



Vespa GS

===== SERVICE
STATION MANUAL





Vespa G.S.

SERVICE STATION
MANUAL

DOUGLAS (SALES & SERVICE) LTD., KINGSWOOD, BRISTOL

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This manual has been issued with the purpose of helping Dealers give the best service to the Customer.

Pages 1—125 refer to Model V.S.2.

Pages 126—127 refer to Model V.S.3.

Page 128 refers to Model V.D.2.T.S.

Vespa G.S.—V.S.4 Section, pages 1—34 at back of Manual.

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

It is essential that dismantling, re-assembling and inspections are carried out with suitable tools listed on pages 20-24.

We remind that, in order to obtain the best performance of the **Vespa**, faulty parts must be replaced with genuine **Vespa** spare parts. On the other hand, using parts of not genuine **Vespa** manufacture will invalidate any unexpired guarantee.



Fig. 1 - Vespa G.S.



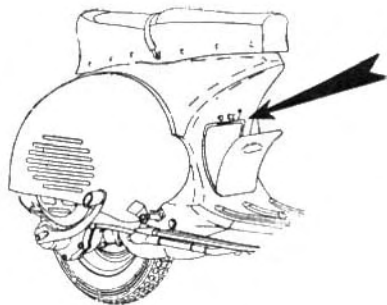


Fig. 2 • Stamping on frame.

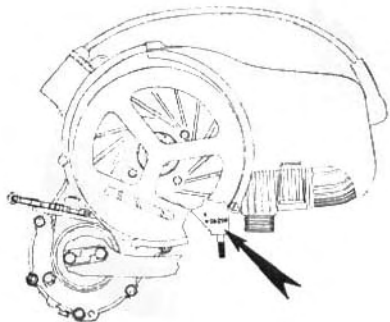


Fig. 3 • Stamping on engine.

IDENTIFICATION DATA

Serial numbers with prefixes are stamped on both frame and engine, in the positions indicated on Figs. 2 and 3 respectively.

Such numbers and prefixes identify the Vespa as prescribed by law and are repeated on the test card and other documents of the Vespa. They are to be quoted when ordering spare parts.

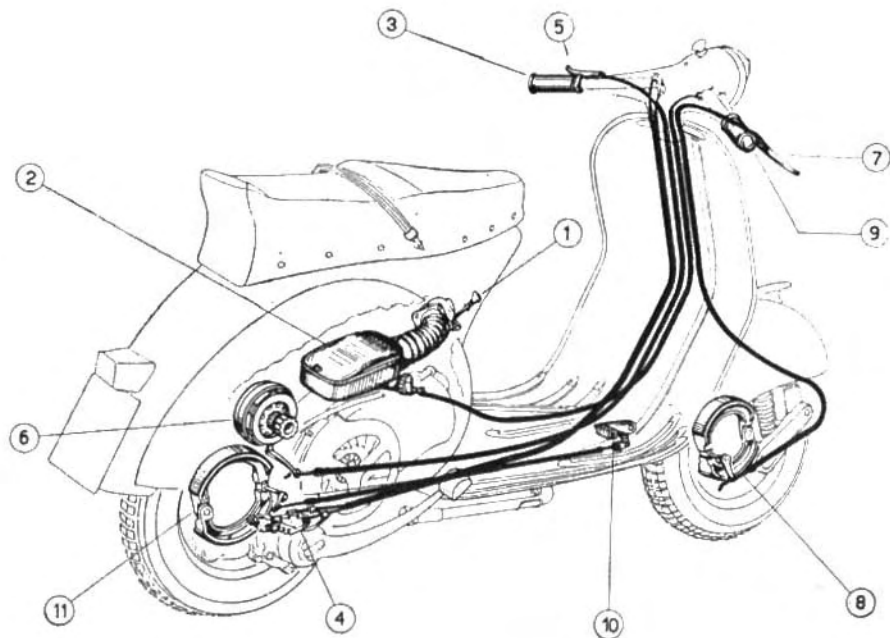


Fig. 4 • Diagram of controls.

1. Choke rod - 2. Air cleaner - 3. Gear change control twistgrip - 4. Gear shifter - 5. Clutch control lever - 6. Clutch - 7. Front brake lever - 8. Front brake jaws - 9. Throttle control twistgrip - 10. Rear brake pedal - 11. Rear brake jaws.



Ist Section
TECHNICAL DATA - DESCRIPTION



INTRODUCTION

The **Vespa G.S.** has exceptional features both for sporting and touring purpose, namely: high speed, brisk acceleration, excellent climbing and road holding, positive braking in all conditions. Besides, those remarkable features which have made Vespa models famous all over the world recur in the G.S.: quiet running, weather protection, excellent suspension and seating for a passenger.

TECHNICAL DATA - DESCRIPTION

Fuel consumption at economic speed	3 liters per 100 Km. 80 miles per USA gal. 95 miles per imp. gal.
Maximum speed (CUNA Standards)	100 Km/h (62 m.p.h.)
Max gradient climbable	1 in 3.3
Wheel base	1180 mm. (46.1")
Maximum width on handlebars .	700 mm. (27")
Maximum length of scooter . . .	1700 mm. (67")
Maximum height of saddle . . .	800 mm. (31.4")
Maximum height	1050 mm. (41.3")
Ground clearance	160 mm. (6.3")
Minimum turning circle	1400 mm. (55")
Weight, unladen (full tank) . .	111 Kg. (244 lbs.)
Fuel tank capacity	9.5 Liters (2.5 USA gals.; 2.1 imp. gals.)
Reserve fuel (included)	1.7 liters (.44 USA gals.; .37 imp. gals.)
Operating range	310 Km. (190 miles)

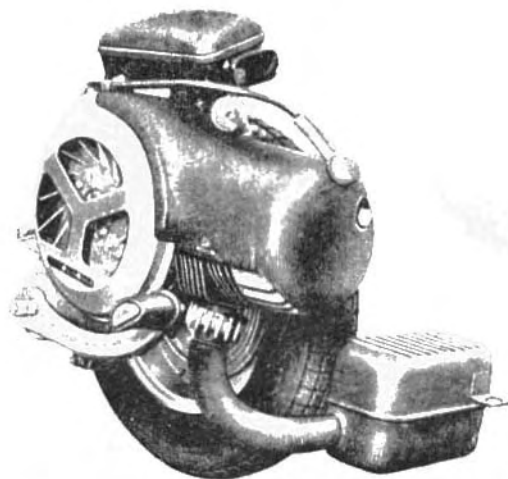


Fig 5 - Engine with carburettor, silencer and rear wheel [scooterhelp.com](http://www.scooterhelp.com)



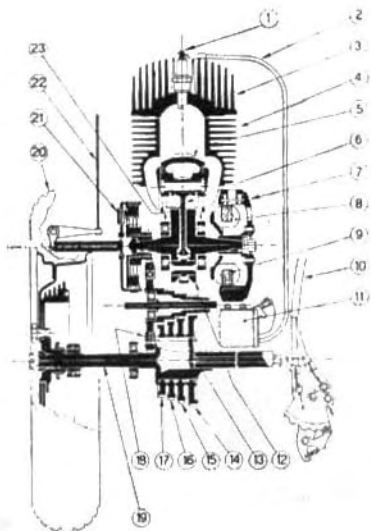


Fig. 6 - Scheme of the engine.

1. Spark plug - 2. Plug lead - 3. Cylinder head - 4. Cylinder - 5. Piston - 6. Connecting rod - 7. Flywheel - 8. Generating coil - 9. L. T. Coil - 10. To gear change control twistgrip - 11. Ignition coil - 12. Crankshaft - 13. Selector - 14. 1st gear - 15. 2nd gear - 16. 3rd gear - 17. 4th gear - 18. Cush gear - 19. Mainshaft - 20. Rear wheel - 21. Clutch - 22. To clutch control lever - 23. Crankshaft ball bearing.

ENGINE

Single cylinder, two stroke, with reverse flow scavenge.

Bore 57 mm. (2.24")

Stroke 57 mm. (2.24")

Displacement 145.6 cc. (8.88 cu.in.)

Compression ratio 6.7 to 1

BHP at 7.500 r.p.m. 8 h. p.

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

Piston in special light alloy, with low thermal expansion, high heat resistance and hardness when run hot; polished ball-shaped piston crown.

Crankshaft with internal flywheels; the crankwebs have tapering ends with key ways for assembly of clutch and rotor respectively.

Con. rod mated with the crankpin and with the gudgeon pin, through a row of rollers and through a bronze bush respectively.

Crankcase in two pieces, pressure die cast, in aluminium alloy.

Transmission. Directly from the crankshaft to the rear wheel through clutch, cush drive, and gear box.



Clutch and gear box. Multiplate clutch, wet type; cork-insert plates, interleaved with steel plates; control by lever on left hand side of the handlebars turning in unison with the gear change control twistgrip.

4-speed gear box with the following ratios:

1st gear:	1 : 14.72
2nd gear:	1 : 10.28
3rd gear:	1 : 7.61
4th gear:	1 : 5.87

Both clutch and gear box are operated by adjustable cables.

Starting. By kickstarter on right hand side of the scooter. It disengages on the return movement being pulled back by a spring.

Ignition. By battery; external ignition coil, with primary circuit fed with d.c. by a 6V - 12Ah battery and not by the flywheel magneto directly.

This ignition system secures a longer service life of the sparkplug and an easier starting.

The ignition circuit is controlled by means of a key in the switch on top of head lamp housing.

Sparkplug, Marelli CW 240 B.

Ignition timing with spark advance of $31^{\circ} \pm 1^{\circ}$.

Important: To avoid that the battery becomes discharged when the engine is turned off, we recommend not to let the key of the switch inserted in the running positions.

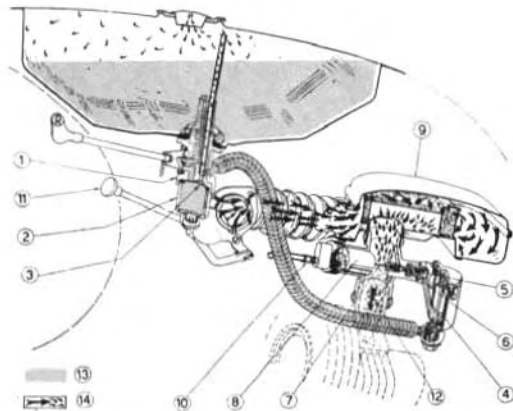


Fig. 7 - Fuel system and air cleaner.

1. Three way fuel cock - 2. Sediment bowl - 3. Filter - 4. Float - 5. Maximum jet - 6. Jet spray nozzle - 7. Needle valve - 8. Throttle slide - 9. Air cleaner - 10. Idling adjuster - 11. Choke rod - 12. To the cylinder - 13. Fuel - 14. Air.



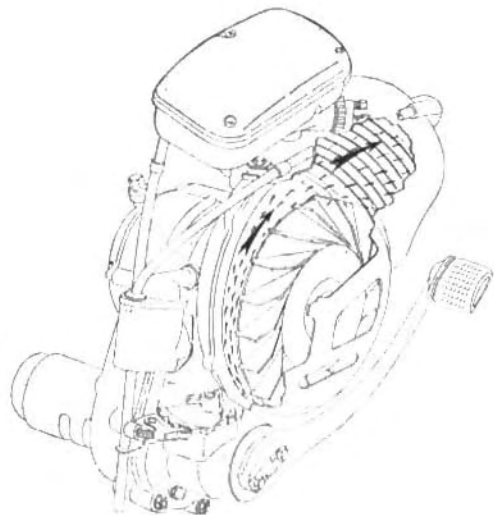


Fig. 8 - Engine cooling scheme.

Fuel system. Gravity fuel system through two wire gauze filters. The carburettor is mounted directly on the cylinder by means of a short pipe and supports the air cleaner (see fig. 7).

Carburettor. Dell'Orto, type UB 23 S 3 with special air cleaner and choke.

Normal maximum jet: 103/100.

Idling revs can be raised or lowered by adjusting the screw (Fig. 7, No. 10) which presses on the carburettor cover.

Cooling. Cooling air from a fan with sloping radial blades, secured to the flywheel, is blown onto the generous finning of both cylinder and head (see Fig. 8). Consequently the air flow is controlled by the engine speed thus ensuring efficient cooling under all conditions.

Air cleaner and silencer. The air-cleaner consists of large intake with choke valve controlled by a rod installed near the lid on the front panel of the body, and of a metal wadding moistened by fuel mixture.

The silencer is of the expansion and absorption combined type.

Note: In order to maintain efficiency, the silencer and air cleaner should not be altered.



FRAME

Stressed skin body of pressed steel sheet, with streamlined monocoque type structure.

Handlebars in light alloy, with arrangement for head lamp and speedometer.

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

Steering column, suspension and wheel. Handlebars are clamped on top of steering column.

The front wheel swinging hub is pivoted at the bottom of the column.

Front suspension with variable rate coil spring and double action hydraulic damper.

Rear suspension. Swinging bracket for engine and rear wheel; variable rate coil spring and coaxial double action hydraulic damper.

The wheels are interchangeable with rims of pressed steel sheet, \varnothing 10". Tyres of dia. 3.50 - 10".

Saddle. The long dual seat permits the driver to assume a crouched position and also provides ample and comfortable seating for a passenger. It gives remarkable comfort being stuffed with sponge rubber and having special steel springs. Access to the fuel tank filler is obtained by swinging the dual seat towards the front of the scooters (see Fig. 11).

Brakes. Expanding type with cable control. Front: lever

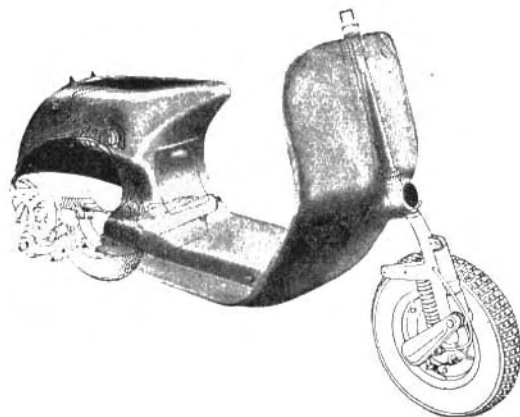


Fig. 9 - Stressed skin body.

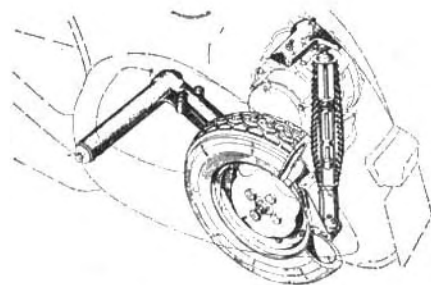


Fig. 10 - Rear suspension.

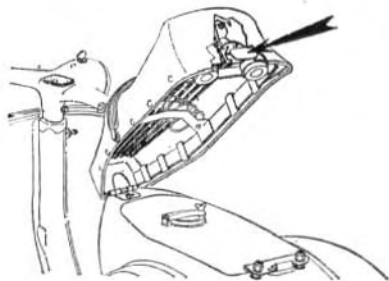


Fig. 11 - Swinging the saddle in front.

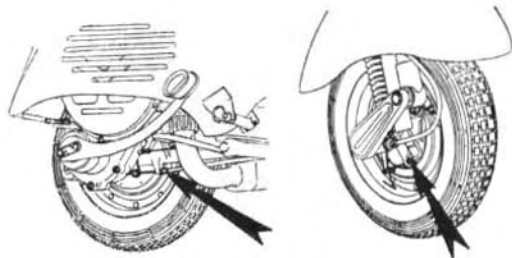


Fig. 12 - Brake adjustment.

on right hand side of handlebars; rear: control pedal on right hand side of floorboard.

Drums in light alloy with cooling fins.

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 an arrow in Fig. 12.

Central stand. A two-leg stand, easy to operate, is arranged under the floorboard.

Two strong return springs hold it in contact with the floorboard and keep it from vibrating while the scooter is being ridden.

Steering lock. A suitable security lock is arranged on the frame, near the handlebars. Turning the key anticlockwise and the handlebars to the left, the lock engages the lugs welded on the steering column, so that the machine can only turn around. Turn the key clockwise for releasing the steering system (see Fig. 13).

We recommend not to lubricate the steering lock, even if it does not function properly.

Do not attempt to ride the machine unless the key is in, and remains in the lock and the handlebars move freely.

Speedometer. The speedometer is applied in the middle of the handlebars (see Fig. 13).



It is driven by the front wheel, the flexible shaft being completely enclosed in the steering column.

The speedometer head is lit during rides at night by a bulb installed in suitable position in the head lamp.

ELECTRIC WIRING SYSTEM

Either alternating or direct current for both horn and lighting system is supplied as follows (see Fig. 14a and Fig. 14b).

- Traffic and country beam and tail lamp are directly fed with a.c. by the six-pole flywheel magneto (nominal voltage: 6 V).
- Horn, parking lights front and rear, and STOP light are fed with d.c. by a 6 V - 12 Ah battery which is re-charged by the flywheel magneto through a metallic rectifier.
- Speedometer head is lit by a 6 V - 1.5 W bulb fed either with alternating or direct current.

The head lamp, \varnothing 115, arranged in the handlebars is provided with a 25/25 W double filament bulb (traffic and country beam), and with a 3 W bulb (town and parking light).

The tail lamp with red reflecting glass has a 5 W bulb, which also lights the number plate, and a 15 W bulb (STOP light) that is operated through a suitable switch when the rear brake pedal is depressed. The main switch, where a key must be inserted completely (position O), is placed on top of the head lamp.

It can be turned into the following positions (see Fig. 14a):

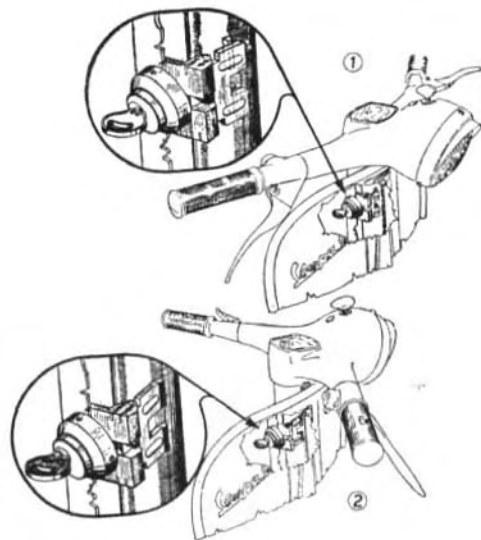


Fig. 13 - Security lock,

1. Normal position - 2. Closed.

1. Country beam
2. Traffic beam
3. Horn button
4. Dimmer switch with horn button
5. From dimmer switch (clamp 3) to head lamp (country beam)
6. From dimmer switch (clamp 2) to head lamp (traffic beam)
7. Inside view of the head lamp
8. From head lamp to flywheel magneto (white)
9. From main switch (clamp 3) to dimmer switch (clamp 1)
10. From main switch (clamp 6) to dimmer switch (clamp 0), white
11. From main switch (clamp 3) to horn
12. From main switch (clamp 7) to ignition coil (clamp 2)
13. From rectifier to main switch (clamp 4)
14. From main switch (clamp 7) to horn
15. From main switch (clamp 8) to speedometer bulb
16. From main switch (clamp 5) to tail lamp
17. From flywheel magneto to main switch (clamp 2)
18. From main switch (clamp 1) to pilot light
19. Five position main switch
20. Bulb for pilot and parking light, 6V - 3W
21. 6V - 25/25 W double filament bulb (country and traffic beam)
22. Horn
23. Switch positions. P: parking lights on, ignition off; 0: lights and ignition off; 1: riding during the day; 2: riding at night with speedometer light, pilot light and tail lamp on; 3: riding at night with speedometer light, head and tail lamp on.
24. From flywheel magneto to rectifier
25. Rectifier
26. From rectifier to STOP switch
27. From rectifier to positive pole of battery
28. Fuse.
29. STOP switch
30. From STOP switch to respective bulb in the tail lamp housing
31. From ignition coil to breaker in flywheel magneto
32. Ignition coil
33. Plug lead (from ignition coil to sparkplug)
34. Tail lamp
35. Earthing cable for battery
36. To flywheel magneto
37. Clamp board
38. Battery 6 V - 12 Ah
39. Sparkplug
40. Speedometer bulb, 6 V - 1.5 W
41. Flywheel magneto
42. Flywheel rotor
43. Stator.
44. To the clamp board
45. To the ignition coil (clamp 1)
46. Bulb for number plate light, 6 V - 5 W
47. Bulb for STOP light, 6 V - 15 W

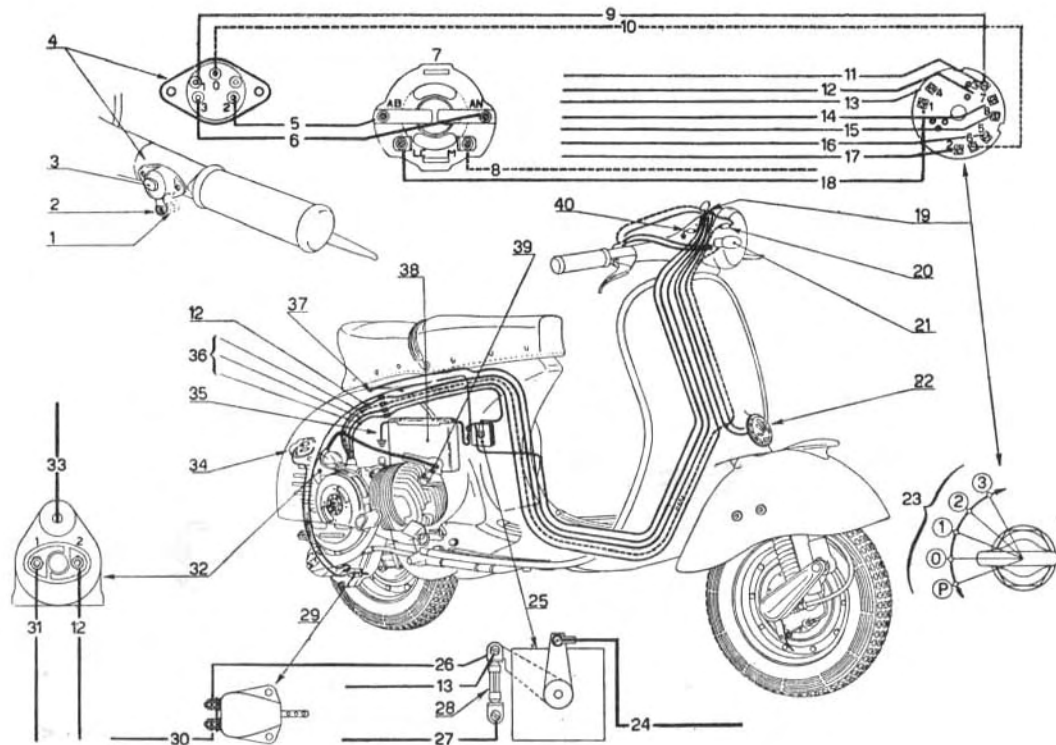


Fig. 14a) - Electric wiring installation.



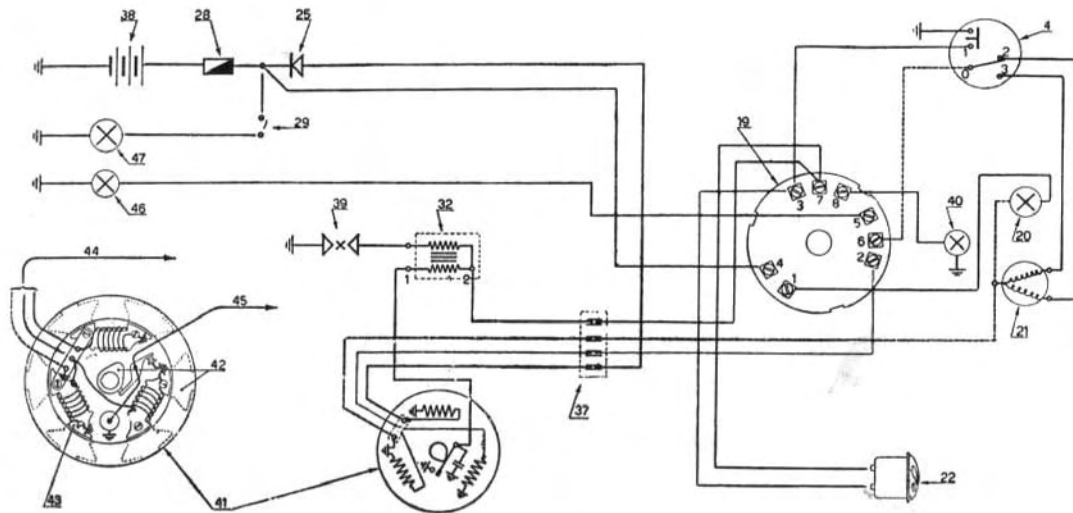


Fig. 14 b) - Electric wiring diagram.

- | | | |
|----|------------------|---------------------------|
| P: | contacts 4-1-5 | } connected to each other |
| 0: | contacts 1-5 | |
| 1: | contacts 4-7 | |
| 2: | contacts 1-5 | |
| 3: | contacts 4-1-5-7 | |
| | 2-5-6 | |

- P) - Parking light on, ignition off.
- O) - Lights and ignition off.
- 1) - Ignition circuit only connected.
- 2) - Riding at night with town lamp, tail lamp and bulb for speedometer on.
- 3) - Riding at night with head lamp, tail lamp and bulb for speedometer on.

On the right hand side of the handlebars is installed the dimmer switch (country beam-traffic beam) with horn button.

SETTING THE HEAD LAMP

The correct orientation of the main beam can be obtained on both vertical and horizontal planes, as said below.

- Make sure that front and rear tyres are inflated to 1.2 and 2.5 atm. (17 and 35.5 psi) respectively.
- Place the scooter on level floor in front of white wall, where a point « O » has been marked, as seen on Fig. 15.
- Start the engine, hold the throttle control twistgrip at about 1/3 and switch on « country beam ».

With two persons on the Vespa, the beam axis should coincide with point « O » on the wall. If not, slacken the screws « V » (Fig. 15), move the head lamp as required, then tighten the screws « V » again. This operation can be carried out also with driver only sitting on the saddle. In such a case, of course, the beam alignment should be altered whenever the scooter is being ridden by both driver and passenger.

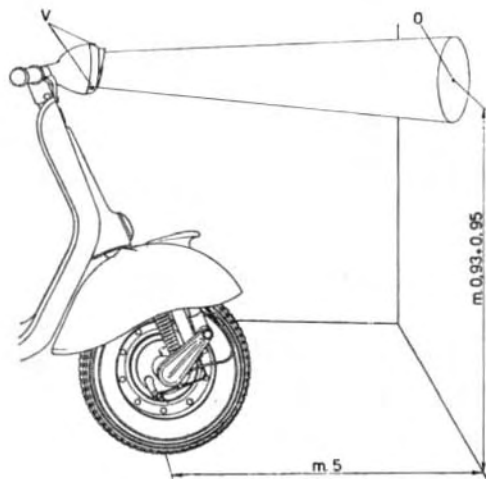


Fig. 15 - Adjusting the head lamp.



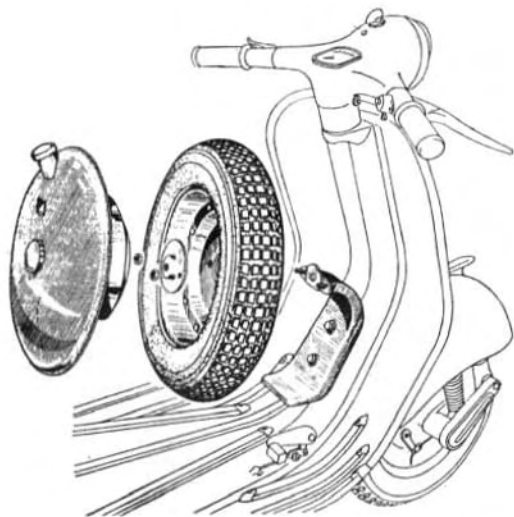


Fig. 16 - Reserve wheel and tank.

TOOL KIT

- 2 double-ended box spanners (11-14, 21-22 mm.)
- 1 double open-ended spanner (11-14 mm.)
- 3 single open-ended spanners (7-8-10 mm.)
- 1 off-set handle for box spanners
- 1 screwdriver.

These tools are contained in a canvas roll which is placed in the left wing together with this booklet and the test card. A security lock is arranged on the lid of the tool box.

ACCESSORIES

On request the Vespa G. S. scooter can be equipped with:

- **Spare wheel and support.** The wheel support, with a packing in-between, can be secured to the two holes in the middle of the longeron. It is very simple and holds the wheel in a vertical position, quite easy to reach (see Fig. 16).
- **Reserve tank.** It contains 5.2 liters (1.37 USA gal.; 1.15 imp. gal.), and can be arranged into the recessed portion of the spare wheel.

OPERATION

Running-in. Important rules to be followed while running-in (3000 Km. or 1800 miles):

— Do not exceed following speeds:

in 1st gear: 25 Km/h (15.5 mph)	
» 2nd » 40 » (25 »)	
» 3rd » 55 » (34 »)	
» 4th » 70 » (44 »)*	
» » 80 » (50 »)**	

* For the first 2000 Kms (1200 miles).

** From 2000 to 3000 Kms (1200 to 1800 miles).

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

— Change oil in the gear box after the first 1000 Kms (600 miles).

— Check that nuts and bolts are not slack after the first 1000 Kms (600 miles).

Fuel mixture to be used. Fuel mixture should be composed of gasoline and oil Essolube 30 in following proportions: 65 cc. of oil to 1 liter of gasoline (1/2 pint per gal.) both during and after running-in. Customers may also ask for 6% ESSO MIX.

Notice: We recommend to use good quality standard grade car gasoline, and to mix oil with gasoline thoroughly. Keep the breather of filling cap clean.

Starting the engine: Insert the key completely into the switch and turn it in the running position.

Open the fuel tap, put the gear box in neutral and the throttle in slow running position, kick the starting lever. With cold engine, pull the choke rod (see Fig. 7). Once the engine started, take care to push the choke rod back. If trouble is due to the fact that the battery is discharged, disconnect the black cable of the battery from the electric wiring.

The above procedure is to be followed in emergency cases only, riding the machine very carefully without exceeding the speed of 60-65 Km/h (37-40 mph) even for short distances.

The owner should, however, have the wiring of his machine checked immediately by a sale agent, so that the Vespa can be operated in the normal way again.

Instead of following the above mentioned procedure, one can try to «push-start» the scooter; engage second gear, depress the clutch and push the machine to a certain speed; suddenly release the clutch lever and pull it back as soon as the engine goes on.

Engine flooding can be overcome with the «push-start» procedure, or with the following method:

— Close the fuel tap, remove the sparkplug and rotate the engine by means of the kickstarter, wipe the plug dry and screw it back. Open the fuel tap and kick the starting lever.



Setting the machine in motion: Let the engine idle, depress the clutch and turn the gear change twistgrip so that the line engraved on it coincides with the figure « 1 » (1st gear) engraved on handlebars. Now let in the clutch gently, while opening the throttle gradually to set the machine in motion.

Gear change: After reaching the required speed in 1st gear, close quickly the throttle, depress the clutch and turn the gear change twistgrip so that the engraved line

is opposite figure « 2 » (2nd gear); let in the clutch and open the throttle.

Repeat this procedure for changing into 3rd and then into 4th gear:

Follow a similar procedure for changing down.

When you reduce the speed of your machine change down with no delay.

Notice: Do not open the throttle while the engine is running in neutral.

MAINTENANCE

For normal maintenance, instructions are given in "Operation and Maintenance" booklet.

For lubricating the machine, follow the "Lubrication Chart" and the lubrication scheme at Fig. 17.

Fault finding, unit overhauls, remedies, etc., are dealt with in special sections of the present Manual.



LUBRICATION CHART

Part to be lubricated		Lubricant				
Every 2,500	Every 5,000	Shell	B.P.	Esso	Wakefield	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 6% or ¼-pint to 1 gall. petrol	Energol Two-Stroke Oil in ratio of 6% or ¼-pint to 1 gall. petrol	Essolube 30 in ratio of 6% or ¼-pint to 1 gall. petrol	Castrol XL in ratio of 6% or ¼-pint to 1 gall. petrol	Mobiloil A in ratio of 6% or ¼-pint to 1 gall. petrol

G.S. only.

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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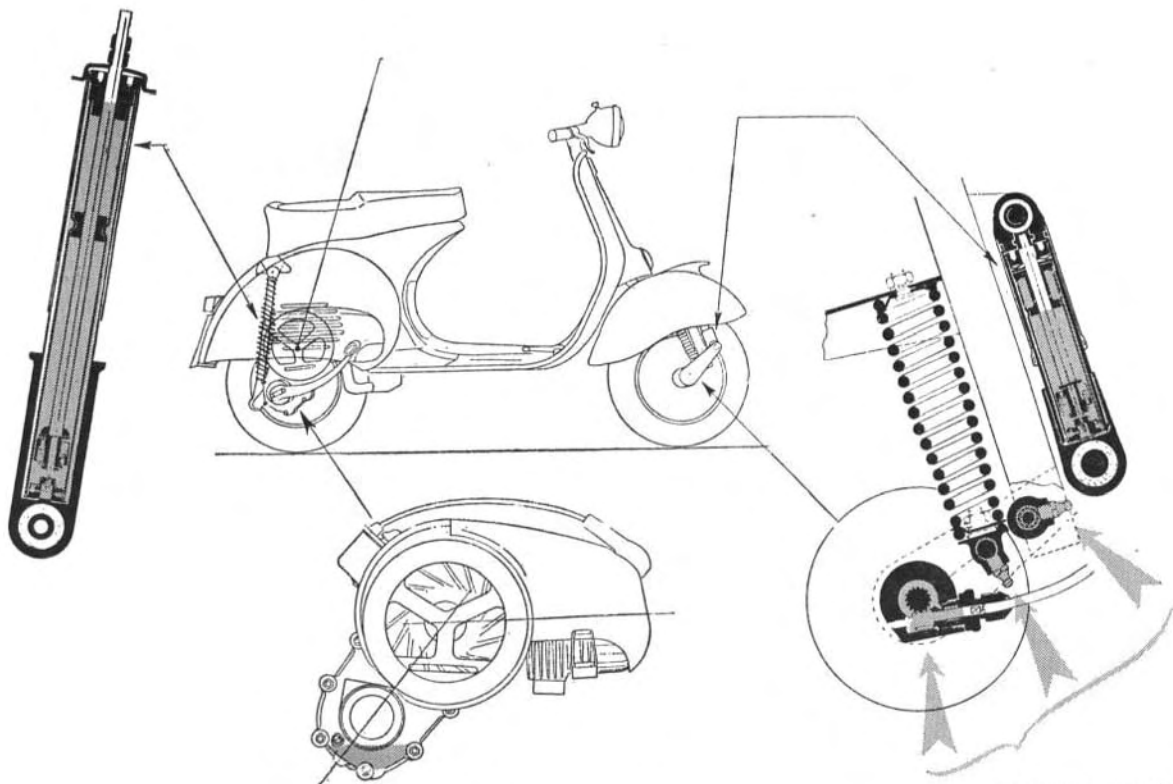


Fig. 17 - Lubrication scheme.

BEARING GREASE





2nd Section
UNPACKING



UNPACKING AND RE-ASSEMBLING THE SCOOTER

A) - CAGE

Proceed for following steps:

1. - Unpacking the scooter and loose components.
2. - Fitting back said components.

1. - Unpacking

- Unscrew nuts « a » and « b » (see Fig. 18), slide off respective bolts or rods, lift off the cage top, seeing that the frame or mudguard are not bumped nor scratched.
- Unscrew, on the right hand long side of the cage, the two nuts « c » securing the angle iron which holds the steering column.
- Separate the angle iron from the front wheel hub, and lay the steering column in a safe position to prevent it getting damaged.
- Unscrew the nuts which secure the rear wheel flange to the angle iron on the cage bottom, unscrew the nuts « d » and remove the cross board bearing on the floorboard, then remove the bar secured at the rear of the dual seat.
- Lift the scooter off the crate and place it on a stand 90 cm. high (about 3.ft.), thus enabling assembly of the steering column.

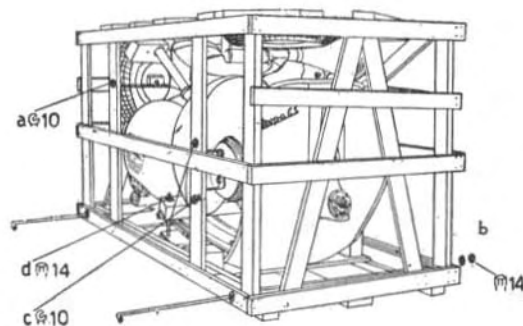


Fig. 18 - Cage.



- Release the scooter from the paper wrapping, wipe clean all parts that had been greased to prevent rusting.

2. - Assembling loose components

Following items are contained in the tool box:

- Test card, booklet « Operation and Maintenance » and other papers.
- Tool roll.
- Speedometer with packing and screws.
- Licence plate holder (with spacers, screws, washers and nuts) and keys of the security lock.
- Upper race, lock washer, threaded ring and balls for steering column top bearing.
- Balls for steering column bottom bearing.
- Bolt and nut clamping the front brake control cable.
- Bolt, washers and nut for handlebars.
- Kickstarter and tab plate for locking the two screws; the latter are screwed in position on the starter bush.

Assemble following the procedure explained below.

- Steering column: first unscrew the nut in speedometer housing then push off the tie bolt downwards. Slide the steering column in through the bottom orifice of the steering cover as said on page 29; hold the handlebars to avoid damages to the electric and control cables.
- Handlebars.
- Speedometer.
- Connecting front brake control cable.

- Connecting clutch control cable.
- Kickstarter.
- Licence plate holder.
- Charging and servicing the battery as said on the accompanying four-language instruction card.

N. B. - We recommend the Agents to read sections « DISMANTLING » and « RE-ASSEMBLING » before undertaking this work.

After assembly, carry out inspections and final operations as said on page 117. *

B) - CRATE FOR VESPA G. S. WITH WHEELS ONLY REMOVED

Proceed per following steps:

1. - Unpacking the scooter.
2. - Assembling the wheels.
3. - Final operations.

1. - Unpacking

- Undo the screws (1) and take off the crate cover (see Fig. 19); unnailed, from the long sides, the cross bar (2) supporting the cover.
- Using the hand tools in the left wing, remove the wheel (3), secured on a long side of the crate, and the cross board (4) bearing on the scooter floorboard; unnailed the wooden block retaining the handlebar, then remove the bar (5) secured at the rear of the dual seat.



— Lift the scooter out of the crate, taking care to avoid bumping or scratching the body, and place it on a stand 90 cm. high (about 3 ft.); the crate itself, turned upside down, may be used for this purpose. (see Fig. 22).

2. - Assembling the wheels

— Remove the wheel rim from the rear wheel flange, unscrew the ten nuts so that the disc and flange will fall apart.

— Take the inner tube from the tool box and place it into the tyre, then inflate it a little, so it will assume proper shape. Place tyre and tube on the disc, the curved valve stem through the hole in the flange, fit the latter on the disc; assemble washers and tighten nuts crosswise and gradually.

— Make sure that the tyre pressure is as prescribed, assemble the wheels on respective flanges and secure with spring washers and nuts, tightening crosswise and gradually.

— Lift the scooter and place it on its central stand.

3. - Final operations

a) - Remove the rubber sheath from the breather on the clutch cover (Fig. 20, No. 6).

b) - If necessary, operate the clutch control adjuster screw (Fig. 20, No. 7), on engine bracket. The cable is to be tensioned or loosened, as the case may be, so that the control lever on handlebars (Fig. 20)

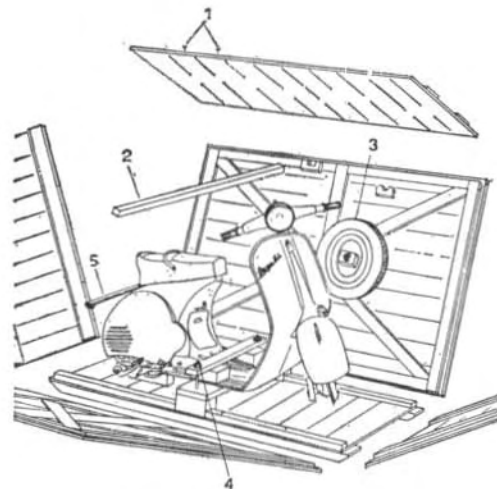


Fig. 19 - Crate for Vespa G.S. with wheels only removed.



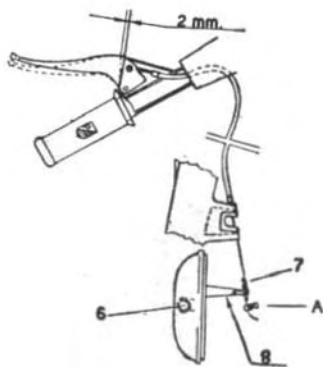


Fig. 20 - Clutch control adjustment.

makes a move of 2 mm. (.078") before the lever (Fig. 20, No. 8) on the engine starts operating. Wrong play in the control may cause the clutch plates burning out even in normal running conditions.

- c) - Remove the level screw, from the oil filling hole on the crankcase; with the scooter placed on its central stand on a level surface, the oil should just be about the flow out; otherwise top up.

After these operations the machine is ready to start; follow the instructions in this manual and in the booklet « Operation and Maintenance » for what may concern refilling, starting the engine, gear change and cut - out.

C) - CRATE FOR VESPA G. S. WITH UNITS REMOVED

Proceed per following steps:

- 1 - Unpacking the scooter and the parts secured to the crate; preparing units for assembly.
- 2 - Assembling the scooter.
- 3 - Final operations.

1 - Unpacking

- a) - Undo the screws (Fig. 21, No. 1) and take off the crate cover; empty the tool box, use the hand tools contained therein for removing the parts secured to the long sides of the crate.

- b) - Unnail the left hand long side (Fig. 21, No. 2) release the scooter and take it out from the crate. If no proper working bench is available, nail the long side in position again, turn the crate upside-down, then place the scooter thereon as shown in Fig. 22.
- c) - Place in order the parts removed from the crate sides and the tool box. Clean carefully all components which had been greased to prevent rusting.

2 - Assembling the scooter

a) - Steering column.

- First unscrew the nut in the speedometer housing, then push off the tie bolt downwards.

For this and subsequent operations, hold the handlebars to avoid damaging the electric or control cables.

- Grease the lower race (Fig. 22, No. 3) of the top bearing and mount 28 balls (5/32"); grease the lower race (Fig. 22, No. 4) of the bottom bearing and place 19 balls (5/16") thereon.

Open the security lock of the steering column.

- Slide the steering column in through the bottom of the steering cover, seeing that the control or electric cables are not damaged. Centralize the column properly, f. ins. by inserting a screwdriver through the top orifice; when the steering column just projects from said orifice, see that all balls are in proper posi-

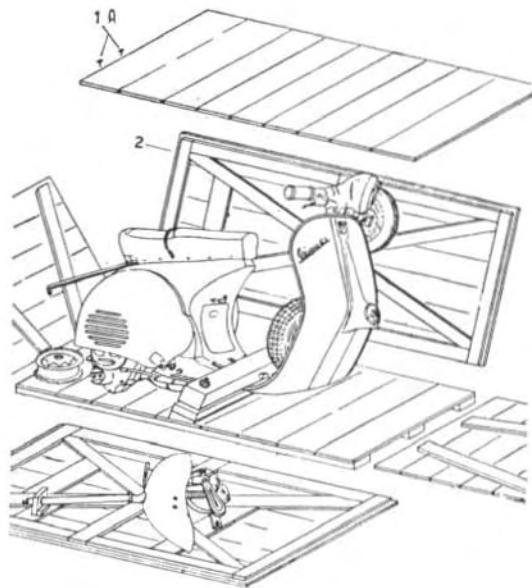


Fig. 21 - Crate for Vespa G.5. with units removed.



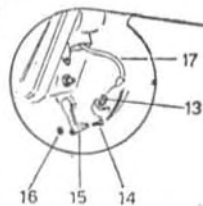


Fig. 22 - Assembly of steering column.

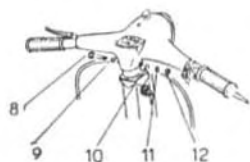


Fig. 23 - Assembling the handlebars.

tion. Lift the column until it is completely in its housing. Screw the upper race (5) by hand on the top thread, then tighten with proper spanner until all endwise movement is eliminated but still the steering column rotates freely.

This may be checked by the following test: from « straight ahead » position, the weight of the assembly should cause the steering column to fall freely to either left or right. If the adjustment is too tight and the unit does not fall freely, loosen the race (5) until proper adjustment is reached.

Slide the lock washer (6) over the top end of the steering column, screw the locking ring (7) then tighten.

b) - Handlebars and speedometer.

— Insert the front brake control cable through the hole in the steering column, until it protrudes from the bottom, then place the handlebars on top of the steering column in proper position to insert the bolt (Fig. 23, Nq. 8) with plain washer (9) under the hexagon; place another plain washer (10), spring washer (11) and screw the nut (12) finger-tight.

— Screw and tighten the threaded ring (on the flex drive sheath protruding from top of the steering column) to the boss of the speedometer head, and be sure that the rubber packing is in position; press lightly the instrument into its housing, at the same time pulling the sheath from the bottom (wheel side), then secure with the screw.

c) - **Front brake control cable.**

- Pass the lower end of the brake control through the hole of the adjuster screw (Fig. 22, No. 13) then through the hole in the bolt (14) between the brake links (15); tighten the nut (16).

Very important: When you adjust the front brake control cable, be sure that you leave a large generous loop (Fig. 22, No. 17) from the point where the cable emerges from the steering column to the adjuster screw.

- If this is not done, swinging of front suspension may tension the cable with consequent **locking of front wheel.**

The adjustment of the control can be checked by rotating the brake drum. If friction is noted, loosen the nut (16) and allow the cable to slide back until the wheel rotates freely, then tighten the nut again.

d) - **Clutch control**

- Tension the clutch control cable and lock it by means of terminal screw « A » (see Fig. 20).

e) - **Kickstarter**

- Undo the two screws (Fig. 22, No. 18) by means of the « T » spanner, place the kickstarter in position; fit the tab plate (19) then secure with the screws.

Very important: After tightening the screws, bend the edges of the tab plate on their hexagons to press against one face, in order to prevent loosening of the screws and consequent loss of kickstarter.

f) - **Wheels.**

- Make sure that the tyres are inflated to the prescribed pressures, then fit the wheels (interchangeable) on respective flanges, assemble spring washers and tighten the nuts with the « T » spanner alternately and progressively, so that equal tension will be applied to each stud.

g) - **Battery**

- When charging or servicing the battery, follow the instructions on accompanying card.

3 - Final operations

- a) - Lift the scooter from the assembly bench and place it on the ground supporting it by use of its centre stand.
- b) - By inspection align the handlebars in a plane parallel with a line drawn through the front axle, then tighten the nut (Fig. 23, No. 12) to secure the handlebars firmly.



- c) - Inspect the front brake control and, if necessary, adjust as prescribed above.

Also check to insure a proper loop in the brake control cable at the point where it emerges from the lower end of the steering column (Fig. 22, No. 17).

- d) - Remove the rubber sheath from the breather on the clutch cover (Fig. 20, No. 6). When required, the adjustment of the clutch control is achieved operating on adjuster screw (Fig. 20, No. 7). The cable is to be tensioned or loosened, as the case may be, so that the clutch control lever, on the handlebars, makes a move of 2 mm. (.078") before the lever (8), on the engine, starts operating. Wrong play in the control may cause the clutch

plates burning out even in normal running conditions.

- e) - Remove the level screw from the oil filling hole on the crankcase; with the scooter placed on its central stand on a level surface, the oil should just be about to flow out; otherwise top up.
- f) - Make sure that the wires are connected with the battery as said on page 83.

Very important: Before starting the engine the rider should be thoroughly familiar and fully understand the instructions concerning operation, maintenance, refueling contained herein and in the booklet « Operation and Maintenance ».



3rd Section
TOOLING



TOOLING

All tools required for overhauling the **Vespa G. S.** are listed in this section in numerical order. Previous tools which can be used are indicated in the second column.

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

The tools are divided into three classes, as shown in columns 6 to 8 for each tool:

- **Current servicing:** rectification of running troubles or adjustment of particular parts, whenever completely dismantling the unit into its components is not required.
- **Minor repairs:** dismantling the scooter into the various sub-assemblies, and the latter into their components, in order to replace defective parts.
- **Major repairs:** as stated in the foregoing paragraph, completed by overhaul and final adjustment of some special units of the scooter.

In addition, extra tools are available for the last two classes (mainly for the third one); we advise that such tools should be employed in order to facilitate and speed up the operations, in case the frequency of these jobs is really great.

N. B. — Every operation is to be done with the proper tools, and according to directions in this manual. We advise the service Agents to provide their shops with all tools required for the operations they are supposed to carry out and to acquaint themselves with their use.



TOOLING FOR DISMANTLING, RE-ASSEMBLING AND OVERHAULING VESPA G.S.

Tool No.	Previous tool still for use	TOOL NAME	GROUP.	Page	CLASSIFICATION			NOTE
					Current servicing	Minor repair	Major repair	
4105/A		Engine support table	Engine	43	yes	yes	yes	
* 4938/A } 5115/A }		Flywheel magneto test stand	Flywheel	76	—	—	yes	* When testing the flywheel, secure on the stand the external ignition coil located on engine.
5479/A		Hand press for assembling front and rear hydraulic damper	Shock-abs.	89-91	—	—	yes	
6488/A		Engine test stand	Engine	93	—	—	yes	
7259/R		Text fixture for shock absorbers	Shock-abs.	92	—	—	yes	
** 12342/C		Template for frame inspection	Frame	84	—	—	yes	
T.12380/C		Crankshaft alignment fixture	Engine	78	—	yes	yes	
13768/C		Base fixture for assembling coils on stator	Flywheel	73	—	yes	yes	** Agents who have this template already, should order the components No. 61-62 63-64 and use them as shown at p. 81, in fig. 110, for use on «Vespa G.S.».
15104,C		Inspection template for steering column (base)	Steering col.	86	—	—	yes	
*** 15119/C		Inspection template for steering column (top)	Steering col.	86	—	—	yes	
381500/B		Reamer for small end bush con. rod	Engine	76	—	—	yes	
550805		Punch	Flywheel	69	—	—	yes	
550807		Punch	Flywheel	69	—	—	yes	
713019/S		Drill point for peg of main bearing bushes	Engine	79	—	—	yes	
716050		Drill point for peg of main bearing bushes	Engine	79	—	—	yes	
784043		Turning tool for main bearing bushes	Engine	79	—	—	yes	
784424		Turning tool for main bearing bushes	Engine	79	—	—	yes	
T.0013460		Crankshaft assembly jig (1st operation)	Engine	78	—	—	yes	
0013589		Magnetiser	Flywheel	72	—	yes	yes	*** Agents who have this template already, should order the components 7-8 for use on «Vespa G.S.».
T.0013781		Mounting tool for top ball race of steering column bottom bearing	Steering col.	115	—	yes	yes	
T.0013782		Turn bearer for engine support table	Engine	41	—	—	yes	
0013964		Face-pin spanner for holding flywheel	Engine	43	—	yes	yes	



Tool No.	Previous tool still for use	TOOL NAME	GROUP	Page	CLASSIFICATION			NOTE
					Current servicing	Minor repairs	Major repairs	
T.0014208		Crankshaft assembly jig (2nd operation)	Engine	78	—	—	yes	* Agents who have this tool already should order the component No. 5 for use on Vespa G.S.
T.0014499		Ball bearing extractor (front wheel axle and crankshaft)	Steering col.	56	yes	yes	yes	
0014566		Hook wrench for lock ring of steering column top bearing	Engine	48	yes	yes	yes	
*T.0014924		Tool for inserting oil seals crankcase halves	Steering col.	53	yes	yes	yes	
T.0015283		Mandril for turning the flywheel	Engine	110	—	yes	yes	
0015284		Balancing mandril for flywheel	Flywheel	70	—	—	yes	
0015309		"L" handle box spanner for castle nut securing the rear wheel flange	Flywheel	71	—	—	yes	
0015413		Tool for unriveting plate washers of cush gear	Wheel	40-116	yes	yes	yes	
T.0016029		Tube for assembling bottom ball race of steering column bottom bearing	Engine	82	—	yes	yes	
0016030		Flexible shank spanner for securing tool box	Steering col.	115	—	yes	yes	
T.0016205		Timing gauge	Engine	57	—	yes	yes	** Agents who have this tool already should order the component No. 8 (for removal of oil seal with mainshaft removed) and the component No. 9 (for the same operation with mainshaft in position).
**T.0016303		Extractor for mainshaft oil seal	Engine	113	yes	yes	yes	
T.0016310		Flywheel extractor	Engine	49	yes	yes	yes	
T.0016331		Extractor for small end bronze bush	Engine	44	—	yes	yes	
T.0016333		Riveting fixture for taper pin of gear shifter	Engine	75	—	—	yes	
T.0016338		Fixture for assembling bronze bush of con. rod small end	Engine	81	—	—	yes	
0016538		Decarbonising tool for silencer outlet pipe	Engine	76	—	—	yes	
0016561		Extractor for bottom ball race of steering column bottom bearing	Steering col.	54	—	yes	yes	
0016741		Gap gauge for breaker points and spark-plug electrodes	Flywheel	—	yes	yes	yes	
0017004		Special screwdriver	Sparkplug Handlebars	55	yes	yes	yes	
T.0017104		Long nose pliers for circlips	Engine	42-47	yes	yes	yes	



Tool No.	Previous tool still for use	TOOL NAME	GROUP	Page	CLASSIFICATION			NOTE
					Current servicing	Minor repairs	Major repairs	
0017549	T.0020231	Face-pin wrench (for dismantling and re-assembling front and rear hydraulic dampers)	Dampers	90	—	yes	yes	To be used with tool T.0021009.
0017780		Spindle for drilling main bearing bushes	Engine	79	—	—	yes	
0017802		Wedge	Engine	46	yes	—	yes	
0017820		Drift for removal of gudgeon pin	Engine	43	—	yes	yes	
0017831		Pilot sleeve for passing the crankshaft through oil seals of flywheel side crankcase	Engine	113	—	yes	yes	
0017843		Punch for removing crankcase oil seal	Engine	49	—	yes	yes	
0017898		Punch for assembling bushes of front wheel needles	Steering col.	115	—	yes	yes	
0018094		Feeler gauge for inspecting axial play of gear pinions	Engine	68	—	yes	yes	
0018111		Hook spanner for security lock	Frame	59	yes	yes	yes	
T.0018119		Tool for assembling mainshaft	Engine	111	—	yes	yes	
*T.0018128		Punch for assembling outer ball bearing of mainshaft	Engine	110-116	—	yes	yes	
T.0018182		Extractor for main bearings from crankcase	Engine	48	—	yes	yes	
0018204		Pilot sleeve on stem of front and rear dampers for assembling rubber packings	Dampers	90	—	yes	yes	
0018205		Pilot sleeve for fitting felt ring into outer tube of front damper	Front damper	90	—	yes	yes	
0018219		Spanner for securing front damper to steering column	Steering col.	55	yes	yes	yes	
T.0018916		Work holder for replacing main bearing bushes	Engine	79	—	—	yes	
T.0019161	Crankpin removal blocks	Engine	77	—	—	yes		

Tool No.	Previous tool still for use	TOOL NAME	GROUP	Page	CLASSIFICATION			NOTE
					Current servicing	Minor repairs	Major repairs	
T.0019372		Work holder for crankshaft overhaul (grinding holes to oversize)	Engine	77	—	—	yes	
T.0019622		Fixture for replacing rubber bushes of engine bracket	Frame	114	—	—	yes	
T.0019859		Crankcase support (flywheel side) for assembling starter unit	Engine	112	—	yes	yes	
0019978		Heater (220 V - 50 Hz)	Engine	111	—	yes	yes	
T.0019982		Special wrench for starter bush	Engine	45-50-112	yes	yes	yes	
* T.0019987		Extractor for top ball race of steering column bottom bearing	Steering col.	56	—	yes	yes	
T.0020105		Pilot sleeve on crankshaft for passing through oil seal of crankcase (flywheel side)	Engine	112	—	yes	yes	
T.0020111		Clutch extractor	Engine	46	yes	yes	yes	
T.0020128		Hook wrench for retaining clutch assy	Engine	46	yes	yes	yes	
T.0020168		Punch for assembling starter unit	Engine	112	—	yes	yes	
T.0020185		Equipment for consumption test	Engine	95	yes	yes	yes	
T.0020200		Extractor for mainshaft roller bearing	Engine	49	—	yes	yes	
T.0020224		Punch for fitting oil seal on mainshaft	Engine	110	—	yes	yes	
T.0020244		Tool for centralizing con-rod	Engine	75	—	—	yes	
T.0020272		Riveting die	Engine	69	—	—	yes	
T.0020322		Clutch stripping and assembling tool	Engine	80	yes	yes	yes	
T.0020601		Clutch holder for fitting rollers and shoulder ring	Engine	51	yes	yes	yes	
T.0020608		Face-pin spanner for shoulder ring of clutch pinion	Engine	51	yes	yes	yes	
T.0020811		Rod for reciprocating piston of front damper to expel air	Shock-abs.	90	—	yes	yes	

* Agents who have this tool already should order the component N. 14 for use on «Vespa G.S.».






Tool No.	Previous tool still for use	TOOL NAME	GROUP	Page	CLASSIFICATION			NOTE
					Current servicing	Minor repairs	Major repairs	
T.0020824		Base of tools for assembling rubber bush and liner on damper body	Shock-abs.	90-91	—	yes	yes	
T.0020825		Tool set for assembling liner and rubber bush on body of rear damper	Shock-abs.	91	—	yes	yes	
T.0020826		Tool set for assembling liner and rubber bush on body of rear damper	Shock-abs.	90	—	yes	yes	
T.0020827		Tool set for assembling liner and rubber bush on stem support of front damper	Shock-abs.	90	—	yes	yes	
T.0020828		Sleeve for assembling discharge valve into inner tube of front damper	Shock-abs.	90	—	yes	yes	
T.0020837	T.0014812	Punch for withdrawal of mainshaft	Engine	47	—	yes	yes	
T.0020840	T.0063767 T.0014677	Wrench for threaded ring retaining ball bearing of mainshaft	Engine	48	—	yes	yes	
T.0020841	T.0028130	Punch for withdrawal of front wheel axle	Steering col.	55	—	yes	yes	* To be used with punch T. 0018128.
T.0020842		Punch for withdrawal of bottom ball race of steering column upper bearing	Steering col.	54	—	yes	yes	
T.0020877	T.0017138 T.0017642	Crankshaft extractor from clutch side crankcase	Engine	46-47	—	yes	yes	
T.0021009	T.0020225	Punch for assembling roller bearing	Engine	110	—	yes	yes	** Available on the market.
0021063		Handlebars extractor	Handlebars	52	—	yes	yes	
T.0021064		Flexible shank spanner for fuel tap	Frame	57	—	yes	yes	
T.0021214		Spanner for silencer threaded ring	Engine	40	yes	yes	yes	
—		Gauge ϕ 62 — 0.026 — 0.045 for inspecting main bearing bushes	Engine	79	—	—	yes	
**		Dial gauge	Engine	78	—	yes	yes	

4th Section
DISMANTLING



DISMANTLING

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

Each operation is indicated with a number under the respective figure; the part to be dismantled is indicated by the same number. Tools are shown with their drg. numbers, whilst open ended spanners, box spanners and screwdrivers are indicated with respective symbols (  ) and hexagon dimension.

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

Agents should strictly follow this operation sequence.

Use of monkey wrenches, hammers, chisels and emergency tools of any kind is to be avoided. Only by means of the tools listed in the second 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 at the re-assembly.

Dismantling of the scooter is to be carried out carefully and under the best conditions of cleanliness. Use two containers with paraffin and gasoline resp.: 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.

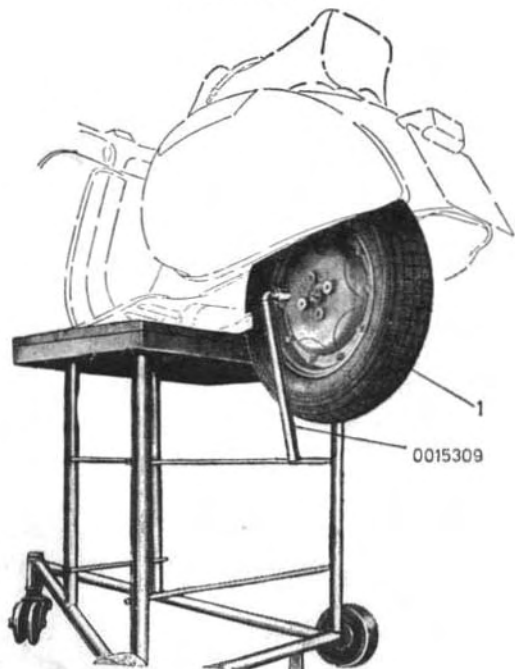
Should the re-assembly be postponed for a while, protect all loose components from dust.

IMPORTANT

For dismantling of units and parts marked with letters in the figures, follow the alphabetical sequence.



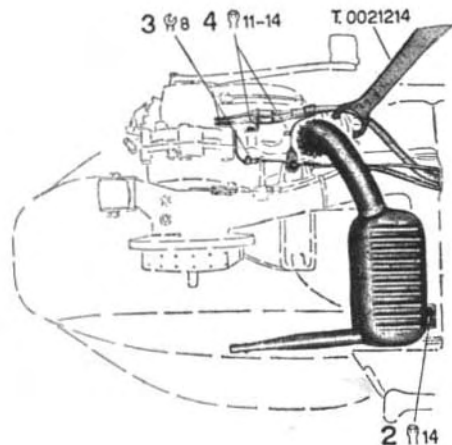
WHEEL REMOVAL



- 1 - 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 of the flange.

Fig. 24

REMOVAL OF ENGINE FROM THE MACHINE

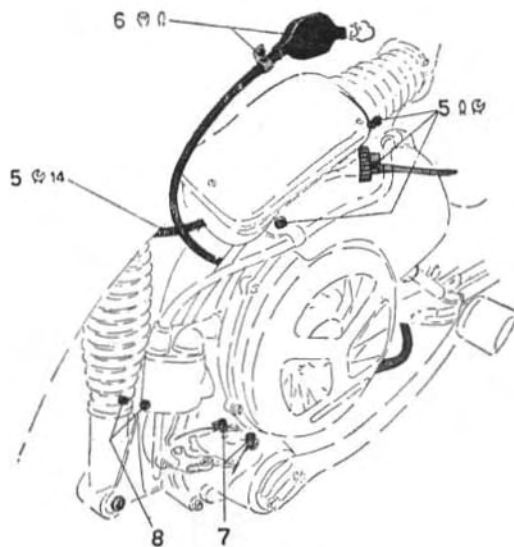


- 2 - Silencer.
3 - Disconnecting the clutch cable.
4 - Nut on engine bracket and nut retaining carrier of adjusters on gear change control cables.

Fig. 25



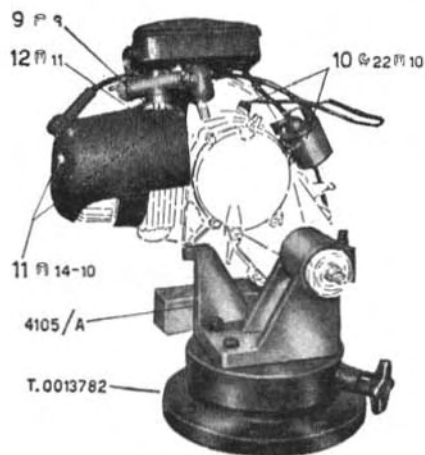
REMOVAL OF ENGINE FROM THE MACHINE



- 5 - Fuel hose - Threaded ring on mixing chamber, throttle control cable - Rubber bellows.
 - 6 - Cable of low tension.
 - 7 - Gear change control cables with ferrules.
 - 8 - Bolts securing the engine.
- Slide off the engine from its bracket, place it on support table 4105/A-T.0013782 and secure.

Fig. 26

DISMANTLING THE ENGINE

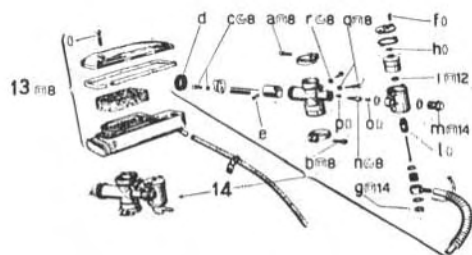


- 9 - Air cleaner and carburettor.
- 10 - Grommet, external ignition coil and plug lead.
- 11 - Cooling hood.
- 12 - Intake pipe.

Fig. 27

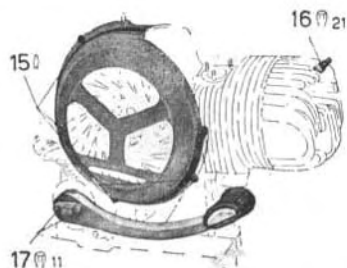


DISMANTLING THE ENGINE



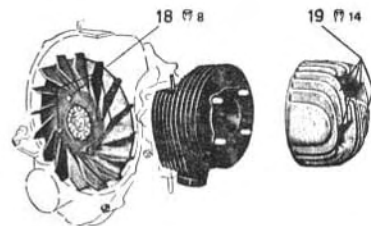
- 13 - Air cleaner components.
14 - Carburettor components.

Fig. 28



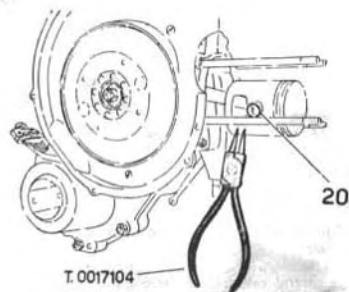
- 15 - Fan cover.
16 - Sparkplug.
17 - Footstarter (straighten the edges of the lock plate).

Fig. 29



- 18 - Fan (straighten the edges of the four tab washers).
19 - Cylinder head and cylinder.
(Inspect piston-cylinder play according to table on page 65).

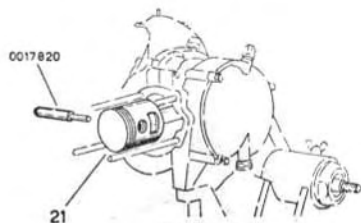
Fig. 30



- 20 - Circlips retaining the gudgeon pin.

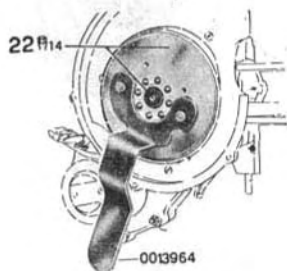
Fig. 31

DISMANTLING THE ENGINE



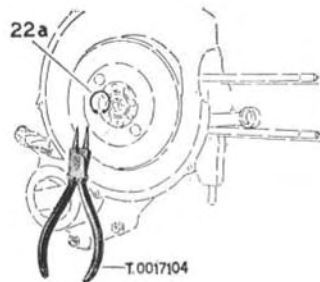
21 - Gudgeon pin.

Fig. 32



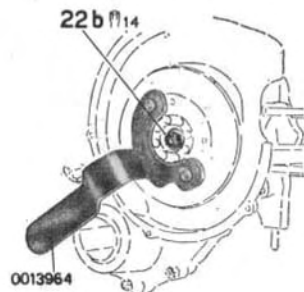
22 - Rotor (see 22 a, b, c, when not successful with this procedure).
N. B.—With the rotor removed, take off the circlip by means of pliers T.0017104.

Fig. 33



22a - Circlip on rotor.

Fig. 34

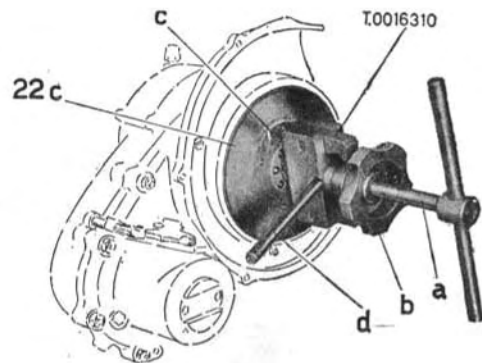


22b - Nut retaining the rotor.

Fig. 35



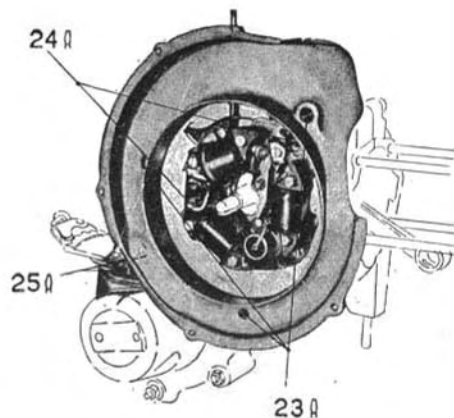
DISMANTLING THE ENGINE



22c - Flywheel rotor.

Use extractor T.0016310: unscrew «a» and «b», fit the tool legs «c» into rotor holes. Screw down «b», hold the tool by «d» to prevent rotation, then screw «a» until rotor becomes free.

Fig. 36



23 - Fan housing.

24 - Stator.

N. B. — Make a reference mark on both stator and crankcase before undoing the screw.

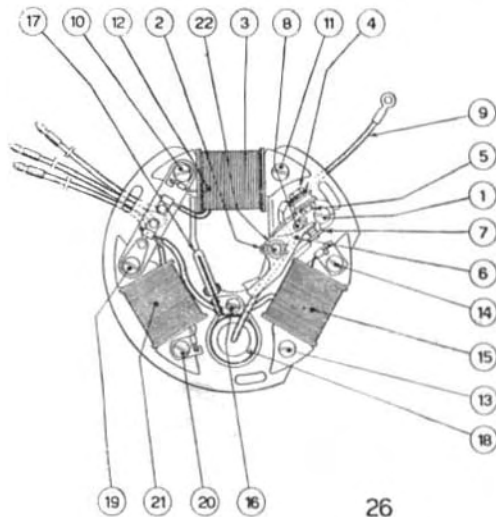
Place the stator into the rotor.

25 - Screws retaining the gear shifter.

Fig. 37

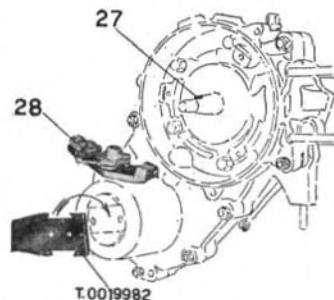


DISMANTLING THE ENGINE



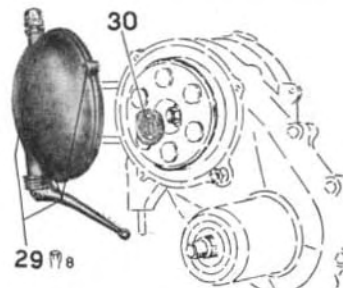
26 Stator components (follow the sequence of numbers).
Component « B » of tool 13768/C, see page 73, fig. 96, can be used as a workholder.

Fig. 38



27 - Woodruff key of flywheel.
28 - Gear shifter (engage 2nd gear and rotate the starter bush to its fullest extent).

Fig. 39

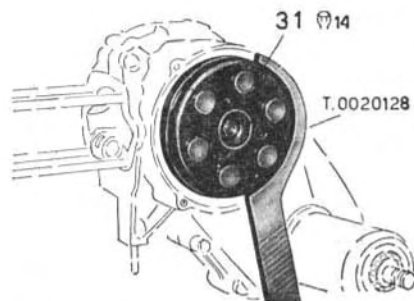


29 - Clutch cover.
30 - Centralizing plate.

Fig. 40

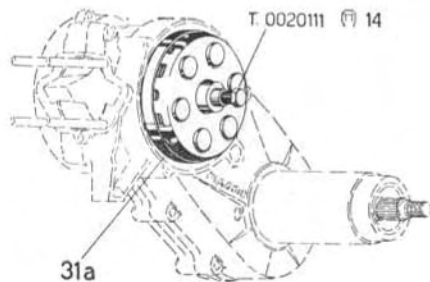


DISMANTLING THE ENGINE



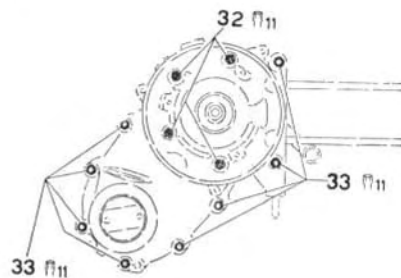
31 - Clutch nut.

Fig. 41



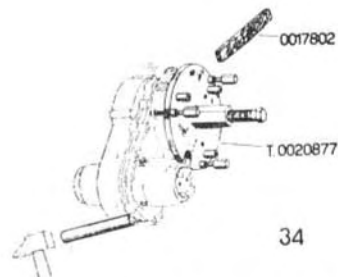
31a - Removal of clutch assy.

Fig. 42



32-33 - Crankcase bolts.
Operate progressively and alternately.

Fig. 43

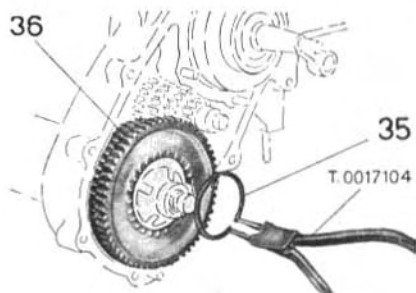


34 - Flywheel-side crankcase (insert the wedge 0017802 between the crankwebs, and fit a drip pan for the engine oil).

Fig. 44

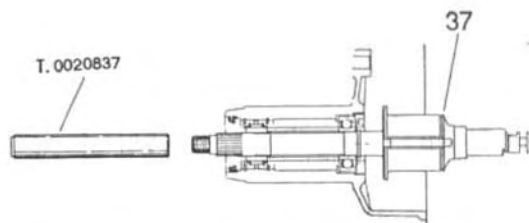


DISMANTLING THE ENGINE



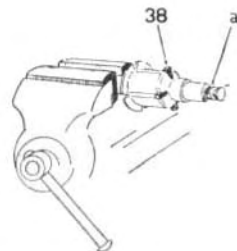
- 35 - Circlip.
36 - Gear pinions (see page 68 for axial play inspection).

Fig. 45



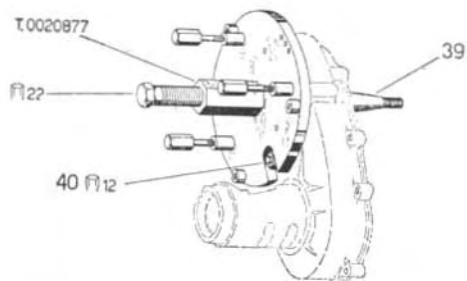
- 37 - Mainshaft.
Turn the mainshaft so that its longest slot faces the cush gear.

Fig. 46



- 38 - Selector (left hand threading).
Straighten the edges of the lock washer « a » by means of a screwdriver.

Fig. 47

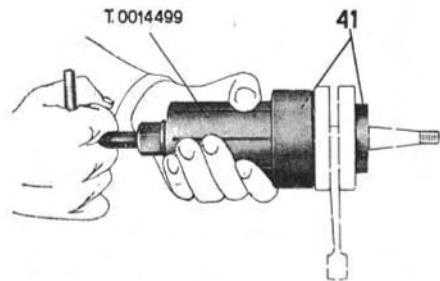


- 39 - Crankshaft.
40 - Cush gear (see page 82, fig. 113 for dismantling the unit).

Fig. 48

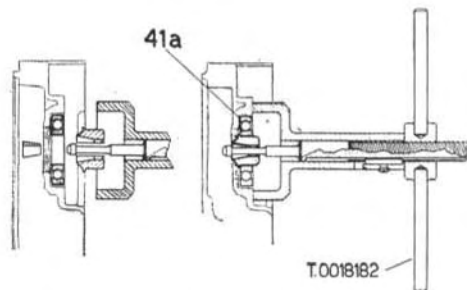


DISMANTLING THE ENGINE



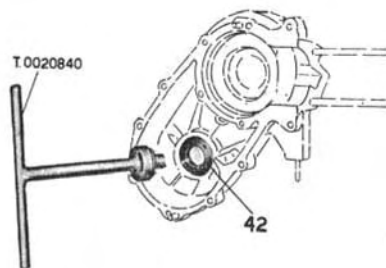
41 - Main bearings (see pages 63 and 66 for play inspection on both ends).

Fig. 49



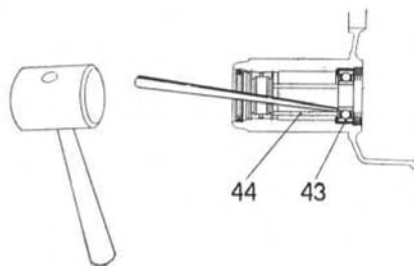
41a - Main bearings (if they remain in the crankcase).

Fig. 50



42 - Threaded ring.

Fig. 51

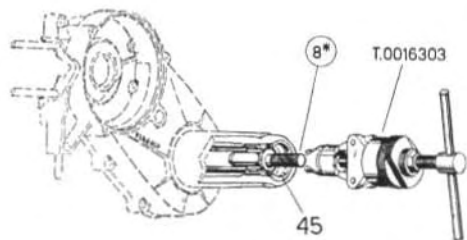


43 - Inner bearing of mainshaft.
44 - Spacer tube.

Fig. 52

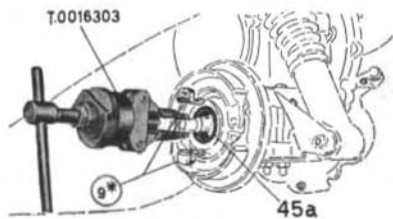


DISMANTLING THE ENGINE



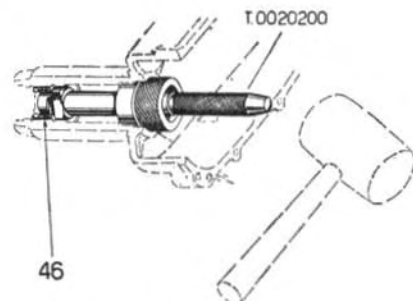
45 - Removal of oil seal from crankcase (mainshaft already removed).
(*) Use component 8 of the tool.

Fig. 53



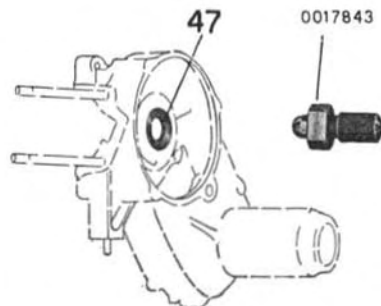
45a - Removal of oil seal from crankcase (with mainshaft in position).
(*) Use component 9 of the tool.

Fig. 54



46 - Removal of circlip and mainshaft roller bearing.

Fig. 55

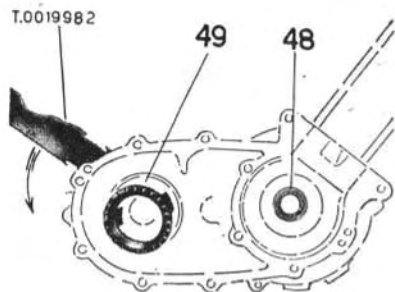


47 - Oil seal from clutch side crankcase.

Fig. 56

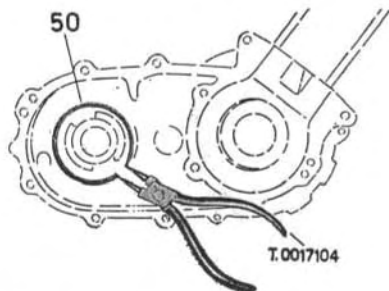


DISMANTLING THE ENGINE



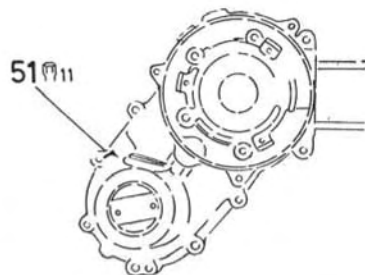
- 48 - Oil seal from flywheel side crankcase (see foregoing operation).
49 - Starter ratchet.

Fig. 57



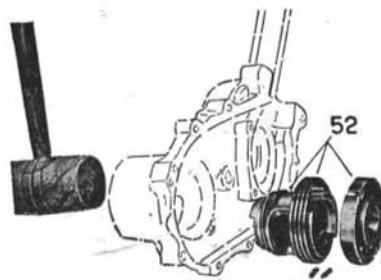
- 50 - Circlip retaining starter assy.

Fig. 58



- 51 - Screw retaining slotted bush.

Fig. 59

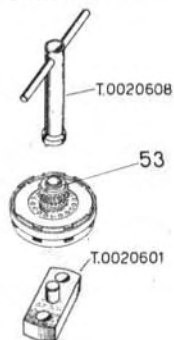


- 52 - Starter assy with oil seal.

Fig. 60



DISMANTLING THE CLUTCH



53 - Threaded ring on clutch pressure plate.

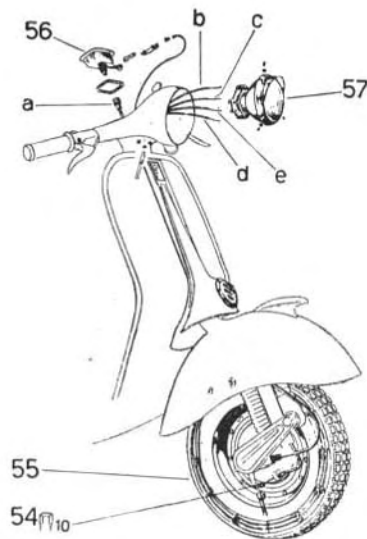
Fig. 61

NOTICE

For removing and dismantling the handlebars (see figg. 62-65), operate as indicated below:

- 1) For removal of the speedometer head, loosen only the screw marked in the fig. 62 with screwdriver symbol and avoid undoing other screws.
- 2) The bolt and nut securing the handlebars on steering column (op 59) are to be removed with two 14 mm. box spanners.

REMOVAL OF SPEEDOMETER, HEAD LAMP AND FRONT WHEEL

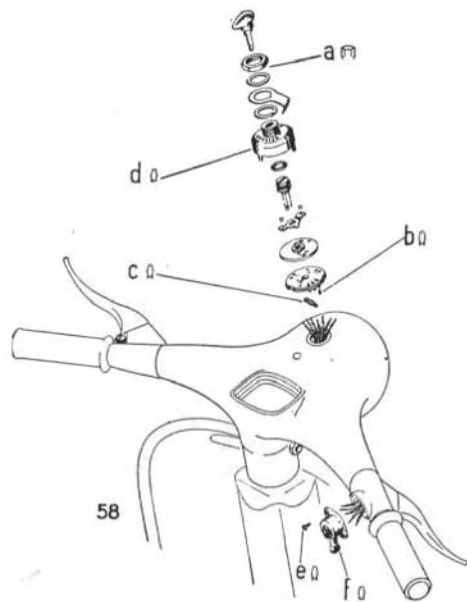


- 54 - Front brake cable (disconnect at bottom end).
- 55 - Front wheel (Unscrew the four nuts, not shown, diagonally and evenly).
- 56 - Speedometer and packing.
Lift the instrument off its housing and unscrew the threaded ring.
- 57 - Head lamp. Disconnect wires.

Fig. 62



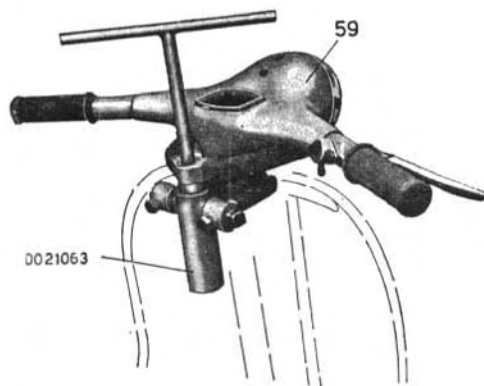
DISMANTLING MAIN AND DIMMER SWITCHES



58 - Main switch, dimmer switch.

Fig. 63

REMOVAL OF HANDLEBARS

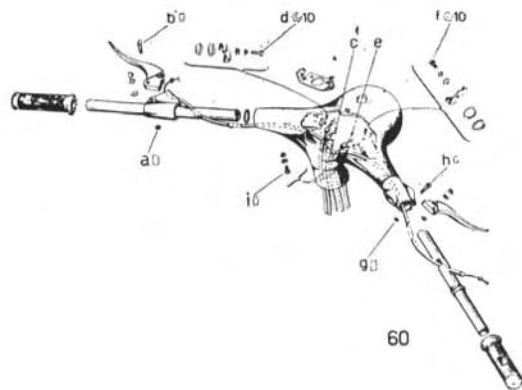


59 - Handlebars (after removing the retaining bolt by means of 14 mm. spanners).

Fig. 64



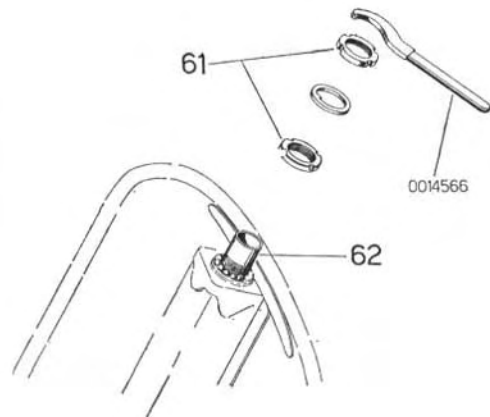
DISMANTLING THE HANDLEBARS



- 60 - Handlebars: Gear change twistgrip.
Throttle control twistgrip.
N. B.— Use screwdriver 0017004 or similar, as shown, for operations « a » and « g ».

Fig. 65

REMOVAL OF STEERING COLUMN

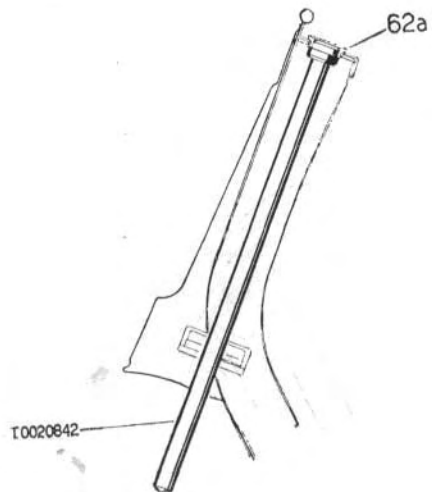


- 61 - Locking ring and upper race of top bearing.
N. B.— Carefully collect the balls.
62 - Slide off steering column downwards.
N. B.— Collect the balls of bottom bearing.

Fig. 66

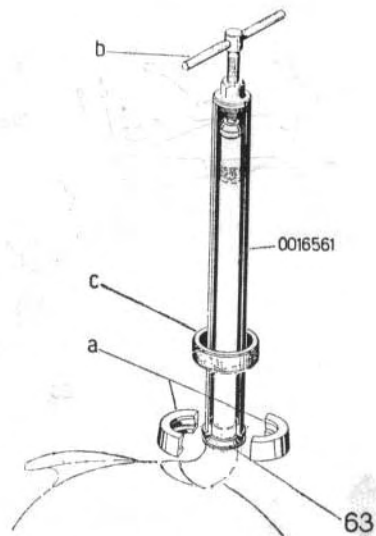


DISMANTLING THE STEERING COLUMN



62a - Lower race of top bearing.

Fig. 67

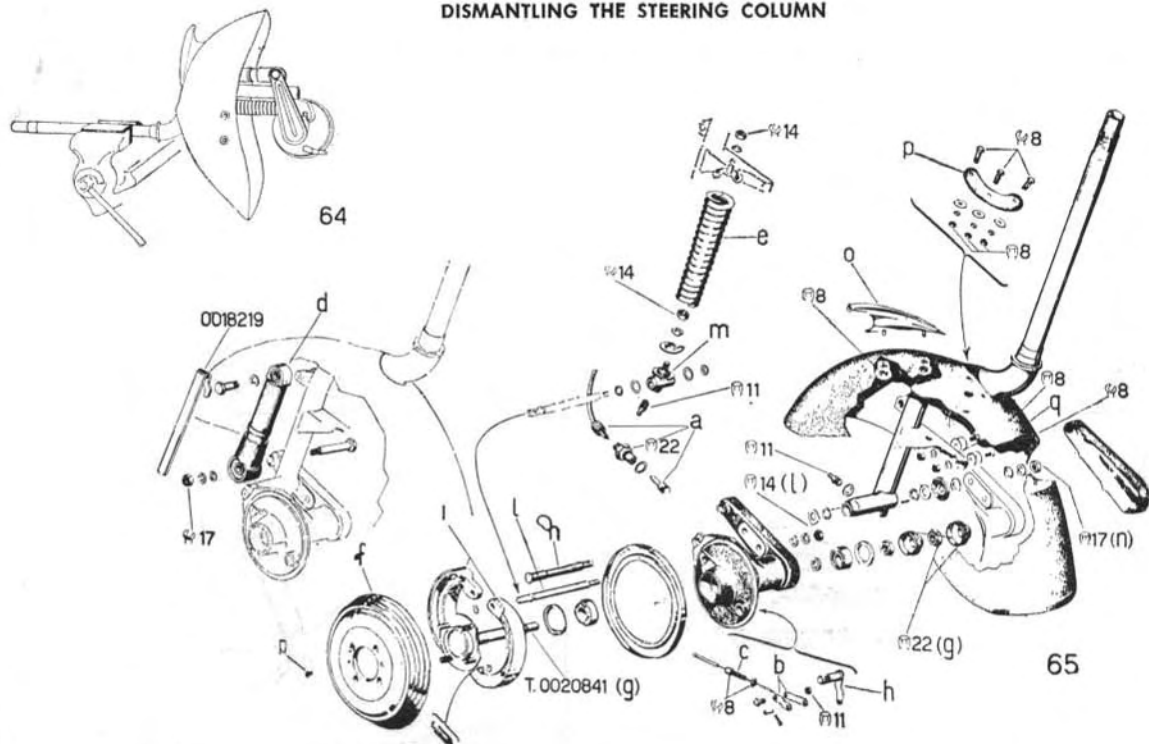


63 - Dust cover and bottom race of bottom bearing.
Use extractor 0016561. Engage the parts to be extracted by means of split ring « a ». Lower the knurled ring « c » to clamp the split ring « a ». Screw down « b » until both race and dust cover are free.

Fig. 68



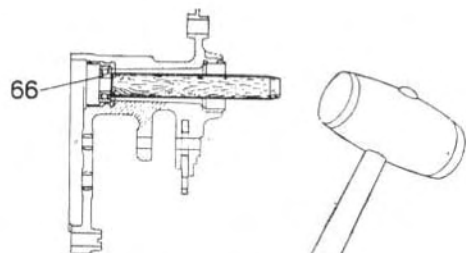
DISMANTLING THE STEERING COLUMN



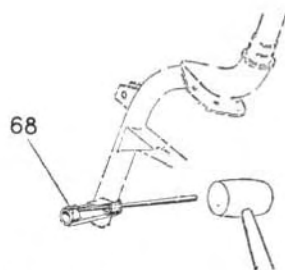
64 - Clamp the steering column in a vice.
 65 - Front suspension, wheel hub, mudguard.
 Fig. 69



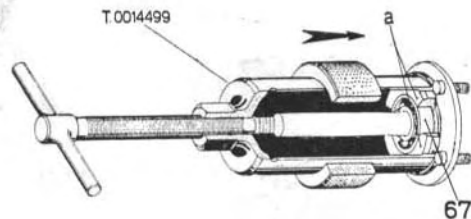
DISMANTLING THE STEERING COLUMN



66 - Ball bearing in front wheel hub.
Fig. 70

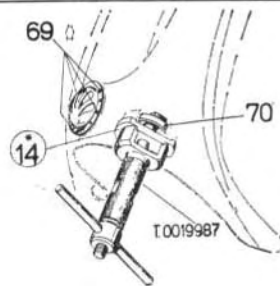


68 - Liners for wheel spindle.
Fig. 72



67 - Ball bearing of wheel spindle.
Extractor T.0014499 is the same as for operation 41, with addition of split ring « a ».

Fig. 71

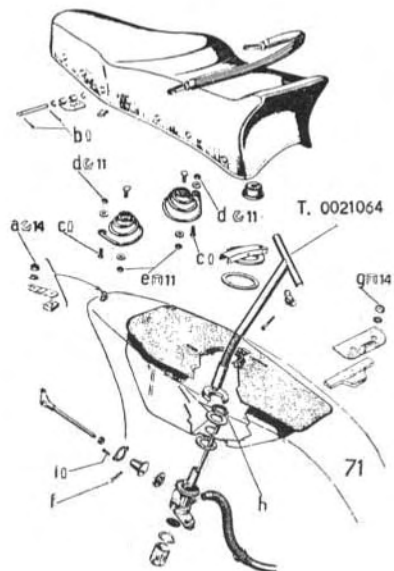


69 - Horn.
70 - Top race of bottom bearing of steering column.
(*) Use the component 14 of the tool.
Make sure that said component rests exactly on the bearing cup.

Fig. 73

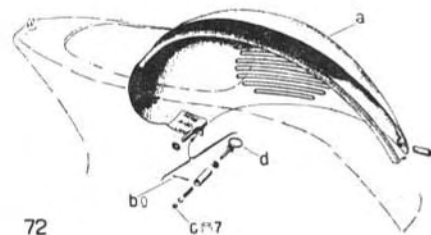


REMOVAL OF SADDLE AND FUEL TANK



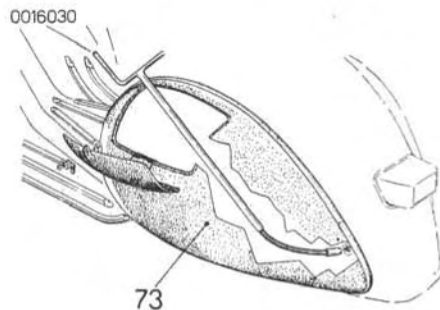
71 - Seat, fuel tank and cock.
Use flexible shank spanner T. 0021064 for operation « h ».
Fig. 74

REMOVAL OF ENGINE COWLING AND TOOL BOX



72 - Engine cowling.

Fig. 75

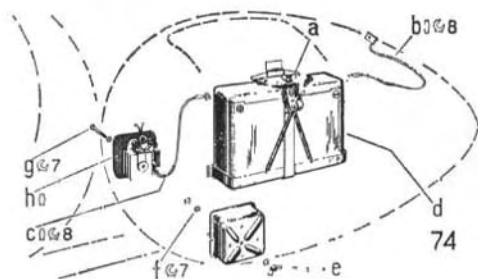


73 - Tool box and security lock.

Fig. 76

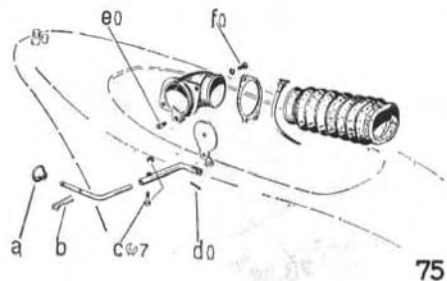


REMOVAL OF BATTERY AND CHOKE



74 - Battery and rectifier.

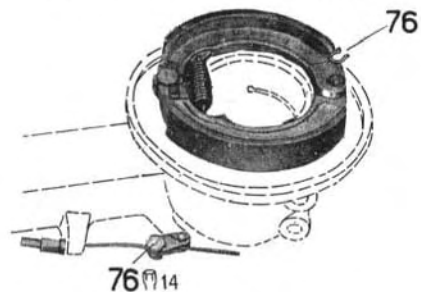
Fig. 77



75 - Choke.

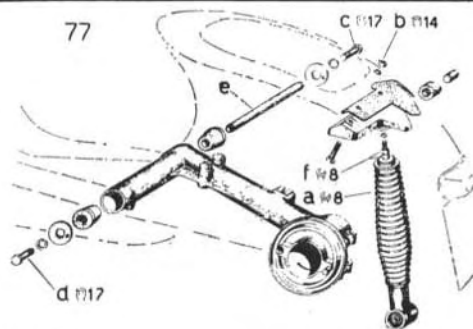
Fig. 78

DISMANTLING REAR SUSPENSION



76 - Rear brake control cable - Brake jaws with cam rod.

Fig. 79



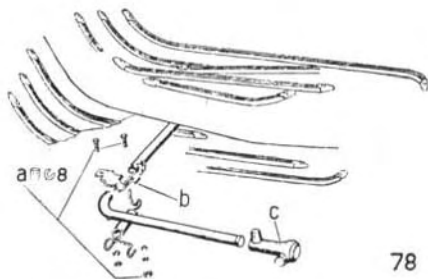
77 - Rear suspension.

N. B. — Remove the two retaining washers for withdrawing spindle « e ».

Fig. 80

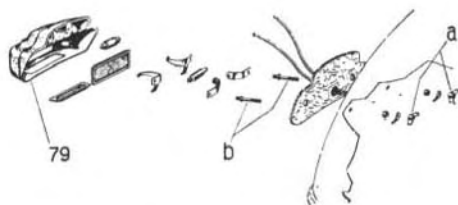


REMOVAL OF CENTRE STAND AND TAIL LAMP



78 - Centre stand.

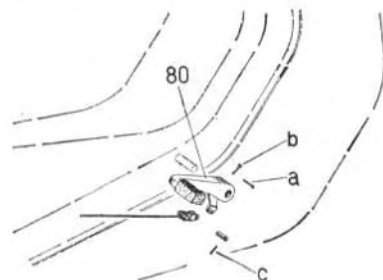
Fig. 81



79 - Tail lamp and STOP light.

Fig. 82

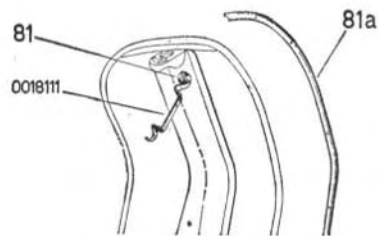
REMOVAL OF REAR BRAKE PEDAL AND STEERING LOCK



80 - Rear brake pedal.

N. B. — Depress the pedal to withdraw pin « b ».

Fig. 83



81 - Steering lock.

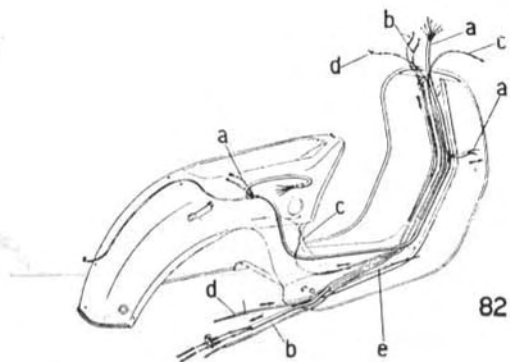
N. B. — Never lubricate the security lock.

81 a - Shield protector.

Fig. 84



REMOVAL OF CABLE HARNESS AND CONTROL CABLES



82 - Electric wires and control cables.

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.

Fig. 85

IMPORTANT

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.



5th Section
PERMISSIBLE TOLERANCES - UNIT OVERHAULS
FAULT FINDING



PERMISSIBLE TOLERANCE - UNIT OVERHAUL FAULT FINDING AND REMEDIES

1. - Tables of permissible assembling tolerances.

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

2. - Directions concerning overhauls, test and special assemblies.

This part deals with the following operations, which are not mentioned in the sections « Dismantling » and « Re-assembling ».

1. - Flywheel magneto
 - a) Replacing the cam — Directions
 - b) Re-magnetising the rotor — Description and directions for use of magnetiser
 - c) Overhauling the stator — Directions
 - d) Unit test — Description and directions for use of the test stand
2. - Crankshaft
 - a) Replacing bronze bush of con.rod small end } — Directions
 - b) Dismantling, overhauling and re-assembling } — Replacement
3. - Main bearing bushes — Directions
4. - Replacement of the clutch plates and control adjustment — Directions for assembling internal gear change lever and adjusting the control cables.
5. - Gear Shifter — Dismantling and re-assembling
6. - Cush drive — Description and directions for use of the test stand
7. - Engine test — Replacement
8. - Threaded ring of silencer — Directions for first charge, re-charge and service
9. - Battery } — Alignment check
10. - Frame } — Replacement
11. - Steering column } — Re-touch directions
12. - Steering cover } — Overhaul and working test
13. - Painting } — Directions
14. - Hydraulic dampers
15. - Consumption test



3. - Tables to guide fault finding, respective remedies and directions to follow.

These tables are composed according to the various scooter assemblies; they indicate the pages where the directions are given for carrying out correctly the required operations.

This section deals with all irregularities, troubles or faults which might be experienced by **Vespa G.S.** users.

Remedies and directions to be followed to eliminate 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 Agent, in order to return the machine to the owner in the best possible condition, not to mention the prestige and personal advantage to the Agent himself.

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



1. Assembly tolerances.

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

CONNECTING ROD AND CRANKSHAFT

Part No.	Part name	Normal dimensions	Reference letter	Assembling tolerance prescribed	Max. play permissible after use
27672	Crankpin	$B = 10.030 \begin{smallmatrix} +.02 \\ -0 \end{smallmatrix}$	} Play at .F.	.030 - .060	2/10
S.7099	Roller	$A = 10 \begin{smallmatrix} +0 \\ -.01 \end{smallmatrix}$			
23945	Con. rod	$C = \begin{cases} \text{min. } 10.270 \\ \text{max. } 10.450 \end{cases}$	} Play at .D.	.270 - .460	6/10
S.7099	Roller	$A = 10 \begin{smallmatrix} +0 \\ -.01 \end{smallmatrix}$			

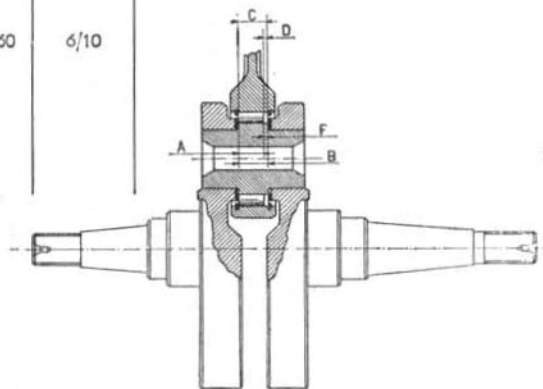


Fig. 86



PISTON AND GUDGEON PIN

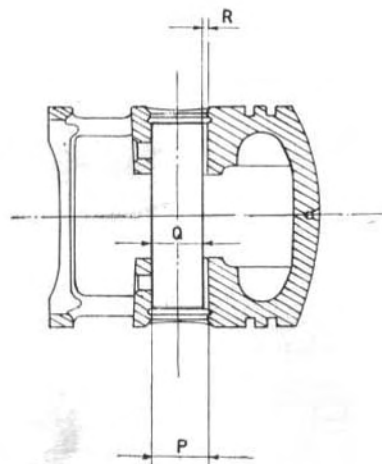


Fig. 87

Part No.	Part name	Normal dimensions	Reference letter	Assembling tolerance prescribed	Max. play permissible after use
26085	Piston, normal	$P = 15 \begin{matrix} +0 \\ -.011 \end{matrix}$	} Play at R	0	2/100
24751	Gudgeon pin	$Q = 15 \begin{matrix} -.005 \\ -.013 \end{matrix}$			



CYLINDER AND PISTON

Part No	Part name	Normal dimensions	Reference letter	Assembling tolerance prescribed	Max. play permissible after use
26408	Cylinder, normal	$E = 57 \begin{smallmatrix} -0 \\ +0.019 \end{smallmatrix}$			
26085	Piston, normal	$F = 56.700 \pm 0.020$ $C = 56.865 \pm 0.010$ $D = 56.970 \pm 0.010$			
27101	Cylinder, 1st o/s	$E = 57.2 \begin{smallmatrix} -0 \\ +0.019 \end{smallmatrix}$			
27102	Piston, 1st o/s	$F = 56.900 \pm 0.020$ $C = 57.065 \pm 0.010$ $D = 57.170 \pm 0.010$			
27104	Cylinder, 2nd o/s	$E = 57.4 \begin{smallmatrix} -0 \\ +0.019 \end{smallmatrix}$			
27105	Piston, 2nd o/s	$F = 57.100 \pm 0.020$ $C = 57.265 \pm 0.010$ $D = 57.370 \pm 0.010$	Play at +A-	16/100	20/100
27107	Cylinder, 3rd o/s	$E = 57.6 \begin{smallmatrix} -0 \\ +0.019 \end{smallmatrix}$			
27108	Piston, 3rd o/s	$F = 57.300 \pm 0.020$ $C = 57.465 \pm 0.010$ $D = 57.570 \pm 0.010$			
27110	Cylinder, 4th o/s	$E = 57.8 \begin{smallmatrix} -0 \\ +0.019 \end{smallmatrix}$			
27111	Piston, 4th o/s	$F = 57.500 \pm 0.020$ $C = 57.665 \pm 0.010$ $D = 57.770 \pm 0.010$			

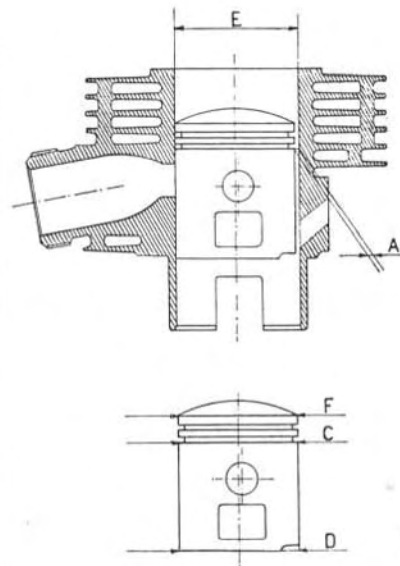


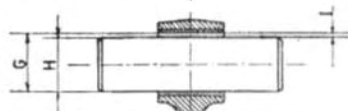
Fig. 88

N. B. - Cylinders and pistons supplied as spare parts by the Firm are marked with alphabet letters and dimensions. In order to ensure the prescribed play of piston and cylinder, when both new, make sure that the two parts to be assembled are marked with the same letters.

IMPORTANT - The cut-away portion at the bottom of the piston skirt must face the intake port, as shown in the drawing.



CONNECTING ROD AND GUDGEON PIN



Part No.	Part name	Normal dimensions	Reference letter	Assembling tolerance prescribed	Max. play permissible after use
23945	Con. rod	$G = 15 \begin{matrix} - .005 \\ + .018 \end{matrix}$	} Play at +l.	.010 — .031	5/100
24751	Gudgeon pin	$H = 15 \begin{matrix} - .005 \\ - .013 \end{matrix}$			

CONNECTING ROD AND CRANKPIN

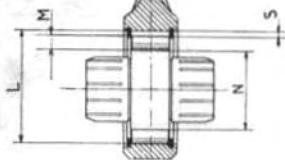


Fig. 89

N. B. — Crankpins and con. rods supplied as spare parts by the Firm are marked with alphabet letters. In order to ensure the prescribed play at « S », make sure that the two parts to be assembled, when both new, are marked with the same letter.

Part No.	Part name	Normal dimension	Reference letter	Assembling tolerance prescribed	Max. play permissible after use
23945	Con. rod	$L = 29.785 \begin{matrix} - 0 \\ + .03 \end{matrix}$	} Play at .S.	.005 — .010	5/100
S. 7099	Roller	$M = 4 \pm .001$			
27672	Crankpin	$N = 21.808 \begin{matrix} + 0 \\ - .03 \end{matrix}$			



PISTON RINGS

Part. N.	Part name	Normal dimension	Reference letter	Assembling tolerance prescribed	Max play permissible after use
22217	Piston ring	∅ 57	} Play at -A-	.2 — .35	2 mm
23248	Piston ring 1st o/s	∅ 57.2			
23249	Piston ring 2nd o/s	∅ 57.4			
23250	Piston ring 3rd o/s	∅ 57.6			
23251	Piston ring 4th o/s	∅ 57.8			

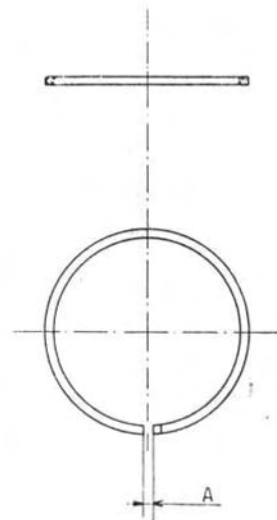


Fig. 90



SHOULDER RING

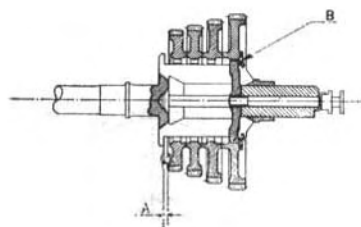


Fig. 91

Part. No.	Part name	Normal dimension	Reference letter	Assembling tolerance prescribed	Max play permissible after use
15558	Shoulder ring	$2.05 \begin{smallmatrix} +0 \\ -0.06 \end{smallmatrix}$	} Play at .A.	0.15 — 0.30	0.50 mm.
20321	Shoulder ring 1st o/s	$2.25 \begin{smallmatrix} +0 \\ -0.06 \end{smallmatrix}$			
20322	Shoulder ring 2nd o/s	$2.45 \begin{smallmatrix} +0 \\ -0.06 \end{smallmatrix}$			
20323	Shoulder ring 3rd o/s	$2.65 \begin{smallmatrix} +0 \\ -0.06 \end{smallmatrix}$			
20324	Shoulder ring 4th o/s	$2.85 \begin{smallmatrix} +0 \\ -0.06 \end{smallmatrix}$			

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 0018C94



FLYWHEEL MAGNETO OVERHAUL

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 outer face of rotor.
3. - Remove washer « a » (see Fig. 92), 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 5.5 mm. drill (.177"), the cam itself functioning as a drill jig.
5. - Bore out to 5.5 (.177") the holes of washer « a » mentioned in paragraph 3; mount washer on outer face of rotor, then the cam and $\phi >$ size rivets; clench the latter, following the sequence as indicated in Fig. 92, by means of supporting block T.0020272 and riveting punch 550807.
6. - By means of mandril T.0015283 and a dial gauge ensure that both dia. « B » and « C » are concentric (see Fig. 93) 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") and feeding depth of 25 mm. (1").
7. - Check the diameters for concentricity again by means of mandril 0015284 and dial gauge (see Fig. 94). Use the same mandril to check the rotor for balance

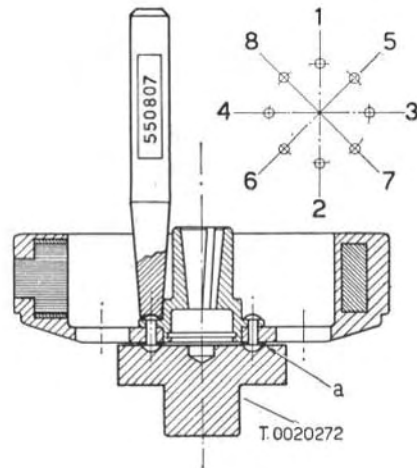


Fig. 92 - Riveting the rotor cam.

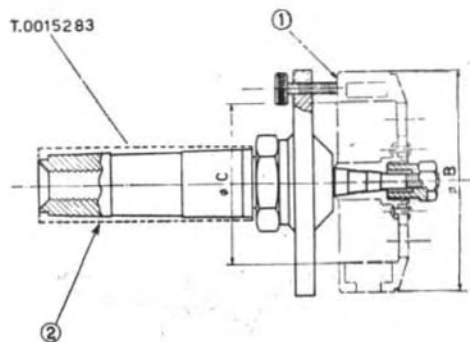
on the two rails « A » (Fig. 94). Tolerance of 4 g. (.014 oz.) is allowed; if necessary, balance the rotor properly by drilling some blind holes on periphery « S », into the lamination.

Re-magnetising the rotor

1. - Clean with very fine emery paper both I. D. and O.D. of rotor. Wipe with clean rags soaked with paraffin, then dry.
2. - Place the rotor into the magnetising fixture, drg. No. 0013589 (see Fig. 95), so that the key way inside the cam points towards any one of the three **south** poles of the fixture, and the pole pieces of the latter cover the surface of the laminations on the rotor periphery. The south pole can be located placing a standard compass near the rotor periphery.
3. - Depress the knife-switch 4-5 times consecutively, each contact lasting 1.5-2 seconds.
4. - Lift out and check the rotor for magnetisation; it should be capable of supporting from its periphery a piece of iron of regular shape with weight not less than 1/2 Kg. (1 lb. 2 oz.).

N. B. - Mate the rotor immediately with the stator or place three pieces of iron into it in order not to loose magnetisation.

The fixture must be fed with d.c. not lesser than 22-24V, 90 A, which can be supplied either by a battery or convertor or rectifier.



- 1) - Plane « P ».
- 2) - This mandril is delivered with cylindrical stem (dotted line) for fitting to any available lathe.

Fig. 93 - Checking dia. concentricity.

Stator overhaul

Replace coils by means of base fixture 13768/C (see Fig. 96) as follows.

1. - Assemble the new coil (which is delivered with the laminations already finished on the lathe) 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 fixture 13768/C for dismantling and re-assembling the stator, and proceed with sequence and tools as indicated respectively on p. 45, Fig. 38.

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

- a) - Secure the coils as said in paragraphs 1-4 above.
- b) - Rub the surface of the laminations where cable tag is fastened.
- c) - The screw 1 (see page 45, operation 26) securing the adjuster cam should be tightened on completion of assembly, after adjusting to .4 mm. (.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.
- d) - The lubricating felt should be set to press slightly against the smallest diameter of the cam.

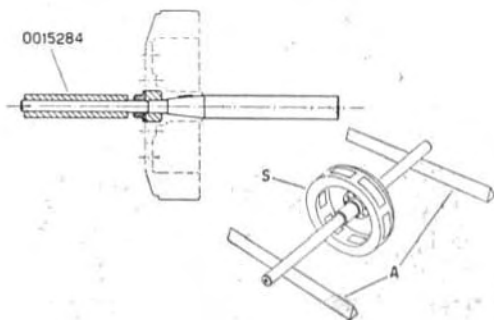
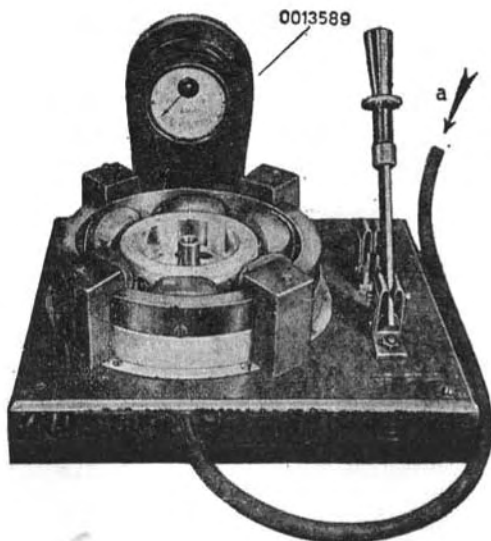


Fig. 94 - Rotor balance inspection.



a: compressed air for cooling

Fig. 95 - Magnetiser.

Flywheel magneto test stand

The stand consists of a metal table (see Fig. 97) which carries:

- repulsion motor, 200 V - 50 Hz - 1.3 HP approx., with rev. counter. The flywheel is geared up (8000 rpm max) by a device installed between motor and flywheel support,
- a two position switch (min-max) on left hand side of the stand,
- 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 a coupling between motor and flywheel,
- a bracket for the external ignition coil and a switch for switching in the revolving pointer and three-point spark gap,
- an instrument panel with following units:
 - a) a high tension circuit with the three-point spark gap (see Fig. 98),
 - b) 11 non-inductive resistors (shunting the spark gap) controlled by a lever, to measure the efficiency of the flywheel magneto,
 - c) a low tension circuit fed by the low tension coils in the flywheel connected in parallel, consisting of 6 V - 25/25 W double filament bulb, 6 V - 5 W and 6 V - 1.5 W bulbs. These units are connected with the light switch by means of leads with the same length and copper section as those used on the scooter,



d) a voltmeter and an ammeter connected on said circuit to measure the potential drop across bulbs and the L.T. circuit current respectively.

The procedure explained underneath is to be followed for the test.

- 1) Secure the ignition coil of the scooter on its bracket.
- 2) Connect the battery-fuse-rectifier unit of the Vespa G. S. with the flywheel and primary circuit of the ignition coil in the same way as they are connected on the machine (Fig. 14 b).
- 3) Mount the stator on the suitable support and secure with the three screws.
- 4) Assemble the rotor on the shaft, seeing that the wood-ruff key fits into the key way, then secure.
- 5) Adjust the gap between the breaker points to .4-.5 mm. (.15-.19"), run the rotor at 150-200 rpm and check the timing of the breaker point by pushing the switch button; under such conditions, sparking occurs between the graded disc and the rotating pointer integral with the flywheel shaft.

TEST ON THE IGNITION CIRCUIT

Test at minimum revs

Steady sparking should occur at 150-200 rpm with 5 mm. gap (see Fig. 98).

Efficiency test

Run at 2000 and 7000 rpm; if the spark gap is shunted with non-inductive resistors (see point « b »), the efficiency, as expressed in micro-siemens, should be:

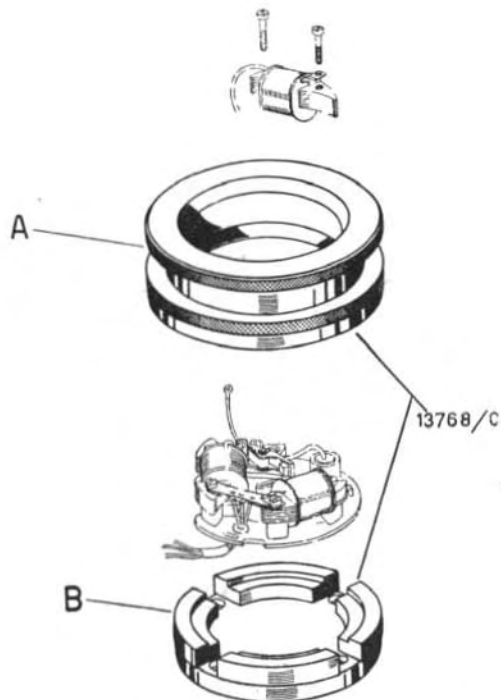


Fig. 96 - Replacing the coils on the stator.



4938/A
5115/A

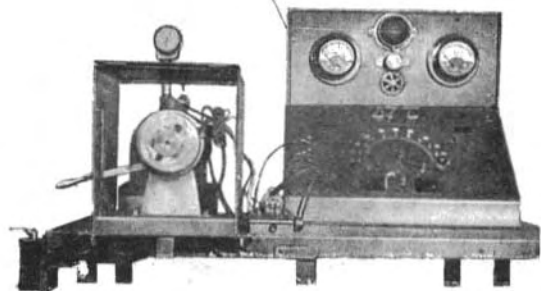
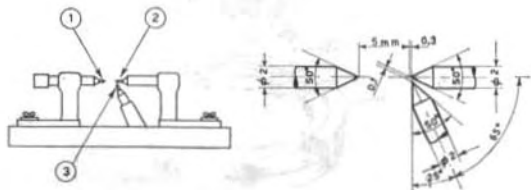


Fig. 97 - Flywheel magneto test stand.



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

Fig. 98 - Spark gap.

2000 rpm
6-8 micro-siemens

7000 rpm
1-1.5 micro-siemens

Overspeed test

Run the rotor at 7200-7300 rpm for about 5 minutes. No sparking between the breaker points but steady sparking at the spark gap should occur.

Emergency running

Make sure that the ignition circuit works regularly at least up to 4500-5000 rpm after disconnecting the negative pole of the battery from the earthing terminal (emergency running). Under such conditions the ignition circuit is fed directly by the battery charge coil through the rectifier.

TEST ON THE L.T. CIRCUIT

Battery charge circuit

Carry out this test on the complete wiring as shown on Fig. 14 b. Connect an ammeter (which should be of the central « zero » type) between the negative pole of the battery and the earth. Run the engine and make sure that the charging current to the battery is equivalent to the current supplied by the battery for ignition only at max rpm of 3000-3200; under such conditions the pointer of the ammeter should be in position « 0 ».

Bulbs

With the load indicated at c), the potential drop across bulbs at 3000 and 7000 rpm should be respectively:

3000 rpm
5.3-5.8 Volts

7000 rpm
6.8-7.5 Volts



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 shake in the big end.

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

Replacing bronze bush of con.rod small end

1. - Remove the worn bush by means of extractor T.0016331 (see Fig. 99) as follows:

Unscrew « b » to its fullest extent, thus advancing the taper end of the inner shaft. Insert the tool head « c » into the bush and place the slotted sleeve « d » therein. Screw down by means of handle « b » to extract the bush, while holding the tool body still by means of a spanner engaging hexagon portion « a ».

2. - Centralize and lock the con.rod by means of fixture shown in Fig. 100 as follows.

- Slide the fixture « a » over the crankcase studs and secure it with the nuts.
- Insert the mandril « c » into the small end through the hole « b ».
- Screw down the four knurled head screws, indicated by « 2 », on the sides of block « a » to clamp the con.rod.

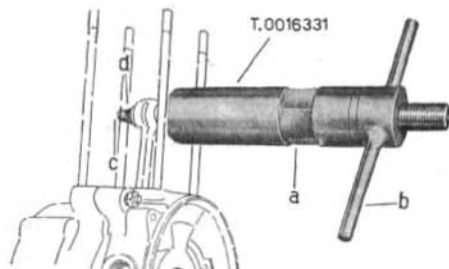


Fig. 99 - Bush extraction.

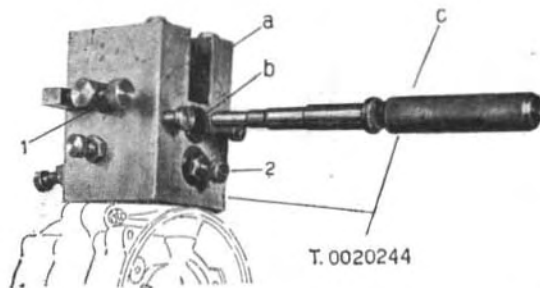


Fig. 100 - Centralizing the con. rod.



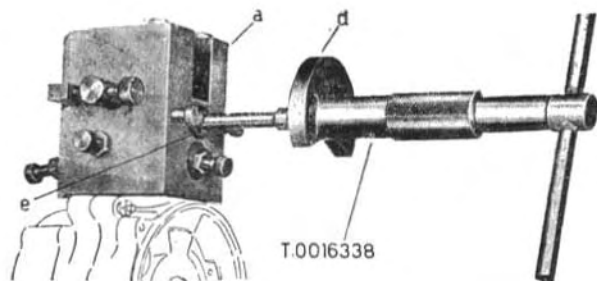


Fig. 101 - Assembling the new bronze bush.

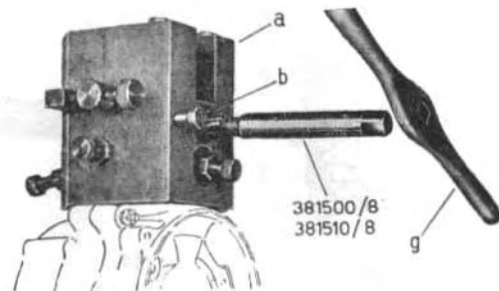


Fig. 102 - Reaming the new bush.

- d) Lock the four screws by means of respective lock nuts. Turn the screw « 1 » until the rear bar leans against the con.rod.
 - e) Remove mandril « c »; adjust the screws « 2 » and the rear bar again, if the mandril does not slide out smoothly from the small end.
3. - Fit the new bronze bush by means of tool T.0016338 (see Fig. 101) as follows:
 - a) Secure the flange of the guide sleeve « d » on the front face of block « a » of tool T.0020244 by means of the two screws « e ».
 - b) Fit the new bush on the tip of threaded mandril T.0016338, then insert the latter into the guide sleeve « d ».
 - c) Screw down until the bush reaches its seat.
 4. - Ream the bush by inserting the reamer 381500/8 (see Fig. 102) into the guide hole « b » of part « a » of fixture T.0020244 and turning it through by means of tap wrench « g ».
 5. - Peen the bush on small end, and slot it with a hack-saw following the slot on the con.rod small end.
 6. - Ream again with tool 381500/8 to deburr.

Crankshaft overhaul

This operation is to be carried out whenever the play between big end and crankpin exceeds the tolerance limits as stated on page 63.

1. - Place the crankshaft on the anvil of the blocks T.0019161 (Fig. 103) and use the suitable drift « a » under a press to clear the bore of the upper crank-



web. Collect the con.rod, shim washer and rollers.
Invert and press out the crankpin from the other web.

N. B. - Use exclusively tool T.0019161 for this operation.

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, to $\varnothing 18.20 \begin{matrix} - 0 \\ + .027 \end{matrix}$ to fit with the o/s crankpin diameter $18.40 \begin{matrix} + 0 \\ - .03 \end{matrix}$
3. - Press the new crankpin « a » into the crankweb « d » clutch side, by means of jig T.0013460 (see Fig. 105).
4. - Grease generously the roller track on con.rod big end, to hold the 20 rollers in position between two circlips, then place the con.rod over the crankpin.
5. - Locate all these parts on assembly jig T.0014208 as shown in Fig. 106 and press the other web into position.
6. - Check the alignment of the crankshaft rotating it on the fixture T.12380/C as shown in Fig. 107. The maximum stroke permissible of the dial gauge is .06 mm.

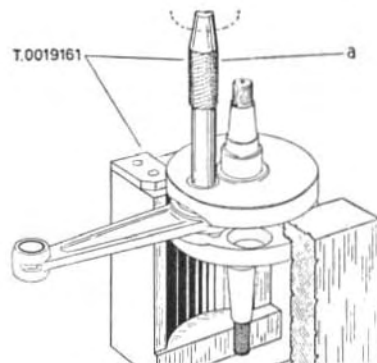


Fig. 103 - Dismantling the crankshaft.

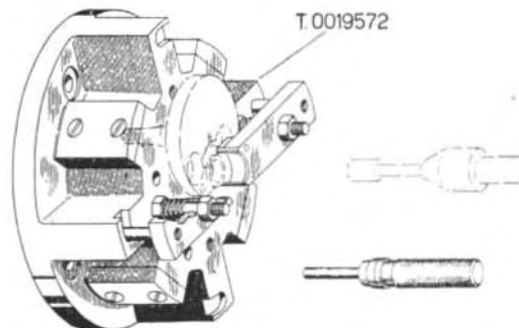


Fig. 104 - Grinding out the crankweb holes for o/s size crankpins.



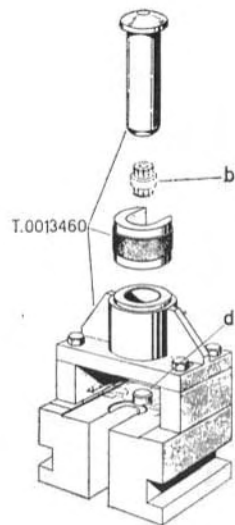


Fig. 105 - Re-assembling the crankshaft (1st operation).

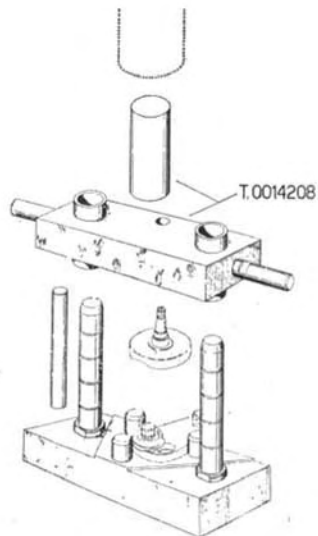


Fig. 106 - Re-assembling the crankshaft (2nd operation).

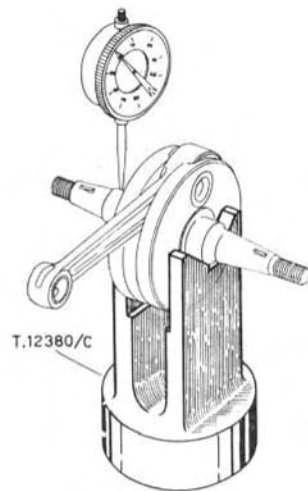


Fig. 107 - Alignment check.

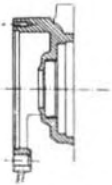
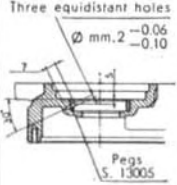
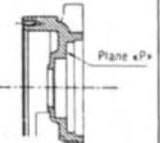
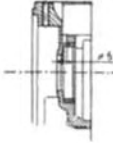
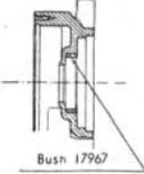
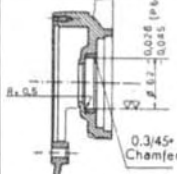
PLANNING SHEET FOR REPLACEMENT OF MAIN BEARING BUSHES ON CRANKCASE (FLYWHEEL AND CLUTCH SIDE)							
No. of OPERATION	FIGURE	DIRECTIONS	REQUIRED EQUIPMENT	No. of OPERATION	FIGURE	DIRECTIONS	REQUIRED EQUIPMENT
1 Washing		Wash the crankcase-half with paraffin					
2 Horizontal lathe		Turn off the worn bush on a lathe until former becomes detached from its housing. Be sure that you don't indent aluminium.	Work holder T. 0018916 Tool 784043	5 Hand drilling and fitting		A) Drill the three holes Ø 2. in intermediate position in respect to previous holes. B) Insert the three pegs, deg. S. 13005, and punch them in.	Hand drilling machine Chuck 0017780 Drill 713019/5
3 Fitting		Mark with a scriber on plane «P» the position (see operation 5, point «A») of holes (to be drilled later on the other face of the housing) for the bush pegs. Tap down protruding tips of old pegs by means of a punch, and grind the area with fine emery cloth.		6 Drilling machine		Drill the bush to dia. 5 mm, following the existing hole on aluminium.	Ø 5 drill 716050
4 Fitting		Cold-assemble the bush by means of a small hand-press (rack type).		7 Horizontal lathe		Turning the bush Carry out carefully	Workholder T. 0018916 Tool 784424 Plug gauge Ø mm. 2 -0.026 -0.045 (P 6)
				8 Washing		Wash the crankcase-half with paraffin	

Fig. 108 - Replacement of main bearing bushes on crankcase



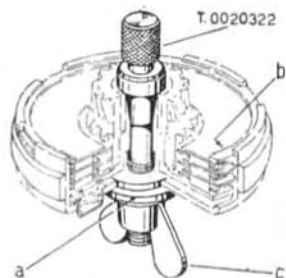


Fig. 109 - Dismantling the clutch unit.

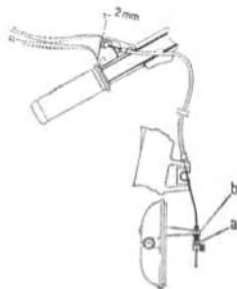


Fig. 110 - Clutch control adjustment.

CLUTCH

Replacing the plates

The tool T.0020322 (see Fig. 109) is required for dismantling the clutch unit, as follows:

- a) Fit the clutch assy in the tool.
- b) Tighten the wing nut « c » to compress the six springs, thus enabling extraction of retaining circlip « b ».
- c) 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.

Control adjustment

Apply contemporarily two 8 mm. open ended spanners on hexagons of both adjuster screw « a » and lock nut, to slacken the latter (see Fig. 110).

The cable is to be tensioned or loosened, as the case may be, so that the 2 mm. gap (.78") 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 condition.

GEAR BOX

Replacement of internal operating lever

The lever is supplied as a spare part together with ratched quadrant and the pin. Operate as indicated below:



1. - Take lever and quadrant apart, place the gear shift-flange between them, then mate again.
2. - Fit the assembly into the riveting fixture T.0016333 as shown in Fig. 111, offer up the pin to the hole and rivet in.

Control adjustment

Should the control have excessive play in neutral, adjust as follows:

- Tension either control cable by screwing back the respective adjuster screw (see Fig. 112) with an open ended spanner.

If the cable tension in neutral is correct but the reference marks of the handlebar 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.

DISMANTLING THE CUSH GEAR

This operation is necessary 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 shown in Fig. 113, and drive the rivets out by means of the punch. The tool may be used in a similar way for re-assembling the unit.

REPLACEMENT OF SILENCER THREADED RING

Operate as indicated below.

- Saw the pipe near the threaded ring as shown in Fig. 114.

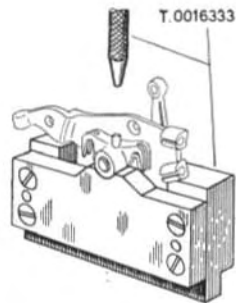


Fig. 111 Riveting the pin of gear shifter.

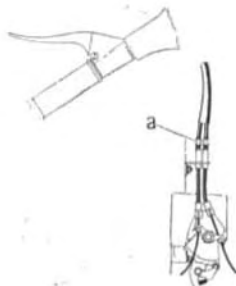


Fig. 112 • Gear shifter control adjustment.



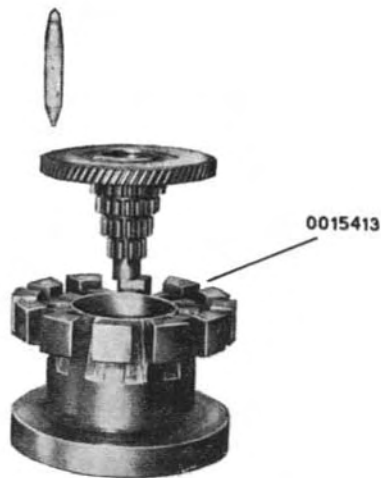


Fig. 113 - Dismantling the cush gear.

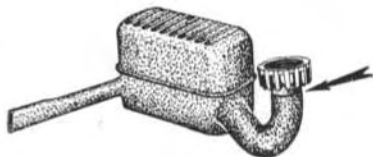


Fig. 114 - Replacement of threaded ring of silencer.

- Slide the ring and fit the new one in.
- Weld the pipe again.
- If necessary, grind down the welding.

BATTERY

The battery (mounted on **Vespa G. S.**) is of the dry lead type: it does not contain therefore any free acid around the plates.

The electrolyte is absorbed by a special material which fills the space between the plates.

This battery is normally delivered charged and is accompanied by a card with directions for re-charge and service. Agents should call customers' attention about following points:

- It is essential that the directions given hereunder are complied with very carefully.
 - The battery should be re-charged by Piaggio Agents, or if this is not possible, directly by Agents of the battery manufacturer.
1. Add distilled water, once a month, until the level is visible and keeps unaltered, which means that the battery has absorbed the required water amount. Let the battery stand for 15 minutes, then eliminate the excess water either by sucking it off with a normal densimeter or by turning the battery upside down.
 2. Add distilled water after, not before a ride.
 3. Have the battery re-charged once a month (1 Amp. for 8 hours) in case of disuse.



4. If the battery becomes discharged, have it re-charged readily. Inspect the wiring of the scooter thoroughly, and particularly the charging circuit for insulation and efficiency.

Normal charge on the bench

1. - Charge with 1.2 Amp.
2. - When the tension in each cell, as checked during the charge, has reached 2.6 volts, keep charging for three more hours. Normally 1.2 Amp. for 12 hours will be sufficient.
3. - On completion of the charge add distilled water, let the battery water stand for 15 minutes, then eliminate the excess liquid.
4. - If the battery has become completely dry, add distil-

led water before and during the re-charge, so that the liquid can be seen through the filling holes during the operation.

Let the battery stand for 15 minutes, then eliminate the excess liquid.

Important

- a) - When securing the battery on the machine, be sure that you connect the positive pole (+) to the cable from the rectifier, and the negative pole (—) to the earthing cable. A wrong connection will readily make the rectifier inefficient and damage the battery entirely.
- b) - Screw down the caps securely and keep dirt from reaching the cells.



TEMPLATE FOR FRAME INSPECTION

The template 12342/C can be used for alignment check of **Vespa G. S.** frame, provided that new parts 12343/C-61-62 e 63-64 (as shown in Fig. 116) are mounted in place of the corresponding parts (see Fig. 115) prescribed for other Vespa models.

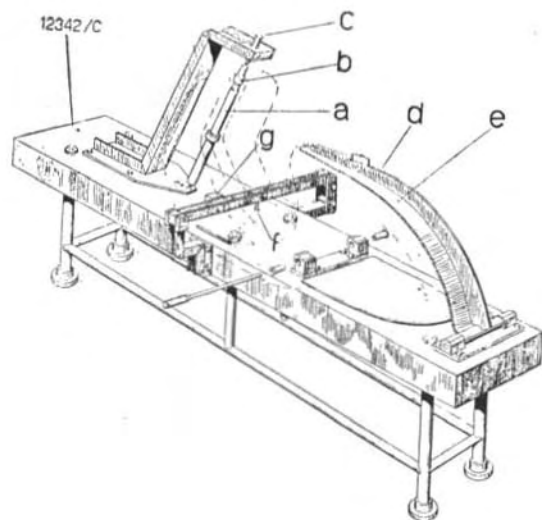


Fig. 115 - Template for frame inspection.

- Locate part 12342/C/61-62 instead of corresponding central support (see Fig. 115) with the four screws, finger tight.

Place a test frame on the template as prescribed below in such a way that all references coincide.

- Place part 12342/C/63-64 instead of the rear support (see Fig. 115) where arm « d » pivots, so that said arm can swing according to references indicated below. Then tighten the screws securing parts 12342/C/61-62 and 63-64 to the template.

- Take off the frame from the template and drill the template table following the holes existing in the supports (holes 1 and 2, see Fig. 116). Fit the dowel pins for exact location of the two supports. Measures for suggested location of such holes are indicated in Fig. 116.

No play is allowed between holes and pins.

Fit parts « a » and « b » on the frame, clamp the latter in the template as shown in Fig. 115 and see that following conditions are reached:



- the tip of pin « a » falls on the center or inside the pad on the template table (tolerance limit);
- the pin « c » enters the cavity of pin « a »;
- both dowel pin and stud for securing the saddle (front) fit into the hole on end of part « d »;
- both holes « e » of part « d » tally with the holes for the bolts securing the light alloy anchorage of the rear suspension.

N. B. - Insert wooden wedge « g » under the floorboard, thus lifting the frame until the longeron surface stops against screw « f ».

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

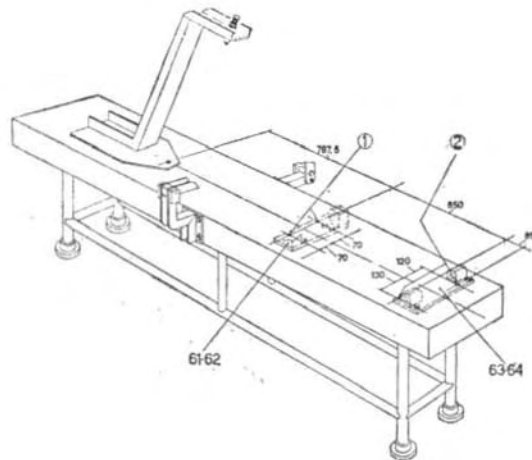


Fig. 116 - Preparing template for frame inspection.

TEMPLATE FOR STEERING COLUMN INSPECTION

The template illustrated on fig. 117 consists of two parts :

- The base, drg. 15104/C, common for all steering column types.
- the top piece « a », which varies for the different models (drg. 15119/C for **Vespa G. S.**).

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

- pins « b », « c » and « d » (the latter is threaded) slide all the way through their respective bushes.
- the play between the ring on pin « b » and its respective bush is within the dimensions of both ends of gauge « e ».
- 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 ».
- the mudguard bracket « f » tallies with the lug « g » on the template.
- the location of the two lugs where security lock engages is radially correct, as checked with gauge « i » placed on plane « h ».

NOTICE - Steering columns not perfectly aligned must be replaced with new ones, since straightening is not allowed.

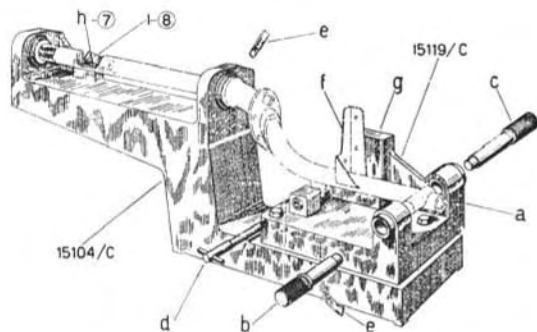


Fig. 117 - Template for steering column inspection.

REPLACEMENT OF STEERING COVER

The steering cover is spot-welded on the main shield. Proceed as follows for replacing it.

- a) Remove « PIAGGIO » medallion, and cut off with a chisel the relief part of the cover as shown in Fig. 118, letter « a », thus leaving on the main shield just the welded edge.
- b) Place precisely the new cover, which is supplied already drilled, upon the edge of the old one, and drill the 14 holes (dia.: 2.6 mm. or .102") for the rivets on the shield using the new part as a template (letter « b »).
- c) Countersink the holes on the inner surface of the shield (letter « c »).
- d) Secure the steering cover on the main shield by means of 14 rivets.
- e) Carry out normal filling up, levelling, rubbing down and spraying (see next page).

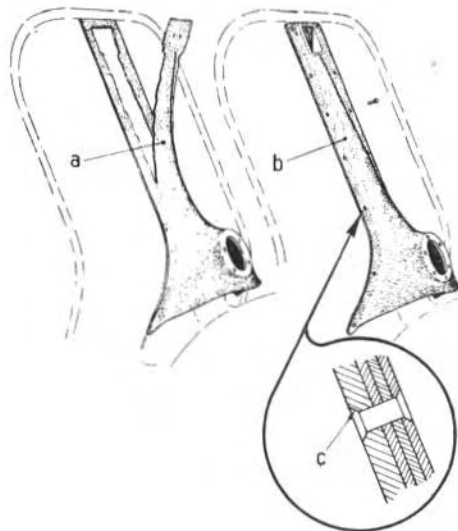


Fig. 118 - Replacement of steering cover.

PAINING

Preparing the products

All products mentioned in these pages are manufactured by the Firm Max-Meyer.

- a) Grey syntetic rust preventative 60961 (diluite 100 g. with 17-19 g. of diluent 63535).

Dry either in air or with infrared ray bulbs.

- b) Stopper 38075 (diluite with diluent 63535).

Dry either in air or with infrared ray bulbs.

- c) Aluminium enamel

1st coat: diluite 100 g. with 60-70 g. of diluent 63535.

Spray generously so as to wet thoroughly the area to be retouched.

Dry in air for 5-10 minutes.

2nd coat (finish): Diluite 100 g. with 130-170 g. of diluent 63535.

When spraying, set the fluid tip of the spray gun almost closed, so that more air than enamel is sprayed out. In this way the retouched area will blend for colour shade and brilliancy with the surrounding surface.

Dry in air for 8-15 minutes, then in oven at 115-125° C for 50-60 minutes or with infrared ray bulbs.

- d) Aluminium enamel 15005 (diluite 100 g. with 100-120 g. of diluent 63535).

Dry in air.

Procedure A

Mayor 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. Fill in with b) and dry.
4. Smooth over with very fine emery paper (minimum grade: 320).
5. If necessary, repeat operations of points 2 and 4.
6. Spray and dry product c).
7. Make use of Polish ZO 78001 (fluid) or Polish ZO 78453 (fluid) all around the retouched area, in order to make the two surfaces blend perfectly.

Procedure B

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 operate according to points 3 and 4 of procedure A.
3. Operate according to point 6 of procedure A.
4. Operate according to point 7 of procedure A.

N. B. — For following parts use product d), then dry:

- Front wheel hub
- Wheel rim and felly
- Front wheel spindle
- Rear wheel flange
- Steering column

DISMANTLING, OVERHAUL AND RE-ASSEMBLY OF FRONT HYDRAULIC DAMPER

Unit Overhaul

Overhaul is necessary if the damper does not function correctly after the oil has been completely changed or topped up.

After dismantling, number or identify the parts in order to avoid errors in re-assembly.

Dismantling

1. Clamp the damper in a vice (lined with aluminium), tightening on the flat facing of the bottom part (a); see Fig. 119, No. 1.
2. Push down the outer tube so that an open ended 6 mm spanner can be inserted to grip the flat surfaces on the stem. Grip this firmly and unscrew the support (g). Slide off the outer tube.
3. Loosen threaded ring (f) using wrench 0017549.
4. Release the piston-cylinder unit and remove packings (e).
5. Slide the stem and piston unit (c) towards the lower end of the cylinder (d), lightly tapping its upper end with a wooden hammer. At the same time, release valve (b).
6. Unscrew the piston retaining nut with a 10 mm spanner and remove the piston.

Re-Assembly

1. Hold the stem firmly in a vice (lined with aluminium); place the piston in position and screw in this nut using a 10 mm. spanner: pierce the thread. It should be remembered that the valve pins should be fitted with their blunt ends towards the outside of the spring. When re-assembly is complete, they should rotate quite freely in their housing.
2. Offer up the stem to the cylinder, completely blocking the aperture in the guide bush. Fill the cylinder with Esso Univis 54.
3. Push the piston-stem unit into the cylinder, forcing out all excess oil. With hand press 5479/A and tools T.0020824 and T.0020828 assemble the discharge valve in the cylinder. Pierce the tube on two opposite points, two of the four holes, in the base of the cylinder so that the valve will not move (Fig. 119, No. 2).
4. With the damper body (a) firmly clamped in a vice (lined with aluminium) fill with ESSO UNIVIS 54 until the level is half way up the tube. Then assemble the cylinder and piston-stem unit previously prepared.
5. Hold the cylinder (for inst.: press on the stem guide bush with a screwdriver), and use tool T.0020811 (Fig. 119, No. 3) to reciprocate the damper stem up and down until all air has been expelled. Let all excess oil out until the level reaches the upper



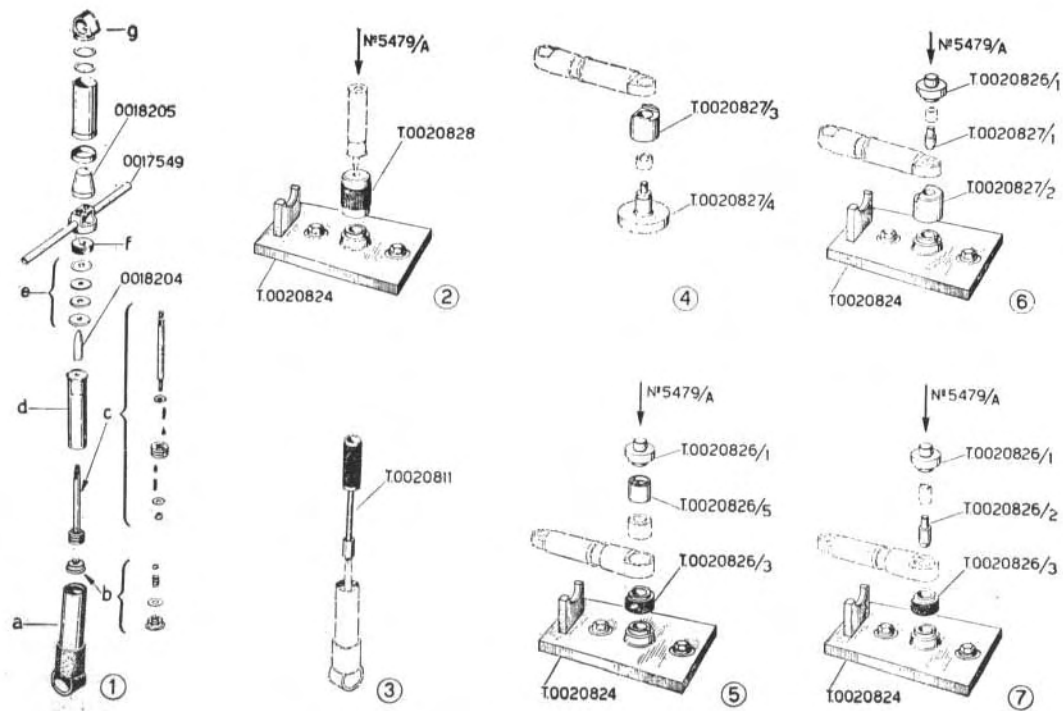


Fig. 119 - Dismantling and re-assembling the front damper.



part of the stem guide bush when the piston is at the end of the compression stroke.

6. With pilot sleeve 0018204 assemble the packings. Assemble the threaded ring with wrench 0017549; with pilot sleeve 0018205 fit felt ring and outer tube. Screw down and tighten the support (g) holding the stem with a 6 mm open ended spanner (see Fig. 119, No. 1).
7. If the rubber bushes are to be changed, the instructions shown in Fig. 119, Nos. 4-7 should be followed.

When carrying out the above re-assembly, make sure that both the liner and the bush housing are cemented prior to fitting.

DISMANTLING, OVERHAUL AND RE-ASSEMBLY OF REAR HYDRAULIC DAMPER

The same procedure applies to the rear hydraulic damper, but the following points should be observed on re-assembly (see also Fig. 120, No. 1).

1. The piston has four springs of two types. For correct functioning, the two shorter springs of thicker wire must be fitted to the lower end of the piston (towards the discharge valve). The other two are fitted to the upper end.
2. To ensure that the correct quantity of oil is in the cylinder, make sure that the level is about halfway of

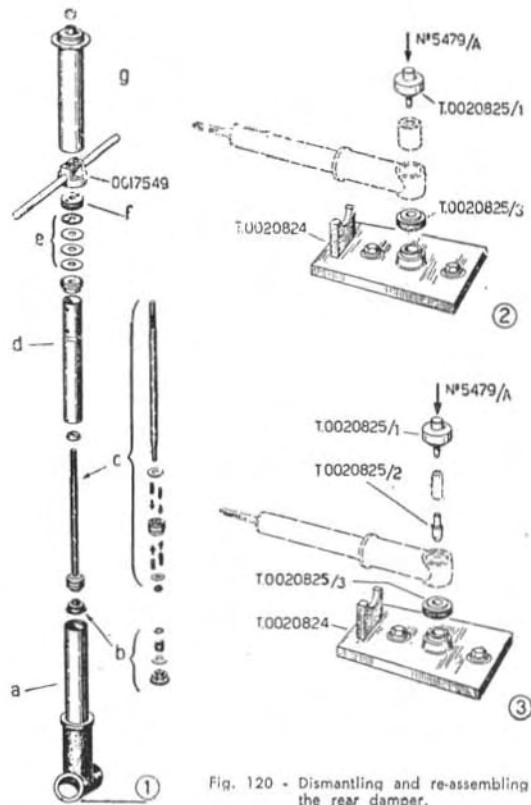


Fig. 120 - Dismantling and re-assembly of the rear damper.



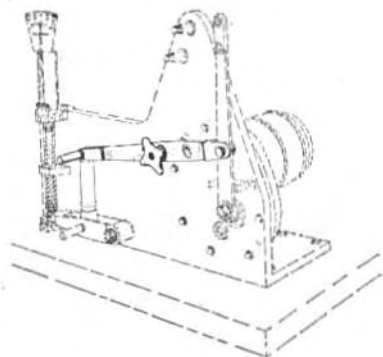


Fig. 121 - Testing the front damper.

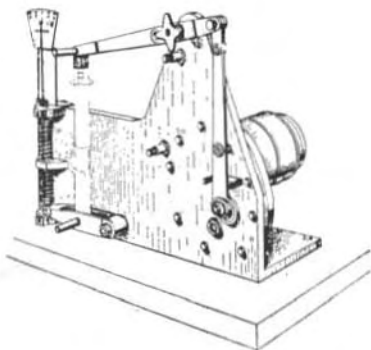


Fig. 122 - Testing the rear damper.

the hole in the upper half of the cylinder after the piston-stem unit has been assembled.

3. The assembly operation to be carried out with tools T.0020811, T.0018204 and 0018205 refer only to the front hydraulic damper. The rear damper packings can be fitted by hand. If the rubber bushes are to be changed (see Fig. 120, Nos. 2-3) use the tools specified in the figure.
4. After the damper has been re-assembled, check that the threaded part of the stem is exposed for about 15-16 mm. (.50" - .62") above the locking nut. Before assembly on the scooter, reciprocate the damper about 15-20 times by hand to control operation.

N. B. — When charged, the dampers contain 90-91 cc. (rear) and 37-38 cc. (front) of oil respectively.

IMPORTANT

A new discharge valve must always be used when the hydraulic dampers are overhauled.

When the dampers are assembled, they should never be operated in any position other than normal.

The metal components of the dampers should always be washed and cleaned with pure gasoline.

Tool 7259/R (Figs. 121 and 122) should always be used for the working test of the dampers and attention should be paid to the instructions contained in the card issued with the test stand.



ENGINE TEST

The test stand 6488/A can be used provided that the propeller blades prescribed for **Vespa G.S.** are mounted. The test stand should be so installed as to avoid any dangerous vibrations to the engine and the other units fitted thereon (burette, fuel tank etc.).

The test stand, consists of a metal table which carries the following structures (see Fig. 123).

1. Engine bracket and propeller unit with its drive.
2. A control board and a panel with head lamp and tail lamp for checking the efficiency of respective circuits. The rev. counter is embodied in the control board together with the throttle control, the three way cock on the fuel line to the carburettor and a burette for the fuel consumption test (burette capacity: « C » = 15 cc.).

The lower mark on the burette should be at least 75 mm. (about 3") higher than the fuel level in the float chamber.

Fuel flows to the carburettor through one of the following three circuits:

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

3. The fuel tank.
4. A bracket for the rev. counter drive, from the propeller.

The propeller is directly driven by the engine; a suitable flange with dogs must be fitted in the end spline of the engine mainshaft; the flange drives mating dogs on end of propeller shaft, through an elastic and a calibrated joint.

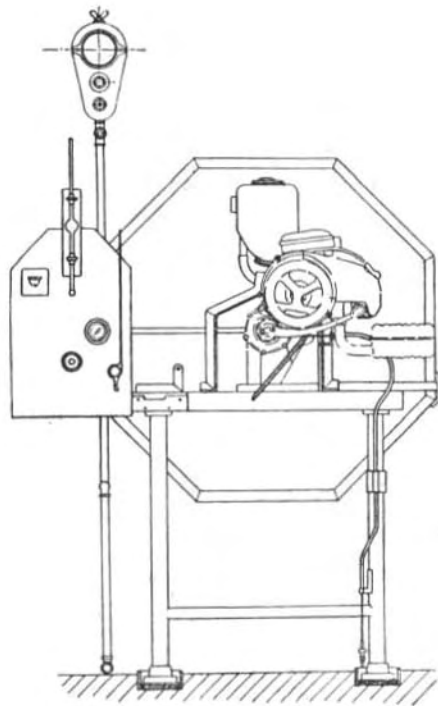


Fig. 123 - Engine test stand.



9. Absence of friction between stator and rotor of fly-wheel magneto.
10. Change gears up and 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 which is engaged. The ratchet quadrant should have a further short free movement before 1st and after 4th gear positions.
11. Remove the cylinder, inspect it and also inspect the crankshaft-con.rod. - gudgeon pin-piston assy according to the tables of permissible tolerances, pages 63-68.

Fuel consumption test on the stand

1. - Feed the carburettor through the circuit « b » and run the engine at 4500 rpm. in 4th gear.
2. - Turn on the circuit « c » and take note of the time « T » spent for emptying the burette.
Being « sG » the specific gravity of the fuel mixture, the specific consumption can be calculated by the following formula:

$$\text{Specific consumption (g./HP/h)} = \frac{1190 \times C \times sG}{T}$$

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

FUEL CONSUMPTION TEST ON THE ROAD

Premise

- a) Check that the tyres are inflated to the prescribed pressure.
- b) During the test the machine must be ridden by the driver alone; he has to sit upright when driving.

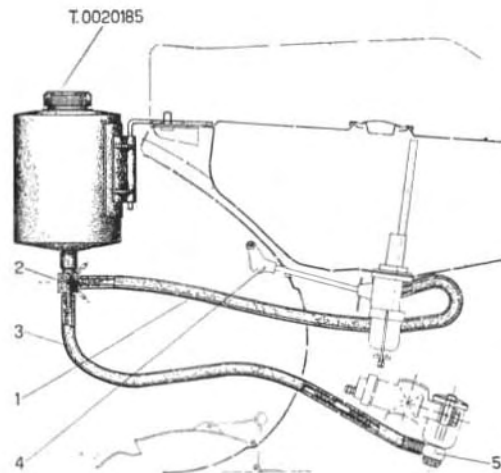


Fig. 124 - Fuel tank for consumption test.

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

14.72 to 1	in 1st gear
10.28 to 1	in 2nd gear
7.61 to 1	in 3rd gear
5.84 to 1	in 4th gear

The revolution counter is driven by two pairs of bevel pinions and a cable; the ratio is 1 to 1. The engine revolutions are equal to the figure shown by the rev. counter multiplied by the transmission ratio of the gear engaged: Example: if the counter shows « 1000 », with 4th gear engaged, the engine revolutions are:

$$1000 \times 5.84 = 5840.$$

IMPORTANT — Ignition circuit (with battery and rectifier) must be connected to the flywheel as when the engine is normally assembled on the machine (see Fig. 14 b).

Adjustment of the test propeller.

The propeller adjustment must be checked periodically (at least once a month), with a test engine tuned to deliver 3.03 HP at 4500 rpm. in 4th gear.

Normal test

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

— Make sure that the engine is in proper running order, that the clutch lever on the engine turns round and comes back to the stop easily.

- Fill the gear box with oil **Essolube 30** or Esso Motor Oil SAE 30 up to the prescribed level.
- Place a 17 mm spacer between the throttle slide and its seating to prevent maximum opening.
- Fuel mixture should consist of 65 cc. of Oil Essolube 30 or Esso Motor Oil SAE 30 per liter of gasoline (1/2 pint per gal.).
- Turn on the feed circuit « a ».

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

Gear box position	Engine revs	Time	Jet
1st gear	2500	5'	103/100
2nd gear	3500	5'	
3rd gear	4000	10'	
4th gear	4500	10'	
4th gear	5000	10'	
4th gear (17 mm spacer)		5'	

After completion, check following points:

1. If sparkplug, nuts and screws are well tightened.
2. Starting with warm engine.
3. Idling under normal conditions, then with battery disconnected and head lamp-tail lamp on.
4. Pick-up.
5. Noisiness.
6. Leaks; there should be no leaks of either oil or fuel.
7. Fuel consumption.
8. Clutch efficiency.



- c) Carry out the test with the top gear engaged.
- d) The test will have to be accomplished on 50 kms. (25 to and 25 fro), corresponding to 31 miles, of dry road with maximum wind speed of 2 m./sec. Temperature should be 5 to 25°C (41 to 77°F).

Preparing the scooter

The auxiliary fuel tank, part. No. T.0020185, is used for this test. A longer fuel pipe to the carburettor must be fitted. Fig. 124 illustrates how the auxiliary tank is fitted to the scooter.

The consumption test should take place under the following conditions:

- a) Close the fuel tap (4) of the scooter and remove the rubber hose connecting the sediment bowl to the carburettor.
- b) Mount the auxiliary tank and secure it with the front nut for the saddle. See that the choke control wire is in position « open ». Move the tank along its bracket until the tap reaches a level higher than the carburettor tap.
- c) Get two rubber hoses of required length and connect the tap (2) of the auxiliary tank to the sediment bowl by means of the hose (1) and to the carburettor (5) by means of the other hose (3). Open the tap of the scooter tank again.
- d) Rotate the lever of the tap (2) to the position « all off » (oblique upwards), and fill the auxiliary tank with 2.5 liters (.66 USA gals; .55 imp. gals) of fuel mixture consisting of 65 cc. of Oil Essolube 30 or Esso Motor Oil SAE 30 per liter of gasoline (1/2 pint per gal.).

Road test

- a) Set the tap (2) of the auxiliary tank horizontally, the carburettor being fed by the scooter tank, and ride to the road section where the test will be carried out adjusting the speed of the scooter to 60 Kms./h. (37.27 mph.).
- b) When entering the road for the test, quickly turn the lever of the tap (2) of the auxiliary tank vertically downwards (the carburettor being fed by the auxiliary tank). The prescribed speed should be maintained as constant as possible for the whole test.
- c) At the end of the last kilometer of the first half of the test section, quickly turn the lever on the tap (2) horizontally, and stop the scooter after about 300 m. (330 yds.).
- d) Invert the riding direction and regulate the speed again to 60 Kms./h., and, at the beginning of the first kilometer, repeat the operation indicated at point b). At the end of the section, quickly turn the lever of tap (2) to horizontal position.

Calculating fuel consumption

- a) Close the tap (4) of the fuel tank of the Vespa.
- b) Detach the rubber hoses (1 and 3) from the auxiliary tank, empty them and measure the amount R (in cc.) of the fuel mixture left in the tank.
- c) The distance « P », expressed in Kms./litre of fuel, may be figured as per following formula:

$$P = \frac{50.000}{2500 - R}$$



FAULT FINDING AND REMEDIES

LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
<p>HARD STARTING: This can be due to one of the following causes:</p>			
<p>1. Fuel system</p>			
No fuel at carburettor	Fuel line clogged by deposits	<p>a) Wash the sediment bowl with gasoline</p> <p>b) Wash the gauze filters, on carburettor and sediment bowl; blow dry.</p> <p>c) Unscrew and remove the main jet. If the fuel system is efficient, fuel will come out. Blow through jet orifice to ensure that it is clear.</p>	<p>* Avoid use of any abrasive materials or wires.</p> <p>** Procedure to re-start engine: a) Push-start the machine in second or first gear with throttle wide open, or b) close the fuel tap, unscrew the sparking plug and rotate the engine for about half a minute with throttle wide open to expel the excess fuel. Replace the sparking plug and proceed as for normal start.</p>
a) Packing of sediment bowl	Damaged	Replace	
b) Sediment bowl	Broken	Replace	
c) Fuel tap body	Clogged	Remove and blow clear	
d) Hose between sediment bowl and carburettor	Damaged, clogged	Replace, blow dry	
e) Float needle valve	Sticking on its seating	Release by removing the float chamber cover	
f) Atomizer	Clogged	Remove and blow clean *	
g) Carburettor body	Clogged	Dismantle the carburettor. Clean carefully with gasoline and blow dry	
<p>2. Carburation</p>			
<p>Neat fuel coming out from exhaust pipe.</p> <p>Fuel dripping out from carburettor</p>	} Engine flooding **		



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	R E M E D Y	NOTES
a) Float	Sticking in depressed position Perforated (indicated by fuel swirling inside when float is shaken briskly)	Release Replace	
b) Air cleaner	Needle not properly fitting into its seating	Clean or replace both needle and float chamber cover.	
c) Choke flap	Choked, dirty	Clean	
d) Carburettor assembly	Sticking in position « closed » Mounted at an angle	Release Turn to vertical position	
3. Ignition			
a) Sparking plug	Dirty	Disconnect the plug lead. Check if sparking occurs between lead and crankcase when the footstarter is operated. * * *	
b) Moving arm of contact breaker	Cracks in insulation 1) Bearing surface worn * 2) Lubrication felt dry or broken	Clean. Correct gap to .6 mm. (.023 in) Replace the plug Replace the breaker Lubricate or replace	* When the bearing surface of the arm becomes abnormally worn, see if the cam surface is perfectly smooth. If not, the cam should be replaced (see page 69).
c) Condenser	Faulty	Replace	
d) Case for external ignition coil	Cracked causing short circuit	Replace	
e) Case cover	Broken or disconnected inside the case	Replace or re-solder	** See « Ignition » page 9.
f) Sparkplug lead			



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	R E M E D Y	NOTES
g) Breaker points	Dirty, partially worn or pitted Gap incorrect	Clean with suitable file or very fine emery paper Correct gap to .4 mm. (.015 in.) with feeler gauge	
	Completely worn or pitted	Replace	
h) Timing	Wrong	Re-time ignition according to directions on page 113.	
i) Woodruff key for flywheel	Worn out	Remove the flywheel and replace the key making sure that the key way is not worn *	
l) Battery	Run down	See page 82	
4. Clutch			
The engine will not revolve when the footstarter is depressed	Clutch slipping	Ensure that there is sufficient play in clutch lever; if correct, follow instructions for clutch repair as given on page 80.	* Firmly tighten the nut retaining the flywheel in order to ensure that the trouble does not re-occur. Replace the crankshaft if the key way is worn.
5. Starter assembly	Not engaging	See page 102.	



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
INCORRECT RUNNING			
1. Lack of power			
a) Silencer outlet pipe b) Induction pipe c) Exhaust port d) Cylinder base gasket	Carbonized Loose Partially closed by carbon deposit Not tight	Clean Tighten the nuts on flange * Decarbonize cylinder, piston and cylinder head * * Replace	* The packing between cylinder flange and induction pipe should be replaced. ** These parts should be removed for decarbonizing.
2. Poor compression			
a) Sparking plug b) Cylinder and cylinder head c) Piston rings	Not well screwed down in cylinder head. The head does not fit properly into spigot on top of cylinder or the three stud nuts are slack Gummed up or not free in grooves	Tighten Set the head properly and tighten the nuts carefully after deburring the spigot, if necessary Inspect the rings and clean the grooves	
3. Explosions at silencer or carburettor			
a) Sparking plug	Excessive electrode gap Carbon coated Carbon pearls on insulation	Correct gap to .6 mm. (.023 in.) Replace or clean and check the gap * * * Clean ***. Ensure that oil-gasoline ratio of fuel is correct.	*** Clean with suitable wire brush and emery paper or, better, by sand-blast.



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
b) Condenser c) Contact breaker d) Carburettor	Pre-ignition Loose in its housing on coil plate Faulty Loose tip Not enough mixture	a) Replace the plug with a colder type b) Re-time the ignition (see Fig. 135). Tighten the screw securing it. Replace Replace See « Hard starting », paragraph 1, letters c, d, e, f, g.	
4. Clutch troubles			
I - Clutch snatches a) Plates with cork inserts b) Convex steel plates c) Gear pinions	Gummed together Wrongly assembled Not lubricated	Wash with paraffin Assemble correctly (see page 80) Top up oil level (see « Lubrication Chart » page 22)	
II - Clutch slips a) Springs b) Plates with cork inserts	Feeble Worn or burnt	Replace Replace*	
III - Clutch does not disengage completely Control cable	Excessive play	Adjust (see page 80)	
5. Gear pinions disengage of own accord			
a) Gearchange control cables b) Gear shifter	Out of adjustment Loose on crankcase	Adjust (see page 80) Tighten the screws	* The springs must be replaced whenever the corks are burnt.



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
c) Spring for stirrup.	Broken, missing or feeble	Replace	
d) Actuating arm	Excessive play with gear shift flange	Replace (see page 80)	
e) Selector	Chamfered arms	Replace	
	Guide bush of selector shaft wrongly assembled	Rectify	
f) Gear pinions	Chipped or worn dogs	Replace	
6. Starter assembly not engaging			
a) Starter ratchet	Movement not free in the slots of the housing	Clean, adjust or, if necessary, replace	
	Chipped or worn teeth*	Replace	* In such a case, the mating teeth on the face of 1st gear pinion should also be inspected.
b) Slotted bush	Deformed or broken	Replace	
c) Starter bush	Deformed or broken	Replace	
d) Thrust springs	Broken or feeble	Replace	
7. High fuel consumption			
I - Fuel level too high in carburettor			
a) Float	Perforated	Replace	
b) Float needle valve	Not properly fitting into its seating	Clean or replace both needle and float chamber cover	
II - Air cleaner			
III - Choke valve flap	Choked or dirty	Clean **	**Swirl in a 30% gasoline-oil bath.
	Sticking in closed or partially closed position	Release	



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	R E M E D Y	NOTES
IV - Main jet	Diameter of orifice increased, or wrong jet fitted	Fit proper jet (1.03 mm.)	
V - Ignition	Retarded	Re-time (see Fig. 135)	
VI - Poor compression			
a) Sparking plug		See page 100, No. 2, letter « a »	
b) Cylinder and cylinder head		See page 100, No. 2, letter « b »	
c) Piston rings	Gummed in or worn out	See page 67	
8. Controls not operating properly			
I - Hard controls *			
Inner cable	Rusty Unravalled	Lubricate or, if necessary, replace Replace and lubricate	* If the throttle control is stiff, the trouble may also be caused by lack of lubrication at r. h. twistgrip.
II - Excessive play			
Inner cable	Slack	Operate on respective adjusting nuts	
9. Steering column becomes stiff			
a) Top race of top ball bearing	Too tight	Adjust	
b) Ball races of bottom bearing	Pitted **	Replaces races and balls	** This trouble may lessen riding stability.
10. Excessive play in steering column			
Top race of top ball bearing	Loose	Adjust	
11. Poor braking			
a) Control pedal or lever	Stroke too long	Adjust	



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
b) Rear brake linings	Worn down Oily	Replace Wash with gasoline, dry and slightly rub the braking surface with emery paper	
c) Brake drums and linings	Scratched	Replace	
12. Inefficiency of suspension			
I - Front suspension			
- Noisiness			
a) Nut securing the spring	Slack	Tighten	
b) Spring	Loose on anchorage trunnion	Screw down	
	Interference with welded support bracket	Move the bracket side away from the upper coils of the spring	
c) Anchorage trunnion	Stiff on its spindle	Dismantle the unit, lubricate and reassemble (see « Lubrication Chart », page 22). If necessary replace the worn parts.	
		Screw down the nut firmly.	
d) Swinging hub	Axial play	Tighten nut securing hub on bottom end of steering column	
- Riding instability			
a) Spring	Broken or feeble	Replace	
b) Spindle of swinging hub	Radial play	Replace the spindle * or the rollers or bushes, as required	
c) Hydraulic damper	Inefficient	Overhaul	
- Difficult rotation of wheel spindle			
a) Ball bearings	Ball races pitted for lack of lubrication	Replace and lubricate generously	

* Spindle « n »,
page 55.



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES *
II - Rear suspension - Noisiness a) Bolts securing light alloy top anchorage b) Engine bracket c) Hydraulic damper d) Top rubber bush for hydraulic damper - Inefficiency a) Spring b) Hydraulic damper	Seized Slack Side or rotational play Ineffective Worn out Broken or feeble Lack of oil; internal components worn out Stem rod loose on top anchorage pin	Replace and lubricate Tighten Replace rubber bushes Overhaul (see page 91) Replace Replace Overhaul (see page 91) Tighten	
13. Engine noisy a) Piston - cylinder - cylinder head assembly b) Connecting rod c) Main bearings	Excessive play Interference between cylinder head and piston sides due to heavy carbon deposit Play between gudgeon pin and small end bush Play between crankpin and con. rod big end Races pitted	Replace or re-grind the cylinder * Replace both piston and rings Decarbonize Replace the bronze bush Overhaul the crankshaft (see tables on pages 63 and 66) Replace the bearings	* See table on page 65.



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	R E M E D Y	NOTES
d) Flywheel magneto	Loose on crankshaft	Replace the woodruff key and tighten with tools supplied *	* If the key ways have damaged edges, the crankshaft should be replaced.
e) Clutch assembly	Loose on crankshaft	Replace the woodruff key and tighten with tools provided	
f) Cush drive	Broken springs	Replace (see page 81)	
g) Gear pinions	Excessive axial play	Assemble an oversize shoulder ring (see page 68)	
h) Clutch pinion	Whining	a) Replace the clutch pinion or b) Replace both clutch pinion and outer helical pinion of cush drive	
i) Fan	Slack screws	Tighten the screws and lock with edge of tab washers	
l) Silencer	Inside baffles detached	Replace the silencer	
14. Faulty electric wiring			
a) Terminals at L. T. socket	Disconnected	Re - connect	
b) Leads	Broken or insulation damaged	Repair or replace	
	Wrong connection on light switch	Rectify the connection (see diagram on page 9).	
c) Horn	Leads out of their terminals	Re - connect and replace the screws if necessary.	
d) Head lamp	Bulb filament fused	Replace the bulb (see type and voltage on page 15)	
	Poor earthing	Repair or replace the earthing cable. Make sure that the cable ends make good contact	
	Surface of reflector mat or yellow	Replace the reflector	



LOCATING SOURCE OF TROUBLE	CAUSE OF TROUBLE	REMEDY	NOTES
e) Tail lamp	Wrong positioning of head lamp Inverted positioning of bulb Bulb filament fused Poor earthing	Rectify (see page 17) Rectify Replace the bulb (see type and voltage on page 15) Replace the contact washers under the wing-nuts securing the tail lamp on frame	
f) Town light	Wrong connection of the lead with the funnel shaped terminal Wrong positioning terminal Wrong connection of white earthing cable on bulb socket Wrong connection of the cable in the switch	The cable terminal must be clamped between the bulb and the lug of its L. H. carrier Secure the cable under the camp of the un-insulated clip Rectify (see diagram, page 15)	
g) Battery cables h) Battery	Disconnected or loose Inefficient	Connect and secure Re-charge (see page 82)	





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6th Section
RE-ASSEMBLY



RE - ASSEMBLY

This section illustrates the sequence to be followed for complete reassembly of the scooter and its units. Notes on page 39 of section « **Dismantling** » apply here as well.

Before assembly, see that all parts are clean; if necessary, wash them and blow dry as said on page 39, then smear all revolving or sliding parts, with mineral oil.

Use new packings and split pins for re-assembly.

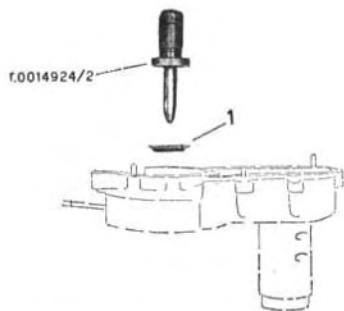
Should the re-assembly of the engine or other units be postponed for a while, protect all loose parts from dust.

NOTICE

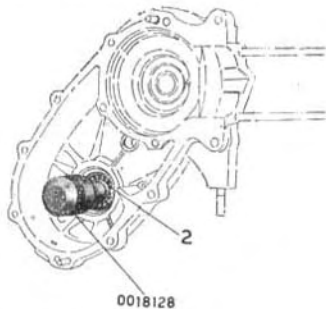
This section illustrates just the operations calling for a particular procedure or use of specific tools not described in the section « **Dismantling** ». Otherwise operate with a procedure reverse of that explained in the figures of said section.



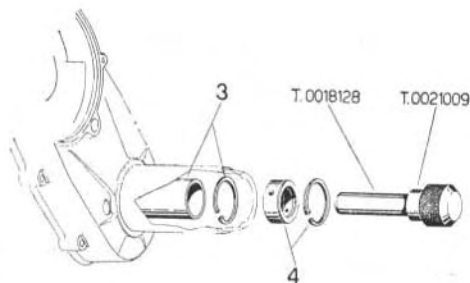
ENGINE RE-ASSEMBLY



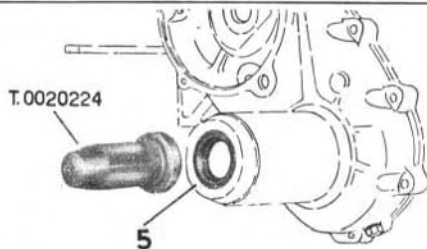
- 1 - Oil seal on crankcase clutch side. (Assemble the seal so that its slot tallies with the end of the crankcase drilling).
Fig. 125



- 2 - Inner bearing of mainshaft.
Threaded ring (see page 48 operation 42).
Fig. 126



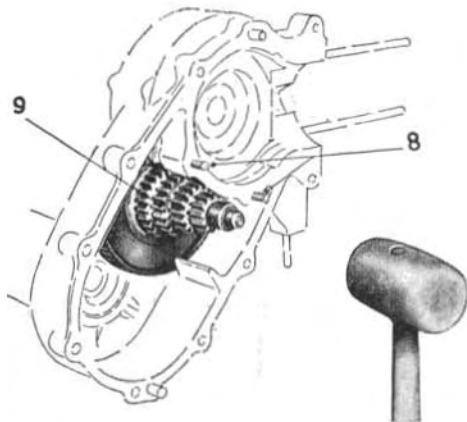
- 3 - Spacer tube and circlip.
4 - Outer bearing of mainshaft.
Fig. 127



- 5 - Oil seal.
(The oil seal can be assembled with the same tools also if the engine is mounted on the scooter; see page 49, operation 45 a).
6 - Selector into mainshaft.
7 - Guide bush.
Selector stem (the selector has left hand threading).
Tab washer (bend the edges).
Fig. 128



ENGINE RE-ASSEMBLY



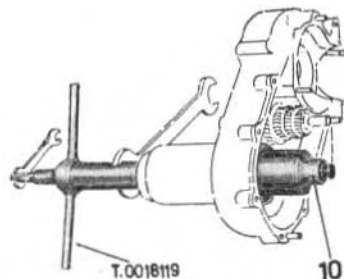
8 - Two lower crankcase bolts.

9 - Cush gear with layshaft.

After assembling the layshaft and the ball bearing with circlip into the multiple gear, slide the cush gear in from the lower portion of the crankcase clutch side, then screw down the nut on said crankcase to secure the layshaft.

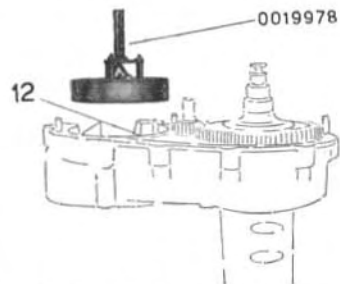
N. B.—The 23 rollers, bearing the layshaft, must be placed into their housing on the other half of the crankcase, after greasing their track.

Fig. 129



10 - Mainshaft (turn the shaft so that its longest slot faces the cush gear)

Fig. 130



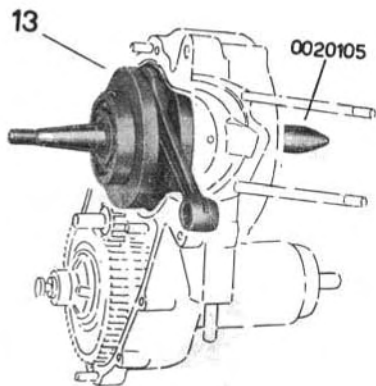
11 - Dip the main bearings into oil at 100° C (212° F) for about six minutes, then mount on the crankshaft.

12 - Heat to 60° C (140° F), by means of heater 0019978, the crankcase bush, clutch side, where the main bearing will be housed.

Fig. 131

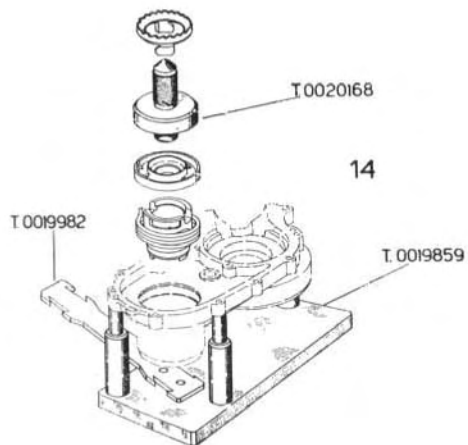


ENGINE RE-ASSEMBLY



13 - Oil seal and crankshaft.

Fig. 132



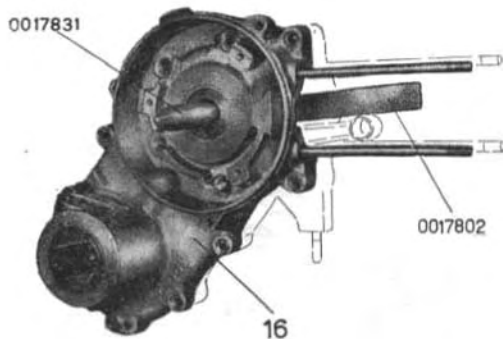
14 - Starter assy.

Warming up the housing on the crankcase by means of heater 0019978 will ease assembly of the slotted bush.

Fig. 133



ENGINE RE-ASSEMBLY

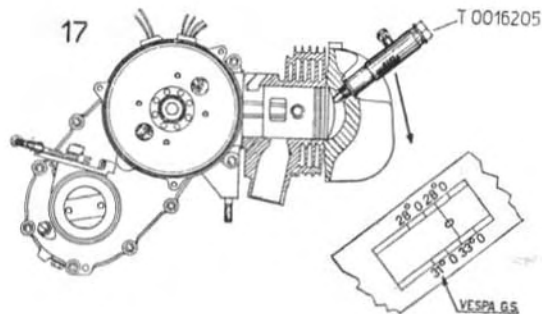


- 15 - Oil seal on crankcase half, flywheel side.
(Use the tool T.0014924 with its part No. 5 replacing the part No. 11; see operation 1).

N. B.— Before assembling the oil seal, heat its housing on crankcase by means of heater 0019978. This is indispensable also for easing, in next following operation 16, the main bearing into its housing on flywheel side crankcase.

- 16 - Crankcase halves.
Clean the joining edges of both crankcase halves, smear with shellac and fit the paper gasket. Assemble the bolts with washers and tighten the nuts, with an 11 mm. box spanner, alternately and progressively.
Bend the edges of the tab washers on the hexagons of the four special nuts.

Fig. 134



- 17 - Time the engine.

Bring the piston to the t.d.c. then let the zero mark of the outer sleeve 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 31° before the t.d.c.

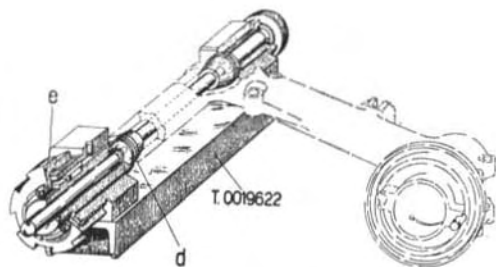
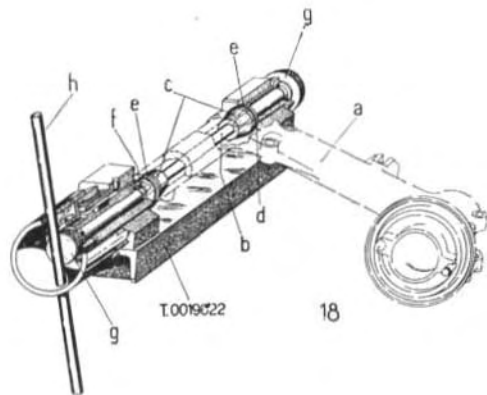
If the ignition is abnormally advanced (more than 31°) or retarded (less than 31°), remove the flywheel, and rotate the stator, respectively in clockwise or anticlockwise direction.

Tighten the screws retaining the stator on the crankcase.

Fig. 135



RE-ASSEMBLY OF SPINDLE AND RUBBER BUSHES OF ENGINE BRACKET



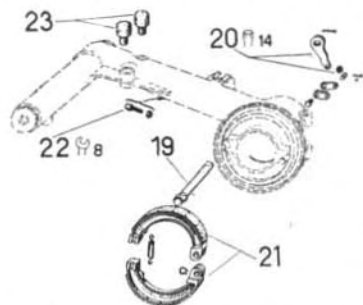
18 - Spindle and rubber bushes of engine bracket.

Operation « A »: assembling spindle and bushes.
Use the tool T.0019622: assemble one of the two bushes « c » on spindle « b », then the whole into the engine bracket. Mount the other bush « c » and position the bracket on the tool. Assemble the washers « e » and secure the bracket by means of the two pins « g ». Tighten « h » down to the stop.

Operation « B »: locking the washers to load the bushes.
Remove « h » and pins « g ». Bend outwards each spindle edge in four points against respective washer by means of punch « e ».

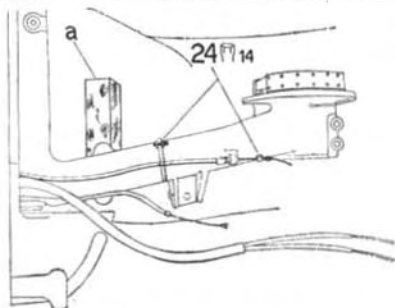
Fig. 136

**RE-ASSEMBLY OF BRAKE OPERATING CAM,
JAWS AND BRAKE CONTROL CABLES**



- 19 - Brake operating cam. 22 - Adjuster of brake control cable.
20 - Lever. 23 - Buffers.
21 - Brake jaws.

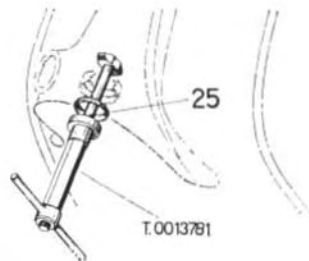
Fig. 137



- 24 - Connect rear brake control cable and fasten the sheath with clip.
N. B. — Place the wedge « a » under engine bracket and mount the engine.

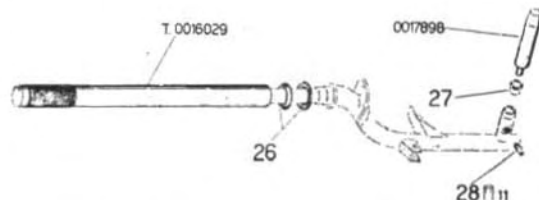
Fig. 138

RE-ASSEMBLY OF STEERING COLUMN



- 25 - Upper ball race of bottom bearing.

Fig. 139



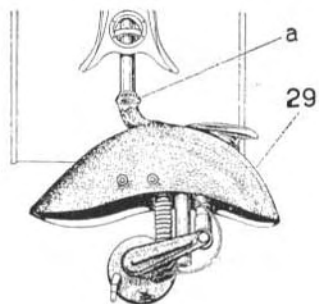
- 26 - Lower ball race and dust cover of bottom bearing.
27 - Liners for wheel axle.
28 - Grease nipple.

N. B. — Inspect the steering column for alignment with template 15040/C - 15119/C.

Fig. 140

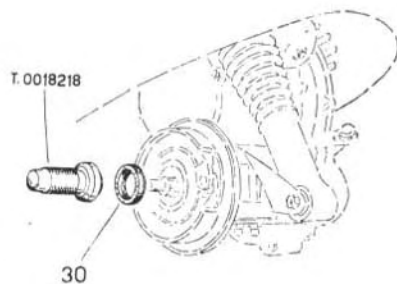


RE-ASSEMBLY OF STEERING COLUMN

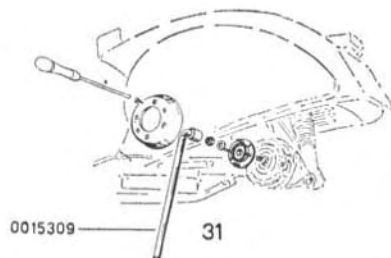


29 - Steering column assy on the scooter.
(Hold the balls in « a » with a thick layer of grease).
Fig. 141

RE-ASSEMBLY OF OIL SEAL AND BRAKE DRUM



30 - Oil seal only with engine secured to the machine.
Fig. 142



31 - Rear wheel flange and brake drum.
(Use a new split pin).
Fig. 143

FINAL INSPECTION BEFORE STARTING USE OF THE SCOOTER

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

- 1 - Make sure that nuts and bolts are tight.
- 2 - Oil level in the gear box: the scooter standing upright, oil should just be about to flow out.
- 3 - Efficiency of shock absorber.
- 4 - No leaks for either fuel mixture or oil.
- 5 - Tyre pressure: 1.75 Kg./cmq. (25 psi) on rear wheel, 1.2 Kg./cmq. (17 psi) on front wheel. When the Vespa is ridden by both driver and passenger, the pressure of the rear tyre should be increased to 2.5 Kg./cmq. (35.5 psi).
- 6 - Electrolyte level in the battery (see page 82).
- 7 - Efficiency of electric wiring.
- 8 - Carburation (see page 97).
- 9 - Brake efficiency.
- 10 - Adjustment of clutch and gear change control cables (see page 80 and 81).
- 11 - Road holding with hands off.
- 12 - Efficiency of security lock (never to be lubricated).
- 13 - 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; keep your fingers off reflector surface.

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





7th Section
INDEXES



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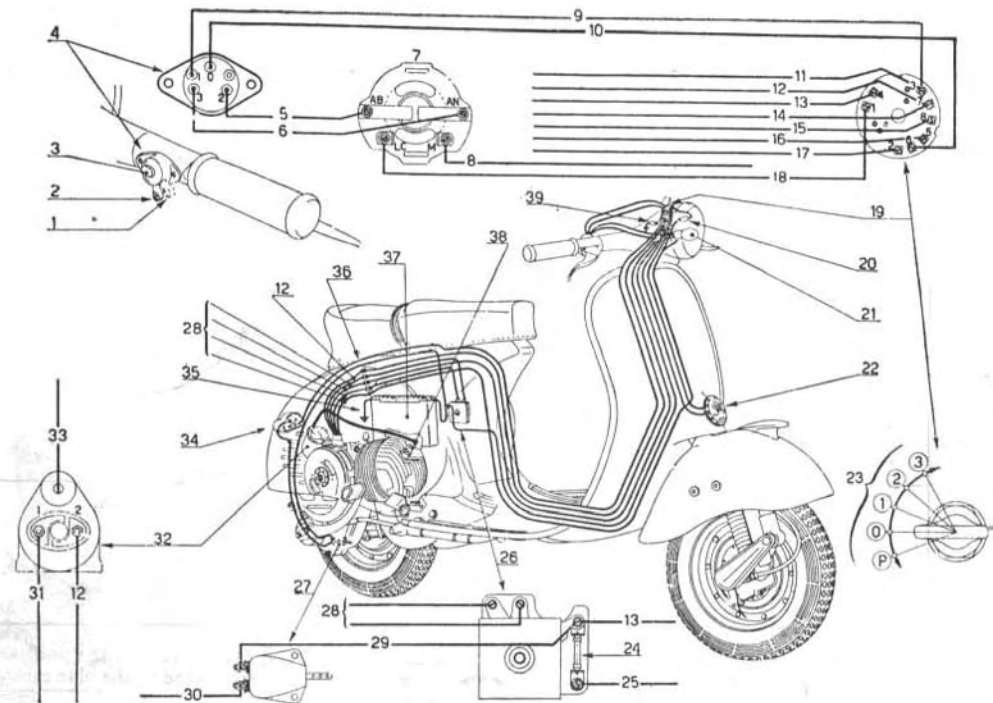
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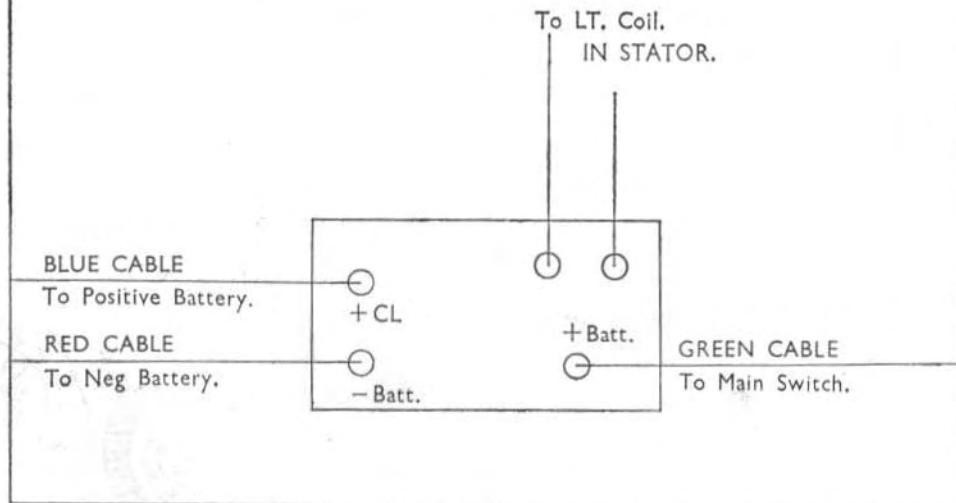


Electric wiring diagram



As V.S.3 Model except for this diagram.

FOR VD2TS SERIES ONLY



Note:—For V.D.2T.S. series the paragraph in column 1 page 30 beginning “ Be sure that the positive pole ” should be as follows:—“ Be sure that the positive pole (+) of the battery is connected to the blue cable and the negative pole (—) is connected to the red cable and attached to the chassis.”





Vespa G.S.

APPENDIX TO SERVICE STATION MANUAL COVERING V.S. 4 AND 5

Valid for scooters with engine-frame prefix: VS 4



scooterhelp.com



Vespa G.S.

APPENDIX TO SERVICE STATION MANUAL FOR VESPA G.S.

Valid for scooters with engine-frame prefix: VS 4

DOUGLAS (SALES & SERVICE) LTD., KINGSWOOD, BRISTOL

Telephone 67-1881

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This appendix, which is to be used in conjunction with the « Service Station Manual » (No. 80465) for Vespa G.S. illustrates the new Vespa model marked by prefixes VS4M-VS4T.



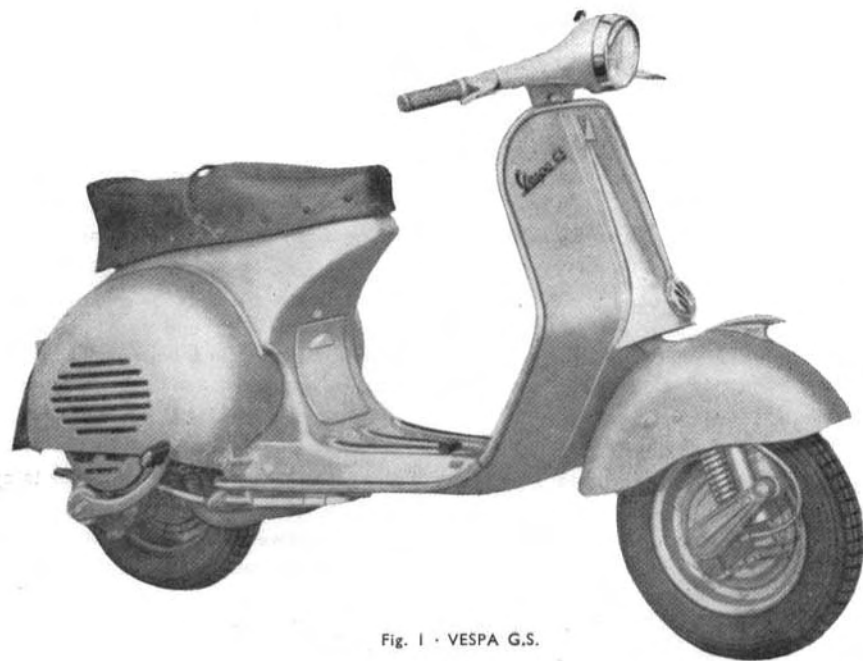


Fig. 1 · VESPA G.S.



INTRODUCTION

The Vespa G.S. has already proved to be a brilliant vehicle which, besides offering weather protection and driving comfort, is distinguished by outstanding performances (high average speed, brisk acceleration, etc.) that endear it to the most expert and hard to please users.

The « Piaggio Co. » has introduced on this high class scooter several noteworthy modifications with the purpose of improving its performance to the best standard obtainable.

The braking system, though quite efficient, has been modified so as to eliminate the particular noise previously obtained due to special weather conditions when braking surfaces are worn. Now brake shoes pivot separately on two pins with the consequence that the anchorage has been improved and any interference eliminated between primary and secondary shoes.

The STOP light device has been improved in that its components, consisting of an orange coloured glass and a 10 W bulb fitted on the tail lamp, are more accessible and better protected. Its switch is operated through the rear brake pedal and is easily accessible for adjustment. The central stand has been secured in a better manner to the floorboard and provided with a modified stop, so that any possibility of excessive play and consequent vibrations after long operation is avoided.

The wheel rims are now more rigid and have more pleasing appearance.

The engine cowling, still detachable, has been supplied with a new lock, more practical and easier to operate, which is partially concealed inside the frame.

Also, the transfer ducts have been ground, in order to increase engine power and elasticity with the same fuel consumption. The metal wadding in the air cleaner unit has been replaced by a special plastic material, which has proved very effective in automobile industry.

The quality of battery, rectifier, etc. (very important units as regard to the car-like, battery-coil ignition) has been considerably improved.

To sum up, we may say that, embodying, as it does, so many unconventional features, the Vespa G.S. is a very remarkable, fully proved machine, which more than justifies its leading position in the light weight two-stroke field.



TECHNICAL DATA

Fuel consumption at economic speed	3 liters per 100 Km (80 miles per USA gal; 95 miles per imp. gal)
Max speed (CUNA Standard)	100 Km/h (62 m.p.h.)
Max gradient climbable	(33%) 1 in 3.3
Wheel base	1180 mm (46.1")
Handlebars width	700 mm (27")
Scooter length	1700 mm (67")
Scooter height	1050 mm (41.3")
Ground clearance	160 mm (6.3")
Minimum turning circle	1400 mm (55")
Weight (full tank)	111 Kg. (224 lbs)
Fuel tank capacity	approx. 9.5 liters (2.5 USA gal., 2.1 imp. gal.)
Reserve fuel (included)	.17 liters (0.44 USA gal., 0.37 imp. gal.)
Operating range	310 Km (190 miles)

ENGINE

Single cylinder, two stroke, with reverse flow scavenge	
Bore	57 mm (2.24")
Stroke	57 mm (2.24")
Displacement	145.45 cc (8.88 cu. in.)
Compression ratio	1: 6.7
BHP at 7000 rpm.	8

Battery coil ignition (see Fig. 2).
Sparkplug: Marelli CW 240 B.
Carburettor Dell'Orto, UB 23 S. 3.
Max jet: 103/100 mm. Idling jet: 50/100 mm. Spray
nozzle: 260/100 mm.

Engine to wheel transmission ratios:

First:	14.72 to 1
Second:	10.28 to 1
Third:	7.61 to 1
Fourth:	5.84 to 1

BRAKES

Expanding type with cable control. The brake rear shoes pivot separately on two pins. The pedal also operates simultaneously the STOP light in the tail lamp.

ELECTRICAL WIRING

Either alternating or direct current for both horn and lighting system is supplied as follows (see Figs. 3 and 4):

- Traffic, country beam, and tail lamp are directly fed with a.c. by the 6-pole flywheel magneto (nominal voltage: 6V).
- Horn, front and rear parking lights and STOP light are fed with d.c. by a 6V-12Ah battery which is re-charged by the flywheel magneto through a metallic rectifier.



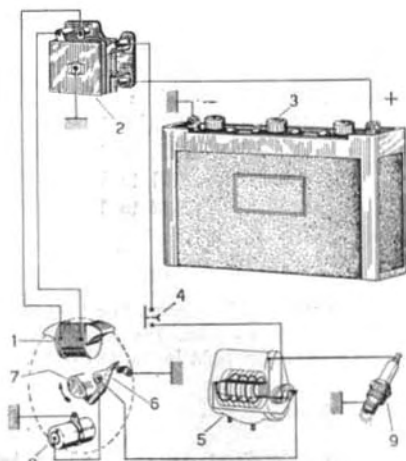


Fig. 2 - Ignition diagram

1. Feeding coil in flywheel magneto - 2. Rectifier, 2.5 A -
 3. Battery (6V-12Ah) - 4. Cut-out - 5. External ignition
 coil - 6. Breaker - 7. Rotor cam - 8. Condenser - 9. Sparkplug.

— Speedometer head is lit by a 6V-1.5W bulb fed either with alternating or direct current.

The **head lamp**, \varnothing 115, arranged in the handlebars, is provided with a 25/25W double filament bulb (traffic and country beam), and with a 1.5W bulb (town and parking light).

The **tail lamp** with red reflector has a 3W bulb, which also illuminates the number plate, and a 10W bulb (STOP light) that is operated through a switch when the rear brake pedal is depressed.

The **main switch**, in which a key must be completely inserted (position 0), is placed on top of the lamp (see No. 13, Fig. 3).

The key can be turned into the following positions (see Fig. 3):

- P) - parking lights on, ignition off
- O) - lights and ignition off
- A) - only ignition circuit connected
- B) - riding at night with town light, tail lamp and bulb for speedometer on
- C) - riding at night with head lamp, tail lamp and bulb for speedometer on.

The dimmer switch (country beam and traffic beam; see Fig. 3, positions « D » and « E ») with horn button is installed on the right hand side of the handlebars.



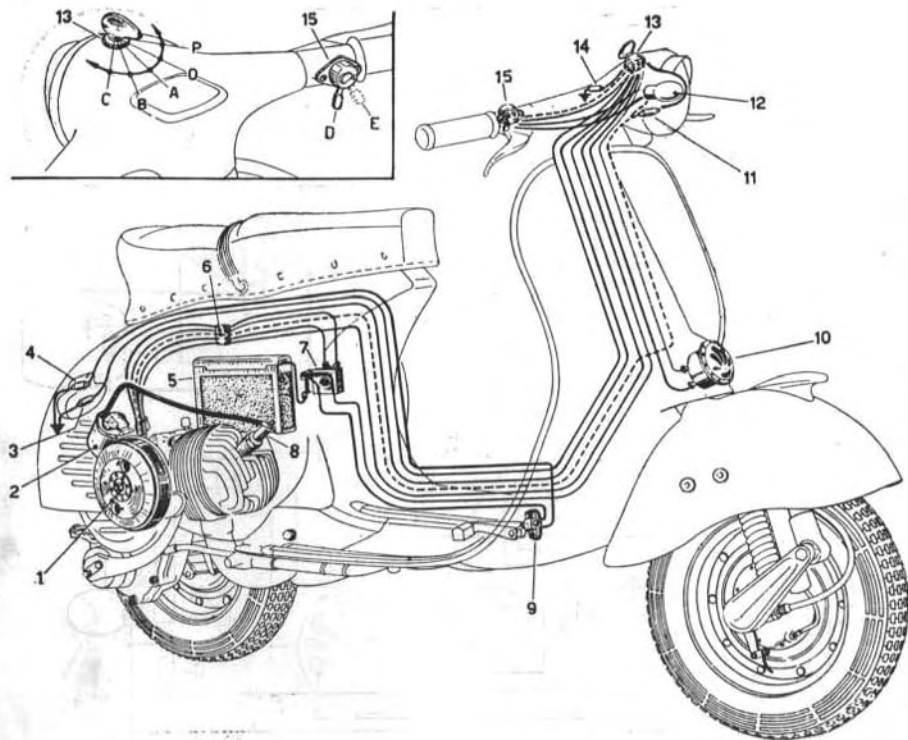


Fig. 3 • Cable harness

1. Flywheel magneto - 2. External ignition coil - 3. 6V-3W bulb for tail light - 4. 6V-10W bulb for STOP light - 5. 6V-12 Ah battery - 6. Clamp board on the frame - 7. Rectifier with fuse - 8. Sparkplug - 9. STOP light switch - 10. Horn - 11. Pilot light (6V-1.5W bulb) - 12. 6V-25/25W double filament bulb - 13. Switch - 14. 6V-1.5 bulb for speedometer light - 15. Dimmer switch with horn button - 16. Inside view of head lamp

N.B. - The clamps in the main switch (No. 13, Fig. 3 and 4) are connected to one another as follows:

- P** : Contacts 4-1-5
- O** : Contacts 1-5
- A** : Contacts 4-7
- B** : Contacts 4-1-5-7
- C** : Contacts 4-7
- Contacts 2-5-6

N.B. - White cables are indicated with black, dotted line.



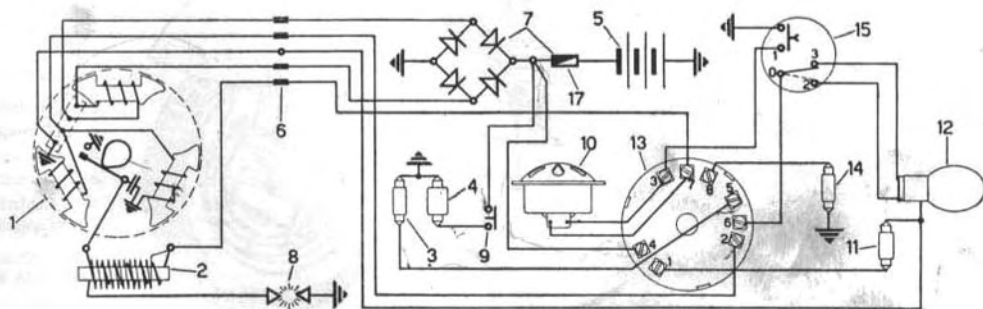
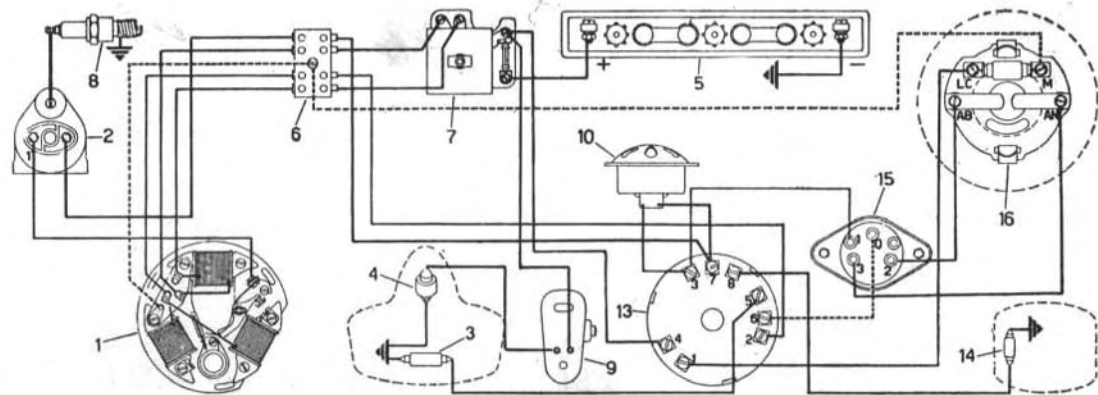


Fig. 4 • Connections and electric wiring diagram



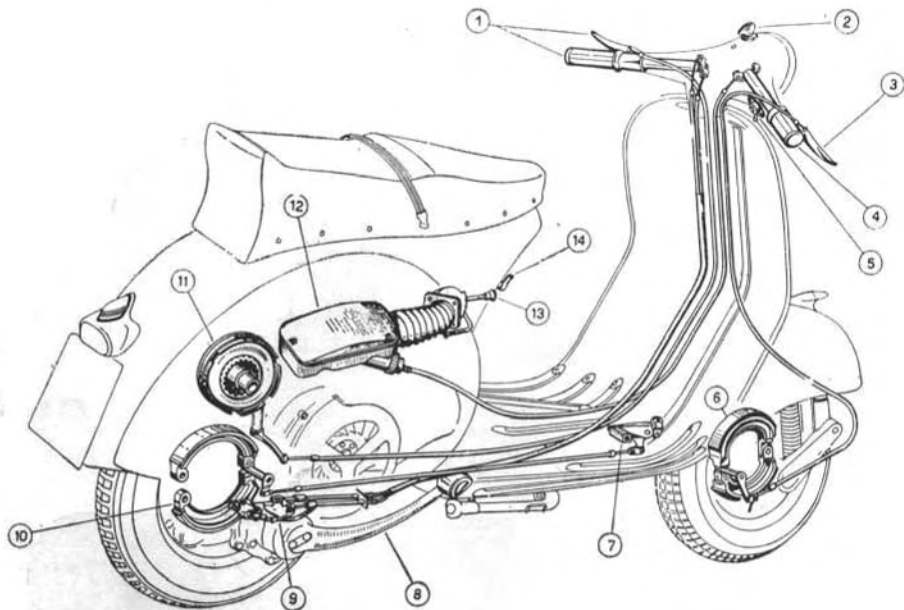


Fig. 5 - Vespa controls

1. Gear change twistgrip with clutch control lever - 2. Five-position switch and cut-out - 3. Front brake lever - 4. Throttle control grip - 5. Dimmer switch with horn button - 6. Front brake shoes - 7. Rear brake pedal - 8. Kickstarter - 9. Gear shifter - 10. Rear brake shoes - 11. Clutch - 12. Carburettor, air cleaner - 13. Choke control lever - 14. Fuel cock.



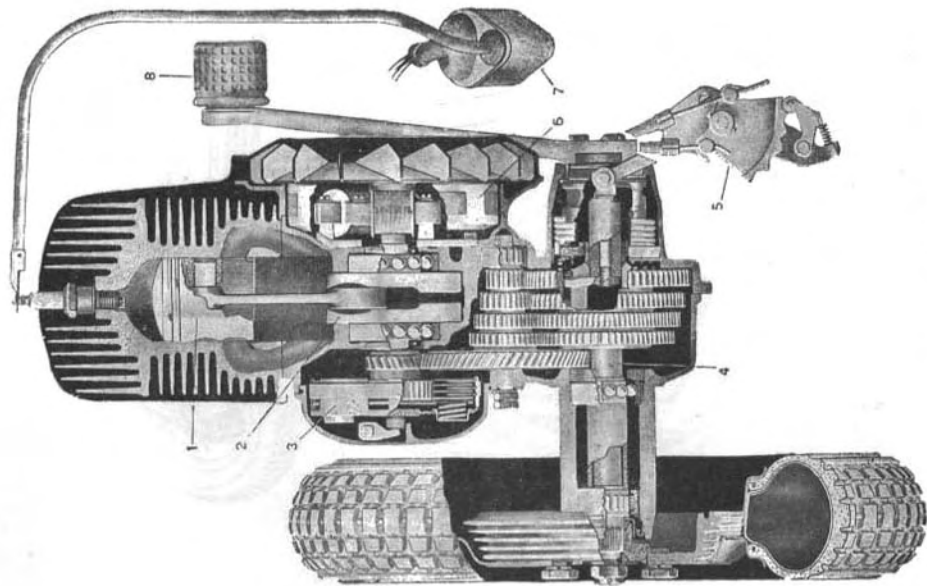


Fig. 6 - Engine section

1. Piston - 2. Crankshaft - 3. Clutch - 4. Mainshaft with gear pinions - 5. Gear shifter - 6. Flywheel magneto - 7. External ignition coil - 8. Kickstarter.



TOOLING

All tools required for overhauling the machine are listed in this section in numerical order. Previous tools which can still be used are indicated in the second column.

Tool No.	Still usable, old tool	TOOL NAME	GROUP	Page	NOTES
4105/A 5479 A		Engine support table Hand press for assembling front and rear hydraulic dampers	Engine Dampers	★ ★	★ Already indicated on Service Station Manual.
7259/R 8002/R	6488/A	Text fixture for hydraulic dampers Engine test stand	Dampers Engine	★ ★	
8290/R	{ 4938/A 5115/A	Flywheel magneto test stand	Flywheel	23	a) Use of components No. 9, 29, 31 is not called for.
T. 12380/C 13768/C 15104/C		Crankshaft alignment fixture Base fixture for assembling coils on stator Inspection template for steering column (base)	Engine Flywheel Steering c.	★ ★ ★	
15119/C		Inspection template for steering column (top)	Steering c.	★	b) Reamer 381500/8 may still be used, if tool T. 0020244 is also used; but it is not to be employed for the oversize bushes.
T. 15362/C T. 15363/C T. 15364/C		Gauge Gauge for reamer adjustment Gauge for reamer adjustment	Engine Engine Engine	30 29 30	
*) T. 15772/C T. 16160/C	12342/C	Jig for frame inspection Gauge for inspecting piston bores (normal size)	Frame Engine	34 29	
T. 16161/C		Gauge for inspecting piston bores (1st o/size)	Engine	29-31	
381500/7	*) 381500/8	Reamer for bronze bush of con.rod small end	Engine	28	



Tool No.	Still usable, old tool	TOOL NAME	GROUP	Page	NOTES
381504		Reamer for 1st o/size wrist pin housing (rough)	Engine	29	★ Already indicated on Service Station Manual.
381505		Reamer for 1st o/size wrist pin housing (finish)	Engine	29	
381505/7		Reamer for bronze bush of con.rod small end (1st o/size)	Engine	28	
400345		Reamer	Engine	30	c) Use of components No. 7, 14, 15 is not called for.
550805		Punch	Flywheel	★	
550807		Punch	Flywheel	★	
713019/5		Drill point for pegs of main bearing bushes	Engine	★	d) Use of components No. 12 and 13 is not called for.
716050		Drill point for pegs of main bearing bushes	Engine	★	
781103		Milling cutter	Engine	30	
784043		Turning tool for main bearing bushes	Engine	★	
784424		Turning tool for main bearing bushes	Engine	★	
845133		Reamer	Engine	29	e) To be used in conjunction with split ring B for removing the bearing of front wheel spindle.
d) T.0013460		Crankshaft assembling jig (1st operation)	Engine	★	
T.0013782		Turning bearer for engine support table	Engine	★	
0013964		Face-pin wrench for holding flywheel	Engine	★	
d) T.0014208		Crankshaft assembling jig (2nd operation)	Engine	★	
e) T.0014499		Ball bearing extractor (front wheel axle and crankshaft)	{ Steering col. { Engine	★	
0014566		Hook wrench for lock ring of steering column top bearing	Steering col.	★	f) 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.
T.0015283		Mandril for turning the flywheel	Flywheel	★	
0015284		Balancing mandril for flywheel	Flywheel	★	
0015413		Tool for unriveting plate washers of cush gear	Engine	★	
	0) { T.0016029 { 0016029	Tube for assembling bottom ball race of steering column bottom bearing	Steering c.	★	



Tool No.	Still usable, old tool	TOOL NAME	GROUP	Page	NOTES
0016030		Flexible shank wrench for securing tool box	Frame	★	★ Already indicated on Service Station Manual.
T.0016205		Timing gauge	Engine	★	
	0016538	Decarbonising tool for muffler exhaust pipe	Engine	★	
g) T.0016561	0016561	Extractor for bottom ball race of steering column bottom bearing	Steering c.	★	
0016741		Gap gauge for breaker points and spark-plug electrodes	Engine	★	
0017004		Special screwdriver	Handlebars	★	
T.0017104		Long nose pliers for circlips	Engine	★	
0017549		Face-pin wrench (for dismantling and re-assembling front and rear hydraulic dampers)	Dampers	★	
0017780		Spindle for drilling main bearing bushes	Engine	★	
0017802		Wedge	Engine	★	
0017820	T.0020231	Drift for removal of wrist pin	Engine	★	
0017831		Pilot sleeve for passing the crankshaft through oil seal of flywheel side crankcase	Engine	★	
0017843		Punch for removing crankcase oil seal	Engine	★	g) To be used in conjunction with split pin 6.
0017898		Punch for assembling bushes of front wheel needles	Steering c.	★	
0018094		Feeler gauge for inspecting axial play of gear pinions	Engine	★	
0018111		Hook wrench for security lock	Frame	★	
T.0018119		Tool for assembling mainshaft	Engine	★	
T.0018128		Punch for assembling outer ball bearing of mainshaft	Engine	★	
0018204		Pilot sleeve on stem of front damper for assembling rubber packings	Dampers	★	

Tool No.	Still usable, old tool	TOOL NAME	GROUP	Page	NOTES
0018205		Pilot sleeve for fitting felt ring into outer tube of front damper	Dampers	★	★ Already Indicated on Service Station Manual.
0018219		Wrench for securing front damper to steering column	Steering c.	★	
h) T.0018916		Work holder for replacing main bearing bushes	Engine	★	h) Use of components No. 5, 18, 22 is not called for.
T.0019572		Work holder for crankshaft overhaul (grinding holes to oversize)	Engine	★	
T.0019622		Fixture for replacing rubber bushes of engine bracket	Frame	★	
T.0019859		Crankcase support (flywheel side) for assembling starter unit	Engine	★	
0019978		Heater (220 V - 50 Hz)	Engine	★ 33	
T.0019982		Special wrench for starter bush	Engine	★	
T.0020105		Pilot sleeve on crankshaft for passing through crankcase oil seal (flywheel side)	Engine	★	
T.0020111		Extractor for clutch assy	Engine	★	
T.0020128		Hook wrench for retaining clutch assy	Engine	★	
T.0020168		Punch for assembling starter unit	Engine	★	
T.0020185		Equipment for consumption test	Engine	★	
T.0020200		Extractor for mainshaft roller bearing	Engine	★	
T.0020224		Punch for fitting oil seal and bush for inner bearing of mainshaft	Engine	★ 32	
T.0020322		Clutch stripping and assembling tool	Engine	★	
T.0020601		Clutch holder for fitting rollers and shoulder ring	Engine	★	
T.0020608		Face-pin wrench for shoulder ring of clutch pinion	Engine	★	
T.0020781		Punch for fitting inner bearing of mainshaft	Engine	★	



Tool No.	Still useable, old tool	TOOL NAME	GROUP	Page	NOTES
T.0020811		Rod for reciprocating piston of front damper to expel air	Dampers	★	★ Already indicated on Service Station Manual.
T.0020824		Base of tools for assembling rubber bush and liner on damper body	Dampers	★	
T.0020825		Tool set for assembling liner and rubber bush on body of rear damper	Dampers	★	
T.0020826		Tool set for assembling liner and rubber bush on body of front damper	Dampers	★	
l) T.0020827		Tool set for assembling liner and rubber bush on stem support of front damper	Dampers	★	j) To be used in conjunction with component No. 1 of tool T.0020826.
T.0020828		Sleeve for assembling discharge valve into inner tube of front and rear dampers	Dampers	★	
T.0020837	T.0014812	Punch for withdrawal of mainshaft	Engine	★	j) Use of components No. 10 and 15 is not called for.
T.0020840	{ T.0014677 T.0023767	Wrench for threaded ring retaining ball bearing of mainshaft	Engine	★	
T.0020841	T.0018130	Punch for withdrawal of front wheel axle	Steering c.	★	
T.0020842		Punch for withdrawal of bottom ball race of steering column upper bearing	Steering c.	★	k) Use of components No. 9 and 14 is not called for.
l) T.0020865		Work holder		29	
T.0020866		Tool holder	} for machining the crankcase	30	
T.0020867		Guide jig		29	
T.0020868		Spindle		29	
T.0020872		Guide plate		30	
h) T.0020877	{ T.0017133 T.0017642	Extractor for crankcase half, flywheel side, and crankshaft	Engine	★	l) Use of components No. 2, 3, 5, 27 is not called for.
l) T.0020897		Piston holder for reaming wrist pin housing	Engine	30	
T.0021009	T.0020225	Punch for assembling roller bearing	Engine	★	m) Use of components No. 9 and 11 is not called for.
0021063		Handlebars extractor	Handlebars	★	
m) T.0021064		Flexible shank wrench for fuel tap	Frame	★	



Tool No.	Still usable, old tool	TOOL NAME	GROUP	Page	NOTES
T.0021071	T.0014924	Tool for inserting oil seals of crankcase halves	Engine	★	★ Already indicated on Service Station Manual.
T.0021084	0015309	« L » handle box wrench for nuts securing front wheel bearing and rear wheel flange	{ Steering c. } Frame	18	
n) T.0021096	T.0019987	Tool for removing and assembling top ball race of steering column bottom bearing	Steering c.	18	n) Use of components No. 1-2-6-11-12-16 is not called for.
T.0021214		Wrench for muffler threaded ring	Engine	★	o) Use of component No. 6 is not called for, when removing main bearings.
T.0021257	{ T.0016331 T.0016338 T.0021259	Fixture for assembling and dismantling bronze bush of con.rod small end	Engine	27	
T.0021265	T.0016310	Flywheel extractor	Engine	18	p) Use of components 2, 5, 6, 7 is not called for.
T.0021272	T.0016303	Extractor for mainshaft oil seal	Engine	18	
T.0021280	T.0016333	Riveting fixture for taper pin of gear shifter	Engine	18	
o) T.0021467	T.0018182	Extractor for main bearing from crankcase and for bush of layshaft rollers	Engine	18-32	q) Use of components 15 and 19 is not called for.
p) T.0021472	T.0019161	Crankpin removal blocks	Engine	18	r) Use of components 1, 11, 12 is not called for.
T.0021481	T.0020272	Supporting blocks for riveting	Flywheel	18	
T.0022453		Tool for assembling sleeve with front brake lever housing on handlebars	Handlebars	32	
q) T.0022460		Extractor for removing sleeve with front brake lever housing from handlebars	Handlebars	32	s) To be used in conjunction with component 11 instead of component 13.
T.0022480		Punch for removing bush of mainshaft ball bearing	Engine	31	t) To be used with extractor T. 0021467.
r) T.0022532	{ T.0020244 T.0021175	Con.rod centering fixture for removal of small end bush	Engine	27	
s) T.0022547	0013589	Magnetiser	Flywheel m.	18	
t) T.0022733		Stirrup	Engine	33	



Tool No.	Still useable, old tool	TOOL NAME	GROUP	Page	NOTES
T.0022734		Tool for assembling the roller bearing on flywheel side crankcase	Engine	33	
—	—	Double ended plug gauge $\phi 62 \begin{smallmatrix} -0.026 \\ 0.045 \end{smallmatrix}$ (P6) for inspecting main bearing bush	Engine	★	★ Already indicated on Service Station Manual.
—	—	Double ended plug gauge $\phi 66 \begin{smallmatrix} 0 \\ +0.046 \end{smallmatrix}$ (H8) for inspecting housing of main bearing bush	Engine	31	u) Standard type.
u)	—	Dial gauge	Engine	★	



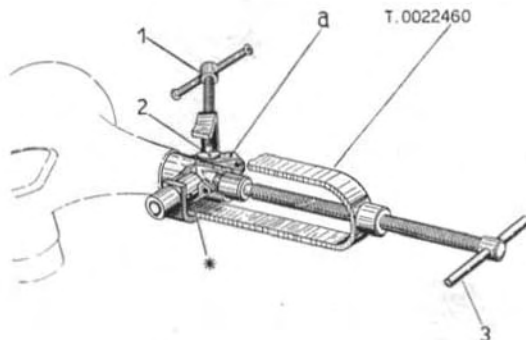
DISMANTLING AND RE-ASSEMBLING

In following pages, besides the operations proper to Vespa G.S. VS4, are indicated also the operations concerning the parts of vehicle (sleeve with front brake lever housing on handlebars, bush on crankcase half, clutch side, for mainshaft inner bearing, bush for layshaft rollers) whose replacement calls for new tools and new procedure. Both the tools for new operations, and the tools which are fundamentally different from the previous ones still usable already indicated in the Manual, are specially illustrated.

The table hereunder gives the list of operations appertaining to Vespa G.S. which may be carried out either with the previous tools or with the new ones indifferently (see section "Tooling", page 11).

Operations and figures in Service Station Manual	Still usable, old tool	New tool of similar type and operation
Removing and re-assembling the wheels (Fig. 24, 62 143)	0015309 (Wrench)	T. 0021084 (Wrench)
Removing the rotor (Fig. 36)	T. 0016310 (Extractor)	T. 0021265 (Extractor)
Removing the main bearing from crankcase (Fig. 50)	T. 0018182 (Extractor)	T. 0021467 (Extractor)
Removing the mainshaft oil seal (Fig. 53)	T. 0016303 (Extractor)	T. 0021272 (Extractor)
Removing and re-assembling top race of steering column bottom bearing (Fig. 73 and 139)	{ T. 0019987 (Extractor) { T. 0013781 (Sleeve with threaded tie rod)	T. 0021096 (Extractor provided with sleeve and plate for the re-assembly)
Replacement of rivets fixing the cam of flywheel rotor (Fig. 92)	T. 0020272 (Riveting die)	T. 0021481 (Riveting die)
Magnetising the rotor (Fig. 95)	0013589 (Magnetiser)	T. 0022547 (Magnetiser)
Dismantling the crankshaft (Fig. 103)	T. 0019161 (Crankpin removal blocks with punch)	T. 0021472 (Crankpin removal blocks, with punch)
Replacement of gear shifter internal lever (Fig. 111)	T. 0016333 (Riveting fixture with punch)	T. 0021280 (Riveting fixture with punch)
Engine test on stand (Fig. 123)	6488/A (Test stand)	8002/R (Test stand)
Re-assembling crankshaft oil seals on crankcase (Fig. 125 and 134)	T. 0014924/2 (Punch)	T. 0021071 (Punch)

DISMANTLING THE HANDLEBARS



- Remove the speedometer head, head lamp and the dimmer switch after disconnecting respective cables (see Fig. 62-63 of manual).
- Disconnect front brake control cables (both wheel and handlebars sides) and throttle control cable; slide off the former (with sheath) from the sleeve.
- Remove the front brake lever and the barrel with throttle control twistgrip (see Fig. 65 of the manual).
- Use tool T. 0022460 as shown in the figure after fitting component « 17 » (indicated with an asterisk); then place the latter into dimmer switch housing.
- Screw down, finger tight, threaded rod « 1 », taking care that part « 2 » rests on « a ».
- Insert the main threaded rod so that it stops against the barrel, then tighten screw « 3 » until sleeve is extracted.

Fig. 7 - Removal of sleeve with front brake lever housing



DISMANTLING ENGINE COWLING, BRAKE SHOES, TAIL LAMP

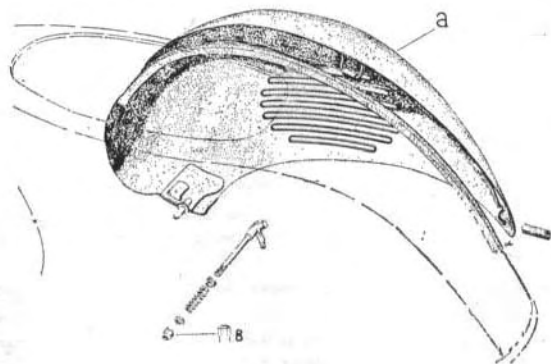


Fig. 8 - Engine cowling with lock

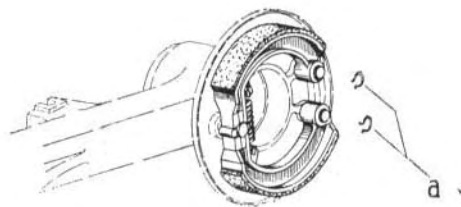


Fig. 9 - Rear brake shoes

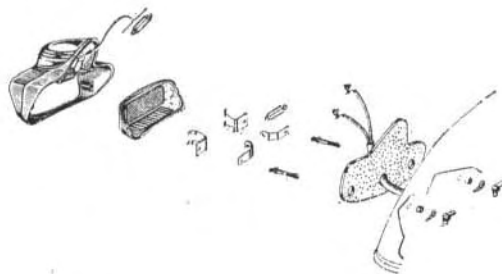


Fig. 10 - Tail lamp



DISMANTLING REAR BRAKE PEDAL

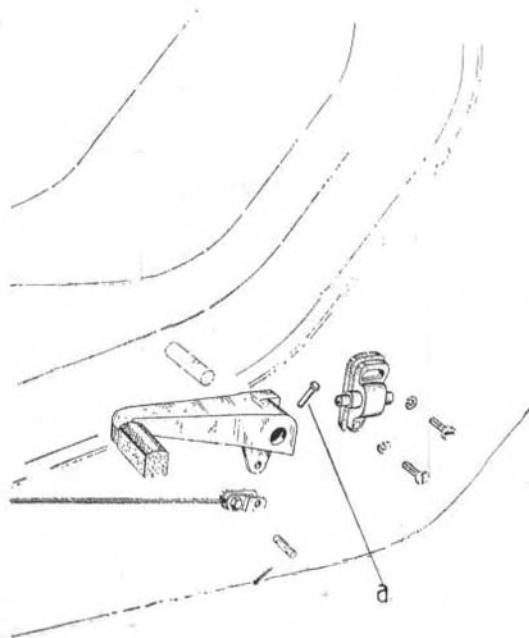


Fig. 11 - Rear brake pedal with STOP light switch
N.B. Depress the pedal and take out pin « a ».

RE-ASSEMBLING FRONT BRAKE LEVER HOUSING

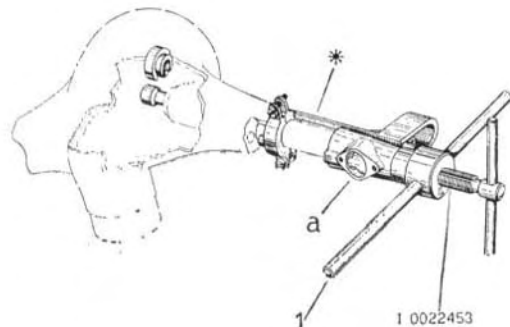


Fig. 12 - Re-assembling the sleeve with front brake lever housing

- Place sleeve « a » into the tool, then use the latter as indicated on the figure.
- To make holes on sleeve « a » (for brake cable and electric wires to the dimmer switch) coincide with the corresponding holes on handlebars, use the centralizing part of tool indicated with an asterisk. Use part « 16 » for securing.
- Screw down « 1 » until sleeve « a » stops against the flange of centralizing part. Remove said part and screw « 1 » further until « a » is in position, seeing that holes on sleeve and those on handlebars coincide.



PERMISSIBLE TOLERANCES AND OVERHAULING

The tables in the Manual apply also to Vespa G.S. VS4. When mounting new piston rings, the respective table is modified as follows:

PISTON RINGS

Part. No.	Part name	Normal dimensions	Max play (mm)	
			at assembly	after use
80021	Piston ring	∅ 57	A = 0.2 — 0.35	A = 2
83001	Piston ring, 1st o/s	∅ 57.2		
83002	Piston ring, 2nd o/s	∅ 57.4		
83003	Piston ring, 3rd o/s	∅ 57.6		
83004	Piston ring, 4th o/s	∅ 57.8		

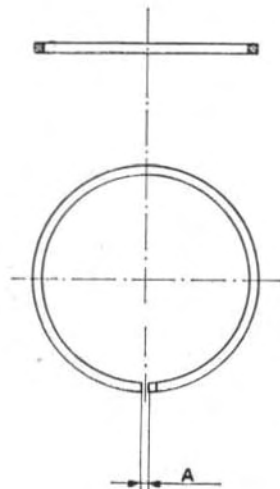


Fig. 13



FLYWHEEL MAGNETO OVERHAUL

Description of the stand

The flywheel magneto test stand 8290/R (see Fig. 14) consists of the following units:

- A repulsion motor, revolving in both senses from 0 to 5000 rpm. Specification: 220 V, 50 Hz, 2.1 HP at 2400 rpm, 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 2000 and from 1000 to 5000 rpm. 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 gearing 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 gearing device with a ratio:1 to 1.826.
- A coupling between motor and gearing device.
- A bracket for the H. T. coil (only for Vespa models with external ignition coil) and a switch for bringing 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.
- b) - 11 resistors (shunting the spark gap) brought into circuit 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 position of the three switches illustrated hereunder.
- d) - Sets of impedances, rectifiers and batteries for the different vehicles.
The battery is automatically switched in 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.
- g) - Seven clamps, where the specific circuits are marked, for connecting the electric cables from the flywheel magneto (see **N. B.** below).
- h) - 3 main switches 1-2-3 of Fig. 14), each showing the specific position for the different flywheel magnetoes to be tested.
They control respectively:



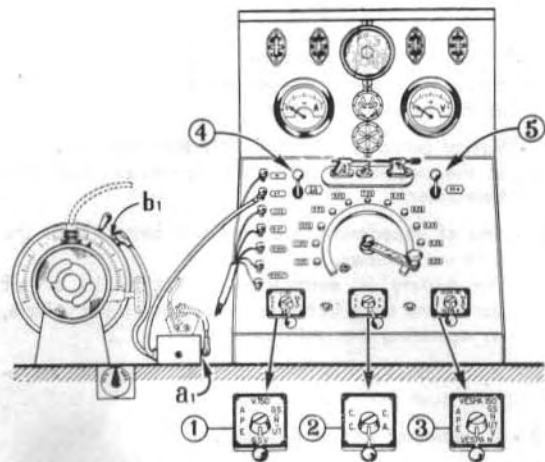


Fig. 14 • Flywheel magneto test stand

1. (L.H.): the impedance, rectifier and battery; it is, of course, to be used for the Vespa models provided with such units.
2. (center): low tension loads, namely: lights off (« O »), direct current (« C.C. »), alternating current (« C.A. »).
3. (R.H.): specific resistive loads of the different models.

- i) - 2 switches (4 and 5 in Fig. 14), with two positions, for Vespa Commercial (Ape) and Vespa G.S. having battery coil ignition.

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 from flywheel magneto.
- « BOBINA A.T. » for Vespa G.S. with battery coil ignition (from scooter with frame serial No. VS 2T - 0013301); d.c. cable from primary winding of the ignition coil (clamp 2) to the clampboard and then to the rectifier- battery unit.
- « RADDR. G.S.N. » for rectifier with half wave bridge for Vespa G.S. (from scooter with frame serial No. VS 2T - 0013301 to scooter VS 2T - 0023310).
- « RADDR. G.S.U.T. » } cables from flywheel magneto
for rectifier with full wave
bridge for Vespa G.S. (from
scooter with frame No. VS 3T -
0023311).



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

Machine	S W I T C H E S				
	1	2	3	4	5
A) All Vespa 150 models (not G.S.)	V. 150	« O » or « C.A. » (al- ternating current) or « C.C. » (direct current) depending on the test	V. 150	Lever downwards	Lever downwards
B) All Vespa 125 models	N.	« O » or « C.A. » (al- ternating current) de- pending on the test	Vespa N	Lever downwards	Lever downwards
C) Mod. '55 Vespa G.S. Later models	G.S.V. G.S.N.U.T.	« O » or « C.A. » (al- ternating current) or « C.C. » (direct current) depending on the test	G.S. N.U.T.V.	Lever downwards	Lever downwards G.S.N. Lever upwards
D) Vespa Commercial (Ape) 150 and Mod. « C » with normal starter assy	APE	« O » or « C.A. » (al- ternating current) or « C.C. » (direct current) depending on the test	APE	Lever downwards or upwards (« C.C. » Ape: direct current) depending on the test.	Lever downwards

Test preliminaries

- a) Mount the H.T. coil and stator on their supports, then secure the stator with the three screws.
- b) Connect the black cable (with standard tag) from the flywheel magneto to clamp « 1 » of primary winding of external ignition coil (see Fig. 4). Clamp « 2 » of the coil shall be connected to the clamp « BOBINA A.T. » of clampboard.
- c) Connect cables with pin-shaped tag from the flywheel magneto to proper clampboard, taking care to mate each cable with the corresponding colour. Leave the red cable disconnected.
- d) Check that the cables joining the clampboards of the stand to the clamps of the panel are connected as indicated on page 24.
- e) Mount the rotor on the shaft, seeing that the woodruff key fits, then secure.



- f) Place switches in the position indicated at **C**), page 25 for Vespa G.S. later models.
- g) One of the two H.T. cables from the switch box should be connected to clamp « b₁ » located near the rotary spark gap, and the other to the H.T. clamp on the panel.
- Lead from the coil must be connected to clamp « a₁ » (see Fig. 14).
- h) Adjust breaker points to 0.4 - 0.5 mm (0.015-0.019 in.), then run the rotor at 150-200 rpm. and check the timing of breaker points by pushing the switch button; in such conditions, sparking should occur between the graded disc and the earthing of rotating pointer integral with the flywheel shaft.

Test at minimum revs

At least 95% of sparks should occur at 150 rpm with lights on and 5 mm (0.197") gap.

Efficiency test

Run at 2000 and 7000 rpm with low tension load either on or off.

In such conditions, shunting the spark gap with non inductive resistors, the efficiency, as expressed in microsiemens, should be 4-8 μ S at 2000 and 2-3 μ S at 7000.

Overspeed test

Run the rotor at 7200-7300 rpm. for approx. 5 minutes. Steady sparking should occur at spark gap and none between the breaker points.

Emergency running

Make sure that ignition works regularly at least for 4500-5000 rpm., disconnecting the negative pole of the battery from earthing terminal (emergency position). In such conditions ignition is fed directly by the battery charging coil through the rectifier.

Battery charging circuit

This test is not carried out on the stand. Insert an ammeter (with central 0) between the negative pole of battery and earth.

Run the engine at 1600-1800 rpm. and check that in the battery charging circuit there is balance between the charging current and the current supplied by the same battery for operating the ignition only: in such conditions the ammeter pointer must be in position 0.

Bulbs

When both head and tail lamps are on, 5.3-5.8 and 6.8-7.8 Volts should be obtained at 3,000 and 7,000 r.p.m. respectively.

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 shake 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.

Replacing bronze bush of con.rod small end

1. - Centralize and lock the con.rod as given below by means of fixture T. 0022532 shown in Fig. 15.
 - a) Slide the block « a » of the fixture over the crankcase studs and secure it with the nuts.
 - b) Insert the mandril « c » into the small end through the hole « b ».
 - c) Screw down the four knurled headed screws « 2 » on the sides of block « a » in order to clamp the con.rod.
 - d) Tighten the locknuts on these screws. Then turn the screw « 1 » until the rear bar leans against the con.rod.
 - e) Remove mandril « c »; adjust the screws « 2 » and the rear bar again, if the mandril does not slide out smoothly from the small end.
2. - Remove the worn bush by means of extractor T. 0021257 provided with item « 5 » (marked with an asterisk), as shown in Fig. 16. Secure the flange

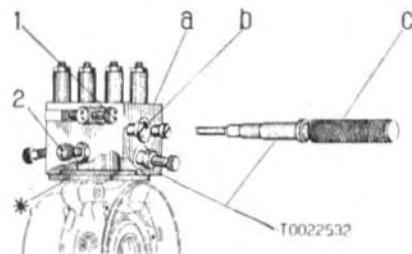


Fig. 15 - Centralizing the con.rod

(*) Use part 21 of the tool

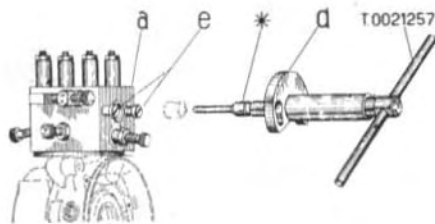


Fig. 16 - Bush extraction

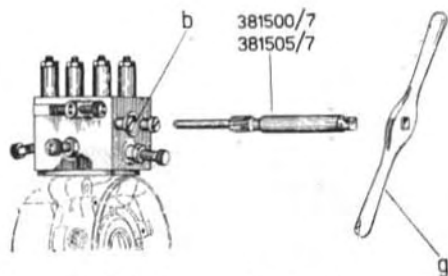


Fig. 17 - Reaming the bush on con.rod small end

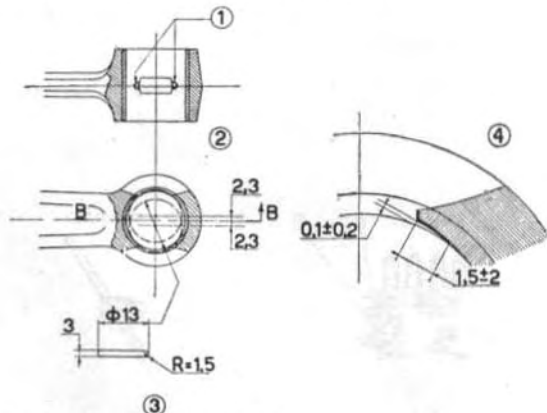


Fig. 18 - Chamfers on con.rod small end

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

«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 mandril 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. 16, replacing part «5» of the tool (marked with an asterisk) with the new bush to be assembled.

N.B. - Retailers, who have old tools T. 0021259 and T. 0021175 or T. 0020244, may use them instead of tools above indicated.

4. - Ream the bush by inserting reamer 381500/7, shown in Fig. 17, into the guide hole «b» of part «a» of fixture T. 0022532, and rotating it 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 wrist pin and bush on con.rod small end while the engine is running, chamfer the four points indicated on Fig. 18, either by means of a circular milling cutter (suggested procedure) or with a \varnothing 2.5-3 mm rat tail file.

Clean the machined area thoroughly.

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 with no effort.

PLANNING SHEET FOR REPLACEMENT OF A CRANKCASE HALF

1. - Wash the still serviceable crankcase half in gasoline and unscrew the cylinder studs from said crankcase half and from the new one.

Couple the two halves and secure with bolts, washers and nuts.

2. - Fix the crankcase on the work holder T. 0020865 provided with guide jig T. 0020867; then adjust the spindle T. 0020868 in the position indicated below (see Fig. 19).

Place the gauge T. 15363/C on surface « a » of the spindle; the reamer 845133 will skim, on lug « C », the step marked by a figure corresponding to the dimensions of the housing « A » in the original crankcase.

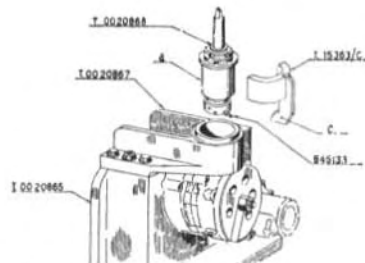


Fig. 19 - Crankcase holder and guide jig

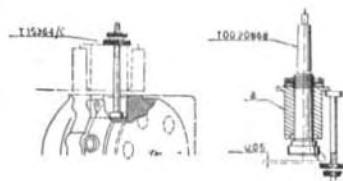


Fig. 20 - Adjustment of machining depth

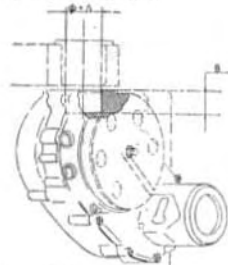


Fig. 21 - Machining dia. « A »



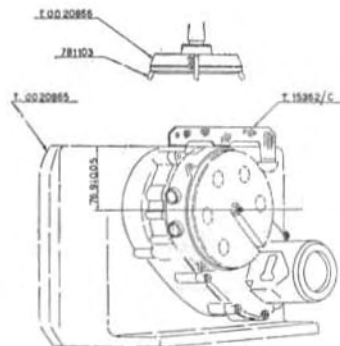


Fig. 22 - Reaming to 3.4 mm

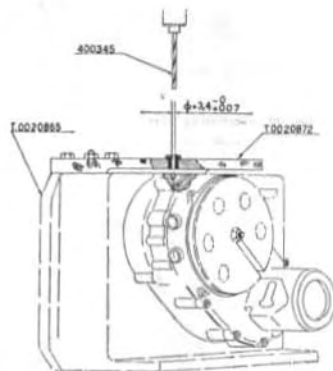


Fig. 23 - Tool holder with milling cutter

- Use gauge T 15364/C, as shown on Fig. 20, to adjust the stroke of the cutting tool secured on the spindle to a depth « B » equal to that of the original crankcase.
- Secure the spindle T. 0020868 on a drilling machine and ream dia. « A » (see Fig. 21). Dimensions « A » and « B » should correspond to those of the original crankcase, which are indicated below:

$$A = \varnothing 63 \begin{matrix} 0 \\ +0.19 \end{matrix} \quad (H 11) \quad B = \varnothing 35 \begin{matrix} 0 \\ +0.5 \end{matrix}$$

Inspect dimensions « A » and « B » with a double-ended plug gauge and vernier caliper respectively.

- Place on the work holder T. 0020865 the guide plate T. 0020872 instead of guide jig T. 0020867 (see Fig. 22), then drill out to 3.4 mm (0.13") by means of reamer 400345.
- Using the work holder T. 0020865 and the holder T. 0020866 provided with the four milling cutters 781103 (see Fig. 23), level off the resting surface for cylinder, on a milling machine, so as to obtain the dimension indicated on the figure; all lugs of gauge T. 15362/C should rest on the surfaces indicated on the figure.
Then assemble the studs fixing the cylinder, remove all nuts and bolts securing the crankcase halves, take these apart and wash in gasoline.

REBORING PISTON FOR WRIST PIN HOUSING

Bore out the wrist pin housing on the piston by means of tool T. 0020897 and reamers 381504 and 381505



(Fig. 24) when an o/size wrist pin is to be assembled (see below)

- Fix part T 0020897/1 (« d » on Fig. 24) in its housing on the base of the tool, and secure the piston thereon.
- Centralize the piston by means of mandril « a » in a position suitable for reaming it; then secure it with screws « b » and « c ». Tightening the screws too firmly may cause piston deformation.
- Dip reamers 381504 (roughing) and 381505 (finishing) into paraffin, then ream and clean the piston bores.
- Check by means of gauge T. 16161/C.

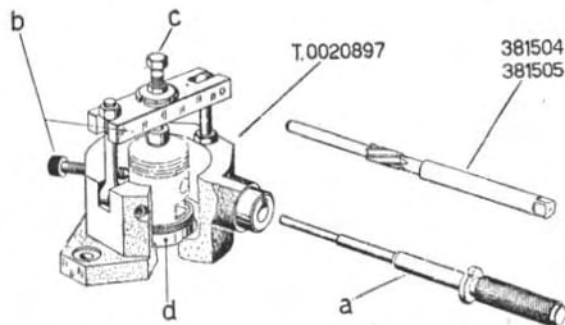


Fig. 24 - Piston bore oversizing

REPLACEMENT OF MAIN BEARING BUSHES

Bushes 80992 will be supplied as spare parts instead of bushes 17967. They can be assembled on crankcase halves originally provided with pegged bush and those with cast-in bush as well.

The planning sheet for removing the worn bush and assembling the new one does not differ from the procedure indicated on page 79 of «Service Station Manual» for Vespa G.S., except for operation « 2 » which varies as follows (see also Fig. 25).

- Turn off the worn bush by means of tool 784043 up to the prescribed diameter.
- Check with double ended plug gauge:

$$\begin{array}{l} \varnothing 66 \\ -0 \\ +0,046 \end{array} \text{ (H 8)}$$

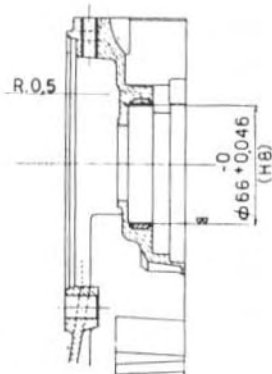


Fig. 25 - Turning main bearing bushes

REPLACEMENT OF BUSH FOR MAINSHAFT INNER BEARING

Take off the worn bush "a" by means of extractor T.0022480 (see Fig. 26 a).
Then assemble the new bush by using tools T. 0018128 as indicated on Fig 26 b

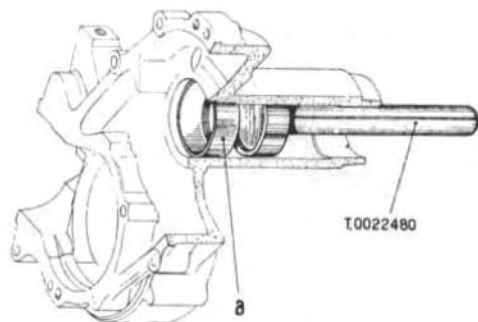


Fig. 26a Dismantling bush of mainshaft inner bearing

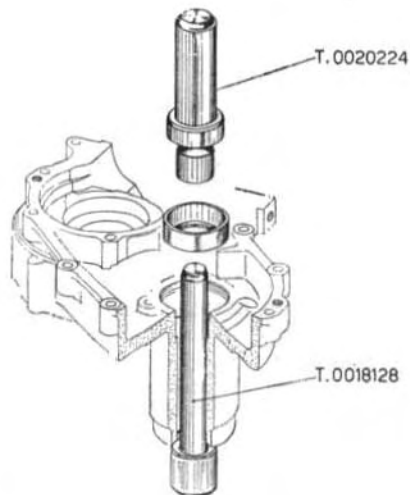


Fig. 26b - Re-assembling bush on mainshaft inner bearing

N. B. - After assembling the bush, mount the inner bearing (see Fig. 126 of Manual) using both punches T. 0018128 and T. 0020781 as follows: proceeding from crankcase **outside**, slide rod of punch T.0018128 into the bearing; then slightly tap on the latter by means of punch T. 0020781 from crankcase **inside**.

REPLACEMENT OF BUSH FOR LAYSHAFT ROLLERS

Dismantling

Place the sprung end of threaded pin, part 6 of extractor T. 0021467, into the bush « a »; screw down part indicated with an asterisk and operate on central nut until the bush is extracted.

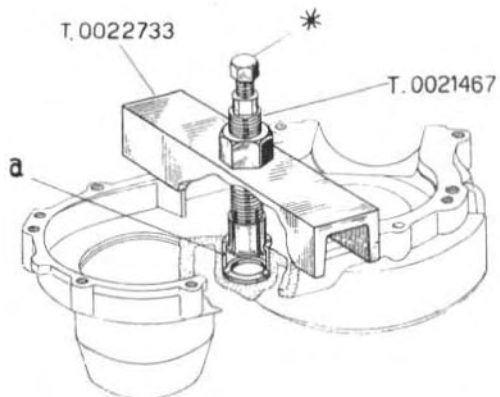


Fig. 27a - Removing the bush for layshaft rollers

Re-assembly

Heat to 100°-120°C the crankcase housing for the bush with heater 0019978.

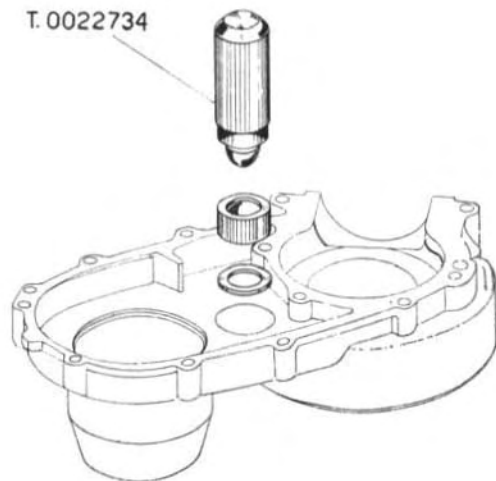


Fig. 27b - Re-assembling the bush for layshaft rollers



ALIGNMENT OF FRAME

Fit the bush « b » 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 in the figure and slide the rod « d » (part No. 2 of the tool)

through the frame holes for the bolt securing the engine and through those on « e » (part No. 4); 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 obtained:

- the tip of pin « a » falls inside the pad welded on the jig table;
- the pin « g » enters the cavity of rod « a ».

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

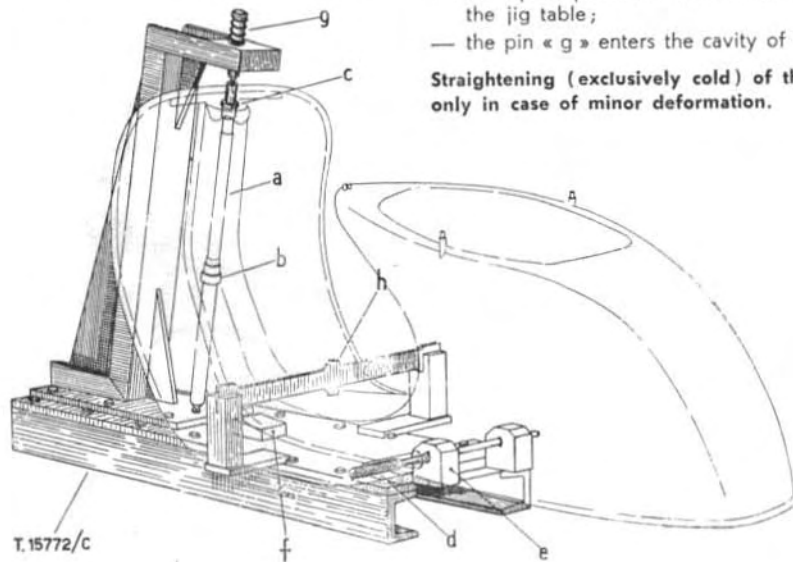


Fig. 28 - Jig for frame inspection



VARIATIONS BETWEEN THE VS.4 & 5 SERIES

The Speedo Bulb is 6V 0-6W.

Champion N.A.B. Sparking Plugs are now approved.

The Wheels different in design are now secured to a Light Alloy Brake Drum by Five Studs.

A new type Spare Wheel Bracket and Spare Petrol Tank must be used.

The Driving Flange and Rear Brake Drum is now one single unit and as a result the 4 Wheel Nuts are no longer fitted.

The Dual Seat has been altered at the Front End and a new type hook has been fitted.

Rubber Feet for the C/Stand have been altered.

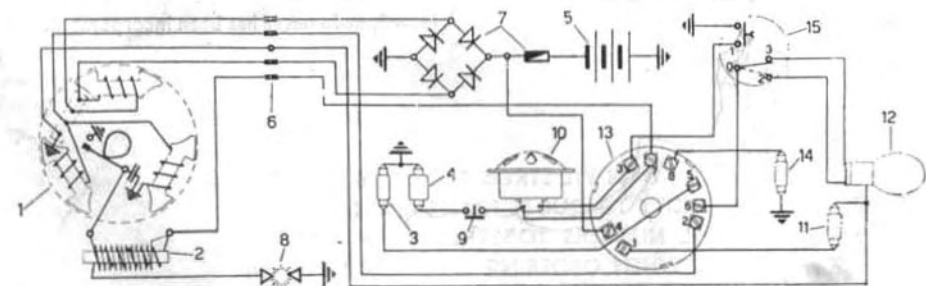
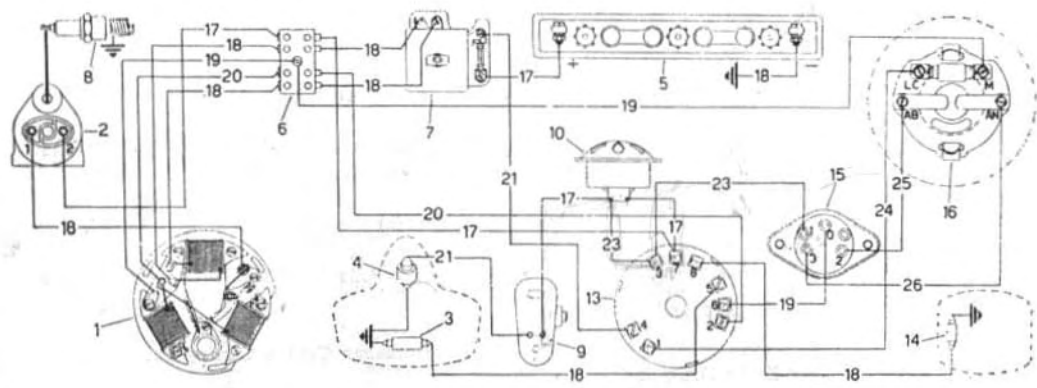
A new Front Axle Shaft and Brake Drum have been fitted.

A New Handlebar Centre Casting has also been fitted.

A New Speedometer has been incorporated.

ONCE AGAIN WE STRESS TO ALL DEALERS THE
NECESSITY TO QUOTE FRAME AND/OR ENGINE
SERIAL NUMBERS TOGETHER WITH ANY PRE-
FIXES WHEN ORDERING SPARES FOR THIS OR
ANY OTHER MODEL

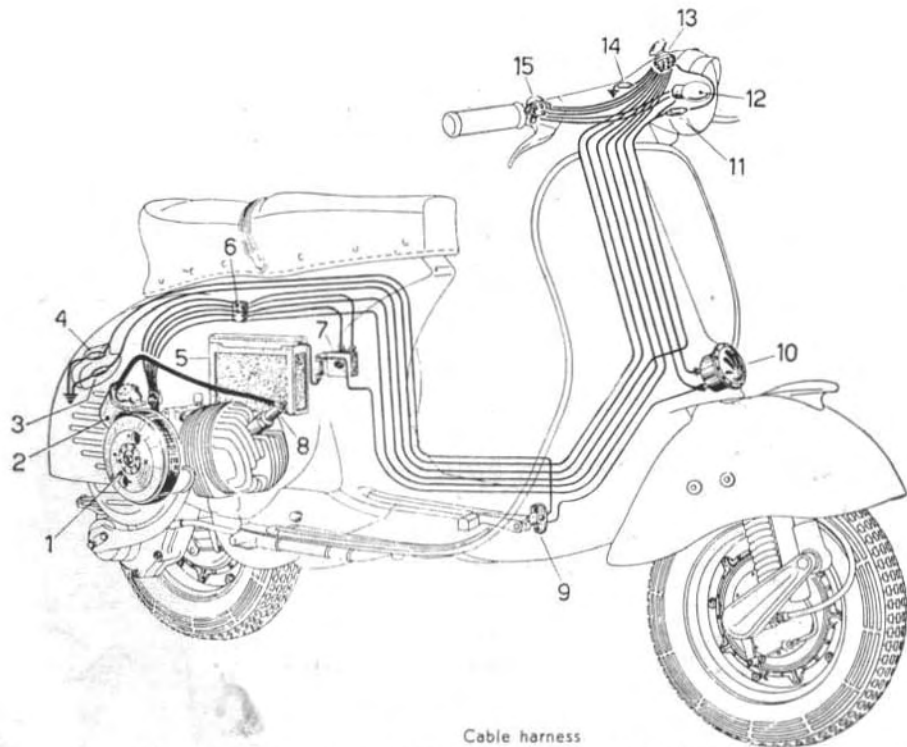




- P: contacts 4-1-5
 - O: contacts 1-5
 - 1: contacts 4-7
 - 2: contacts 4-1-5-7-8
 - 3: contacts 4-7
 - contacts 2-5-6-8
- } connected to each other (See the switch positions P, O, 1, 2, 3 on Fig. 14)

Connections and electric wiring diagram





Cable harness

1. Flywheel magneto - 2. External ignition coil - 3. 6V-3W bulb for tail light - 4. 6V-10W bulb for STOP light - 5. 6V-12Ah battery - 6. Clamp board on the frame - 7. Rectifier with fuse - 8. Sparkplug - 9. STOP switch - 10. Horn - 11. Pilot light (6V-1.5W bulb) - 12. 6V-25 25W double filament bulb - 13. Switch - 14. 6V-0.6W bulb for speedometer light - 15. Dimmer switch with horn button - 16. Inside view of head lamp - 17. Red - 18. Black - 19. White - 20. Yellow - 21. Light blue - 22. Green - 23. Pink - 24. Blue - 25. Brown - 26. Violet.



DOUGLAS SERVICE DEPOTS

**DOUGLAS (Sales & Service) LTD. DEPOT,
11 RUSTON STREET,
Off BROAD STREET,
BIRMINGHAM 16.
(Telephone MIDland 6756)**

**DOUGLAS (Sales & Service) LTD. DEPOT,
130 RENFREW STREET,
GLASGOW, C.2.
(Telephone DOUglas 5332)**

**DOUGLAS (Sales & Service) LTD. DEPOT,
406 FINCHLEY ROAD,
CHILDS HILL,
LONDON, N.W.2.
(Telephone SWIss Cottage 2371)**



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please quote this reference:—
G.S./L.B.6592/12.59.

