

Motor Cycle & Cycle

TRADER

TRADER AID SERIES

Servicing Data Sheet No. 18

HERCULES HCM HER-CU-MOTOR

Manufacturer: The Hercules Cycle and Motor Co., Ltd., Aston, Birmingham, 6.

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Announced at the 1955 Motor Cycle and Cycle Show, the Hercules HCM Her-cu-motor all-British moped looks likely to prove one of the best machines in its class. It has a lively engine, well-chosen gear ratios, and its low centre of gravity gives good handling characteristics.

GENERAL DATA

ENGINE. (Manufactured by J. A. Prestwich Industries Ltd., especially for the Hercules Cycle and Motor Co. Ltd.). Single-cylinder two-stroke, with cast-iron cylinder and die-cast aluminium-alloy cylinder-head. Bore, 42mm.; stroke, 35.5mm.; capacity, 49 c.c. BHP is 1.4 at 5,200 RPM. The Lo-ex alloy piston carries two pegged piston rings of the following dimensions: Diameter, 42mm.; width, 0.777-0.787mm.; radial thickness, 0.063-0.069mm. The ring-end gap (new) is .004-.009in. Piston clearances are: Bottom of skirt, .0035-.0055in., and at top lands .0065-.0085in. Pistons of .020in. and .040in. over-size are available. The connecting rod small-end is fitted with a bronze-bush and the big-end runs directly on 18 needle-rollers of $\frac{1}{16}$ in. diam. The crankshaft main-bearings are both ball journals, type 6202 (15mm. bore by 35mm. o/d by 11mm. wide). Oil and compression seals are fitted outside each main bearing (15mm. bore by 30mm. o/d by 10mm. wide). Petroil lubrication is employed (see under Lubrication).

CARBURETTOR. Amal type 360/4 incorporating a cold-starting device. The starting lever should be raised for 5 to 7 seconds when starting from cold only. Main-jet size (standard) No. 27. Throttle valve No. 3 cutaway (see also Maintenance and Tuning of Carburettor).

FLYWHEEL MAGNETO. Miller type BS9 (HU10). Lighting output approximately 7 watts. Contact-breaker points gap .018in. fully open. Air-gap between pole pieces and coil cores approximately .010in.

SPARK PLUG. Type KLG F50. Gap .020in.

IGNITION TIMING. The flywheel, carrying the contact-breaker cam, is keyed to the tapered crankshaft. Normal timing is en-

sured by having c/b. points gap correct, and by centralizing the two securing screws in the stator plate slots (see also Electrical System). **Gearbox and Clutch.** (Manufactured by Burman and Sons Ltd., especially for the Hercules Cycle and Motor Co. Ltd.).

HCM—Burman 2-speed. Gear ratios—Top 15.07 to 1. Bottom 24.8 to 1 (see also Transmission).

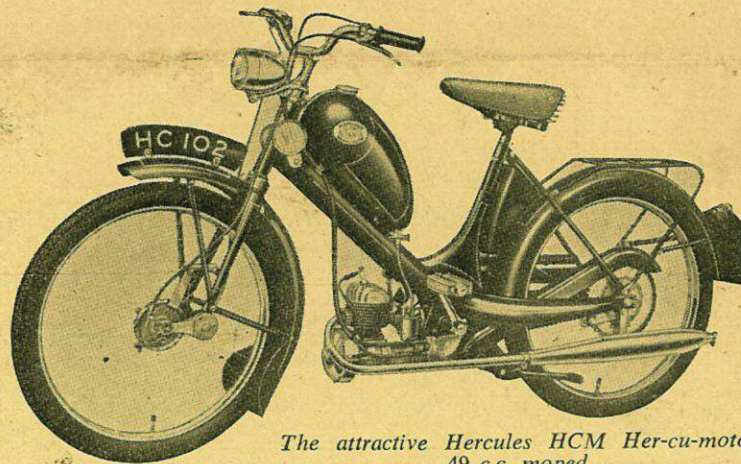
Chains.

Power-drive chain— $\frac{1}{2}$ in. by $\frac{3}{8}$ in. by 93 links (heavy-duty). Pedal-chain— $\frac{1}{2}$ in. by $\frac{1}{8}$ in.

Wheels.

Tyre sizes (front and rear): 23in. by 2in. Rim sizes: 23in. by 2in., 36 H. Tyre pressures (machine and rider):

Front wheel (lb./sq. in.) weighing 8st., 24; 9st., 24; 10st., 25; 11st., 26; 12st., 28; 13st., 30.



The attractive Hercules HCM Her-cu-motor 49 c.c. moped.

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Rear wheel (lb./sq. in.) weighing 8st., 26; 9st., 28; 10st., 30; 11st., 32; 12st., 34; 13st., 36.

Spoke sizes (front): 18 off. 9in. by 13g.; and 18 off. 8 $\frac{1}{2}$ in. by 13g.

Spoke sizes (rear): 18 off. 7 $\frac{1}{2}$ in. by 13g.; and 18 off. 7 $\frac{1}{4}$ in. by 13g.

Bearings (front): 1 fixed and 1 adjustable cone. 18 off. steel balls of $\frac{1}{4}$ in. diameter.

Bearings (rear): 2 sets of caged balls.

Steering-head races.

Consist of 1 screwed race (ME 95), 1 top frame race (ME 96), 1 bottom frame race (ME 97), 1 crown race (ME 98), and 44 steel balls of $\frac{3}{8}$ in. diameter.

General.

Unladen weight, 88lb.; wheelbase, 45in.; normal saddle height, 30in.; under engine ground clearance, 5 $\frac{1}{2}$ in.; pedal bracket height, 10in.; width inside cranks, 6in.; normal max-

Removal and refitting of Magneto.

Remove cover. Undo flywheel (rotor) securing nut (RH thread), tapping spanner if necessary. Remove flywheel by means of a two-pin extractor (Part No. ME110/1). (The two holes in the flywheel-boss are tapped with a 2 BA thread). Disconnect LT cable at external terminal and HT lead at spark-plug. Remove the two securing-screws from the stator-plate slots and remove stator-plate. To refit reverse the above process, ensuring that the mating tapers of flywheel and engine shaft are in good condition and free from oil.

Timing ignition.

The timing is fixed. A key in the tapered mainshaft locates in a keyway in the flywheel centre-boss, thus fixing the timing of the spark in relation to the piston position. A small amount of adjustment is provided, however, by the stator-plate fixing-screw holes being

leakage and capacity or check by substitution of a new condenser.

The spark-plug should be cleaned and the gap checked every 500-1,000 miles.

(2) **Lighting.** To check LT output, disconnect the LT output cable from the external terminal on the stator-plate. Connect an AC voltmeter (with a 1 ohm. load-resistor) between the terminal and earth. Run the engine at $\frac{1}{4}$ to $\frac{1}{2}$ throttle and an output of 2 volts should be obtained.

The wiring should be kept firmly secured to frame, etc., and connections and terminals must be secure. Ensure that the headlamp, tail-lamp, horn push, etc., make good electrical contact to earth via frame of machine.

Correct wattage bulbs must be fitted (head, 6 volt 6 watt; and rear, 12 volt 2.2 watt). Incorrect bulbs will result in either poor lights or continual burning-out of bulbs.

LUBRICATION

Engine petrol mixture.

Twenty-four parts of petrol to one part SAE 30 oil (four petrol tank filler cap measures of SAE 30 oil to one gallon petrol); or, 16 parts petrol to one part of self-mixing oil (six petrol tank filler cap measures of self-mixing oil to one gallon petrol). Wherever possible pre-mix the petrol and oil.

Gearbox and clutch.

Use SAE 30 oil. Check level every 300 miles by removing oil-level screw (see Fig. 2). If necessary, replenish through gearbox cover-plate (held by three slotted screws).

Rear hub.

The rear hub is packed with grease as required on assembly, and this will suffice for a long period.

Front fork.

The nylon bushes for the fork link spindles are greased on assembly. Frequently, lubricate (with oil) the two torque-plate link anchor-pins (near side).

Magneto.

Every 2,000 miles, apply a few drops of thin oil to the contact-breaker cam felt-lubricator.

Controls, cables, etc.

Lubricate periodically, using a light mineral oil.

Chains.

Every 1,000-2,000 miles remove, wash thoroughly in paraffin, dry and immerse in molten grease.

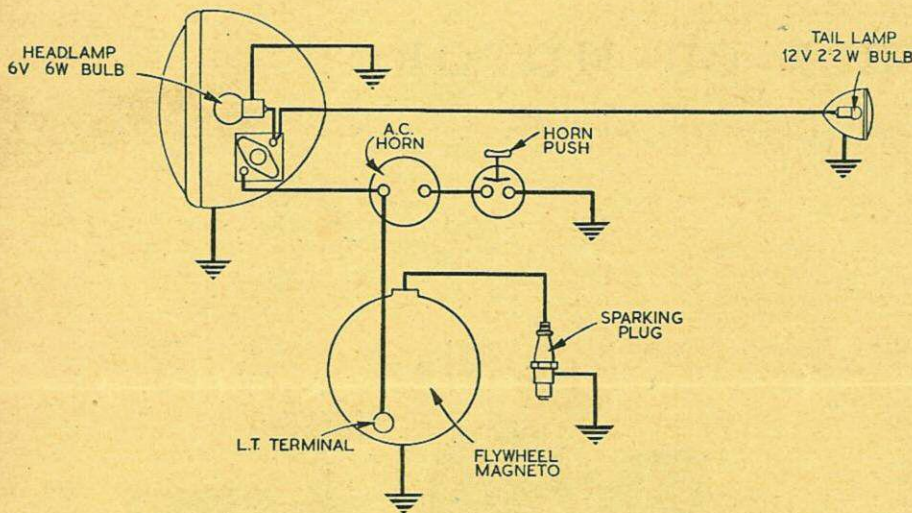
CARBURETTOR

AMAL TYPE 360/4

Dismantling and re-assembly.

Turn off fuel-tap, pull feed-pipe from float-chamber top. Slacken fixing-clip screw and twist carburettor from induction stub. Unscrew mixing-chamber top and withdraw throttle-valve assembly. Unscrew cable-stop from twistgrip control, and remove from cable by means of slot in stop. Slip outer cable into twistgrip, allowing lower end of inner-cable to pass out of throttle-valve slot and out of hole in end of slot. Valve, spring, throttle-needle and clip are now released. Remove main-jet cover-nut, withdraw petrol-filter, unscrew main- and needle-jets. Remove screw holding air-filter plates and shake out plates. Remove two hexagon screws holding float cover, remove cover, gasket and float. Compress cold-starting needle spring and cap, take out pin, and remove needle from cover. Wash all parts in clean petrol, blow out passages with air-hose, giving special attention to main jet and to fuel-hole situated behind throttle-valve.

Do not remove blanking-plugs from passages in carburettor body or probe jets with wire to remove foreign matter. When assembling, fit blunt end of float-needle into float-chamber base hole, place gasket on cover, enter cold-starting needle into recess in starter chamber,



Wiring diagram for the Her-cu-motor.

imum speed, 33-35 mph.; fuel tank capacity, 1 $\frac{1}{4}$ gallons.

Frame Number.

Stamped on near side of saddle pillar clamp-ing lug.

Engine Number.

Stamped on near side of crankcase below cylinder-base flange.

ELECTRICAL SYSTEM

HT current for ignition and LT current for lighting and AC electric-horn are supplied by a Miller BS9 (HU10) flywheel-magneto. This consists of an outer cover, a rotor (or magnetic flywheel) and a stator-plate, on which are mounted an ignition-coil, LT lighting-coil, a condenser, contact-breaker and an HT pick-up. The rotor carries four magnets, four laminated poles and the centre boss is used as the contact-breaker cam. The stator-plate is secured to the crankcase by two screws, the holes for which are slotted to allow variation of the ignition timing. The rotor is located in the correct position on the crankshaft by a key and it is secured by a taper and a fixing nut. The "air-gap" between rotor poles and stator coil cores is approximately .010in.

The headlamp fitted is a Miller 7TM/S and the tail lamp a Miller 596T (later model, Miller No. 39). A Miller AC electric horn is fitted.

slotted. Movement of the stator-plate clockwise advances the ignition timing, and movement anti-clockwise retards the timing. The normal position is when the securing screws are central in their slots.

Maintenance.

(1) **Ignition.** After the first 500 miles, and subsequently after every 1,500 miles running, check the contact-breaker points gap as follows: Remove magneto-cover. The contact-breaker is visible and accessible through one of the flywheel slotted-holes. Turn flywheel until the contact-lever is at highest position on cam. Loosen the adjustable contact-plate fixing-screw (see Fig. 1) enough to allow the contact-plate to move under pressure from a screw driver until the correct gap of .018in. is obtained. Securely tighten fixing-screw.

At all times the contact points must be kept clean and free from oil or grease. To clean the points, use a piece of very fine emery-cloth and finally wipe with a petrol-soaked rag, removing all traces of rag afterwards. Ensure the contact-breaker lever is free on its pivot, and that the points seat squarely over their whole surface.

Every 2,000 miles apply a few drops of thin oil to the cam-felt lubricator.

If excessive sparking occurs at c/b. points, or if the points burn and pit rapidly, the condenser may be at fault. Remove and test for

place cover approximately $\frac{1}{8}$ in. from float-chamber, invert assembly and check that float-needle taper enters cover-seating. Press cover home, shake assembly gently to check freedom of float, fit cover-screws. Twist cold-starting needle lightly and raise to check for correct operation. Fit main- and needle-jets (do not over-tighten), petrol-filter and jet-cover nut complete with fibre-washer. Fit three air-filter plates. Pass mixing-chamber top and valve spring over control cable. With throttle-needle (clip in second-top groove, for standard setting) fitted into throttle valve, feed inner-cable through valve slot-holes into slot-recess.

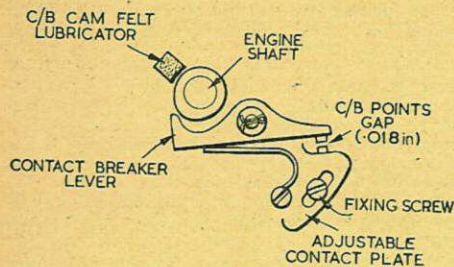


FIG. 1.—Contact-breaker assembly.

Fit cable-stop over cable and screw into twist-grip control. Place throttle-valve into mixing chamber body, with cutaway towards air-filter, valve-guide slot engaging key in carburettor body and throttle-needle entering needle-jet, push valve home and tighten knurled cap-nut. Check operation of twistgrip control, setting cable adjuster so that valve closes completely. Lightly oil induction-stub, push carburettor fully home with a twisting movement, set it vertically and then tighten securing clip screw. Connect fuel-pipe, start engine, run until warm, and then set cable-adjuster to give correct tickover.

Adjustments and tuning.

Before making any adjustments to carburettor, ensure that ignition system is in good order and that engine does not require decarbonising. Apart from tickover setting (described above), tuning for over-rich or weak mixture may be necessary. Richness is shown by black exhaust smoke, four-stroking and poor mileage per gallon. Weakness is indicated by poor tickover, spitting back through air-filter, overheating and lack of power. The carburettor should be thoroughly cleaned and machine road tested before making adjustments.

The mixture is controlled by (1) main jet. These jets are numbered and higher numbers denote larger jets. Sizes range from 20, 22, 25, 27, 30 and 32 (No. 27 is standard on new machines). (2) Throttle valves which have No. stamped on base denoting depth of cutaway; high numbers indicate bigger cutaway, and smaller numbers smaller cutaways. (3) Needle-clip position on throttle needle which controls fuel passed by throttle needle (e.g. to richen, fit needle-clip in lower groove).

To cure **weak mixture** (a) at speeds up to $\frac{1}{4}$ throttle-opening, fit throttle-valve with smaller cutaway. (b) From $\frac{1}{4}$ to $\frac{1}{2}$ throttle-opening, fit needle-clip in a lower groove of needle. **Note:** Move clip one groove only at a time, test machine on road before altering needle-clip farther. (c) From $\frac{1}{4}$ to full throttle, fit a larger-size main jet.

To cure **over-rich mixture:** (a) up to $\frac{1}{4}$ throttle-opening, fit throttle-valve with larger cutaway; (b) $\frac{1}{4}$ to $\frac{1}{2}$ throttle-opening, fit needle-clip in a higher groove of throttle-needle; (c) $\frac{1}{4}$ to full throttle, fit a smaller-size main-jet.

Tickover setting will be affected by above

adjustments, and will require to be reset when mixture tuning is completed. Make one adjustment only at a time, test machine on road to note performance changes before proceeding further.

DECARBONISING

This should be carried out at first 500 miles, and thereafter when indicated by loss of power.

(1) **At first 500 miles.** Using tool-kit C spanner, unscrew exhaust-nut from cylinder, undo silencer bracket-nut and remove exhaust-assembly. Remove spark-plug and undo cylinder-head nuts. Take off cylinder-head. Set piston at BDC. Scrape carbon outwards from exhaust-port. Wipe all carbon flakes from piston-top out through exhaust-port. Do not blow into cylinder, as carbon may enter transfer-port. Turn engine until piston is at TDC and clean oily deposit from piston-top and from cylinder-head. Replace cylinder-head, tightening down securing nuts diagonally. Refit exhaust-assembly, with copper and asbestos washer sealing exhaust-pipe and cylinder joint.

(2) **Complete decarbonising.** Remove exhaust system, carburettor, and front engine-support strap-bolt complete with D packing pieces. Undo three nuts securing engine to primary-shaft casing and lift engine forward.

engine by a short enclosed shaft. Spiral bevel-gears transmit the drive to a short cross-shaft carrying the final drive sprocket.

Dismantling of gearbox.

Remove engine unit from gearbox. Unscrew bolts which hold the drive-shaft assembly to main-gear unit. Take circlip off driving spindle and then remove:

Thrust washer; clutch unit; clutch ballrace; clutch-operating lever; gear engagement-piece and fork; top engaging-gear; bottom engaging-gear and bush.

Unlock lockwasher on layshaft spindle, undo screws and take out layshaft and gears. Slide off the remaining gear on driving spindle.

The bevel-gear assembly is removed by unlocking lockwasher on sprocket and unscrewing nut, and then removing screws from other side of gearbox and gently tapping bevel-gear spindle through sprocket and withdrawing complete unit.

To re-assemble, reverse the dismantling order, paying particular attention to the replacement of the same shims that were removed from behind the small plate (secured by two screws) on right-hand side of gearbox. These shims control the meshing of the gearbox crown-wheel and bevel-pinions which is correctly set at works on assembly.

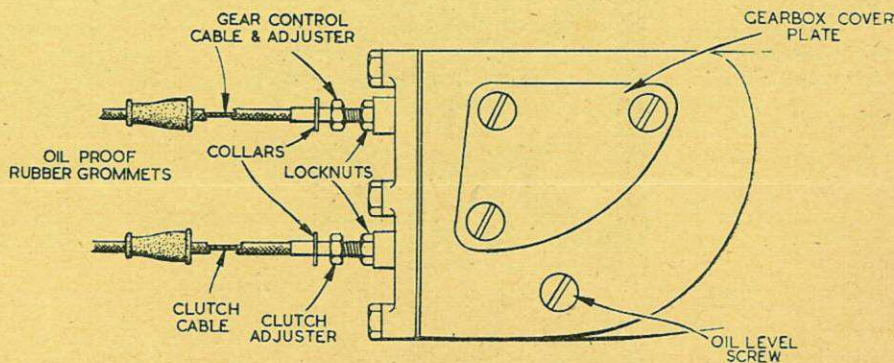


FIG. 2.—Gearbox adjustments and lubrication details.

Remove cylinder-head and barrel, supporting piston, and also packing rag into crankcase mouth as barrel is withdrawn from holding studs. Scrape carbon from exhaust-port, cylinder-head and piston-top. If piston rings are free in grooves do not disturb. If rings stuck in grooves, ease out with thin blade, scrape ring-grooves with squared-end of broken ring, taking care that stop-pegs in grooves are not damaged. If same rings to be used, fit in same grooves as originally fitted and with the same side upwards. If new rings used, file end-gap to .004in. Lightly oil piston and cylinder; refit, using new cylinder-base gasket, ensuring ring gaps and stop-pegs coincide. Refit cylinder-head. Rotate engine several times by hand. Clean spark-plug, set gap to .020in. and refit to cylinder-head. Remove silencer tail-pipe clip, withdraw baffle pipe, scrape ports and vents. Refit, with larger diameter last, and set flush with silencer-end. Refit engine to primary-shaft casing using three self-locking nuts with washers. Refit engine-front support-strap, carburettor and exhaust system.

TRANSMISSION

The gearbox, incorporating multi-plate clutch, is operated by a combined handlebar twistgrip and clutch lever. It is bolted to the engine and the power is transmitted from the

Routine servicing of gearbox, chains, etc.

Always maintain correct oil level (see Lubrication). Maintain at least $\frac{1}{8}$ in. "free movement" of the clutch control-cable at the handlebar control-lever. Adjust the cable by screwing adjuster at gearbox end of cable inwards to increase, and outwards to decrease "free movement". Finally, secure adjuster by tightening locknut. Adjustment of the gear-control is by means of the other cable adjuster at the gearbox. To set gears, put machine on stand, and set twistgrip control in neutral (centre position), screw cable adjuster in or out a turn or two until the rear wheel moves freely by hand. Check that an equal movement of the twistgrip each side of neutral engages the appropriate gear. Finally, secure adjuster by tightening locknut.

Ensure that the oilproof rubber grommets are correctly positioned (especially after cable adjustment), sealing the joints between clutch and gear-control cable outer casings and adjusters. The grommets must grip the small circular collars on the adjusters (see Fig. 2).

"Loading" of the clutch-operating mechanism must be avoided. To this end, neutral gear must be engaged in preference to holding the clutch dis-engaged for prolonged periods.

Adjust pedal chain by means of normal-type adjusters on rear wheel spindle, keeping wheel

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central. After adjusting, check power-drive chain-adjustment.

Take up slack in the power-drive chain by slackening the nuts (pedal-chain side) of the two top gearbox-to-frame bolts, slackening the front engine-support strap-bolt and then tightening up central nut on gearbox adjuster situated above the gearbox, just behind the carburettor air intake, as necessary. To slacken off the chain, unscrew the adjuster nut and push back the engine unit by hand. Adjust so that there is $\frac{1}{2}$ in. up-and-down movement in the middle of the bottom run of the chain. Finally, tighten up the support strap-bolt and the two gearbox nuts.

Front wheel.

The front brake is a normal internal-expanding type, but the brake-plate is free to

end bearing or oil-seals require replacing. To check main-bearing wear, remove magneto cover, grip flywheel and feel if "lift" in main bearing is present. Big-end wear may be checked when cylinder is removed for decarbonising. No up-and-down movement should be felt on conrod when crankshaft is held stationary. Failure of oil-seals (generally due to worn main bearings) is indicated by poor tickover, fluctuation of engine revs. when throttle set at any one position, and by general loss of power.

Dismantling, repairing and re-assembling.

Remove exhaust-nut from cylinder, twist exhaust-pipe to one side. Disconnect lighting-lead from back of stator-plate. Turn off fuel,

and crankshafts. Fit oil-seals (spring-side inwards) into crankcases easing seal-lip over ridge on magneto-side shaft and tapping squarely up to main bearings. Fit magneto (as in Electrical Repairs). Liberally grease drive-side shaft and with new gasket on joint face, fit engine to primary-drive housing, aligning drive-tongue with primary-drive shaft-recess. Fit clamping bolt nuts and washers. Fit support-strap assembly, carburettor, lighting-lead and exhaust system. Turn engine over by hand several times before testing.

FAULT FINDING

In the event of the machine failing to start when the normal starting procedure has been carried out, check engine in this sequence and remedy as follows:

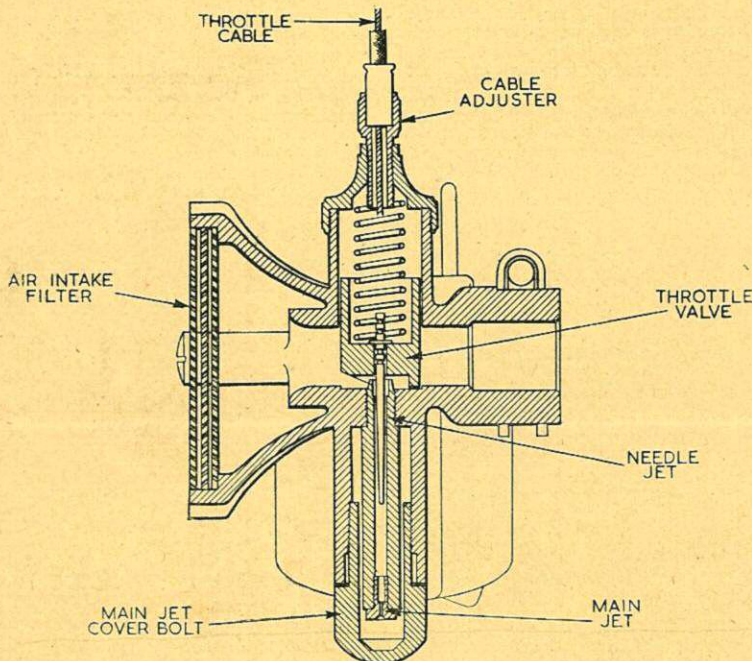
Remove spark-plug, and with HT-lead attached, hold plug body against cylinder-head and rotate engine. If no spark occurs at plug electrodes, substitute plug with known good plug and retest. If spark in order, clean original plug, set gap to .020 in. and refit. If no spark, check plug-cover for cracks, HT leads for faulty insulation, c/b. points for burning, pitted surfaces and incorrect gap, breaker arm for sticking in "open" position and HT coil for cracked insulation. Repair or replace faulty parts and reset c/b. points gap to .018 in.

If good HT spark is obtained, but engine will not start, check that tank holds fuel, that tap is "on" and that fuel feed-pipe is clear by pulling pipe from carburettor and checking fuel flow. If fuel feed-pipe is blocked, blow through pipe. (This will afford only a temporary repair, as it is likely that foreign matter has entered tank with fuel and tank will need to be removed and rinsed out thoroughly to remedy this fault completely). If fuel flow good to carburettor, loosen jet-cover bolt. If no fuel escapes, check float-chamber for blockage and clean as under Carburettor.

If fuel flows from loosened jet-cover bolt, turn fuel-tap off, remove jet-cover bolt, filter and needle jet. Clean out obstruction and reassemble. Should repeated efforts be made to start machine, without success, remove crankcase drain plug, rotate engine smartly with fuel tap off and spark-plug removed to blow excess liquid fuel from crankcases. Replace drain plug, spark-plug (ensure first that it is not wet with excess fuel), turn on fuel-tap and start as normal.

When engine starts normally but lacks power, and will not rev up smoothly (1) check exhaust-port and silencer for carbon build-up and remedy as in Decarbonising. (2) Check fuel-feed for port blockage and remedy as above. (3) Check "lift" in main bearings and remedy as under Engine. (4) Check ignition timing and reset to 25 degrees before TDC.

Should engine misfire (1) check that fuel is free from globules of water (which usually collect in float-chamber and jet-cover bolt) and remedy by cleaning carburettor and refilling fuel tank. (2) Check air filter-plates for blockage, remove, wash in petrol and replace. (3) Check main-jet, throttle cutaway size and needle position for over-weak setting and remedy as in Carburettor.



Sectioned drawing of the carburettor (through mixing chamber).

float on flanged collars fitted on front-wheel spindle. The front-brake torque arm (or brake anchor-arm) is connected to the front fork by a separate link. On no account must the brake-plate be clamped rigidly to front-wheel spindle. The front brake linings are bonded to their shoes.

Rear wheel.

The rear brake is an internal-expanding type of $4\frac{1}{2}$ in. diameter, and it is operated by "back-peddalling". The brake shoes are expanded by a cam connected to a quadrant which, in turn, is operated by a spur-gear. No lubrication other than the packing with grease on assembly, is necessary. When pedalling the machine forward, a clicking noise comes from the hub. This is quite in order.

If the rear brake-shoes are removed, it should be noted that the brake shoe-springs are of different lengths. The cam-end spring is $1\frac{1}{2}$ in. long and the anchorage end spring is $1\frac{1}{4}$ in. long, and is coloured black.

ENGINE

Apart from decarbonising and servicing of magneto, the engine needs no attention, unless, after considerable mileage, main bearings, big-

pull off fuel-pipe at carburettor, remove carburettor. Disconnect engine support-strap from rear of cylinder. Remove (3) nuts from gearbox clamping studs and take engine from primary shaft housing. Remove magneto (see Electrical Repairs). Remove cylinder-head, cylinder and piston as for decarbonising. Remove (4) crankcase clamping-bolts, separate crankcase halves and remove crankshaft assembly. Immerse crankcase-halves in hot water, tap out main bearings and oil-seals. Wash all parts in petrol. Clean off all joint faces and examine for wear, (1) Main bearings should be replaced if any trace of wear is apparent, (2) Crankshaft keyway and driving tongue should be examined in addition to big-end and small-end bearings. If small-end bush worn, press out, fit new bush and ream until gudgeon-pin is a sliding fit. If big-end or shafts worn, fit service replacement assembly. (3) Oil seals should be replaced, together with gaskets when engine is dismantled completely for any reason.

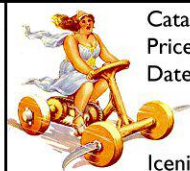
Heat crankcase halves in hot water, tap bearings home on crankshaft and fit crankcase-halves together over crankshaft with sealing compound on joint-faces. Bolt up crankcase halves, fit piston, cylinder and cylinder-head as in Decarbonising. Lightly oil main bearings

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

CARRIER CYCLE REPAIRS

and will be included in the issue dated
6 JULY, 1957

Additional copies of these Service Sheets may be obtained by readers at 1s. each or 11s. a dozen.



HER-CU-MOTOR FACTS

Since the publication of Service Data Sheet No. 18 covering the Hercules HCM Her-cu-motor the Hercules Cycle and Motor Co. Ltd. states that the following technical modifications have been found to be desirable.

- (a) Tail Lamp and Bulb (page two of Service Sheet) :
A 6V 3W tail lamp bulb is now fitted instead of the type mentioned.
- (b) Carburettor Jet Size (page three) :
Sizes 27 (standard) and 30 are the only ones which should be used with the HCM engine. Other sizes mentioned have been found to be unsuitable.