User's Handbook

Villiers

250 c.c. TWIN MK 2T

FOUR-SPEED
ENGINE-GEAR UNIT

THE VILLIERS ENGINEERING CO. LTD.
MARSTON ROAD, WOLVERHAMPTON, ENGLAND.
Telephone: Wolverhampton 22399 (All Departments).

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TECHNICAL DATA

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Bore	50 m.m. = 1.970″
Stroke	63½ m.m. = 2.50″
Capacity	250 c.c.
Compression ratio	8.2: 1
Maximum power output	15 b.h.p. at 5,500 r.p.m.
Engine sprocket	20 teeth x ⅜″ pitch
Clutch sprocket	43 teeth x ⅜″ pitch
Primary drive ratio	2.15: 1
Gearbox ratios	1: 1, 1.325: 1, 1.9: 1, 3.06: 1
Final drive sprocket	18 tooth, ½″ pitch for .305″ wide chain
Final drive chainline	2.11/16″
Exhaust pipe diameter	1½″ outside diameter
Carburetter	Villiers Type S.22/2
Carburetter taper needle	No. 3½ set in 3rd groove from top
Throttle (carburetter)	No. 3
Sparking plug	Lodge H.H.14
Sparking plug gap	.018″/.025″
Ignition timing	3/16″ before top dead centre
Contact breaker point gap	.012″/.015″
Lubrication, Engine	Petroil mixture. For the first 500 miles 1 part Castrol XL (SAE 30) to 16 parts petrol, and subsequently, 1 part oil to 20 parts petrol.
Lubrication, Gearbox and Chaincase	Castrol XL (SAE 30). Fill Gearbox to Dipstick level and Chaincase to level plug.

Operating Instructions

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LUBRICATION

ENGINE

The Engine is lubricated by the petroil system and no other lubricant other than that introduced with the petrol is necessary. For normal use and after the running-in period has been completed, we recommend Castrol XL (SAE 30) used in the ratio of 1 part oil to 20 parts petrol. Mix thoroughly before putting mixture into the tank.

Also recommended is Castrol Two-Stroke Self-Mixing Oil, in this case the ratio being ½-pint oil to 1 gallon of petrol. (This represents a ratio of 1 to 20 actual lubricant to petrol). 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

CastrolL X (SAE 30) is also recommended for the gearbox. The gearbox filler plug and dipstick are combined and positioned as shown. The oil capacity of the gearbox is approximately 1.2 pints and the oil level should be maintained to the notch cut in the dipstick. The oil level should be checked with the dipstick resting on top of the gearbox casing, and with the machine standing on level ground. A drain plug is provided at the base of the gearbox and it is recommended that the oil is replaced every 5,000 miles.

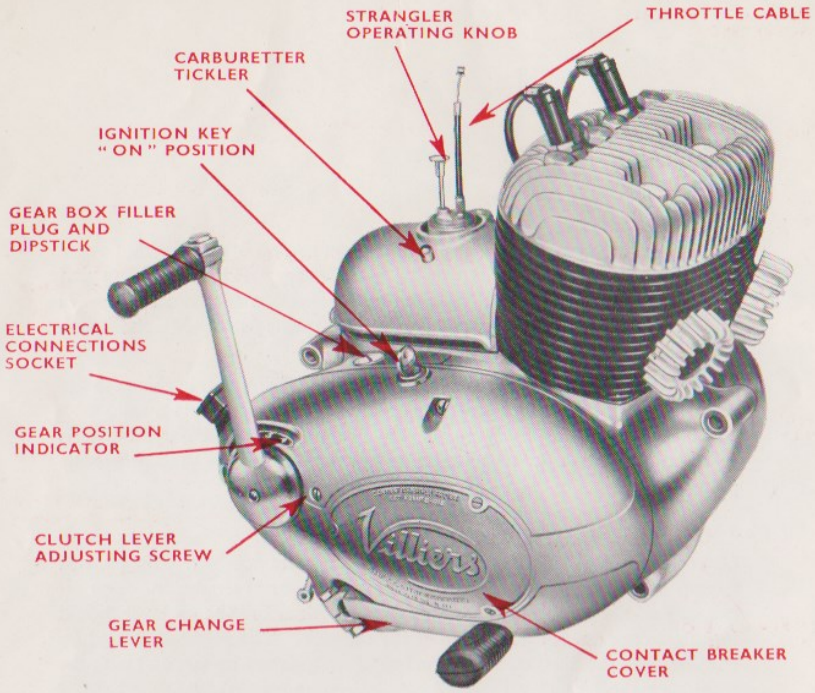
CHAINCASE

The chaincase houses the primary drive chain and clutch. Castrol XL oil is used in the chaincase, and filler and oil level plugs are provided. When filling the chaincase both plugs should be removed and oil fed in until it commences to run out of the level plug hole. Allow any surplus oil to drain off before replacing the plugs. Change oil every 5,000 miles.

STARTING

When cold. Place the petrol tap and ignition switch in the " ON " position and flood the carburetter by depressing the tickler on the right-hand side of the carburetter cover. Close the strangler by the means provided in order to obtain a rich mixture. Check that the gearbox is in the neutral position, open the twist-grip about one third of a turn and turn the engine over sharply by means of the kickstarter. When the engine fires the throttle should be adjusted accordingly and the strangler gradually opened as the engine warms up.

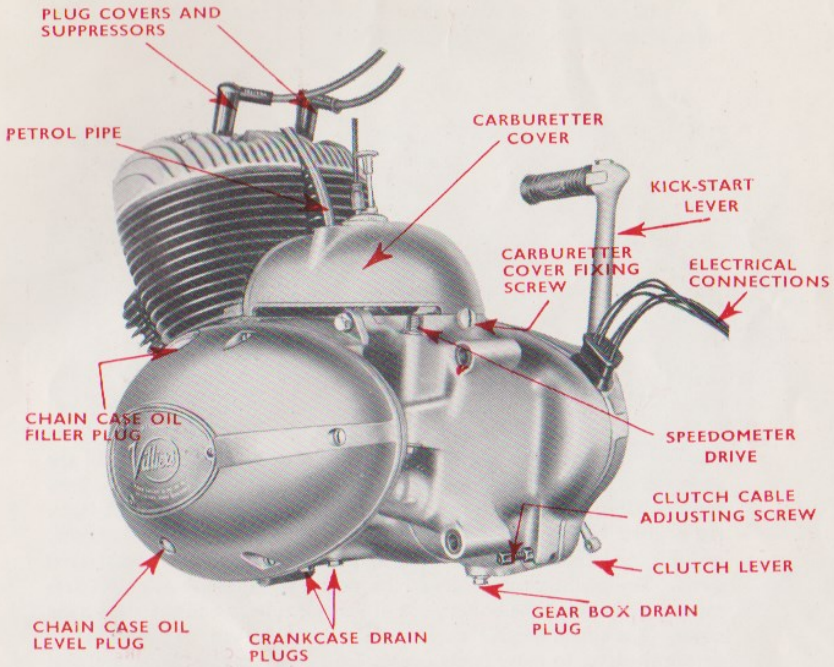
When hot. Switch on the petrol and ignition only. It is not necessary to close the strangler or flood the carburetter.



FAILURE TO START

If the starting procedure has been carried out correctly and repeated kicks have failed to start the engine, it is possible that the mixture is too rich. The cylinder and crankcase may be cleared of excessive mixture by turning off the fuel supply, opening the strangler and throttle and turning the engine over sharply a number of times. Repeat the starting procedure outlined above, but do not fully close the strangler.

If the engine still fails to start the sparking plugs may be fouled. If this is found to be the case, it will be advisable to remove the drain plugs situated at the bottom of the crankcase and whilst the sparking plugs are removed rotate the engine to clear the cylinders and crankcase of excess mixture. If this procedure still fails to effect a start, the fuel supply and electrical circuits should be carefully checked.



STOPPING THE ENGINE

The engine may be stopped by switching off the ignition, completely closing throttle, or turning off the petrol and allowing the carburetter to run dry. The latter procedure is recommended when the machine has to stand for a considerable time before again being required.

RUNNING-IN

As a general rule, it is not advisable to exceed 40 miles per hour in top gear, 25 miles per hour in third gear, 20 miles per hour in second gear and 10 miles per hour in bottom during the first 500 miles. Speeds not greatly in excess of those quoted are permissible provided that no undue load is placed upon the engine. After the initial running-in period has been completed the maximum speeds should gradually be increased as follows;

500—1,000 miles, up to 50 m.p.h.; 1,000 to 1,500 miles, up to 60 m.p.h.; 1,500 to 2,000 miles, maximum speeds for short bursts only, after 2,000 miles, extended full throttle is permissable.

GEARBOX

Gear selection is by means of a foot-operated lever which returns to a central position after each gear change. A gear position indicator is provided on the right-hand cover adjacent to the kickstarter lever. The gear lever should be moved upwards to change down and down to change into higher gears. Neutral position is between first and second gears and is selected by moving lever through half the normal distance. It is most important that the clutch is fully disengaged whenever a gear change is made.

CLUTCH AND PRIMARY DRIVE

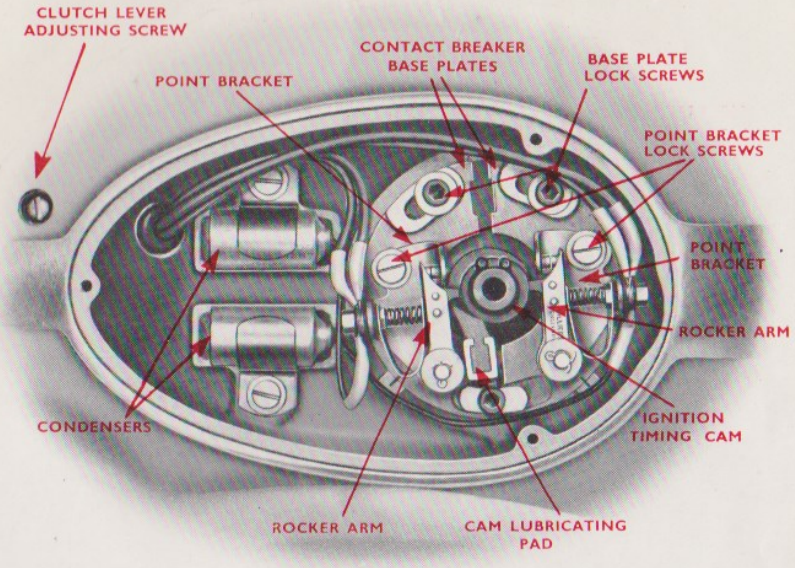
The drive from the engine to the multi-plate clutch is by a pre-stretched endless roller chain running in the oil bath chaincase. No attention is necessary beyond that of lubrication and occasional adjustment of the push rod and clutch lever. Whilst the clutch is engaged, i.e. driving, there must be clearance between the end of the push rod and the clutch lever. An adjuster having a slotted end is provided for clutch lever adjustment, and this can be reached with a screwdriver through a hole in the right-hand cover. The adjuster screw should be positioned until there is $\frac{3}{16}$" free movement between the bottom end of the clutch lever and the right-hand cover. The clutch control cable adjuster should then be positioned to permit the lever to move freely over at least $\frac{1}{8}$". It is most important that there is no end pressure on the push rod whilst the clutch is engaged. Do not slip the clutch when in motion, except when getting away from a standing start, otherwise rapid wear of the clutch linings will occur. When stopping for any length of time at traffic lights, etc., move the gear lever to the neutral position and engage the clutch.

FLYWHEEL MAGNETO GENERATOR

Both the ignition and battery charging circuits are fed from coils mounted on the armature plate on the right-hand side of the engine. The flywheel is fastened to the right-hand drive shaft and to an extension of this shaft is fitted the cam which operates the contact breakers. A wiring diagram of the complete installation is given inside the back cover, and from this it will be noted that two ignition coils and a selenium rectifier, together with battery and lighting set complete the electrical equipment.

IGNITION TIMING

Two completely separate ignition systems are used, each being energised by one of the coils on the armature plate. The contact breaker assemblies are mounted on separate base plates, and each can be rotated round the centre line of the ignition cam, thus giving independent timing of each cylinder.



Contact Breaker—with cover removed.

A felt lubricating pad is provided for the contact breaker cam, and occasional soaking of the pad in molten high melting point grease is recommended in order to ensure silent operation of the contact breakers and to reduce the wear on the fibre heel of the rocker arms.

Reference to the illustration will show the three socket headed screws which lock the contact breaker base plates in position. As the ignition timing is correctly set at the Works it is not advisable to release these screws unless the replacement of any parts render this necessary. In order to maintain the ignition system at the peak of efficiency it is essential to keep all electrical connections clean and tight, and to maintain the contact breaker point gaps at .012″/.015″. Adjustment of the gap is carried out as follows:—

Rotate the engine until the left-hand contact breaker is in the fully open position, i.e. with the left-hand (drive side) piston in the top dead centre position. Release the point bracket lock screw and adjust the contact breaker point gap to .012″/.015″, using the screwdriver and feeler gauge provided with the engine. Securely re-tighten the point bracket lock screw. Repeat the operation with the right-hand contact breaker (with the right hand, magneto side, piston in the top dead centre position).

Should it be necessary to re-set the ignition timing, the solder must be removed from the socket headed screws so that they can be released. Having checked that the contact breaker gap setting is correct (.012″/.015″), rotate the engine until the left-hand piston is positioned $\frac{3}{16}$″ before top dead centre, and then release the bottom socket headed screw and the screw securing the left-hand contact breaker bracket. Rotate the bracket until the contact breaker points are just opening. Lock the base plate fixing screw, rotate the engine until the right-hand piston is $\frac{3}{16}$″ before top dead centre, and adjust the right-hand contract breaker base plate until the contact breaker points commence to open. After re-checking the timing of each cylinder, tighten the bottom socket headed screw and check that the other two screws are securely tightened. To accurately check the piston position, both cylinder heads should be removed.

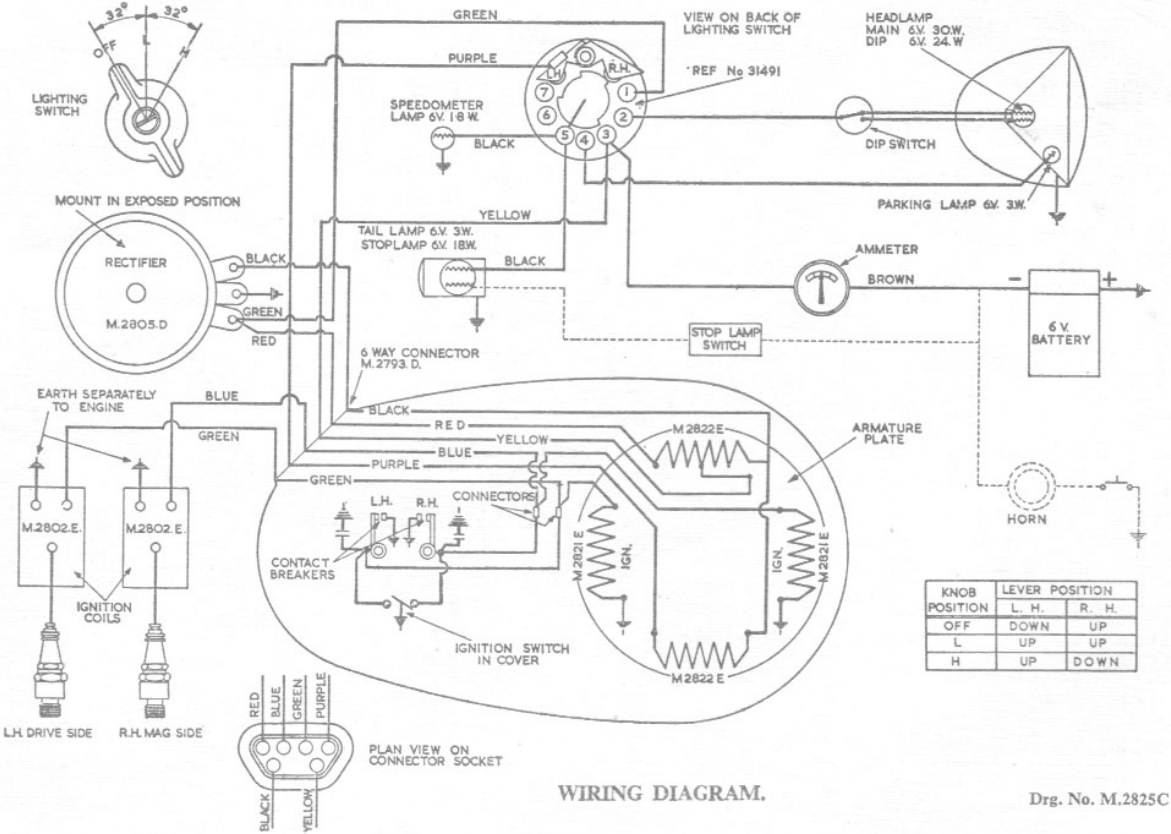
The ignition coils are mounted in a moulded case with external screwed connections, and no attempt should be made to dismantle this assembly. An ignition switch with key is mounted on the right-hand cover and this enables the engine to be immobilised when the machine is left unattended. A multi-pin plug and socket carry the electrical connections from the engine to the ignition coils and battery charging circuits, and it is most important to ensure that the plug contacts are clean and secure, otherwise trouble may be experienced with both ignition and lighting circuits.

CARBURETTER

The carburetter is the Villiers Type S.22/2 fitted to a detachable inlet pipe connecting the inlet ports of the two separate cylinder castings. Access to the carburetter is obtained by releasing the cover fixing screw and removing the carburetter cover. All air entering the carburetter passes through the filter housed in the carburetter cover. A strangler slide for easy starting operates within the carburetter throttle, control being either by a short rod protruding through the top of the carburetter or alternatively, by an additional Bowden type cable with a control on the handlebar.

Provision is also made for adjustment of the slow-running mixture, by means of a screw on the right-hand side of the carburetter, and for the taper needle, slotted to engage in a spring clip attached to the throttle. As the carburetter is set during initial bench testing of the engine, and again when the complete machine is tested by the manufacturer, it should not be necessary to make other than very minor adjustments to the taper needle or slow-running mixture control screw.

The main jet which controls the flow of petrol through the carburetter at the higher throttle openings is located in the bottom of the float chamber, and can be removed, by unscrewing, for cleaning. A petrol filter is incorporated in the banjo fitting connecting the petrol pipe to the carburetter, and the flow of fuel into the float chamber is controlled by a fuel needle seating in a brass bush, and operated by a lever which engages with the top of the float. Both the fuel needle and bush are accessible after the float cup, float and fuel needle operating lever have been removed.



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

WIRING DIAGRAM.

Drg. No. M.2825C

Villiers

The Power and the Heart of a fine machine

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