

OPERATING INSTRUCTIONS
AND
SPARE PARTS LIST

Villiers

MARK 2F

TWO STROKE

AUTO-CYCLE ENGINE/CLUTCH UNIT



TWO SHILLINGS

THE VILLIERS ENGINEERING CO. LTD.
WOLVERHAMPTON, ENGLAND

SPECIFICATION.

The Mark 2.F. Engine is built in unit with a countershaft clutch, the drive from engine crankshaft being by an endless roller type chain running in an oil bath case.

A deeply finned cast iron cylinder with one exhaust and two transfer ports of unique design is used, the carburetter being mounted on a stub at the rear.

Secured to the cylinder by four bolts is an aluminium alloy head in which is fitted a 14 mm. sparking plug (Lodge H14). The aluminium flat topped piston carries a floating gudgeon pin located endways by circlips. The "big end" bearing consists of two rows of steel rollers running on a crankpin fitted in double crankwebs carried by a large ball journal bearing on each side.

Power is taken through a two plate cork insert clutch, control being by Bowden cable and lever fitted on cycle handlebar.

Final drive to rear wheel is by a roller chain. A Villiers Junior or S.12 carburetter is fitted at the rear of cylinder, control being by a single lever. A strangler for easy starting, and within the reach of the rider, is provided, and a gauze type air filter prevents the entry of dirt and water.

A decompressor to assist in starting the engine is fitted in the cylinder head, control being by Bowden cable and lever fitted on the handlebar.

The ignition and lighting current is provided by the Villiers flywheel magneto, a special model giving increased output having been developed. The headlamp now carries a 6 Volt—12 Watt bulb.

THE VILLIERS ENGINEERING COMPANY LIMITED.

Marston Road

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Wolverhampton

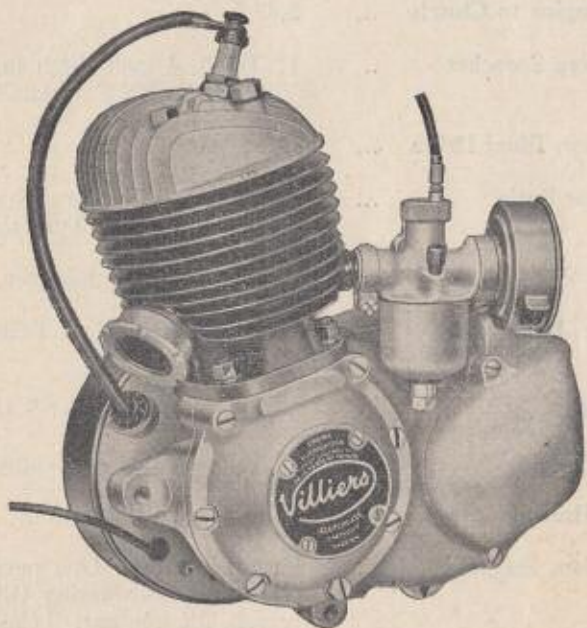
TELEPHONE:—
WOLVERHAMPTON
22399 (20 LINES).

TELEGRAMS:—VILLIERS,
WOLVERHAMPTON,
CODE:—BENTLEY'S.

The

Villiers

Mk. 2.F. AUTOCYCLE ENGINE



**BEFORE ATTEMPTING TO START ENGINE
CAREFULLY READ INSTRUCTIONS ON PAGES 3 & 4.**

GENERAL DATA.

Model	...	...	...	Mk. 2.F.
Bore	...	...	...	47 mm. = 1.8504 inches.
Stroke	...	...	...	57 mm. = 2.244 inches.
Capacity	...	...	...	98 cc. = 6 cubic inches.
Horse Power, Maximum	...	...	...	2.0 at 3,750 R.P.M.
Engine Sprocket	...	...	...	17 Teeth.
Clutch Sprocket	...	...	...	42 Teeth.
Ratio, Engine to Clutch	...	...	...	2.47.
Final Drive Sprocket	...	...	...	11 Teeth, $\frac{1}{2}$ inch Pitch for "COVENTRY" Chain No. 112045.
Chain Line, Final Drive	...	...	...	$1\frac{7}{8}$ inches.
Final Gear Ratio	...	...	...	10.76—1 with rear wheel sprocket, having 48 Teeth. Tyre size 26 inches.
Exhaust Pipe	...	...	...	$1\frac{1}{4}$ inch external diameter.
Sparking Plug	...	...	...	14 mm. Lodge H14, Point Gap .018" to .025".
Carburetter	...	...	...	Villiers "Junior" or S.12.
Ignition Timing	...	...	...	$\frac{1}{8}$ " before top dead centre.
Contact Breaker	...	...	...	Point Gap .012"/.015".
Lubrication, Engine	...	...	...	Petrol mixture. One part "Castrol" two-stroke Self-Mixing Oil to 16 parts petrol, OR one part "Castrol" 'XL' Oil (S.A.E. 30) to 20 parts petrol.
Lubrication, Chaincase	...	...	...	Castrol 'D' Oil S.A.E. 140.
Lighting Set	...	...	...	Head Lamp Bulb, 6 Volt—12 Watt S.B.C. Head Lamp Pilot Bulb, 4 Volt —.3 amp. M.E.S. Tail Lamp Bulb, 4 Volt—.3 amp. M.E.S. Parking Battery, Ever-Ready No. 1289.

INSTRUCTIONS FOR USING THE VILLIERS MARK 2.F. UNIT.

BEFORE USE.

CHAINCASE Remove the chaincase oil filler and oil level plugs, see Fig. 1, and with the cycle off the stand, pour in CASTROL "D" OIL (S.A.E.140) until it runs out at the level plug hole. Refit plugs securely. Examine every 500 miles and top up if necessary.

FUEL TANK Fill up Tank with a mixture of oil and petrol, the mixture to be made and well shaken before putting into Tank.

We recommend "Castrol" two-stroke Self-Mixing Oil at a ratio of $\frac{1}{2}$ -pint to one gallon of petrol (ratio 1-16) OR Castrol XL Oil (S.A.E. 30) ratio 1-20.

Due to the Self-Mixing properties of "Castrol" two-stroke Self-Mixing Oil, $\frac{1}{2}$ -pint to one gallon of petrol represents a ratio of 1-20 actual lubricant to petrol, and **no pre-mixing is necessary**, but it is essential to turn off the Petrol Tap and put the oil into the Tank before the petrol.

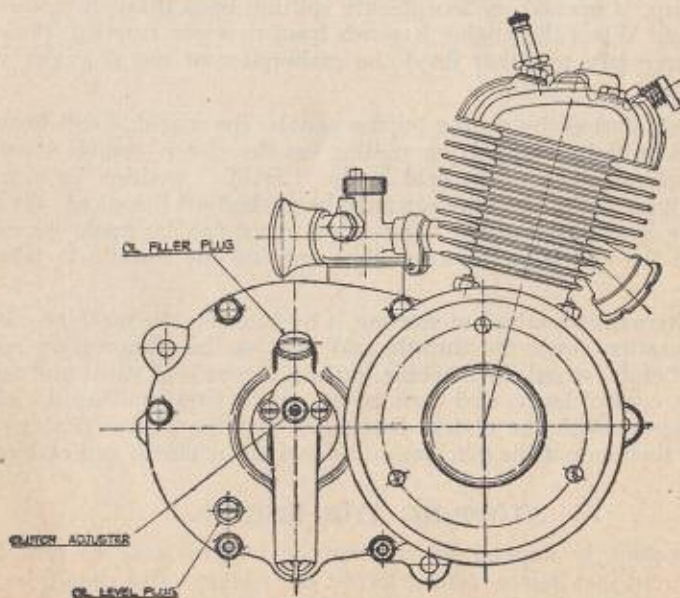


FIG. 1.

STARTING THE ENGINE.

Where the owner has had no previous experience of driving it is advisable to become accustomed to the use of the various controls and, therefore, before attempting to start the engine, the cycle should be put on its stand, the rear wheel being off the ground.

The carburetter control lever is moved by the right hand and opens inwards to increase the speed of the engine.

The decompressor or compression release valve, as it is sometimes called, is controlled by a small lever usually fixed on the underside of the left handlebar and immediately in front of the clutch control lever.

The function of the decompressor is to release the pressure in the cylinder head so making it possible to rotate the engine by means of the pedalling gear when starting by this method.

The fuel tap can now be turned to the ON position, and the strangler closed by lifting the lever at rear of carburetter. Junior Carburetter.—Open throttle about one third of full travel and flood float chamber by depressing the tickler. S.12 Carburetter—Fully open throttle—do not flood float chamber except under cold weather conditions. Rotate engine by pedalling whilst sitting on the saddle, and the engine should start when the decompressor lever is released. As the engine warms up after running for half a minute or so, the strangler can be gradually moved to the fully open position and the throttle adjusted to give the required engine speed. In very cold weather it may not be possible to do this immediately, in which case leave strangler partly closed until engine is warmed up, if opened up too quickly spitting back through carburetter will occur. When the engine is warm from previous running, it should not be necessary to either flood the carburetter or use strangler when restarting.

Having started the engine by the pedals, the machine still being on the stand, withdraw clutch by pulling up the clutch control lever, on some machines the lever is held in the "OUT" position by a spring loaded trigger. The machine can now be pushed off the stand, the rider still being astride the saddle, and a get away can be made by gently letting in the clutch at the same time opening the throttle to take the load.

An alternative method of starting is by pushing the machine. Flood the carburetter, open the throttle and depress the compression release valve as before, wheel the machine forward a couple of yards and release the valve control lever, and then as the engine fires, pull up the clutch control lever, With the clutch disengaged and the engine running, the rider can then mount the machine and move off by clutch and carburetter control.

STOPPING THE ENGINE.

The engine is stopped by moving the control lever to the closed position, and just before coming to rest the release valve should be used to prevent the engine jerking over compression.

FAILURE TO START.

If the engine will not start after a reasonable number of attempts, ascertain if this is due to lack of compression, no fuel or faulty ignition. **COMPRESSION** should be felt whilst rotating the engine by the pedalling gear, with the throttle partly open.

FUEL SUPPLY. Depress tickler at side of carburetter body. If fuel is reaching float chamber, it will spurt from vent hole in tickler cap.

FAULTY IGNITION. Unscrew spark plug from cylinder head and with the ignition cable attached place on a flat metal part of engine. When the engine is rotated a spark should be visible at the points. If no spark, detach cable and hold end one-eighth inch from cylinder whilst rotating engine.

If these preliminary tests prove negative a more detailed examination will have to be made, and reference should be made to "Tracing Engine Troubles" on pages 28 - 30.

RUNNING IN.

For the first 500 miles the engine must not be over-driven, and during this period the throttle should not be fully opened. The engine must not be allowed to race, or run at a high speed under a light load. Do not exceed 20 m.p.h. during the running-in period, and after covering about 500 miles it will very likely be necessary to weaken off the mixture of fuel and air in carburetter. How to do this is explained in the section dealing with the carburetter.

PERIODICAL ATTENTION.

It is advisable, in order to enjoy trouble-free riding, that the engine and machine should have routine attention, and the following hints will help to keep the engine in good running order:—

Every 500 miles inspect level of oil in clutchcase by removing Level Screw (See Fig. 1). Top up if necessary with grade of oil previously recommended.

Examine the contact breaker points after the first 500 miles have been completed as the points may require slight adjustment after initial bedding in. The correct gap when points are fully open is .015". They should also be kept free from oil.

Every 2,000 miles remove cylinder head and scrape out carbon. The edges of the exhaust port in the cylinder can be cleaned when the piston is at the bottom of the stroke. Clean piston top.

It should not be necessary to remove barrel and piston every 2,000 miles every 4,000 miles should be sufficient.

Every 2,000 miles remove and clean silencer, exhaust pipe, and carburetter air filter.

Occasionally check clutch control cable adjustment. There should be a very small amount of slack in the clutch cable when clutch is engaged. Adjust clutch cable by means of adjustment screw on clutch bridge casting (See Fig. 1). Screw adjuster in until there is just a trace of slack in the cable; this is essential, otherwise the clutch may be slightly disengaged and cause slipping. Tighten locknut after adjustment.

Periodically examine joints, cylinder head, cylinder base, crankcase and clutchcase, for gas or oil leaks, and tighten if necessary. Examine all visible nuts, bolts and screws for looseness.

CARBURETTER.

Either the Junior or the S.12 Carburetter is fitted and it should not normally be necessary to alter the setting obtained by the motor-cycle maker after road-testing.

Operation of the Carburetter. The function of the carburetter is to supply a mixture of petrol and air in the correct proportions, no matter what the conditions under which the engine has to work.

In both carburetters the float chamber and float surround the centrepiece, the float rising as the fuel enters the chamber until the correct level is reached. At this point a forked lever which rests on top of the float, lifts a fuel needle valve to stop the fuel supply. In the Junior carburetter fuel enters the centrepiece through a hole in the side and passes through the calibrated jet fitted in the bottom of the centrepiece. The S.12 carburetter has a calibrated jet in the float chamber, and fuel enters the centrepiece from the bottom, via this jet. The throttle is of a cylindrical pattern, and is fitted with a tapered needle which extends below it into the centrepiece. When the throttle, which is operated by a cable from the handlebar, closes the air supply, the largest diameter of the needle nearly closes the fuel outlet; but when the throttle is raised to admit more air, the smaller diameter of the needle allows more fuel to pass.

In this way the combination of jet size, needle position and needle taper gives a correct mixture of fuel and air at all throttle settings, making the carburetter automatic in operation. The only adjustment which can be made in the Junior carburetter is to the position of the taper needle in the throttle. The S.12 carburetter incorporates an air by-pass screw which enables the mixture to be adjusted between closed and $\frac{1}{2}$ throttle. Screw in to richen mixture and vice versa.

It is not normally necessary to alter the setting of the taper needle which has been determined during testing at the works. This setting controls the mixture strength from the point at which the

engine is ticking over until the throttle is about two-thirds open. After this the jet controls the mixture up to full throttle position. No alternative sizes of taper needles or jets are necessary for normal running conditions.

In cold weather conditions the mixture may, with advantage, be richened slightly by raising the taper needle slightly. Adjustment in the Junior carburetter is by means of a screw in the centre of the throttle—screw out to richen and vice-versa.

In the S.12 carburetter the taper needle is located by a clip, and raising the needle one groove, e.g. No. 3 to No. 4 (See page 24) will richen the mixture.

DISMANTLING THE CARBURETTER.

Always stop the Engine before removing the Throttle from the Carburetter.

It is recommended that as long as the carburetter—or any other part of the engine—is giving satisfactory service, it should not be tampered with or taken to pieces. If dismantling becomes necessary, carry it out in the following way:—

JUNIOR TYPE 6/0.

To Remove Throttle from Body. Open the throttle to its fullest extent, and unscrew the milled ring on top of the throttle body.

The throttle can now be withdrawn, but take care not to damage or bend the taper needle.

To detach the throttle from the cable, return the throttle control lever to the fully closed position, compress the throttle spring, and the inner cable can then be lifted out of its slot.

To Remove Centrepiece and Fuel Needle from Body. Unscrew the nut underneath the float chamber. Remove the small fibre washer, the float chamber and float, and if loose, the fibre washer between the float chamber and the carburetter body.

Remove the small locking screw situated below and to the rear of the petrol pipe union, and push the centrepiece up through the throttle bore.

NOTE:—Do not attempt to remove the jet from the centrepiece, as these parts are not intended to be separated.

When the centrepiece is removed, the fuel needle lever is freed, and will turn to allow the fuel needle to drop out of its seating. Therefore the fuel needle should be removed at the same time as the centrepiece, and kept in a safe place until it is required.

No attempt whatever should be made to remove the fuel needle lever from the carburetter body.

To Remove Tickler. This should not be necessary unless the air vent hole in the carburetter body, at the base of the tickler, has become clogged. If this happens, it will no longer be possible to make a ready check on whether fuel is reaching the carburetter. Remove the tickler by taking out the split pin at its lower end, thereby releasing the tickler and its spring. One vent hole is at the bottom of the hole into which the spring fits, and the other is in the side of the tickler cap.

Re-assembly of Carburetter. This is the reverse of the process already described, but the following points should be observed:—

The fuel needle must be fitted into its seating point first.

The fuel needle lever should then be held so that it holds the needle in place, ready for the centrepiece to be fitted between the two small prongs on the lever.

Fit the centrepiece—with the fibre washer first—so that the small locking screw can locate itself in the slot in the head of the centre-piece. Re-fit the locking screw.

Replace the float on the centrepiece, and check to ensure that the fuel needle lever has not become bent or damaged, allowing the float to rise too high in the float chamber.

When the float is held up against the lever, the distance between the top of the float and the carburetter body should be $\frac{7}{32}$ ".

Replace the float chamber, not forgetting the fibre washer which goes between the chamber and the carburetter body.

Re-fit the float chamber retaining nut and its fibre washer to the bottom of the centrepiece, and tighten firmly. Do not over-tighten the nut, however, as this may distort the carburetter body.

Setting the Carburetter. As stated already, the only adjustment which can be made to the carburetter is to the position of the taper needle in the throttle. Such adjustments should not be made unless absolutely necessary, and then only with the use of care and patience, making several small adjustments to find the best position, in preference to a single large alteration.

In this way the best possible setting can be found with the least amount of trouble.

The best setting of the taper needle is that which gives the most even two-stroking when the engine has attained its usual running temperature and is running at normal loads and speeds.

If the engine four-strokes when pulling very hard, this indicates that the mixture of fuel and air passing to the engine is too rich. As this can cause the sparking plug to oil up and stop the engine, the condition should be corrected at once.

Check that the carburettor float chamber is not flooding, and that the air cleaner is not choked.

If the four-stroke continues, the fuel and air mixture must be weakened by lowering the taper needle in the throttle. This is done by adjusting the screw which is fitted in the centre of the top of the throttle. Turn it clockwise to lower the taper needle, and test the engine after every half-turn.

The adjusting screw is split to make it grip the hole in which it fits; take care that it does not become loose through unnecessary adjustments. Should this happen, remove the screw and prise the split portion apart VERY GENTLY, a little at a time, until it is tight enough to grip the hole properly.

NOTE: The taper needle must be fitted with the small spring under its head, so that it is held up against the adjusting screw.

The normal taper needle setting measures $\frac{3}{32}$ " from the bottom of the throttle to the end of the needle, but this should only be taken as a guide, as each engine requires individual adjustment to obtain the best results.

TYPE S.12. (See page 24 for illustration).

To Remove Throttle from Body. Open throttle fully and remove the top cap screw. Withdraw throttle, taking care not to damage the taper needle. The throttle may be removed from the cable after releasing the tension on the throttle spring and lifting cable nipple from the slot in the throttle slide. The taper needle can be removed after the spring clip has been moved to one side.

To Remove Jet Block and Fuel Needle from Body. A special tool is required to remove the jet block, which is screwed into the carburettor body. Unless the jet is worn, it is recommended that this component is not disturbed.

Removal of the fuel needle and the fuel needle bush is possible after the float cup, float and fuel needle lever have been removed.

The fuel needle bush is screwed into the carburettor body and again it is recommended that this remains undisturbed unless a replacement is required.

To Remove Tickler. A circlip retains the tickler in position, and, after removal, the tickler and tickler spring can be withdrawn from the carburettor body.

To Remove Main and Air Compensating Jets. These are screwed into the float cup and carburetter body respectively. The jets may be unscrewed for cleaning when necessary. Providing the air filter is kept in position, the air compensating jet should not require cleaning.

Re-assembly of Carburetter. This is the reverse of the process already described, but the following points should be observed:—

The fuel needle bush, main and air compensating jets must be screwed firmly into their respective positions.

The fuel needle must be inserted, point first, into the fuel needle bush, and the fuel lever located by the needle hinge.

With the float in position, ensure that it is clear of the tickler. If not, the fuel needle lever has been bent, and must be reset to give a vertical measurement of $\frac{7}{32}$ " between the top of the float and the face of the carburetter body where the sealing ring is located

The float chamber sealing washer must be intact and seated correctly in the recess in the carburetter body.

Replace float chamber and **tighten by hand. Do not use spanner, etc., otherwise damage to threads may occur.**

Replace taper needle in throttle, locating by spring clip in the correct groove, and replace throttle spring and cable.

Place throttle into carburetter body, guiding the taper needle into the jet block. Replace top cap and knurled screw.

Re-Setting Carburetter. The main, air compensating and needle jets, and the taper needle, fitted to each carburetter have been selected to give optimum results, for each particular engine, and, therefore, it is recommended that adjustments to the taper needle setting and air by-pass screw only are carried out by the owner.

The air by-pass screw enables the mixture to be adjusted between the closed and $\frac{1}{2}$ open position of the throttle. Screw in to richen mixture and vice-versa.

The taper needle position governs the mixture strength between $\frac{1}{2}$ and $\frac{3}{4}$ throttle. The nominal position is with the needle locating clip in groove No. 3. Groove No. 1 is the weakest position. The speed of tickover can be adjusted by the cable adjusting screw. In cold weather, the taper needle may be set one groove richer (one number higher) than standard.

FLYWHEEL MAGNETO.

The Villiers 6-Pole Flywheel Magneto provides alternating current for both ignition and lighting. A connector is fitted to the lighting cable and this must be unscrewed should the engine be removed. Keep the rubber sleeve in position over the connector, otherwise a short circuit may occur.

The armature plate which carries the ignition coil, lighting coils, and contact breaker mechanism is secured to the engine crankcase by four screws. The H.T. Lead from ignition coil to sparking plug is detachable by unscrewing from armature plate and when refitting it is important to make sure that the brass pad carried by the spring and secured to the terminal makes contact with the soldered disc on the outside of the ignition coil.

In the magneto flywheel are fitted four permanent magnets and two dummies, and it is very important should these be removed at any time that they are replaced in the original position in relation to the peak of the cam profile ground on the centre boss which is rivetted to the arms of the flywheel.

The flywheel should not be removed unless absolutely necessary, and then it is advisable to use a Villiers hammer tight Spanner for the centre nut. The nut is imprisoned in the flywheel and acts as an extractor when turned anti-clockwise looking at the magneto.

Before access can be made to the nut, of course, the flywheel cover has first to be removed by releasing the three screws holding cover to flywheel.

TIMING OF THE MAGNETO.

The contact breaker points should commence to open when the piston is $\frac{1}{8}$ " before top of stroke. Timing marks are stamped on both the armature plate and flywheel rim.

The mark on the armature plate is stamped on a small boss on the rim of the armature plate, and the mark on the flywheel rim coincides with this mark when the piston is at the top of the stroke. On checking timing it is only necessary to remove the sparking plug; turn flywheel until the two marks are opposite when the piston should be at top of stroke.

When timing ignition after dismantling loosely fit the flywheel to shaft and, having set piston $\frac{1}{8}$ " from top of stroke, rotate flywheel without turning the crankshaft until the contact points commence to open. Tighten up flywheel centre nut sufficiently tight for crankshaft to be rotated. Check to see that the flywheel has not slipped. Finally tighten the centre nut with the special hammer tight spanner, refit cover and screws.

CONTACT BREAKER ASSEMBLY.

This is of the type requiring a screwdriver only to adjust the contact points. Adjustment is as follows:—

Turn flywheel clockwise until rocker pad "E" is on top of cam profile of flywheel boss. Release the screw "A" (see illustration below). Position bracket "B" by turning adjuster cam "C" until .015" feeler gauge can be inserted between the contact points. Tighten screw "A" and withdraw feeler gauge. It is not necessary to disturb nut "D" when adjusting point gap.

A felt pad "F" is used to keep the cam in a slightly oily condition, and is impregnated when new with grease. This can, if visibly dry, be oiled with a small amount of the heaviest oil available. It is better, however, to soak the pad in a molten high temperature grease if it is convenient to detach the box itself for this operation. If too much oil is put on the felt pad it may creep along the Rocker Arm, get on the contact points and so cause ignition trouble.

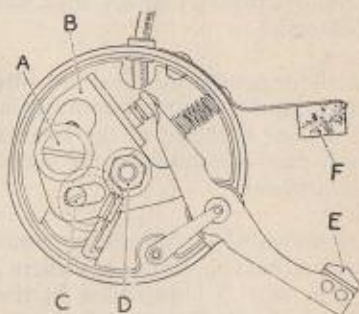
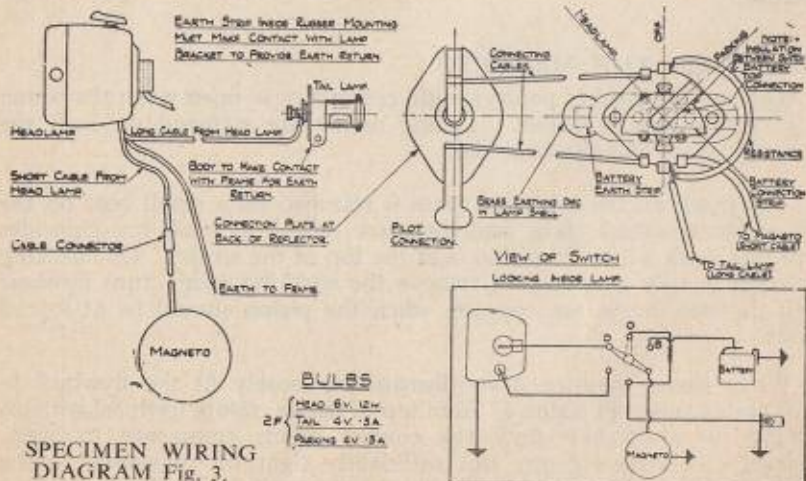


Fig. 2.



LIGHTING SET.

The head and tail lamps are fitted with single pole, single contact bulbs, and it is essential that both lamp bodies make metal to metal contact with the cycle frame to ensure a good EARTH for the lighting circuit.

The correct bulbs are listed on the DATA page, and the dry battery fitted in the head lamp is the EVER-READY No. 1289, or one of similar size and capacity.

TRACING TROUBLES.

For the satisfactory running of any Villiers Engine it is essential that three main conditions are fulfilled, and by making a systematic and intelligent investigation the faults can usually be located and rectified. Usually when the engine stops, symptoms give a clue to the cause, but where this is not the case, the trouble can be more easily diagnosed by following a definite method of investigation.

The three conditions mentioned above are as follows:—

1. The required quantity of combustible mixture (petrol and air) must enter the engine, which means that a sufficient supply of fuel must be available at the carburetter and that the throttle should open and close freely.
2. There must be a good spark at the plug points, when under compression, and at the correct time in relation to the position of piston on its upward stroke.
3. The engine must be in good mechanical condition, there must be good compression in cylinder and crankcase, and no air leaks at the various joints.

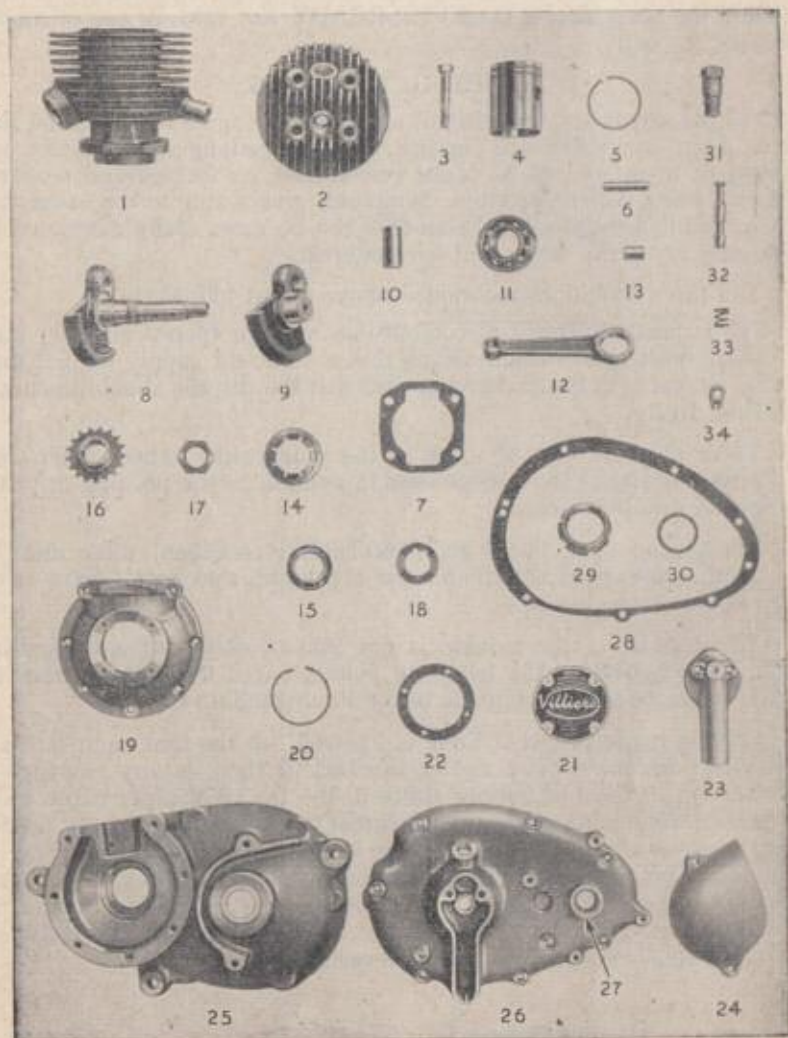
When cause of the trouble is not evident carry out a preliminary examination covering the following points, but if this fails to trace the cause reference should be made to the Fault Finding Charts.

Having made sure that there is "petrol" in the tank, and tap is in the ON position, depress tickler to check if there is any stoppage or obstruction in the fuel supply either in the tap, fuel pipe, banjo union or fuel needle seating. Being satisfied that fuel is reaching the carburetter, next unscrew sparking plug and with high tension lead attached lay on cylinder head. Test by turning engine by pedals with cycle on start, and if the spark is satisfactory it is possible that the timing is incorrect. Finally examine the carburetter controls to make certain the throttle is actually opening when the control lever is moved.

* Insist on

GENUINE

Villiers SPARES



ENGINE.

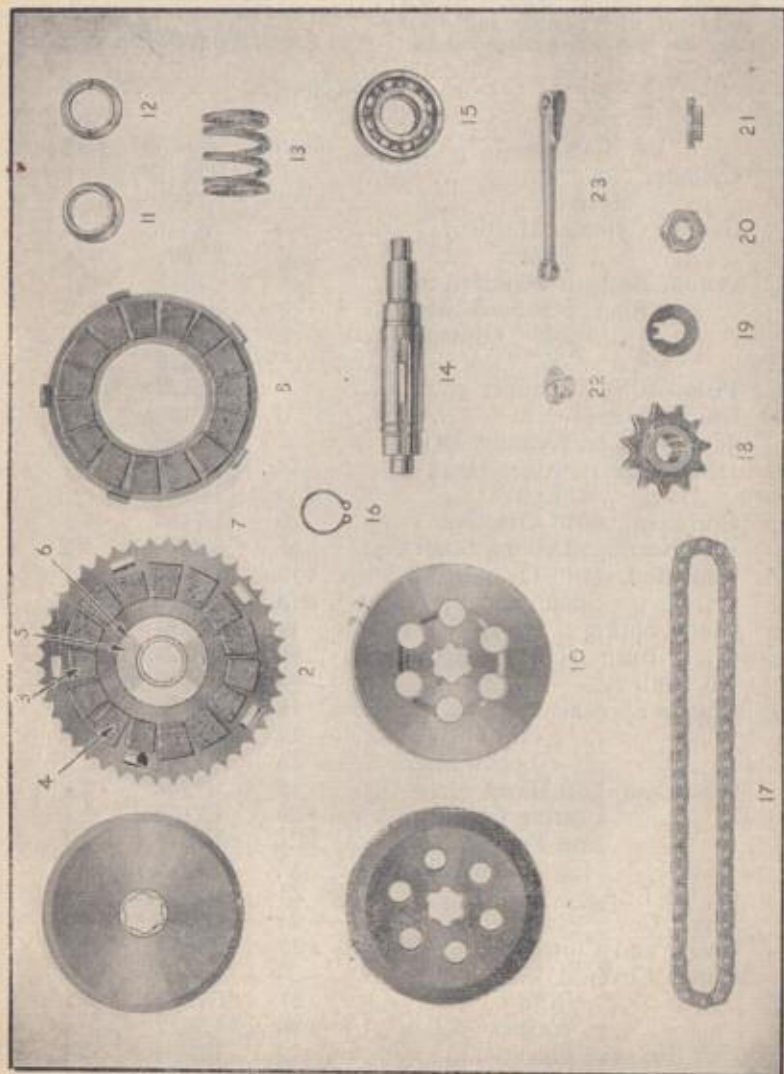
SPARE PARTS LIST

When ordering spares, always quote the engine number. This is stamped on the crankcase door. ALWAYS quote the part number and description, not the illustration number.



ENGINE.

<i>Component.</i>	<i>Illus. No.</i>	<i>Part No.</i>	<i>No. per Set.</i>
Cylinder	1	B7261F/2	1
" Head	2	B7455	1
Gasket, Cylinder Head	—	E8546	1
" " Bolt	3	E3907	4
Piston, Bushed, Standard Size ...	4	C7045	1
" Ring, Standard Size	5	E6141	2
" " .015" Oversize	5	E7516	2
" " .03" "	5	E7518	2
Piston Ring Expander	—	E8272	1
Gudgeon Pin	6	E7198	1
Joint Washer, Cylinder Base	7	E7168	1
Driving Shaft, Right Hand	8	D7266	1
" " Left "	9	D7267	1
Crankpin, .001" Oversize	10	E7493	1
Ball Bearing, Driving Shaft	11	6205	2
Con. Rod, .001" Oversize, Bushed	12	D7494	1
" " Small End Bush	13	E6192	1
Gland Spring } Not fitted to ...	14	E6221	1
" Bush } current engines	15	E6724/1	1
Oil Seal	—	E9728	1
Engine Sprocket	16	E6725	1
" " Nut	17	E6930	1
" " Lockwasher	18	E7197	1
Crankcase, Left Hand	19	B7262	1
" " Bearing Circlip	20	E7189	1
" " End Plate	21	E7275	1
" " " Washer	22	E7276	1
Clutch Bridge	23	D7410/2	1
Chain Cover	24	D7413	1
Crank and Clutchcase	25	E7553/1	1
Clutch Cover	26	A7409	1
" " Bush	27	E7385	1
" " Washer	28	C7417	1
Nut, Exhaust Pipe	29	E3934	1
Washer for Nut	30	E4453	1
Body, Release Valve	31	E3064	1
Stem, " " 	32	E1280	1
Spring, " " 	33	E1163	1
Nut, " " 	34	E1276	1



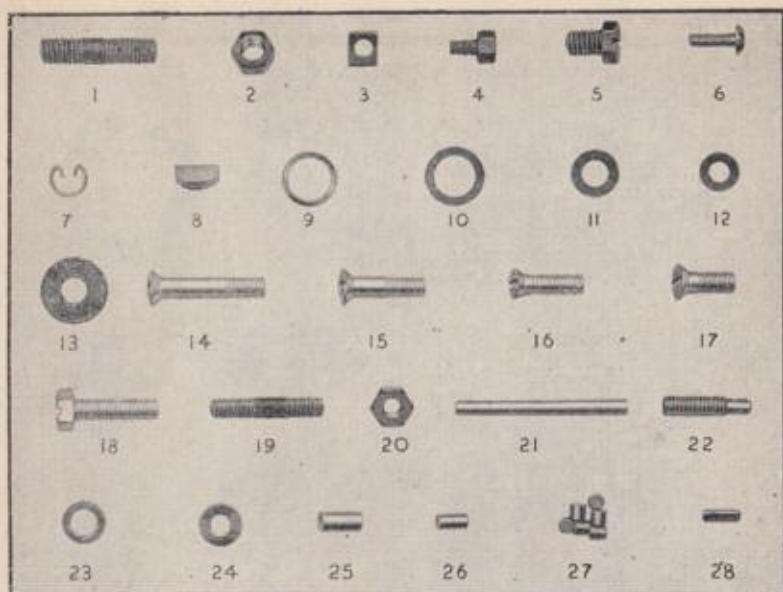
ENGINE—Contd.

<i>Component.</i>	<i>Illus. No.</i>	<i>Part No.</i>	<i>No. per Set.</i>
Clutch Plate, Outer	1	D5433	1
Clutch Sprocket Assembly	2	D5232	1
.. Cork, Small	3	E5220	5
.. .. Large	4	E4960	25
.. Sprocket Side Plate	5	E4955	2
Rivet for Side Plate	6	E5001	5
Sprocket Ball Race	7	E4948	1
Clutch Plate, Corked	8	D5233	1
.. .. Outer	9	D4951	1
.. .. Centre, Dished	10	D4954	1
Clutch Spring Bush, Long	11	E5556	1
.. .. Short, Split	12	E7608	1
Clutch Spring	13	E5558/1	1
Clutch Shaft	14	C7411/1	1
.. .. Ball Bearing	15	6204	2
.. .. Circlip	16	E7454	1
Primary Chain, 54 Pitches	17	110037	1
Drive Sprocket, 11 Teeth	18	D7415	1
.. .. Lockwasher	19	D6125	1
.. .. Nut	20	E3931	1
Clutch Cotter	21	E4944	1
Oil Filler Plug	22	E9329	1
Clutch Lever	23	D7412	1

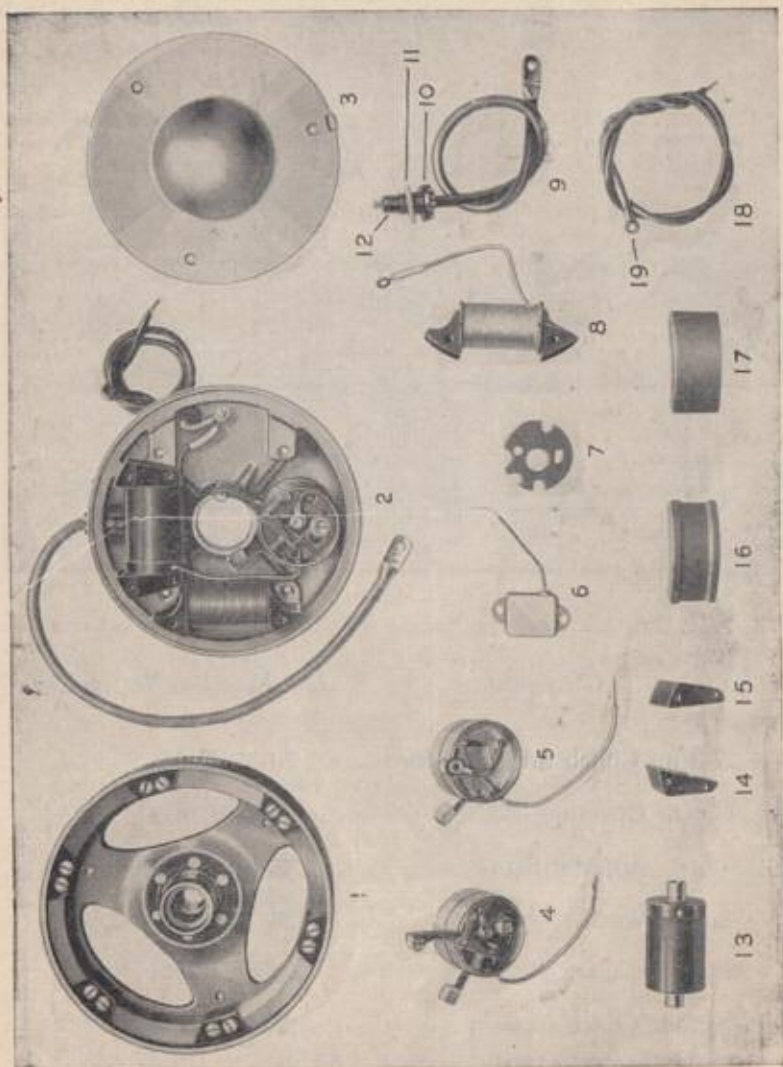
ENGINE—Contd.

<i>Component.</i>	<i>Illus. No.</i>	<i>Part No.</i>	<i>No. per Set.</i>
Cylinder Base Stud	1	E363	4
Nut for Stud	2	E3961	4
Clamp, Release Valve	3	E1545	1
" Screw, Release Valve	4	E6737	1
Oil Level Plug	5	E1962	1
Screw, Crankcase End Plate	6	E7530	4
Circlip, Gudgeon Pin	7	E5218	2
Key, Drive Sprocket	8	E5581	1
Joint Washer, Release Valve	9	E3318	1
" " Oil Filler Plug	10	V107 × 3	1
" " Level Screw	11	E1905	1
" " Crankcase Drain Screw	12	V476	1
Washer, Cylinder Head Bolt	13	E5808	4
Crankcase Screw, $1\frac{5}{16}$ " × 90°	14	E7271	2
" " $\frac{3}{4}$ " × 90°	15	E7128	4
Clutch Bridge Screw, $\frac{13}{16}$ " × 60°	16	E4934	4
Clutch Cover Screw, 1" × 90°	17	E7326	2
Clutch Cover Bolt and Crank- case Drain Screw	18	E3222	4
Stud, Clutch Cover, $\frac{1}{4}$ " × $1\frac{5}{16}$ "	19	E5107	2
Nut for Stud, Small Hex.	20	E2539	2

ENGINE—Contd.



<i>Component.</i>	<i>Illus. No.</i>	<i>Part No.</i>	<i>No. per Set.</i>
Nut for Clutch Adjuster Screw ...	20	E401	1
Clutch Operating Rod ...	21	E7414	1
.. Adjuster Screw ...	22	E6567	1
Spring Washer, $\frac{5}{16}$ " ...	23	E1050	4
Plain Washer, $\frac{1}{2}$ " ...	24	E2924	5
Dowel, Clutch Case ...	25	E7619	2
.. Crankcase ...	26	E2677	1
Crankpin Roller ...	27	E9777	28
Key Engine Sprocket ...	28	E5124	1



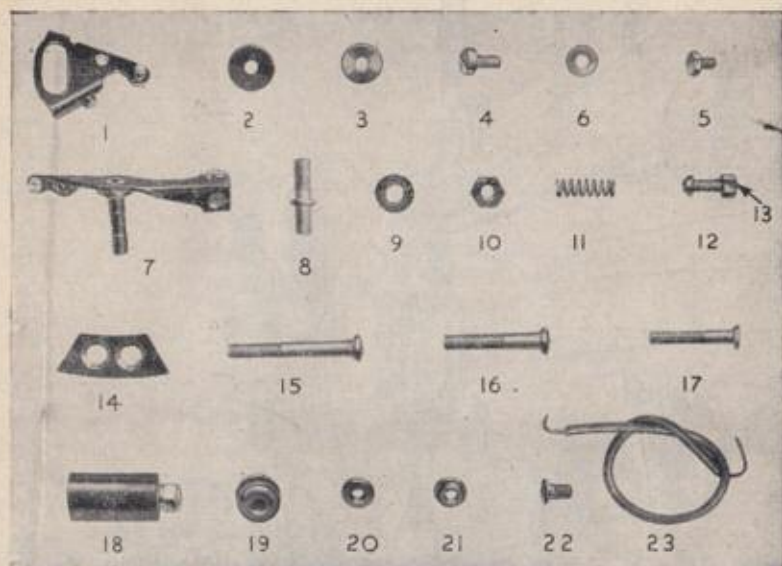
MAGNETO.

MAGNETO.

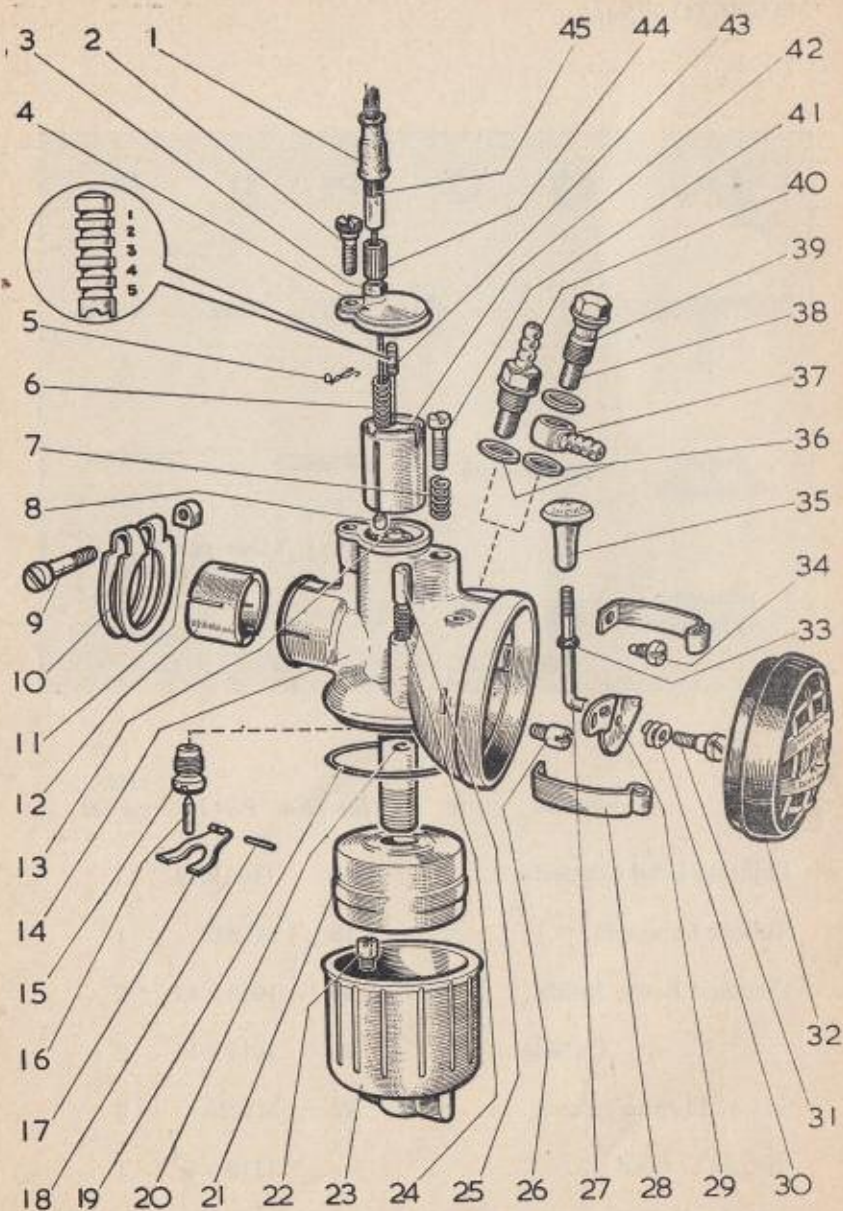
<i>Component.</i>	<i>Illus. No.</i>	<i>Part No.</i>	<i>No. per Set.</i>
Flywheel Assembly, Less Cover...	1	R110	1
Armature Plate Assembly ...	2	A107	1
Flywheel Cover	3	M1580	1
Con. Box Assembly Complete ...	4	M2504	1
.. .. Only with Oil Pad ...	5	M2505	1
.. .. with Condenser ...	—	M2506	1
Condenser	6	M1750	1
Insulating Pad, Con. Box ...	7	M2903	1
Lighting Coil Assembly	8	M2049	1
H.T. Lead Complete	9	1148 × 4	1
.. Terminal	10	1124 × 8	1
.. .. Felt Washer	11	E869	1
.. Spring	—	1010 × 11	1
.. .. Pad	12	1046 × 13	1
.. .. Screw	—	$\frac{5}{8}$ " × No. 2	1
.. Coil	13	M1361	1
.. Coil End, L. Hand	14	M1855	1
.. .. R. Hand	15	M1856	1
Dummy Magnet	16	M1553	2
Magnet	17	M1354	4
Lighting Lead	18	125/114	1
.. .. Terminal	19	M2369E	1

MAGNETO—*Contd.*

<i>Component.</i>	<i>Illus. No.</i>	<i>Part No.</i>	<i>No. per Set.</i>
Point Bracket	1	M2313	1
Cam, Point Bracket	—	M2311	1
Fibre Washer, Locking Screw ...	2	M1805	1
Brass	3	M1802	1
Locking Screw, Point Bracket ...	4	M1801	1
Contact	5	1006 × 3	1
.. .. Washer	6	1113 × 5	3
Rocker Arm with Point and Pad	7	M1714	1
Stud, Con. Box Fixing	8	1053 × 1	2
Spring Washer for Stud	9	1002 × 13	2
Nut for Stud	10	1002 × 15	2
Rocker Arm Spring	11	1047 × 3	1
Terminal Screw	12	M1670	2
Nut for Screw	13	1113 × 4	2
Top Plate, Pole Shoe	14	M1822	6
Fixing Screw	15	1002 × 9	12
.. .. Arm Plate and Lighting Coil	16	1124 × 9	6
.. .. H.T. Coil Ends	17	M1383	4



<i>Component.</i>	<i>Illus. No.</i>	<i>Part No.</i>	<i>No. per Set.</i>
Lighting Lead Connector ...	18	1106 x 14	1
Rubber Grommet ...	19	M1232	1
Terminal Bush, Inside ...	20	1013 x 13	2
" " Outside ...	21	1013 x 12	2
Screw, Flywheel Cover ...	22	M1228	3
Nut, L.T. Lead ...	—	1113 x 4	1
L.T. Lead, H.T. Coil to Point			
Bracket ...	23	482	1



TYPE S.12 CARBURETTER.

TYPE S.12 CARBURETTER.

ILLUS. No.	PART No.	DESCRIPTION	Qty.
1	V826E	Cover, cable	1
2	V1400E	Screw, top cap	1
3	V105 X 2E	Nut, cable adjuster locking	1
4	V1317E	Cap, carburetter top	1
5	V1301E/1	Circlip, needle locating	1
6	V369E	Spring, throttle	1
7	V1402E	„ air adjusting screw	1
8	V145 X 16E	Nipple, cable, throttle end	1
9	V1440E	Bolt, carburetter body clip	1
10	V1426E	Clip, „ „	1
11	V1436E	Nut, „ „ „ bolt	1
12	V1343E	Bush, heat insulating	1
* 13		Jet block, needle	1
14	V1267D	Body, carburetter, $\frac{1}{8}$ " choke	1
15	V1180E	Bush, fuel	1
16	V1179E	Needle, fuel	1
17	V1396E	Lever, fuel needle	1
18	V1237E	Pin, „ „ lever hinge	1
19	V1386E	Washer, float chamber sealing	1
20	V1590E	Circlip, tickler	1
21	V1419E	Float	1
* 22		Jet, main, 85 c.c.	1
23	V1356D	Chamber, float	1
24	V801E	Spring, tickler	1
25	V1398E	Tickler	1
* 26		Jet, air compensating	1
27	V1338E	Spindle, strangler	1
28	V1349D	Clip, filter	2
29	V1337E	Plate, strangler	1
30	V1588E	Washer, strangler screw	1
31	V626E	Screw, strangler plate	1
32	V1383D	Filter assembly	1
33	V1589E	Seal, strangler spindle	1
34	V829E/1	Screw	2
or 34	V1684E	Screw, self-tapping	2
35	V1339E	Knob, strangler spindle	1
36	V1397E	Washer, fibre	1 or 2
37	V1341E	Union, banjo (for item 39)	1
38	V1387E	Gauze, filter	1
39	V1342E	Bolt, banjo	1
or 40	V986E	Union, petrol feed	1
41	V1401E	Screw, air adjustment	1
42	V1248D	Throttle	1
* 43		Needle, taper, No. 3	1
44	V105 X 1E	Adjuster, cable	1
* 45		Cable, throttle, complete	1

* Quote Engine No. in full when ordering.

JUNIOR CARBURETTER.

<i>Component.</i>	<i>Illus. No.</i>	<i>Part No.</i>	<i>No. per Set.</i>
Carburetter Body	C1	V508C/1	1
Top Ring	1014	V367	1
Top Disc	1012	V665	1
Throttle	1007	V365	1
Throttle Spring	1008	V369	1
Taper Needle, No. 2½	1010	V651	1
" " Adjuster	1009	V413	1
" " Spring	1011	V107 × 7	1
Centrepiece and Jet J.8	1075	V408	1
" " Washer	20	V107 × 3	1
" " Locating Screw	C3	V424	1
Bottom Nut	M22	V581	1
" " Washer	23	V107 × 4	1
Float	12	V107 × 1	1
" " Cup	14	V146 × 6	1
" " Washer	13	V107 × 2	1
Fuel Needle	16	V355	1
" " Lever and Pin	M29	V257	1
Body Clip	1016	V922	1
" " Screw	42	V754E	1
Strangler Plate	1017	V373	1
" " Screw	M14	V626	1
" " " " Washer	M15	V146 × 2	1
Air Cleaner	C2	V148 × 3	1
Banjo Union	1071	V381	1
" " Bolt	1072	V382	1
" " Filter Gauze	1074	V404	1
Fibre Washer, Large Hole	C4	H104 × 8	1
" " Small	C5	V383	1
Tickler	C6	V207	1
Tickler Spring	C7	V369	1
" " Split Pin	C8	V111 × 2	1
Control Cable Complete	1026	V234B.C.G	1
or Control Cable Assembly	—	V1453E	1
Control Body	C10	V405	1
" " Handlebar Clip	C11	V142 × 7	1
" " " " Screw	J4	V142 × 5	2
" " Lever	C12	V406	1
" " Top Cover	C13	V387	1
" " Body Friction Plate	1080	V429	1
" " Spring Washer	1081	V142 × 11	1
" " Fibre Washer	1082	V142 × 10	2
" " Top Screw	45	V117 × 5	1
Cable Nipple, Control End	—	V123 × 15	1
" " Throttle End	—	V145 × 16	1
" " Sleeve	—	V108 × 4	1
Cable Adjuster	7	V105 × 1	1
" " Locknut	7	V105 × 2	1

FAULT FINDING CHART.

Sequence of Testing.	Possible Trouble.	Remedy.
Engine will not start.		
Depress tickler on carburetter to check whether fuel is reaching carburetter.	No fuel reaching carburetter. Air lock in petrol pipe.	Turn tap to ON, refill tank, clear-air vent in filler cap. Turn on reserve tap where fitted.
If no fuel, even when tap is on and fuel is in tank.	Choked petrol pipe, filter on tap, filter in banjo. Fuel needle sticking in seating.	Remove and clean out. Dismantle carburetter and fit new needle.
Test for spark by holding sparking plug body on cylinder head.	Leak along insulation of plug or high tension lead.	Try a new plug of the type recommended and/or new H.T. lead.
If still no spark: Test for spark at end of H.T. lead held $\frac{1}{8}$ " from cylinder fins.	Plug points may be oily or sooted up. If no spark at end of H.T. lead, contact breaker point gap may be too narrow or points pitted or dirty or oily.	Clean plug or fit new one. Adjust point gap to .015 inches. Clean.
	Moisture on insulation of condenser box.	Clean and dry out.
	High tension pickup not making good contact on ignition coil due to corrosion or misplacement.	Clean and correct.
	Cracked insulation of adjustable contact breaker point.	Renew.
	Damaged insulating sleeving on wires connecting contact breaker to coil or condenser.	Replace with new sleeving.
	Faulty connection to low tension wire of ignition coil.	Correct.
	Faulty Condenser.	Replace.
	Faulty ignition coil.	Replace.

Sequence of Testing.	Possible Trouble.	Remedy.
If above tests are O.K. but engine will not start.	Mixture may be too rich due to use of strangler, or incorrect setting of taper needle.	Open throttle wide and depress kickstarter several times to clear engine of petrol mixture, adjust taper needle, drain crankcase.
	Air leak at carburettor stub or manifold joint causing weak mixture	Correct.
	Incorrect ignition timing due to flywheel having slipped on driving shaft taper.	Check, following instructions given for respective type of engine.
Engine four or eight strokes.		
Strangler may not be fully open or taper needle in the "RICH" position. Air filter where fitted may need cleaning.	Mixture too rich.	Lower taper needle by moving to "WEAK" position. Lower needle by adjuster screw fitted in throttle.
Check by watching for excessive smoke from exhaust pipe or silencer.	Engine may four stroke for a little while after standing due to accumulation of oil in crankcase.	Usually ceases when engine has been running for a few minutes unless too much oil has been mixed with the petrol.
	Flooding of carburettor.	Persistent flooding is usually due to dirt under fuel needle seating, or sticking fuel needle, or damaged seating or punctured float.
Engine Lacks Power.		
	Engine out of tune, bearings worn. Unsuitable sparking plug. Loss of compression.	Overhaul. Replace with recommended type. Tighten cylinder head bolts. Worn piston rings.
	Incorrect "Petrol" mixture.	Correct mixture is 1 part oil, 20 parts petrol.
	Excessive carbon deposit on piston crown and cylinder head.	Decarbonize.

Sequence of Testing.	Possible Trouble.	Remedy.
Engine Lacks Power (contd.)	Exhaust system choked with carbon.	Clean out silencer and exhaust pipes.
	Incorrect carburettor setting.	Check with setting chart.
	Air Cleaner choked.	Wash in petrol, drain and dip in thin oil.
	Obstruction in fuel supply.	Clean out tap, fuel pipe and filters.
	Incorrect ignition timing.	Check against timing chart.
	Brakes binding.	Adjust.
	Driving chains too tight.	Adjust.
Engine will not run Slowly.	Weak mixture due to air leaks at carburettor stub or manifold joint, crankcase and cylinder base joints.	Tighten all joints.
	Crankcase drain screw loose or missing.	Tighten or replace.
	Worn crankshaft bearings or leaking compression gland.	Replace.
	Ignition timing too far advanced.	Correct.
Engine Suddenly Stops Firing.	Spark plug lead detached.	Replace and tighten nut.
	Plug points bridged by oil, carbon, or deposit caused by use of leaded petrol.	Clean or replace.
	Short circuit of high tension current by water on H.T. lead.	Dry out.

★ Where engines are built to customer's specific requirements, certain special parts may not be included in this spares list. We can supply the correct replacement parts if the description and full engine number are given.

VILLIERS EXCHANGE SERVICE.

Engine Units. When a complete major overhaul becomes necessary, we will accept the old engine providing that it is complete with magneto and carburetter to our catalogue specification, and supply a fully reconditioned engine in part exchange. The reconditioned unit carries the same guarantee as a new unit. Other items which can be part exchanged are as follows:—

- (2) Magneto complete with flywheel,
- (3) Carburetter (less air filter),
- (4) Rebored cylinder with oversize piston complete. (The cylinder presented for exchange must be suitable for re-boring to our maximum oversize of .030").
- (5) Re-conditioned driveshaft assembly.
- (6) Re-corked clutch plates and sprockets.

TERMS OF BUSINESS.

Repairs and spares must always be treated on a cash basis. Ledger accounts will be opened for items of £10 (ten pounds) and upwards for approved accounts.

An extra amount must always be included in remittances to cover the cost of postage or carriage and packing on spare parts. This is 5% extra up to £10 value. Minimum extra is 1/-. Stamps cannot be accepted for items over 1/- (one shilling) in value.

When making remittances by telegraph money order, the name and address of the sender must be included in the space provided on the Post Office Requisition Form for a private message from remitter to payee. Unless this is done, the Post Office does not give this information upon the telegram.

IMPORTANT.

1.—In correspondence, and when ordering replacement assemblies or spares, always quote the Engine Specification and Serial Number stamped on the Crankcase below the Cylinder Base. (See sketch below for example):—



The Engine number is in two parts, the first being the SPECIFICATION Number which is the key to the component parts fitted, and the second the Serial Number by which the date of manufacture, etc., can be determined, e.g. 576B/469.

The **Magneto** also bears a SPECIFICATION Number (example: R.110/A.107) but no Serial Number. The "R" (Rotor or Flywheel), and "A" (Armature Plate) Number is stamped on the face of the Flywheel.

2.—When sending parts for replacement, repair, or as pattern, the name and address of the sender should always be securely attached. Full instructions explaining what is required should be sent separately by post. Duplicate instructions should **always** be enclosed with the parts.

3.—If an engine is sent for repair, it should be well packed in a strong box. Cardboard or a sack is insufficient, and engines so packed are liable to get seriously damaged in transit. Packing cases are not returnable unless specially asked for by the owner at the time of sending to us.

4.—All goods must be consigned to us carriage paid, addressed to "Service Dept." Goods returned by rail are consigned carriage paid.

5.—We prefer to bench test every repaired engine before returning it to its owner. It is, therefore, always advisable to send the engine complete with its magneto, sparking plug and carburetter.

6.—When forwarding a flywheel magneto for overhaul, send the armature plate and the flywheel complete.

7.—**Old or worn out parts sent as patterns, which we consider unserviceable are not returned unless specially asked for at the time of sending them to us.**

8.—Any engine or sub-assembly sent to our Works for repair and not paid for within 12 months from the date of our estimate or from the date the owner is notified of completion of repair, will be dealt with under The Disposal of Uncollected Goods Act, 1952.

ESTIMATES.

If required, we are always prepared to give an estimate before proceeding with any repair. This entails a certain amount of labour in dismantling to ascertain what new parts will be required, and therefore, in the case of any estimate not being accepted for special reasons, a small charge is made for our mechanics' time in taking down the parts for report.

Estimates must be treated as approximate only. We reserve the right to include additional parts should these be found, on further examination or on bench test, to be necessary, to make the repair satisfactory.

We do not undertake to fit to engines sent to us for overhaul, any parts specified by the customer when we consider that other parts are necessary to make an efficient repair. In such cases, we are prepared to supply the customers' requirements in spares, but we do not undertake to fit them.

GUARANTEE.

WE give the following guarantee with VILLIERS Engines and Accessories in place of any implied guarantee by statute or otherwise, all such guarantees being in all cases excluded. No statement or representation contained in this catalogue shall be construed as enlarging or varying this guarantee. In the case of engines and accessories which have been used for "hiring out" purposes, or from which our trade mark, name, or manufacturing number has been removed, no guarantee of any kind is given or is to be implied.

We guarantee, subject to the conditions mentioned below, that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, but this guarantee is to extend and to be in force for six months only from the date the engines or accessories are despatched by us and the damages for which we make ourselves responsible under this guarantee are limited to the replacement of a part manufactured by us which may have proved defective. We cannot accept responsibility for the replacement of any proprietary articles or parts not manufactured by us, unless the makers of these parts agree to replacement.

We do not undertake to refit or bear the cost of replacement or refitting such new part. We guarantee, subject to the conditions mentioned below, to make good at any time within six months any defects in these respects. As VILLIERS Engines and Accessories are liable to derangement by neglect or misuse, this guarantee does not apply to defects caused by wear and tear, misuse and neglect.

CONDITIONS OF GUARANTEE.

If a defective part should be found in our engines or accessories, it must be sent to us carriage paid and accompanied by an intimation from the sender that he desires to have it repaired free of charge, under our guarantee, and he must also furnish us at the same time with the number of the engine, and full particulars of purchase. Failing compliance with the above, no notice will be taken of anything that may arrive, but such articles will lie here at the risk of the sender, and this guarantee or any implied guarantee shall not be enforceable.

THE TERM "AGENT" is used in a complimentary sense only, and those firms whom we style our agents are not authorised to advertise, incur any debts, or transact any business whatsoever on our account other than the sale of goods which they may purchase from us, nor are they authorised to give any warranty or make any representations on our behalf or sell subject to or with any conditions other than those contained in the above guarantee.

The guarantee becomes void if any parts not made or supplied by THE VILLIERS ENGINEERING COMPANY, LTD., are fitted to a VILLIERS engine. To safeguard his own interests the owner should always insist upon genuine VILLIERS parts.

Villiers

*The Power and the Heart
of a fine machine*