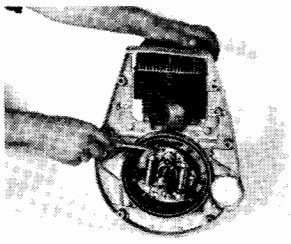
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JLO Single Cylinder Engines

Disassembly and Assembly Procedure - Models L-295 (IF-295-1), L-340 (IF-340-1), R-295 (IF-295-2), R-340 (IF-340-2), L-297 and L-300.

Assembly

1. Crankshaft

Heat crankshaft bearings in oil preheated to 215°F. After reaching temperature, quickly slip bearing over end of crankshaft; it should fall freely on the counterweight. Using a hollow pipe with a diameter approximately that of the inner bearing race, hit pipe with a rubber hammer and seat the bearing on the shaft. The bearing should now rest securely and turn freely. Repeat procedure for bearing on other end of crankshaft.

2. Crankcase

Check both halves of crankcase and clean, carefully removing any left-over gasket material or burrs; 2) with the ignition side of the crankcase facing up, heat bearing seat area while protecting oil seal with a hollow pipe (see instructions K-3 and K-4; *disassembly*); 3) guide crankshaft through the oil seal until the bearing fits easily into its seat; 4) let casting cool, then install crankcase gasket; 5) to install the other half of the crankcase, repeat items 2, 3 and 4, as applicable; 6) insert the 6 Allen Head screws and tighten slightly; 7) check alignment of crankcase halves with a straight edge and 8) firmly tighten the Allen Head screws, crosswise.

3. Piston and Cylinder

Clean carbon deposits from the piston. Check to see that rings move freely in their grooves. Install piston with the arrow pointing toward the exhaust port. Insert needle bearings into the connecting rod, then put a daub of grease on the rod so that the spacers installed later will adhere to it. Gently guide the piston over the connecting rod and insert the wrist pin. Snap circlips into each side of the piston using needle-nose pliers. Install cylinder-base gasket. Place a V-shaped wood block under the piston, resting it on the crankcase. After lining up the rings with the locating pins on the piston, compress them with a ring compressor. Rest piston on wood block and carefully slide cylinder over the piston until the rings disappear into the cylinder. Remove ring compressor and wood block. Install cylinder base nuts and torque-down crosswise (28/32 ft. lbs.).

4. Cylinder Head

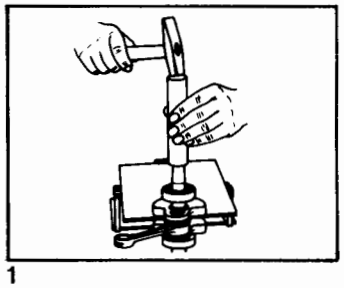
Install cylinder head gasket, with the wide side of the metal ring facing up, then the cylinder head with the flat portion of the combustion chamber facing toward the exhaust port. Install washers and nuts. Tighten to specifications (16/18 ft. lbs.).

5. Spark Plug

Install and tighten spark plug.

6. Armature Plate

Before installing the armature plate inspect it for loose connections, pinched wires, worn out contact breakers and defective condenser. Note: the condenser is pressed into the plate and can be removed and replaced with a special Bosch tool. Install the rubber grommet and feed wires through it. Place armature in the original position marked in disassembly (instruction I) and fasten it using the three slotted screws. Attach the terminal clips to the wires and connect to the external coil.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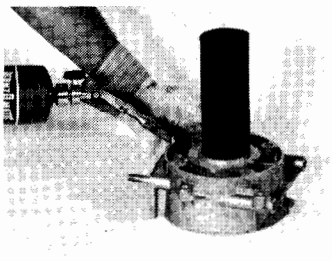
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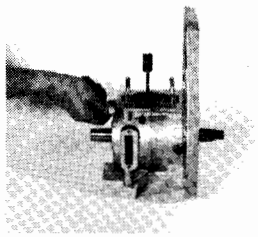
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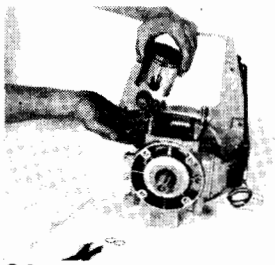
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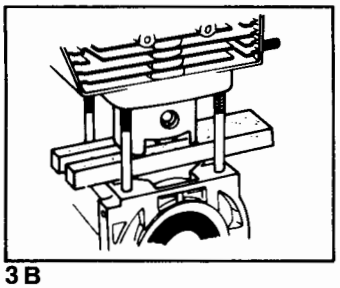
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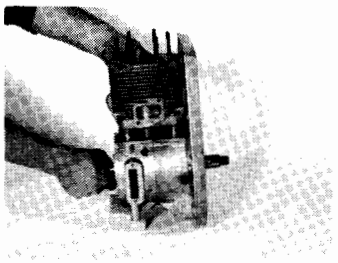
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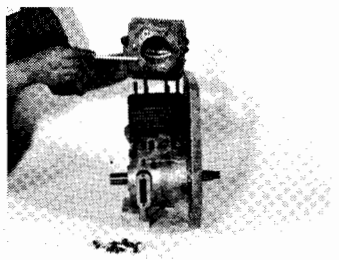
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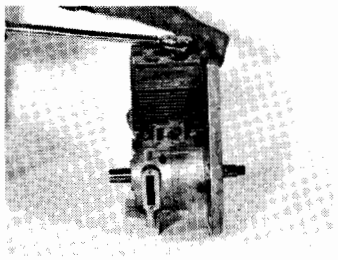
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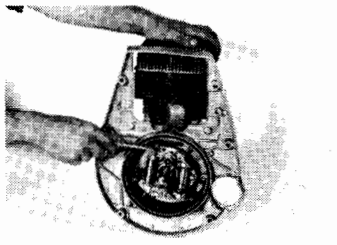

6

7. Flywheel Magneto; Ignition Timing
Align magnetic flywheel with keyway; insert and tap key into position. Tighten flywheel nut. For timing, refer to Timing Procedure.

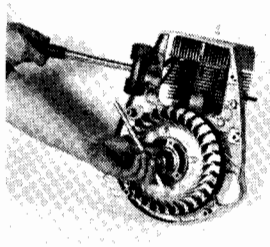
8. Fan Housing
Insert the six screws through the back of the fan house casting. Install the longest of these screws on the upper right side of casting through the high tension wire clamp. Tighten all screws firmly and evenly.

9. Carrier; Emergency Pulley
Install emergency rope pulley, shims and carrier with three hexhead screws. Note that the shim plates go between the emergency pulley and carrier and are used to maintain the proper tolerance between the rope pulley and carrier. The dimension between the fan cover flange and top of carrier is 1.732", plus or minus .020".

10. Airshroud Assembly
Install top shroud as follows: Place one washer on the respective cylinder head studs. Install top shroud. Place one washer on each of the studs protruding thru the air shroud. Install nuts and tighten. Then, install the shroud for the intake side, making sure to place a gasket on each side of the shroud and align the gaskets to prevent restriction of the impulse hole. Install shroud for the exhaust side, placing one gasket on each side of shroud; attach the exhaust flange and tighten.

11. Spark Plug
Install spark plug with a socket wrench.

12. Recoil Starter
Assemble the recoil starter to the engine using four hexhead screws, and lockwashers. For detailed service instructions, refer to Recoil Starter, Disassembly and Assembly.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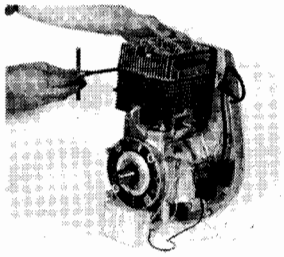
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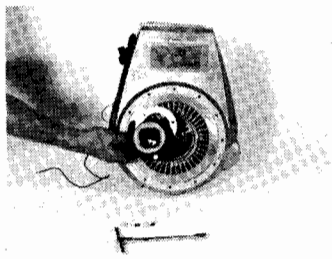
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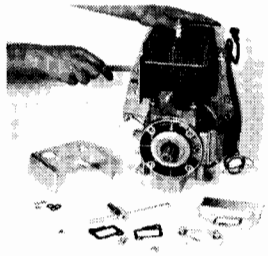
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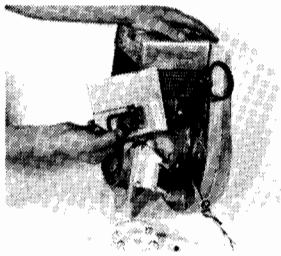
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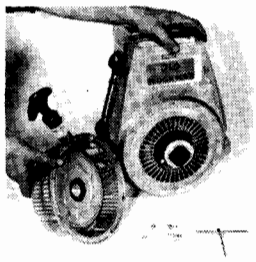
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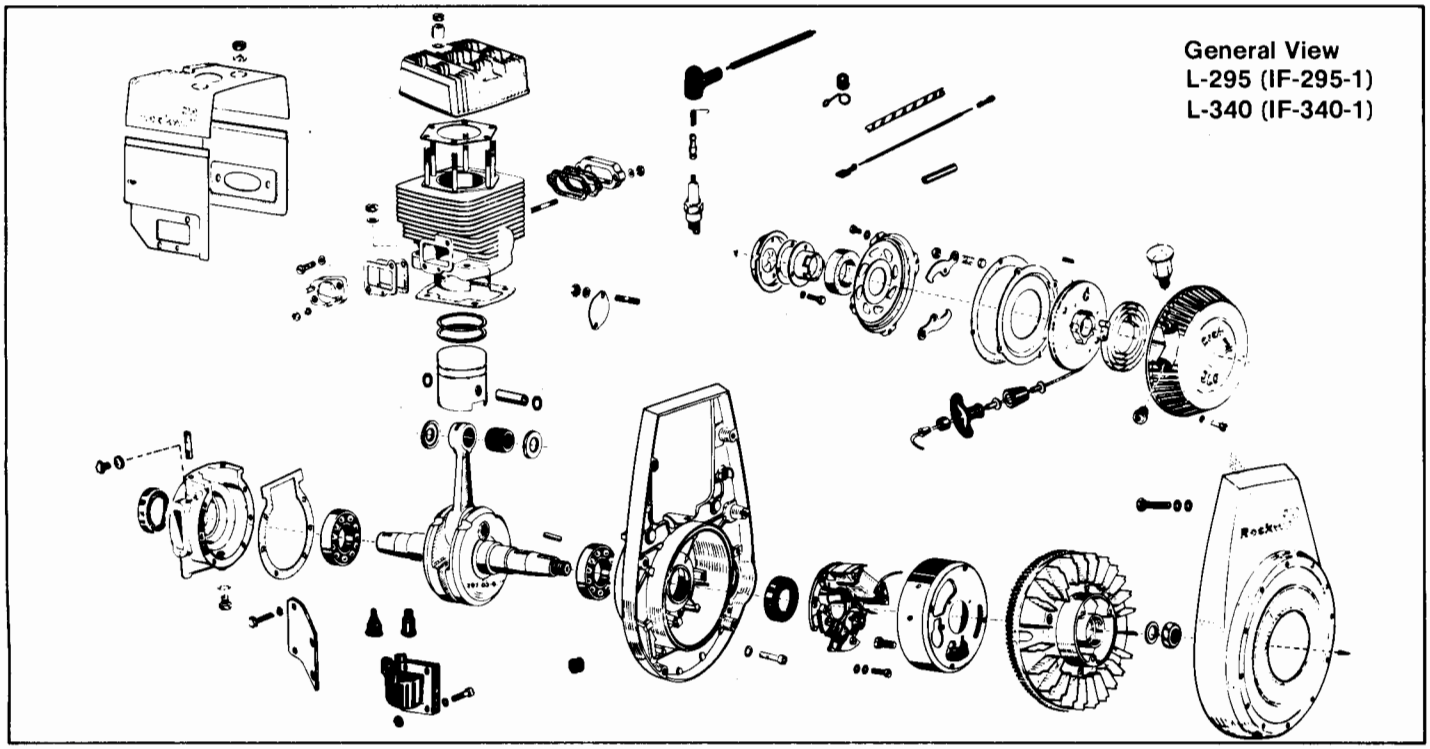


JLO Single Cylinder Engines

Disassembly and Assembly Procedure - Models L-295 (IF-295-1), L-340 (IF-340-1), R-295 (IF-295-2), R-340 (IF-340-2), L-297 and L-300.

Models R-295, R-340

These models have certain features which should be taken into consideration for proper servicing, as follows:

A. These engines have an aluminum spacer on the P.T.O. end of the crankshaft between the bearing and crank web.

B. Cylinder heads have angled dome with off-set spark plug hole. Spark plugs are long reach type (14 x 1.25 mm.)

C. Three-piece air shrouds; top shroud slanted to accommodate long reach spark plug.

D. Impeller assembly has curved fins.

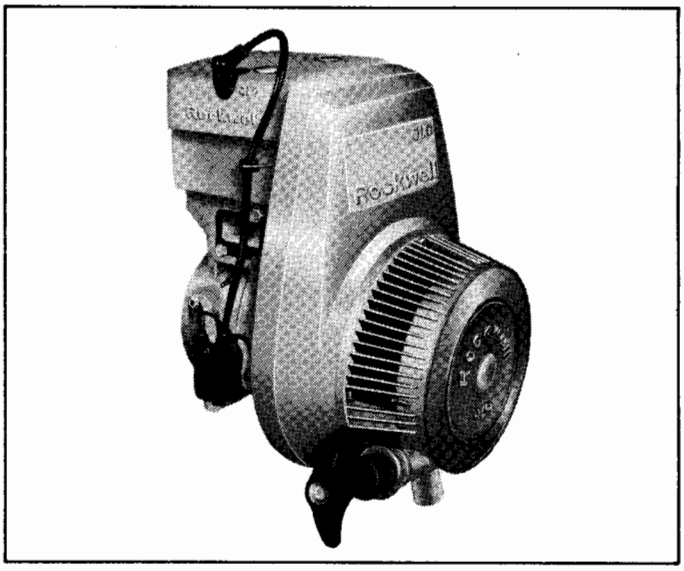
E. Cylinder base requires thin metal shims to maintain proper piston clearance.

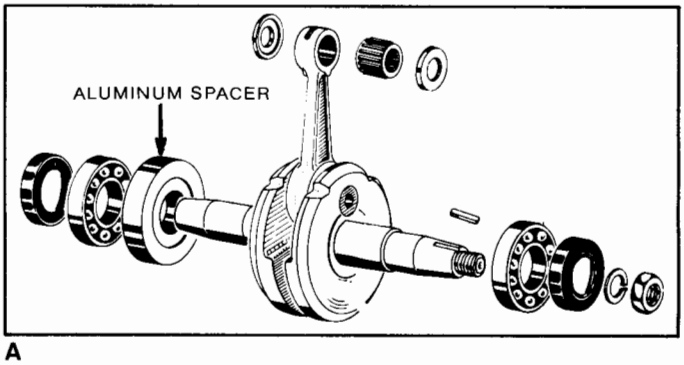
The following procedure should be observed in reassembling these engines: When reassembling cylinder and head on the R-295 and R-340 engines, a tolerance of .059" and .071" (1.5 and 1.8 mm.) must be maintained between the top of the piston and the rim of the cylinder head.

To measure the tolerance insert a bent strip of solder about 1/8" diameter into the spark plug hole, and turn the crankshaft over top-dead-center several times. Measure the squeezed portion of the solder. Any deviation from the prescribed tolerance should be adjusted with the following metal shims inserted under the cylinder base.

Part No.	Thickness
295-07-009-00	.004" (0.1 mm.)
295-07-010-00	.012" (0.3 mm.)
295-07-011-00	.020" (0.5 mm.)

Assembly Sequence: Place one paper gasket for cylinder base over studs in crankcase, add number of compensating shims required and place another paper gasket for cylinder base. Put on cylinder over studs, add lockwashers and tighten nuts.





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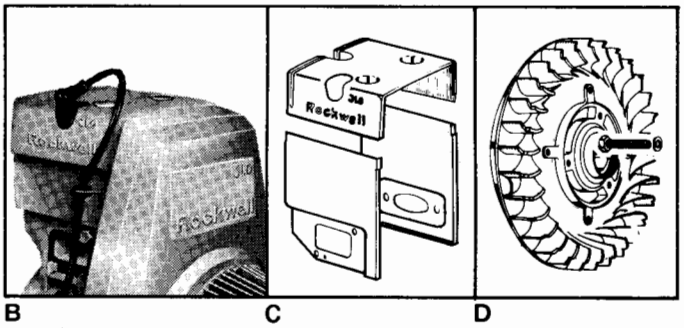

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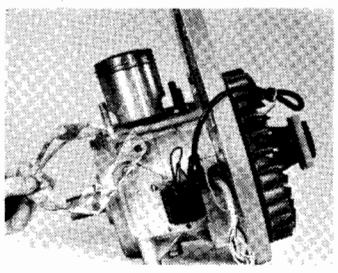

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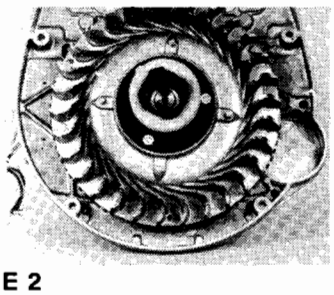


E 2

JLO Single Cylinder Engines

Disassembly and Assembly Procedure - Recoil Starter - Models L-295 (IF-295-1), L-340 (IF-340-1), R-295 (IF-295-2), R-340 (IF-340-2), L-297 and L-300

Disassembly

A. Take off cover plate and gasket ring by removing four slotted or Philipps head screws.

B. Lift out pawl assembly, including spring caps and pressure springs.

C. Remove intermediate plate.

D. Remove handle assembly. To provide needed slack to remove handle, pull rope part way out and tie a knot.

E. After removing handle, untie knot in rope carefully holding recoil pulley with one hand and let the rope feed back slowly to gradually release spring tension.

F. Remove nylon rope bushing.

G. Lift out rope pulley with pliers. Keep coil spring in position using a screwdriver.

H. Turn recoil housing upside down in your hand and smack down sharply against workbench. This will release spring tension within the housing enabling you to grasp the spring and gradually and safely uncoil it.

Assembly

1. Insert recoil housing in jig and lower the hub, locking it in position with a cotter pin. Hook end of spring onto the small boss cast in the housing and start rotating the housing clockwise, slowly guiding the spring into position. Complete the recoiling and remove housing from the jig.

2. With rope pulley in one hand and a Philip's screwdriver in the other, guide the screwdriver into the spring loop and engage the end of the spring on the pulley hub. The spring loop must be properly seated on the pulley hub.

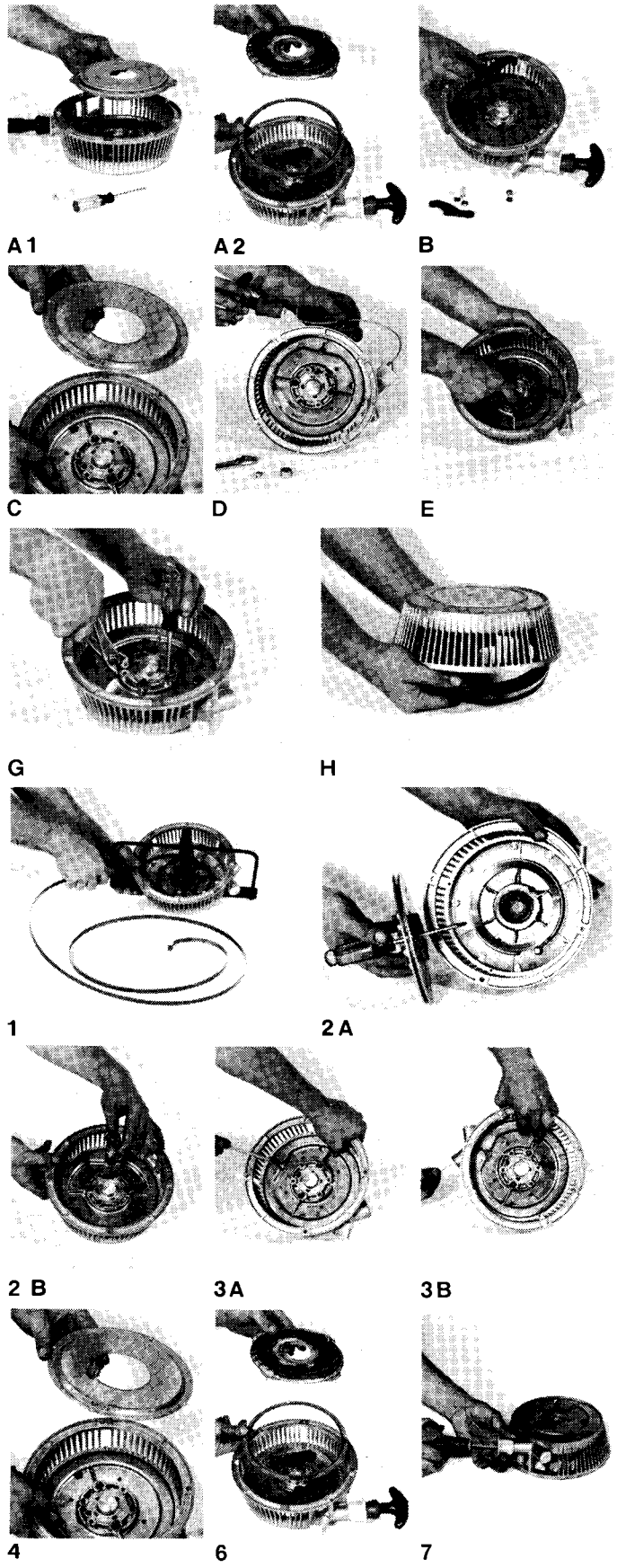
3. Before installing rope, turn rope pulley counterclockwise as far as possible. Backoff 1/2 to 3/4 of a turn. Align rope hole with outlet of starter housing and insert the rope. Install nylon bushing and handle assembly. Release tension while guiding the rope into the starter housing.

4. Install the Intermediate Plate.

5. Install Starter Pawl Assembly including springs and caps. Make sure that spring caps and springs are properly aligned to prevent binding.

6. Install gasket ring and cover plate.

7. Check the complete assembly for free play.



JLO Single Cylinder Engines

Electric Starter Mounting Instructions - Models L-295 (IF-295-1), L-340 (IF-340-1), R-295 (IF-295-2), R-340 (IF-340-2), L-297 and L-300.

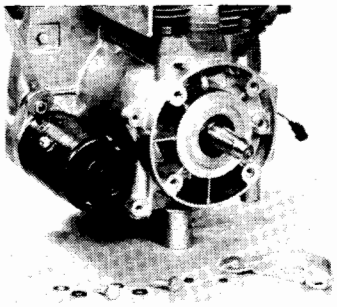
Important: The following instructions apply only to engines prepared for electric start.

A. Remove starter cover plate from crankcase.

B. Insert forward end of electric starter in crankcase opening and tighten down the two nuts with a 13 mm. wrench.

C. Attach support bracket at rear of starter using bolts and nuts provided and tighten. Note: In order to prevent starter from binding, place the two plain washers provided between the start bracket and the crankcase.

Note: to remove kit, reverse above procedure.



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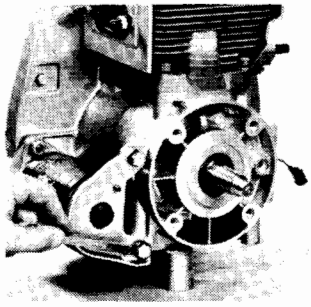


C

Timing Procedure For Models L-295 (IF-295-1), L-340 (IF-340-1), R-295(IF-295-2), R-340 (IF-340-2), L-297 and L-300

Remove the recoil starter and carrier assembly and proceed as follows:

A. Attach the dial indicator to the cylinder.

B. Check point gap:

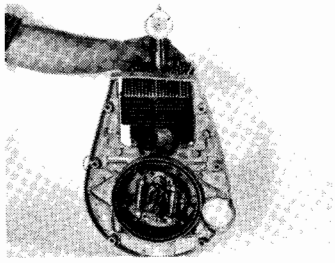
1. **With Flywheel On:** Turn the flywheel clockwise to TDC (top dead center). If the contact breakers are not accessible at this time, continue clockwise rotation until the breaker points are visible. Use a clean feeler gauge to check the gap; if necessary, adjust according to specifications.
2. **With Flywheel Off:** Use an old cam and rotate until the points are at their largest opening. Check gap and adjust, if necessary, to specifications.

C. Advance the centrifugal weight. Hold in place using locking pin, (a tool specially designed for this purpose.)

D. Attach one lead of the ignition timing light to the black "kill" wire, the other to ground (engine casting).

E. Bring piston to TDC and adjust dial to zero.

F. Turn flywheel counterclockwise (away from Top Dead Center), closely observing dial indicator and timing light. When the piston reaches the timing point the light will dim, indicating the opening of the points. Check the dial indicator and, if timing does not agree with specifications, do not change the breaker point gap but, instead, adjust by loosening the stator plate and rotating the complete assembly. Clockwise rotation will retard the ignition, counterclockwise will advance the ignition. Correct breaker gap will insure maximum ignition output.



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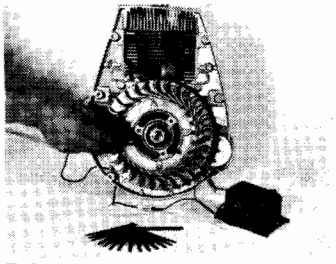

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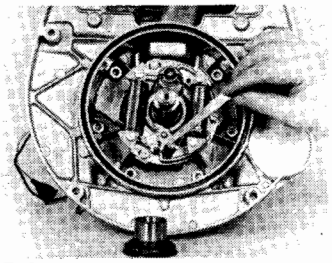

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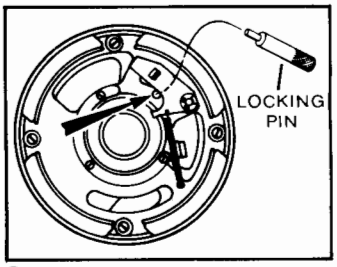

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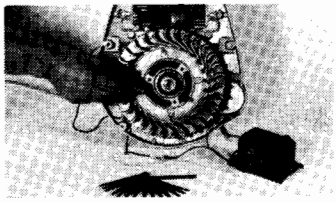

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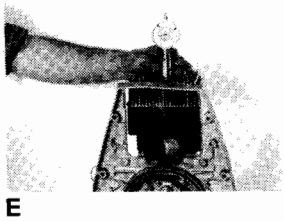


E

	L295, L340 L297, L300	*R295 R340*
Contact Breaker Gap	.014" to .118"	.014" to .118"
Spark Plug Gap	.118" to .138"	.140" to .160"
Spark Plug:	.016" to .020"	.016" to .020"
Bosch	M-240-T I	W-280-T20S
Champion	K-8	N-60Y

JLO Twin Cylinder Engines

Disassembly and Assembly Procedure

Models LR-340/2 (2F-340-1), LR-399/2 (2F-400-1) and LR-440/2 (2F-440-2).

Disassembly

A. Recoil Starter

Remove four screws holding recoil to fan housing and the spacers and washers. Remove recoil assembly, complete. (For detailed service instructions refer to Recoil Starter, Disassembly and Assembly.

B. Lower Fan Pulley and Carrier Assembly

Remove three hexhead screws on carrier. Remove dust seal, carrier, lower pulley halves and V-belt.

C. Upper Fan Belt Pulley Assembly

To keep impeller from turning, insert a punch through the fan housing and into the impeller body. With a 17 mm. wrench, remove fan nut. Pull out the loosened assembly—nut, washer, spacers, and upper pulley halves.

D. Flywheel Magneto

Make sure spark plugs are tight. Working against engine compression, with a 27 mm. wrench, remove crankshaft nut by striking wrench a few sharp blows with a hammer. To pull flywheel, attach special puller to flywheel flange, using three of the recoil starter screws previously removed. Screw into the three holes on flange and tighten. Turn puller until bolt touches tip of crankshaft. With a 24 mm. socket wrench, turn puller bolt clockwise and extract flywheel. Note that key may come loose and adhere to the flywheel magnets.

E. Intake Manifold

Remove the four nuts holding manifold and the two lower coil cover screws. Take off manifold and coil cover. Remove screw holding spark plug wires to side of fan housing.

F. Fan Housing; Armature Plate

Disconnect solid blue and blue-yellow coil wires. With a metric Allen Head wrench, remove the 4 socket cap screw holding fan housing to crankcase. To loosen, place unit with fan housing protruding over end of workbench and, holding housing with one hand, hit light but sharp blows around edge of housing. Pull housing straight out past the crankshaft careful not to cut the oil seal on the keyway. From *front of fan housing,* drive out shaft and fan. The fan housing bearings may now be removed by punching out from the side opposite that from which they are normally inserted. Remove bearing spacer.

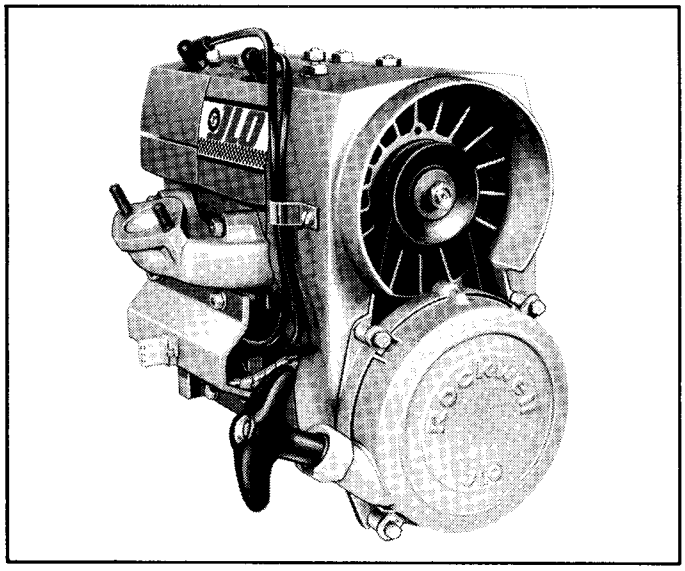
The armature plate is attached to the fan housing by two slotted screws and can be removed at this time. Scratch-mark its original position before removing to facilitate engine timing.

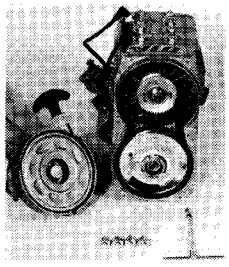
G. Spark Plugs

Remove with a socket wrench.

H. Cylinder Heads

With 17 mm. wrench remove head nuts and lift head and gasket from cylinder block. Mark cylinder head and corresponding cylinder in order to assure proper reassembly. (Cylinder closest to the P.T.O. end is always considered No. 1 cylinder). Repeat operation for second cylinder.





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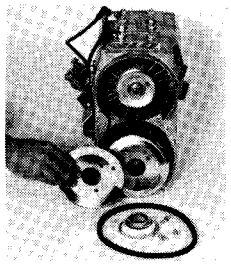

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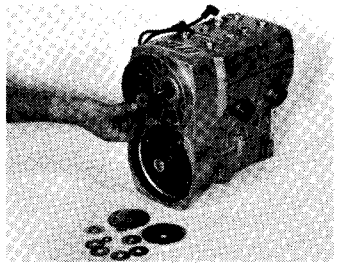

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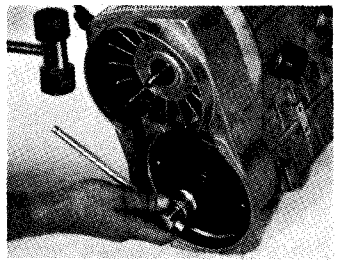

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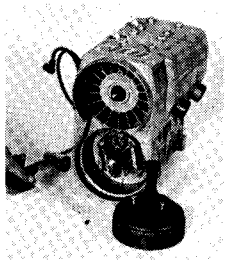

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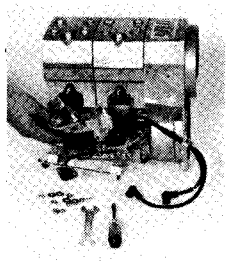

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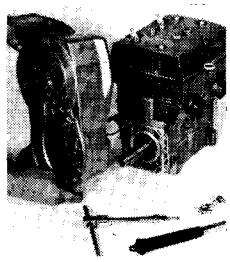

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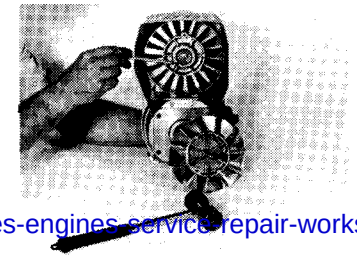

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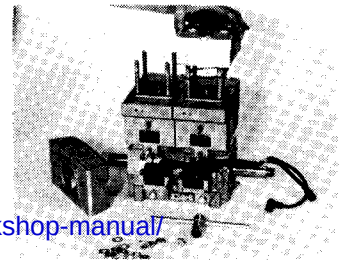

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