



A15 INDUSTRIAL ENGINE
WITH ELECTRONIC IGNITION

OPERATING
AND SPARES
HANDBOOK

TECHNICAL DATA. A15 ENGINE

Manufacturers:

Villiers Ltd., Marston Road, Wolverhampton, England.

Bore	65 mm (2.559 in)
Stroke	44 mm (1.732 in)
Capacity	146 cc
Maximum Power	3.2 bhp @ 3400 rpm
Compression Ratio	6.4:1
Ignition Timing	1.62 mm (0.064 in) B.T.D.C. (20°)
Sparking Plug Gap	0.76 mm (0.030 in)
Sparking Plug Type	Champion RN12YC or RN14Y
Crankshaft End Float	0.05-0.15 mm (0.002-0.006 in)
Tappet Clearances	0.10-0.15 mm (0.004-0.006 in)
Sump Oil Capacity	400c.c. (0.7 pint)
Oil Grade	Above -9°C (16°F) Below -9°C (16°F)
Fuel Capacity	2.27 litre (4 pints)
Fuel Grade	2 Star Petrol
Dry Weight	14 kg (31 lb)

IMPORTANT

1. This handbook relates to engines with engine numbers above 3202. These engines incorporate electronic ignition and have a specification ending in "E" i.e. A15-02-03E. For engines without this suffix refer to previous handbook which will have a cover which does not mention electronic ignition.
2. 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.
3. In all communications regarding this engine, the type and the engine specification and serial numbers, stamped on the base or cowl, must be given.
4. 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

Telephone: (0902) 771431. Telex: 339810. Telegrams: Villiers, Wolverhampton

DESCRIPTION

Engine

The engine is a 4-stroke forced air cooled type with a single cylinder inclined 35 deg to the horizontal. The CI cylinder is pressed into the aluminium alloy one-piece cylinder/crankcase, as also are the valve guides and seats.

The crankshaft is a steel forging and the cylinder head is die-cast in aluminium alloy. The engine may be either governed or ungoverned.

Lubrication

The internal parts are lubricated by an oil mist which is generated by the camshaft gear rotating in an oil trough. Oil picked up by the gear teeth is ejected on meshing with the crankshaft gear. The resulting oil-mist is distributed throughout the crankcase via the air displaced by the reciprocating action of the piston.

CAUTION: The oil trough reflects the general oil level in the sump. It is imperative therefore that this level be maintained at all times.

Induction and Carburation

Air intake into the updraught carburettor is via a paper element air filter.

The **VILLIERS B10/1** carburettor is of orthodox design, reliable and efficient, requiring very little attention once set.

Electronic Ignition

The capacitor discharge electronic ignition system fitted to Villiers engines has no moving parts, no contact breaker points 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.

OPERATING PROCEDURES

Putting Into Service

The engine will have been drained and inhibited following its factory test run and before despatch. This involves injecting inhibiting oil into the cylinder through the plug hole and rotating the engine to coat the internal surfaces. The fuel tank is similarly treated. A cork is fitted into the plug hole.

TO REINSTATE THE ENGINE:

1. Stand the engine on a level surface and pour 400c.c. of oil (DO NOT OVERFILL) into the sump.
The oil should then register within the small circle 'o' below the bottom thread on the underside of dipstick — this is the maximum oil level.
The minimum oil level is shown by the oil just registering on the dipstick, between the end of the dipstick and the groove just above.
NOTE: All dipstick levels are to be observed after the dipstick has first been screwed home in the sump.
2. Remove the cork (or spark plug) and turn the crankshaft several times.
3. Check the plug is the correct type, is in good condition, and the gap is correct.
4. Clean the spark plug seating face (and plug sealing washer) and screw in the plug finger tight. Fit a plug spanner and tighten a further $\frac{1}{4}$ turn only. Alternatively, use a torque spanner and torque to 1.1 kg/m (8 lb/ft) max.
CAUTION: Overtightening can cause damage to the plug and interfere with the engine performance.
5. Fit the plug lead.
6. Fill the tank with 2-star petrol.
7. Read any instruction labels fitted to the engine or equipment.
The engine is now ready for starting.

PRE-START CHECKS

1. Sump oil is at correct level.
2. Sufficient fuel in tank.
3. Plug lead connected and secure.
4. Fuel tap **ON**.
5. Choke **CLOSED** for cold start i.e. lever horizontal.
6. Ignition switch **OFF**.
7. Engine mounted securely and on level surface.

COLD START

1. Gently pull the rewind starter handle to turn the engine onto compression. When compression is felt continue to turn until piston is just over TDC.
2. Allow the starter to rewind slowly.
3. Set the throttle $\frac{1}{4}$ **OPEN**.
4. Switch ignition **ON**.
5. Give a brisk pull on the starter handle.
6. Close the throttle as soon as the engine runs.
7. Progressively **OPEN** the choke as the engine warms. After a few minutes it should be fully **OPEN**.

WARNING: Exhaust fumes are highly toxic and can quickly **KILL**. If running the engine indoors the exhaust must be ducted outside and adequate ventilation provided.

NOTE: A new engine may emit some smoke initially due to the inhibitor oil burning off.

HOT START

Follow the same procedure as for cold start but do not operate the choke, leave it **OPEN** i.e. lever vertical.

SHUTTING DOWN

1. **CLOSE** the throttle fully.
2. Switch **OFF** the ignition.
3. Turn **OFF** the fuel tap.

STORING (LAYING UP)

1. Drain the carburettor. This can be done by turning the fuel tap **OFF** whilst the engine is running, until the engine stops.
Otherwise: a) Turn the fuel tap **OFF**.
b) Remove the fuel banjo from carburettor.
c) Remove the 2 body screws to release the carburettor. Drain it and replace.
2. Remove the fuel banjo from the carburettor.
3. Place a 2 $\frac{1}{4}$ litre ($\frac{1}{2}$ gallon) petrol storage can beneath the banjo and **OPEN** the fuel tap to drain the tank. (Unscrew the filler cap to assist draining).
WARNING: Petrol is highly volatile. Do not smoke or have naked lights near. Ensure adequate ventilation and proper storage facilities.
4. Refit banjo to carburettor body.
5. If the engine is to be stored in any position other than vertical, i.e. on its base, then the sump oil must be drained.
6. Remove the spark plug and squirt a few drops of inhibiting oil into the cylinder. Turn the engine over a few times and leave the piston TDC on compression stroke.
7. Replace the spark plug (finger tight plus $\frac{1}{4}$ turn).
8. Squirt a few shots of oil into the fuel tank and roll around if possible to coat the internal surface. Fit the filler cap.
9. Clean the engine and store in a dry place with a loose dust cover over.

ROUTINE MAINTENANCE

Oil Changing

This is best done immediately following shutdown, whilst the engine is still hot and the viscosity low.

1. Place a suitable $\frac{1}{2}$ litre or 1 pint receptacle beneath the drain plug.
2. Remove the filler plug to assist draining and remove the drain plug. If possible, wear protective gloves and tilt the engine towards the drain hole.
3. Replace the drain plug with its sealing washer. Do not overtighten; finger tight plus $\frac{1}{4}$ turn is adequate.
4. Pour in 400c.c. (0.7 pint) of new oil. The oil should then register within the small circle 'o' below the bottom thread on the underside of dipstick. This is the maximum oil level.
5. Replace filler plug and wipe off any spilled oil.

CARBURETTOR

Stripping and Inspecting

The carburettor is correctly set before leaving the factory and should not require adjustment unless it has been disturbed or tampered with. The only regular maintenance required is the occasional cleaning of the float chamber, the filter and the jets.

1. Turn the fuel tap **OFF**.
2. Remove the banjo bolt with its filter screen and two fibre washers.

WARNING Beware of naked lights or cigarettes. Petrol is highly volatile and some will be spilled on removal of the banjo.

3. Remove the two body bolts from the top of the carburettor whilst supporting the carburettor and remove the carburettor body. Safeguard the gasket.
4. Lift out the float, shake it and listen for fuel inside which would indicate a fracture. Examine the tapered end of the spindle for wear or distortion.
5. Remove the two screws securing the air inlet manifold to the body underside. Safeguard the gasket.
Check the air passage is not obstructed by dents or foreign bodies, and the drain gauze in the bottom is not blocked or broken.
6. Check the air filter element.
7. Unscrew the jet screws and blow these through with compressed air.

CAUTION: Do not poke anything into the jet orifice, it is a finely calibrated bore and is easily damaged. Clean only by air blast.

8. Wash out the float chamber using petrol or paraffin. Clean out any sediment from the well at the bottom and ensure there are no deposits in the float guide spindle housing.
9. Remove the top casting from engine. Safeguard the gasket.
10. Clean the passages by air blast, also the fuel inlet valve seat.
11. Check the butterfly valve for security on its spindle, for freedom of movement, and the functioning of the return spring.
12. Check for excessive play in the throttle spindle which could cause air leaks and interfere with the slow running capability of the engine.

Rebuilding, Fitting and Adjusting

1. Fit the top casting onto the engine inlet flange face with its gasket. Tighten screws evenly.
2. Fit the air filter/induction pipe assembly to the underside of the carburettor body with its gasket. Secure with 2 screws.
3. Gently place the float into the float chamber (tapered end of spindle uppermost).
4. Fit the gasket on top of the body and fit the body to the top casting. Secure with 2 screws pulled up evenly.
5. Check the fuel inlet filter gauze is not clogged or broken. Fit the banjo bolt with filter and 2 fibre washers and secure the banjo to the carburettor. Do not overtighten. (Finger tight plus $\frac{1}{4}$ turn maximum).
6. Connect the throttle linkage and set this to give a minimum of free movement from the closed position when the throttle control is opened.

Slow Running Adjustment

Before starting the cold engine:

1. Carry out the pre-start checks.
2. Screw in the mixture control screw until it just bottoms, then unscrew $1\frac{1}{2}$ turns.
3. Unscrew the throttle stop screw until the throttle butterfly is fully closed.
4. Start the engine.
5. Allow the engine to attain normal running temperature (approx 5 mins).
6. Close throttle and screw in throttle adjuster screw to give approx 900 rpm.
7. Screw the mixture adjusting screw in or out $\frac{1}{4}$ turn at a time only, to find the best slow running position, i.e. position that gives max revs.
8. Readjust slow running revs as required by turning the throttle stop screw.
9. If the engine fails to pick up properly when the throttle is opened up smartly, screw in the mixture screw a fraction to slightly richen the mixture.

FAULT FINDING GUIDE

The diagnosis and rectification of faults in an internal combustion engine 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. 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.
6. 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 filter cap removed.
7. Check that the carburettor is not flooding excessively. If it is check the fuel needle and seat.
8. Make sure that the pilot air-adjusting screw is correctly set as instructed in the chapter dealing with the carburettor.
9. Make sure there is a spark at the plug electrode. 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.
10. 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 $\frac{1}{4}$ in. from the plug terminal and rotating the engine. If a spark occurs, clean and reset the plug electrode gap or fit a new plug.
11. If the magneto is not sparking check the lead for a short or a break inside the insulation. Renew if faulty.
12. 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.

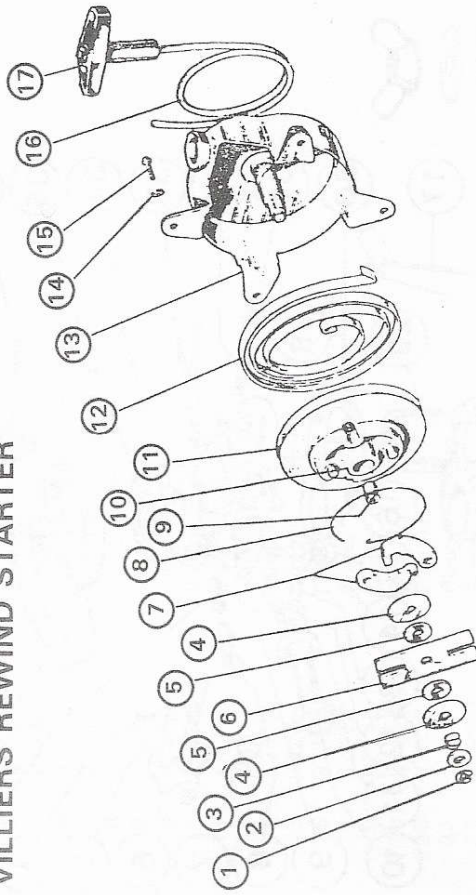
If the engine starts reasonably well but lacks power, the cause may be due to loss of compression resulting from badly seating valves or worn piston rings. Worn piston rings will also cause heavy oil consumption and smoking. Any of the ignition or carburation faults previously described can cause loss 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.

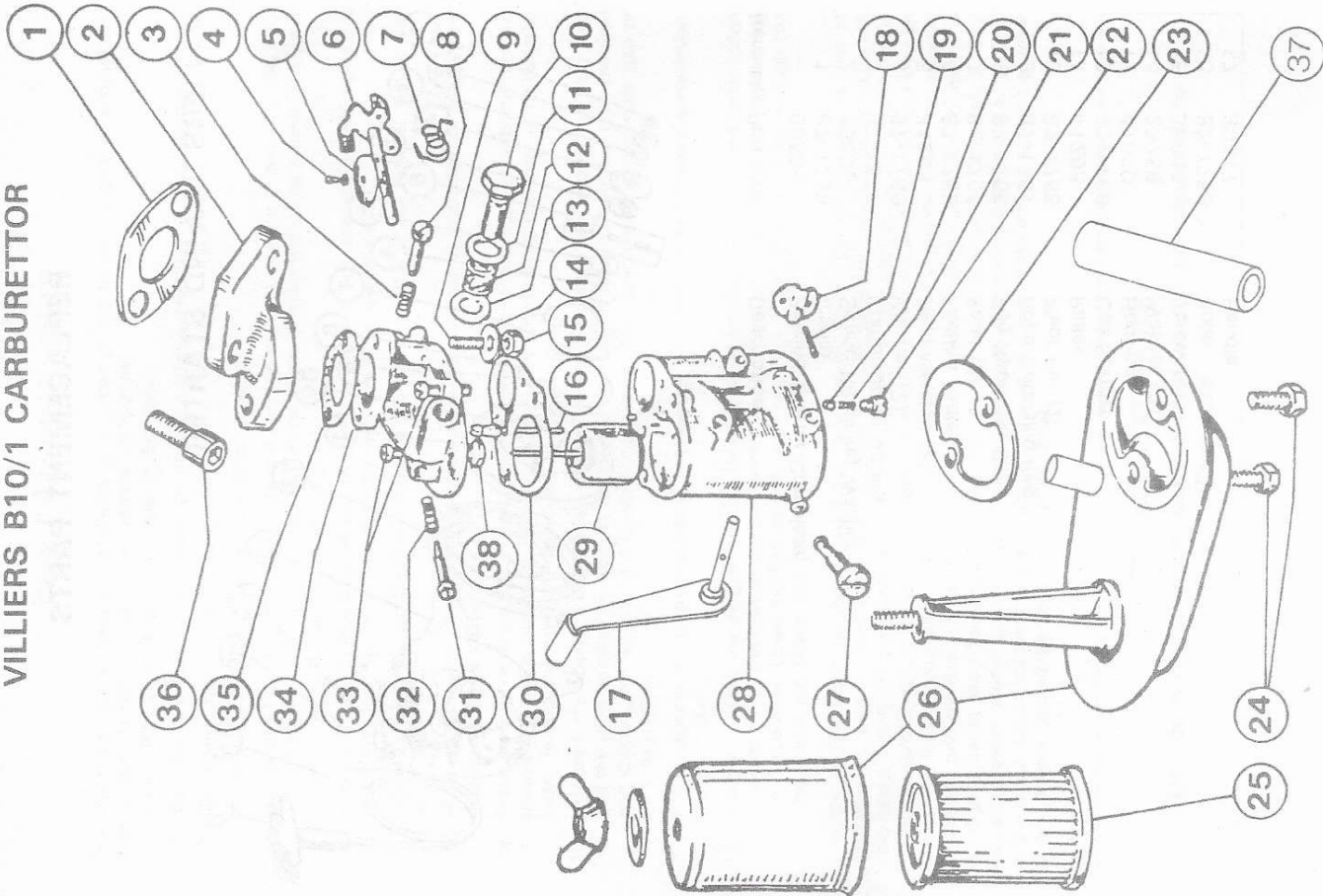
REPLACEMENT PARTS

VILLIERS REWIND STARTER



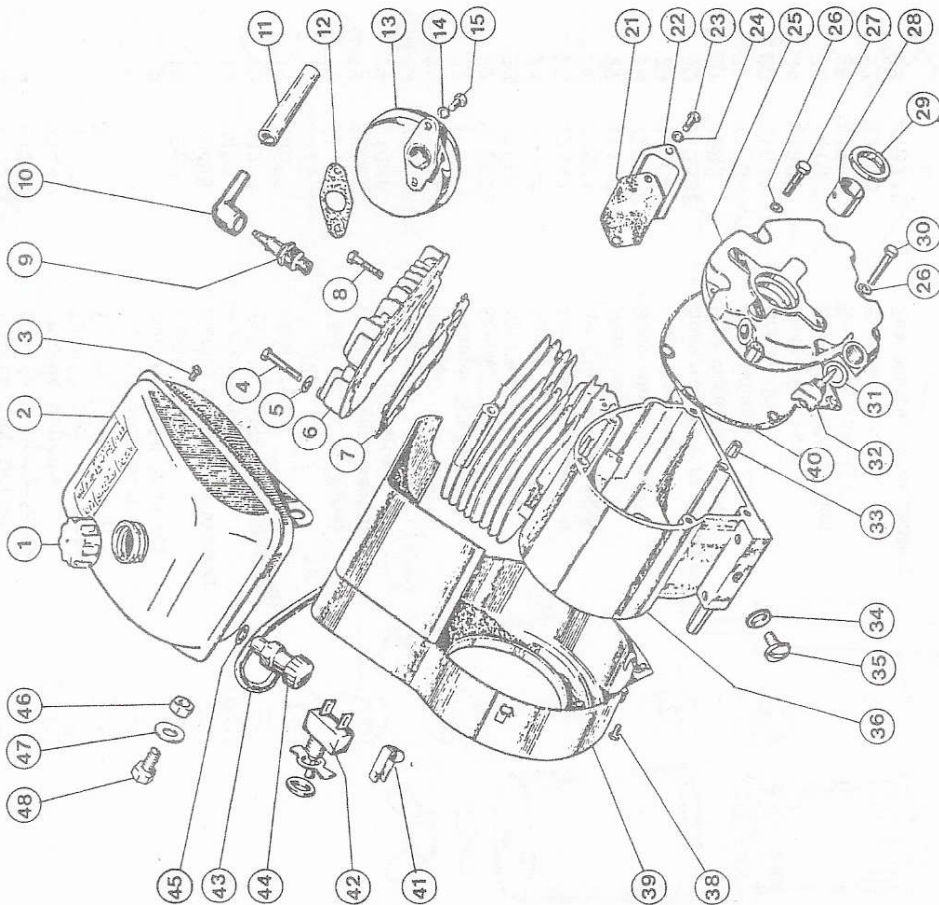
Item No.	Part No.	Description
—	60589	Rewind Starter Complete
1	87-1759	Circlip
2	26076	Spring Retaining Washer
3	87-157	Compression Spring
4	87-1760	Washer (2)
5	31268	Fibre Washer (2)
6	87-1762	Friction Plate
7	87-1764	Pawl (2)
8	87-1755	Peg Retaining Clip
9	87-1757	Rope Retaining Peg
10	87-1765	Pivot Pin (2)
11	41268	Pulley
12	87-1766	Coil Spring
13	41020	Housing
14	27758	Washer (4)
15	28048	Screw (4)
16	87-1758	Rope
17	30417	Handle

VILLIERS B10/1 CARBURETTOR



Item No.	Part No.	Description
1	87-1656	Inlet Manifold Gasket
2	32449	Inlet Manifold
3	V1332E	Throttle Stop Spring
4	V1241	Throttle Butterfly Screw
5	V1240	Throttle Butterfly
6	31207	Throttle Lever Assembly
7	32552	Throttle Lever Spring
8	31644	Throttle Stop Screw
9	1567	Inlet Manifold Stud (2)
10	V382	Banjo Bolt
11	104x8	Banjo Bolt Washer (Large)
12	V404	Banjo Bolt Gauze
13	18317	Banjo Bolt Washer (Small)
14	25592	Banjo Bolt Washer (2)
15	2926	Nut (2)
16	31127	Pilot Jet (With Tube)
17	32922	Choke Lever Assembly
18	V1246	Choke Butterfly
19	V111x2E	Split Pin
20	V1018	Plunger
21	1166/1	Plunger Spring
22	V1302E	Screw
23	32551	Air Cleaner Gasket
24	31644	Screw (2)
25	32547	Air Filter Element
26	60821	Air Cleaner Assembly
27	31126	Main Jet
28	V2075C	Body (Bottom Half)
29	32209	Float Assembly
30	V1353E	Body Top/Bottom Gasket
31	V885	Pilot Adjusting Screw
32	4270	Pilot Adjusting Spring
33	31644	Screw (2)
34	V1303	Body (Top Half)
35	1919	Body/Manifold Gasket
36	32399	Socket Screw (2)
37	32940	Breather Pipe
38	V1871E	Fuel Needle Valve Seating

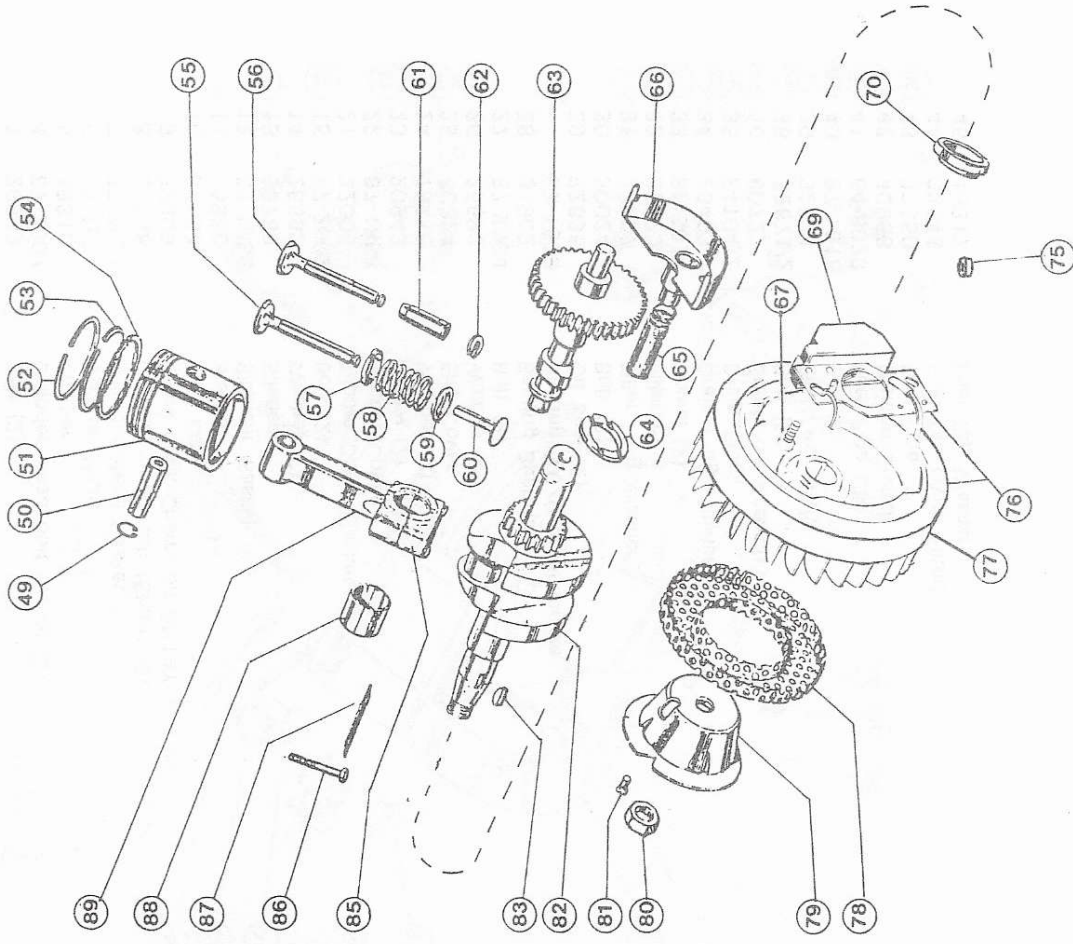
ENGINE COMPONENTS (EXTERNAL)



Replacement Parts Engine

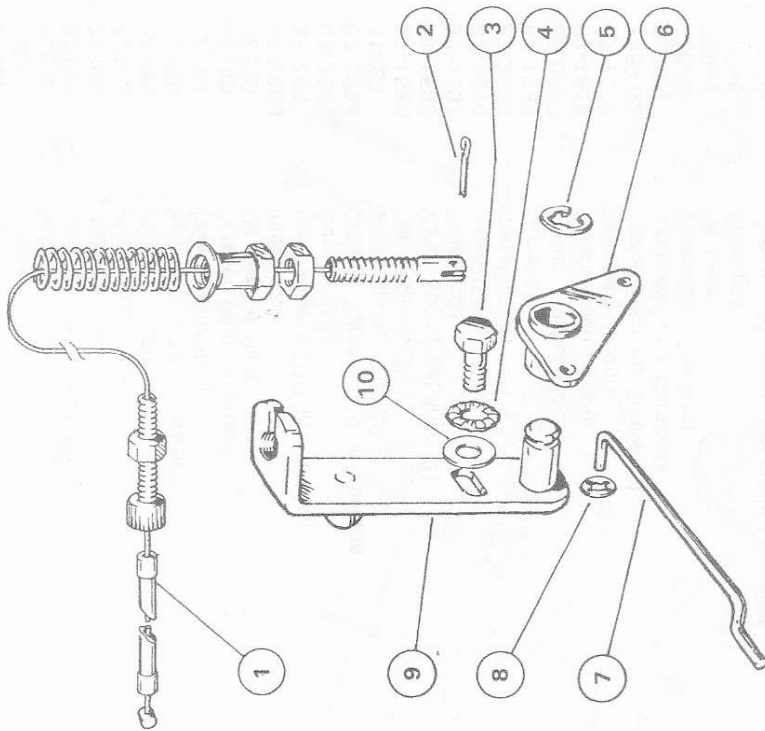
Item No.	Part No.	Description
1	30505	Filler Cap
2	87-1693	Fuel Tank
3	20943	Bolt (2)
4	87-2007	Cylinder Head Bolt (Long) (2)
5	18316	Washer
6	87-1575	Cylinder Head
7	87-2521	Cylinder Head Gasket
8	27836	Cylinder Head Bolt (Short) (6)
9	32309	Spark Plug, Champion RN14Y
10	32667	Plug Cap
11	25830	Sleeve
12	87-1656	Silencer Gasket
13	60769	Silencer
14	25592	Washer (2)
15	87-2002	Bolt (2)
21	32005	Tappet Cover Gasket
22	87-1858	Tappet Cover
23	20943	Screw (2)
24	18315	Washer (2)
25	60824	End Cover
26	25592	Washer (6)
27	87-2004	Bolt (4)
28	31902	Bearing Bush (2)
29	87-1529	Bearing 0.020 in Undersize
30	32635	Oil Seal (2)
31	30024	Bolt (2)
32	30097	Filler Plug Washer
33	32329	Filler Plug
34	66-3074	Dowel (2)
35	26403	Drain Plug Washer
36	E4104/2	Drain Plug
38	60722	Crankcase Assembly
39	32671/2	Bolt (2)
40	32534	Cowl Assembly
41	87-1616	Gasket
42	64-8023	Fuel Pipe Clip
43	40958	Ignition Switch
44	32550	Fuel Pipe
45	32548	Fuel Tap (With Filter)
46	18317	Fuel Tap Washer

ENGINE COMPONENTS (INTERNAL)



Item No.	Part No.	Description
46	21865	Nut
47	25592	Washer
48	25613	Bolt
49	32391	Gudgeon Pin Circlip (2)
50	32390	Gudgeon Pin
51	32392	Piston Assembly
52	32386	Piston +0.020 in oversize
53	32385	Piston +0.040 in oversize
54	32388	Compression Ring
55	32389	Scraper Ring (Stepped)
56	87-2859	Oil Control Ring
57	87-2861	Inlet Valve
58	87-2861	Inlet Valve 0.010 in oversize
59	87-2522	Exhaust Valve
60	87-2858	Exhaust Valve 0.010 in oversize
61	31600	Valve Spring Cup (2)
62	87-1580	Valve Spring (2)
63	87-1583	Valve Spring Retainer (2)
64	87-1581	Tappet (2)
65	87-1514	Valve Guide (2)
66	87-2526	Cotter (2)
67	87-1551	Camshaft
68	86-8807	Thrust Washer (2)
69	87-1619	Compression Spring
70	87-1618	Camshaft Trough
71	32671/2	Stator Securing Screw (2)
72	41401	Electronic Unit Complete
73	32663	Stator Locating Ring
74	32557	HT Lead
75	30746	Grommet
76	32824	Flywheel Magneto Assembly Complete
77	41405	Flywheel
78	87-1655	Rotating Screen
79	87-1659	Pulley
80	87-2100	Flywheel Securing Nut
81	86-6566	Pulley Locating Screw
82		Crankshaft (Quote Engine No.)
83	86-4555	Key
84	87-1563	Connecting Rod Cap
85	87-1564	Connecting Rod Bolt (2)
86	87-1564	Tab Washer
87	87-1565	Bearing Half (2)
88	86-2552	Connecting Rod
89	87-1562	Connecting Rod

PROGRESSIVE THROTTLE LINKAGE



Item No.	Part No.	Description
1	32549	Throttle Cable Assembly
2	13180	Split Pin
3	3186/1	Bolt
4	E9722	Washer Fan Disc
5	87-1759	Circlip
6	32528	Bellcrank Lever
7	32530	Throttle Link
8	32538	'Starlock' Washer
9	32533	Bracket Assembly
10	18315	Washer Heavy Plain

MECHANICAL GOVERNOR (where fitted)

Where a mechanical governor is fitted, the cowl, end cover, camshaft, trough and silencer are different. In addition, the carburettor has a larger choke. When ordering replacement parts for the carburettor, all items are the same as those shown on page 8 except that item no. 16, pilot jet 31127 is replaced by 28017; item no. 27, main jet 31126 is replaced by V1545 and item no. 28, body is replaced by 41077.

The following parts replace those shown in the preceding lists.

Cowl Assembly	32756
End Cover	41414
Camshaft	87-1550
Trough	32751
Silencer	60745
Tappet Cover	32747
Breather Pipe	32749

The following additional parts are also found in the governed version of the A15 engine.

Weights (4 off)	87-1682
Thrust Plate	87-1677
Control Arm	32767
Washer (2 off)	18315
Split Pin	13180
Governor Lever	32755
Bolt	87-2810
Nut	26947
Washer	18315
Spring for Governor	32754
Throttle Rod	32753
Fibre Washer	1990
Adjusting Knob	25917
Link for Carburettor	32752

GUARANTEE

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.

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.

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.

The guarantee does not apply to Products to which any replacement part not made or supplied by Villiers has been fitted.

JUNE 1986

VILLIERS LIMITED
WOLVERHAMPTON
ENGLAND