

Motor Cycle & Cycle

TRADER

TRADER AID SERIES

Servicing Data Sheet No. 9

THE NORMAN CYCLEMATE

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THE Cyclemate is the latest variation on the well-known Cyclemaster engine. It consists of a specially-designed Norman bicycle, with the Cyclemaster engine mounted in front of the pedals. This arrangement gives maximum accessibility. The engine is a two-stroke, of 32 c.c. capacity, incorporating in its design a flat disc-valve, controlling the gas inlet to the crankcase. This ensures maximum volumetric efficiency. It has a detachable cylinder-head, Wico-Pacy flywheel ignition-generator, a BEC carburettor, and a cork-lined clutch. The carburettor has an easy starting device and the throttle is controlled by a handlebar twistgrip. Clutch control is by ratchet-type lever on left-hand handlebar. For further details, see Useful Data.

IGNITION SYSTEM

Spark Plug. Every 400-500 miles remove and clean with wire brush to ensure that earth disc is free to rotate. Every 1,000 miles, dismantle plug and clean thoroughly. Reset points gap to .018 in-.020 in.

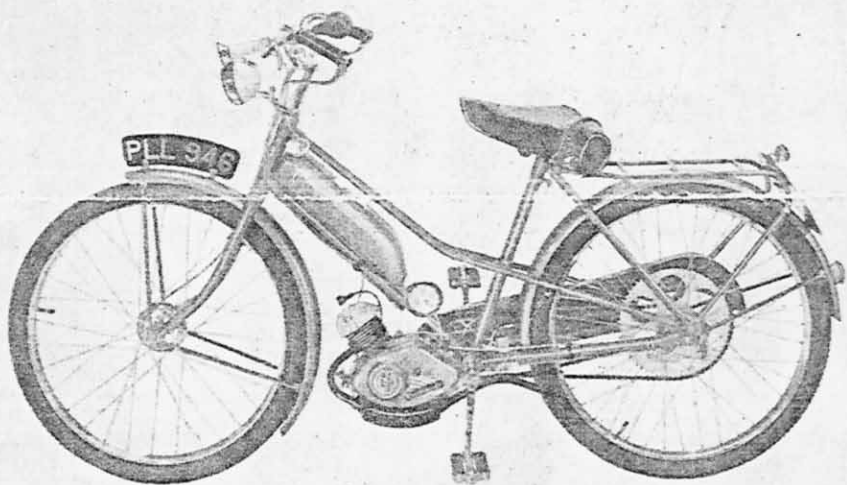
Wipac Series 90 Flywheel Ignition Generator. This unit embodies two assemblies; the flywheel containing three magnetic units, and the stator, which carries the ignition-coil, lighting-coil, contact-breaker unit and condenser. The contact-breaker cam is located on engine crankshaft by a key, and is held in position by the tapered and keyed flywheel. At engine speeds as low as 350 r.p.m. the HT spark has an approximate voltage of 9,000 volts. The LT cur-

rent remains reasonably constant over a wide range of engine speeds, giving a good light at low r.p.m., without overloading the lamps at maximum r.p.m.

Servicing the Generator. Keep contact-breaker points clean (use fine abrasive paper), and ensure that they seat squarely. Check adjustment every 2,000 miles (rotate engine until points are fully open, slacken locking screw A, and turn eccentric screw B (see Fig. 1), until the gap is .018 in. (Tighten locking screw and re-check gap). Every 5,000 miles, remove cam-pad and lubricate by working-in a summer-grade motor transmission grease. Ensure that pivot for contact-breaker movable arm is rigid in mounting-plate and that the arm moves freely. Excessive burning of points indicates a faulty condenser (shown by intense blue sparking at c/b points). Some sparking at points is inevitable, but is usually harmless, and the condenser is often

replaced unnecessarily. The condenser can be tested (after removal from magneto) on a 200-250 volt D/C current. Condenser should hold "charge" for at least 15 seconds, and a good spark should be seen and heard when condenser-lead is touched to casing. To check ignition-timing, first check that c/b gap is correct. Turn engine forward till piston is at TDC. Scribe line across flywheel and crankcase, rotate engine anti-clockwise almost one turn. Set mark on flywheel to $\frac{1}{8}$ in. to right of mark on crankcase. C/b points should be just breaking (check with .002 in. feeler). If timing incorrect, adjust by slackening two stator plate securing screws and turn stator plate in required direction. Tighten screws securely (see Fig. 2).

Removal of generator unit from engine. Take off C.M. cover. Remove centre-nut and lockwasher. Use Service Tool CBI (or two-jaw extractor), pull off flywheel and



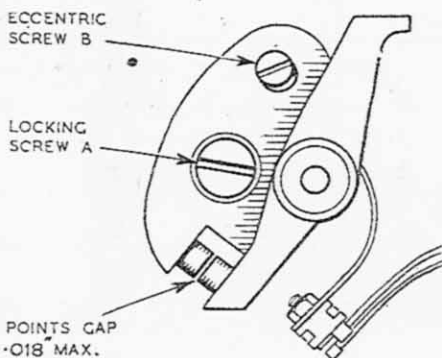


Fig. 1. Contact-breaker adjustment.

remove key. Remove cam and spring from crankshaft. Disconnect LT and HT leads. Remove two securing-screws, and lift off stator plate. (No keepers are necessary to retain magnetism when the flywheel is removed). When re-fitting, it is essential that the stator-plate screws should be well tightened and that the flywheel is scrupulously clean.

Testing. The stator plate assembly may be checked reasonably accurately as follows:

(1) **Ignition circuit.** Place piece of paper between contact-breaker points. Connect one side of 2-volt battery cell to body of stator plate. Connect lead (with ammeter in series) to other side of cell, and connect momentarily to insulated side of contact breaker. A steady discharge of approximately 4 amps. will show continuity and insulation of primary-circuit to be in order. Full discharge, or an unsteady reading, will indicate a fault. If no reading, look for an open-circuit in primary. If the HT lead terminal is held approximately 1/4 in. from the stator plate, an HT spark should jump this gap if the connection to the insulated side of contact breaker is made and broken. If no spark, look for "short" in primary circuit or an "open" or "short" in secondary circuit. If insulation of HT coil is faulty, signs of "charring" of the binding tape should be visible.

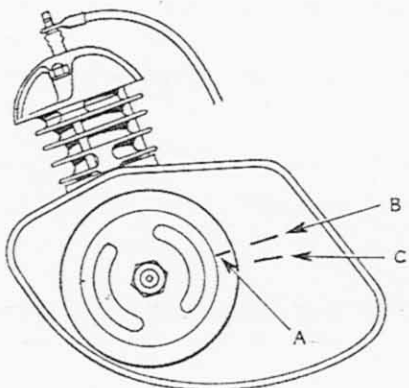
(2) **Lighting coil.** Use a lamp and battery to ensure that continuity exists between lighting output connection and the stator plate body (earth). (See also fault-finding hints).

DECARBONISATION OF ENGINE EXHAUST SYSTEM, ETC.

The need for de-carbonisation is shown by gradual loss of power, and by a muffled exhaust note. It is essential that it is carried out when necessary, not only to rectify the poor performance, etc., but because a badly carboned-up exhaust port (see Fig. 3), and/or exhaust system can cause the burnt gases to be forced down the inlet ports and thus cause premature failure of the crankshaft bearings (due to corrosion caused by water vapour present in the burnt gases). As a rough guide, decarbonisation of the exhaust-system, exhaust-port and cylinder-

head should be carried out every 1,000 to 1,500 miles, and the inlet ports and piston ring grooves decarbonised every 2,500 to 3,000 miles.

Exhaust system and exhaust port decarbonisation. Remove silencing system complete. Remove clamping screw from front of silencer, and withdraw front pipe (do not rotate pipe excessively). Using a stiff piece of wire, clean out the holes in the end of front pipe and apertures at each corner of silencer baffle plate (see Fig. 4). Clean out any other carbon present and re-assemble pipe to silencer. Remove spark plug and slacken the three 0 BA cylinder-head nuts (service tool CA 17 or 18), and



MARKS A - B IN LINE AT T.D.C. MARKS A - C IN LINE WHEN CONTACT BREAKER POINTS ABOUT TO BREAK DISTANCE BETWEEN B AND C IS 7/8"

Fig. 2. Checking ignition-timing.

lift off cylinder head. Remove CM engine-cover, dis-engage clutch, and (ensuring cylinder does not move with piston), turn engine by means of flywheel until piston is at TDC. Using a suitable soft-scraper, clean carbon from top of piston and from cylinder-head. Holding the cylinder once more, turn engine until piston is at bottom of its stroke and then examine inlet ports (2) and exhaust port. If the inlet ports are clean, clean out exhaust only and re-assemble head and exhaust-system. If inlet ports are dirty, however, remove cylinder by lifting straight up. Rotating cylinder will almost certainly cause breakage of piston rings. Clean cylinder thoroughly, including joint-faces. Ease off rings from piston, using thin shims. Close mouth of crankcase with duster, and, using a piece of an old ring, scrape out piston-ring grooves carefully. If rings are worn (check end-gap in unworn part of cylinder bore and replace if over .080in.), fit new rings gapped to .067 in. (This gap allows for width of ring-pegs in piston grooves). Ensure that the gap locates over pegs in grooves. Check small-end bush for wear, and ensure that oil-holes are clear. Lightly oil cylinder-bore and piston with engine oil. Smear crankcase/cylinder-base joint-faces with oil and fit new paper gasket. Using piston-ring sleeve (service tool CB8), and ensuring rings are correctly positioned, slide cylinder onto piston without rotating cylinder. Re-fit cylinder head (using jointing-cement) and

tighten down cylinder-head nuts. Refit exhaust-system and spark-plug. To obtain full benefits from decarbonising, the spark-plug and carburettor should be cleaned at the same time and magneto-points cleaned and adjusted. After running the engine, re-tighten cylinder-head nuts and exhaust flange-screws.

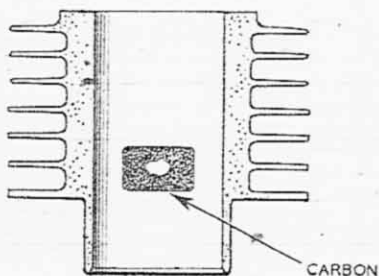
N.B. On Cyclemaster wheels fitted with the latest detachable cylinder-head, the exhaust port and cylinder head can be cleaned without removing unit from cycle, or engine from wheel. On older types, however (previous to engine No. 111,860 unless modified) the unit must be removed and then the engine removed from wheel. However, if great care is used, the exhaust port may be cleaned out by removal of the exhaust system only. In this case the piston must be at bottom dead-centre.

CARBURETTOR

The BEC carburettor, controlled by the twistgrip on the handlebar, has an easy-starting device and an air-filter built-in. The throttle control cable has an adjuster on top of mixing chamber for tickover setting, and is held clear of cylinder by a guide-ring on cylinder-head fins. The easy-starting device incorporates spring-loaded needle, which allows passage of fuel to well in mixing chamber when starter device control is operated. Raising this control for five seconds is sufficient to fill fuel-well, and gives an extra-rich mixture, which improves starting. Air-filter can be easily dismantled for cleaning of mesh-filters and air-intake holes at mixing-chamber end of filter. The elements should be washed in petrol, dried, dipped in oil, drained of surplus oil and re-fitted, at each decarbonising period. The carburettor must be kept free of dirt and sediment by ensuring that fuel filter in banjo-union and petrol tap are regularly cleaned. The only adjustment to mixture is by means of an air-bleed screw, which should be screwed home, then screwed out one to three turns. Anti-clockwise movement of screw weakens mixture, and vice-versa. If correct mixture cannot be obtained by adjusting air bleed screw, and the symptoms are:

- (1) **Rich mixture.** (a) Clean air filter; (b) check that main jet is seated correctly; (c) check that float is fitted correctly and is not allowing excessively high fuel level; and (d) check that easy-starting device is seating correctly.
- (2) **Weak mixture.** (a) Check filters are not choked; (b) check fuel pipe for kinks

Fig. 3. Section through cylinder, showing carbon build-up in exhaust port. Shaded part shows carbon. Original port dimension 5/16 in. deep by 5/8 in. wide.



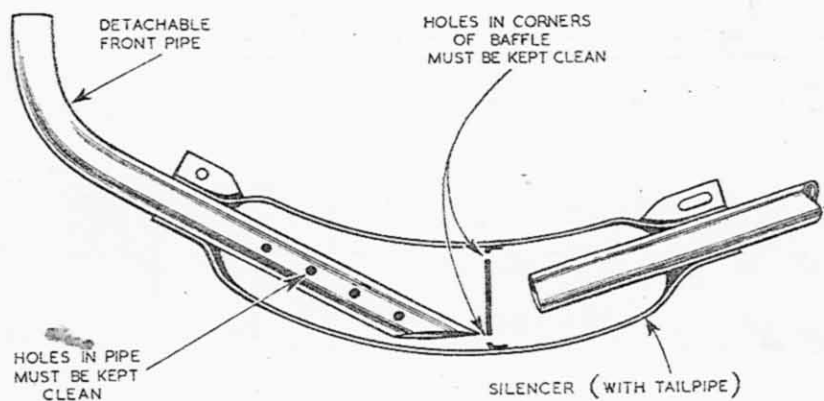


Fig. 4. Silencer cutaway view, showing holes that need to be kept clean.

or obstructions; (c) check that main jet is clear; and (d) check that float-chamber vent is clear. When refitting throttle slide, ensure that the cutaway portion faces the air filter. Make sure that the mixing chamber is vertical when carburettor is refitted to induction pipe.

REMOVAL OF ENGINE UNIT

Remove the front part of the chainguard by detaching the main engine mounting bolt-nut, and loosening the clips at the rear. Disconnect the secondary chain at the spring-link, and refit clip to chain. Remove carburettor from induction pipe and disconnect the fuel feed pipe from the float chamber. The carburettor can then remain attached to the throttle-cable or be taken off by undoing the mixing chamber cover. Take off the CM cover, unscrew the main clutch-adjuster, and detach the clutch-cable at the engine end. Release the earth-cable by removing earthing screw from crankcase, and LT cable by pulling out the snap-connector. Remove split pins and disconnect chain-tensioner: then withdraw main engine securing bolt, and lower engine from frame.

NOTE: The frame-clamp and mounting brackets are adjusted on assembly to provide correct clutch-shaft sprocket alignment. It is most important, therefore, to leave the three clamping-bolts tight, so that there is no possibility of this assembly being disturbed. (It is not necessary to loosen this clamp to remove the engine).

DISMANTLING OF ENGINE UNIT

Mount engine in stand. Remove clutch-adjuster locknut, spring-washer and crank. Withdraw two-start screw and adjusting screw from worm bush. Undo nut securing magneto-flywheel. Remove spring washer. Using tool CB1 withdraw rotor carefully. Remove woodruff key from shaft. Remove C/B cam, driving-key, and spring. Remove two set-screws with washers and spring-washers securing stator. Withdraw stator, pulling HT lead and grommet through hole in casting. Remove clutch-chamber filler-plug and allow oil to drain. Replace plug. Remove set-screws securing clutch housing casting, remove free dowel (below tapered filler plug). Using tool CA2 withdraw casting (extractor-bolts screw into stator-plate setscrew holes). When withdrawing casting, ensure that clutch-end thrust assembly does not fall out. Remove clutch-end thrust assembly.

Using tool CA3 withdraw outer ball-race from drive-end crankshaft. Undo clutch locknut and remove spring washer. Carefully remove clutch assembly complete with endless drive chain and crankshaft sprocket. Four clutch-springs and cups will probably drop out. Remove drive-sprocket and clutch-shaft woodruff keys and remove clutch-thrust plate. Remove spark plug, cylinder-head and cylinder (see decarbonising). Remove two gudgeon pin circlips, press out gudgeon pin using tool CB 10 and remove piston and tool. Remove five screws securing induction casting. Heat casting around main bearing and ease off gently with screw-driver. Place crankshaft distance-piece (tool CA 9) between crankshaft webs, and using two other pieces of metal placed across casting faces, press out crankshaft. Using tools CA 3 and 4, in conjunction with tool CA 5, draw remaining ball-races from crankshaft. Remove disc-valve and three springs. Press clutch-spindle through housing together with ball-race and distance-piece. If necessary, use tools CA 3 and 5 to remove this race. Remove two circlips and press out other bearing from casting.

EXAMINATION OF ENGINE BEFORE RE-ASSEMBLY

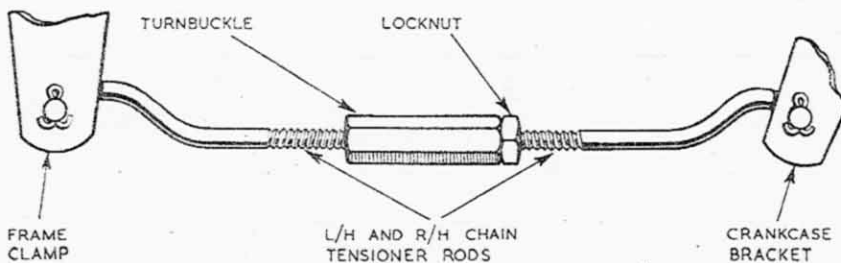
Crankshaft and connecting rod assembly must never be dismantled. If wear has taken place in big-end or shafts, fit new assembly. Small-end may be re-bushed and reamed to give .0005 in. clearance on gudgeon pin. Check cylinder and piston for wear. Clearance new, .0046 in. at crown and .003 in. at skirt of piston. If clearance more than .008 in. at skirt, fit new cylinder and piston. If old piston is re-used, clean out grooves and fit new rings

(minimum clearance between locating-peg and ring-ends should be .006 in.). Clean crankcases and castings (castings are supplied and must be kept as a set). To warm castings to remove or fit bearings, use boiling water. Examine clutch-corks for wear and replace if necessary with service chain-wheel. Check clutch-springs for free length against new part. Replace, if necessary as a set. Check fit of clutch hob in chainwheel. Renew as necessary. If wear is apparent, fit new clutch-operating bush, which must be drilled for correct location. (Bush should be positioned with the rear lands of grooves in line with web of clutch-casting). If disc-valve is worn, replace with new one. Check oil- and gas-seal in induction casting for security. Over-size cylinder studs are available if required. (Crankcase end threaded 9/32 in. Whitworth).

RE-ASSEMBLY OF ENGINE

Refit piston to connecting rod using tool CB 10. Fit new gudgeon pin circlips. Lightly oil disc-valve, and fit onto rectangular shoulder on short end of crankshaft (ensuring that three springs are in position in crankshaft web recesses). The hole in the disc must correspond with hole in web (marked face towards crankshaft). Press lightly oiled bearing onto short end of crankshaft (distance-piece CA 9 between crankshaft webs), ensuring valve is correctly positioned on crankshaft. Press similar bearing onto long end of crankshaft. Bearings must be pressed fully home against shoulders. Three circlips should now be fitted in casting (one in crankshaft bore, two in clutch-spindle bore). Warm inner crankcase casting, and press clutch-spindle assembly into casting (drive housing and ball-race already in position on spindle). Reverse casting and fit distance-piece and second bearing into casting. Fit crankshaft assembly using tool CA 9 between crankshaft webs. Support inner face of casting on strong metal supports (one on either side of crankshaft), and apply pressure to short end of crankshaft, ensuring conrod is correctly positioned in crankcase mouth. Fit new oilseal into crankcase over long end of crankshaft, pressing against circlip. (Open end of oil seal inwards). Fit paper gasket to crankcase with oil. Warm induction-casting and press over bearing with distance-piece still between crankshaft webs. Secure with five screws. Insert key and fit crankshaft sprocket. Lightly lubricate clutch-spindle, fit clutch-thrust plate with shoulder towards ball-race and fit clutch-shaft key. Hold inner clutchplate flat with convex side downwards, take clutch hob and insert short ends of pins into holes in plate. Fit chain-wheel over

Fig. 5. Sketch of method of adjusting driving chain.



long ends of pins. Fit clutchplate (outer), convex side uppermost. Turn assembly over, insert four spring-cups and springs. Fit chain to clutch sprocket. Withdraw crankshaft sprocket slightly. Fit chain to this sprocket and clutch assembly onto clutch spindle at the same time. Fit washer and nut to clutch spindle and tighten nut at the same time as crankshaft sprocket is pressed home. Locate clutch end thrust assembly with smear of grease. Warm clutch housing casting, press in from outer side the grooved oil ring and fit circlip. Press in ballrace from inner side. Ensure that oilseal behind clutch operating bush is still in position and fit paper gasket to casting. Position free dowel in clutch housing casting and place crankcase assembly in press, long end of crankshaft uppermost. Press clutch housing home, using a round metal-sleeve on machined face of crankshaft boss in clutch housing casting (making sure that clutch-thrust assembly is still in position). Tighten casting securing screws diagonally, tap home free dowel with small punch. Insert clutch-operating two-start screw and fit adjusting screw. Clutch-operating crank should be secured on flats with spring-washer and locknut. Remove web support CA 9. Lightly oil disc-valve and big-end. Fit new cylinder-base gasket, refit cylinder, cylinder-head and magneto as previously described. Refill clutch chamber with SAE 140 oil. Refit clutch cable and C.M. cover. Refit engine to machine in reverse order of dismantling adjusting rear drive chain with turn-buckle tensioner. (See Fig. 5).

Cycle parts are serviced in normal manner, paying particular attention to brakes. Do not over-lubricate hubs. Adequate lubrication of the wheel hub-bearings can be assured by dismantling hubs every 3,000 miles and packing them with heavy grease. Do not lubricate in between the dismantlings.

Adjustment of the secondary chain (clutch sprocket to rear wheel sprocket) is very important, as is maintaining correct alignment of the sprockets. The position of the clutch sprocket is set on assembly (see note to Removal of Engine Unit), and providing the engine mounting bolts for the frame clamp are kept very tight, this sprocket alignment will not alter. If the rear wheel is moved (for pedal chain adjustment), the spindle adjuster-nuts should be moved equally to maintain rear wheel sprocket alignment (Note: the clearance between the tyre and the R.H. chainstay is greater than that between the tyre and the L.H. chainstay).

A special measuring device (consisting of a straight rod or tube with 4 pointers of equal length attached) is used to check sprocket alignment).

FAULT FINDING HINTS

1. **Difficult starting, and failure to start.** Ensure that correct grade and quantity of oil is mixed thoroughly with the petrol. The fuel mixture should be shut off when engine is stopped (it is preferable to run the carburettor dry if the machine is to stand for any length of time).

(a) **Lack of fuel.** Check that petrol is reaching carburettor. If not, ensure that tank contains petrol and that filters, etc. are clear. Check that no obvious air leaks are

present in induction system and that vent in petrol tank cap is clear.

(b) **Over-rich mixture.** Check that carburettor is not flooding due to punctured float, incorrectly fitted float, or foreign matter in float chamber. Ensure that easy-starting device is not sticking. Check that air-cleaner is not choked. To clear excessive fuel from engine, turn off petrol supply, open throttle-control fully, and pedal machine, with clutch engaged, until the engine has been cleared.

(c) **Ignition fault.** Check if spark present at plug points. If not clean or replace spark plug. If no spark at HT lead terminal, check as under magneto servicing. If spark is weak when tested externally, it may be non-existent under compression.

2. **Clutch slip.** Check that adequate clearance is present in clutch-operation mechanism ($\frac{1}{4}$ in. free movement at tip of control lever before clutch begins to lift).

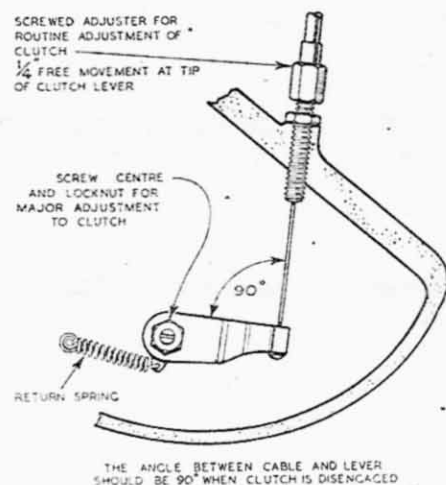


Fig. 6. Clutch-cable adjustment.

3. **Heavy clutch operation.** Check that clutch-cable and mechanism is well lubricated and that cable is free from kinks. Check that clutch operating arm (at engine) is at correct angle to cable (90 degrees when clutch is disengaged—see Fig. 6).

4. **Loss of power.** Check if engine and/or exhaust system require decarbonising. Check carburation and ignition. Check that brakes are not binding. Check for clutch slip. If engine has run for a considerable mileage, check cylinder-barrel for wear and crankcase-seals for leaks. Check cylinder-head joint for blowing. If head is distorted, possible cause is over-heating, due to weak mixture.

5. **Plug "whiskering."** Generally caused by combination of metallic additives to fuel and oil, and excessively high engine operating temperature. Check for incorrect carburettor settings, air leaks, retarded ignition, or dirt-clogged cylinder fins.

6. **"Blowing" bulbs.** Provided that the correct wattage (see data) bulbs are fitted, "blowing" of bulbs is usually caused

through bad connections. Check that all number plate nuts and bolts are tight and that earthing arrangements are secure. A bad earth return can allow the full generator output to pass to one lamp only, which could fail under the excessive load.

SERVICE TOOLS

(Including tools for use with earlier model Cyclemaster wheels).

- CA1 Flywheel extractor (Bantamag). (Up to eng. No. 76,750.)
- CB1 Flywheel extractor (Series 90 Magneto).
- CA2 Clutch-housing casting extractor. (After eng. No. 76,750.)
- CA3 Ball-race extractor (Crankshaft Drive Side).
- CA4 Ball-race extractor (Valve side of Crankshaft).
- CA5 Ball race clamp (Use with CA3 and CA4).
- CA7 Oil-retainer extractor (Cyclemaster Wheels 1-50,000).
- CB8* Piston-ring sleeve (32 cc.).
- CA9 Crankshaft distance piece.
- CB10 Piston and gudgeon-pin extractor.
- CA11 Flywheel retaining arm (Bantamag).
- CA12 Magneto-cam remover (Bantamag).
- CA13 Piston rest and crankshaft support.
- CA14 Ball-race fitting tube.
- CA16 Exhaust-nut spanner (Cyclemaster Wheels).
- CA17 O BA Spanner (Cylinder-head nuts) workshop pattern.
- CA18 O BA Spanner (Cylinder-head nuts) owners' tool kit.
- CA19 Spark-plug spanner.
- CA20 Tyre-valve adaptor.
- CA21 Feeler gauge set—.015in. and .018 in.
- CA22 "C" spanner.

USEFUL DATA

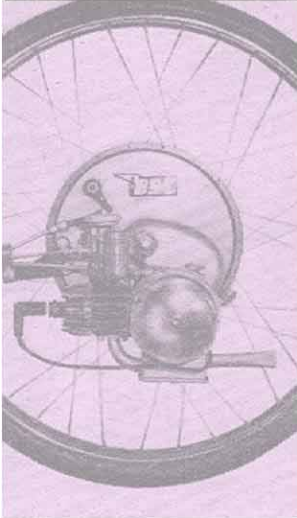
- Cylinder bore—36 mm.
- Engine stroke—32 mm.
- Engine capacity—32 c.c.
- Compression ratio—6.2 to 1.
- Piston-ring gap—.006 in. between ring ends and locating peg.
- Contact-breaker gap—.015 in. to .018 in.
- Magneto-type—Wipac Series 90 Flywheel Magneto Generator (anti-clock).
- Spark-plug type—14 mm. KLG Type CF50.
- Spark-plug gap—.018 in. to .020 in.
- Carburettor—BEC.
- Petrol tank capacity—5½ pints (two-level tap, with reserve).
- Petrol-mixture—1 part oil in 25 parts petrol.
- Clutch-chamber capacity—50 c.c. (1 filler-cap measure).
- Gear-ratio (overall)—18-1.
- Wheels—26 in. x 1½ in.
- Tyres—26 in. x 2 in. Dunlop Carrier.
- Brakes—Internal-expanding hub type (front and rear).
- Wheelbase—45 in.
- Weight—76 lb.
- Generator output—Approx. 9 watts.
- Headlamp bulb—6v. 6w. } or { 6v. 8w. }
- Tail lamp bulb—6v. 3w. } or { 6v. 1w. }
- (Total wattage must be at least nine.)
- Recommended grades of oil—(1) Engine SAE 30; (2) Clutch-chamber, SAE140.

The next servicing data sheet in this series will deal with the

ROYAL ENFIELD 350 & 500 c.c. models and will be included in the issue dated **7 JANUARY, 1956**

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