

**S E R V I C E
S T A T I O N
M A N U A L**

G.L.2 Model

**DOUGLAS (Kingswood) LTD.
Kingswood, Bristol.**

DOUGLAS - ~~Capd~~

SERVICE STATION MANUAL

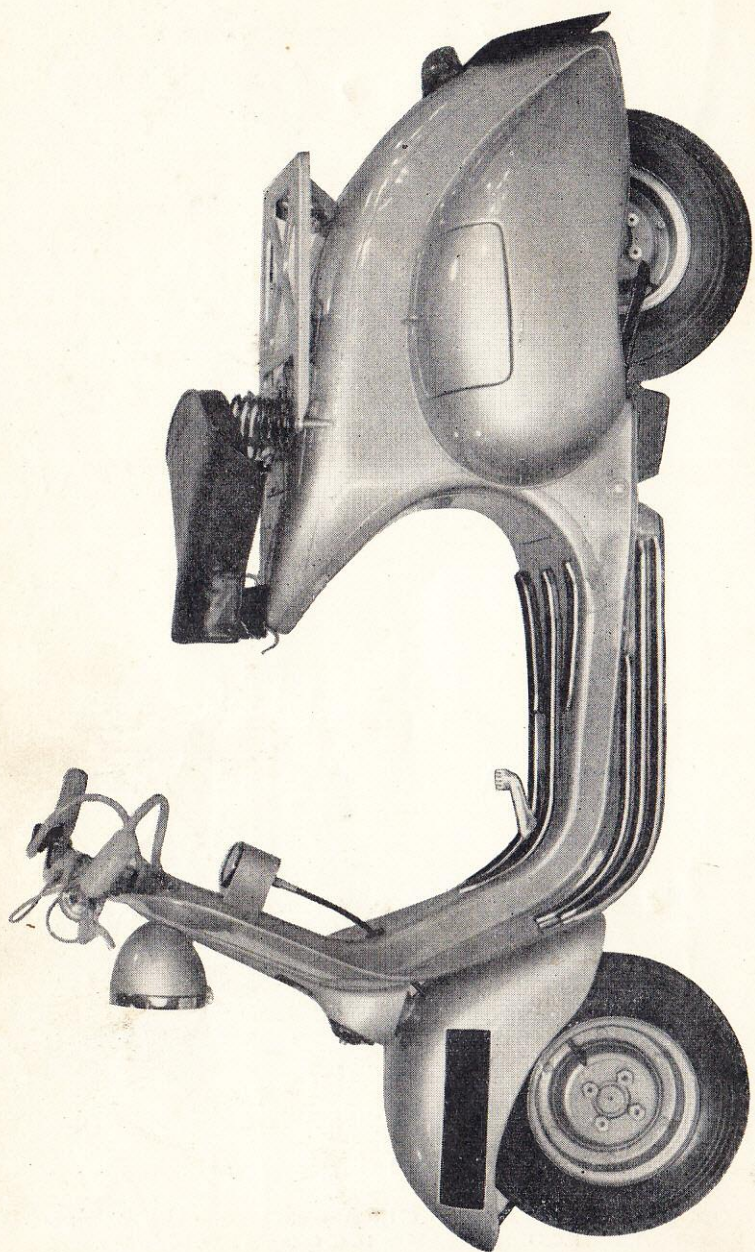
G.L.2 Model

DOUGLAS (KINGSWOOD) LTD · KINGSWOOD · BRISTOL

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1st Section
Specification and General Data



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DESCRIPTION

(INTRODUCTION)

When the Vespa was introduced in Italy in 1945 the cylinder capacity was 98 cc., and it was later increased to 125 cc. Since then the model has been produced with only minor modifications. For 1955 however several important changes were made to the power unit, and minor modifications to the chassis and suspension.

This model is designated the "GL2." The Service Manual is mainly concerned with this model only, *BUT* reference is made to previous models on Page 73.

The crankshaft has been redesigned, and machined steel flywheels replace the bobweights employed previously. Objects of the change are to increase the crankcase compression and to improve the flow of the ingoing charge by decreasing crankcase turbulence. The outside diameter of the two caged ball bearings which support the crankshaft is increased by 11mm.

The cylinder of the new engine, too, has been considerably altered. Two transfer ports are employed. The exhaust port is underneath the cylinder, instead of at the left side as previously, and is of increased diameter—30 mm. as compared with 24 mm. on the earlier engine. That part of the piston deflector which directs the ingoing charge is in the form of an inverted V. The combustion chamber is almost hemispherical. Depth of the cylinder head finning has been increased. Entirely redesigned, the exhaust system incorporates a transverse expansion chamber, which replaces the fish-shaped unit previously employed.

To improve cooling, the aluminium air ducting which surrounds the fan has been altered in shape and the depth of the steel cylinder cowl is increased. Modifications have been made also to the cast-aluminium engine bearer. The bearer pivots on bonded rubber bushes which are pressed into the cross-member and not, as previously, into extensions from the cross-member. Only two pinch bolts are employed to clamp the engine to the bearer.

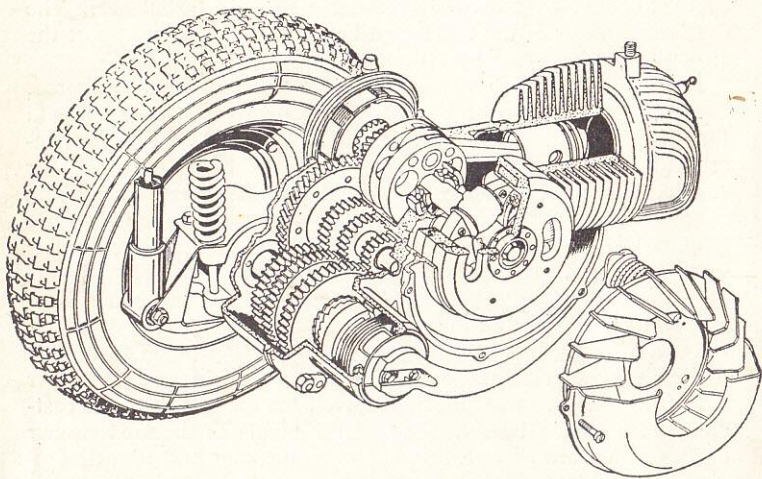
Changes to the transmission include the fitting of two extra plates in the clutch and a more robust footstart assembly. The clutch drum is of the same width as before—space has been made to accommodate the extra cork-carrying plate and steel intermediate plate by employing thinner intermediate plates and compressing the springs to a greater extent. In order to ensure greater longevity the diameter of the gearbox end of the combined mainshaft and rear-

wheel driving spindle has been increased by 5 mm.; the sliding foot-starter engagement ratchet is also of larger diameter and greatly increased thickness. The engagement dogs inside the three main-shaft pinions have been increased in width. As with the later 1954 models, gear changing is by means of a two-cable, twistgrip-operated control on the left handlebar. To prevent water and grit entering the rear brake, the flange of the drum is fitted into a machined recess in the engine bearer.

Internal construction of the B.T.H. flywheel magneto remains unchanged; no changes have been considered necessary. Lighting is direct, but battery-energized parking lights are available at extra charge.

Improvements to the remainder of the machine include a more robust trunnion block for the front suspension spring. The new trunnion block incorporates a grease nipple; and a modified damper valve for the rear suspension is claimed to provide more progressive rebound control.

FIG. 1. SECTIONALISED VIEW OF VESPA ENGINE.





SPECIFICATION

ENGINE

Max. B.H.P.	: 5 at 5,000 r.p.m.
Bore	: 54 mm. (2.12 ins.)
Stroke	: 54 mm. (2.12 ins.)
Displacement	: 125 cc. (7.48 cu. ins.)
Compression Ratio	: 6.4 : 1

IGNITION

From flywheel magneto, one H.T. coil to the sparking plug, and two L.T. coils to the lighting system and horn, in conjunction with selenium rectifier and battery, 6 v. 8 ah.

Headlamp	: 6 v. 24 watts.
Parking light and tail light	: 6 v. 3 watts.
Speedometer light	: 6 v. 3 watts.
Sparking plug—electrodes gap	: 0.018 ins.
Magneto contacts gap	: 0.012 ins.

COOLING

By forced draught from centrifugal fan maintaining a constant temperature at all times.

FUEL SYSTEM

Gravity feed from fuel tank to Amal type carburettor.

Maximum Jet	: 95
Fuel Tank capacity	: 1.1 gallons
Emergency reserve	: 0.2 gallons

LUBRICATION

By petrol-oil mixture for cylinder barrel, piston, main bearings and crankshaft.

By oil for gearbox and clutch. For further data refer to Lubrication Chart on Page 24.

TRANSMISSION

From crankshaft through clutch (wet disc type—cork inserts) and spring loaded gear to gearbox; from gearbox by direct drive on rear wheel.

Three speed gearbox: controlled from twist grip on left handlebar.

Gear Ratios—1st gear	: 12.2 to 1
2nd Gear	: 7.6 to 1
3rd Gear	: 4.85 to 1

FRAME

Distance between axles	: 44½ ins.
Maximum width of handlebars	: 31.5 ins.
Overall length	: 67.5 ins.
Maximum height at handlebars	: 38½ ins.
Ground Clearance	: 6 ins.
Minimum turning circle diam.	: 59 ins.
Weight empty	: 180 lbs. approximately

SUSPENSION

Spring suspension on front wheel. Rear engine-wheel bracket (pivoted on frame with special rubber bushes), with variable rate coil spring and single action hydraulic damper.

WHEELS

Pressed steel—interchangeable and removable in the same way as the wheels of a car, with split rims to facilitate removal of tyre and tube.

Tyres : 3½ by 8 ins.

Pressures:—

Michelin

Front	: 17 lbs. per sq. in.
Rear	: 23 „ „ „ „
Rear—(with 2 persons)	: 30 „ „ „ „

BRAKES

Mechanical car-type expanding brakes on both wheels with separated controls.

Front: hand lever on R.H. side of handlebars.

Rear: foot pedal on R.H. side of floor board.

SPEEDOMETER

Connected to front wheel axle by a gearbox and flexible drive to speedo clock. Mounted on central longeron.

PROPRIETARY EQUIPMENT

Battery: Joseph Lucas Ltd. (Local Depots) and
Birmingham 18.

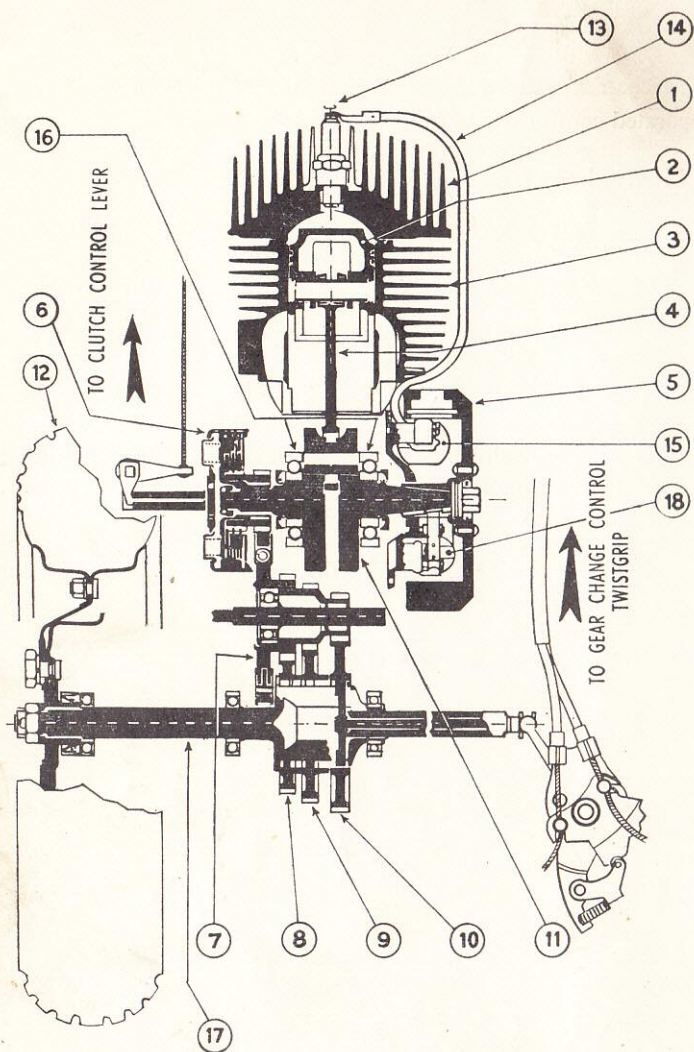
Flywheel Magneto and Handlebar Switch British Thomson-Houston Co. Ltd.,
Alma Street,
Coventry (and local depots).

Carburettor: Amal Ltd.,
Holford Works,
Birmingham, 20.

Speedometer: Smiths Motors Accessories Ltd.,
Cricklewood Works,
London, N.W.2.

Tyres: Michelin Tyres Co. Ltd., Burslem, Staffs.

Sparking Plug: K.L.G. Sparking Plugs Ltd.,
London, S.W.15.

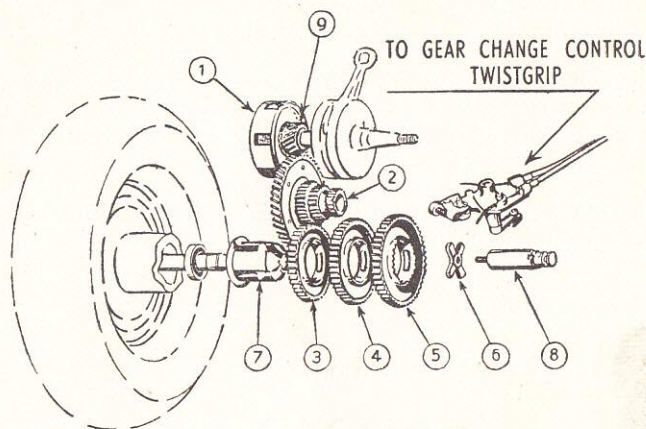


ENGINE LAYOUT FIG. 2.

- | | |
|---------------------|------------------------------|
| 1. Cylinder head | 10. 1st Gear pinion |
| 2. Piston | 11. Crankshaft |
| 3. Cylinder | 12. Driving Wheel |
| 4. Connecting Rod | 13. Sparking Plug |
| 5. Flywheel Magneto | 14. Plug Lead |
| 6. Clutch | 15. Ignition Coil |
| 7. Cush Drive | 16. Crankshaft ball bearings |
| 8. 3rd Gear pinion | 17. Gear Shaft |
| 9. 2nd Gear pinion | 18. Low tension Coils |

ENGINE

The two piece CRANKCASE is in the cast aluminium alloy and embodies the clutch, cush drive, gearbox, starter assembly and the rear wheel shaft. Besides that it houses the flywheel and the centrifugal cooling fan, which are protected by a suitable cover.



- | | |
|--------------------|------------------------------|
| 1. Clutch | 6. Selector |
| 2. Cush drive | 7. Gear shaft |
| 3. 3rd gear pinion | 8. Selector stem |
| 4. 2nd gear pinion | 9. Compound pinion of clutch |
| 5. 1st gear pinion | |

FIG. 3. DRIVE SYSTEM

The cast iron CYLINDER has four ports: one for intake, two for transfer and one for exhaust, and is generally finned on the exhaust side; the detachable CYLINDER HEAD is in light alloy. Both these components are secured to the Crankcase by means of three studs.

The light alloy PISTON has a special deflector on its crown, which completes the efficiency of the reverse flow transfer.

The webbed CRANKSHAFT is built of three parts, the crankpin being pressed into the crank webs. (See Figs. 1 and 2).

Both CLUTCH AND FLYWHEEL are mounted on the crankshaft ends and locked with woodruff keys. The clutch drives the multiple gear through a special cush drive.

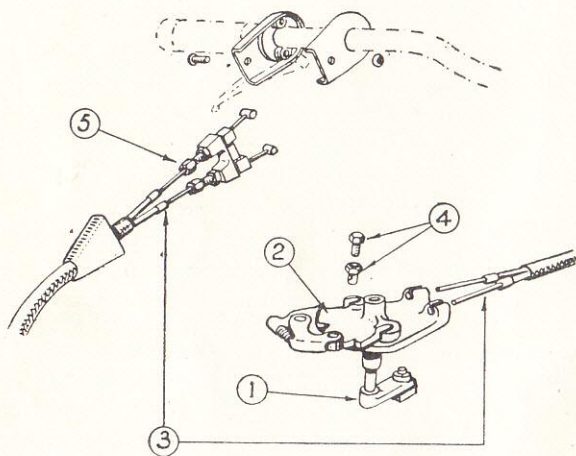
The light alloy flywheel rotor has cast in magnets and laminations and its central bush, slotted to house the woodruff key, has a cam outline to operate the breaker points. The contact breaker, the three coils and the condensor are mounted on a stator plate secured to the crankcase.

The CUSH DRIVE consists of two concentric parts (an outer gear and a cluster of three pinions) and six incorporated springs which absorb the sudden motions of the crankshaft and wheel. The centre cluster of three pinions, the multiple gear, meshes with the three corresponding PINIONS floating on the mainshaft (Fig. 3) which bears the rear wheel as well. According to which gear ratio is required, the selected gear can be locked to the mainshaft by means of the SELECTOR which is operated by the twist grip, and cables located on handlebars (L.H. side) (Fig. 4).

The FOOTSTART ASSEMBLY is housed in the crankcase, and comprises a spring loaded ratchet meshing with the teeth on the face of the first gear pinion (see Fig. 1) when the footstarter is depressed.

The ratchet disengages on the return movement being pulled back by the return coil spring.

FIG. 4



1. Cross-piece operating lever

2. Indexing plate

3. Control cables

4. Cable clamping screw

5. Cable adjusters

The CARBURETTOR (see Fig. 5) is housed beneath the framework under the saddle, and can be reached through the small door in the chassis as shown (see Fig. 6). It is adequately protected from dirt or dust, there is also an air filter on the intake which gives further protection. This air filter is fitted with a choke which is operated by a rod located under the saddle (see Fig. 7).

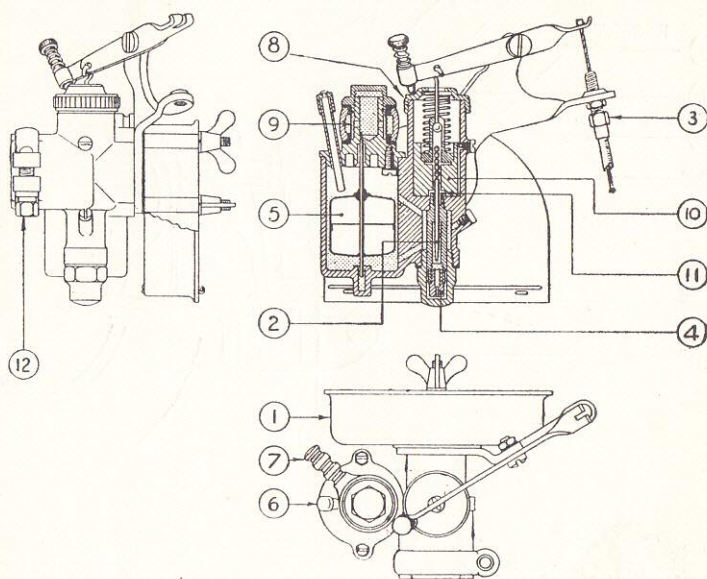


FIG. 5. CARBURETTOR, VERTICAL SECTION

- | | |
|--------------------------|-----------------------------|
| 1. Air Intake | 7. Fuel Supply Pipe |
| 2. Tapering Needle | 8. Mixing Chamber Cover |
| 3. Throttle Control Wire | 9. Fuel Filter |
| 4. Maximum Jet | 10. Throttle Valve |
| 5. Float | 11. Jet Spray Nozzle |
| 6. Tickler | 12. Collar Tightening Screw |

The petrol mixture reaches the carburettor from the fuel tank by gravity feed. There is a fuel-filter fitted in the connecting pipe of the carburettor. The jet is easily dismantled by a spanner in the manner shown (see Fig. 6).

The FUEL TAP is of the push-pull type and incorporated (see Fig. 6) is a small lever situated above the main tap, which, when turned at right angles with the fuel tap in the "on" position, gives access to the reserve supply, this amounting to approximately 0.2 gallons.

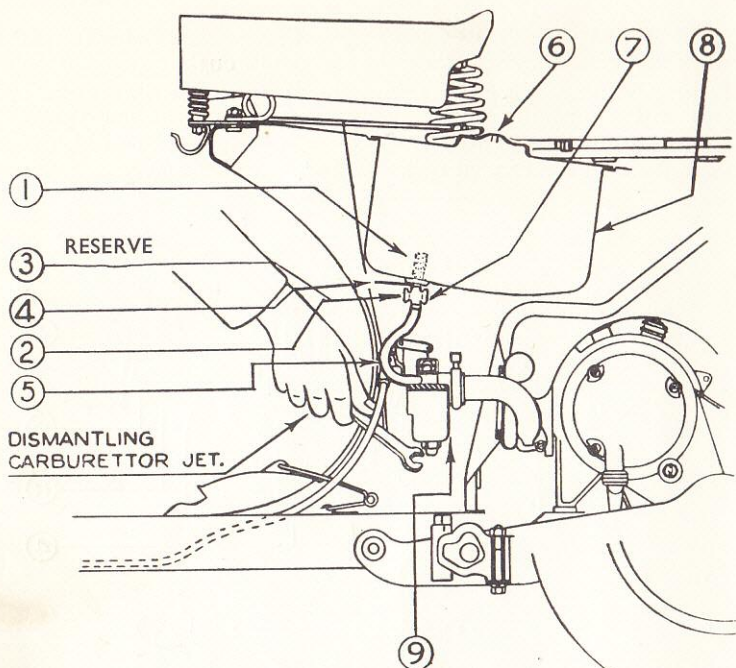


FIG. 6. DISMANTLING CARBURETTOR JET

- | | | |
|----------------|-----------------------|----------------|
| 1. Fuel Filter | 4. Cock Reserve | 7. Cock |
| 2. Cock Closed | 5. Rubber Petrol Pipe | 8. Fuel Tank |
| 3. Cock Open | 6. Vent | 9. Carburettor |

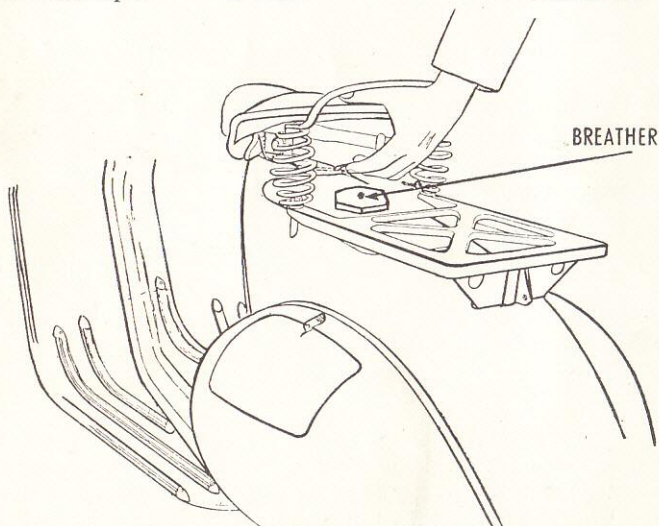


FIG. 7. CHOKE CONTROL

COOLING is obtained by means of a centrifugal fan which is bolted to the flywheel (see Fig. 8). The fan sucks air through the central orifice of its cover, and blows it through the fan casing into the cooling hood which partially shrouds both the cylinder and cylinder head. Such an efficient and safe system sends a steady air stream on to all surfaces of the cylinder and cylinder head, thus maintaining a constant temperature.

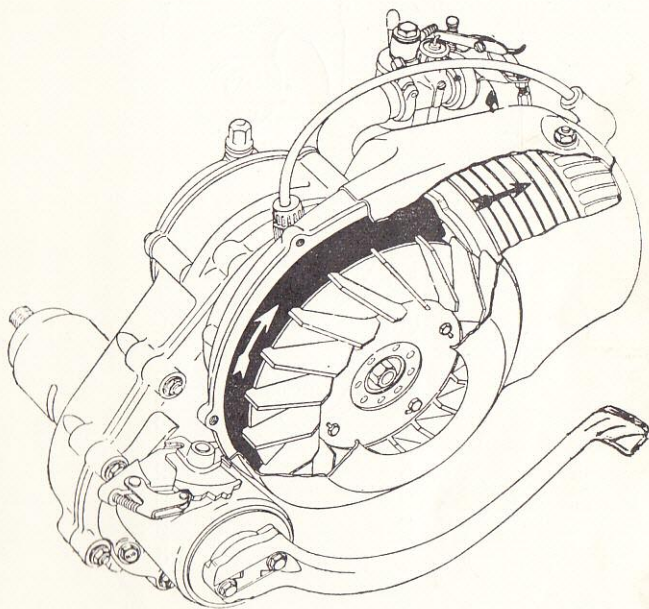


FIG. 8. ENGINE COOLING SCHEME

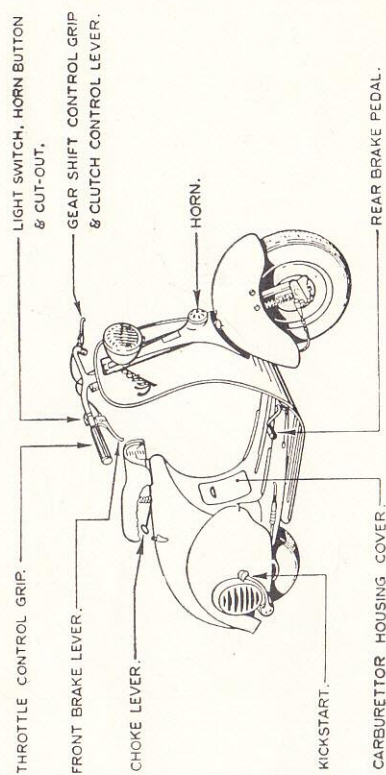


FIG. 9. CONTROLS

CONTROLS

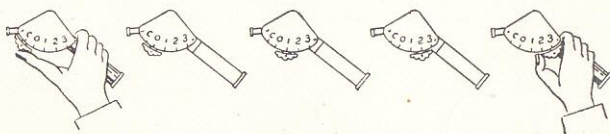
All VESPA controls, but the rear brake pedal and footstarter, are hand operated. The left hand twistgrip of the handlebars operates the gear change by means of two flexible cables secured on a ratchet quadrant which operates the selector; the cables are attached to the quadrant by means of two screwed nipples which provide means for adjustment (see Fig. 2 and 9). The clutch control lever is pivoted on the same twist grip; it operates the clutch through a cable which has an adjustment screw and lock nut on the opposite end.

The throttle is controlled by the right hand twistgrip through a cable which operates the throttle slide. Idling revs can easily be raised by simply tightening the adjuster screw which presses on the mixture chamber cover and vice versa (see Fig. 4); this screw is threaded into the rocker to which the control cable is secured.

The front brake control lever is also situated on the right hand side of the handlebars. The rear brake is operated by a pedal on the right hand of the floorboard; both front and rear brakes are operated by cable control, with adjusting nut and locknut near their respective wheels (see Fig. 9).

The switch controls all lighting, engine cut-out and horn. These positions are operated by the thumb to give the following lighting conditions.

Switch Position	Head Lamp		Tail Light	Speedo Light	Parking Light
	Dipping	Beam			
C.	MAGNETO		EARTH		
0	OFF	OFF	OFF	OFF	OFF
1	ON	OFF	ON	ON	OFF
2	OFF	ON	ON	ON	OFF
3	OFF	OFF	ON	ON	ON



FRAME

The pressed steel frame (Fig. 10) consists of a central longeron of inverted " U " section, which becomes wider at the rear end where it is spot-welded to the rear part of the body.

Built on to the longeron is the main shield which strengthens the assembly and affords weather protection to the rider.

The engine bracket is pivoted to the frame (Fig. 10) where the longeron is spot-welded to the rear part of the body. The rear suspension (coil spring and hydraulic damper) is located between the engine bracket and top panel of the body.

The rear wheel and ENGINE BEARER (Fig. 13) is a light alloy casting pivoted at the end of the longeron.

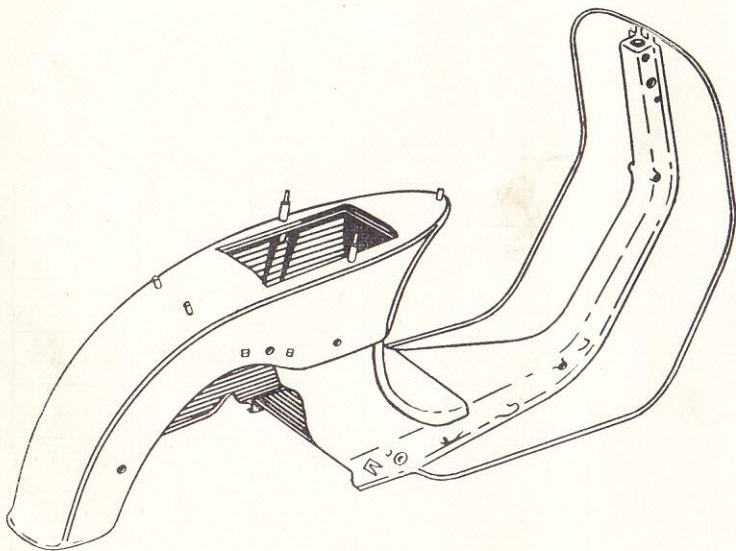


FIG. 10. FRAME

STEERING COLUMN

The steering column is formed by a cranked tube turning on two thrust ball bearings inside the longeron (Fig. 11).

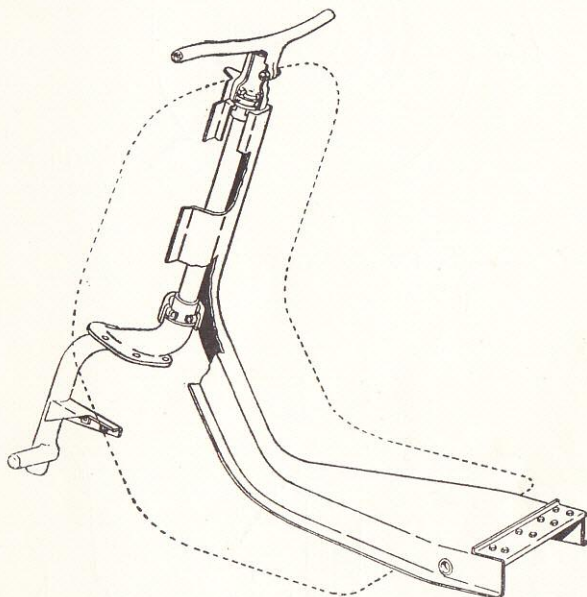


FIG. 11. FRAME, STEERING COLUMN AND HANDLEBARS

The ball races are force fitted on chassis or steering column. The bottom crank of the column permits the attachment of the front hub, stub axle and wheel.

The hub houses two ball bearings for the front spindle (Fig. 12) and bears the variable rate coil spring. The top end of which is secured to a bracket welded on the steering column. The WHEEL SPINDLE is slotted to provide a drive for the speedometer gearbox.

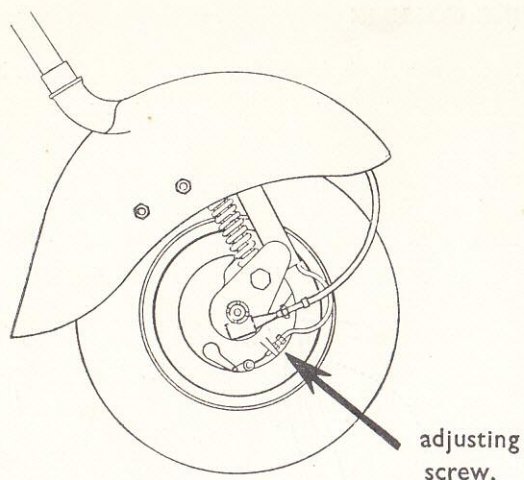


FIG. 12. FRONT WHEEL SUSPENSION

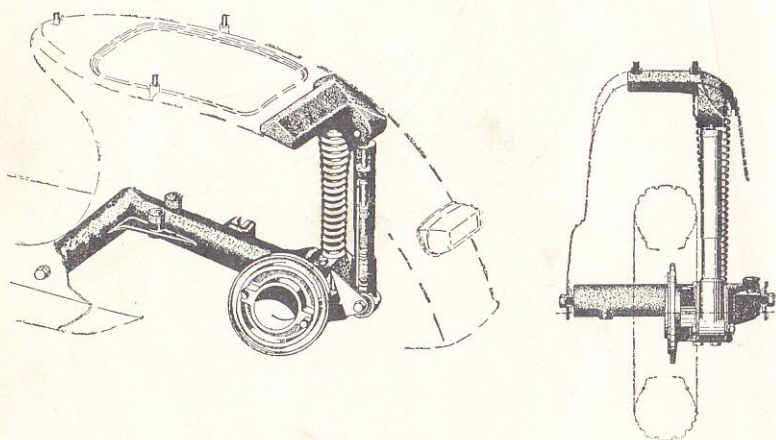


FIG. 13. REAR WHEEL SUSPENSION

There is a LOCK mounted on the central longeron which engages two lugs welded on the steering column when the key is turned anti-clockwise, thus arresting further movement of the handlebars, when turned fully to the left. (Fig. 14).

The TOOL KIT consists of:—

- 1 single ended flat spanner 9 mm.
- 1 single ended flat spanner 10 mm.
- 1 double ended flat spanner 11 and 14 mm.
- 1 double ended flat spanner 7 and 8 mm.
- Tommy Bar
- 1 double ended box spanner 11 and 14 mm.
- 1 double ended box spanner 21 and 22 mm.
- 1 Screwdriver

also special carburettor spanner:—

- 1 double ended flat spanner $\frac{1}{4}'' \times \frac{5}{16}''$.

All contained in a canvas tool roll.

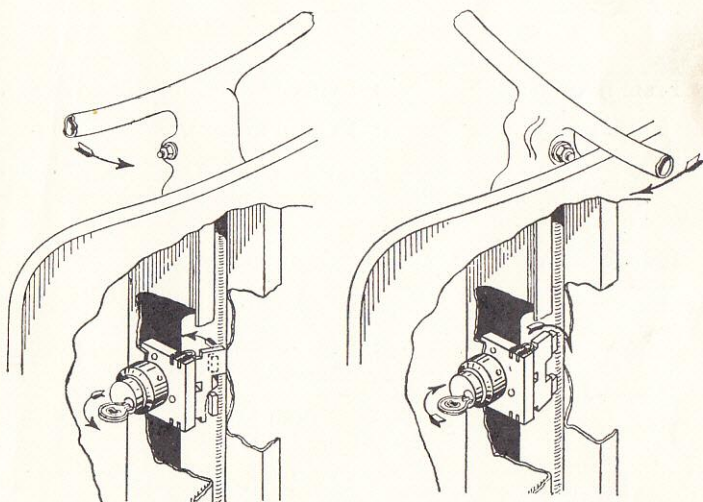


FIG. 14. UNLOCKED POSITION.

LOCKED POSITION.

ELECTRICAL SYSTEM—WIRING

On the flywheel magneto there are three coils, one H.T. to the sparking plug, and two L.T. for lighting and horn, in conjunction with selenium rectifier and resistor (5 Ohms.) and 6 v. battery. (Fig. 15).

Note: The following system of wiring only applies to solo Vespas supplied with parking lights. It does not apply to Vespas supplied without parking light equipment or Vespa Commercial and Passenger sidecar models. (Fig. 16).

The leads used on the wiring circuit of the Vespa are coloured as follows:—

- | | |
|-----------------------------|-----------------------------------------------------|
| From the flywheel magneto : | 1 Black from earth to switch. |
| | : 1 yellow from L.T. terminal to resistor. |
| From battery : | 1 Black to rectifier. |
| From rectifier : | 1 Brown to switch. |
| | : 1 Black to battery. |
| From resistor : | 1 Green to push-button on switch. |
| | : 1 Green to horn. |
| | : 1 Yellow from L.T. terminal of fly-wheel magneto. |
| Inside Switch : | 1 Green from resistor. |
| | : 1 Brown from rectifier. |
| | : 1 Black from earth on flywheel magneto. |
| | : 1 Yellow to full beam on headlamp main bulb. |
| | : 1 Dark blue to dipped beam on headlamp main bulb. |
| | : 1 Light blue to headlamp parking bulb. |
| | : 1 Red to tail lamp and to speedometer head. |

- At push-button on switch : 1 Purple to horn.
- At horn : 1 Purple from push-button on switch.
: 1 Green from resistor.
- At headlamp : 1 Yellow from switch to full beam on main bulb.
: 1 Dark blue from switch dipped beam on main bulb.
: 1 Light blue from switch from parking light bulb.
- At tail lamp : 1 Red from switch.
- At speedometer head : 1 Red from switch.

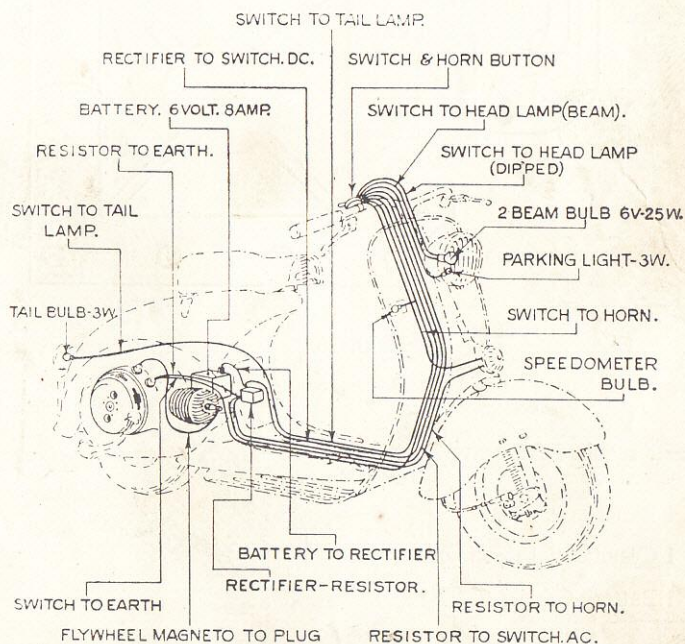


FIG. 15. ELECTRIC WIRING DIAGRAM

COMMERCIAL PASSENGER WIRING DIAGRAM

WESTALITE RECTIFIER—2L 985. PART No. 24117

Side and tail lights on passenger/commercial vehicle are connected as in Fig. 17.

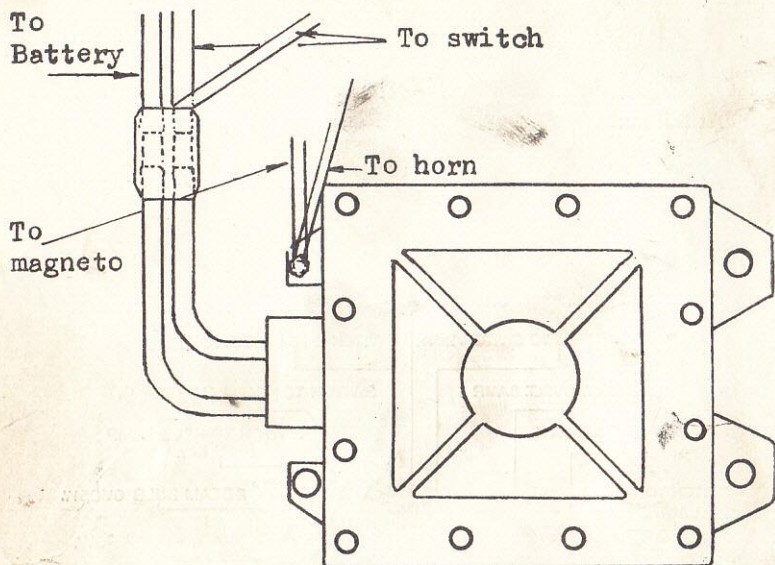


FIG. 16.

Parts required for conversion from solo:—

- 1 Battery 6v. 12a.
- 1 Commercial Rectifier 2L 985.
- 1 Battery Carrier (large type).

Please Note: that this rectifier has a positive earth, it is essential therefore that when connecting battery, the positive lead must go to earth.

FLYWHEEL MAGNETO AND GENERATOR UNIT

NOTE: Examine to ensure that vibration has not caused any fraying and that the wiring generally is in good order.

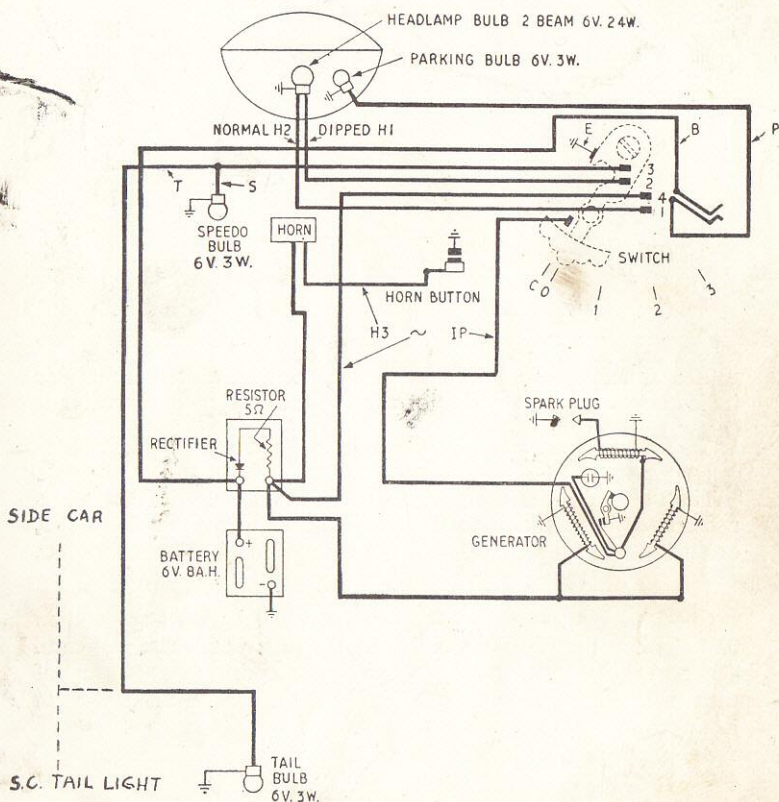


FIG. 17. WIRING DIAGRAM INCLUDING INTERNAL CONNECTIONS OF FLYWHEEL MAGNETO GENERATOR

FLYWHEEL MAGNETO AND GENERATOR UNIT

The unit consists of the following:—

- (a) A Flywheel, comprising six permanent magnets and pole pieces cast into an aluminium casing. The ignition cam is riveted to the flywheel and an internal taper in the cam is used for mounting the flywheel on the engine.
- (b) A Backplate comprising the essentials for lighting and ignition, viz:—
 - (i) Two lighting coils.
 - (ii) Ignition coil.
 - (iii) Contact breaker.
 - (iv) Capacitor.

The complete wiring diagram of the machine, which also clearly indicates the internal wiring of the flywheel magneto generator is shown on Page 21.

The unit has been designed so that the minimum of service is necessary and attention to the following points every 3,000 miles, or during engine overhaul, will keep the unit in first class condition.

Check the contact gap and adjust if noticeably greater or less than 0.012" when the contact lever is on the high portion of the cam. The large holes in the flywheel have been so positioned that one of them will show the contacts fully open, the other will show them just opening.

Lubrication:—

Contact lever—Lean the machine on its side and allow one spot of light oil to run down the pivot pin. Wipe off all surplus and keep oil from the contacts.

Lubricating cam pad:—Replenish with three spots of light oil. Avoid excess oil.

LUBRICATION—ENGINE:

This is attended to by the oil content of the fuel mixture in the tank. No additional lubrication is necessary, but it is of course *ESSENTIAL* that the necessary quantity of lubricating oil to the petrol when filling up, is never omitted. (See Lubrication Chart on Page 24.)

—GEARBOX:

At the rear of the engine is a plug marked *OIL*. Unscrew this, and pour in about one sixth of a pint of oil, until the oil level is just up to the inlet hole. (Fig. 18).

After the first 600 miles, drain out the old oil by leaning the machine over on its right hand side, with the engine warm, and before refilling, rinse the gearbox thoroughly with flushing oil and drain thoroughly.

Every 600 miles check the level of the oil, and replenish as may be necessary.

—FRONT HUB AND TRUNNION BLOCK:

At the completion of every 600 miles, lubricate the front hub and trunnion block with a pressure grease gun.

—HYDRAULIC DAMPER:

If trouble develops with this unit, it is better to remove same from machine, and drain out old oil then refill with clean oil.

Note: The utmost cleanliness during this operation is essential.

LUBRICATION CHART

<i>Part to be lubricated</i>	<i>When to be lubricated</i>	<i>Lubrication Instructions</i>	<i>Type of Oil to be used</i>			
			<i>Shell</i>	<i>Mobil Oil</i>	<i>Esso</i>	<i>Wakefield</i> <i>B.P.</i>
ENGINE	At every refuelling	Petrol oil-mixture During first 1,200 miles: $\frac{3}{4}$ pint of oil per 1 gallon petrol. After first 1,200 miles: $\frac{1}{2}$ pint of oil per 1 gallon petrol	X 100—30	Mobiloil 'A'	30	XL Energol SAE 30
GEARBOX	Immediately after first 600 miles Every subsequent 600 miles	Drain off all oil while engine is warm; rinse thoroughly with paraffin; refill with clean oil. Replenish oil level.	X 100—30	Mobiloil 'A'	30	XL Energol SAE 30
FRONT HUB	Every 600 miles	Lubricate with pressure gun	Shell	Vacuum	Esso	Wakefield Castrol- ease Heavy B.P.
LUBRICATION FELT OF FLY-WHEEL MAGNETO CAM	Every 1,200 miles	Apply two or three drops of light oil.	Retinax RB	Mobil-Hub Grease	High Temp. Grease	ditto.
HYDRAULIC DAMPER	If damper is not functioning freely	Drain and completely refill See page 48 DEALERS ONLY	Donax A1	Mobiloil Shock Absorber Oil light	Hydraulic Oil light	Castrol Shockol Energol SA Light

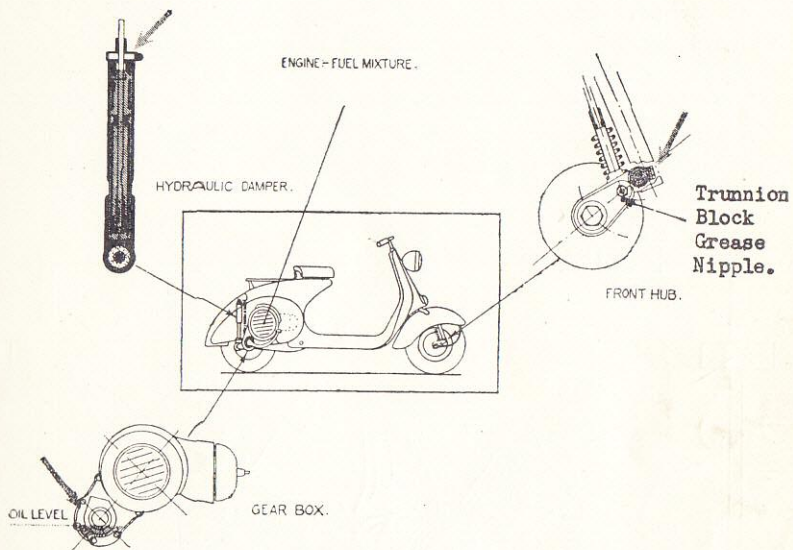


FIG. 18. LUBRICATION DIAGRAM

ACCESSORIES

The Standard Vespa is delivered as shown in the photograph in the front of the book; all the accessories listed hereunder can, however, be delivered by request, thus widening the field of use of the scooter.

A soft foam rubber *pillion seat* of pleasant appearance completes the efficiency of the suspensions and provides a comfortable ride for the passenger (Fig. 19). The pillion seat is secured on to the rear luggage carrier by means of four nuts, and washers.

A sturdy *bracket* for the spare wheel can be secured to the luggage carrier by means of three bolts; a *spare wheel*, which does not derange the passenger at all.

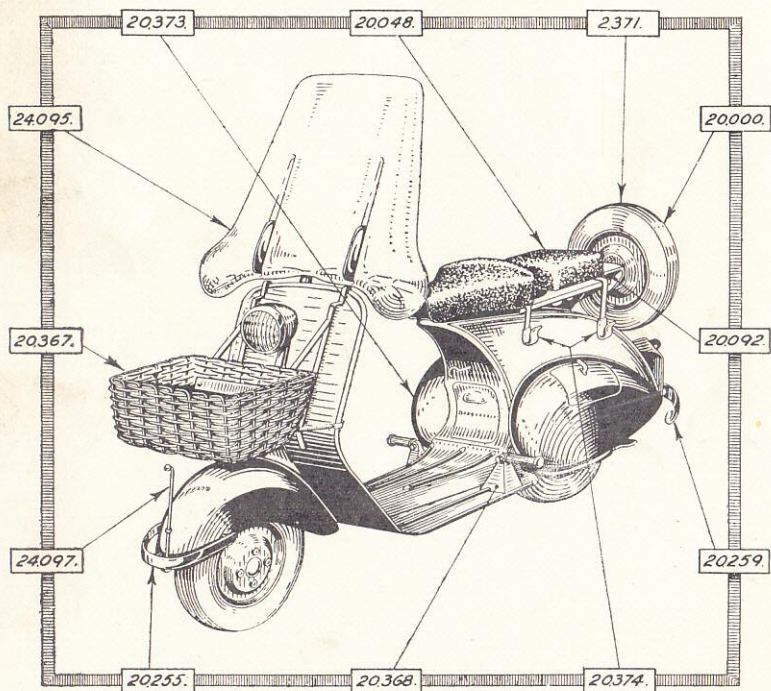


FIG. 19. VESPA—COMPLETE WITH ACCESSORIES

REMOVING AND DISMANTLING THE STEERING COLUMN

In each section of this Manual, the Vespa has been considered as divided into three main units; STEERING COLUMN, CHASSIS and ENGINE.

Before commencing work on the Vespa it will be found easier to place the machine on to a bench or platform, approximately 3 feet high; this will then allow both wheels, engine and steering column to be removed with ease.

FRONT WHEEL—Removing and dismantling

Remove the four nuts, and withdraw the wheel sideways from the drum (Fig. 20). Deflate the inner tube; remove the six nuts and washers holding the two rim flanges together. Having done this the two flanges can then be separated. To reassemble slightly inflate, and place the two rim flanges together and secure with the six nuts and spring washers; inflate to correct tyre pressure.

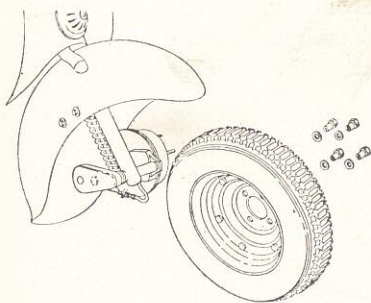


FIG. 20

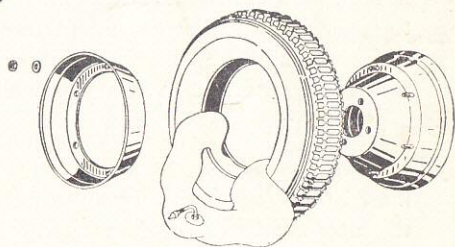


FIG. 21

DISMANTLING THE HANDLEBARS

If complete dismantling of the handlebars is not required, it is possible to remove them from steering head without disconnecting all the controls; all that is required is to release the clamp holding the front brake cable situated on the wheel hub. This will then allow the cable to be pulled upwards through the steering column. Now remove the nut and bolt clamping the handlebars in position.

The complete assembly can now be lifted off of the steering column and be suspended on the remaining cables.

Note 1: Care must be taken not to twist or distort these cables.

Note 2: If one or more cables have to be changed, or removed from the chassis, it is advisable to tie a pilot wire to their ends, so that it remains in the chassis to ease the assembly of a new cable.

Should it be necessary to take the handlebar components completely apart, proceed as follows:

Remove the switch cover; remove the screw securing the switch to the handlebars; release the front brake cable from its clamp on the front hub, depress the slotted end of the rocker on the carburettor and release the throttle cable, then raise the outer clutch control lever on the engine, by means of a screw driver, or similar tool and pull the cable free.

Remove the nuts and screws securing the control levers to the handlebars; release the clutch and front brake cables from their levers; remove the throttle control cable from the throttle slider.

Turn back the rubber sheath on the gear change control cables to give access to adjuster guide; remove the nut on the end of the screw securing the guide, then remove the screw; pull slightly outwards the gear change twistgrip without rotating it too much;

Now go to the gear index plate mounted on the engine and remove the two nipples (Fig. 23 "A" and "B") securing the cables. The inner cables can now be removed from the handlebar end. Ease the cable nipples out of the twistgrip (Fig. 22). To dismantle the throttle grip remove the rubber grip then remove the switch and slide bracket; the slide itself will then be free.

Carry out any necessary repairs, and reverse the above procedure for the assembly.

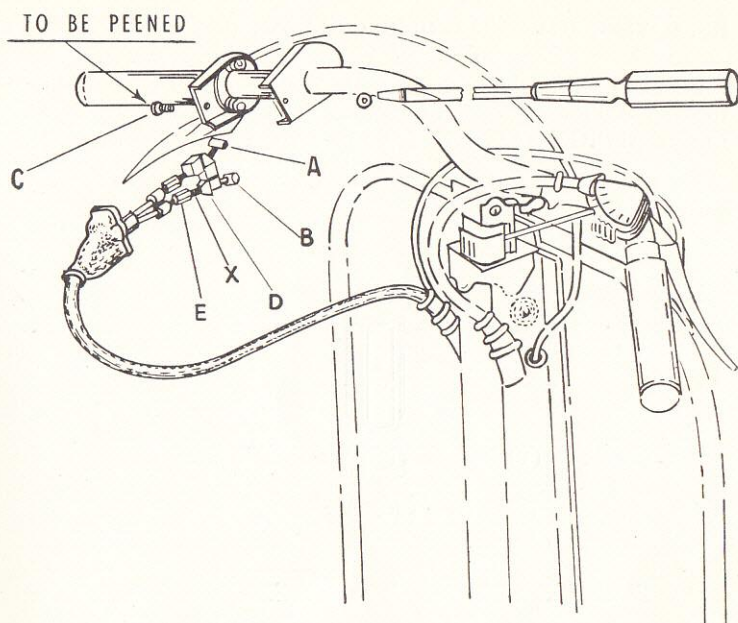


FIG. 22. DISCONNECTING GEAR CONTROL CABLES ON THE HANDLEBARS

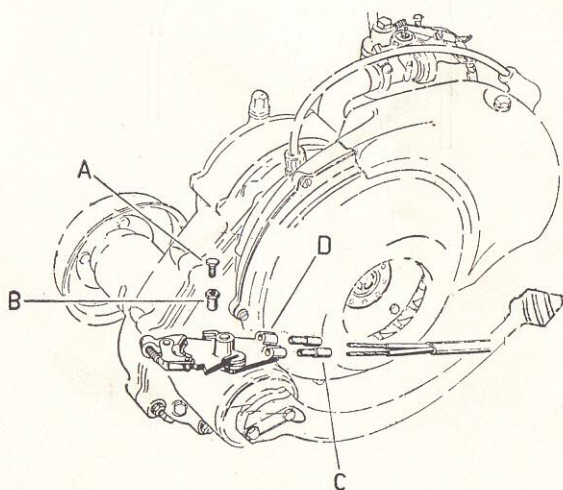


FIG. 23. DISCONNECTING GEAR CONTROL CABLES AT THE ENGINE UNIT

REMOVING THE STEERING COLUMN (Fig. 24)

First disconnect the cable from the speedo clock by unscrewing the thumb screw situated at the base. Now, using Tool No.14484 LOCKING RING SPANNER unscrew the top locking ring (1).

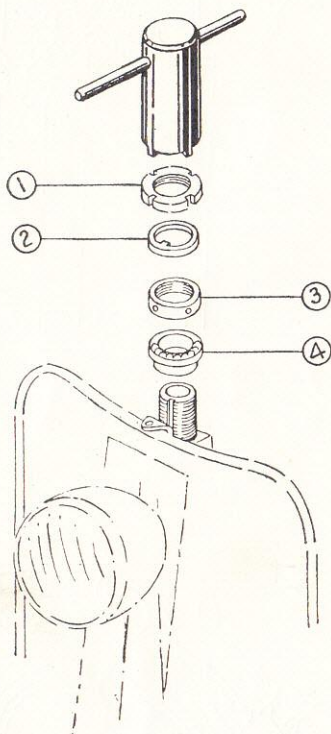


FIG. 24. LOCKING RING SPANNER FOR REMOVING STEERING COLUMN

Remove the locking washer (2); unscrew the top race of the ball bearing (3) (at the same time supporting the steering column assembly). This will then set free the 35 ball bearings (4). The complete assembly can then be withdrawn from the frame at the same time feeding the speedo cable back through the frame; in the process of this operation it will be found that the 22 ball bearings of the bottom bearing will also be set free.

If it is necessary to remove the top ball race track from the top of the longeron, this can be done by using a suitable drift inserted from the bottom of the frame.

To remove the top race at the bottom of the steering column cover, use Tool No. 15118 BALL RACE EXTRACTING TOOL, as shown in Fig. 25.

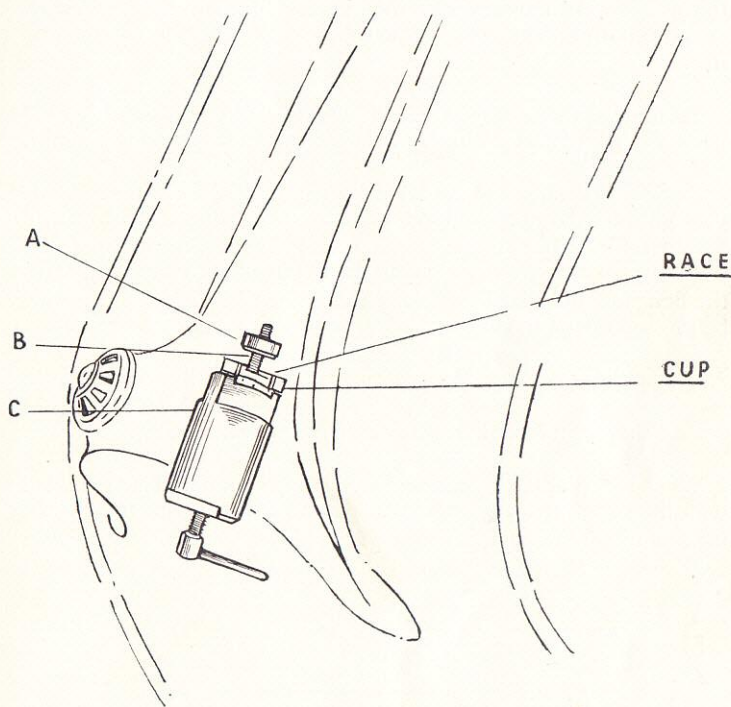


FIG. 25. BALL RACE EXTRACTING TOOL

Place the collar (A) on the top of the bearing in the cup housing.

Assemble the bolt (B) through the body of the tool (C), and into the collar (A).

Rotate the bolt until the bearing is removed.

DISMANTLING THE FRONT WHEEL SUSPENSION

Although the front suspension can be dismantled when the steering column is in the frame, we would suggest that the column be removed and placed on a bench. Remove the speedometer gearbox together with the hub cover. This will then remain suspended on the speedometer cable; should it be necessary to dismantle these components the process is as follows:—

First detach the speedometer cable from the speedometer gearbox by undoing the nut locking them together. On the inside of the speedometer cover will be found a lock nut and spring washer. Remove both these items and the speedometer gearbox will then be free.

To remove the speedometer cable remove clip securing it to the front mudguard and withdraw from the hole in the steering column.

Remove the large grease cup with a box spanner. Behind this you will find the nut and large plain washer securing the **FRONT WHEEL SPINDLE**; remove both of these items. Now remove the two counter sunk screws securing the **FRONT BRAKE DRUM** to the flange of the wheel spindle. The front wheel spindle can now be pressed out of the hub.

Note: Care and a suitable tool should be used in this operation so as not to damage the threads, and slot, which houses the drive from the speedometer gearbox.

When the spindle has been removed it will be found it is assembled with the **LEFT HAND** wheel bearing and felt oil seal. Should the bearing require removing Tool No. 15114 **BALL RACE EXTRACTOR TOOL** should be used. (Fig. 26).

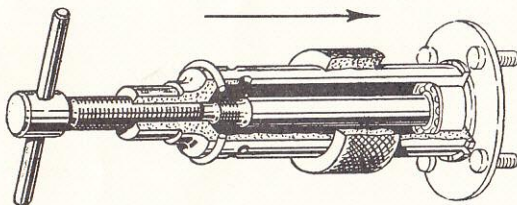


FIG. 26. BALL RACE EXTRACTOR TOOL

FRONT WHEEL (Fig. 20)

To reassemble the BEARING, first pack with grease (see lubrication Chart on Page 24): fit the felt seal into its groove on the flange; place the ball bearing in position and seat it, using a suitable piece of tube; when carrying out this operation care should be taken not to damage the four studs which carry the front wheel and brake drum. (Fig. 27).

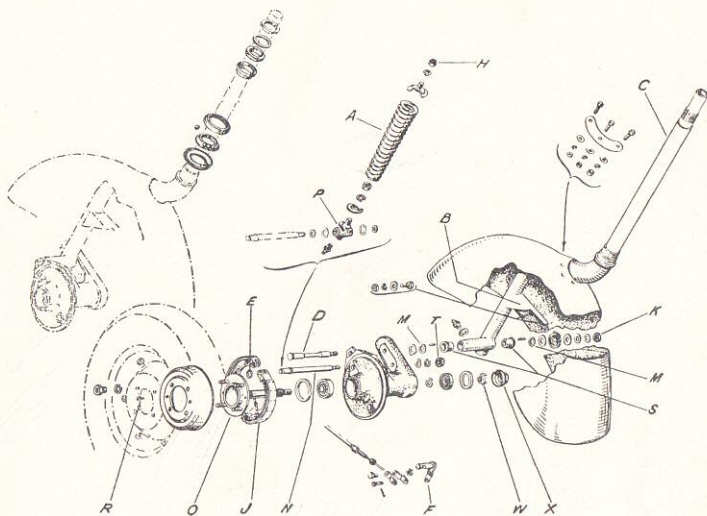


FIG. 27

To remove the TRUNNION BLOCK (P) and SPINDLE first remove the front BRAKE SHOES (J) by removing the small CIRCLIP (E) on the end of the trunnion block spindle, rotate the brake operating cam lever 90°; this will then open the brake shoes which can be removed by a pair of suitable levers. Now disconnect the NUT (H) and SPRING WASHER (H) securing the front COIL SPRING (A) to the BRACKET (B) welded to the steering column (C). The HUB can then be pressed downwards to free the spring. The spring and plain washer can then be unscrewed from the trunnion block. Now remove the nut and spring washer and plain washer from the end of the trunnion block and tap the spindle out. This will then release the trunnion block, two large plain washers and one plain shoulder washer. Now remove the nut, spring washer and plain washer from the end of the stud spindle (D) and slide the spindle out. The hub will then be completely free of the steering column. To remove the cups, housing the 36 rollers in the steering column, first remove the two shoulder rings to set the 36 rollers free, use a suitable drift, and tap the cups out.

REMOVAL OF CHASSIS SUB-ASSEMBLIES

The expression "Chassis sub-assemblies" means all units assembled to the chassis—BRAKE PEDAL, CENTRE STAND, PETROL TANK, ENGINE COWL and TOOL BOX.

Directions for dismantling these units are given on the following pages.

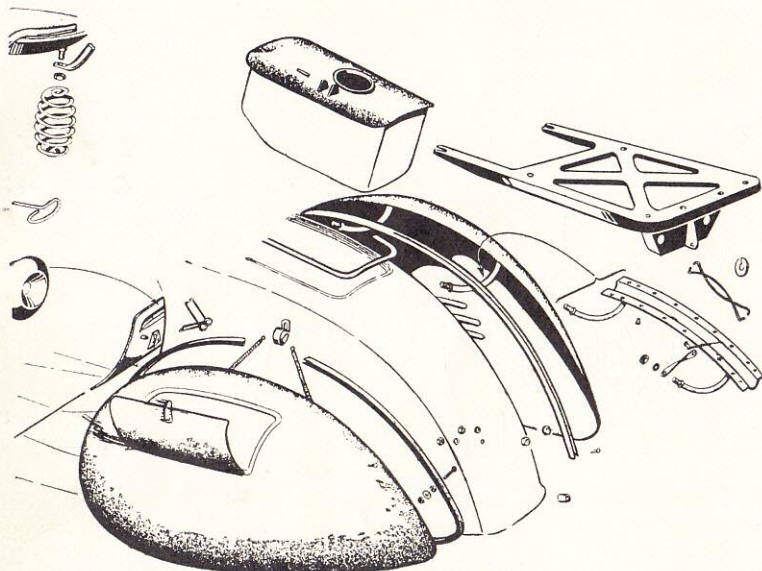


FIG. 28. SUB-ASSEMBLIES

SECURITY LOCK

Whenever the lock unit has to be removed from the longeron, the top race at the bottom of the steering column cover must be removed first (Fig. 25). Having done this ensure the lock is in the closed position, remove the locking ring and washer from the body of the lock. This will then allow the lock unit to be pushed into the steering column housing. It will then drop to the bottom of the housing from which it can be removed through the cup welded in the longeron by allowing the body of the lock to drop through first with the lock tumblers at the top.

REMOVING—CENTRE STAND

First release the springs from the two legs then take out the two bolts retaining the stand clips.

Note: The stand springs and clips are in left and right hands, and therefore not interchangeable.

—PETROL TANK (Fig. 28)

See that the petrol tap is in the "off" position and remove the feed pipe from top of carburettor. Remove the saddle, choke control rod and rear carrier. Remove the two tank clamps, the tank can then be lifted out of its housing.

—ENGINE COWLING

Undo the two nuts on the cowl hinges, one of which is situated in the tank housing, the other underneath the chassis, above the engine unit.

—TOOL BOX (Fig. 28)

First disconnect the battery leads, and remove the battery from its carrier. Then undo the six nuts and washers; the assembly can then be removed.

—FOOT BRAKE PEDAL

Disconnect the control cable from the operating lever on the right-hand side of the engine bracket. Depress the pedal completely downwards to allow the retaining pin to be withdrawn; then pull the pedal outwards removing it from its mounting.

LIGHTING—REMOVING HEADLAMP, HORN AND WIRING HARNESS

Loosen the screw beneath the headlamp retaining the reflector, glass and rim. Disconnect the three leads from their respective terminals; the reflector unit can now be removed.

Undo the two bolts retaining the headlamp shell to the chassis.

Remove the four screws retaining the horn in its position; disconnect the two leads and remove the horn.

To remove the wiring harness completely from the chassis, all leads connected to the switch must be removed.

The harness can then be pulled back through the aperture at the bottom of the steering column.

Having done this, disconnect the respective leads from the rectifier unit and tail light.

Note: These instructions can only apply providing the steering column, handlebars and petrol tank have previously been removed.

REMOVING THE ENGINE UNIT FROM THE MACHINE

First disconnect all cables from respective levers on the engine.

Disconnect ELECTRIC LEADS from L.T. Socket (Fig. 15).

It is advisable to mark each pair of leads when disconnecting in order to avoid confusion at reassembly.

Stagger these earth, lighting and horn cables so that they can easily pass through the low tension socket; unscrew the socket and release the tag of the earthing cable. (Fig. 15).

If they are still in place, disconnect the GEAR CHANGE CONTROL CABLES (Fig. 23) from the ratchet quadrant of gear shifter.

Remove the two ferrules from the ratchet quadrant of the gear shifter and pass the cables through the slots of the ferrule housing (Figs. 4/23).

The SILENCER must also be removed; slacken the nut securing the cylinder port, and the bolt which secures the body to the engine bracket.

Remove the induction pipe by detaching the three nuts securing it to the cylinder. Collect the three spring washers, the deflector, and the two plain washers. Detach the brake drum and wheel flange after removing the split pin and unscrewing the slotted nut securing the flange on the end of the main shaft.

The wheel in position facilitates unscrewing this nut. Slacken the two bolts and the nut clamping the engine in the bracket, below the rear wheel suspension and on the bracket arm. Ease the engine away from its bracket and place it on a suitable turntable. (Tool No. 13782 ENGINE MOUNTING TOOL).

DISMANTLING THE ENGINE:

PRELIMINARIES

Before starting dismantling, inspect the engine outside for leakages, then mount it on Turntable. (Fig. 29).

The engine boss is placed into the clamping orifice, then the engine is revolved against the lug and secured with a nut; clamp the engine boss and secure.

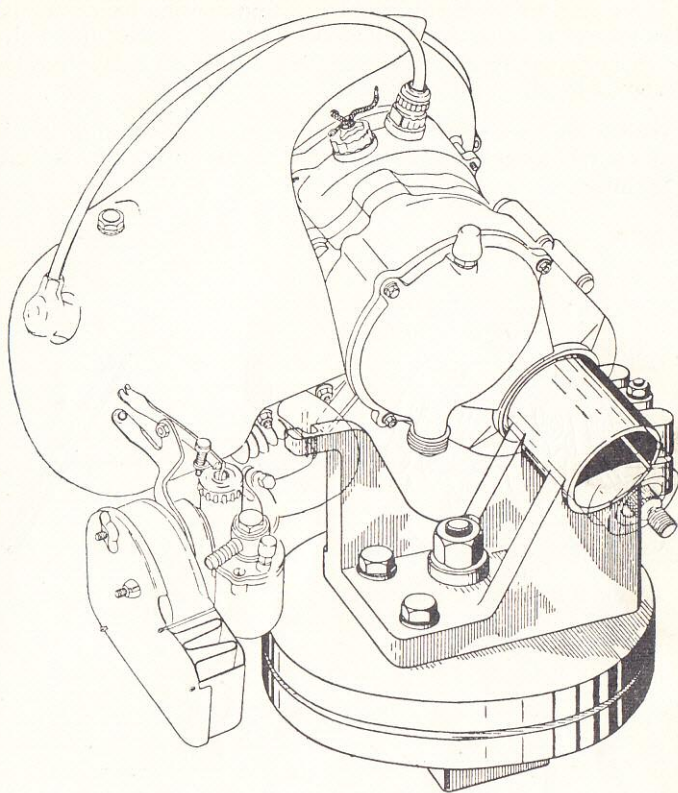


FIG. 29. ENGINE SUPPORT WITH TURNTABLE

PROCEED AS FOLLOWS:

Disconnect the PLUG LEAD from the spark plug, then unscrew the PICK UP TERMINAL from the crankcase.

Unscrew the nut on the CYLINDER HEAD and the screw on the FAN HOUSING to remove the COOLING HOOD.

Remove the SPARKING PLUG.

Straighten the edges of tab plate and unscrew the bolt retaining the KICKSTARTER and remove the latter from starter bush.

Remove the FAN COVER; straighten the edges of the four tab washers, remove the screws and the FAN.

The FLYWHEEL is removed by first unscrewing the centre nut until the nut tightens against the self-extracting device. Then give the spanner (box type), a sharp tap with a light hammer, when the flywheel will loosen from the taper.

Whilst this operation is being carried out the flywheel is held in position by using TOOL No. 13964 FLYWHEEL SPANNER. (Fig. 30).

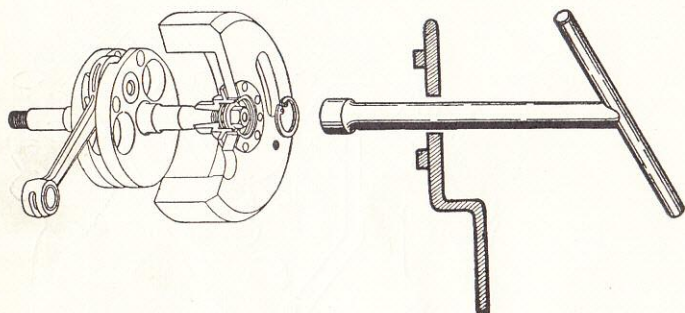


FIG. 30. FLYWHEEL SPANNER

In order to avoid the flywheel becoming demagnetized, the stator plate assembly should be placed back into the flywheel after dismantling.

Remove the FAN HOUSING.

Note: To avoid the necessity of re-timing the engine, scribe a line on the stator plate to coincide exactly with a line on the engine casing.

Undo the three screws fixing the STATOR PLATE to the crankcase, remove the plate, taking care that the cables are not damaged, when passing through the crankcase (the stator plate can now be placed into the flywheel magneto, as previously instructed).

Operating gradually and alternately on each of them, unscrew the three nuts from the studs, fixing both cylinder and cylinder head to the crankcase.

Remove both head and cylinder.

Remove the circlips retaining the GUDGEON PIN; extract the latter by means of Tool No. 14854 GUDGEON PIN EXTRACTING TOOL (Fig. 31).

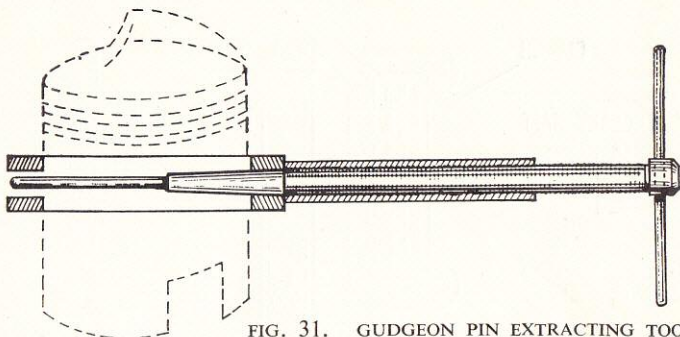


FIG. 31. GUDGEON PIN EXTRACTING TOOL

Remove the GEAR SHIFTER putting consecutively the ratchet quadrant into 1st and 3rd gear position and undoing the two screws retaining the flange on the crankcase; select 2nd gear, then depress the kickstarter bush so as to bring the cut-away portion thereon in such a position that it permits the extraction of the actuating arm with skid.

Unscrew, outside of the crankcase, the LOCK SCREW OF SLOTTED HOUSING, by means of a box spanner. Undo the three screws retaining the CLUTCH COVER, remove the cover together with slotted plunger and pull back the end of the retaining spring with a screwdriver to release the thrust plate.

Remove the CLUTCH by unscrewing the nut on crankshaft using Tool No. 14872 CLUTCH WRENCH TOOL and Tool No. 14871 "C" SPANNER. (Fig. 32).

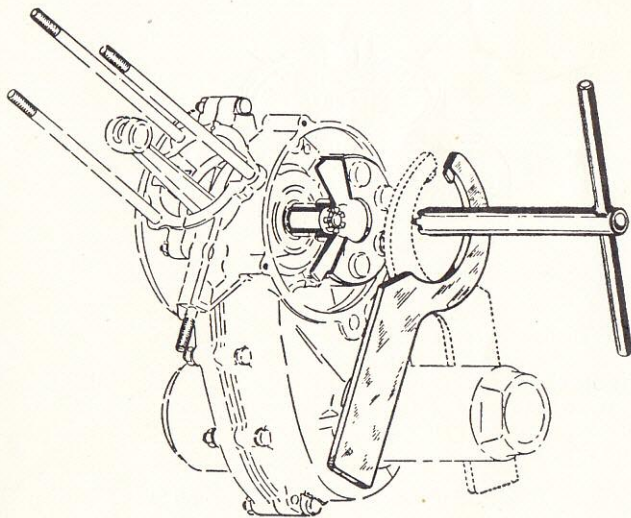


FIG. 32. REMOVAL OF CLUTCH

Should the clutch be difficult to remove, use Tool No. GA4012 CLUTCH EXTRACTOR. (Fig. 33).

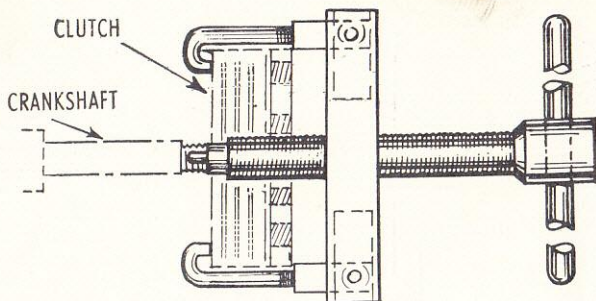


FIG. 33. CLUTCH EXTRACTOR

Remove the nut and spring washer. While pulling off the clutch from the crankshaft, be careful that the clutch gear does not come out of its housing, as this would result in the rollers falling into the engine. This applies also to the woodruff key.

If necessary, dismantle the clutch unit by means of Tool No. 15046 CLUTCH ASSY. TOOL. (Fig. 34).

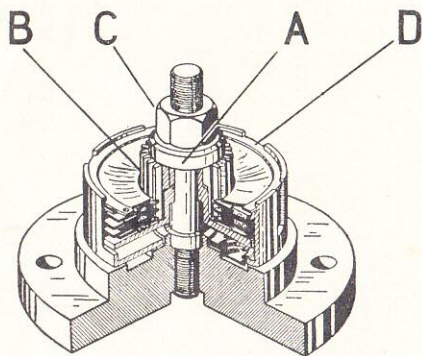


FIG. 34. CLUTCH ASSEMBLY TOOL

Fit the clutch assembly in the tool, place the spline "B" to engage with the teeth of the clutch plates, and lock by means of plate "A". Tighten the nut "C" to compress the six springs; the retaining circlip "D" can now be extracted.

Unscrew nut "C" remove plate "A" and spline "B" to withdraw the individual components.

Unscrew the nuts from the eight outer crankcase bolts, slide the latter out and collect plain and spring washers. Straighten the edges of the tab washers which lock the four nuts in the stator plate housing (the stator plate has already been removed). Unscrew the nuts, collect the tab washers and remove the two upper bolts. The remaining two bolts can be removed only after action is taken to remove the cush drive assembly. Separate the two halves of the crankcase by means of Tool No. 14801 (Fig. 36) CRANKSHAFT AND CRANKCASE EXTRACTING TOOL and Tool No. 14202 TAPER WEDGE TOOL (Fig. 35).

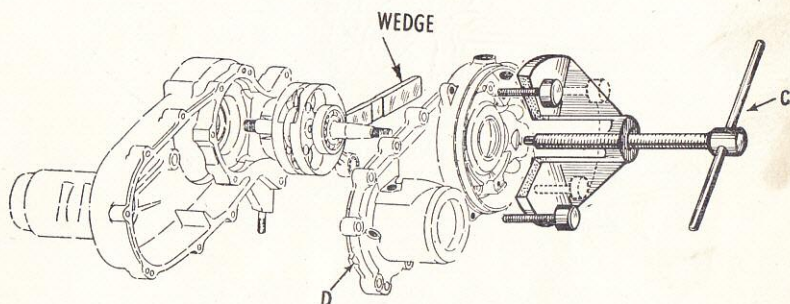


FIG. 35. DISMANTLING THE CRANKCASE

Note: FAILURE TO USE OR INCORRECT USE OF WEDGE MAY RESULT IN THE CRANKSHAFT BEING DISTORTED.

Fit the Tool No. 14801 so that the three rods with knurled heads can be screwed into the holes in the crankcase. INSERT THE WEDGE BETWEEN THE CRANK WEBS then tighten main screw by means of handle "C" until it is under stress, then tap with a mallet the lug "D" on the outer end of the crankcase (starter side). Operate alternatively on handle "C" and on lug "D" until the crankcase halves have been evenly separated.

The starter bush, return spring and the two thrust springs, will remain in the flywheel half of the crankcase. These can easily be removed by a slight tap.

Care should be taken not to lose the two thrust springs.

Remove the CRANKSHAFT, from the clutch side crankcase by means of Tool No. 14801 CRANKSHAFT AND CRANKCASE EXTRACTING TOOL. (Fig. 36).

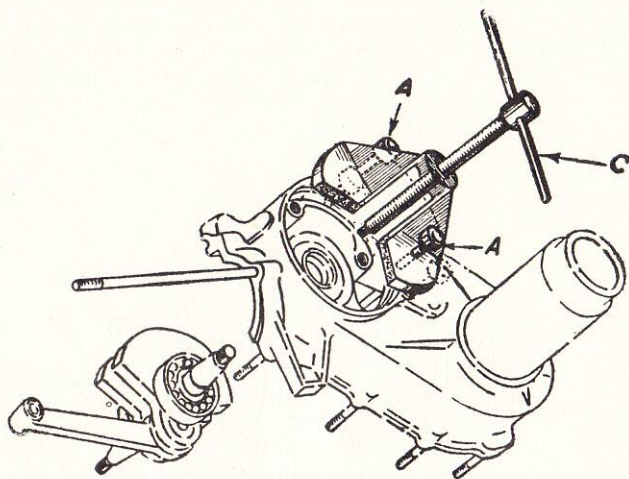


FIG. 36. CRANKSHAFT REMOVAL

Screw the three rods with knurled heads into holes.

Rotate handle " C " in a clockwise direction until the crankshaft is forced out of its seating.

Remove the circlip retaining the RATCHET HOUSING on end of the main shaft.

Now, remove the SLOTTED HOUSING, and its ball bearing from end of main shaft by means of Tool No. 15688 KICKSTART BEARING EXTRACTING TOOL. (Fig. 37).

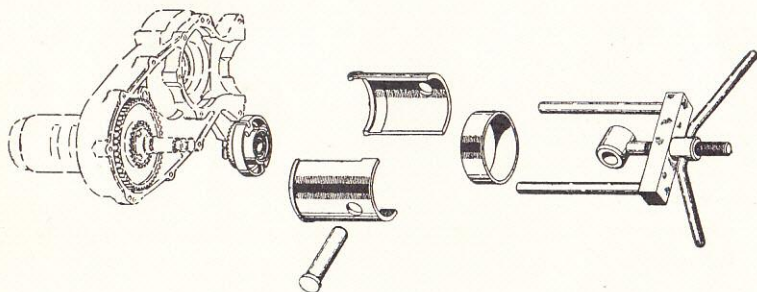


FIG. 37. KICKSTART BEARING

Place the split sleeve over the slotted housing so that the projecting edges on the interior engage between the low speed gear and the edge of the housing. Lock by sliding the ring to its fullest extent over the sleeve, then fit the tool part provided with screw and lug and slide the pin in. (Fig. 38).

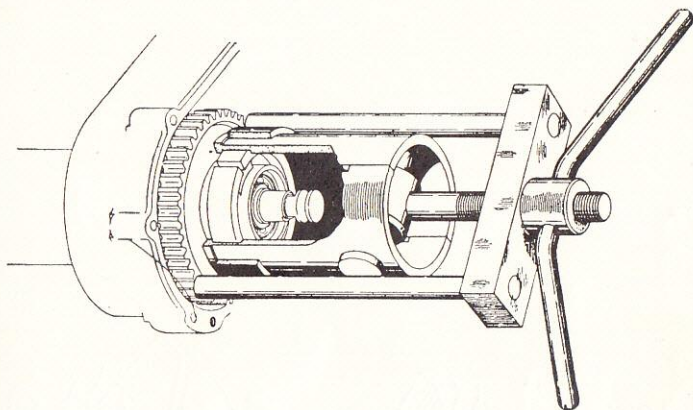


FIG. 38. REMOVAL OF SLOTTED HOUSING

Rotate the tool handle in a clockwise direction until the housing is free from the gear shaft end.

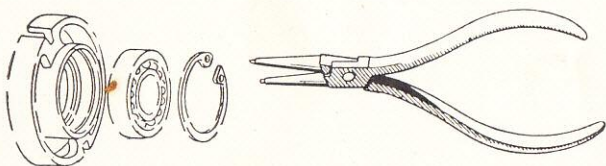


FIG. 39. REMOVAL OF CIRCLIP

Remove the circlip retaining the ball bearing in the slotted housing (Fig. 39).

Remove the ball bearing taking care not to distort this ratchet housing.

Remove the circlip from the end of the mainshaft by means of long nosed pliers. Then remove the washer and the 1st, 2nd and 3rd speed gears.

Extract the GEARSHAFT from the crankcase by means of Tool No. 14812 MAINSHAFT EXTRACTING TOOL. (Fig. 40).

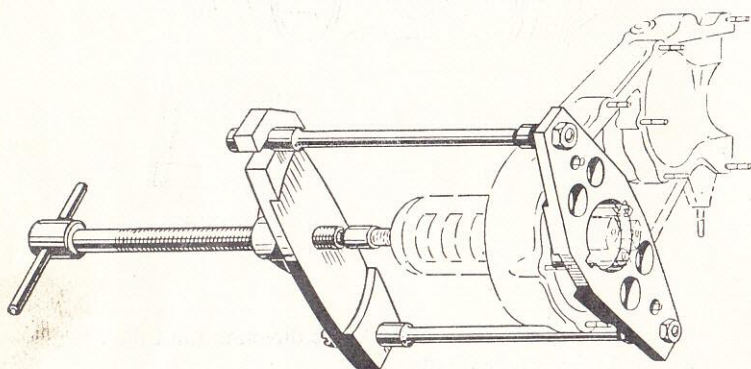


FIG. 40. EXTRACTION OF GEAR SHAFT

After removing the gear pinions, turn the mainshaft so that the cut-away portion of the flange of the mainshaft ball bearing faces the cush drive, thus allowing clearance for the teeth of the latter to pass. Fit the base of the extractor on the inside edge of the crankcase half (Fig. 40) and engage the end of the extractor screw against the threaded end of the mainshaft. Turn the tool handle in a clockwise direction, until the shaft is forced out of the crankcase.

To remove the SELECTOR assembly from the mainshaft, straighten the edge of the locking washer, unscrew the selector shaft (LEFT HAND THREAD) and rotate the cruciform selector so that it can be lifted out through one of the slots of the gear shaft.

Undo the nut on the outside of the crankcase securing the CUSH DRIVE lay shaft. Tap the shaft back through the crankcase hole taking care to collect the 16 rollers and remove the unit downwards out of the crankcase. Now you can remove the last two bolts retaining the crankcase halves.

Remove the circlip retaining the ball bearing of the cush drive then force the bearing out of its housing by means of a mallet and a soft drift.

If the springs of the cush-drive have to be replaced grind off the rivet heads securing the plate washers and drive the rivets out by means of a punch. Lift off the plate washers, remove the springs with a slight pressure, then rotate the outer gear out of the gear cluster.

Remove the threaded ring retaining the internal ball bearing of the main shaft by means of Tool No. 13767 LOCKING RING TOOL (Fig. 41).

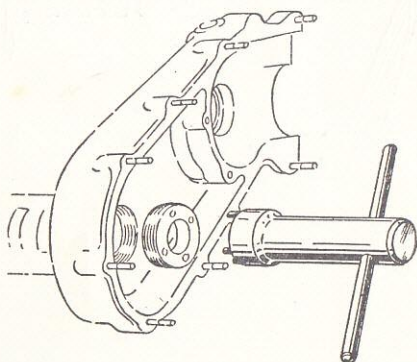


FIG. 41. REMOVAL OF THREADED RING

If it is necessary to remove the ball-bearing and the spring loaded seal of the main shaft, proceed as shown (Fig. 42).

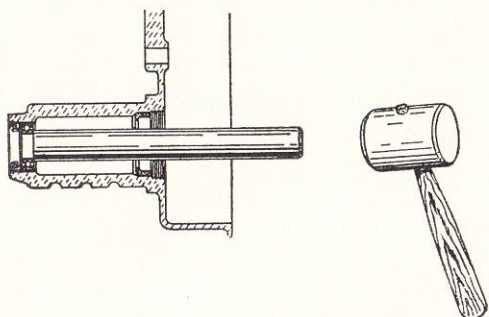


FIG. 42. REMOVING REAR WHEEL BALL-BEARING AND SEAL

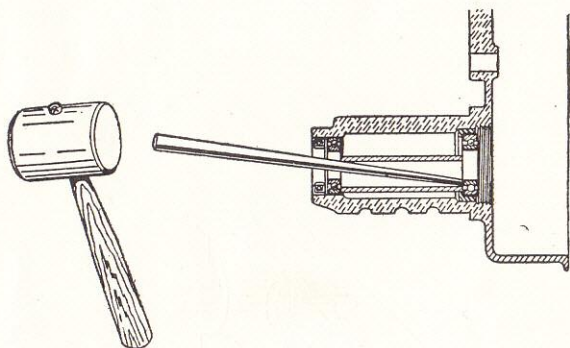


FIG. 43. REMOVING INNER BEARING

If only the mainshaft spring-loaded seal is to be extracted without removing the engine from the machine, this can be freed with a screw-driver or other suitable tool, after removing the brake drum, flange and wheel.

If the MAIN BEARINGS have to be removed from the crankshaft, use Tool No. 14499 MAIN BEARING EXTRACTOR TOOL (Fig. 44)

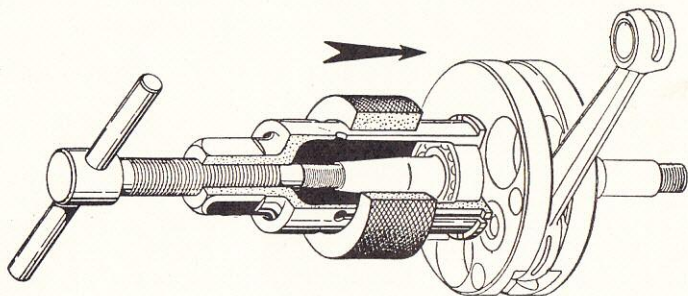


FIG. 44. REMOVAL OF BALL-BEARING FROM CRANKSHAFT

Main bearing OIL SEALS can be removed by tapping from the crankcase, using a suitable drift.

For removing the ENGINE BRACKET from the Chassis (after removal of the engine):—

- undo the adjusting screw of the clutch control cable and release the cable from the lug on the bracket.
- repeat this operation for the rear brake control cable.
- open the clip on the engine bracket retaining the sheath of the rear brake cable control.
- unscrew the bolts securing the bracket to the frame.

The bracket is now free.

The engine bracket can also be removed together with the engine and if, required, the rear wheel. In such a case, however, the following operation must be first carried out:—

- release the rear suspension (coil spring and hydraulic damper) from the bracket end.
- disconnect the nipples of the gear change, clutch and rear brake control cables.
- unclamp wires from low tension socket

REAR SUSPENSION AND HYDRAULIC DAMPER— DISMANTLING

To remove the damper from the chassis, insert an open-ended spanner between the top of the damper itself and the top support bracket in the chassis, unscrew the damper from its housing.

To remove the rear spring simply unscrew it from its housing.

First, remove the nut "A" at the top of the stem rod "B," the outer dust cover "C" can then be unscrewed and removed. (Should the stem rod rotate it is advisable to cut a slot in the top for the insertion of a screwdriver). Having accomplished this, remove the screwed cap "D" with the Tool No. 17549 DAMPER WRENCH, this also contains a sealing washer "E" and rubber gland. Now pull out the stem rod complete with barrel "F" and piston "G" this will also free the top gland housing "H" complete with rubber gland "I" and outer seal "J," take the stem rod, and piston, from barrel; this will also free the shock absorber spring "J."

To remove the piston and its release valve "K" from the stem, remove the nut "L" spring washer "M," plain washer "N," taking care not to lose the spring "O," and ground washer "P," which form the release valve mechanism.

—RE-ASSEMBLY

Prior to assembly, ALL parts must be free from dirt and grease; this is absolutely essential.

Assemble the piston and release valve to the stem rod. Slip the shock absorber spring over the stem rod and place the assembly inside the barrel, before this entry is complete, turn the assembly upside down and fill the barrel with oil (See Lubrication Chart Page 24). Pour a small quantity of oil (approx. 50 c.c.) in the damper body. Then, place the barrel complete with piston into the damper body and press down to its fullest extent, during this stage a certain amount of oil will be lost; therefore, allow the oil to settle and then top up to just below the thread of the damper body. Assemble the rubber glands to the housing and fit housing to the top of the stem rod. When pressed down into position, fit the rubber gland and washer to the screwed cap and fit cap to seating. Replace the outer dust cover and fit lock nut.

AFTER RE-ASSEMBLY IT IS ESSENTIAL TO DETERMINE THAT THE DAMPER IS FUNCTIONING CORRECTLY, HAVING MADE SURE THAT ALL SLIDING SURFACES ARE SUITABLY GREASED.

Finally, fit to frame, reversing the dismantling procedure.

The damper can also be removed from the chassis with the engine remaining in position, if the following procedure is carried out:—

Remove the rear wheel and slightly compress the rear spring. Remove the nut and washer from the end of the bolt securing the damper to the bracket attaching it to the engine bearer. Withdraw the bolt and two spacing washers. The tension on the rear spring can now be released. Insert an open-ended spanner between the top of the damper itself and the top support bracket and unscrew the complete unit.

To re-assemble, reverse the dismantling procedure.

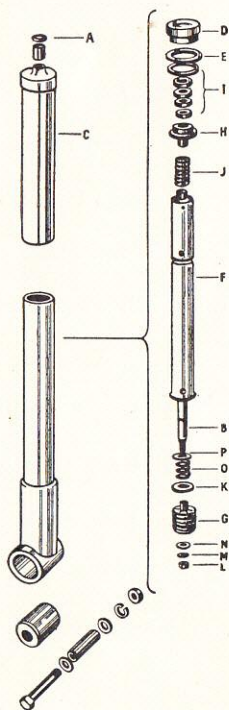
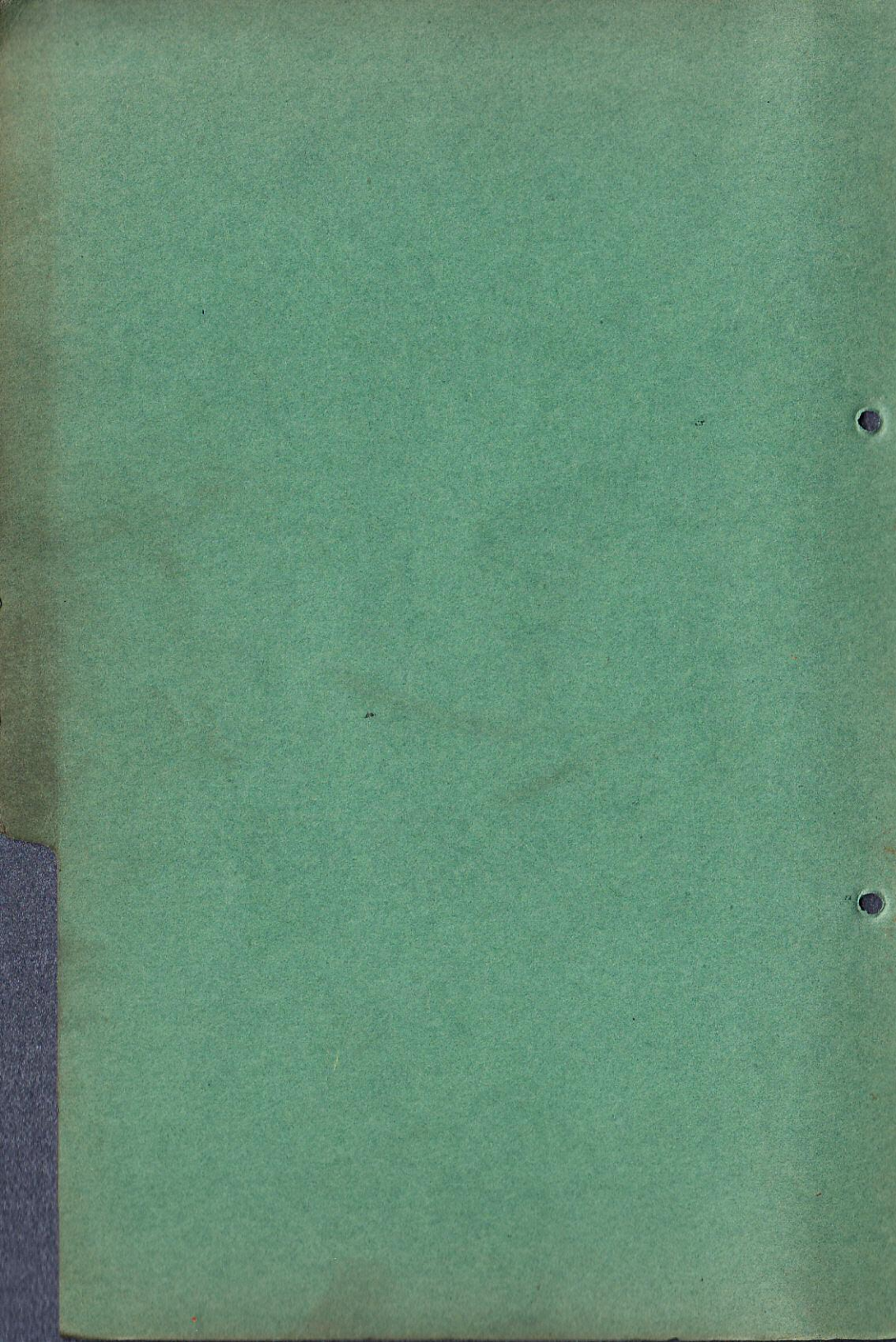


FIG. 45. HYDRAULIC DAMPER

SERVICE TOOLS

<i>Part No.</i>	<i>Description</i>	<i>Page</i>
GA 4012	Clutch Extractor	40
13767	Locking Ring Tool	45
13781	Ball Race Mounting Tool	60
13782	Engine Mounting Tool	36
13784	Pilot for Crankshaft	52
13964	Flywheel Spanner	38
14202	Taper Wedge Tool	41
14484	Locking Ring Spanner	30
14499	Main Bearing Extractor	47
14801	Crankshaft & Crankcase Ext. Tool	42
14812	Mainshaft Extractor Tool	44
14854	Gudgeon Pin Extractor Tool	39
14871	" C " Spanner	39
14872	Clutch Wrench Tool	39
15046	Clutch Assembly Tool	40
15114	Ball Race Extractor Tool	32
15118	Ball Race Extractor Tool	31
15123	Ball Race Mounting Tool	61
15688	Kickstart Bearing Ext. Tool	42
17549	Damper Wrench	48



ENGINE—RE-ASSEMBLY

Whenever possible carry out the re-assembly with the reverse procedure to that given for dismantling.

All parts must be cleansed, wiped dry with clean rags.

Lubricate with mineral oil all turning or sliding parts of the Engine unit and preserve them from dust and foreign bodies.

USE NEW PACKINGS AND SPLIT PINS ON RE-ASSEMBLING.

Press the INTERNAL BALL RACE of the main shaft in position into the respective crankcase bushing; lock the race by means of the THREADED RING using Tool No. 13767 LOCKING RING TOOL (Fig. 41, Page 45). Insert the spacer; mount the EXTERNAL BALL RACE, DISTANCE RING AND OIL SEAL.

Important: TWO OF THE TEN SHORTER CRANKCASE BOLTS (2.4") MUST NOW BE FITTED INTO THE LOWER HOLES OF THE CLUTCH HOUSING, WHICH WILL LATER BE COVERED OVER BY THE CUSH DRIVE. THERE ARE TWO LONGER BOLTS ONLY (2.8") WHICH MUST BE FITTED AT THE RIGHT MOMENT INTO THE UPPER HOLES. FAILURE TO FIT THE CORRECT BOLTS WILL NECESSITATE DISMANTLING OF THE ENGINE.

Grease the roller track on the layshaft and position the 16 rollers thereon. Insert the layshaft into the CUSH DRIVE. Fit this sub-assembly so that the threaded end of the layshaft projects out through the crankcase hole, put on plain and spring washers and screw down the nut for a few turns.

Note: This nut will be tightened after mating the two halves of the crankcase. A slot in the layshaft end will facilitate the job. Insert the SELECTOR into one of the four slots on the main shaft, and rotate it so that the MILLED FACE is turned towards the plain end of the shaft. Insert the guide bush of the selector stem into the shaft hole. MATE THE PROJECTION OF THE SELECTOR WITH THE CORRESPONDING SLOT OF THE BUSH. Insert the stem with tab washer into the guide and screw it into the selector (LEFT HAND THREAD), and lock in position with the tab washer. Assemble the mainshaft into the internal ball race and press into position through the external ball race.

Note: The flange for the internal ball race of the mainshaft has a small cutaway portion in order to allow clearance for the teeth of cush drive to pass. Assemble the 1st, 2nd and 3rd speed gears to mesh correctly with the gear cluster, place the WASHER into position and lock with circlip.

After heating the CRANKCASE (clutch half), press in the OIL SEAL, ensuring that the cutaway portion is fitted opposite the main bearing oilway, so that the lubrication of the main bearing is not obstructed.

Mount the main bearing on to the crankshaft by means of a press or a mallet, using a soft iron tube placed on the internal race of the bearing.

The main bearings should be dipped into hot oil (Temp. 100°C.) to facilitate a "Shrink fit" on to the crankshaft. Temperature excessive to the figure given will soften the material of the bearing.

Using Tool No. 13784 PILOT (Fig. 46) feed the crankshaft through the oil seal into the main bearing housing whilst the crankcase is still hot.

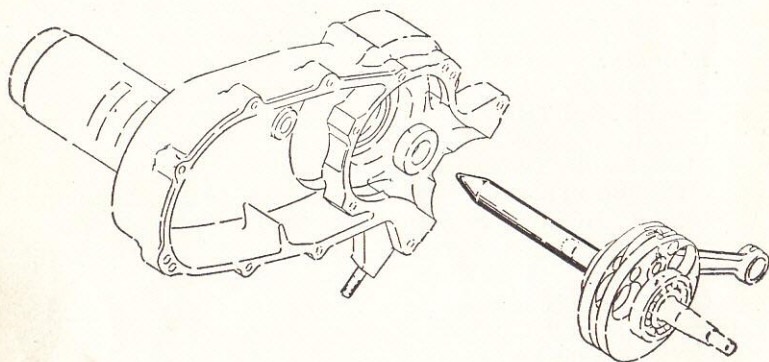


FIG. 46. PILOT TOOL

Press the ball race into the ratchet housing, and lock the race in position by means of the circlip. Insert the lugs of the STARTER RATCHET into the slots of the housing, seeing that the former moves freely in the latter. Place the slotted housing on the end of the main shaft. Seat in position by means of a soft iron drift. Lock in position with the circlip.

Fit the two small thrust springs into the holes of the STARTER BUSH: fit the latter, ensuring that the springs engage on the lugs of the starter ratchet. Mount the RETURN SPRING using a hook and pawl. (Fig. 47).

Fit the rubber packing on the end outer of the starter bush.

Fit the crankcase gasket, first smearing it with jointing compound.

Heat the flywheel half of the crankcase and press in the OIL SEAL ensuring that the cutaway portion is fitted opposite the main bearing oilway, so that the lubrication of the main bearing is not obstructed.

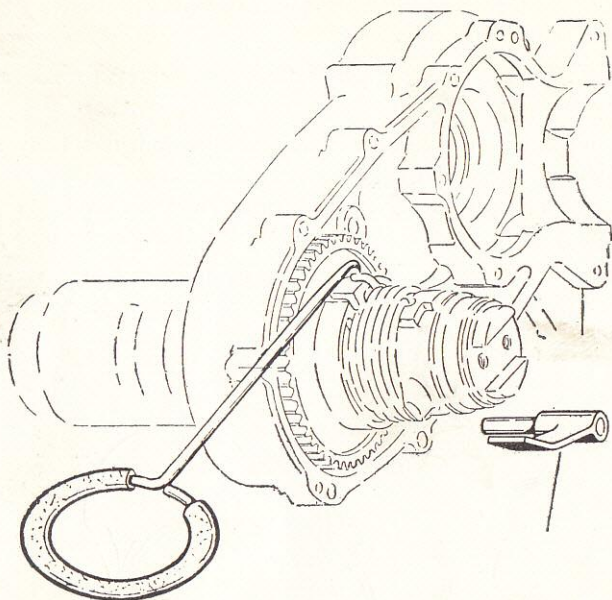


FIG. 47. HOOK AND PAWL

Join the two crankcase halves together, seeing that the dowel pins and the two bolts already assembled, enter respective holes; retain the starter bush in position with a finger through the orifice to prevent the spring end coming out from the chamfered slot of the housing.

Insert the Tool No. 14202 WEDGE (Fig. 35, Page 41) between the crankcase web and tap gently with a mallet alternatively on both ends of the crankcase ensuring that the con. rod is not trapped between the two halves of the crankcase.

Assemble the two longer bolts (2.28") into the upper holes of the clutch housing. Place the tab washers and screw by hand the four special nuts on the bolts protruding in the stator plate housing.

Assemble the remaining eight shorter bolts (2.043") into the holes on the crankcase edge; place the plain and spring washers over the bolts and screw the nuts by hand.

Tighten the four special nuts, then gradually those on the crankcase edge.

Bend the edge of the tab washers on one face of respective special nuts to prevent loosening.

TIGHTEN THE NUT WHICH SECURES THE LAYSHAFT
(See 1st Note on Page 51).

Fit the washer and the face plate onto the footstart body and assemble the footstarter pedal.

Depress the pedal until the free slot of the ratchet housing is opposite the hole on the crankcase.

Screw down the tapered screw and lock with the nut by means of a box spanner. (Fig. 48).

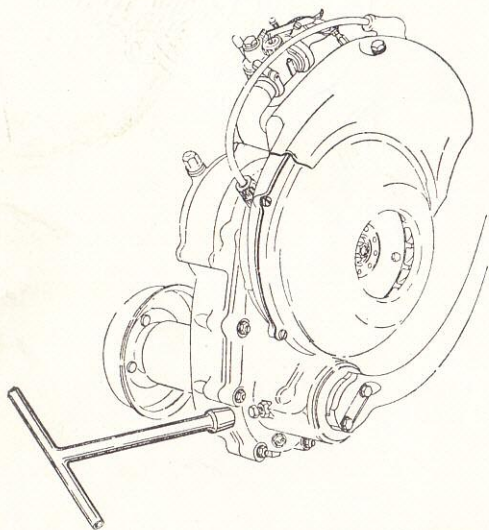


FIG. 48. BOX SPANNER FOR LOCK NUT OF TAPERED SCREW

Reassemble the CLUTCH by means of Tool No. 15046 (Fig. 34, Page 40). Place the clutch body into the tool, insert the six spring cups into their seatings and fit the springs; fit the spring plate, one plate with corks, one plain steel plate, another plate with corks, another plain steel plate, the third plate with corks and finally the convex steel plate, ENSURING THAT THE CONVEX FACE OF THE LATTER IS TOWARDS THE PLATE WITH CORKS.

Insert spline "B" into the teeth of the clutch plates and lock by means of plate "A" as shown in Fig. 34. Screw the nut "C" to compress the springs and insert the circlip "D" ensuring that it goes completely into its groove.

Unscrew the nut "C" remove the retaining plate "A" and the spline "B" thus releasing the clutch assembly.

Place in position the SHOULDER WASHER and the WOODRUFF KEY on the CRANKSHAFT; place the clutch pinion over the boss of the spring plate and insert the 29 needle rollers between these two components, securing them with some grease. Put the clutch to the crankshaft, ensuring that neither the woodruff key nor the needle rollers fall into the crankcase.

See that the clutch gear engages with the outer gear of the cush drive.

Secure the clutch assembly in position by means of spring washer and a castle nut, using the Tool No. 14872 and 14871 CLUTCH WRENCH TOOL AND "C" SPANNER. (Fig. 32, Page 39).

Mount the CLUTCH THRUST PLATE. Insert the open end of the Circlip "B" into the small hole and the lug "A" into the large hole of the plate. (Fig. 49).

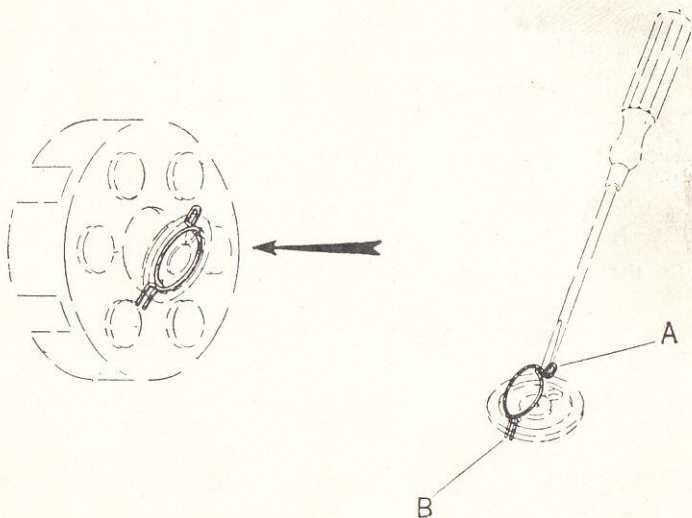


FIG. 49. RE-ASSEMBLY OF THE CLUTCH THRUST PLATE

Place the slotted THRUST PISTON into the housing on the clutch cover, fit the latter and secure with the three screws.

Secure the STATOR PLATE on the crankcase with plain and spring washers and the three screws following the mark made while dismantling. (See Note, Page 38).

Stagger the two L.T. leads and the earth wire to pass them through the crankcase hole where the L.T. terminal will be screwed down.

Set the Woodruff key on the crankshaft, fit the FLYWHEEL MAGNETO and secure it with plain and spring washer and nut using Tool No. 13964 FLYWHEEL SPANNER. (Fig. 30, Page 38).

Note: FIT THE FLYWHEEL CAREFULLY: MAKE SURE THAT THE KEY FITS PROPERLY INTO THE KEYWAY BEFORE TIGHTENING THE NUT.

The circlip which serves for removing the flywheel magneto must be fitted into its groove by means of long nosed pliers. Check the gap between the breaker points as instructed in ignition timing. (Page 22).

Reassemble the GEAR SHIFTER on the crankcase. Thereupon 2nd gear must be selected, which is easily accomplished by employing a suitable tool on the selector stem. Put also the gear shifter in 2nd gear position.

Rotate the starter bush by depressing the kickstarter pedal to allow the skid on the INTERNAL GEAR CHANGE LEVER to engage in the groove at the end of the selector stem.

Secure the gear shifter on the crankcase by means of the two screws and dowel.

Reassemble the PISTON on the CON. ROD small end and press in the GUDGEON PIN by means of Tool No. 14854 GUDGEON PIN EXTRACTOR TOOL (Fig. 31, Page 39). Secure with two CIRCLIPS.

See that the piston rings have their correct tolerances. (Page 68).

Place a new paper gasket on the cylinder base using sealing compound. Slide the CYLINDER over the three studs, taking care not to damage the piston rings.

Assemble the copper gasket and the CYLINDER HEAD so that the latter fits properly into the spigot of the cylinder ; secure with plain and spring washers and nuts screwing down the latter progressively and alternately in order that they are all tightened the same amount.

Place the packing and the induction pipe on the cylinder flange; place the two spring washers and the deflector over the upper studs, then assemble the spring washers on all the three studs and secure with the nuts.

Fit the FAN HOUSING and secure the FAN with four tabs washers and screws; assemble the fan housing COVER, the SPARKING PLUG and the COOLING HOOD.

Screw down on the crankcase the L.T. and H.T. terminals, and connect their respective leads.

CHASSIS

The first operation for re-assembly concerns the **ELECTRIC WIRING**.

Fit back the **WIRING HARNESS** through the longeron and the body according to the Wiring Diagram (Fig. 15, Page 19) and follow the reverse procedure to that described to dismantling (Page 35). This operation will be made easier with the aid of a pilot wire threaded through the chassis. Slide the rear brake control cable with sheath through the orifice on the lower edge of the longeron, rear end; push until the sheath stops inside the longeron and the inner cable projects out on the footboard.

Fit one of the two brake links, slide the cable through the bolt hole, fit the second link and tighten the nut slightly.

Secure the brake links to the **PEDAL** by means of pin and lock with the split pins. Assemble the brake pedal over its pivot; depress it completely downwards, and lock by means of the cotter pin. Tighten the nut firmly while engaging the bolt head with an open-ended spanner.

Note: On lower edge of the longeron, rear end, can be seen the ends of three guide tubes, (as seen in the riding direction of the scooter):—

left hand	:	gear change control cables.
centre	:	gear change control cables.
right hand	:	clutch control cable.

See that the cables keep aligned also outside of the guide tubes to ensure proper operation.

Slide the **GEAR CHANGE CABLES** into the longeron through the guide tube on left hand side; the throttle control cable should be threaded through the hole on the right hand side of the longeron.

Now all control cables are ready for connecting when the engine and the handlebars will be refitted to the machine.

Note: These operations will be carried out more easily, if a pilot wire has been bound to the cables whilst dismantling. (*Note 2, Page 28*).

Secure the **TOOL BOX** to the left hand panel of the body ensuring that the rubber beading fits correctly in between, and that the angle irons welded to the tool box fit properly over the bolts.

Assemble the plain washers and secure with the nuts.

Assemble the **BATTERY** into its battery carrier and connect up the various leads, as shown in wiring diagram (Fig. 15, Page 19).

The rectifier can also be fitted at this stage.

Assemble the ENGINE COWL by fixing the bent arms of the cowl to the respective hinges and secure with nuts and washers.

The spring for holding the cowl open can also be fitted at this stage.

Get the ENGINE BEARER ready for assembly to the chassis. Fit the engine bracket, together with the BRAKE jaws and levers, and secure it to the chassis with washers and bolts. If the top ANCHORAGE BRACKET of the rear suspension has been removed assemble it to the chassis, first placing the rubber packing in position and secure with the two bolts.

Assemble the REAR DAMPER and REAR SUSPENSION SPRINGS by screwing them into their respective housing.

Fit the rubber grommet into the chassis baffle.

Using the corresponding bolt and nut, secure the bottom of the rear damper to the rear suspension lower bracket. Place the engine on the main bracket and insert the two bolts through the boss in the engine bearer. The bolt on the right hand side should be screwed into the nut which is secured to the suspension spring.

The stud on the crankcase projection, must fit into the lug of the bracket arm, where it is secured with a nut. Then tighten the two rear bolts on the engine boss, as well as the bolt fixing the rear damper to the lower bracket.

Assemble the SILENCER, ensuring that the bolt on the clamp securing it to the CYLINDER is tight.

Slide the SPLINED FLANGE and BRAKE DRUM onto the end of the main shaft, secure with plain washer and castle nut, and lock with a split pin. The nut will be easier to tighten if the wheel has previously been fitted onto its flange, to enable it to be used as a hold.

The wires from the WIRING HARNESS in the chassis can now be connected to their respective leads of the L.T. Socket, on the engine.

Secure the PETROL TANK and its gaskets on the chassis, by means of the two clamp brackets, at the same time secure the LUGGAGE CARRIER and SADDLE, after first fitting the choke control rod.

Note: Should the carburettor have been removed, connect it to the intake pipe and tighten the hexagon-head screw of the locking collar, making sure that the carburettor is in an absolutely vertical position.

Should the choke control wire have been removed, re-assemble it, making sure that it operates properly on the AIR CLEANER. Insert the latter in the two studs of the carburettor and lock it by means of the corresponding wing-nuts. Now connect the fuel feed pipe.

FRONT WHEEL SUSPENSION

Insert the two liners for front suspension rollers into the stub axle, which is welded to the STEERING COLUMN, then smear the inside of the liners with grease, and place the 36 rollers into them (18 on each side). Reassemble the two shoulder rings and insert the hub, taking care that each component is placed correctly:—

—on the left: the “celeron” washer.

—on the right: the shoulder ring, the cover and second shoulder ring.

Note: This is proved easier if a pin is used to keep the washers aligned.

The STUB AXLE SPINDLE can now be fitted to secure the hub to the steering column, taking care not to push any NEEDLE ROLLER out of place. Having done this, the spindle can now be secured with its respective nuts and washers.

The TRUNNION BLOCK SPINDLE can now be fitted into the hub at the same time fitting the TRUNNION BLOCK, and its two distance washers and the shoulder washer. Secure with its respective nuts and washers. The plain washer and the front spring can now be screwed on to the trunnion block and also connected to the support bracket welded to the steering column, and locked in position with its spring washer and nut.

The front BRAKE SHOES can now be assembled to the end of the trunnion block spindle, and secured by means of the circlip. Open the jaws of the shoes and insert the brake operating cam LEVER.

The FRONT WHEEL SPINDLE with its bearings can now be fitted to the HUB, using a suitable drift.

If the opposite ball race in the hub has been removed, refit with a suitable drift.

Secure the wheel spindle with its plain washer and nut.

Note: Should the spindle be difficult or hard to rotate use a brass drift and settle the bearing in, taking care not to damage the end of the spindle which is slotted for the speedometer gear-box drive.

The SPEEDOMETER CABLE, GEARBOX and FRONT HUB COVER can now be fitted, first placing the distance piece between the front hub and the hub cover, and locating the drive of the gear-box into the slot of the front wheel spindle, and secure it with the bolt and washer.

Reassemble the front wheel BRAKE DRUM and secure it to the flange on the front wheel spindle by means of the two counter-sunk screws. The FRONT WHEEL can now be reassembled to the front hub and secured with the four spring washers and four nuts.

SECURITY LOCK

Should the security lock have been dismantled, reassemble it by first passing it through the cone at the bottom of the steering column housing; this should be done with the lock in the "closed" position. Feeding a wire from the top of the steering column housing hook this into the service hole provided in the body of the lock. The unit can now be lifted up and pushed into the hole provided for same in the longeron. Place the plain washer and locking ring on the body of the lock and tighten up.

It will be found that after assembly of the steering column unit, the lock may need some slight adjustment before it engages correctly on the lugs provided on the steering column.

STEERING COLUMN

Assemble the UPPER RACE of the STEERING COLUMN bottom bearing using Tool No. 13781 BALL RACE MOUNTING TOOL. (Fig. 50).

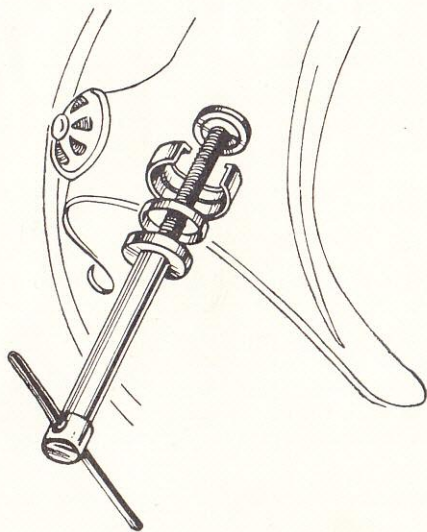


FIG. 50. BALL RACE MOUNTING

Place the collar (A) at the top of the cup housing.
Assemble the bolt (B) with bearing and thread into the collar (A).
Rotate the bolt until the bearing is pressed into position.

Should the race on the steering column have been removed, reassemble it with the dust cover by means of Tool No. 15123 BALL RACE MOUNTING TOOL. (Fig. 51).

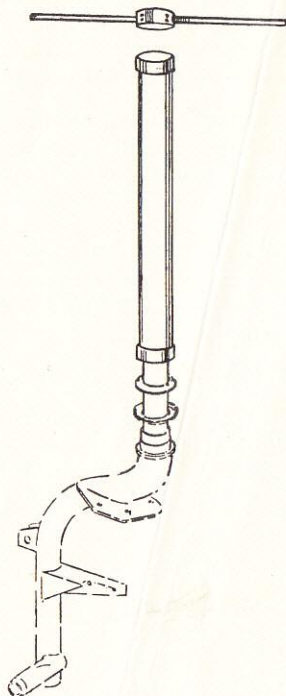


FIG. 51. MOUNTING THE BOTTOM RACE
OF THE BOTTOM BEARING

Having done this, smear the bearing with grease and assemble 22 ball bearings. Place to one side and assemble the top cup of the steering column race into the chassis. Smear this with grease and assemble 35 ball bearings. The column can now be assembled into the chassis taking care that it does not foul any of the lighting cables or control cables.

The SPEEDOMETER CABLE should also be threaded through its appropriate hole in the longeron.

Note: Care should be taken not to dislodge or lose any of the ball bearings from the steering column whilst this operation is being carried out. When the column is correctly seated the top race of the ball bearing can be screwed down on the steering column using Tool No. 14484 LOCKING RING SPANNER (Fig. 24, Page 30). Having done this the steering should be adjusted so that no loose motion exists but not sufficiently tight to impede free swing of the handlebars.

The assembly can now be locked in position by the locking washer and locking ring. After tightening make sure that the steering column still rotates freely.

The HANDLEBAR ASSEMBLY should then be assembled by reversing the dismantling procedure (Page 28). The complete assembly can now be placed on to the steering column head and secured in position with bolt and a nut.

Slide the front brake CONTROL CABLE through the hole provided in the steering column until it appears at the bottom. The nipple end can then be assembled into the front brake lever which in turn can be secured to the handlebars by means of the screw and nut provided. The end of this screw should be peened over. This also locks the LIGHTING SWITCH and throttle slide bracket in position. Having done this the brake cable can be passed through the adjuster screw situated on the front hub and into the clamp which can then be locked by the clamp nut.

Check the BRAKE to see that it is functioning correctly.

The lighting switch can now be assembled to the handlebars having previously connected the appropriate wires in their correct position, as shown in wiring diagram. (Fig. 15, Page 19).

The clutch control cable can now be assembled to the clutch lever of the handlebars and secured by means of the screw and nut provided. This screw also should be peened over.

The opposite end of the clutch cable can now be connected to the external clutch lever on the engine.

Note: During this operation care should be taken to see that the clutch is not lifted, and that there is at least $\frac{1}{8}$ " free movement on the clutch lever situated on the handlebars. If this is not adhered to, faulty operation of the clutch will follow i.e. slipping, or burnt cork plates.

Next, assemble the two GEAR CHANGE CONTROL CABLES, by first passing the inner cables through the adjuster guide and into the outer cables. Assemble the nipples of the two inner cables to the holes provided in the gear change twist grip. The twist grip can now be secured to the bracket welded to the handlebars by means of the screw and lock nut provided.

Note: This screw also passes through the adjuster guide. The end of the screw should be peened over in the same way as the clutch and front brake screws.

Now go to the engine; pass the end of the appropriate cables through the brass ferrules on the INDEX PLATE, select the 1st gear position on the HANDLEBARS and on the INDEX PLATE of the GEARBOX. Secure the appropriate cable by means of the nipple and screw. The other cable can also be secured in the same way.

The remaining slack, if any, can be taken up by the two adjusters located in the adjuster guide.

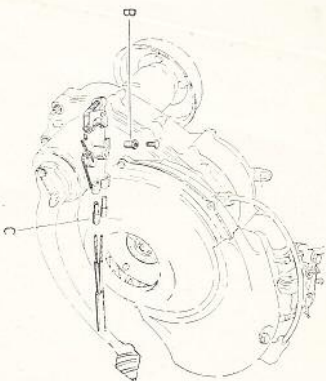


FIG. 52. CONNECTING GEAR CHANGE CONTROL CABLES TO ENGINE

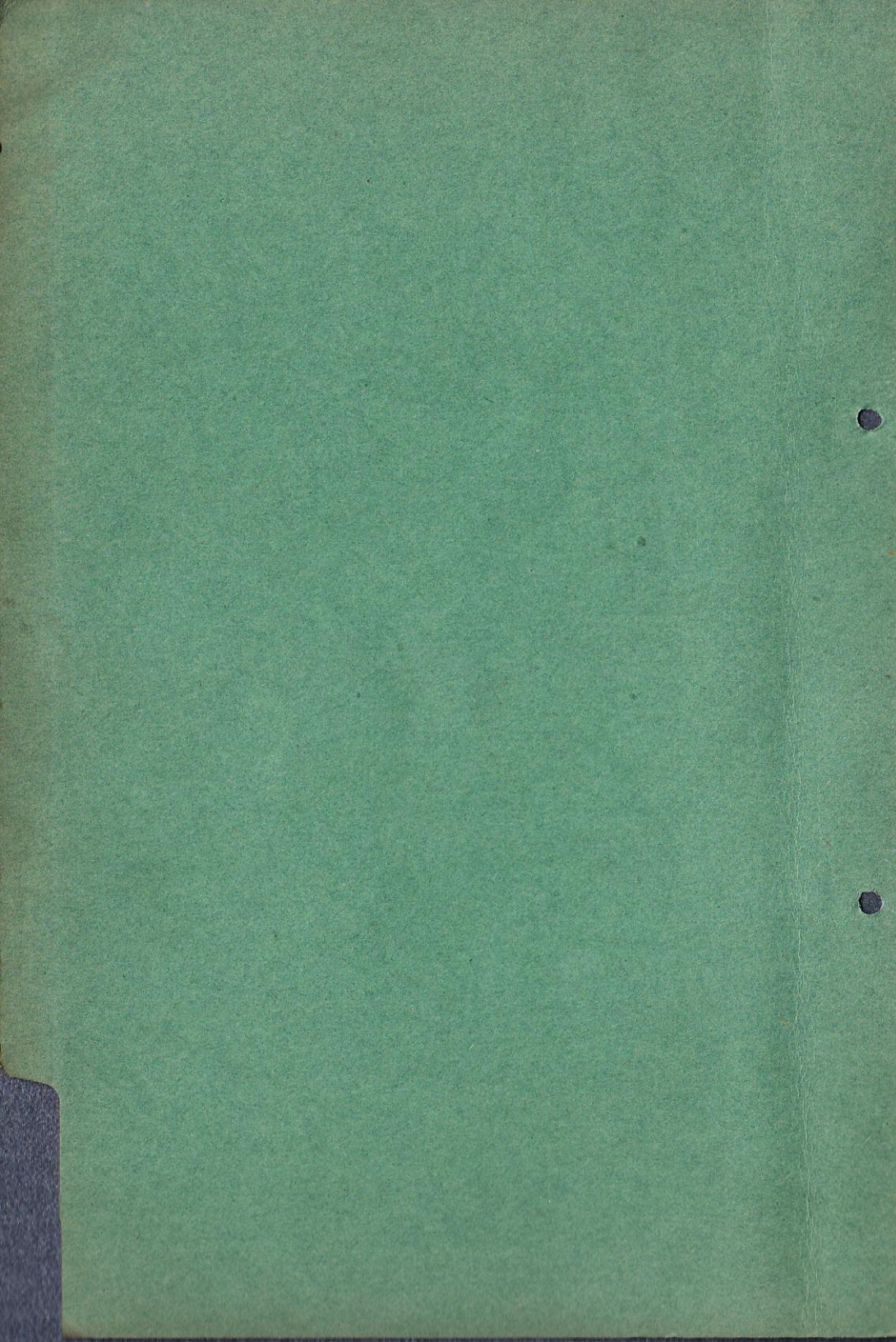
Check to see that all gears are obtainable.

The HORN can now be assembled. First connect the two horn cables to their respective terminals as shown on wiring diagram (Fig. 15, Page 19); then secure the horn in position with the four screws, and rubber packing piece.

The SPEEDOMETER CABLE can also be connected to the speedometer CLOCK. To engage the inner cable into the clock it is necessary to rotate front wheel.

The final operation is to feed the HEADLAMP SHELL over the lighting cables and to attach it to the chassis by means of the two bolts provided. The REFLECTOR, GLASS and RIM can now be attached to the headlamp shell by means of the screw situated at its base, having first connected the lighting cables to their appropriate terminals as shown in wiring diagram, (Fig. 15, Page 19).

IMPORTANT. BEFORE ROAD TESTING THE MACHINE.
THE LEVEL OF THE GEARBOX OIL MUST BE CHECKED. CARE SHOULD ALSO BE TAKEN TO SEE THAT ALL RESPECTIVE CABLES i.e. CLUTCH, THROTTLE, FRONT BRAKE AND REAR BRAKE, ARE CONNECTED TO THEIR APPROPRIATE TERMINALS, AND THAT BOTH WHEELS ARE SECURELY ATTACHED TO THEIR RESPECTIVE HUBS, TAKING SPECIAL NOTE THAT THE SPLIT PIN SECURING THE REAR WHEEL DRIVING FLANGE IS IN POSITION AND CORRECTLY TURNED OVER.



The remaining slack, if any, can be taken up by the two adjusters located in the adjuster guide.

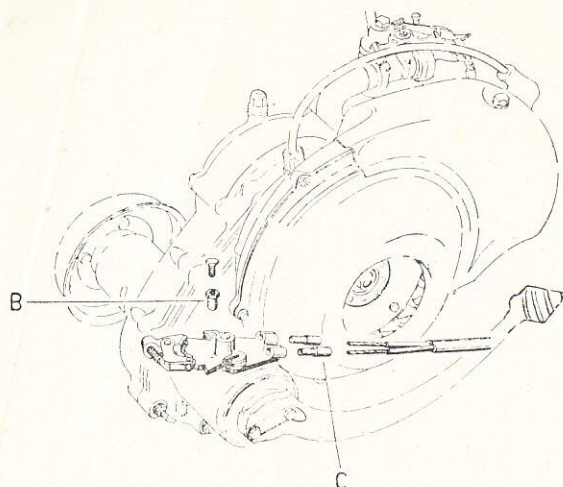


FIG. 52. CONNECTING GEAR CHANGE CONTROL CABLES TO ENGINE

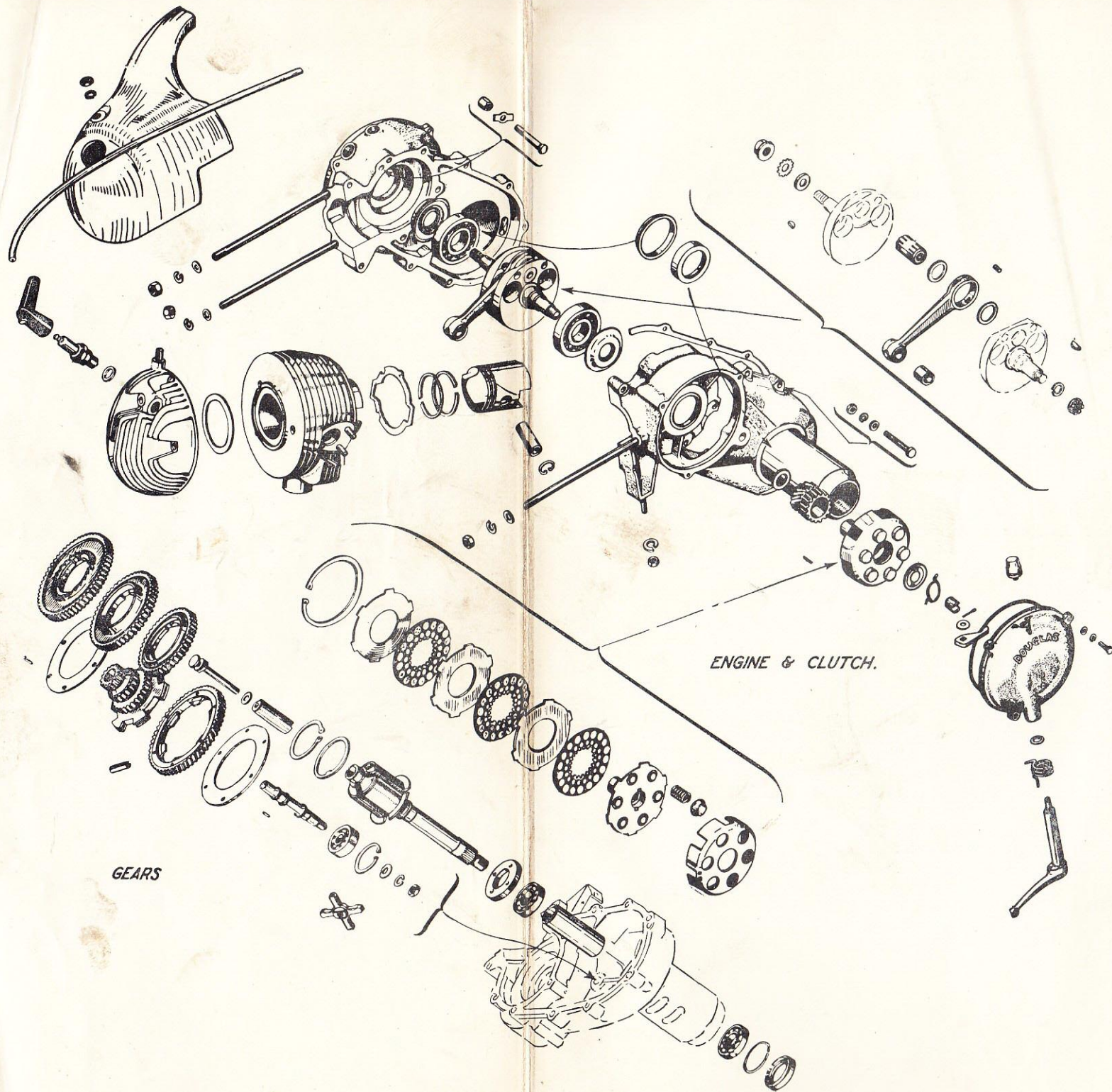
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ENGINE & CLUTCH.

GEARS

Replace the SPARKING PLUG by the timing gauge and rotate slowly the crankshaft by hand until the mark on the sliding rod of the tool shows that the piston has reached the t.d.c. Hold the crankshaft still, slacken the knurled screw and move the outer sleeve, until its "zero" coincides with the mark on the inner rod. Tighten the knurled screw again. Rotate the flywheel through 90° in an anticlockwise direction then place a small strip of very thin paper between the breaker points through the hole in the flywheel. The breaker points should open exactly 28° before the mark on the sliding rod coincides again with the "zero" mark on the outer sleeve. Check this with a very slight pull on the paper; it should be sufficient to release the paper. If the ignition is not properly timed, remove the flywheel, slacken the three screws retaining the coil plate, and rotate the latter in a clockwise direction when the ignition is advanced and vice-versa.

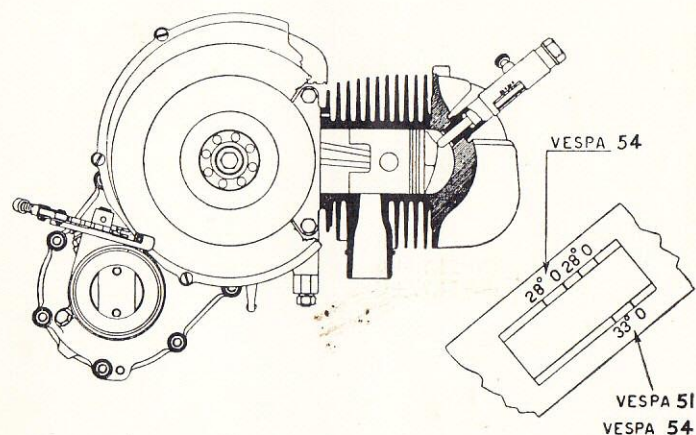
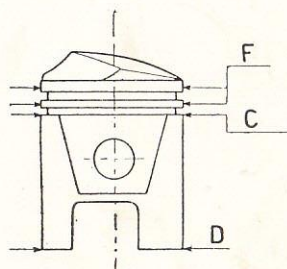
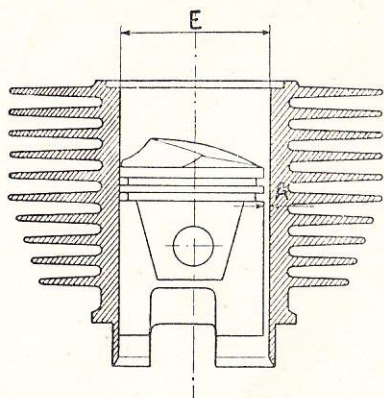


FIG. 54. TIMING GAUGE

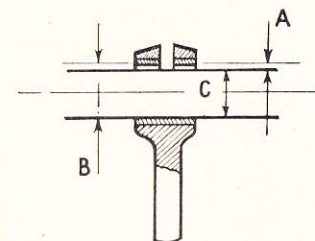


CYLINDER AND PISTON

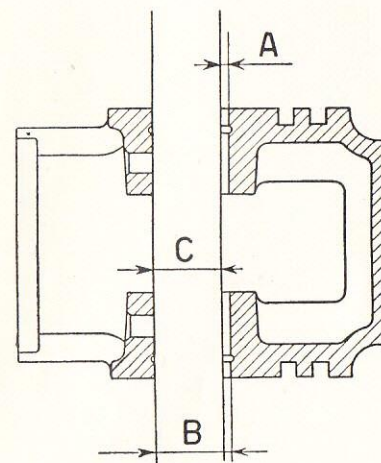
Part	Normal dimension	Ref.	Assy. tolerance	Max. play
Cylinder—normal	$E = 54 \begin{smallmatrix} +0 \\ -0.02 \end{smallmatrix}$	} Play at 'A'	.011 ÷ .012	17/100
Piston—normal	$F = 53.79 \begin{smallmatrix} +0 \\ -0.03 \end{smallmatrix}$ $C = 53.90 \pm 0.01$ $D = 53.97 \pm 0.02$			
Cylinder—1st o/size	$E = 54.20 \begin{smallmatrix} +0 \\ -0.02 \end{smallmatrix}$			
Piston—1st o/size	$F = 53.99 \begin{smallmatrix} +0 \\ -0.03 \end{smallmatrix}$ $C = 54.10 \pm 0.01$ $D = 54.17 \pm 0.02$			
Cylinder—2nd o/size	$E = 54.40 \begin{smallmatrix} +0 \\ -0.02 \end{smallmatrix}$			
Piston—2nd o/size	$F = 54.19 \begin{smallmatrix} +0 \\ -0.03 \end{smallmatrix}$ $C = 54.30 \pm 0.01$ $D = 54.37 \pm 0.02$			
Cylinder—3rd o/size	$E = 54.60 \begin{smallmatrix} +0 \\ -0.02 \end{smallmatrix}$			
Piston—3rd o/size	$F = 54.39 \begin{smallmatrix} +0 \\ -0.03 \end{smallmatrix}$ $C = 54.50 \pm 0.01$ $D = 54.57 \pm 0.02$			
Cylinder—4th o/size	$E = 54.80 \begin{smallmatrix} +0 \\ -0.02 \end{smallmatrix}$			
Piston—4th o/size	$F = 54.59 \begin{smallmatrix} +0 \\ -0.03 \end{smallmatrix}$ $C = 54.70 \pm 0.01$ $D = 54.77 \pm 0.02$			

Part	Normal dimension	Ref.	Assy. tolerance	Max. play
Gudgeon pin	$C \begin{smallmatrix} 15 \\ -0.002 \\ -0.010 \end{smallmatrix}$	Play at 'A'	$0.002 \div 0.030$	6/100
Connecting rod	$B \begin{smallmatrix} 15 \\ +0.03 \\ +0.02 \end{smallmatrix}$	Play at 'A'	$0.002 \div 0.030$	6/100

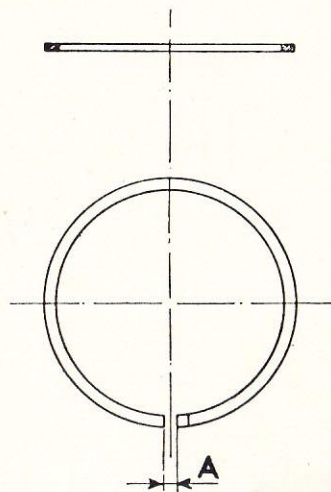
Part	Normal dimension	Ref.	Assy. tolerance	Max. play
Piston—normal	$B \begin{smallmatrix} 15 \\ +0 \\ -0.011 \end{smallmatrix}$	Play at 'A'	0	2/100
Gudgeon pin	$C \begin{smallmatrix} 15 \\ -0.002 \\ -0.010 \end{smallmatrix}$	Play at 'A'	0	2/100



CONNECTING ROD AND GUDGEON PIN

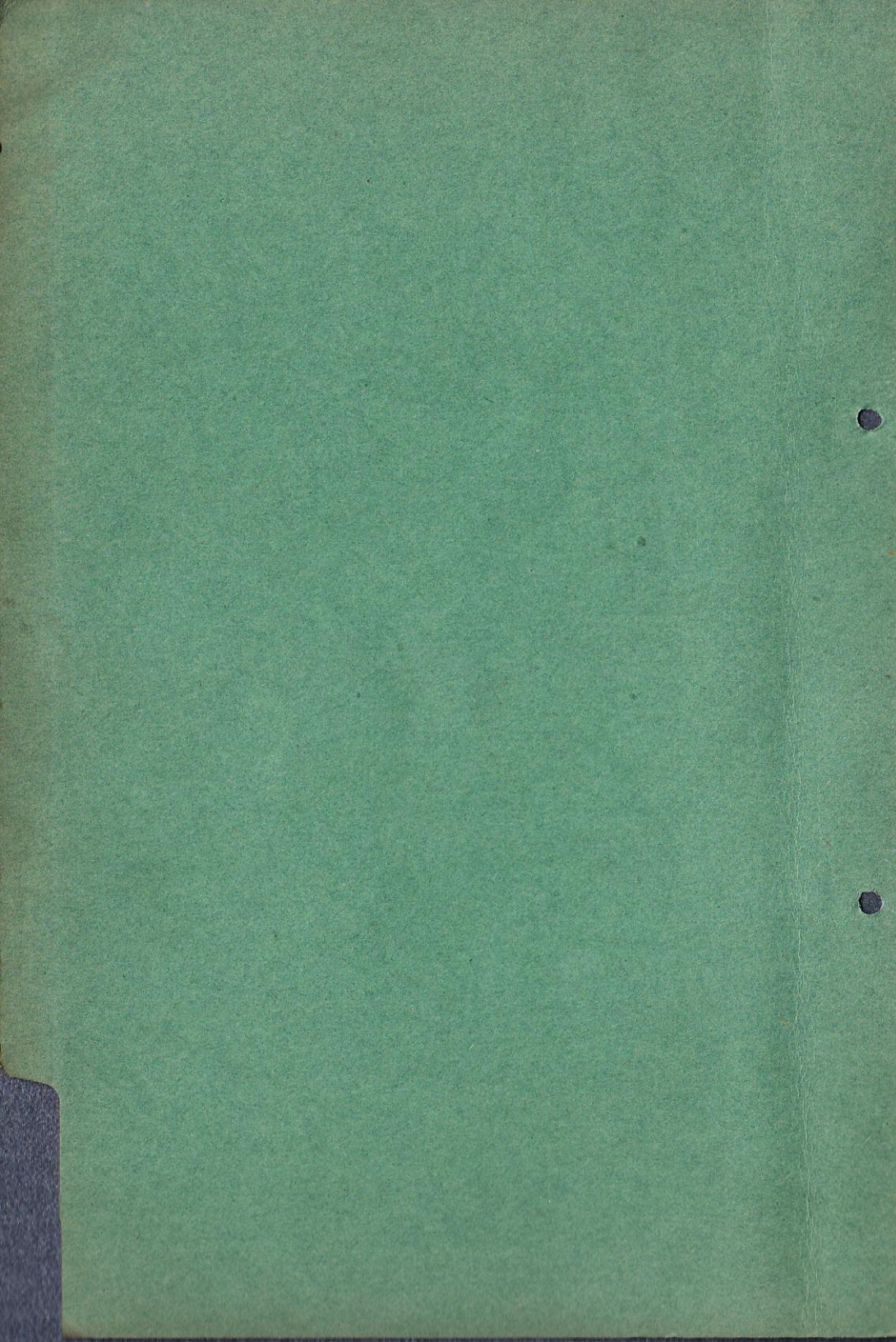


PISTON AND GUDGEON PIN



PISTON RINGS

Part	Normal dimension	Ref.	Assy. tolerance	Max. play
Piston ring	ø 54	<div style="display: flex; align-items: center;"> <div style="flex: 1;"> <div style="border-left: 1px solid black; height: 100px; margin-left: 5px;"></div> </div> <div style="flex: 1; text-align: center;"> Play at 'A' </div> </div>	0.2 ÷ 0.35	2mm.
Piston ring—1st o/size	ø 54.2			
Piston ring—2nd o/size	ø 54.4			
Piston ring—3rd o/size	ø 54.6			
Piston ring—4th o/size	ø 54.8			



HARD STARTING: This can be due to one of the following causes:

1. Fuel system

Fuel tank empty

No fuel at carburettor

Refill

(a) Depress the tickler until some fuel drips out, or

(b) Unscrew and remove the main jet. If the fuel system is efficient, fuel will come out

(c) Blow through jet orifice to ensure it is clear. Turn the fuel tap into position "open"

(a) Fuel tap

Closed

Turn the fuel tap into position "reserve"

(b) Main supply of fuel exhausted

(c) Fuel tap body

Clogged

Replace, blow dry

(d) Float chamber union filter

Dirty

Release by depressing the tickler

(e) Float needle valve

Sticking on its seating

Remove and blow clean

Avoid use of abrasive material or wires

(f) Carburettor body

Clogged

2. Carburation

Neat fuel coming out from exhaust pipe } Engine flooding
Fuel dripping out from carburettor }

Operate as indicated hereunder, as the case may be

To restart engine:

(a) push-start the machine in 2nd or 1st gear with throttle wide open, or—

(a) Tickler

Sticking in depressed position
Perforated (indicated by fuel swirling inside when float is shaking briskly)

Release

(b) Float

Replace

(b) close fuel tap, unscrew the sparking plug and rotate engine for about $\frac{1}{2}$ minute with throttle wide open to expel excess fuel. Replace sparking plug and proceed as for normal start

(c) Air cleaner

Choked, dirty

Clean

(d) Choke flap

Sticking in position "closed"

Release

(e) Carburettor assembly

Mounted at an angle

Turn to vertical position

(f) Float

Needle not properly fitted into its seating

Clean or replace both needle and float chamber cover

3. Ignition

Lack of spark

Disconnect the plug lead. Check if sparking occurs between lead and crankcase when the footstarter is operated. Proceed as indicated underneath, as the case may be

(a) Sparking plug

Dirty

Clean. Correct gap to 0.018"

(b) Lever jammed in "stop" position

Cracks in insulation

Replace the plug

(c) Earth lead

Insulation damaged causing short circuit

Release the lever

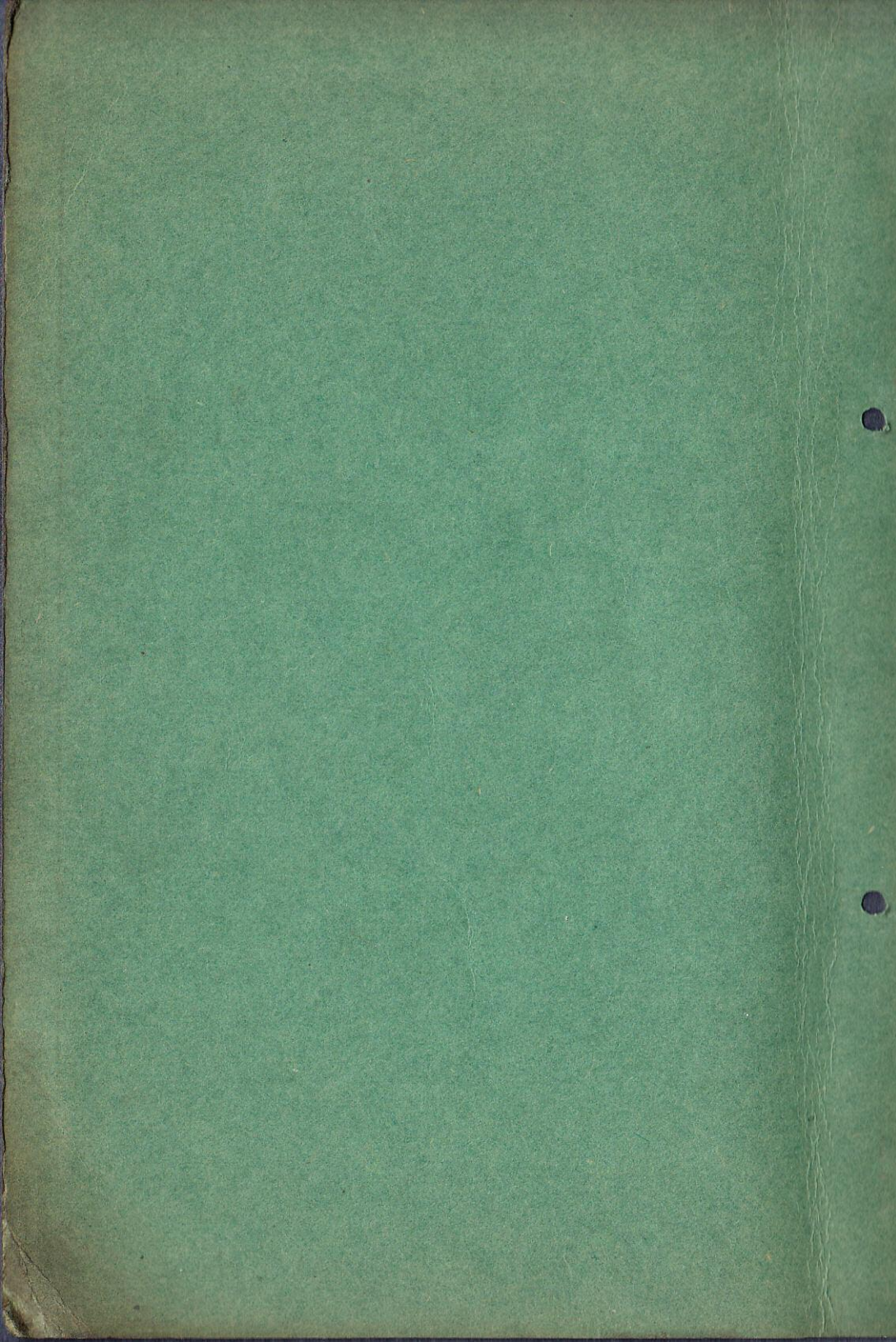
Disconnect the lead terminal from L.T. Socket; if the ignition works again, the trouble is located in the lead portion inside the frame

Replace the earth lead

LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
Ignition—continued			
(d) Moving arm of contact breaker	(1) Bearing surface worn (2) Lubrication felt dry or broken	Replace the breaker Lubricate or replace	When the bearing surface of the arm becomes abnormally worn, see if the cam surface is perfectly smooth
(e) Condenser	Faulty	Replace	
(f) Pick-up terminal	Cracks in insulation. Short circuit in the terminal	Replace the pick-up terminal	
(g) Breaker points	Dirty, partially worn or pitted	Clean with suitable file or very fine emery paper Correct gap to 0.012" with feeler gauge	
(h) Timing	Gap incorrect Completely worn or pitted Wrong	Replace Re-time ignition	
4. Clutch			
The engine will not revolve when the kickstarter is depressed	Clutch slipping	Ensure that there is sufficient play in clutch lever; if correct, follow instructions for clutch repair as given on Page 71	
INCORRECT RUNNING: Possible causes are indicated hereunder			
1. Lack of Power			
(a) Silencer outlet pipe	Carbonised	Tighten the nuts on flange Decarbonise cylinder, piston and cylinder head (after removal) Replace	The packing between cylinder flange and induction pipe should be inspected, and replaced if necessary
(b) Induction pipe	Loose		
(c) Exhaust port	Partially closed by carbon deposit		
(d) Cylinder base gasket	Not tight		
2. Poor compression			
(a) Sparking plug	Not well screwed down in cylinder head	Tighten	In order not to damage the thread on cylinder head start the sparking plug by hand using box spanner for final tightening
(b) Cylinder and cylinder head	The head does not fit properly into spigot on top of cylinder or three stud nuts are slack Head gasket missing	Set the head properly and tighten the nuts carefully after deburring the spigot, if necessary Replace	
(c) Piston rings	Gummed up or not free in grooves	Inspect the rings and clean the grooves	
3. Explosions at silencer or carburettor			
(a) Sparking plug	Excessive electrode gap	Correct gap to 0.018"	Clean with suitable wire brush and emery paper, or, better, by sandblast
	Carbon coated Carbon pearls on insulation	Replace or clean and check the gap Clean. Ensure that oil-gasoline ratio of fuel is correct	

LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
4. Clutch troubles			
A.—Clutch snatches			
(a) Outer convex plate	Wrongly assembled	Assemble correctly (See page 54)	
(b) Gear pinions	Not lubricated	Top up oil level (see Lubrication Chart Page 24)	
(c) Plates with cork inserts	Gummed together	Wash with paraffin	
B.—Clutch slips			
(a) Springs	Feeble	Replace	
(b) Plates with cork inserts	Worn or burnt	Replace	Springs must be replaced whenever corks are burnt
C.—Clutch does not disengage completely			
(a) Control cable	Excessive play	Adjust	
(b) Outer convex plate	Excessive convexity	Replace	
5. Gear pinions disengage of own accord			
(a) Gear change control cables	Out of adjustment	Adjust (See page 62)	
(b) Gear shifter	Loose on crankcase	Tighten the screws	
(c) Spring for stirrup	Broken, missing or feeble	Replace	
(d) Selector	Chamfered arms	Replace (See Pages 45 and 51)	
	Guide bush of selector shaft wrongly assembled	Rectify	
(e) Gear pinions	Chipped or worn dogs	Replace	
6. Starter assembly not engaging			
(a) Starter ratchet			
	Movement not free in the slots of the housing	Clean, adjust or if necessary replace	
	Chipped or worn teeth	Replace	In such a case the mating teeth on 1st gear pinion should also be inspected
(b) Slotted housing			
(b) Slotted housing	Deformed or broken	Replace	
(c) Starter bush	Deformed or broken	Replace	
(d) Thrust springs	Broken or feeble	Replace	
7. High fuel consumption			
A.—Fuel level too high in carburettor			
(a) Tickler	Sticking in depressed position	Release	
(b) Float	Perforated	Replace	
(c) Float needle valve	Not properly fitting into seating	Clean or replace both needle and float chamber cover	
B.—Air cleaner			
	Choked or dirty	Clean	
C.—Choke valve flap			
	Sticking in closed or partially closed position	Release operating and lubricating lever on back of cleaner case	

LOCATING SOURCE OF TROUBLE		CAUSE OF TROUBLE	REMEDY	NOTES
8. Controls not operating properly				
A.—Hand controls				
(a) Inner cable	Rusty Unravelled	Lubricate, or, if necessary, replace	If throttle control is stiff trouble may be caused by lack of lubrication at slider and r.h. twistgrip. Lubricate. Replace cable sheath if damaged.	
B.—Excessive play				
(a) Inner cable	Slack	Operate on respective adjusting nuts	If gear change control cables are loose, be sure they are firmly clamped in screw nipples of gear shifter before starting operation on handle-bar adjusting nuts	
9. Steering column becomes stiff				
(a) Top race of top ball bearing	Too tight	Adjust (See Page 61)	This trouble may lessen riding stability	
(b) Ball races of bottom bearing	Pitted	Replace races and balls		
10. Excessive play in steering column				
Top race of top ball bearing	Loose	Adjust (See page 61)		
11. Poor braking				
(a) Rear brake linings	Worn down Oily	Replace Wash with gasoline and slightly rub the braking surface with emery paper, or replace if deeply impregnated with oil	If oil gets to the brake linings from the gearbox: (a) replace spring loaded seal, or (b) tighten the nut securing the rear wheel flange	
(b) Brake drums and linings	Scratched	Replace		



PREVIOUS MODELS

The Douglas Vespa Model, type G.L.2, which is the main subject of this Service Station Manual, must not make us forget the previous models. The latter comprise two types; the 1951/2/3 machine with the rod-operated Gear Controls, and the subsequent 1953/4 machine (namely Model "G") which incorporated the cable change controls; although basically this is the same engine unit and construction as the previous model.

MODEL 1952/3 ROD-OPERATED (see fig. 55)

This was the original Italian model which has served us so well, but with experience certain changes and modifications took place, which culminated in the production of the Model "G". However, the changes effected concern the following:—

MAINSHAFT (12699)—Redesigned to prevent undue movement.

CLUTCH (13200)— Remained basically the same, although the lifting mechanism was modified to improve clutch operation.

CON. ROD —Lubrication of the big end bearing was improved by slotted oil ways.

This method of gear selection was accomplished through the medium of rod and linkage from handlebars to gearbox.

MODEL "G" 1953/4 (see fig. 56)

The major change of design on this model was the replacement of the rod linkage by cables, this necessitated in turn, alterations to the main chassis. However, the engine unit was basically the same with the exception of the gear selector mechanism which required slight modification to utilise the cable medium of selection. This change of course necessitated the redesigning of the handlebars. It is important to note that the previous type of handlebars are not interchangeable.

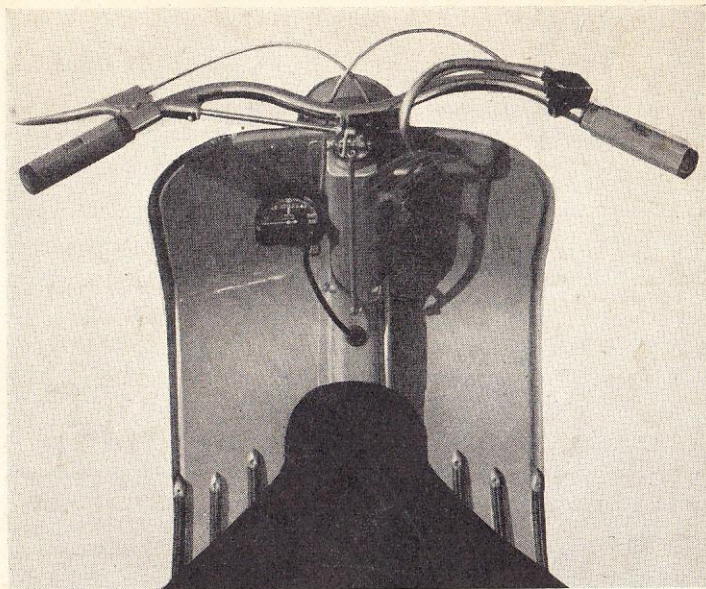


FIG. 55

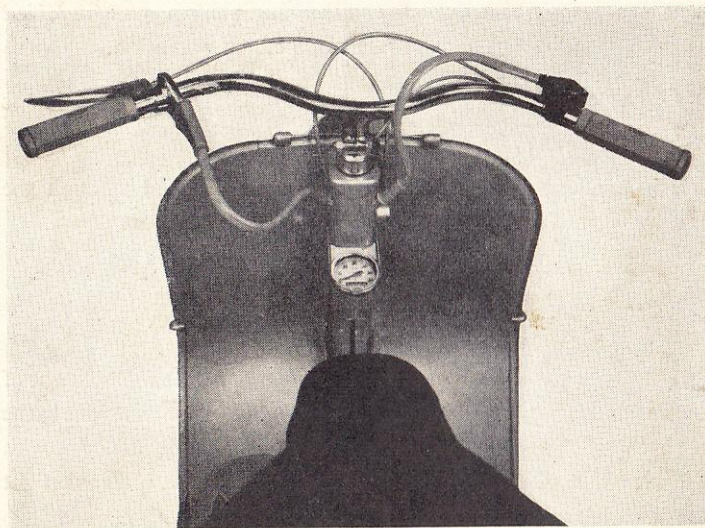


FIG. 56

Top

Green

Maroon

Black

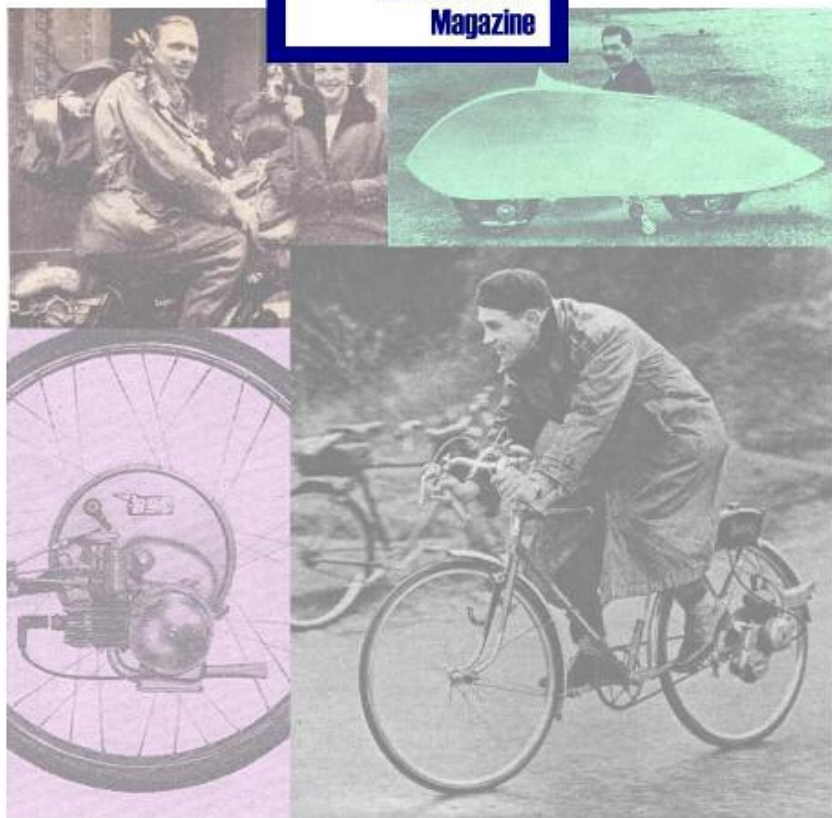
Purple

Yellow

Pink

White

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