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**OPERATING
INSTRUCTIONS
AND
SPARE PARTS
LIST FOR THE**

Villiers

**ENGINE UNIT
Mk. 2.F.**

6^d.

SEPT., 1949

The Villiers Engineering Co Ltd
WOLVERHAMPTON, England

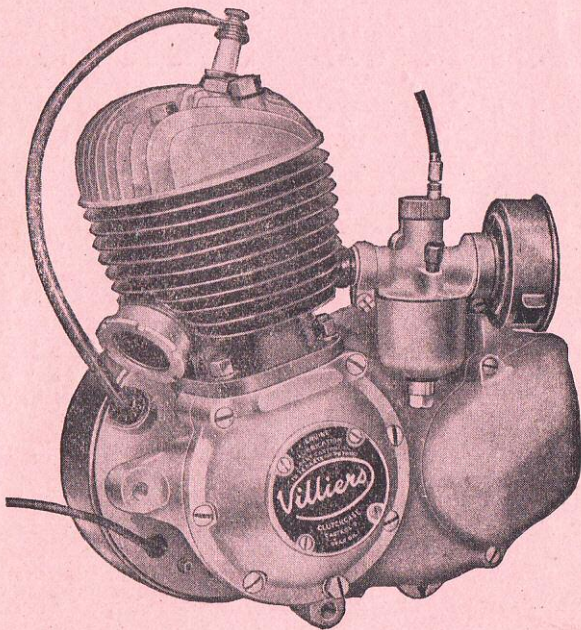
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**KEEP THIS BOOK SAFELY
FOR REFERENCE**

THE *Villiers* Mk. 2.F.
ENGINE UNIT



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

The VILLIERS Mk. 2.F. AUTOCYCLE ENGINE

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 pattern 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.

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	$1\frac{1}{8}$ 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 dia.
Sparking Plug	14 mm. Lodge H14, Point Gap .018" to .025".
Carburetter	Villiers "Junior" Type.
Carburetter Jet Size	Marked J8.
Carburetter Taper Needle	No. 2 $\frac{1}{2}$. Setting $\frac{29}{32}$ " out.
Ignition Timing	$\frac{1}{8}$ " before Top Dead Centre.
Contact Breaker	Point Gap .015" Maximum.
Lubrication, Engine	Petrol Mixture in Fuel Tank (Oil S.A.E. 30).
Lubrication, Chaincase	Castrol "D" Oil (S.A.E. 140) filled to level plug. See Fig. 1.
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 "PETROIL" mixture made by mixing thoroughly half a pint CASTROL XL OIL (S.A.E.30) with one gallon of PETROL. On no account must the oil be put into the tank before mixing, and it is advisable to pour the mixture through a fine mesh gauze when putting into tank.

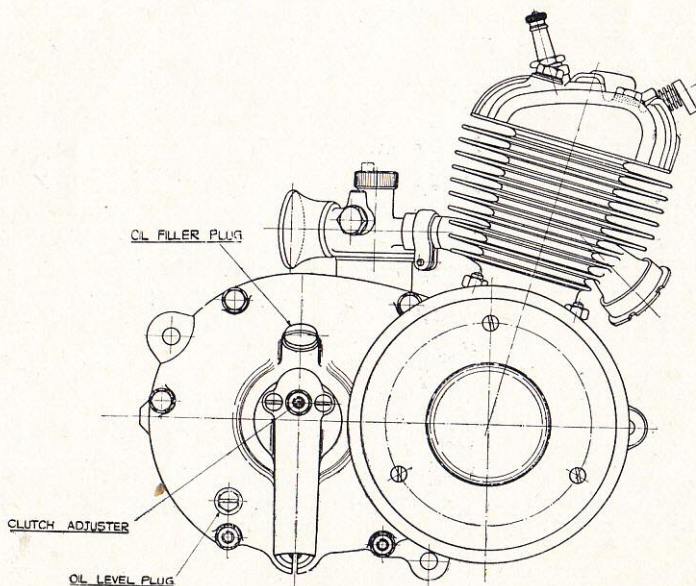


FIG. 1.

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. Open the carburetter control lever about one third its total movement, and flood the float chamber by depressing tickler. 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. 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 11 - 13.

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 by lowering slightly the taper needle 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 periodical 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.

The Villiers Junior Carburetter is used with the Mark 2.F. Engine, and it should not be necessary to alter the setting obtained by the maker (except for needle adjustment), after road testing the machine.

OPERATION OF CARBURETTER.

The function of the Carburetter is to supply a mixture of petrol and air in correct proportion under all conditions. In the Villiers Carburetter the float chamber surrounds the jet and centrepiece, and in the chamber an annular float rises as the fuel enters the chamber until the correct level is obtained, then the forked lever which rests on the top of the float lifts the fuel needle which has a conical end and shuts off the fuel supply by closing the hole in the bush fitted in carburetter body.

Fuel enters the centrepiece through a hole in the side and passes through the calibrated jet fitted in the bottom of centrepiece.

The throttle operated by the cable is fitted with a taper needle which extends below the throttle and into the centrepiece. When the throttle slide closes the air supply the largest diameter of the needle nearly closes the fuel outlet, but when the slide is lifted admitting more air, the smaller diameter of the needle now in the centrepiece allows more fuel to pass. A suitable combination jet size, needle position and taper will give a correct mixture strength on all throttle openings.

The fuel level is maintained by a float and needle valve, and under no circumstances should any alteration be made either to the above or to the float lever.

The amount of fuel supplied to the engine is controlled by one jet which is fixed in the bottom of the centrepiece, and by the taper needle which is carried in the throttle and operates in the top end of the centrepiece.

The jet is not detachable from the centrepiece and is not supplied separately.

The Carburetter is automatic in action and gives a correct mixture over the whole range of throttle openings, the only available adjustment

being the position of the taper needle in the throttle (which controls the size of the jet orifice), and is necessary to suit individual engines.

The needle controls the mixture strength from tickover to approximately two-thirds throttle, the jet controls the remainder.

The position of the taper needle in the throttle is determined during testing at the works, but should it be necessary to alter the setting this is done by the needle adjusting screw situated in the centre and top of throttle. Screw in to weaken mixture, (i.e. lower needle), the screw should not be loose in the throttle slide as it is likely to move and alter the setting. It is split to make it grip the hole. Should the screw be loose the split portion should be gently prised apart before fitting.

NOTE.—The taper needle spring should be fitted with the small coil under the head of needle.

TO DISMANTLE CARBURETTER.

TO REMOVE THROTTLE FROM BODY. Open throttle to full open, undo top ring, throttle can now be withdrawn. Take care not to damage or bend the taper needle. Return throttle to fully closed position, the guide peg attached to top disc will then be exposed and, if necessary, the control cable can be detached by compressing throttle spring, the inner cable then being lifted out through the slot.

TO REMOVE CENTREPIECE AND FUEL NEEDLE. Unscrew the bottom nut underneath the float chamber cup. Next remove the fibre washer, the cup with float inside, and if loose, the fibre washer between cup and carburetter body. Then remove the small centrepiece locking screw situated below and to the rear of the banjo petrol pipe union, the centrepiece with fibre washer under head can now be pushed up through the throttle bore.

When the centrepiece is removed the fuel needle lever can swing round and will thus allow the fuel needle to drop out of its seating; the needle should therefore be removed at the same time as the centrepiece and kept in a safe place until required for reassembly. No attempt should be made to remove the fuel needle lever from the carburetter body.

TO REMOVE TICKLER. This should not be necessary unless the vent hole in base of body is blocked, in which case remove the split cotter pin at end of tickler which will release the tickler and its spring. One vent hole is at the bottom of the hole where the spring fits, the other being in the side of the tickler cap.

CARBURETTER SETTING. The Carburetter is fitted with a taper needle marked 2½ on the parallel portion under the head, a centrepiece marked J8 on the head, and the jet (which is not detachable) marked 8 on the hexagon portion. The normal taper needle setting is $\frac{29}{32}$ " from the bottom of the throttle to the end of the needle, but this is usually a matter of individual adjustment to suit each engine.

REASSEMBLY OF CARBURETTER. This, of course, is the reverse process to that already described; the fuel needle should be fitted point first, the fuel needle lever should then be placed so that it holds the needle in position whilst the centrepiece is replaced. Care should be taken to see that the centrepiece complete with fibre washer is fitted so that the locking screw locates in the slot in the head of the centrepiece. When refitting float do not overtighten bottom nut as this may distort the jet.

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.

CONTACT BREAKER ASSEMBLY.

This is of the latest improved type requiring a screwdriver only to adjust the contact points. To adjust the contact points proceed as follows:—

Turn flywheel until rocker pad is on top of cam profile of flywheel boss. Release the screw "A," see illustration, Fig. 2.

Position Bracket "B" with .015" feeler gauge between contact points, tighten screw, taking care not to use too much force. It is not necessary to disturb screw "C" when adjusting point gap.

A felt pad 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.

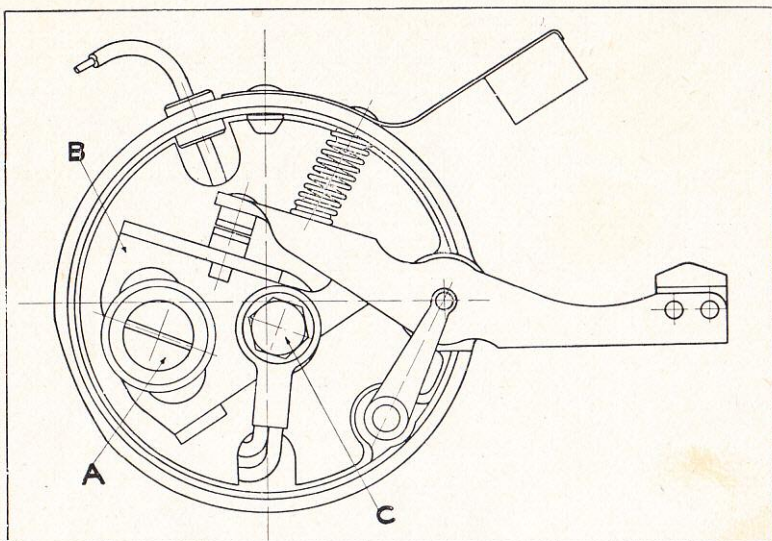


FIG. 2.
CONTACT BREAKER ASSEMBLY.

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 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.

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.

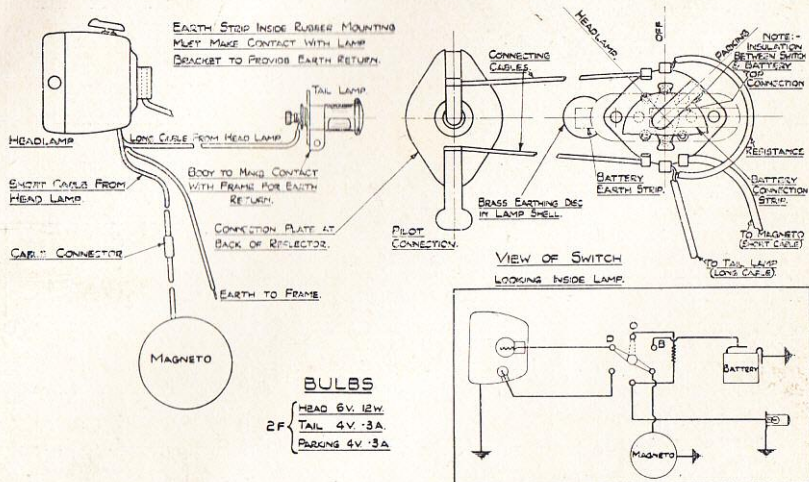


FIG. 3.
WIRING DIAGRAM Mk. 2.F.

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 stand, 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.

FAULT FINDING CHART.

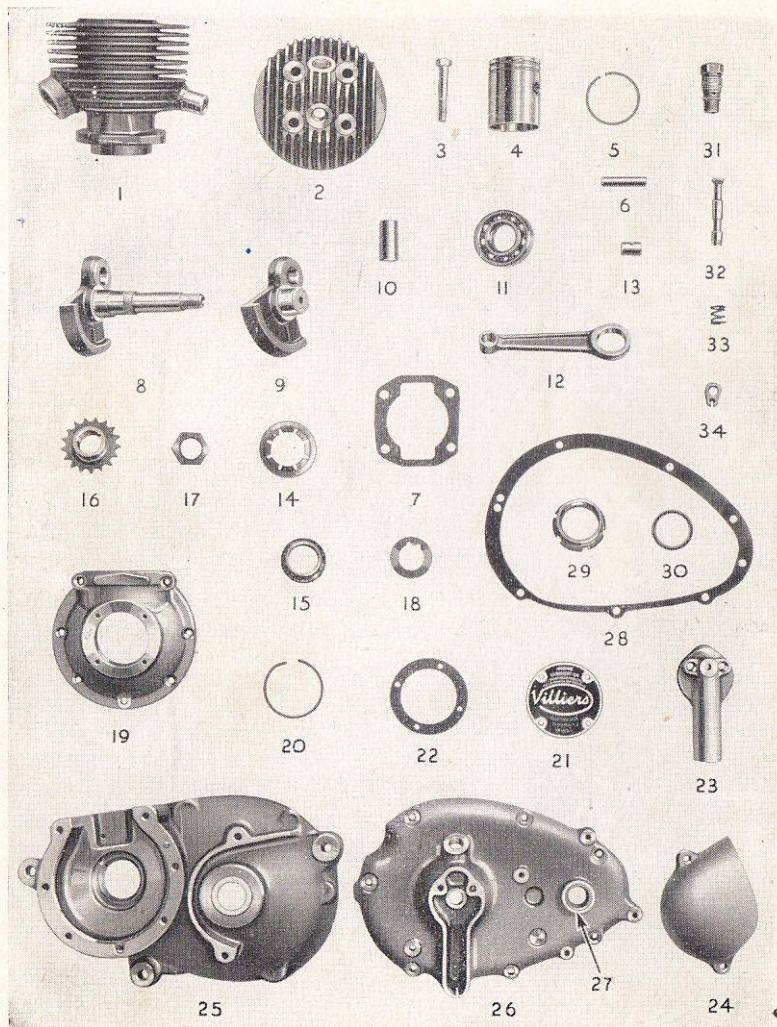
Sequence of Testing.	Possible Trouble.	Remedy.
Engine will not start.		
Depress tickler on carburetter to check whether fuel is reaching carburetter.	No fuel reaching carburetter, air lock in petrol pipe.	Turn tap to ON, refill tank, clear air vent in filler cap. Turn on reserve tap where fitted.
If 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 pick-up not making good contact on ignition coil due to corrosion or misplacement.	Clean and correct.

Sequence of Testing.	Possible Trouble.	Remedy.	
If above tests are O.K. but engine will not start.	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.	
	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 leaks 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 silencers.	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.	

Sequence of Testing.	Possible Trouble.	Remedy.	
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. Excessive carbon deposit on piston crown, and cylinder head.	Correct mixture is 1 part oil, 16 parts petrol. Decarbonize.	
	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. Driving chains too tight.	Adjust. 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.	Sparking 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.	

MARK 2.F. ENGINE UNIT.

ENGINE.



Always quote Engine Number when ordering spares.

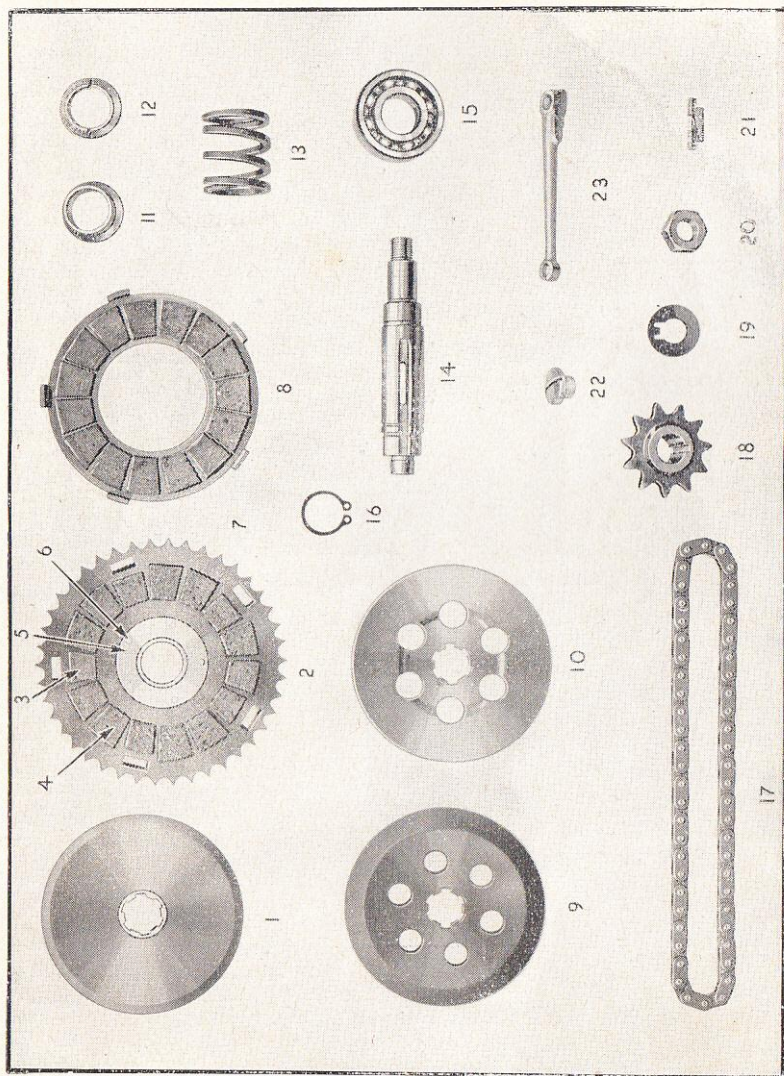
MARK 2.F. ENGINE UNIT.

ENGINE.

Component.	Illus.No.	Part No.	No. per Set.	List Price		
				Each.		
				£	s.	d.
Cylinder	1	B7261/2	1	2	10	0
" Head	2	B7455	1		16	0
" " Bolt	3	E3907	4			8
Piston, Bushed, Standard Size	4	C7045	1	1	0	0
" Ring, Standard Size	5	E6141	2		1	9
" " .015" Oversize	5	E7516	2		1	9
" " .03" "	5	E7518	2		1	9
Gudgeon Pin	6	E7198	1		2	6
Joint Washer, Cylinder Base	7	E7168	1			4
Driving Shaft, Right Hand	8	D7266	1	1	10	0
" " Left	9	D7267	1		12	0
Crankpin, .001" Oversize	10	E7493	1		4	6
Ball Bearing, Driving Shaft	11	6205	2			—
Con. Rod, .001" Oversize	12	D7494	1		12	6
" " Small End Bush	13	E6192	1		2	6
Crankcase Gland Spring	14	E6221	1		1	0
" " Bush	15	E6724/1	1		4	0
Engine Sprocket	16	E6725	1		7	0
" " Nut	17	E6930	1			9
" " Lockwasher	18	E7197	1			4
Crankcase, Left Hand	19	B7262	1	1	0	0
" Bearing Circlip	20	E7189	1			6
" End Plate	21	E7275	1		2	0
" " " Washer	22	E7276	1			3
Clutch Bridge	23	D7410	1		6	0
Chain Cover	24	D7413	1		5	0
Crank and Clutchcase	25	A7408	1	2	0	0
Clutch Cover	26	A7409	1	1	15	0
" " Bush	27	E7385	1		2	6
" " Washer	28	C7417	1			4
Nut, Exhaust Pipe	29	E3934	1		1	3
Washer for Nut	30	E4453	1			3
Body, Release Valve	31	E3064	1		3	0
Stem, " " "	32	E1280	1		1	9
Spring, " " "	33	E1163	1			5
Nut, " " "	34	E1276	1			3

MARK 2.F. ENGINE UNIT.

ENGINE—Contd.



Always quote Engine Number when ordering spares.

MARK 2.F. ENGINE UNIT.

ENGINE—*Contd.*

<i>Component.</i>	<i>Illus.No.</i>	<i>Part No.</i>	<i>No. per Set.</i>	<i>List Price</i>	
				<i>Each.</i>	
				<i>£</i>	<i>s. d.</i>
Clutch Plate, Outer	1	D5433	1	5	3
Clutch Sprocket, Assembly	2	D5232	1	11	6
„ Cork, Small	3	E5220	5		1
„ „ Large	4	E4960	25		1
„ Sprocket Side Plate	5	E4955	2		5
Rivet for Side Plate	6	E5001	5	Set	2
Sprocket Ball Race	7	E4948	1	2	3
Clutch Plate, Corked	8	D5233	1	5	9
„ „ Outer	9	D4951	1	5	3
„ „ Centre, Dished	10	D4954	1	5	3
Clutch Spring Bush, Long	11	E5556	1	1	6
„ „ „ Short, Split	12	E7608	1 pair	1	6
Clutch Spring	13	E5558/1	1	1	2
Clutch Shaft	14	C7411/1	1	10	0
„ „ Ball Bearing	15	6204	2	—	
„ „ Circlip	16	E7454	1		9
Primary Chain, 54 Pitches	17	110037	1	12	0
Drive Sprocket, 11 Teeth	18	D7415	1	6	6
„ „ Lockwasher	19	D6125	1		4
„ „ Nut	20	E3931	1		6
Clutch Cotter	21	E4944	1		10
Oil Filler Plug	22	E4104	1		10
Clutch Lever	23	D7412	1	2	6

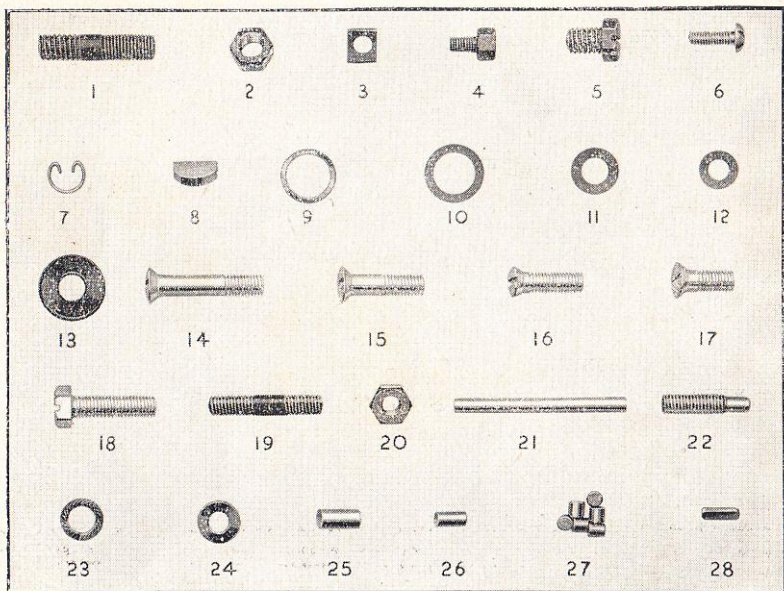
MARK 2.F. ENGINE UNIT.

ENGINE—*Contd.*

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

MARK 2.F. ENGINE UNIT.

ENGINE—*Contd.*



<i>Component.</i>	<i>Illus. No.</i>	<i>Part No.</i>	<i>No. per Set.</i>	<i>List Price Each.</i>
				<i>£ s. d.</i>
Nut for Clutch Adjuster Screw ...	20	E401	1	2
Clutch Operating Rod	21	E7414	1	9
,, Adjuster Screw	22	E6567	1	6
Spring Washer, $\frac{5}{16}$ "	23	E1050	4	2
Plain Washer, $\frac{1}{4}$ "	24	E2924	5	1
Dowel, Clutch Case	25	E7619	2	3
,, Crankcase	26	E2677	1	3
Crankpin Roller	27	E7452	28	2
Key, Engine Sprocket	28	E5124	1	3

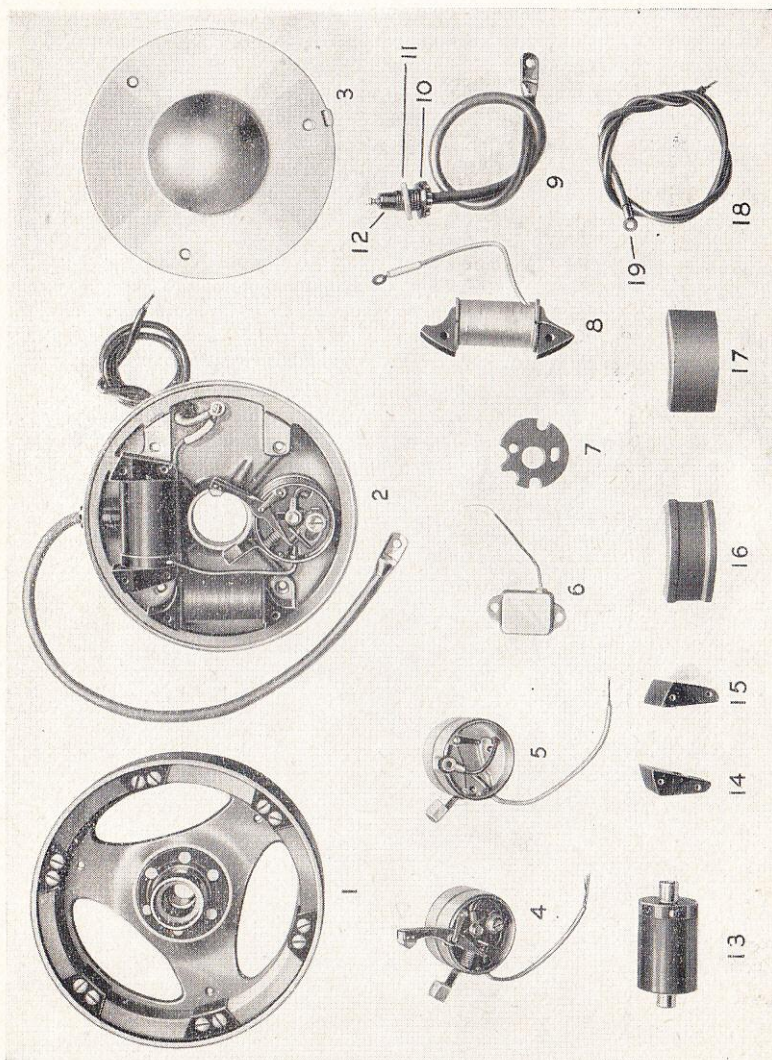
MARK 2.F. ENGINE UNIT.

MAGNETO.

<i>Component.</i>	<i>Illus.No.</i>	<i>Part No.</i>	<i>No. per Set.</i>	<i>List Price</i>		
				<i>Each.</i>		
				<i>£</i>	<i>s.</i>	<i>d.</i>
Flywheel Assembly, Less Cover...	1	R110	1	4	12	0
Armature Plate Assembly ...	2	A107	1	4	0	0
Flywheel Cover	3	M1580	1		4	0
Con. Box Assembly	4	M1864	1	18		6
„ „ Only with Oil Pad ...	5	M1872	1		5	0
Condenser	6	M1750	1		4	6
Insulating Pad, Con. Box ...	7	M1803	1			3
Lighting Coil Assembly	8	M2049	1		12	0
H.T. Lead Complete	9	1148 × 4	1		4	6
„ Terminal	10	1124 × 8	1		1	0
„ „ Felt Washer	11	ES69	1			3
„ Spring	—	1010 × 11	1			2
„ „ Pad	12	1046 × 13	1			2
„ „ Screw	—	$\frac{5}{8}$ " × No. 2	1			2
„ Coil	13	M1361	1	1	0	0
„ Coil End, L. Hand	14	M1855	1		3	0
„ „ „ R. Hand	15	M1856	1		3	0
Dummy Magnet	16	M1553	2		2	0
Magnet	17	M1354	4		4	0
Lighting Lead	18	125/114	1			7
„ „ Terminal	19	M1291	1			1

MARK 2.F. ENGINE UNIT.

MAGNETO.



Always quote Engine Number when ordering spares.

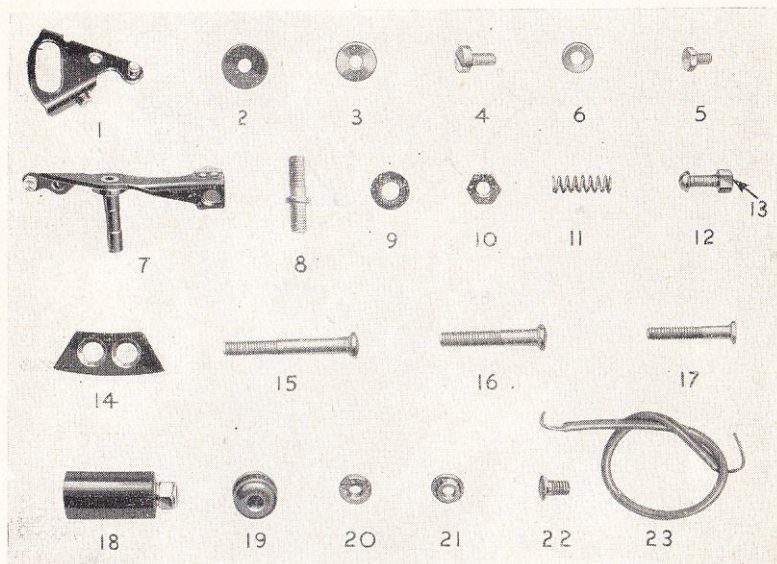
MARK 2.F. ENGINE UNIT.

MAGNETO—*Contd.*

<i>Component.</i>	<i>Illus.No.</i>	<i>Part No.</i>	<i>No. per Set.</i>	<i>List Price</i>	
				<i>£</i>	<i>s. d.</i>
Point Bracket	1	M1873	1	.2	3
Fibre Washer, Locking Screw ...	2	M1805	1		2
Brass ,, ,, ,, ...	3	M1802	1		2
Locking Screw, Point Bracket ...	4	M1801	1		4
Contact ,, ,, ,, ...	5	1006 × 3	1		2
,, ,, Washer	6	1113 × 5	3		1
Rocker Arm with Point and Pad	7	M1714	1	4	6
Stud, Con. Box Fixing	8	1053 × 1	2		3
Spring Washer for Stud	9	1002 × 13	2		2
Nut for Stud	10	1002 × 15	2		2
Rocker Arm Spring	11	1047 × 3	1		3
Terminal Screw	12	M1670	2		3
Nut for Screw	13	1113 × 4	2		1
Top Plate, Pole Shoe	14	M1822	6		3
Fixing Screw ,, ,,	15	1002 × 9	12		3
,, ,, Arm Plate and Lighting Coil	16	1124 × 9	6		3
,, ,, H.T. Coil Ends	17	M1383	4		3

MARK 2.F. ENGINE UNIT.

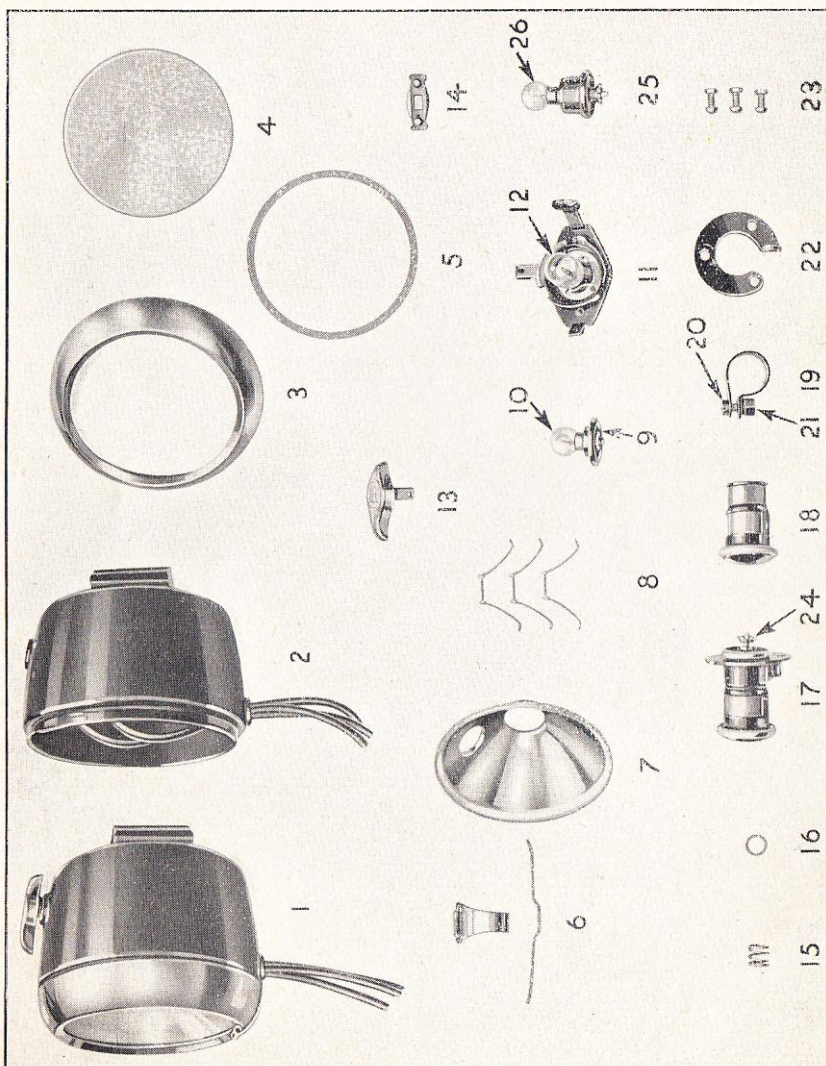
MAGNETO—*Contd.*



<i>Component.</i>	<i>Illus. No.</i>	<i>Part No.</i>	<i>No. per Set.</i>	<i>List Price</i>	
				<i>Each.</i>	<i>£ s. d.</i>
Lighting Lead Connector ...	18	1106 × 14	1	7	
Rubber Grommet ...	19	M1232	1	2	
Terminal Bush, Inside ...	20	1013 × 13	2	3	
,, ,, Outside ...	21	1013 × 12	2	3	
Screw, Flywheel Cover ...	22	M1228	3	3	
L.T. Lead, H.T. Coil to Point Bracket ...	23	482	1	6	

MARK 2.F. ENGINE UNIT.

LIGHTING SET.



Always quote Engine Number when ordering spares.

MARK 2.F. ENGINE UNIT.

LIGHTING SET.

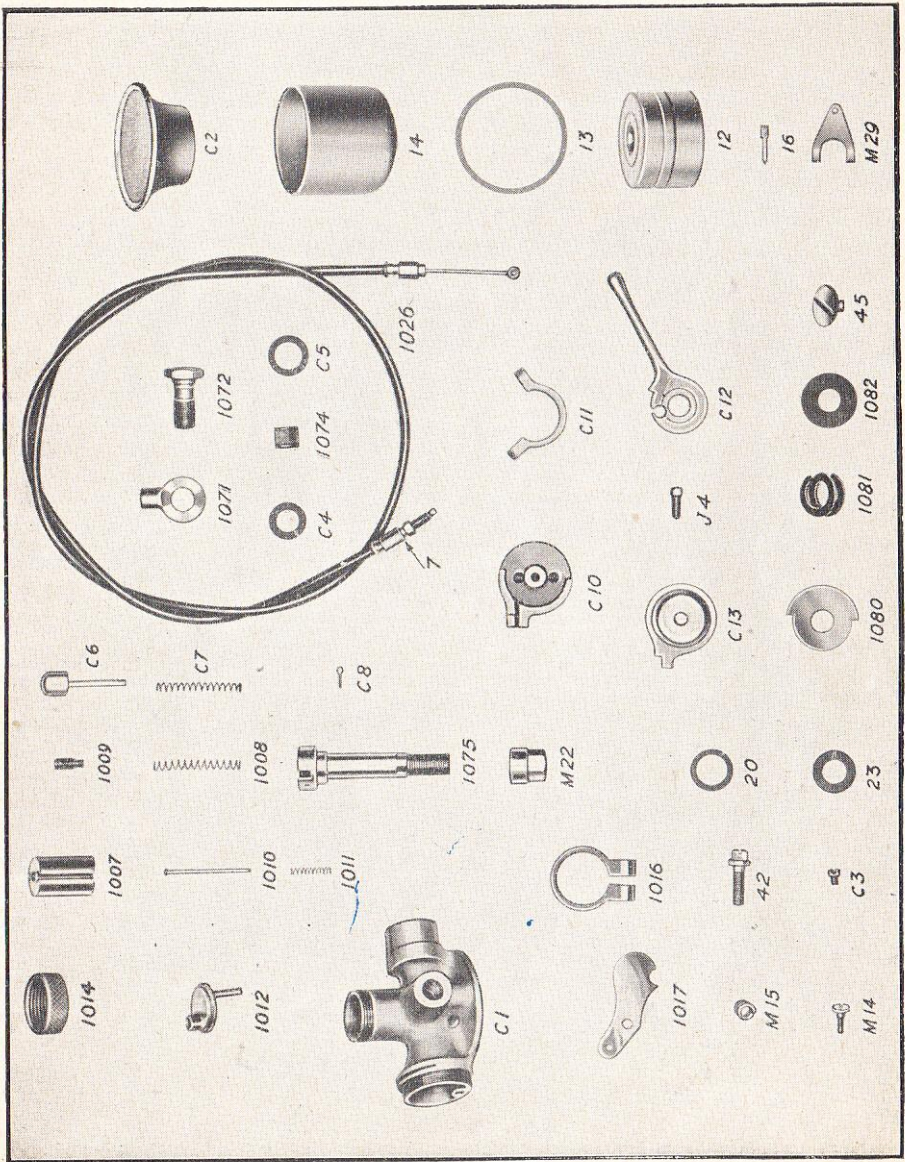
<i>Component.</i>	<i>Illus.No.</i>	<i>Part No.</i>	<i>No. per Set.</i>	<i>List Price Each.</i>	<i>£ s. d.</i>
Complete Lighting Set with Head Lamp, Tail Lamp, Bulbs and Cables	—	VRS.304	1		
Head Lamp complete with Cables	1	64004B & D	1		
Head Lamp Body Assembly with Bracket and Cables	2	608094	1		
Front Rim	3	608254	1		
Front Glass	4	608340	1		
Rubber Packing for Glass	5	600307	1		
Front Clip and Fixing Wire	6	608190	1		
Reflector	7	608552	1		
„ Retaining Wire	8	608073	3		
Pilot Bulb Holder	9	608025	1		
Pilot Bulb, 4 V.—.3A, Screw Cap	10		1		
Main Bulbholder Assembly	11	601036	1		
Main Bulb, 6 V.—12 W.	12		1		
Switch Knob Assembly	13	608179	1		
Switch Arm	14	608033	1		
Switch Spindle Spring	15	608030	1		
„ „ „ Washer	16	699009	1		
Cable, Head to Magneto, 23 inch	—	601087A	1		
„ Head to Tail, 82 inch	—	608076F	1		
„ Head to Earth, 29 inch	—	631067A	1		
Resistance	—	601081	1		
Tail Lamp complete, type V.T.31	17	606212A	1		
Tail Lamp Body	18	601082	1		
„ „ „ Clip	19	606216	1		
Clip Screw	20	126520	1		
„ „ Nut	21	165190	1		
„ „ Washer	—	G1405	1		
Fixing Plate	22	601084	1		
„ „ Screw and Nut	23	608177	3		
Terminal Nut	24	630050	1		
Bulb Holder Assembly	25	606207	1		
Bulb, 4 V.—.3 A, Screw Cap	26		1		
Parking Battery, Ever-Ready No. 1289	—		1		

MARK 2.F. ENGINE UNIT.

CARBURETTER.

<i>Component.</i>	<i>Illus. No.</i>	<i>Part No.</i>	<i>No. per Set.</i>	<i>List Price</i>	
				<i>£</i>	<i>s. d.</i>
Carburetter Body	C1	V508	1	9	3
Top Ring	1014	V367	1	1	3
Top Disc	1012	V665	1	2	0
Throttle	1007	V365	1	2	3
Throttle Spring	1008	V369	1		6
Taper Needle, No. 2½	1010	V651	1	1	0
„ „ Adjuster	1009	V413	1		6
„ „ Spring	1011	V107 × 7	1		3
Centrepiece and Jet J.8	1075	V408	1	4	0
„ Washer	20	V107 × 3	1		2
„ Locating Screw	C3	V424	1		3
Bottom Nut	M22	V172	1	1	0
„ „ Washer	23	V107 × 4	1		2
Float	12	V107 × 1	1	3	6
„ Cup	14	V146 × 6	1	3	3
„ „ Washer	13	V107 × 2	1		6
Fuel Needle	16	V355	1		9
„ „ Lever and Pin	M29	V257	1		7
Body Clip	1016	V326	1	2	0
„ „ Screw	42	V107 × 16	1		6
Strangler Plate	1017	V373	1		9
„ „ Screw	M14	V626	1		3
„ „ „ Washer	M15	V146 × 2	1		2
Air Cleaner	C2	V148 × 3	1	3	0
Banjo Union	1071	V381	1	1	9
„ „ Bolt	1072	V382	1	1	0
„ „ Filter Gauze	1074	V404	1		6
Fibre Washer, Large Hole	C4	H104 × 8	1		3
„ „ Small „	C5	V383	1		3
Tickler	C6	V207	1		5

CARBURETTOR.



Always quote Engine Number when ordering spares.

MARK 2.F. ENGINE UNIT.

CARBURETTER—*Contd.*

<i>Component.</i>	<i>Illus. No.</i>	<i>Part No.</i>	<i>No. per Set.</i>	<i>List Price</i>	
				<i>Each.</i>	<i>£ s. d.</i>
Tickler Spring	C7	V21	1		3
„ Split Pin	C8	V111 × 2	1		1
Control Cable Complete ...	1026	V234B.C.G	1	4	6
„ Body	C10	V405	1	3	6
„ „ Handlebar Clip ...	C11	V142 × 7	1	1	6
„ „ „ „ Screw	J4	V142 × 5	2		2
„ Lever	C12	V406	1	3	0
„ Top Cover	C13	V387	1	1	3
„ Body Friction Plate ...	1080	V429	1		6
„ „ Spring Washer ...	1081	V142 × 11	1		3
„ „ Fibre Washer ...	1082	V142 × 10	2		3
„ „ Top Screw	45	V117 × 5	1		6
Cable Nipple, Control End ...	—	V123 × 15	1		2
„ „ Throttle End ...	—	V145 × 16	1		2
„ „ Sleeve	—	V108 × 4	1		4
Cable Adjuster	7	V105 × 1	1		7
„ „ Locknut	7	V105 × 2	1		2

NOTES.

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.

TERMS OF BUSINESS.

Repairs and spares must always be treated on a cash basis. Ledger accounts will be opened for items of £5 (five 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 £5 value. Minimum extra is 6d. 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.

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 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.

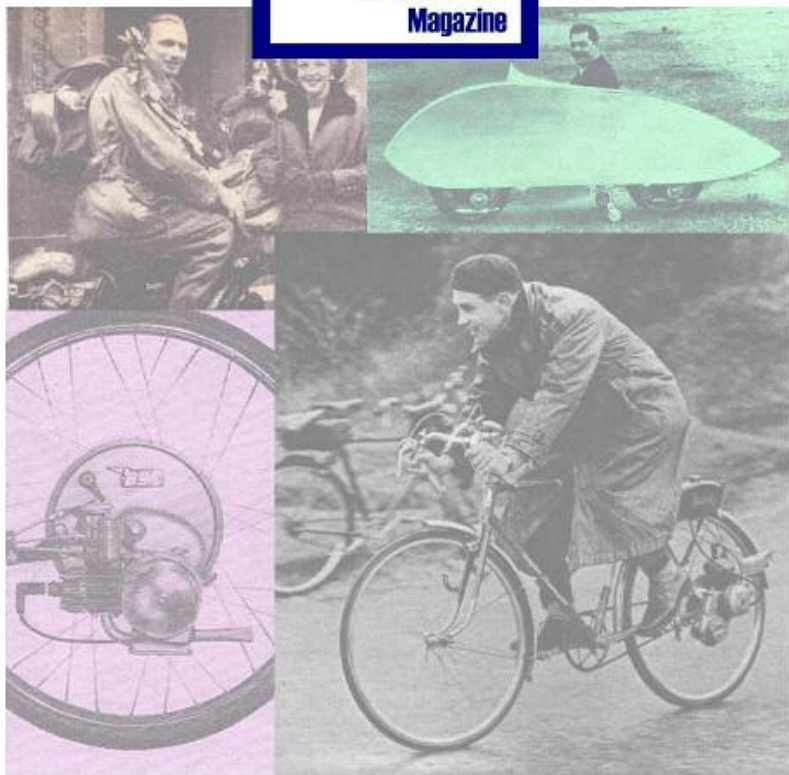
CONDITIONS OF GUARANTEE.

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.

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