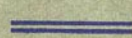




By Appointment
To His Royal Highness The Duke of Edinburgh
Manufacturers of Vespa Scooters

Vespa

125 cc



SERVICE STATION MANUAL

FOR 152L2 MODEL [scooterhelp.com](http://www.scooterhelp.com)





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== SERVICE STATION MANUAL
FOR 152L2 MODEL

DOUGLAS (SALES & SERVICE) LTD., KINGSWOOD, BRISTOL.
Telephone 67-1881

A DIVISION OF THE WESTINGHOUSE BRAKE AND SIGNAL COMPANY LIMITED



In accordance with the Douglas policy of progressive improvement, the right is reserved to alter any details of price, specification, accessories, and equipment, without notice, and without incurring any obligation.

This manual has been issued with the purpose of initiating the Dealers and the authorized workshops for the best service to the individual customer.

They should therefore conform to it, with particular consideration for the section concerning fault finding and remedies, in order to carry out their dismantling, re-assembling and overhauling operations quicker and better.

It is essential that dismantling, re-assembling and inspections are carried out with suitable tools listed in a section of the manual.

We remind the Dealers that, in order to obtain the best performance of the **Vespa**, faulty parts must be replaced with genuine **Vespa Douglas** spares. The use of spares from other sources invalidates the guarantee.





Fig. 1. Vespa 125.



INTRODUCTION

Due to its new features the Vespa 125 152L2 model may be considered the result of the experience achieved in over ten years of production and operation of the foregoing 125 c.c. models.

The design is completely new. The scooter is produced with very modern systems and equipment, has a very pleasant appearance and gives better performance:

It is lighter, has a brisker acceleration and this results in easier handling and enhanced liveliness; the max. speed exceeds 46.5 m.p.h., while fuel consumption is equally improved up to 120 m.p.g.

The vehicle has a quieter running because of its re-designed silencer and the new arrangement of the carburettor and air cleaner.

Brake efficiency has been improved by providing the rear brake with a light alloy drum fitted with cooling fins and cast-in ring.

The new arrangement of the carburettor and the introduction of a fully detachable engine cowling have increased the accessibility of engine parts.

Suitable improvements have been introduced in the electric wiring in order to enhance the accessibility to the low tension terminal and switch. The maintenance of the scooter is therefore easier and quicker.

The design basis was the simplification of parts, reduction of their number and possibility of employing automatic methods in the machining department, as well as in the pressing and welding shops.

The new chassis consists mainly of two shells welded along the longitudinal plane of the vehicle and connected to each other by a strengthening baffle: the wider central longeron is formed of two parts having a generous overlapping surface and being spot welded thereon.



Parts have been dimensioned so as to have a stress distribution which ensures the required strength and rigidity with reduced thickness.

The engine bracket is now cast on the crankcase; this is another simplification which makes assembly easier. In addition the cooling circuit is embodied in the crankcase half, flywheel side, whereas it was made as a separate part before.

The completely re-designed starter assembly is fitted on the layshaft.

Another remarkable improvement is the new handlebars, with the head lamp embodied and inner controls, of the same type successfully introduced on Vespa 150 and G.S. Such handlebars have a streamlining shape, add to the neat appearance of the vehicle and afford smooth and immediate controls.

The tool box, engine cowling and luggage carrier have also been modified to fit the new chassis and their line has been improved.

The width of the shield and footboard has been reduced; this means another improvement of the performance because of lower wind resistance.

Finally several technical improvements to different parts complete the range of the modifications on the new scooter. Among these: the gear shifter has been arranged in a covered container, in order to protect it from dust, mud and weather; the length of the connecting rod has been reduced and the gudgeon pin housing has been moved towards the lower part of the piston, away from the higher temperature zones, and cooling is thus enhanced.

The saddle is provided with a central spring adjustable to the driver's weight.

Modifications above described are shown in the illustrations of this manual; all Dealers are invited to examine it carefully, so as to be properly equipped for carrying out any operation on the machine.

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I.

TECHNICAL DATA-DESCRIPTION



TECHNICAL DATA - DESCRIPTION

Fuel consumption at economic speed

Up to 120 miles per imp. gal.

Max. speed	46.5 m.p.h.
Carrying capacity . 2 persons and 22 lbs. of luggage	
Max. gradient climbable	25% (1 in 4)
Operating range	200 miles
Fuel tank capacity	1.7 gals.
Reserve fuel (included)	0.44 gals.
Wheel base	46.5"
Handlebars width	25.8"
Scooter length	68.3"
Scooter height	38.8"
Minimum height of floorboard	8.07"
Minimum turning circle	59"
Weight (full tank)	192 lbs.

IDENTIFICATION DATA

Serial numbers with prefixes are stamped on both engine and frame. Such numbers and prefixes identify the Vespa as prescribed by law and are repeated on the test card and other documents of the scooter.

SERIAL NUMBERS

Engine. Stamped on cast platform on bearer arm of clutch side of c/case.

Chassis. On serial plate affixed to chassis panel under engine wing.



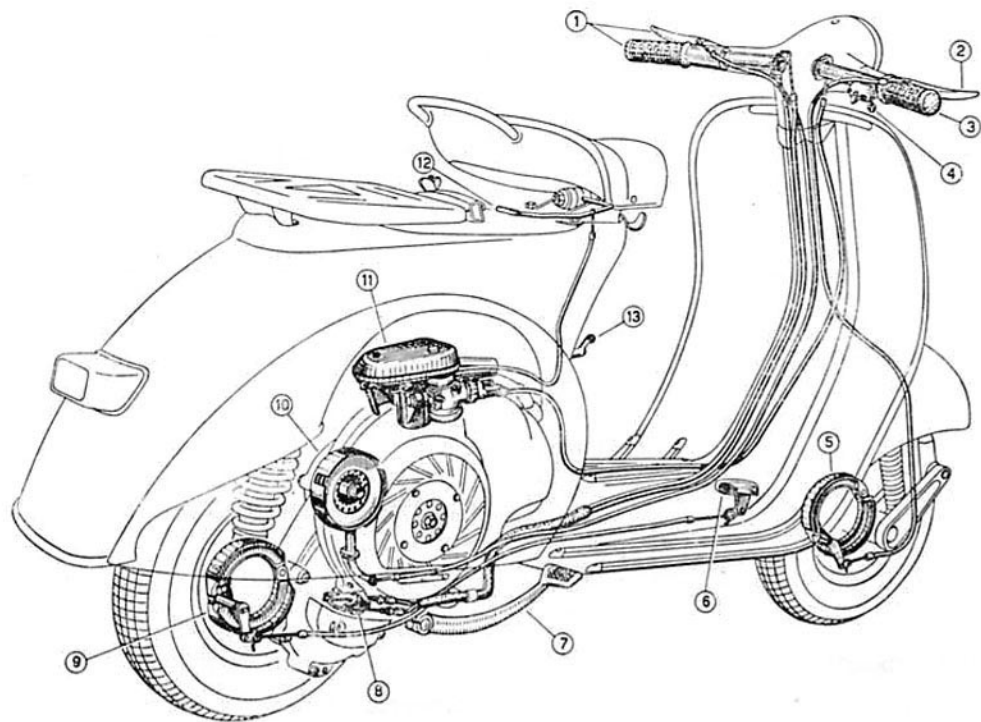


Fig. 3. Vespa controls.

1. Gear change twistgrip with clutch control lever. 2. Front brake lever. 3. Throttle control grip. 4. Light and dip switch. 5. Front brake shoes
 6. Rear brake pedal. 7. Kickstarter. 8. Gear shifter. 9. Rear brake shoes. 10. Clutch. 11. Carburettor, air cleaner. 12. Choke control lever.



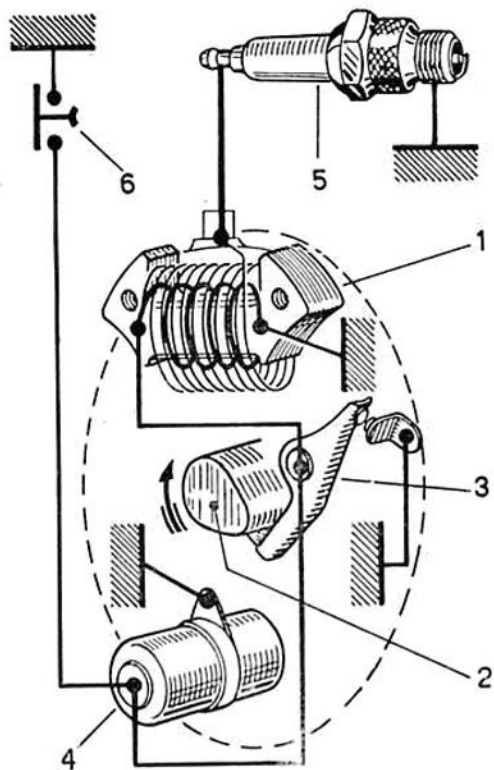


Fig. 4. Ignition diagram.

1. Ignition coil in flywheel magneto. 2. Rotor cam. 3. Breaker. 4. Condenser. 5. Sparkplug. 6. Engine cut-out on switch.

ENGINE

Single cylinder, two stroke, with reverse flow scavenge and deflector piston.

Bore	. . . . .	54 mm	(2.126")
Stroke	. . . . .	54 mm	(2.126")
Displacement	. . . . .	123.67 c.c.	(7.48 cu. in.)
Compression ratio	. . . . .		6.3 to 1
BHP at 5,000 r.p.m.	. . . . .		4.5

Cylinder of special cast iron with light alloy, pressure die cast **head**, secured on the crankcase by means of four studs.

Piston in light alloy with low thermal expansion, high heat resistance and hardness when run hot.

Crankshaft and con. rod. The crankshaft with internal flywheels has tapering ends with key ways for assembly of clutch and rotor respectively; the crankpin is force-fitted into the crankwebs and the con. rod big end is mated therewith through a row of special rollers. The small end is mated with the gudgeon pin through a bronze bush.

Main ball bearings with cage (lubricated by the oil in the fuel mixture sucked into the pre-compression chamber) and provided with oil seals against their outer surfaces.



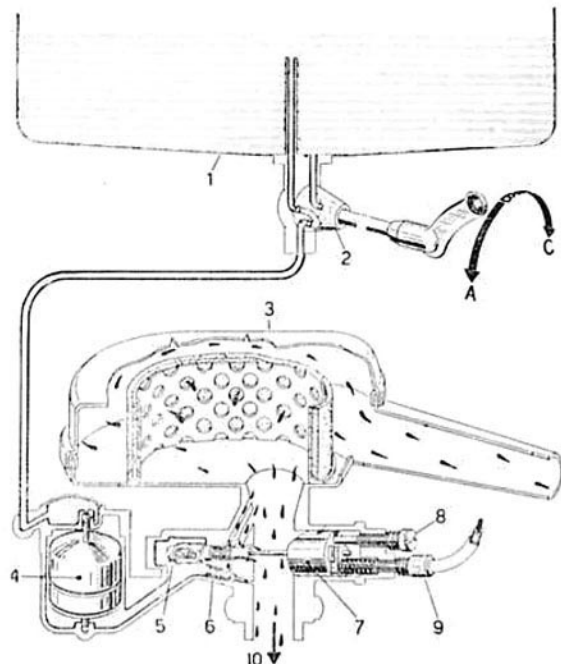


Fig. 5. Feeding circuit.

1. Fuel tank. 2. Fuel tap lever: (A) Reserve, (B) Open, (C) Closed. 3. Air cleaner. 4. Float. 5. Maximum jet. 6. Idling jet. 7. Throttle side. 8. Idling adjuster. 9. Adjuster on throttle control cable. 10. To the cylinder.

Crankcase in two pieces, pressure die cast in light alloy. A cylindrical arm is cast in with the clutch side crankcase half to secure the engine on the body. The other half forms an involute shroud directing to cylinder and cylinder head the cooling air stream blown by the fan.

Lubrication achieved by the oil in the fuel mixture for the cylinder, piston, gudgeon pin, connecting rod, crankshaft and main bearings.

Both clutch and gear box operate in oil bath.

Ignition by a high tension coil in the flywheel magneto (see Fig. 4).

Sparkplug: either AC 45 F, KLG F 70, Lodge HN, or Champion L 86.

Ignition timing with spark advance of $28^{\circ} \pm 1^{\circ}$.

Feeding provided by gravity with petrol mixture. Three way tap (reserve, on, off; see Fig. 5).

Carburettor Dell'Orto, UA 16 SI with silencing air cleaner and choke.

Max. jet: 72/100 mm. Idling jet: 38/100 mm. Needle jet: 260/100 mm.

Air intake from inside the body.

Amal type 503/1 fitted to machines from 1099272 onwards. Main jet: 70. Pilot jet: 20. Jet Needle Variable according to engine requirement.



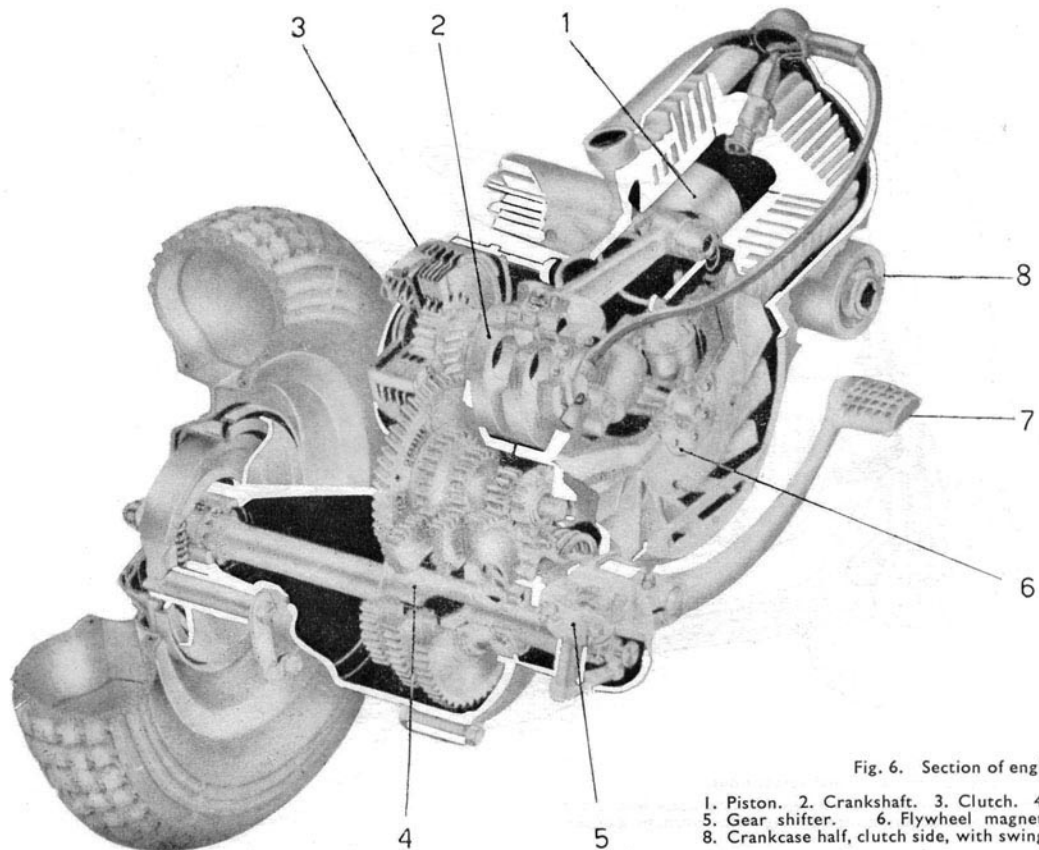


Fig. 6. Section of engine.

1. Piston.
2. Crankshaft.
3. Clutch.
4. Mainshaft and gears.
5. Gear shifter.
6. Flywheel magneto.
7. Kickstarter.
8. Crankcase half, clutch side, with swinging arm.



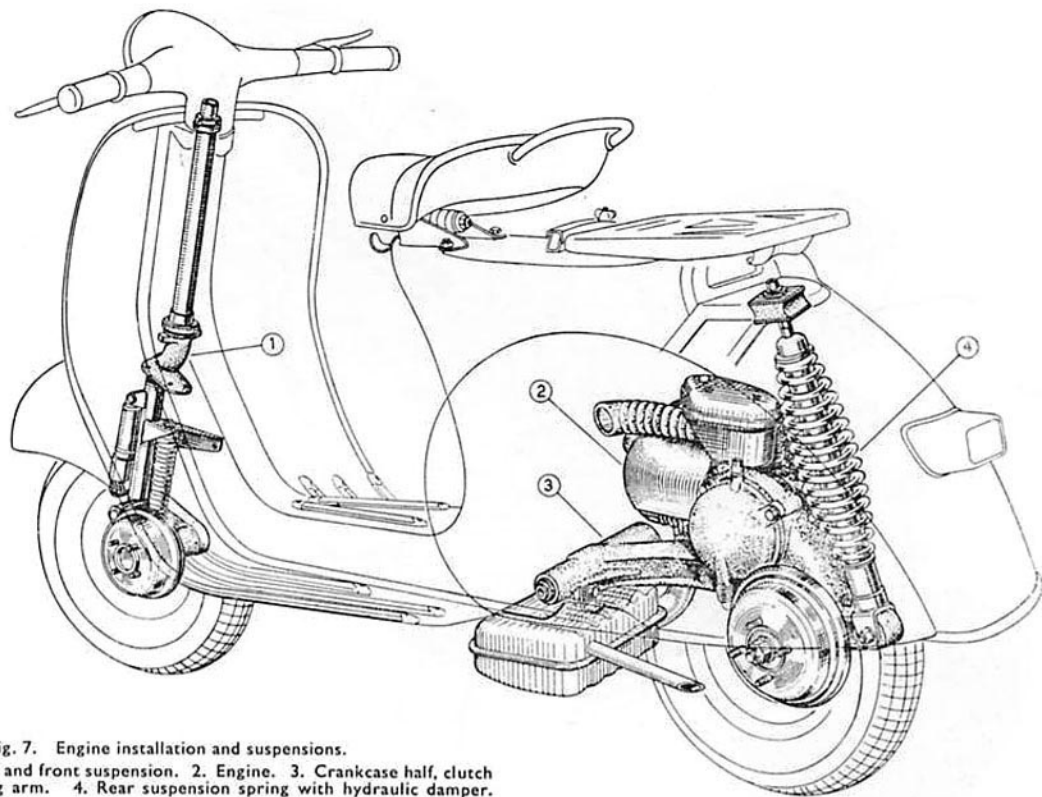


Fig. 7. Engine installation and suspensions.

1. Steering column and front suspension. 2. Engine. 3. Crankcase half, clutch side, with swinging arm. 4. Rear suspension spring with hydraulic damper.

Mixture Screw adjustment: 1—1½ turns out from “In” position.

Throttle Slide adjustment: By rotating knurled screw situated on mixing chamber cover.

Transmission. The engine drives directly the rear wheel through clutch, cush drive and gear box (see the engine section on Fig. 6).

Clutch. Multiplate (see Fig. 6), with cork lining on the driven discs.

Control by lever on the left hand side of handlebars and adjustable cable (see Fig. 3).

Gear box. 3 speed drive with mesh gears in oil bath. Its adjustable twistgrip control is coupled with the clutch lever and located on the left hand side of handlebars (see Figs. 3 and 6).

Engine to wheel transmission ratios:

First: 12.2 to 1 Second: 7.6 to 1 Third: 4.85 to 1

Starting by means of kickstarter located on the right hand side of scooter (see Fig. 6). The multiple gear and consequently the engine are set in motion through a ratchet sector and a gear by operating the kick-starter.

Silencer of the expansion and absorption combined type, with high silencing effect.

Cooling effected at all engine speeds by a centrifugal fan (Fig. 8).

Engine installation. The engine is pivoted to the

chassis of the scooter through the cylindrical arm of the crankcase half, clutch side, provided with a spindle and two rubber bushes (see Fig. 7).

Its vibrations are damped by the rear suspension with variable rate coil spring and hydraulic damper.

The rear wheel is secured to the end of mainshaft.

Particular attention has been given to the design of the silencer and air filter in accordance with Ministry of Transport requests to reduce the noise level to an absolute minimum. We recommend that these parts are maintained in good order.

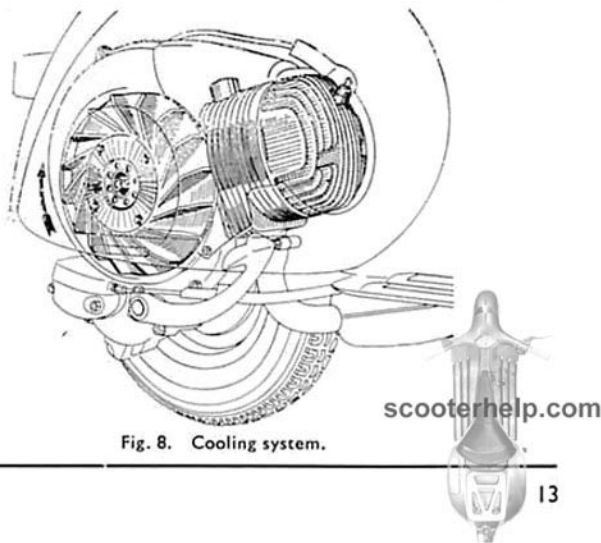


Fig. 8. Cooling system.

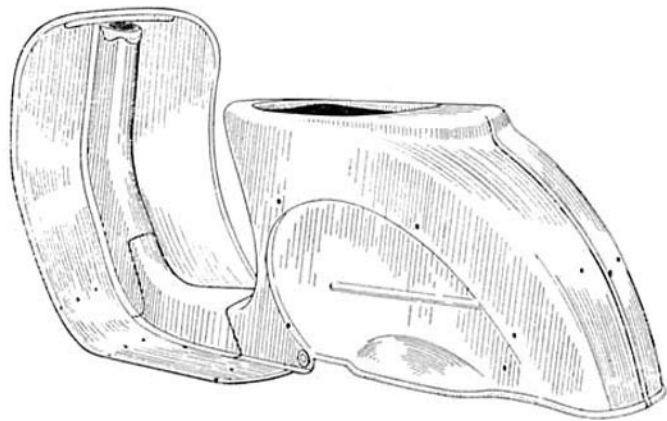


Fig. 9. Stressed skin body.

FRAME

Stressed skin **body** of pressed sheet with streamlined, monocoque type structure (see Fig. 9). It gives full protection to the driver, to the passenger and to the vehicle units; it is completed in this function by the mudguard and, on the two sides, by the steel sheet engine cowling and tool box.

Handlebars consisting of two arms in steel tube clamped on a support which is fixed to the steering column.

The central part of handlebars is completed with two shells in pressed steel sheet. The head lamp is installed therein (see Fig. 1).

All control cables and electric wires, to be connected to the handlebars, are concealed therein.

Steering column, suspension and wheels. The steering column bears the handlebars, clamped on its top end, and the front wheel swinging hub, pivoted at its bottom end through a stub axle (see Fig. 7).

Front suspension with coil spring and double acting hydraulic damper.

Rear suspension with a variable rate coil spring and coaxial, double acting hydraulic damper.

The wheels are interchangeable and have rims of pressed steel sheet 8" dia. Tyres dia.: 3.50 x 8".

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Dunlop tyre pressures to be:—

Solo: Front 16 lbs., Rear 20 lbs.

Pillion: Front 16 lbs., Rear 32 lbs.

Sidecar: Front 16 lbs., Rear 24 lbs., Sidecar 16 lbs.

Pirelli tyre pressures to be:—

Solo: Front 16 lbs., Rear 22 lbs.

Pillion: Front 16 lbs., Rear 32 lbs.

Sidecar: Front 18 lbs., Rear 24 lbs., Sidecar 16 lbs.

Saddle of the nose-pivoted, sprung type with central spring adjustable to the driver's weight.

Brakes. Expanding type with cable control.

Front: lever on right hand side of handlebars.

Rear: control pedal on right hand side of floorboard.

Central stand. A two leg stand is arranged under the floorboard. A strong return spring holds it in contact with the floorboard and keeps it from vibrating while the scooter is being ridden.

ELECTRIC WIRING

A six pole flywheel magneto (nominal voltage: 6 V) supplies alternating current for feeding head lamp, tail lamp and horn (see Figs. 12 and 13).

The **head lamp** with \varnothing 105 mm (4.13"), installed on the handlebars, has a 25/25 double filament bulb (main and dipped beam) and a 3W bulb (parking light).

The **tail lamp** with red reflector has a 3W bulb which also illuminates the number plate. The light and dip **switch** with two levers is installed on the right hand side of the handlebars (Fig. 11). The switch has also two push buttons for cut-out (M) and horn (C) respectively.

TOOL KIT

2 double-ended box spanners (11-14 and 21-22 mm); 1 double open-ended spanner (8, 14 mm); 1 single open-ended spanner (7 mm); 1 screwdriver.

These tools are contained in a canvas roll which is placed in the left wing together with the "Operation and Maintenance Manual."

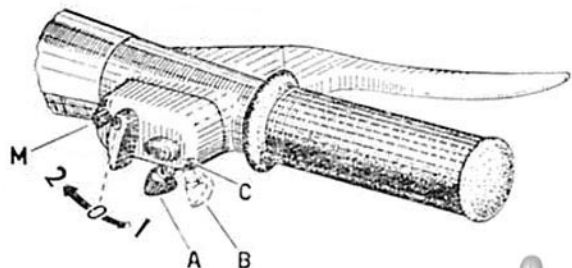
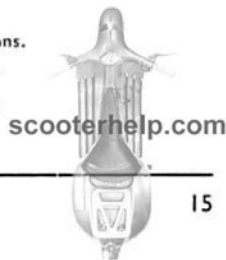


Fig. 11. Light and dip switch positions.

1. Head light and tail lamp on.
0. Lights off.
2. Pilot lamp and tail lamp on.
- A. Dipped beam.
- B. Main beam.



ELECTRICAL LAYOUT

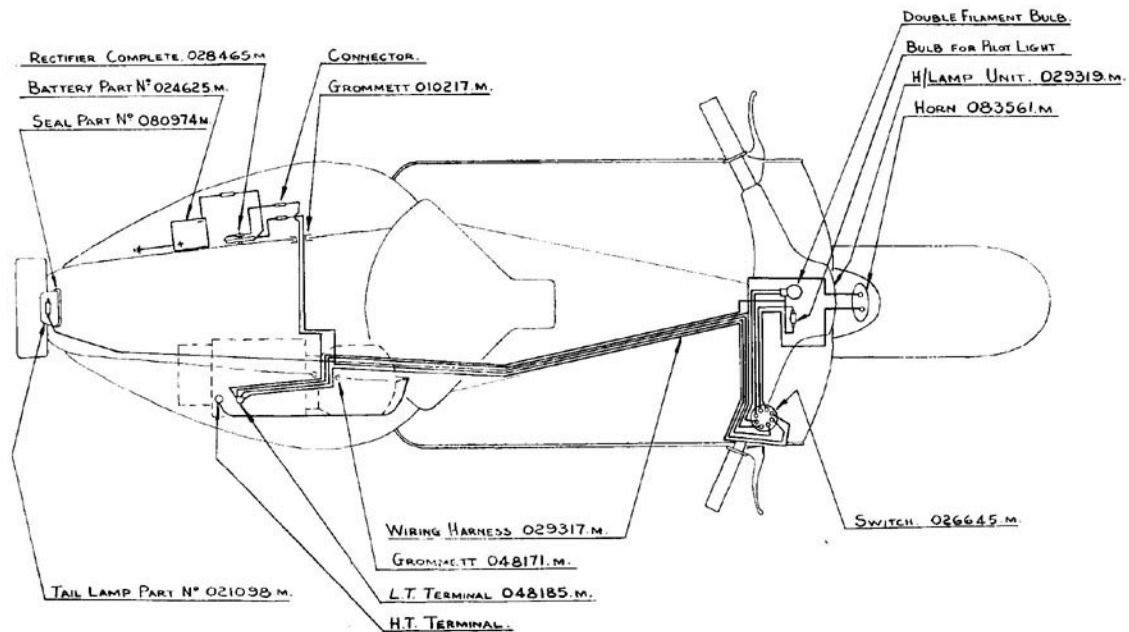


Fig. 12.

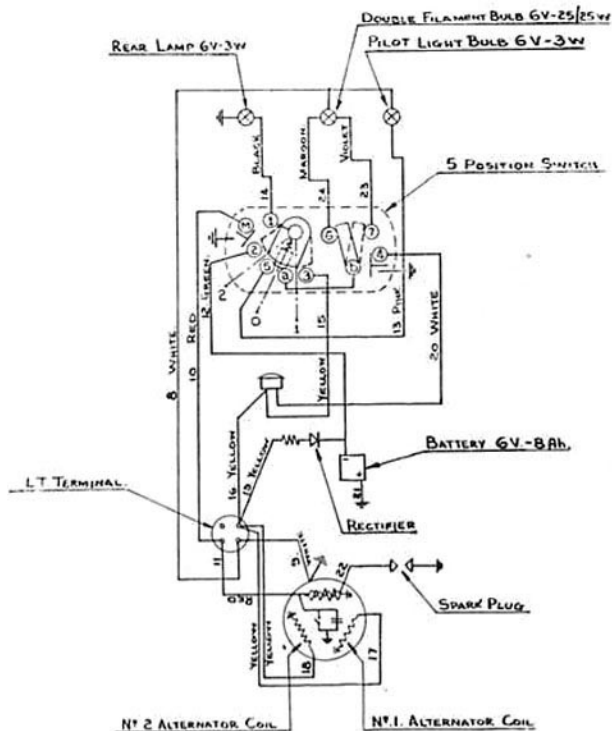


Fig. 13. Wiring diagram.

FOR MACHINES UP TO SERIAL NO. 15240—MACHINES ABOVE THAT NO. SEE PAGE 18 (NEXT PAGE). scooterhelp.com

SWITCH POSITIONS	
Position 0	No Lights.
" 1	Contacts 1, 3 (6 or 7) a and b Connected. A.C. Current to H/Lamp (Main or Dipped Beams) and Tail Light.
" 2	Contacts 1, 2 and 5 Connected. D.C. Current to Parking and Tail Light.

8. H/lamp/parking light to L.T. terminal (White). 9. L.T. terminal to earth (White). 10. Engine cut out (Red) switch contact M to L.T. terminal. 11. Engine cut out (Red) L.T. terminal to magnetic coil. 12. D.C. feed (Green) switch contact 2 to battery. 13. D.C. feed (Pink) switch contact 5 to parking light. 14. Tail lamp lead (Black) switch contact 1 to tail light. 15. A.C. feed (Yellow) switch contact 3 to horn. 16. A.C. feed (Yellow) horn to L.T. terminal. 17. A.C. feed (Yellow) L.T. terminal to No. 1 alternator coil. 18. A.C. feed (Yellow) No. 2 alternator to L.T. terminal. 19. A.C. feed (Yellow) L.T. terminal to rectifier. 20. Horn to horn button (White) switch contact 4. 21. Battery lead to earth. 22. H.T. lead to plug. 23. A.C. feed (Violet) switch contact 7 to H/lamp main beam. 24. A.C. feed (Maroon) switch contact 6 to h/lamp dipped beam.



SWITCH POSITIONS

- Position 0—No Lights.
 Position 1—Contacts 1, 3 (6 or 7) a and b connected
 A.C. current to H/lamp (main or dipped beams)
 and Tail light.
 Position 2—Contacts 1, 2 and 5 connected
 D.C. current to Parking and Tail light.

8. H/lamp/parking light to L.T. terminal (White).
 9. L.T. terminal to earth (White). 10. Engine
 cut-out (Red) switch contact M to L.T. terminal.
 11. Engine cut-out (Red) L.T. terminal to magnetic
 coil. 12. D.C. feed (Blue) switch contact 2 to
 battery. 13. D.C. feed (Pink) switch contact 5 to
 parking light. 14. Tail lamp lead (Black) switch
 contact 1 to tail light. 15. A.C. feed (Yellow)
 switch contact 3 to horn. 16. A.C. feed (Yellow)
 horn to L.T. terminal. 17. A.C. feed (Yellow)
 L.T. terminal to No. 1 alternator coil. 18. A.C.
 feed (Yellow) No. 2 alternator to L.T. terminal.
 19. A.C. feed (Green) L.T. terminal to rectifier.
 20. Horn to horn button (White) switch contact
 4. 21. Battery lead to earth. 22. H.T. lead to
 plug. 23. A.C. feed (Violet) switch contact 7 to
 H/lamp main beam. 24. A.C. feed (Maroon)
 switch contact 6 to H/lamp dipped beam. 25.
 A.C. feed No. 2 alternator coil to L.T. terminal.

**FOR MACHINES
 SERIAL NO. 15241 ONWARDS.**

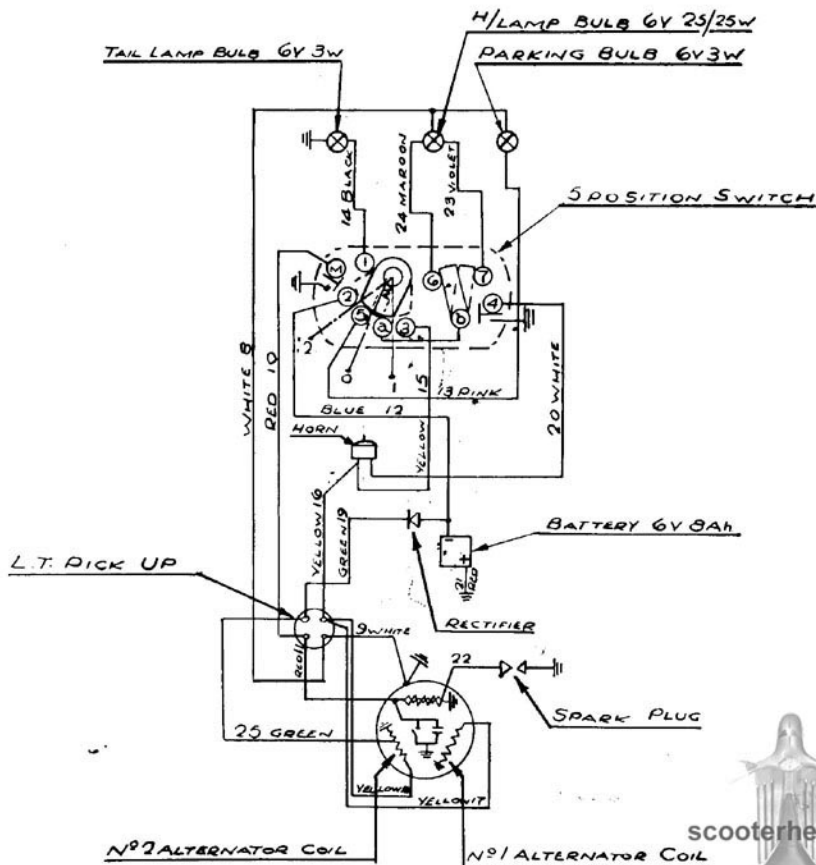


Fig. 11. Connections and electric wiring diagram.



OPERATION

We remind customers that they should comply with instructions outlined in the "Operation and Maintenance Manual." The directions below should be adhered to as far as running-in, oil to petrol ratio of the fuel mixture, oil and other lubricants to be used are concerned.

Fault finding, remedies, overhauls, etc. are dealt with in respective sections of this manual.

For **fuel mixture** to be used both during and after running-in, see chart on Page 20.

We recommend to use good quality, standard grade petrol, and to mix it with oil thoroughly. Keep the breather on filling cap clean.

Running-in. Important rules to be followed while running in, 1,200 miles:

Do not exceed following speeds:

1st gear 9.5 m.p.h.

2nd gear 19 m.p.h.

3rd gear 31 m.p.h.

Do not hold these max. speeds for long periods neither use full throttle opening up-hill.

Change the oil in the gear box and check that nuts screws and bolts are not slack after the first 600 miles.

Slow running adjustment. No hand tool is required for this job. Idling revs. can be raised or reduced resp. by simply slackening or tightening the screw on carburettor cover. (See page 22).

LUBRICATION CHART

Part to be lubricated		Lubrication				
Every 2,500	Every 5,000	*Shell	*B.P.	Esso	Wak:field	Mobil
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	Mobiloil A
Front suspension Felt pad on flywheel cam Joints on brake control Speedo flexible drive	Control cables Gear-change quadrant	Retinax A	Energrease L.2.	Esso Multi-purpose Grease H	Castrol L.M.	Mobilgrease M.P.
Engine at each re-fuelling		Shell 2T Two-Stroke Oil in ratio of 5% or ½-pint to 1½ galls. petrol	Energol Two-Stroke Oil in ratio of 5% or ½-pint to 1½ galls. petrol	Essolube 30 in ratio of 5% or ½-pint to 1½ galls. petrol. Esso Two-Stroke Motor Oil in ratio of ½-pint to 1½ galls. petrol	Castrol XL in ratio of 5% or ½-pint to 1½ gal. s. petrol. Castrol Two-Stroke Oil in ratio of ½-pint to 1½ galls petrol	Mobiloil A in ratio of 5% or ½-pint to 1½ galls. petrol or Mobil-Mix in ratio of ½-pint to 1½ galls. petrol

* Marketed also by National Benzole Co. Ltd., by arrangement with Shell-Mex & B.P. Ltd.

Approved Petrol/Oil Mixture

Make	Description
Shell	2T Two-Stroke Mixture
B.P.	B.P.-Zoom
National Benzole Co. Ltd.	Hi-Fli

Hydraulic Dampers

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



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ENGINE LUBRICATED BY MIXTURE.

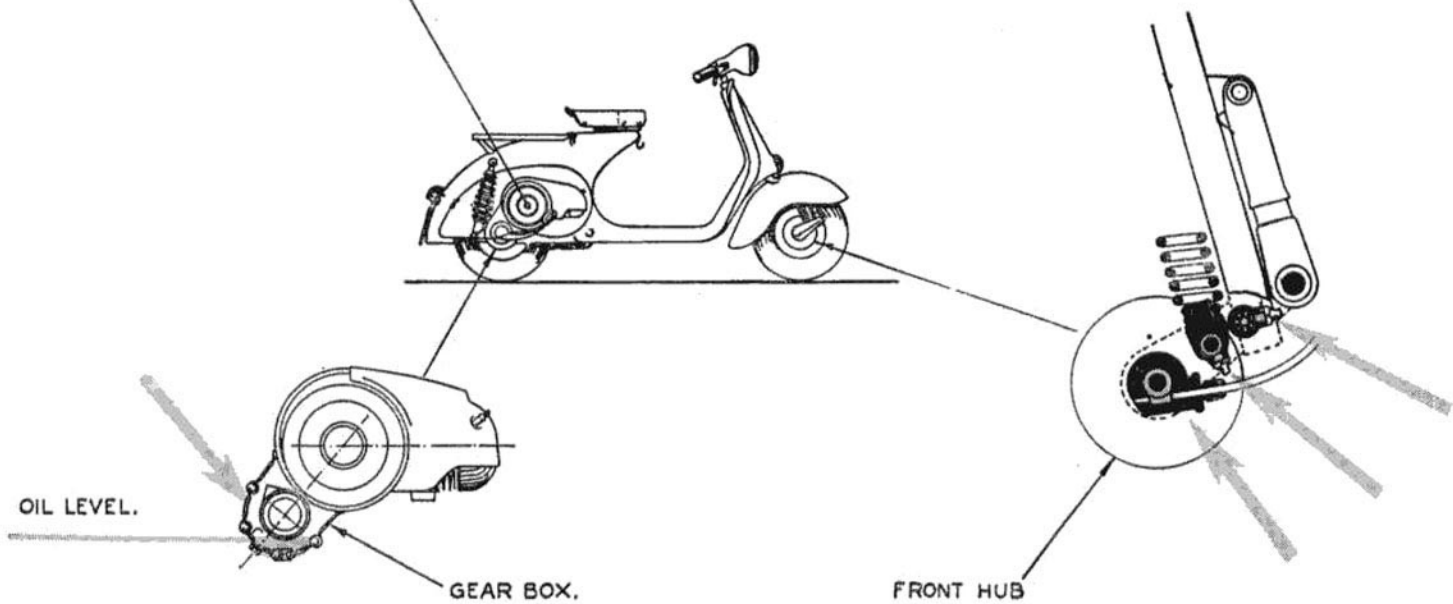


Fig. 15. Lubrication scheme.



Notice. Near the screw for slow running adjustment there is another screw for adjusting the throttle control cable. It is to be used only if necessary and while dismantling and re-assembling.

Setting the head lamp. The correct orientation of the main beam can be obtained on the vertical plane as follows.

Check that both front and rear tyres conform to prescribed pressures.

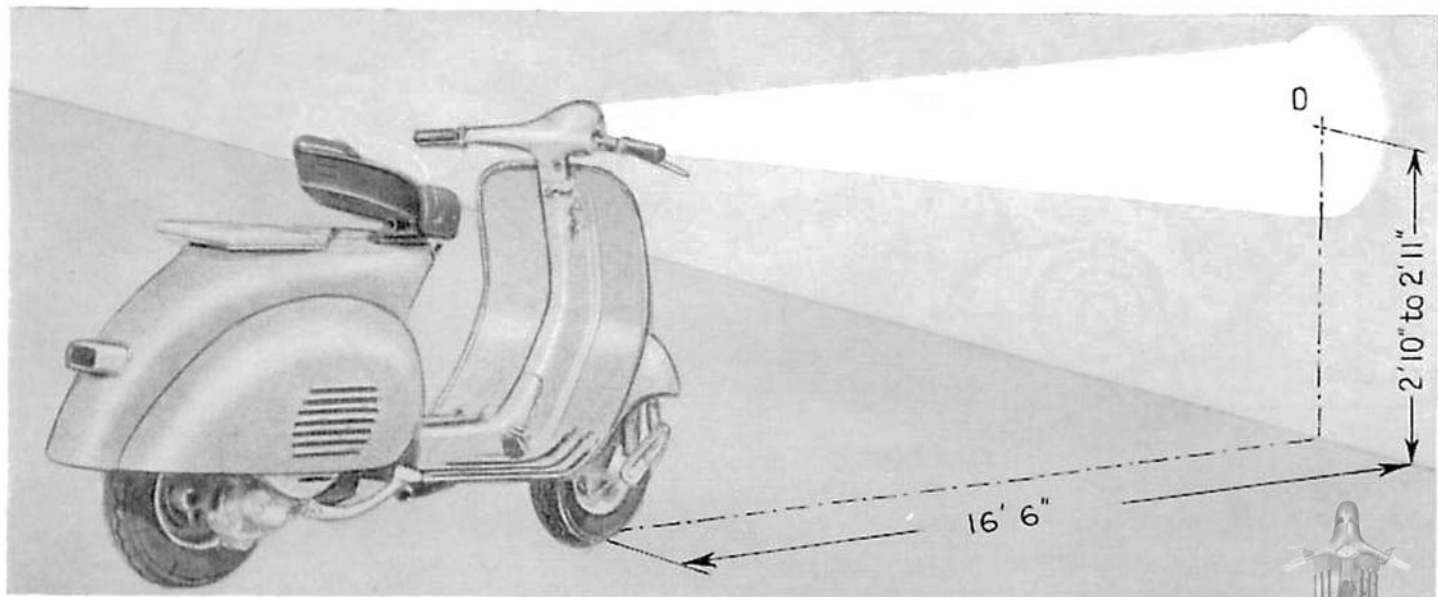


Fig. 16. Adjustment of head lamp.

N.B. The adjustment must be carried out with driver and passenger on the machine.



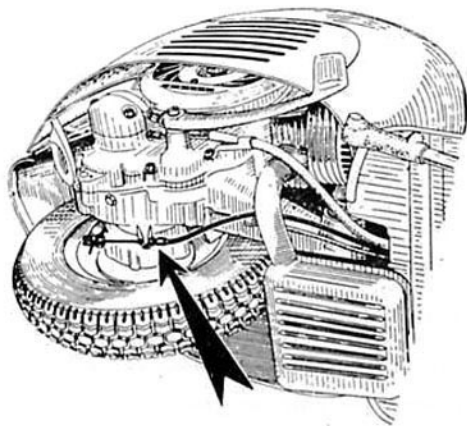


Fig. 17. Brake adjustment.

Place the scooter on a level floor in front of a white wall as seen on Fig. 16.

Start the engine, hold the throttle control twistgrip at about $1/3$ and set the switch on "main beam."

With two persons on the Vespa, slacken the screw securing the head lamp then move the latter as required in order that the beam axis coincides with the point "O" on the wall.

This operation can be carried out also with driver only sitting on the saddle. In such case, of course, the beam alignment should be altered whenever the scooter is being ridden by both driver and passenger.

Brake adjustment. Brakes are properly adjusted if:
the wheel rotates freely when respective control lever or pedal are in resting position;
the braking action starts as soon as respective controls are operated.



These conditions are achieved adjusting the cables by means of screws indicated with arrows in Fig. 17.

Laying up. In such a case proceed as follows:

1. Start the engine and run it at low revs. Then pump 60 c.c. of oil, SAE 30, into the carburettor intake through the hole on the air cleaner by means of an oil can.
2. Rest the floorboard on two wooden blocks in order to take weight off the tyres.
3. Drain all fuel from both tank and carburettor.
4. Grease all unpainted metal parts.

N.B.—After long laying up, in order to prevent forming of air bubbles in the fuel system and consequent carburation troubles during the first fuelling, remove the air cleaner, disconnect the rubber hose from the carburettor and let some fuel drip out to expel air. Then, with fuel tap open, reconnect the hose to the carburettor.

Follow this procedure also when refuelling after running out of mixture.

In case of long storage or disuse the carburation may become faulty, though said precautions have been taken, because of oil deposits in the idling jet due to the evaporation of the petrol contained in the fuel mixture. Dismantle the jet and wash it with petrol and blow dry.



2. TOOLING



TOOLING

All tools required for dismantling, re-assembling and overhauling the **Vespa 125** (prefix 152L2) are listed in this section in numerical order.

Previous tools which can still be used are indicated in the second column.

The equipment is indispensable. The success of the various operations depends on its continuous and proper use.

Every operation should be done with the proper tools, and according to directions in this manual.

Dealers should provide themselves with all specialised service tools required to ensure efficient after sales service.



TOOLING FOR DISMANTLING, RE-ASSEMBLING AND OVERHAULING VESPA 125 cc. 152L2 MODEL

Tool No.	Previous tool still in use	TOOL NAME	GROUP	Page	NOTES
5479/A	6488/A	Hand press for hydraulic dampers	Dampers	95	<p>(a) Dealers who have this tool already must order the new tool 8608/R and alter the stand as indicated on page 88.</p> <p>(b) Dealers who have this tool already must order the new parts 31, 32, 33.</p>
7259/R		Test fixture for hydraulic dampers	Dampers	100	
8002/R (a)		Engine test stand	Engine	88	
8290/R		Flywheel magneto test stand	Flywheel	70	
T. 12380/C		Crankshaft alignment fixture	Engine	81	
13768/C		Base fixture for assembling coils on stator	Flywheel	69	
15104/C		Inspection template for steering column (base)	Steering c.	91	
15118/C		Inspection template for steering column (top)	Steering c.	91	
T. 15772/C (b)		Jig for frame inspection	Frame	92	
T. 16160/C		Control gauge (normal size)	Engine	79	
T. 16161/C		Control gauge (1st o/size)	Engine	79	
381500/7		Reamer for bush of con. rod small end	Engine	77-78	
381504		Reamer for 1st o/size gudgeon pin housing (rough)	Engine	82	
381505		Reamer for 1st o/size gudgeon pin housing (finish)	Engine	82	
381505/7		Reamer for bronze bush of con. rod small end (1st o/size)	Engine	77-78	
550804		Punch	Flywheel	65	
550805	Punch	Flywheel	65-66		
713019/5	Drill point for pegs of main bearing bushes	Engine	83		
716050	Drill point for pegs of main bearing bushes	Engine	83		



Tool No.	Previous tool still for use	TOOL NAME	GROUP	Page	NOTES
784043		Turning tool for main bearing bushes	Engine	83	
784424		Turning tool for main bearing bushes	Engine	83	
T. 0013460		Crankshaft assembling jig (1st operation)	Engine	80	
T. 0013782	0013782	Turn bearer for engine support table	Engine	36	
0013964		Face-pin wrench for holding flywheel	Flywheel	38	
	0014000 (c)	Tool for clamping the steering column in the vice	Steering c.	—	(c) Not indispensable (steering column may also be clamped in vice with aluminium pads).
T. 0014208		Crankshaft assembly jig (2nd operation)	Engine	80	
T. 0014499		Ball bearing extractor (front wheel axle and crankshaft)	Steering c.	45-52	
0014566		Hook spanner for lock ring of steering column top bearing	Engine		
			Steering c.	49	
	T.0015192 (d) 0015192 }	Box wrench for nut retaining the flywheel	Flywheel	—	(d) Standard 14 mm box spanner.
T. 0015283		Mandrel for turning the flywheel	Flywheel	66	
0015284		Balancing mandrel for flywheel	Flywheel	67	
0015413		Tool for removing rivets in side plates on cush gear	Engine	86	
	T. 0016029 (e)	Tube for assembling bottom ball race of steering column bottom bearing	Steering c.	120	(e) A 530 mm (20-8") long, 5-7 mm (0.19-0.27") thick tube with 36 mm (1.4") I.D. is a suitable substitute for this tool
0016030		Flexible shank spanner for securing tool box	Frame	53	
T. 0016205		Timing gauge	Engine	119	
	0016538	Decarbonising tool for silencer exhaust pipe	Engine	—	
T. 0016561		Extractor for bottom ball race of steering column bottom bearing	Steering c.	50	
0016741		Gap gauge for breaker points and spark-plug electrodes	Engine	98	
0017004 (f)		Special screwdriver	Steering c.	48	(f) A screwdriver for slotted nuts can be used as well (see Fig. 51, (a) and (b), page 48)



Tool No.	Previous tool still in use	TOOL NAME	GROUP	Page	NOTES
T. 0017104	T. 0017102 (g) 0017129 (h)	Extractor for bushes of front wheel axle Long nose pliers for circlips Single open ended spanners for nut and bolt securing breaker spring	Steering c. Engine Flywheel	— 38-44-113 —	(g) Not indispensable (a metal drift may be used as well). (h) Standard 6 mm spanners.
0017549		Face-pin spanner for dismantling and re-assembling the front damper	Dampers	95	
0017780		Spindle for drilling main bearing bushes	Engine	83	
0017802		Wedge	Engine	42-117	
0017808		Pilot sleeve for passing the crankshaft through oil seal of clutch side crankcase	Engine	116	
0017820		Drift for removal of gudgeon pin	Engine	38	
0017831		Pilot sleeve for passing the crankshaft through oil seal of flywheel side crankcase	Engine	117	
0017843 (i)		Punch for removing crankcase oil seal	Engine	42-45	
0017898		Punch for assembling bushes of front wheel needles	Steering c.	120	
0018094		Feeler gauge for inspecting axial play of gear pinions	Engine	64	
T. 0018119		Tool for assembling mainshaft	Engine	113	(i) To be used in conjunction with bearer T. 0022474 for dismantling the oil seal on spacer of crankcase half, clutch side. (k) To be used in conjunction with tool T. 0022552.
T. 0018190 (k)		Tool for dismantling and re-assembling rubber bushes and spindle from cylindrical arm of crankcase half, clutch side	Engine	46-110	
0018204		Pilot sleeve on stem of front damper for assembling rubber packings	Dampers	95	
0018205		Pilot sleeve for fitting felt ring	Dampers	95	
0018219		Spanner for securing front damper to steering column	Steering c.	51	
	T. 0019273 (l)	Mainshaft holder for bending the edge of lock washer	Engine	—	



Tool No.	Previous tool still for use	TOOL NAME	GROUP	Page	NOTES
T. 0019353	T. 0015046	Box spanner for castle nut retaining the clutch	Engine	41	(m) Dealers who have this tool already must order parts 53, 54, 55, 56 and 57.
T. 0019354		Hook spanner for retaining the clutch	Engine	41	
T. 0019572		Work holder for crankshaft overhaul (grinding holes to oversize)	Engine	79	
0019978		Heater (220 V - 50 Hz)	Engine	114	
T. 0020185(m)		Equipment for consumption test	Engine	95	
T. 0020322		Clutch stripping and assembling tool	Engine	84	
T. 0020720		Joint spanner for adjustment of saddle spring	Frame	122	
T. 0020781		Punch for assembling mainshaft inner ball bearing	Engine	112	
T. 0020811		Rod for reciprocating piston of front damper to expel air	Dampers	95	
T. 0020824		Base of tools for assembling rubber bush and liner on damper body	Dampers	95-96	
T. 0020826		Tool set for assembling liner and rubber bush on body of front damper	Dampers	96	
T. 0020827		Tool set for assembling liner and rubber bush on stem support of front damper	Dampers	96	
T. 0020828		Sleeve for assembling discharge valve into inner tube of front and rear dampers	Dampers	95	
T. 0020837		T. 0014812	Punch for withdrawal of mainshaft	Engine		43
T. 0020841	T. 0018130	Punch for withdrawal of front wheel axle	Steering c.	51	
T. 0020842		Punch for withdrawal of bottom ball race of steering column upper bearing	Steering c.	49	
T. 0020877 (n)		Extractor for crankcase half, flywheel side, and crankshaft	Engine	42-45	(n) Dealers who have this tool already must order part 14.
T. 0020897 (o)		Piston holder for reaming gudgeon pin housing	Engine	82	(o) Dealers who have this tool already must order part 17.



Tool No.	Previous tool still in use	TOOL NAME	GROUP	Page	NOTES
T. 0021064(p) T. 0021071	T. 0014924	Flexible shank spanner for fuel tap Tool for inserting oil seals on crankcase half, flywheel side, and on spacer of crankcase half, clutch side	Frame Engine	54 115	(p) Dealers who have this tool already must order part 11.
T. 0021084	0015309	"L" cranked box spanner for nuts securing front wheel bearing and rear wheel flange	Engine Steering c.	34	
T. 0021257(q)	{ T. 0021259 T. 0016331 T. 0016338 T. 0016310	Fixture for assembling and dismantling bronze bush of con. rod. small end	Engine	76	(q) Tool T. 0021257, if used in conjunction with part 5, can be employed instead of tool T. 0021259.
T. 0021265 T. 0021330 (r)	T. 0016310	Flywheel extractor Tool for assembling the bottom ball race of upper bearing and upper ball race of bottom bearing of the steering column	Engine Steering c.	39 120	
T. 0021467	T. 0018182	Extractor for main bearings from crank case	Engine	43	(r) Dealers who have this tool already must order part 1 which has been altered.
T. 0021472 T. 0021481 (s) T. 0022192 (t)	T. 0019161 T. 0015724 (s)	Crankpin removal blocks Supporting blocks for riveting Riveting fixture for taper pin of gear shifter	Engine Flywheel Engine	79 65 85	
T. 0022342		Tool for assembling the pawl of gear sector	Engine	87	(s) To be altered (see page 65). (t) To be used in conjunction with part 1 of tool T. 0021280 (previous toolset).
T. 0022407		Wrench for threaded ring retaining ball bearing of mainshaft	Engine	44-119	
T. 0022442		Extractor for roller bearing of crankcase half, flywheel side	Engine	42	
T. 0022449 T. 0022465		Engine support table Pliers for circlip of spacer on crankcase half, clutch side	Engine Engine	36 45-114	



Tool No.	Previous tool still for use	TOOL NAME	GROUP	Page	NOTES
T. 0022467		Crankcase support (flywheel side) for assembling the bearing	Engine	116	
T. 0022472		Punch for dismantling and assembling the oil seal on threaded ring fixing the bearing of crankcase half, clutch side	Engine	44	
T. 0022473		Tool for assembling the roller bearing on crankcase half, flywheel side	Engine	116	
T. 0022474 (u)		Bearer for dismantling oil seal from spacer on crankcase half, clutch side	Engine	45	(u) To be used in conjunction with punch 0017843.
T. 0022480		Extractor for ball bearing of crankcase half, clutch side	Engine	45	
T. 0022517 (v)		Spanner for operating the gear shifter	Engine	91	(v) Delivered with engine test stand 8002/R.
T. 0022519		Spanner for screwed plug of rear damper	Dampers	99	
T. 0022532	T. 0021175 (w)	Con. rod. centring fixture for removal of small end bush	Engine	75	(w) Dealers must order parts 22 and 27 for using tool T. 0021175, which they have already.
T. 0022547		Magnetiser	Engine	68	
T. 0022552		Tool for dismantling the rubber bushes and inner spindle from crankcase arm, clutch side	Engine	46	
T. 0022553 (x)		Tool for dismantling and assembling the rubber bush and the liner for attachment of damper	Engine	46-110	(x) To be used in conjunction with tool 0018190.
T. 0022555		Punch for bending outwards the edge of inner spindle on crankcase arm, clutch side	Engine	110	
T. 0022567		Tool for assembling the bushes and inner spindle on crankcase arm, clutch side	Engine	110	
T. 0022573		Work holder for turning main bearing bushes	Engine	83	



Tool No.	Previous tool still in use	TOOL NAME	GROUP	Page	NOTES
T. 0022587		Tool for centring the inner spindle in the crankcase arm, clutch side	Engine	110	
—	—	Double ended plug gauge $\varnothing 62_{-0.045}^{-0.026}$ (P6) for inspecting main bearing bushes	Engine	83	
—	—	Double ended plug gauge $\varnothing 66_{+0.046}^{-0.}$ (H8) for inspecting housing of main bearing bushes	Engine	83	



3. DISMANTLING



DISMANTLING

This section gives the directions for the complete dismantling of the scooter and its sub-assemblies.

When not otherwise specified, the succession of operations in each figure is indicated by the alphabetical order of letters, which are marked in accordance with the parts to be dismantled. Tools are shown with their drg. numbers, whilst open ended spanners, box spanners and screwdrivers are indicated with respective symbols (🔧🔩🪛) and hexagon dimensions.

When no tool is indicated, the operation can be carried out by hand.

Use of monkey wrenches, hammers, chisels and emergency tools of any kind must be avoided. Only by means of the tools listed in the proper section of this manual, and by using them to do the job they have been designed for, can any operation be quickly and

successfully carried out on the scooter without damaging the parts involved. Place all dismantled parts so that they cannot be mixed up with components of other machines.

Washers and other small parts are not pointed out on the figures; it is advisable to keep washers, bolts, nuts., etc., together with respective parts, in order to avoid losing or confusing them when re-assembling.

Dismantling of the scooter is to be carried out carefully and under the best conditions of cleanliness. Use two containers with paraffin and petrol respectively: wash the parts in the first and rinse them in the second one. Wipe the parts dry with clean and good quality rags or, better, blow them dry.

Should the re-assembly be postponed for a while, protect all loose components from dust and oxidation.



WHEEL REMOVAL

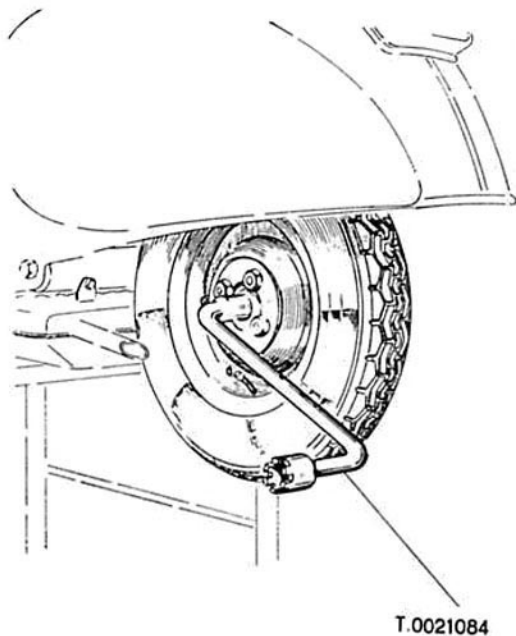


Fig. 23.

Wheel with brake drum and flange.

Unscrew the four nuts diagonally and evenly by means of a 22 mm box spanner. For detaching the wheel from the drum, undo the two screws retaining the brake drum on the flange.

N.B. For replacing tyres, see the booklet "Operation and maintenance."

REMOVING ENGINE FROM SCOOTER

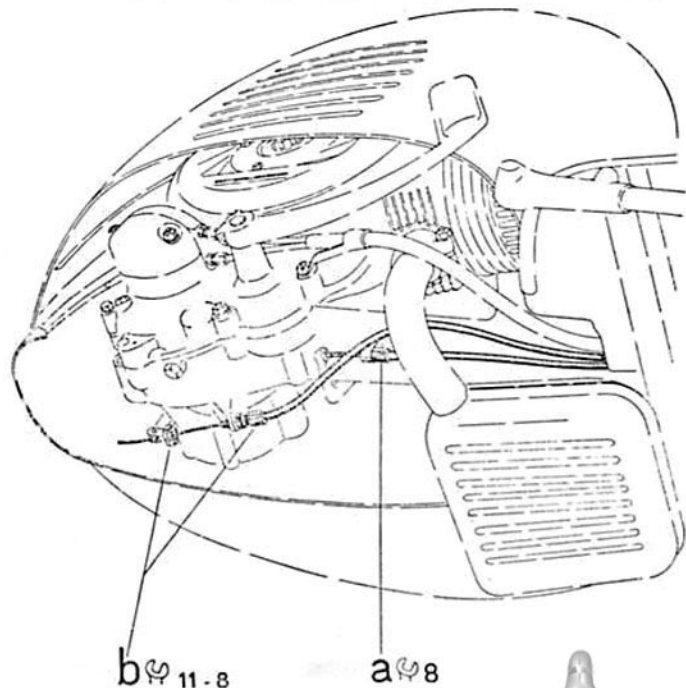


Fig. 24.

- Disconnect the clutch cable (slide out the cable from the clutch control lever and undo the adjuster all way through).
- Disconnect the rear brake cable (slacken the clamp, undo the adjuster completely and slide out cable).

REMOVING ENGINE FROM SCOOTER

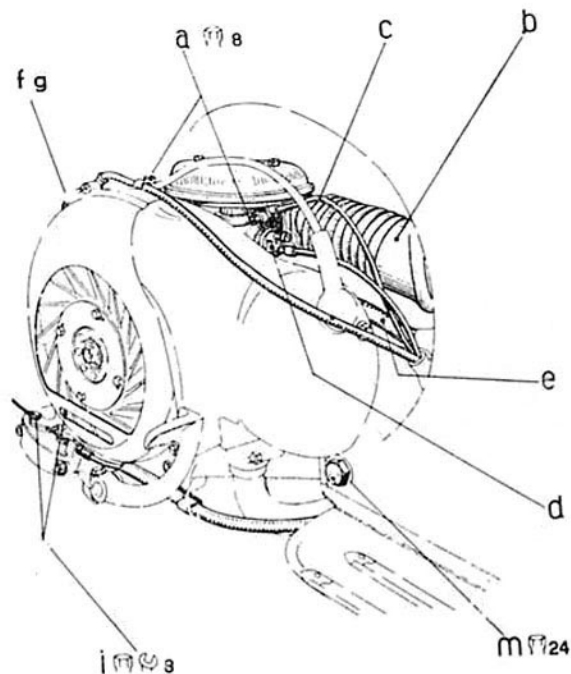


Fig. 25.

(a) Air cleaner. (b) Rubber bellows. (c) Choke control cable (unhook on air cleaner lever). (d) Throttle control cable (undo threaded ring from throttle slide and remove slide). (e) Fuel pipe. (f) Low tension cables (remove cover of L.T. terminal and disconnect cables. (g) L.T. terminal. (h) Cover of gear shifter casing. (i) Gear control change cables with nipples. (l) Bolt anchoring rear hydraulic damper. (m) Bolt anchoring engine to frame.



DISMANTLING THE ENGINE

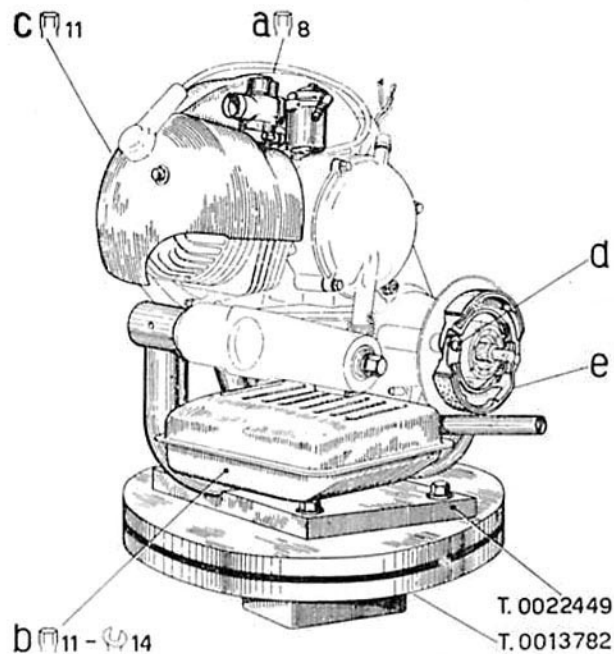


Fig. 26.

(a) Carburettor. (b) Silencer. (c) Engine cooling hood. (d) Circlip on brake jaw pivot. (e) Brake shoes.

N.B. The brake jaws can be replaced and their pivot removed even with engine assembled on the scooter, after withdrawing the brake drum and the wheel.

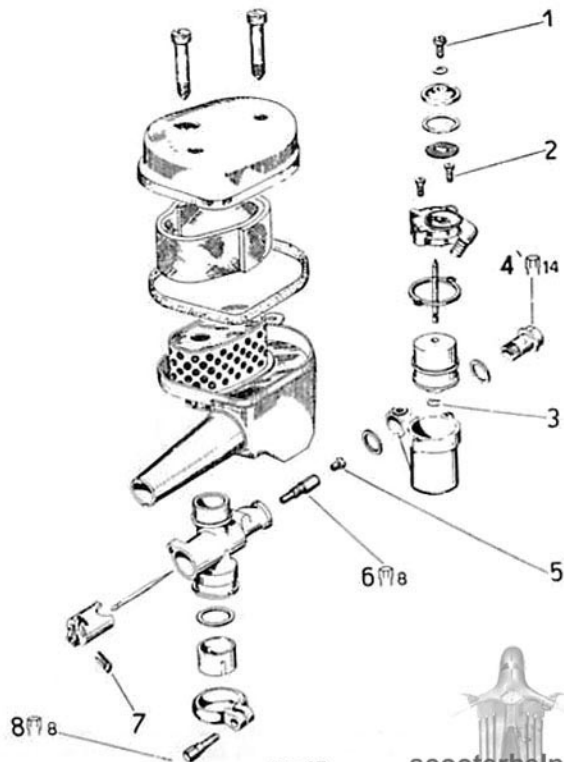


Fig. 27.

Air cleaner and carburettor components (the latter in numerical order).

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DISMANTLING THE ENGINE

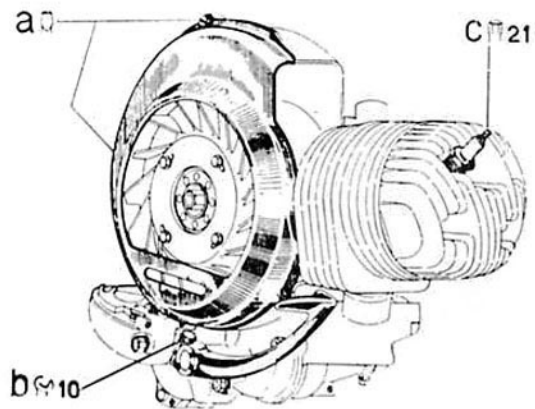


Fig. 28.

(a) Fan housing cover. (b) Kickstarter (remove the clamp-bolt and pull out the starting lever). (c) Spark-plug.

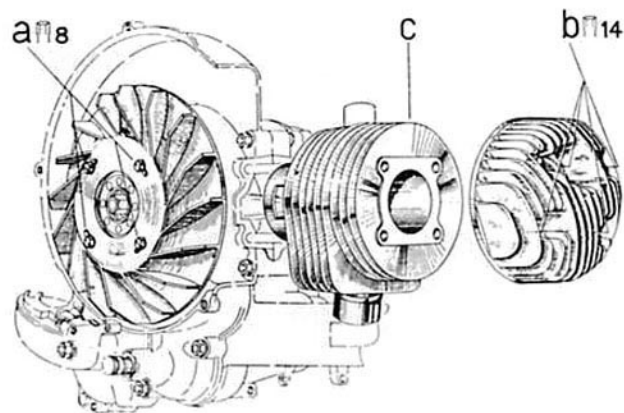
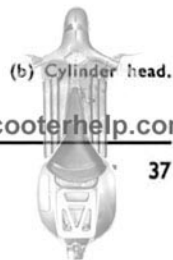


Fig. 29.

(a) Fan (straighten up the edges of tab washers). (c) Cylinder.



(b) Cylinder head.

DISMANTLING THE ENGINE

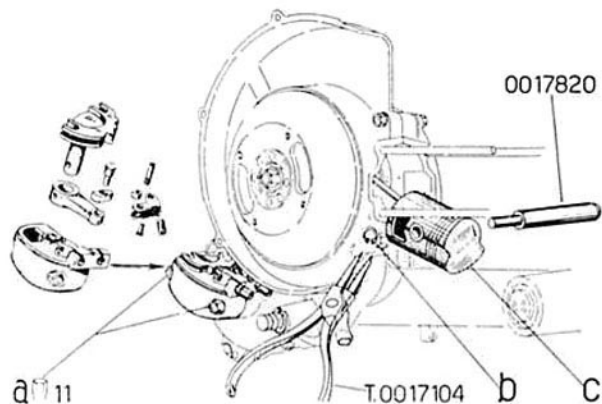


Fig. 30.

(a) Gear shifter casing (select 3rd gear). Gear shifter. (b) Circlips retaining the gudgeon pin. (c) Piston (remove the gudgeon pin by means of drift 0017820).

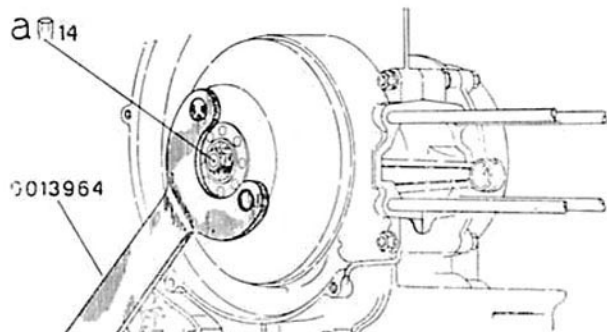


Fig. 31.

Flywheel magneto. When not successful with this procedure, operate as follows:

Remove the circlip with long nose pliers T. 0017104 (operation similar to that shown at point "b" in Fig. 30).

Remove the flywheel nut with tools and following procedure shown in this figure.

Operate by means of extractor T. 0021265 as indicated in Fig. 32.

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DISMANTLING THE ENGINE

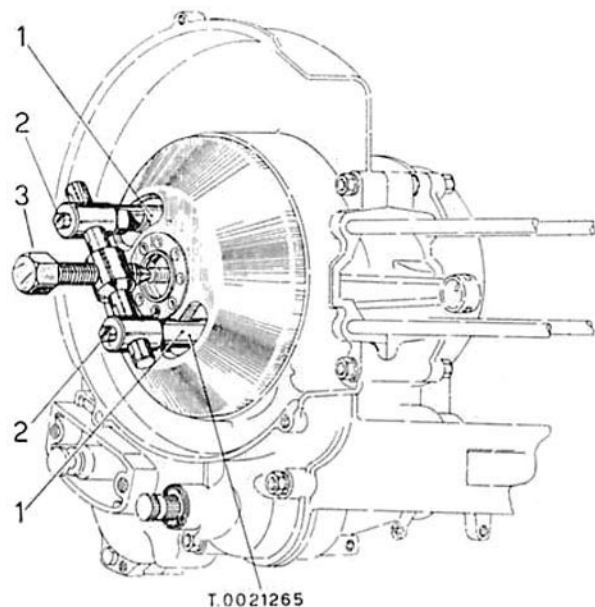


Fig. 32.

Flywheel.

Use tool T. 0021265; fit the tool legs "1" into rotor holes and let them slide towards the centre of their axle to rest on the cam collar; tighten screws "2"; operate by means of a 19 mm spanner on the central threaded pin "3" until the flywheel is extracted.

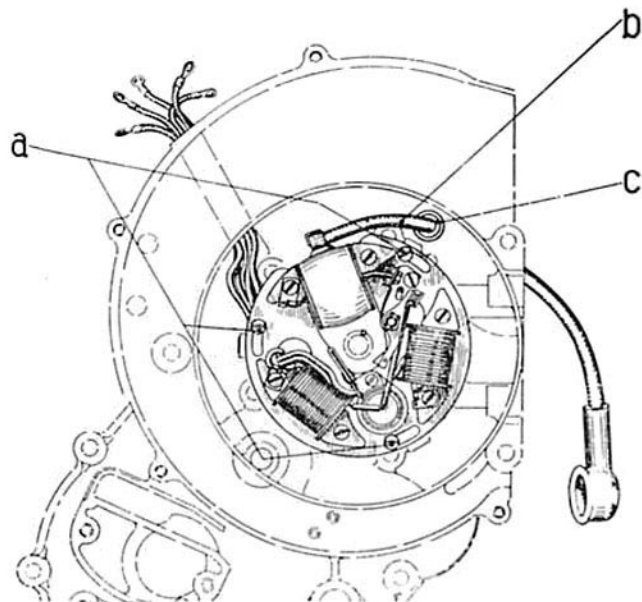


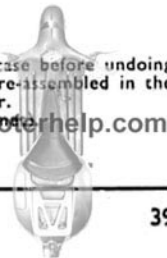
Fig. 33

(a) Woodruff key and stator.

N.B. Make a reference mark on both stator and crankcase before undoing the screws to make sure that the two parts are re-assembled in the original position. Place the stator inside the rotor.

(b) Sparking plug cap and plug lead (through the grommet).

(c) Grommet for plug lead.



DISMANTLING THE ENGINE

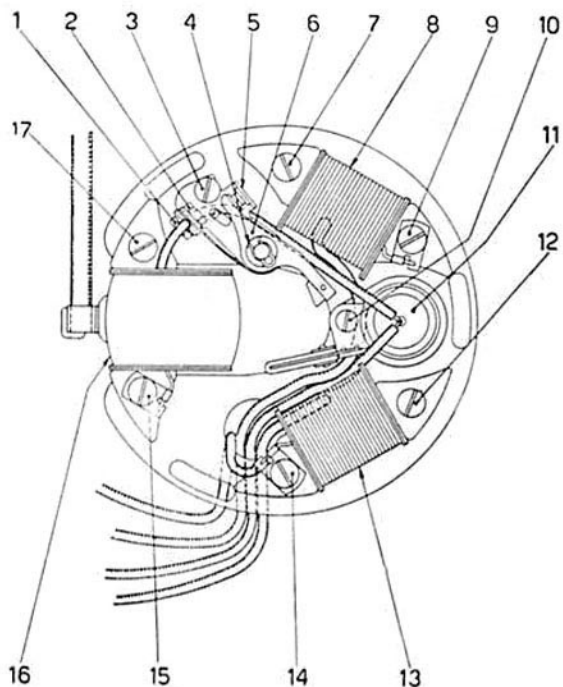


Fig. 34.

Stator components (follow the numerical order when dismantling).

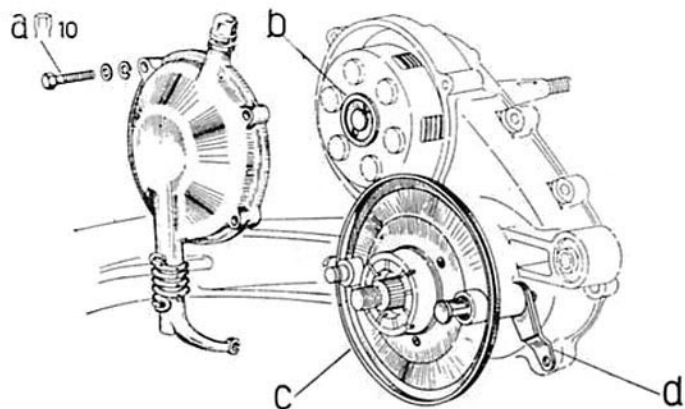


Fig. 35.

(a) Clutch cover. (b) Centralizing plate (operate with a screwdriver for removing the circlip). (c) Dust cover (remove the three screws). (d) Brake operating lever (split pin) and cam.

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DISMANTLING THE ENGINE

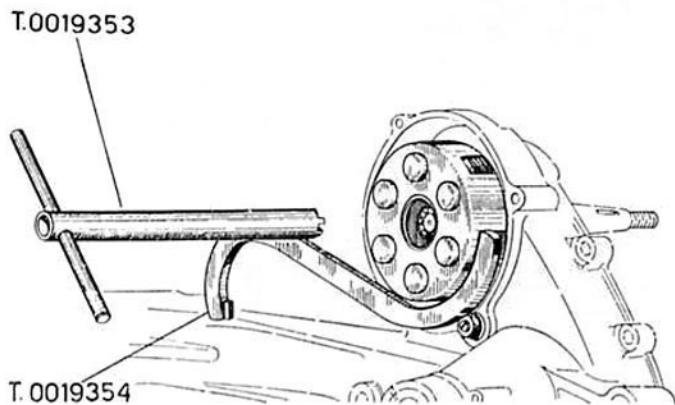


Fig. 36.

Clutch body (for dismantling, see Fig. 95), and woodruff key.

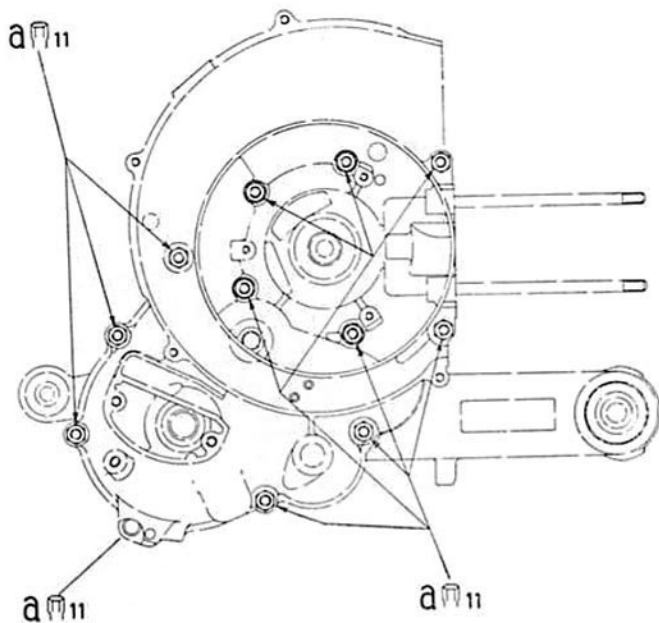


Fig. 37.

Crankcase bolts (unscrew diagonally and evenly).
N.B. The bolt marked with an asterisk is assembled in opposite sense in respect to the other bolts. When re-assembling make sure that the longer bolt runs through the swinging arm of crankcase half, clutch side.



DISMANTLING THE ENGINE

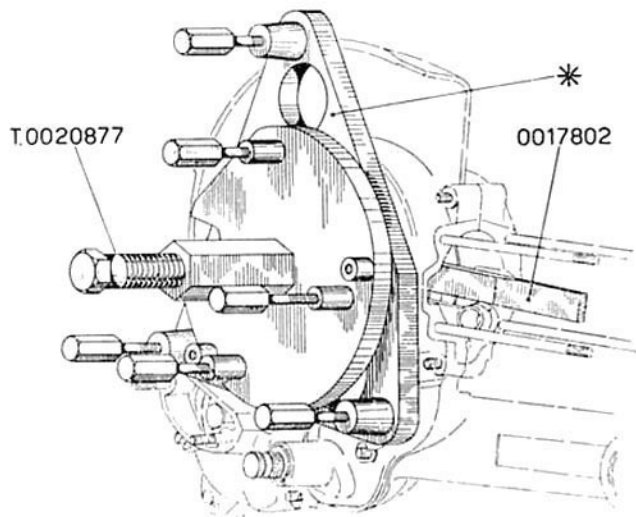


Fig. 38.

Preliminaries for dismantling the crankcase.

Use of the tool: secure part No. T. 0020877/14 (marked with an asterisk in the figure) on the circular plate of the tool by means of the three internal screws of the latter. Place the completed tool on the crankcase half, flywheel side, and secure by means of the three external screws. Insert the wedge 0017802 between the crank-webs, set a dripping pan for the engine oil, then operate on the central screw (which presses on crankshaft) until the crankcase halves are disengaged.

N.B. The whole starter unit with the driving pinion floating on end of the multiple gear will come off together with the crankcase half, flywheel side.

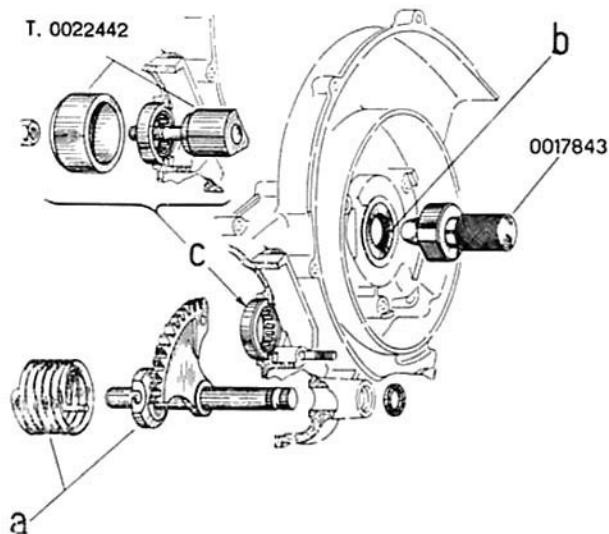


Fig. 39.

(a) Starter unit.

(b) Oil seal on crankcase half, flywheel side.

N.B. This operation can be carried out only if the flywheel side main bearing remains on the crankshaft; if instead it slides off with the crankcase half, remove the ball bearing with the procedure illustrated in Fig. 40 before dismantling the oil seal.

(c) Mainshaft roller bearing.

Use of tool T. 0022442: insert the threaded part of extractor through the bearing and through the "bell" of the tool; place the latter against the crankcase half; screw nut on the extractor, thus pulling the bearing off.



DISMANTLING THE ENGINE

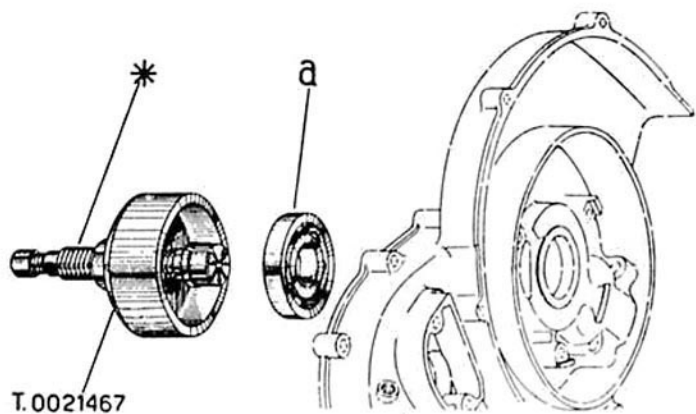


Fig. 40.

Crankshaft main bearings (if they remain in the crankcase).
(* Use part "1" of tool.

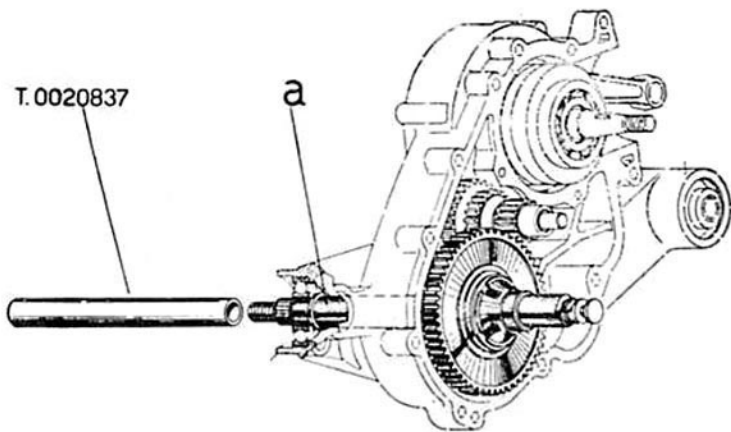


Fig. 41.

Mainshaft with gear pinions and gear change mechanism (tap slightly on tube
T. 0020837 to expel the unit).



DISMANTLING THE ENGINE

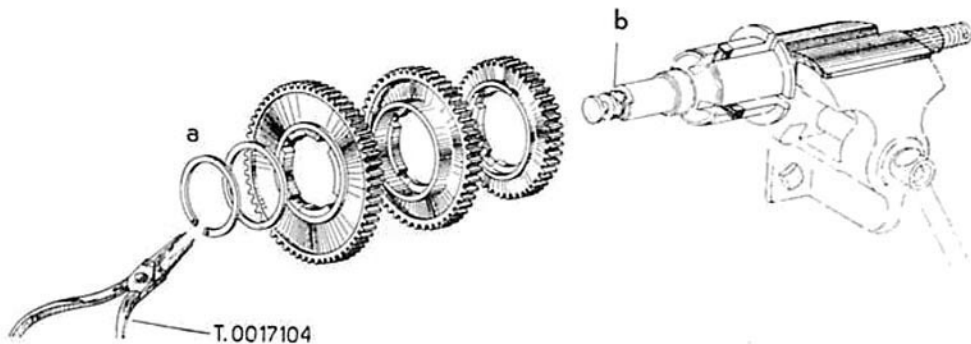


Fig. 42.

Mainshaft unit. **N.B.** We remind that the selector is left hand threaded.
For withdrawing the guide bush of selector stem, straighten up the edges of the tab washer by means of a screwdriver.

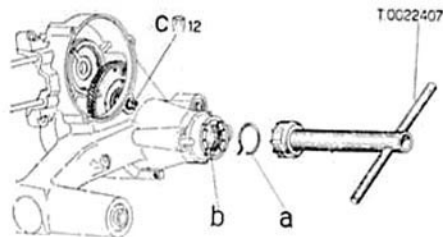


Fig. 43.

(a) Circlip. (b) Threaded ring (left hand threaded). (c) Gear cluster.
Collect the 23 rollers. For dismantling the unit, see Fig. 99.

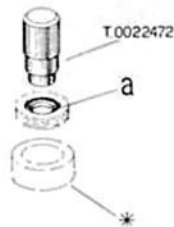


Fig. 44.

Oil seal in the threaded ring.
(*) For removing the oil seal, place the threaded ring on a piece of pipe having i.d. of 40 mm (1-57").



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DISMANTLING THE ENGINE

T.0020877

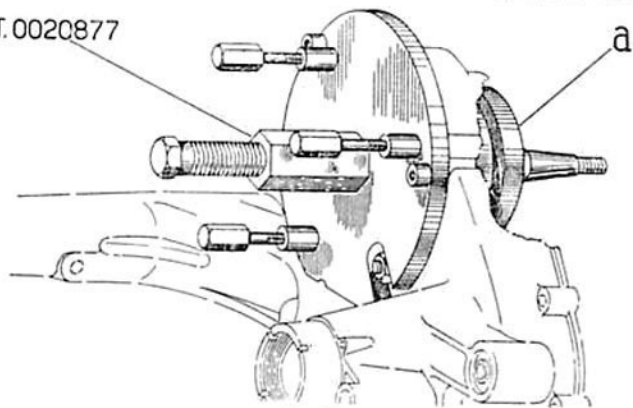


Fig. 45.
Crankshaft.

I.B. Dealers having the old tool model shall remove a small part of the circular plate, to avoid interference with the swinging arm.

T.0014499

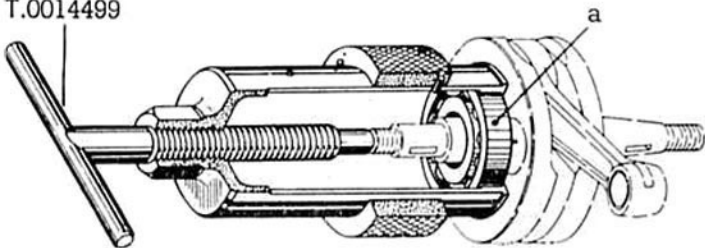


Fig. 46.
Main bearings.

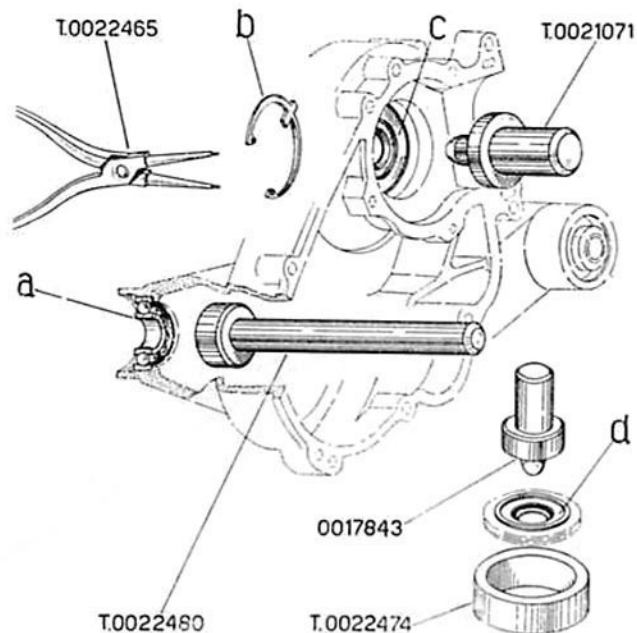


Fig. 47.

(a) Mainshaft ball bearing. (b) Circlip retaining the spacer. (c) Spacer with oil seal of crankcase, clutch side. (d) Oil seal from spacer.



DISMANTLING THE ENGINE

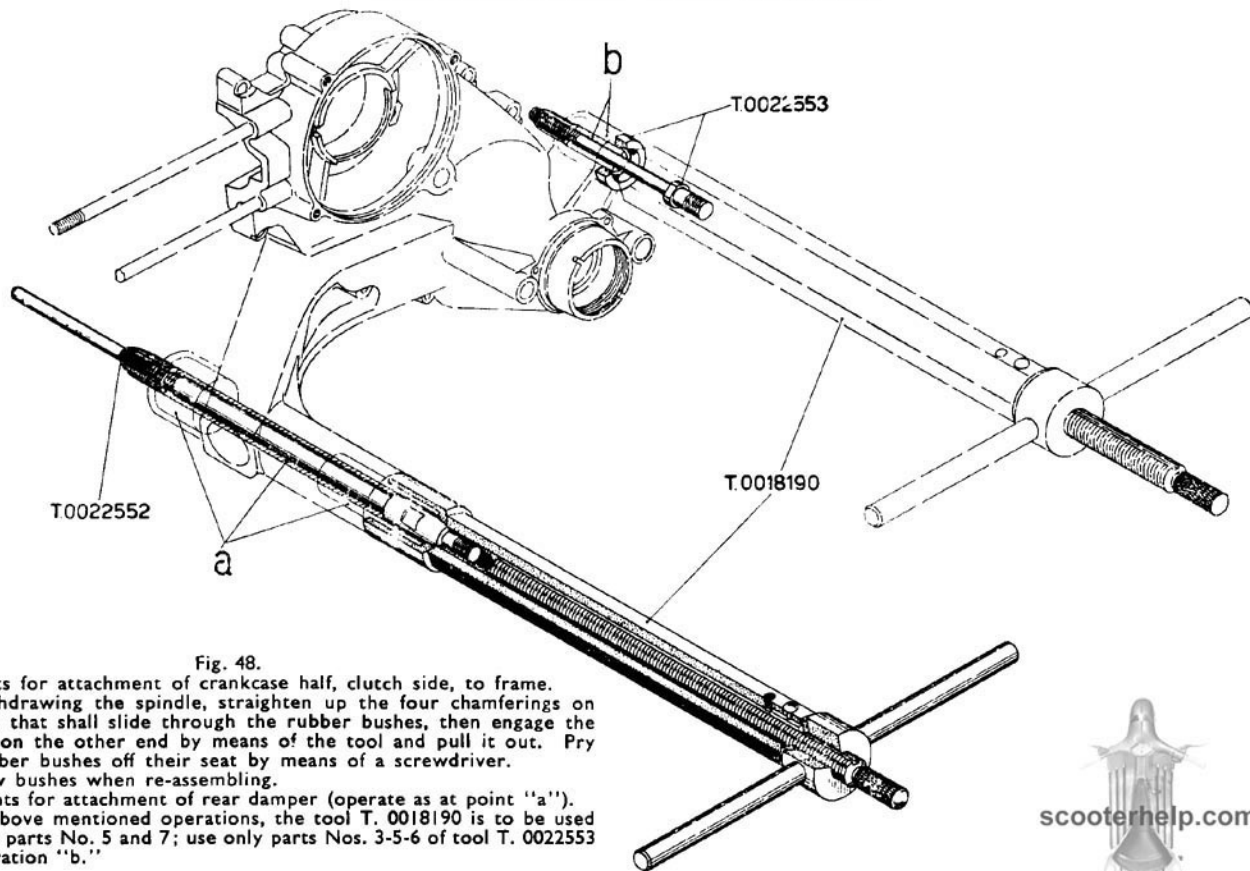


Fig. 48.

(a) Components for attachment of crankcase half, clutch side, to frame.

N.B. For withdrawing the spindle, straighten up the four chamferings on the end that shall slide through the rubber bushes, then engage the spindle on the other end by means of the tool and pull it out. Pry the rubber bushes off their seat by means of a screwdriver. Use new bushes when re-assembling.

(b) Components for attachment of rear damper (operate as at point "a").

N.B. In the above mentioned operations, the tool T. 0018190 is to be used without parts No. 5 and 7; use only parts Nos. 3-5-6 of tool T. 002253 for operation "b."



DISMANTLING FRONT PART OF SCOOTER

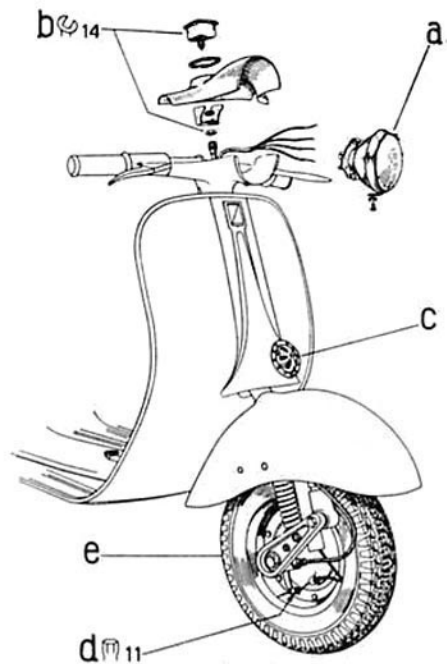


Fig. 49.

(a) Head lamp. Disconnect wires. (b) Speedometer. Lift the instrument off its housing and unscrew the threaded ring. (c) Horn (remove the screws and disconnect the wires). (d) Brake cable (disconnect at the bottom end). (e) Wheel. Unscrew the four nuts (not shown in the figure) diagonally and gradually.

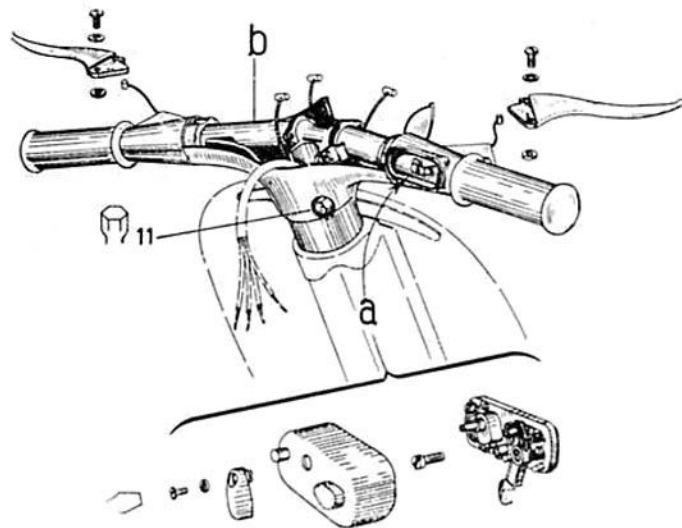


Fig. 50.

(a) Light and dip switch. (b) Handlebars (for removing the control lever see also Fig. 51). Slide brake cable out of the steering column.



DISMANTLING THE HANDLEBARS

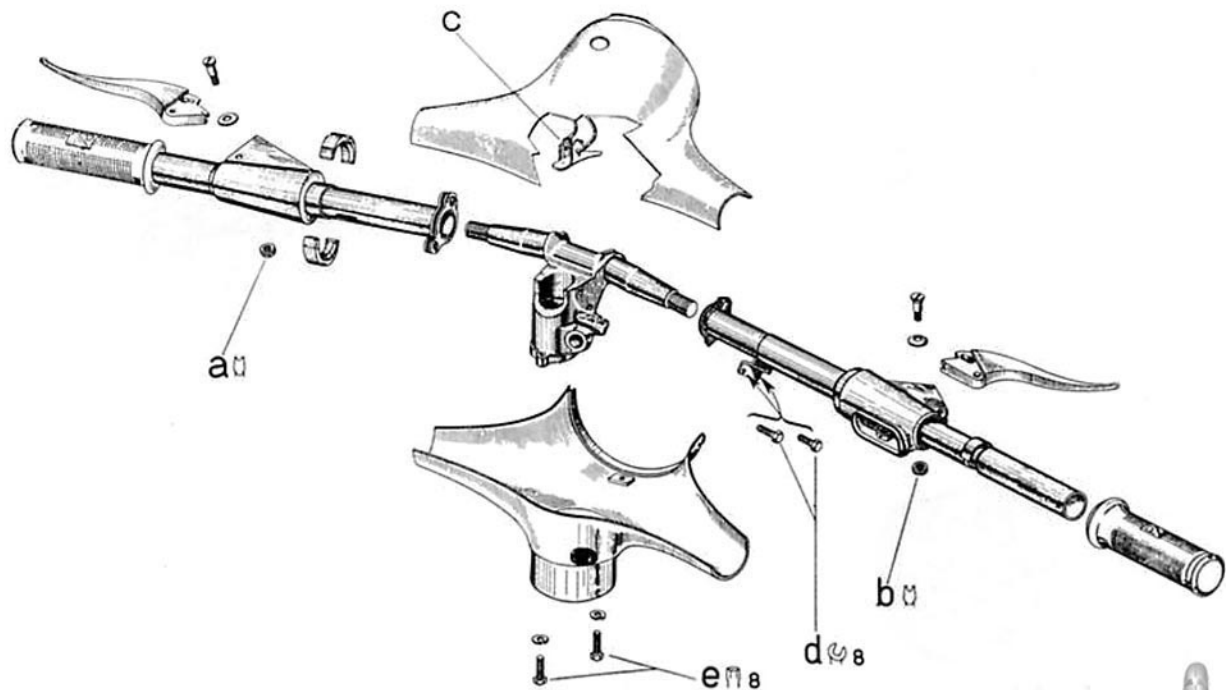


Fig. 51.

Handlebar components. (For dismantling the switch, see Fig. 50.)

N.B. The screwdriver for operations "a" and "b" may be either the specific 0017004, or a normal one with its head shaped as shown in the figure.



REMOVAL OF STEERING COLUMN

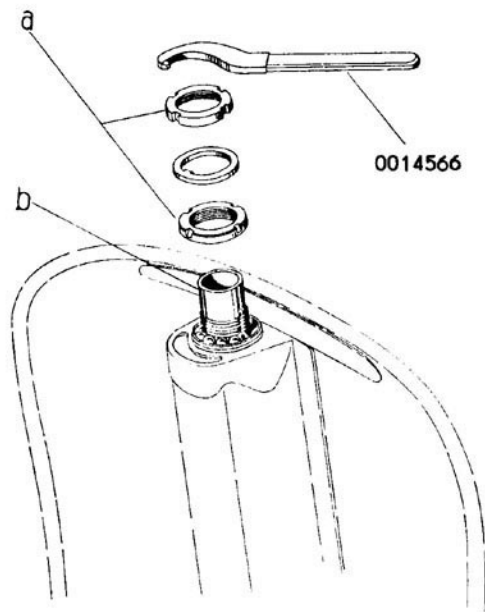


Fig. 52.

- (a) Top ball bearing.
(b) Slide off steering column downwards.
N.B. Collect balls, inspect them and, if necessary, replace.

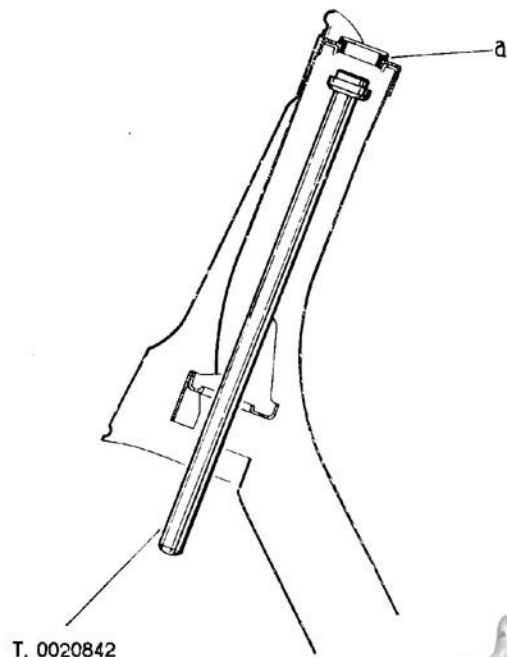


Fig. 53.

Bottom race of top ball bearing scooterhelp.com



DISMANTLING STEERING COLUMN

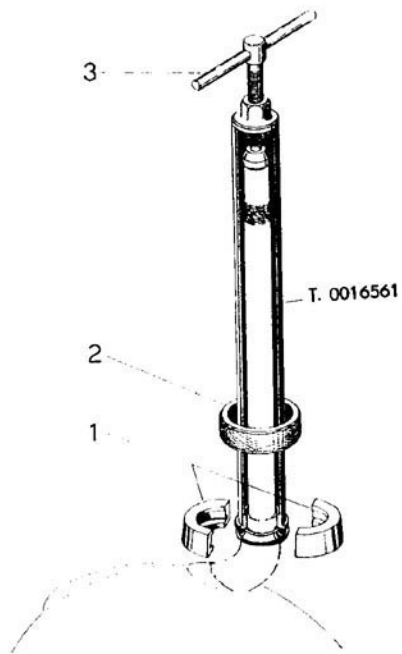


Fig. 54.

Dust cover and lower race of bottom ball bearing. Use tool T. 0016561. Engage the parts to be extracted by means of split ring "1"; lower the knurled ring "2" to clamp the split ring "1." Screw down "3" until both race and dust cover are released.

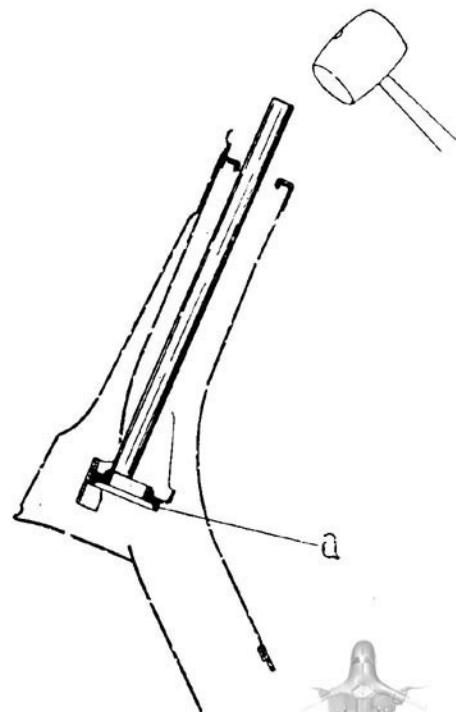


Fig. 55. scooterhelp.com
Upper race of steering column bottom bearing.

DISMANTLING STEERING COLUMN AND FRONT SUSPENSION

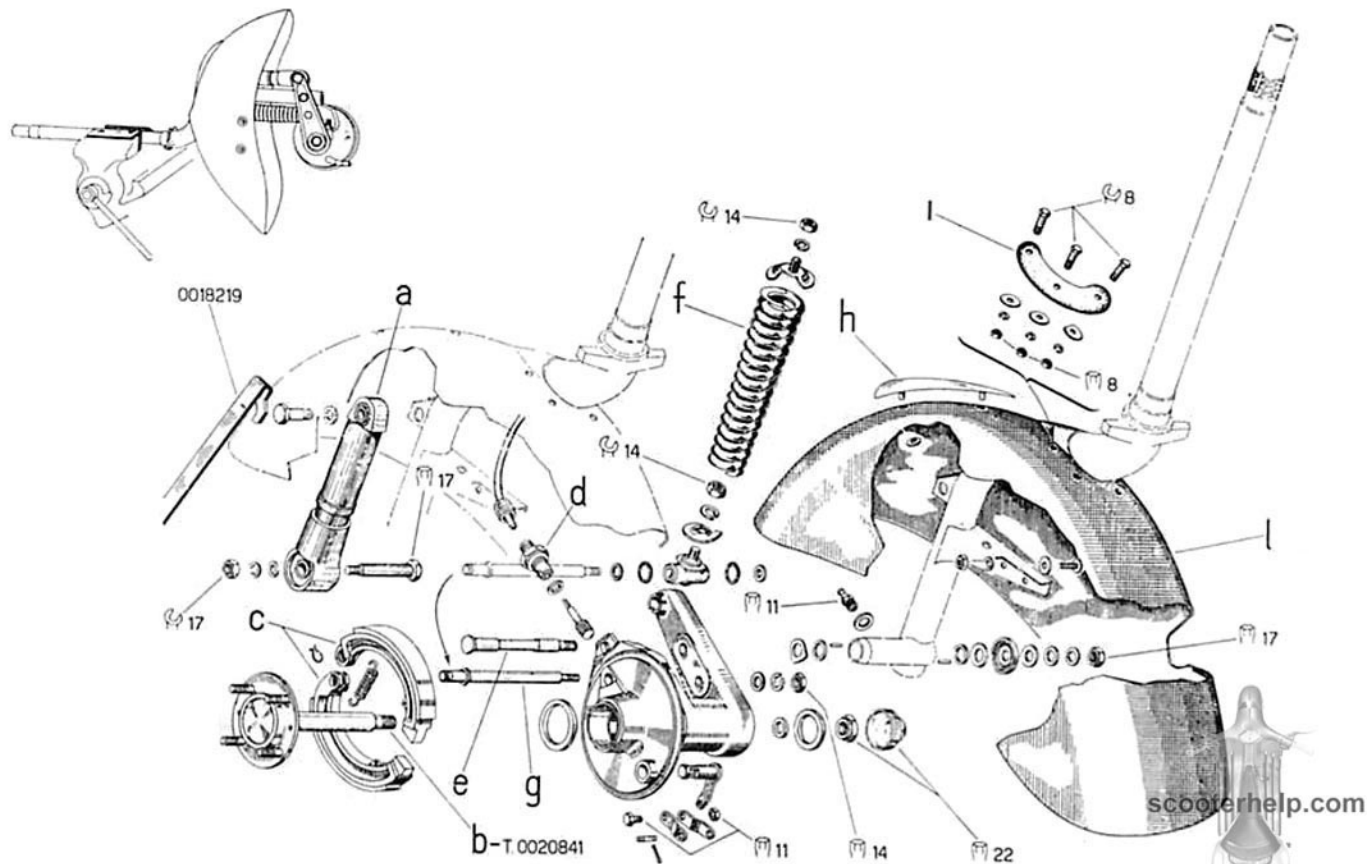


Fig. 56. (See Page 52.)

DISMANTLING FRONT WHEEL HUB

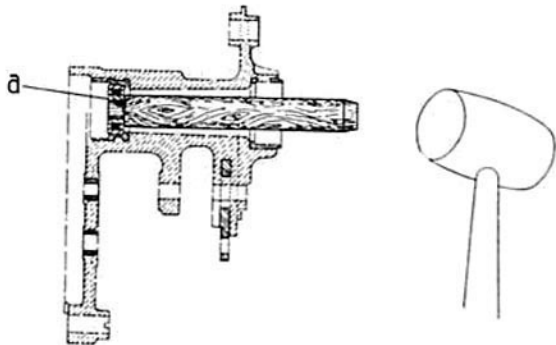


Fig. 56.

Place the steering column in the vice and dismantle the unit following the order of the letters. For withdrawing the wheel spindle, use tool T. 0020841 in a similar way as the tool T. 0020837, shown in Fig. 41 for the mainshaft.

Fig. 57.
Wheel hub bearing.

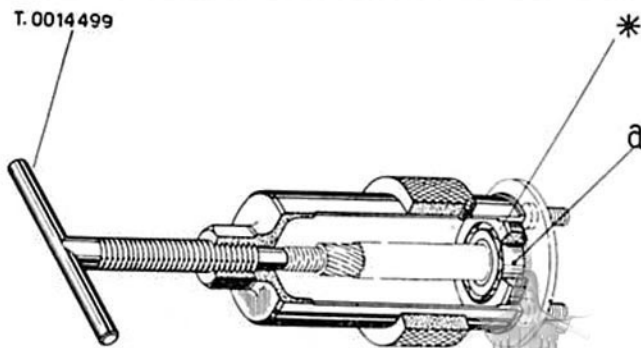


Fig. 58.
Wheel spindle bearing. scooterhelp.com
(* Use part "8" of tool T. 0014499.

DISMANTLING FRONT WHEEL HUB

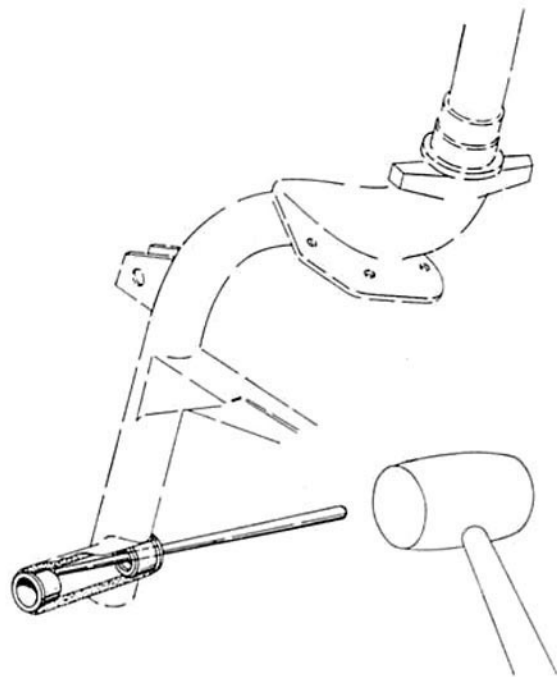


Fig. 59.

Liners for wheel spindle.

REMOVAL OF SADDLE LUGGAGE CARRIER AND TOOL BOX

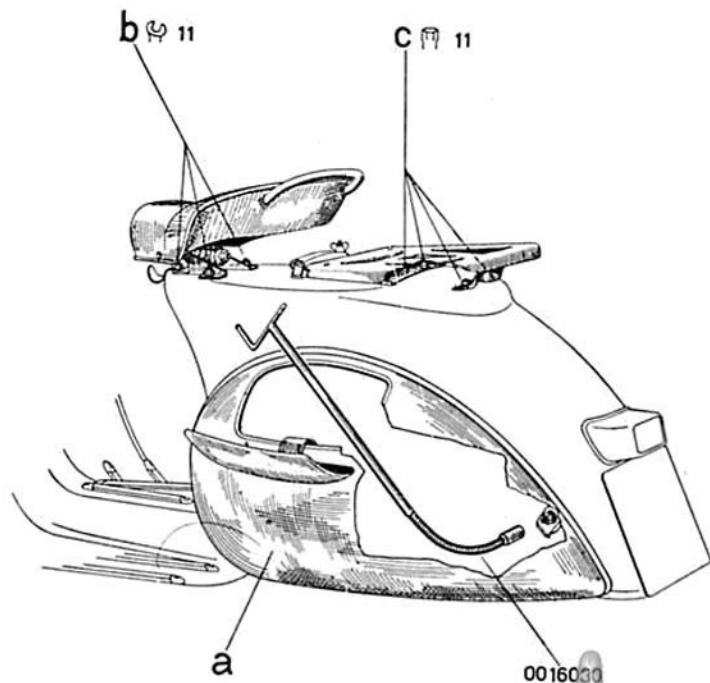


Fig. 60.

(a) Tool box. (b) Saddle. (c) Luggage carrier.

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ENGINE COWLING, TANK, REAR SUSPENSION

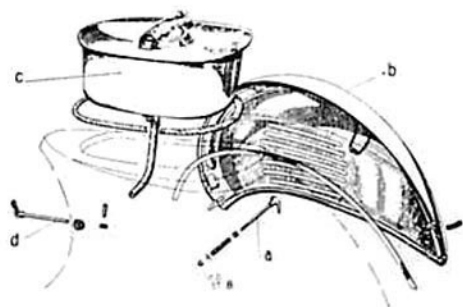


Fig. 61.

(a) Engine cowling catch. (b) Engine cowling. (c) Fuel tank with tap.
(d) Fuel operating lever.

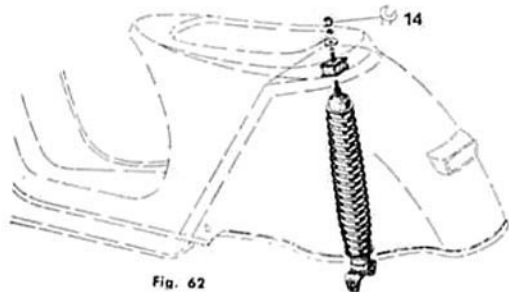


Fig. 62

Fig. 62.
Rear suspension.

DISMANTLING THE FUEL TAP

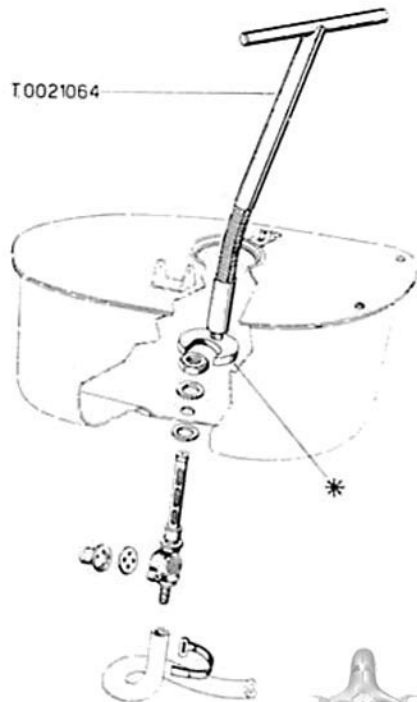


Fig. 63.

Fuel tap and pipe. scooterhelp.com
(* Use part "11" of tool.

REMOVAL OF SCOOTER STAND AND TAIL LIGHT

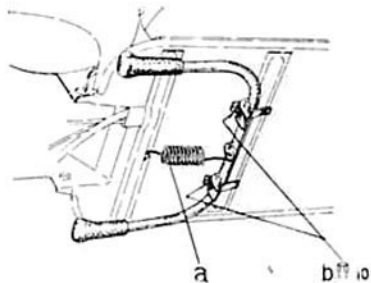


Fig. 65.
Central stand.

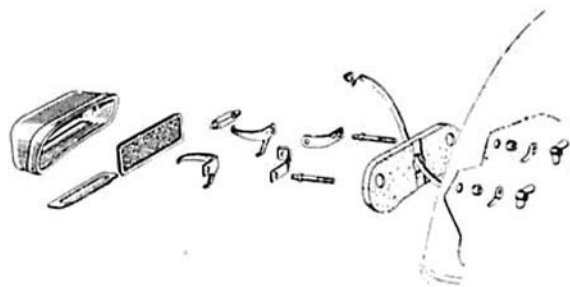


Fig. 66.
Tail lamp.

REMOVAL OF REAR BRAKE PEDAL

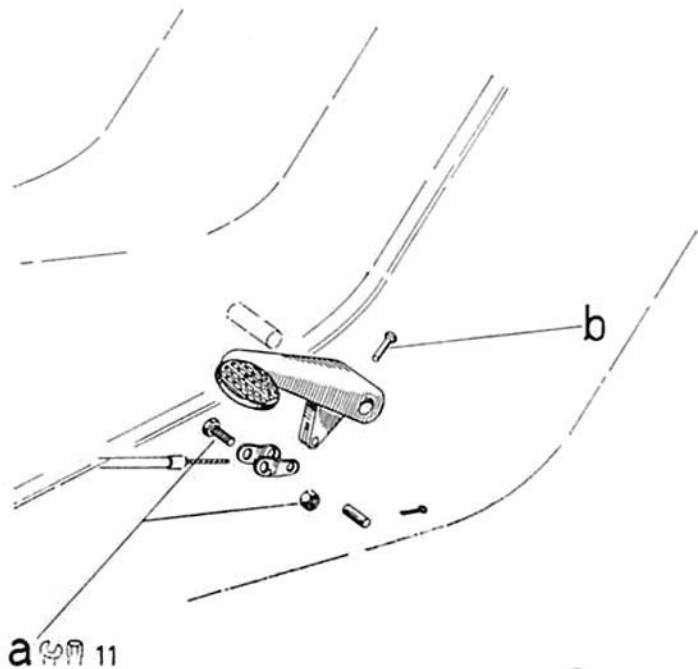
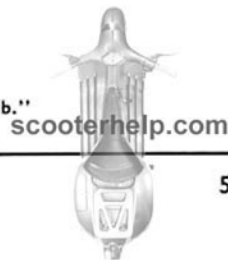


Fig. 67.

Rear brake pedal.

N.B. Push down pedal to withdraw holding pin "b."



REMOVAL OF CABLE HARNESS AND CONTROL CABLES

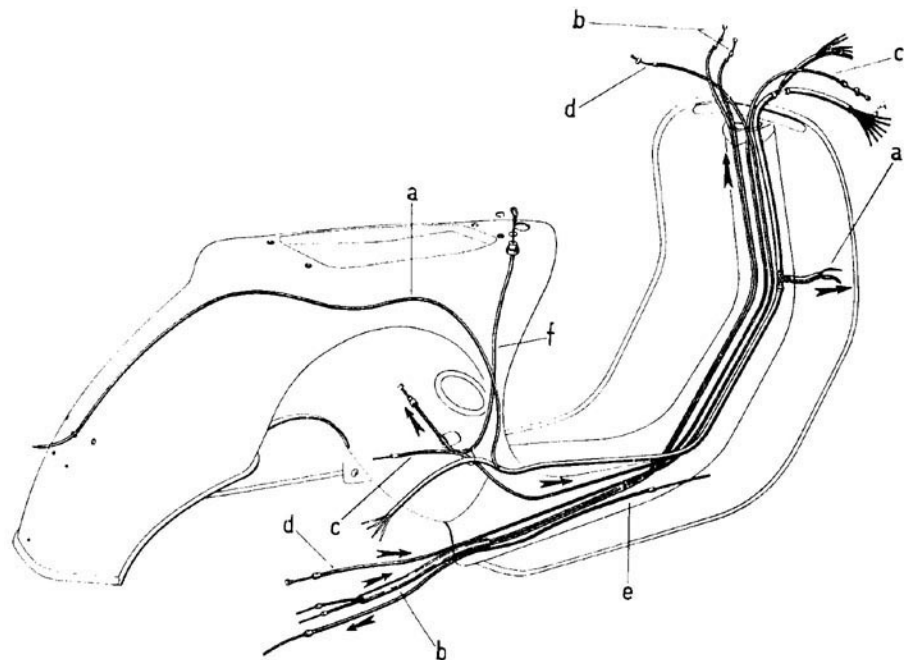
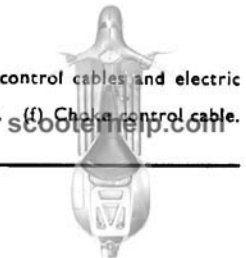


Fig. 68.

Wiring harness and control cables.

N.B. In order to facilitate the re-assembly of new parts, a pilot wire (to remain inside the frame) should be bound to the ends of both control cables and electric wires when withdrawing them. Withdraw following the arrows, after unsoldering the cable tags and opening the retaining clips.

(a) Cable harness. (b) Gear change control cables. (c) Throttle control cable. (d) Clutch control cable. (e) Rear brake control cable. (f) Choke control cable.



4.

**PERMISSIBLE TOLERANCES-UNIT OVERHAULS
FAULT FINDING**



PERMISSIBLE TOLERANCES - UNIT OVERHAUL - FAULT FINDING

A Tables of permissible assembling tolerances

These tables indicate the tolerances to be adhered to with new parts and the tolerance limits permissible for used parts.

B Directions concerning overhauls, tests and special assemblies

This part deals with the following operations not mentioned in sections "Dismantling" and "Re-assembling."

1. Flywheel magneto.

(a) Replacing the cam. (b) Re-magnetising the rotor. (c) Overhauling the stator. (d) Description of flywheel magneto test stand. (e) Test

preliminaries. (f) Timing test. (g) Test at minimum revs. (h) Efficiency test. (i) Checking current intensity and voltage. (l) Overspeed test.

2. Crankshaft.

(a) Replacing bronze bush of con. rod small end. (b) Big end overhaul.

3. Oversizing the piston bores.

4. Replacement of main bearing bushes.

5. Clutch.

(a) Replacement of the clutch plates. (b) Adjustment of control cable.

6. Gear shifter.
(a) Replacement of gear shifter lever. (b) Control adjustment.
7. Dismantling and re-assembling the cush drive.
8. Replacement of pawl in gear sector of starter assembly.
9. Engine test on stand.
(a) Description of test stand. (b) Propeller adjustment. (c) Consumption test on the stand. (d) Normal test.
10. Alignment check of steering column.
11. Alignment check of frame.
12. Painting.
(a) Preparing the products. (b) Procedure "A." (c) Procedure "B."
13. Consumption test on the road.
(a) Premise. (b) Preparing the scooter. (c) Road test. (d) Calculating fuel consumption.
14. Overhaul and working test of hydraulic dampers.

C Tables to guide fault finding, respective remedies and directions to follow

The tables are composed according to the various scooter assemblies; they indicate the pages where directions are given for carrying out correctly the required operations. This section deals widely with all irregularities, troubles or faults which might be experienced by **Vespa** users. Remedies and directions to be followed for eliminating the troubles are indicated in detail for every case.

All operations involved for tracing and locating faults, the consequent inspection and all necessary overhauls and adjustments must be carried out carefully and quickly by the Dealer, in order to return the scooter to the owner in the best possible condition, not to mention the prestige and personal advantage to the Dealer himself.

All Dealers should therefore study this section thoroughly, and carefully read paragraphs applicable whenever they have to inspect and test the scooter for locating and eliminating defects of any kind.

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A. - ASSEMBLY TOLERANCES

The following tables indicate the play prescribed for: piston and gudgeon pin, connecting rod and crankshaft, connecting rod and gudgeon pin, connecting rod and crankpin, cylinder and piston, piston rings, shoulder rings.

PISTON AND GUDGEON PIN

Drg. No.	Part name	Normal dimensions	Max. play	
			at assembly	after use
081887	Piston standard	$P = 15 \begin{matrix} + 0 \\ - 0.011 \end{matrix}$	R = 0	R = 2/100
018064	Gudgeon pin	$Q = 15 \begin{matrix} - 0.009 \\ - 0.017 \end{matrix}$		

All dimensions in millimetres.

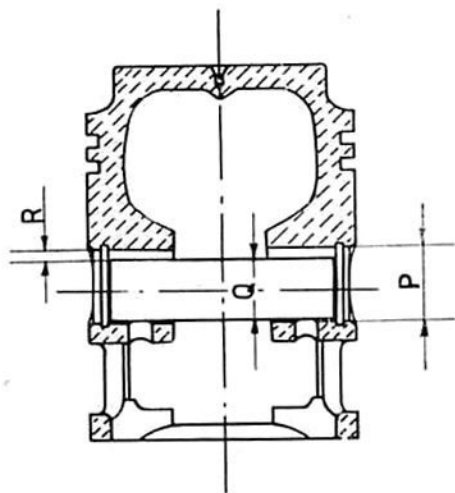


Fig. 69.



CONNECTING ROD AND CRANKSHAFT

Drg. No.	Part name	Normal dimensions	Max. play	
			at assembly	after use
026092	Crankpin	$B = 10.030 + 0.02$ $- 0$	} $F = 0.030 - 0.060$	$F = 2/10$
S. 7099	Roller	$A = 10 + 0$ $- 0.01$		
023945	Con. rod	$C = \begin{cases} \text{min. } 10.270 \\ \text{max. } 10.450 \end{cases}$	} $D = 0.270 - 0.460$	$D = 6/10$
S. 7099	Roller	$A = 10 + 0$ $- 0.01$		

All dimensions in millimetres.

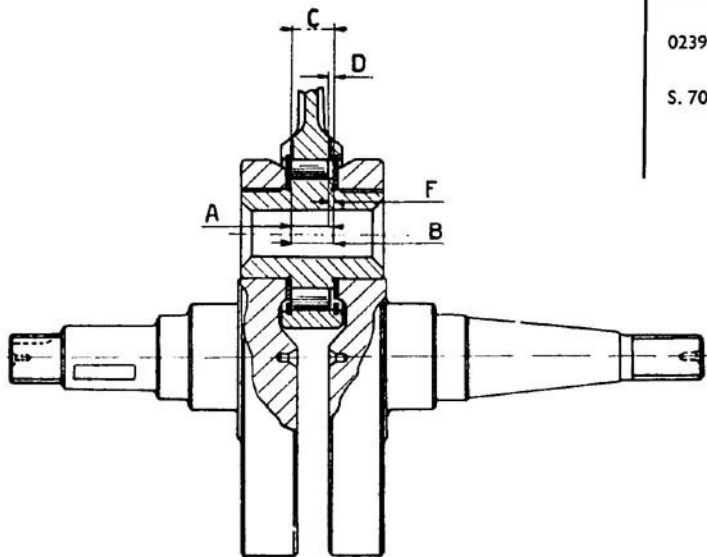


Fig. 70



CYLINDER AND PISTON

Drg. No.	Part name	Normal dimensions	Max. play	
			at assembly	after use
081075	Cylinder, standard	$E = 54 - 0$ $+ 0.02$	} $A = 14/100$	} $A = 18/100$
081887	Piston, standard	$C = 53.87 \pm 0.01$		
082748	Cylinder, 1st o/s	$E = 54.2 - 0$ $+ 0.02$		
082754	Piston, 1st o/s	$C = 54.07 \pm 0.01$		
082749	Cylinder, 2nd o/s	$E = 54.4 - 0$ $+ 0.02$		
082755	Piston, 2nd o/s	$C = 54.27 \pm 0.01$		
082750	Cylinder, 3rd o/s	$E = 54.6 - 0$ $+ 0.02$		
082756	Piston, 3rd o/s	$C = 54.47 \pm 0.01$		
082751	Cylinder, 4th o/s	$E = 54.8 - 0$ $+ 0.02$		
082757	Piston, 4th o/s	$C = 54.67 \pm 0.01$		

All dimensions in millimetres.

OVERSIZE PISTONS AND CYLINDERS ARE NOT SOLD SEPARATELY.

The table is given for your guidance. We recommend that you use the Works Service Exchange Scheme.

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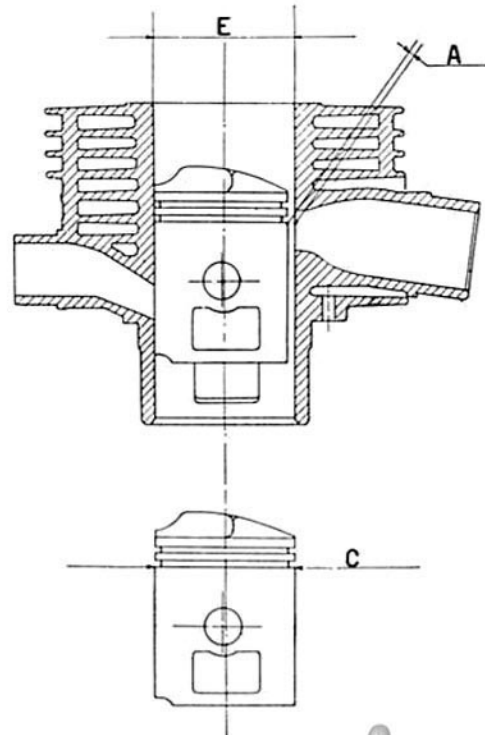


Fig. 71



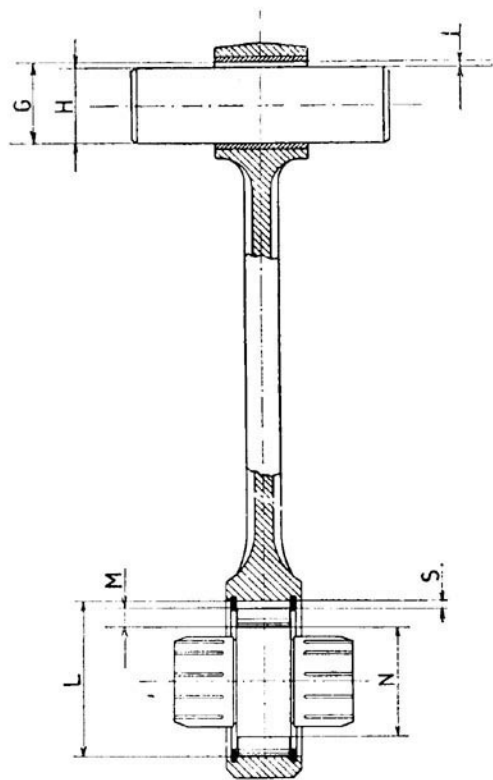


Fig. 72.

CONNECTING ROD AND GUDGEON PIN

Drg. No.	Part name	Normal dimensions	Max. play	
			at assembly	after use
023945	Con. rod	$G = 15 - 0.005$ $+ 0.018$	} $l = 0.014 - 0.035$	$l = 5/100$
018064	Gudgeon pin	$H = 15 - 0.009$ $- 0.017$		

CONNECTING ROD AND CRANKPIN

Drg. No.	Part name	Normal dimensions	Max. play	
			at assembly	after use
023945	Con. rod	$L = 29.785 \pm 0$ $+ 0.03$	} $S = 0.005 - 0.010$	$S = 5/100$
S. 7099	Roller	$M = 4 \pm 0.001$		
026092	Crankpin	$N = 21.808 \pm 0$ $- 0.03$		

All dimensions in millimetres.

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PISTON RINGS

Drg. No.	Part name	Normal dimensions	Max. play	
			at assembly	after use
018113	Piston ring	$\varnothing = 54$	} A = 0.2 - 0.35	A = 2
019195	Piston ring, 1st o/s	$\varnothing = 54.2$		
019196	Piston ring, 2nd o/s	$\varnothing = 54.4$		
019197	Piston ring, 3rd o/s	$\varnothing = 54.6$		
019356	Piston ring, 4th o/s	$\varnothing = 54.8$		

All dimensions in millimetres.

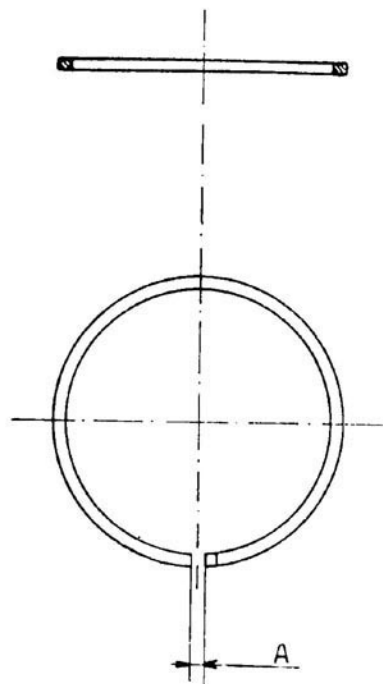


Fig. 73.



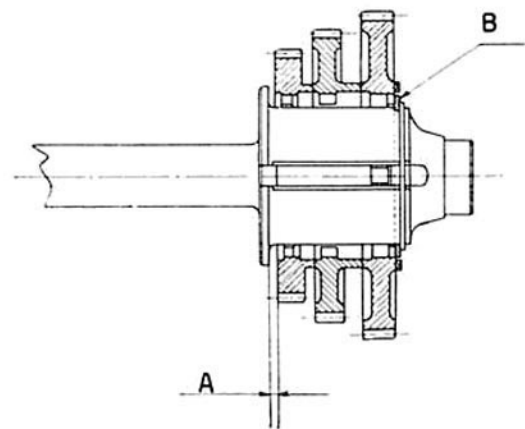


Fig. 74.

SHOULDER RINGS

Drg. No.	Part name	Normal dimensions	Max. play	
			at assembly	after use
018558	Shoulder ring	$2.05 \begin{matrix} + 0 \\ - 0.06 \end{matrix}$	A = 0.15 - 0.30	A = 0.50
020321	Shoulder ring, 1st o/s	$2.25 \begin{matrix} + 0 \\ - 0.06 \end{matrix}$		
020322	Shoulder ring, 2nd o/s	$2.45 \begin{matrix} + 0 \\ - 0.06 \end{matrix}$		
020323	Shoulder ring, 3rd o/s	$2.65 \begin{matrix} + 0 \\ - 0.06 \end{matrix}$		
020324	Shoulder ring, 4th o/s	$2.85 \begin{matrix} + 0 \\ - 0.06 \end{matrix}$		

All dimensions in millimetres.

N.B. When prescribed play at "A" is exceeded with use of normal size shoulder ring "B," replace the latter by another of proper o/size. Inspect by means of feeler gauge 0018094.



B. - OVERHAULS - SPECIAL ASSEMBLIES

1. FLYWHEEL MAGNETO OVERHAUL

1a. Replacing the cam

1. Make a mark on inner face of rotor to indicate the position of the key way on the cam.
2. Grind off the rivet heads on the outer face of the rotor.
3. Remove washer "a" (see Fig. 75), then push the rivets out by means of the pin punch 550805.
4. Assemble the new cam following the mark (paragraph 1) then bore out the holes by means of a 4.5 mm reamer (0.177") the cam itself functioning as a drill jig.
5. Bore out to 4.5 (0.177") the holes of washer "a" mentioned in paragraph 3; mount washer on

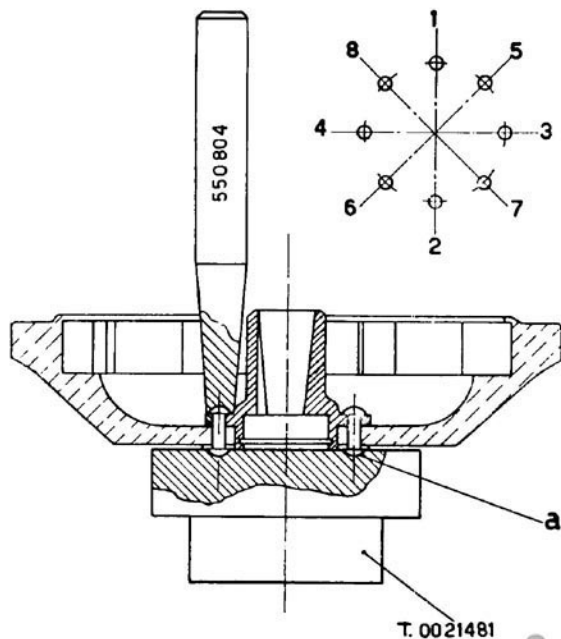


Fig. 75.

Riveting the rotor cam.

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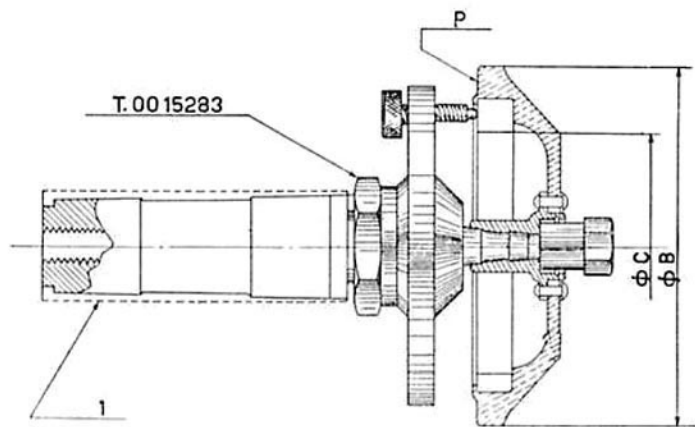


Fig. 76.

Checking dia. concentricity.

N.B. Mandrel "1" is delivered with cylindrical stem (dotted line) for fitting to any available lathe.

outer face of rotor, then the cam and o/size rivets; clench the latter, following the sequence as indicated in Fig. 75, by means of supporting block T. 0021481 and riveting punch 550804.

N.B.—In order to lock the washer "a" properly under the rivet heads, recess the supporting block T. 0021481 (or the previous block T. 0015724 still employable) so that the protruding portion of the cam is housed therein without resting on the block surface.

- By means of mandrel T. 0015283 and a dial gauge ensure that both dia. "B" and "C" are concentric (see Fig. 76) and plane "P" is normal to rotation axis. Skim dia. "B" on a lathe if the error exceeds 0.03 mm.

Fasten the rotor, by dia. "B", on an independent chuck lathe with dial gauge, and skim dia. "C" if it is not concentric; take care not to exceed the max. size of 106.4 mm (4.2").

In order to avoid that the three screws of the tool press on the aluminium edge of the rotor. Dealers who have the old mandrel should chamfer the screw tips accordingly. scooterhelp.com



7. Check diameters for concentricity again by means of mandrel 0015284 and dial gauge (see Fig. 77). Use the same mandrel to check the rotor for balance on the two rails "a" shown in said figure. If necessary, balance the rotor properly by drilling some blind holes on the face of the pole piece (see "F" in Fig. 77).

1b. Re-magnetising the rotor

1. Clean with very fine emery paper the inner diameter of rotor. Wipe the surface with clean rags soaked with paraffin, then dry.
2. Place the rotor into the magnetising fixture, drg. No. 0022547 (see Fig. 78) so that one of the three **south** poles of the latter covers completely the pole piece of the rotor opposite to the key way on the cam.
The fixture must be fed with d.c. not less than 22-24 V., 90 A, which may be supplied either by a battery or through a converter or rectifier.
3. Depress the knife-switch seven times consecutively, each contact lasting 1-5-2 seconds.

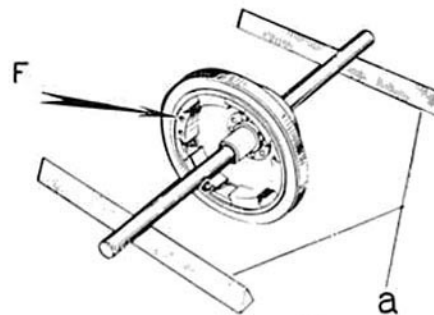
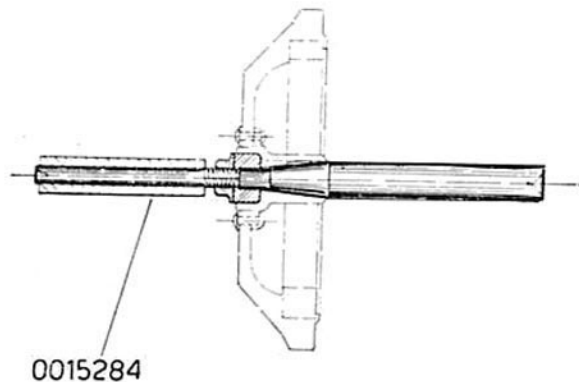


Fig. 77.

Rotor balance inspection.
F: Blind holes drilled for balancing properly.



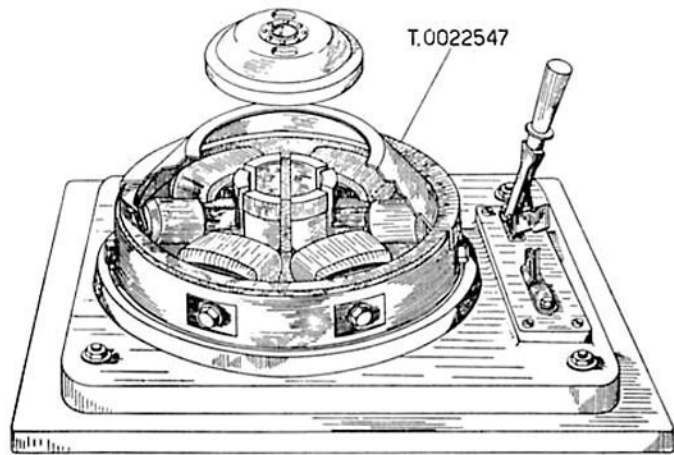


Fig. 78.
Magnetiser.

4. Lift out and check the rotor for magnetisation; it should be capable of supporting a piece of iron of regular shape with a weight not less than 0.5 Kg. (1 lb. 2 oz.).

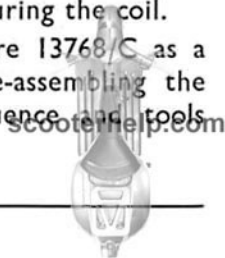
N.B. Mate the rotor immediately with the stator or place three pieces of iron on its inner diameter in order not to lose magnetisation.

1c. Stator overhaul

Replace coils by means of base fixture 13768/C (see Fig. 79) as follows:

1. Assemble the new coil (which is delivered with the laminations already finished on the lathe) with screws, finger tight.
2. Place the stator into suitable housing of part "b."
3. Mate part "a" properly to "b."
4. Hold the coil in such a position that the turned laminations are in contact with the I.D. of "a," then tighten the two screws securing the coil.

Use the part "b" of the fixture 13768/C as a support for dismantling and re-assembling the stator, and proceed with sequence and tools indicated at page 40, Fig. 34.



Particular care is called for on following points while re-assembling:

- (a) Secure the coils as indicated in the paragraphs 1-4 above.
- (b) Rub the surface of the laminations where cable tag is fastened.
- (c) The screw securing the adjuster cam should be tightened on completion of assembly, after adjusting to 0.4 mm (0.015") the gap between the breaker points. This adjustment is to be made on the flywheel magneto test stand, the skid of the breaker arm being on the point of maximum lift of the cam (see also timing instructions in the following pages).
- (d) The lubricating felt should be set to press slightly against the smallest diameter of the cam.

Retailers who have the old test stand shall carry out on the stator support the modifications indicated on Fig. 81 in order to use it for testing flywheel magnetoes of Vespa 125 cc. 152.L2.

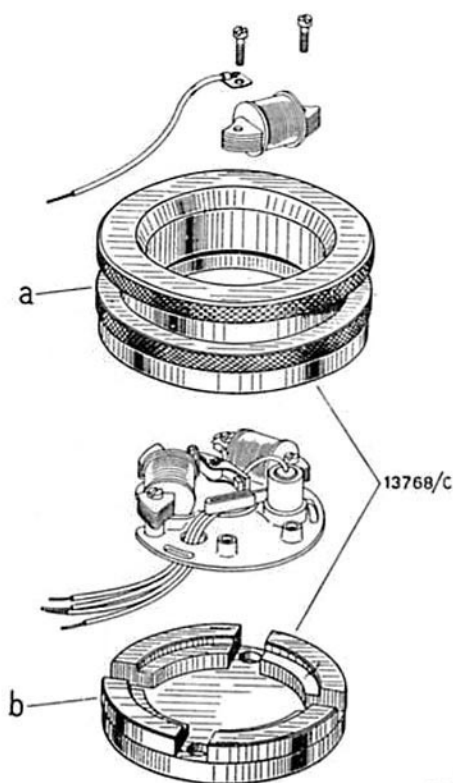


Fig. 79.
Replacing the coils on the stator.

1d. Flywheel magneto test stand

The flywheel magneto test stand 8290/R (see Fig. 80) consists of the following units:

a repulsion motor, revolving in both senses from 0 to 5,000 r.p.m.

Specification: 220 V, 50 Hz, 2.1 HP at 2,400 r.p.m., rev. counter and right angle drive and dials covering a 0-30 speed range (multiplying factor: 200),

a two position switch (min.-max.) to divide the speed range into two sections: from 0 to 2,000 and from 1,000 to 5,000 r.p.m. approx.,

a rotary spark gap consisting of a graded disc and a pointer integral with the flywheel shaft,

a support for the unit to be tested, with coupling between rotor and gear-up device. The support is normally provided with two clamp boards, one for connecting flywheel cables with standard tag,

the other one for connecting flywheel cables with a pin-shaped tag (Vespa G.S.). Said cables can also be connected directly to the clamps on the panel,

leaving off the clampboards.

a gear-up device with a ratio: 1 to 1.826,

a coupling between motor and gear-up device,

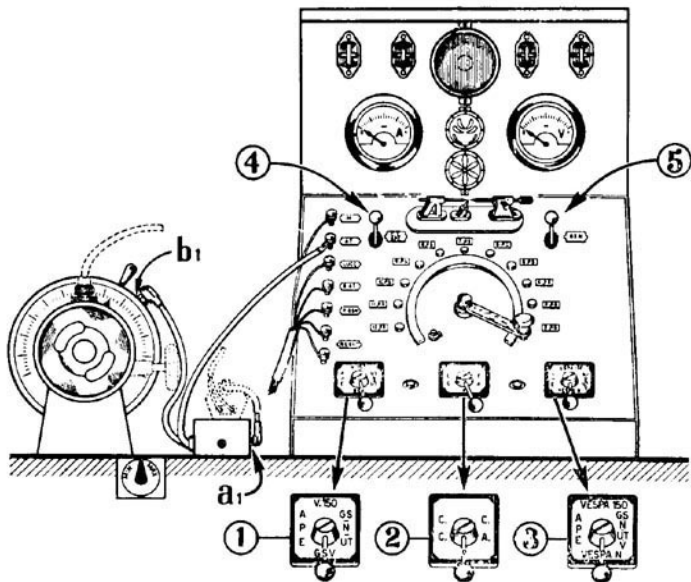


Fig. 80

Flywheel magneto test stand.



a bracket for the H.T. coil (only for Vespa models with external ignition coil) and a switch for switching in the revolving pointer and the three-point spark gap which are to be connected to the H.T. coil by means of cables provided.

an instrument panel.

The instrument panel has the following installations:

- (a) a high tension circuit including the three-point spark gap (Fig. 82);
 - (b) 11 resistors (shunting the spark gap) switched in by means of a lever, to measure the efficiency of the flywheel magneto;
 - (c) sets of bulbs to form the different loads according to the positions of the three switches illustrated hereunder;
 - (d) sets of impedance, rectifiers and batteries for the different vehicles.
- The battery is automatically switched on or off during the tests, in the same way as on the vehicle, by operating the main switches;
- (e) horns (on alternating or direct current) with respective push buttons;
 - (f) a voltmeter and an ammeter;

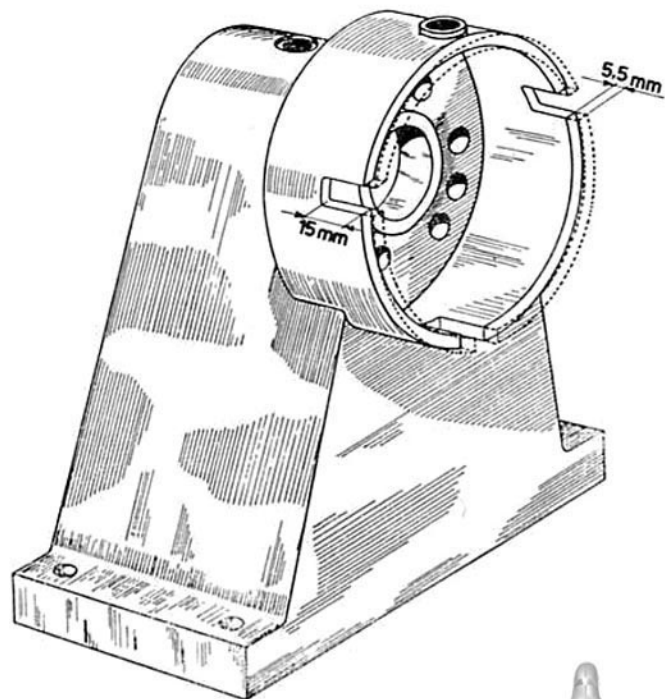


Fig. 81.

Modified stator support. scooterhelp.com



- (g) seven clamps, where the specific circuits are marked, for connecting the electric cables from the flywheel magneto (see **N.B.** below);
- (h) Three main switches (1-2-3 of Fig. 80), each showing the specific positions for the different flywheel magnetoes to be tested (see page 74). They control respectively:
 1. (L.H.): the impedance, rectifier and battery; it is, of course, to be used for the Vespa models provided with such units.
 2. (centre): low tension loads, namely: lights off ("O"), direct current ("C.C."), alternating current ("C.A.").
 3. (R.H.): ohmic loads specific of the different models.
- (i) Two switches (4 and 5 in Fig. 80), with two positions, for Vespa Commercial and Vespa G.S. having battery coil ignition (see also page 74).

N.B. Connect the clamps as follows:

"M": flywheel magneto earthing cable.

"AT": cable from external ignition coil for switching in the three point spark gap.

"LUCE": low tension cable.

The other four clamps on the panel have the indications:
 "BOBINA A. T." (ignition coil).
 "RADDR.G.S.N." (previous rectifier for Vespa G.S.).
 "RADDR.G.S.U.T." } rectifier with full wave
 "RADDR.G.S.U.T." } bridge for Vespa G.S.
 They are to connect cables from flywheel magneto in the different Vespa G.S. models.

1e. Test preliminaries

- (a) Remove H.T. terminal from stand support.
- (b) Mount the stator on this support and secure with the three screws.
- (c) Connect the cable from the ignition coil in the stator to clamp "a" of switching box (see Fig. 80).
- (d) The cables from the L.T. coils (except for that of the pilot light) to the clamp "LUCE" of the panel, leaving the earth cables for engine, head lamp and pilot light disconnected.
- (e) Place switches in position indicated as "All Vespa 125 models" (see page 74).
- (f) One of the two H.T. cables departing from switching box should be connected to clamp "b," located near the rotary spark gap, and the other cable to the H.T. clamp on the panel.



1f. Timing test

1. Draw a line from the shaft axis to one end of the ignition coil lamination and make a mark ("a", Fig. 83) where the line intersects the rotor bracket. Follow the same procedure for the other end of the lamination and mark point "b" accordingly.
2. Scribe a mark "c" on the rotor to indicate the middle of pole shoe opposite to the key way on the cam.
3. Mount the rotor on the shaft, seeing that the wood-ruff key fits in the key way, and secure.
4. Revolve the rotor by hand until the mark "c" tallies with mark "a," then read the position of the rotating pointer. Let the mark "c" tally with "b," then read the position of the pointer again.
5. Bring the rotating pointer to a position half-way from those of previous readings (see point "4").
6. Run the rotor at 150-200 r.p.m. and check the timing of the breaker points by pushing the switch button; in such conditions, sparking should occur 8° in a clockwise direction after the position explained on point "5". If not, adjust the breaker points.

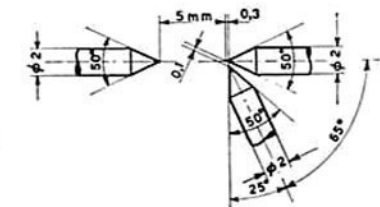
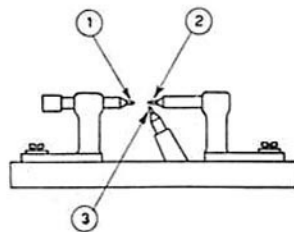


Fig. 82.

Three-point sparkgap.

1. Adjustable point. 2. Fixed point. 3. Third point.

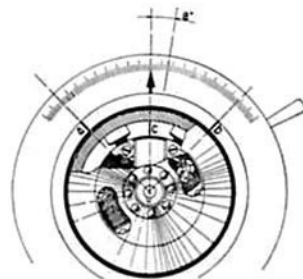


Fig. 83.

Timing the stator.



Switch positions on panel of flywheel magneto test stand 8290/R.

Machine	SWITCHES				
	1	2	3	4	5
All Vespa 150 models (not G.S.)	V. 150	"O" or "C.A." or "C.C." depending on the test	V. 150	Lever downwards	Lever downwards
All Vespa 125 models	N.	"O" or "C.A." depending on the test	Vespa N	Lever downwards	Lever downwards
Vespa G.S., Mod. 55 Vespa G.S. Mod. 56 Vespa G.S. Mod. 57 Vespa G.S. Mod. 58	G.S.V. G.S.N.UT.	"O" or "C.A." or "C.C." depending on the test	G.S. - N.UT.V.	Lever downwards	Lever downwards G.S.N. Lever upwards
Vespa Commercial 150 and Mod. "C" with normal starter assy.	APE	"O" or "C.A." or "C.C." depending on the test	APE	Lever downwards or upwards (C.C. APE) depending on the test	Lever downwards



1g. Test at minimum revs.

At least 85% of sparks should occur at 150 r.p.m. with lights on and 5 mm (0.197") gap (see Fig. 82).

1h. Efficiency test

Run at 1,500 and 4,000 r.p.m. with low tension load both on and off.

In such conditions, shunting the spark gap with non-inductive resistors, the efficiency, as expressed in microsiemens, should be:

	1,500 r.p.m.	4,000 r.p.m.
L.T. circuit switched on	2-4 μS	4-6 μS
L.T. circuit switched off	3-6 μS	6-11 μS

Steady sparking should occur at the spark gap.

1i. Checking current intensity and voltage

In the foregoing conditions and with L.T. load on (switch No. "2" in position "C.A."),

4.4 - 4.7 Amperes

7.3 - 7.8 Volts

should be obtained at 4,000 r.p.m.

The horn should not absorb over 1.7 Amperes.

1l. Overspeed test

Run the rotor at 5,000 r.p.m. for two minutes, with lights off. Steady sparking should occur at the spark gap during this test.

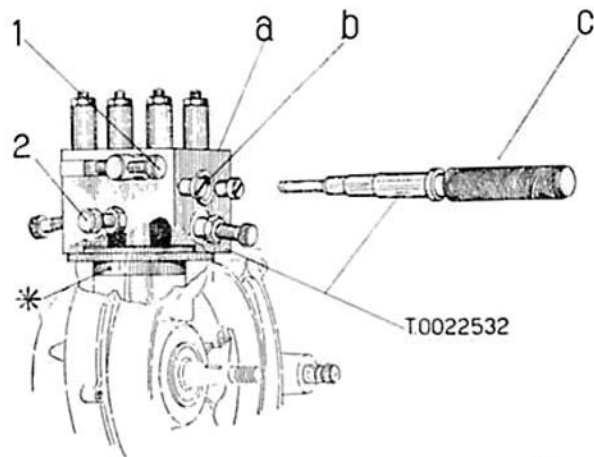


Fig. 84.

Centralizing the con. rod.

(*) Use part 11 of the tool. scooterhelp.com



2. CRANKSHAFT OVERHAUL

By this expression we mean replacement of bronze bush in con. rod small end, or replacement of crankpin and rollers in case of end Float in the big end.

N.B. The crankwebs cannot be replaced, since the diameters are ground after completion of crankshaft assembly. Therefore, a new crankshaft should be assembled when either crankweb is defective.

2a. Replacing bronze bush of con. rod small end

1. Centralize and lock the con. rod as said underneath by means of fixture T. 0022532 shown in Fig. 84.

- Slide the block "a" of the fixture over the crankcase studs and secure it with the nuts.
- Insert the mandrel "c" into the small end through the hole "b."
- Screw down the four knurled head screws on the sides of block "a," indicated by "2," in order to clamp the con. rod.
- Tighten the counternuts on these screws. Then turn the screw "1" until the rear bar leans against the con. rod.
- Remove mandrel "c"; adjust the screws "2" and the rear bar again, if the mandrel does not slide out smoothly from the small end.

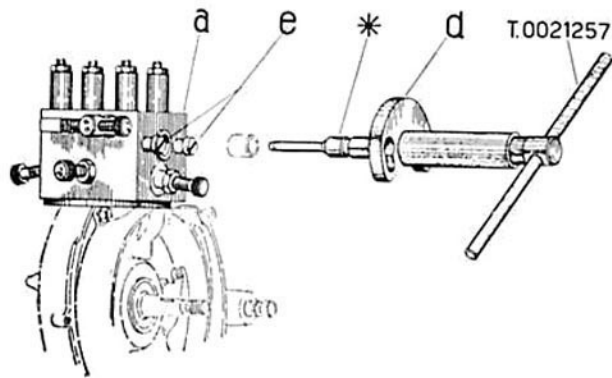


Fig. 85.

Bush extraction.

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2. Remove the worn bush by means of extractor T. 0021257 provided with item "5" (marked with an asterisk), as shown in Fig. 85. Secure the flange "d" against block "a" of fixture T. 0022532 and lock it by means of screws "e"; slide the part No. "5" (asterisk) over the tip of the threaded mandrel T. 0021257, then insert the latter through the sleeve of the flange "d." Screw down until the worn bush is forced out.
3. Disengage flange "d" from screws "e" and check centralizing as prescribed in paragraph 1; then mount flange "d" again. Fit the new bronze bush by means of the tool T. 0021257 as shown in Fig. 85, replacing part "5" of the tool (marked with an asterisk) with the new bush to be assembled.
4. Ream the bush by inserting reamer 381500/7, shown in Fig. 86, into the guide hole "b" of part "a" of fixture T. 0022532, and turning it through by means of a tap wrench "g." Use reamer 381505/7 for 1st o/size bushes.
5. Spot-punch the bush on con. rod small end and slot it, following slots on con. rod, either by means of a drill or of a hacksaw.

6. Ream again with reamer 381500/7 or 381505/7 as said at point 4.
7. In order to improve the flow of lubricant to the gudgeon pin and bush on con. rod small end while the engine is running, chamfer the four points indicated on Fig. 87, either by means of a circular

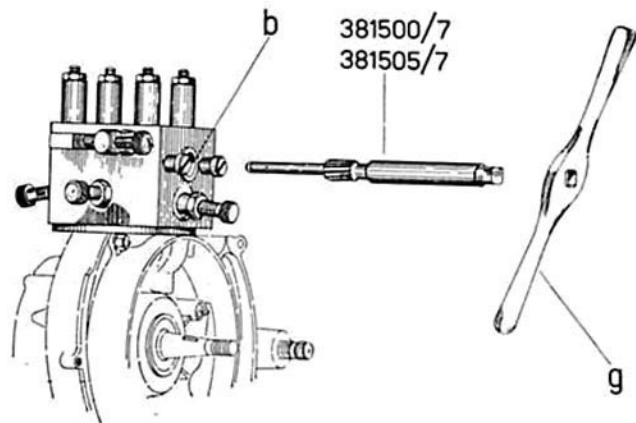


Fig. 86.

Reaming the bush on con. rod small end.

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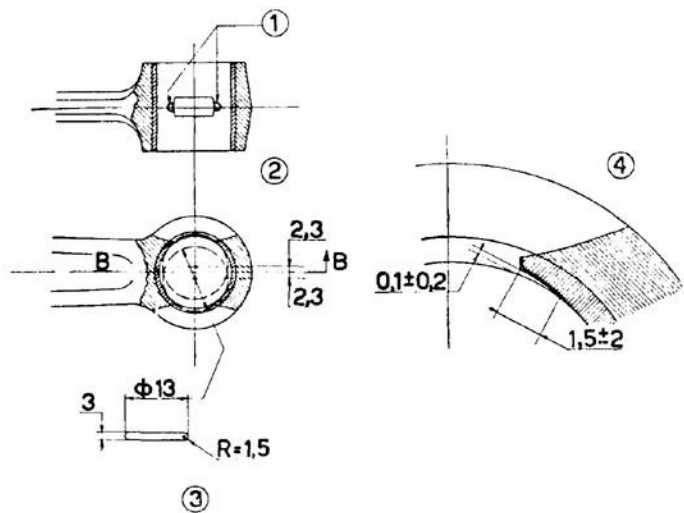


Fig. 87.

Chamfers on con. rod small end.

1. Chamfers. 2. B-B section view. 3. Contour of milling cutter. 4. Chamfer detail.

milling cutter (suggested procedure) or with a \varnothing 2-5-3 mm rat tail file.

Clean the machined area accurately.

8. Inspect the bore of the small end bush by means of plug gauge T. 16160/C (standard bore) or 16161/C (1st o/size). The assembler should be able to slide the gauge into the bush by hand with no effort.

N.B. Dealers who have the old tools T. 0021259 and T. 0021175 can replace the small end bush operating as follows:

Extract bush by means of tool T. 0021259.

Centralize and lock the con. rod by means of tool T. 0021175 provided with the new part No. 27 in place of part No. 11 marked with an asterisk in Fig. 84. Besides that, use new part, T. 0021175/22 in place of part "a" of Fig. 84, taking however all screws and other small parts from the latter.

Parts T. 0021175/22 and T. 0021175/27 are delivered upon demand.

Mount the new bush as indicated above.

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2b. Big end overhaul (for guidance only)

We recommend that you use the works service exchange scheme.

This operation is to be carried out whenever the play between big end and crankpin exceeds the tolerance limits as stated on page 60.

1. Position the crankshaft on the anvil of the blocks T.0021472 (Fig. 88) and use the suitable drift "a" (T.0021472/1) under a press to clear the bore of the upper crankweb. Collect the con. rod, shim washers and rollers.

Invert and press out the crankpin from the other web.

2. Enlarge the holes in the crankwebs to fit a larger diameter crankpin, leaving the same grade of force fit. The holes must be ground oversize, by means of the workholder T. 0019572 (see Fig. 89), to $\varnothing 18.20 \begin{smallmatrix} -0 \\ +0.027 \end{smallmatrix}$ to fit with the o/s crankpin diameter, $18.40 \begin{smallmatrix} +0 \\ -0.030 \end{smallmatrix}$ mm.
3. Press the new crankpin "b" into the crankweb, clutch side (centralized over boss "d"), by means of jig T. 0013460 (see Fig. 90).

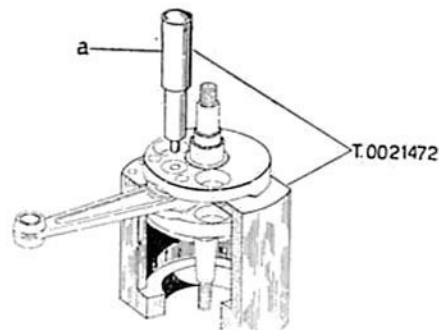


Fig. 88.
Dismantling the crankshaft.

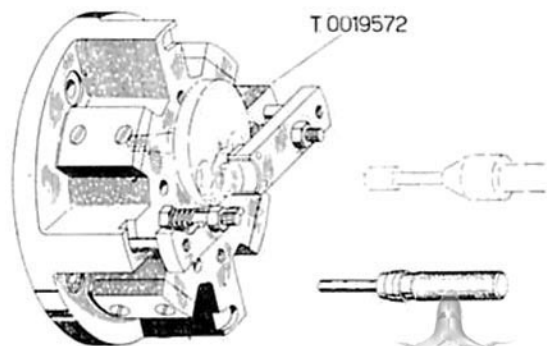


Fig. 89.
Grinding out the crankshaft holes

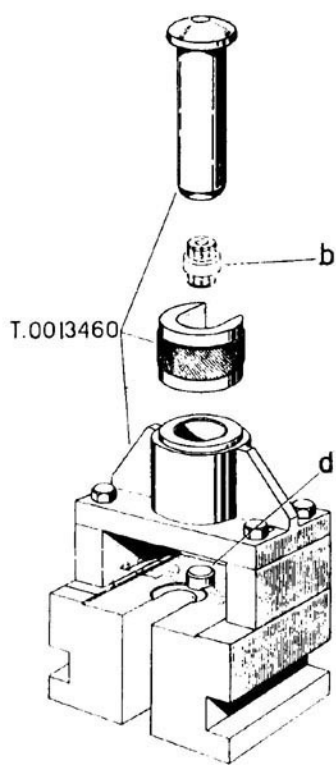


Fig. 90.

Re-assembling the crankshaft (1st operation).

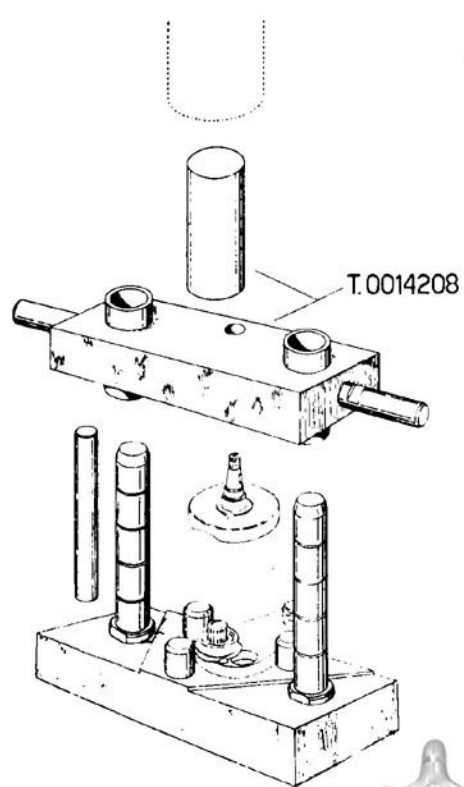


Fig. 91.

Re-assembling the crankshaft (2nd operation).



4. Grease generously the roller track on con. rod big end, mount the 20 rollers in position between the two circlips, then place the con. rod over the crankpin.
5. Locate all these parts on assembly jig T. 0014208 as shown in Fig. 91 and press the other web (rotor side) into position.
6. Check the alignment of the crankshaft rotating it on the fixture T. 12380/C as shown in Fig. 92. The maximum stroke permissible of the dial gauge is 0.06 mm, as read at the crankshaft end.

3. OVERSIZING THE PISTON BORES

Bore out the gudgeon pin housing on the piston by means of tool T. 0020897 and reamers 381504 and 381505 (Fig. 93) when an o/size gudgeon pin is to be assembled (see below).

- (a) Fix part T. 0020897/27 ("d" on Fig. 93) in its housing on the base of the tool, and secure the piston thereon.
- (b) Centralize the piston by means of mandrel "a" in a position suitable for reaming it; then secure it with screws "b" and "c."

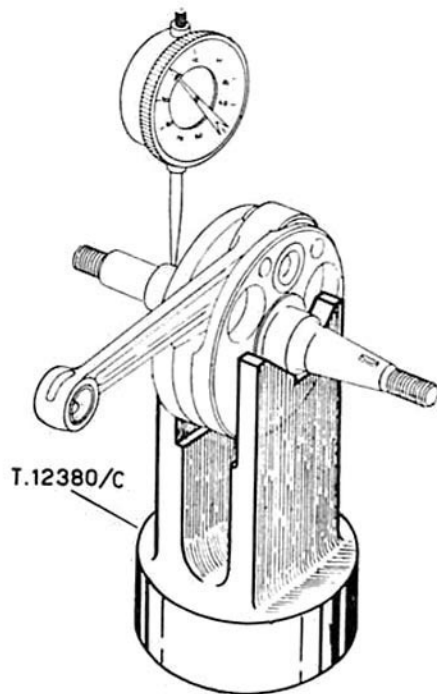
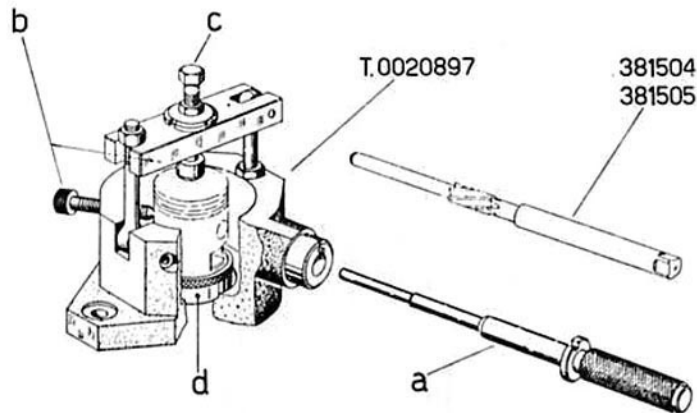


Fig. 92.
Alignment check.





Tightening the screws too firmly may cause the piston to be deformed.

- (c) Dip reamers 381504 (roughing) and 381505 (finishing) into paraffin, then ream and clean the piston bores.
- (d) Make sure that the gudgeon pin can be rotated to right position through the piston bores by a slight pressure of the thumb.

Fig. 93.

Piston bore oversizing



5. CLUTCH

5a. Replacing the plates

The tool T. 0020322 (see Fig. 95) is required for dismantling the clutch unit, as follows:

- Fit the clutch assembly in the tool.
- Tighten the wing nut "c" to compress the six springs, thus enabling extraction of retaining circlip "b."
- Remove "b," unscrew the wing nut "c," remove plate "a" and the tool itself to release the clutch components.

The tool can be used in a similar way for re-assembling the unit.

N.B. Make sure that the convex side of the outer plate faces the cork lining and that the reference mark is visible after assembly.

5b. Control adjustment

Engage contemporarily with two 8 mm open ended wrenches the hexagons of both adjuster screw "a" and lock nut in order to slacken the latter (see Fig. 96).

The cable is to be tensioned or loosened, as the case may be, so that the 2 mm gap (0.078") of the indicated points in respect to each other is attained before lever "b" starts operating.

N.B. Wrong play in the control may cause the clutch plates burning out even in normal running conditions.

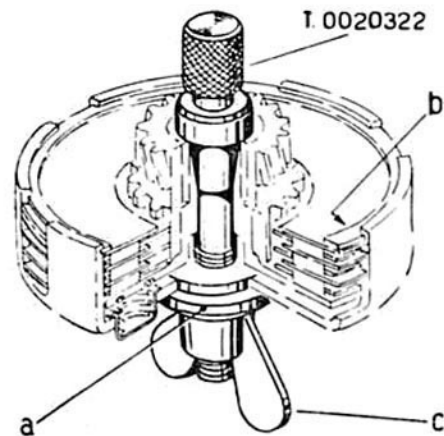


Fig. 95.

Dismantling the clutch.

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6. GEAR SHIFTER

6a. Replacement of internal operating lever

1. Mount the shifter casing on fixture T. 0022192 as shown in Fig. 97.
2. Place the new lever "a" in correspondence of the stem housing, then slide the quadrant "b" in
3. Rivet in the pin by means of punch T.0021280/1.

N.B. Whenever the stirrup has been dismantled, the edge of the shifter casing is to be spot punched on the slot of the stirrup pivot at re-assembly.

6b. Control adjustment

Should the control have excessive play in neutral, tension either control cable by screwing back the respective adjuster screw ("a" in Fig. 98) with an open ended spanner. If the cable tension in neutral is correct but the reference marks of the handlebars do not tally, tighten one of the adjuster screws and unscrew the other one to the same extent, so that the cable tension is not altered.

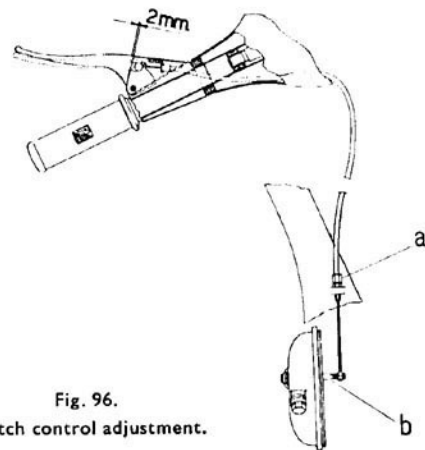


Fig. 96.
Clutch control adjustment.

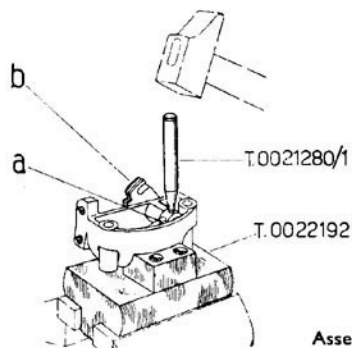


Fig. 97.
Assembling the gear shifter.

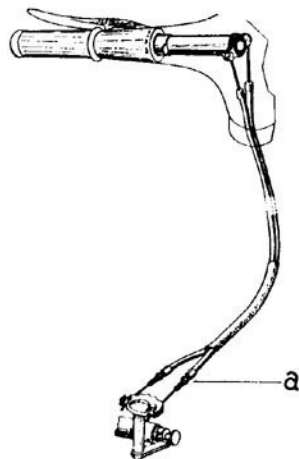


Fig. 98.
Gear shifter control adjustment.

7. CUSH GEAR

The cush gear is to be dismantled whenever the springs, or the outer gear or the gear cluster have to be replaced. Remove the rivet heads, then place the cush gear on the tool 0015413 (Fig. 99) drive the rivets out by means of a punch. The tool may be used in a similar way for re-assembling the unit.

9. ENGINE TEST ON STAND

9a. Description of the stand

The engine test stand, Drg. 8002/R, consists of a metal table which carries the following structures (see Fig. 101).

1. Engine brackets and propeller unit with its drive.
2. A control board and a panel with different bulb sets which are switched on by means of a switch with different positions depending on which engine model is being tested.



Two horns, for a.c. and d.c. respectively, are also fitted on the panel.

3. Fuel tank and burette for consumption test, supported by a sectioned iron frame located on the right hand side of stand and independent therefrom.

The fuel tank can easily be moved along a post, so that the central portion of the burette is placed higher than the carburettor by the extent required for the different engine models (at least 250 mm or 6" for Vespa 125 engine).

4. A tap on the fuel line for turning on one of following circuits:

- (a) from tank to carburettor (burette on).
- (b) from burette to carburettor (tank off).

The burette capacity is $C = 15$ c.c.

5. Throttle control lever.

The propeller is directly driven by the engine; a suitable flange with dogs must be fitted on the end spline of the engine mainshaft; the flange drives mating dogs

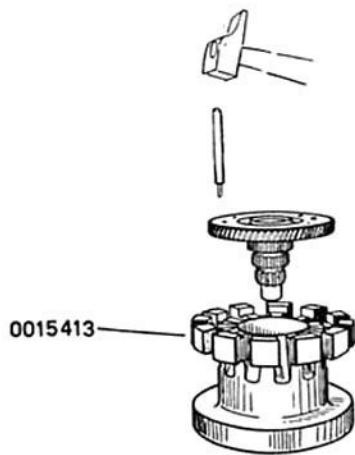


Fig. 99.

Dismantling the cush gear.

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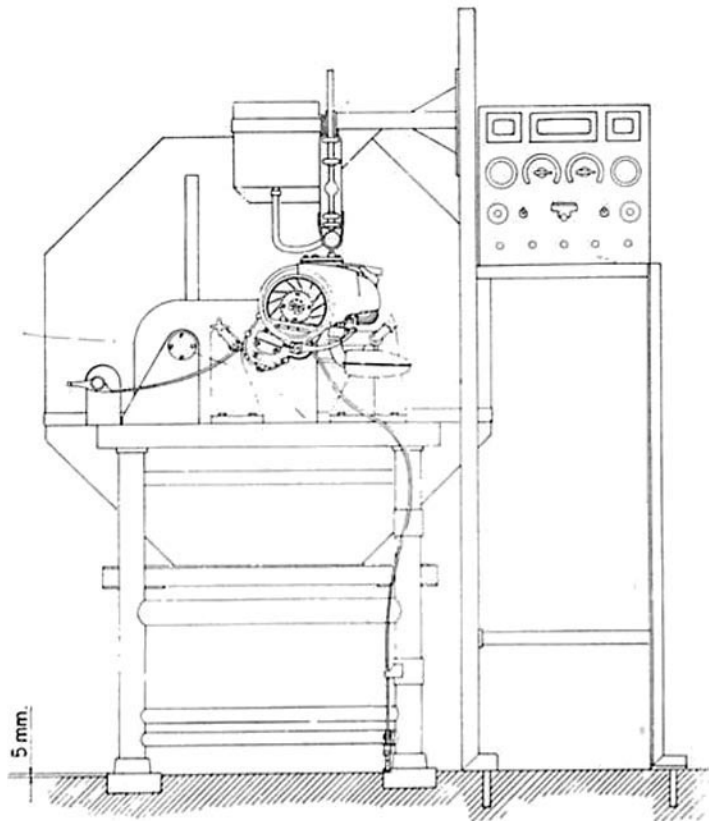


Fig. 101.
Engine test stand.

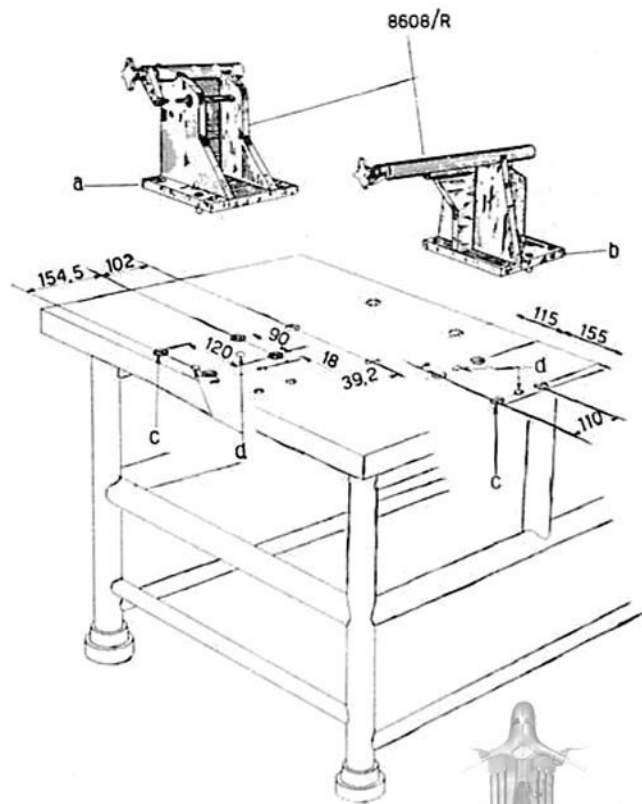


Fig. 102.
Modified engine test stand.

on end of propeller shaft, through an elastic and a calibrated joint.

The transmission ratio is therefore the same as that of the gear pinions, namely:

12.2 to 1 in 1st gear

7.6 to 1 in 2nd gear

4.85 to 1 in 3rd gear

The shaft where to check the r.p.m. by means of a portable counter is driven through two spur gears with transmission ratio 1 : 1.

The engine revolutions are equal to the figure shown by the rev. counter multiplied by the transmission ratio of the gear engaged. For instance: if the counter shows "500" with 3rd gear engaged, the engine revolutions are $500 \times 4.85 = 2425$.

N.B. The test stand 8002/R can be used for testing all Vespa engines. Make sure, before testing, that propeller blades are set to the pitch angle indicated thereon for the engine to be tested.

In order to test the engine of Vespa 125 (prefix 152L2), complete the stand as follows:

- (a) Replace the standard engine bracket with the unit 8608/3 consisting of two separate brackets ("a" and "b" in Fig. 102). Mount the 125 engine on said brackets. The bracket "a" is not used for testing other engines; it can, however, remain on the stand.
- (b) Mount the engine so that the lug with rubber buffer for attachment of the rear damper is housed on bracket "a" and the crankcase swinging arm on bracket "b."
- (c) Dealers who have already the old test stand 8002/R shall order the unit 8608/R, then drill and tap the eight holes "c" on the stand as shown in Fig. 102; mount brackets "a" and "b" on the stand (with an engine on them) and secure with bolts, finger tight. Find the right position where to secure the brackets firmly. Tighten the bolts, remove engine and drill four holes "d" for the centralizing pins.

9b. Adjustment of test propeller

The propeller adjustment must be checked periodically (at least once a month) with a test engine tuned to deliver 1.86 HP at 3,414 r.p.m. in 3rd gear.

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9c. Fuel consumption test on the stand

Fuel mixture should consist of $\frac{1}{2}$ pint of oil, grade **SAE 30** per gallon of petrol (specific gravity: $sG = 0.72$).

1. Feed the carburettor through the circuit "a" and run the engine at 3,414 r.p.m. in 3rd gear.
2. Turn on the circuit "b" and take note of the time "T" (seconds) spent emptying the burette.

Being "sG" the specific gravity of the fuel mixture, the specific consumption can be calculated by the following formula:

$$\text{Specific consumption (g/HP/h)} = \frac{1940 \times C \times sG}{T}$$

The consumption should result 390 to 450 g/HP/h.

9d. Normal test

Mount the engine on the stand, then proceed as follows:

Make sure that the engine is in proper running order, that the clutch lever on the engine turns around smoothly and comes back to the stop easily. Fill the gear box with oil, grade SAE 30, up to the prescribed level.

Turn on the feed circuit "a."

Under such conditions the engine is to be run-in as follows:

Gear box position	Engine revs.	Time
1st gear	2,500	5 minutes
2nd gear	3,390	5 "
3rd gear	3,130	5 "
3rd gear	3,540	5 "
3rd gear	3,740	5 "

After completion, check following points:

1. If sparkplug, nuts and screws are well tightened.
2. Starting with warm engine.
3. Idling, pick-up, noisiness, fuel consumption.
4. Leaks; there should be no leaks of either oil or fuel.
5. Absence of friction between stator and rotor of flywheel magneto.
6. Clutch efficiency.
7. Change gears up down, and see that the roller which limits the rotation of the gear change quadrant rests in the bottom of the slot corresponding to the gear engaged.
The ratchet quadrant should have a further short free movement before 1st and after 3rd gear positions.
8. Remove the cylinder, inspect it and also inspect the crankshaft, con. rod, gudgeon pin, piston



assembly according to the tables of permissible tolerances.

N.B. Changing gears when the engine is on the test stand will be easier if the ratchet quadrant of the gear shifter is operated by means of wrench T. 0022517.

10. STEERING COLUMN INSPECTION

The template illustrated in Fig. 104 consist of two parts: the base, drg. 15104/C common for all steering column types.

The top piece "a" which varies for the different models (for Vespa 152L2: drg. No. 15118/C).

Clamp the steering column in the template to check for alignment, and see that the following conditions are reached:

pins "b" and "c" slide all the way through into their respective bushes;

the play between the ring on pin "b" and its respective bush is within the dimensions of both ends of gauge "d";

the play between the bush in the central portion of the template and the light alloy flange of the steering column is within the dimensions of both ends of gauge "e";

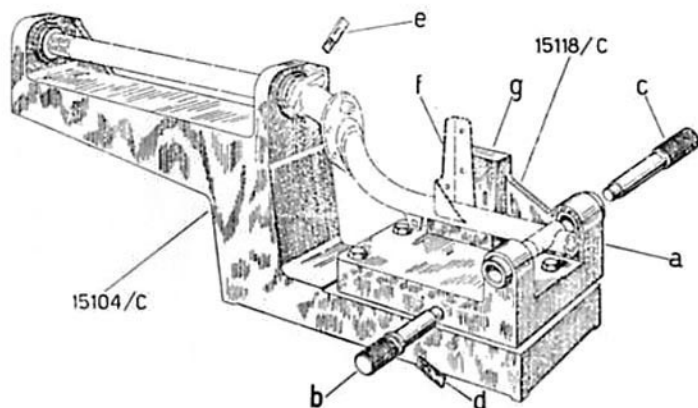


Fig. 104.

Template for steering column inspection.



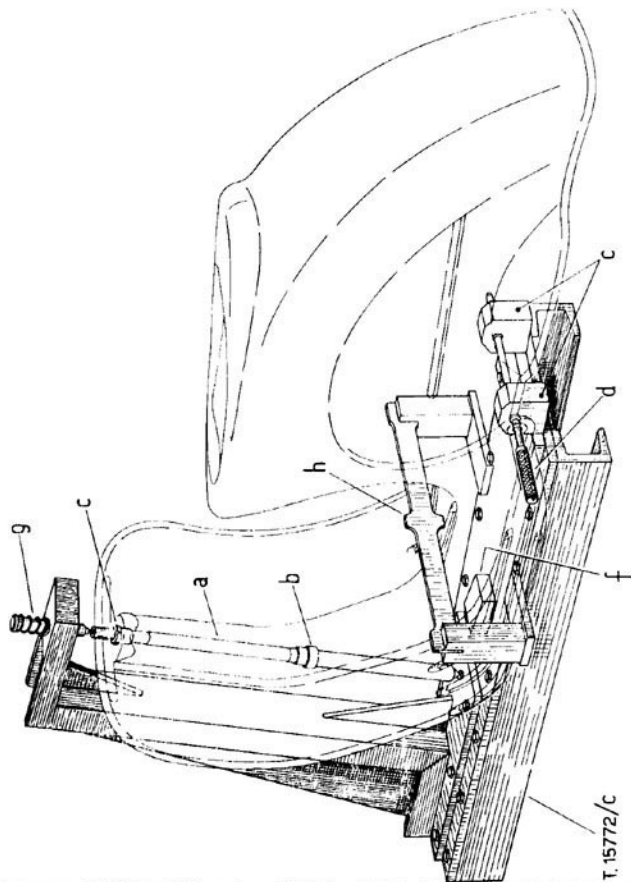


Fig. 105.
Jig for frame inspection.

the mudguard bracket "f" tallies with the lug "g" on the template.

Steering columns should always be returned to works if repair is necessary.

11. ALIGNMENT OF FRAME

Fit the bush "b" (part No. 33 of the tool) on rod "a"; slide the latter through the steering column housing and mount the other bush "c" in the top bearing housing.

Lay the frame on the jig T. 15772/C as shown on Fig. 105, and slide the rod "d" (part No. 31 of the tool) through the frame holes for the bolt securing the engine and through those on "e" (part No. 29); the rod should slide in smoothly. Insert the wooden wedge "f" under the floorboard, thus lifting the frame until the longeron surface stops against the lug of gauge "h," where "Vespa G.S. 56 - 150 VB." etc. is stamped. Now see that following conditions are reached:

the tip of pin "a" falls inside the pad welded on the jig table;

the pin "g" enters the cavity of pin "a."

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Straightening (exclusively cold) of the frame is allowed only in case of minor deformation.

12. PAINTING

Strictly follow the procedure outlined below in order to obtain the best results in retouching.

12a. Preparing the product

- (a) Grey synthetic rust preventative. Dry either in air or with infra-red ray bulbs.
- (b) Stopper. Dry either in air or with infra-red ray bulbs.
- (c) Compound enamel.
Dry in oven.
Having none of such facilities, dry in air for at least 48 hours.

12b. Procedure A

Minor retouches not calling for use of a rust preventative.

1. Rub down with very fine emery paper (minimum grade: 320) and wipe the rubbed area with clean rags.
2. If necessary fill in with stopper "b" and dry, then

smooth over with very fine emery paper (minimum grade: 320).

3. Spray and dry product "c" and then finish with abrasive paste and polish.

12c. Procedure B

Major retouches, when either the steel sheet is naked and rusted, or the paint is peeling off.

1. Rub down thoroughly the area until the metal is exposed. Dry and remove dust with clean rags.
2. Spray and dry product "a."
3. Operate according to point "2" of procedure "A."
4. If necessary, repeat operation of point "2."
5. If necessary, rub down again.
6. Operate according to point "3" of procedure "A."

13. FUEL CONSUMPTION TEST ON THE ROAD

13a. Premise

- (a) Check that the tyres are inflated to the prescribed pressure.
- (b) During the test the scooter must be ridden by



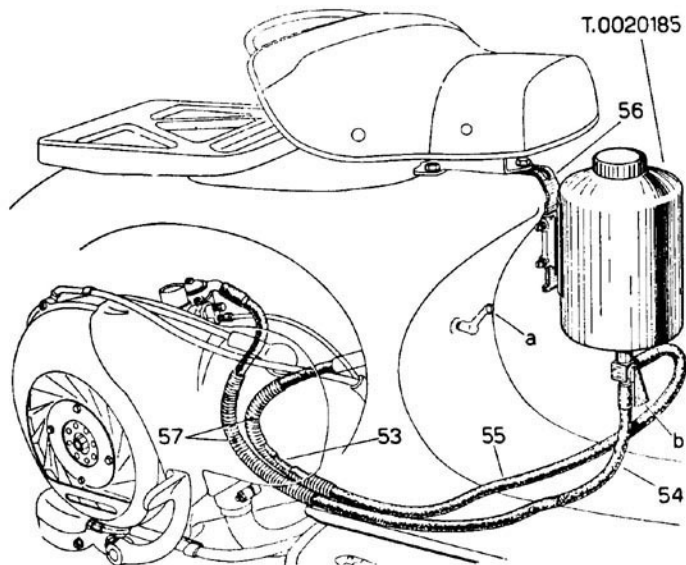


Fig. 106.

Fuel tank for consumption test.

the driver alone; he should not be less than 5 ft. 3 in. tall, and sit upright when driving.

- (c) Carry out the test with the top gear engaged.
- (d) The test should take place on 31 miles of dry, flat highway in calm weather (max. wind speed: 2 m/sec).

Temperature should be + 5 to 25°C (41 - 77°F).

USE PETROL AND OIL OF TYPE AND GRADE GIVEN ON LUBRICATION CHART FOR THIS TEST.

13b. Preparing the scooter

Use the auxiliary tank T. 0020185 completed with parts No. 53 to 57, as follows:

- (a) Clamp the tank bracket (part No. 56) between the chassis and the saddle as shown in Fig. 106, then tighten the screw again.



Move the tank along the bracket until its tap reaches a level higher than that of the scooter tap.

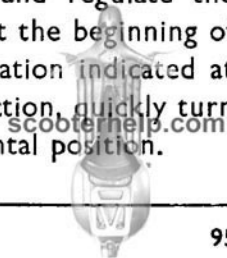
- (b) Close the fuel tap "a" of the scooter, remove the air cleaner and disconnect the rubber hose from the carburettor.
- (c) Connect the tap of the auxiliary tank by means of hose and union pipe (part No. 55 and 53 of the tool resp.) with the fuel hose of the scooter, and by means of hose "54" with the carburettor.

Both hoses 54 and 55 should be insulated from cylinder by means of sheaths "57" before connection.

- (d) Re-assemble the air cleaner and the engine cowling.
- (e) Rotate the lever of the tap "b" to the position "all off" (oblique upwards) and fill auxiliary tank up to the hole on the baffle fitted just below the filler cap.

13c. Road test

- (a) Set the lever of tap "b" of the auxiliary tank horizontally, the carburettor being fed by the scooter tank, and ride to the road section for the test, adjusting the scooter speed to 28 m.p.h.
- (b) When entering the road for the test, quickly turn the lever of the tap "b" of the auxiliary tank vertically downwards (carburettor fed by the auxiliary tank). The speed of 28 m.p.h. should be maintained as constant as possible for the whole test.
- (c) At the end of the last mile of the first half of the test section, quickly turn the lever on the tap "b" horizontally, and stop the scooter after about 330 yards.
- (d) Reverse the riding direction and regulate the speed again to 28 m.p.h. and, at the beginning of the first mile, repeat the operation indicated at point (b). At the end of the section, quickly turn the lever of tap "b" to horizontal position.



13d. Calculating fuel consumption

- (a) Close the tap "a" of the fuel tank of the scooter.
- (b) Take some fuel mixture from a graduated burette (not from the two tanks on the scooter), and top up the auxiliary tank to the original level (see paragraph "14b", letter "e"). The amount "C" (in c.c.) added is obviously equal to the amount of fuel used for the test.

- (c) The distance "P," expressed in m.p.g. of fuel is given by the following formula:

$$P = \frac{141,235}{C}$$

14. DISMANTLING, OVERHAUL AND RE-ASSEMBLY OF HYDRAULIC DAMPERS

This should be carried out only at the works, where a service replacement scheme is available.



C. - FAULT FINDING AND REMEDIES

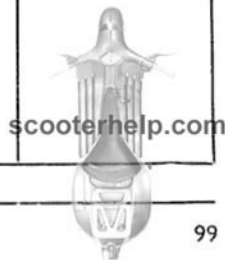
LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
<p>HARD STARTING</p> <p>I. Fuel system Fuel tank empty No fuel at carburettor</p>	<p>(a) Fuel line clogged by deposits</p> <p>(b) Laying up of the scooter</p> <p>(c) Fuel tap body clogged</p> <p>(d) Hose between carburettor broken or clogged</p> <p>(e) Filter on carburettor dirty</p> <p>(f) Float needle valve sticking in its seating</p> <p>(g) Jet clogged</p> <p>(h) Carburettor body clogged</p>	<p>Refuel</p> <p>Clean carburettor filter (see point "c"). Unscrew and remove the main jet, If the fuel system is efficient, fuel will come out. In order to prevent forming of air bubbles in the fuel system during the first fuelling, remove the air cleaner, disconnect the hose from the carburettor and let some fuel flow out to expel air; then with the hose full and fuel tap open, connect the hose again, check and clean if necessary the idling jet.</p> <p>Remove and blow clear</p> <p>Replace. Blow clear</p> <p>Remove and wash with petrol, blow dry</p> <p>Clean or replace needle and float chamber cover</p> <p>Remove and blow clean (1) Dismantle the carburettor. Clean carefully with petrol and blow dry</p>	<p>(1) Avoid use of any abrasive materials or wires.</p>



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
<p>2. Carburation Neat fuel coming out from exhaust pipe. Fuel dripping out from carburettor</p> <p>Float</p> <p>Air cleaner</p> <p>Choke flap</p>	<p>Engine flooding (2) Perforated Needle not properly fitting into its seating Choked, dirty</p> <p>Sticking in position "closed"</p>	<p>Replace Clean or replace both needle and float chamber cover</p> <p>Wash in petrol and blow dry; dip in a 30% oil-petrol bath Release</p>	<p>(2) Suggested procedures: (a) push-start the scooter; (b) close fuel tap, unscrew spark-plug and rotate the engine in order to expel the excess fuel. Replace the sparkplug and proceed as for normal start.</p>
<p>3. Ignition</p> <p>Sparkplug</p> <p>Switch</p> <p>Earth cable</p> <p>Moving arm of contact breaker</p>	<p>Dirty Cracks in insulation Push button sticking in "cut-out" position Insulation damaged causing short circuit</p> <p>Bearing surface worn (4) Lubrication felt dry or broken</p>	<p>Disconnect the sparkplug lead. Check if sparking occurs between lead and crankcase when the footstarter is operated Clean. Correct gap to 0.6 mm (0.023 in.) (3) Replace the plug Release. If necessary, dismantle and inspect the switch Replace earth cable</p> <p>Disconnect the lead tag from the L.T. terminal; if the ignition works again the trouble is located in the lead portion inside the frame Replace the breaker</p> <p>Lubricate or replace</p>	<p>(3) Inspect by means of feeler gauge 0016741.</p> <p>(4) Replace the rotor cam if its surface is scratched (see page 65).</p>



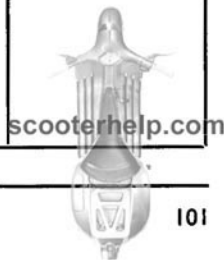
LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
Condenser Sparkplug lead	Faulty Broken or disconnected from H.T. coil	Replace Replace or re-solder	
Breaker points	Dirty Gap incorrect	Clean with suitable file or very fine emery paper Correct gap to 0.4 mm (0.015 in.) with feeler gauge 0016741	
Timing	Worn out or pitted Wrong	Replace Re-time ignition according to directions on page 119	
Woodruff key for flywheel	Broken	Remove the flywheel and replace the key (5). If the key way is worn out, replace the crankshaft	(5) Firmly tighten the nut retaining the flywheel to ensure that the trouble does not re-occur.
4. Clutch The engine will not revolve when the footstarter is depressed	Clutch slipping	Inspect and replace the clutch plates (see page 84)	
5. Starter assembly Starter pinion	Not meshing	Check the thrust blades of the starter pinion and the side teeth of the same and of multiple gear	
Kickstarter	Too short stroke due to wrong positioning	Correct kickstarter position (see page 116)	
INCORRECT RUNNING			
1. Lack of power Silencer	Carbonized	Clean	



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
Exhaust port Cylinder base gasket 2. Poor compression	Partially closed by carbon deposits Not tight	De-carbonize cylinder, piston and cylinder head Replace	
Sparkplug Cylinder and cylinder head Piston rings	Not well screwed down in cylinder head The head does not fit properly into spigot on top of cylinder Gummed up	Tighten Set the head properly and tighten nuts carefully, after deburring the spigot, if necessary Replace piston rings and clear piston grooves	(6) Clean with a wire brush or, better, a scraper. (7) When the breaker point is loose, if the lights are turned on while the engine is idling, the latter should stop or at least misfire.
3. Explosions at silencer and carburettor			
Sparkplug	Excessive electrode gap Carbon coated Carbon pearls on insulation Pre-ignition	Correct gap to 0.6 mm (0.023 in.) Replace or clean (6) and check the gap Clean with a suitable wire brush or by sand-blast Check oil-petrol percentage in fuel mixture Replace the sparkplug Check ignition timing (see page 119)	
Condenser Contact breaker Carburettor	Loose Faulty Loose tip (7) Not enough mixture	Tighten the screw securing it Replace Replace See "Hard starting," paragraph 1	



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
<p>4. Clutch troubles</p> <p>Clutch snatches (a) Plates with cork lining (b) Outer plate</p> <p>(c) Gear pinions</p> <p>Clutch slips (a) Springs (b) Plates with cork lining</p> <p>Clutch does not disengage completely Control cable</p>	<p>Gummed together Wrongly assembled</p> <p>Not lubricated</p> <p>Feeble Worn out or burnt</p> <p>Excessive play</p>	<p>Wash with paraffin Turn the convex face of the plate towards the cork lining; the reference mark should be visible after assembly Top up oil level (see "Lubrication chart," page 20)</p> <p>Replace Replace (8)</p> <p>Adjust</p>	<p>(8) Replace the springs whenever the cork lining is burnt.</p>
<p>5 Gear pinions disengage of own accord</p> <p>Gear change control cables Pin for gear shifter stirrup</p> <p>Spring for stirrup</p> <p>Selector</p> <p>Gear pinions</p>	<p>Out of adjustment Loose</p> <p>Broken, missing or feeble</p> <p>Chamfered arms Guide bush of selector stem wrongly assembled</p> <p>Chipped or worn dogs</p>	<p>Adjust (page 85-86) Tighten firmly. Spot-punch the edge of the shifter casing on the slot of the pin</p> <p>Replace</p> <p>Replace Rectify</p> <p>Replace</p>	



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
<p>6. Starter assembly not engaging</p> <p>Gear sector</p> <p>Starter pinion</p> <p>Return spring</p> <p>Kickstarter</p>	<p>Not meshing properly</p> <p>Not meshing properly with the gear sector and with multiple gear</p> <p>Broken</p> <p>Wrongly assembled</p>	<p>Check, clean or replace if the side teeth are worn out</p> <ol style="list-style-type: none"> 1. Inspect the paw of the starter pinion 2. Inspect and if necessary, replace the thrust blades on crankcase (the longer blade should press on the pinion) 3. Inspect the side teeth on the starter pinion and on gear cluster. Replace these parts if such teeth are damaged <p>Replace</p> <p>See page 116</p>	<p>(9) Swirl in a 30% petrol-oil bath.</p>
<p>7. High fuel consumption</p> <p>Fuel level in carburettor too high</p> <p>(a) Float</p> <p>(b) Float needle valve</p> <p>Air cleaner</p> <p>Choke valve flap</p> <p>Main jet</p> <p>Ignition</p>	<p>Perforated</p> <p>Not properly fitting into its seating</p> <p>Choked or dirty</p> <p>Sticking in closed or partially closed position</p> <p>Diameter of orifice increased</p> <p>Retarded</p>	<p>Replace</p> <p>Clean or replace both needle and float chamber cover</p> <p>Clean (9)</p> <p>Release. Operate upon lever located under air cleaner body and lubricate it</p> <p>Fit proper jet (72/100 mm)</p> <p>Re-time (see page 119)</p>	



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
Compression (sparkplug, cylinder and cylinder head assembly, piston rings)	Poor	See page 100	
8. Controls not operating properly			
Hard controls (10) Inner cable	Rusty Unravelled	Lubricate or, if necessary, replace Replace and lubricate	(10) If the control twistgrips are stiff, lubricate the threaded ends of the hub, where the two bars are screwed. Also lubricate the barrel in the throttle control twistgrip.
Excessive play Inner cable	Loose	Operate on respective adjusting screws	
9. Steering column becomes stiff			
Upper race of top ball bearing Ball races	Too tight Pitted (11)	Adjust Replace	(11) This trouble may lessen riding stability.
10. Excessive play in steering column			
Upper race of top ball bearing	Loose	Adjust	
11. Poor braking			
Control pedal or lever Rear brake jaws	Stroke too long Linings worn down Linings oily	Adjust and lubricate cables Replace linings Wash with petrol, dry and slightly rub, if necessary, the braking surface with emery paper	
Brake drums and linings	Scatched	Replace brake linings and drums	



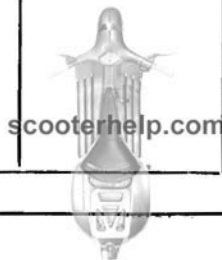
LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
<p>12. Inefficiency of front suspension Noisiness (a) Nut securing the spring (b) Spring</p> <p>(c) Anchorage trunnion</p> <p>(d) Swinging hub</p> <p>Riding instability (a) Spring (b) Spindle of swinging hub</p> <p>(c) Hydraulic damper</p> <p>Difficult rotation of wheel spindle (a) Bearings (b) Speedometer drive pinion</p> <p>13. Inefficiency of rear suspension Noisiness (a) Spring</p>	<p>Slack Loose on anchorage trunnion Interference with welded support bracket Stiff on its spindle</p> <p>Axial play</p> <p>Broken or feeble Radial play</p> <p>Inefficient</p> <p>Ball races pitted for lack of lubrication Seized</p> <p>Broken</p>	<p>Tighten Tighten</p> <p>Move the bracket side away from the upper coils of spring</p> <p>Dismantle the unit, lubricate and re-assemble; if necessary, replace the worn parts (see Lubrication chart, page 20). Screw down the nut firmly Tighten the nut securing the hub on bottom end of steering column</p> <p>Replace Replace the spindle or the rollers or bushes, as the case may be Overhaul (see instructions at page 96)</p> <p>Replace and lubricate generously</p> <p>Replace and lubricate</p> <p>Replace</p>	<p></p>



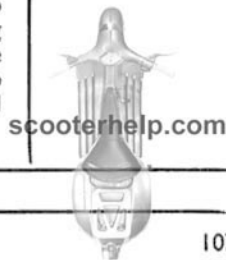
LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
(b) Top rubber bush for hydraulic damper (c) Hydraulic damper (d) Attachment of engine to frame Inefficiency (a) Spring (b) Hydraulic damper	Slack or damaged Loose on supports Side or rotational play Broken or feeble	Tighten or replace Tighten Replace the rubber bushes Replace Overhaul (see N.B., pages 20 & 96)	
14. Engine noisy Piston-cylinder assembly Connecting rod Main bearings Flywheel magnet Clutch assembly Cush drive Gear pinions Clutch pinion	Excessive play Play between gudgeon pin and small end bush Play between crankpin and con. rod big end Races pitted } Loose on crankshaft Broken springs Excessive axial play Whining	Replace or re-grind the cylinder (12) Replace both piston and rings Replace the bronze bush and, if scratched, the gudgeon pin as well Overhaul the crankshaft (see tables at pages 60, 62 and directions at page 76) Replace the bearings Replace the woodruff key and tighten with spanners supplied (13) Replace Assemble an oversize shoulder ring (see permissible tolerances at page 64) (a) Replace clutch pinion or (b) Replace both clutch pinion and outer helical pinion of cush drive	(12) See permissible tolerances, p 61. (13) If the edges of the key ways are damaged, the crankshaft should be replaced.



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
Fan Silencer	Slack screws Inside baffles detached	Tighten or replace the screws and lock edge of tab washers Replace the silencer	
15. Faulty electric wiring Tags at L.T. terminal L.T. terminal Leads Switch	Disconnected Slack Interrupted or naked Wrong connection on L.T. terminal Wrong connection on light switch Clampboard faulty Spring of dip switch lever feeble Screw securing switch lever slack or faulty Poor contact due to slackening of the clamp screws	Re-connect or replace the screws Tighten central screw Repair or replace } Rectify (see diagram on pages 16-18) Replace Replace Tighten or replace screw Tighten	
Horn Head lamp	Leads loose from their clamps Bulb filament fused Poor earthing	Re-connect and replace the screws, if necessary Replace the bulb Repair or replace the earthing cable Make sure that the end of the cable connecting the bulb socket with the clamp in the L.T. terminal, where the earth cable from the flywheel magneto is also connected, makes good contact	



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
Tail lamp	<p>Surface of reflector mat or yellow</p> <p>Wrong positioning of head lamp</p> <p>Inverted positioning of bulb</p> <p>Bulb filament fused</p> <p>Poor earthing</p> <p>Wrong connection of the lead with the funnel shaped terminal</p>	<p>Replace the reflector</p> <p>Rectify (see page 22)</p> <p>Rectify</p> <p>Replace the bulb</p> <p>Replace the contact washers under the wing-nuts securing the tail lamp on frame</p> <p>The cable terminal must be clamped between the bulb and the lug of its L.H. carrier</p>	
Parking light	<p>Wrong connection of white earthing cable on bulb socket</p> <p>Wrong connection of the cable in the switch</p>	<p>Secure the cable under the clamp of the un-insulated clip</p> <p>Re-connect according to diagram at pages 16-17-18</p> <p>IMPORTANT</p> <p>When noticing through the red indicator that the pilot light and consequently the tail lamp are off, though the switch is in position "parking light and tail lamp on," set the switch in the position "main beam," so that the tail lamp goes on again. Check then the two bulbs and replace the damaged one</p>	






5.
RE-ASSEMBLY



R E - A S S E M B L Y

This section illustrates the sequence to be followed for complete re-assembly of the scooter and its units.

When not otherwise specified at page foot, the succession of operations in each figure is indicated by the alphabetical order of letters, which are marked in correspondence of the parts to be re-assembled.

Tools are shown with their drg. numbers, whilst open ended spanners, box spanners and screwdrivers are indicated with respective symbols (  ) and hexagon dimensions.

When no tool is pointed out, the operation can be carried out by hand.

Use of monkey wrenches, hammers, chisels and emergency tools of any kind must be avoided. Only by

means of the tools listed in the proper section of this manual, and by using them to do the job they have been designed for, can any operation be quickly and successfully carried out on the scooter without damaging the parts involved.

Before re-assembling, see that all parts are clean and, if necessary, wash them and wipe them dry according to instructions issued at page 33.

Smear with mineral oil all revolving and sliding parts of engine.

Should the assembly of engine or of other units be postponed for a while, keep all loose parts protected from dust.

Use new gaskets and split pins for re-assembly.



ENGINE RE-ASSEMBLY

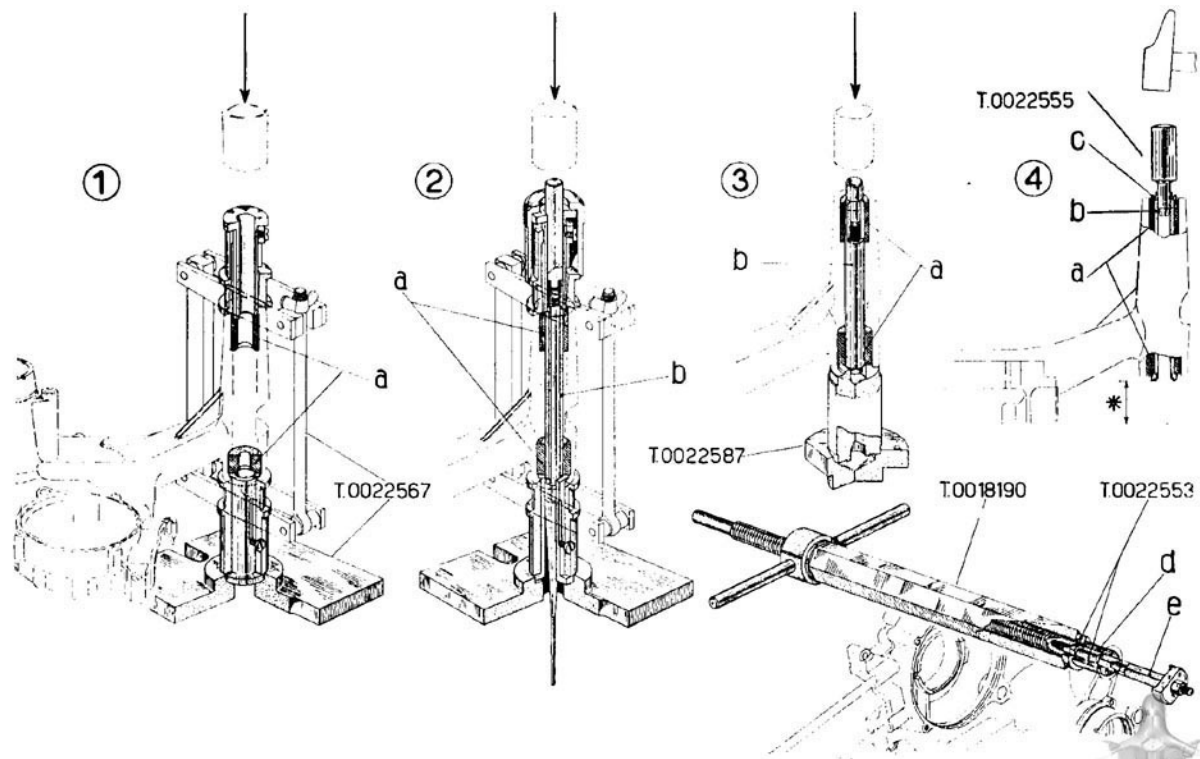


Fig. III.

Components for attachment of the engine to the frame and to the rear damper (see also next page).

Explanations to Fig. III.

(a) Rubber bush. (b) Spindle. (c) Shoulder washers. (d) Rubber bush. (e) Liner for attachment of rear hydraulic damper. Dip the rubber bush (d) and liner (e) in soapy water before assembling by means of tool provided.

Operation 1.

Dip the bushes in a soapy water solution. By the aid of a hydraulic press, with power of 5 tons at least force the rubber bushes in position seeing that their tapering ends show as indicated in the figure.

Operation 2.

Fit the spindle **b** into tapering sleeve (part No. 12 of the tool) and secure by means of part No. 17.

Place the whole as shown in the figure, lubricate the spindle with soapy water, then force it into the rubber bushes **a** by means of the hydraulic press.

Operation 3 (when necessary).

Centralize the spindle in the swinging arm operating by means of a hand press

on the spindle end which stands out more than required. The spindle should protrude from the swinging arm (flywheel side) so that, after assembling the spacer and bending the spindle end (operation 4), the latter is 45.3 ± 0.5 mm (1.8 ± 0.02 ") away from the joining surface of the crankcase halves (see dimension mark with an asterisk at operation 4).

Operation 4.

Mount the spacers and bend both ends of spindle **b**. See that the proper spacer (part No. 47946 or 48988 or 48989) is mounted on the bush with smaller diameter so that the latter is axially force fitted by 0-1.5 mm (0.06").

Notice. These components can also be assembled when the engine is completely mounted.

In such a case, of course, measuring the dimension marked with an asterisk at operation 4 would be very difficult; the Dealers should, therefore, make sure that the spindle stands out by the same amount on both sides of the swinging arm.



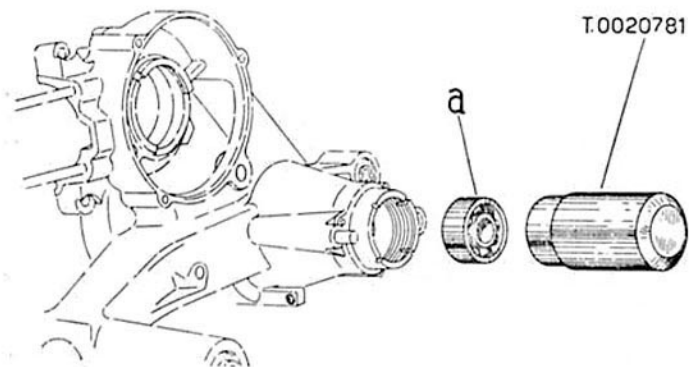


Fig. 112.
Mainshaft ball bearing.

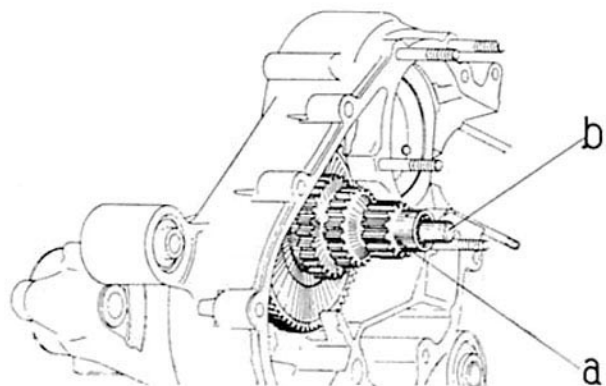


Fig. 113.
(a) Cush gear with layshaft and needle rollers. Secure the 23 rollers on their track by means of a layer of grease. (b) Insert the layshaft with rollers through the central hole and screw down the nut on the other end.



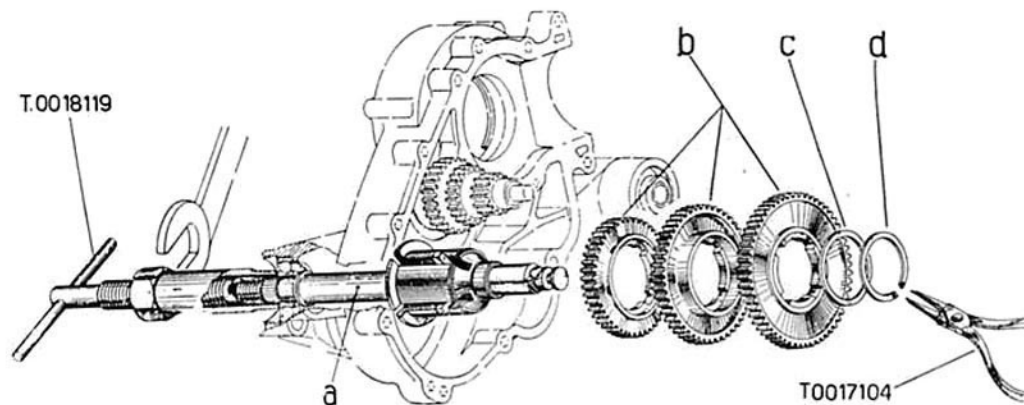


Fig. 114.

(a) Mainshaft (with selector and stem). (b) Gear pinions.

N.B. The 2nd and 3rd gear pinions are to be positioned with their collars turned outwards; the 1st gear pinion (largest diameter) is to be mounted so that its collar with more pronounced relief is turned towards the crankcase half, clutch side.
(c) Shoulder washer. (d) Circlip.

N.B. For assembling the shoulder washer see table at page 64. Axial play is to be checked with feeler gauge 0018094.



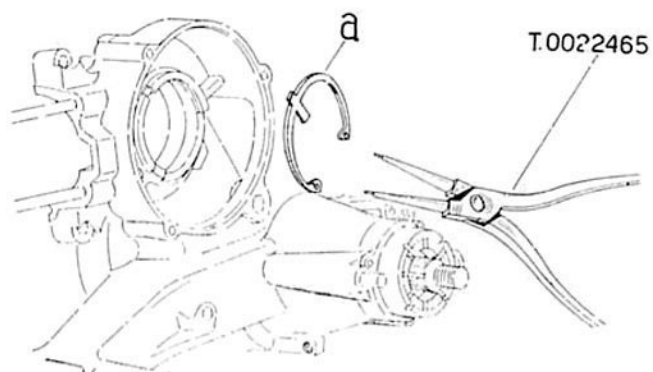


Fig. 115.

Circlip retaining crankshaft spacer (fit top end of the centralizing lug into its seating on crankcase).

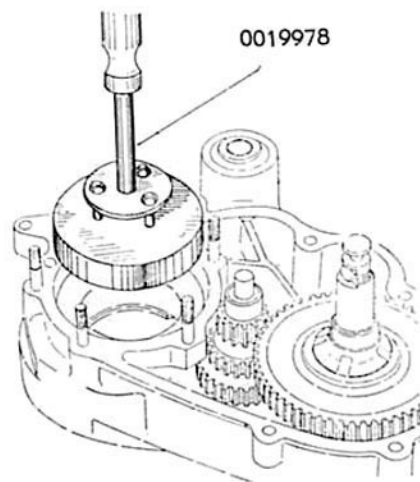


Fig. 116.

(a) Dip the main bearings for about 6 minutes into oil at 100°C (212°F) and mount them on the crankshaft. (b) Heat to 60°C (140°F), with heater 0019978, the crankcase bush, clutch side, where the main bearing will be housed.

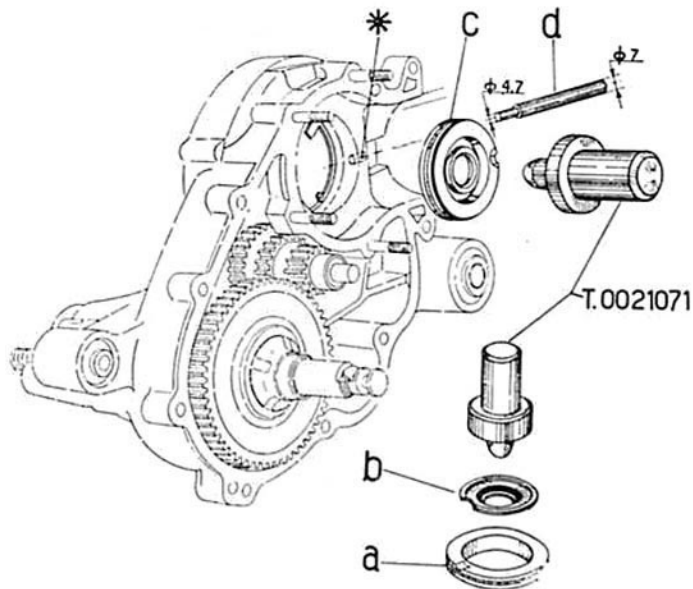


Fig. 117.

(a)-(b) Oil seal and packing on spacer (the slot on the oil seal should tally with that on the spacer).
 (c) Spacer with oil seal.

N.B. Make sure that the milled portion on the spacer tallies with the lug of the circlip.

(d) In order to avoid damage to packing "a" when assembling the spacer on crankcase, put the drift "d," having the dimensions shown in figure, into the hole marked with an asterisk: the drift portion with 4.7 mm dia. (0.18") must be as long as the hole on the crankcase half.



ENGINE RE-ASSEMBLY

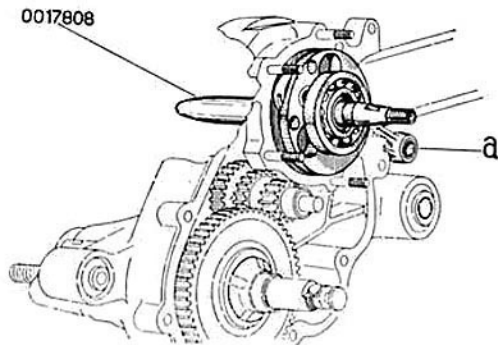


Fig. 118.
Crankshaft.

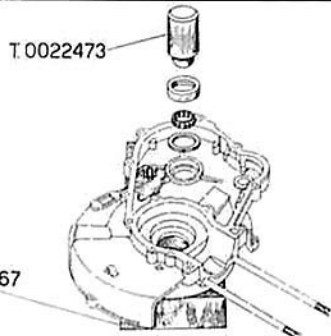


Fig. 119.
Mainshaft roller bearing.

N.B. Smear with grease the bearing cage, then mount the 14 rollers.

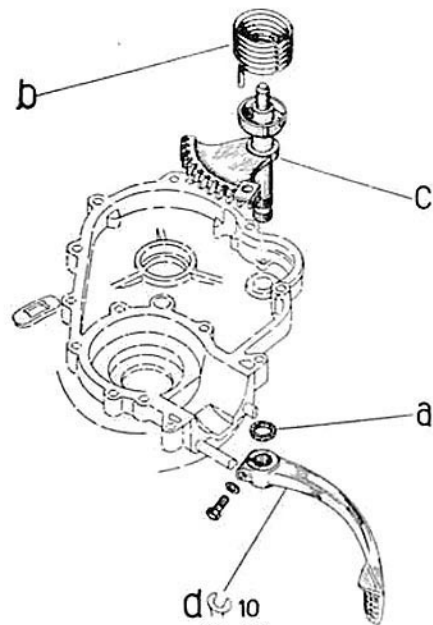


Fig. 120.
Starter assembly.

(a) Kickstarter packing. (b) Return spring (secure the spring end bent inwards in the slot of the boss on the sector axle). (c) Axle with gear sector and return spring. (d) Kickstarter.

Anchor the free end of spring in the hole of the crankcase.

N.B. Correct position of kickstarter is to be found practically with engine assembled on scooter; mate the kickstarter to the sector axle so that it can travel the entire stroke for starting the engine without interference with the engine cowling.

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ENGINE RE-ASSEMBLY

1. Assemble the starter pinion on the gear cluster of the cush gear, being sure that the side teeth of the pinion mesh with the corresponding set of teeth of the cluster.
2. Replace the two rubber buffers for the starter sector if they are damaged, and make sure they do not stand out beyond the joining surface of crankcase halves.
3. Mount oil seal on crankcase half, flywheel side (operation similar to, and to be performed with the same tool as, that for assembling the oil seal on the crankcase spacer, clutch side, Fig. 117).
4. If the thrust blades for the starter pinion must be replaced, secure them to the crankcase half, flywheel side, by means of suitable rivets and pad (see the list of spare parts); make sure the longer blade is assembled on the shorter.
5. Re-assemble the plug on the hole for the layshaft (crankcase half, flywheel side) seeing that the convex side of the plug is turned towards the assembler.

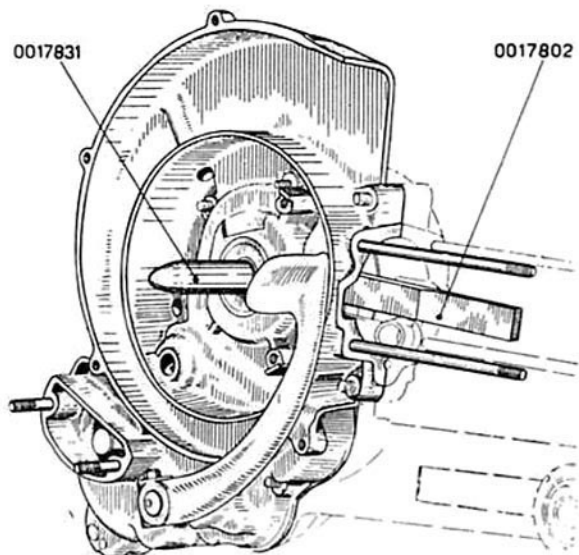
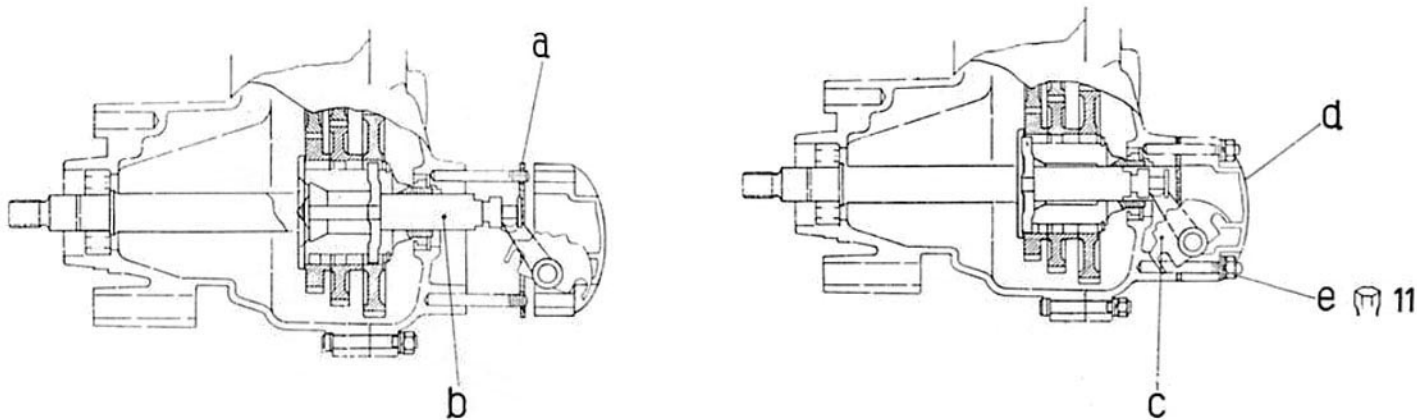


Fig. 121.

- (a) Clean the joining surfaces of both crankcase halves, smear the paper gasket with shellac and place it on one of the crankcase halves.
- (b) Insert wedge 0017802 between crankwebs; assemble the pilot sleeve on the crankshaft, flywheel side.
- (c) Join the crankcase halves: depress the kickstarter until the gear sector meshes with the starter pinion; assemble bolts, washers and nuts, tightening diagonally and evenly (see the section "Dismantling"). Remove the wedge and make sure the engine revolves freely; in case of failure, re-assemble wedge and tap on the crankweb ends with a wooden hammer.

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ENGINE RE-ASSEMBLY



Figs. 122-123.

- (a) Packing between gear shifter case and crankcase (smear the packing with "Hermetite" or similar compound).
- (b) Operate on selector stem until the selector engages the 1st speed gear.
- (c) Assemble the gear shifter unit, rotate the shifter into 3rd gear, position the skid of the lever in the stem track and allow the two securing studs on the crankcase to enter the two holes on shifter case.
- (d) Push the unit against the crankcase, and revolve the mainshaft so that the selector engages the 3rd speed gear; then secure the shifter case in final assembly position.
- (e) Assemble washers and nuts, then lock.



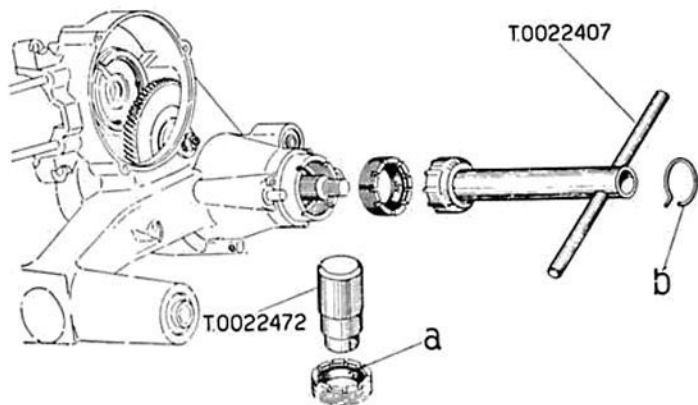


Fig. 124.

(a) Mainshaft oil seal. (b) Circlip.

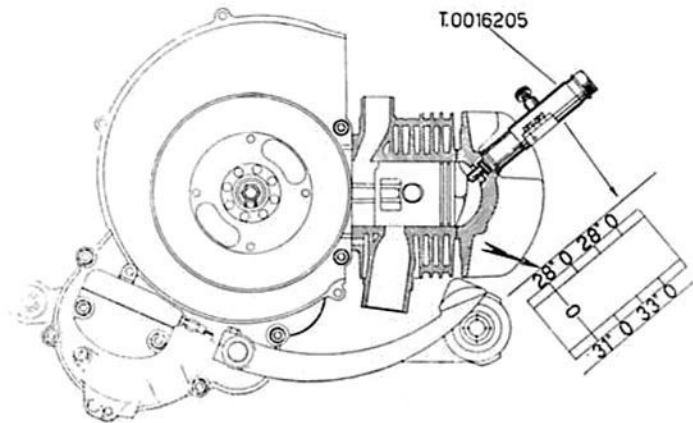


Fig. 125.

Timing the engine.

Bring the piston to the t.d.c. then let the zero mark of the outer sleeve of the tool T. 0016205 coincide with the line on the inner rod. Rotate the flywheel through 90° in an anticlockwise direction, then back again. The breaker points should clear exactly 28° before the t.d.c. If ignition is advanced (more than 28°) or retarded (less than 28°), remove the flywheel and rotate the stator on a clockwise or anticlockwise direction respectively. Tighten then the screws retaining the stator on the crankcase.

ASSEMBLY OF STEERING COLUMN

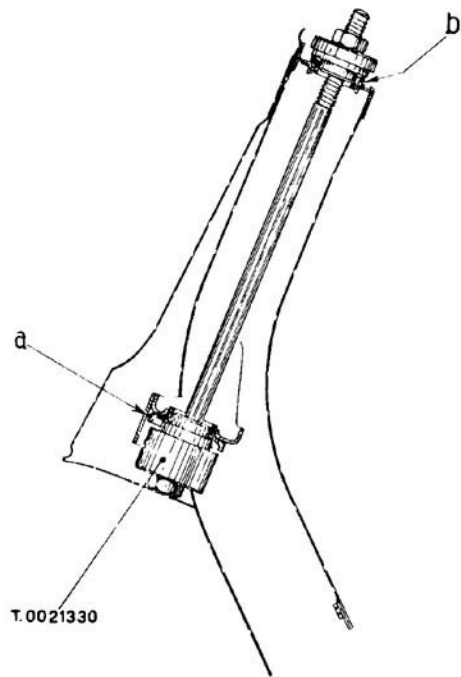


Fig. 126.

(a) Top race of bottom bearing. (b) Bottom race of top bearing.

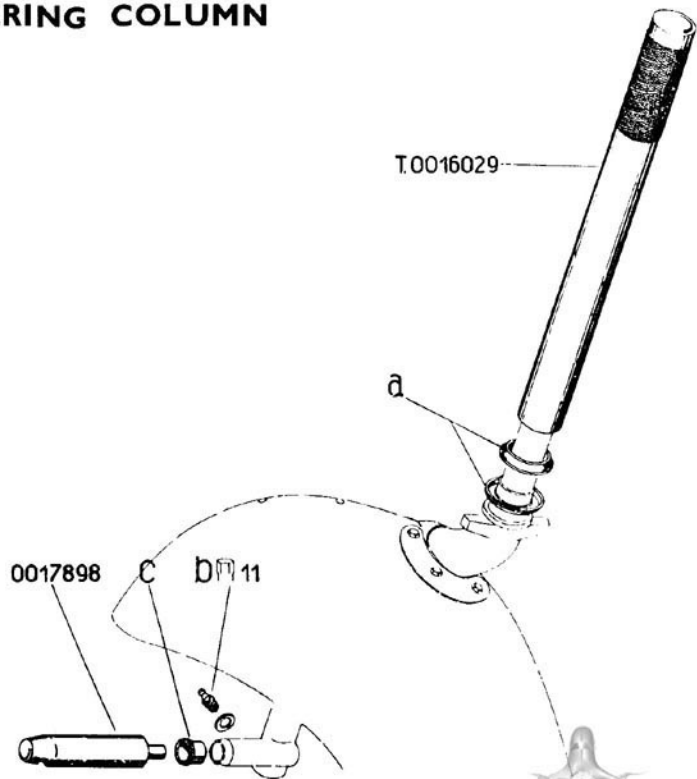


Fig. 127.

(a) Bottom race of bottom ball bearing and dust cover. (b) Grease nipple.
(c) Liner for wheel spindle.
N.B. See on page 91 the directions for checking steering column alignment.



ASSEMBLY OF STEERING COLUMN

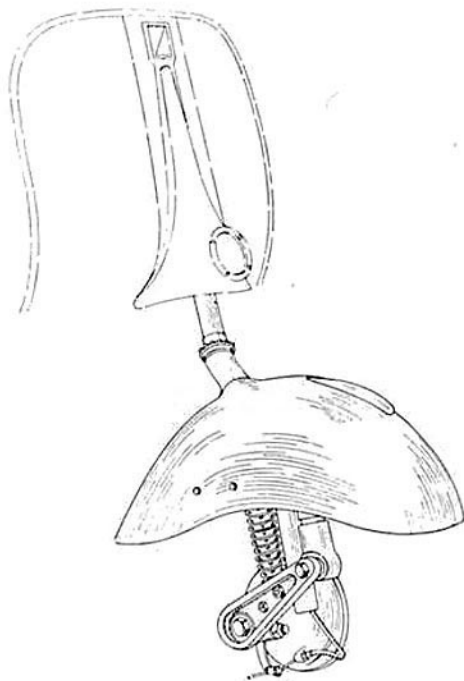


Fig. 128.

Steering column unit on the scooter (hold the 19 balls of bottom bearing in position by means of a layer of grease).

ASSEMBLY OF HANDLEBARS

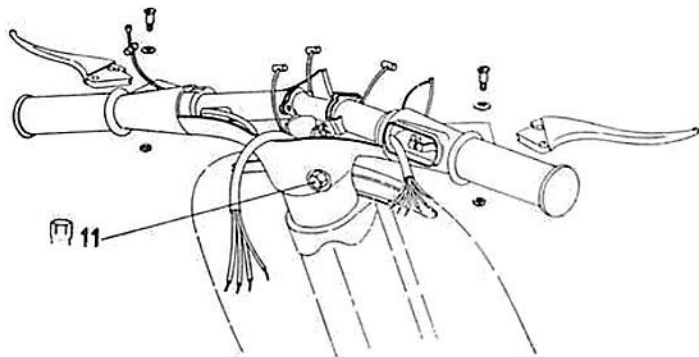


Fig. 129.

Handlebars on steering column (be sure that the nipples are soldered on the cables).

N.B. When mounting the speedometer, check the axial play of drive pinion is between 0.25-0.8 mm (0.01-0.03") and, if necessary, mount the shim washer, part No. 16209.

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ADJUSTMENT OF SADDLE SPRING

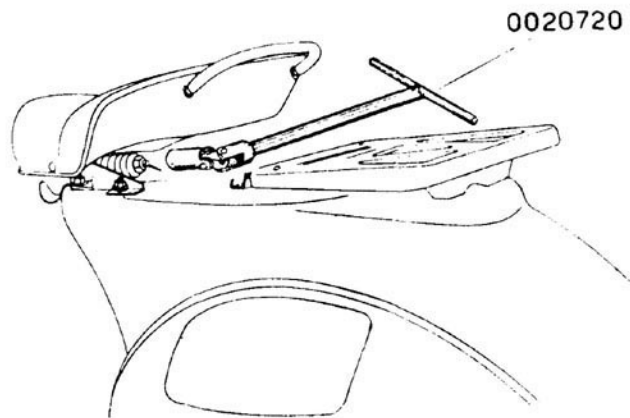


Fig. 130.

Saddle adjustment (the spring is adjustable according to driver's weight).

NOTICE: For all re-assembly operations not illustrated here, follow a procedure reverse of that explained in the section "Dismantling."

BEFORE STARTING OPERATION OF THE SCOOTER

After completing the overhaul of the engine or other units and, when required, testing engine and flywheel magneto on the test stands, inspect as indicated hereunder before returning the scooter to the owner.

1. Make sure that nuts and bolts are tight.
2. Oil level in gear box: the scooter standing upright, oil should just be about to flow out.
3. Efficiency of shock absorbers.
4. No leaks of either oil or fuel mixture.
5. Tyre pressure: 23 lbs. p.s.i. on rear wheel: 16 lbs. p.s.i. on front wheel. When the Vespa is ridden by both driver and passenger, the pressure of the rear tyre should be increased to 28 lbs. p.s.i.
6. Check assembly position of kickstarter (see N.B. at Fig. 116).
7. Efficiency of electric wiring.
8. Carburation (see page 98).
9. Brake efficiency.
10. Adjustment of clutch and gear change control cables (see pages 84 and 85).
11. Road holding with hands off.
12. Cleaning the scooter; use paraffin for the engine outside; wash the painted parts with water and wipe dry with chamois leather. Wipe off dust from the reflector with a very soft feather and keep fingers off reflector surface.

Notice. Such an inspection should be made by the Dealers on new scooters after unpacking, before they are handed over to the customer.



6.

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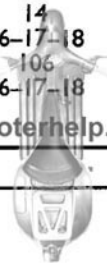
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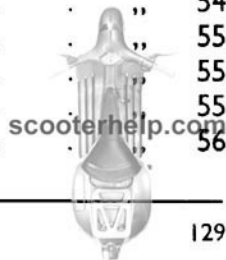
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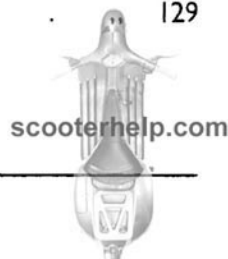
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When referring to this Model it is essential to quote
this reference:

125 c.c. 152L2/500/4.63/L.B. 2900

