



**C12 INDUSTRIAL ENGINE  
WITH ELECTRONIC IGNITION**

**OPERATING  
AND SPARES  
HANDBOOK**

## **IMPORTANT NOTE**

All engines fitted with Electronic Ignition have a specification ending in 'E' ie C12-04-46E. For engines without this suffix, refer to previous handbooks which will have a cover which does not mention Electronic Ignition

## **Decarbonising**

The engine will need decarbonising at intervals of around 1000 operating hours according to the type of service the engine has to perform. If the engine "knocks" at normal loads but not when the load is reduced, it is usually an indication that there is an excess of carbon on the piston and the inside of the cylinder head. Loss of power and difficulty in starting are other indications.

## **Mechanical governor**

The governor is set before delivery to give the specified engine speed. An adjusting nut is fitted above the spring so that a different speed may be obtained when this is really necessary, but no adjustment can be made by altering the position of the lever on the shaft. Hunting at light load may occur due to stiffness in the joints of the carburettor links. These should always have free movement and the pivot pins can be adjusted to ensure this provided that the locknut is tightened up again. If hunting occurs when the joints are free the throttle adjusting screw should be screwed in so that the throttle does not quite close. Hunting may also be due to a weak carburettor setting.

## **To reset the lever after removal**

Fit the governor lever loosely on its shaft, connect up the carburettor link at each end and turn the shaft as far as possible in a clockwise direction. Move the lever to the right until the throttle is fully open and tighten the clamp bolt securely.

## **Cooling system**

To ensure adequate cooling it is important that the fin surfaces over the whole cylinder area are kept clean and free from foreign matter. The cooling air is drawn by the fan through a rotating or static gauze. The gauze must be kept free from grass cuttings, etc., or the air flow will be restricted and overheating result.

## **Oil leaks**

The outside of the engine should be kept clean. If oil leaks develop, check the tightness of the valve cover plate and the cylinder nuts and examine the oil level, which should not be appreciably higher than the "full" mark on the dipstick, where this is fitted. The breather valve can be removed and washed in paraffin to allow the ball to operate freely.

# MAINTENANCE AND REPAIRS

## Petrol filter

Occasional examination and cleaning of the filter gauzes is desirable. These are accessible by unscrewing the banjo bolt on the carburettor and the tap on the petrol tank. In the case of paraffin and vapourising-oil engines filters are also incorporated in the banjo fittings securing the two copper pipes to the tank.

## Sparking plug

Clean and reset the point gap to 0.8-0.9 mm. (0.30-0.035 in.) after each 200 hours' operation, adjustment being by moving the points attached to the outer body of the plug. NEVER BEND THE CENTRAL ELECTRODE. Keep the outside of the plug insulation clean and dry. Should any undue stiffness be experienced when screwing the plug into the cylinder head do not use force but examine the threads for particles of grit or carbon. These must be removed or the threads in the cylinder head will be damaged. It is a good plan to smear a little graphite grease on the plug threads before replacing.

## Electronic Ignition System

The inductive electronic ignition system fitted to Villiers engines has no moving parts, no contact breaker to adjust and is maintenance-free for the life of the unit.

Ignition timing is automatically set on assembly and cannot be adjusted.

The system will operate most effectively with a resistive plug and a non-resistive plug cover.

## Low Oil Alert

Some engines are fitted with a device which stops the engine in the event of the oil level falling too low (see page 16).

If such a device is fitted and the engine will not start, or stops when running, check sump oil level. Top up if required. The device automatically resets when oil is added to the correct level. The engine can then be started again.

# BOTTLED-GAS (PROPANE) ENGINES

The carburettor fitted to these engines does not possess a float, fuel needle, or choke.

Gas fed to the carburettor is regulated by pressure-reducing valve, and fuel controller. Low-pressure hose can be used to connect the reducing valve to the fuel controller, but high-pressure hose must be used between the reducing valve and the gas cylinder where these are not directly coupled.

The pressure-reducing valve feeds gas at low pressure to the fuel controller. Unless the engine is running or being turned over by hand the fuel controller automatically prevents gas passing to the carburettor, but a priming button is fitted, for starting purposes.

## Starting

Operate the ignition switch if fitted. Open the gas-cylinder valve one half turn, open stop valve on fuel controller (if fitted) and press the priming button on the cut-off valve for 2-3 seconds, immediately afterwards operating the starting device. Repeat priming and starting procedure if necessary.

## Stopping

Operate the ignition switch (if fitted) close stop valve on fuel controller (if fitted) and then close the gas-cylinder valve

IT IS MOST IMPORTANT THAT ALL UNIONS ARE GAS-TIGHT.

The only adjustments possible are to the slow-running mixture (when a slow-running facility is fitted) and to the throttle-stop screws. The screw regulating the slow-running mixture must be turned clockwise to weaken and anti-clockwise to richen—the opposite to the adjustment on petrol-driven engines.

# ROUTINE ATTENTION

## Oil level

Daily or after every eight running hours, the oil level in the engine sump must be checked and topped up as necessary with the recommended grade of oil. Do not remove the filler plug while the engine is running. Once a week remove the oil-level plug from the reduction-gear casing and top up with fresh oil as required. The engine must be level when checking and topping up.

## Changing the oil

After the first five hours and then after every 100 hours' operation, drain the oil from the sump by removing the small slotted plug fitted at the side and refill the sump with clean new oil of the correct grade. If this is not carried out at the proper intervals excessive wear will result.

## Air intake filter

Regular attention to the air filter is required, especially when the engine is operating under dusty conditions. It is important to see that the filter does not become choked, or the engine will overheat and the fuel consumption become excessive. If the engine runs better without the filter, then the filter needs cleaning, but the engine must on no account be allowed to operate for more than a momentary test period without a filter or serious damage will result. Directions for cleaning the filter are given on page 7.

## TECHNICAL DATA – C12 ENGINE

*Manufacturers:*

Villiers Ltd, Marston Road, Wolverhampton, England

Bore	55mm (2.165 in.)
Stroke	50mm (1.969 in.)
Capacity	119 c.c. (7.25 cu in.)
Power rating	2.5 b.h.p. @ 3,850 r.p.m.
Fuel-tank capacity	2.27 litre (½ gallon)
Sump capacity	0.57 litre (1 pint)
Tapet clearance (Cold)	.15/.25 mm. (.006/.010 in.)
Ignition system	Electronic
Sparking plug — petrol or LPG	Champion RL86C/Motorcraft AER 6
Sparking plug — paraffin	Champion RN8/Motorcraft AGR 5
Plug gap	0.8-0.9mm. (.030-.035 in.)
Weight	17 kilos
Ignition timing B.t.d.c	4.218 mm. 0.187 in. (33°)

### IMPORTANT

1. After putting a new engine into operation, users are strongly advised to make frequent checks of the oil level. Until the piston rings are fully bedded in, oil consumption may be slightly higher than normal.
2. In all communications regarding this engine, the engine type and the engine specification and serial numbers, stamped on the instruction plate on the cowling, must be given.
3. Every care has been taken in compiling this handbook but we reserve the right to make modifications which we consider necessary.

**PUBLISHED BY**

**VILLIERS LTD, MARSTON ROAD, WOLVERHAMPTON, ENGLAND**

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## INTRODUCTION

The engine referred to in this booklet is designed to operate on petrol, paraffin, vaporising oil or bottled gas and to drive a wide variety of machinery under the most adverse of conditions. Its reliability and quality of performance depend upon the simple maintenance outlined in this booklet being adhered to. For efficiency during operation it needs (i) a supply of clean fuel of the recommended grade; (ii) fresh, clean air; (iii) clean lubricating oil.

## INSTALLATION

Invariably the engine will be installed as the prime mover of a particular piece of machinery, but where an operator is building it into his own equipment the following advice should be followed.

The engine is "splash" lubricated from a "wet" sump and therefore, should be installed as level as possible, that is, with the cylinder vertical. Operation will be satisfactory up to 12 degrees of tilt in any direction, but this is the maximum safe limit. The engine must be securely bolted in position, using the base mounting points provided.

Wherever possible the mounting base should be common with the driven machinery, pulley drives being as close to the engine as possible to avoid overloading the crankshaft bearings.

Where practicable, the engine should be started with the drive disengaged. The exhaust system, if an extension is fitted, should be as short as possible and the spent gases must be directed away from the engine. In confined spaces the exhaust fumes must be ducted to the open air. Not only are exhaust gases TOXIC, but the engine must have cool, clean air to burn and for cooling purposes.

## LUBRICATION

Villiers Limited recommend the use of SAE 20W-50 oil in all temperatures.

## FUEL

### Petrol (gasolene)

Engines operating on petrol (gasolene) need regular 2 star grade. The fuel should be clean and free from water content. Fuel stored in tins should be poured into the tank through a fine-mesh filter. If the engine is only used at infrequent intervals or is to stand idle for several weeks, the petrol should be drained from the tank and the carburettor after use. Stale fuel creates starting difficulties.

### Kerosene (power paraffin)

Engines designed to run on Kerosene are fitted with a tank having 2 compartments, the smaller being for petrol and the larger for the operating fuel. The petrol should be regular 2 star, the Kerosene of 25 octane minimum but a higher octane rating is much preferred.

## TEMPORARY STORAGE

If the engine is not required for a considerable period, the following action should be taken to lessen the risk of corrosion.

1. Turn off the petrol tap while the engine is running in order to empty the carburettor.
2. Drain all fuel from the tank and replace the filler cap.
3. Remove the sparking plug and squirt a small amount of engine oil into the cylinder. Rotate the crankshaft a few times to cover the cylinder wall with a film of oil and replace the plug. Leave the engine with the piston on top dead centre with both valves closed.
4. Cover the engine and store in a dry place.

# OPERATING INSTRUCTIONS

## Before starting

With the engine level, fill the sump with the recommended grade of lubricating oil to the groove on the dipstick as indicated when the filler plug is screwed in. Top up before the lubricating-oil level drops below the end of the dipstick.

Reduction gearboxes, where fitted, must be filled to the level-plug orifice with lubricating oil.

Oil-bath air filters, where fitted, should be filled to the level indicated on the bowl.

## PETROL ENGINES

### Starting when the engine is cold

Open the petrol tap and close the choke by raising the small lever on the carburettor body to the horizontal position and switch on the ignition.

Wind the rope around the starting pulley in a clockwise direction, the knotted end being placed in the notch provided in the pulley, the knob at the other end being held in the hand. Give a brisk pull to rotate the engine, pulling the rope clear of the starting pulley.

After starting, open the choke gradually as the engine warms up. At extremely low temperatures the lighter grade of oil recommended should be used to enable the engine to rotate quickly enough to start and to ensure proper circulation of the oil.

Where a rewind starter is fitted pull the handle slowly until cylinder compression is felt then allow the rope to return into the starter and, with the free hand resting on the engine but well clear of the starter, give a brisk pull to start the engine. Do not allow the handle to snap back into place but control its return. As the engine warms up fully open the choke.

### Starting when the engine is hot

The same method is used for starting when the engine is still hot from a recent run, but it is not usually necessary to close the choke.

### Stopping

The engine can be stopped by operating the "ON/OFF" switch.

## KEROSENE (POWER PARAFFIN) ENGINES

### Starting

Engines designed to operate on Kerosene are started on petrol in the normal way, the fuel tap being switched to Kerosene when operating temperature is reached.

### Stopping

The engine can be stopped by operating the "ON/OFF" switch and, if the engine is hot enough, it can be restarted on the operating fuel, but if it is allowed to get cold, the fuel in the carburettor float chamber must be drained out by means of the drain plug and a start made on petrol as already described.

Under normal conditions the two-way cock should be switched to the petrol supply four or five minutes before the engine is stopped in order to use up the operating fuel in the float chamber and leave it full of petrol in readiness for the next cold start.



# CARBURETTOR MAINTENANCE

The engine will be fitted with a Villiers B10/2 carburettor. This will be correctly set before leaving the factory and adjustments should be made only when absolutely necessary.

## Flooding of carburettor

If flooding occurs, the petrol should be turned off and the bottom half of the body removed.

The fuel needle is attached to the float and the fuel-needle bush is screwed into the top half of the carburettor body. If the fuel bush or needle seating are damaged or worn they should be replaced. Care must be taken to see that the fuel needle is located freely in the seating at the top and in the guide at the base of the carburettor body.

When reassembling the carburettor take care that the joint washer is correctly fitted and that the fixing screws are securely tightened.

## Re-setting the pilot and slow-running adjusting screw

The main and pilot jets, which must be clear of obstruction and tight in their respective positions, are not adjustable. If the settings have been upset they can be reset as follows.

Turn the pilot adjuster screw lightly on to its seating and give approximately two complete turns in an anti-clockwise direction. Turn on the petrol, start the engine and allow it to warm up. With the pilot adjuster screw set in the position given above, the engine should run evenly both on and off load. If the engine "hunts" when off load, turn the pilot adjuster screw until even running is obtained. The screw should be given only a 1/4 turn at a time and the engine put on load momentarily between checks. If a slow-running control cable or lever is fitted, the throttle-stop screw should be adjusted to give a tick-over of approximately 1,000 r.p.m. with the engine off load and the control in the idling position. Should there be any tendency for the engine to fade when load is suddenly applied, turn the pilot adjuster screw in a clockwise direction to richen the mixture slightly.

## Fitting replacement parts

The choke, main jet and pilot jet sizes are selected to give the best results for each particular application. Either an oil-wetted wire mesh, an oil-bath, or a paper-element air filter is fitted according to the equipment manufacturer's requirements and it is important to fit the exact replacements should they eventually become necessary. Main and pilot jets have the calibration figure stamped on the head of the jet and the carburettor body bottom half, containing the float chamber and choke tube, has the part number cast into the body.

## Air intake filters

The carburettor will be fitted with either an oil-wetted wire-mesh air filter, an oil-bath unit or a dry type with a paper filter element.

The **oil-wetted air filter** should be removed from the carburettor, washed in petrol or paraffin and dipped in engine oil, the surplus being allowed to drain before refitting.

The **oil-bath air filter** should be serviced at regular intervals to ensure that the engine oil is maintained at the correct level and that an excess of sludge does not accumulate in the base of the filter cup, which requires washing out with petrol or paraffin and refilling to the level mark with engine oil. The filter element should be washed in petrol or paraffin and allowed to drain. It will be re-oiled automatically when the engine is started.

A **paper filter element** must on no account be wetted or oiled, but on removal should be briskly shaken to remove the dust. When refitting make sure the element is properly located so that no unfiltered air enters the engine. The element will need replacing when it is ingrained with dirt.

The frequency of filter cleaning will depend upon the conditions under which the engine operates. The oil-wetted air filter should be re-oiled before use if the engine has been standing for some time. If the engine runs rich, the filter requires cleaning. **Never allow the engine to operate with the air filter removed or serious damage to the engine will result.**

# FAULT FINDING GUIDE

The diagnosis and rectification of faults is simplified if investigation is carried out systematically as follows:

1. Check that there is sufficient fuel in the tank.
2. See that the fuel tap is turned on and that fuel is reaching the carburettor.
3. Make sure the ignition is switched on.
4. Check that the choke control operates correctly.
5. If engine is fitted with low oil alert, check oil level.
6. Rotate the engine to make sure there is no loss of compression. If there is, check for a sticking valve. The tappet clearance of the affected valve will be excessive. The valve must be removed and freed in its guide.
7. See that the breather hole in the filler cap is clear. If not the engine will run for a while and stop but will run perfectly with the filler cap removed.
8. Check that the carburettor is not flooding excessively. If it is check the fuel needle and seat.
9. Make sure that the pilot air-adjusting screw is correctly set as instructed in the chapter dealing with the carburettor.
10. Make sure there is a spark at the plug points and that the points are dry. If there are signs of unburnt fuel the trouble is probably electrical. Dry the plug and earth the body of the plug to the cylinder head. Rotate the engine briskly and check the spark.
11. If there is no spark, see if a spark can be induced between the end of the plug lead and the plug terminal by holding the end of the lead about  $\frac{1}{8}$  in. from the plug terminal and rotating the engine. If a spark occurs, clean and reset the plug gap to .8-.9 mm. (.030-.035 in.) or fit a new plug.
12. If the magneto is not sparking check the L.T. & H.T. lead for a short or a break inside the insulation. Renew if faulty.
13. If there is still no spark, replace electronic unit.
14. If when checked the plug is found to be dry, check that fuel is reaching the combustion chamber. Trace the flow to the carburettor by detaching the fuel pipe. If fuel is reaching the carburettor, clean the fuel needle, seat and jets. If fuel does not flow through the pipe check the filters and pipe for an obstruction.

If the engine starts reasonably well but lacks power, the cause may be due to loss of compression resulting from badly seating valves or worn piston rings. Worn piston rings will also cause heavy oil consumption and smoking. Any of the ignition or carburation faults previously described can cause loss of power or erratic running if they are not serious enough to stop the engine completely. Small industrial engines frequently operate under very adverse conditions and troubles can often be forestalled by careful storage when not in use. It is good practice to start the engine at intervals and run it up to working temperature. This helps to prevent condensation in the cylinder, sticking valves and fuel blockage due to 'gelling' in the pipes. Clean containers should always be used to store petrol and oil and the exterior of the engine should be kept clean at all times.

## REPLACEMENT PARTS

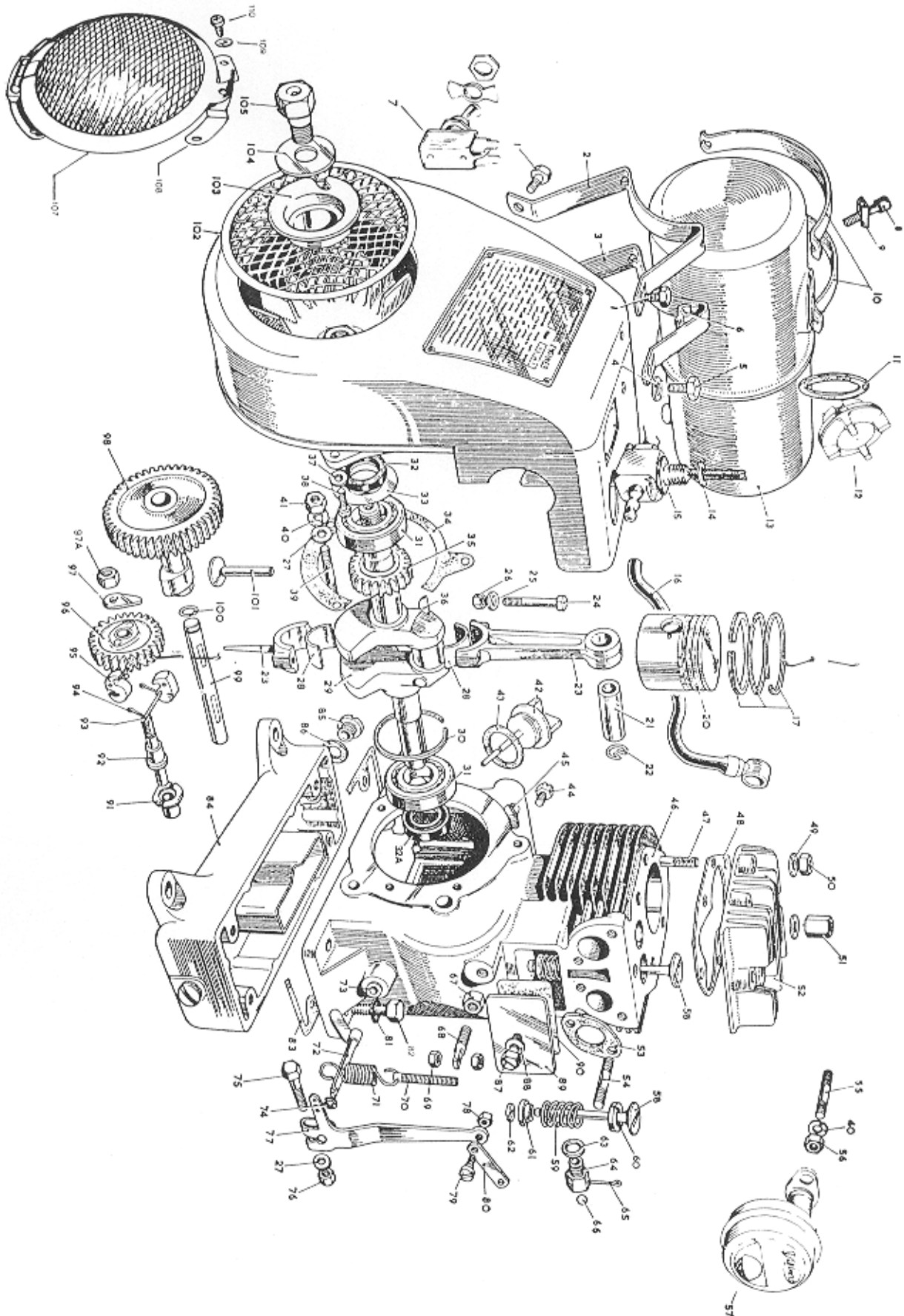
Use only replacement parts manufactured or approved by  
Villiers Ltd.

# REPLACEMENT PARTS

Always quote engine number when ordering replacement parts

## ENGINE

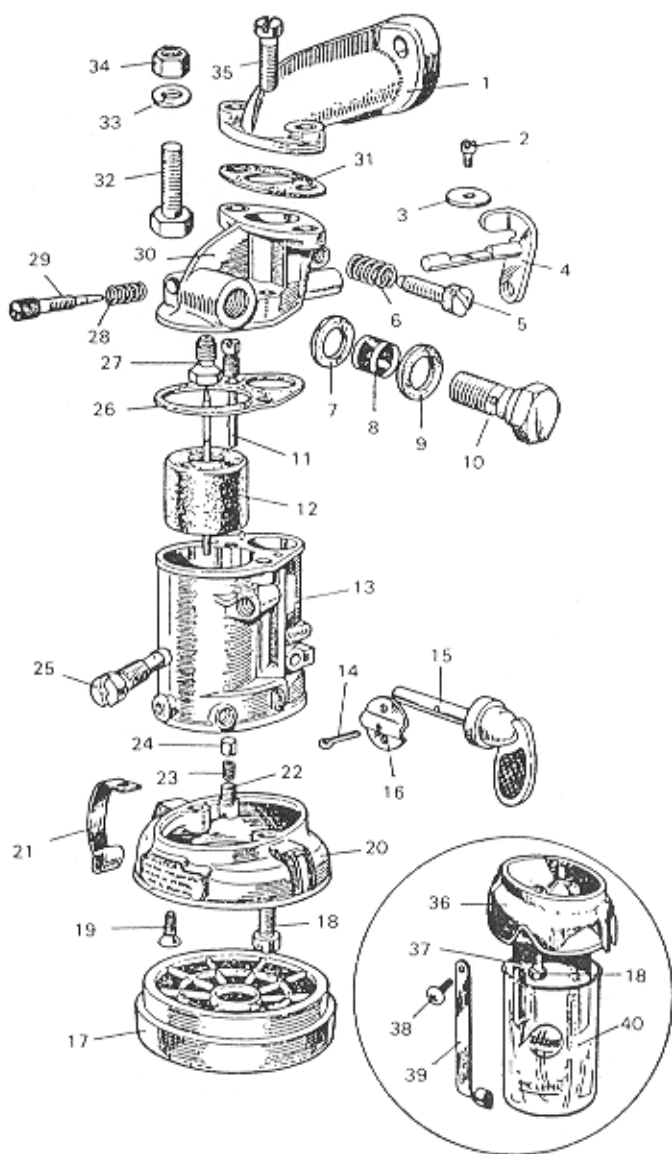
Illus. No.	Part No.	Description
1	EM539	Tank-bracket bolts (2)
2	DM1370	Tank-bracket (short)
3	DM1369	Tank-bracket (long)
4	E2667	Washer
5	EM1812	Tank-bracket bolt (top)
6	EG532	Trunnion — screwed (4)
7	40958	Ignition switch assembly
8	32271	Tank-strap screws (4)
9	86-4601	Trunnion — plain (4)
10	EM542	Tank-straps (2)
11	EM1870	Washer
12	31128	Petrol-tank cap
13	CM970	Petrol-tank with cap (CM705 — 1 gall. tank)
14	V107x4E	Washer (as required)
15	32352	Petrol tap
16	32411	Petrol pipe, 11"
—	32409	Petrol pipe, 12"
17		Piston Ring Set Standard
—		Piston Ring Set +0.020"
—		Piston Ring Set +0.030"
—		Piston Ring Set +0.040"
20	30987	Piston complete standard
or	30988	Piston complete +0.020"
or	30989	Piston complete +0.030"
or	30990	Piston complete +0.040"
21	30954	Gudgeon pin
22	30960	Gudgeon pin circlips (2)
23	30510	Connecting rod complete (including liners)
24	30567	Connecting rod bolts (2)
25	E2924	Washers (2)
26	31129	Nuts (2)
27	18315	Washers (5 crankcase and 1 governor lever)
28	EM913	Liners (standard) (1 pair)
or	EM2557	Liners (0.020" undersize) (1 pair)
29	DM910	Crankshaft (parallel with key way)
or	DM2519	Crankshaft (threaded pump)
or	30548	Crankshaft (6:1 reduction gear)
or	40085	Crankshaft (3:1 reduction gear)
—		For other shafts, quote engine specification
30	EM664	Circlip
31	28244	Ball Bearings (2)



Illus. No.	Part No.	Description
32	20940	Oil seal
32A	EM2675	Oil seal (with standard cylinder DM2699)
	or 20940	Oil seal (with reduction gear cylinder DM2486)
33	EM545	Ball bearing packing washer (as required)
34	DM530	Gasket
35	EM523/2	Timing-gear
36	18429	Timing-gear key
37	27758	Washers (2)
38	25933	Cowl/stator plate screws (2)
39	E4011	Stator plate/crankcase studs (5)
40	18320	Washers (5 crankcase and 4 manifolds)
41	E401	Nuts (5)
42	32331	Oil filler cap and dipstick
43	30097	Washer
44	E1962	Tank-bracket screw
45	EM220	Stator plate set screws
46	DM2699	Cylinder and crankcase (standard)
	or DM2486	Cylinder and crankcase (reduction gear)
47	EM1799	Cylinder-head studs (6)
48	31724	Cylinder-head gasket
49	FG186E	Washers
50	E364	Nuts (2)
51	EM1798	Pillar nuts (4)
52	BM2349	Cylinder head
53	EM202	Inlet and exhaust gaskets (2)
54	E4011	Inlet pipe studs (2)
55	FG185	Exhaust pipe studs (2)
56	E2539	Nuts (4)
57	60745	Silencer
58	EM929	Inlet and exhaust valves (2)
	or EM1363	Inlet and exhaust valves (.005" O/S stem) (2)
59	EM513/1	Valve springs (2)
60	25178	Valve-spring seats (top) (2)
61	EM514	Valve-spring seats (bottom) (2)
62	EM515	Valve collars (2)
63	H104x8E	Washer
64	31453	Breather valve assembly
65	16265	Split pin ( $\frac{1}{16}$ " x 1" )
66	EM2161	Breather-valve ball
67	26624	Nut
68	EM223	Governor adjuster anchor bolt
69	1002x15E	Adjuster locknuts (2)
70	E4869	Governor-spring adjuster
71	EM222	Governor spring (1,500 to 2,400 r.p.m.)
	or EM921	Governor spring (up to 1,500 r.p.m.)
	or EM547	Governor spring (over 2,400 r.p.m.)
72	EM2640	Governor crank
73	EM2109	Governor crank bush

Illus. No.	Part No.	Description
74	EM2038	Circlip
75	87-2810	Governor-lever bolt
76	26947	Nut
77	DM1883	Governor lever
or	29213	Governor lever (when paper air filter is fitted)
78	1004x5E	Nuts (2)
79	V626E	Pivot pin
80	EM194	Carburettor link
81	22528	Washers (4)
82	27839	Crankcase bolt (4)
83	DM2409	Crankcase gasket
84	BM2324	Base
85	E4104	Drain plugs (2)
86	26403	Washers (2)
87	EM2505	Cover plate bolt
88	V476E	Washer
89	EM597	Cover plate
90	EM533	Cover plate gasket
91	31351	Governor gear sleeve
92	EM1557	Governor gear spindle
93	32178	Governor weight pins (2)
94	30411	Split pins (2)
95	EM701	Governor weights (2) (or 32184)
96	30403	Governor gear
—	30406	Governor gear assembly complete
97	EM341	Governor spindle lockplate
97A	27815	Governor spindle lock-nut
98	DM507	Camshaft
99	EM521	Spindle
100	EM546	Circlip
101	32556	Tappets (2)
102	80402	Cowl
103	27420	Starter pulley with gauze (rope start)
—	EM2687	Starter pulley washer
—	27667	Shim
104	31599	Starter pulley bolt washer
105	31595	Starter pulley bolt
—	32450	Starter rope assembly
107	29471	Pulley guard
108	29470	Plate
109	27758	Washers (4)
110	25966	Screws (4)

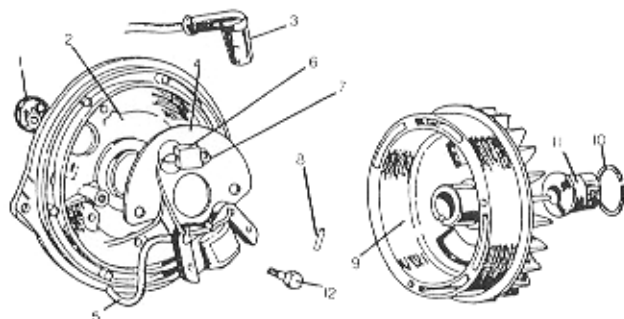
# VILLIERS B10/2 CARBURETTOR



Illus. No.	Part No.	Description
1	DM1882	Inlet pipe
2	V1241E	Throttle-plate screw
3	V1240E	Throttle plate
4	SA28025	Throttle lever and spindle
5	V1331E	Throttle-stop screw
6	V1332E	Throttle-stop screw spring
7	18317	Banjo washer (small)
8	V404E	Gauze filter
9	H104x8E	Banjo washer (large)
10	V382E	Banjo bolt
11	SA28017	Pilot jet with tube (35 c.c.)
12	32209	Float/Needle
13	41170	Body (bottom) $\frac{5}{8}$ " choke
or	41076	Body (bottom) $\frac{5}{8}$ " choke (Kerosene)
or	41077	Body (bottom) $\frac{1}{2}$ " choke
or	41078	Body (bottom) $\frac{1}{4}$ " choke
14	V1980E	Split pin
15	SA29336	Choke lever and spindle
16	31363	Choke plate
17	V1383D	Air filter (oil wetted)
18	31644	Filter-cover screws (2)
19	E11532	Clip screws (2)
20	V1344/1D	Filter cover
21	V1349/D	Filter cover clips (2)
22	V1302E	Screw
23	EM1166/1	Plunger spring
24	V1018E	Plunger
25	SAV1803E	Main jet (34 c.c.)
or	SAV1323E	Main jet (36 c.c.)
or	SAV1543E	Main jet (38 c.c.)
or	SAV1545E	Main jet (40 c.c.) Also Kerosene
26	V1353E	Body gasket
27	V1871E	Fuel needle valve seating
28	E4270	Spring
29	V885E	Pilot-jet adjusting screw
30	V1303C	Body (top half)
31	EM1919	Gasket
—	26593	Joint washer (Kerosene engines)
32	87-2810	Carburettor fixing bolts (2)
or	26644	Studs (2) (Kerosene engines)
33	E9722	Washers (2)
34	EM1565	Nuts (2)
35	31644	Carburettor body screws (2)
36	V1270/1C	Oil-bath air-filter cover
37	V1314D	Oil-bath filter element
38	27033	Clip screws (2)
39	V1729E	Filter clips (2)
40	V1272D	Filter cup
—	SA30436	Float-chamber drain screw (for Kerosene body)
—	41055/1	Control complete $\frac{7}{8}$ "
—	41055/3	Control complete 1"
—	41055/5	Control complete $\frac{3}{4}$ "
—	SA30418	Control complete Slow running
—	CM2450V	Cable with adjuster Quote Engine No.



# MAGNETO (ELECTRONIC IGNITION)



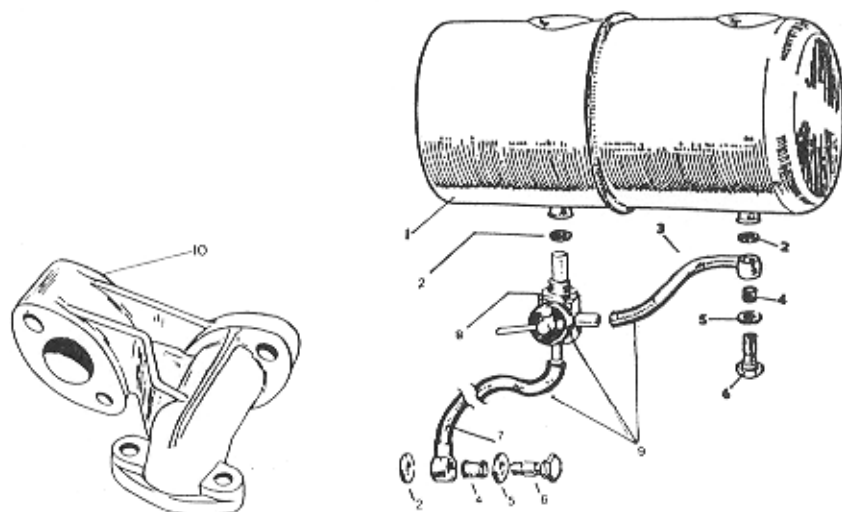
Illus. No.	Part No.	Description
1	32269	Grommet (switch & H.T. Leads)
2	60721	Back Plate
3	32667	Plug Cover - Non Suppressed
4	32864	Stator Plate Assy; With Coil Electronic Unit, (L.T. and Low Oil Alert Lead)
—	32882	As above but L.T. Lead only
—	32879	As above but Low Oil Switch Lead only
5	27390	H.T. Lead
6	32862	Electronic Ignition only
7	32865	Screw - Securing Electronic Unit
8	50095	Pin Timing
9	60783	Flywheel Assy
10	2641E	Flywheel Centre - Nut Circlip
11	3054	Flywheel Centre - Nut
12	32671/2	Stator Securing Screws
—	32199	Spark Plug (Petrol/L.P.G.)
—	32198	Spark Plug (Kerosene)
—	86-9200	Spark Plug (Screened ignition)

## LOW OIL ALERT (not illustrated)

Illus. No.	Part No.	Description
—	32899	Low oil alert assembly complete
—	32891	Earth lead assembly only
—	32887	L.T. lead assembly only
—	32894	Oil Alert mounting stud
—	9722	Washer
—	21865	Nut

{ recommended  
 assembly with  
 Loctite 638

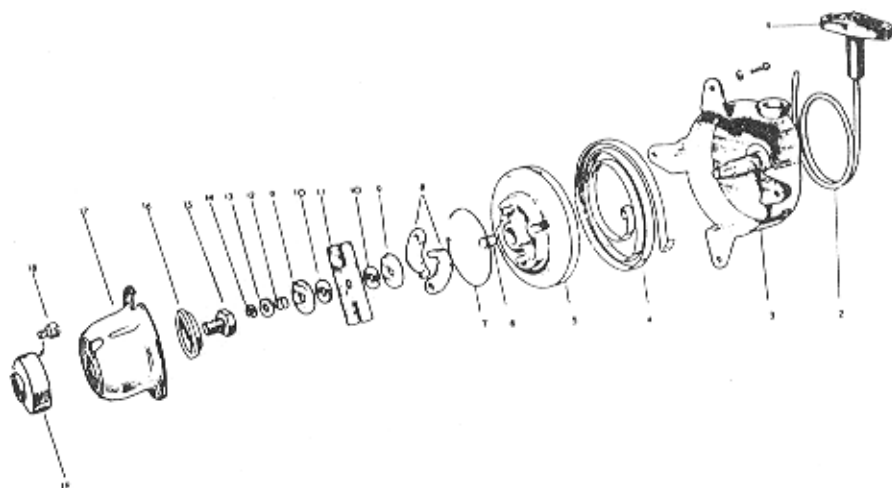
# KEROSENE (POWER PARAFFIN) ENGINES



Engines operating on Kerosene are fitted with the following additional and/or alternative parts:-

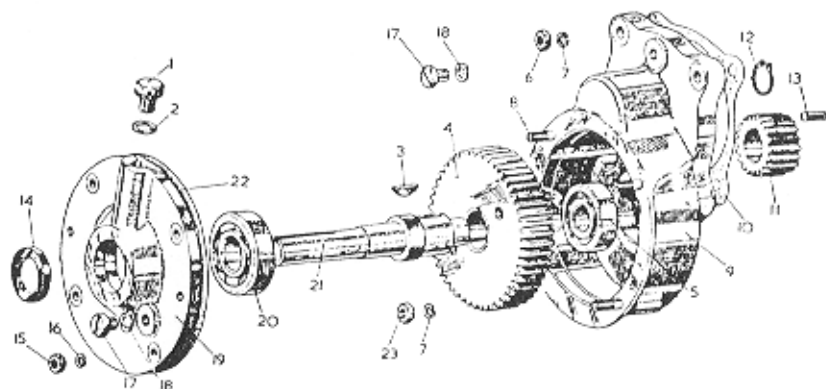
Illus. No.	Part No.	Description
—	41125/103	Carburettor complete
1	1023	Fuel tank
—	31128	Filler caps (2)
2	18317	Washers (2)
3	32221	Petrol pipe (short)
4	V404E	Gauze filters (2)
5	104x8	Washers (large hole) (2)
6	V382E	Banjo bolts (2)
7	32222	Fuel pipe (long)
8	32514	Three way tap
9	41272	Tap and pipe assembly
10	41383	Vaporiser
—	18315	Washers (4)
—	1120	Vaporiser stud (long) (2)
—	4011	Vaporiser stud (short) (2)
—	2539	Nut (4)
—	31724	Gasket
—	60700	Cylinder head
—	32198	Spark plug (Champion RN8, Motorcraft AGR 5)

# VILLIERS REWIND STARTER



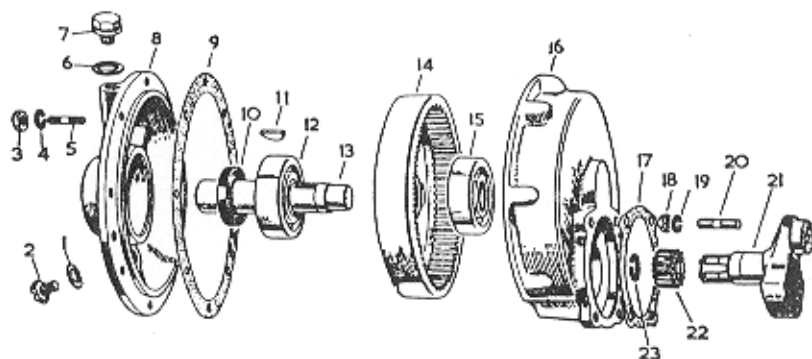
Illus. No.	Part No.	Description
—	60589	Rewind starter complete
—	31236	Fixing Screws (4)
—	27758	Washers (4)
1	30417	Starter handle
2	87-1758	Starter rope
3	41020	Starter housing assembly
4	87-1766	Rewind starter spring
5	87-1753	Starter pulley
6	87-1757	Rope retaining peg
7	87-1755	Retaining peg clip
8	87-1764	Starter pawls (2)
9	87-1760	Washers (2)
10	31268	Fibre washers (2)
11	87-1762	Friction plate
12	87-157	Friction spring
13	26076	Spring retaining washer
14	87-1759	Circlip
15	32235	Bolt
16	32234	Washer
17	41280	Cup
18	86-6566	Screw
19	32233	Distance Piece
—	32250	Screen

## 3:1 Reduction gear



Illus. No.	Part No.	Description
—	40085	Crankshaft
—	DM2486	Cylinder and crankcase
—	E2152	Crankcase/R.G. Casing studs (long)(2)
—	E8470	Crankcase/R.G. Casing studs (short)(2)
1	E5267	Oil-filler plug
2	V107 x 3E	Washer
3	EM1813	Woodruff key
4	DM2626	Output shaft gear
5	28318	Inner ball bearing ( $\frac{3}{8}$ " x $1\frac{1}{2}$ " x $\frac{3}{4}$ " )
6	E364	Gear-case retaining stud nuts (large)(2)
7	E1050	Washers (spring)(4)
8	E4011	Studs in gearcase securing end cover (4)
9	41157	Gear casing
10	DM814	Gasket
11	25636	Crankshaft input gear
12	21765	Circlip
13	EM793	Key
14	20940	Oil seal
15	E401	Nuts (4)
16	E1430	Washers (spring)(4)
17	F3742	Plugs (2)
18	22689	Washers (2)
19	41158	End cover
20	28244	Outer ball bearing ( $\frac{3}{4}$ " x $1\frac{1}{2}$ " x $\frac{3}{4}$ " )
21	DM772	Output shaft
22	31676	Gasket
23	E3961	Gear-case retaining stud nuts (small)(2)

## 6:1 Reduction gear



Illus. No.	Part No.	Description
—	DM2486	Cylinder and crankcase
1	22689	Oil-level plug washer
2	E1962	Oil-level plug
3	E401	Nuts (3/4") (8)
4	18320	Spring washers (8)
5	E4011	Studs in gearcase (8)
6	V107 x 3E	Oil-filler-plug washer
7	E5267	Oil-filler plug
8	CM1337	End cover
9	DM1343	End-cover gasket
10	20940	Oil seal
11	EM1813	Woodruff key
12	18346	Outer ball bearing (1" x 2 1/2" x 3/4")
13	DM1341	Output shaft
14	DM1338	Output shaft gear
15	28244	Inner ball bearing (3/4" x 1 1/8" x 3/16")
16	CM1336	Gear casing
17	DM814	Gasket
18	E364	Nuts (4)
19	22528	Washers (spring) (4)
20	E2152	Studs (4)
21	SA30548	Crankshaft with input gear
22	EM1342	Crankshaft input gear
23	EM1344	Circlip

# GUARANTEE

Subject to the conditions set out below, Villiers Ltd. ("Villiers") guarantees the Products manufactured by it against defects in materials or workmanship existing at the time of delivery, for a period of one year from the date of delivery to the first owner user:

- (a) The guarantee shall not apply in the case of a Product which has been hired out or leased in any manner or where defects have been caused by misuse, neglect, wear and tear or where the Product has been incorporated in equipment without Villiers' approval.
- (b) Villiers' liability under the guarantee shall not exceed the price of the product purchased by the consumer and Villiers shall not be liable for any loss, damage or injury consequential or otherwise beyond such price.
- (c) Any claim can only be considered if the defective part is sent to Villiers or to one of its distributors with a letter stating the Serial Number of the Product and the date and place of purchase.
- (d) The guarantee does not apply to Products to which any replacement part not made or supplied by Villiers has been fitted.

# EXCLUSION OF LIABILITY

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- (b) The express guarantee contained in the above Conditions is in place of all warranties and conditions, express or implied by common law statute or otherwise and such warranties and conditions are hereby expressly excluded, including without prejudice to the generality of the foregoing, any representation or warranty as to the performance of the Products and their fitness for any purpose contained in any leaflet, handbook, circular or catalogue.