

# WORK ON THE VILLIERS ENGINE

## Decarbonizing Britain's Latest Moped Power Unit

**SIMPLICITY** of maintenance was one of the points carefully borne in mind by the Villiers designers when laying down the lines of the new Villiers Mark 3K two-stroke engine unit, which is Britain's latest contribution to the moped field. Thus decarbonizing can be carried out with no more fuss than the undoing of half a dozen nuts and bolts, and without disturbing the engine at all.

In this up-to-the-minute design, Unified threads are used at certain points. A Unified nut can be identified easily, for it has a double circle stamped upon it, usually on one of the flats. It is essential, of course, that you have the proper tools to fit these.

### Decarbonizing Equipment

For decarbonizing you will need a half-inch a/f box spanner; a 14-mm. plug spanner; the special Villiers C-spanner for unscrewing the slotted exhaust ring; a spanner to fit the lower bolt of the rear silencer support clip; and a screwdriver with which to free the silencer internals. A pair of pliers; a scraper; and some clean, non-fluffy rag are the only other items you will need, but before commencing work it will be as well to purchase from your dealer a spare gasket for the exhaust pipe/exhaust port joint.

Currently, two machines employ the Villiers engine — the Norman "Nippy" and the Norman "Lido." On the "Nippy" the engine is open, and work can commence on it straight away. On the "Lido," on the other hand, the front engine cowling will have to be removed to give access to the unit.

This is done quite simply by removing the top set-screw, and then the front screws on the left- and right-hand side panels. This done, it is a simple matter to ease the cowling away from the machine, thus baring the engine.

Before you begin to dismantle your unit, use paraffin and a stiff brush to clean away all road dirt on the outside of the unit — not forgetting to brush the cooling fins as well. Then detach the H.T. lead, and remove the sparking plug.

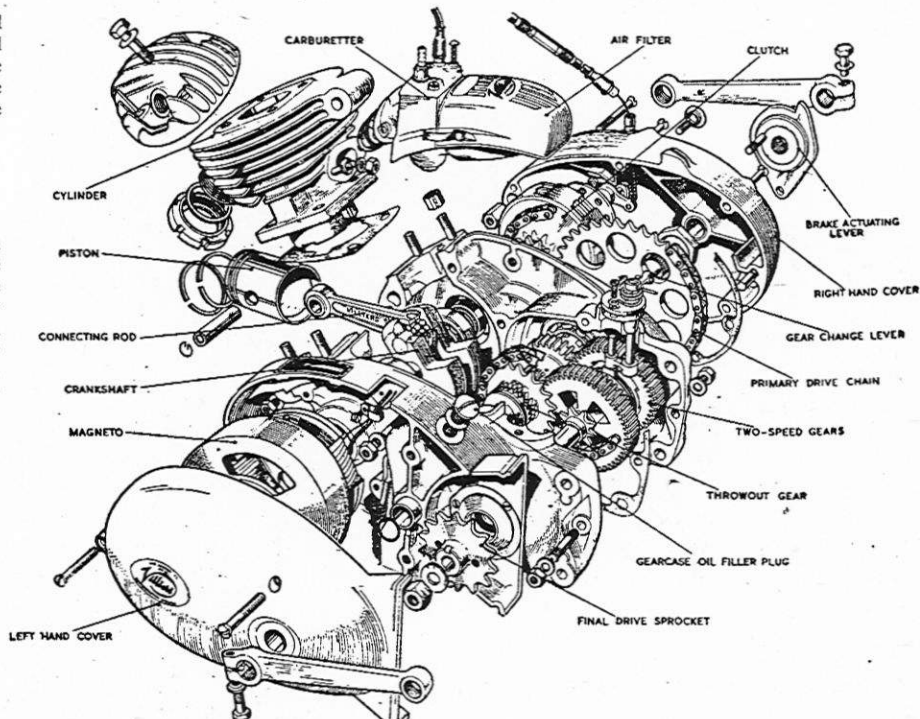
### Exhaust System

Next, engage the prong of the C-spanner into one of the slots on the exhaust ring, and gently tap the end of the spanner to free the thread. Then unscrew the ring, and allow the exhaust pipe to droop. Now undo the lower bolt on the rear silencer clip, and you will be able to lift the complete exhaust system away from the machine.

Using a half-inch box spanner undo the four bolts which secure the cylinder head to the barrel, placing them and their washers on the bench. Do this in such a way that when you come to re-assemble the unit you are able to replace each bolt in the hole from which it originally came.

Engage the gear, and turn the rear wheel to bring the top of the piston into its lowest position in the bore . . . just below the exhaust port. This will enable you to remove all

carbon from the port, working with the scraper from the exhaust pipe end of the stub. If you are careful you will find that very little in the way of chippings enter the cylinder. Those that do can be blown out with a tyre pump, or washed away with clean petrol. When you have finished work on the port, draw a piece of rag through it to clean it, and then turn



The working parts of the Villiers unit can be seen in this factory-prepared drawing, which will assist you when decarbonizing your engine.

the wheel until the piston is right at the top of the bore.

Now you can get busy on the piston crown, cleaning all the carbon away from it, and wiping it clean with a petrol-soaked rag when you have finished. It but remains to deal similarly with the inside of the cylinder head and the job, so far as the engine itself is concerned, is completed.

There remains the highly important exhaust system, however. To clean this it is necessary to remove the internals, and this is done by first removing the small screw which you will find at the extreme rear end of the silencer body. The internals can then be gripped with a pair of pliers, and drawn clear of the body. This done, wash them in petrol, paraffin or detergent, and scrub them vigorously with a stiff wire brush to clear away all excess carbon. You will usually find that the type of carbon which forms in the relatively cool silencer is of a soft type, which can be dealt with quite easily.

A harder variety may, however, form in the initial bend of the exhaust pipe, and it may be necessary to pull an old chain through the pipe to clear a heavy deposit here. You should

be able to tell by inspection what the condition of the pipe is like.

When all the components have been cleaned and are ready, refit the head, taking each head bolt up to finger tightness in turn. Then work from the front left to the rear right and the front right to the rear left, tightening each half a turn at a time until all are fully home. Never tighten down each bolt completely while the others are loose, or there is a real risk of distorting the cylinder head, and thus causing a loss of compression and of power.

Next, re-assemble the silencer, and when the internals are locked home loosely fit the exhaust system by means of the single rear bolt. This should not, however, be fully tightened at this stage. Using the new gasket which you have bought, slide the exhaust ring back into contact with the threads of the stub, and tighten it up by hand as far as it will go.

Then use the C-spanner for the final tightening. You can, if you wish, tap the end of the spanner gently with a hammer to lock the ring in place, but don't overdo this, or you may easily damage either the threads or the stub itself.

Tighten the rear silencer bolt, and clean the sparking plug. Gap it to between 0.018 and 0.022-in., refit it, and reconnect the H.T. lead. Your Villiers engine will now give anything from 1,500 to 3,000 miles service before the job need be done again.

### MAINTENANCE HINTS

**ON** machines on which the spark is weak, the fault may be traced to the use of a suppressor in the ignition lead. The extra resistance is, if the magneto is not on top line, sufficient to cause trouble.

**WHEN** replacing nuts and bolts, it is a good idea to smear them lightly with a medium grease. This will prevent the threads rusting, and make them easier to remove next time.

# MORE VILLIERS MAINTENANCE

## Care of the Magneto, Carburetter, Clutch and Gearbox

**RELIABILITY** has long been a Villiers watchword, and it is significant that the manufacturers of this new engine confidently assert that work on the flywheel magneto-generator will be confined to cleaning and adjusting the points, and that this will have to be done only once in 2,000 miles.

Reaching the magneto entails removal of the left-hand engine casing. To do this, you must first loosen the small clamping bolt which locks the left-hand pedal crank to its splines, and draw the crank off the shaft. Then undo the three screws holding the case, and pull this off, thereby leaving the magneto completely exposed.

### Clean Points

You will see that the flywheel has apertures pierced in its face, through which the contact-breaker points can clearly be seen. Revolve the flywheel until they are observed to be fully open, and then clean them by inserting a thin metal blade around which is folded a petrol-soaked rag. Pure petrol should be used, not petrol, for when the petrol evaporated the result would be a film of oil left on the points, with consequent failure of the spark!

When the points are clean (this can be checked by inserting a clean slip of cardboard between them, and closing them on to it: any dirt will then mark the cardboard) insert a feeler gauge and verify the gap. It should be no less than .012 and no more than .015in. Should adjustment be required, slacken by one-eighth of a turn the screw which clamps the bracket of the points to the back-plate, and then rotate the smaller adjuster screw, contained in the slot in the bracket, until the gap is correct. Turning it to the right will increase the gap; to the left, decrease. When the gap is between the stated limits, tighten the clamping screw, and when this has been done recheck the points to ensure that you did not inadvertently move them when tightening the screw.

### Sealing Technique

Now the cover can be replaced. There is a special technique for reseating the rubber sealing ring on the pedal shaft. This must be inserted into the housing first, and then carefully worked over the shaft with the cover. When the cover is in place lock it up, and then replace the pedal crank.

Providing that periodic attention is given to cleaning the fuel filters; to cleaning and re-wetting the air filter; and to occasional checking of the main jet, there is little reason why the carburetter need ever be removed! Two filters are fitted to the fuel line. One is contained in the banjo connection on the carburetter; the other is in the petrol tap itself. Of the two, the banjo's filter is the one most likely to be fouled, and this should be removed occasionally and washed clean.

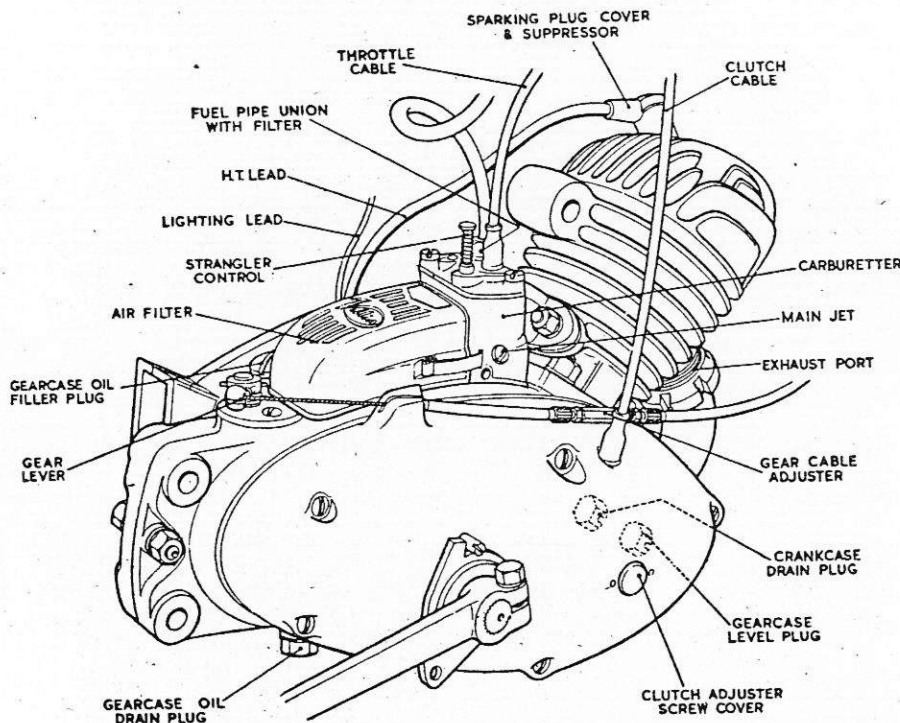
Air filter cleaning is simple. The filter is held to the carburetter by spring clips, one on each side. If these are prised open the filter can be removed bodily. Invert it, and you will observe a Vee-shaped plastic drain plug which closes a pair of drain holes in the

bottom of the casing. This should be removed, and the entire filter unit submerged in pure petrol, and swilled out. Allow a few minutes for it to drain, and then dip the entire unit into fresh petrol mixture. Wipe the outside of the filter clean, press the plastic plug into place, check that the rubber ring which forms a seal between the filter and the mouth of the carburetter is in place, and refit the filter. This, again, is a "once in 2,000 miles" job.

If jet blockage is suspected, it is a simple job to clean the main jet, since a side-mounting design has been adopted. Simply unscrew the jet, and remove it for inspection. Any

in the right-hand case which covers the clutch-adjusting screw. Turn this screw slowly to the right, testing meantime with the pedals, until the pedals can just slip without rotating the engine crankshaft. When this stage is reached, tighten up the cable adjuster to remove all the play, and then rotate the clutch-adjusting screw one quarter of a turn to the left. The internal cam is now correctly set, and the plug can be replaced, and between 1/16 and 1/8-in. free play on the lever allowed for by slightly loosening the clutch cable adjuster. All future adjustments can now be made on this. Naturally, the cam adjustment will be correct when the machine leaves the factory, and thus initial adjustments, also, can be made on the clutch cable alone. If the clutch is disturbed, or a new cable fitted, however, the full procedure, as just described, will have to be adopted.

Every 1,000 miles it will be necessary to drain off the oil in the gearbox and refill it with fresh S.A.E. 30 oil. This is done by re-



dirt can be cleared by blowing through it, and the channels in the carburetter can be flushed out by switching on the petrol with the jet removed.

### Gear Adjustment

Gear adjustment is by means of an adjuster built into the cable. Top gear is engaged when the spring is pulling the arm to the rear and the cable is slack, and consequently there should be just a perceptible up and down play in the cable when top gear is being used. To adjust the setting, engage top gear, and loosen the lock-nut on the adjuster. Then screw it in or out until the desired play is achieved, locking the nut home again to secure it.

Clutch adjustments, on the other hand, must be made with the engine in neutral. Slacken off the clutch cable by means of its inbuilt adjuster, and then remove the plug

moving the drain plug beneath the rear of the gearbox, and opening up the filler plug on the top of the case. When all the oil has drained away—it will help if the engine is run to warm it up before the job is started—unscrew the level plug on the right hand side of the engine, at the front (not the left-hand plug, which is for the crankcase) and replace the bottom drain plug. It will take about 15 minutes for all the oil to drain out.

Now pour in fresh oil until it begins to ooze from the level hole, and then replace the level plug and the filler plug. Every 500 miles the level plug should be removed and the oil level verified. If no oil comes out, the level must be topped up. When verifying the oil level the filler plug must always be removed, and the machine should invariably be stood on level ground.

Given regular maintenance to the extent described in this series of articles, your Villiers engine will ask nothing more in the way of servicing for many thousands of miles.



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