

**Villiers**  
*The Power and the Heart  
of a fine machine*

Barford & Newitt, Printers, Wolverhampton.

Ref. B. & N. V2/1446

OPERATING INSTRUCTIONS  
AND  
SPARE PARTS LIST

**Villiers**

MARK 12D AND MARK 8E

(Including 11D/4, 7E/4, 8E/4 & 8E/R)

TWO-STROKE

MOTOR CYCLE ENGINE GEAR UNITS

W. H. OLIVER,  
2, Bruce Grove, N.17.

THREE SHILLINGS

THE VILLIERS ENGINEERING CO. LTD.  
WOLVERHAMPTON, ENGLAND

July, 1964.

V.E.C. 73.



## Introduction

**Y**OUR Villiers engine is the heart of the machine in which it is installed. It has been manufactured and assembled with great care and precision, and it will give you long and efficient service if it receives the attention it deserves.

This book contains the necessary information to enable you to give your engine this simple, but important, routine attention and you will be well advised to keep the book on hand for consultation when necessary.

After a long period of service, your engine may require overhauling, and it is important always to make sure that only genuine Villiers replacement parts are used. Remember that genuine Villiers spares are made with the same fine workmanship as the original engine components.

### THE VILLIERS ENGINEERING COMPANY LTD.

**Marston Road** - - - **Wolverhampton**  
 TELEPHONE :- WOLVERHAMPTON 22399 (20 LINES).  
 TELEGRAMS :- VILLIERS, WOLVERHAMPTON.  
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## GUARANTEE.

**W**E 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.

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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.

THE  
*Villiers*

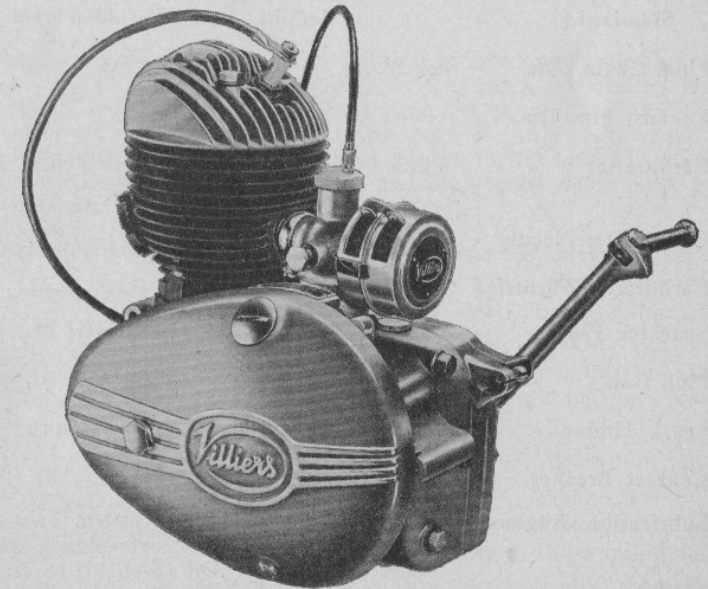
## MARK 12D & MARK 8E

(Including 11D/4, 7E/4, 8E/4 & 8E/R)

122 c.c. and 197 c.c.

TWO STROKE

MOTOR CYCLE ENGINE GEAR UNITS



## GENERAL DATA.

	Mk. 12D.	Mk. 8E.
<b>Bore</b> - - -	50mm.	59mm.
<b>Stroke</b> - - -	62mm.	72mm.
<b>Capacity</b> - - -	122cc.=7.44 cu. ins.	197cc.=12.03 cu. ins.
<b>Engine Sprocket</b> -	18 Teeth— $\frac{3}{8}$ " Pitch.	23 Teeth— $\frac{3}{8}$ " Pitch.
<b>Clutch Sprocket</b> -	51 „ $\frac{3}{8}$ " „	51 „ $\frac{3}{8}$ " „
<b>Primary Drive Ratio</b> -	2.83—1.	2.21—1.
<b>Gearbox Ratios, Standard :</b>		
<b>3 Speed</b> - - -	1—1, 1.34—1, 2.55—1.	1—1, 1.34—1, 2.55—1
<b>4 Speed</b> - - -		1—1, 1.35—1, 1.8—1 2.93—1
<b>Final Drive Sprocket - Standard.</b>	15 Teeth— $\frac{1}{2}$ " Pitch. For Renold Chain No. 110044.	17 Teeth— $\frac{1}{2}$ " Pitch.
<b>Final Chain Line</b> -	2 $\frac{3}{16}$ ins.	2 $\frac{3}{16}$ ins.
<b>Exhaust Pipe Dia.</b> -	1 $\frac{1}{4}$ ins.	1 $\frac{1}{2}$ ins.
<b>Carburetter</b> - - -	Villiers Type S.19.	Villiers Type S.24 or S.25.
<b>Carburetter Needle</b> -	No. 3 $\frac{1}{2}$ —2.015" out.	No. 3 $\frac{1}{2}$ —1.95" out.
<b>Carburetter Throttle</b> -	No. 2 $\frac{1}{2}$ .	No. 3.
<b>Sparking Plug</b> - - -	Lodge H14.	Lodge HH 14.
<b>Plug Gap</b> - - -	.018"/.025".	.018"/.025".
<b>Spark Timing</b> - - -	$\frac{5}{32}$ ins. Before T.D.C.	$\frac{5}{32}$ ins. Before T.D.C.
<b>Contact Breaker</b> -	Points Gap .012"/.015".	
<b>Lubrication, Engine</b> -	Petroil Mixture. One part Castrol Two-stroke Self-Mixing Oil to 16 parts petrol, OR one part Castrol 'XL' Oil (SAE 30) to 20 parts petrol.	
<b>Lubrication, Gearbox and Chaincase</b> - - -	Castrol "D" Oil (SAE 140) Filled to Level Plugs provided.	

2.—When sending parts for replacement, repair, or as pattern the name and address of the sender should always be securely attached, and full instructions explaining what is required must also be sent separately by post. In no circumstances should instructions be sent only with the parts as they are liable to be lost or damaged in unpacking.

3.—If an engine is sent for repair, it should be well packed in a strong wooden 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.—As we are not manufacturers of complete vehicles or other machines, **only the engine unit should be sent to us.** If machines are forwarded an extra charge will be made for dismantling the engine from the frame and returning the components that are not of our manufacture.

6.—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.

7.—When forwarding a flywheel magneto for overhaul, send the armature plate, flywheel and contact breaker assembly.

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.

9.—**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.**

10.—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.

## ESTIMATES.

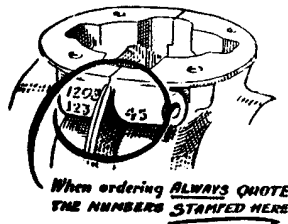
If requested at the time of despatch we are prepared to give an estimate before proceeding with any repair. This entails a certain amount of labour in dismantling to ascertain what new parts will be required, and therefore, in the case of any estimate not being accepted, a charge is made for our mechanic's time in taking down the engine for report and the re-building, and return carriage costs.

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, such parts as specified by the customer if we consider that other parts are necessary to make an efficient repair. In such cases, we are prepared to supply the customer's requirements in spares, but we do not undertake to fit them.

## 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 number is comprised of two parts, the first being the SPECIFICATION Number which is the key to the component parts fitted, and the second being the Engine Serial Number by which the date of manufacture, etc., can be determined, e.g. 120B/12345.

The **Magneto** also bears a SPECIFICATION Number (example: R120/A.123) but no Serial Number. The "R" (Rotor or Flywheel), and "A" (Armature Plate) Number is stamped on the face of the Flywheel.

The **Carburettor** bears no identification marks.

## INSTRUCTIONS FOR USING THE MARK 12D & MARK 8E UNITS.

**Important.** Provided that the negative battery lead is suitably insulated, and the wiring is in good condition, no damage to the Rectifier will occur if the engine is used without the battery. It should, however, be clearly understood, that the switch should not be put to the "PARKING" position whilst the engine is running.

**NOTE:** This does not apply to the High Output type of Magneto and circuit employed on certain light cars, etc., where it is essential to disconnect the Rectifier from the generator in the event of the engine being run without the battery.

**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 (1-16), OR Castrol XL (SAE.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.**

**Gearbox.** Remove the oil level dipstick, situated alongside the oil filler plug on top of gearbox and check oil level. The "full" position is indicated by the groove about  $\frac{3}{8}$  in. from end of dipstick. If level is found to be below end of dipstick remove filler plug, top up with Castrol D oil (SAE. 140). Examine every 1,000 miles approximately, and drain every 5,000 miles by removing plug in bottom of box.

**Chaincase.** Remove filler plug on top at front, and level plug at bottom.

With cycle standing vertically, pour in Castrol D Oil through top hole until it appears at the bottom level hole. Allow the surplus oil to drain out and then replace top and bottom plugs. Top up every 1,000 miles and drain by removing front cover every 5,000 miles. (See Fig. 1).

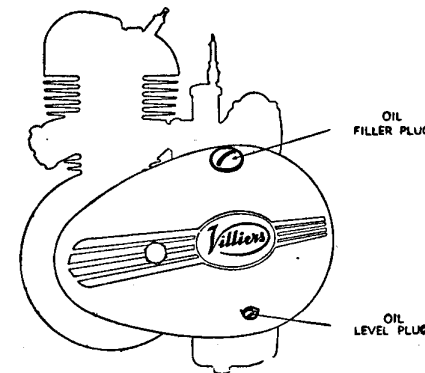


Fig. 1.

## STARTING.

### Mark 12D and 8E Units.

**When Cold.** Turn petrol tap to the 'ON' position. Flood carburetter float chamber by depressing tickler.

The carburetters fitted to these engines have a single lever controlling the throttle position, and to obtain a rich mixture for starting it is necessary to turn the air filter shutter to the closed position. Having flooded the carburetter, place gear control lever in the "NEUTRAL" or free engine position, open throttle lever, or twist grip where fitted, about one third open and give kickstart lever two or three sharp kicks. Having started the engine, the air filter can gradually be returned to the fully open position as the engine warms up.

**When Hot.** Do not flood the carburetter or close the strangler shutter fitted to air cleaner.

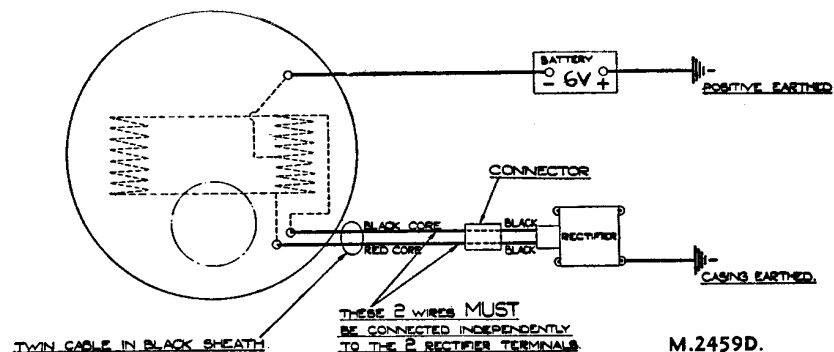
**Failure to Start.** If repeated kicks fail to start after flooding (when cold), turn off fuel supply, open throttle wide, and clear cylinder of excessive mixture by giving a number of kicks to starter lever. Now turn on fuel supply, and after opening throttle a little, try again. If not successful, the sparking plug will probably be found to be wet. If so, remove and dry out, and turn the engine quickly after having removed the drain plug situated at bottom of crankcase, so that accumulated mixture can be blown out. If still not successful after having replaced drain plug the trouble must be found elsewhere, and reference should be made to the "Fault Finding Chart."

**Stopping the Engine.** If the engine is stopped by turning off the fuel supply instead of closing throttle, an easier start will be made if the machine has to stand a long time before again being required.

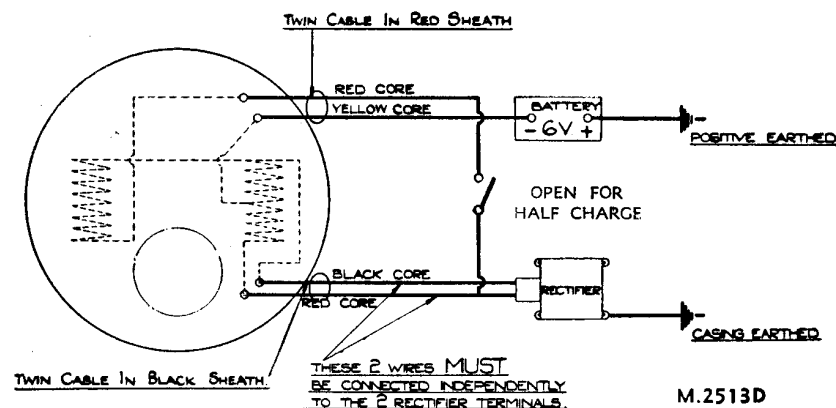
**Running In** The useful life of a motor-cycle engine depends to a great extent upon how it is treated during the first 500 miles, and during this period the machine should not be driven at more than 30 miles per hour in top gear, 20 in middle, and 10 in bottom gear. Do not allow the engine to labour in top gear, change to a lower gear and ease back the throttle control.

## GEARBOX.

The gear ratios are selected by the foot operated lever having a positive stop for each gear position, "neutral" or free engine position being obtained by pressing lever downwards from the first or low gear position. When starting off, with the gears in "neutral", lift control lever up against the stop to give first, or low gear, then when under way, press lever DOWN to next stop to obtain the second, or middle gear. Press DOWN again to next stop to obtain third, or top gear. The lever returns under spring pressure to its normal position after each change. When

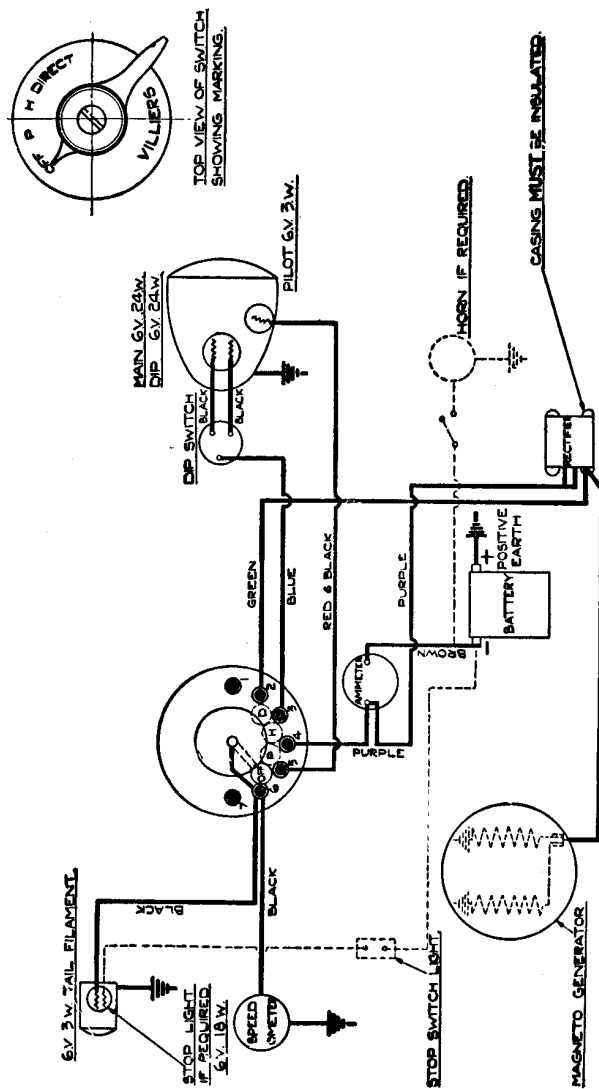


**HIGH OUTPUT MAGNETO—BASIC CIRCUIT.** Fig. 14.  
Full charge only—Armature Assembly No. A.128.  
Lighting Coil Assembly No. M.2867D.



**HIGH OUTPUT MAGNETO—BASIC CIRCUIT.** Fig. 15.  
With Half-charge switch—Armature Assembly No. A.132.  
Lighting Coil Assembly No. M.2572D.

The above wiring diagrams (Figs 14 and 15) show the basic circuit only. For full details of the complete electrical installation the vehicle manufacturer's handbook should be consulted. For sake of clarity, the ignition coil and contact breaker have been omitted, lighting coils only being shown.



"RECTIFIER" LIGHTING SET.

WIRING DIAGRAM.

Fig. 13.

M.2232D

changing down from top to middle, and middle to bottom gear, LIFT the lever against its stop for each position. The lever is adjustable for position to suit the individual rider, and by releasing the clamp bolt, can be removed from the splined spindle and refitted in an alternative position. Certain specifications of engines have a "direct" change mechanism where the gear lever has a definite position for each gear.

### CLUTCH.

The drive from the engine to clutch is taken by a pre-stretched endless roller chain running in the oil bath chaincase. No attention is necessary beyond that of lubrication, and correct adjustment of push rod to give the necessary clearance to prevent clutch slip. Whilst the clutch is engaged, i.e. driving, there must be clearance between end of pushrod and the clutch lever fitted to gearbox, and a special adjuster having a knurled and slotted head is provided so that adjustment can be made by hand without having to use tools. There should be about  $\frac{1}{16}$  inch free movement at the end of gearbox clutch lever before commencing to depress the clutch springs. When new corks are fitted they must be ground to a thickness of  $\frac{13}{32}$ " for the chainwheel and  $\frac{5}{16}$ " for the tanged plate, after fitting to the plates.

### MAGNETO.

The magneto fitted to both engines is the latest 6-pole pattern providing current for ignition and lighting, the same magneto being used for both the "DIRECT" and "RECTIFIER" lighting sets available with each type of engine. The wiring connections differ, however, and reference should be made to the wiring diagrams Figs. 12 and 13. The Flywheel should not be removed unless absolutely necessary, and then it is advisable to use a Villiers "Hammer-tight" spanner on the centre nut which is exposed after removal of flywheel cover. The centre nut is imprisoned in the flywheel and acts as an extractor when turned anti-clockwise.

The armature plate which carries the ignition coil, lighting coils and contact breaker mechanism is secured to the engine crankcase by six screws. The H.T. Lead from the 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. The high output magneto wiring diagram is not shown, and reference must be made to the machine manufacturer's handbook for this information.

### Timing of the Magneto.

The contact breaker points must commence to open before the piston reaches top of stroke. In the case of Mark 12D and 8E Engines this dimension is  $\frac{5}{32}$  inch.

Timing marks are provided on the armature plate and flywheel rim. In the armature plate a slot is cut in line with the H.T. terminal, and the mark stamped on flywheel rim coincides

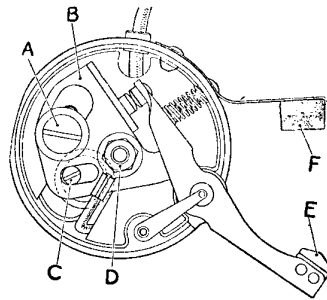
with the slot when the piston is at TOP of stroke, the necessary amount of advance having been allowed. When timing ignition, necessary because of the flywheel removal, loosely fit flywheel to shaft, and, having set piston at correct distance BEFORE top dead centre, rotate flywheel without turning the crankshaft until the points commence to open. Tighten up flywheel nut sufficiently to turn crankshaft, rotate until piston is at top of stroke, then timing marks should be opposite one another. Finally, tighten up centre nut with the hammer-tight spanner, and refit flywheel cover.

**Contact Breaker Assembly.** This is of the latest type requiring a screwdriver only to adjust the contact points. To adjust the contact points proceed 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 with grease when new.

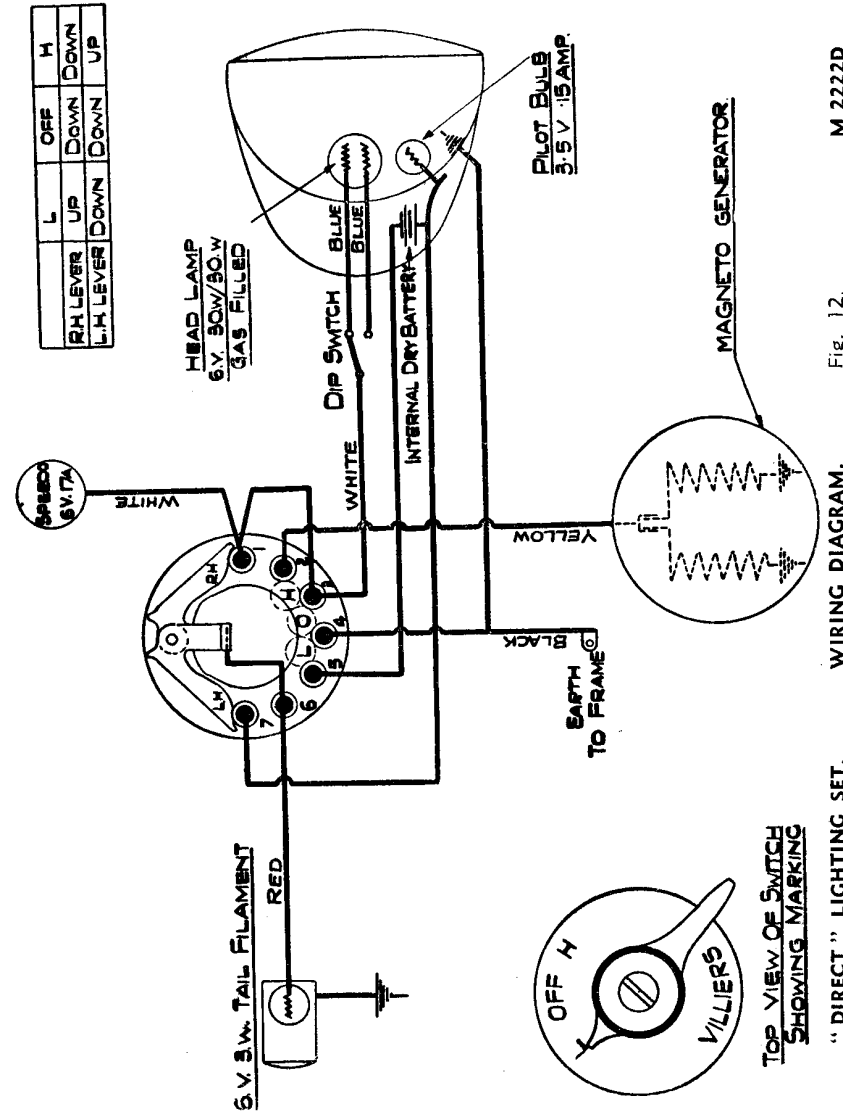
This can, if visibly dry, be oiled with a small amount of the heaviest oil available. It is better, however, to soak the pad in a molten high temperature grease if it is convenient to detach the box itself for this operation. If too much oil is put on the felt pad it may creep along the Rocker Arm, get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



CONTACT BREAKER ASSEMBLY.  
Fig. 2.

**CARBURETTERS.**

The carburetter fitted to the Mark 12D engine is the Type S.19, and for the Mark 8E, Type S.24, or the later Type S.25. In all carburetters the position of taper needle in relation to the throttle is adjustable by means of the special screw situated in the centre at the top of throttle.



M 2222D.

Fig. 12.

WIRING DIAGRAM.

"DIRECT" LIGHTING SET.



**CARBURETTER, TYPE S.25**—continued.

Where the S.25 carburetter is fitted with a cable operated choke the standard air filter is not required, and the following parts are incorporated.

Part No.	Description.	Qty.
V.1156E	Carburetter body (replaces V.834D) - - - -	1
V.942C	Strangler body - - - -	1
V.948E	"    "    fixing studs -	2
1113 x 4E	"    "    "    "    nuts -	2
E.7529	Spring washer, 4BA - - -	2
V.943E/V.944E	Strangler lever and spindle (not supplied separately) - -	1
V.946E	Strangler plate - - - -	1
EM.362	Screw - - - - -	1
V.1305E	Washer, spring $\frac{1}{8}$ " - - -	1
V.947E	Lever return spring - - -	1
V.1020E	Cable pivot pin - - - -	1
V.105 x 2E	Nut    "    "    - - - -	1
V.496D/1	Air filter (with clip) - - -	1
V.953C	Strangler assembly complete -	1

In certain applications the fuel needle lever (V.738E), fuel needle (V.355E) and float (V.777E), are replaced by:—

V.1076E	Float - - - - -	1
V.1284E	Fuel needle - - - - -	1

The following main jets are also available, but are not fitted as standard:

Part No.	Carburetter type and calibration.	
V.981E	S.25	115 c.c.
V.1152E	S.19	80 c.c.
V.1151E	S.25	130 c.c.

**TOOLS, etc.**

E.7402	Spanner, Sparking Plug
M.2715E	Screwdriver
M.2693E	Feeler Gauge
M.1239E	Hammertight Spanner
Lodge H.H14	Spark Plug

This adjustment is provided to suit individual engines, and it should not be necessary to alter the makers setting except after considerable mileage. The standard setting from throttle to end of taper needle is, Mark 12D. 2.015 inches, Mark 8E. 1.95 inches.

**Operation of Carburetter.** The handlebar twistgrip (or lever) control operates the throttle slide and thereby regulates the amount of mixture entering the engine, whilst the carburetter itself automatically meters and atomises the correct amount of fuel to give the necessary mixture strength. To achieve this automatic control of the mixture strength, two separate fuel systems are fitted, namely the main-jet and pilot-jet systems. At idling speeds the carburetter draws fuel from the pilot-jet and, as the throttle is gradually opened, the fuel is then drawn in turn from the pilot "progression" hole and the main-jet system. The operation of the two systems is given below.

**1(a) Pilot-Jet System.** (See Figs. 3 and 3A for reference).

At idling speeds, when the throttle is nearly closed, the pilot outlet hole (A) is subject to the very high engine suction, and petrol is, therefore, drawn from the float chamber through the pilot tube (B), and the pilot outlet hole. The calibrated pilot-jet is contained in the top of the pilot tube.

At the same time, a filtered supply of air is drawn from the mouth of the carburetter through passage C, through the variable air-jet D, and is then pre-mixed with the fuel in the small chamber E. The pilot adjuster screw F varies the size of the pilot air jet, and therefore, the pilot mixture strength—to richen mixture, turn screw clockwise.

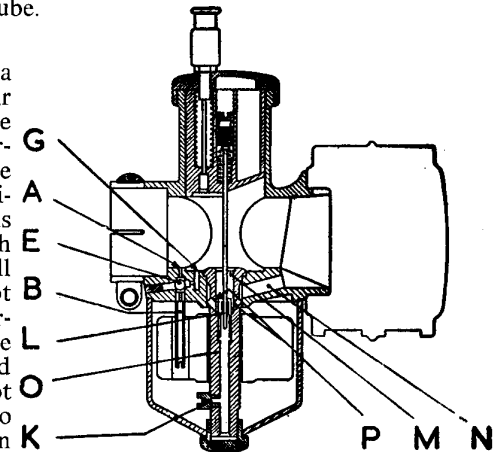


Fig. 3.

When the throttle slide is opened a small amount beyond that required for idling, the suction on the pilot outlet hole is reduced, but at the same time, the suction on the pilot "progression" hole (G) increases. A further supply of petrol is, therefore, drawn through the "progression" hole, and prevents the weak spot which would otherwise occur due to the fall off in supply from the pilot hole before the main jet comes into full operation.

It follows from the preceding remarks that whenever the throttle is shut off whilst the engine speed is high (such as on long downhill sections), the pilot system is subject to the full engine suction, and petrol will flow into the engine from the pilot outlet hole. As the engine is not firing under these conditions, this fuel supply will tend to build up in the crankcase and cylinder and cause severe "four-stroking" or "eight-stroking" when the throttle is opened again. To overcome this fault in the present range of Villiers Carburetters, an automatic air bleed to the pilot has been incorporated, which relies upon the matching of two slots, one in the throttle slide and the other in the carburettor body. When the throttle slide is shut, these two slots line up and air can flow from the front of the Carburettor through the throttle slide and down passages H and J into the pilot system. The high depression on the pilot system is then destroyed. In all other throttle positions, the two slots do not line up, and no air can pass to the pilot system through these passages.

**1(b) Main Jet System.**

As the throttle slide is opened further beyond the idling and progression positions, the engine suction has its effect upon the main-jet system, and petrol is drawn from the float chamber through the calibrated main jet (K) and the needle-jet (L) and into the small pre-mixing chamber (M). There the petrol is atomised by the filtered secondary air which is drawn from the mouth of the carburettor along passage (N), and which enters the centre-piece (O) through four small holes (P). The rich petrol-air mixture then flows from the pre-mixing chamber into the main mixing chamber, where it meets the main air stream. The effective size of the needle-jet (L) depends upon the throttle slide position (as the taper needle is fixed to the slide), and the sizes of the needle-jet and the needle are chosen to give correct carburation over the range.

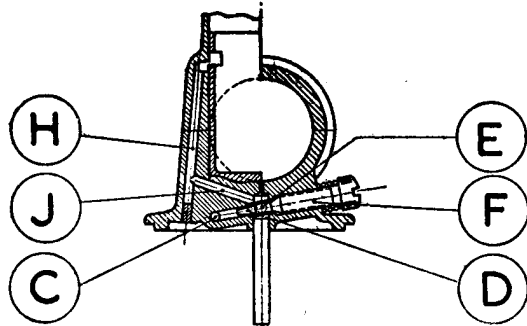


Fig. 3A

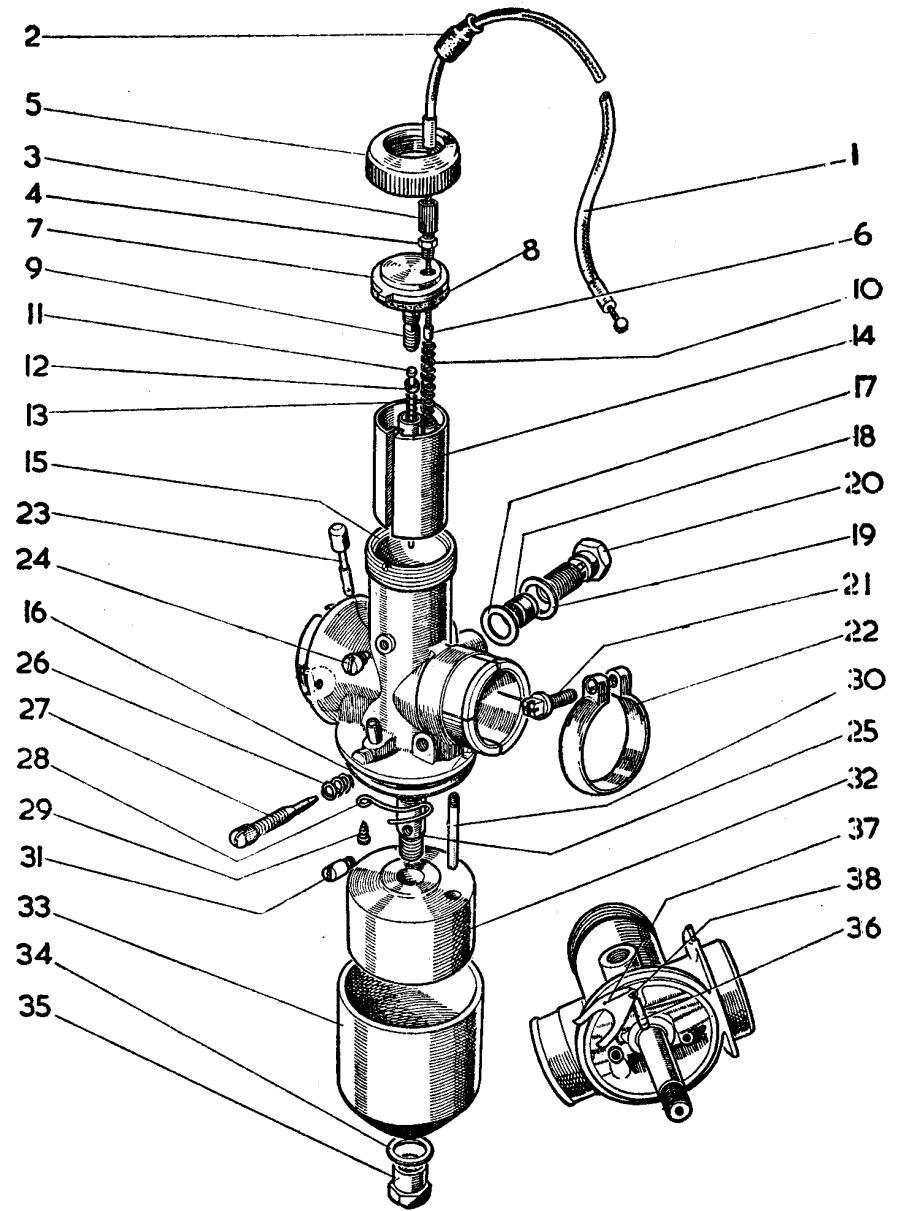


Fig. 11. CARBURETTOR, TYPE S.25.

## CARBURETTER, TYPE S.25.

Fig. 11.

Illus. No.	Part No.	Description.	Qty.
1	Quote Engine Spec. No.	Throttle cable complete assembly - - - -	1
2	V.826E	Rubber cover, cable adjuster -	1
3	V.105 × 1E	Cable adjuster - - - -	1
4	V.105 × 2E	Locknut for adjuster - - -	1
5	V.815E	Top ring - - - -	1
6	V.108 × 15E	Cable nipple - - - -	1
7	V.739E	Top disc - - - -	1
8	V.828E	Top disc fibre washer - - -	1
9	V.786E	Needle adjusting screw - - -	1
10	V.107 × 8E	Throttle spring - - - -	1
11	V.748E	Needle, No. 3½ - - - -	1
12	V.787E	Needle collar - - - -	1
13	V.1235E	Needle spring - - - -	1
14	V.1308D	Throttle, No. 3 cutaway - - -	1
15	V.834D	Carburetter body - - - -	1
16	V.125 × 8E	Cup washer - - - -	1
17	V.383E	Banjo washer—small hole - -	1
18	V.404E	Petrol filter - - - -	1
19	H.104 × 8	Banjo washer—large hole - -	1
20	V.382E	Banjo bolt - - - -	1
21	V.754E	Body clip screw - - - -	1
22	V.818E	Body clip - - - -	1
23	V.742E	Tickler - - - -	1
24	V.829E	Guide screw (Throttle) - - -	1
25	V.827E	Centrepiece - - - -	1
26	V.749E	Spring for pilot needle - - -	1
27	V.775E	Pilot needle jet - - - -	1
28	V.830E	Tickler spring - - - -	1
29	M.2704E	Screw for tickler spring - - -	1
30	V.717E	Pilot jet - - - -	1
31	V.774E	Main jet - - - -	1
32	V.777E	Float - - - -	1
33	V.773E	„ cup - - - -	1
34	V.107 × 3E	Bottom nut washer - - - -	1
35	V.361E	Bottom nut - - - -	1
36	V.355E	Fuel needle - - - -	1
37	V.738E	„ „ lever - - - -	1
38	V.375E	„ „ „ pin - - - -	1
—	V.837E	Air filter - - - -	1
—	V.790E	„ „ clip - - - -	2
—	V.831E	Screw for clip - - - -	2
—	Quote engine Number when ordering	Carburetter S.25 complete (less Air Filter) - - -	1

(Continued on page 42).

**Tuning Carburetter.** Before any attempt is made to tune the Carburetter it is essential that the engine is in a good mechanical condition.

This means that there should be no air leaks at any of the joints, there should be a good spark at the plug points and also that there is no restriction in the fuel supply. It is also important of course, that the carburetter is clean internally, and that the air filter is not obstructed.

There are four adjustments for tuning the carburetter, but each of these has its full effect at a particular part of the throttle range, and should, therefore, only be used for tuning that particular part of the range. There is also a definite sequence for the tuning, and this also must be adhered to in order that the results achieved with one adjustment are not upset by the next adjustment.

The sequence of tuning with the necessary adjustments is given below :—

### (1) Main Jet. Throttle Range— $\frac{3}{4}$ to Full.

In order to obtain the correct main jet size, the engine must be tested at full throttle in top gear. If the engine lacks power, detonates badly or runs better with the strangler slightly closed, a larger main jet is required. Should the engine “four stroke” or improve momentarily after the petrol has been switched off, a smaller jet is required. After de-clutching and stopping the engine quickly the sparking plug should have a shiny black appearance if the correct main-jet is fitted. As an additional guide the engine should tend to “four-stroke” at full throttle in bottom gear on level ground (or high engine speeds in neutral), but not in any higher gears.

### (2) Pilot Jet. Throttle Range—Closed to $\frac{1}{8}$ open.

The pilot jet must be set when the machine is stationary with the engine running at the required idling speed. To richen mixture, screw in the pilot adjuster screw, and to weaken, unscrew pilot adjuster. The mixture strength must be set as weak as possible consistent with a steady reliable idling speed and good engine acceleration from this throttle position. If the mixture strength is set to rich, trouble will be experienced with the fuel build-up in the crankcase when the throttle is shut with the engine still running fast. Should this latter fault be present after adjusting the pilot, unscrew pilot a further half a turn. Any weakness on acceleration can be cured by throttle cut away as given below:—

### (3) Throttle Cut-Away. Throttle Range $\frac{1}{8}$ to $\frac{1}{4}$ Open.

The throttle slide is made with a cut-away on the carburetter inlet side which influences the depression on the main-jet system. The throttles are marked with a number which represents in sixteenths of an inch, the amount of cut-away. A throttle with more cut-away will give weaker mixtures (over the particular throttle range) and vice-versa. If the acceleration is weak, fit throttle with smaller cut-away, e.g. change from 3 to 2½. Should the engine tend to “four-stroke” when the throttle is shut, fit larger cut-away.



**(4) Needle Adjustment :— Throttle Range— $\frac{1}{4}$  to  $\frac{3}{4}$  Open.**

The needle is adjusted by the grub screw in the top of the throttle—screw down to weaken mixture, and vice-versa. The needle controls the mixture strength over most of the “cruising range” and must be correct for good fuel consumption and acceleration. After carrying out the above adjustments, it is wise to go back and re-check the pilot adjustment to see that this has not been affected by other adjustments.

**To Change the Taper Needle.** Remove throttle from body after unscrewing the top ring, and in the centre at top of throttle will be found a small slotted screw. This is the adjuster referred to in the previous paragraph, and when this is removed by unscrewing, the needle with spring can be pushed up from underneath. When replacing the needle make sure that the needle collar is in position.

**To Change the Fuel Needle.** To obtain access to the fuel needle it is first necessary to remove the bottom nut and fibre washer, holding the float chamber in position.

Before the float can be taken off, the main jet should be unscrewed from the side of the centrepiece. The pilot jet tube which is fixed to the underside of the carburettor body, should not be disturbed. The forked lever retaining the fuel needle is split so that this may be sprung free from the pin holding it in position. Following this, the fuel needle is free to be taken out. The shape of the forked lever should not be altered.

**Important.** The only time when it will be necessary to remove the Centrepiece from the Carburettor Body is when the hole in the Centrepiece is badly worn and when the correct mixture strength cannot be obtained. The Centrepiece may be pushed up through the Carburettor Body, but when replacing the Jet in the Body, it is very important to ensure that this is pressed in squarely, otherwise the Carburettor Body will be damaged.

**To Reassemble Carburettor.** Clean the various components and make sure that the tickler vent holes are clear. Insert the centrepiece making sure that the forked fuel needle lever and fuel needle are in position. Place float in position, this is marked “Bottom,” and replace main jet in side of centrepiece. Clean out the float cup and replace with large fibre joint washer at top. Replace bottom nut and fibre washer, but do not use too much force, otherwise there is the danger of stripping the thread of centrepiece. Replace throttle in body at the same time guiding the taper needle into the hole in top of centrepiece. A guide screw in the carburettor body will prevent the throttle being replaced unless it is correctly positioned. (Type S.19 and S.25 only). Locate top disc in top of body and screw on top ring. If the carburettor has been removed from the engine, make sure when refitting that the body is pushed on to the manifold as far as possible, and that it is set upright. There are four narrow slots in the body to allow the securing clip to function, and if the manifold stub does not extend past the end of the slots, air will be sucked in causing hard starting and erratic running.

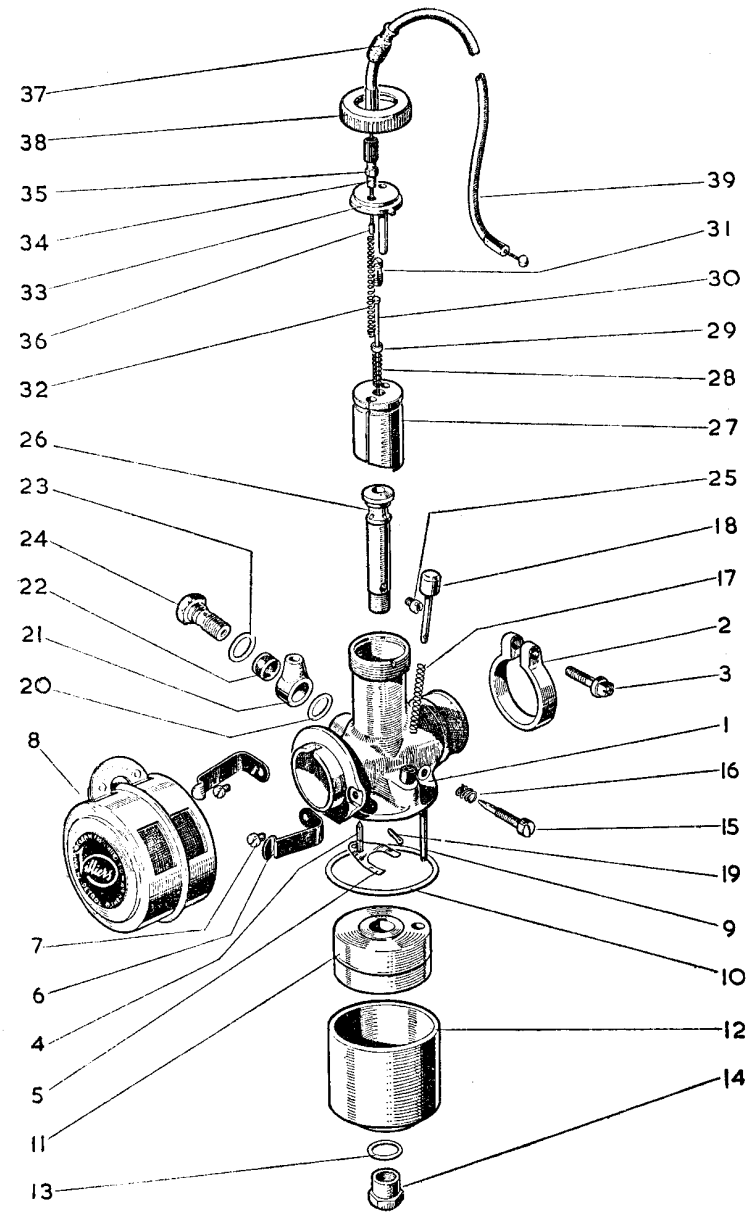


Fig. 10 CARBURETTOR, TYPE S.24.

## CARBURETTER, TYPE S.24.

Fig. 10.

illus. No.	Part No.	Description.	Qty.
1	V.771E	Body with fuel bush	1
2	V.113 × 14	Body clip	1
3	V.754E	" " screw	1
4	V.355E	Fuel needle	1
5	V.257E	" " lever	1
6	V.790E	Air filter clip	2
7	V.831E	Screw for clip	2
8	V.837E	Air filter	1
9	V.717E	Pilot jet	1
10	V.125 × 8E	Cup joint washer	1
11	V.777E	Float	1
12	V.773E	" cup	1
13	V.107 × 3E	Bottom nut washer	1
14	V.361E	Bottom nut	1
15	V.775E	Pilot jet needle	1
16	V.749E	Spring for needle	1
17	V.369E	Tickler spring	1
18	V.207E	Tickler	1
19	V.111 × 2E	" split pin	1
20	V.383E	Washer, small hole	1
21	V.381E	Banjo union	1
22	V.404E	Filter gauze	1
23	H.104 × 8	Washer, large hole-	1
24	V.382E	Banjo bolt	1
25	V.774E	Main jet 120 c.c. 7E and 8E-	1
—	V.927E	Main jet,140 c.c., Mk. 11D/4-	1
26	V.772D	Centrepiece	1
27	V.792E	Throttle No. 3	1
28	V.1235E	Needle spring	1
29	V.787E	" collar	1
30	V.748E	Taper needle No. 3½	1
31	V.786E	Needle adjuster	1
32	V.586E	Throttle spring	1
33	V.799E	Top disc with peg	1
34	V.105 × 1E	Cable adjuster	1
35	V.105 × 2E	Adjuster locknut	1
36	V.108 × 15E	Cable nipple	1
37	V.826E	" cover	1
38	V.107 × 5E	Top ring	1
39	Quote engine Number when ordering	Inner and outer cable complete Carburetter S.24 complete (less Air Filter)	1 1 1

The carburetter has a banjo petrol pipe fitting inside of which is a fine mesh filter gauze which should be periodically cleaned by dipping in petrol. Be sure that when replacing the petrol pipe the fibre washers make a petrol tight joint, otherwise fuel will be wasted.

Detach the Air Filter by opening the Fixing Clips and periodically clean by dousing in petrol.

### LIGHTING SETS.

Two types of lighting sets are supplied for use with the Mark 12D and Mark 8E Engines, and although the magnetos are identical for both engines and lighting sets, there is a difference to be noted when making the connections.

High output magnetos have also been manufactured for use with Mark 8E Engines. Lighting sets for use in conjunction with these magnetos are supplied by the manufacturers of the machines and basic wiring diagrams are given on page 45.

#### "Direct" Lighting Set.

In this Set alternating current is taken direct from magneto to lamps via the head lamp switch, and it will be seen on reference to the Wiring Diagram M.2222D, Fig. 12, that the end of cable from magneto is joined to the cable from head lamp (yellow ring), No. 2 terminal switch. There is now no separate earthing cable, the lighting coil windings are earthed inside magneto.

#### Lighting Bulbs for "Direct" Set.

Head Lamp	... 6 Volt—30/30 Watt Double Filament	S.B.C.
Pilot Lamp	... 3.5 Volt—15 amp.	M.E.S.
Tail Lamp	... 6 Volt—3 Watt	M.B.C.
Speedo	... 6 Volt—17 amp	M.B.C.

#### "Rectifier" Lighting Set. (Head Lamp Type 575).

In this Set the current from the lighting coils is converted to D.C. by passing through a Selenium type Rectifier, and then used for charging a 6 Volt 10 amp/hr. battery. The rectifier casing MUST be insulated from the cycle frame. When connecting up the magneto follow the Wiring Diagram M. 2232D, Fig. 13. The cable from magneto, and the cable (green ring) from No. 2 terminal in switch are connected to one of the rectifier lugs. The two rectifier leads are joined to the cable (purple ring) from the No. 4 terminal in switch. The positive side of the battery is EARTHED.

#### Lighting Bulbs for "Rectifier" Set.

Head Lamp	... 6 Volt—24/24 Watt Double Filament	Pre-Focus.
Pilot Bulb	... 6 Volt—3 Watt	M.B.C.
Tail Bulb	... 6 Volt—3 Watt	M.B.C.
Tail Bulb		
Stop Light	... 6 Volt—3W/18W Double Filament	
Speedo	... 6 Volt—17 amp.	M.B.C.

**Rectifier.** The casing of rectifier must not make contact with any portion of the cycle frame. Various methods are adopted

to ensure this by the manufacturers of the motor cycle, and any insulating pads or washers must be replaced in position should at any time the rectifier have to be removed.

**Care of Battery.**

Once a month unscrew filler caps of each cell and pour in a small quantity of distilled water to bring the acid level with the tops of the separators. Do not use tap water as it contains impurities detrimental to the battery. Acid should not be added unless this is accidentally spilled out of the battery.

This should be replaced by diluted sulphuric acid of the same specific gravity as in the cells. Keep the battery terminals clean. See also battery manufacturer's instructions.

Many lighting troubles can be traced to unseen corrosion between the surfaces of a perfectly tight joint, and in the case of the battery this corrosion takes place much more frequently than at other electrical contacts. The positive is earthed to reduce this effect to a minimum.

**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. If the engine stops, symptoms will generally give a clue to the cause, but where this is not the case, the trouble can be more easily traced by following a definite method of investigation. The three conditions mentioned above are as follows:—

- (1) The required quantity of petrol-and-air mixture must enter the engine, which means that a proper supply of fuel has to be available from the carburetter, and that the throttle should open and close freely.
- (2) The sparking plug must give a good spark, at the right time in relation to the position of the piston on its upward stroke.
- (3) The engine must be in good mechanical condition, with no air leaks at the various joints.

There must also be efficient compression of the air in the cylinder and crankcase. This can be easily checked by putting the gear-box into the neutral position, and rotating the crankshaft by means of the kickstarter. On every revolution a definite resistance should be felt, caused by the air in the cylinder being compressed.

**Making a Preliminary Check.**

When the cause of the trouble is not evident, carry out a preliminary check covering the following points. If this fails to trace the cause, reference should be made to the Fault Finding Chart (pages 13 and 14).

Having made sure that there is "petrol" in the tank, and that the tap is in the "ON" position, depress the tickler on the carburetter to ensure that there is no blockage in the fuel supply, either in the tap, fuel pipe, banjo union or fuel needle seating. If the fuel supply is clear, fuel will spurt from the vent hole in the side of the tickler cap.

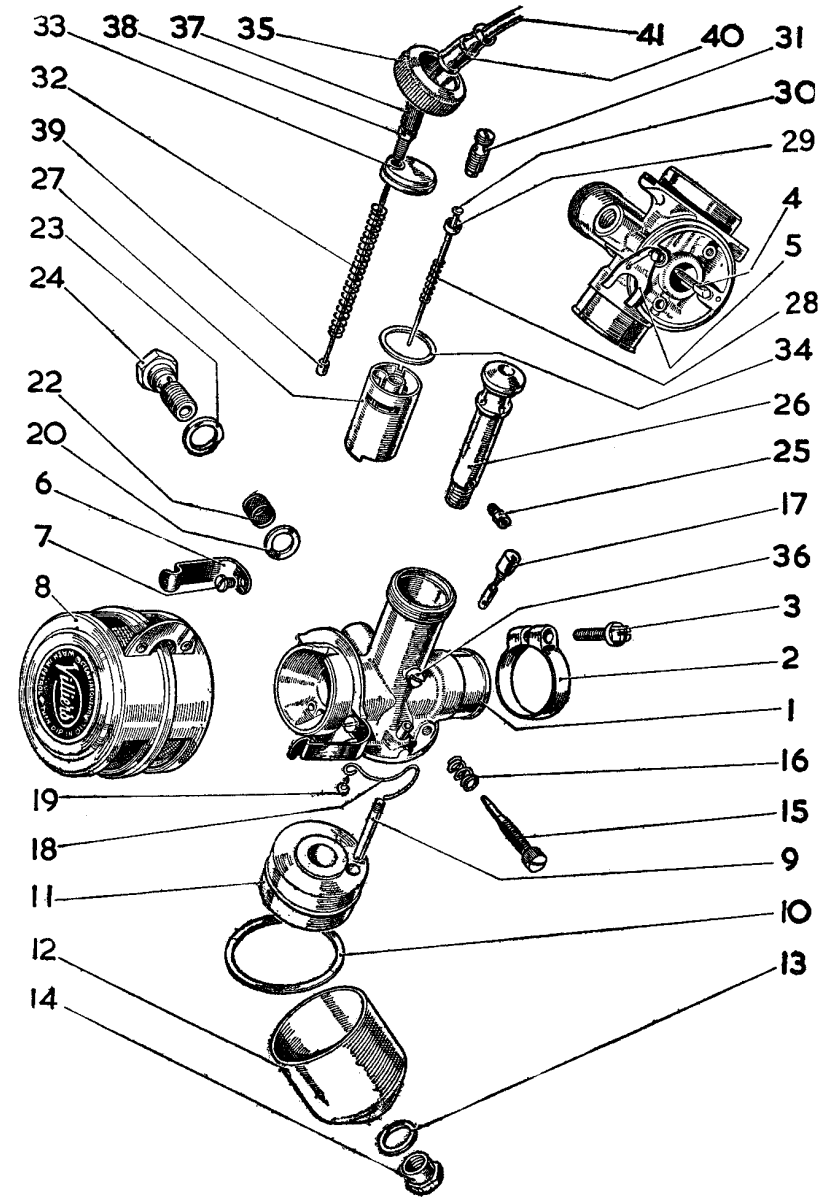


Fig. 9. CARBURETTER, TYPE S.19.



## CARBURETTER, TYPE S.19.

Fig. 9.

Illus. No.	Part No.	Description.	Qty.
1	V.840B	Body with fuel bush	1
2	V.854E	Body clip	1
3	V.754E	" " screw	1
4	V.355E	Fuel Needle	1
5	V.738E	" " lever	1
6	V.790E	Air filter clip	2
7	V.831E	Screw for clip	2
8	V.837E	Air filter	1
9	V.717E	Pilot jet	1
10	V.107x2E	Cup joint washer	1
11	V.839E	Float	1
12	V.857E	" cup	1
13	V.107x3E	Bottom nut washer	1
14	V.361E	Bottom nut	1
15	V.775E	Pilot jet needle	1
16	V.749E	Spring for needle	1
17	V.742E	Tickler	1
18	V.830E	" spring	1
19	M.2704E	Screw for spring	1
20	V.383E	Washer, small hole	1
22	V.404E	Filter gauze	1
23	H.104x8	Washer, large hole	1
24	V.382E	Banjo bolt	1
25	V.1152	Main jet, centrepiece	1
26	V.848D	Centrepiece	1
27	V.952E	Throttle	1
28	V.1235E	Needle spring	1
29	V.787E	" collar	1
30	V.748E	Taper Needle No. 3½	1
31	V.786E	Needle adjusting screw	1
32	V.586E	Throttle spring	1
33	V.850E	Top disc	1
34	V.856E	" " washer	1
35	V.852E	Top ring	1
36	V.829E	Throttle guide peg	1
37	V.105x1E	Cable adjuster	1
38	V.105x2E	Adjuster locknut	1
39	V.108x15E	Cable nipple	1
40	V.826E	" cover	1
41	Quote engine Number when ordering	Inner and outer cable complete Carburetter S.19 complete, less air filter	1

Being satisfied that fuel is reaching the carburetter, next unscrew the sparking plug, and with the high tension lead still attached, lay the plug on the cylinder head. Turn the engine by means of the kickstarter, and if there is a good spark, it is possible that the ignition timing is incorrect.

Finally, examine the carburetter controls to make certain that the throttle is actually opening when the control lever is moved.

## FAULT FINDING CHART.

Sequence of Testing.	Possible Trouble.	Remedy.
<b>Engine will not Start.</b> Depress tickler on carburetter to check whether fuel is reaching carburetter.	No fuel reaching carburetter, air lock in petrol pipe.	Turn tap 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 ¼" 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.	Clean and dry out.
	High tension terminal not making good contact on ignition coil	Clean and correct.
	Cracked insulation of adjustable contact breaker point.	Replace.
	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.
if above tests are satisfactory 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, adjust taper needle, drain crankcase.
	Air leaks at carburetter stub or manifold joint causing weak mixture.	Correct.
	Incorrect ignition timing.	Check, following instructions given.

FAULT FINDING CHART—(continued).

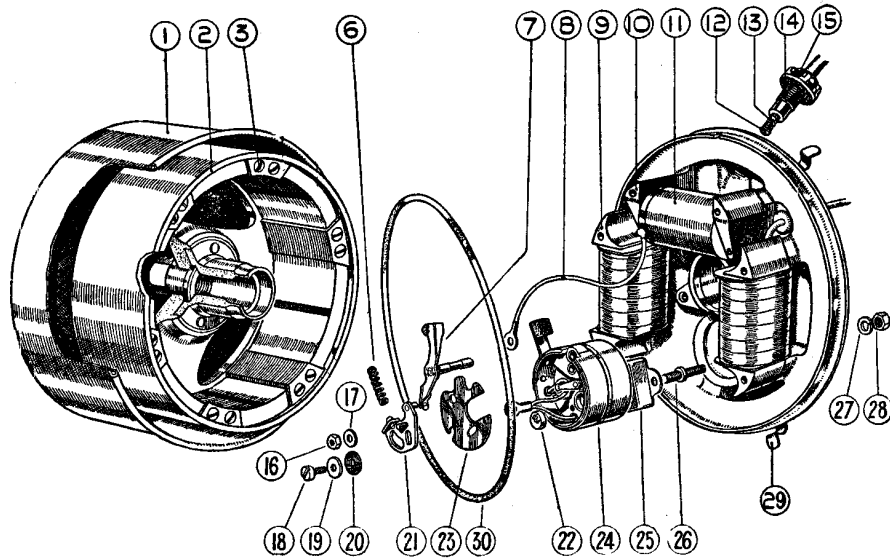
Sequence of Testing.	Possible Trouble.	Remedy.
<b>Engine Four or Eight Strokes.</b>		
Strangler may not be fully open or taper needle in a too high position. Air filter may need cleaning.	Mixture too rich.	Lower taper needle by moving to a WEAKER position. Lower needle by adjuster screw fitted in throttle.
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 carburetter.	Persistent flooding is usually due to dirt under fuel needle seating, or sticking fuel needle, damaged seating or punctured float.
<b>Engine Lacks Power.</b>		
	Engine out of tune, bearings worn. Unsuitable sparking plug. Loss of compression.	Overhaul. Replace with recommended type. Tighten cylinder head bolts. Replace worn piston rings.
	Incorrect "petrol" mixture.	Correct mixture is 1 part oil, 20 parts petrol. (Also see page 3).
	Excessive carbon deposit on piston crown and cylinder head.	Decarbonize.
	Exhaust system choked with carbon.	Clean out silencer and exhaust pipes.
	Incorrect carburetter setting.	Check and adjust.
	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 and adjust.
	Brakes binding.	Adjust.
	Driving chains too tight.	Adjust.
<b>Engine will not run Slowly.</b>		
	Weak mixture due to air leaks at carburetter 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 seal.	Replace.
	Ignition timing too far advanced.	Correct.
<b>Engine Suddenly Stops Firing.</b>		
	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.

Illus. No.	Part No	Description.	Qty.
12	1046 × 13	,, terminal pad - -	1
13	1010 × 11	,, ,, spring - -	1
14	E.869	,, ,, felt washer - -	1
15	1124 × 8	,, terminal - -	1
—	M.2110E	,, ,, cover - -	1
16	1113 × 4E	Nut, L.T. lead - -	1
17	1113 × 5E	Brass Washer - -	1
18	M.1801E	Lockscrew, point bracket - -	1
19	M.1802E	Brass washer - -	1
20	M.1805E	Insulating washer - -	1
21	M.2313E	Point bracket - -	1
22	M.2311E	Point bracket adjuster cam - -	1
23	M.2309E	Insulating pad - -	1
24	M.2505E	Condenser Box - -	1
—	M.2503E	,, ,, assembly - -	1
—	M.2506E	Condenser Box unit, condenser fixing studs, nuts, washers, oil pad and L.T. lead - -	1
25	M.1750D	Condenser - -	1
26	1053 × 1E	,, box fixing stud - -	2
27	1002 × 13E	Washer for stud - -	2
28	1002 × 15E	Nut for Stud - -	2
29	M.1297E	Flywheel cover clip - -	3
—	M.1535E	Cotter for clip - -	3
30	M.2304D	Cover joint ring - -	1
—	M.2501E	Badge for cover M.2500C - -	1
—	M.2502E	Cover badge washer for M.2500C - -	1
—	A.123	Std. Armature plate assembly - -	1
— or	A.124	Competition armature plate assy. - -	1
—	A.128	} High output armature plate assy. - -	1
— or	A.132		
—	M.2431E	Armature vent tube - -	1
—	1124 × 9E	Coil end screw, $\frac{3}{8}$ " dia. - -	2
—	M.1383E	,, ,, ,, $\frac{5}{8}$ " dia. - -	2
—	494	H.T. lead complete - -	1
—	EM.1175	Screw, armature plate fixing - -	2
—	1140 × 1E	,, ,, ,, ,, - -	4
—	1010 × 16E	Bush, lead insulating - -	1

## VILLIERS "DIRECT" LIGHTING SET.

Wiring Diagram M.2222D—Fig. 12 (Page 43).

Mark 12D and 8E Units.



**MAGNETO.** Fig. 8.

<i>Illus. No.</i>	<i>Part No.</i>	<i>Description.</i>	<i>Qty.</i>
1	M.2500C	Flywheel cover - - -	1
2	R.117	„ assembly (competition)	1
—	R.120	„ assembly (standard)	1
—	or R.123	„ „ (high output)	1
3	M.1797E	Screw, pole shoe - - -	12
6	M.2090E	Rocker arm spring - - -	1
7	M.1632E	Rocker arm - - -	1
8	482	Low tension lead - - -	1
9	M.2259—	Lighting coils with cheeks -	1 pr.
—	See page 45	Ditto for High Output Magnetos	1 pr.
10	M.1855E	H.T. coil end—left-hand -	1
10	M.1856E	H.T. coil end—right-hand -	1
11	M.1361E	„ coil - - -	1
—	or M.2306—	H.T. coil (High output mag - and competition Engine)	1

<i>Component.</i>	<i>Part No.</i>
Headlamp Complete, M35 - - -	060088
Rim, Chrome, Less Glass - - -	608157
Wire, Glass Fixing - - -	600308 (Set of 4).
Packing, Glass - - -	612220
Glass - - -	612103
Main Bulb Holder - - -	612171
Pilot - - -	608025
Reflector - - -	612172
Lighting Switch, U39 L18 - - -	31157A
Dipper Switch, No. 99 - - -	380501
Cable Grommet - - -	CM2
Lamp Fixing Screw - - -	612230
Plain Washer - - -	137141
Shakeproof Washer - - -	188471
Rim Catch Spring - - -	612218
Rim Catch - - -	612217
Terminal Sleeve - - -	188818
Battery Contact - - -	612222
Main Bulb, 6 V.—30/30 Watt S.B.C. -	No. 169
Pilot Bulb, 3½ V.—15 Amp. M.E.S. -	No. 974
Cable Harness - - -	993701
Switch Handle Assembly - - -	351567
„ „ Screw - - -	105751
Sleeve Terminal - - -	188818
<b>Tail Lamp, Type 529 Complete -</b>	<b>53256</b>
Lens - - -	526404
Window - - -	526406
Screw, Lens Fixing - - -	133551
Bulb-Holder Assembly - - -	554710
Rubber Base - - -	526408
Screw, Base Fixing - - -	526410
6V—3W. Bulb, M.B.C. - - -	988

For use with Magneto having one Lighting Cable only.



# VILLIERS AC/DC LIGHTING SET WITH RECTIFIER.

Wiring Diagram M.2232D—Fig. 13 (Page 44).

## Mark 12D and 8E Units.

Component	Part No.
Headlamp complete with ammeter, less cables, Type MCH56	51654A
Headlamp rim assembly	534343
Rim fixing wire (5 per set)	504665
Light Unit (Less bulbs)	516828
Light Adaptor	859598
Pilot bulb holder with lead	861552
Ammeter	36084
Ammeter rubber ring	523986
Switch	31309
Switch fixing spring	308234
Switch rubber ring	523986
Rim clip	534296
Rim clip screw	144921
Main bulb (pre focus) 6V. 24/24W.	166
Pilot bulb 6V. 3W (M.B.C.)	988
Lamp fixing screw	516856
Lamp fixing washer	137499
Harness	836241
Speedometer cable grommet	199005
Harness grommet	862217
<b>Stop Tail Lamp type 564</b>	<b>53394</b>
Lens	573839
Window	575200
Lens fixing screws (2 per set)	552928
Rubber gasket	575208
Base assembly	575212
Bulb holder assembly	575209
Bulb holder base grommet	575207
Bulb lead grommet	573825
Bulb 6V. 18/3W.	352
<b>Miscellaneous items</b>	
Stop light switch (right hand fitting)	31437
Stop light switch (switch hand fitting)	31384
Stop light switch spring	315543
A.C. horn	70068
A.C. horn push	76204
Continental light unit for MCH56	516829
Continental main bulb 6V—25/25W (Duplo)	377
Rectifier	2L985

Illus. No.	Description	Part No.
39	Clutch Lever Adjuster Pin	E.8827
40	Clutch Lever	E.8828
—	Grease Nipple	E.8850
41	Inspection Cover	E.8829
42	Inspection Cover Pin	E.8830
43	K.S. Return Spring	E.8831
44	K.S. Crank	E.8832
45	K.S. Crank Pedal	E.8833
46	K.S. Crank Pedal Bolt	E.8834
47	K.S. Crank Pedal, Spring and Ball	E.8835
48	K.S. Crank Pinch Pin and Nut	E.8836
49	Selector Plunger	Supplied as Assembly only
	Selector Plunger Box	
	Selector Plunger Spring	
50	Selector Plunger Box Washer and Nut	E.8840
51	Dip Stick	E.8841
52	Drain Plug	E.8842
53	Operator Bush	E.8843
54	Operator Shaft (complete with lever)	E.8844
55	Control Lever	E.8882
56	Dished Washer and Pin	E.8863
—	Control Lever Pin	E.8864
57	Final Drive Sprocket, 17T × .195" wide	E.8868
57	" " " 17T × .295" "	E.9016
57	" " " 15T × .295" "	E.9018
57	" " " 15T × .195" "	E.9017
57	" " " 18T × .195" "	E.11062
58	Sprocket Gland Nut	E.8869
59	Sprocket Gland Nut Felt Washer	E.8870
60	Sprocket Locking Screw	E.8871
61	Inside Op. Lever Distance Piece	E.8883
—	Reverse Shaft Cover Plate	E.10539

†Earlier pattern. Now supplied E.11063 Pinion, E.11064 Bush.

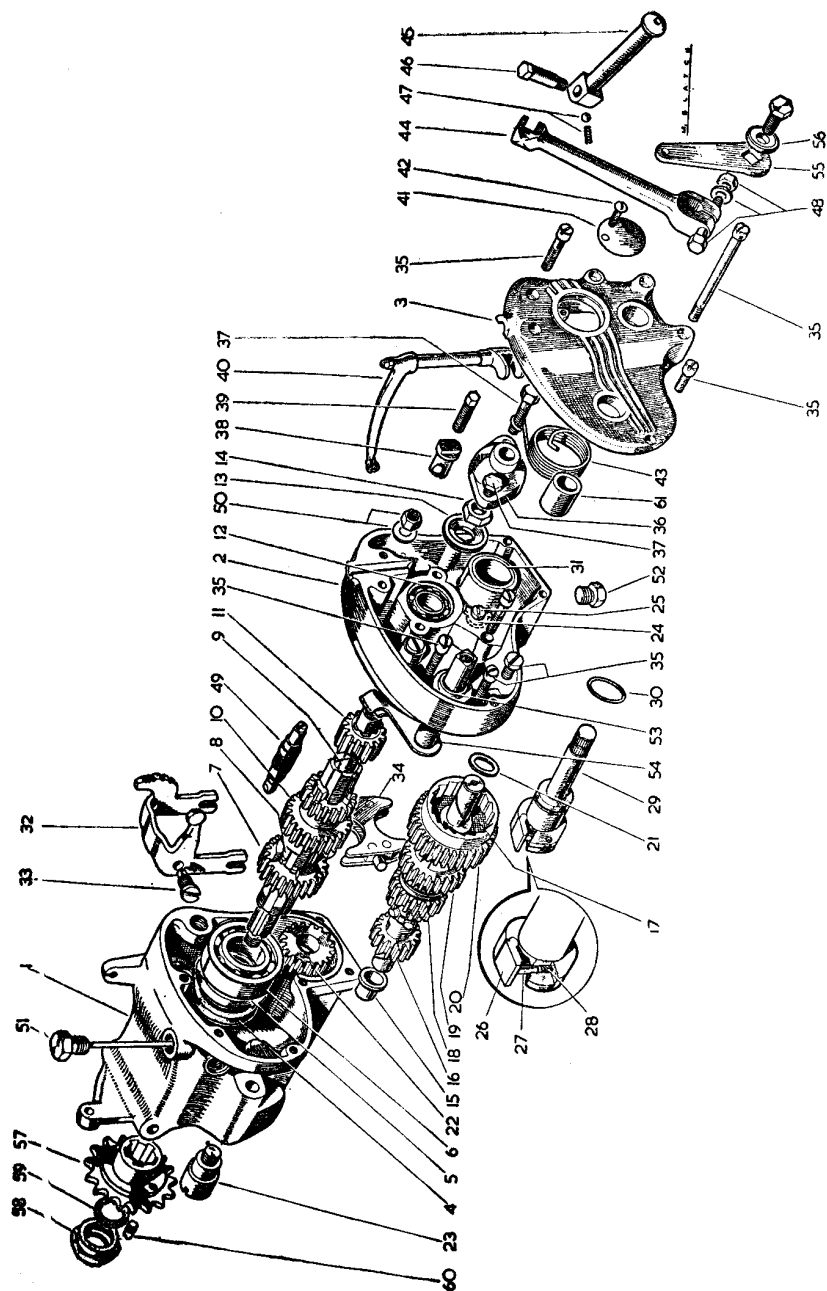


Fig. 7. 3 SPEED AND REVERSE GEARBOX.

Alternative specifications are made for manufacturers' individual requirements, and the components fitted are detailed below. When ordering, always quote the part number of the component, together with the full engine number.

### MARK 12D.

Description.	Part No.	Qty.
Cylinder head for decompressor Mk. 11D (comp)	B.7958	1
Cylinder with separate inlet manifold for Mk. 11D (comp)	B.7957/1	1
Inlet manifold straight for Mk. 11D (comp)	D.8300	1
Finned exhaust pipe nut	E.8629	1

### MARK 8E.

Description.	Part No.	Qty.
Cylinder head for decompressor Mk. 8E	B.8613	1
Cylinder head for decompressor Mk. 7E (comp)	B.8571	1
Cylinder head, no decompressor, Mk. 7E (comp)	B.8716	1
Cylinder with separate inlet manifold Mk. 8E and 8E/4 and 8E/R	B.7095/1	1
Cylinder with separate inlet manifold Mk. 7E (comp)	B.8438	1
Cylinder with integral carb. stub. Mk. 7E (comp)	B.8439	1
Inlet manifold, straight, Mk. 8E and 7E	D.7096	1
Inlet manifold, bent, Mk. 8E and 7E	D.7448	1
Manifold stud	E.363	2
Nut for stud	E.3961	2
1/8" spring washer	E.1050	2
Manifold joint washer	E.7341	1
Finned exhaust pipe nut	E.8564	1

### DECOMPRESSOR COMPONENTS.

#### COMMON TO 197 c.c. and 122 c.c. ENGINES.

Description.	Part No.	Qty.
Release valve assembly	E.11219	1
Release valve body	E.3064	1
" " stem	E.1280	1
" " spring	E.1163	1
" " cable nut	E.1276	1
" " " clamp	E.1545	1
" " clamp screw	E.6737	1
" " joint washer	E.3318	1

## ENGINE WITH 4 SPEED OR 3 SPEED WITH REVERSE GEARBOX.

Listed below are components differing from the standard Mk. 8E Unit and to be substituted for the items shown in the Spare Parts List.

Description	Part No.	Qty. Per Set.
Chaincase, Inner half - -	C.8428 - -	1
Clutch Centre Assembly - -	E.8429 - -	1
Push Rod, Headed - -	E.4465 - -	1
" " " 7 <sup>9</sup> / <sub>16</sub> " - -	E.8656 - -	1
Mainshaft Nut - -	E.8614 - -	1
Mainshaft Spring Washer - -	E.8615 - -	1
Gearbox Stud—Top Left - -	E.7769 - -	1
" " — " Right - -	E.3393 - -	1
" " —Bottom - -	E.363 - -	2
" " Nut - -	E.364 - -	3
" " " - -	E.3961 - -	1
" " Washers - -	E.2667 - -	4

### 4 SPEED GEARBOX.

In cases where a wide ratio type of gearbox is fitted, parts numbered E8796, E8805, E8799 and E8807, are replaced by the following:—

Wide ratio	Part No.	Description
}	E9028	Mainshaft Low Gear Pinion, 27 T ...
	E9029	Layshaft Low Gear, 14 T ...
	E9030	Mainshaft Sliding Gear, 23 T and 18 T
	E9031	Layshaft Second Gear, 18 T ...

### 3 SPEED GEARBOX.

For a wide ratio gearbox (ratios 1 : 1, 1.7 : 1, 3.25 : 1) parts numbered D8508 and E7714 are replaced by:—

D7283	High Gear Pinion, 26T ...	1
E7287	Layshaft Fixed Pinion, 16T	1

For the "Direct change" gearbox the following parts are not fitted:

D.6536	D.7951	E.8642	D.6538	E.6573	E.6627	E.7949	E.6296
E.6543	E.7437	E.6542	E.7228	E.6544	D.8290	M.1564	E.7948

They are replaced by:—

U.118 × 12	Plunger Spring	...	...	...	1
E.8724	Selector Arm Assembly	...	...	...	1
E.8725	Plunger Box	...	...	...	1
E.7209	Plunger	...	...	...	1
D.7576/7	Operating Spindle and Lever Assy.	...	...	...	1
D.7807	Gear-change Lever	...	...	...	1

Illus. No.	Description.	Part No.
1	Gear Box Case	E.8872
2	Gear Box Cover	E.8873
3	Gear Box Cap	E.8874
4	Gear Box Oil Seal	E.8793
5	Oil Seal Retainer	E.8794
6	Ball Race (Large)	E.8795
7	Mainshaft Low Gear Pinion 23T	E.8875
8	Mainshaft Sleeve	E.8797
9	Mainshaft	E.8798
10	Mainshaft Sliding Gear 23T and 18T	E.8876
11	Mainshaft High Gear Pinion 15T	E.10538
12	Ball Race (Small)	E.8801
13	Oil Thrower	E.8802
14	Mainshaft Nut (Left Hand Thread)	E.8803
15	Layshaft Bush (Box)	E.8804
16	Layshaft Low Gear Pinion 15T	E.8877
17	Layshaft	E.8806
18	Layshaft 2nd Gear Pinion 18T	E.8878
19	Layshaft 3rd Gear Pinion 24T	E.8808
20	Layshaft High Gear Pinion and K.S. Pinion 32T	E.8879
21	Layshaft Bush Pen Steel Washer	E.8810
—	Layshaft Bush K.S. End (not supplied separately)	E.8811
22	† Idler Pinion	E.8880
23	Idler Pinion Shaft	E.8881
24	K.S. Stop Plate	E.8812
25	K.S. Stop Plate Pin	E.8813
26	K.S. Pawl	E.8814
27	K.S. Pawl Plunger	E.8815
28	K.S. Pawl Plunger Spring	E.8816
29	K.S. Shaft	E.11065
30	K.S. Oil Seal Ring	E.8818
31	K.S. Shaft Bush	E.8819
32	Inside Operator	E.8820
33	Inside Operator Anchor Pins (2 off)	E.8821
34	Operator Fork	E.8822
35	Cover Pins (4 off 3" × ¼" CH) (2 off 1 <sup>1</sup> / <sub>16</sub> " × ¼" CH) Quote length (3 off 9 <sup>3</sup> / <sub>16</sub> " × ¼" CH)	E.8823 " "
36	Bearing Cap	E.8824
37	Bearing Cap Pins (1 off 1" × ¼" HEX) Quote length (1 off 9 <sup>3</sup> / <sub>16</sub> " × ¼" HEX)	E.8825 "
38	Clutch Lever Adjuster Sleeve and Ball	E.8826

## 3 SPEED AND REVERSE GEARBOX

For The Mk. 8E/R Unit

(Fig. 7. Illustration on page 32).

**Note:**—When ordering spares, always quote the engine number. This is stamped on the crankcase lug. **Always** quote the part number and description, not the illustration number, which is only for your assistance.

### GEARBOX RATIOS

FORWARD - 1—1, 1.60—1 and 2.73—1  
REVERSE - 3.27—1

### LUBRICATION

For the gearbox we recommend Castrol "D" Oil (S.A.E. 140) which can be inserted after the Gearbox Dipstick (Illustration No. 51) has been removed. The oil capacity of the gearbox is approx.  $\frac{1}{4}$  pint and a groove cut into the dipstick indicates the correct oil level. A Grease Nipple is provided on the exposed end of the clutch lever, and grease should be applied periodically.

### ADJUSTMENT OF CLUTCH OPERATING RODS

Remove cover, illustration No. 41 ; then detach clutch cable from operating lever No. 40. This will expose the clutch adjuster, No. 39, which when screwed in will reduce the clearance between the adjuster sleeve, No. 38, and the push rods. Unscrewing the adjuster will increase the clearance. Independent adjustment for the clutch control cable is provided by the adjuster screw in the lug at top of gearbox.

### IMPORTANT.

Apart from the gearboxes, there are several components not common to both the Mark 8E and the Mark 8E/R units. These parts include primary chaincase, clutch assembly, etc., and for this reason when ordering replacement parts **IT IS VERY IMPORTANT INDEED** that the full number of the engine is quoted

## SPARE PARTS LIST. MARK 12D AND 8E ENGINES.

**Note:**—When ordering spares, always quote the engine number. This is stamped on the crankcase lug. **Always** quote the part number and description, not the illustration number, which is only for your assistance.

### ENGINE Fig. 5 (pages 24 and 25).

DESCRIPTION.	Illus. No.	MARK 12D.		MARK 8E.	
		Part No.	Qty.	Part No.	Qty.
Cylinder head (no decompressor)	1	B.8566	1	B.8561	1
" " bolt	2	E.7339	4	E.1897	4
Washer	3	E.5808	4	E.1898	4
Gasket for cylinder head	4	E.8148	1	E.8149	1
Cylinder	5	B.8343	1	B.8291	1
Nut for exhaust pipe (plain)	6	E.3934	1	E.5577	1
Nut for exhaust pipe, finned, 1 $\frac{1}{2}$ " diam. pipe	—	—	—	E.8564	1
Nut for exhaust pipe, finned, 1 $\frac{1}{2}$ " diam. pipe	—	—	—	E.9027	1
Washer for nut E.9027 only	—	—	—	E.7912	1
Washer	7	E.4453	1	E.5578	1
Gasket for cylinder base	8	E.7306	1	E.7340	1
Piston, standard	9	C.8129	1	C.7337	1
" .015" oversize	—	D.8620	1	D.7521	1
" .030"	—	D.8619	1	D.7523	1
" ring, standard	10	E.1725	2	E.6622	2
" .015" oversize	—	E.4480	2	D.7522	2
" .030"	—	E.4582	2	D.7524	2
Expander ring	11	E.8249	1	E.8545	1
Gudgeon pin	12	E.3903	1	E.5457	1
Circlip	13	E.4047	2	E.4047	2
Connecting rod, standard	14	D.8388	1	D.7117	1
Connecting rod, bushed, .001" oversize	14	D.8665	1	D.7506	1
Small end bush	15	E.1729/1	1	E.1547/1	1
Rollers for crankpin—steel	16	E.9731	12	E.9731	26
" —bronze	—	E.1899	6	—	—
Crankpin, standard	17	E.8391	1	E.7116	1
Crankpin, .001" oversize	17	E.8666	1	E.7505	1
" plug	18	E.7229	2	E.5593	2
Crankshaft—right hand	19	D.8385/1	1	D.7119	1
" —left hand	20	D.8384/1	1	D.8280	1
Key for engine sprocket	21	E.5581	1	E.5581	1
Ball bearing	22	6204	2	6304	2
" "	23	6204	1	6204	1
Distance piece for bearings	24	E.8390	1	E.8282	1
Oil seal—crankshaft drive end	25	E.9720	1	E.9720	1
" " magneto end	26	E.9718	1	E.9718	1
Shim for engine sprocket	27	E.4150	as reqd.	E.4150	as reqd.
Engine sprocket	28	E.8389	1	E.7800	1
Spring washer	29	E.5706	1	E.5706	1
Nut	30	E.3931	1	E.3931	1
Crankcase, right and left-hand halves, less fittings	31	B.8382 B.8383	1 1	A.7558/1 A.8279	1 1
Stud in crankcase for cylinder	32	E.4160	4	E.2152	4
Spring washer	33	E.1050	4	E.1050	4
Nut	34	E.3961	4	E.364	4
Stud (fitted) securing crankcase halves	35	E.7210	2	E.7210	2
Washer	36	E.2924	2	E.2924	2
Nut	37	E.2539	2	E.2539	2

**ENGINE PARTS—continued.**

DESCRIPTION.	MARK 12D.			MARK 8E.	
	Illus. No.	Part No.	Qty.	Part No.	Qty.
Stud (fitted) securing crankcase halves—short ...	38	E.3392	2	E.3392	2
Washer ...	39	E.2924	2	E.2924	2
Nut ...	40	E.2539	2	E.2539	2
Stud securing crankcase halves ...	41	EM.1120	1	EM.1120	1
Washer ...	42	E.2924	1	E.2924	1
Nut ...	43	E.2539	1	E.2539	1
Dowel in crankcase locating gear-box ...	44	E.7619	2	E.7619	2
Crankcase drain plug ...	45	E.1962	1	E.1962	1
Washer ...	46	E.1905	1	E.1905	1
Stud for chaincase ...	47	E.4093	1	E.4093	1
Nut ...	48	E.8276	1	E.8276	1
Gasket ...	49	E.8401	1	E.8401	1
Chaincase, inner, with gland plate	50	B.8259	1	B.8259	1
Stud in chaincase for gearbox ...	51	E.5107	1	E.5107	1
Gland plate ...	52	E.5547	1	E.5547	1
Felt washer ...	53	E.5715	1	E.5715	1
Rivets for gland plate ...	54	E.4083	4	E.4083	4
Dowel for outer chaincase ...	55	W.174	1	W.174	1
Cone nut for inner chaincase ...	56	E.5354	1	E.5354	1
Lockwasher ...	57	E.5599	1	E.5599	1
Screw ...	58	E.5561	1	E.5561	1
Clutch centre assembly ...	59	D.7329/1	1	D.7329/1	1
Clutch sprocket assembly ...	60	D.7328	1	D.7328	1
or Clutch sprocket assembly (neo-langite faced) ...	60	D.7328/1	1	D.7328/1	1
Cork ...	61	E.4464	30	E.4464	30
Ball retaining plate ...	62	D.4462	2	D.4462	2
Ball ...	63	E.9755	50	E.9755	50
Rivet ...	64	E.5574	15	E.5574	15
Primary chain ...	65	Renold 110038	1 (64 pitches)	Renold 110038	1 (66 pitches)
Centre plate ...	66	D.7293	1	D.7293	1
Clutch plate (corked) ...	67	D.7292	1	D.7292	1
Front plate assembly (cork clutch) or Front plate assembly (neo-langite clutch) ...	68	D.10281	1	D.10281	1
or Clutch plate (neo-langite faced)	68	D.7294	1	D.7294	1
Spring ...	67	D.6320	1	D.6320	1
Screw ...	69	E.4466	6	E.4466	6
Screw ...	70	E.4208	6	E.4208	6
Gasket ...	71	C.7304/1	1	C.7304/1	1
Chaincase, outer ...	72	B.8258	1	B.8258	1
" oil level screw ...	73	E.8275	1	E.8275	1
Washer ...	74	E.1905	1	E.1905	1
Oil filler plug ...	75	E.9330	1	E.9330	1
Washer ...	76	E.8261	1	E.8261	1
Breather valve for chaincase ...	77	E.7703	1	E.7703	1
Spring washer ...	78	E.1430	1	E.1430	1
Nut ...	79	E.401	1	E.401	1
Stud, gearbox fixing, top right ...	—	E.8625	1	E.8625	1
" " " left ...	—	E.6559	1	E.6559	1
" " " bottom left ...	—	E.6558	1	E.6558	1
Nut " " top right front ...	—	E.3961	1	E.3961	1
Carburetter (see pages 37, 39 and 41 for components) ...	80	Type S.19	1	Type S.24 or " S.25	1

Illus. No.	Description	Part No.	Quantity
46	K.S. Pawl Plunger ...	E.8815	1
47	K.S. Pawl Plunger Spring ...	E.8816	1
48	K.S. Shaft ...	E.8817	1
48a	K.S. Shaft Bush ...	E.8819	1
49	K.S. Pawl ...	E.8814	1
51	K.S. Oil Seal Ring ...	E.8818	1
52 & 53	Selector Plunger Box Washer and Nut ...	E.8840	1
54	Drain Plug ...	E.8842	1
55	Ball Race (Small) ...	E.8801	1
56	Grease Nipple ...	E.8850	1
57	K.S. Return Spring ...	E.8831	1
58	Short Control Lever ...	E.8849	1
59	Bearing Cap ...	E.8824	1
60	Mainshaft Nut, Left Hand Thread ...	E.8803	1
61	Oil Thrower ...	E.8802	1
62	K.S. Stop Plate Pin ...	E.8813	1
63	Operator Bush ...	E.8843	1
64	Clutch Lever ...	E.8828	1
65	Bearing Cap Pins 1" x 1/4" HEX } Quote length 3/8" x 1/4" HEX }	E.8825	1
66	Clutch Lever Adjuster Sleeve and Ball ...	E.8826	1
67	Clutch Lever Adjuster Pin ...	E.8827	1
68	Foot Change Rubber ...	E.8867	1
69	Foot Change Lever ...	E.8865	1
70	Gear Box Cap ...	E.8792	1
71	K.S. Crank Pinch Pin, Nut ...	E.8836	1
72	Cover Pins 3" x 1/4" CH } Quote length 1 1/8" x 1/4" CH } 3/8" x 1/4" CH }	E.8823	4
73	Clip Bolt for Lever ...	E.8866	1
74	Inspection Cover ...	E.8829	1
75	Inspection Cover Pin ...	E.8830	1
77	Nut for Adjuster Plate Pin ...	E.8860	2
78	Adjuster Plate Pin ...	E.8848	2
79	Bush for Adjuster Pin ...	E.8847	2
80	Spring Stop for Adjuster Plate ...	E.8845	1

\* Not supplied separately.

**3-SPEED GEARBOX** (continued from page 23).

86	D.9523	Kickstart lever, 1 1/8" crank	-	1
86	D.9538	Kickstart lever, 1 1/2" crank	-	1
87	E.4096	" pedal	-	1
88	E.4098	Pedal pivot pin	-	1
89	E.9776	Ball for pivot pin	-	1
90	E.4270	Spring for ball	-	1
91	E.2152	Stud	-	1
92	E.2667	Washer	-	1
93	E.364	Nut	-	1



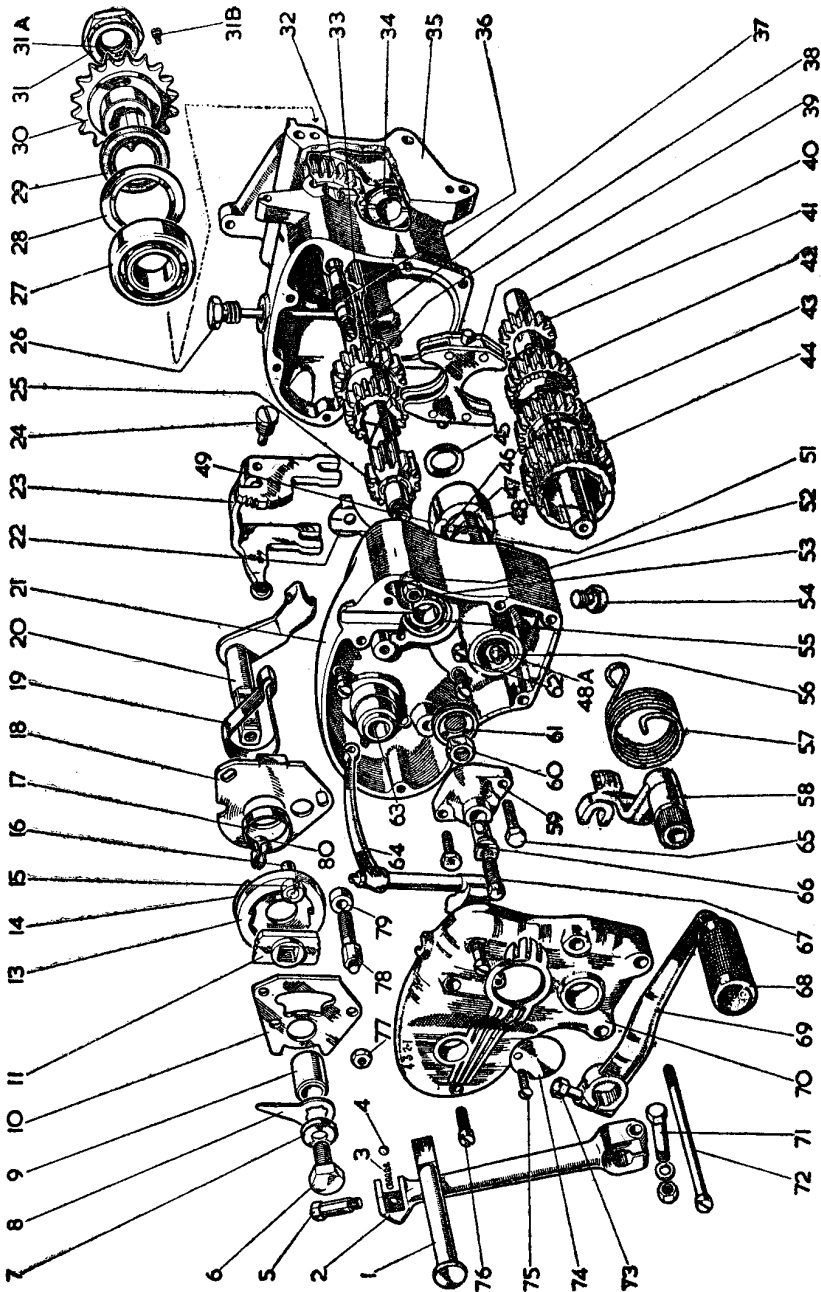


FIG. 6. 4-SPEED GEARBOX.

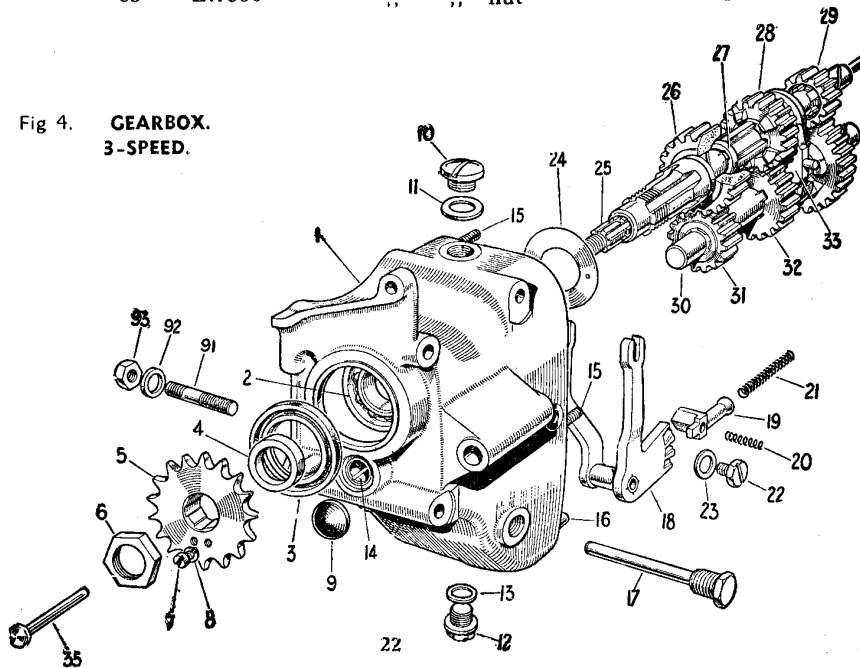
### 3 SPEED GEARBOX.

<i>Illus. No.</i>	<i>Part No.</i>	<i>Description.</i>	<i>Qty.</i>
1	B.8298	Gearbox, bushed - - -	1
2	6205	Ball bearing - - -	1
3	E.9728	Oil Seal - - -	1
4	E.7882	Sprocket distance piece - -	1
5	E.8230	Sprocket 15T .205" chain -	1
	or E.8671	" 15T .305" " -	1
	or E.9516	" 16T .205" " -	1
	or E.10710	" 16T .305" " -	1
	or E.8231	" 17T .205" " -	1
	or E.8468	" 17T .305" " -	1
	or E.9515	" 18T .205" " -	1
	or D.8744	" 19T .205" " -	1
	or D.9408	" 19T .305" " -	1
-	E.9648	Washer, dished - - -	1
6	E.6930	Sprocket locknut - - -	1
7	E.5561	Screw for locknut - - -	1
8	E.7529	Spring washer - - -	1
9	Z.1009×9	Sealing disc - - -	1
10	E.9331	Oil filler plug - - -	1
11	E.6593	Washer for plug - - -	1
12	E.6292	Oil drain plug - - -	1
13	V.107×3E	Washer for plug - - -	1
14	E.6528	Layshaft bush - - -	1
15	E.4011	Stud for end plate - - -	3
16	E.7619	Dowel - - -	2
17	E.8296/7	Selector pivot pin - - -	1
18	D.8290	" quadrant - - -	1
19	E.7948	" plunger - - -	1
20	M.1564	Plunger spring, short - -	1
21	E.6296	" " long - - -	1
22	E.1962	Oil level plug - - -	1
23	E.1905	Washer for plug - - -	1
24	E.7347	Bearing sealing washer - -	1
25	C.7281/1	Mainshaft - - -	1
26	D.8508	High gear pinion - - -	1
27	E.6566	Pressure Washer - - -	1
28	D.6525	Mainshaft sliding pinion -	1
29	E.7286	" fixed pinion - - -	1
30	C.7282	Layshaft - - -	1
31	E.7714	" fixed pinion - - -	1
32	D.6524	" sliding pinion - - -	1
33	E.6531	Sliding gear operator - -	1
34	D.6523/1	Ratchet pinion - - -	1
35	E.7439	Push rod, headed - - -	1
36	E.7372	" " long - - -	1
37	E.5263	" " short - - -	1
38	E.5257	Steel washer - - -	2
39	E.6564	Felt washer - - -	1

**GEARBOX—continued**

Illus. No.	Part No.	Description.	Qty.
40	D.6526/1	Kickstart shaft, bushed	1
41	E.6882	„ pawl	1
42	E.4908	„ „ plunger	1
43	E.4907	Plunger Spring	1
44	E.8777	Sealing ring	1
45	D.6536	Operating spindle	1
46	E.8776	Sealing ring	1
47	E.4150	Pressure washer	1
48	E.6552	Spindle circlip	1
49	D.6996	Foot change lever	1
50	D.6861	Rubber for lever	1
51	E.4251	Bolt for foot lever	2
52	E.4252	Nut for bolt	2
53	E.6543	Ratchet spring	1
54	D.7951	Operating pawl	1
55	E.7437	„ „ spring	1
56	E.8642	„ spindle plate	1
57	E.6542	„ „ distance piece	1
58	D.6538	„ lever	1
59	E.7228	„ spindle shim	as reqd
60	E.6573	„ „ washer	1
61	E.6544	„ lockwasher	1
62	E.6627	„ nut	1
63	E.6545	Stop pin	1
64	E.7949	Plunger box	1
65	E.7950	„ „ nut	1

Fig 4. **GEARBOX.**  
**3-SPEED.**



Illus. No.	Description	Part No.	Quantity.
1	K.S. Crank Pedal	E.8833	1
2	K.S. Crank	E.8832	1
3 and 4	K.S. Crank Pedal Spring and Ball	E.8835	1
5	K.S. Crank Pedal Bolt	E.8834	1
6	Operator Shaft Securing Pin	E.8864	1
7	Dished Washer	E.8863	1
8	Gear Indicator	E.8862	1
9	Outer Bush for Operator	E.8861	1
10	Stop Plate and Spring Retainer	E.8859	1
11	Control Ratchet Female	E.8858	1
13	Control Ratchet Male	E.8855	1
14	Control Plate	E.8854	1
15	Bush for Control Plate Pin	E.8856	2
—	Spring Stop for Control Plate	E.8853	1
16	Operating Pin for Pawl Plate	E.8857	1
17	Pawl Plate Spring	E.8852	1
18	Adjuster Plate	E.8846	1
19	Lever Return Spring	E.8851	1
20	Operator Shaft (Complete with Lever)	E.8844	1
21	Gear Box Cover	E.8791	1
22	K.S. Stop Plate	E.8812	1
23	Inside Operator	E.8820	1
24	Inside Operator Anchor Pins	E.8821	2
25	Mainshaft High Gear Pinion 15T	E.8800	1
26	Dip Stick	E.8841	1
27	Ball Race (Large)	E.8795	1
28	Oil Seal Retainer	E.8794	1
29	Gear Box Oil Seal	E.8793	1
30	Final Drive Sprocket, 17T, X .195" wide	E.8868	1
30	„ „ „ 17T. X .295" „	E.9016	1
30	„ „ „ 15T. X .295" „	E.9018	1
30	„ „ „ 15T. X .195" „	E.9017	1
—	„ „ „ 18T. X .195" „	E.11062	1
31	Sprocket Gland Nut	E.8869	1
31a	Sprocket Gland Nut Felt Washer	E.8870	1
31b	Sprocket Locking Screw	E.8871	1
32	Mainshaft Low Gear Pinion 26T.	E.8796	1
33	Mainshaft Sleeve	E.8797	1
34	Layshaft Bush (Box)	E.8804	1
35	Gear Box Case	E.8790	1
36	Selector Plunger Box	E.8838	1
	Selector Plunger Spring } Assembled	E.8839	1
	Selector Plunger	E.8837	1
37	Mainshaft	E.8798	1
38	Mainshaft Sliding Gear 21T. and 18T.	E.8799	1
39	Operator Fork	E.8822	1
40	Layshaft	E.8806	1
41	Layshaft Low Gear Pinion 16T.	E.8805	1
42	Layshaft 2nd Gear Pinion 21T.	E.8807	1
43	Layshaft 3rd Gear Pinion 24T.	E.8808	1
44	Layshaft High Gear Pinion and KS Pinion 27T.	E.8809	1
45	Layshaft Bush Penn Steel Washer	E.8810	1
	*Layshaft Bush (K.S. End)	E.8811	1

## 4-SPEED GEARBOX

for the Mk. 11D/4, Mk. 7E/4 and Mk. 8E/4 Units.

(Fig. 6. Illustration on page 28).

**Note:**—When ordering spares, always quote the engine number. This is stamped on the crankcase lug. **Always** quote the part number and description, not the illustration number, which is only for your assistance.

### GEARBOX RATIOS.

Standard Type

Index Mark S — 1—1, 1.35—1, 1.8—1 and 2.93—1.

Wide Ratio Type

Index Mark V — 1—1, 1.35—1, 2.3—1 and 3.47—1.

### LUBRICATION.

For the gearbox we recommend Castrol "D" Oil (S.A.E. 140) which can be inserted after the Gearbox Dipstick (Illustration No. 26) has been removed. The oil capacity of the gearbox is approx.  $\frac{1}{4}$  pint and a groove cut into the dipstick indicates the correct oil level. A grease nipple is provided on the exposed end of the clutch lever, and grease should be applied periodically.

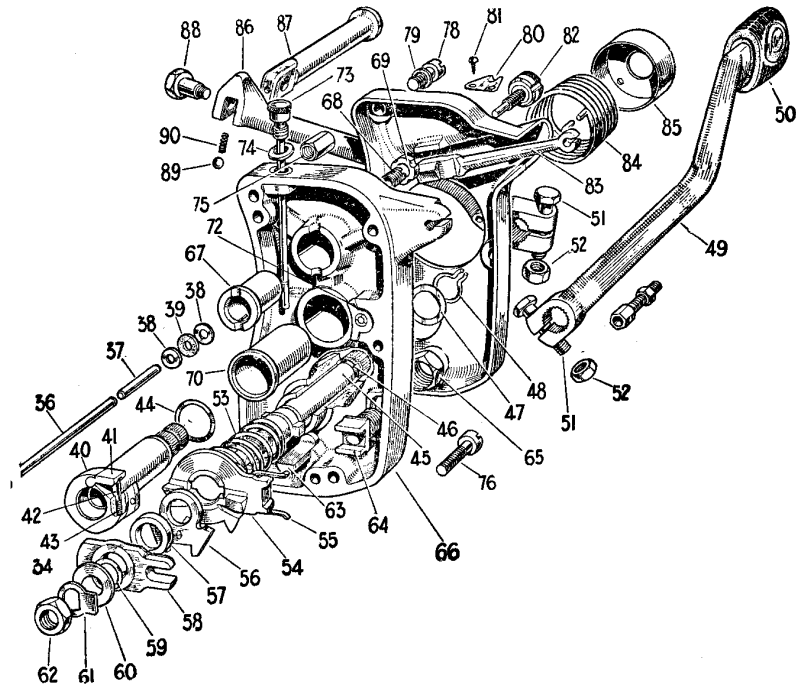
### ADJUSTMENT OF CLUTCH OPERATING RODS.

Remove cover, illustration No. 74; then detach clutch cable from operating lever No. 64. This will expose the clutch adjuster, No. 67, which when screwed in will reduce the clearance between the adjuster sleeve, No. 66, and the push rods. Unscrewing the adjuster will increase the clearance. Independent adjustment for the clutch control cable is provided by the adjuster screw in the lug at top of gearbox.

### IMPORTANT.

Apart from the gearboxes, there are several components not common to both the Mark 8E/3 and the Mark 8E/4 units. These parts include primary chaincase, clutch assembly, etc., and for this reason when ordering replacement parts **IT IS VERY IMPORTANT INDEED** that the full number of the engine is quoted.

Illus. No.	Part No.	Description.	Qty.
66	B.8263	End plate, bushed - - -	1
67	E.6527	Mainshaft bush - - -	1
68	E.4906	Adjuster bush - - -	1
69	E.4905	„ „ locknut - - -	1
70	E.8264	Bush kickstart shaft - - -	1
—	E.6537/1	„ operating spindle - - -	1
72	E.4899	Kickstart stop piece - - -	1
—	E.6655	Screw for stop piece - - -	1
—	E.4467	Mainshaft Nut - - -	1

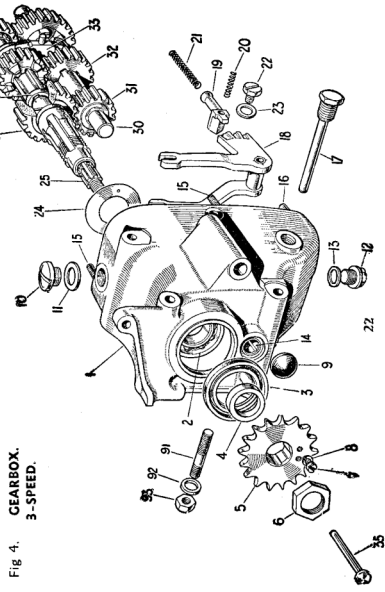


73	E7471	Dipstick - - -	1
74	V.476	Washer for dipstick - - -	1
75	E.6547	End plate nut - - -	3
76	E.6561	„ „ screw - - -	3
—	C.6506	Dust cover - - -	1
78	E.6562	„ „ screw - - -	3
79	V.157 x 2	Washer for screw - - -	3
—	D.7461	Joint Washer, C'case & Gearbox As reqd.	
80	E.6829	Adjuster locking plate - - -	1
81	M.2704E	Fixing screw - - -	2
82	E.7034/1	Clutch adjusting screw - - -	1
83	D.6546	„ lever - - -	1
84	E.7511	Return spring - - -	1
85	E.4014	Cap for spring - - -	1

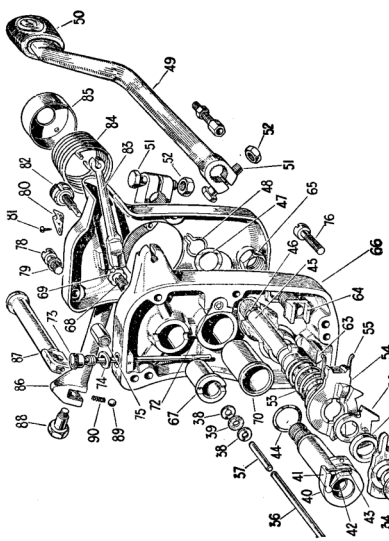
**GEARBOX—continued**

Illus. No.	Part No.	Description.	Qty.
40	D.6526/1	Kickstart shaft, bushed	1
41	E.6882	" pawl	1
42	E.4908	" plunger	1
43	E.4907	Plunger Spring	1
44	E.8777	Sealing ring	1
45	D.6536	Operating spindle	1
46	E.8776	Sealing ring	1
47	E.4150	Pressure washer	1
48	E.6532	Spindle circlip	1
49	D.6896	Foot change lever	1
50	D.6861	Rubber for lever	2
51	E.4251	Bolt for foot lever	2
52	E.4252	Nut for bolt	2
53	E.6543	Ratchet spring	1
54	D.7951	Operating pawl	1
55	E.7437	" spring	1
56	E.8642	" spindle plate	1
57	E.6542	" lever	1
58	D.6538	" distance piece	1
59	E.7228	" spindle shim	as reqd
60	E.6573	" washer	1
61	E.6544	" lockwasher	1
62	E.6627	" nut	1
63	E.6545	Plunger box	1
64	E.7949	" "	1
65	E.7950	" nut	1

Fig. 4. GEARBOX.  
3-SPEED.



Illus. No.	Part No.	Description.	Qty.
66	B.8263	End plate, bushed	1
67	E.6527	Mainshaft bush	1
68	E.4906	Adjuster bush	1
69	E.4805	" locknut	1
70	E.8264	" kickstart shaft	1
71	E.6537/1	" operating spindle	1
72	E.4899	Kickstart stop piece	1
73	E.6655	Screw for stop piece	1
74	E.4467	Mainshaft Nut	1



75	E.7471	Dipstick	1
76	V.476	Washer for dipstick	1
77	E.6547	End plate nut	1
78	E.6561	End plate screw	3
79	C.6506	Dust cover	1
80	E.6562	" screw	3
81	V.157 x 2	Washer for screw	3
82	D.7461	Joint Washer, C case & Gearbox	1
83	E.6829	As reqd.	1
84	M.2704E	Adjuster locking plate	2
85	E.7034/1	Fixing screw	1
86	D.6546	Clutch adjusting screw	1
87	E.7511	" lever	1
88	E.4014	Return spring	1
89		Cap for spring	1

(continued on page 29)

