



Vespa

model 42 L2

model 92 L2

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

DOUGLAS (Sales & Service) LIMITED
Kingswood, Bristol

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DOUGLAS (Sales & Service) LIMITED
Kingswood, Bristol

Telephone: Bristol 67-1881 (9 lines)

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1ST SECTION

SPECIFICATION AND GENERAL DATA



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SERVICE TOOLS

Part No.	Description	Page
GA.4012	Clutch Extractor	43
13767	Engine Locking Ring Tool	48
A.13781	Chassis Bottom Bearing Assembly and Removal Tool	32 & 65
4105/A/0013782	Engine Mounting Stand	39
14202	Taper Wedge Tool	44
14484	Locking Ring Spanner	31 & 67
0014499	Tool for Extracting Main Bearings and Front Wheel Bearings	35 & 50
B.14801-1	Crankshaft & Crankcase Removal Tool (drill only)	44 & 45
B.14812-5	Mainshaft Extractor	47
14854	Gudgeon Pin Extracting and Assembly Tool	41
A.14871-1	Clutch " C " Spanner	42
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0014924/5	Crankcase Oil Seal Assembly	52
15046	Clutch Assembly Fixture	43
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15688	Kickstart Bearing Extractor	45
0016029	Steering Column Race Assembly	66
0017808	Pilot for Crankshaft (clutch half)	53
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0018128	Ball Race Assembly Tool	59
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(See note on Page 50)

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DESCRIPTION

(INTRODUCTION)

The 42 L 2 Vespa in a dove grey colour, is a significant step forward in the production of motor scooters in this country. The new positioning of the headlamp gives an added grace to the Vespa's incomparable lines, together with the streamlining of the engine housing and the repositioning of the footstarter.

The main points of difference in the power unit consist of new crankshaft incorporating larger big end bearings, new flywheel magneto, larger clutch, airfilter and silencer. There is now a hydraulic damper incorporated on the front suspension, and a new rear suspension unit. A larger battery, heavier control cables which now pass through the handlebars, a new speedometer drive in hub with the cable passing through the steering column, and increased petrol tank capacity are all points of improvement on previous models.

This Manual, however, deals with the servicing of the 42 L 2 and 92 L 2 in their entirety.

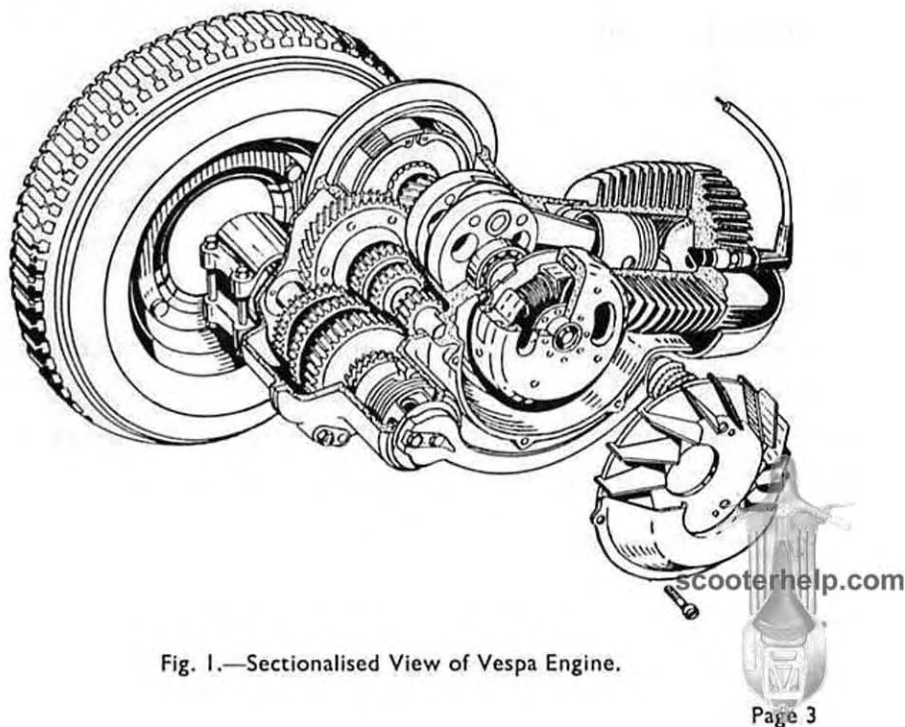


Fig. 1.—Sectionalised View of Vespa Engine.

SPECIFICATION

ENGINE

Bore: 54 mm. (2.126 ins.)

Stroke: 54 mm. (2.126 ins.)

Displacement: 123.67 cc. (7.48 cu. ins.)

Compression ratio: 6.5 : 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.

Sparking plug—electrodes gap: 0.018 ins.

Magneto contacts gap: 0.015 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.

	42 L 2	92 L 2
Maximum Jet:	95	95
Fuel Tank capacity:	1.25 gallons	1.75 gallons
Emergency reserve:	.6 pints	.75 pints

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 25.

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

Wheel base: 46½ inches.

Maximum width of handlebars: 31.1 inches.

Maximum length of scooter: 67½ inches.

Maximum height: 40½ inches.

Ground clearance: 4 inches.

Minimum turning circle: 59 inches.

Weight (unladen): 190 lbs. approx.

SUSPENSION

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

Pressures: **Michelin**

Solo ... front 14/15 lbs. rear 20/21 lbs.

Pillion ... front 14/15 lbs. rear 29/30 lbs.

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.



PROPRIETARY EQUIPMENT

Battery: Joseph Lucas Ltd.,
Birmingham 18.
(and at local depots).

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

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

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



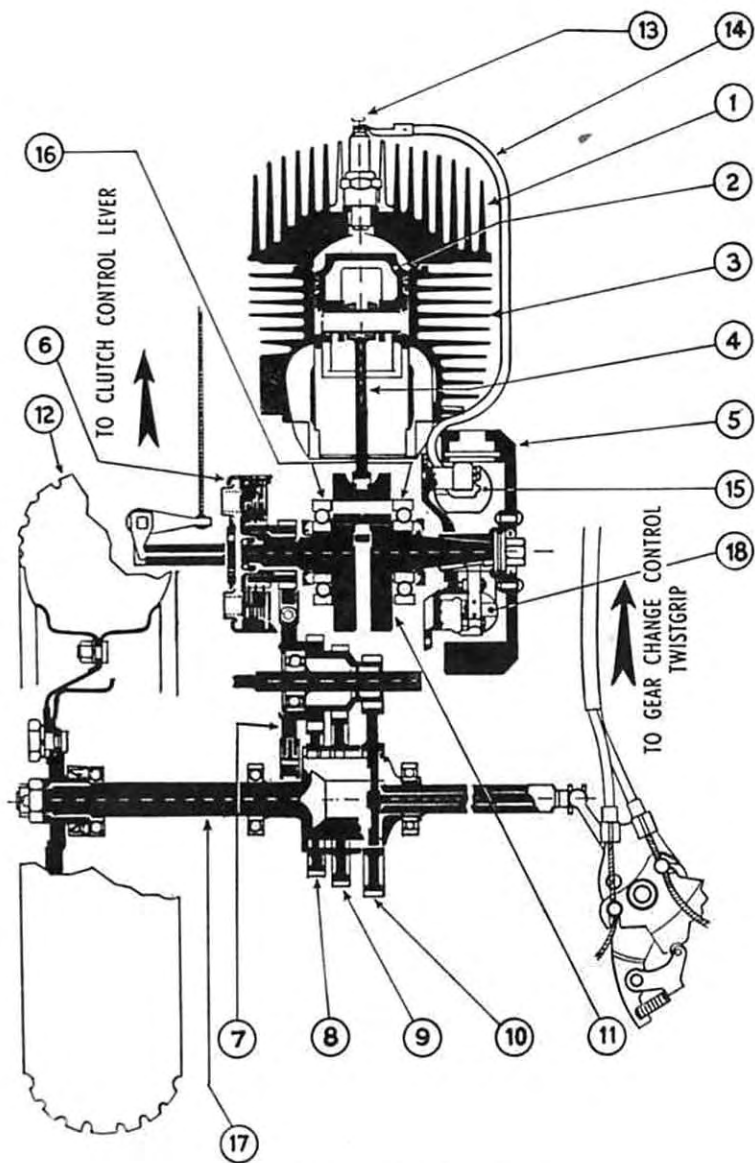


Fig. 2.—Engine Layout.

- | | |
|---------------------|------------------------------|
| 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 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.

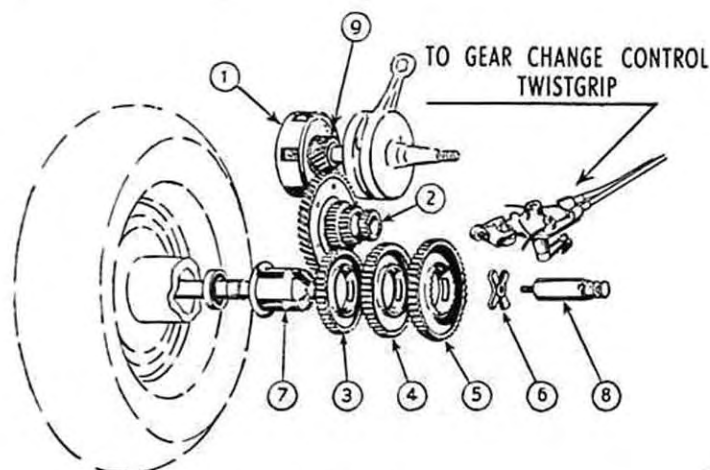


Fig. 3.—Drive System.

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

The cast iron CYLINDER has four ports; one for intake, two for transfer and one for exhaust, and is generously 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 woodruffe 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 woodruffe key, has a cam outline to operate the breaker points. The contact breaker, the three coils and the condenser 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 KICKSTART 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 kickstart is depressed.

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

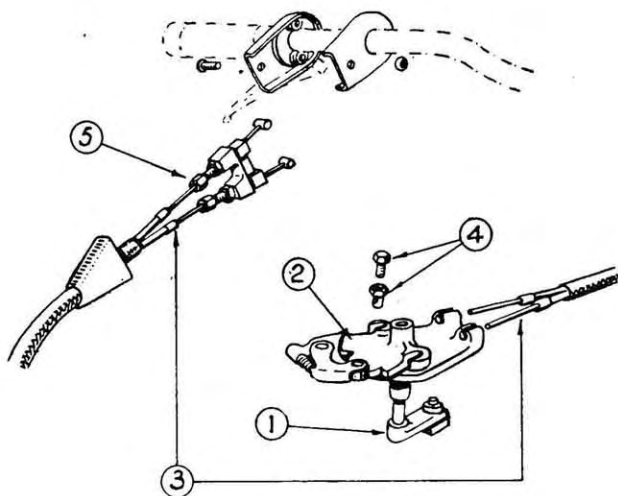


Fig. 4.

- | | |
|-----------------------------|-----------------------------------|
| 1. Selector operating lever | 3. Control cables |
| 2. Indexing plate | 4. Cable clamping screwed nipples |
| | 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 and 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).

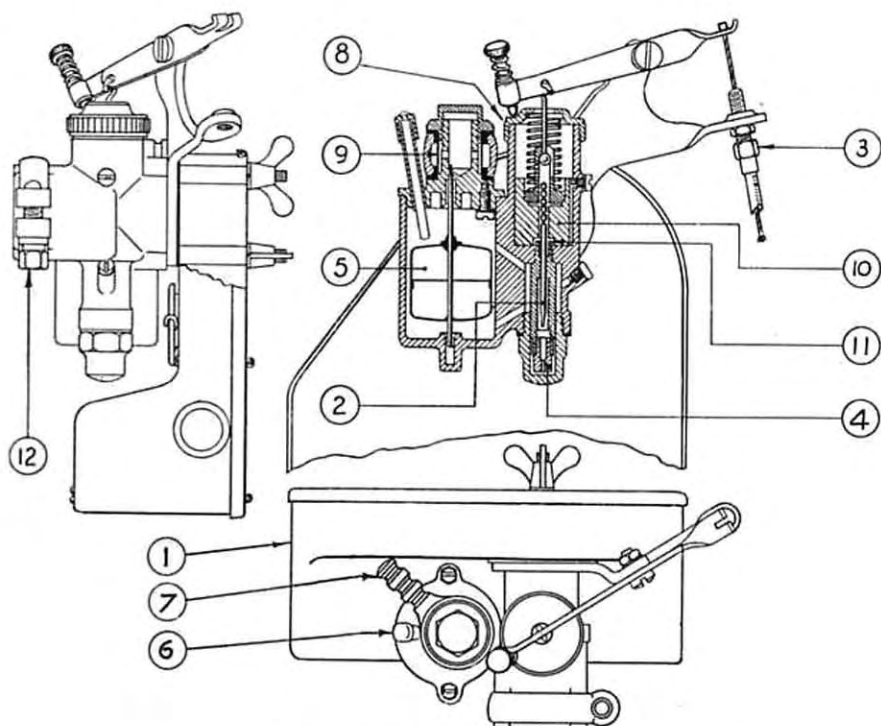
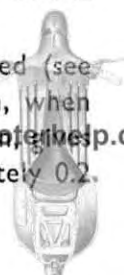


Fig. 5.—Carburettor, Vertical Section.

- | | |
|--------------------------|-----------------------------|
| 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.



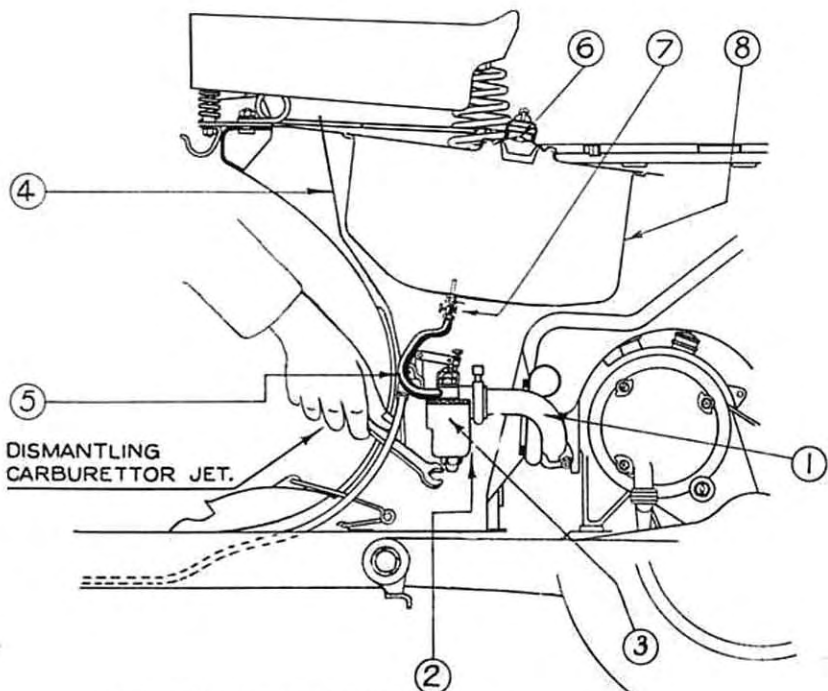


Fig. 6.—Dismantling Carburettor Jet.

- | | |
|-------------------|----------------|
| 1. Induction Pipe | 5. Rubber Hose |
| 2. Carburettor | 6. Filler Cap |
| 3. Float Chamber | 7. Fuel Tap |
| 4. Choke Control | 8. Fuel Tank |

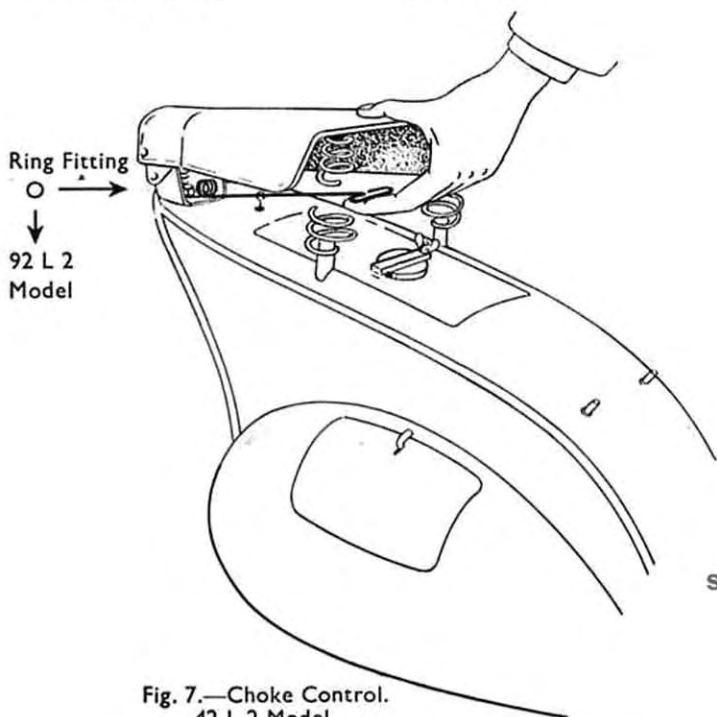


Fig. 7.—Choke Control.
42 L 2 Model



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.

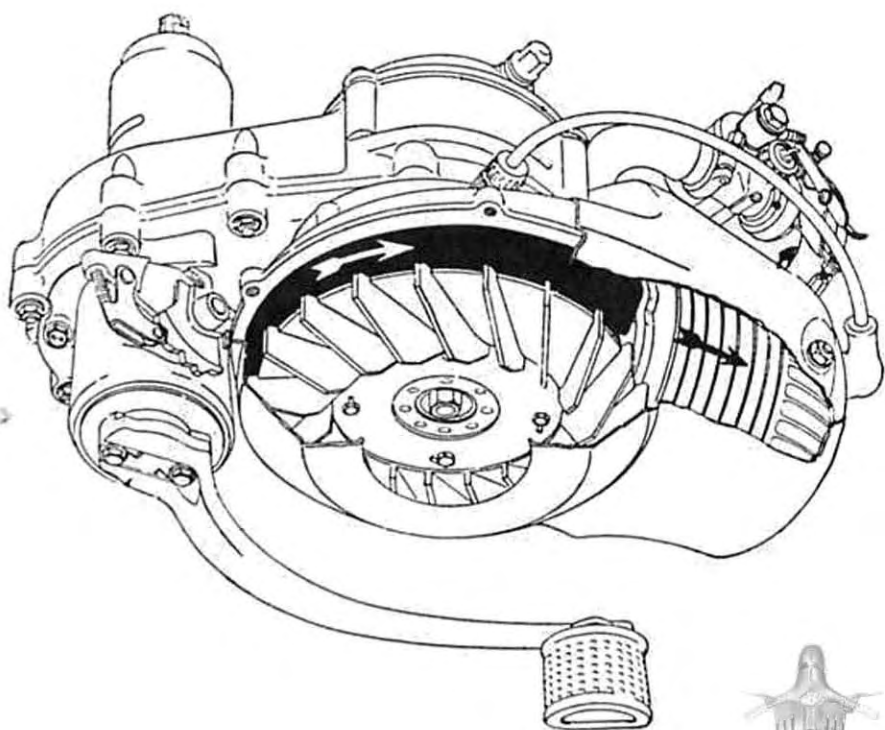


Fig. 8.— Engine Cooling Scheme.



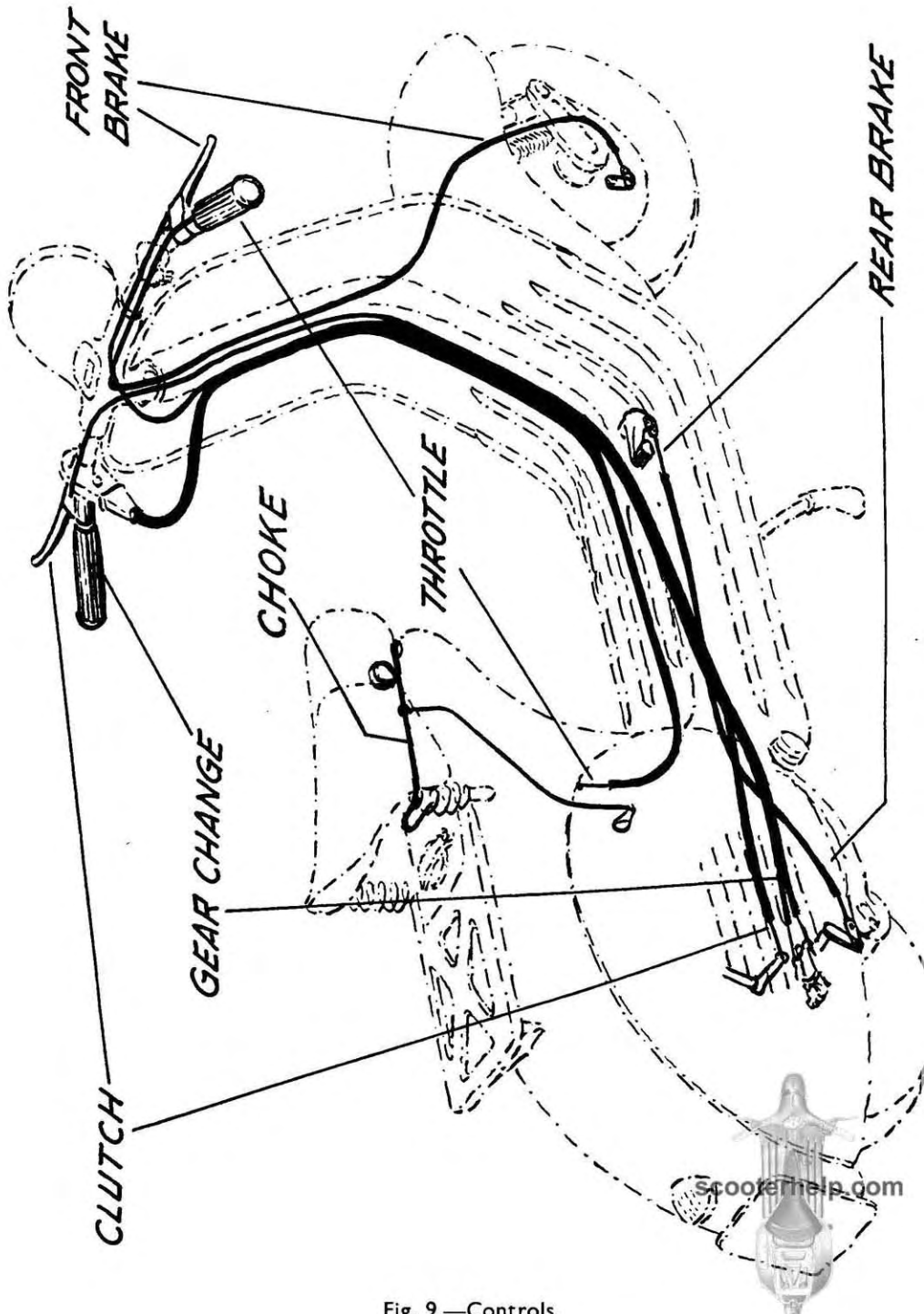


Fig. 9.—Controls.

CONTROLS

All VESPA controls, but the rear brake pedal and kickstarter, 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 Figs. 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 rocket 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			
	Dipping	Beam	Parking	Tail lamp
M	M a g n e t o E a r t h			
0	off	off	off	off
1	on	off	off	on
2	off	on	off	on
3	off	off	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 bearer is pivoted to the frame (see 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 bearer and top panel of the body.

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

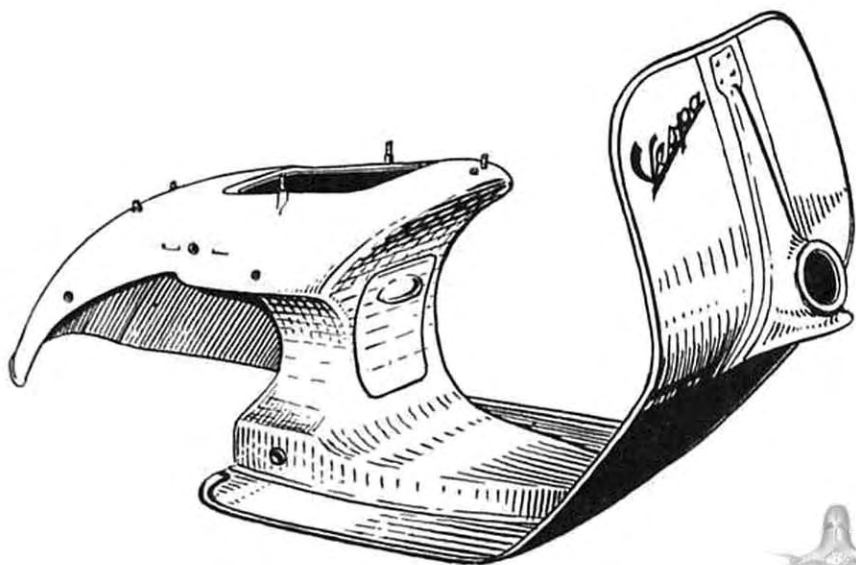


Fig. 10.—Frame.



STEERING COLUMN

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

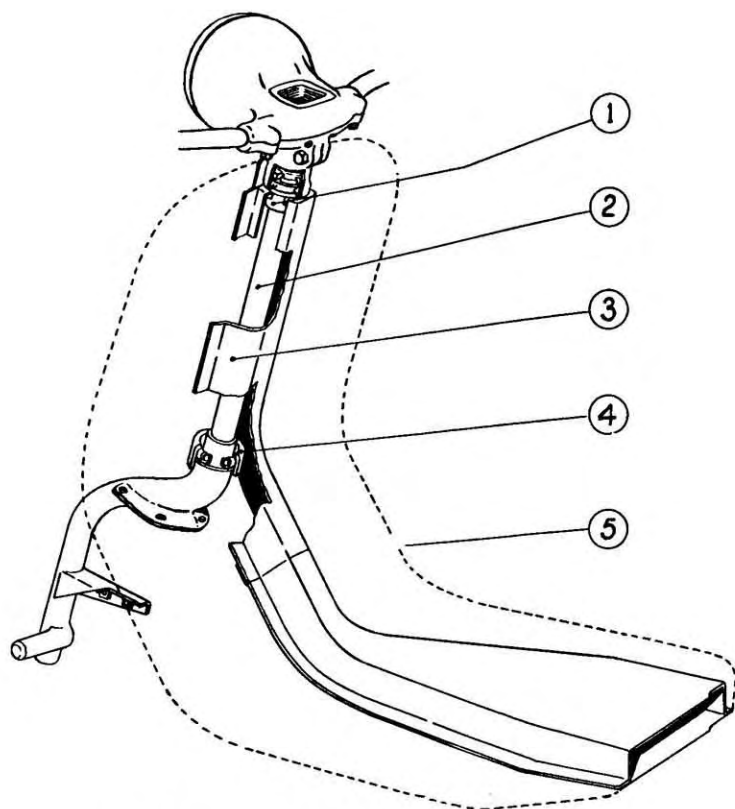


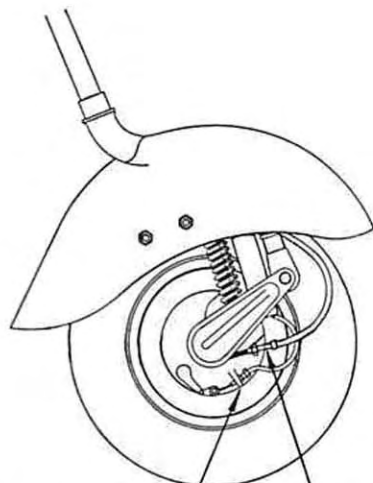
Fig. 11.—Central Longeron and Steering Column.

- | | |
|-------------------------------|---------------------|
| 1. Top Ball Race (adjustable) | 4. Bottom Ball Race |
| 2. Steering Column | 5. Frame |
| 3. Steering Column Housing | |

The ball races are force fitted on the chassis and steering column. The bottom crank of the column permits the attachment of the front hub, complete with damper, stub axle and wheel (Fig. 12).

The hub houses two ball races for the front spindle 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 incorporates the worm drive for the speedometer.





BRAKE CABLE ADJUSTER.

SPEED DRIVE.

Fig. 12.—Front Wheel Suspension.

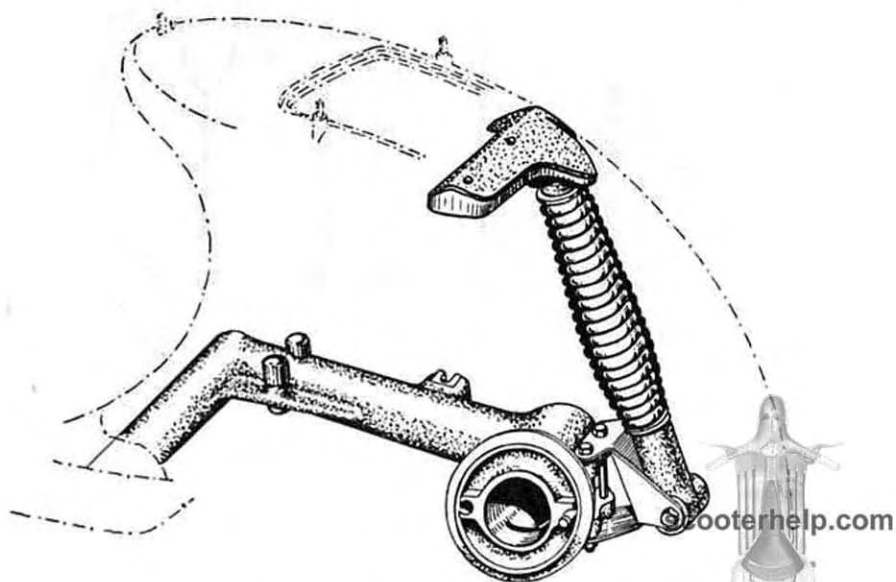


Fig. 13.—Rear Wheel Suspension

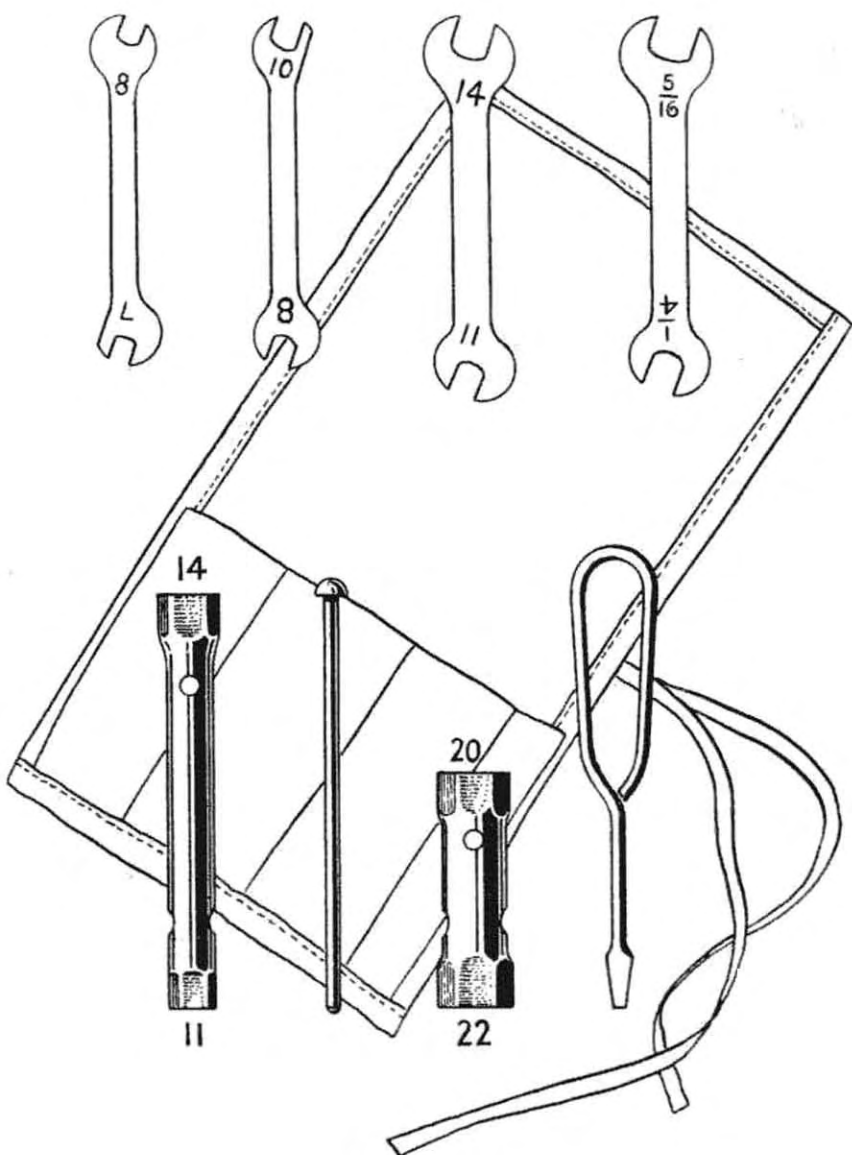


Fig. 14.—Tools.



ELECTRICAL SYSTEM: The following system of wiring applies only to Solo Vespas supplied with parking lights. The commercial lighting is illustrated on Page 21.

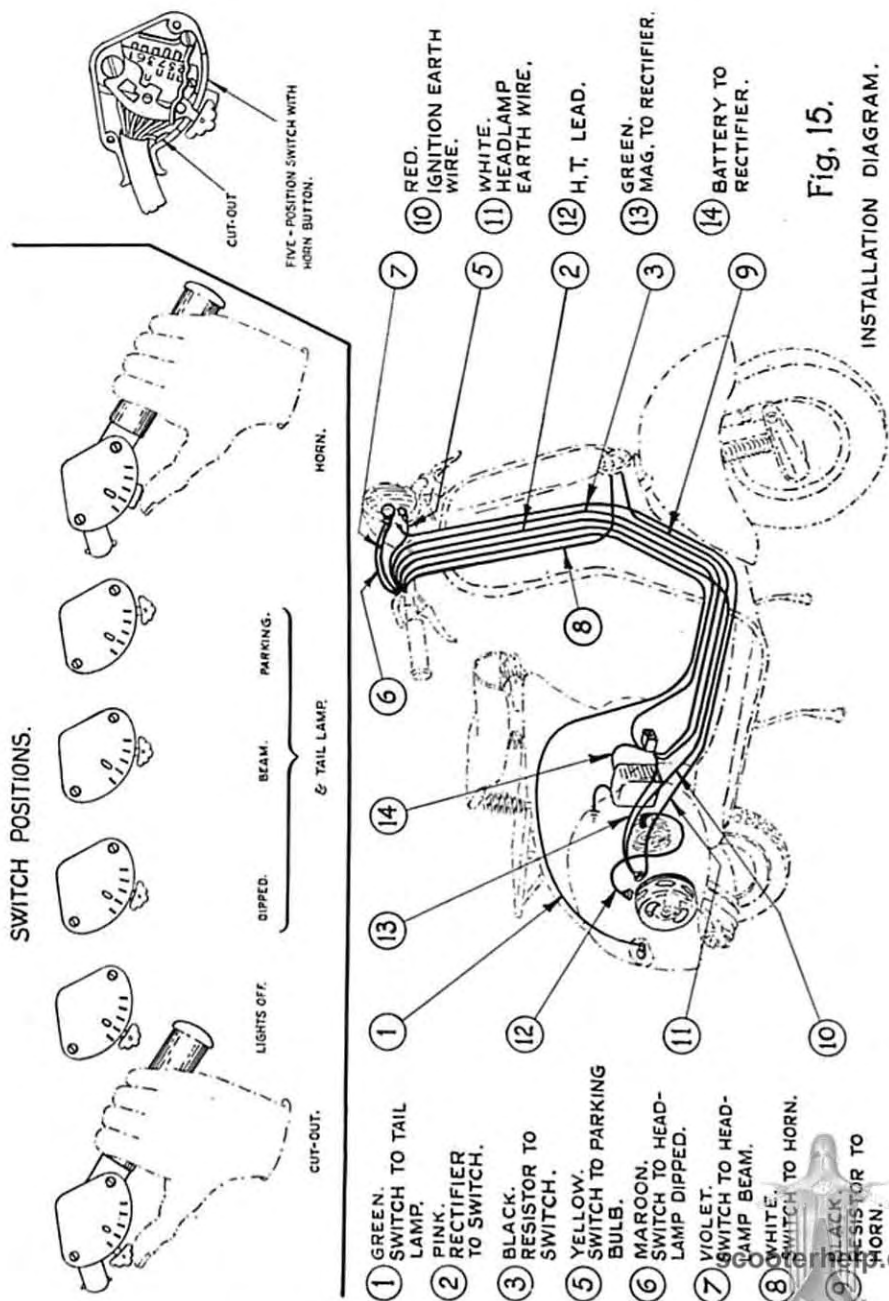


Fig. 15.—Electric Wiring Lay-out on Chassis.

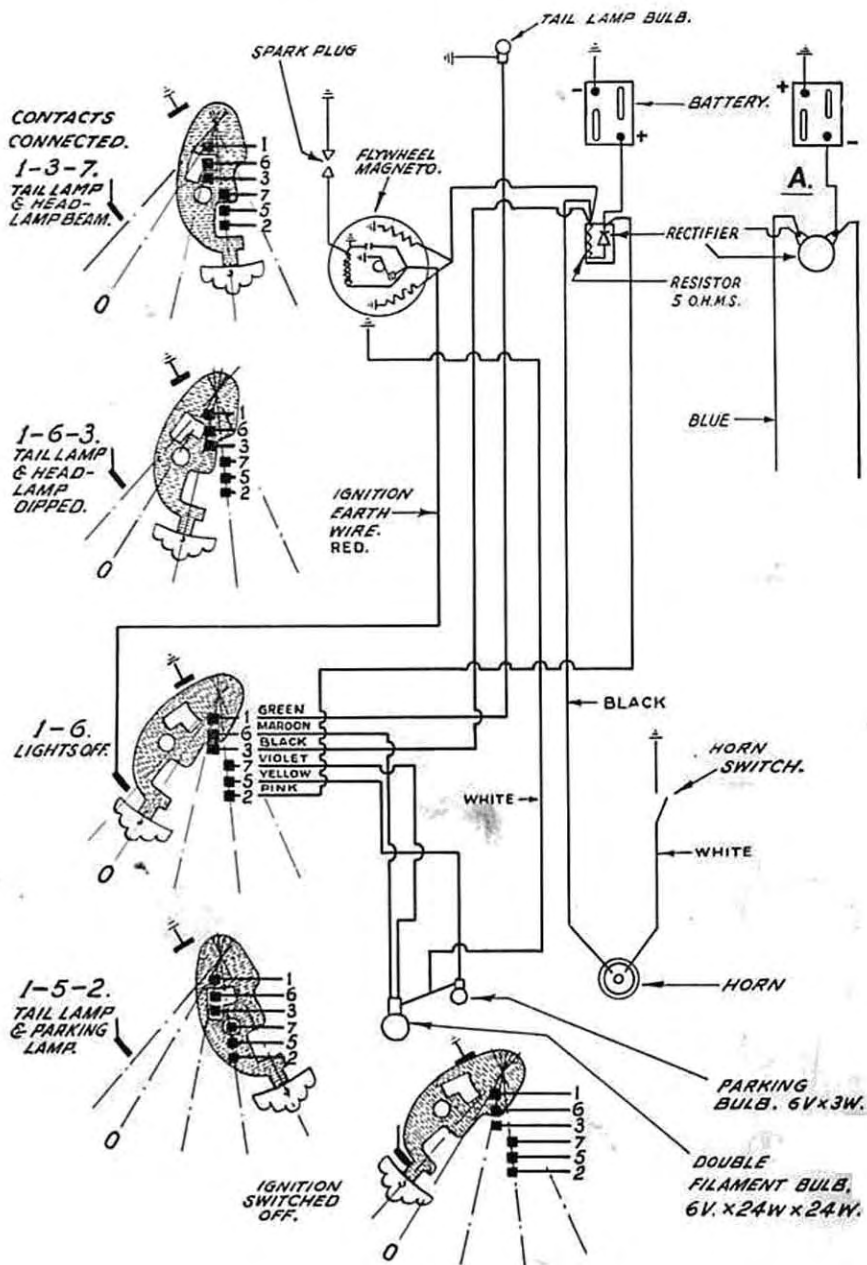


Fig. 16.—Electric Wiring Diagram & Switch Positions.

New wiring and rectifier as shown at "A" fitted to Machines from No. 06523102 onwards.

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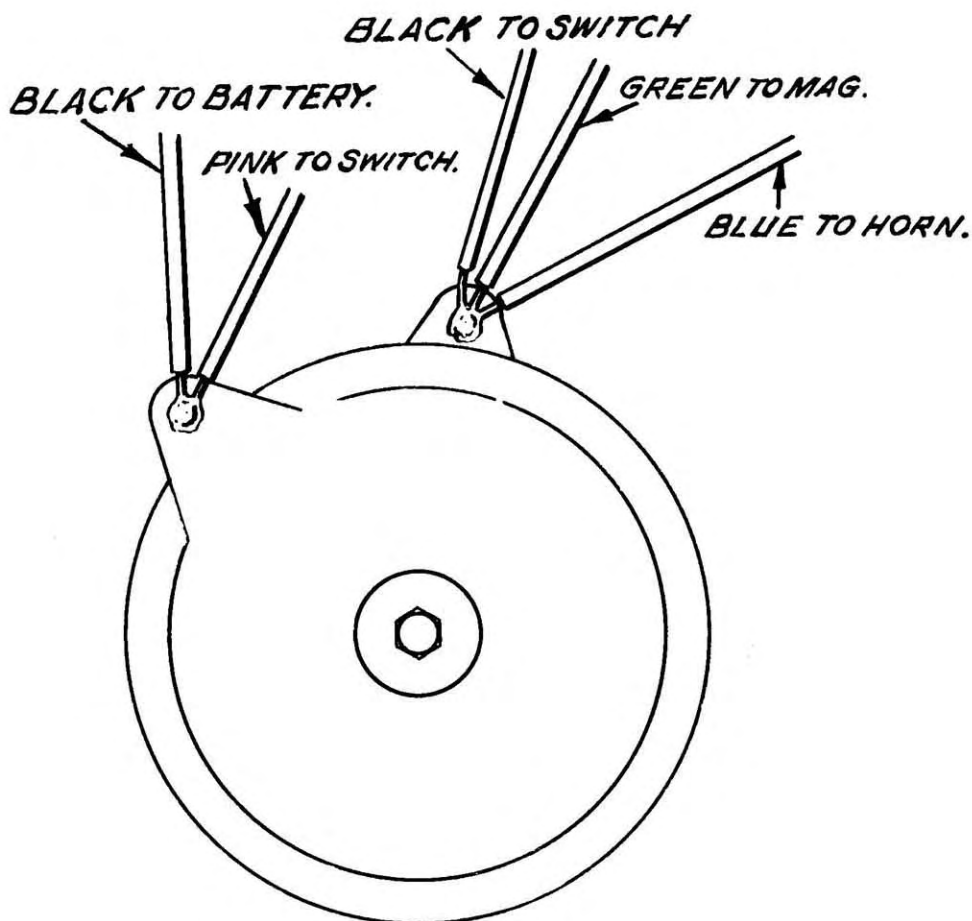


Fig. 17.—Rectifier.

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

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 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 0.015 ins. 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.

THE SERVICING AND REPAIR OF THE ABOVE UNIT IS NOW UNDERTAKEN SOLELY BY DOUGLAS (SALES & SERVICE) LTD., KINGSWOOD.

The complete wiring diagram of the machine, which also details www.douglas.com indicates the internal wiring of the flywheel magneto generator is shown on Page 20.



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 25).

LUBRICATION—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. 17).

After the first 600 miles, drain out the old oil by unscrewing the drain plug at the base of the crankcase, 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.

LUBRICATION—FRONT HUB & TRUNNION BLOCK

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

LUBRICATION—HYDRAULIC DAMPERS (Front & Rear)

If trouble develops with these units, it is better to remove them from the machine; return to works (see Page 38).

***N.B. THE UTMOST CLEANLINESS DURING THIS OPERATION IS ESSENTIAL.**



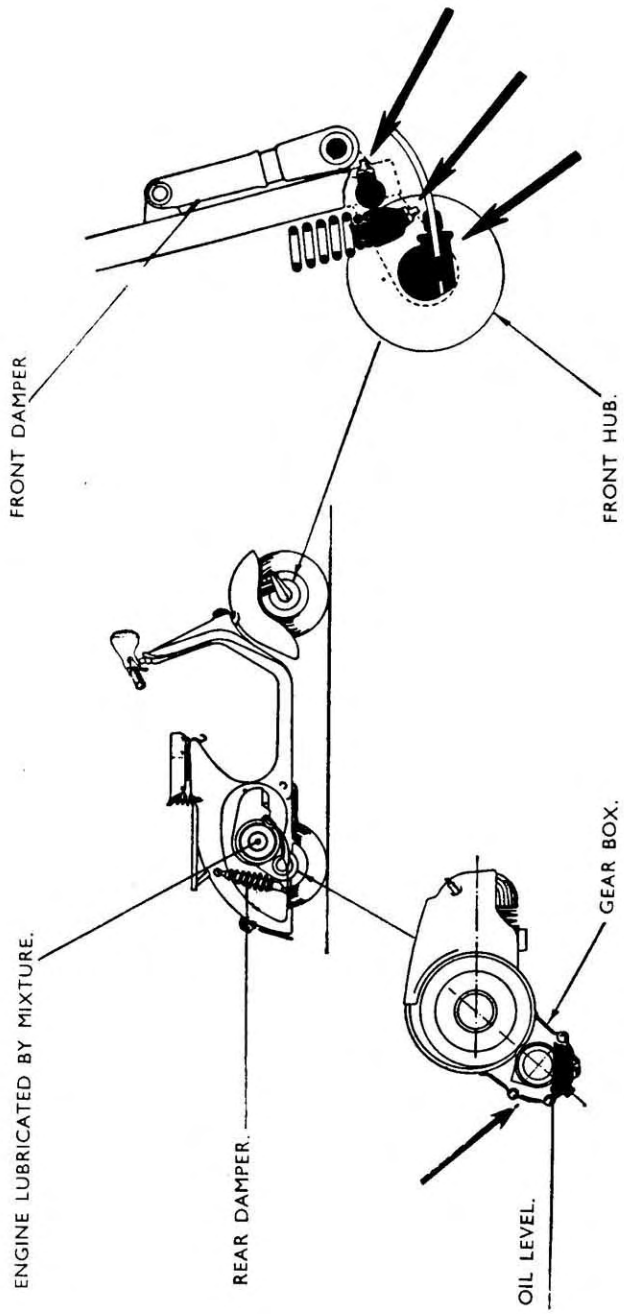


Fig. 18.—Lubrication Diagram.



LUBRICATION CHART

Part to be lubricated		Lubricant			
		Shell	B.P.	Esso	Wakefield
Every 2,500	Every 5,000				
Gear-box topping-up	Gear-box change oil	Shell 2T Two-Stroke Oil or Shell X-100 30	Energol Two-Stroke Oil or Energol SAE 30	Esso Extra Motor Oil 20W/30	Castrol XL
Front suspension Felt pad on flywheel cam	Control cables				
Joints on brake control	Gear-change quadrant	Retinax A	Energrease L.2.	Esso Multi-purpose Grease H	Castrolase L.M.
Speedo flexible drive					
Engine at each re-fuelling		Shell 2T Two-Stroke Oil in ratio of 5% or 1-pint to 1 1/4 galls. petrol	Energol Two-Stroke Oil in ratio of 5% or 1-pint to 1 1/4 galls. petrol	Esso Two-Stroke Motor Oil in ratio of 6% or 1-pint to 1 1/4-pint to 1 gall. petrol	Castrol XL in ratio of 5% or 1-pint to 1 1/4 galls. petrol. Castrol Two-Stroke Oil in ratio of 6% or 1-pint to 1 1/4-pint to 1 gall. petrol
					Mobiloil A in ratio of 5% or 1-pint to 1 1/4 galls. petrol or Mobil-Mix in ratio of 6% or 1-pint to 1 1/4-pint to 1 gall. petrol

Approved Petrol/Oil Mixtures

Make	Description
Shell	2T Two-Stroke Mixture
B.P.	B.P.-Zoom

Hydraulic Dampers

When not working efficiently, consult your Dealer. If servicing is required, they should always be returned to the Works.



2ND SECTION
DISMANTLING AND USE OF SERVICE TOOLS



ACCESSORIES

The Standard Vespa is delivered as shown in the photograph in the front of the book; all the accessories illustrated 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 suspension and provides a comfortable ride for the passenger (Fig. 19) as does the alternative dual seat. 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 can also be supplied which does not derange the pillion passenger at all.

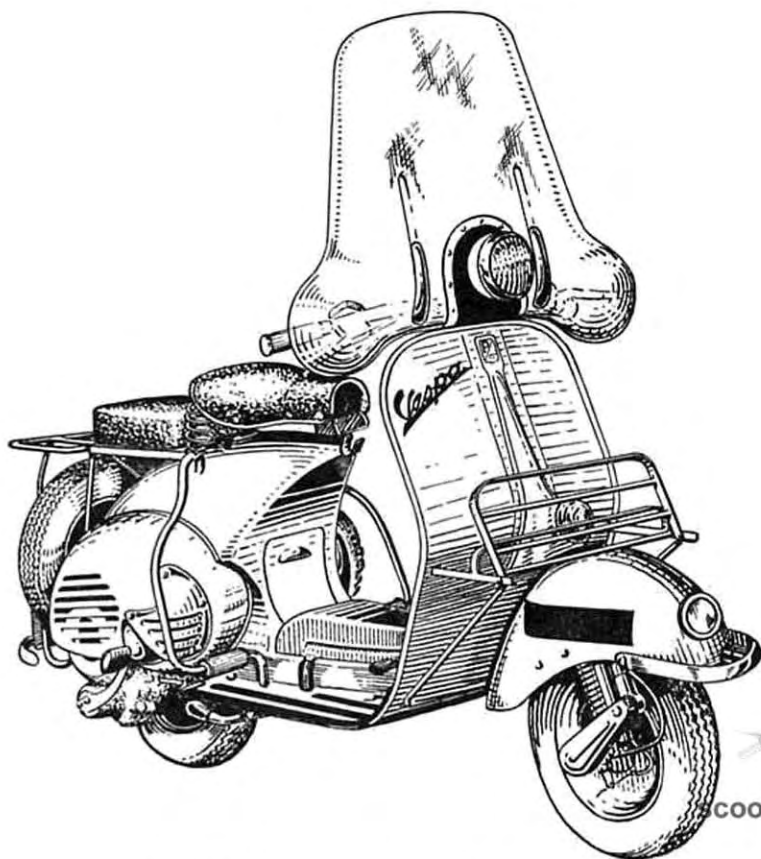


Fig. 19.—Vespa complete with Accessories.



REMOVING & 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 remove the silencer and 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 at 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.

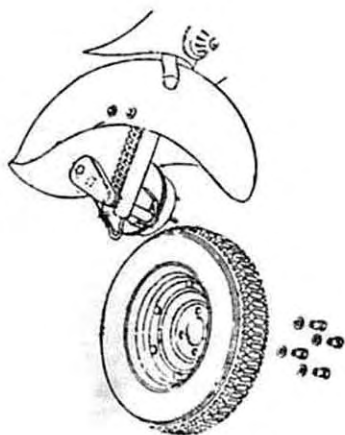


Fig. 20.

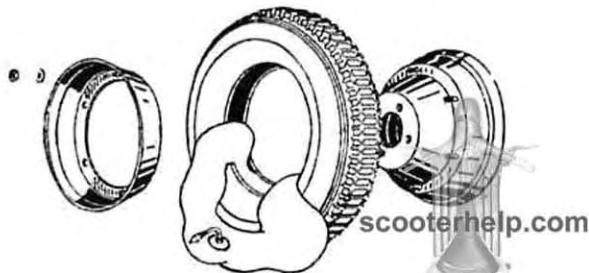


Fig. 21.

MINIMUM STRIPPING OF HANDLEBARS REQUIRED TO EFFECT REMOVAL OF STEERING COLUMN

If complete dismantling of the handlebar components is not required, it is possible to remove the whole unit (handlebars, support and cover) from the steering column leaving all controls connected. To accomplish this the front brake cable must be released from the clamp on the wheel hub and pulled completely upwards through the steering column; the two set screws " B " securing the speedometer head to the headlamp housing can now be removed.

After feeding the speedometer cable through the column lift the speedometer head and disconnect " C." Having released the clutch cable from the external clutch lever on the engine, remove clamping nut and bolt, the handlebars can now be lifted complete from the steering column at the same time pulling the front brake cable up through the steering column. Let the handlebars hang down on their cables, taking care that the latter are not twisted or tensioned.

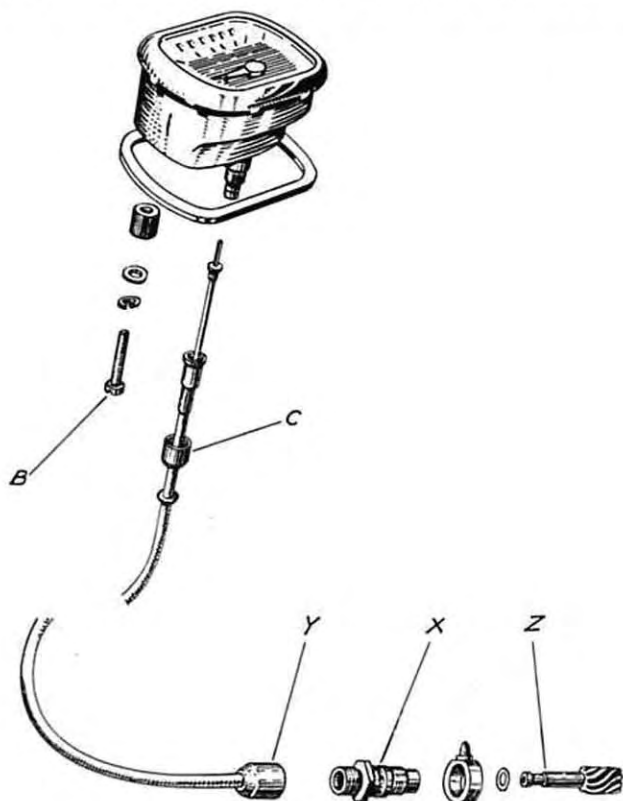


Fig. 22.

NOTE: If one or more cables must be 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.



DISMANTLING THE HANDLEBARS

To dismantle the handlebar components completely, proceed as follows (Fig. 23):

After removing the switch cover "A" undo the screw "B" securing the switch to the lug welded to the handlebars and allow the switch to hang down on its cables. Depress the slotted end of the rocker on the carburettor to release the throttle control cable. By means of a slotted screwdriver remove the nuts "C" of the screws retaining the control levers on the handlebars, then with a normal screwdriver, remove the screws "D" and slide the levers out.

Push the end anchor "E" of control cable out of its housing in the lever, taking care not to lose or damage this.

Repeat this procedure on the end anchor of the front brake control lever; pull out the right hand grip; press the throttle control slider "F" out of the barrel and releasing it from the cable, slide out the shoulder washer "G" from the handlebars.

Turn back the rubber cap "H" of gear change control cables, to reach the guide "J" of the adjuster screws. Remove by means of slotted screwdriver the nut "K" from the screw retaining the guide. Then with a normal screwdriver remove the screw "L"; pull slightly outwards the gear change twist grip without rotating it too much in order not to damage the sheath of the clutch control cable "M" (Fig. 24).

Go now to the gear shifter on the engine (Fig. 24). Pull the cable with a pair of pliers and release (without unscrewing) the outer screw nipple from its claw in the gear change quadrant "X" Fig. 24. The respective nipple "O" Fig. 23 on the opposite end of the cable can then be removed. The other nipple "P" can be taken out easily from the twistgrip which becomes free and can be pulled completely outwards.

Loosen the screw retaining the headlamp unit to its housing; remove the headlamp from the housing. Disconnect the three lamp cables by breaking the snap connectors. Remove the screw retaining the earth wire, thus releasing the cable. These can now be fed back through the grommet in the headlamp shell.

Unscrew, with a 10 mm. spanner, the four nuts "S" securing the headlamp bracket on the handlebar support. Remove the top cover and lift the handlebars slightly; slide out the sheath of the throttle control cable whilst easing it through the slot of the slider.

Repeat similar procedure for the sheath of the clutch control cable.

Lift off the handlebars, which are now free from the front brake control cable; slide this out of the handlebars.

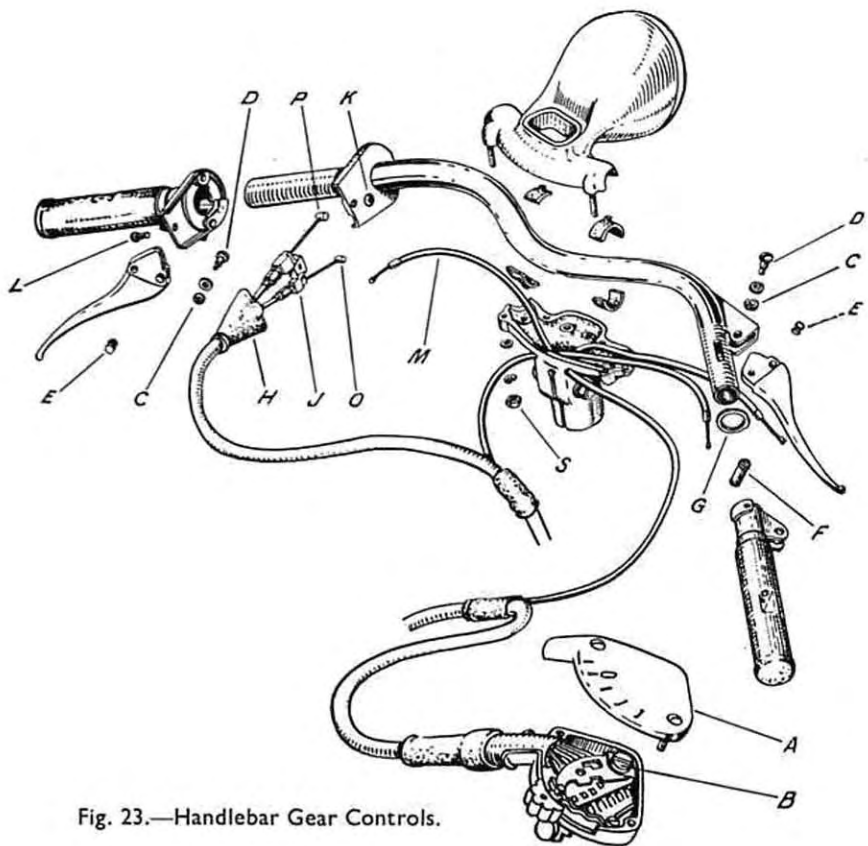


Fig. 23.—Handlebar Gear Controls.

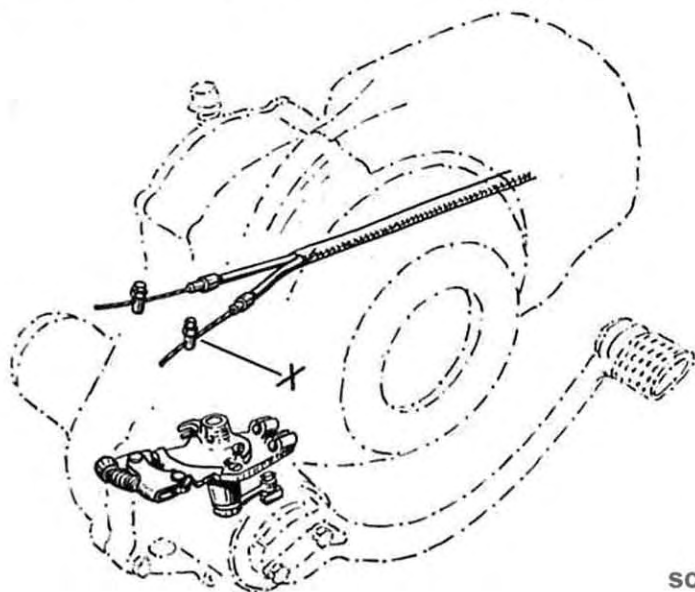


Fig. 24.
Gear Controls at Engine.



REMOVING THE STEERING COLUMN

By means of wrench 14484 (Fig. 25) unscrew the locking ring of the top bearing "A," remove locking washer "B," top race "C" and collect the 28 balls which are now free. Slide the steering column down out of the body gathering the 19 balls of the bottom bearing.

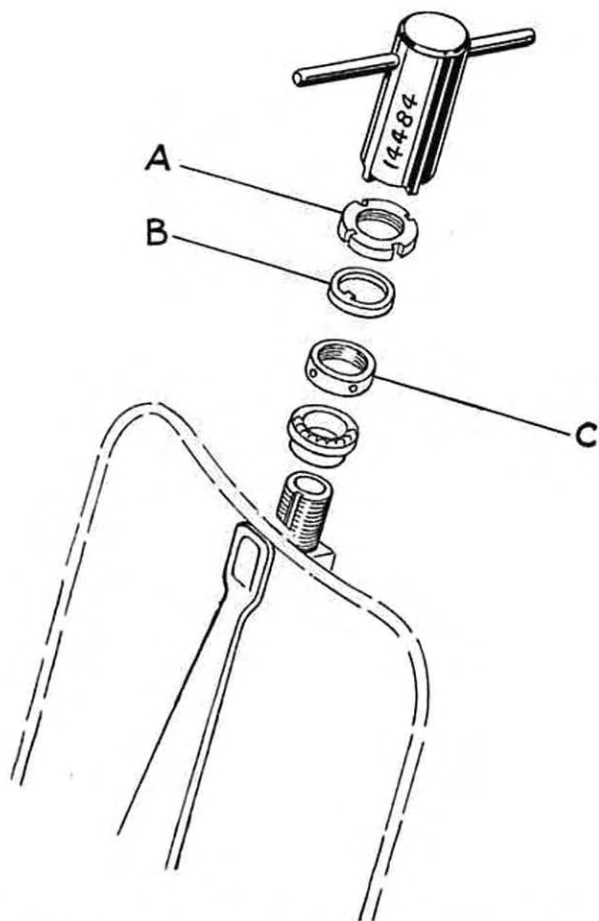


Fig. 25.—Removing Top Ball Bearing of Steering Column.

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. A13781 BALL RACE EXTRACTING TOOL (Fig. 26).

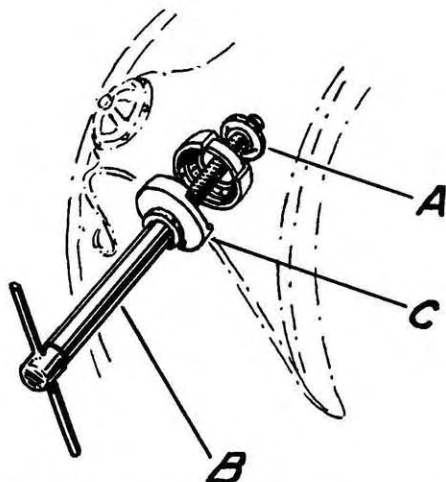


Fig. 26.—Ball Race Extracting Tool.

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 wheel suspension can also be dismantled when the steering column is in place on the scooter, we suggest that the column should be removed and placed in a vice, provided with a suitable clamp to eliminate marks or damage to the column in any way.

Remove the hub cover by lifting two of the four lugs with a screw driver. By means of a box spanner, unscrew the grease cup "X" and the nuts "W" (Fig. 27).

Undo the two screws "R" and remove the brake drum from the flange of the wheel axle. It will be necessary to remove the speedometer control cable complete which is connected to the support bush of the driving pinion by means of a threaded ring. Unscrew this ring "Y" (Fig. 22) slide the sheath out, unscrew the driving pinion support "X" (Fig. 22) from the suspension link and take out the pinion "Z" (Fig. 22). Knock out the front wheel spindle "O" (Fig. 27) by means of a suitable soft drift taking care not to lose the distance washer "Z." Remove the circlip "E" retaining the brake shoes. Rotate the brake operating lever "F" through 90° in order to open the shoes. Remove the lever and shoes.

Unscrew the nut "G" and pull out bolt "V" securing the hydraulic damper to the wheel hub. Use spanner 0018219 to release the damper on the steering column (Fig. 28). Unscrew the nut "H" (Fig. 27) securing the top anchorage bracket of the front spring. Depress the wheel hub until the spring, complete with anchorage bracket, is freed from the bracket welded on the steering column. The spring can now be unscrewed from the trunnion block "P." Slide out stub axle "D" after removing the nut, spring and plain washers "K"; the front hub is now completely free from the steering column.

Should the steel liners "S" for the 36 rollers have to be changed remove the shoulder rings "M" and the rollers (18 on each side) and tap out with a suitable drift. Remove spindle "N" after unscrewing the nut, plain washer and spring washer "T"; this will then release the spring anchorage trunnion "P"; CARE MUST BE TAKEN NOT TO LOSE THE DISTANCE PIECES AND RUBBER SEALING RINGS. IF NECESSARY, unscrew the lubricator of the front suspension.

Proceed as follows when the two ball races of the wheel axle have to be removed: Bearing "I" (which remains on the front wheel spindle)—use EXTRACTOR 0014499 (Fig. 29). Bearing "L" (which remains in its housing in the wheel hub) is removed by means of a mallet and soft drift.



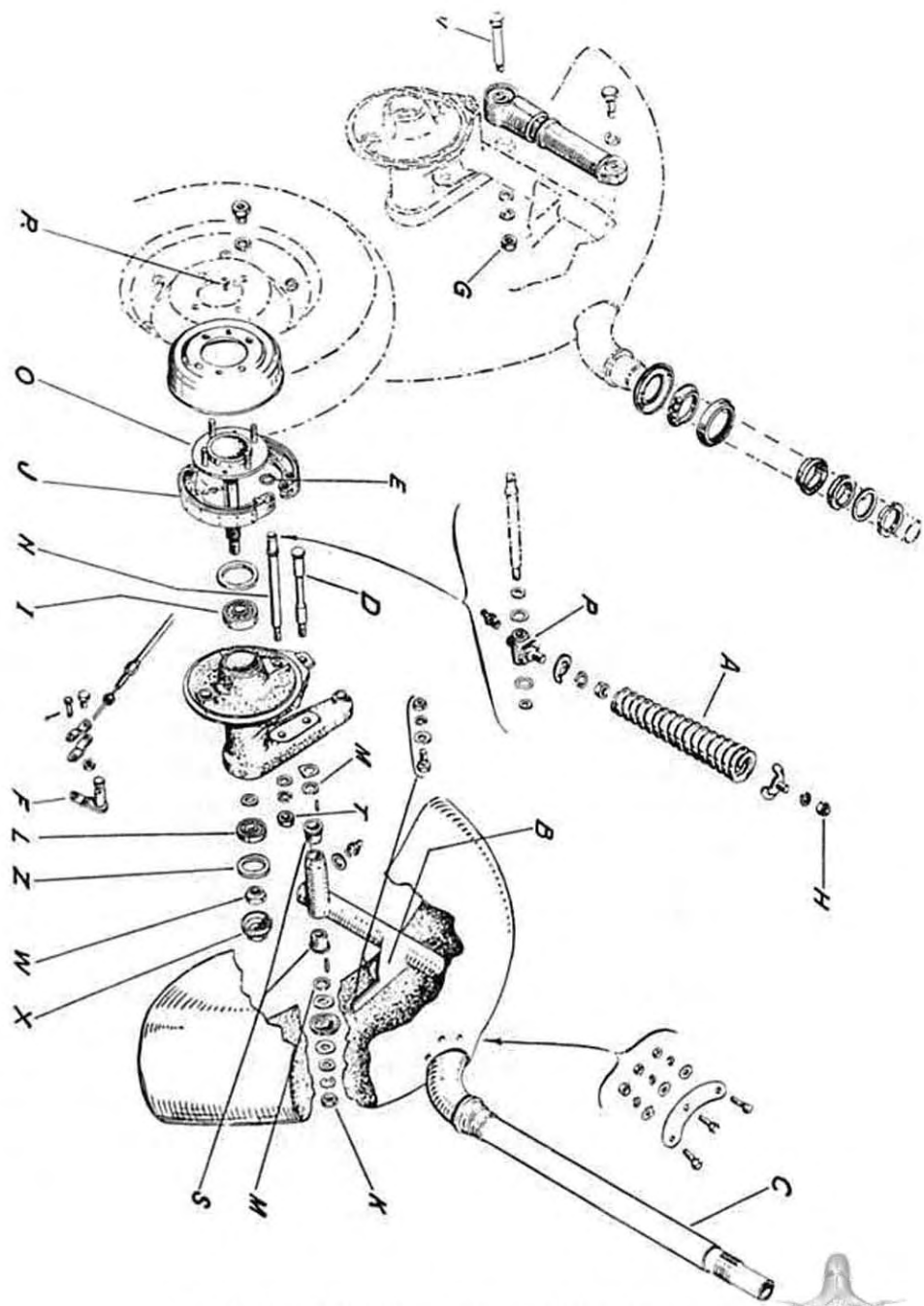


Fig. 27.—Exploded View of Front Wheel Suspension.

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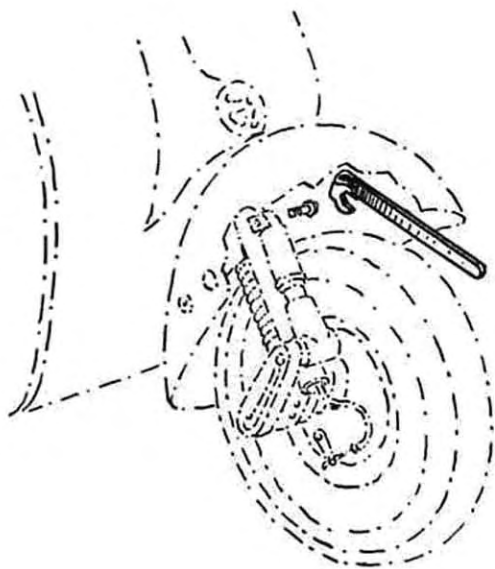


Fig. 28.—Releasing Front Damper on Steering Column.
(Tool 0018219)

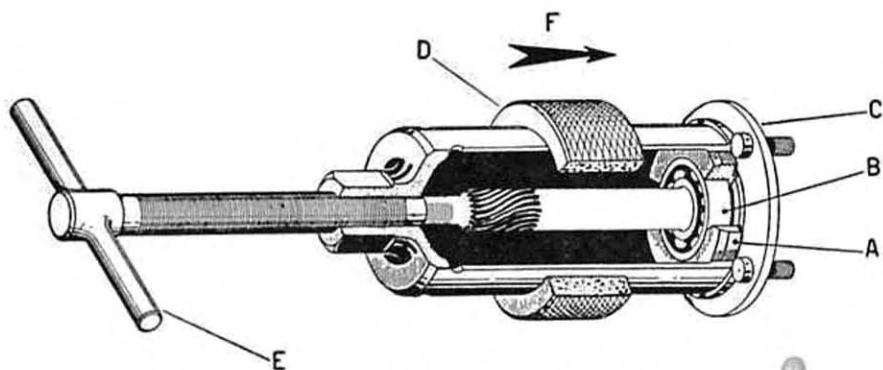


Fig. 29.—Removing Ball Bearing from Front Wheel Axle.
(Tool 0014499)



REMOVAL OF CHASSIS SUB-ASSEMBLIES

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

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

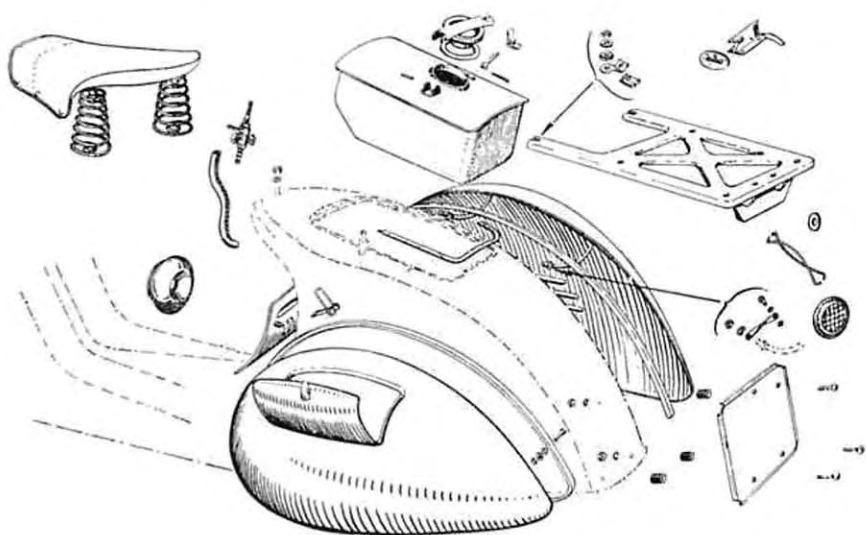


Fig. 30.—Sub-Assemblies.

REMOVING—CENTRE STAND

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

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



REMOVING—PETROL TANK (Fig. 30)

See that the petrol tap is in the “ off ” position and remove the feed pipe from the top of the 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.

REMOVING—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.

REMOVING—TOOL BOX (Fig. 30)

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.

REMOVING—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.

REMOVING—HORN AND WIRING HARNESS

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 and headlamp 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. The harness can now be threaded back through the chassis from the carburettor housing.

NOTE: This instruction can only apply providing the steering column handlebars and petrol tank have previously been removed (Pages 26-37).

REMOVING—REAR HYDRAULIC DAMPER

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



FRONT AND REAR DAMPER UNITS

These have now been redesigned as double action units, and are sealed after manufacture, due to the required consistency of performance under all conditions.

We as manufacturers strongly recommend that all repairs and servicing are carried out by Douglas (Sales & Service) Ltd., Kingswood. To meet these requirements an efficient and economic Service/Repair Scheme has been introduced, which can be assisted by the stocking of spare units by agents.

NOTE: On the return of the rear damper to the Works it is essential that the spring is NOT removed from the damper.

REMOVAL OF 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 on reassembly.

Stagger the leads 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. 24) from the ratchet quadrant of the gear shifter. Remove the two ferrules from the ratchet quadrant and pass the cables through the slots of the ferrule housing (Figs. 4/24).

Remove the split pin situated on the end of the mainshaft, unscrew the castellated nut and washer. The wheel, complete with flange and brake drum, can now be removed from the spline.

The two bolts which hold the deflector plate on to the clutch cover must now be removed, thus giving access to the induction pipe. By removing the three nuts and spring washers securing it to the cylinder port, disconnect the induction pipe.

The clutch adjuster complete with cable must now be removed from the engine bearer, thus giving access to the front engine mounting nut. This can be unscrewed by means of a suitable box spanner. Remove the nut and spring washer holding the damper to the damper bracket. Slide out the bolt thus freeing the damper. Disconnect the nuts from the two engine mounting bolts which also secure the rear damper and spring unit, the bolts of which can now be removed, thus setting the engine free.

Ease the engine from its bearer and place it on the turntable No. 0013782 (Fig. 31) after inspecting the engine outside for leakages.

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REMOVAL OF ENGINE BEARER

To remove the engine bearer from the Chassis (after removal of the engine) release the rear brake control cable and open the clip on the engine bearer retaining the sheath of the rear brake cable control.

Unscrew the bolts securing the bearer to the frame.

The Bearer is now free.

DISMANTLING THE ENGINE

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.

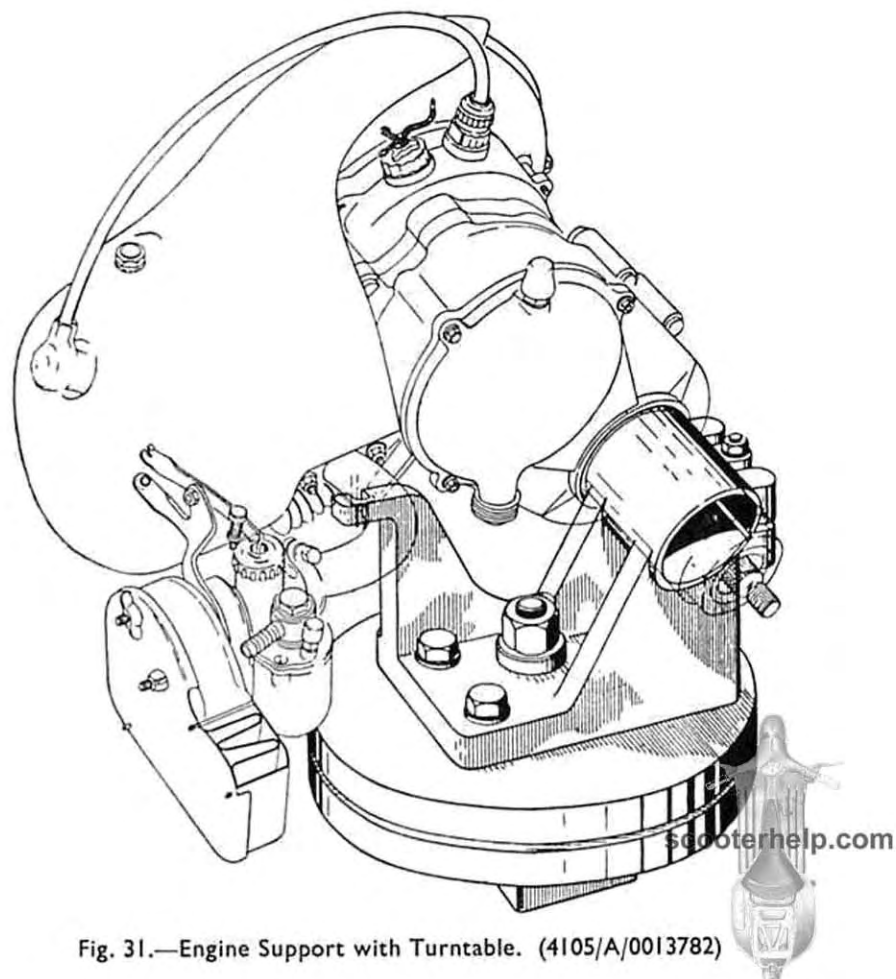


Fig. 31.—Engine Support with Turntable. (4105/A/0013782)

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 the tab plate and unscrew the bolts retaining the PEDAL and remove the latter from the kickstarter body.

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. 0015192 FLYWHEEL SPANNER (Fig. 32).

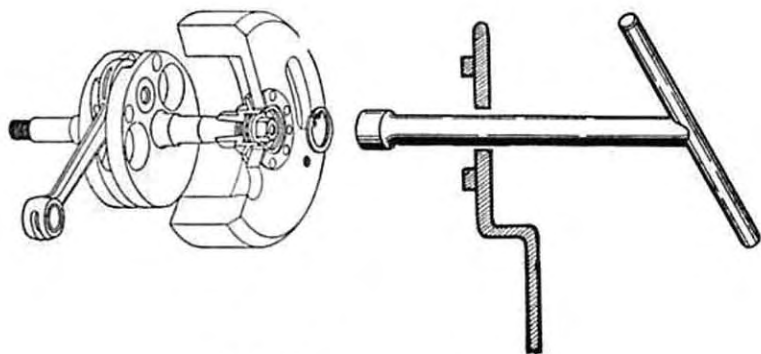


Fig. 32.—Flywheel Spanner.

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, [saboterhelp.com](http://www.saboterhelp.com) 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, avoiding damage to piston and con rod.

Remove the circlips retaining the GUDGEON PIN. Extract the latter by means of Tool No. 14854 GUDGEON PIN EXTRACTING TOOL (Fig. 33).

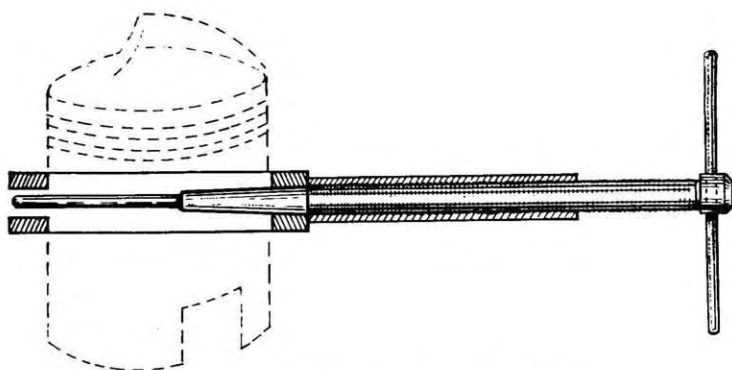


Fig. 33.—Gudgeon Pin Extracting Tool.

Remove the GEAR SHIFTER by consecutively putting 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 body 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 the (DRIVER) SLOTTED HOUSING, by means of a box spanner. Undo the three screws retaining the CLUTCH COVER, remove the cover together with the 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 the crankshaft using Tool No. I4872 CLUTCH WRENCH TOOL and Tool No. AI4871 "C" SPANNER (Fig. 24).

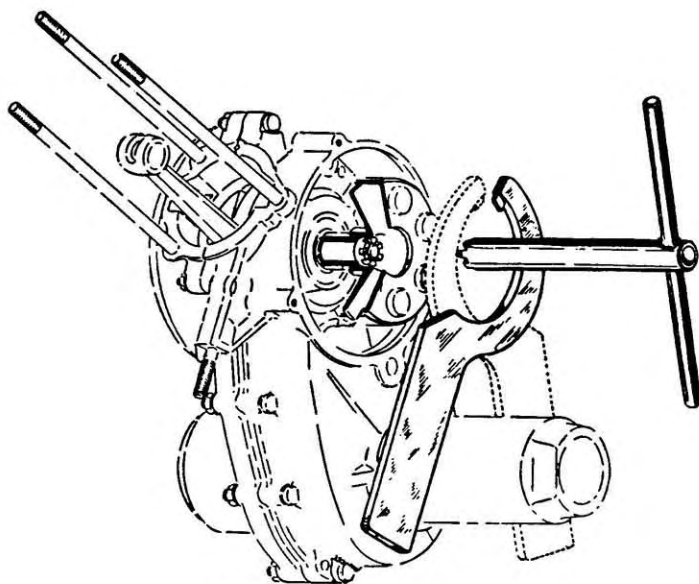


Fig. 34.—Removal of Clutch.



Should the clutch be difficult to remove, use Tool No. GA4012 CLUTCH EXTRACTOR (Fig. 35).

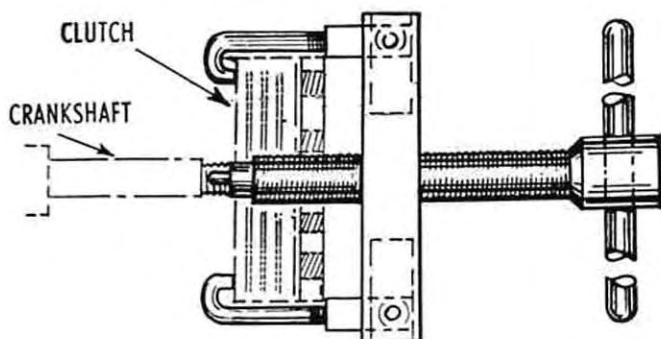


Fig. 35.—Clutch Extractor.

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 ASSEMBLY TOOL (Fig. 36).

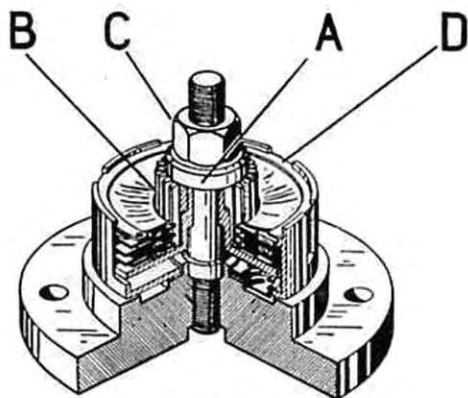


Fig. 36.—Clutch Assembly Tool.

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. BI4801 CRANKSHAFT AND CRANKCASE EXTRACTING TOOL (Fig. 38) and Tool No. I4202 TAPER WEDGE TOOL (Fig. 37).

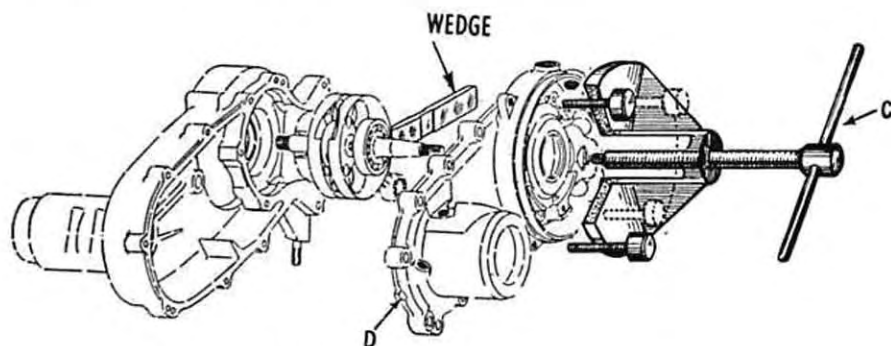


Fig. 37.—Dismantling the Crankcase.

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

Fit the Tool No. I4801 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 on 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. B14801 CRANKSHAFT AND CRANKCASE EXTRACTING TOOL (Fig. 38).

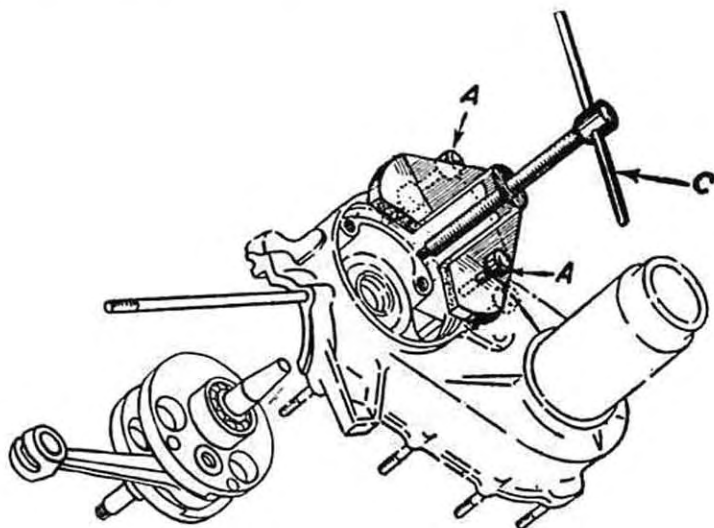


Fig. 38.—Crankshaft Removal.

Remove woodruff key and thrust washer from crankshaft. Screw the three rods "A" with knurled heads of tool 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. 39).

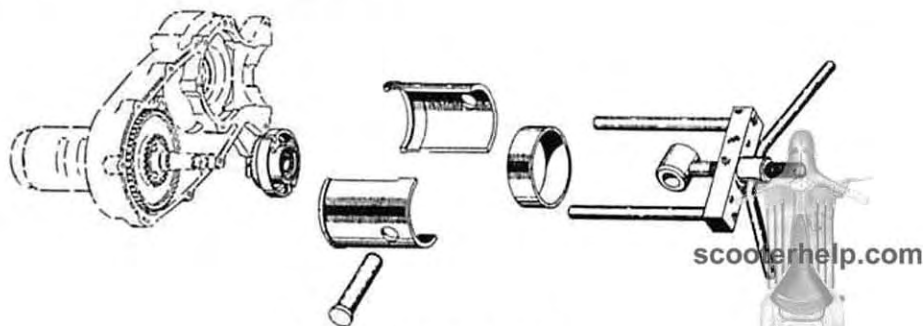


Fig. 39.—Kickstart Bearing.

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. 40).

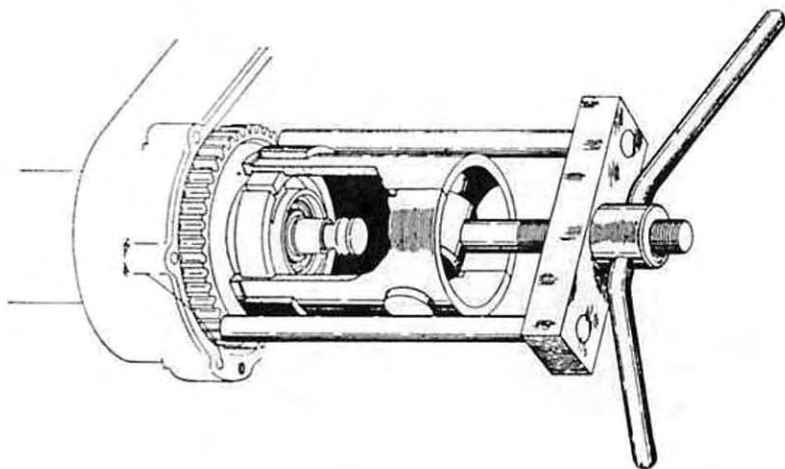


Fig. 40.—Removal of Slotted Housing.

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

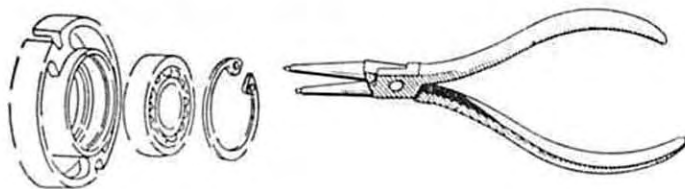


Fig. 41.—Removal of Circlip.

Remove the circlip retaining the ball bearing in the slotted housing (Fig. 41). scooterhelp.com

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 MAINSHAFT from the crankcase by means of Tool No. B14812 MAINSHAFT EXTRACTING TOOL (Fig. 42).

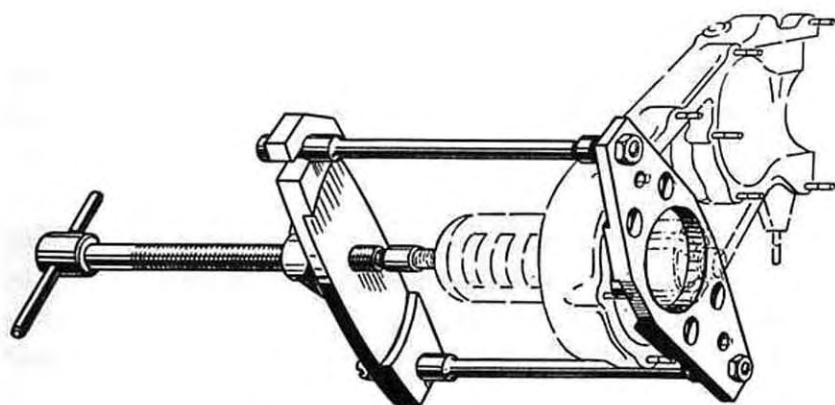


Fig. 42.—Extraction of Main Shaft.

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. 42) 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 main shaft.

Undo the nut on the outside of the crankcase securing the CUSH DRIVE lay shaft. Tap the shaft 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. 43).

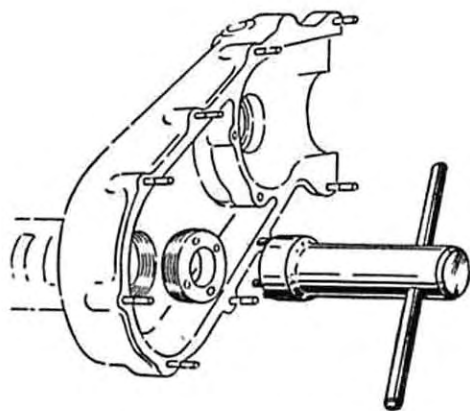


Fig. 43.—Removal of Threaded Ring.



If it is necessary to remove the ball-bearings and the spring-loaded seal of the main shaft, proceed as shown (Figs. 44 and 45).

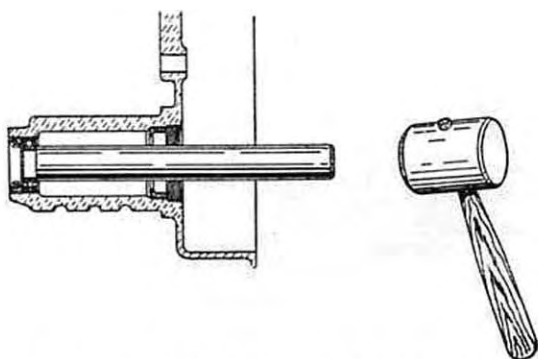


Fig. 44.—Removing Rear Wheel Ball-Bearing.

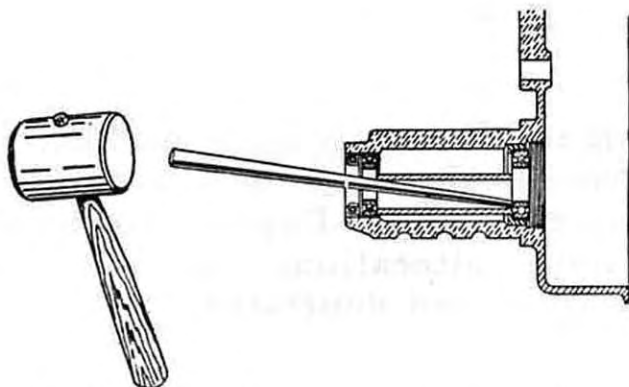


Fig. 45.—Removing Rear Wheel Ball-Bearing and Seal.

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 (Fig. 46).

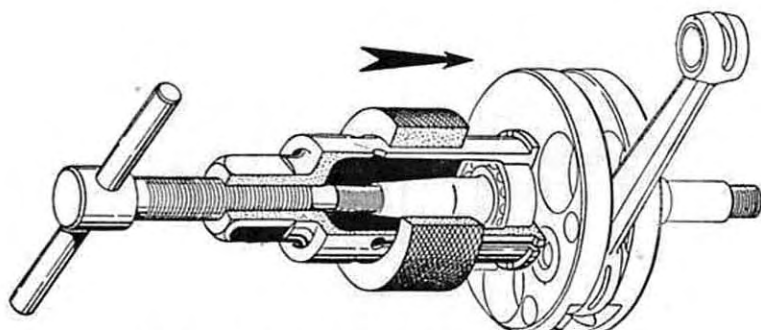


Fig. 46.—Removal of Ball-Bearing from Crankshaft.

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

Tools are constantly being modified and improved, therefore it is advisable to consult Service Depots concerning possible alterations to the tools catalogued and illustrated.



3RD SECTION
RE-ASSEMBLY



ENGINE—REASSEMBLY

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

Before commencing to reassemble, all parts should be thoroughly washed and dried 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 (Page 48, Fig. 43). Insert the spacer; mount the EXTERNAL BALL RACE, and OIL SEAL (see Figs. 53-54).

IMPORTANT: TWO OF THE TEN SHORTER CRANKCASE BOLTS (2.4 ins.) 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 ins.) 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 through the crankcase hole, put on plain and spring washers and screw down the nut for a few turns.

N.B.—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.



The flange for the internal ball race of the mainshaft has a small cut-away portion in order to allow clearance for the teeth of the 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) to 60°C (140°F), press in the OIL SEAL, ensuring that the cut-away portion is fitted opposite the main bearing oilway, so that the lubrication of the main bearing is not obstructed, using Tool No. 00114924 and sleeve (Fig. 47).

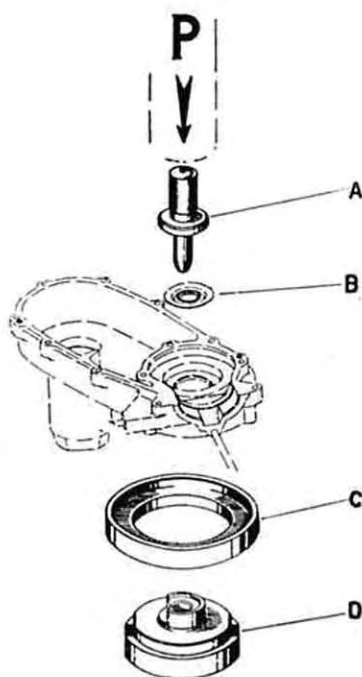


Fig. 47.—Assembling the Oil Seal on the Crankcase.

Place the tool base "D" on the work bench. Fit the ring "C" thereon; place the crankcase upon "C" and slide the oil seal "B" over the pin "A"; position the pin into the base hole then operate upon "A" with a press, or tap with a mallet, to force the oil seal into the crankcase bushing.



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

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. 0017808 PILOT (Fig. 48) and Tool No. 14202 WEDGE (Fig. 37, Page 44) feed the crankshaft through the oil seal into the main bearing housing WHILST THE CRANKCASE (CLUTCH HALF) IS STILL HOT.

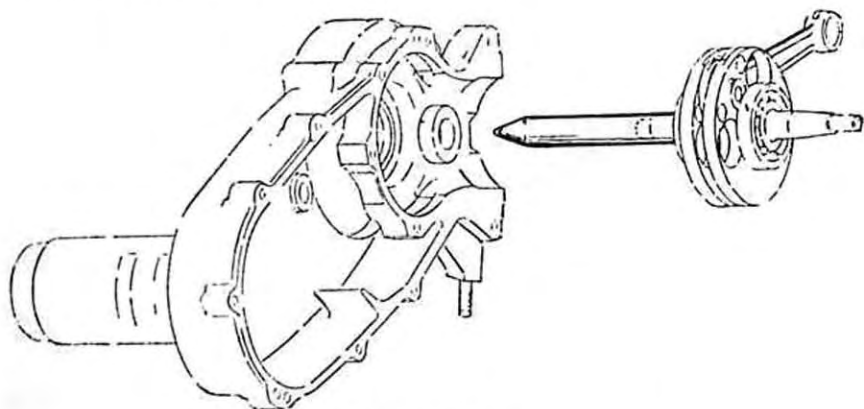


Fig. 48.—Pilot Tool.

Press the ball race into the slotted housing (driver) and lock the race in position by means of a 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 mainshaft. Seat in position by means of a soft iron drift. Lock in position with the circlip. Fit the crankcase gasket.

Fit the two small thrust springs into the holes in the KICKSTART BODY. Fit the latter, ensuring the springs engage on the lugs of the starter ratchet. Mount the RETURN SPRING using TOOL No. 0018012 HOOK AND PAWL (Fig. 49). Fit the rubber packing on the outer end of the KICKSTART BODY.

Heat the flywheel half of the crankcase to 60°C (140°F) and press in the OIL SEAL ensuring that the cut-away portion is fitted opposite the main bearing oilway, so that the lubrication of the main bearing is not obstructed. Then, using Tool No. 0017831 PILOT (this has the same function as Tool No. 0017808 PILOT, Fig. 48) assemble the

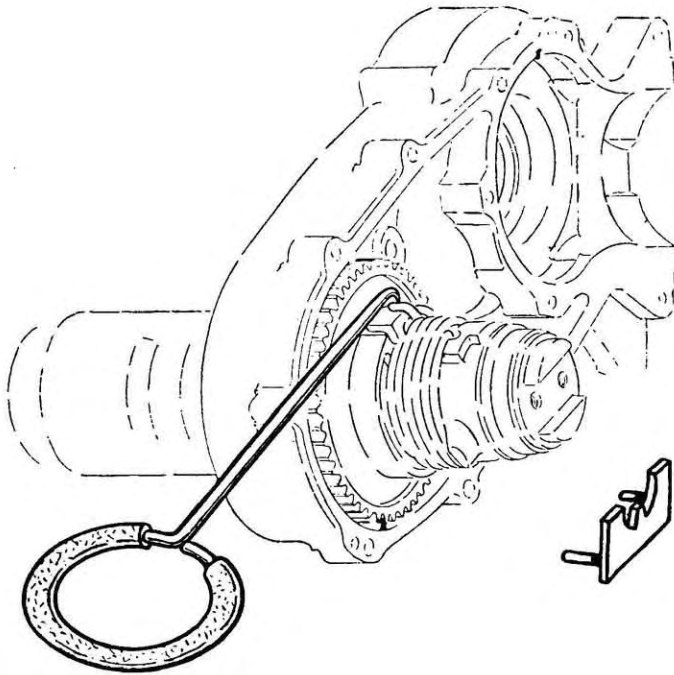


Fig. 49.—Hook and Pawl. (0018012)

crankcase complete, seeing that the dowel pins and the two bolts already assembled, enter respective holes; retain the KICKSTART BODY position with a finger through the orifice to prevent the spring end coming out from the chamfered slot of the housing.

Insert Tool No. 14202 WEDGE (Fig. 37, Page 44) between the crank-shaft web and tap gently with a mallet alternatively on both ends of the crankshaft to centralize.

Assemble the two longer bolts (2.28 ins.) 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 ins.) 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 Note, Page 51).

Fit the felt washer and the face plate on to the kickstart body and assemble the kickstarter pedal.

Depress the pedal until the free slot of the slotted housing (driver) is opposite the hole on the crankcase.

Screw down the tapered screw and lock with the nut by means of a box spanner (Fig. 50).

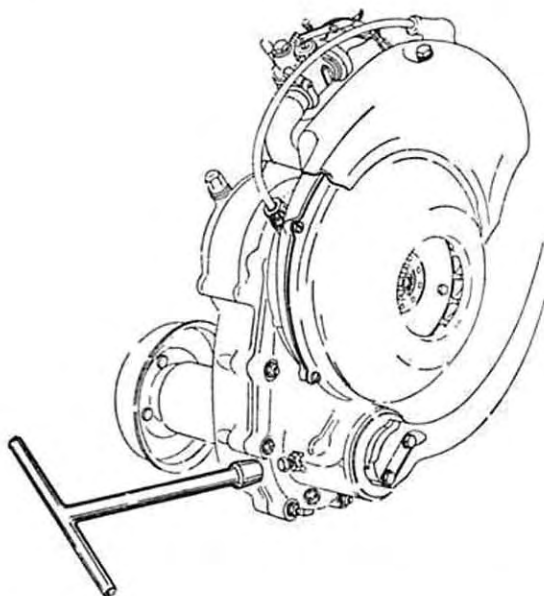


Fig. 50.—Box Spanner for Lock Nut of Tapered Screw.

Reassemble the CLUTCH by means of Tool No. 15046 (Fig 36, Page 43). Place the clutch body into the tool, insert the six spring cups into their respective seatings and fit the springs; fit the spring plate, one plate with corks, one convex steel plate, another plate with corks, another convex steel plate, the third plate with corks and finally the third convex steel plate, ENSURING THAT THE CONVEX FACES ARE TOWARDS THE PLATE WITH CORKS AND THE "POP" MARKS ARE IN LINE AND UPPERMOST.

Insert spline "B" into the teeth of the clutch plates and lock by means of plate "A" as shown in Fig. 36. 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 the **SHOULDER WASHER** and the **WOODRUFF KEY** in position on the **CRANKSHAFT**: place the clutch pinion over the boss of the spring plate and insert 29 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 washers and a castle nut, using the Tool No. 14872 and 14871 **CLUTCH WRENCH TOOL** and "C" **SPANNER** (Fig. 34, Page 42).

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. 51).

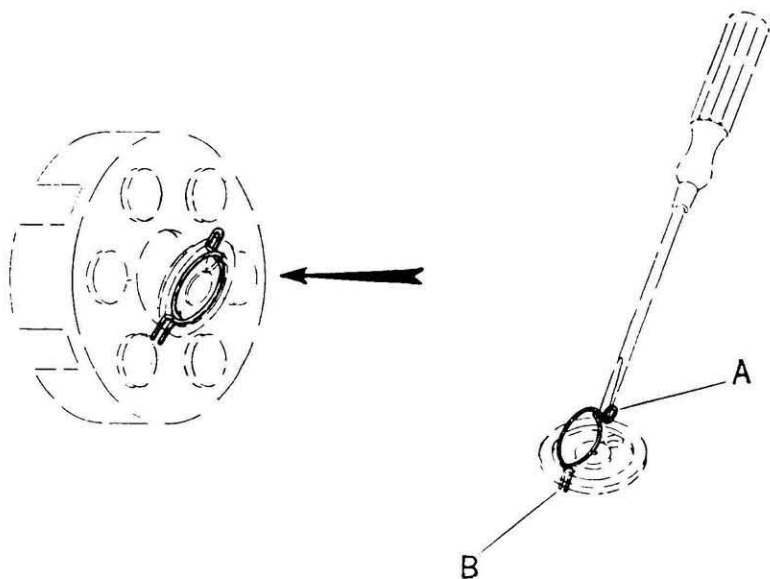


Fig. 51.—Re-assembly of the Clutch Thrust Plate.

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 www.madetohelp.com dismantling (see NOTE, Page 40). If ignition requires checking, proceed as shown on Page 58.



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 with plain and spring washer and the nut using TOOL No. 0015192 FLYWHEEL SPANNER (Fig. 32, Page 40).

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 the groove by means of long nosed pliers. Check the gap between the breaker points (see 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 kickstart body by depressing the kickstart 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 (Fig. 33, Page 41). Secure with the two CIRCLIPS. See that the PISTON RINGS have their correct tolerances.

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 spigot fits properly into the recess 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 joint and the INDUCTION PIPE on the cylinder flange.

Place the three spring washers over the studs, and secure with the nuts. Fit deflector plate to clutch cover.

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

Screw down on the crankcase the L.T. terminal (at the same time feeding through the leads) and pick-up terminal, and connect their respective leads.



IGNITION TIMING

Replace the SPARKING PLUG by the timing gauge. Slowly rotate 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 anti-clockwise 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.

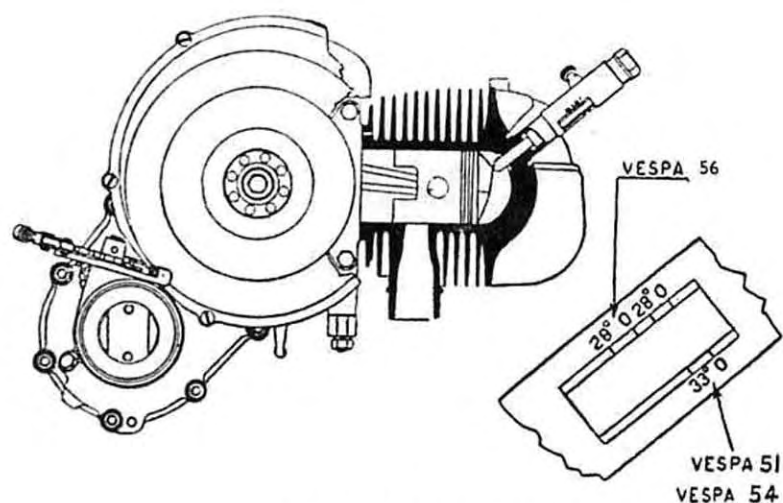


Fig. 52.—Timing Gauge.



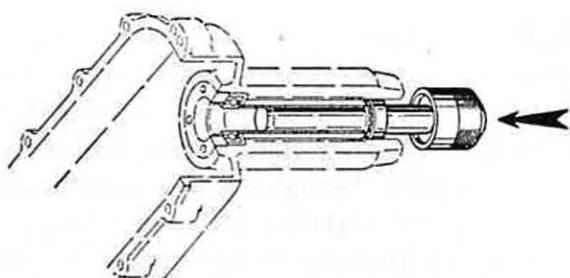


Fig. 53.—Ball Race Assembly Tool, Part No. 0018128.

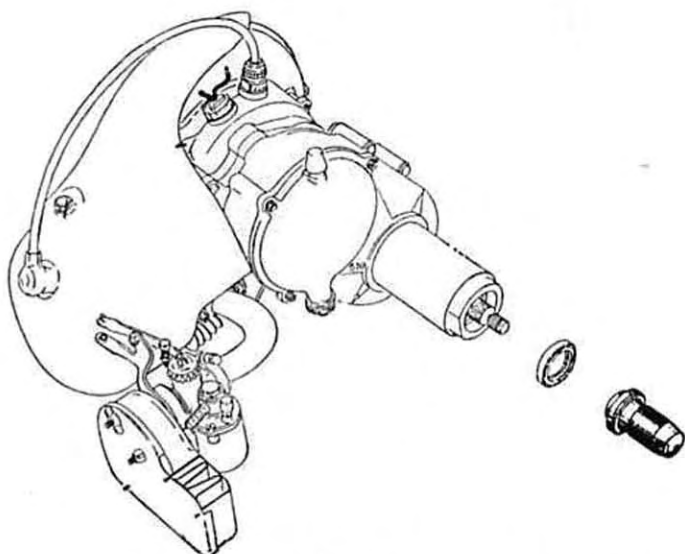


Fig. 54.—Rear Wheel Oil Seal Drift, Part No. 0018218.



CHASSIS

The first operation for reassembly of the scooter concerns the ELECTRIC WIRING.

Fit back the cable harness through the longeron on the body according to the wiring diagram (Fig. 16) and follow the reverse procedure to that described for dismantling (Page 37).

REAR BRAKE CABLE—slide the rear brake control cable, inner only, through the orifice at the brake pedal; this will then act as a guide for the outer cover which can be fed on through the left hand orifice at the rear of the longeron. Mount one of the two front brake links, slide the cable through the bolt hole, mount the second link and tighten the nut slightly. Secure the brake links to the PEDAL "D" (Fig. 55) by means of dowel pin "C" and lock with split pins.

Assemble the brake pedal through its pivot "B" on the longeron, depress it completely downwards and lock by means of cotter pins "A." Tighten the nut firmly while engaging the bolt head with an open-ended spanner.

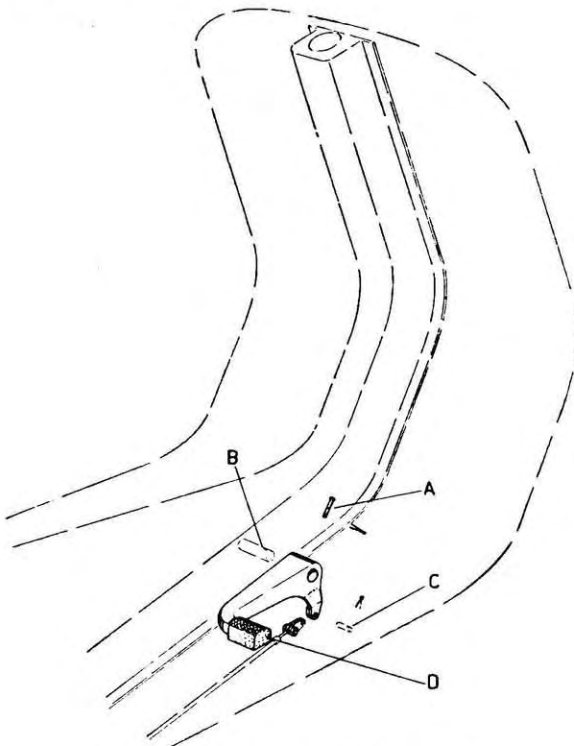


Fig. 55.—Re-assembly of Brake Pedal.



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

Left hand: Rear brake cable.

Centre: gear change control cables.

Right hand: clutch control cable.

Slide the gear change and clutch control cables into the longeron through their respective guide tubes at the rear end, feeding them through to the top of the steering column housing. The throttle control cable goes through the right hand side of the longeron and the electric wiring through the left hand side of the longeron, both coming from the carburettor compartment.

Now all electric and control cables are ready for connecting when the engine and handlebars are refitted on the machine. As previously stated, the operation can be carried out easier if a pilot wire has been bound to the cables whilst dismantling (Page 28).

Secure the TOOLBOX to the left hand panel of the body ensuring that the rubber beading fits correctly, and that the angle brackets riveted to the toolbox, fit properly over the bolts.

Assemble the washers and secure with nuts.

Assemble the ENGINE WING by fixing the curved arms through the chassis to their respective hinges (the supporting washer should first be inserted on the front arm).

Refit the two retaining wires, which will thus press the washer against the chassis.

Should the engine bearer have been removed, this can be re-assembled to the chassis and secured with its respective bolts and washers. This also applies to the top anchorage bracket of the rear suspension, complete with the rubber packing.

The REAR DAMPER and spring unit combined can now be screwed back into the trunnion situated in the top anchorage bracket.

The engine unit can now be reassembled to the chassis, placing it into the engine bearer and securing it together with the gear change cables to the front engine mounting bolt. The two rear bolts together with the damper bracket can now be secured.

The rear damper unit itself must now be secured to the damper bracket using bolt washers and nut.

NOTE: Care should be taken that the engine is completely seated in the engine bearer or trouble will be experienced when assembling the rear wheel.



The INDUCTION PIPE, together with its gasket can now be fitted back to the cylinder port and secured with three spring washers and nuts. Also the DEFLECTOR PLATE can be reassembled to the clutch cover.

Slide the spline flange and brake drum on to the end of the mainshaft, secure with plain washer and castellated nut, and lock with a split pin.

NOTE: Care should be taken when fitting this split pin. As stated on Page 38 the nut will be easier to tighten if the wheel has previously been fitted to its flange, so that it can be used as a hold.

The tail lamp and low tension cables can also be refitted at this stage, taking care that they go to their correct terminals.

The PETROL TANK can now be placed into the chassis and secured with its two brackets together with the REAR CARRIER. The choke control wire can also be fitted and secured together with the saddle.

Should the CARBURETTOR have been removed, connect it to the intake pipe and tighten the hexagon head screw of the locking collar. **NOTE:** Care should be taken that the carburettor is completely home and in an absolutely vertical position.

When reassembling the AIR CLEANER to the carburettor care must be taken to see that the choke opens and closes when the choke lever is lifted.

STEERING COLUMN

If they have previously been removed, screw in the two lubricators by means of box spanner. Then using spanner 0018219 (Fig. 56) secure the front hydraulic damper to the bracket welded to the steering column.

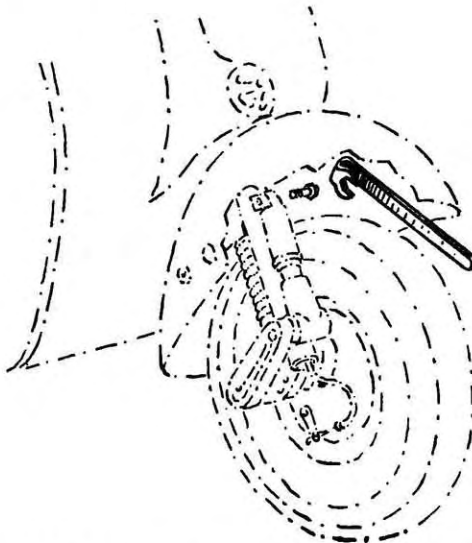


Fig. 56.—Screwing Front Damper to Column.



Using Tool No. 0017898, insert the two liners for the front suspension rollers, into the stub axle housing which is also welded to the steering column (Fig. 57). Smear the inside of the liners with grease and place the 36 rollers into this (18 on each side).

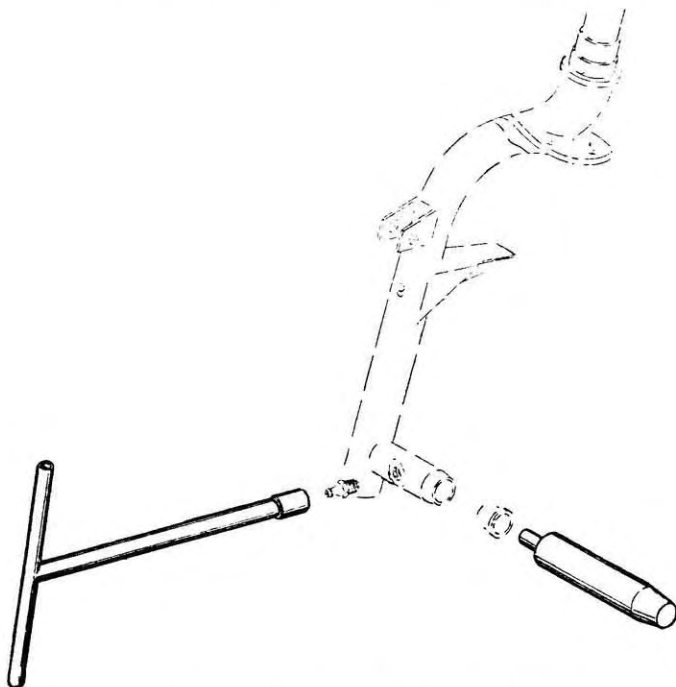


Fig. 57.—Assembling Lubricators and Liners.

Assemble the two shoulder rings and insert the hub, taking care that each component is placed correctly, on the left the fibre washer, on the right the shoulder ring, the cover and the second shoulder ring.

Using stub axle "D" (Fig. 58) fit the suspension link to the stub axle housing welded to the steering column taking care not to put any needle rollers out of place.

Slide the spindle "N" which carries the SPRING ANCHORAGE TRUNNION "P" with its washers and packings, and secure with its nut and spring washers.

Fasten the BRAKE SHOES with the CIRCLIP "E" on the end of the spindle "N." Insert brake operating lever "F" between brake jaws. Fit the BALL BEARING "I" on the front wheel spindle using a soft iron tube and hammer, after placing the felt packing between the two parts.



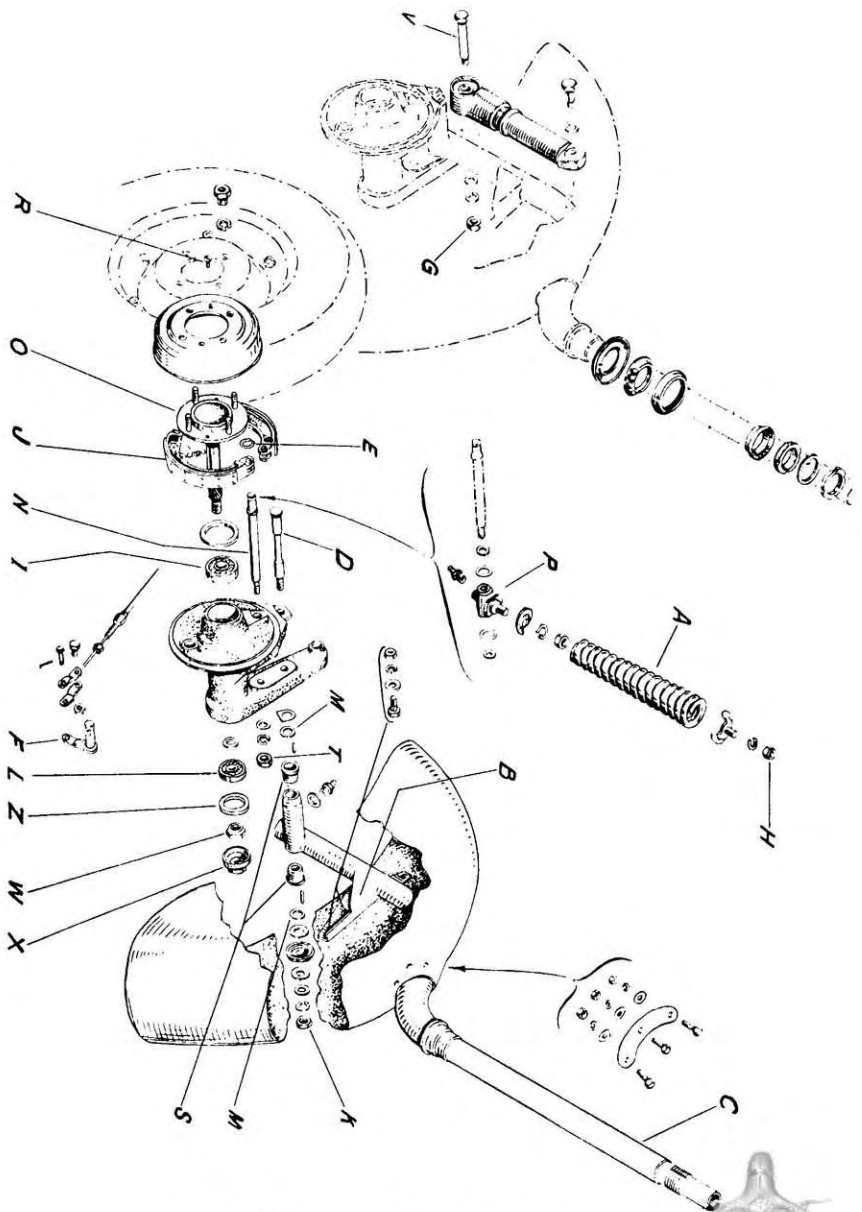


Fig. 58.—Re-assembly of Steering Column.

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Then slide the front wheel spindle into the front hub. Insert washer on to the right hand side of the hub; fit the ball bearing " L " into the suspension link and secure the axle with nut " W ." Fill the cup " X " with grease and fit this, after inserting washer " Z "

Secure the BRAKE DRUM to the front wheel spindle flange with the two screws " R ."

Place the spring anchorage washer on to the trunnion button and secure it with the spring washer and nut. Screw on the front suspension spring and secure it to the welded lug on the steering column. Fit the damper on the end of the hub. Should the front MUDGUARD have been removed, refit it and see that it is correctly aligned.

The SPEEDOMETER DRIVE pinion can now be assembled to its housing and secured with a plain washer and cable pick-up.

Assemble the upper race of the steering column bottom bearing, using Tool No. A13781 BALL RACE MOUNTING TOOL (Fig. 59). Unscrew to fullest extent handle " C ." Mount race " A " on tool, then insert end " B " beyond the upper rim of ring " D ." Turn handle " C " to tighten until the race reaches correct assembling position.

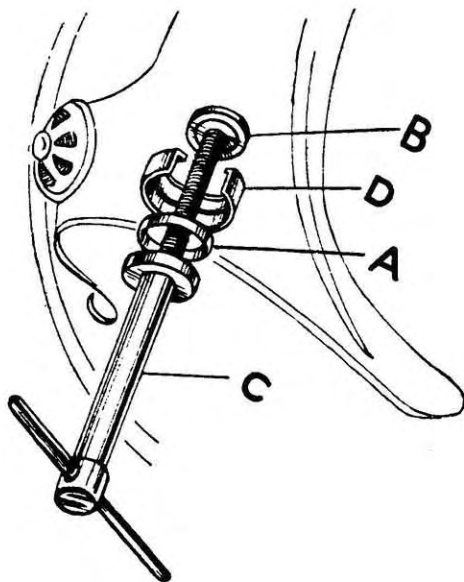


Fig. 59.—Ball Race Mounting Tool.

Mount the dust cover and bottom race of the steering column bottom bearing using Tool No. 0016029 BALL RACE MOUNTING TOOL (Fig. 60).

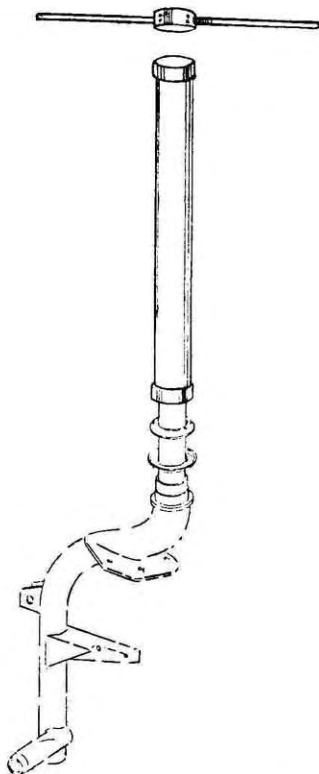


Fig. 60.—Mounting the Bottom Race of the Bottom Bearing.

Grease the bottom race of the bottom bearing, then place 19 balls thereon.

Put 28 balls on the bottom race of the top bearing and smear with grease to hold them in position.

Should this race of the top bearing have been previously dismantled it can be replaced by putting it on its housing, and tapping gently with a wooden mallet.

Slide the steering column through the bottom orifice into the front section of the longeron taking care not to damage the cable



harness; then tighten the top race of the top bearing using Tool No. 14484 (Fig. 61) LOCKING RING SPANNER.

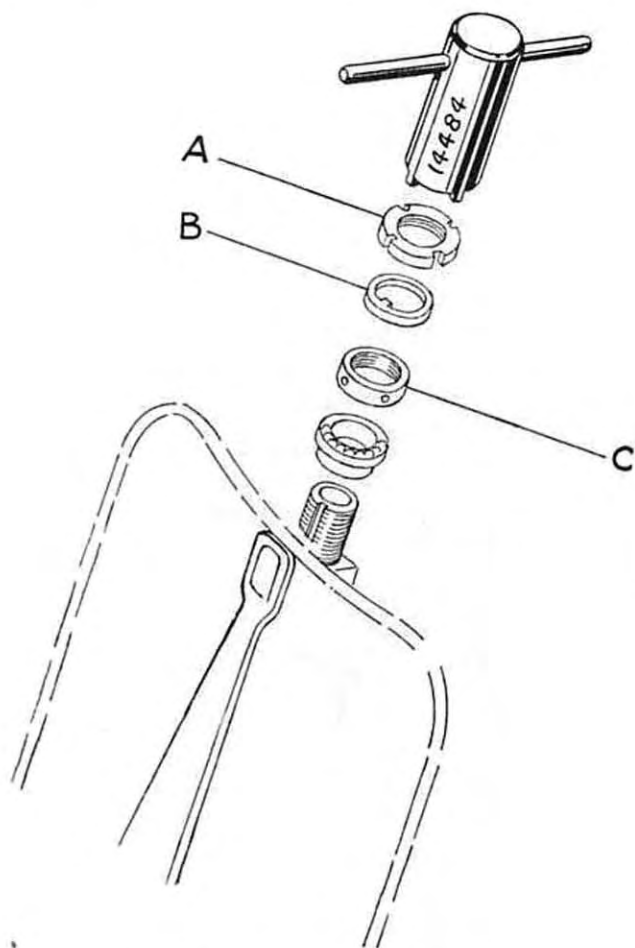


Fig. 61.—Re-assembling Top Bearing.

The top race should be screwed down until axial play is completely eliminated, but the steering column still rotates freely. Fit the lock washer and screw down locking ring with the same wrench.

After tightening, make sure the steering column still rotates freely.

Place the HANDLEBAR support on top of the steering column, tightening its bolt and nut slightly.

Slide the opposite end of the brake control cable into the steering column, pulling it out through the bottom end of the latter.

Insert the pilot wire into the steering column through the hole near the front suspension until it protrudes from the top end. Slide the outer casing of the speedometer cable over the wire so that the end of the knurled ring for attachment to the SPEEDOMETER HEAD remains on the handlebar. Hold the outer cable still and pull the pilot wire out. Grease liberally the inner cable and slide it in.

Pass the end of the front brake control cable through the handlebars ready for connecting to the front brake lever. This also applies to the throttle and clutch control cables. The handlebars can now be clamped in position with the top support, making sure that the rubber packings are correctly assembled; the whole can then be secured with four spring washers and nuts.

The four leads can then be threaded through the HEADLAMP Housing and connected to their various terminals. The headlamp itself can then be secured with its clip and screw.

The SPEEDOMETER HEAD can now be attached to the end of the driving cable, and placed into its housing together with the two rubber cushions, and rubber joint, and secured by the two screws and spring washers (Fig. 62).

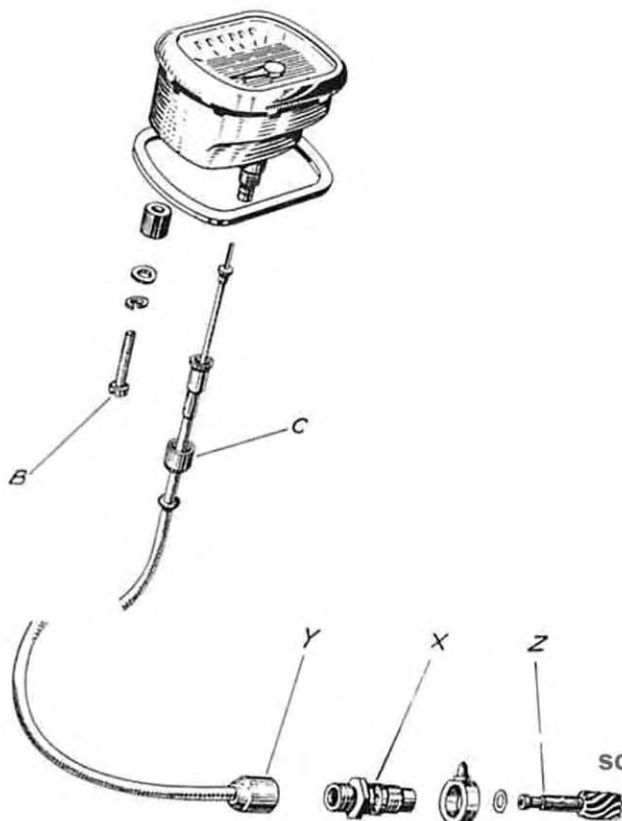


Fig. 62.—Re-assembly of Speedometer.

Slide the throttle control cable complete through the handlebars, right hand side, until the soldered nipple appears in the slot housing the control slider. Insert the clutch cable complete and push it to the left until the end, with the soldered nipple, protrudes from the proper slot.

Insert the shouldered washer over the end of the right hand handlebar, so that its lug fits into the welded box; then slide the throttle cable through the housing on the slider and insert the latter into the proper slot on the handlebar tube. Slip the guide sleeve into the hand grip, and the former over the handlebar so that its spiral grooves engage the slider rollers.

Pull outwards the front brake control cable as much as it is necessary to fit it to the lever; fit the buffer on the cable and provided with a nipple, and insert it into the proper housing on the lever. Pull the cable protruding from the bottom end of the steering column downwards until the lever fits properly in its housing on the handlebars, taking care that the ferrule is placed in its housing.

Secure the brake lever and the twist grip to the proper box on the handlebars using the screw and lock nut provided for this purpose.

Insert the end of the inner cable through the hole in the adjuster and thread it through the hole in the locking bolt. Adjust the cable tension to prevent any contact between the brake drum and shoes when the brake lever is released, and tighten the nut on the locking bolt. Should any further adjustment be required, this can be obtained from the adjuster.

NOTE: After carrying out this assembly operation, make sure that the cable does not rub against the wheel flange, and that the loop between the bottom end of the steering column and the adjusting nut is sufficient to avoid any accidental blocking up of the brake, due to the swinging motion of the front wheel suspension.

Mount the lighting SWITCH on the right handlebar; then fasten the flexible gear change and clutch control cables at the handlebars at their opposite ends. To do this, slide the screw nipples into the anchorage holes on the gear shifter (engine) making sure that the sheaths of the brass ferrules fit properly into their housings, then secure the terminals on the handlebar side (Fig. 23, Page 30).

Fill the box of the handlebars with grease; slide the left hand grip over the handlebars, fasten the end of the clutch control cable to the lever and place the sheath into the box welded to the handlebars. Do not forget to insert the vibration damping washer between the clutch control lever and the handlebar box. The box should be fastened with a screw which should be inserted through the hole of the guide socket; tighten the nut, using a suitable screwdriver.



On page 29 we recommend the releasing of the gear change control cables from the handlebars without slackening the screw nipples (Fig. 23). If the complete removal of the gear change controls could not be avoided proceed as follows for reassembling: the cables being already mounted in the chassis, fit the twist grip over the left handlebar and insert the nipples into the respective anchorage sockets, screw down the two adjusting nuts to their fullest extent and fill the small split casing with grease and secure; tighten the nut by means of a screwdriver (Fig. 23); peen the nut on to the screw indicated; select 1st gear both on the twist grip and on the gear shifter (engine). Insert the cable ends into the holes of the screw nipples (Fig. 24).

Position the clamp screws without tightening, and slide the screw nipples until they reach their housing on the flange. Insert the ferrules into their housing on the gear shifter.

Hold the end of the inner cable with a pair of pliers and pull it until the twist grip is about to turn; keep the cable in tension, screw slightly the bolt; now select 3rd gear both on twist grip and on the gear shifter and repeat the above operations for the other cable.

Place the machine in a neutral position. If correctly set there should be slight play; if not, proceed as follows:—pull back the rubber sleeve to reach the adjusting nut on the handlebars (Fig. 23) tension the two cables by screwing back their respective adjusters. If the cable tension is correct and the handlebar indications are wrong, this can be taken up and corrected by the adjuster.

This adjuster should be checked and corrected whenever found to be faulty as this can result in faulty gear selection. Align the handlebars in correct relation to the front wheel, and tighten the locking bolt.

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.



4TH SECTION
DIAGNOSIS AND CURES



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LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
<p>HARD STARTING: This can be due to one of the following causes:</p>			
<p>1. FUEL SYSTEM</p>			
<p>Fuel tank empty</p>	<p>... ..</p>	<p>Refill</p>	
<p>No fuel at carburettor</p>	<p>... ..</p>	<p>(a) Depress the tickler until some fuel drips out (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"</p>	
<p>(a) Fuel tap</p>	<p>Closed</p>	<p>Turn the fuel tap into position "reserve"</p>	
<p>(b) Main supply of fuel exhausted</p>		<p>Replace, blow dry</p>	
<p>(c) Fuel tap body</p>	<p>Clogged</p>	<p>Release by depressing the tickler</p>	
<p>(d) Float chamber union filter</p>	<p>Dirty</p>	<p>Remove and blow clean</p>	
<p>(e) Float needle valve</p>	<p>Sticking on its seating</p>		<p>Avoid use of abrasive material or wires</p>
<p>(f) Carburettor body</p>	<p>Clogged</p>		
<p>2. CARBURATION</p>			
<p>Neat fuel coming out from exhaust pipe } Fuel dripping out from carburettor ... }</p>	<p>Engine flooding</p>	<p>Operate as indicated hereunder, as the case may be</p>	<p>To re-start engine:</p>
<p>(a) Tickler</p>	<p>Sticking in depressed position</p>	<p>Release</p>	<p>(a) push-start the machine in 2nd or 1st gear with throttle wide open, or</p>
<p>(b) Float</p>	<p>Perforated (indicated by fuel swirling inside when float is shaking briskly)</p>	<p>Replace</p>	<p>(b) close fuel tap, unscrew the sparking plug and rotate engine for about 1/2 minute with throttle wide open to expel excess fuel. Replace sparking plug and proceed as for normal start</p>
<p>(c) Air cleaner</p>	<p>Choked, dirty</p>	<p>Clean</p>	
<p>(d) Choke flap</p>	<p>Sticking in position "closed"</p>	<p>Release</p>	
<p>(e) Carburettor assembly</p>	<p>Mounted at an angle</p>	<p>Turn to vertical position</p>	
<p>(f) Float</p>	<p>Needle not properly fitted into its seating</p>	<p>Clean or replace both needle and float chamber cover</p>	
<p>3. IGNITION</p>	<p>Lack of spark</p>	<p>Disconnect the plug lead. Check if sparking occurs between lead and crankcase when kick-start is operated. Proceed as indicated underneath:</p>	
<p>(a) Sparking plug</p>	<p>Dirty</p>	<p>Clean. Correct gap to 0.018 ins.</p>	
<p>(b) Switch</p>	<p>Cracks in insulation</p>	<p>Replace the plug</p>	
<p>(c) Earth lead</p>	<p>Lever jammed in "Stop" position</p>	<p>Release the lever</p>	
<p>(c) Earth lead</p>	<p>Insulation damaged causing short circuit. Disconnect the lead terminal from L.T. Socket; if the ignition works again the trouble is located in the lead portion inside the frame</p>	<p>Replace the earth lead</p>	



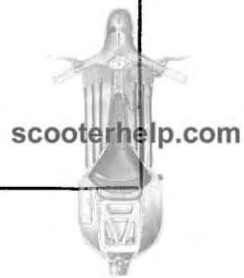
LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
(d) Moving arm of contact breaker ...	Bearing surface worn Lubrication felt dry or broken	Replace the breaker Lubricate or replace	When the bearing surface of the arm becomes abnormally worn, see if the cam surface is perfectly smooth
(e) Condenser	Faulty	Replace	
(f) Pick-up terminal	Cracks in insulation Short circuit in terminal	Replace the pick-up terminal	
(g) Breaker points	Dirty, partially worn or pitted Gap incorrect Completely worn or pitted	Clean with suitable file or very fine emery paper Correct gap to 0.105 ins. with feeler gauge Replace	
(h) Timing	Wrong	Re-time ignition	
4. CLUTCH			
The engine will not revolve when the kick-starter is depressed	Clutch slipping	Ensure that there is sufficient play in clutch lever; if correct, follow instructions for clutch repair on Page 73	
INCORRECT RUNNING: Possible causes are indicated hereunder:			
1. LACK OF POWER			
(a) Silencer outlet pipe	Carbonised		
(b) Induction pipe	Loose	Tighten the nuts on flange	The packing between cylinder flange and induction pipe should be inspected, and replaced if necessary
(c) Exhaust port	Partially closed by carbon deposit	Decarbonise cylinder, piston and cylinder head (after removal)	
(d) Cylinder base gasket	Not tight	Replace	
2. POOR COMPRESSION			
(a) Sparking plug	Not well screwed down in cylinder head	Tighten	
(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 nuts carefully after deburring spigot, if necessary Replace	In order not to damage the thread on cylinder head start the sparking plug by hand using box spanner for final tightening
(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 Carbon coated Carbon pearls on insulation	Correct gap to 0.018 ins. Replace or clean and check the gap Clean. Ensure that oil-gasoline ratio of fuel is correct	Clean with suitable wire brush and emery paper, or better, by sandblast scooterhelp.com



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
4. CLUTCH TROUBLES			
A.—Clutch snatches		Assemble correctly (see Page 55)	
(a) Outer convex plate	Wrongly assembled		
(b) Gear pinions	Not lubricated	Top up oil level (Lubrication Chart Page 25)	
(c) Plates with cork inserts	Gummed together	Wash with paraffin	
B.—Clutch slips			
(a) Springs	Feeble	Replace	Springs must be replaced whenever corks are burnt
(b) Plates with cork inserts	Worn or burnt	Replace	
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 69)	
(b) Gear shifter	Loose on crankcase	Tighten the screws	
(c) Spring for stirrup	Broken, missing or feeble	Replace	
(d) Selector	Chamfered arms Guide bush of selector shaft wrongly assembled	Replace (see Pages 48 and 51) Rectify	
(e) Gear pinions	Chipped or worn dogs	Replace	
6. STARTER ASSEMBLY NOT ENGAGING			
(a) Starter ratchet	Movement not free in slots of the housing Chipped or worn teeth	Clean, adjust or if necessary replace Replace	In such a case the mating teeth on 1st gear pinion should also be inspected
(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 fitted 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
<p>8. CONTROLS NOT OPERATING PROPERLY</p> <p>(a) Hand controls (inner cable)</p> <p>(b) Excessive play (inner cable)</p>	<p>Rusty Unravalled</p> <p>Slack</p>	<p>Lubricate, or, if necessary, replace</p> <p>Operate on respective adjusting nuts</p>	<p>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</p> <p>If gear change control cables are loose be sure they are firmly clamped in screw nipples of gear shifter before starting operation on handlebar adjusting nuts</p>
<p>9. STEERING COLUMN BECOMES STIFF</p> <p>(a) Top race of top ball bearing</p> <p>(b) Ball races of bottom bearing</p>	<p>Too tight</p> <p>Pitted</p>	<p>Adjust (see Page 66)</p> <p>Replace races and balls</p>	<p>This trouble may lessen riding stability</p>
<p>10. EXCESSIVE PLAY IN STEERING COLUMN</p> <p>(a) Top race of top ball bearing</p>	<p>Loose</p>	<p>Adjust (see Page 66)</p>	
<p>11. POOR BRAKING</p> <p>(a) Rear brake linings</p> <p>(b) Brake drums and linings</p>	<p>Worn down Oily</p> <p>Scratched</p>	<p>Replace</p> <p>Wash with gasoline and slightly rub the braking surface with emery paper, or replace if deeply impregnated with oil</p> <p>Replace</p>	<p>If oil gets to the brake linings from the gearbox</p> <p>(a) replace spring loaded seal, or</p> <p>(b) tighten the nut securing the rear wheel flange</p>



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