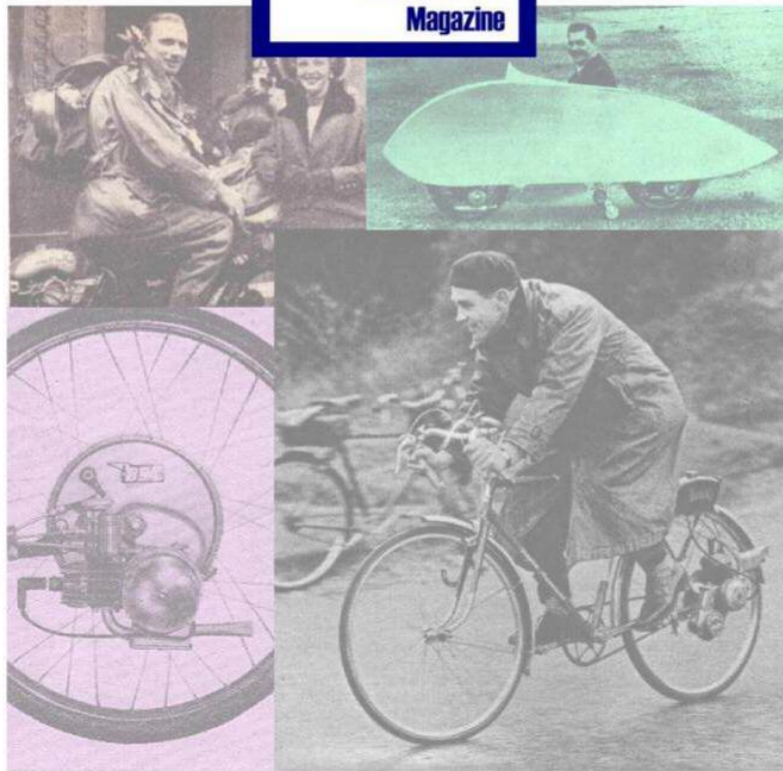


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INSTRUCTIONS
for
FITTING and MAINTENANCE
OF THE

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ETW 666

VINCENT

Firefly

ALL-WEATHER CYCLE MOTOR



VINCENT ENGINEERS (STEVENAGE) LTD.
STEVENAGE :: HERTS :: ENGLAND

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INTRODUCTION

Before fitting the "Firefly" it is advisable to ensure that the bicycle is in sound general condition, particularly as regards tyres and brakes. On bicycles fitted with a bottom bracket stirrup brake the operating rod, stirrup, etc., must be removed and the use of the "Phillips" cable rear brake set No. 410 is recommended. The "Firefly" will, of course, repay regular attention to lubrication and adjustment of the bicycle by greater fuel economy and better performance. Removal of oilbath chaincases from cycles is recommended to facilitate access to the engine for maintenance.

FITTING

See Fig. 1.

(1) Remove the left-hand pedal crank from the cycle, and if the machine is fitted with a narrow bottom bracket spindle an adaptor is available from the dealer who supplied the "Firefly". This adaptor is fitted as illustrated enabling the crank to clear the motor. Shorten the cycle rear mudguard if necessary.

(2) Fit the lower frame clamp loosely to the cycle front down tube.

(3) Assemble the front lugs of the suspension unit to the lower frame clamp, placing two of the four locating washers provided on the left-hand side of the clamp. At this stage the retaining bolt should be finger tight only.

(4) Remove securing nut from the retaining bolt at rear of the suspension unit clamp assembly and remove the top clamp plate. Ensure that the alignment plate is correctly positioned (this is clearly marked with the word "Front") and that the cradles are so arranged that the cut-aways provided clear the frame lugs. Swing the rear end of the suspension unit upwards, with the retaining bolt passing between the chain stays of the cycle. Fit the top clamp plate so that the offset hole for the retaining bolt is to the left of the cycle, viewed by rider astride. Fit securing nut, washer, and partly tighten.

(5) Lightly oil the suspension rubbers and slide the engine into position from the front to the rear, after removal of the small screw in the left-hand front slide. The engine should move smoothly in the slides. Remove engine from suspension unit.

(6) The roller engaging lever is passed between cycle wheel and left-hand chain stay, and after suitably arranging the cable, ensuring there are no sharp bends, fix the lever to the left-hand side of the handlebar. On some cycles it is better to lead the cable along the outside of the chain stay.

(7) Remove left-hand wheel spindle nut and mount the rear end of the pull bar unit; omit washer if necessary. Replace wheel nut and partly tighten. Refit engine to slides, replace small screw in left-hand slide, and attach the front end of the pull bar unit using the slotted link pin secured by a split pin.

(8) Adjustments to the position of the suspension unit and depth of roller engagement should now be made ensuring that :—

- (i) Engine position laterally allows a minimum of $\frac{1}{8}$ " (3.17 mm.) between gear case and tyre.
- (ii) When roller is disengaged there is a minimum clearance of $\frac{1}{8}$ " between roller and tyre.
- (iii) When roller is engaged it compresses the tyre tread to a depth of $\frac{3}{16}$ " (4.76 mm.).

As various makes of bicycles have slight dimensional differences the exact procedure for adjustment will vary slightly. There are, however, three points only at which adjustment can be made :—

- (a) The height of the front of the engine.
- (b) The lateral position of the engine.
- (c) The length of the adjuster on the pull bar unit.

(a) can be adjusted by raising or lowering the lower frame clamp on the cycle down tube. Raising the clamp withdraws the roller from the tyre and lowering the clamp moves the roller towards the tyre.

(b) The lateral position of the engine is controlled at the front by locating washers referred to in paragraph 3 and at the rear by sliding the alignment plate on the cradles. Displacement of the locating washers may be necessary.

(c) Having adjusted the roller position roughly by (a) and (b), turn the adjusting sleeve to obtain the correct depth of roller engagement with the tyre tread.

(9) Fit the top frame clamp to the upper lug of the petrol tank with the bolt provided, temporarily removing the lower half of the clamp, and fit the adjustable lower tank lugs to the bottom frame clamp. Fit the top clamp to the frame down tube and tighten. The coil can be rotated in its housing if the high tension terminal tends to foul the frame down tube. An extra clamp is included to raise the tank if necessary, independent of the engine.

(10) Connect petrol hose to fuel tap.

(11) Attach high tension lead to sparking plug. Attach the wire with the red tab to the coil terminal marked "SW"; attach the other wire to the coil terminal marked "CB".

(12) Fit the dual control lever to the right-hand side of the handlebar, taking care to arrange the cables in a suitable manner, avoiding tight bends.

(13) Refit the bicycle pedal crank, using the adaptor if necessary.

(14) Connect the lighting set of the cycle with the terminal on the coil marked "SW" but a switch will have to be fitted if the bicycle headlamp is not originally so equipped.

(15) The exhaust pipe is attached to the silencer box by means of a clip and a second clip is secured to the pulley support as illustrated on Fig. 3.

(16) As the unit is dispatched dry, SAE30 engine oil must be injected to the level of the filling screw on the rear of the gear case. See also under "Lubrication."

(17) Some cycles may benefit from a larger rear wheel chain sprocket for easier starting.

CONTROLS

See Figs. 1 and 2.

The combined throttle/decompressor control is fitted to the right-hand side of the cycle handlebar and turning the lever outwards to "D", releases the compression for easy starting. Moving the lever inwards towards "T" opens the throttle and increases speed. The roller engaging lever is mounted to the left-hand side of the handlebar and a trigger, "R", is provided for locking the lever in the drive position. The air filter of the Amal carburettor is fitted with a choke operated by a lever and the "SHUT" and "OPEN" positions are clearly marked on the housing. The petrol tap is open when the lever is in line with the fuel hose.

PREPARING FOR THE ROAD

For riders who have no previous experience of riding a motor cycle, or a pedal cycle equipped with a motor, it is a good plan to ride without attempting to start the engine until thorough familiarity with control levers and brakes is obtained. Spend a few minutes adjusting the controls to a comfortable position.

1. Verify that there is sufficient petrol/oil mixture in the tank. The tank holds 5 pints (2.84 litres). Petrol and oil must be mixed in a separate tin before putting into the tank and the correct proportion is 16 : 1. This may be obtained by mixing 3 measures of oil with $\frac{1}{2}$ gallon (2 litres) of petrol using the oil measure attached to the filler cap of the tank. Fuel consumption is approximately 170 m.p.g. (1 litre per 60 k.m.) at speeds of 19-22 m.p.h. (30-35 k.p.h.). SAE30 engine oil is recommended, i.e. Wakefield's Castrol XL, Vacuum Mobiloil A, Shell X-100 Motor Oil 30, B.P. Energol SAE30 or Essolube 30. In view of the compression ratio of 5 : 1 petrol of commercial grade (low octane rating) can be used for the petrol/oil mixture.

2. Open petrol tap.

RIDING

1. Set choke in "Shut" position (leave open when engine is warm).

2. Engage the driving roller by pulling the ratchet lever to the snap position.

3. Push the throttle lever to the right (to ease compression), pedal to gain some speed, push the throttle lever slightly to the left and the engine will start.

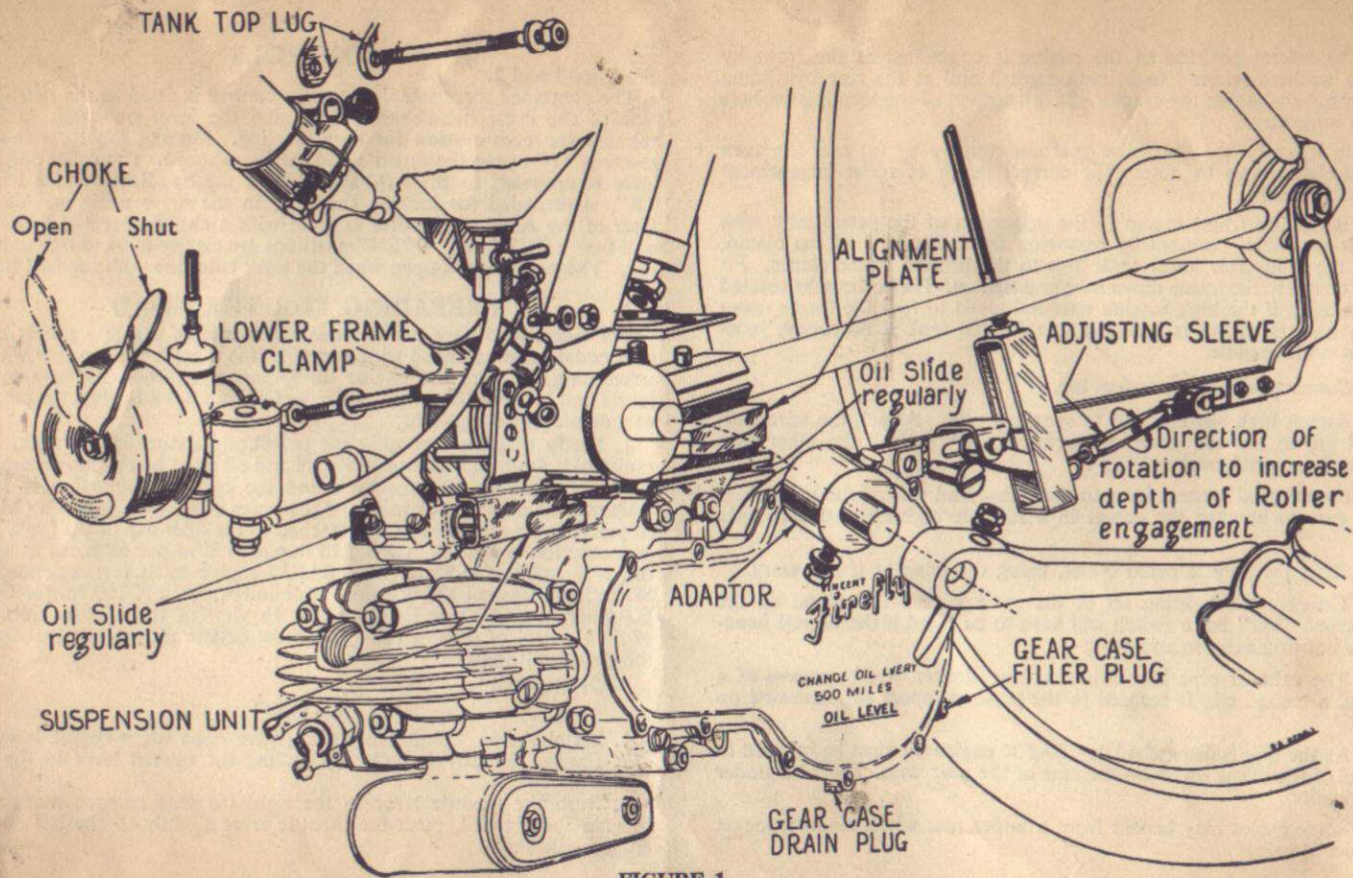


FIGURE 1.

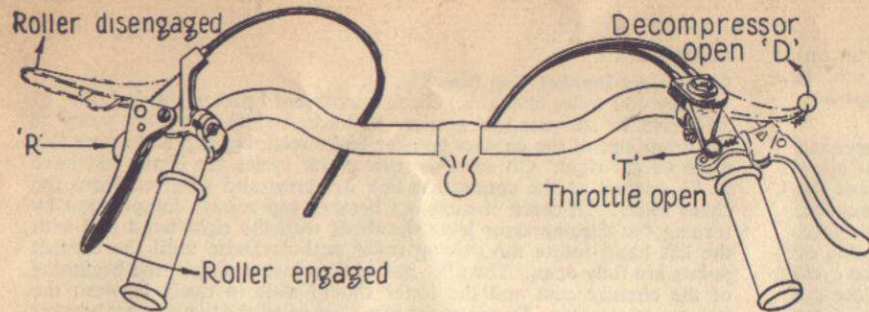


FIGURE 2.

NOTE:

As engines are drained prior to dispatch, oil must be injected to the level of the filler plug before use.

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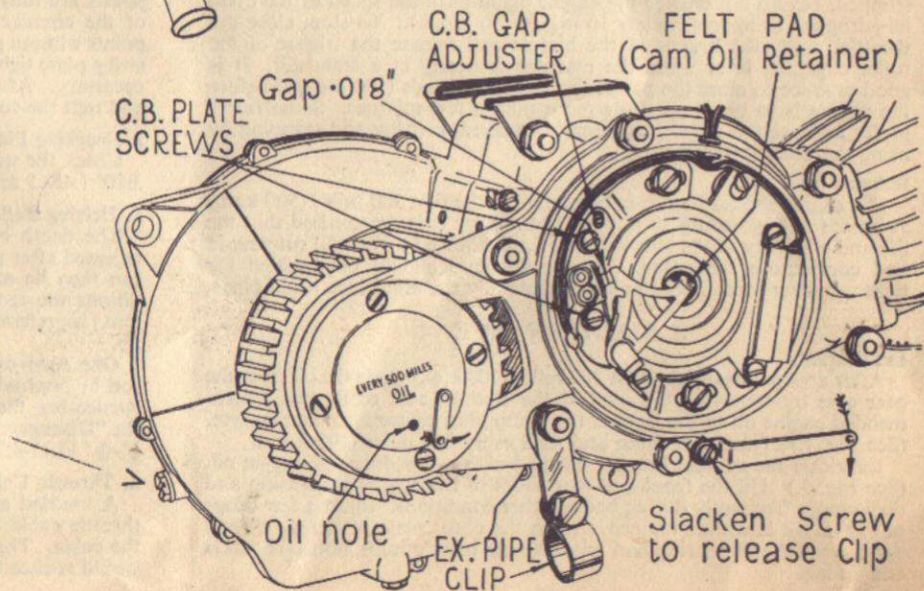


FIGURE 3.

4. The choke should be opened when the engine begins to run unevenly, indicating that it is warmed up. The distance necessary to achieve this will vary from a few yards (metres) in hot weather to perhaps 200-300 yards (200-300 metres) in very cold weather.

5. For economy and long life run the engine up to $\frac{3}{4}$ throttle opening, although the throttle may be opened fully occasionally. Do not allow the engine to run excessively fast down hills and do not engage the running engine with the bicycle stationary but pedal to gain suitable speed. Normally main road hills can be taken without pedal assistance. When riding down long hills the engine may be disengaged, idling or stopped, but do not engage the engine again until the speed of the cycle has dropped to approximately 10 m.p.h. (16 k.p.h.). To stop, close the throttle, apply the brakes of the bicycle and release the trigger of the roller engaging lever when the machine is nearly at a standstill. It is good practice to close the petrol tap some 100 yards (100 metres) before the engine is to be stopped for more than a few minutes. Some riders prefer to leave the roller permanently engaged, starting and stopping by using the decompressor only.

Running-in.

The engine should be run-in carefully for the first 300 miles (500 k.m.) at speeds not exceeding 20 m.p.h. (32 k.p.h.). It is emphasised that the life and efficiency of the unit will be greatly affected by careful running-in and correct use thereafter. Nuts and screws should be checked for tightness after some initial mileage, especially the crankcase drain plugs.

MAINTENANCE

Lubrication.

After approximately the first 200 miles (300 k.m.) drain the oil from the gear case by removing the plug at the bottom and refill with recommended engine oil to the level of the filling plug adjacent to the rear tyre. (See Fig. 1.) Thereafter drain and refill every 500 miles (800 k.m.).

Lubricate the contact breaker felt pad with a few drops of engine oil. (See Fig. 3.) Oil the front and rear slides of the engine suspension and do so more frequently during bad weather conditions. Inject a few drops of engine oil into the hole provided in the cover plate of the right-hand driving roller ball bearing and lubricate the bicycle hubs, bottom bracket and pedals.

Adjustments.

1. Contact Breaker Gap (See Fig. 3).

Every 500 miles (800 k.m.) check the contact breaker gap for .018" to .016" (.45 to .40 mm.) clearance. For access slacken off the screw at the lower end of the contact breaker cover retaining clip and swing this aside to the right. On some narrow crank cycles the chain will have to be opened at the connecting link or screw and removed from the chain wheel. To check the contact breaker gap release compression by turning the decompressor lever outwards with the right hand and with the left hand rotate the driving roller anti-clockwise until the contact points are fully open. The fibre pad is then just resting at the beginning of the circular cam and the feeler should slide in easily between the points without play. To adjust the gap, slacken off the two contact breaker swing plate tightening screws, turn the gap eccentric and adjust the gap as necessary. After setting and tightening the screws re-check the setting and refit the cover.

2. Sparking Plug.

Check the sparking plug at regular intervals ; the correct gap is .018"-.020" (.45-.5 mm.).

3. Driving Roller.

The depth of engagement of the driving roller with the tyre can be adjusted after slackening off the nuts on both ends of the adjuster which can then be set according to requirements. For average weather conditions the recommended depth is $\frac{3}{8}$ " (4.76 mm.) but for snow $\frac{1}{2}$ " (6.35 mm.) is preferable. See Fig. 1. An adjuster enables cable slack to be taken up.

One turn of the adjusting sleeve alters the length of the push-pull rod by approximately $\frac{1}{16}$ " (2 mm.) and the same amount of engagement. Remember that with the handlebar Engaging Mechanism Control in the "Disengaged" position the clearance between roller and tyre should be $\frac{1}{8}$ "- $\frac{3}{16}$ " (3.17-4.76 mm.).

4. Throttle Cable.

A knurled adjuster with locknut is provided at the lower end of the throttle cable and this adjuster should be used to take up any slack in the cable. The adjuster should not be used to obtain fast idling as this would reduce the braking capacity of the engine.

5. Ignition Timing.

After the first 200 miles (300 k.m.) the ignition timing should be re-checked. The timing is .165" (4.2 mm.) before Top Dead Centre, .171" being equivalent to $\frac{1}{16}$ ". This is set at the Works and the rider should only check periodically the contact breaker gap and adjust as indicated in para. 1. Any correction of the ignition timing should be effected as follows :—

- (a) Set the contact breaker gap to .018" (.45 mm.).
- (b) Turn the piston .165" (4.2 mm.) before Top Dead Centre.
- (c) Slacken two contact breaker base fixing screws.
- (d) Turn the timing eccentric to get contact breaker just starting to open.
- (e) Tighten the fixing screws.
- (f) Re-check the setting.

6. Carburettor.

Standard needle position is middle notch, but this may be altered by experiment to suit conditions of operation. Carburettor settings are : No. 2 throttle valve, 30 main jet and .0745 needle jet. Verify that the air-bleed hole in the carburettor adaptor is clear at all times.

DECARBONISING

The engine should be decarbonised every 1,600 miles (2,000 km.) or whenever power begins to fall off. The cylinder head is removed after undoing the four 0-BA nuts and by working carefully the owner should be able to preserve the original asbestos gasket although the fitting of a new gasket is advisable. Removal of the cylinder barrel is recommended for decarbonising the transfer ports and it is necessary to remove the silencer box so that the exhaust port may be cleaned. Carbon is scraped off the cylinder head as well as piston top and the use of a suitably shaped soft scraping tool is recommended with a view to preventing damage to alloy parts. The silencer side plates should be removed by undoing the two 0-BA nuts so that the internals of the silencer may be scraped clean with a blunt knife or stiff wire brush. The tail pipe should also be cleaned if necessary.

It should be noted that most nuts, bolts and screws used in this precision-built cyclemotor are British Association (B.A.) sizes and if any of these items should be lost or damaged genuine replacement parts should be obtained from the nearest stockist.

ELECTRICAL EQUIPMENT

The Alternating Current 6-volt Generator has an output of 9 watts. Any headlamp with built-in or separate switch can be used and the tail lamp wire is usually attached to the headlamp terminal. An electric horn can be used provided the instrument is of the Alternating Current type. The recommended headlamp bulb is 6 volts, 6 watt and the tail lamp bulb is 6 volt .04 amps. If a dry battery is used for stationary lighting an extra 3.5 volt pilot bulb is required in the headlamp.

RECOMMENDED ACCESSORIES

Sparkign Plug.—Initial equipment is K.L.G. F20 which meets the requirements of most users. For maximum performance on long distance runs K.L.G. F50 can be substituted. Alternative plugs : Champion L-10 or Lodge C-14.

Rear Tyre.—Rear tyre wear is insignificant due to the driving roller diameter of 3.22" (82 mm.) and the roller is furthermore resiliently mounted thereby ensuring a smooth drive. A special cyclemotor tyre can be fitted, a suitable cover being the Avon "Powermaster" 26" x $1\frac{3}{8}$ ". An inner tube with Schrader valve can be used for easy checking of tyre pressure. The recommended inflation pressure for the rear tyre is 60 lbs. per square inch (4.2 Atmospheres). Under-inflation will cause roller slip and rapid tyre wear.

PERFORMANCE CHARACTERISTICS

The two-stroke motor has a bore of 38 mm. and a stroke of 42 mm. giving a capacity of 47.6 cc. The power developed is 1 h.p. at 4,200 r.p.m. The weight of the complete unit is approximately 24 lbs. (10.88 kg.).

Queries regarding the running and maintenance of the power unit should be taken up with your dealer. In cases where there is need for reference to the manufacturers the engine number *must* be quoted.

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