

BOND

**OPERATING INSTRUCTIONS  
AND  
SPARE PARTS LIST**

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**Mark 9E**  
197 c.c.

**Mark 2L**  
173 c.c.

**Mark 31C**  
148 c.c.

**TWO - STROKE  
ENGINE - GEAR UNITS  
INCLUDING  
BLOWER-COOLED MODELS**

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TWO SHILLINGS AND SIXPENCE

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**THE VILLIERS ENGINEERING CO. LTD.  
WOLVERHAMPTON, ENGLAND**

## *Introduction*



**L**IKE all Villiers products the Engines covered by this book are precision built, with every component part conforming rigidly to pre-set standards of the highest quality. Your Engine is the heart of the machine in which it is installed, and with proper care and attention will give many years of efficient and trouble-free service.

This booklet, prepared by Villiers technicians, will enable you to obtain the maximum efficiency by carrying out the simple, but important, routine attention suggested. It should be kept handy for consultation when required.

Should replacement parts eventually become necessary only genuine Villiers spares, which conform to the same high quality of workmanship as the original components, should be used.

**THE VILLIERS ENGINEERING COMPANY LTD.**

**Marston Road, - - - - - Wolverhampton**

**TELEPHONES :—22399 (20 lines).  
CODE:—BENTLEY'S.**

**TELEGRAMS :—VILLIERS,  
WOLVERHAMPTON.**



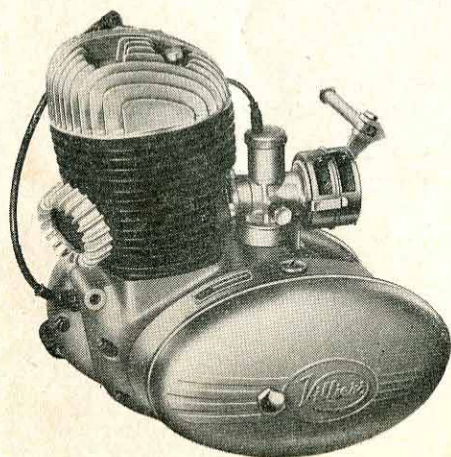
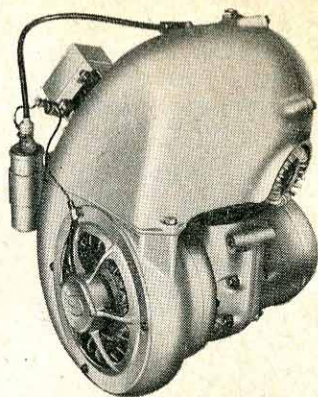
THE

*Villiers*

Mark 9E 197 c.c.

Mark 2L 173 c.c.

Mark 31C 148 c.c.



**TWO-STROKE  
ENGINE  
GEAR-UNITS**

*Read pages 4 and 5 before putting Engine into Service.*

## SUMMARY OF ENGINE/GEAR UNITS DESCRIBED IN THIS BOOKLET

Owing to the wide range of engines covered, we give below a list of type designations, together with a brief description of each unit. The type designations appear throughout the booklet, both in the Operating Instructions and Spare Parts Lists, and a complete understanding of the designation of your particular Engine is desirable. This will ensure that the correct sections of the Operating Instructions are applied, and that correct replacement parts are ordered when necessary.

<b>197 c.c. Range</b>		S.25 Carburetter
Mark 9E/3	... ..	3-speed gearbox.
Mark 9E/4	... ..	4-speed gearbox.
Mark 9E/3S	... ..	3-speed gearbox and Self-Starter Equipment (see separate booklet for Self-Starter Operating Instructions and Spare Parts).
Mark 9E/4S	... ..	4-speed gearbox and Self-Starter Equipment.
Mark 9E/4SF	... ..	4-speed gearbox, blower cooling and Self-Starter Equipment.
Mark 9E/4SFR	... ..	4-speed gearbox, blower cooling and Self-Starter Equipment for forward or reverse running of engine.
Mark 9E/4 Trials	... ..	High compression cylinder head, 4-speed gearbox, special flywheel, ignition coil and inlet pipe.
Mark 9E/4 Sports	... ..	High compression cylinder head, 4-speed gearbox, and special ignition coil.

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**173 c.c. Range**                      S.22 Carburetter

Mark 2L/3	... ..	3-speed gearbox.
Mark 2L/4	... ..	4-speed gearbox.

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**148 c.c. Range**                      S.19 Carburetter

31C/3	... ..	3-speed gearbox.
31C/3KF	... ..	3-speed gearbox, kickstarter and blower cooling
31C/3SF	... ..	3-speed gearbox, Self-Starter generator and blower cooling.
31C/4	... ..	4-speed gearbox.



# T E C H N I C A L     D A T A

	9E Range	2L Range	31C Range
Bore ... ..	59 m.m. = 2.323 ins.	59 m.m. = 2.323 ins.	57 m.m. = 2.244 ins.
Stroke ... ..	72 m.m. = 2.834 ins.	63.5 m.m. = 2.50 ins.	58 m.m. = 2.283 ins.
Capacity ... ..	197 c.c. = 12.03 cu. ins.	173 c.c. = 10.55 cu. ins.	148 c.c. = 9.03 cu. ins.
Compression ratio (Std.)	7.25:1	7.4:1	7.75:1
Compression ratio (Trials & Sports)...	8.25:1	—	—
Engine Sprocket ... ..	20 teeth x $\frac{3}{8}$ " pitch	20 teeth x $\frac{3}{8}$ " pitch	20 teeth x $\frac{3}{8}$ " pitch
Clutch Sprocket ... ..	43 teeth x $\frac{3}{8}$ " pitch	43 teeth x $\frac{3}{8}$ " pitch	43 teeth x $\frac{3}{8}$ " pitch
Primary Drive Ratio ... ..	2.15—1	2.15—1	2.15—1
Gearbox Ratios 3-speed and 4-speed...	See tables on page 48	See tables on page 48	See tables on page 48
Final Drive Sprocket (Standard) ... ..	18T x $\frac{1}{2}$ " pitch x .295" wide	17T x $\frac{1}{2}$ " pitch x .295" wide	16T x $\frac{1}{2}$ " pitch x .295" wide
Final Chain Line ... ..	2 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "	2 $\frac{1}{2}$ "
Carburetter ... ..	Villiers type S.25	Villiers type S.22	Villiers type S.19
Carburetter Needle ... ..	No. 3 $\frac{1}{2}$ . Set 1.95" out	No. 3 $\frac{1}{2}$ . No. 4 Groove	No. 3 $\frac{1}{2}$ . Set 1 $\frac{3}{32}$ " out
Throttle (Carburetter) ... ..	No. 3	No. 2 $\frac{1}{2}$	No. 2 $\frac{1}{2}$
Sparking Plug ... ..	Lodge H.H.14	Lodge H.H.14	Lodge H.H.14
Plug Gap ... ..	.018"/.025"	.018"/.025"	.018"/.025"
Spark Timing ... ..	$\frac{1}{64}$ " $\pm$ $\frac{1}{64}$ " B.T.D.C.	$\frac{1}{64}$ " $\pm$ $\frac{1}{64}$ " B.T.D.C.	$\frac{1}{64}$ " $\pm$ $\frac{1}{64}$ " B.T.D.C.
Contact Point Gap ... ..	.012"/.015"	.012"/.015"	.012"/.015"
Lubrication, Engine ... ..	Petrol mixture. For the first 500 miles 1 part Castrol XL (SAE.30) oil to 16 parts petrol and subsequently 1 part to 20 parts. (See also page 4)	Castrol XL (SAE.30) oil.	Castrol XL (SAE.30) oil.
Lubrication, Gearbox ... ..	Castrol XL (SAE.30) oil.	Castrolite (SAE.20) oil.	Castrolite (SAE.20) oil.
" Chaincase ... ..	Castrolite (SAE.20) oil.	Castrolite (SAE.20) oil.	Castrolite (SAE.20) oil.

# OPERATING INSTRUCTIONS

## LUBRICATION

### ENGINE

The engine is lubricated by the petrol system and no lubricant other than that introduced with the petrol is necessary. 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.

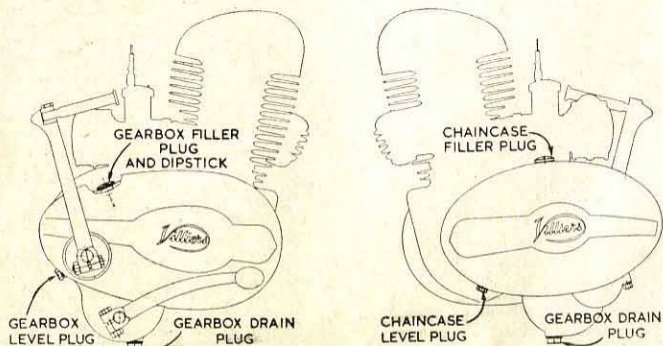
Due to the Self-Mixing properties of Castrol Two-Stroke Self-Mixing Oil,  $\frac{1}{2}$ -pint to one gallon of petrol represents a ratio of 1—20 actual lubricant to petrol, and **no pre-mixing is necessary, but it is essential to turn off the Petrol Tap and put the Oil into the Tank before the petrol.**

### GEARBOX

Castrol XL (SAE.30) is also recommended for the Gearbox, and this can be inserted after removal of the dipstick or filler plug. (See sketch below). The positions of the 3-speed gearbox plugs are slightly different, the diagrams below refer to the 4-speed gearbox. The oil level should be maintained to the notch cut into the dipstick and should be checked with the dipstick resting on **top** of the gearbox casing and not when screwed down. A drain plug is provided at the base of the gearbox so that after every 5,000 miles the oil can be drained away and replaced by fresh oil.

### CHAINCASE

Castrolite (S.A.E.20) oil is recommended for the chaincase and reference to the diagrams below will show the location of both the filler and oil level plugs. When filling the chaincase, both plugs should be removed and oil fed in until it just commences to run out of the level plug hole. Allow any surplus oil to drain off before replacing level plug.





## **STARTING—WHEN COLD**

Place the petrol tap in the "ON" position and flood the carburetter by depressing the tickler on the right-hand side of the carburetter body. Close the strangler by the means provided in order to obtain a rich mixture. Having done this, make sure that the gearbox is in the neutral position, open the twist grip about 1/3rd and turn the engine over sharply by means of the kick-starter or self-starter. When the engine fires, the throttle should be adjusted accordingly and the strangler can be opened gradually as the engine warms up. With Self-Starter equipped engines the ignition must also be switched 'ON.'

## **WHEN HOT**

It is not necessary to close the strangler or flood the carburetter.

## **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 closing throttle to 1/3rd, try again. If not successful, the sparking plug will probably be found to be wet. If so dry out and rotate 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" on page 18, and, for Self-Starter equipped engines, to the chart in the separate booklet.

## **STOPPING THE ENGINE**

If the engine is stopped by turning off the fuel supply instead of closing throttle or switching OFF the ignition an easier start will be made if the machine has to stand a long time before again being required. Where this method of stopping is employed, the ignition must be switched OFF when the engine has stopped.

## **RUNNING IN**

The useful life of your engine will depend a great deal upon the way in which it is treated during the first 500 miles. As a general rule it is not advisable to exceed 30 m.p.h. in top gear, 20 m.p.h. in third, 15 m.p.h. in second and 10 m.p.h. in bottom gear. After the running in period is completed, do not throw caution to the winds and open up the engine to its full extent. The machine should be gradually brought up to its peak performance.

## **GEARBOX**

The gears are selected by a lever which returns to its original position after each gear change, or alternatively, by a remote control having a different position for each gear. To obtain first (bottom) gear, the gear lever should be moved upwards in the case of the foot-change, or in the direction indicated in the case of the remote control. The higher gears are obtained by pressing the foot-change lever downwards, or the remote control to the gear position indicated. The neutral position is between first and

second gear, and is selected by moving the gear lever over half the distance required for a normal gear change.

Remember that when in motion and changing to a higher gear the engine speed must be reduced by partially closing throttle, but when selecting a lower gear the engine speed should be increased to obtain a smooth and silent change. When selecting any gear with the machine at rest or in motion, always fully de-clutch before operating the gear lever.

Do not allow the engine to race, or labour. Full use should be made of the gearbox thus enabling the engine revolutions to be maintained under varying load conditions.

During the initial stages the operation of the gearbox may be slightly stiff, but this condition will disappear as the engine is run-in.

The **Mark 9E/4 SFR Engine** can be started in either direction, and it is essential that the first gear position only be used when the engine is running in the "REVERSE" direction.

## CLUTCH AND PRIMARY DRIVE

The drive from the engine to the four plate clutch is by a pre-stretched endless chain running in the oil bath chain-case. No attention is necessary beyond that of lubrication, and occasional adjustment of push rod clearance to prevent clutch slip. Whilst the clutch is engaged, i.e. driving, there must be clearance between end of the push rod, located in the hollow gearbox mainshaft, and the clutch lever fitted to the gearbox end cover. An adjuster having a slotted end is provided and this can be reached with a screwdriver through a hole in the right-hand outer casing, or fan casing.

To adjust the clutch proceed as follows:—

### 1. Engines with covered clutch lever (See Fig. 2)

First slacken off the cable adjuster in the clutch control cable. After locating a screwdriver in the slot of the adjusting screw, the screw should be positioned until there is about  $\frac{1}{8}$ " of free movement between the end of the clutch lever and the right hand cover. Now take up any slack in the control cable, still leaving  $\frac{1}{16}$ " free movement of the clutch lever before commencing to depress the clutch spring. Finally, tighten the cable adjuster locknut after making sure that there is no end pressure on the push rod whilst the clutch is engaged. Although the clutch runs in oil the corks may in time become worn on the driving faces, and it will be necessary from time to time to make use of the push rod adjuster to maintain the free movement referred to above.

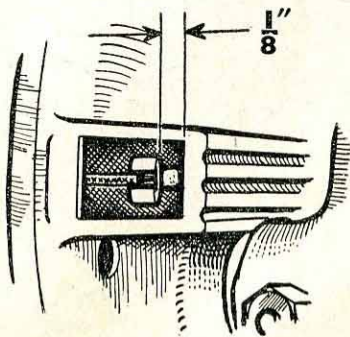


Fig. 2



## 2. Engines with exposed clutch lever (See Fig. 3)

Slacken off the clutch cable adjuster in the control cable. Locate a screw-driver in the slot of the clutch lever adjusting screw and position the screw so that the clutch lever is in approximately the position indicated. Now take up any slack in the control cable until there is  $\frac{1}{16}$ " free movement of the clutch lever before it commences to depress the clutch spring. Finally, tighten the cable adjuster lock nut after again checking that there is no end pressure on the push rod whilst the clutch is engaged.

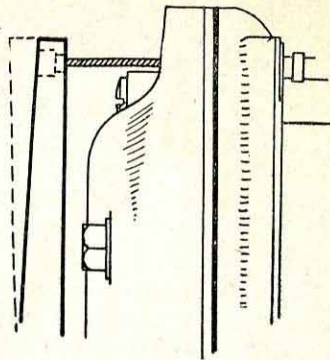


Fig. 3

## 3. Adjustment of push rod (See Fig. 4)

In order to maintain satisfactory operation of the clutch, it is necessary for the effective length of the push rods to remain within certain limits. This adjustment is carried out by means of the adjuster situated in the centre of the clutch cap nut.

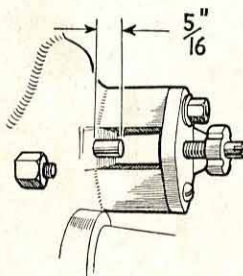


Fig. 4

When carrying out this adjustment, it is preferable to remove the clutch lever so that the extent to which the push rod protrudes through the gearbox end cover can be measured. The correct setting is for the push rod to protrude  $\frac{5}{16}$ " and the adjusting screw in the clutch cap nut should be turned until this setting is obtained. It is most important that the adjuster screw lock nut is securely tightened after carrying out any adjustments. Under normal conditions of running adjustment of the push rods should not be necessary unless new push rods and/or clutch components have been fitted, but it is recommended that the push rod setting be checked at the time of changing the oil in the chaincase as the push rod adjusting screw is then readily accessible.

Do not slip the clutch when in motion except when getting away from a standing start, otherwise rapid wear will take place. If stopping for any length of time at traffic lights, etc., move gear lever to "NEUTRAL" position. Do not stand in gear with clutch lever pulled up.

## FLYWHEEL MAGNETO GENERATOR

### 6 volt and 12 volt (High Output)

This assembly comprises three main components, i.e. the flywheel, the armature plate and the contact breaker assembly.

**The Flywheel** is totally enclosed by the armature plate and right-hand cover, and is located on the drive shaft by means of a key, and locked on a taper by a single centre nut, which also serves as an extractor. The magnets and pole shoes are secured in the flywheel by means of screws and retaining plates, and the complete flywheel assembly is balanced and magnetised after final machining. No attempt should be made to remove the magnets or pole pieces. Under normal circumstances the flywheel magnets should not require attention, but if for any reason there is a drop in magnetism the complete flywheel should be returned to our Service Department for attention.

**The Armature Plate** is secured to the right-hand crankcase, and consists of the ignition and lighting coils. The high tension lead screws into the armature plate, connection to the ignition coil being by means of a spring-loaded brass pad. The lighting coils are connected to cables which are in turn connected to the sockets on top of the armature plate in the case of the 6-volt system, and to leads, which are fed through grommets in the armature plate, in the case of the 12-volt system. The pole pieces of the coils are machined after they have been assembled to the armature plate and should not be disturbed unless replacements are to be fitted. All lighting coils bought as spares are supplied with the appropriate length of connecting lead and have the pole pieces machined, but it is essential to check that there is clearance of  $.012"/.015"$  between the pole pieces of the coils and those of the flywheel before any attempt is made to run the engine. The right-hand crankcase oil seal is also housed in the armature plate, and care should be taken not to damage the knife edge of the seal, should it be found necessary to remove the armature plate from the crankcase. See separate booklet for description of the Self-Starter assembly.

**The Contact Breaker Assembly** is housed in the right-hand cover, and is accessible after removing the cover plate, which is secured by screws.

Fig. 2 shows the general lay-out of the contact breaker assembly fitted to engines having Villiers flywheel magnetos. The contact breaker cam B is located on the right-hand crankshaft by means of a key and circlip, and it is not necessary to disturb either the cam or the flywheel when checking the contact point gap or altering the timing of the spark.

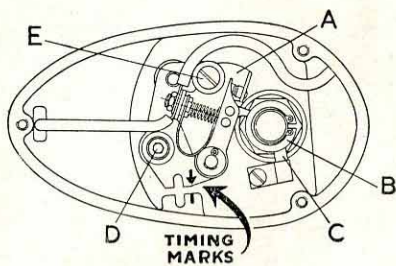


Fig. 5

The contact breaker point gap should be adjusted as follows:—  
Set gap to fully open position by rotating engine. Release screw E and alter position of bracket A until the point gap is  $.012"/.015"$ . Tighten screw E and re-check point gap. The screwdriver, and feeler gauge provided should be used for carrying out this adjustment.



It should not be necessary to re-time the ignition unless the engine has been dismantled or new components have been fitted involving the removal of screw D. This screw is fitted with solder when the timing is set when the engine is built.

Re-timing of the ignition may be carried out as follows:—

Remove the solder from the socket-headed screw, and, after loosening, swing the contact breaker base plate to an average position. With the piston set at top dead centre, release the screw E and adjust the point bracket A to give a gap between the contact points of  $.012"/.015"$ . Tighten screw E and rotate the engine in the normal direction until the contact breaker points commence to open, check the piston position which should now be  $11/64"$  before top dead centre. If the piston position differs from this figure, the base plate should be swung to the left or right to advance or retard the timing as required, and the contact breaker gap re-set. Repeat both adjustments, if necessary, until the piston position and point gap are within the required limits. Securely tighten screw locking D and E when correct adjustment has been obtained.

A felt oiling pad C is provided for the contact breaker cam. The pad should be removed periodically and soaked in molten high melting point grease, wipe off surplus grease before re-fitting.

**Note:**—In order to obtain trouble-free service from the electrical system it is essential that all component parts and connections are secure and clean. Regular inspection will ensure the minimum of trouble.

### **Engines with Self-Starter**

The letter "S" in the engine mark indicates that self-starting equipment is fitted. A separate booklet is supplied with each engine giving operating instructions and spare parts list. Additional or alternative components in the engine are listed on pages 45 to 47.

Special care should be taken when fitting a new rocker arm to ensure that the "heel" is well "bedded in," i.e. is in contact with the cam over the whole width of the heel. The method of re-timing is explained in the separate booklet.

### **IMPORTANT**

**To ensure maximum service from the self-starter, it is essential to keep the commutator and brushes clean.**

At intervals, not exceeding 5,000 miles running, it is recommended that the armature (rotor) be removed, and the commutator and brushes cleaned. See separate booklet and Villiers Service Bulletin M/C.24 for further details.

## CARBURETTER

All air passing through the carburetter is filtered, thus preventing particles of foreign matter reaching the engine. During bench-testing at our works, the carburetter is carefully set and normally it will not be necessary to alter the setting until a considerable mileage has been completed.

Means are provided for adjustment to suit individual requirements.

Except in the case of the Mark 9E/4 Trials Engine, the carburetter inlet manifold fixing screws must be removed before the carburetter can be lifted from the engine.

The carburetters fitted to the engines described in this booklet are as follows:—

Mark 31C Engines	...	...	...	Carburetter Type S.19
Mark 2L Engines	...	...	...	Carburetter Type S.22
Mark 9E Engines	...	...	...	Carburetter Type S.25

These carburetters are also available with a large air filter (Type 1100) with rod operated strangler slide, or with the large air filter and handlebar control for the strangler slide. For identification purposes, each carburetter type has a suffix figure, i.e. S.25/2, to indicate the component parts fitted to the carburetter. Full details of these designations will be found in the spare parts list on page 44, and the alternative component parts are illustrated in fig. 18.

## 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. Details of operation of the two systems is given in the following pages, and whilst the sectional drawings refer to the type S.19 and type S.25 carburetters, the information given also applies to the type S.22 carburetter, fitted to the Mark 2L Engine.

(a) **Pilot-Jet System.** (See Figs. 6 and 7).

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.

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 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 carburetter body. When the throttle slide is shut, these two line up and air can flow from the front of the carburetter 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 the passages.

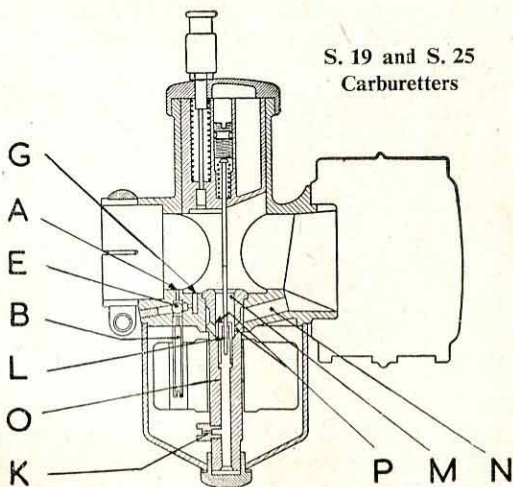


Fig. 6.

### (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.

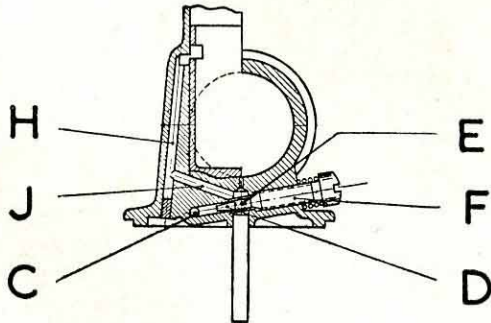


Fig. 7

## AIR FILTER

The Air Filter provided with this engine is designed to prevent ingress of foreign matter to the engine thus extending its useful working life. Two sizes of air filter are available, the smaller one incorporating a strangler shutter. Where the larger air filter is fitted, it is necessary to provide alternative means of strangling for starting from cold. This is done by the fitting of an air slide within the carburettor throttle operated either by a knob on top of the carburettor or, remotely, by a control lever on the handlebar. Filters should be maintained in accordance with the instructions which will be found on a plate attached to the filter.

## TUNING CARBURETTER

Before any attempt is made to tune the Carburettor 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 carburettor is clean internally, and that the air filter is not obstructed.

There are four adjustments for tuning the carburettor, 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 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 too 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  $3\frac{1}{2}$  to 3. 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**

In the S.19 and S.25 carburetters the needle is adjusted by a screw in the top of the throttle—screw down to weaken mixture, and vice-versa. In the S.22 carburetter the needle is adjusted by means of a spring clip attached to the throttle engaging in one of five slots in the head of the needle (see Fig. 17). 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**

### **S.19 and S.25 Carburetter**

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 and spring are in position.

### **S.22 Carburetter**

The retaining spring should be moved to one side after which the taper needle can be lifted upwards and out of the throttle.

## **TO CHANGE THE FUEL NEEDLE**

### **S.19 and S.25 Carburetters**

After removing the float cup, main jet and float, the fuel needle lever can be removed by easing it off the pivot pin. The fuel needle can then be removed for inspection or replacement. Assembly is in the reverse order and care should be taken not to distort the fuel needle lever in any way.

### **S.22 Carburetter**

Remove the float cup and float by unscrewing the cup from the carburetter body. The main jet is screwed into the bottom of the float cup. The fuel needle lever is retained by a pivot pin and removal of the pin will release the lever, which will then allow the fuel needle to be removed from the fuel needle bush. The latter item can be removed for replacement purposes. Fuel needle lever setting is as shown in Fig. 17.

## **THE CENTREPIECE**

In the S.19 and S.25 carburetters the centrepiece is a press fit in the carburetter body and should not be removed unless absolutely essential. The S.22 carburetter centrepiece is an integral part of the carburetter body.

## **TO REASSEMBLE CARBURETTER**

### **S.19 and S.25 Carburetters**

Clean the various components and make sure that the tickler vent hole is clear. Replace float in correct 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.



## **S.22 Carburetter**

Clean the various components and make sure that the tickler vent hole is clear, and that the main jet is screwed tightly into the float chamber. Replace float and check that float chamber seating ring is properly located in the recess in the carburetter body. Screw float cup into position, taking care not to overtighten.

### **All Carburetters**

Replace throttle in body at the same time guiding the taper needle into hole in top of centrepiece. A guide screw in the carburetter body will prevent the throttle being replaced unless it is correctly positioned. Locate top disc in top of body and screw on top ring. If the carburetter 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 drawn in causing hard starting and erratic running.

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.

---

## **ELECTRICAL SYSTEM. Villiers Flywheel Magneto 6v.**

### **Rectifier Lighting**

A copy of a typical Wiring Diagram relative to this magneto generator set will be found on page 50.

The output of the magneto lighting coils is converted to direct current by means of a selenium rectifier, switches may be provided to allow half-charge when lights are not in use.

### **Direct Lighting**

This is used where it is not desirable to incorporate a battery in the vehicle.

Two coils only of the magneto generator are used for lighting, the third being available for stop-light or A.C. horn operation.

A typical wiring diagram appears on page 52.

## **Villiers Flywheel Magneto 12v.**

### **Rectifier Lighting**

The basic circuit employed for this generator is given in fig. 19, and it will be noted that a switch is provided to give approximately half the normal charge.

## RECTIFIER

The casing of the rectifier used for the 6-volt generator must not make contact with any portion of the cycle frame. Various methods of insulating the rectifier are adopted by the Motor Cycle Manufacturer, and any insulating material must be replaced in position if the rectifier is removed. The 12-volt generator (high output) uses a rectifier with single bolt fixing. This bolt must be in good electrical contact with the frame of the machine.

## BATTERY

The battery is supplied by the maker of the machine, and correct polarity must be maintained as shown in the relative wiring diagrams. About once a month the filler cap of each cell should be unscrewed so that distilled water can be added to bring the acid level above the top of the separator. **Do not add tap water as this contains impurities.** Acid should not be added unless this is accidentally spilled out of the battery, when it should be replaced by diluted sulphuric acid of the same specific gravity as in the cells. Keep the battery terminals clean. 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. See also battery manufacturers instructions regarding maintenance.

## IMPORTANT

### 6 volt rectifier lighting

Provided that the positive 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. In order to prevent "blowing" of the bulbs it should be noted that high engine speeds should be avoided if the switch is set to other than the "OFF" or "DIRECT" position.

### 12 volt rectifier lighting

In this installation it is necessary to disconnect from the rectifier and insulate the black core of the twin cable in order that the engine may be safely run with the battery disconnected.



## TRACING TROUBLES

For the satisfactory running of any Villiers Engine it is essential that three main conditions are fulfilled, and by making a systematic 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 no loss of compression either in the cylinder head or crankcase. This can be easily checked by putting the gears into the neutral position and rotating the engine by means of the kickstarter. The throttle, of course, must be open so as to allow air to enter the crankcase. On every revolution a definite resistance should be felt by the air being compressed in the cylinder head.

### 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 on pages 18 and 19.

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 body to ensure that there is no blockage in the fuel supply, either in the tap, 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.

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 starter, and if the magneto and high tension lead are in order, there should be a good spark at the plug electrodes.

Finally, examine the carburetter controls to make certain that the throttle is actually opening when the control lever is moved, and that the strangler slide cable and control, if fitted, are operating satisfactorily.

## FAULT FINDING CHART

Sequence of Testing	Possible Trouble	Remedy
<p><b>Engine will not start</b></p> <p>Depress tickler on carburetter to check whether fuel is reaching carburetter.</p> <p>If no fuel, even when tap is on and fuel is in tank.</p> <p>Test for spark by holding sparking plug body on cylinder head.</p> <p>If still no spark: Test for spark at end of H.T. lead held <math>\frac{1}{8}</math>" from cylinder fins.</p> <p>If above tests are satisfactory, but engine will not start.</p>	<p>No fuel reaching carburetter. Air lock in petrol pipe.</p> <p>Choked petrol pipe, filter on tap, filter in banjo. Fuel needle sticking in seating.</p> <p>Leak along insulation of plug or high tension lead.</p> <p>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.</p> <p>Moisture on insulation of condenser.</p> <p>Damaged insulation on wires connecting contact breaker to coil or condenser.</p> <p>Faulty condenser.</p> <p>Faulty ignition coil.</p> <p>Faulty insulating plate.</p> <p>Mixture may be too rich due to use of strangler, or incorrect setting of taper needle.</p> <p>Air leaks at carburetter stub or inlet pipe joint, causing weak mixture.</p> <p>Incorrect ignition timing.</p>	<p>Turn tap to ON, refill tank, clear air vent in filler cap. Turn on reserve tap where fitted.</p> <p>Remove and clean out. Dismantle carburetter and fit new needle.</p> <p>Try a new plug of the type recommended and/or new H.T. lead.</p> <p>Clean plug or fit new one. Adjust point gap to .015". Clean.</p> <p>Clean and dry out.</p> <p>Replace.</p> <p>Replace.</p> <p>Replace.</p> <p>Replace.</p> <p>Open throttle wide and depress kickstarter several times to clear engine of petrol. Adjust taper needle.</p> <p>Correct.</p> <p>Check, following instructions given.</p>
<p><b>Engine four or eight strokes</b></p> <p>Strangler may not be fully open or taper needle in a too high position. Air filter may need cleaning.</p> <p>Check by watching for excessive smoke from exhaust pipe or silencer.</p>	<p>Mixture too rich.</p> <p>Engine may four stroke for a little while after standing due to accumulation of oil in crankcase.</p> <p>Flooding of carburetter.</p>	<p>Lower taper needle by adjuster screw fitted in throttle.</p> <p>Usually ceases when engine has been running for a few minutes unless too much oil has been mixed with the petrol.</p> <p>Persistent flooding is usually due to dirt under fuel needle seating, or sticking fuel needle, damaged seating or punctured float.</p>



**Sequence of Testing**  
**Engine lacks power**

**Possible Trouble**

**Remedy**

Engine out of tune, bearings worn. Un-suitable 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 (See also page 4).

Decarbonise.

Excessive carbon deposit on piston crown, cylinder head, inlet, exhaust and transfer ports.

Exhaust system choked with carbon.

Clean out silencer and exhaust pipes.

Incorrect carburettor setting.

Check and adjust.

Air filter choked.

Clean. See instructions on air filter.

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.

**Engine will not run slowly**

Weak mixture due to air leaks at carburettor stub or inlet pipe, crankcase and cylinder base joints.

Tighten all joints.

Crankcase drain screw loose or missing.

Tighten or replace

Worn crankshaft bearings or leaking oil seals.

Replace.

Ignition timing too far advanced.

Correct, following instructions given on page 9.

**Engine suddenly stops firing**

Sparking plug lead detached.

Replace.

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.

***See separate leaflet for fault finding on Self-Starter equipment.***

# OVERHAULING

## DECARBONISING

The points at which carbon forms most rapidly are the Combustion Chamber, Piston Head, Exhaust Port and Silencer. It will be appreciated that excessive carbon in the Combustion Chamber reduces compression space and probably causes pre-ignition and rough running. Heavy carbon deposits in the Exhaust Pipe and Silencer will cause back pressure coupled with heavy fuel consumption, loss of power and over heating.

In order to maintain engine efficiency it is advisable about every 2,000 miles to remove all carbon from inside the Cylinder Head, the top of the Piston and the edges of the ports. The Exhaust Pipe and Silencer should also be cleaned out. Before commencing to decarbonise, disconnect the Petrol Pipe and Carburetter and also remove Sparking Plug from Cylinder Head. Unscrew the 4 Cylinder Head Fixing Bolts. The Head can now be lifted clear of the Cylinder, and although the Gasket fitted between the Cylinder Head and Cylinder Barrel may not be damaged, it is advisable to fit a new one. Where engines are fitted with cowling, this must first be removed to obtain access to the cylinder head.

With a soft copper scraper, remove all deposit from the inside of the Head, taking care not to damage the joint faces. With the Piston at the top of the stroke, remove all carbon from the Piston top. Wipe off any loose carbon from around the edge of the Piston, then unscrew the Exhaust Pipe Nut and remove Silencer and Exhaust Pipe. Move the Piston to the bottom of its stroke and scrape out any carbon from Exhaust Stub and from the edges of the port in the Cylinder bore. This is best done from the outside of the Cylinder, taking care to avoid scratching the Cylinder bore. A piece of soft cloth placed in Cylinder bore will help to prevent the scraper causing damage and also prevent any particles of loose carbon from falling down through transfer passages. Make sure there is no loose carbon about before assembly. Remove any accumulation of mud or grit from the Cylinder fins.

For advice regarding the method of cleaning the Exhaust Pipe and Silencer internally, apply to the manufacturer of your motor-cycle.

If it is necessary at any time to remove the Cylinder, the 4 Nuts and Spring Washers fitted to the Studs securing the Cylinder to the Crankcase must be removed. Rotate Crankshaft until Piston is at bottom of stroke. Following this, the Cylinder may be taken off, but it is important not to twist the Cylinder in relation to the Piston, otherwise there is a danger of the ends of the Piston Rings springing into the ports and consequent breakage. Take advantage of the cylinder being off to remove all trace of carbon deposit from inlet and exhaust ports; also from the transfer ports, which are not completely accessible when the head only is removed.

To remove the Piston from the Connecting Rod a pair of thin nosed pliers should be used to take out one of the spring circlips which retain the Gudgeon Pin in position. When this has been done, the Gudgeon Pin can be pushed clear of the Small End Bush and the Piston lifted away. If carbon deposits prevent removal by hand, the use of an extractor of the band type is recommended, in which case it will be necessary to remove both circlips. So that the Piston may be re-fitted in the same way it is marked "front."



Carbon will also form in the grooves behind the Piston Rings and to remove this deposit it will be necessary to spring the rings out of the grooves. Rings may be removed without risk of damage by introducing behind the Ring 3 pieces of thin brass strip equally spaced around the Piston and then sliding off the Rings. It is desirable to ensure that each Ring is re-fitted in its original groove. Behind the lower Ring will be found an Expander Ring. This Ring is fitted to prevent noise due to 'Piston Slap' whilst the engine is cold. This Ring will have to be cleared of carbon and may, in time, possibly lose its "temper" because of the heat and, therefore, it is advisable to renew the Expander Ring when decarbonising.

The Piston Rings should be bright all round and for the whole width indicating that the whole of the Piston Ring area is in contact with the Cylinder bore. If the gap between the ends of the Rings when in the Cylinder, exceeds .030", then they should be discarded and replaced. The amount of gap can be checked by placing the Ring inside the Cylinder bore and pushing in a little way with the skirt of the Piston. This ensures that the Ring is square to the bore, and the gap can then be checked by Feeler Gauges.

Where new Rings of the standard size are required it is necessary to check the gap before fitting to the Piston. Place the Ring squarely in the Cylinder bore when the gap between the ends of the Ring should be a maximum of .011" and a minimum of .007".

## RE-BORING

After the machine has done a considerable mileage the Cylinder bore may become worn as indicated by a ridge at the top of the bore and, therefore, before fitting the Cylinder the bore should be checked by means of a dial gauge. If the bore is .008" or more larger than the original size, the Cylinder should be returned to the Works for reboring and fitting of an oversize Piston with Rings.

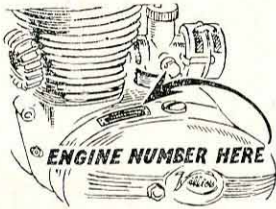
When refitting the Cylinder, fit new Base Washer to Crankcase. Smear Cylinder bore and Piston surfaces with clean engine oil and fit Cylinder Barrel over Piston, taking every care not to twist the Cylinder. Ensure each Piston Ring is fully compressed in its groove with the ends correctly fitting on the Locating Pegs as the Barrel passes over it. Replace the 4 Nuts on Cylinder Base Studs and tighten equally. Re-fit Cylinder Head with new Gasket in position and tighten the 4 Bolts in diagonal rotation to prevent any possibility of Cylinder Head distortion.

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This Booklet is not intended to contain full details for carrying out major repairs to your engine. In our opinion, it is inadvisable for the owner to attempt full dismantling of his engine, since without proper tools and facilities, damage may be caused to parts which are machined and assembled within very fine limits.

If your Unit needs expert attention you will be wise to contact your nearest Dealer, or you may approach us direct. Our fully-equipped Service Department is at your disposal to give you any help that you may need.

# SPARE PARTS LIST



Note:—When ordering spares it is important that the engine number is quoted. This number will be found stamped on the nameplate. Always quote the part number and description, not the illustration number.

Where components are special to one particular type or group of engine, this is shown against the description of the component. For special parts fitted to Self-Starter equipped and Blower Cooled engines please refer to pages 45, 46 and 47.

## ENGINE GROUP. Fig. 8.

ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
1	B.8561	Cylinder head, 9E (except sports and trials)	1
or	B.8613	Cylinder head (for release valve) 9E (except sports and trials) ... ..	1
	B.9763	Cylinder head (for release valve) 9E (sports and trials) ... ..	1
	B.9654	Cylinder head 31C ... ..	1
	B.8716	Cylinder head 2L ... ..	1
2	E.8149	Cylinder head joint washer ... ..	1
3	A.9079	Cylinder 9E ... ..	1
—	A.9003	Cylinder 2L ... ..	1
—	A.8984/1	Cylinder 31C ... ..	1
4	E.8750	Exhaust nut washer 9E ... ..	1
—	E.5578	Exhaust nut washer 2L and 31C ... ..	1
5	E.8654	Exhaust nut 9E ... ..	1
—	E.8564	Exhaust nut 2L and 31C ... ..	1
6	E.364	Nut, cylinder base and gearbox ... ..	8
7	D.9279/1	Washer, cylinder base ... ..	1
8	E.1050	Washer, spring ... ..	6
9	E.3393	Stud, cylinder base 9E and 2L ... ..	4
—	E.2152	Stud, cylinder base 31C ... ..	4
10 & 60	A.9077 & 8	Crankcase L.H. and R.H. ... ..	1 pair
or	D.10275	Crankcase L.H. } Drilled for carburetter	
	D.10276	Crankcase R.H. } pocket cover ... ..	1 pair
11	E.8440	Stud, crankcase (short) ... ..	2
12	E.2924	Washer, plain $\frac{1}{4}$ " ... ..	17
13	E.2539	Nut, small hex. $\frac{1}{4}$ " ... ..	15
14	A.136	Armature plate assembly 6 v. (see page 36 for details) ... ..	1
or	A.140	Armature plate assembly 12 v. (see page 37 for details) ... ..	1
15	M.2673E	Screw, armature plate fixing ... ..	4
16	E.401	Nut, large hex. $\frac{1}{4}$ " ... ..	2
17	E.5148	Stud, R.H. cover ... ..	1
18	A.8686	R.H. cover 4-speed gearbox ... ..	1
or	A.9082	R.H. cover, 3-speed gearbox ... ..	1
or	C.9885	R.H. cover, 3-speed gearbox (drilled for ignition cut-out screw) ... ..	1
19	C.8481	Contact breaker cover ... ..	1
20	E.7916	Screw, R.H. cover ... ..	2
21	E.8670	Screw, contact breaker cover ... ..	3
22	E.7210	Stud, crankcase, long ... ..	3
23	E.2667	Washer, gearbox fixing stud ... ..	4
24	E.363	Stud, gearbox fixing ... ..	1
25	E.9794	Stud, gearbox end cover ... ..	3

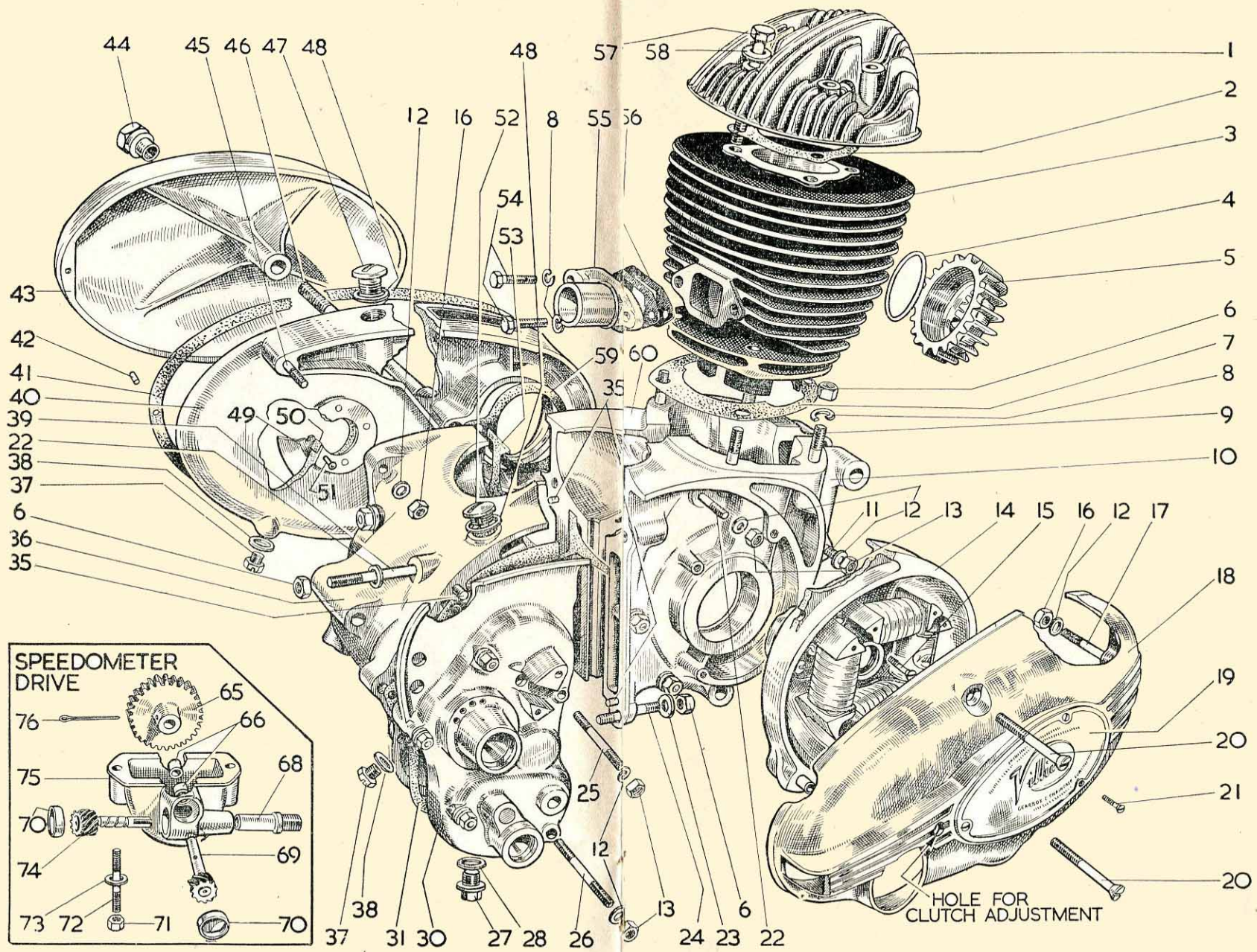


ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
26	EM.1120	Stud, long, gearbox end cover ... ..	2
27	E.6292/1	Plug, gearbox drain ... ..	1
28	V.107x3E	Washer, gearbox drain plug ... ..	1
30	A.9087	Gearbox end cover, bushes ... ..	1
31	C.9542	Gearbox end cover, joint washer ... ..	1
35	E.7619	Dowels, crankcase and gearbox ... ..	4
36	A.9085	Gearbox casing, bushed, with cam barrel bearing pin (without provision for speedometer drive) Four-speed ... ..	1
—	A.9085/1	Gearbox casing, bushed, with cam barrel bearing pin (with provision for speedometer drive) Four speed ... ..	1
37	E.1962	Plug, chaincase and gearbox oil level and crankcase drain ... ..	3
38	E.1905	Washer for E.1962 ... ..	3
39	E.8897	Stud, gearbox fixing (long) ... ..	3
†40	B.9080	Chaincase, inner ... ..	1
41	D.8899	Chaincase, joint washer ... ..	1
42	W.174E	Dowel, chaincase ... ..	1
43	E.8341	Chaincase, outer ... ..	1
44	E.8276	Nut, chaincase, fixing ... ..	1
45	E.5107	Stud, chaincase inner to gearbox ... ..	1
46	E.8894	Stud, chaincase fixing ... ..	1
47	E.10967	Chaincase filler plug ... ..	1
48	E.6593	Chaincase filler plug and dipstick washer ... ..	2
†49	E.9684	Gland plate, chaincase inner ... ..	1
†50	E.5715	Washer, felt ... ..	1
†51	E.4083	Rivets for gland plate ... .. (per set)	4
52	E.9673	Dipstick, gearbox oil level ... ..	1
53	C.8898/1	Washer, joint, gearbox to crankcase ... ..	As required
54	FG.151E	Screw, inlet manifold fixing ... ..	2
55	D.9160/2	Inlet manifold 9E ... ..	1
or	D.10114	Inlet pipe 9E trials and sports ... ..	1
or	D.9195/2	Inlet pipe 2L ... ..	1
or	D.10214	Inlet pipe 31C ... ..	1
—	C.10118	Cover, carburetter pocket ... ..	1
—	E.9260	Screw, carburetter cover pocket ... ..	1
56	E.9172/1	Inlet manifold washer ... ..	2
57	E.1897	Bolt, cylinder head fixing 9E and 2L ... ..	4
—	E.9690	Bolt, cylinder head fixing 31C ... ..	4
58	E.1898	Washer, cylinder head bolt ... ..	4
59	E.8401	Washer, joint, inner chaincase to crankcase (See Illustration No. 10) ... ..	1
60	E.8250	Dowel, R/H cover ... ..	2
†	Where these items are not fitted, the following parts are used		
40	B.9080/1	Chaincase, inner ... ..	1
—	E.9718	Seal, oil ... ..	1

### SPEEDOMETER DRIVE GROUP Fig. 8.

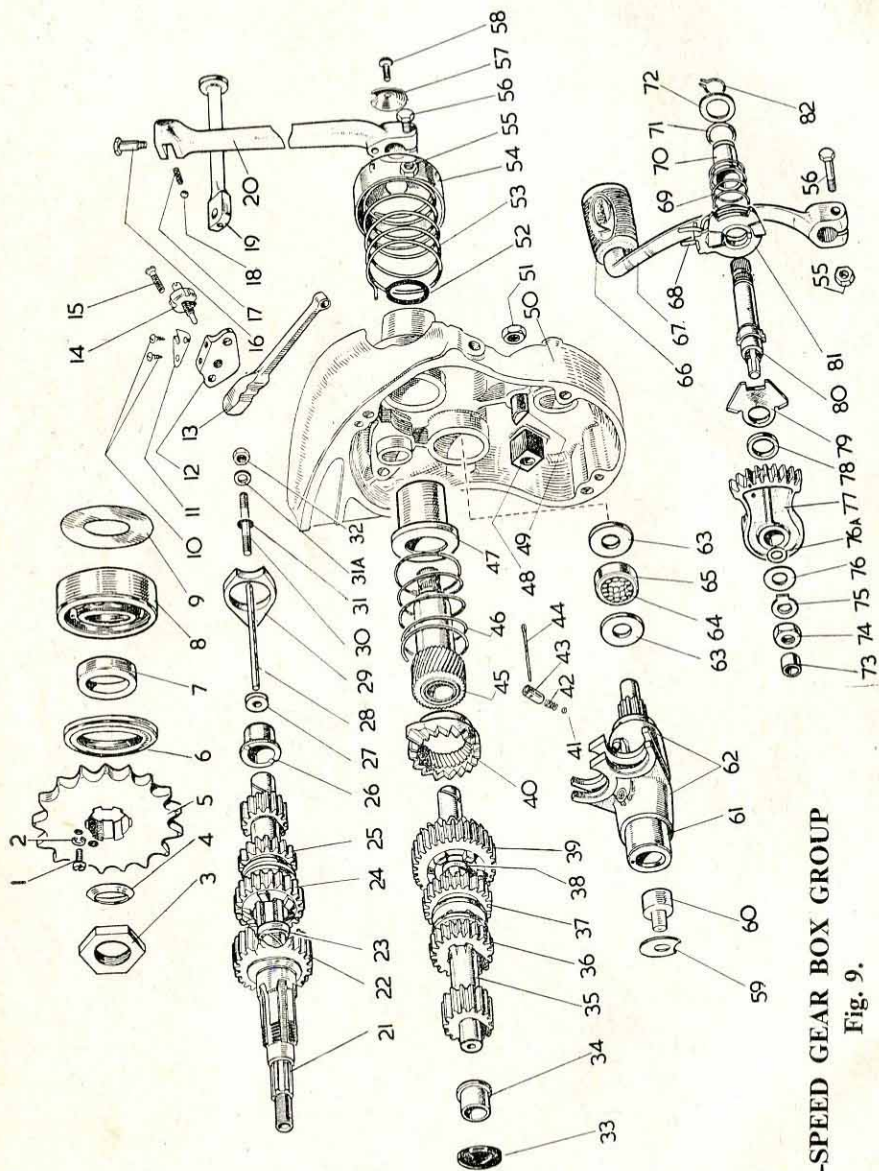
65	—	Gear Wheel (see tables on page 48) ... ..	1
66	E.8968	Bush ... ..	2
68	E.8969	Bush ... ..	1
69	E.8966	Worm gear ... ..	1
70	E.8970	Plugs for casing ... ..	2
71	E.2539	Casing stud nuts ... ..	2
72	EM.816	Casing studs ... ..	2
73	E.2924	Casing stud washers ... ..	2
74	E.8967	Wormwheel (speedometer cable drive) ... ..	1
75	D.8959	Casing (bushed) 4-speed gearbox ... ..	1
or	C.8958	Casing, (bushed) 3-speed gearbox ... ..	1
76	M.1535E	Split pin ... ..	1
—	E.8973	Washer, speedometer drive flange ... ..	1





ENGINE GROUP. Fig. 8





4-SPEED GEAR BOX GROUP

Fig. 9.

## 4-SPEED GEARBOX GROUP Fig. 9.

ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
1	E.5561	Screw, final drive nut locking ... ..	1
2	E.7529	Washer, spring ... ..	1
3	E.9652	Nut, final drive sprocket ... ..	1
4	E.9697	Washer, dished ... ..	1
5	E.9968	Final drive sprocket 15T ... ..	1
or	E.10267	Final drive sprocket 16T ... ..	1
or	E.9674	Final drive sprocket 17T ... ..	1
or	E.9149/1	Final drive sprocket 18T ... ..	1
or	E.9675	Final drive sprocket 19T ... ..	1
6	E.9728	Oil seal ... ..	1
7	E.9644	Distance piece, F.D. sprocket ... ..	1
8	6205	Ball bearing 25 mm. x 52 mm. x 15 mm. ...	1
9	E.7347	Shim, bearing sealing ... ..	1
10	M.2704E	Screw, locking plate ... ..	2
11	E.6829	Clutch adjuster locking plate ... ..	1
12	E.8687	Clutch bridge ... ..	1
13	D.8606	Clutch lever ... ..	1
14	E.8503	Screw, clutch adjuster, external ... ..	1
15	E.G.527	Screw, clutch bridge ... ..	1
16	E.4098	Kickstart pedal pivot pin ... ..	1
17	E.4270	Kickstart pedal spring ... ..	1
18	E.9776	Kickstart pedal ball $\frac{1}{4}$ " dia. ... ..	1
19	E.4096	Kickstart pedal ... ..	1
20	D.9523	Kickstart lever, $\frac{5}{8}$ " dia. spline, $1\frac{1}{4}$ " crank ...	1
or	D.9538	Kickstart lever $\frac{5}{8}$ " dia. spline, $1\frac{1}{2}$ " crank ...	1
or	D.10137	Kickstart lever, $\frac{3}{4}$ " dia. spline, $1\frac{1}{16}$ " crank ...	1
or	D.10139	Kickstart lever, $\frac{3}{4}$ " dia. spline, $1\frac{1}{2}$ " crank ...	1
†21	C.8491/1	Mainshaft, with 14T gear ( $\frac{3}{16}$ " push rods) ...	1
†or	C.11036	Mainshaft, with 14T gear ( $\frac{3}{16}$ " and $\frac{1}{4}$ " push rods)	1
†22	D.8498/1	High gear pinion 25T ... ..	1
23	E.8541	Pressure washer ... ..	1
†24	D.8496	Sliding gear with dogs, mainshaft 22T ...	1
†25	E.9026	Sliding gear without dogs, mainshaft 19T ...	1
26	E.8410	Bush, mainshaft ... ..	1
27	E.8039	Washer, rubber, for $\frac{3}{16}$ " push rod ... ..	1
or	E.11031	Washer, rubber, for $\frac{1}{4}$ " push rod ... ..	1
28	E.9465	Rod, push, ( $\frac{3}{16}$ " x 3 ) for C.8491/1 mainshaft	3
or	E.8236	Rod, push, ( $\frac{3}{16}$ " x $3\frac{5}{16}$ " ) for C.11036 mainshaft	2
and	E.11023	Rod, push, ( $\frac{1}{4}$ " x $2\frac{9}{32}$ " ) mainshaft ... ..	1
29	E.8542	Kickstart ratchet stop ... ..	1
30	E.3314	Stud, clutch bridge ... ..	1
31	E.9789	Sealing ring ... ..	1
31A	E.2924	Washer, clutch bridge ... ..	1
32	E.2539	Nut, clutch bridge ... ..	1
33	Z.1009x9	Disc, layshaft bush cap ... ..	1
34	E.6528	Bush, layshaft ... ..	1
†35	C.8492/1	Layshaft, with integral gear, 17T ... ..	1
†36	E.9026	Sliding gear, without dogs, layshaft 19T ...	1
†37	D.8497	Sliding gear, with dogs, layshaft 23T ...	1
38	E.8541	Pressure washer ... ..	1
39	D.8499/1	Ratchet pinion, kickstart 28T ... ..	1
40	D.8534	Kickstart ratchet ... ..	1
41	E.9775	Ball, sliding gear fork peg $\frac{3}{16}$ " dia. ... ..	2
42	V.122x14	Spring, sliding gear fork peg ... ..	2
43	E.8095	Peg, sliding gear fork ... ..	2
44	E.8393	Split pin, peg and spring retaining ... ..	2
45	D.8535	Kickstart shaft, bushed $\frac{5}{8}$ " dia. spline ...	1
or	D.10141	Kickstart shaft, bushed $\frac{3}{4}$ " dia. spline ...	1

†See also page 48.



ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
46	E.8177	Kickstart ratchet spring ... ..	1
47	E.8159	Bush, kickstart shaft ... ..	1
48	E.8198	Stop, gear change return spring ... ..	1
49	E.6545	Stop pin, gear operating pawl ... ..	1
50	A.9087	Gearbox end cover, bushed ... ..	1
51	E.6627	Nut, gearchange spring stop ... ..	1
52	E.9721	Sealing ring, kickstart shaft ... ..	1
53	E.8408	Kickstart return spring ... ..	1
54	E.8409	Kickstart return spring cap, $\frac{31}{32}$ " dia. hole	1
or	E.10303	Kickstart return spring cap, $\frac{35}{32}$ " dia. hole	1
55	E.4252	Kickstart and foot change pedal nut ... ..	2
56	E.4251	Kickstart and foot change pedal bolt ... ..	2
57	E.9596	Kickstart shaft cover washer ... ..	1
58	E.8479	Kickstart shaft cover washer screw ... ..	1
59	E.8097	Thrust washer, cam barrel ... ..	1
60	E.8096	Bearing pin, cam barrel ... ..	1
61	C.8507	Cam barrel with stop peg ... ..	1
62	C.8531	Sliding gear fork ... ..	2
63	E.8155	Cam barrel bearing thrust washer ... ..	2
64	E.9777	Rollers, cam barrel bearing $\frac{3}{16}$ " x $\frac{3}{16}$ "	24 set
65	E.8154	Cam barrel bearing outer race ... ..	1
66	D.6861	Gear change lever rubber ... ..	1
67	D.9032	Gear change lever ... ..	1
68	E.7437	Gear operating pawl spring... ..	1
69	E.6543	Gear change ratchet spring ... ..	1
70	E.6537/1	Bush, gear operating spindle (end cover) ...	1
71	E.8776	Oil seal, gear operating spindle ... ..	1
72	E.4150	Washer, oil seal retaining ... ..	1
73	E.6595	Bush, gear operating spindle (gearbox shell)	1
74	E.6627	Nut, gear operating spindle ... ..	1
75	E.6544	Lockwasher, gear operating spindle ... ..	1
76	E.6573	Washer, gear operating spindle ... ..	1
76A	E.7228	Shim, gear operating spindle ... ..	As required
77	D.9162	Gear operating quadrant ... ..	1
78	E.6542	Distance piece ... ..	1
79	E.9444	Gear operating spindle plate ... ..	1
80	D.6536	Gear operating spindle ... ..	1
81	D.6539	Gear operating pawl... ..	1
82	E.6552	Circlip, gear operating spindle ... ..	1

Up to and including Engine No. 361 the following parts were fitted in place of those shown in the above list.

ILLUS. NO.	PART NO.	DESCRIPTION
3	E.6930	Sprocket locknut ... ..
5	E.9149	Final drive sprocket 18T ... ..
7	E.7882	Distance piece ... ..
22	D.8498	High gear pinion 25T ... ..

Components are not interchangeable with current equivalents.

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

E.7437, E.6543, E.6627, E.6544, E.7228, D.9032, D.9162, E.6542, E.9444, D.6536, D.6539.

These parts are replaced by:—

D.7577/D.9185	Gear operating assembly ... ..	1
D.7807	Gear change lever ... ..	1

A table of the gears required for alternative gearbox ratios will be found on page 48.

### 3-SPEED GEARBOX GROUP Fig. 10

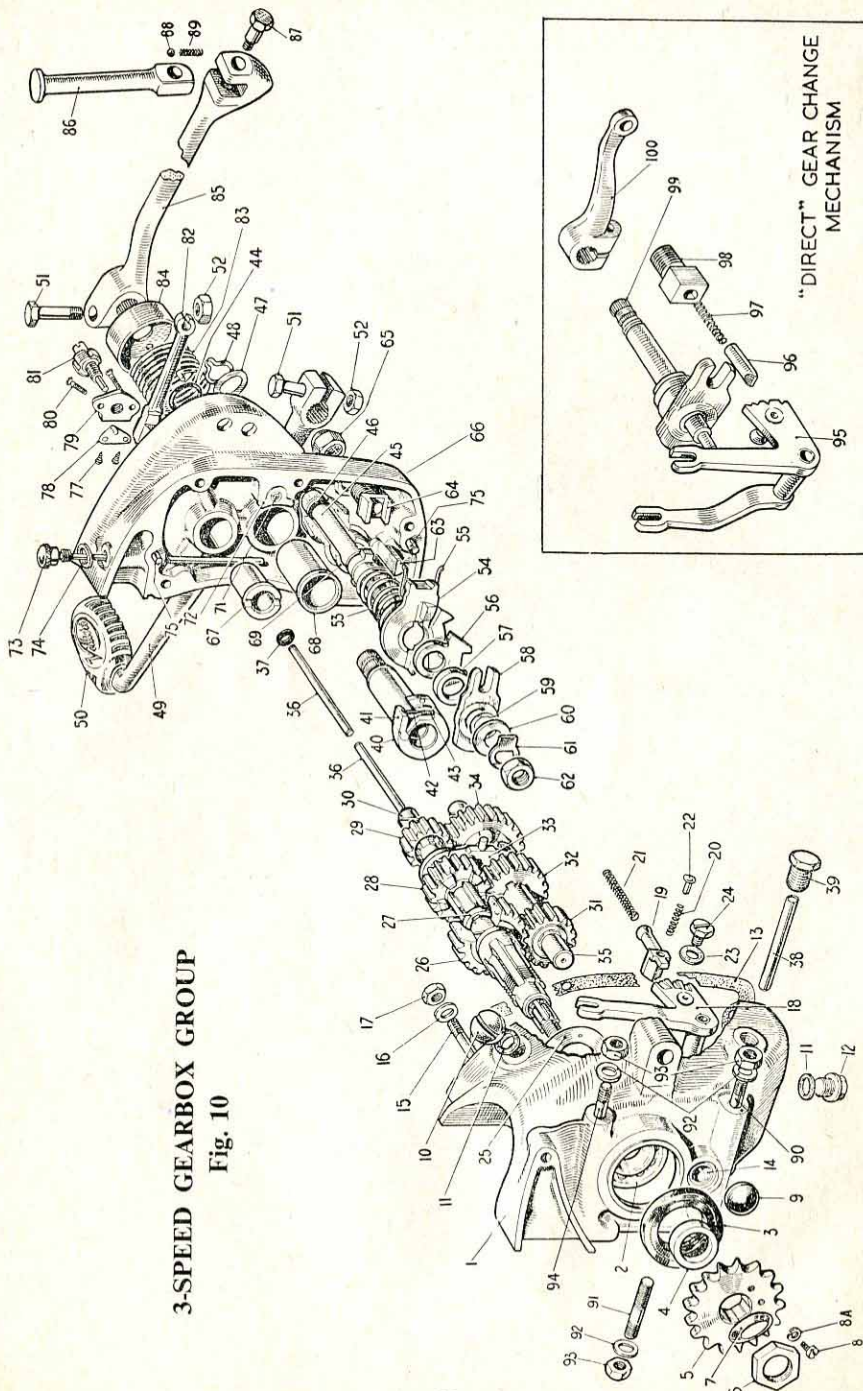
ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
1	A.9084	Gearbox Shell (Bushed) ... ..	1
	or A.9084/1	Gearbox Shell (Bushed) with hole for speedo drive ... ..	1
2	6205	Bearing, ball, 25 mm x 52 mm x 15 mm ...	1
3	E.9728	Seal, oil ... ..	1
4	E.9644	Distance piece, final drive sprocket ...	1
5	E.9968	Sprocket, final drive 15T	1
— or	E.10267	Sprocket, final drive 16T	1
— or	E.9674	Sprocket, final drive 17T	1
— or	E.9149/1	Sprocket, final drive 18T	1
— or	E.9675	Sprocket, final drive 19T	1
— or	E.10644	Sprocket, final drive 18T for .205" wide chain	1
6	E.9652	Nut, final drive sprocket ... ..	1
7	E.9697	Washer, final drive sprocket nut ... ..	1
8	E.5561	Screw, final drive sprocket locking ... ..	1
8A	E.7529	Washer, final drive sprocket lock screw ...	1
9	Z.1009 x 9E	Disc, layshaft bush cap ... ..	1
10	E.9682	Plug, oil filler ... ..	1
11	V.107 x 3E	Washer, oil filler and drain plug ... ..	2
12	E.6292/1	Plug, oil drain ... ..	1
13	C.9543	Washer, gearbox joint ... ..	1
14	E.6528	Bush, layshaft ... ..	1
15	EM.257	Stud, gearbox end cover ... ..	6
16	E.2924	Washer, gearbox end cover stud ... ..	6
17	E.2539	Nut, gearbox end cover stud ... ..	6
18	D.8290	Fork, gear change selector ... ..	1
19	E.7948	Plunger, gear selector ... ..	1
20	M.1564E	Spring, small, gear selector plunger ...	1
21	E.6296	Spring, large, gear selector plunger ...	1
22	1046 x 13E	Pad, gear selector plunger spring ...	1
23	E.1905	Washer, oil level screw ... ..	1
24	E.1962	Screw, oil level ... ..	1
25	E.7347	Washer, bearing sealing ... ..	1
†26	D.8886/1	Pinion, high gear, 23 teeth ... ..	1
27	E.6566	Washer, main shaft pressure ... ..	1
28	D.6525	Pinion, mainshaft, sliding 21T ... ..	1
†29	E.7286	Pinion, mainshaft, fixed 14T ... ..	1
30	C.8889	Mainshaft, ( $\frac{3}{16}$ " push rods) ... ..	1
or	C.11037	Mainshaft, ( $\frac{3}{16}$ " and $\frac{1}{4}$ " push rods) ...	1
†31	E.8885	Pinion, layshaft, fixed 18T ... ..	1
†32	D.6524	Pinion, layshaft, sliding 22T ... ..	1
33	E.6531	Operator, sliding gear ... ..	1
34	D.6523/1	Pinion, kickstart ratchet ... ..	1
35	C.7282/1	Layshaft ... ..	1
36	E.9464	Rod, push, ( $\frac{3}{16}$ " x $2\frac{7}{8}$ ") for C.8889 mainshaft	3
or	E.8236	Rod, push, ( $\frac{3}{16}$ " x $3\frac{5}{16}$ ")	} for C.11037 mainshaft 1
and	E.11025	Rod, push, ( $\frac{3}{16}$ " x $2\frac{1}{2}$ ")	
and	E.11023	Rod, push, ( $\frac{1}{4}$ " x $2\frac{9}{32}$ ")	
37	E.8039	Washer, rubber, for $\frac{3}{16}$ " push rod ...	
or	E.11031	Washer, rubber, for $\frac{1}{4}$ " push rod ...	1
38	E.8297	Pin, pivot, gear selector fork ... ..	1
39	E.8296	Head, selector pivot pin ... ..	1
40	D.8887	Shaft, kickstart, bushed ... ..	1
41	E.6882	Pawl, kickstart ... ..	1
42	E.4908	Plunger, kickstart pawl ... ..	1
43	E.4907	Spring, plunger ... ..	1
44	E.8777	Ring, sealing, kickstart shaft ... ..	1
45	D.6536	Spindle, gear change operating ... ..	1
46	E.8776	Ring, sealing, operating spindle ... ..	1

†See also page 48.



# 3-SPEED GEARBOX GROUP

Fig. 10



"DIRECT" GEAR CHANGE MECHANISM

### 3-SPEED GEARBOX—continued.

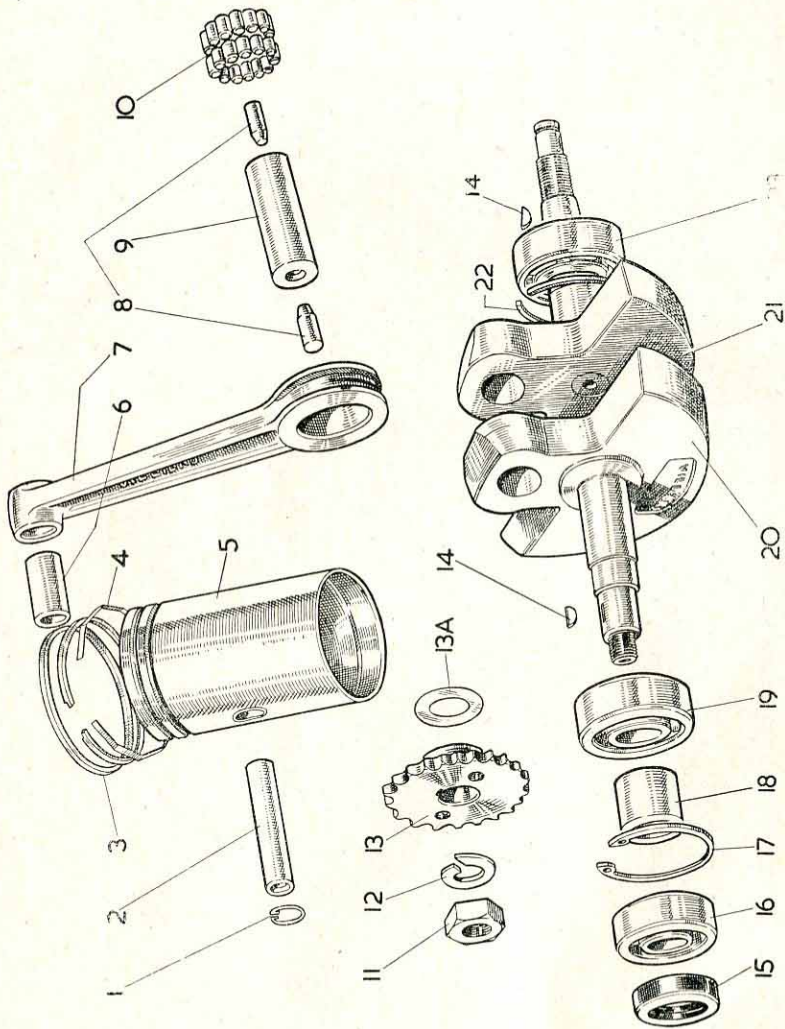
ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
47	E.4150	Washer, sealing ring retaining ...	1
48	E.6552	Circlip, washer retaining ...	1
49	D.9175	Lever, gearchange, foot operated ...	1
50	D.6861	Rubber, gearchange lever ...	1
51	E.4251	Bolt, gearchange and kickstart levers ...	2
52	E.4252	Nut, gearchange and kickstart levers ...	2
53	E.6543	Spring, gear operating pawl ...	1
54	D.7951	Pawl, gear operating... ...	1
55	E.7437	Spring, gear operating pawl ...	1
56	E.8642	Plate, gear operating spindle ...	1
57	E.6542	Distance piece, operating spindle ...	1
58	D.6538	Lever, gear operating spindle ...	1
59	E.7228	Shim, gear operating spindle ...	As required
60	E.6573	Washer, gear operating spindle ...	1
61	E.6544	Washer locking, operating spindle nut ...	1
62	E.6627	Nut, locking, operating spindle ...	1
63	E.6545	Pin, stop, gear operating pawl ...	1
64	E.7949	Box, plunger ...	1
65	E.7950	Nut, plunger box ...	1
66	B.9086	Cover, gearbox end, bushed ...	1
67	E.8410	Bush, mainshaft ...	1
68	E.8888	Bush, kickstart shaft... ...	1
69	E.6537/1	Bush, gear operating spindle ...	1
71	E.6655	Screw, kickstart stop ...	1
72	E.4899	Stop, kickstart return ...	1
73	E.9200/E.9513	Dipstick and knob (not supplied separately)	1
74	V.476E	Washer, dipstick ...	1
75	E.7619	Dowel, gearbox end cover ...	2
77	M.2704E	Screw, clutch adjuster locking plate ...	2
78	E.6829	Plate, clutch adjuster locking plate ...	1
79	E.8532	Bridge, clutch lever ...	1
80	E.G.527	Screw, clutch bridge ...	2
81	E.8503	Screw, clutch adjuster (external) ...	1
82	D.8606	Lever, clutch ...	1
83	E.7511	Spring, kickstart return ...	1
84	E.4014	Cap, kickstart return spring ...	1
85	D.9523	Lever, kickstart $1\frac{1}{6}$ " crank ...	1
— or	D.9538	Lever, kickstart $1\frac{1}{2}$ " crank ...	1
86	E.4096	Pedal, kickstart lever ...	1
87	E.4098	Pin, kickstart lever pedal pivot ...	1
88	E.9776	Ball, kickstart lever pedal ...	1
89	E.4270	Spring, kickstart lever pedal ball ...	1
90	E.6559	Stud, gearbox fixing, bottom, left-hand ...	1
91	E.363	Stud, gearbox fixing, bottom, right-hand ...	1
92	E.2667	Washer, gearbox fixing stud nut ...	4
93	E.364	Nut, gearbox fixing ...	4
94	E.8897	Stud, gearbox fixing, top ...	2
—	E.6595	Bush, gear operating spindle (in gearbox shell) ...	1

The following items are used in gearboxes incorporating "Direct" gear change mechanism.

95	E.8724	Fork, gear change and selector ...	1
96	E.7209	Plunger ...	1
97	U.118 x 12	Spring, plunger ...	1
98	E.8725	Plunger box ...	1
99	D.7576/7	Lever and spindle, gear operating ...	1
100	D.9798/1	Lever, gear change ...	1

A table of the gears required for the alternative gearbox ratios will be found on page 48





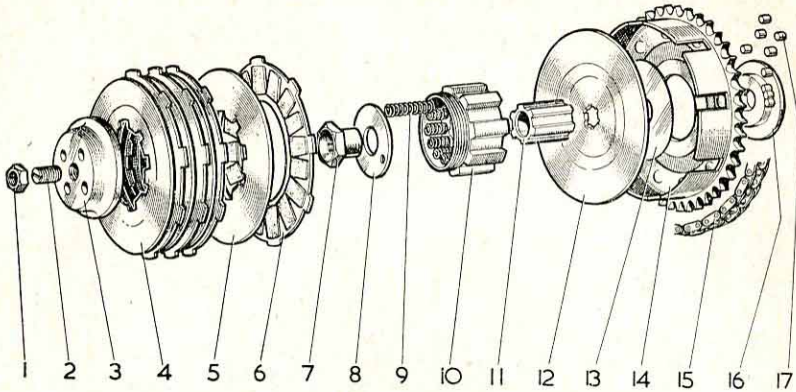
PISTON AND CRANKSHAFT GROUP. Fig. 11

## PISTON AND CRANKSHAFT GROUP Fig. 11

ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
1	E.4047	Circlip, gudgeon pin ... ..	2
2	E.5457	Gudgeon pin 9E and 2L ... ..	1
—	E.8747	Gudgeon pin 31C ... ..	1
3	E.6622	Piston ring standard size ... ..	2
—	D.7522	Piston ring .015" o/s } 9E and 2L ... ..	2
—	D.7524	Piston ring .030" o/s } ... ..	2
—	E.8764	Piston ring, standard size } ... ..	2
—	E.10291	Piston ring, .015" o/s } 31C ... ..	2
—	E.10292	Piston ring, .030" o/s } ... ..	2
4	E.8545	Expander ring, 9E and 2L ... ..	1
—	E.9971	Expander ring 31C ... ..	1
5	C.7337	Piston standard size, ... ..	1
—	D.7521	Piston, .015" o/s, } 9E and 2L ... ..	1
—	D.7523	Piston, .030" o/s, } ... ..	1
—	C.8746	Piston, standard size, } ... ..	1
—	D.10289	Piston .015" o/s, } 31C... ..	1
—	D.10290	Piston .030" o/s, } ... ..	1
6	E.1547/1	Bush, connecting rod small end, 9E and 2L ... ..	1
—	E.7858	Bush, connecting rod small end, 31C ... ..	1
†7	D.7117	Connecting rod with small end bush, standard size big end, 9E ... ..	1
—	D.7506	Connecting rod .001" o/s big end, 9E ... ..	1
†—	D.9740	Connecting rod, standard size big end, 9E Sports and Trials ... ..	1
—	D.9779	Connecting rod .001" o/s big-end, 9E Sports and Trials ... ..	1
†—	D.8988	Connecting rod, with s/e bush, standard size big end, 2L ... ..	1
—	D.10294	Connecting rod, .001" o/s big end 2L ... ..	1
†—	D.9007	Connecting rod, with s/e bush, standard size, 31C ... ..	1
—	D.10293	Connecting rod, with s/e bush .001" o/s big end, 31C ... ..	1
8	E.5593	Plug, crankpin ... ..	2
†9	E.8690	Crankpin, standard size 9E ... ..	1
—	E.9691	Crankpin, .001" o/s 9E ... ..	1
†—	E.7116	Crankpin, standard size, 2L and 31C ... ..	1
—	E.7505	Crankpin, .001" o/s 2L and 31C ... ..	1
10	E.9731	Rollers, $\frac{1}{4}$ " x $\frac{1}{4}$ " ... ..	26 set
or	E.10383	Cage, big end (9E sports and trials) ... ..	1
and	E.10658	Rollers, $\frac{1}{4}$ " x $\frac{5}{16}$ " (9E sports and trials) ... ..	9
11	E.3931	Nut, engine sprocket ... ..	1
12	E.5706	Washer, engine sprocket nut ... ..	1
13	E.9437	Engine sprocket, 20T ... ..	1
13A	E.4150	Shim, engine sprocket ... ..	As required
14	E.5581	Key, engine sprocket and flywheel ... ..	2
15	E.9720	Oil seal (in L.H. crankcase) ... ..	1
16	6204	Ball bearing 20 mm. x 47 mm. x 14 mm. ... ..	1
17	E.9692	Circlip, bearing locating L.H. ... ..	1
18	E.8282	Distance piece ... ..	1
19	6304	Ball bearing 20 mm. x 52 mm. x 15 mm. ... ..	1
20	D.9744	Drive shaft L.H. (drive side) 9E ... ..	1
21	D.9743	Drive shaft R.H. (magneto side) 9E ... ..	1
20	D.9004	Drive shaft L.H. (drive side) 2L } Not as illus- 1	
21	D.9005	Drive shaft R.H. (magneto side) 2L } as illus- 1	
20	D.8985	Drive shaft L.H. (drive side) 31C } 1	
21	D.8986	Drive shaft R.H. (magneto side) 31C } treated 1	
22	E.7189	Circlip, bearing locating R.H. ... ..	1
23	R.125	Roller race 25 mm. x 52 mm. x 15 m. ... ..	1

†Standard size crankpin must only be used with new drive shafts and standard size connecting rod.





**CLUTCH GROUP Fig. 15**

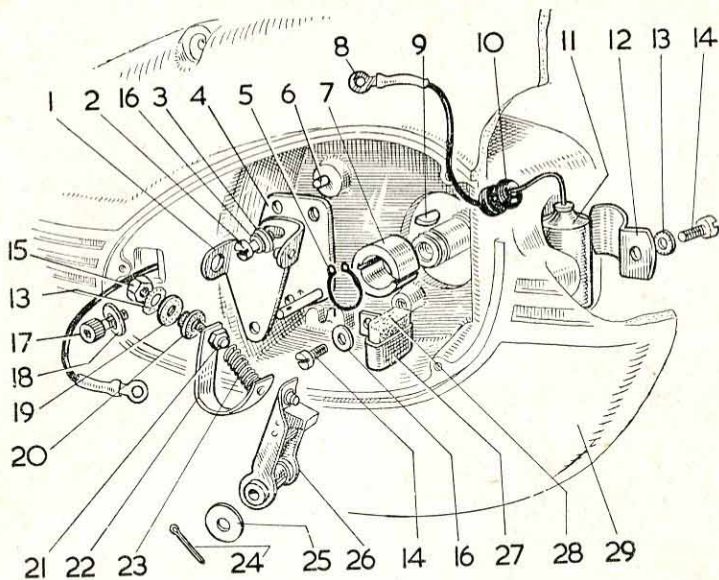
ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
1	E.8473	Locknut, internal clutch adjuster screw	1
2	E.8472	Screw, adjuster, internal, with $\frac{3}{16}$ " roller	1
3	E.11029	Nut, cap	1
either	E.11019	Piece, packing .048" (if reqd.)	1
or	E.11020	Piece, packing .064" (if reqd.)	1
4	D.8352	Plate, pressure	1
5	D.8462	Plate, intermediate	3
6	E.8348/1	Plate, driving, (bonded facings)	4
†7	E.10014	Nut, centre	1
†8	E.10015	Washer, springs retaining	1
†9	E.9989	Spring	9
†10	E.9988	Sleeve, sliding	1
11	E.8354	Hub	1
12	D.8459	Plate, back	1
13	E.9645	Shim for back plate	1
14	E.8347	Chainwheel assembly, 43T	1
15	—	Chain, primary, 60 pitches, 110038	1
16	E.8216/2	Roller, track, chainwheel	1
17	E.9777	Roller for track, $\frac{3}{16}$ " x $\frac{3}{16}$ "	24

†These parts are not fitted to earlier clutch assemblies which have the following in lieu:—

E.8356	Nut, clutch centre	1
E.8732	Spring, clutch, (inner)	1
E.8358	Spring, clutch, (outer)	1
E.8357	Sleeve, clutch sliding	1

### DECOMPRESSOR COMPONENTS

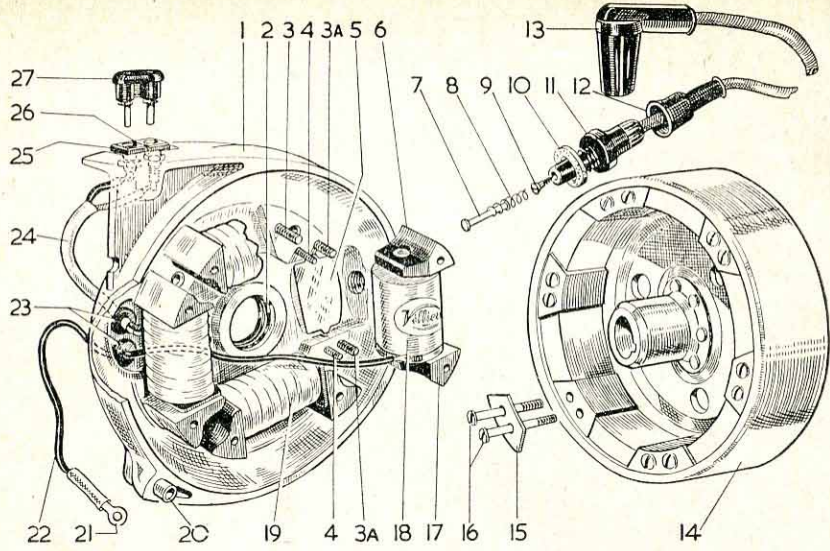
E.3064	Body, release valve	1
E.1280	Stem, release valve	1
E.1545	Plate, cable clamp	1
E.1163	Spring, release valve	1
E.6737	Screw, cable clamp plate	1
E.1276	Nut, cable (at top of stem)	1
E.3318	Washer, joint	1



CONTACT BREAKER GROUP. Fig. 13.

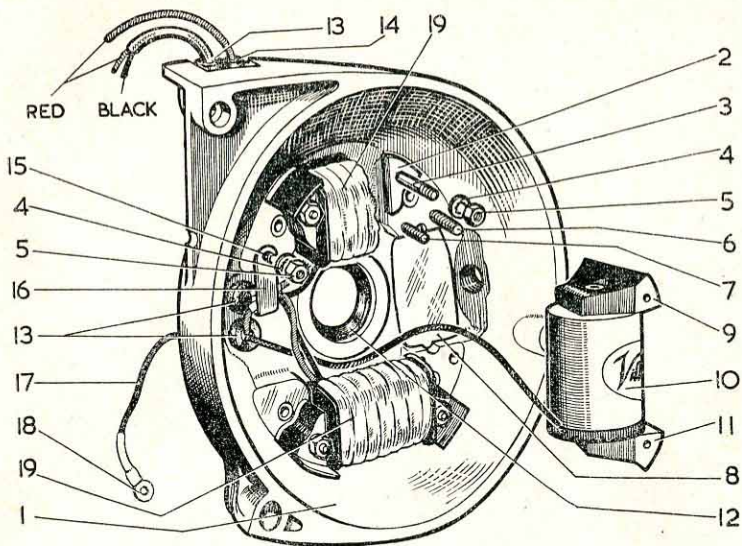
ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
1	M.2293E	Point bracket ... ..	1
2	M.1801E	Point bracket fixing screw ... ..	1
3	M.1802E	Point bracket fixing screw washer ... ..	1
4	M.2509E	Base plate with pivot pin ... ..	1
5	E.9732	Circlip ... ..	1
6	E.8015	Dowel ... ..	1
7	M.2277E	Cam for contact breaker ... ..	1
or	M.2277/1E	Cam, 9E Sports and Trials ... ..	1
8	M.2369E	Terminal 4 B.A. ... ..	1
9	M.2333E	Key, ignition cam ... ..	1
10	M.1232E	Grommet ... ..	1
11	M.2593E	Condenser ... ..	1
12	M.2342E/1	Clip ... ..	1
13	M.2714E	Washer, Shakeproof 4 B.A. ... ..	2
14	V.1304E	Screw ... ..	2
15	1113 × 4E	Nut ... ..	1
16	1113 × 5E	Washer ... ..	2
17	M.2705E	Screw ... ..	1
18	E.5584	Washer ... ..	1
19	M.1805E	Washer (fibre) ... ..	1
20	M.2138E	Bush (fibre) ... ..	1
21	M.2120E	Pin (point bracket) ... ..	1
22	M.2365E	Connecting strip ... ..	1
23	M.2090E	Rocker Spring ... ..	1
24	V.111 × 2E	Split pin, for rocker arm pivot pin ... ..	1
25	E.5257	Washer for rocker arm pivot pin ... ..	1
26	M.2141D/1	Rocker Arm ... ..	1
or	M.2141D/2	Rocker Arm with packing washers (2) ... ..	1
27	M.2294E	Oil pad clip ... ..	1
28	E.8181	Oil Pad ... ..	1
29	—	R.H. cover (see page 22, illustration No. 18) ... ..	1





**ARMATURE PLATE AND FLYWHEEL GROUP Fig. 14.**  
 6 volt Lighting Coils, Wiring diagram on page 50 and 52

ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
—	A.136	Armature plate assembly (standard) ...	1
—	A.138	Armature plate assembly (9E Sports and Trials) ...	1
1	M.2552A	Armature plate only ...	1
2	E.9719	Oil Seal ...	1
3	1140 x 1E	Screw, lighting coil poleshoe ...	6
3A	E.24 x 9E/1	Screw, ignition coil poleshoe ...	2
4	M.2240E	Screw, ignition coil poleshoe ...	2
5	M.2611E	Insulating plate ...	1
6	M.2565E	Poleshoe, H.T. Coil, L.H. ...	1
7	M.2104E	Pad, H.T. Pickup ...	1
8	M.2105E/1	Spring, H.T. Pickup ...	1
9	M.2703E	Screw, H.T. lead fixing ...	1
10	E.869E	Washer, felt ...	1
11	M.2302E/1	H.T. Terminal ...	1
12	M.2303E	Cover, H.T. Terminal ...	1
—	Quote Engine Number	H.T. lead 17" complete less plug cover ...	1
13	M.2490E	Plug cover, with built in suppressor ...	1
14	R.134	Flywheel complete ...	1
or	R.136	Flywheel complete, 9E Trials ...	1
15	M.1822E	Plate, poleshoe fixing ...	6
16	1030 x 8E	Screw ...	12
17	M.2566E	Poleshoe, H.T. coil, R.H. ...	1
18	M.2722E	Ignition coil ...	1
or	M.2151E	Ignition coil (colour code yellow), 9E Sports and 9E Trials ...	1
19	M.2723E	Lighting coil ...	3
20	E.8250	Dowel ...	2
21	M.2369E	Terminal, L.T. lead ...	1
22	—	L.T. lead, 13" with terminal ...	1
23	M.1232E	Grommet, rubber ...	2
24	—	Lead, twin, lighting 6" ...	1
25	M.2711E	Socket, small, lighting ...	1
26	M.2712E	Socket, large, lighting ...	1
27	M.2708E	Plug, twin, lighting ...	1



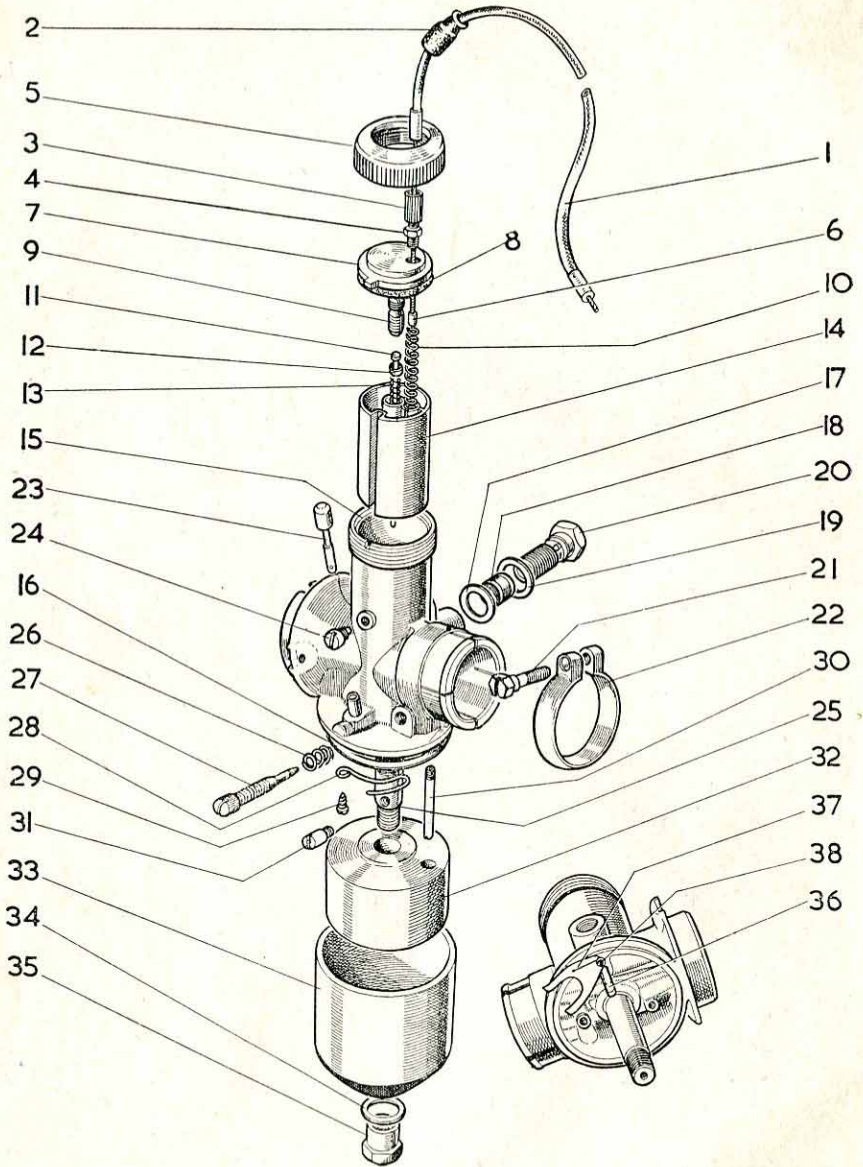
ARMATURE PLATE Fig. 15.

12 volt Lighting Coils. Wiring diagram on page 49.

ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
—	A.140	Armature plate assembly complete with coils and H.T. lead ... ..	1
1	M.2807C	Armature plate only ... ..	1
2	M.2605E	Distance piece ... ..	4
3	1002x9E	Screw, lighting coil ... ..	4
4	M.2707E	Washer, shakeproof ... ..	5
5	1002x15E	Nut, lighting coil and lead clip fixing ... ..	5
6	1124x9E/1	Screw, ignition coil poleshoe ... ..	2
7	M.2240E	Screw, ignition coil poleshoe ... ..	2
8	M.2611E	Plate, insulating ... ..	1
9	M.2565E	Poleshoe, L.H., H.T. coil ... ..	1
10	M.2722E	Ignition coil ... ..	1
11	M.2566E	Poleshoe, R.H., H.T. coil ... ..	1
12	E.9719	Oil Seal ... ..	1
13	M.2788E	Grommet, rubber ... ..	3
14	M.2736E	Grommet, rubber ... ..	1
15	1140x1E	Screw, clip fixing ... ..	1
16	M.2275E	Clip, lighting cable fixing ... ..	1
17	—	L.T. lead, with terminal 13" ... ..	1
18	M.2369E	Terminal, L.T. lead ... ..	1
19	M.2818E	Lighting coil assembly (2 coils) with leads ... ..	set 1
—	M.2817D	Rectifier ... ..	...

Note:—The H.T. lead and flywheel R.134 used with this armature plate are as listed on page 36.





CARBURETTERS Type S.19 and S.25 Fig. 16

# CARBURETTERS TYPE S.19 and S.25 Fig. 16

(less Air Filter)

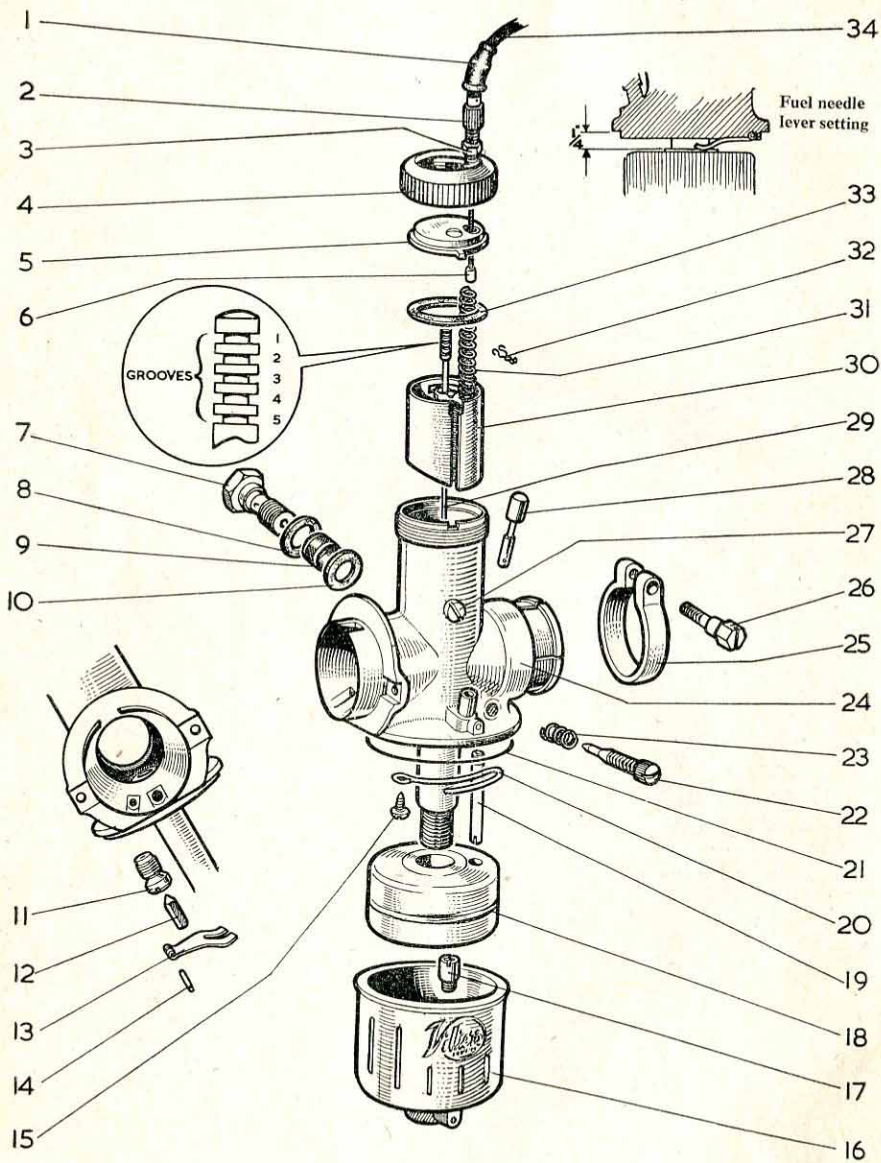
ILLUS. NO	PART NO.	DESCRIPTION	QTY.
1	<b>Quote Engine No.</b>	Throttle cable complete assembly	1
2	V.826E	Rubber cover, cable adjuster	1
3	V.105 x 1E	Cable adjuster	1
4	V.105 x 2E	Locknut for adjuster	1
5	V.852E	Top ring S.19	1
or	V.815E	Top ring S.25	1
6	V.108 x 15E	Cable nipple	1
7	V.850E	Top disc S.19	1
or	V.739E	Top disc S.25	1
8	V.856E	Top disc fibre washer S.19	1
or	V.828E	Top disc fibre washer S.25	1
9	V.786E	Needle adjusting screw	1
10	V.586E	Throttle spring S.19	1
or	V.107 x 8E	Throttle spring S.25	1
11	V.748E	Needle No. 3½	1
12	V.787E	Needle collar	1
13	V.1235E	Needle spring	1
14	V.952E	Throttle No. 2½ S.19	1
or	V.725D	Throttle No. 3 S.25	1
15	V.840B	Carburetter body S.19	1
or	V.1244E	Carburetter body S.25	1
16	V.107 x 2E	Float cup washer S.19	1
or	V.125 x 8E	Float cup washer S.25	1
17	V.383E	Banjo washer—small hole	1
18	V.404E	Petrol filter	1
19	H.104 x 8	Banjo washer—large hole	1
20	V.382E	Banjo bolt	1
21	V.754E	Body clip screw	1
22	V.854E	Body clip S.19	1
or	V.818E	Bodyclip S.25	1
23	V.742E	Tickler	1
24	V.829E	Guide screw (throttle)	1
25	V.848D	Centrepiece S.19	1
or	V.827E	Centrepiece S.25	1
26	V.749E	Spring for pilot needle	1
27	V.775E	Pilot jet needle	1
28	V.830E	Tickler spring	1
29	V.2704E	Screw for tickler spring	1
30	V.717E	Pilot jet 35 c.c.	1
31	M.855E	Main jet, 90 c.c. S.19	1
or	V.1152E	Main jet, 80 c.c. S.19	1
or	V.774E	Main jet, 120 c.c. S.25	1
32	V.839E	Float S.19	1
or	V.777E	Float S.25	1
33	V.857E	Float cup S.19	1
or	V.773E	Float cup S.25	1
34	V.107 x 3E	Bottom nut washer	1
35	V.361E	Bottom nut	1
36	V.355E	Fuel needle	1
37	V.738E	Fuel needle lever	1
38	V.375E	Fuel needle lever pin	1

In certain applications of the S.25 carburetter 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

**Note:**—See page 43 for air filter and strangler assemblies. Except where stated, components are common to both carburetters.





CARBURETTER Type S.22 Fig. 17

# CARBURETTER TYPE S.22 Fig. 17

(less Air Filter)

ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
1	V.826E	Cover, cable adjuster ... ..	1
2	V.105 x 1E	Adjuster, cable ... ..	1
3	V.105 x 2E	Nut, cable adjuster ... ..	1
4	V.1120E	Ring, carburetter top ... ..	1
5	V.1172E	Disc, top ... ..	1
6	V.108 x 15E	Nipple, cable, throttle end ... ..	1
7	V.382E	Screw, banjo ... ..	1
8	H.104 x 8E	Washer, banjo, large hole ... ..	1
9	V.404E	Gauze, petrol filter ... ..	1
10	V.383E	Washer, banjo, small hole ... ..	1
11	V.1180E	Bush, fuel needle ... ..	1
12	V.1179E	Needle, fuel ... ..	1
13	V.1130/1E	Lever, fuel needle ... ..	1
14	V.1237E	Pin, fuel needle lever hinge ... ..	1
15	M.2704E	Screw, tickler spring ... ..	1
16	V.1121D	Chamber, float ... ..	1
17	V.1511E	Jet, main, 135 c.c. ... ..	1
18	V.1129E	Float ... ..	1
19	V.717E	Jet, pilot, 35 c.c. ... ..	1
20	V.830E	Spring, tickler ... ..	1
21	V.1218E	Washer, float chamber joint ... ..	1
22	V.775E	Needle, pilot jet ... ..	1
23	V.749E	Spring, pilot jet needle ... ..	1
24	V.1438D	Body, carburetter, complete with diffuser plug and needle jet ... ..	1
25	V.1247E	Clip, carburetter body ... ..	1
26	V.754E	Screw, body clip ... ..	1
27	V.829E	Screw, throttle guide ... ..	1
28	V.742E	Rod, tickler, with cap ... ..	1
29	V.1265E	Needle, No. 3½ ... ..	1
30	V.1486E	Throttle, No. 2½ cut-away ... ..	1
31	V.107 x 8E	Spring, throttle return ... ..	1
32	V.1301/1E	Circlip, needle locating ... ..	1
33	V.1145E	Washer, top disc ... ..	1
34	Quote engine number	Throttle cable complete with adjuster and nipple ... ..	1

Note:—See page 43 for air filter and strangler assemblies.

\* Insist on

GENUINE



SPARES

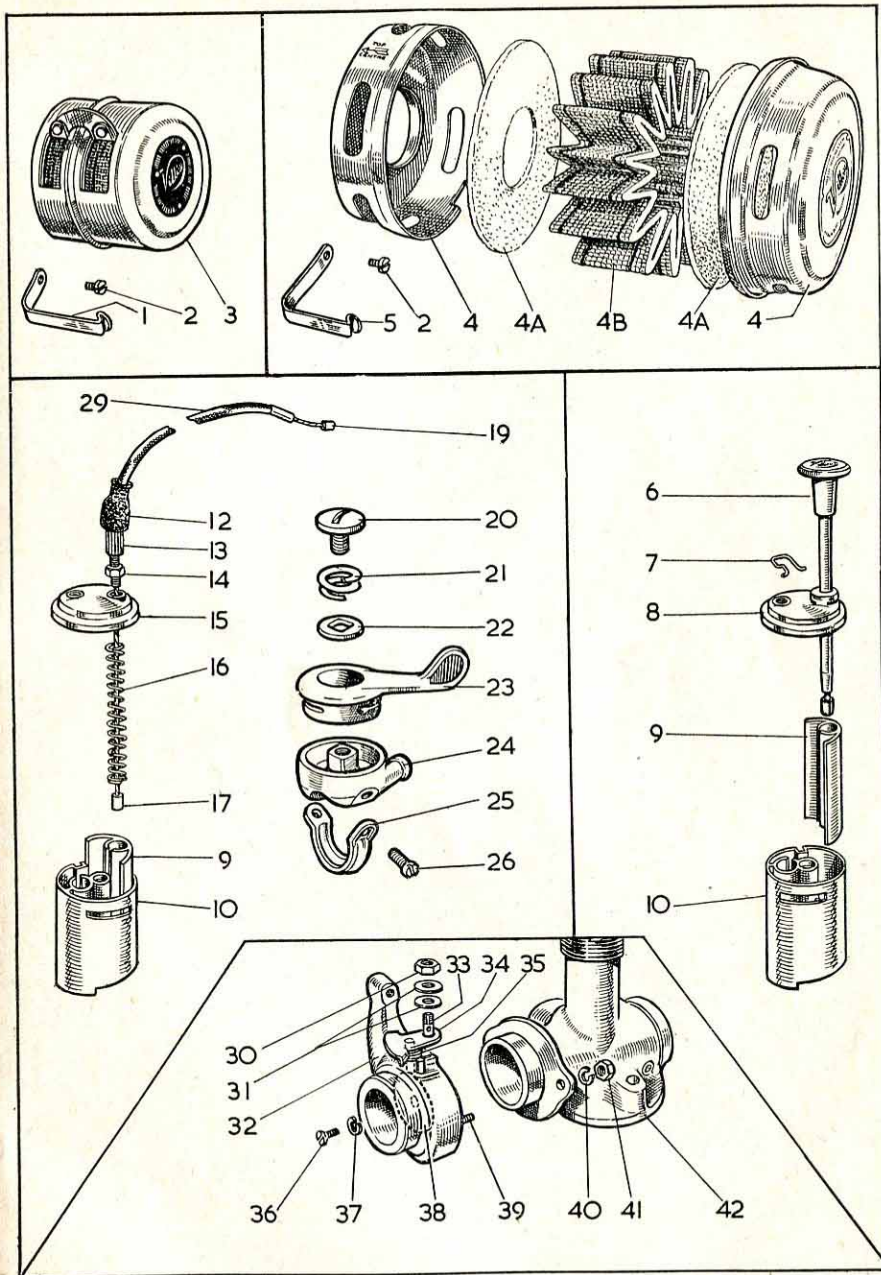


# AIR FILTER AND STRANGLER GROUP Fig. 18

Unless otherwise stated, parts shown below are additional to those listed on pages 39 and 41 and illustrated in figs. 16 and 17.

ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
<b>Standard Air Cleaner</b>			
1	V.790E	Air filter clip ... ..	2
2	V.831E	Screw for clip ... ..	2
3	V.837E	Air filter, incorporating air strangler	1
<b>" 1100 " Air Cleaner</b>			
2	V.831E	Screw for air filter clip ... ..	2
4, 4A & B	V.1100B	Air filter type ' 1100 ' complete	1
4	—	Filter end caps (not supplied separately)	—
4A	V.1142E	Felt sealing washer ... ..	2
4B	V.1104D	Star element ... ..	1
5	V.1134E	Clip for air filter ... ..	2
<b>Spindle operated Strangler Slide</b>			
6	V.1167E/49E/1	Strangler knob and spindle S.25/2	1
or 6	V.1422E/25E	Strangler knob and spindle S.22/2	1
or 6	V.1464E/65E	Strangler knob and spindle S.19/2	1
7	V.1178E/1	Spring clip ... ..	1
8	V.1161E	Top disc (Replaces V.739E) S.25/2	1
or 8	V.1263E	Top disc (Replaces V.1172E) S.22/2	1
or 8	V.1461D	Top disc (Replaces V.850E) S.19/2	1
9	V.958D/1	Strangler slide S.25 ... ..	1
or 9	V.1264D	Strangler slide S.22 ... ..	1
or 9	V.1034D	Strangler slide S.19 ... ..	1
10	V.1308D	Throttle (Replaces V.725D) S.25/2 & 3	1
or 10	V.1463D	Throttle (Replaces V.952E) S.19/2 & 3	1
<b>Cable operated Strangler Slide</b>			
9 } 10 }		—as for spindle operation	
12	V.826E	Rubber cover (strangler cable) ... ..	1
13	V.105 x 1E	Cable adjuster ... ..	1
14	V.105 x 2E	Cable adjuster locknut ... ..	1
15	V.1054E	Top disc. (Replaces V.739E) S.25/3	1
or 15	V.1421E	Top disc. (Replaces V.1172E) S.22/3	1
or 15	V.1462E	Top disc. (Replaces V.850E) S.19/3	1
16	V.586E	Strangler slide spring S.25/3	1
or 16	V.1037E	Strangler slide spring S.22/3 and S.19/3	1
17 & 19	V.108 x 15E	Cable nipple ... ..	1
<b>Strangler cable control</b>			
20	V.1368E	Top screw ... ..	1
21	V.1370E	Spring ... ..	1
22	V.1371E	Spring locating washer ... ..	1
23	V.1483C	Lever ... ..	1
24	V.1530C	Control body 120° movement $\frac{7}{8}$ " bar S.25/3	1
or 24	V.1531C	Control body 112° movement $\frac{7}{8}$ " bar S.22/3	1
or 24	V.1532E	Control body 98° movement $\frac{7}{8}$ " bar S.19/3	1
—	V.1549E	Rubber cover for cable ... ..	1
25	V.1481E	Clip, $\frac{7}{8}$ " bar ... ..	1
26	V.1525E	Screw, body fixing ... ..	2
29	Quote Engine Number	Strangler cable complete ... ..	1
		Strangler control complete ... ..	1

(continued on page 44)



AIR FILTER AND STRANGLER GROUP Fig. 18



## AIR FILTER AND STRANGLER GROUP—*continued*

Where the S.25/1 carburetter is fitted with a cable operated strangler (not incorporated in the throttle slide as in the S.25/2 and S.25/3) the following additional or alternative components are required.

ILLUS. NO.	PART NO.	DESCRIPTION	QTY.
30	V.105 × 2E	Nut ... ..	1
31	V.1021E	Washer ... ..	2
32	V.942C	Strangler body ... ..	1
33	V.1020E	Pivot pin, cable ... ..	1
34	V 943E/V 944E	Strangler lever and spindle (not supplied separately) ... ..	1
35	V.947E	Lever return spring screw ... ..	1
36	EM.362	Screw ... ..	1
37	V.1305E	Washer, spring $\frac{1}{8}$ " ... ..	1
38	V.946E	Strangler plate ... ..	1
39	V.948E	Stud ... ..	2
40	E.7529	Washer, spring 4 B.A. ... ..	2
41	1113 × 4E	Nut ... ..	2
42	V.1156E	Carburetter body (replaces V.1244E) ...	1
—	V.496E	Air filter complete with clip (replaces V.837E) ... ..	1
—	V.953C	Strangler assembly complete (less air filter)	1

### CARBURETTERS COMPLETE

#### Less Air Filters and Strangler Cable Control

Type S.19/1	Carburetter as Fig. 16 ... ..
„ S.19/2	Carburetter as Fig. 16, with strangler slide and operating knob ... ..
„ S.19/3	Carburetter as Fig. 16, with cable operated strangler slide and cable ... ..
Type S.22/1	Carburetter as Fig. 17 ... ..
„ S.22/2	Carburetter as Fig. 17, with strangler slide and operating knob ... ..
„ S.22/3	Carburetter as Fig. 17, with cable operated strangler slide and cable ... ..
Type S.25/1	Carburetter as Fig. 16 ... ..
„ S.25/2	Carburetter as Fig. 16, with strangler slide and operating knob ... ..
„ S.25/3	Carburetter as Fig. 16, with cable operated strangler slide and cable ... ..

*Air filter, clips, clip screws and strangler cable control are charged extra. If carburetters are required complete with these items, please state exact requirements, quoting part numbers.*

Always quote engine number when ordering cables or complete carburetters

### TOOLS AND MISCELLANEOUS EQUIPMENT

E.7402	Spanner, plug
E.9314E	Spanner, plug (for cowled engines)
M.2715E	Screwdriver
M.2693E	Feeler gauge .015"
or M.2968/9E	Feeler gauge .020"
†M.1239D	Spanner, hammer-tight (for flywheel)
†E.8678	Spanner, exhaust nut
†9362/C	Spanner, clutch cap nut
†ST.1687A	Spanner, self-starter rotor.
†SST/1565D/1	Extractor, self-starter rotor
Lodge HH.14	Spark plug
2L.985	Rectifier, 6 volt generator
M.2817D	Rectifier, 12 volt generator.

†Not supplied with engine. Obtainable through normal spares channels.

Additional or Alternative Components required for  
**Mark 31C (3KF and 3SF) and Mark 9E (3S, 4S, 4SF and 4SFR).**

DESCRIPTION	31C/3KF	31C/3SF	9E/3S	9E/4S	9E/4SF	9E/4SFR
Adaptor, oil seal ... ..	E.9975	E.9975	—	—	—	—
Bolt, cowl bottom/cowl top joint ... ..	—	—	R.320	R.320	FG.151E (2)	FG.151E (2)
Bearing, roller, 20 m.m. x 52 m.m. x 15 m.m.	—	Quote Engine No.	Quote Engine No.	Quote Engine No.	Quote Engine No.	Quote Engine No.
Bracket, ignition coil ... ..	—	E.10732	—	E.10019	E.10019	E.10019
†Bush, layshaft, in gearbox end cover ... ..	—	—	—	—	—	—
Cam, contact breaker ... ..	—	—	—	—	M.1662E	M.1662E
Clip, H.T. lead ... ..	—	—	—	—	E.7189 (2)	E.7189 (2)
Circlip, bearing locating ... ..	—	E.7189 (2)	E.7189 (2)	E.7189 (2)	M.2743D	M.2743D
Clip, stator cables ... ..	—	M.2743D	M.2743D	M.2743D	M.2816E	M.2816E
Clip, contact breaker lead(s) ... ..	—	—	—	—	—	—
Cylinder ... ..	D.11032	D.11032	—	—	—	—
Cylinder head ... ..	B.10424	B.10424	—	—	—	—
Connector, L.T. cable to contact breaker ... ..	—	—	—	—	—	M.2857E (2)
Cover, R.H. (for small C.B. assy. with small cover) ... ..	—	—	A.9549	—	—	—
or Cover, R.H. (for small C.B. assy. with large cover) ... ..	—	—	A.9978	—	—	—
or Cover, R.H. (for large C.B. assy. with large cover) ... ..	—	—	—	A.9597	—	—
Cover, contact breaker (2 $\frac{3}{16}$ " dia.) ... ..	C.10733	C.10733	A.9977	A.9597	—	—
or Cover, contact breaker (2 $\frac{3}{16}$ " dia.) ... ..	—	—	D.9563	—	—	—
†Cover, gearbox end bushed ... ..	D.9563/1	D.9563/1	D.9563/1	D.9563/1	D.9563/1	D.9563/1
Cowl, bottom half ... ..	D.10731	D.10731	D.10731	C.10011	C.10012	C.10543
Cowl, front (L.H. side of cylinder) ... ..	—	—	—	—	A.9605	C.10306
Cowl, front plate (housing C.B. assy.) ... ..	—	—	—	—	B.9991	B.9991
	—	—	—	—	C.9606	C.9606



DESCRIPTION	31C/3KF	31C/3SF	9E/3S	9E/4S	9E/4SF	9E/4SFR
Chaincase outer and bottom cowl ...	A.10376	A.10376	—	—	—	—
Cowl, front ...	C.10417	C.10417	—	—	—	—
Cowl, top ...	A.10617	A.10617	—	—	A.9608	C.10305
Crankcase, R.H. (sold only with A.9077) ...	—	B.9530	B.9530	B.9530	B.9530	B.9530
Distance piece engine sprocket/fan hub ...	E.10398	E.10398	—	—	—	—
Driveshaft, R.H. ...	—	D.10590	D.9548	D.9548	D.9548	D.5948
Driveshaft, L.H. ...	D.10396	D.10396	—	—	—	—
†Disc, cap (layshaft bush sealing) ...	—	Z.1009 x 9E	—	Z.1009 x 9E	Z.1009 x 9E	Z.1009 x 9E
Fan ...	E.10463	E.10463	—	—	C.9933	C.9933
Grommet (rectangular 3 holes) ...	—	M.2806E	M.2806E	M.2806E	M.2806E	—
Grommet (rectangular 1 hole) ...	—	—	—	—	M.2782E (3)	—
Grommet (rectangular 5 holes) ...	—	—	—	—	—	—
Grommet (rectangular 2 holes) ...	—	—	—	—	—	—
Grommet (single hole, for 2.5 m.m. cable) ...	—	M.2736E	M.2736E	M.2736E	M.2736E	M.2777E
Grommet, for sparking plug ...	E.10156	E.10156	—	—	E.10156	M.2781E (3)
Housing, stator ...	—	B.9536/1	B.9536	B.9536	B.9536/1	E.10156
Key, fan ...	—	E.5581	—	—	—	B.9536/1
Lever, gearchange ...	D.7807	D.7807	C.9616	C.9616	D.7807	D.7807
Nut, rotor securing ...	—	E.9688	E.9688	E.9688	E.9688	E.9688
Nut, $\frac{1}{4}$ " small hexagon ...	—	E.2539 (5)	E.2539 (5)	E.2539 (5)	E.2539 (3)	E.2539
Nut, $\frac{1}{4}$ " standard hexagon ...	—	—	—	—	E.401	E.401
Nut, bottom cowl stud ...	E.834	E.834	—	—	—	—
Nut, cowl top and cylinder head ...	E.834 (2)	E.834 (2)	—	—	E.834 (3)	E.834 (3)
Nut, adaptor stud ...	1002 x 15 (4)	1002 x 15 (4)	—	—	—	—
Seal, oil in stator ...	—	E.9718	E.9718	E.9718	E.9718	E.9718
Seal, oil L.H. ...	E.9720	E.9720	—	—	—	—
Screw, contact breaker cover ...	—	E.9570 (2)	E.9570 (2)	E.9570 (2)	E.9570 (2)	E.9570 (2)
Screw, stator housing fixing ...	—	E.G.527 (4)	E.G.527 (4)	E.G.527 (4)	E.G.527 (4)	E.G.527 (4)
Screw, R.H. cover fixing (long) ...	—	E.9569	E.9569	E.9569	—	—
Screw, R.H. cover fixing (short) ...	—	E.9260	E.9260	E.9260	—	—

Screw, cowl bottom half fixing	...	—	—	E.8453	E.8453
Screw, fanfixing	...	—	—	E.10002 (4)	E.10002 (4)
Screw, top/bottom cowl fixing	...	—	—	—	—
Screw, contact breaker assy. fixing	1022 x 4E (2)	1022 x 4E (2)	4E (2)	—	—
Screw, stator fixing (Unbrako $\frac{1}{4}$ " x 26 x $\frac{3}{4}$ ")	—	M.2739E (2)	M.2739E (2)	M.2739E (2)	M.2739E (2)
Screw, H.T. coil fixing	—	E.10008 (3)	E.10008 (3)	E.10008 (3)	E.10008 (3)
Screw, cowl front plate fixing	—	E.478 (2)	E.478 (2)	E.6561 (2)	E.6561 (2)
Screw, front cowl fixing	—	—	—	E.9333 (3)	E.9333 (3)
Strip, insulating, for M.2743D clip	—	M.1228E (3)	M.1228E (3)	E.6561 (3)	E.6561 (3)
Stud, switch assembly box	...	M.2744D	M.2744D	M.2744D	M.2744D
Stud, cowl bottom half/stator housing or	...	FG.185E (2)	FG.185E (2)	FG.185E (2)	FG.185E (2)
Armature plate	...	E.10619	E.10619	E.5106	E.5106
Stud, cylinder head and cowl fixing	...	E.10932	E.10932	E.10003	E.10003
†Stud, clutch bridge	...	—	—	E.392	E.392
Stud, oil seal adaptor	...	E.10589	E.10589 (4)	—	—
Washer, felt, contact breaker box sealing	...	—	—	E.10259	E.10259
Washer, joint, small contact breaker cover	...	—	—	—	—
Washer, joint, large contact breaker cover	...	E.9564/1	E.9564/1	E.9564/1	E.9564/1
Washer, shakeproof $\frac{1}{4}$ "	...	E.9722 (3)	E.9722 (3)	E.9722 (4)	E.9722 (4)
Washer, spring, single coil $\frac{1}{4}$ "	...	E.1430 (4)	E.1430 (4)	E.1430 (2)	—
Washer, cowl joint bolts	...	—	—	E.2667 (2)	E.2667 (2)
Washer, front cowl fixing screw	...	—	—	E.2924 (3)	E.2924 (3)
Washer, front plate fixing screw	...	—	—	FG.161E (3)	FG.161E (3)
Washer, cowl steady stud	...	—	—	E.10157	E.10157
Washer, bottom cowl stud	...	E.373	E.373	—	—
Washer, adaptor stud	...	E.5257 (4)	E.5257 (4)	—	—

†The Marks 31C/3SF, 9E/4S, 9E/4SF and 9E/4SFR Engines are not fitted with kickstart mechanism and these items replace the standard Gearbox and Cover, etc.

The letter 'S' in the Engine Type indicates that the unit is fitted with Self-Starter Equipment. For details and spare parts list of this equipment, reference should be made to the separate booklet issued with each engine.



## GEAR RATIO TABLES

### 3-SPEED GEARBOX

GEARS AND COMPONENTS	RATIOS AND PART NUMBERS			
	Standard		Wide	
TOP GEAR ... ..	1—1		1—1	
SECOND GEAR ... ..	1.34		1.7	
FIRST GEAR ... ..	2.55		3.25	
Mainshaft fixed pinion ... ..	E.7286	14T	E.7286	14T
Mainshaft sliding pinion ... ..	D.6525	21T	D.6525	21T
Layshaft fixed pinion ... ..	E.8885	18T	E.9796	16T
Layshaft sliding pinion ... ..	D.6524	22T	D.6524	22T
High gear pinion ... ..	D.8886/1	23T	D.9110/1	26T
Ratchet pinion ... ..	D.6523/1	28T	D.6523/1	28T
Speedometer drive gear ... ..	E.8960	24T	—	
Speedometer drive gear ... ..	E.10283	25T	—	

### 4-SPEED GEARBOX

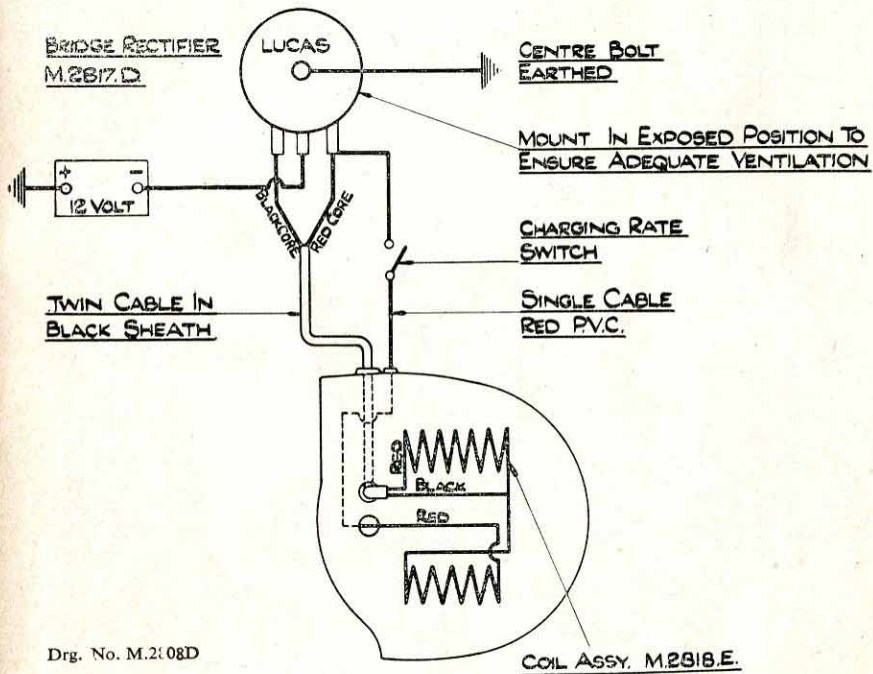
GEARS AND COMPONENTS	RATIOS AND PART NUMBERS			
	Standard		Wide	
TOP GEAR ... ..	1—1		1—1	
THIRD GEAR ... ..	1.27		1.34	
SECOND GEAR ... ..	1.78		2.4	
FIRST GEAR ... ..	2.94		3.6	
Mainshaft ( $\frac{3}{16}$ " push rods)... ..	C.8491/1	14T	C.8491/1	14T
or Mainshaft ( $\frac{3}{16}$ " and $\frac{1}{4}$ " push rods) ... ..	C.11036	14T	C.11036	14T
Layshaft ... ..	C.8492/1	17T	C.9155	15T
Mainshaft sliding pinion with dogs ... ..	D.8496	22T	D.9227	24T
Layshaft sliding pinion with dogs ... ..	D.8497	23T	D.9228	24T
Mainshaft sliding pinion without dogs ... ..	E.9026	19T	E.9229	18T
Layshaft sliding pinion without dogs ... ..	E.9026	19T	E.9229	18T
High gear pinion ... ..	D.8498/1	25T	D.9157/1	27T
Speedo drive gear ... ..	E.8961	26T	E.9326	28T
Speedo drive gear ... ..	E.10268	27T	E.10282	29T

#### HIGH GEAR PINIONS with ball thrust race

In certain engines the high gear pinion is fitted with balls in addition to the pressure washer. Numbers of these components are given below.

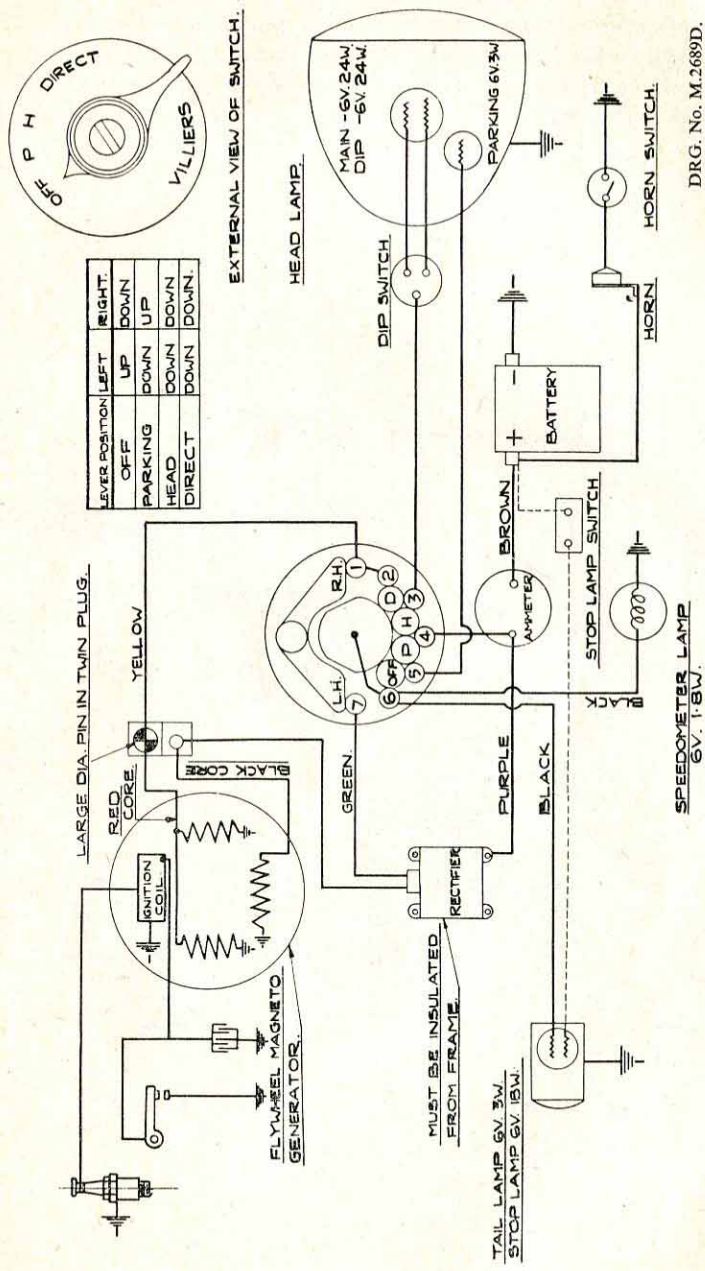
PART NO.	DESCRIPTION	QTY.
D.10158	High Gear Pinion 25T (4-Speed Gearbox)	1
D.10307	High Gear Pinion 27T (4-Speed Gearbox)	1
D.10159	High Gear Pinion 23T (3-Speed Gearbox)	1
D.10160	High Gear Pinion 26T (3-Speed Gearbox)	1
E.9775	Ball, $\frac{3}{8}$ " dia. for high gear pinion ... ..	14
E.10314	Pressure washer (3-Speed only) ... ..	1

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



WIRING DIAGRAM (BASIC CIRCUIT) Fig. 19  
Villiers 12v. Magneto Generator





DRG. No. M.2689D.

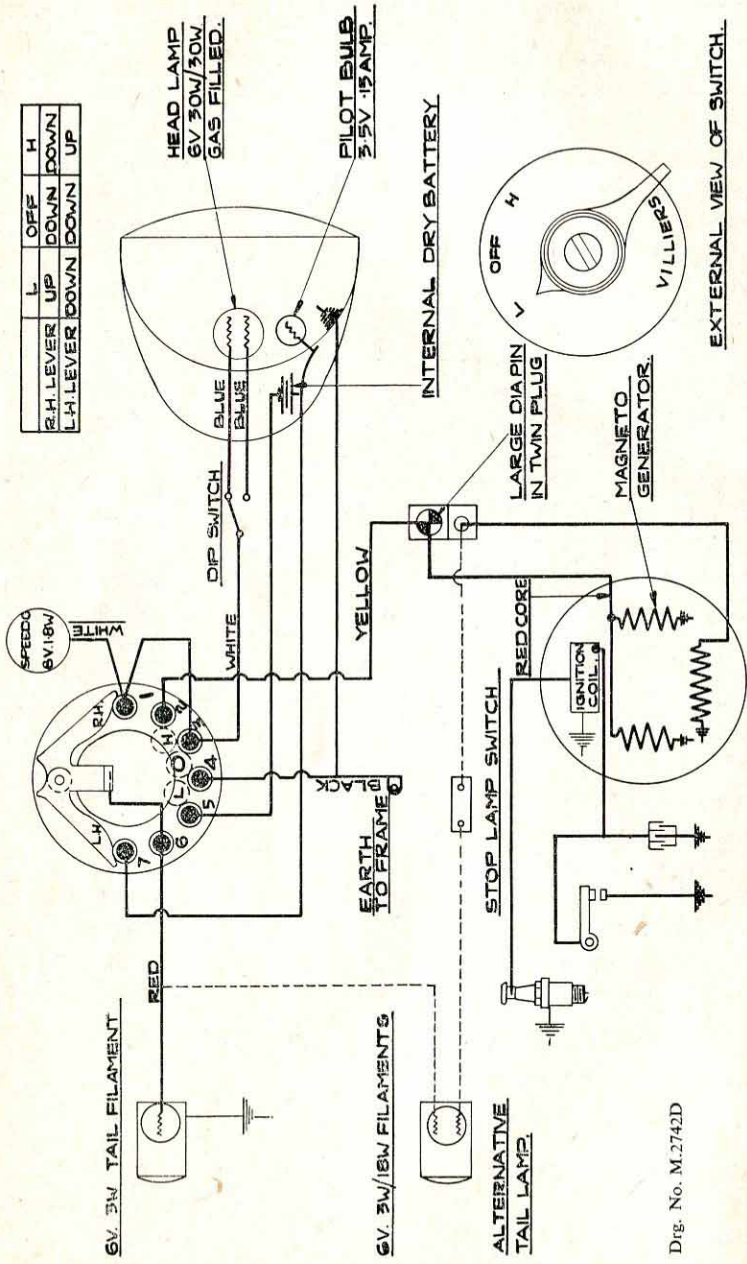
WIRING DIAGRAM (RECTIFIER LIGHTING) Fig. 20  
using VILLIERS Lighting Set and 6v. Magneto Generator.

# VILLIERS RECTIFIER LIGHTING SET—6 volt

Wiring Diagram on Page 50.

COMPONENT	PART NO.
<b>Headlamp complete with ammeter, less cables, Type MCH56</b> ...	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 ...	31461A
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 complete</b> ...	53394
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 (left 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



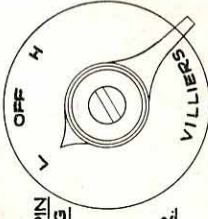


R.H. LEVER UP	L	OFF	H
R.H. LEVER DOWN	DOWN	DOWN	DOWN
L.H. LEVER UP	UP	DOWN	UP
L.H. LEVER DOWN	DOWN	DOWN	UP

HEAD LAMP  
6V 30W/30V  
GAS FILLED.

PILOT BULB  
25V 15AMP.

INTERNAL DRY BATTERY



EXTERNAL VIEW OF SWITCH

WIRING DIAGRAM (DIRECT LIGHTING) Fig. 21  
using VILLIERS Lighting Set and 6v. Magneto Generator

Fig. No. M.2742D

# VILLIERS DIRECT LIGHTING SET—6 volt

## For Sports and Trials Engines

Wiring Diagram on Page 52

COMPONENT	PART No.
<b>Headlamp complete, M35</b> ... ..	060088
Rim, chrome, less glass ... ..	608157
Wire, glass fixing ... ..	(Set of 4) 600308
Packing, glass ... ..	612220
Glass ... ..	612235
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
Switch handle screw ... ..	105751
Sleeve terminal ... ..	188818
<b>Tail Lamp type 529 complete</b> ... ..	53256
Lens ... ..	526404
Window ... ..	526406
Screw, lens fixing ... ..	133551
Bulb-holder assembly ... ..	554710
Rubber base ... ..	526408
Screw, base fixing ... ..	526410
6 V—3 watt bulb, M.B.C. ... ..	988



# TERMS OF BUSINESS

## ESTIMATES

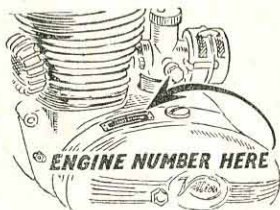
If requested at the time of despatch, we are prepared to give an estimate before proceeding with any repair. This entails a certain amount of labour in dismantling to ascertain what new parts will be required, and therefore, in the case of any estimate not being accepted, a charge is made for our mechanic's 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 plate rivetted to the inner chaincase. (See sketch below).



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. 270B/343.

The **Magneto** also bears a SPECIFICATION Number (example: R.134/A.136) but no Serial Number. The "R" (Rotor or Flywheel), and "A" (Armature Plate) Number is stamped on the Flywheel.

The **Carburettor** identification mark is stamped on the inlet stub, e.g. S.25/1.

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. Components sent as pattern are not returned unless requested, except where we cannot complete the order ex-stock.

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 returned to the customer unless the outside of the case is marked accordingly, and a special request is contained in the covering letter or contents note.

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 and the flywheel complete.

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.—All transactions must be treated on a cash basis, unless ledger account facilities have already been arranged.

10.—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.

11.—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

**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.

## 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, not 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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