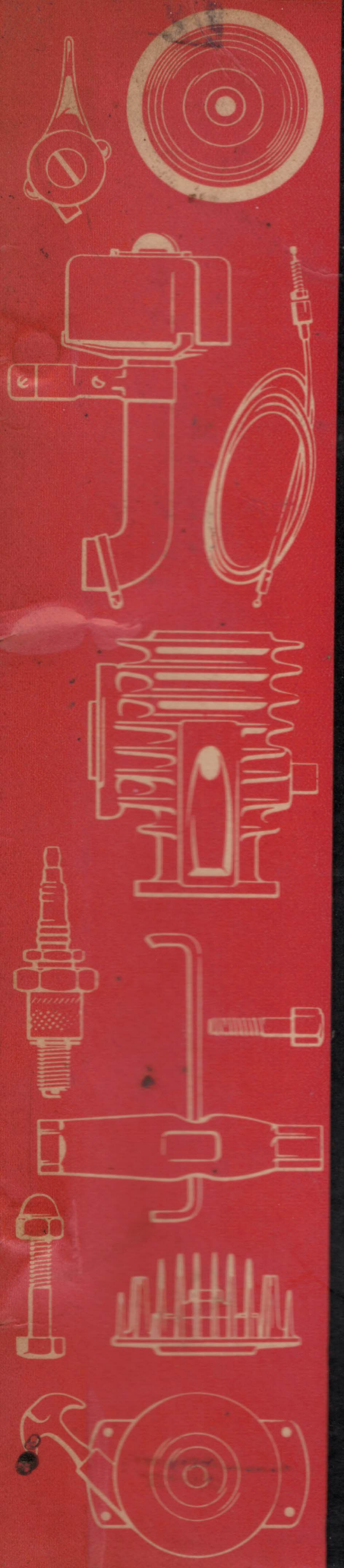


MOWER AND ENGINE

Work Shop Manual

VICTA

WORKSHOP MANUAL

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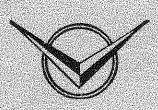
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VICTA MOWER DIVISION

A Unit of the Victa Group

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VICTA WORKSHOP MANUAL

VICTA TWO-CYCLE ENGINES

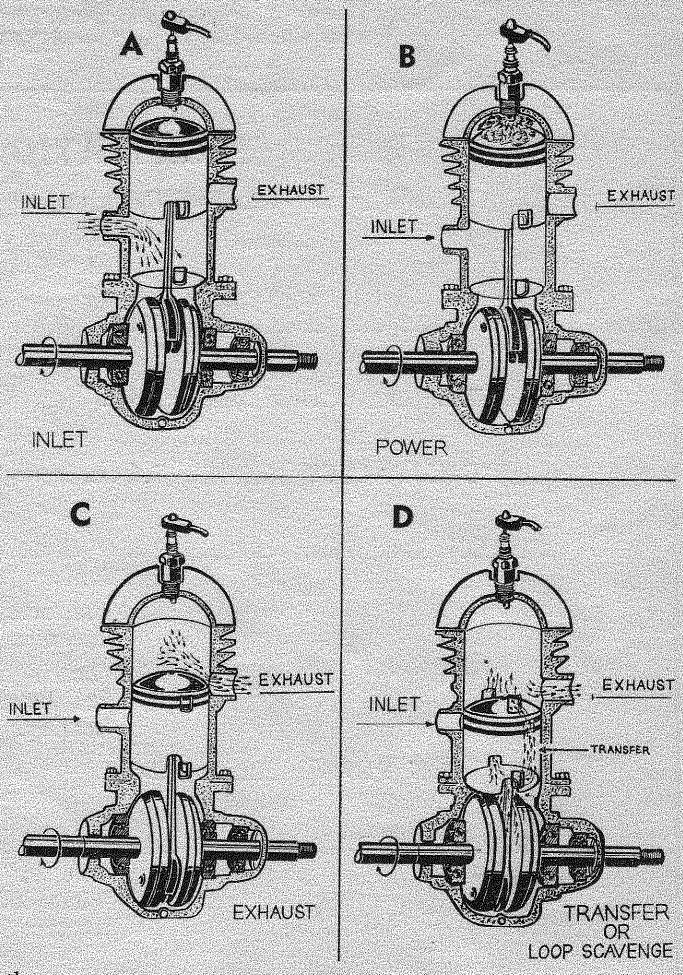
SPECIFICATIONS

Common to all Victa Two-Cycle engines except where specially noted.

BORE	2⅛″.
STROKE	2⅛″.
CUBIC CAPACITY	7.6 cu. in or 125 c.c.
PISTON	2.120″ bottom of skirt tapering to 2.115″ at top land. Big end bearing, hardened aloy steel, con rod and crankpin, 15 steel rollers, 3/16″ x ½″. Man bearings. Drive side 1-20 mm. 1-17 mm. ball bearing. Magneto side, 1-20 mm. ball bearing.
GUDGEON PIN	.562″.
CRANKSHAFT	Machined to carry ball bearings, 15° taper drive end, ½″ B.S.F. threads both ends. Some Victa industrial engines have optional alterations to crankshaft.
IGNITION TIMING	⅛″ Before top dead centre.
BREAKER POINT GAP	.020″.
SPARK PLUG GAP	.025″.
SPARK PLUG	Angled fitting, Champion "N21," reach ¾″. Central fitting, Champion "L14," reach ½″.
LUBRICATION AND FUEL	B.P. Zoom or ½ pint B.P. Two-Stroke or Energol 30 SAE to each gallon of regular grade petrol. **NEVER USE NEAT PETROL.**

BASIC TWO-CYCLE ENGINE OPERATION

The Victa two-cycle engine operates on the loop scavenge principle, utilising the crankcase as a compressor in its cycle of operations, and the piston to close or open the various cylinder ports as required. As the piston ascends on the compression stroke it creates a vacuum in the crankcase. When the stroke is almost completed the lower edge of the piston uncovers the inlet port in the cylinder to which the carburettor is attached. At this stage atmospheric pressure causes a charge of fuel and air to enter as a gas below the piston and more or less fill the crankcase. (See illustration A).



Just before the piston reaches top dead centre, a spark occurs across the points of the spark plug, igniting the gas in the combustion chamber (see illustration B) so that maximum combustion pressure occurs as the piston reaches the top of its stroke, thrusting the piston down on the power stroke. As the piston descends, its lower edge seals off the inlet port, cutting off the entry of the gas mixture, and compression of the mixture in the crankcase commences. As the power stroke of the piston continues, the exhaust port in the cylinder is uncovered and the burnt gas escapes into the muffler. (See illustration C). At this time the top openings of the transfer passages are uncovered and because the lower ends of these passages communicate with the crankcase, the gas mixture compressed there is discharged into the combustion chamber in such a way that the final dregs of burnt gas are blown through the exhaust port (this is called loop scavenge). (See illustration D). The piston then reaches and passes bottom dead centre. As it ascends again it closes the transfer and exhaust ports, commences to compress the charge of gas in the combustion chamber, and the cycle is repeated.

As the fuel-air mixture contains a proportion of lubricating oil, it will be seen that all the moving parts of the engine are bathed in an oil mist at some stage of the operations, and the importance of having the correct grade of oil in the petrol in the right proportions will be readily understood.

DECARBONISING AND FITTING NEW RINGS

Some engines have no cowl; start at Paragraph 7 for this type

IMPORTANT—Clean engine thoroughly before dismantling.

(A) IF FITTED WITH A REWIND OR IMPULSE STARTER

1. Turn the petrol tap off.
2. Remove the fuel line from the carburettor.
3. Disconnect the high tension lead from the spark plug.
4. Remove the mounting screws which hold the cowl to the engine (Fig. 1). The starter screws need not be disturbed, the cowl and starter can be lifted off as a unit.
5. As the cowl is removed the high tension lead should be fed back carefully through the grommet in the cowl. On engines equipped with pressed steel cowls, the high tension lead is retained in a clip beneath the cowl, release the clip as the cowl is lifted.

(Decarbonising and Fitting New Rings—contd.)

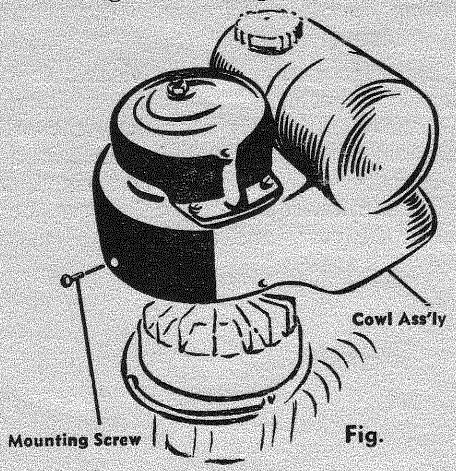


Fig.

(B) IF FITTED WITH A STARTER PULLEY

6. Unscrew the starter pulley by inserting a block of wood in the rope slot in the pulley and tapping in an anti-clockwise direction. When the pulley is free on the thread it may then be unscrewed by hand. The removal of the cowl is now completed by following all the operations 1 to 5 as listed above.
7. Remove spark plug.
8. Remove 4 cylinder head bolts and washers, A, B, C, D (Fig. 2). Spanner size ¼" Whitworth, socket or tube type required.
9. At this stage the cylinder head will usually be free; if not, tap it lightly with a block of wood in the vicinity of the joint between the head and the cylinder barrel, being careful not to break the fins of the head or the barrel.

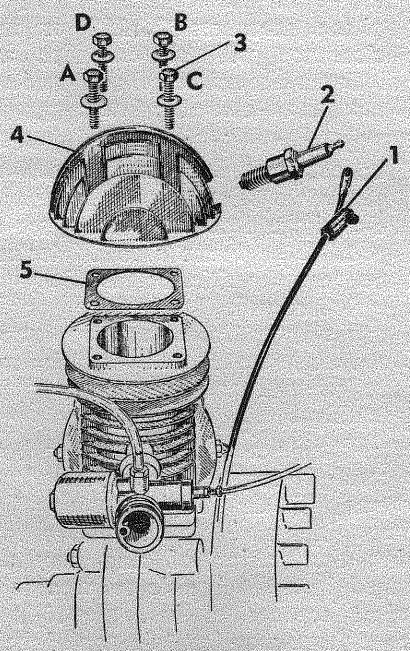


Fig. 2

10. Slacken off the clamp screw and remove the carburettor.
11. (a) If fitted with a bun or torpedo type muffler, loosen the clamp bolt and remove the muffler.
    (b) If fitted with a base plate muffler, remove the stud which holds the exhaust manifold to the cylinder and withdraw the manifold from the base plate.
12. Remove the 4 cylinder base nuts and shakeproof washers (Fig. 3), A. B. C. D. The

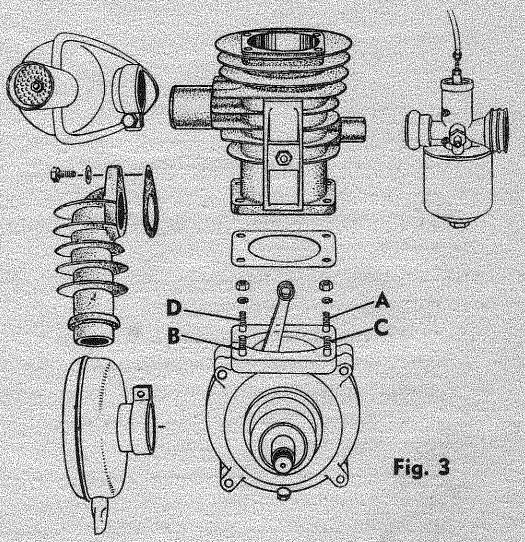


Fig. 3

cylinder should now be free; if not, a light blow on its top end with the palm of the hand will break the lower joint. Gently slide the cylinder off the piston.

13. Remove the nut from the central stud of each port cover; in some cases there is one acorn type nut and one plain; in other, two plain nuts. Be careful to keep the nuts separate from the cylinder base nuts as the thread size is different and they must not be mixed on re-assembly. Tap each port cover sideways at one end to break the joint, and remove. In 1963/64 two-cycle engines, the transfer passages are cast in the cylinder block; there are therefore no separate port covers on these engines.
14. Extract the circlip from each side of the piston with long-nosed pliers. If the engine remains on the base plate, extract the top circlip then pass a thin screwdriver through the gudgeon pin until the point contacts the lug of the lower circlip. Steady the screwdriver with one hand and with a sharp blow of the palm of the other hand, spring the

(Decarbonising and Fitting New Rings—contd.)

circlip out. Push out the gudgeon pin from the piston just far enough to allow the piston to be removed from the connecting rod. If the gudgeon pin cannot be removed by hand pressure, use tool shown in Fig. 4, or

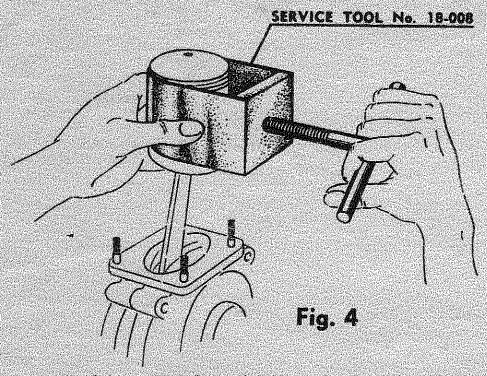


Fig. 4

a suitable punch. If a punch is used, have someone support the opposite side of the piston so that the connecting rod will not be strained or bent. Put a scratch mark inside the piston so that it can be re-fitted the same way round.

15. Piston rings may be removed by either of the following methods:—
   (a) Hold the piston securely on the bench. With the thumbs on the ends of the piston ring press gently apart until it is possible to clear the ring from the piston. (See Fig. 5). Care must be taken not to exert too much pressure or the piston ring may be broken.
   (b) Insert 3 thin strips of metal between the piston and the rings. Insert the strips one at a time and work them around the piston until they are equally spaced. The rings may now be eased up over the strips until they clear the piston (Fig. 5a).

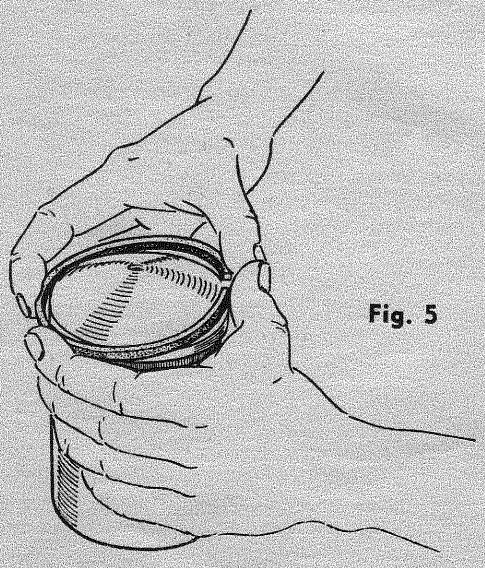


Fig. 5

At this stage it would be advisable to check the clearance between the piston and cylinder bore; if the clearance is excessive, it would be desirable to rebore the cylinder and fit a new oversize piston rather than fit new rings, which might, if the cylinder bore is badly worn, become trapped in the ports and break.

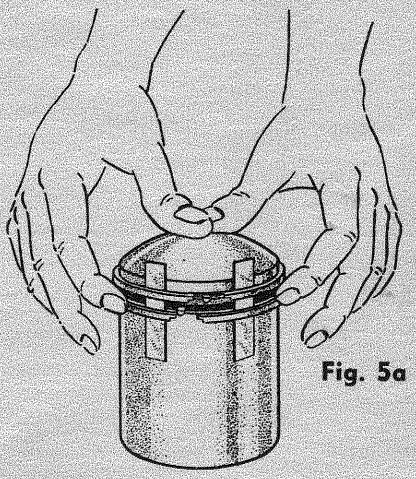


Fig. 5a

The clearance may be checked in two ways:

   (c) With a micrometer, measure the diameter of the piston at the lower end of the skirt, the standard size at this point is 2.120″, giving a clearance of .005″ in the cylinder bore. If the piston measures 2.115″ or less, the clearance will be excessive and the cylinder should be rebored and an oversize piston assembly fitted.
   (d) Place the cylinder lower end up on the bench, and drop the piston without piston rings into it, so that the head of the piston is down. Now see if it is possible to insert a .010″ feeler gauge between the skirt of the piston and the cylinder wall; if this feeler or a larger one will go in, excessive piston clearance is indicated and the cylinder should be rebored and an oversize piston assembly fitted.

16. Before fitting new rings ALL carbon must be carefully removed from the piston ring grooves. To do this, break one of the old piston rings and file the end to a chisel point; the section of ring may then be wedged in a file handle to provide a convenient scraper of just the right width. Scrape the carbon from the top of the piston, being careful not to damage the compara-

(Decarbonising and Fitting New Rings—contd.)

tively soft aluminium alloy. Wash the piston in clean kerosene and dry off with a clean cloth.

17. Check the gap of the new piston rings by placing each ring squarely in the lower, unworn end of the cylinder bore; the gap between the ends of each ring should be not less than .008″ or more than .017″. Carefully file the end of the ring if there is insufficient gap.
18. Assemble the new rings to the piston, using the three thin strips of metal, if necessary, making sure that the cutaway for the ring peg is right way up. The crimped expander ring may be fitted last by feeding it between the ring joint into the lower groove.
19. Remove all carbon from the ports in the cylinder, being careful not to mark the bore. Do not file or alter the shape of the ports, otherwise the efficiency of the cylinder may be destroyed. Clean off all traces of the old gaskets and wash the cylinder in clean kerosene. Treat the port covers in the same way. Use a rule to check whether the port covers are warped; if they are, lap the joint face as per the cylinder head instructions—para. 20. Dry off the parts and refit the port covers to the cylinder, using new gaskets which should be coated on both sides with grease. Be sure that a new fibre washer is fitted on each port cover stud, then a plain washer and the nut. Tighten the nut firmly but not overtight, otherwise the port cover will be distorted.
20. Scrape the carbon out of the cylinder head and all trace of the old gasket from the joint face, taking care not to damage the surface of the aluminium alloy casting.

    If the cylinder head joint face is warped, it may be reconditioned as follows:

    Take a sheet of medium grade emery cloth and lay it on a perfectly flat surface; place the cylinder head face down on the cloth and work it backwards and forwards; keep the head flat down on the cloth and turn it 90° every few strokes. Examine the head at frequent intervals and cease the lapping operation when a clean, flat face has been secured. Wash the head in clean kerosene and dry off.
21. Clean the face of the crankcase and place over the studs the new cylinder base gasket (white); use dry, no oil or grease is required. Oil the small end bush and the gudgeon pin and refit the piston to the connecting rod, using the same care as was called for when dismantling. Carefully install the gudgeon pin circlips in the grooves in the piston. The simplest method to reassemble the piston if the engine remains on the chassis is to first replace the lower gudgeon pin circlip, then offer the piston to the small end of the conrod and push the gudegon pin from the top through the small end of the conrod until it comes to rest on the already installed circlip. Then replace the top circlip.
22. For compressing the piston rings in their grooves while the cylinder is refitted, the use of a piston ring clamp, service tool 18-003, is recommended, but a successful substitute can be made from a clean ½″ wide metal strip. The strip should be 8″ long, put a 90° bend in it ¾″ from each end. There should be a gap of approximately ¼″ between the turned-up ends when the strip is wrapped tightly around the piston skirt.
23. Apply plenty of clean oil to the piston rings and to the bore of the cylinder. Locate the rings so that the gaps are lined up with the pegs in the piston and place the clamp or compression strip over the rings to pull them tightly into the grooves; use a pair of pliers if finger pressure is insufficient (Fig. 6). Slip the cylinder into place and use it to push the clamp or compression strip down off the rings. Place the cylinder on the crankcase studs and fit the 4 shakeproof washers and the nuts. Run the nuts down with the fingers and then tighten each one a little at a time until all are firmly and evenly tensioned; do not overstrain by applying all possible pressure to the spanner.

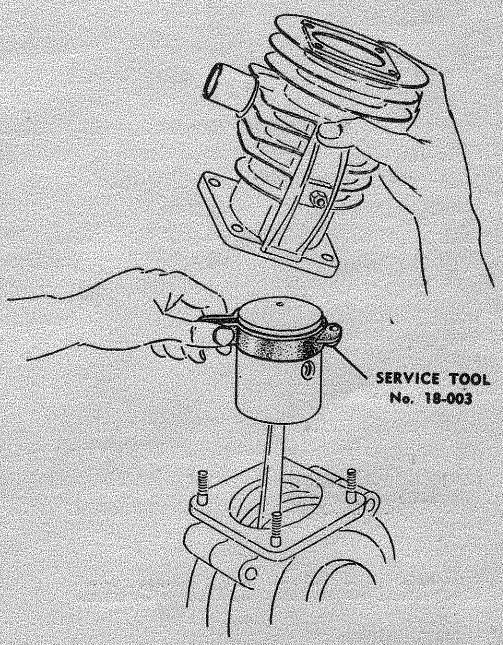


Fig. 6

(Decarbonising and Fitting New Rings—contd.)

24. Lightly smear each side of the new head gasket with grease; use the grease to stick the gasket to the face of the cylinder head. Slip the washers on the cylinder head bolts and the bolts into the head; offer the assembly to the cylinder, enter the bolts and tighten evenly and firmly as with the cylinder base nuts.
25. Clean the spark plug and reset the gap to .025". Reassemble the remainder of the engine in reverse order to that adopted in dismantling.

REMOVING ENGINE FROM CHASSIS.

1. Slacken off clamp screw and remove carburettor.
2. Tip the mower on its left side.

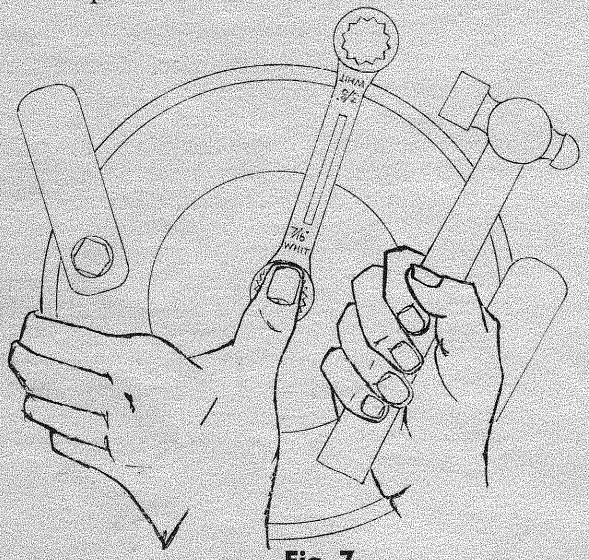


Fig. 7

3. Place a suitable ring spanner over the blade holder nut.
4. Steady the spanner and the blade holder with one hand, tap the handle of the spanner with a hammer (See Fig. 7) and remove nut and blade holder.
   When refitting the blade holder, finally tighten the nut by tapping the spanner with a hammer in the reverse direction.
5. Remove nuts from engine mounting bolts.
6. Set mower back on wheels and lift engine clear of base plate.
7. The taper sleeve may be removed with a sheave puller or, as in Fig. 8, by stretching the taper with a punch. This method works best when the support is something solid, like a heavy piece of steel or a small anvil.

DISMANTLING THE CRANKCASE.

1. Unscrew the four crankcase nuts and remove the crankcase bolts.
2. Tap the side of the crankcase with a hide hammer to break the seal.
3. Hold one half of the crankcase by hand and tap the end of the crankshaft with a hide or copper-faced hammer until the crankcase is removed. Repeat the above process for the other side.
4. It will be noticed that there is no sealing gasket between the crankcase halves, the seal being attained by coating the jointing surfaces with gasket cement on re-assembly. It is essential to make sure that there are no burrs on the matching surfaces. Ensuring a good seal between the crankcase halves is essential for the efficient operation of the motor.

Special precautions need to be observed when reassembling the crankcase seals. Service tools are provided for this operation. The use of these tools is shown in Fig. 8a. The tapered shaft guide is placed in position on the crankshaft, smeared with a light film of oil and the seal pushed on. Place the guide dolly on the shaft and

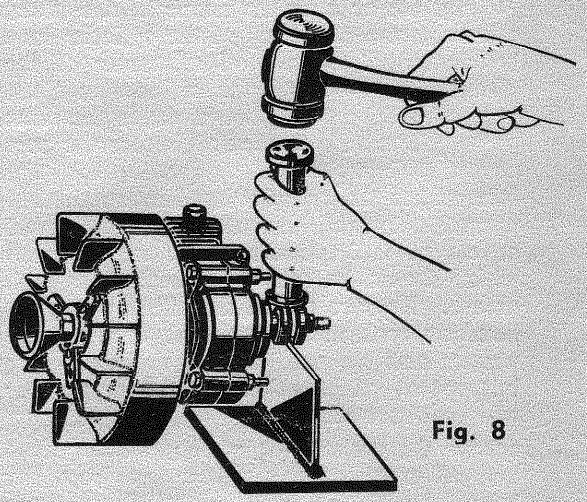


Fig. 8

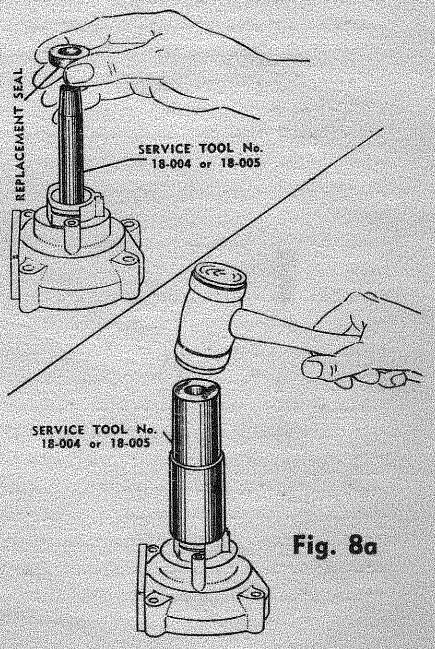


Fig. 8a

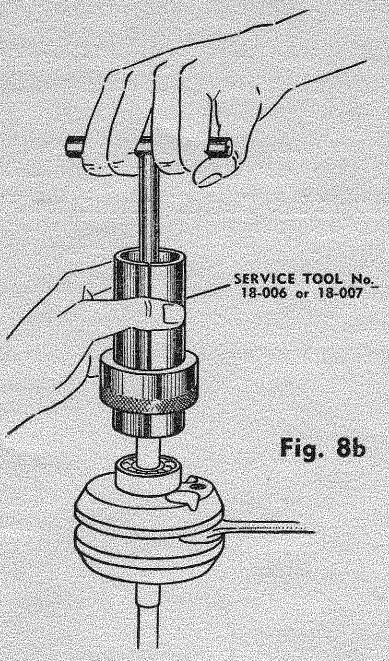


Fig. 8b

tap the seal in position. A separate tool is required for each end of the crankshaft. Should these tools not be available, an alternative method of assembly would be to wrap a piece of shim brass around the shaft to act as a guide over which the seal may be pushed. If there is any lip or shoulder on shaft, remove it with a scraper.

Viceroy, Cadet and Sheerline Models

On these models the top oil seal is located inside the crankcase. For purpose of replacement it is necessary to split the crankcase halves, thus allowing the oil seal to be removed from its housing.

Generally it will be found that the ball bearings will hold on the crankshaft in preference to the crankcase. To remove the bearings in this particular case, it is preferable to use the "Victa" bearing removal tools, consisting of one for the 17 m.m. bearing No. 18-006 and one for the 20 m.m. bearing No. 18-007. The bearing removal tools are made in four pieces. In use, the halves of the tool are placed around the bearing and the ring is slipped over the two halves to hold them in position. The screw is then actuated so that it bears down on the end of the crankshaft; the handle is screwed until the bearing has been removed from the shaft. Reference to Fig. 8b will illustrate the use of these tools. If the tools are not available, bearings may be prised off with two screwdrivers.

DISMANTLING THE CRANKSHAFT.

This operation requires the use of a hydraulic press or screw press in conjunction with a "Victa" crankshaft assembly Jig No. 18-010.

1. Place the spacer plate of the jig between the crankshaft halves, and set the crankshaft and spacer plate on the jig under the press. Place the stepped drift pin so that the small diameter fits the hole in the crankpin. (Reference to Fig. 9a will illustrate the arrangement.) Bring the press ram down so that it bears on top of the stepped drift pin, and apply gradual pressure until the crankpin has been pushed out of the top half of the crankshaft.
2. Remove the connecting rod, rollers and thrust washers.
3. Turn the crankshaft over and repeat Operation 1. This then completes the dismantling of the crankshaft.

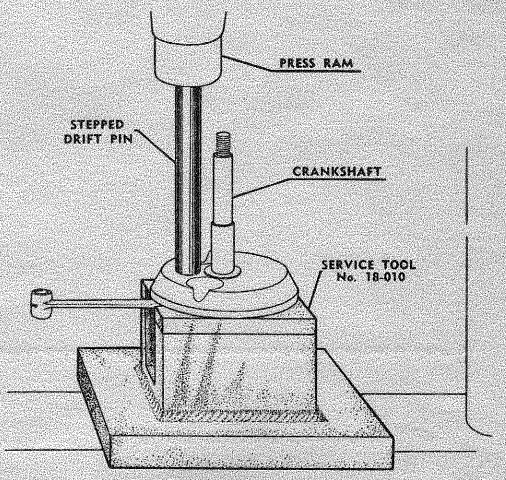


Fig. 9a

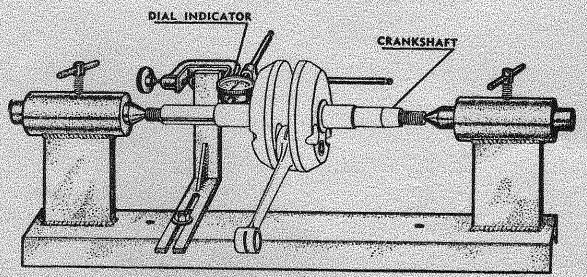


Fig. 9b

ASSEMBLING THE CRANKSHAFT.

1. Place the bottom crankshaft half in the jig with the shaft protruding through the centre hole in such a way that the crankpin hole is out of alignment with the offset hole in the jig. The crankpin is now placed in position and the press ram brought down, so pressing the pin into position.
2. Thrust washers, rollers and connecting rod are then assembled.
3. Place the top half crankshaft in position in jig. The hardened adaptor

block is then placed on the end of the stepped drift pin, set up over the crankpin hole. Bring the press ram down until the two halves have a clearance of not less than .008″ or more than .010″ between the connecting rod and side of crankshaft. The crankshaft assembly at this stage should have an eccentricity not exceding .015″.

4. The assembly is now placed either between centres in a lathe or in an alignment jig as shown in Fig. 9b. With the aid of a dial indicator the crankshaft is brought into final alignment, see Fig. 9b. Maximum tolerance of eccentricity to be not more than .001″. (Total indicator reading.)

Remember! When servicing Victa mowers . .

USE ONLY *Genuine*

VICTA

SPARE PARTS

COMPLETE RANGE AVAILABLE FROM YOUR VICTA BRANCH

FOUR-CYCLE ENGINES

LAUSON LV22B & KIRBY-LAUSON LV30 AND VK30 SERIES

SPECIFICATIONS

	LV22B Series	LV30 and VK30 Series
STROKE	1¾″	1 13/16″
DISPLACEMENT	120 c.c.	125 c.c.

NOTE.—The following specifications are common to the LV22B, LV30 and VK30 Series.

BORE	2.3125″.
TYPE	4-cycle, L-Head, vertical crankshaft, single cylinder.
DIRECTION OF ROTATION	(Viewed from power take-off side) counter-clockwise.
IGNITION	High tension, flywheel type magneto, dust and moisture proof.
SPARK PLUG	Champion J8, 14 m.m. x ⅜″ reach, gap .025″.
LUBRICATION	Forced feed—Full pressure to both crankshaft bearing, top main bearing and connecting rod crank pin bearings. Spillage from crank pin bearing lubricates piston wrist pin and cylinder. Pressure supplied by positive displacement pump running in oil.
CARBURETTOR	Walbro or Zenith.
AIR CLEANER	Estafoam washable.
GOVERNOR	Efficient mechanical type to ensure positive control of engine speed.
CYLINDER	Aluminium alloy die casting with alloy cast iron sleeve.
CYLINDER HEAD	Aluminium alloy.
TOP MAIN BEARING	Pressure lubricated aluminium alloy.
LOWER MAIN BEARING	Aluminium alloy, extra long.
CRANKSHAFT	Arma steel or steel forging, heat treated for maximum strength, drilled for pressure lubrication. End float .007″-.027″.
CONNECTING ROD	Aluminium alloy.
PISTON	Special aluminium alloy heat treated. Size 2.308″.
PISTON RINGS	2 compression 2 5/16″ x 3/32″, 1 oil control ring 2 5/16″ x ⅛″.
VALVE GUIDES	Cast iron, both intake and exhaust.
VALVE SEATS	High temperature dual valve seat insert cast integrally in cylinder.
TAPPET CLEARANCE	.008″ inlet, .010″ exhaust.
INTAKE VALVE	Alloy steel, heat treated.
EXHAUST VALVE	Diachrome alloy steel.
FUEL STRAINER	Screen.
STARTER	Impulse.
OIL CAPACITY	Approx. 1 Pint.
FUEL TANK CAPACITY	Approx. 1 quart.

FOUR-CYCLE ENGINES

BASIC FOUR-CYCLE ENGINE OPERATION

Theory of Operation.

GENERAL. To properly service the four-cycle engines (Fig. F1), a thorough understanding of basic engine operation is essential.

(a) In the operation of the four-cycle engine there are two revolutions of the crankshaft for each power cycle. The power cycle consists of the intake stroke, compression stroke, power stroke, and exhaust stroke.

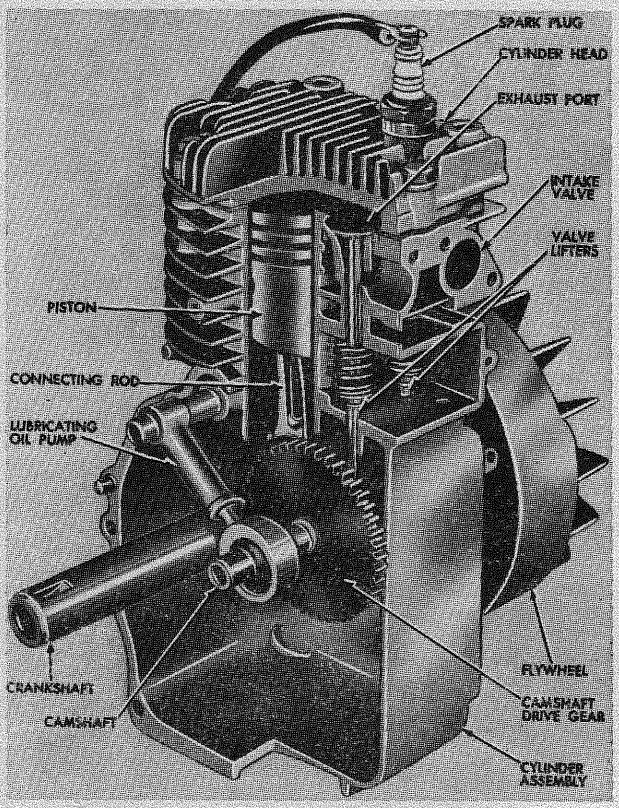


Figure F-1. Four-Cycle Engine, Cutaway Model

(b) The intake stroke (A, Fig. F2) occurs during the downward movement of the piston. The exhaust valve is closed and the intake valve is open. As the piston moves down, a partial vacuum is created in the combustion chamber. To fill this vacuum, air flows through the carburettor where it becomes mixed with fuel, and the fuel-air mixture flows into the cylinder.

(c) During the compression or second stroke (B, Fig. F2), both the intake and exhaust valves are closed, and the fuel-air mixture is trapped in the cylinder. As the piston moves up the cylinder, the trapped mixture is compressed between the cylinder head and the top of the piston. As the piston nears the end of its stroke, the compression heats the mixture preparatory to igniting.

(d) The third, or power, stroke (C, Fig. F2) occurs as the piston approaches top-dead-centre and the fuel-air mixture is ignited by the ignition spark. The igniting of the fuel-air mixture causes the gases to expand, releasing energy that is transferred to the piston and through the connecting rod to the crankshaft. Both valves remain closed during this stroke so that the full impact of expanding gases is directed to the piston. The fit of valves to seats must be tight to prevent burning gases from leaking past valves. The flywheel provides torque for the three strokes that occur before the next power stroke.

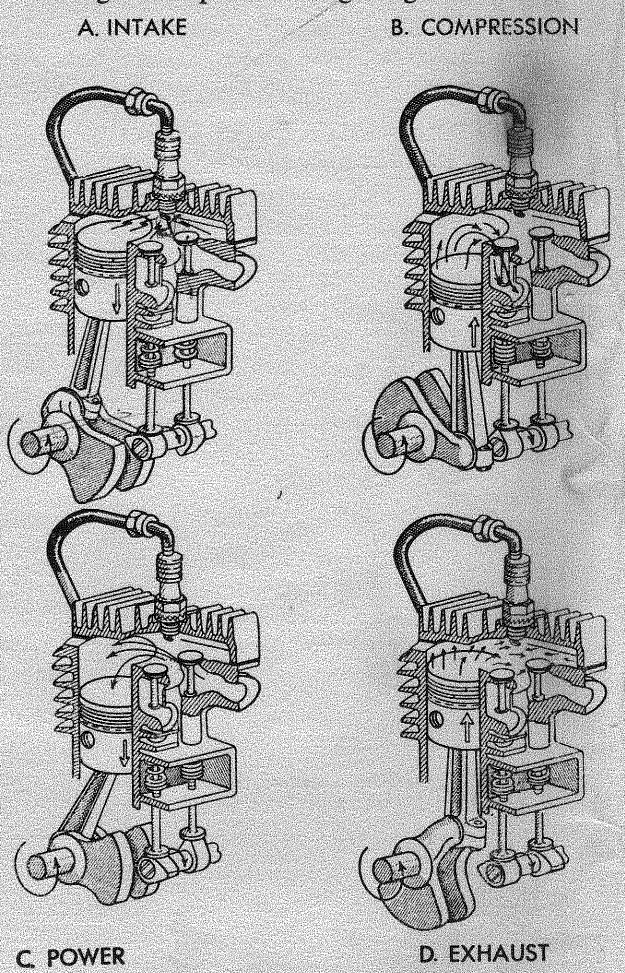


Figure F-2. Four-Cycle Engine Operation

(e) The fourth, or exhaust, stroke (D, Fig. F2) occurs as the piston moves into the cylinder immediately after the power stroke. During the exhaust stroke the exhaust valve is open and as the piston moves up the cylinder, exhaust gases and other by-products of combustion are forced from the cylinder and through the muffler.

(Theory of Operation—contd.)

(f) The valves are operated by a camshaft (Fig. F1). The camshaft is driven by the crankshaft at a 1-2 ratio. The cams are positioned on the camshaft in such a manner that they force the associated valve open at the correct instant for proper engine operation. The valves are closed by spring pressure as the high portion of the cam moves past the valve lifters.

PRE-OVERHAUL CHECK OF FOUR-STROKE ENGINES

A thorough check of four-stroke engines before overhaul will frequently show up the cause of improper operation. If a check of carburation and ignition indicates no faulty operation (see magneto and carburettor sections) check the following:—

(a) Remove the spark plug and insert a compression gauge into spark plug port. Crank engine with starter and check compression reading on gauge. Compression should be no less than 100-110 lb. P.S.I.

(b) If a compression gauge is not available, disconnect the spark plug lead to ensure that engine will not start, and turn the engine in direction of normal rotation by means of the blade holder. There should be considerable resistance to turning as the piston approaches top dead centre on the compresion stroke. Hold the piston against compression for several seconds. If resistance to turning rapidly decreases, it indicates poor compression. Poor compression is usually the result of one or more of the following:—

(1) Defective head gasket.
(2) Warped head.
(3) Burned valves.
(4) Carbon accumulation on valves.
(5) Worn piston rings.
(6) Worn cylinder bore.
(7) Weak or broken valve springs.
(8) Improper clearance between valve lifter and valve stem.
(9) Ring gaps not staggered around the piston.

(c) Crank the engine slowly, checking for noise, binding, scraping or other signs of improper operation. These symptoms could be due to damaged bearings, connecting rod, valves, or to a bent crankshaft.

(d) Rock the crankshaft back and forth to check for excessive play. Excessive play indicates worn rod bearings or a worn piston pin.

(e) Check the oil seals for evidence of oil leaks; replace the seals if necessary.

(f) Remove the two screws and lock washers that hold the valve spring cover assembly and crankcase breather assembly to the crankcase; remove cover and breather. Check the valve lifter clearance as shown in Fig. F12. Make sure that clearance is checked whilst piston is on either compression or power stroke so that cams on camshaft are free of the valve lifters. This check should be made when the engine is cold. Valve lifter clearance adjustment is described on page F8.

CAMSHAFT AND CRANKSHAFT REMOVAL AND REASSEMBLY

(a) Remove camshaft and crankshaft as follows:

1. Remove fuel tank, flywheel, and magneto from engine.
2. Clean all rust from mainshaft with fine emery cloth before removing flange. Remove mounting flange. Check oil seal for wear or damage.

   To replace, remove the original seal as in Fig. F3.

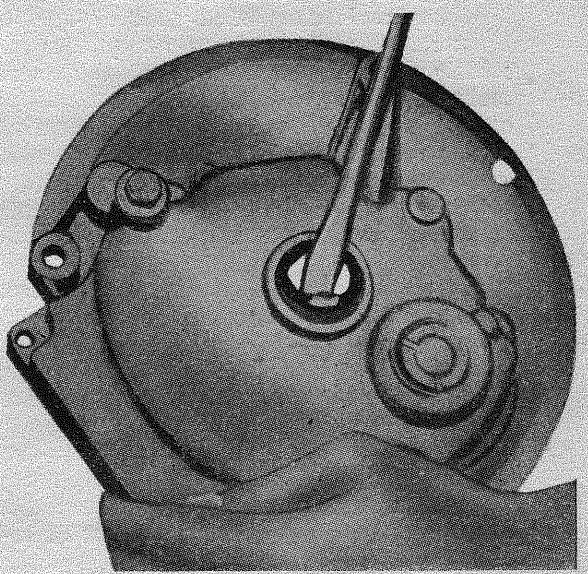


Fig. F-3. Removing the Oil Seal from the Mounting Flange

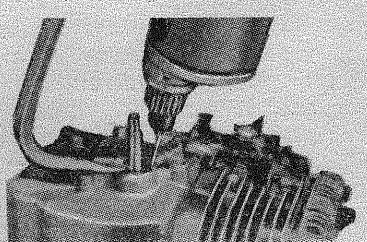


Fig. F-4. To remove the oil seal on the magneto end drill two holes in the seal, insert self-tapping sheet metal screws and draw out the seal with a claw hammer or other suitable tool. To install new seal, simply drive into place with seal driver.

(Camshaft and Crankshaft Removal and Reassembly—contd.)

Lay mounting flange on a flat surface and position a new oil seal squarely in oil seal seat. Drive seal to bottom of seat using a suitable drift, making sure the seal is squarely and completely seated.

When refitting the flange, wrap friction tape over the keyway or use a seal fitting sleeve to protect seal, liberally lubricate the seal and shaft.

3. Remove barrel type oil pump.
4. Rotate crankshaft until timing marks on crankshaft gear and camshaft gear are aligned (Fig. F5). This will relieve all pressure between camshaft lobes and valve lifters. Remove camshaft.
5. Bend back locking strip and remove connecting rod bolts; remove connecting rod cap. Rotate crankshaft and remove from cylinder.
6. The magneto end oil seal may be removed and replaced without completely dismantling the engine. Proceed as in Fig. F4.

   If engine is dismantled proceed as follows: Remove oil seal from the cylinder assembly with a screwdriver, in the same manner as bottom seal was removed. Be careful not to damage top main bearing during removal. Re-install a new seal **after** crankshaft is positioned in cylinder (see below).

(b) Clean and inspect crankshaft and camshaft as follows:

1. Wash crankshaft and camshaft in solvent. Blow the solvent from all oil passages with compressed air.
2. Check camshaft for scored or worn bearing surfaces. If surfaces are scored, replace camshaft.
3. Check threaded ends of crankshaft for worn or damaged threads. Damaged threads can sometimes be redressed with a thread die. Replace crankshaft if threads cannot be redressed.
4. Examine crankshaft taper and keyways. If taper is rusty, it indicates a loose flywheel. Polish taper with fine emery cloth. If keyways are damaged, replace crankshaft.
5. Check all bearing surfaces of crankshaft for scoring or wear. Replace crankshaft if scoring or wear is excessive.
6. Check crankshaft gear for wear, broken teeth, or loose mounting on crankshaft. If gear is damaged, remove from crankshaft with an arbor press. To replace gear, press gear onto shaft with arbor press. Make sure gear is installed with timing mark facing power take-off end of shaft.
7. Replacement crankshafts are supplied with gear, factory installed.

(c) Install crankshaft and camshaft as follows:

1. Lubricate bearing surfaces of crankshaft and position it in cylinder block so that tapered end of shaft extends through bearing in cylinder.
2. Install connecting rod as outlined in paragraph 6, page F6.
3. Lubricate bearing surfaces of camshaft and install camshaft in cylinder, making sure match marks on camshaft gear are aligned with match marks on crankshaft gear (Fig. F5). This will aid reassembly by relieving pressure between camshaft lobes and valve lifters, as well as providing correct timing for valves in relation to crankshaft.
4. Install barrel type oil pump. (See para. 9, page F6).
5. Install mounting flange.
6. Install crankshaft oil seal in cylinder. To install seal, position sleeve tool on end of crankshaft. Slide oil seal over sleeve tool, then, with sleeve tool still in place, drive oil seal in place with oil seal driver so that oil seal is squarely positioned in bottom of oil seal seat. Remove driver and sleeve tool.
7. Install magneto, flywheel, and fuel tank on engine.

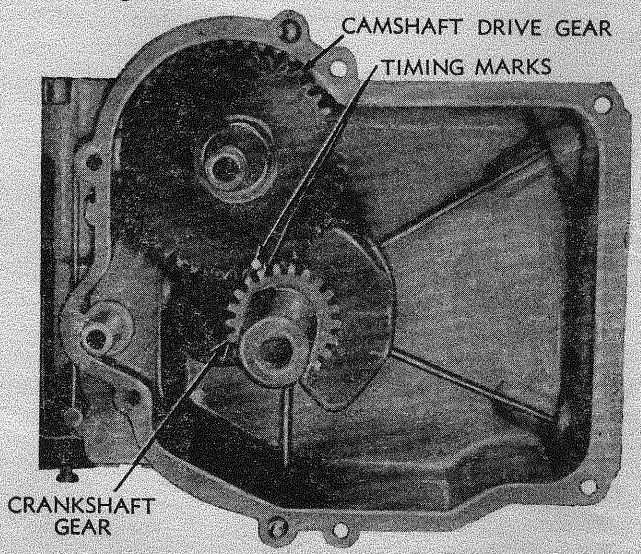


Fig. F-5. Timing Marks on Camshaft and Crankshaft Gears Aligned.

PISTON AND CONNECTING ROD REMOVAL AND REASSEMBLY

(a) Remove piston, piston rings, and connecting rod as follows:

1. Remove cylinder head and scrape any carbon from upper cylinder bore and head.
2. Remove mounting flange and remove barrel type oil pump.
3. Rotate crankshaft until crankshaft and camshaft timing marks are aligned. Remove camshaft.

(Piston and Connecting Rod Removal and Reassembly—contd.)

4. Bend back locking strip and remove connecting rod bolts; remove rod cap from connecting rod.
5. Push assembled connecting rod and piston assembly out of cylinder.
6. Remove three piston rings. The two compression rings have a $\frac{1}{32}''$ step cut in the internal bore. The step goes to the top. The top and middle ring are identical, with top ring acting as a compression ring and the middle ring acting as a scraper ring. The perforated bottom ring is an oil ring. Lay rings aside in order removed for easy identification.
7. Remove circlips from piston with long-nosed pliers. Remove piston pin to separate piston and connecting rod.

(b) Clean and inspect piston, piston rings, and connecting rod as follows:

1. Wash all parts in solvent. Use particular care to remove all carbon from ring lands and grooves of piston. This can easily be done with dressed end of old ring.
2. Check cylinder bore diameter with an accurate micrometer. If it is worn more than .005″ cylinder will have to be rebored and oversize piston and rings will be required.
3. If cylinder is within dimension limits, insert each ring, in turn, into cylinder bore. Insert the piston into the cylinder bore to make sure the piston ring is squarely in the bore (Fig. F6). Measure ring gap with a feeler gauge (Fig. F7). If ring gap is greater than .020″, replace rings.

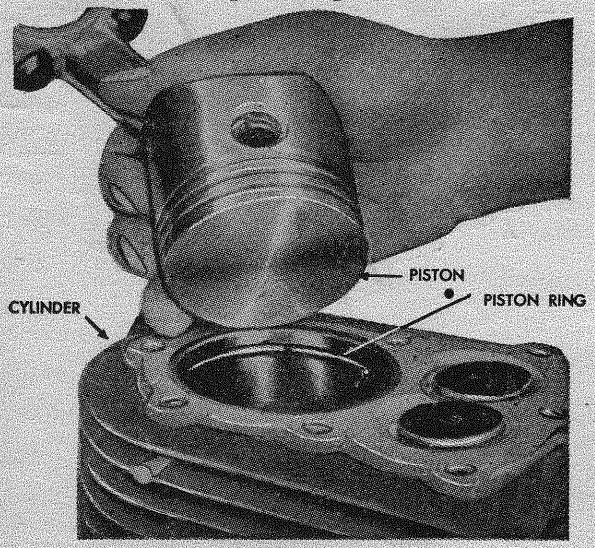


Fig. F-6. Squaring Piston Ring in Cylinder Bore.

NOTE: Rings must always be replaced in sets, never singly. Because of the low cost of rings, it is advisable to replace rings whenever the engine is dismantled.

4. Inspect piston for wear or scoring. If it is scored, or worn, piston and pin assembly should be replaced. (See para. 3).

   NOTE: The piston and piston pin can be replaced only in matched pairs. If either is worn or damaged, both must be replaced.
5. Insert piston pin in piston and check for play. If excessive play exists, replace piston and pin.

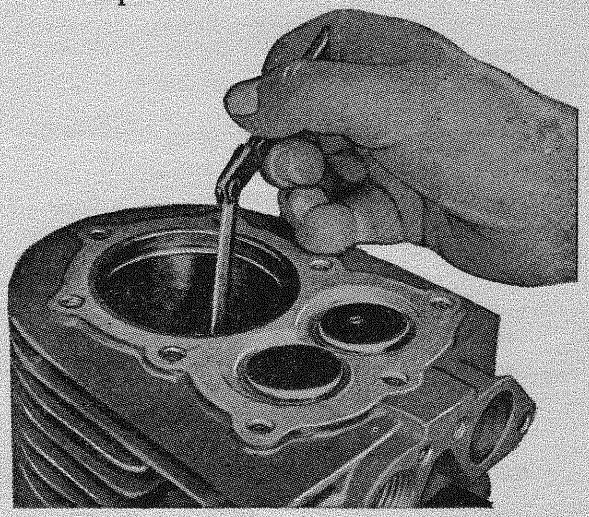


Fig. F-7. Measuring Ring Gap.

6. Check connecting rod bearings for wear and scoring. Check bearing on piston end of rod by inserting piston pin in bearing. It should be a snug fit. Check diameter of crankshaft end of rod by installing rod cap and securely tightening bolts. The match marks (Fig. F8) on connecting rod and cap must be properly aligned. Visually check connecting rod shank for signs of cracking or distortion. If connecting rod is worn or damaged, replace connecting rod and cap.

(c) Install piston, piston rings, and connecting rod as follows:

1. Position piston on connecting rod. Coat piston pin with oil and insert piston pin into piston and rod, secure in place by installing a circlip at each end.
2. Install piston rings on piston. Make sure the step identifying top of ring is up. Stagger ring gaps around piston to prevent compression loss.
3. Before using new rings in a cylinder that has not been rebored, wipe cylinder wall with fine emery cloth to break glaze. This will aid proper seating of rings. Clean inside of cylinder wall thoroughly with solvent and allow to dry.
4. Coat inside of cylinder wall with oil to facilitate insertion of piston and ring assembly. This ensures lubrication when starting

(Piston and Connecting Rod Removal and Reassembly—contd.)

engine after overhaul.

5. Use a ring compression tool for easy insertion of piston in cylinder.
6. Coat connecting rod journal with oil and position end of connecting rod on connecting rod journal of crankshaft. Position rod cap on connecting rod so that match marks on rod and cap are aligned. Secure rod and cap to journal with two bolts, washers, and new self-locking nuts, LV22 model; two bolts and locking strip, LV30 and VK30 models.

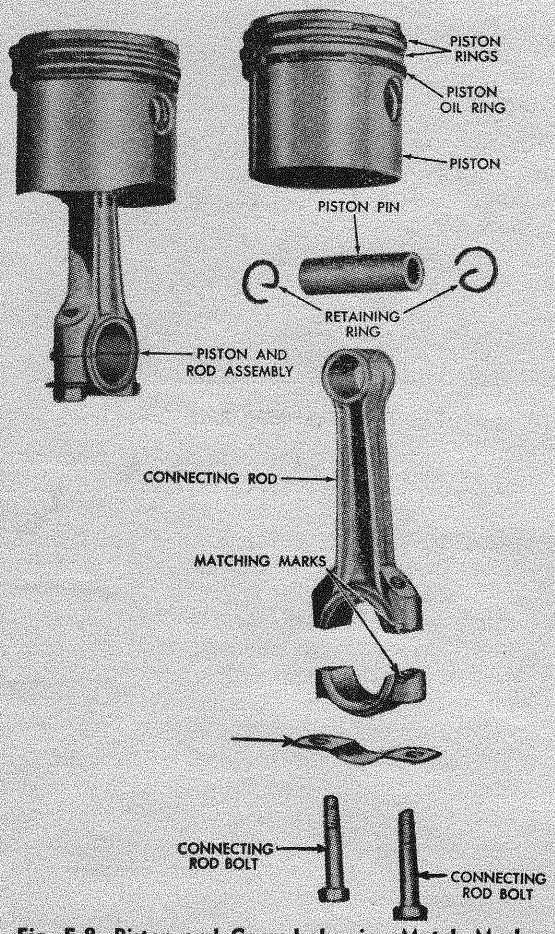


Fig. F-8. Piston and Conrod showing Match Marks.

7. Tighten connecting rod nuts or bolts securely and evenly (refer to the Table of Torque Limits, (as under).
8. Install camshaft, making sure match marks on crankshaft gear and camshaft gear are aligned. See Valve Timing, Fig. F5.
9. Install barrel type oil pump and mounting flange. Lubricate eccentric on camshaft. Position bearing end of barrel on camshaft. If the oil pump has a chamfer only on one side, that side must be placed towards the camshaft gear and the ball end of the plunger placed so that it will enter the recess in the mounting flange.
10. Check cylinder head for cracks, broken cooling fins, or other damage. Lay cylinder head on flat surface to check for distortion or warping. Replace damaged cylinder head. Install cylinder head, using a new gasket, tightening head bolts in sequence shown in Fig. F9. Tighten bolts to torque indicated in Table of Torque Limits (as under).

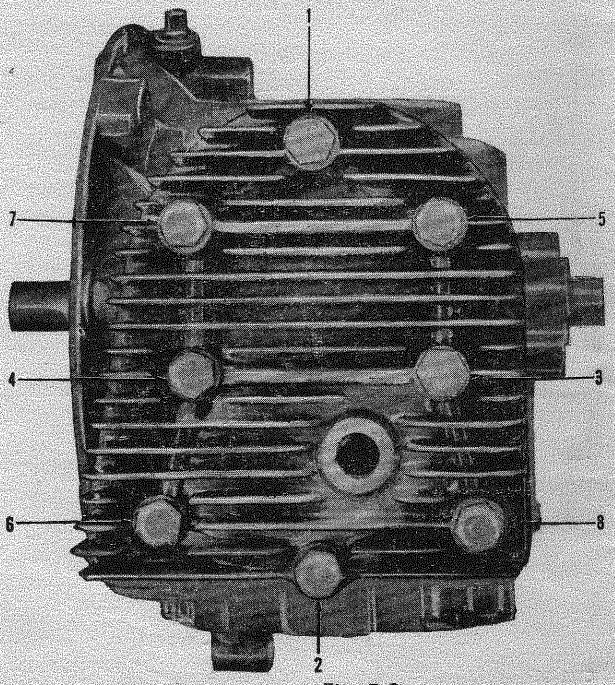


Fig. F-9.

TORQUE INFORMATION

Connecting rod bolts	1/4″—28 T.P.I.	Torque	7-9 ft. lb.
Cylinder head bolts	5/16″—18 T.P.I.	Torque	14-16 ft. lb.
Engine base to cylinder	1/4″—20 T.P.I.	Torque	6-8 ft. lb.
Flywheel nut	7/16″—20 T.P.I.	Torque	24-26 ft. lb.

BARREL TYPE LUBRICATION PUMP SYSTEM

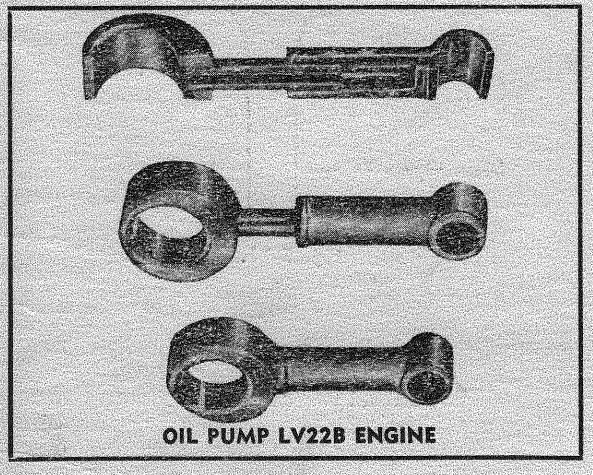
(See Page F6 para. 9, for installation instructions)

(a) The barrel type lubrication pump is driven by an eccentric on the camshaft. Lubricating oil is drawn by the pump through the hollow camshaft that extends into the oil sump in the engine base. This occurs when the pump is making its intake stroke. During this time the passage through the camshaft to the sump is aligned with the pump opening.

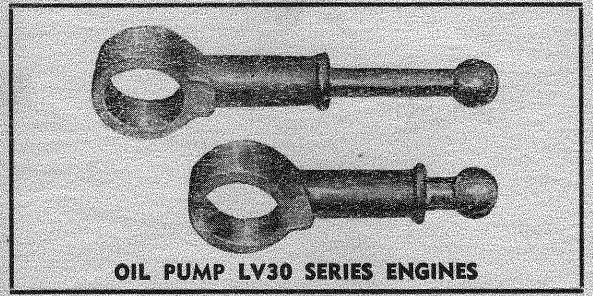
(b) As the camshaft continues to rotate, the eccentric causes the pump to start its pressure stroke, during which time the plunger is driven down into the pump body, forcing out the oil. At this time the other port in the camshaft is aligned with the pump and the oil is directed through the drilled camshaft passage to the other end of the camshaft.

(c) At the end of the camshaft opposite the pump, the oil is forced through a crankcase passage to the top main bearing oil groove. The drilled crankshaft passage is aligned with the top main bearing oil groove, and oil is directed through this passage to the crankshaft connecting rod journal. Spillage from the connecting rod lubricates the cylinder walls, and normal splash lubricates the other internal parts of the engine.

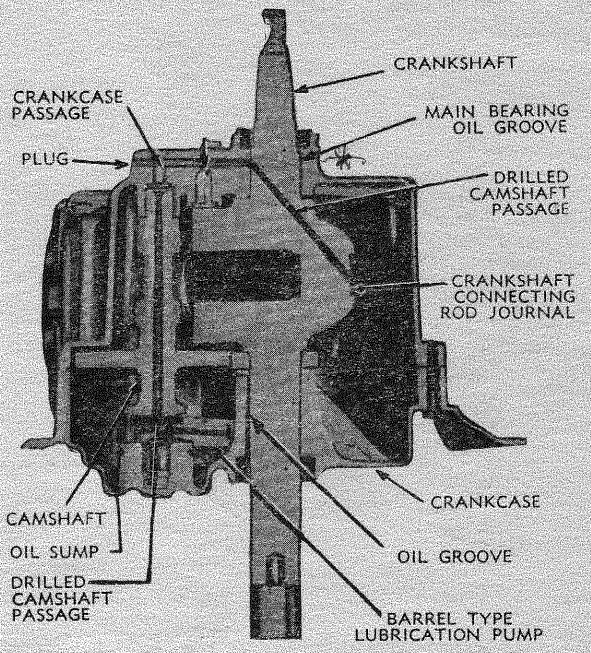
(d) The bottom bearing receives its lubrication through a long and deep oil groove in the bearing. This constant lubrication of the working parts of the engines ensures that the engine will be able to handle heavy loads for extended periods of time without danger of bearing damage.



OIL PUMP LV22B ENGINE



OIL PUMP LV30 SERIES ENGINES



LUBRICATION SYSTEM

VALVES

1. Valves are set at the factory to provide an operating clearance between the end of the push rod and the valve stem of .008" intake and .010" exhaust.
   If the engine is operated under extremely dusty conditions, wear on the valve seats will sometimes reduce the clearance to a point where valve life will be shortened.
2. To check tappet clearance, remove the tappet case and breather cover and measure the tappet clearance with a feeler gauge. When taking this measurement, make certain the tappet is at its widest position by rotating the engine until the tappet rests on the heel of the cam.
3. If the clearance is too wide, it indicates that the valves are slightly warped or that the valve seats and valve faces are heavily oxidised, holding the valves slightly off their seats.
4. If the clearance is too close, it indicates that considerable wear has taken place at the valve seat and allowed the valve to drop.
5. In either case, it will be necessary to remove the valves for complete servicing.

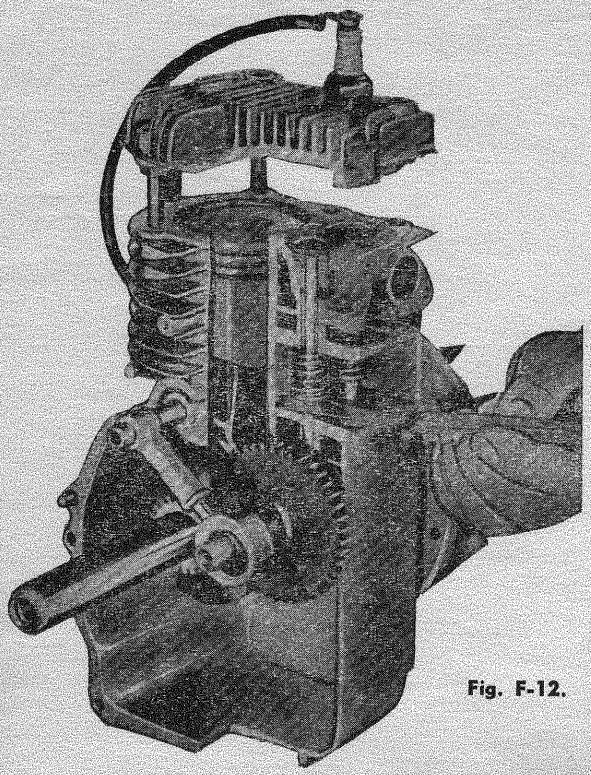


Fig. F-12.

VALVE GRINDING AND REPLACEMENT

Valves and valve seats can be reground with a minimum of engine disassembly. Broken valve spring, see item 4.

(a) Remove valves as follows:—

(1) Remove fuel tank, carburettor, muffler and cylinder head from engine.

(2) Remove two screws that hold breather cover to crankcase; remove breather cover and breather assembly.

(3) Raise lower valve spring caps with blade of screwdriver while holding valve heads tightly against valve seat. Remove valve spring cap keeper from valve with long-nosed pliers.

(4) Broken valve spring.
It is not necessary to remove the cylinder head to replace a broken valve spring, either valve can be held on its seat with a screwdriver inserted through the spark plug hole, the broken spring can then be dealt with as in valve spring removal, paragraph 3 above.

(5) Lift valves from cylinder block. Remove valves, spring and valve spring caps from crankcase.

(b) Clean all parts with solvent, carefully removing all carbon from valves.

(c) Check valve springs for compression and pitting. If valve springs are less than $\frac{15}{16}$" long or are pitted, replace them.

(d) Carefully inspect valves for distortion or other damage. If valves are in usable condition, place them in a valve refacing machine and grind valve faces to the angle given (Fig. F11).
If valve faces are ground to less than $\frac{1}{32}$", replace valves.

(e) Carefully check valve seats for cracks or pitting. Valve seats are permanently installed and are not removable. If the valve seat is warped or distorted, crankcase must be replaced.

(f) Lapping in valves is necessary whenever new or reground valves are installed to ensure a gas-tight fit. Lap in valves as follows:—

(1) Coat valve sparingly with a fine grade of valve grinding compound, and using a vacuum cup valve grinder to grip top of valve, rotate valve in circular motion on valve seat.

SPECIFICATION OF VALVE SEAT

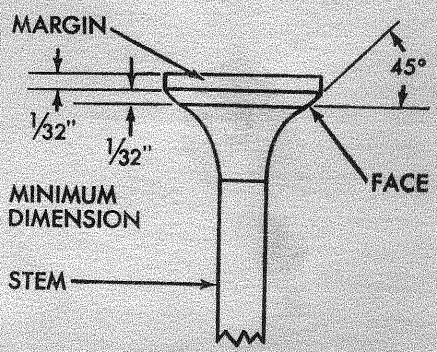


Fig. F-11.

CAUTION

The exhaust valve and the intake valve are not identical. The exhaust valve, subject to the high exhaust heat, is diachrome alloy steel and is marked with an "EX" to identify it. Make sure this valve is lapped and assembled to the exhaust port.

(2) Lift valve from seat every eight or ten strokes to keep compound equalised on surface of valve seat.

(3) Continue valve lapping operation until a smooth surface is attained on both valve and seat.

(4) When a good surface is attained, wash all parts with solvent to remove all traces of lapping compound; dry parts thoroughly.

(g) Valve grinding changes the valve lifter clearance. After grinding valves, check valve lifter clearance as follows:—

(1) Rotate crankshaft until cams on camshaft are out of engagement with valve lifters.

(2) Insert valves in their guides and hold valves firmly on seats.

(3) Check clearance between bottom of each valve stem and its valve lifter with feeler gauge, Fig. F12.
The clearance should be .008″ inlet and .010″ exhaust. Grind off valve stem in a valve resurfacing machine set to grind a perfectly square face. Grind stem until proper clearance is attained.

(h) Install valves as follows:—

(1) Position valve spring and upper and lower valve spring caps under valve guide for valve being installed.

(2) Lubricate valve stem and install valve in its valve guide, making sure that valve marked "EX" is inserted in exhaust port. The valve stem must pass through the valve spring and the valve spring caps.

(3) Insert blade of screwdriver under lower valve spring cap and prise spring up.

(4) Insert valve keeper into groove in valve stem with long-nosed pliers. Make sure valve keeper is properly seated under lower valve spring cap.

(i) Refit cylinder head as in Paragraph 10, page F6.

(j) Install carburettor, muffler and fuel tank.

GOVERNOR SETTING

ZENITH CARBURETTOR

Remove the air filter from the carburettor.

It is not necessary to remove the engine cowl or the control cover. They have been removed from the engine in Fig. F13, for the sake of clarity.

1. Tighten screw No. 1.
2. Loosen screw No. 2.
3. Press anti-clockwise on A at C. Hold firmly in place.
4. Move lever B anti-clockwise until throttle is wide open.
5. Tighten screw No. 2.

Open Position.

Check the operation of the throttle spindle by moving the governor lever "B" back and forward with the fingers.

While this is being done, take note of the two down-turned lugs on the throttle spindle flange. When the governor lever "B" is at its anti-clockwise extremity of movement, the smallest of the two lugs should contact the rib on top of the carburettor body.

This is the wide open position.

When the governor lever "B" is moved to its clockwise extremity the largest of the two lugs should contact the point of the idle speed adjusting screw.

When the engine is at rest the throttle spindle should move to the full open position under the action of the light governor spring. If it does not, check for a tight spindle or stiffness in the linkage.

Do not confuse the throttle spindle with the throttle control lever on top of the inlet manifold, adjacent to the carburettor flange.

This control lever should be set in the normal run position while the above adjustments are made.

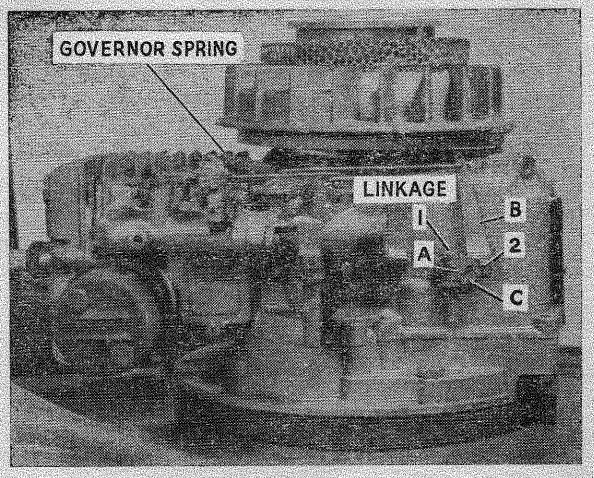


Fig. F-13.



VICTA "CLEARVIEW" PACKAGING

FOR DISPLAY, EASY IDENTIFICATION, AND PROTECTION

FUNCTION OF THE MAGNETO

The magneto is actually a small dynamo so constructed that electricity is generated at a very high voltage. The magneto is connected to the spark plug by the high tension lead and at appropriate times (which are controlled by the operation of the cam and the breaker points) a spark producing high voltage current appears across the gap in the plug. There are three main components in the magneto; the stator plate on which is mounted the coil, condenser and breaker points — the flywheel which carries the magnet and pole pieces — the cam which separates the breaker points once every revolution.

The Ignition Coil, in which the high voltage current is built up, consists of two separate coils The coil closest to the core consists of a relatively small number of turns of heavy gauge copper wire and is known as a primary coil. One end of this coil is connected to the frame of the magneto and the other end is connected to one side of the breaker points. Wound over the primary coil, but insulated from it, are many turns of very fine gauge copper wire which make up the secondary coil. One end of this coil goes to the frame of the magneto while the other end goes to the spark plug via the high tension lead. The other side of the breaker points referred to in the primary coil information, is connected to the frame.

When the breaker points are closed, i.e., are in contact with one another, and the magnet in the flywheel passes the coil, current flows in the primary winding. When this primary current is interrupted by the opening of the breaker points, a very high voltage current is induced in the secondary winding and this is the current which, connected to the spark plug, causes a spark to jump across the points of the plug.

The Condenser: The function of the condenser is to prevent sparking at the breaker points when they are opened. No magneto will function correctly if the condenser is faulty or does not make good electrical contact at its connections. Therefore, when servicing a magneto ensure that the condenser mounting screw or screws and the lead from the breaker points make clean and tight connections.

Testing the Condenser: The condenser should be tested on an automotive tester of reputable manufacture. Its capacity should be within the limits set down in the magneto specifications, page M2 for two-strokes, page M4 for four-strokes.

Testing the Ignition Coil: Always check that the screws in the stator plate are tight, as loose connections will result in a weak and erratic spark. The coil should be tested on a meter specially designed for magneto ignition coils. Auto-Lab Industries Pty. Ltd. (Sydney) make a tester especially designed for the Wico Pacy and Victa magnetos. If the tester being used operates from a 6 volt battery, care should be taken that the battery is always in good order, as unless full voltage is applied an incorrect result will be achieved. A good coil should be kept on hand to provide a reference so that at any time the testing meter may be checked.

The Contact Breaker: This is the name given to the mechanism which breaks the circuit in the primary winding. It consists of a fixed point, and a moving point mounted on a breaker arm. One end of the breaker arm makes contact with the cam to operate the contact points. The cam is relieved to ensure that the breaker arm is not touching the cam face whilst the contact points are closed. The adjustable point is fixed to a bracket pivotted in the centre and secured to the stator plate by two screws.

VICTA MAGNETO

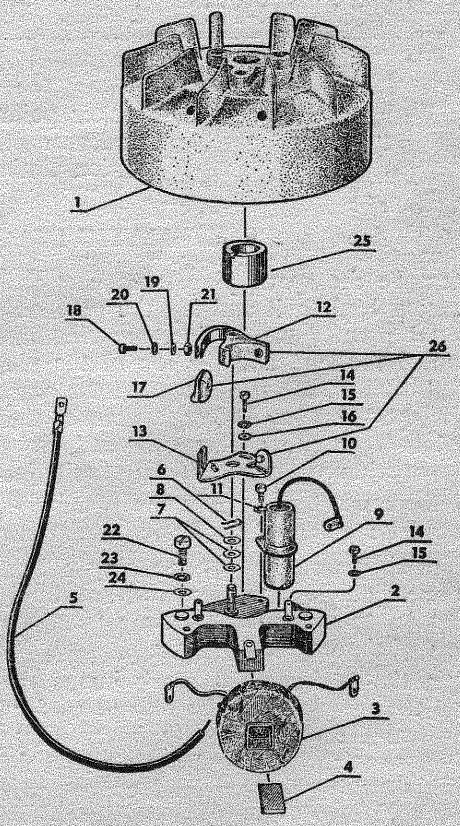


Fig. M1

(See overleaf for breakdown of parts)

FLYWHEEL MAGNETO

VICTA MAGNETO ASSEMBLY (TWO-CYCLE ENGINES)

ILLUST. No.	PART No.	QTY.	PART DESCRIPTION
	5C	1	Magneto assembly comprising the following:—
1	5-101	1	5½" dia. flywheel assembly.
2	5-144	1	Stator plate assembly complete.
2	5-149	1	Stator plate and E core lamination stack assy.
3	5-118	1	Coil.
4	5-120	2	Coil wedges.
5	5-175	1	High tension lead.
6	5-126	1	Condenser.
7	N20-026	1	Condenser mounting screw.
8	B23-162	1	Condenser mounting S/P washers.
10	5-158	1	Contact breaker.
12	N20-026	2	Fixed point carrier screw.
13	N22-082	2	Fixed point carrier flat washer.
15	5-152	1	Pivot pin spring clip.
16	5-168	1	Bearing post washer.
17	5-164	1	Spring mounting screw.
18	5-165	1	Spring mounting washer.
19	23-285	1	Spring mounting S/P washer.
20	20-005	2	Stator plate mounting screws.
21	B23-163	2	Stator plate mounting S/P washers.
22	N22-043	2	Stator plate mounting washer.
23	5-148	1	Magneto cam.

SPECIFICATIONS

Breaker point setting ..... .020".
Condenser capacity ..... 1.65-1.8 MFD.
Ignition timing ..... ⅛" Before top dead centre.

SYSTEMATIC DIAGNOSIS OF MAGNETO TROUBLE

1. Remove the spark plug, reconnect the high tension lead to it and lay the plug on some metal part of the engine, ensuring that the end of the lead and the top of the plug are well clear of the metal so that the current is not shorted away before it reaches the plug points. Spin the engine over and observe if a spark jumps the gap at the plug points.

   If there is a good spark the ignition system could be regarded as proved satisfactory.

2. If there is no spark at the plug points, disconnect the high tension lead and hold it so that its terminal is ⅛" away from a metal part of the engine.

   Spin the engine—if a spark jumps the ⅛" gap the magneto will be proved as functioning and the spark plug as faulty. Clean the plug, reset the gap and again make the test with the high tension lead connected to it.

   If there is still no spark at the points, replace the plug.

   Going back to the test from the terminal of the high tension lead across the ⅛" gap, if there is no spark at this stage proceed to check the magneto as in section 3.

   One ignition trouble which could be present but not proved at this point is faulty timing. However, this is an unusual trouble and in making a rapid diagnosis, the timing could be left for subsequent checking, if the preliminary systematic examination fails to unearth the trouble.

3. Remove the magneto flywheel, clean and adjust the breaker points. Ensure that all the connections are clean and tight, that none of the leads are broken and that they do not rub on the flywheel.

   Temporarily replace the flywheel and test whether a spark is obtainable at the terminal of the high tension lead. If there is a spark the magneto can be regarded as satisfactory; if there is no spark, remove the flywheel, test the coil and condenser with suitable equipment, replace any parts found faulty.

TROUBLE SHOOTING GUIDE FOR TWO-CYCLE MODELS
(A) WICO PACY MAGNETO

SYMPTOMS	CAUSE	REMEDY
INTERMITTENT OR NO SPARK	Dirty points.	Clean and adjust points.
	Faulty coil or condenser.	Replace coil or condenser.
	Faulty connection between flexible lead lug and point on breaker arm.	Clean lead lug and rivetted section of point with emery cloth, bond both parts with dab of solder.
	Faulty connection betwen breaker point and adjustable plate.	Remove nut holding point, scrape joint clean and replace.
	Flexible lead to breaker arm broken inside insulating cover.	Renew lead or complete breaker arm and lead.
	Lugs on leads to condenser touch casing.	Bend lugs to secure clearance.
	Primary lead from condenser to coil trapped under lamination stack.	Loosen screws holding lamination stack, release lead, bind with P.V.C. tape if necessary.
	Oil on breaker points.	Renew top oil seal, clean felt cam pad, use only grease on cam pad.
	Worn top main engine bearing which allows breaker gap to vary.	Replace top main engine bearing.

(B) VICTA MAGNETO — See Fig. M3

SYMPTOMS	CAUSE	REMEDY
INTERMITTENT OR NO SPARK	Dirty points.	Clean and adjust points.
	Faulty coil or condenser.	Replace coil or condenser.
	Spark shorts from H.T. pick up on coil to lamination stack, soldered type lead.	Usualy result of leaving too much bare H.T. lead, ensure that insulation on lead is close up to H.T. pick up on coil.
	Spark shorts from H.T. pick up on coil to lamination stack, black encapsulated coil.	Refit lead by screwing into socket so that insulation on lead is well inside.
	Oil on breaker points.	Renew top oil seal.
	Condenser lead to breaker points rubs flywheel.	Re-locate lead, renew condenser or wrap damaged lead with P.V.C. tape.
	Rivetted section of point on breaker arm touches cam.	File heel of breaker arm to gain clearance.

ADJUSTMENTS TO TWO CYCLE MODELS

ACCESS TO THE MAGNETO.

1. Remove Engine Cowl.
2. Remove the flywheel nut, dog nut or starter drum. It is usually difficult to prevent the engine from turning during this operation, but the nut can be released easily if a suitable spanner, size 7/16″ Whit., ring or socket type, is placed over it, steady the flywheel and spanner with the left hand and with the right tap the handle of the spanner with a hammer (See Fig. M4.). In most cases it will now be possible to slide the flywheel off the crankshaft. If the flywheel is tight on the crankshaft, remove by using Tool No. 18-011, Universal Flywheel Puller. (See Fig. M2).
3. Remove the key from the crankshaft.
4. Unscrew two holding down bolts or screws and remove the stator plate.
5. If necessary, remove the magneto cam.

Assemble in reverse order, making sure that flywheel key engages in the keyway in cam.

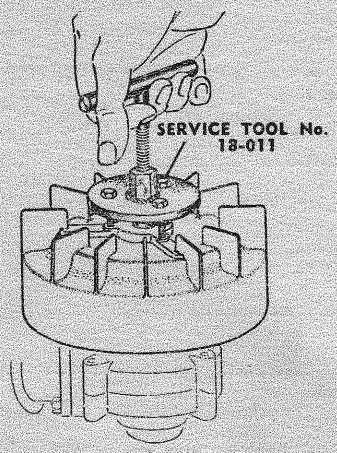


Fig. M2

BREAKER POINTS.

Turn the engine clockwise until the moving arm is fully raised, loosen the two screws holding the point bracket and move the bracket until a 0.020″ feeler gauge can just be placed between the points. Re-tighten the screws and check the gap. (See Fig. M3.) It is important that all connections at the breaker arm spring are kept clean and tight.

Wico magneto points are adjusted by releasing the lock screw and rotating the eccentric screw until the desired gap is obtained.

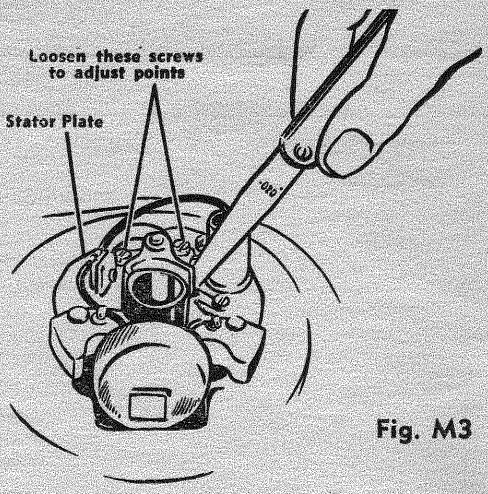


Fig. M3

To obtain the maximum spark it is important that the points are kept clean and correctly adjusted. To clean the points they should be removed from the stator plate and carefully dressed with a fine oil stone. On no account should emery cloth be used. Remove all trace of oil from the points before reassembling.

Wico—make sure felt pad is in contact with cam, lubricate pad with small quantity of grease.

RE-TIMING THE MAGNETO.

First, check the contact breaker points, and adjust to 0.020″ gap. If the points are pitted, they should be cleaned and dressed as described above, ensuring that when fitted together they bear with a maximum contact. Turn the crankshaft until the piston is ⅛″ before top dead centre. Loosen the two locking screws on the stator plate, and rotate the stator plate until the breaker points are just beginning to open. Tighten the locking screws and re-check the timing for gap opening, etc.

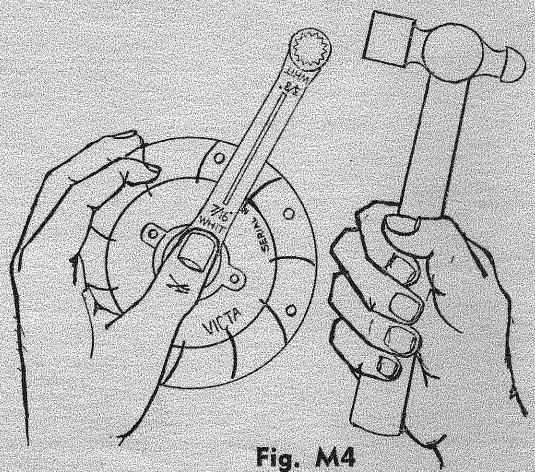


Fig. M4

ADJUSTMENTS — FOUR CYCLE MODELS

Two different makes of magneto are used on Lauson and Kirby-Lauson engines, they are of Wico-Pacy and Phelon manufacture. Engines fitted with Phelon magnetos are identified by the suffix "P" which follows the engine serial number. Wico-Pacy equipped engines carry no special identification.

The following remarks on servicing are applicable to both magnetos as they are of very similar construction. However, Wico-Pacy parts are not interchangeable with Phelon parts and care must be taken to quote the complete engine number when ordering replacements.

FLYWHEEL

The flywheel on all Four Stroke models is located on a tapered crankshaft held with a flywheel key. The key should be in good condition to ensure proper location of the flywheel for ignition purposes. Use only the key recommended.

TO REMOVE FLYWHEEL — FOUR-CYCLE ONLY

Loosen the flywheel nut by locking flywheel, as illustrated in Fig. M5. Remove nut, washer and pulley. Reassemble nut until it is flush with end of crankshaft. This will protect threads on the shaft. Insert a large screwdriver under the flywheel as shown in Fig. M6, and while prising upward with the screwdriver, tap squarely on flywheel nut with a soft face hammer to break flywheel loose. If necessary, rotate flywheel a half turn and repeat process until flywheel loosens from crankshaft. Remove the nut and flywheel. This will expose magneto.

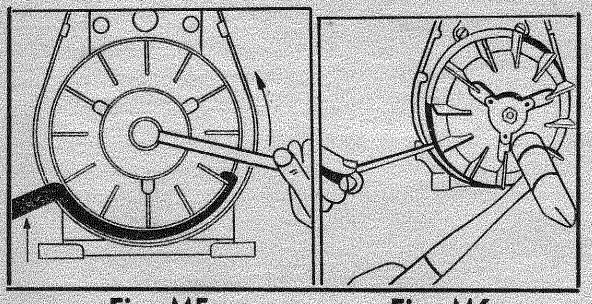


Fig. M5 Fig. M6

When servicing the magneto it is most important to pay careful attention to all low-tension connections so that an easy current path is provided for the relatively small amount of electrical energy available at this stage in the sequence of operations.

The breaker points 5-8 shown in Fig. M8 must therefore be clean and correctly adjusted (gap .020) and the terminals of the condenser lead and the coil primary lead should be clean and bright and free from any greasy deposits.

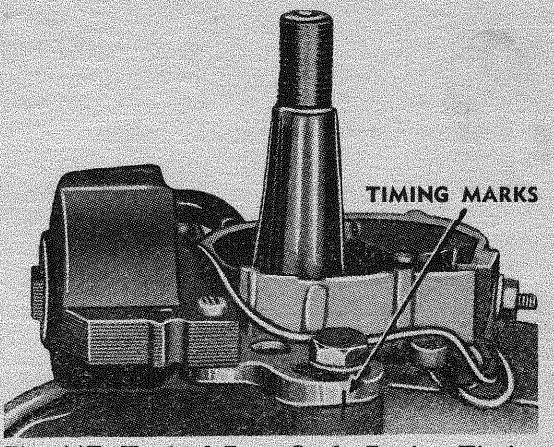


Fig. M7. Typical Four-Cycle Engine Timing Marks.

SPECIFICATIONS

Breaker Point Setting	.020" all models.
Condenser Capacity:	
Phelon	.11-.13 MFD.
Wico-Pacy	.2 MFD.
Ignition Timing	$\frac{1}{16}$" Before top dead centre.

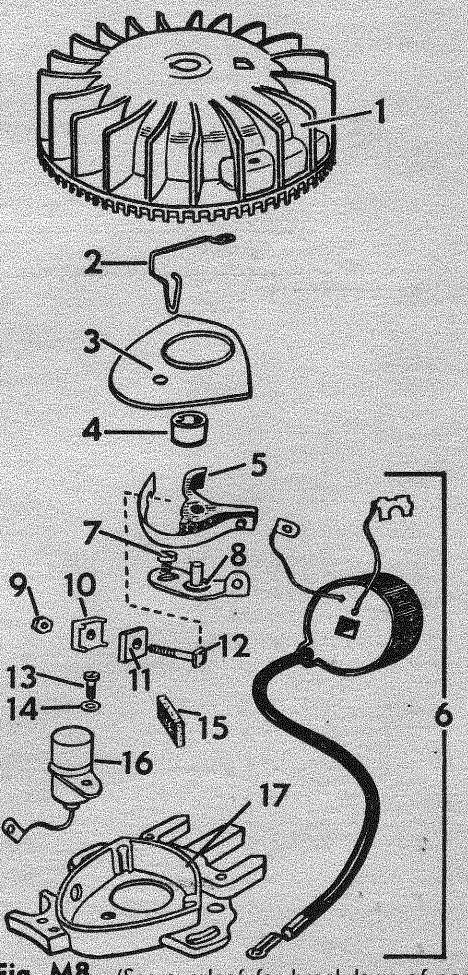


Fig. M8. (See overleaf for breakdown of parts)

There is a variation in the coils (6) in that some have a pigtail type earth as illustrated while in others the earth is made in the form of a metal strip which folds into the centre of the coil and makes its earth on the lamination stack of the core.

The H.T. lead and coil are manufactured as a unit which must be replaced in its entirety if either part becomes faulty or damaged.

Not illustrated in the exploded view is the earth lead from the magneto to the cut-out connection on the inlet manifold.

If it becomes necessary to remove the magneto stator plate from the engine, check the presence of timing match marks, Fig. M7. If there are no marks, use a prick punch or small chisel to make marks similar to those illustrated, before disturbing the two securing bolts.

FOUR-CYCLE MAGNETO ASSEMBLY

ILLUST. No.	QTY.	PART DESCRIPTION
	1	Magneto Assembly.
1	1	Flywheel.
2	1	Cover spring.
3	1	Breaker Box Cover.
4	1	Breaker Cam.
5 & 8	1	Breaker Base and Arm.
6	1	Coil and Lead Wire.
7	1	Screw and Lockwasher.
9	1	Nut.
10	1	Outside Insulator.
11	1	Inside Insulator.
12	1	Connecting Stud.
13	1	Screw.
14	1	Lockwasher.
15	1	Cam Wiper Felt.
16	1	Condenser.
17	1	Stator Plate.
	1	Coil Wedge Spring.

TROUBLE SHOOTING GUIDE FOR FOUR-CYCLE MODELS

See Page M2 for systematic diagnosis of Magneto Trouble.

SYMPTOM	CAUSE	REMEDY
INTERMITTENT NO SPARK	Dirty points.	Hone and adjust points.
	Faulty coil or condenser.	Replace coil or condenser.
	Oil in contact housing.	Check top mainshaft oil seal, replace if leaking. See para. 2 page F3, leaking oil seals.
	Short circuit in magneto earth switch lead.	Insulation on lead may be damaged if lead is trapped under fuel line or lead may be rubbing flywheel—re-locate lead, repair damage with P.V.C. tape, or renew.
	H.T. lead rubbing flywheel.	Renew coil and lead or cover damage with several layers of P.V.C. tape.
ENGINE WILL NOT STOP WHEN SWITCH IS MOVED TO STOP POSITION.	Faulty earth lead or connections.	Refit or renew as necessary.
ENGINE WILL NOT START OR BACKFIRES.	Oil on breaker points.	Check oil seal. Replace if leaking. Coat outer diameter of seal with gasket cement. Hone points.

VICTA TWO-CYCLE ENGINES

Victa Two Cycle engines are equipped with the Victa fixed jet type carburettor which depends on some restriction in its air supply to function correctly. The restriction is achieved in early models by the incorporation of a washer in the choke, whilst later models have their air filter outlets designed to deliver the correct amount of air. The size of the outlet is dependent on the snorkel length and the type of air filter element fitted.

Construction of the carburettor is shown in the EXPLODED VIEW, (Fig. C1). Earlier model carburettors had a different throttle slide cap to that illustrated. Some carburettors are attached direct to the inlet spigot on the cylinder, and others have a heat insulator interposed or have a heat insulator sleeve inside the spigot fitting as illustrated.

Illust. No.	Qty.	Part Description
1	1	Carburettor body.
2	1	Fuel cut-off needle seat.
3	1	Fuel cut-off needle.
4	1	Float lever.
5	1	Lever retaining drive screw.
6	1	Tickler.
7	1	Tickler spring.
8	1	Brass wire.
9	1	Fuel inlet nipple.
10	1	Inlet washer.
11	2	Guide screw.
12	1	Carburettor clamp.
13	1	Clamp screw.
14	1	Bowl retaining screw washer.
15	1	Bowl retaining screw.
16	1	Float.
17	1	Float bowl rim washer.
18	1	Float bowl.
19	1	Jet block.
20	1	Main jet.
21	1	Jet block washer.
22	1	Slide, throttle.
23	1	Spring, throttle slide.
24	1	Cap, throttle slide.
25	1	Clip, throttle slide cap.
26*	1	Heat insulating bush.
27*	1	Heat insulating washer.

* Not fitted to early models.

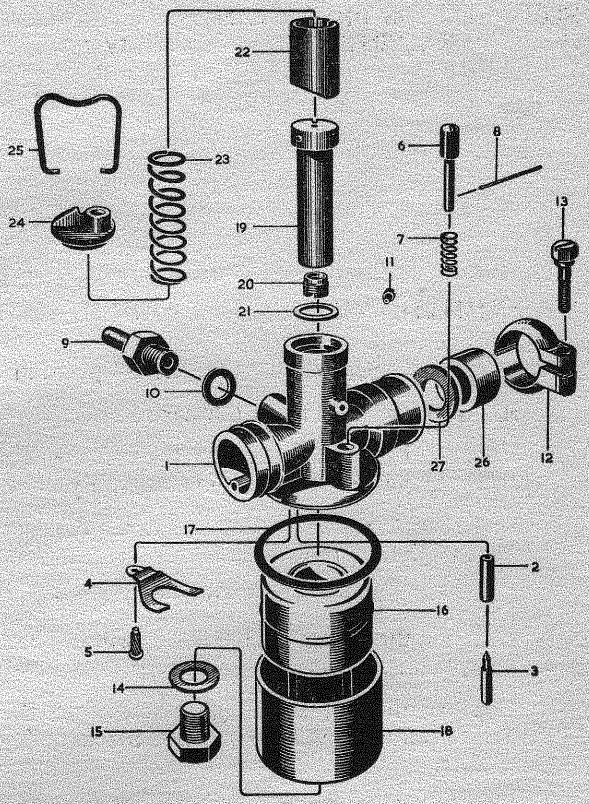


Fig. C1.

CARBURETTOR

TROUBLE SHOOTING GUIDE FOR TWO-CYCLE MODELS

SYMPTOM	CAUSE	REMEDY
ENGINE SPITS BACK INTO CARBURETTOR.	Blockage in internal passages of jet block.	Dismantle and clean.
	Air leak where carburettor joins cylinder.	Ensure that carburettor is fully home on cylinder stub; if a heat insulator is fitted, check for correct installation.
	Air restriction section of choke or air filter missing or broken. Snorkel torn or punctured.	Replace choke, air filter flange, or snorkel.
	Faulty gasket on cylinder transfer port cover or cylinder base.	Replace gasket.
	Faulty top or bottom crankshaft oil seal.	Replace faulty oil seal.
FUEL FLOODS FROM VENT HOLE ADJACENT TO TICKLER.	Punctured float.	Replace.
	Dirty or faulty fuel needle and seat.	Clean or replace.
	Incorrect float level.	Reset as in Fig. C2.

DISMANTLING THE VICTA CARBURETTOR.

1. Move the petrol tap to the "OFF" position.
2. Remove fuel line from the carburettor.
3. Remove the clip from the top of the carburettor and remove the throttle slide assembly.
4. Unscrew the carburettor snorkel clip screw and remove the snorkel tube.
5. Loosen the clamp screw and remove the carburettor.
6. Unscrew the lower float bowl screw and remove the float, bowl rim washer, and lower float bowl washer.
7. Unscrew the two small guide screws on the side of the carburettor and remove jet block and jet block washer.
8. Turn float lever to one side and take out fuel needle.

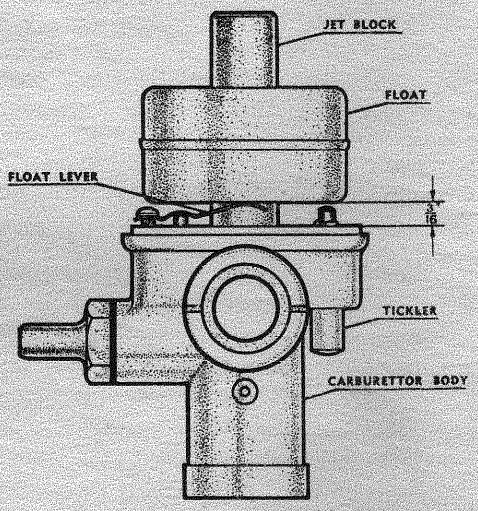


Fig. C2.

9. Remove main jet from inside the jet block, using a wide screwdriver to avoid damage to the jet orifice.
10. Remove the fuel inlet nipple and fibre washer.

To reassemble, reverse the above procedure, taking care that the cutaway section of the throttle slide faces the snorkel tube, and that the lower guide screw engages in the notch on top of jet block.

When refitting to the cylinder, carburettors equipped with internal heat insulators, ensure that the fibre washer and insulator are fully seated in the carburettor body. On no account assemble carburettor with insulator sleeve on cylinder stub.

On occasions when it is necessary to dismantle the carburettor it is as well to check the float level. This should be adjusted so that the top of the float, when held parallel with the bottom of the carburettor body is 3/16" from body (see Fig. C2). Adjustment is made by setting the curved fingers of the float lever.

To remove the fuel cut-off seat, use a No. 2 "Easy Out" inserted in the bore of the seat. Turn anti-clockwise to remove.

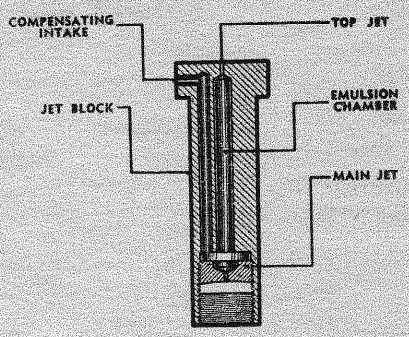


Fig. C3.

When replacing a fuel cut-off needle seat, insert the new seat in the carburettor body and tap down with a small hammer until the top of the seat is level with the bottom of the carburettor body. Remove any burrs from inside the seat bore with a small triangular scraper.

When cleaning the carburettor, take particular care to clean the jet block thoroughly, especially in the emulsion chamber. (This is the area between the main jet and the top jet. See Fig. C3).

Make sure the small jet hole in the jet block is not choked. Also, clean the main jet.

FOUR CYCLE MODELS

WALBRO CARBURETTORS LMB50 AND LMB50A

See Exploded View, Fig. C5.

Dismantling.

1. Remove carburettor from engine, this may be done without disturbing the engine cowl by first removing the air filter, then, two screws which hold the carburettor manifold to the engine block, unclip the cut-out lead, prise off the fuel line and breather pipe; lastly, disconnect the governor link and/or spring from the governor arm, taking note of which hole the parts were connected to.
2. LMB50 Model. Unscrew and remove power adjusting needle assembly. This will allow bowl to come free.
   LMB50A. Remove bowl retaining screw. CAUTION: There are 2 gaskets:—One outside bowl and one inside.
3. Remove float hinge pin, which frees float. Inspect float carefully for dents, leaks, and wear on lip or pin holes.
4. Triangular float valve needle will drop out. Unscrew brass needle valve seat.
5. Remove bowl gasket from recess in casting.
6. Unscrew nozzle and remove.

   The main nozzle in the Walbro carburettor is cross drilled after assembly. The original main nozzle, therefore, cannot be reinstalled once it has been removed, unless a groove is cut around the threaded section taking in the fine radial hole, otherwise it is impossible to line up the hole in the nozzle with the one in the carburettor body. Replacement nozzles and those fitted to LMB50A fixed jet carburettors are grooved as a standard procedure and automatically permit proper alignment.
7. Unscrew idle needle (with spring) and remove.
8. Remove throttle valve screw. Valve will drop clear. Slide shaft and lever out sidewise.
9. Remove choke valve screws. Valve will drop clear. Slide shaft and lever out sidewise. Pull choke return spring free with pliers.
10. Check throttle adjusting screw for damage and for weak or broken spring.
11. Clean all parts in solvent, making sure that all accumulated carbon is removed—especially from the bore and from where the throttle valve seats in the casting. Blow out thoroughly with compressed air.
12. Always replace all worn or damaged parts, and always replace all gaskets and guide screws with new ones.

Assembly

1. Install throttle shaft and lever.
2. Install throttle valve with one screw. CAUTION: Valve must be installed with trade mark "W" showing and to the left.

(Walbro Carburettors, LMB50 and LMB50A—contd.)

3. Install new choke friction spring by pressing carefully into seat with pliers.
4. Install choke lever and shaft.
5. Install choke valve with two screws. CAUTION: Valve must be installed with notch pointing toward right.
6. Install throttle adjusting screw, with spring.
7. Install idle adjustment screw and spring. Turn finger tight, then back off ¾ turn.
8. Install nozzle.
9. Install matched assembly of float valve, valve seat, and gasket.
10. Install bowl gasket.
11. Install float assembly in position, and insert float hinge pin. With casting upside down, and the free weight of the float resting on the seated float valve needle, the distance between the bottom of the casting and the free end of the float (opposite the needle valve) should be ⅛ inch, plus or minus 1/64 inch. Adjust as required by carefully bending the "lip", which rests against the needle, with a small screwdriver.
12. Model LMB50. Insert power adjustment needle assembly in hole in bowl bottom. Model LMB50A. Insert Bowl retaining screw. Be sure to place one gasket between assembly or retaining screw and bowl, and one inside the bowl.
13. Install bowl and power needle assembly by screwing assembly down until snug. To protect the power adjustment needle during this operation, back it off 6 to 8 turns. Next, tighten large hex. nut, making sure that bowl is centred. Then turn adjustment needle (knurled head) until it seats finger tight; and back off one turn. Make certain that packing nut is tight.

POWER AND IDLE SCREW ADJUSTMENT

See Fig. C4.

After the carburettor has been installed on the engine, the final adjustments must be made.

Power Needle Adjustment—Model LMB50 only.

1. Turning the power needle (located below bowl) in a clockwise direction, gives a leaner mixture for high speed.
2. When adjusting power needle, adjust approximately ¾ turn off the seat. Then allow a few seconds for the engine to react to each adjustment thereafter, before turning again.

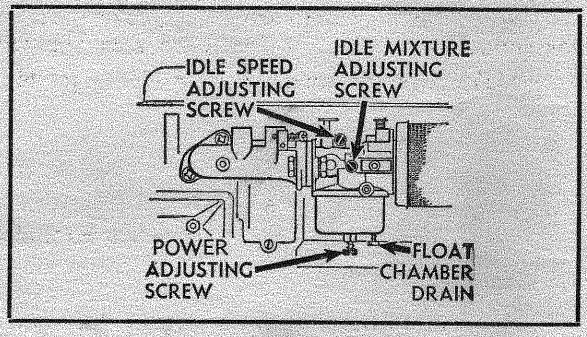


Fig. C4.

Idle Screw Adjustment—

1. Turning the idle screw in a clockwise direction gives leaner idle mixture.
2. When adjusting the idle needle, adjust approximately one turn off the seat. Then allow a few seconds for the engine to react to each adjustment thereafter, before turning again.

TROUBLE SHOOTING GUIDE FOR WALBRO CARBURETTOR

SYMPTOM.	CAUSE.	REMEDY
ENGINE WILL NOT THROTTLE BACK.	Throttle valve spindle jammed.	Dismantle and clean.
ENGINE SPEED FLUCTUATES ON LOW REVS.	Cross hole in nozzle blocked.	Dismantle and clean.
RICH MIXTURE—BLACK SMOKE FROM EXHAUST.	Choke valve spindle jammed.	Dismantle and clean.
CARBURETTOR FLOODS	Dirt on fuel needle seat.	Dismantle and clean.
	Punctured float.	Replace.
	Blockage in float bowl vent.	Clear blockage.

GEW WALBRO CARBURETTOR LMB50 AND LMB50A

Illust. No.	Part Description
	Carburettor Assembly.
1	Body Assembly.
2	Baffle—Bowl Vent.
3	Screw—Baffle.
4	Gasket—Bowl Rim to Body.
5	Nozzle.
6	Gasket—Valve Seat.
7	Float Valve, Seat, and Gasket Assy.
8	Float Assembly.
9	Shaft—Float.
10	Stem and Gasket Assembly.
11	Bowl and Drain Assembly.
12	Gasket—Bowl Drain Stem.
13	Spring—Bowl Drain Stem.
14	Retainer—Bowl Drain Stem.
15	Gasket—Bowl Retainer.
16	Needle Assy.—Power Adjusting. (LMB50 only.)
16A	Bowl retaining screw LMB50A only.
17	Spring—Power Adjusting Needle.
18	"O" Ring.
19	Valve—Choke.
20	Screw—Choke Valve.
21	Valve—Throttle.
22	Screw—Throttle Valve.
23	Screw—Idle Speed Adjusting.
24	Screw—Idle Mixture Adjusting.
25	Spring—Adjusting Screw.
26	Spring—Choke Return.
27	Shaft and Lever Assembly—Choke.
28	Shaft and Lever Assembly—Throttle.

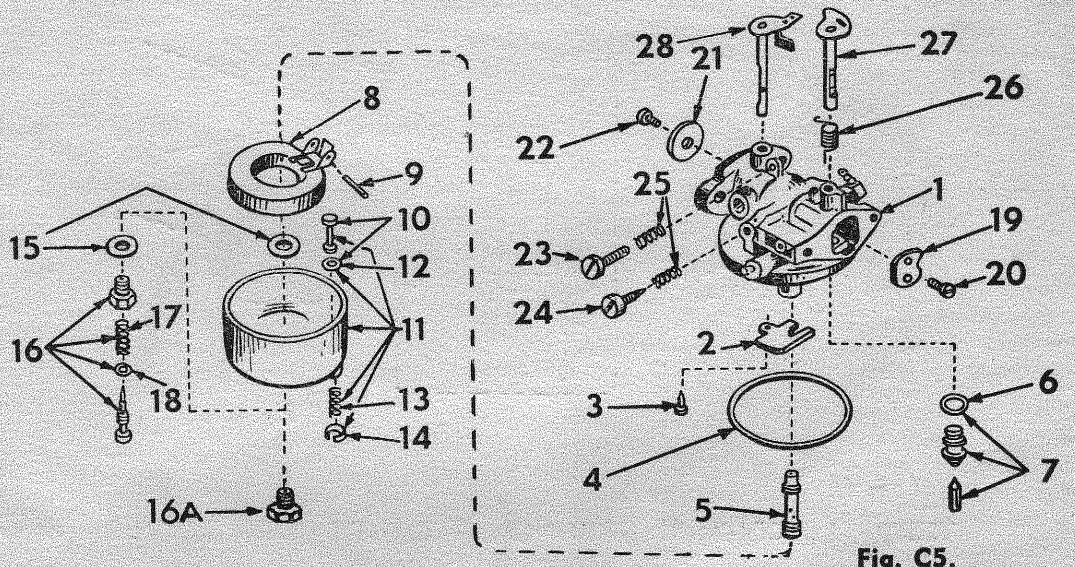


Fig. C5.

ZENITH CARBURETTOR AS FITTED TO LV30 ENGINE

Exploded View, Fig. C6.

Adjustment of Idle System: Adjust the throttle stop screw (6 in exploded view) to obtain the desired idling speed by turning screw in (clockwise) to increase the speed and out (counter-clockwise) to decrease the engine speed.

Adjust the Idle Air Regulating Screw (10) to obtain smooth running of the engine at idling speed.

Turning the screw in (clockwise) causes a richer mixture, and turning it out (counter-clockwise) causes a leaner mixture.

Do not attempt to remove pressed-in idle tube. The screw in the bottom of this tube can be removed to enable the idling system to be cleaned by rinsing in petrol and blowing out with air.

Inspect point of Idle Air Regulating Screw (10). This must be smooth and free of ridges.

Main Jet (19) is easily removable for cleaning by unscrewing Plug (21). Clean by blowing with air.

Access to Needle Valve and Seating (2) is obtained by removing screws (23) and separating bowl (16) from body assembly (1).

Replace needle valve if worn, also replace Float Hinge (18) if any wear is detected on the pin.

Replace all gaskets and fibre washers every time the carburettor is disassembled.

(Zenith Carburettor—contd.)

There are three 5/64" holes drilled in the top flange of the throttle valve spindle (5). Two of the holes are close together and, of these two, the governor link connects to the one nearer the centre spindle.

The Throttle Butterfly (8) is numbered on one side. The number should face the inside of the carburettor, i.e., away from the head of the fixing screw (9) and be on the same side of the spindle as the governor connection hole.

The Choke Butterfly (7) illustrated has two flat sides. In actual fact the one in use has one flat side, which is on the left when viewed from the air inlet.

Check the Flange. If the Zenith carburettor is delivering a rich mixture, check the fibre washer under the flange of the jet. It may be split or damaged, allowing the jet to be by-passed by some of the fuel. The standard jet size is No. 68.

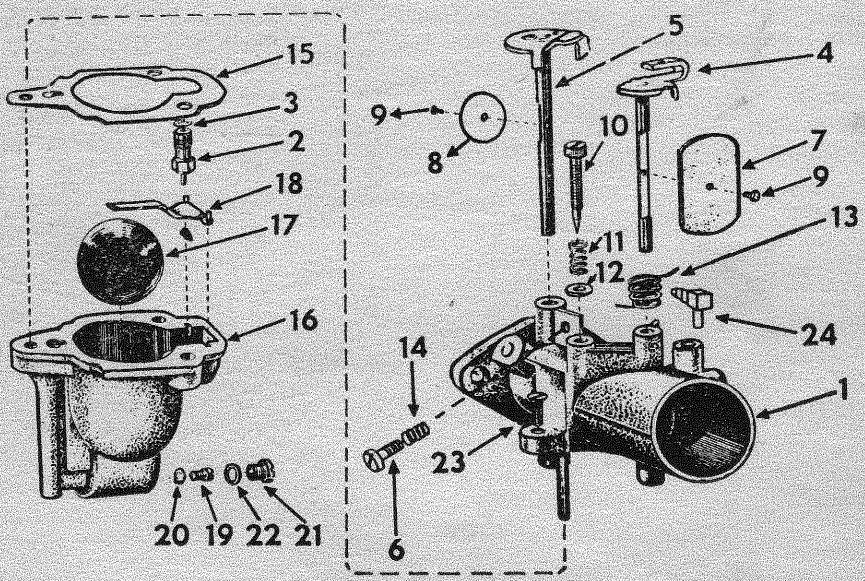


Fig. C6.

THROTTLE CONTROL SETTINGS — ZENITH CARBURETTOR

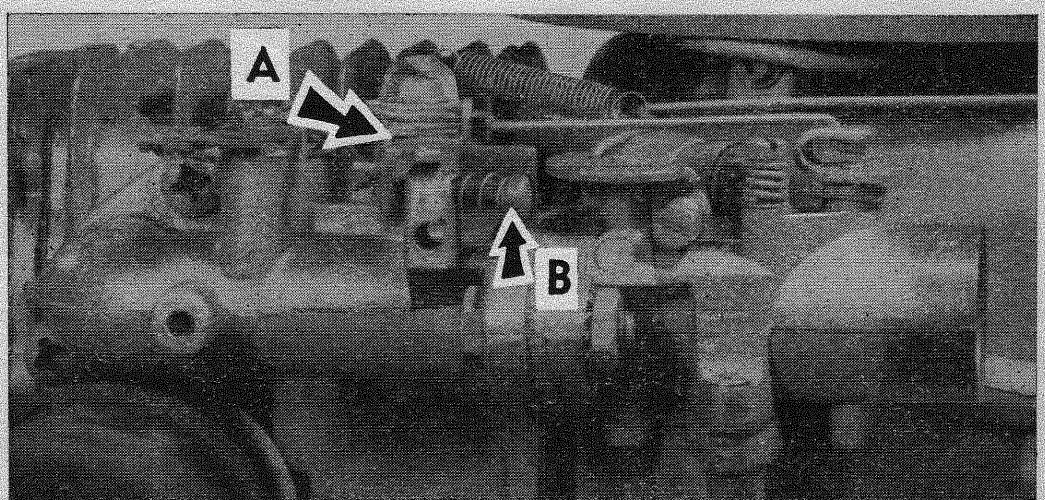


Fig. C7.

(Zenith Carburettor—contd.)

If low power output occurs under load, check the control spring GEE 254, which is located under the speed control and governor adjustment levers at A in Fig. C7.

When the speed control lever is set in the fast run position the spring should keep the turned down lug of the governor lever in contact with the tip of the speed adjusting screw B.

Replace the spring if it does not have sufficient tension to maintain the contact.

The speed adjusting screw (B) is set in the factory test to give a governed speed of 3,400 r.p.m. If slightly more speed is required to deal with heavy mowing conditions, the speed adjusting screw may be backed off until its tip is flush with the lug into which it screws.

The maximum speed that can be obtained in this way is 3,500 to 3,600 r.p.m.

Difficulty in Starting.

If difficulty in starting is experienced with a four-stroke engine equipped with a Zenith carburettor, the trouble may be connected with the relative positions of the choke valve and the float chamber vent hole.

In this carburettor the float chamber vent hole is located in the inlet bore of the carburettor (see Fig. C8). When the choke valve is closed, the vent hole should be fully visible on the atmosphere side of the choke valve.

In some instances it has been found that the vent hole is out of position and, when the choke is closed, the valve partly or fully obscures the hole.

This upsets the pressure balance in the float chamber to the extent that fuel will not feed through the jet.

To overcome the trouble, replace the carburettor body or file a notch in the valve to give the hole a clear intake.

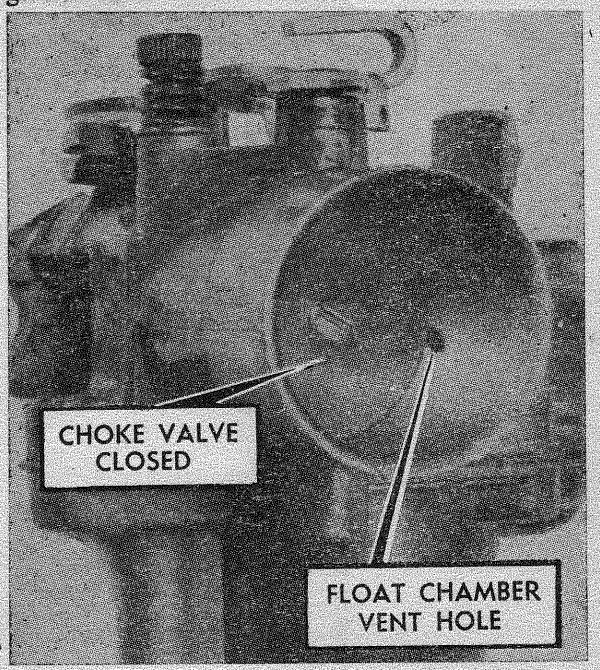
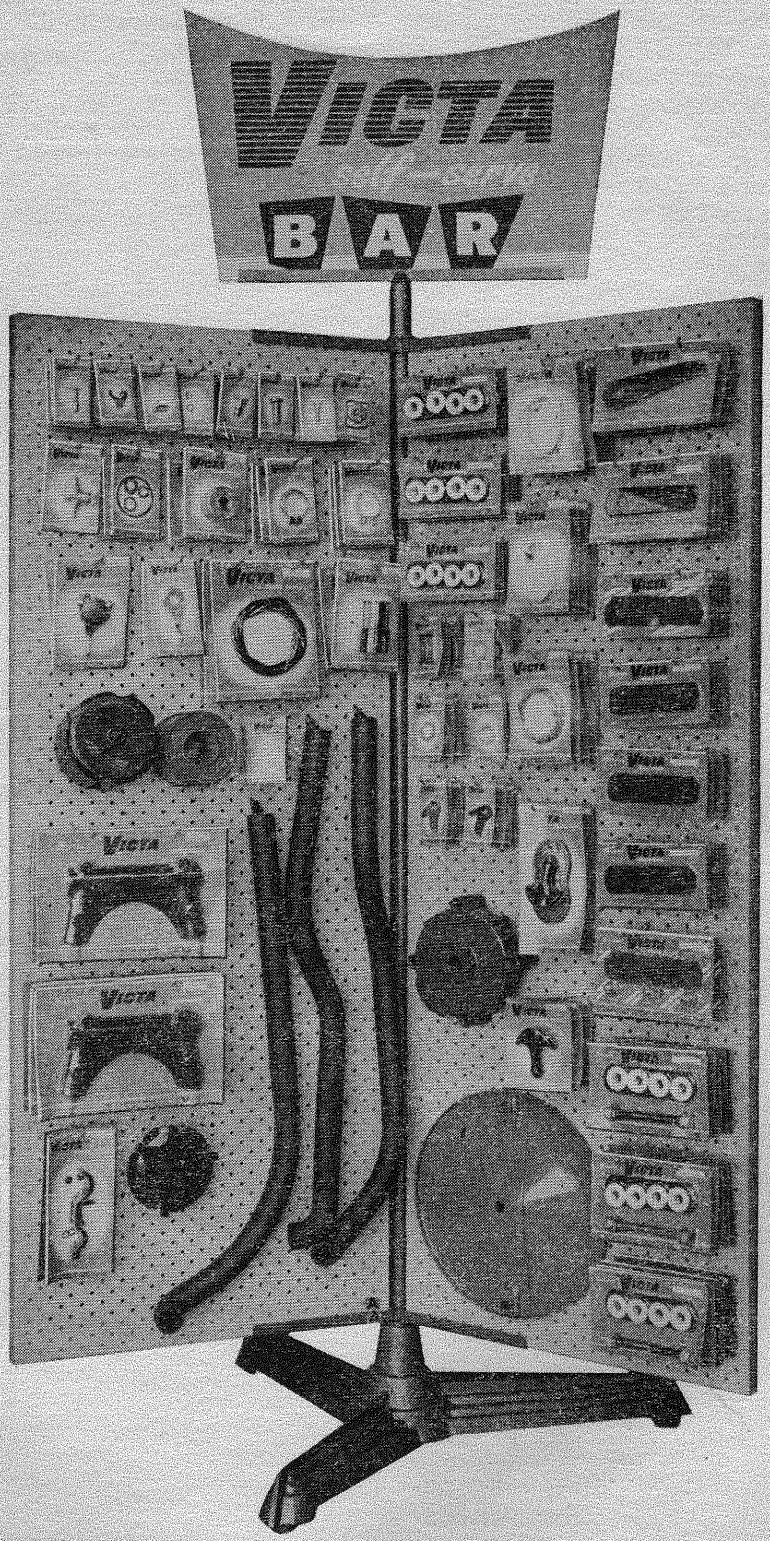


Fig. C8.

TROUBLE SHOOTING GUIDE FOR ZENITH

SYMPTOM	CAUSE.	REMEDY
ENGINE RACES ON IDLE SETTING.	Throttle valve spindle jamming.	Dismantle and clean.
RICH MIXTURE — BLACK SMOKE FROM EXHAUST.	Choke valve spindle jammed.	Dismantle and clean.
CARBURETTOR FLOODS.	Main jet loose or seating washer broken.	Replace washer.
	Punctured float.	Replace float.
	Dirt on fuel needle seat.	Dismantle and clean.
	Sticking fuel needle.	Replace needle and seat.
PETROL WILL NOT FEED TO FLOAT BOWL.	Fuel needle stuck to seat.	Replace needle and seat.
	Vent hole in tank cap or anti-splash washer blocked.	Clean out vent holes.
	Needle seat not screwed completely in.	Tighten on to fibre washer.
	Float hinge bent.	Replace or reset.
ENGINE WILL NOT IDLE.	Blockage in Idle Tube	Remove screw and clear.
	Blockage in Idle Passages in carburettor body.	If necessary, remove plugs over passages by drilling small hole and inserting self - tapping screw to withdraw. Refit plug after soldering hole.

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WITH A FLOOR MODEL "SELF SERVE" BAR.

DISMANTLING AND SERVICING THE VICTA REWIND STARTERS

Models 12A and 12B.

Whilst this starter is of sturdy, yet simple, design, some adjustment may be necessary from time to time. Before making any adjustments the Rewind Starter must be removed from the engine cowl by removing the (4) locating screws. **(Do not remove or slacken centre nut.)**

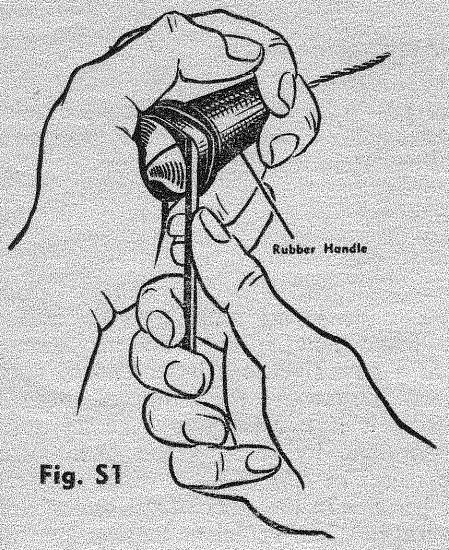


Fig. S1

1. **To replace the wire rope assembly:**
   Prise the rubber handle from the handle centres (see Fig. S1), remove 4 cheese head screws from the sheave plates (see Fig. S2), and lift sheave plates from the housing. Remove 2 self-tapping screws and separate sheave plates. Remove the wire rope and fit a new assembly. Reassemble in reverse order, pass wire rope through guide bush, refit rubber handle and handle centres. The rubber handle will pass easily over the handle centres if first dipped in kerosene, petrol or soapy water.

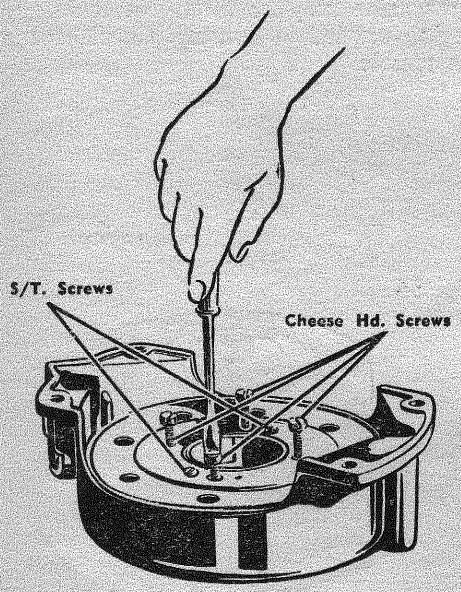


Fig. S2

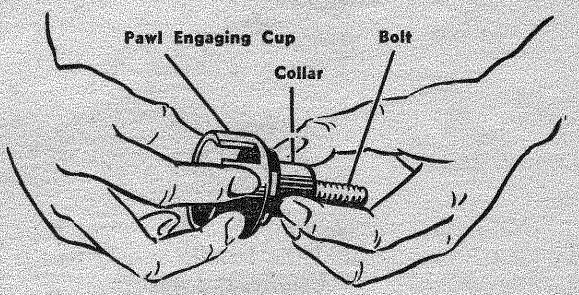


Fig. S3

2. **To adjust the clutch tension:**
   Remove the handle and sheave plates as described in paragraph 1, remove centre nut and carefully withdraw the pawl engaging cap and bolt. If removed carelessly the spring may jump from the housing. Screw the starter bearing collar down as far as it will go (finger tight) and slacken off half a turn. (See Fig. S3.)

3. **To replace the pawl carrier and/or pawls:**
   Dismantle the sheave plates (see paragraph 1), fit new parts and reassemble. When fitting the pawl carrier the two spigots must face the spring drum (see Fig. S4). The pawls are interchangeable.

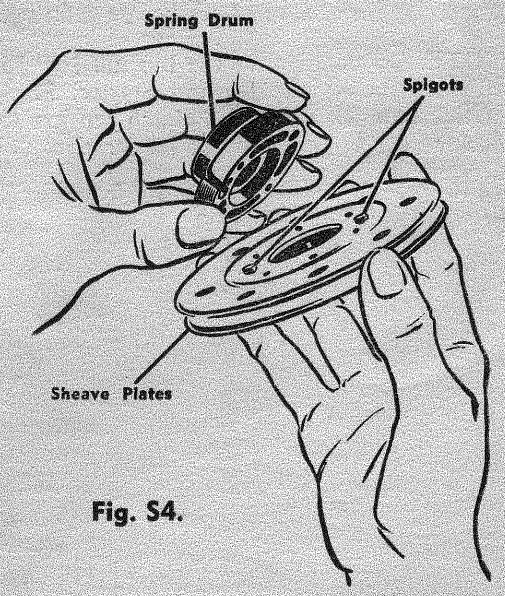


Fig. S4.

(Dismantling and Servicing Victa Rewind Starters—contd.)

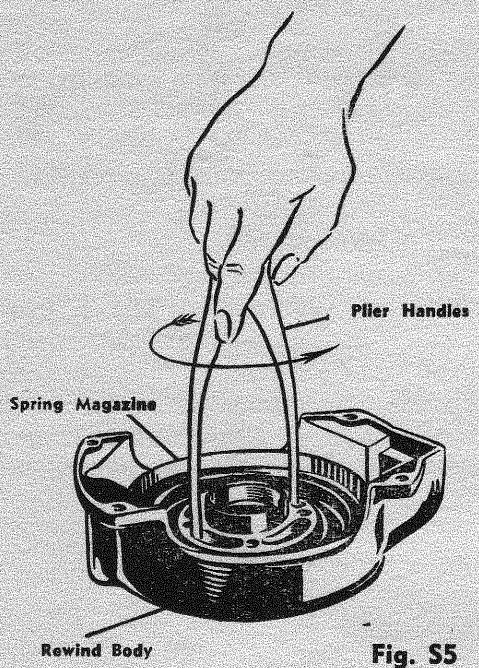


Fig. S5

4. **To replace the rope guide block:**
Remove the rubber handle and handle centres from the wire rope, pass rope through guide block, lock the sheave plates with a wooden wedge to stop the spring unwinding. Remove the guide block and fit replacement.

5. **To replace the spring:**
Dismantle the rewind starter as described in 1 and 2 above, punch out the spring retaining rivet and remove spring. Place new spring and magazine in position and fit a new rivet. Fit inner end of spring into spring drum. To remove the unwanted magazine from the housing it is necessary to take up spring tension. This is done by rotating the spring drum anti-clockwise (see Fig. S5). This is made easier by inserting plier handles in the slots of the spring drum to provide leverage. When sufficient tension has been taken up the magazine may be lifted out; carefully allow the spring to unwind in housing. Check clutch tension and reassemble.

General Hints:

When correctly assembled, the wire rope should return and hold the handle snugly to the housing. Should the handle not return snugly, remove the sheave plates, rotate 180 degrees and refit.

The wire rope assembly must always be fully wound on the sheave plates before refitting.

NOTE: Do not remove the top nut (see Fig. S6) unless servicing the Rewind Starter. Slackening of this nut will cause the clutch tension to alter and the starter will become inoperative.

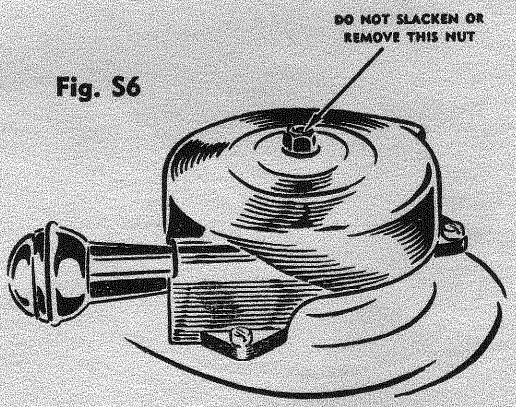


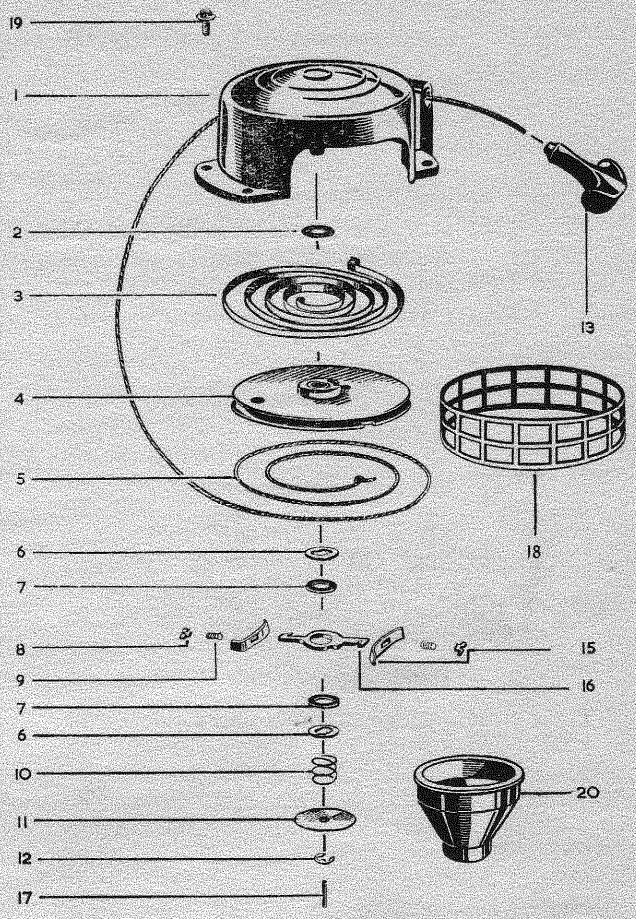
Fig. S6

SERVICING MODEL 12D REWIND STARTER.

The order of assembly is shown in Fig. S7, all the working parts being detachable from the housing on removal of the "E" type circlip. (12).

Re-assembly of the unit is quite straight forward, but certain precautions are necessary to ensure correct operation.

A dismantled starter is reassembled in the following sequence.



1. Preliminary Assembly

Place spacer washer (2) over centre spindle and lightly smear spindle with grease, **not oil.**

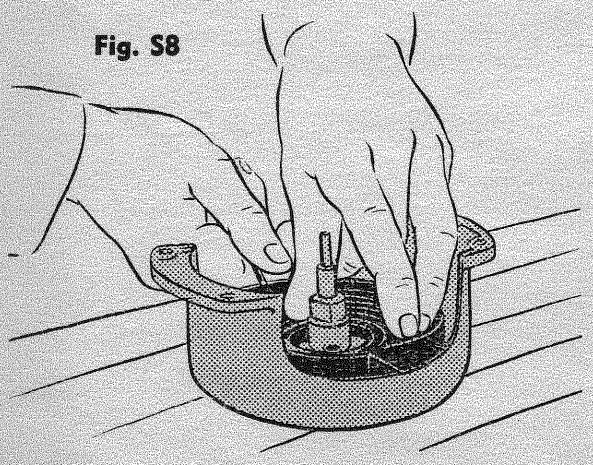
2. Fitting Recoil Spring

Take magazine containing new spring and place in housing (1) external loop of spring to go over pin provided. Keep spring pressed down in housing and prise off the spring magazine. See Fig. S8. If an original spring is to be re-used, wind it into a magazine before fitting.

3. Fitting Pulley

Wind rope (5) on pulley (4) in anti-clockwise direction until last 4 or 5 inches which is pulled into the notch provided in the rim of the pulley, place the pulley over the housing spindle and locate the inner eye of the spring in the retaining groove. Access hole for this operation is provided in the pulley.

Fig. S8



4. Tension Recoil Spring and fit Handle

Place tension on spring by taking end of rope and winding pulley 2 to 2½ turns anti-clockwise, Fig. S9. Feed rope through guide hole, draw out enough to slip on handle and tie a double knot, i.e., slip tail of rope back through loop.

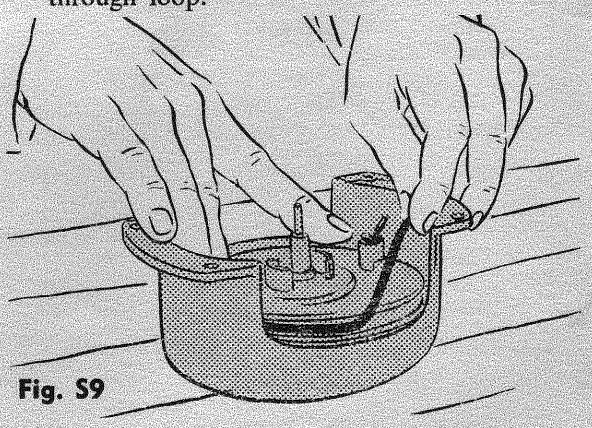


Fig. S9

(Servicing Model 12D Rewind Starter—contd.)

5. To make up Pawl Sub-assembly

Take the flat of the lever between the thumb and forefinger of the left hand with one leg of the lever projecting vertically and the open side of its notch pointing to the left; place a pawl (15) over the lever, ensuring that the ends are pointing outwards with the end identified by a dash (—) on the right, then fit a pawl spring (9) and its retainer (8). Turn other leg of lever up and carry out same procedure.

If the ends of the pawls marked with a dash (—) become blunt, the pawls will not grip when the rope is actuated. The pawls should be replaced or they may be sharpened with a file. If this is done, make sure that the original angle is maintained. Sharpen only the marked end. Oil or grease on the thrust or friction washers (6) (7) will also cause the starter to slip. Clean the washers in straight petrol or replace if necessary, see item 6.

6. To fit Pawl Sub-assembly

Place over housing centre spindle one thrust washer (6), one friction washer (7) then the pawl sub-assembly in the same way that it appeared when held between the fingers, i.e., with the identification dash (—) to the top and to the right.

Now fit the other friction washer (7), a thrust washer (6), friction spring (9), large plain washer (11) and "E" type circlip (12). Fig. S10.

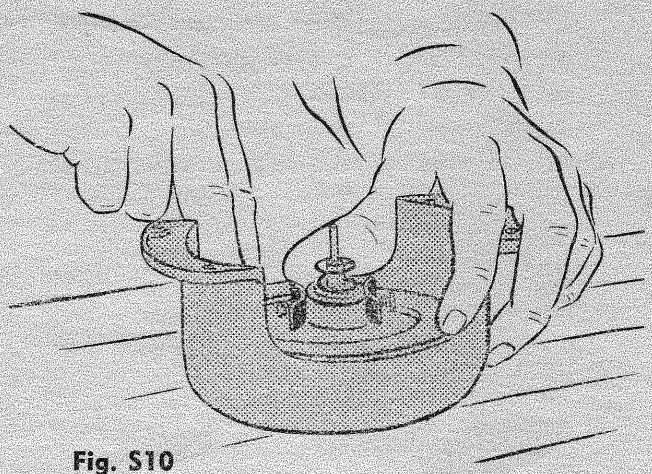


Fig. S10

At no time should oil or grease be allowed to reach the friction washers.

7. Centering Pin

The purpose of the brass pin (17) in the spindle is to centre the starter in relation to the engine shaft as it is fitted, the pin being designed to push into the spindle as the starter is screwed down.

The pin is actually a tube rolled from flat brass and may be drawn down for recentering if required, by applying a screwing action with a pair of pliers.

DISMANTLING AND SERVICING "SURE START" IMPULSE STARTERS

Refer to the exploded view drawing of the starter, Fig. S11.

(a) Before attempting to remove the starter from the engine, make sure that the starter spring is in a released condition. If the starter will not release, open the handle fully and wind it anti-clockwise until it engages the next cog on the ratchet. With the handle in the open or extended position it is safe to remove the four mounting screws. Immediately after removing the starter, place it on the floor and fold the handle to release the spring tension.

(b) Remove two screws holding retainer (23) to hub (18). Note hook on retainer. When assembling, be sure the spring from the hub assembly is attached to this hook.

(Dismantling and Servicing "Sure Start" Impulse Starters—contd.)

(c) Remove brake screw (24) and brake (22).

(d) Take handle assembly from housing and remove ratchet (5) and spacer (6).
- (1) Check brake for tight fit on retainer hub.
- (2) If loose, replace.
- (3) Remove and clean dog (19).

(e) The hub assembly is removed by lifting straight up.
- (1) Clean and recoat hub shaft with light grease.

(f) Check the spring by removing the four screws holding the spring and keeper assembly to the housing assembly (14).
- (1) Lift out spring and keeper assembly (15).
- (2) If spring is broken or stretched, replace entire assembly. Lubricate spring with light oil if operation of starter is sluggish.
- (3) Remove foreign material from spring and keeper assembly. DO NOT ATTEMPT TO REMOVE SPRING FROM KEEPER.
- (4) Reassemble to housing.

(g) Dismantle handle assembly (1) by removing retainer (12) from post on which ratchet dogs (8) (11) pivot.
- (1) Replace retainer if it is worn or is bent during removal.

(h) Lift off lower dog (11), dog release spring (9), two washers, upper dog (8) and washer.
- (1) Check to determine if spring has sufficient tension to hold dogs against ratchet gear.
- (2) Check parts for wear.
- (3) Clean and recoat with light grease.

(i) Clean ratchet and ratchet bearing.
- (1) Replace ratchet bearing (4) on handle. DO NOT REPLACE RATCHET (5) IN HANDLE.

(k) On pivot post, replace washer (7), upper starter dog (8), washer (9), spring (10) and lower starter dog (11).
- (1) Be certain that hook on spring is against lower starter dog.
- (2) Replace retainer clip (12) using screwdriver or needle nose pliers.
- (3) Check end float of release dogs on pivot post. If necessary, add extra washers between dogs to minimise end float, but be sure that dogs are absolutely free to rotate. This is the most important check to ensure correct starter operation.
- (4) Release dog pivot should be oiled frequently. Oil through trip hole in handle.

(l) Hold back end of starter spring with screwdriver and replace hub (18).
- (1) Place ratchet spacer (6) on end of hub shaft which protrudes through housing assembly.
- (2) Position ratchet (5) on top of spacer.
- (3) Teeth on ratchet must point in opposite direction to teeth on gear of housing.

(m) Fold over handle. Hold back lower dog with screwdriver and re-install handle.

(n) Replace the brake washer (21), brake (22) and fasten with screw.

(o) Replace dog (19) hook spring (20) to retainer (23).

(p) Position retainer on hub, fasten with two screws removed at start of disassembly.

(q) Remount starter to engine.

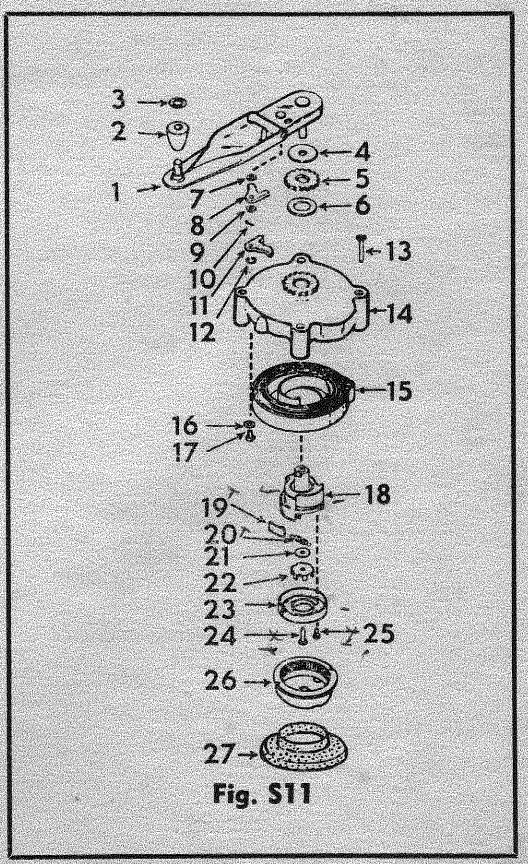


Fig. S11

DISMANTLING AND SERVICING OF TRIP RELEASE IMPULSE STARTERS

Refer to exploded view drawing of the starter (Fig. S12).

(a) Pull release lever away from housing assembly to remove tension from spring.

(b) Remove four screws holding starter to engine housing.

(c) Remove centering pin (if fitted).

(d) Remove $\frac{11}{16}$" hex. nut (right-hand thread).

(e) Lift off the retainer, brake and thrust washer. Note: Brake has only three (3) prongs. Disassemble starter engagement mechanism. This consists of three pawls, brake spring and thrust washers. Examine these parts for wear and replace if necessary.

(f) Unfold the starter handle, and while holding the starter in a horizontal position, pull out the starter handle from the top of the starter. Check wind dog in post of handle for wear.

(g) Continuing to hold the starter in a horizontal position, carefully turn the starter spring assembly and at the same time put light pressure on the top internal bearing surface. This will allow the starter spring and centre bearing to drop out of the starter.

(h) Remove centre bearing and spacer washer from spring and keeper assembly and check for wear.

(i) Check lock dog and spring inside hub of housing assembly. Spring should hold dog firmly away from wall of hub.

(j) Clean all parts. Coat bearing surfaces of keeper and hub and cover assembly with **light grease.**

(k) The starter spring is a double wound single spring. Locate spacer washer in spring keeper with grease and engage slot in lower end of centre bearing with starter spring.

(l) Install spring and keeper, washer and centre bearing as an assembly into starter housing. Hold back lock dog and spring to enable centre bearing to enter fully into housing.

(m) Install handle assembly, complete with wind dog, into centre bearing.

(n) Replace three drive dogs, thrust washer and brake, and engage retainer spring on anchor pin, at the same time fitting the retainer over the drive dogs.

(o) Replace $\frac{11}{16}$" hex. nut and tighten nut to 175 to 200 inch/lb.

(p) To fit new spring, locate one tongue of spring in the slot in the hub assembly, engage the centre bearing with the other tongue, slip the handle into this with the wind dog and turn the handle clockwise. This will close the coils of the spring and it will drop easily into its housing. Remove handle and bearing centre and proceed as in Para. (L).

TRIP RELEASE STARTER

1	Fastener knob.
2	Knob starter.
3	Handle assembly starter.
4	Dog wind.
5	Band brake.
6	Spring lock dog.
7	Dog lock.
8	Housing.
9	Washer wave.
10	Lever release.
11	Button release.
12	Spring release dog.
13	Dog release.
14	Seal button release.
15	Bearing centre.
16	Washer spacer.
17	Hub and spring assembly.
18	Washer thrust.
19	Brake.
20	Spring retainer.
21	Dog starter.
22	Retainer.
23	Nut shoulder.
24	Pin centering.

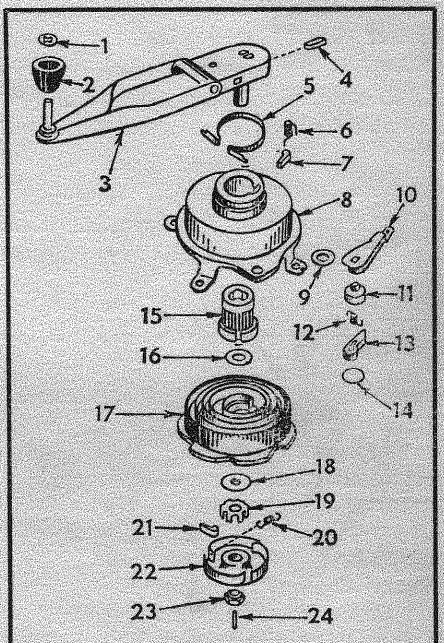


Fig. S12

Note:—Parts numbered 11 to 14 are supplied only as an assembly. To fit, pass stem of assembly through the hole in the housing, fit friction washer (9), trip release handle (10), and rivet over.