



Vappa G.S.

SERVICE STATION MANUAL

V.S.B. I MODEL (160 c.c.)  cooterhelp.com

SERIES I and II



Vespa

G.S.

**V.S.B.I MODEL
SERIES I and II (160 c.c.)**

SERVICE STATION MANUAL

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

A DIVISION OF THE WESTINGHOUSE BRAKE AND SIGNAL COMPANY LIMITED

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This Manual has been compiled with the intention of furnishing necessary instructions relative to the maintenance and repair of the Vespa, GS 160 c.c. V.S.B.I. With this purpose the following are taken into consideration:

General instructions for vehicle maintenance.

Fault finding and remedies.

Tooling necessary for normal operations to be carried out on the vehicle.

Illustrations and instructions for dismantling, overhauling and reassembly.

Assembly tolerances on main components.

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SPECIFICATIONS - GENERAL INSTRUCTIONS FOR MAINTENANCE - ELECTRICAL WIRING DIAGRAMS





VESPA G.S. VSB. I



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IDENTIFICATION DATA

In the positions indicated on the figures 3 and 4 are stamped the prefix (VSB) and production serial numbers of both engine and frame.

These prefixes and serial numbers serve in identifying

the vehicle in the eyes of the law and are reproduced on all other documents relative to the vehicle. On requesting spares said numbers should always be quoted.

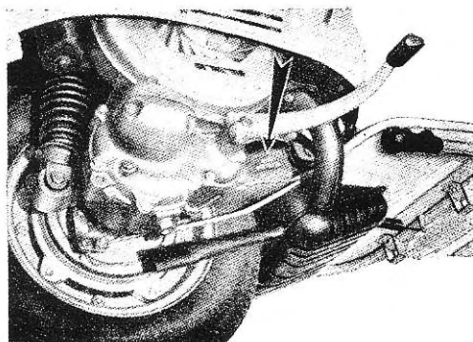


Fig. 3—Engine identification

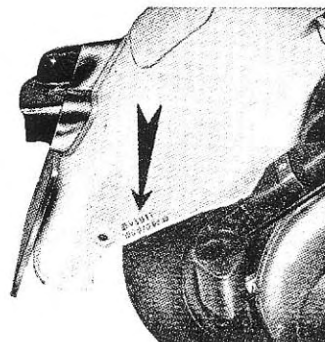


Fig. 4—Frame identification



Consumption 95 miles/lmp. gal. approx.

Max. speed with one up 62 m.p.h.

Max. speed with two up 53 m.p.h.

B.H.P. 8 at 6,500 r.p.m.

MAIN SPECIFICATIONS

Wheel base 1,220 mm. (48")

Overall handlebar width 710 mm. (28")

Overall length 1,795 mm. (70.7")

Overall height 1,045 mm. (41.2")

Min. footboard height 220 mm. (8.7")

Min. turning circle 1,400 mm. (55")

Total weight, dry plus spare wheel
110 Kg. (242 lbs.)

Engine-wheel transmission ratio:

1st Gear 14.72 : 1

2nd Gear 10.28 : 1

3rd Gear 7.61 : 1

4th Gear 5.84 : 1

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

Model Prefix	Year	Engine			Mixture	Carburettor Dell'orto	Timing $\pm 1^\circ$	Sparking Plug	Tyre Pressure	
		Stroke mm.	Bore mm.	Capacity cm.					F.	R.
VSB 1	1962	60	58	158-63	5% Pure mineral oil	SI 27/23	26°	Champion NAB KLG F.E80 Lodge 2 KLN	Dunlop 16	Dunlop Solo 20
		4 Speed gear box			See Lubrication Chart				Pirreli 16	Pirreli 22 Dunlop with Pillion 32 Pirreli 32
									Tyres - 3.50-10"	



LUBRICATION CHART

Part to be lubricated		Lubrication				
Every 2,500	Every 5,000	*Shell	*B.P.	Esso	Wakefield	Mobil
See	over	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 fly-wheel cam Joints on brake control Speedo flexible drive	Control cables Gear-change quadrant	Retinax A	Energrease L.2.	Esso Multi-purpose Grease H	Castrol L.M.	Mobilgrease M.P.
Engine at each re-fuelling		Shell 2T Two-Stroke Oil in ratio of 5% or $\frac{1}{2}$ -pint to $1\frac{1}{4}$ -galls. petrol	Energol Two-Stroke Oil in ratio of 5% or $\frac{1}{2}$ -pint to $1\frac{1}{4}$ -galls. petrol	Essolube 30 in ratio of 5% or $\frac{1}{2}$ -pint to $1\frac{1}{4}$ -galls. petrol. Esso Two-Stroke Motor Oil in ratio of $\frac{3}{4}$ -pint to $1\frac{1}{4}$ -galls. petrol	Castrol XL in ratio of 5% or $\frac{1}{2}$ -pint to $1\frac{1}{4}$ -galls. petrol. Castrol Two-Stroke Oil in ratio of $\frac{3}{4}$ -pint to $1\frac{1}{4}$ -galls. petrol	Mobiloil A in ratio of 5% or $\frac{1}{2}$ -pint to $1\frac{1}{4}$ -galls. petrol or Mobil-Mix in ratio of $\frac{3}{4}$ -pint to $1\frac{1}{4}$ -galls. petrol

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

APPROVED PETROL/OIL MIXTURE

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

Hydraulic Dampers	When not working efficiently, consult your Dealer. If servicing is required, they should always be returned to the Works.
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GENERAL INSTRUCTIONS FOR MAINTENANCE AND LUBRICATION

Group	OPERATIONS TO CARRY OUT				Lubricant	NOTES
	After first 600 mls.	Every 2,400 mls.	Every 4,800 mls.	During overhauls		
Gear-box	Oil change (**) Check and top up every 1,200 mls.	Oil change (**)	Oil change (**)	Oil change (**)	Esso Motor Oil 30 Shell X-100 Motor Oil 2 T Shell X-100 Motor Oil 30 Mobiloil A	(**) Operation to be carried out with warm engine. Clean magnetic drain plug.
Gear Selector	—	Grease	Grease	Grease	Esso Multi Purpose Grease "H" or Grease 2 — Shell Retinax A Shell Alvania Grease 3 Mobilgrease MP — Mobilgrease Special	The filter should be cleaned more regularly when running on dusty roads. (^{oo}) Use 75% of ESSO SAE 30 plus 25% Esso Multi-Purpose Grease 2 for lubricating control cables.
Brake lever and pedal fulcrum points Front suspension Felt. of mag. cam.	—	Grease	—	Grease		
Air Filter	Clean in petrol and dry in air jet	Clean in petrol and dry in air jet	—	Clean in petrol and dry in air jet	—	
Speedometer drive system Control cables	—	—	Grease (^{oo})	Grease (^{oo})	Esso Multi Purpose Grease "H" or Grease 2 Shell Retinax A Shell Alvania Grease 3 Mobilgrease MP Mobilgrease Special	
More important bolts and nuts	Check tightness	—	—	Check tightness	—	
Sparking plug	—	Clean, decoke and adjust electrode gap to 0.6 mm (0".023)	—	Fit new sparking plug	—	



Group	OPERATIONS TO CARRY OUT				Lubricant	NOTES
	After first 600 mls.	Every 2,400 mls.	Every 4,800 mls.	During overhauls		
Silencer	—	Clean exhaust pipe (+ +)	—	Clean exhaust pipe (+ +)	—	(+ +) Clean using a hooked wire or by blowing through compressed air from the inlet end after having previously heated the unit externally.
Engine	Check carburettor nuts and bolts for tightness	Decoke piston, cylinder head, cylinder ports and external cylinder surfaces	—	Decoke engine parts. To be re-assembled	—	
Flywheel	—	—	Clean contact breaker points and adjust gap to 0"·019; check timing	Replace contact breaker arm (if necessary) or clean and set points; check timing	—	The out-let section of the pipe is at least 10 mm (0·4") wide.
Main bearing housing, flywheel side	—	—	—	Introduce 6 cc. of grease after cleaning out the housing with petrol	Esso Multi Purpose Grease 2 Shell Alvania Grease 3 Mobilgrease Special	
Bearings and area of speedometer bearing on front wheel axle	—	—	—	Grease	Esso Multi Purpose Grease "H" or Grease 2 Shell Retinax A Shell Alvania Grease 3 Mobilgrease MP Mobilgrease Special	
Battery	Periodically add distilled water (once a month or depending on distance of runs and seasonal temperatures) so that the plates are always immersed.					
When the vehicle is to be left inactive over a long period carry out the following instructions: 1. Clean the vehicle - 2. With engine stationary and throttle open, introduce 40 cc. Esso Motor Oil 30 (Shell X-100 Motor Oil 2T, Shell X-100 Motor Oil 30 or Mobiloil A); action kickstarter 3 or 4 times - 3. Drain off all fuel - 4. Grease all unpainted metallic parts - 5. Disconnect battery cables, clean poles and dry - 6. Raise the vehicle wheels from the ground.						

Setting the headlamp beam: A correct orientation can be obtained by adjusting the three screws which secure the headlamp in its housing. Before carrying out this operation ensure that the tyre pressures conform to the recommendations and then place the scooter on a level floor in front of a white wall as seen in Fig. 21. Start the engine, hold the throttle control twistgrip at about 1/3 and set the switch on "main beam."

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

Tighten the screws firmly.

This operation can be carried out also with the driver only sitting on the saddle.

In this case, of course, the beam alignment should be altered whenever the scooter is being ridden by both driver and passenger.

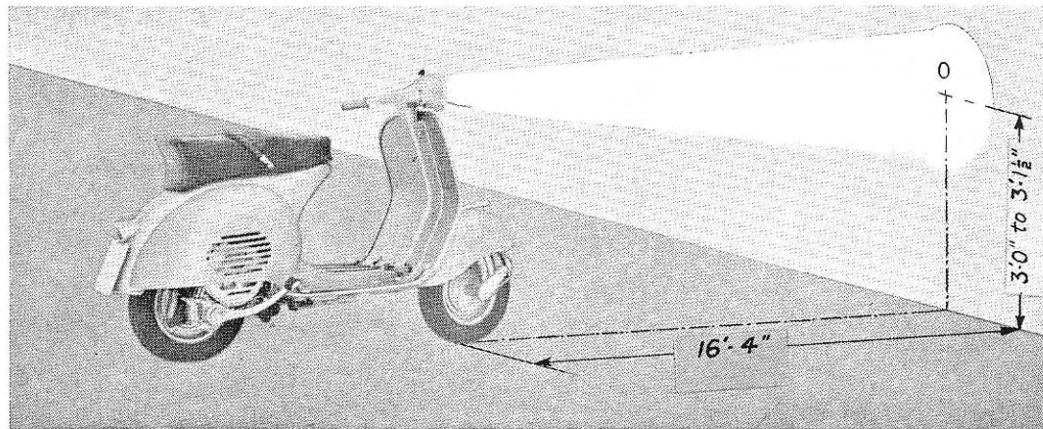
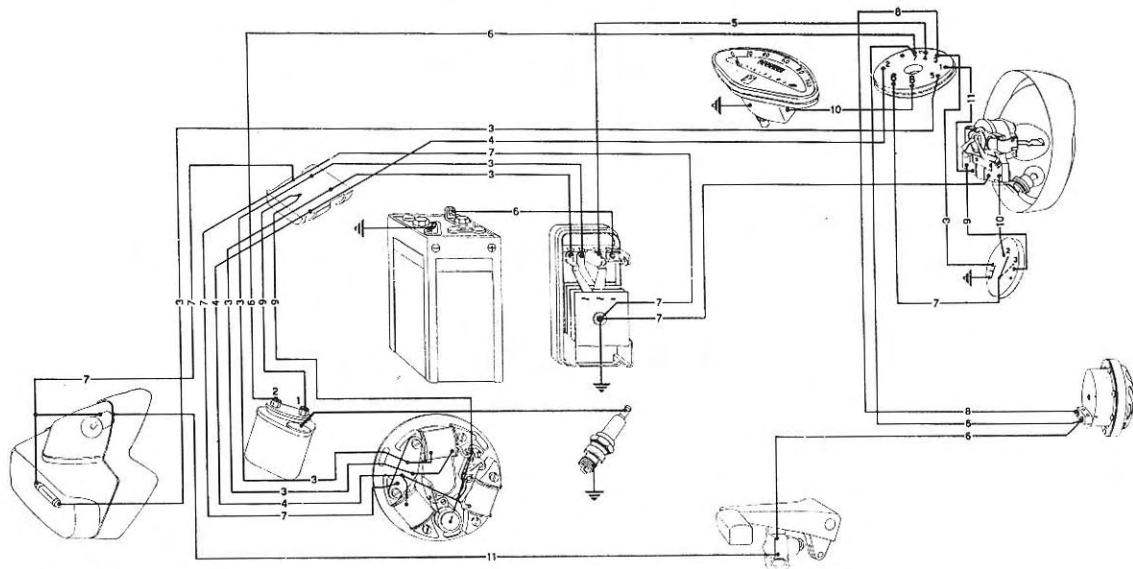


Fig. 21—Headlamp adjustment

N.B.—The height of the point "O" is constant for solo or driver and pillion passenger adjustment.



Vespa G. S. Mod. VSB 1



1-2: H.T. coil terminal – 3: Black – 4: Yellow – 5: Green – 6: Red – 7: White
8: Pink – 9: Violet – 10: Brown – 11: Sky-blue.

Bulbs: 6V - 25/25 W (Headlamp); 6V-3W (Pilot light); 6V-3W (Tail lamp);
6V-10W (Stop light); 6V-0.6W (Speedo. light).

Battery: 6V-12Ah; **Fuse:** 8A; **Rectifier:** 6V-3-7A.

CONNECTIONS ON SWITCH UNIT

Positions

- " Parking light on "
- " Light off "
- " Day-time running "
- " Running by night with pilot lights on "
- " Running by night with head light on "

Terminal connection
4 - 5 - 1

4 - 7
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4 - 7; 2 - 5 - 6 - 8



GENERAL INSTRUCTIONS FOR FAULT FINDING



FAULT FINDING AND REMEDIES

GROUP in which the fault is verified	INSTRUCTIONS RELATIVE TO OPERATIONS TO BE CARRIED OUT	NOTES
<p>Engine (See chart at page 19).</p>	<p>In cases of poor performance, lack of compression and escape of gases, always check that the nuts and screws securing the relative engine components are always well tightened (carburettor, cylinder head, silencer attachment).</p> <p>On replacing spark plug, use the type recommended on the table at page 8.</p> <p>It is to be remembered that many engine faults derive from inappropriate sparking plugs and the use of fuel mixtures with unsuitable oils or with an oil percentage different to that prescribed.</p> <p>The max. gap between the contact breaker points should be 0.5 mm (0.019"); the spark advance should correspond to that indicated on the table at page 8 (for engine timing see the instructions at the section " Reassembly ")</p> <p>With reference to the clutch and gear box it is important that the play on the controls be checked (see Overhauls) and that the cables are not frayed or rusted; in cases of slipping or "snatching" clutch, check springs, plates, oil level in gear box; for gear box, check the parts of the transmission in relationship to the gear selector.</p> <p>On dismantling components for overhauls or replacements, always use new gaskets and split pins on reassembly.</p> <p>In cases where faults are found which are not due to the causes indicated on the chart on page 20 (e.g. abnormal noises, breakage or premature wear to mechanical parts, etc.), the damage must first be localised</p>	<p>For the general instructions on the vehicles maintenance, see the table at page 10.</p>

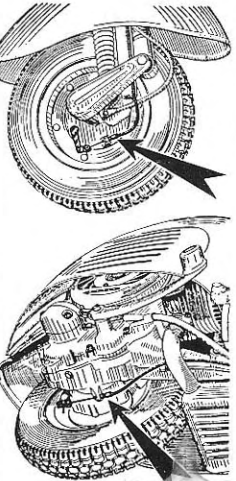


FAULT FINDING AND REMEDIES

GROUP in which the fault is verified	INSTRUCTIONS RELATIVE TO OPERATIONS TO BE CARRIED OUT	NOTES
<p>Electrical equipment</p>	<p>and the parts in question overhauled or replaced as the case may be: it is to be noted that on fitting main engine parts, they should function with the assembly tolerances as indicated on the table at pages 43 to 46.</p> <p>If the battery becomes discharged due to a fault in the charging circuit, check the flywheel magneto-rectifier, fuse, H.T. coil and connections to battery and chassis earthing. Ensure that the battery is connected to the circuit so as to avoid " emergency running " with subsequent damage to the rectifier.</p> <p>For the horn and lighting equipment, besides carrying out inspections similar to those relative to the flywheel magneto and battery, examine the conditions of the electrical wires ascertaining that their insulation is intact; take particular care that the battery lead terminals are not corroded or oxidized.</p> <p>Check that the terminals are not loose.</p> <p>Check bulbs and the contacts on the bulb sockets.</p> <p>Check connections, contacts on switch units and fuses.</p> <p>In the case of faulty operation of the horn, adjust by regulating the adjusting screw.</p>	<p>For normal bench charging of the battery, follow the instructions indicated on the battery guarantee sheet. Battery maintenance should be effected as indicated on the table at page 11.</p>
<p>Braking system</p>	<p>Where a normal adjustment of the brake cables is not sufficient in eliminating the fault, check the brake drums and jaws: if excessive wear or score marks exists, proceed with the necessary replacements.</p>	



FAULT FINDING AND REMEDIES

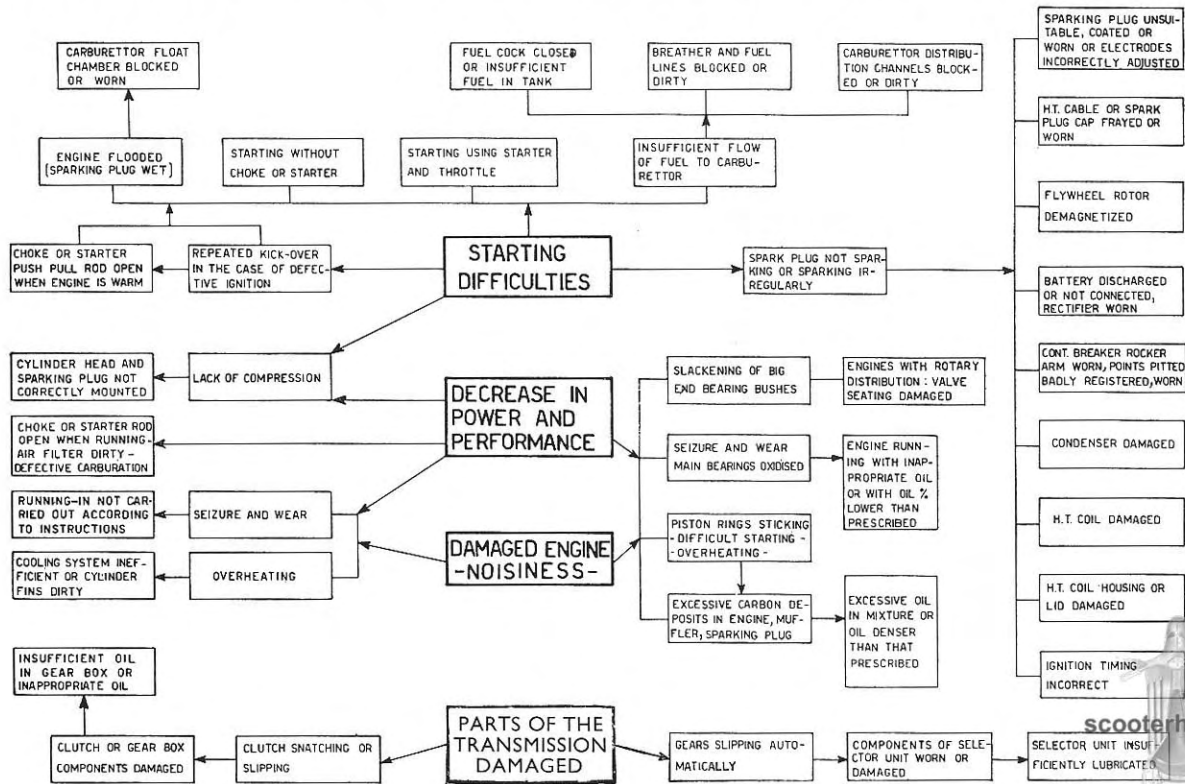
GROUP in which the fault is verified	INSTRUCTIONS RELATIVE TO OPERATIONS TO BE CARRIED OUT	NOTES
<p>Controls – Steering column – Suspension</p>	<p>Then examine the oil seal housing and if it is normal, mount a new oil seal, fixing in position with "Hermetite" or similar type of bonding solution.</p> <p>If the brake pedal is stiff, remove and lubricate.</p> <p>If the brake lever has excessive movement, adjustment can be carried out by the cable adjuster. For obtaining a perfect braking action, the wheels should rotate freely when the respective brake lever and pedal are in their resting position and the braking action should start immediately said levers are operated.</p> <p>If the brake cables are rusted, lubricate or replace.</p> <p>After completing an overhaul, repair or adjustment to the braking system, tests should be carried out under normal road running conditions.</p> <p>To avoid stiffness and rusting to the control cables, lubricate according to the table at page 9.</p> <p>If the steering column is stiff, or has excessive play, check the upper ring nut to verify if it is correctly tightened or not; see also indications at Sec. "Reassembling".</p> <p>If the steering column does not rotate freely after having carried out the above mentioned adjustments, check the bearing seatings and replace if pitted.</p> <p>If the front suspension is noisy, check according to the fault reported replacing the damaged parts as necessary.</p>	<p>For adjusting the brakes set the controls by means of the adjusters as indicated in Fig. 1</p> 

FAULT FINDING AND REMEDIES

GROUP in which the fault is verified	INSTRUCTIONS RELATIVE TO OPERATIONS TO BE CARRIED OUT	NOTES
	<ol style="list-style-type: none">1. Suspension spring if bottoming is easily verified. Also check the rubber buffers of the damper assembly.2. The efficiency of the front damper.3. That the nuts on the wheel hub are secure.4. The conditions of the bearings, bushes and needle bearings. <p>The rear suspension should be treated in the same manner as that of the front suspension.</p>	



MAIN ENGINE FAULTS AND THEIR PROBABLE CAUSES



ELIMINATION OF SPECIFIC FAULTS

FAULT	OPERATIONS TO CARRY OUT
Clutch "snatching" and defective main bearings, clutch side	<p>For avoiding defects to main bearing clutch side (lubricated by the oil in gear box) and snatching of the clutch, it is necessary to ensure that the oil in the gear box does not fall below the prescribed level (see booklet Operation and Maintenance).</p> <p>In the case of engine overhauls of a complete oil change, introduce about 250 cc. of new oil.</p> <p>On vehicles with an engine number successive to VSB I M-009501, the oil filler hole is situated so that when the vehicle in a vertical position, the oil comes up to the level of said hole; on vehicles prior to the above mentioned number the oil filler hole is situated lower and 180 cc. is necessary for attaining the required level in the gear case. Before reassembling carefully clean the plug on the oil drain hole, which is of the "magnetic" type.</p>
Defective front suspension	<p>If the front suspension presents end of run bottoming, replace the existing buffers if they are not of the cylindrical type; where necessary also replace the damper. From the Vespa G.S. VSB I T-008019 a damper has been introduced with superior braking qualities on the compression stroke.</p>
Necessity to replace pistons	<p>When it is necessary to assemble a new piston and cylinder check that the assembly play between the two components is of 0.12-0.125 mm.</p>
Defective carburation	<p>Note: To avoid rich carburation, excessive consumption and loss in performance, besides periodically carrying out the operations of maintenance indicated on the table at page 10, ensure that the air intake situated under the saddle is not blocked or choked by rags or other objects.</p>



TOOLING



TOOL LIST FOR DISMANTLING, ASSEMBLING AND OVERHAULING OPERATIONS

Tool No.	Previous tool still utilizable	PART NAME	Illustrated at page	NOTES
(a) Tools illustrated in this Manual				
I3768/C T.0014499 0014566 0015413 T.0016029 T.0016561 * 0017004 0017820 T.0018119 0019978 T.0020111 T.0020128 T.0020322 T.0020601 T.0020781 T.0020837 T.0020842 T.0021096 T.0021265	0015600 T.0015046	Base for assy. of coil to stator Bearing extractor Hook wrench for assy. upper steering column ring nut Tool for extracting rivets on spring gear retainer plate Tool for assy. of lower track on lower steering column bearing Tool for removing lower track of lower steering column bearing Special screwdriver for handlebar levers Punch for wrist pin extraction Tool for assy. of shafts and axles Heater (220 V-50 Hz or 260 V-50 Hz). Clutch extractor " S " wrench for holding clutch Tool for dismantling and re-assembly of clutch Tool for dismantling and assy. of rollers and spacer nut on clutch backplate Punch for assy. mainshaft bearing Punch for extracting mainshaft Punch for dismantling lower track of upper steering column bearing Tool for assy. and dis. upper track of lower bearing Flywheel extractor	103 Figs. 7 and 10 Fig. 10-74 54 71 Fig. 10 — See Fig. 5 Fig. 10 63 Fig. 5 27 51 Fig. 5 Fig. 69 Fig. 9 Fig. 11 Fig. 74 Fig. 8	(*) Can be substituted with a standard modified screwdriver.



TOOL LIST FOR DISMANTLING, ASSEMBLING AND OVERHAULING OPERATIONS

Tool No.	Previous tool still utilizable	PART NAME	Illustrated at page	NOTES
T.0021330		Tool for assy. of tracks of steering column bearing	Fig. 74	
T.0021467		Crankcase half bearing extractor	Figs. 8 and 9	
T.0022407		Ring nut face pin wrench	Fig. 10-73	
T.0022453		Tool for assembling sleeve with front brake lever housing on handlebars	Fig. 58B	
T.0022460		Extractor for removing sleeve with front brake lever housing from handlebars	Fig. 58A	
T.0022465		Long nose pliers for assy. and dismantling circlip	Fig. 9, Fig. 69	
T.0022473		Jig for assy. of crankcase roller bearing, flywheel side	Fig. 10, 73	
22733		Ext. for cluster gear retainer bush	Fig. 8	
(*)T.0023465		Graduated disc	68	
T.23465/2		Bracket	68	
T.0023589		Punch for assy. and dismantling oil seal on crankcase clutch side	Fig. 9-69	
0023638		Long nose pliers for circlips	Fig. 9-69	
T.0023745	{ T.0017138 T.0017642 T.0020877	Fixture for separating crankcase halves and extracting crankshaft	Fig. 7	(*) For application to engines of the G. S. Mod. VSB 1, request the component 2 (bracket).
T.0023853		Indexing device for engine timing	68	
T.0024912		Face pin wrench for ring nut on crankcase, clutch side	Fig. 5-69	
T.0025095	Engine base plate	Fig. 5		
T.0025124	Hook wrench for spacer ring nut on clutch gear	Fig. 5		
T.0025127	Wedge	Fig. 71		
T.0026362	Timing gauge			
T.0027159	Jig for centering con-rod	53		
T.0027160	{ T.0024601 T.0021257 T.0016338	Jig for substituting small end bush	53	



TOOL LIST FOR DISMANTLING, ASSEMBLING AND OVERHAULING OPERATIONS

Tool No.	Previous tool still utilizable	PART NAME	Illustrated at page	NOTES
T.0027329 T.0027338	 T.0023278 381500/8	Wrench for fuel cock Jig for assy, of external oil seal on flywheel side of crankcase	Fig. 12 Fig. 71	
T.0027345		Punch for oil seal on bearing ring nut	Fig. 5-69	
T.0027346		Pilot sleeve for oil seal	Fig. 7	
T.0027347		Punch for dismantling oil seal on crankcase	Fig. 8	
T.0027348		Punch for expelling roller bearing on mainshaft	Fig. 8 and 9	
T.0027350				
T.0027383		Wrench for holding flywheel fan	Fig. 5	
T.0027393		Cluster gear roller bearing extractor	Fig. 8	
T.0027399		Mainshaft roller bearing extractor	Fig. 8	
T.0027533 0028182 381500/7		Apparatus for engine timing Reamer for small end bush	68 53	



DISMANTLING



DISMANTLING

NOTICE

In this chapter the principal dismantling operations which need special tooling and procedure are illustrated. Simple operations which can be easily carried out using standard tools, such as screwdrivers, wrenches, pliers, etc., are not indicated.

We consider it advisable to consult the Spare Parts Catalogue, relative to the group under consideration, for obtaining a clear picture of the component parts of said group, before carrying out the necessary operations.



Engine group components

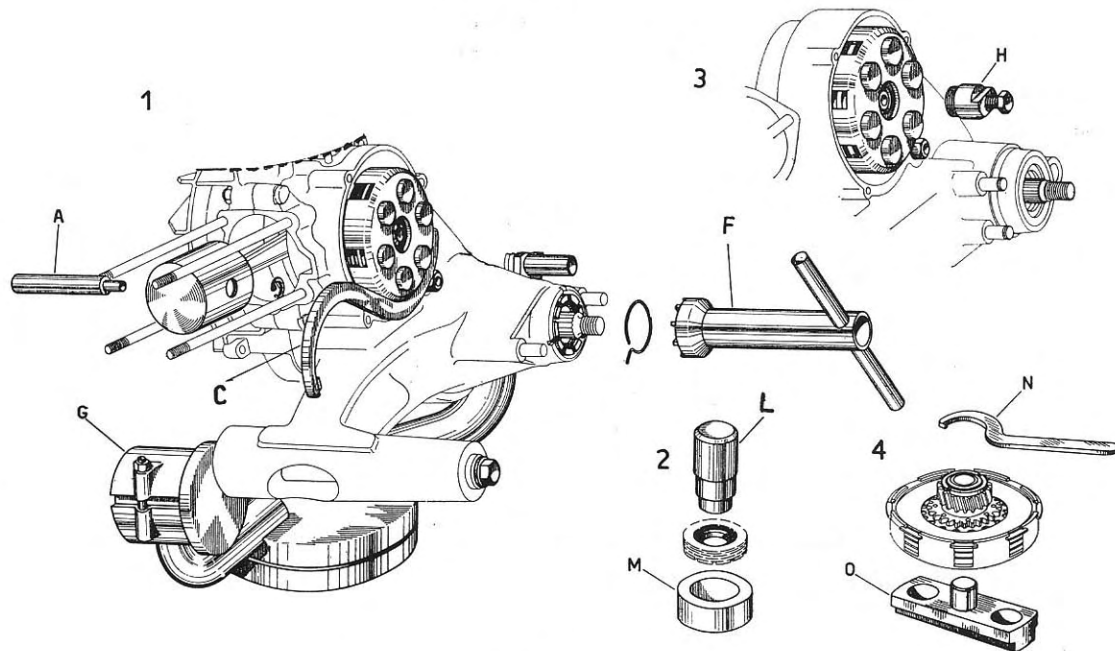


Fig. 5
(See instructions on the following page)



DISMANTLING

Opn. No. (see Fig. 5)	DESCRIPTION	Fig. tool	Tool Drg. No.	NOTES
1	On having removed engine from vehicle secure to bench support Gudgeon pin (after having removed circlip) from piston Piston Clutch unit Clutch retainer nut Ring nut securing external bearing on mainshaft	G A C	T.0025095 0017820 T.0020128 °	° For removing the nut (Hex. hd., 14 mm. flats), use a standard box wrench.
2	Oil seal from ring nut	F M L	T.0024912 I.D. of tube 40 mm T.0027345	
3	Clutch group	H	T.0020111	
4	Clutch gear ring nut	{ N O	T.0025124 T.0020601	



Engine group components

3

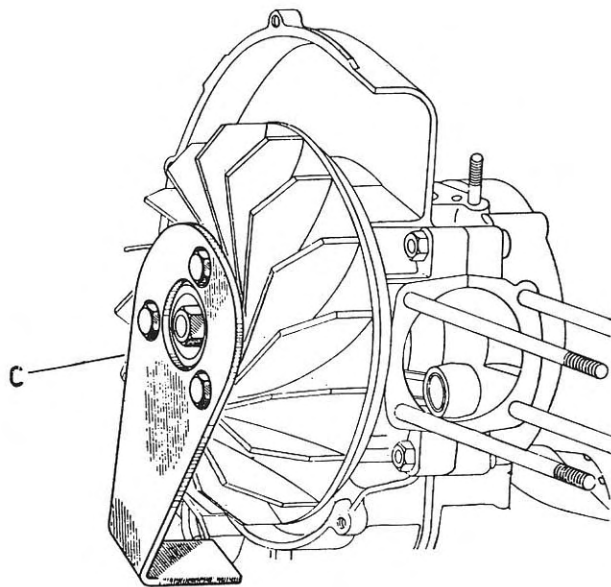


Fig. 6
(See instructions on the following page)



DISMANTLING

Opn. No. (see Fig. 6)	DESCRIPTION	Fig. tool	Tool Drg.No.	NOTES
I	Extract flywheel, by unscrewing securing nut	C	T.0027383	



DISMANTLING

Crankcase halves – Crankshaft

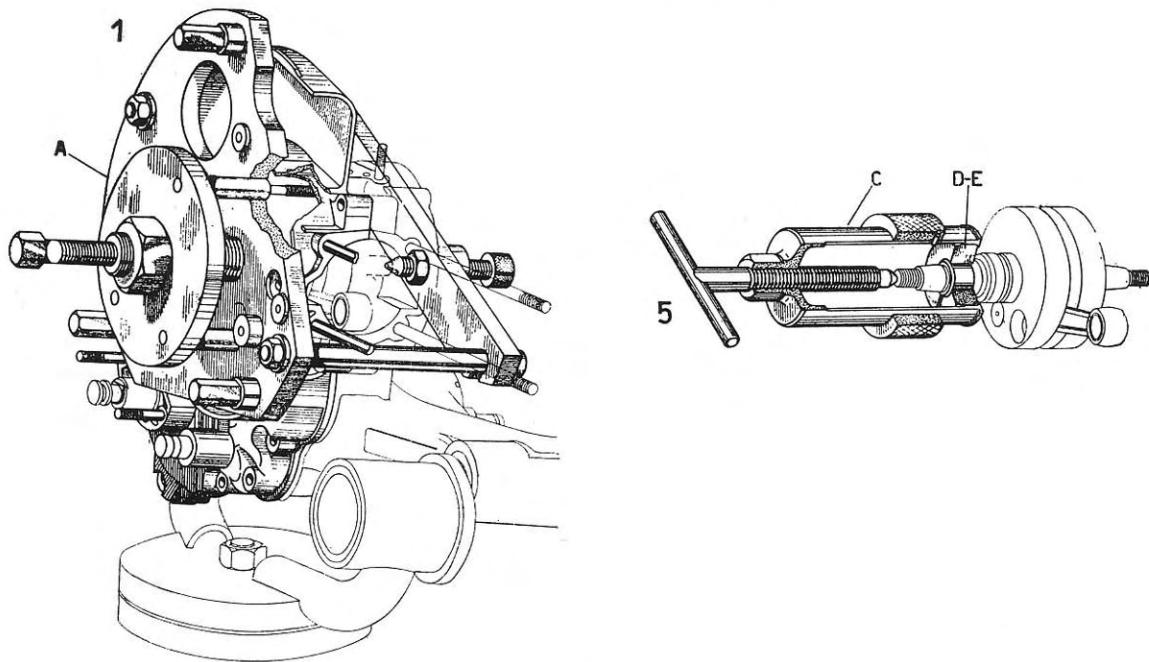


Fig. 7
(See instructions on the following page)



DISMANTLING

Opn. No. (see Fig. 7)	DESCRIPTION	Fig. tool	Tool Drg. No.	NOTES
1	<p>Separating crankcase halves (place a drip tray under the engine to catch the oil. Fix the tool to the flywheel side of the crankcase half and bring the clamp staff screw lightly in contact against the crankshaft extremity (clutch side). Tighten the nut on the sliding plate equipped with four legs; these latter will then act on the 4 central studs of the crankcase half causing it to separate from its mating component. Extraction of crankshaft: unscrew the clamp screw previously mentioned to the end of its run so as to make contact with the crankshaft extremity; act on the central screw (plate on flywheel side) until the crankshaft is extracted.</p>	A	T.0023745 * with Part 20	
2-3	<p>Separation of crankcase halves and extraction of crankshaft; for avoiding deformation to the crankshafts in separating the crankcase halves, insert a wedge between the crankshaft webs. See the column " notes " for the tool components to be used.</p>			
4	<p>Crankshaft cam and inner ring of main roller bearing</p>	C-D-E	T.0014499 (with Parts 12 and 13)	



Crankcase half flywheel side

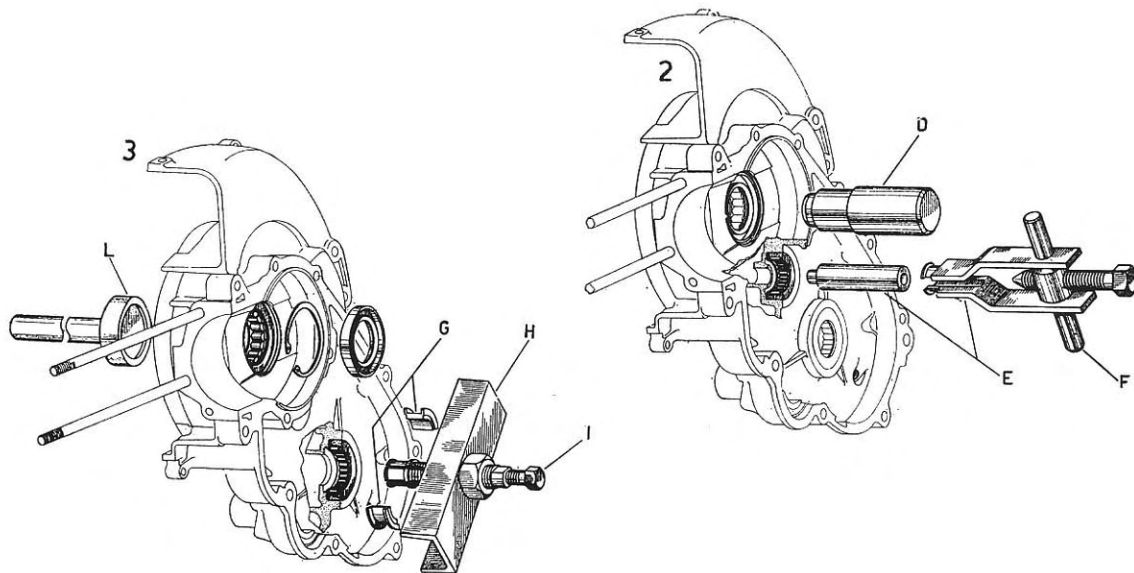


Fig. 8
(See instructions on the following page)

DISMANTLING

Opn. No. (see Fig. 8)	DESCRIPTION	Fig. tool	Tool Drg. No.	NOTES
1	External oil seal from housing of main roller bearing. Multiple gear roller bearing; apply the tool "F" so that the extremities are inserted between the circlip of the bearing to be extracted and crankcase; slide the pin "E" through the tool until it butts against the crankcase; turn the screw of the tool until the bearing is extracted.	D E-F	T.0027347 T.0027393 Extractor arm and screw T.0021265	For dismantling the gear box selector unit. Set the gear change sector in the top gear position.
2	Oil seal in main roller bearing housing; circlip; outer track of roller bearing. Mainshaft roller bearing.	L G H I	T.0027348 T.0027399 T.0022733 T.0021467 (excluding the parts 1 and 2)	



Crankcase half clutch side

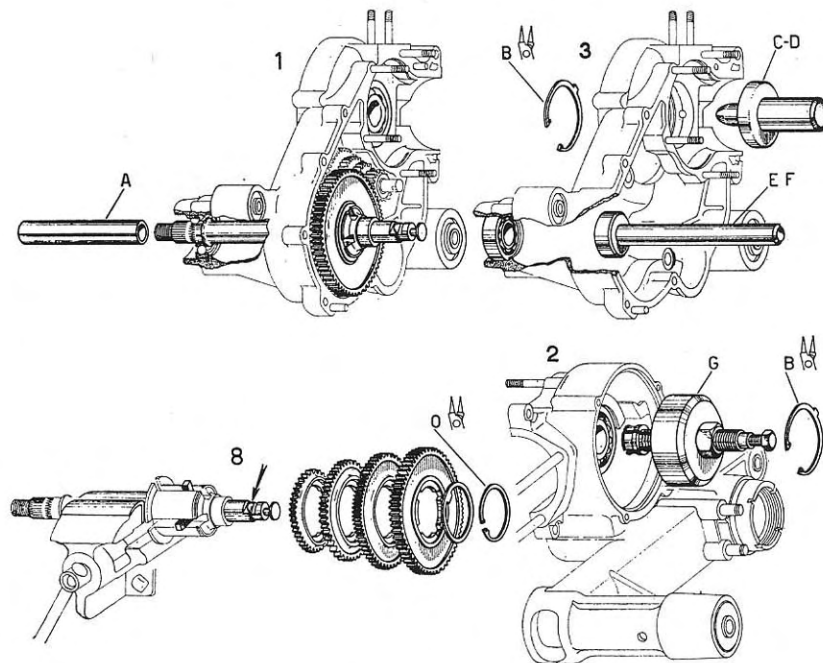


Fig. 9
(See instructions on the following page)



DISMANTLING

Opn. No. (see Fig. 9)	DESCRIPTION	Fig. tool	Tool Drg. No.	NOTES
1	Final drive shaft	A	T.0020837	
2	Circlip from main bearing bush	B	T.0022465	The tool should be applied as in figure (from outside of crankcase); after having removed the circlip. (1) First remove the oil seal (with a screwdriver) and then the circlip (standard type pliers).
3	Main bearing clutch side	G	T.0021467	
3	Main bearing oil seal	C	T.0023589	
4	Final drive shaft bearing	F	T.0027348	
4	Gear group; selector spider	O	0023638	

N.B. Straighten the lock washer lugs using a screwdriver; please note that the selector spider has a L.H. thread.



Steering column and front suspension

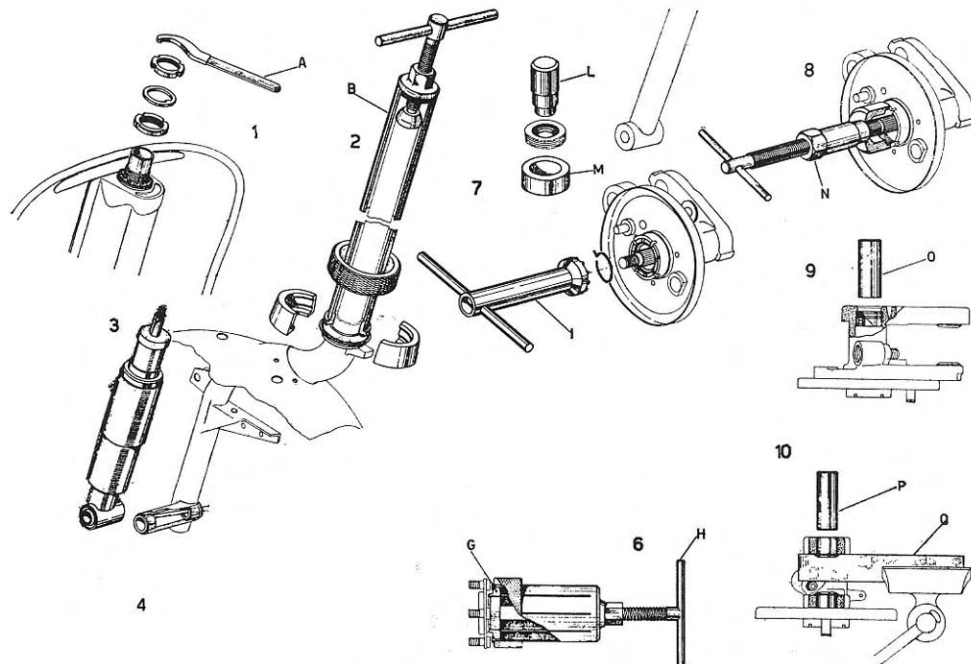


Fig. 10
(See instructions on the following page)



DISMANTLING

Opn. No. (see Fig. 10)	DESCRIPTION	Fig. tool	Tool Drg. No.	NOTES
1	Ring nut of upper steering column bearing	A	0014566	
2	Lower bearing track of lower steering column bearing	B	T.0016561	
3	Bolt securing damper	D	Punch \varnothing 8 mm	
4	Bearing from wheel axle	{ H G	T.0014499 *	
5	Ring nut from wheel hub		I	T.0022407
	Oil seal from ring nut	{ L M	T.0022473 **	** Tubular punch internal dia. 40 mm.
6	Wheel axle complete of wheelside bearing (^{oo})		N	T.0018119
7	Bearing and hub plug (opposite to wheel side)	O	Punch \varnothing 26	
8	Bushes for shaft connecting steering column to wheel hub	{ P Q	Punch 23 mm Rod 25 \times 35 mm	



Steering columns bearings

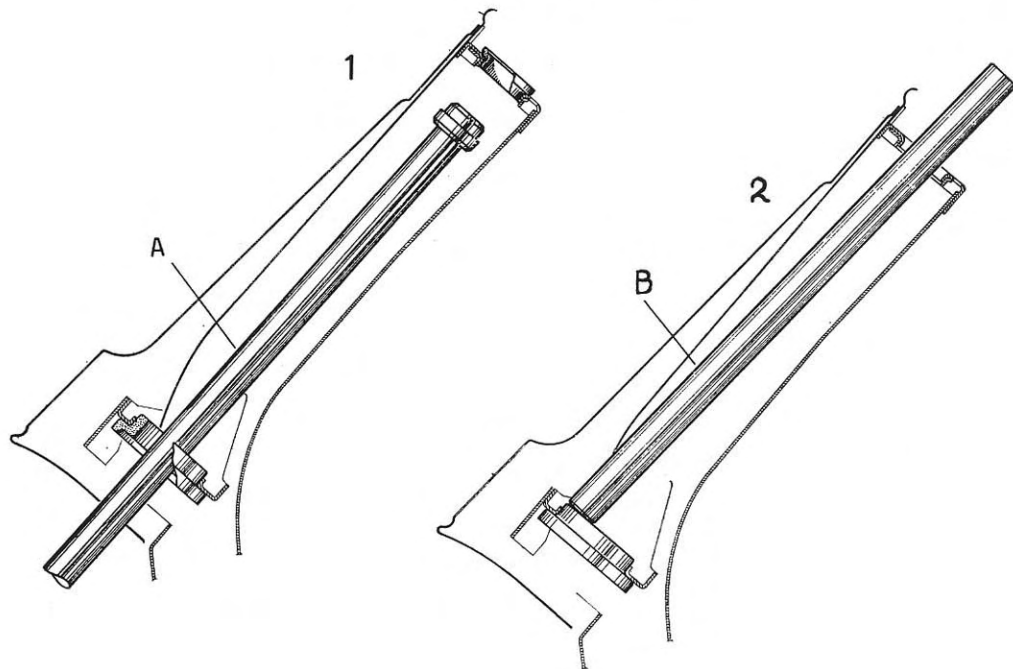


Fig. 11
(See instructions on the following page)



DISMANTLING

Opn. No. (see Fig. 11)	DESCRIPTION	Fig. tool	Tool Drg. No.	NOTES
1	Lower track of upper steering column bearing	A	T.0020842	
2	Upper track of lower steering column bearing	B	—	Tube; length 530 mm., O.D. 35 mm.



DISMANTLING

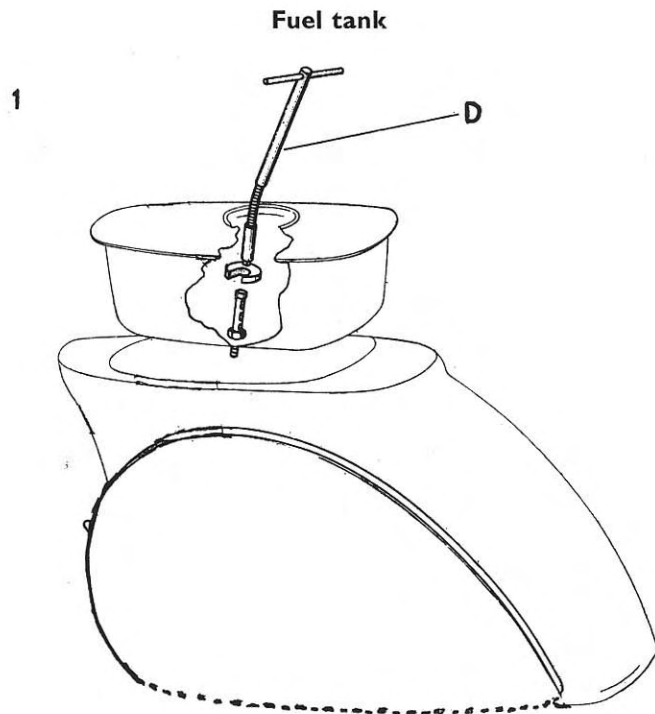


Fig. 12
(See instructions on the following page)

DISMANTLING

Opn. No. (see Fig. 12)	DESCRIPTION	Fig. tool	Tool Drg No.	NOTES
I	Nut securing fuel tap	D	T.0027329	



Cable groups from chassis

- (1) Unsolder or disconnect the terminals and securing straps.
- (2) Tie a pilot wire to the cable extremities, which on extracting the wires should remain in the chassis to facilitate the re-assembling operation.
- (3) Slide out the gear change, throttle and clutch cable from handlebar side.
- (4) Slide out the cable harness (inside the chassis) from under the steering column cover.



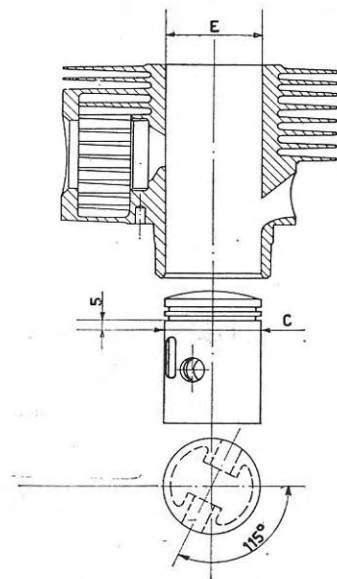
ASSEMBLY TOLERANCES - OVERHAULS



CYLINDER AND PISTON VESPA G. S. VSBI MODEL

Part name	Normal dimensions		Clearance "A" on assy	Clearance "A" admissi- ble after use
		Limits		
Cylinder, normal	E = 58	- 0.005 + 0.025	0.12	0.18
Piston, normal	C = 57.89	± 0.015		
Cylinder, 1st o/s	E = 58.2	- 0 + 0.02		
Piston, 1st o/s	C = 58.09	± 0.01		
Cylinder, 2nd o/s	E = 58.4	- 0 + 0.02		
Piston, 2nd o/s	C = 58.29	± 0.01		
Cylinder, 3rd o/s	E = 58.6	- 0 + 0.02		
Piston, 3rd o/s	C = 58.49	± 0.01		
Cylinder, 4th o/s	E = 58.8	- 0 + 0.02		
Piston, 4th o/s	C = 58.69	± 0.01		

* Note: The reading of the dimension "C" for obtaining "A" are taken from different sections to those of the previous models (see note under figure).



Measuring plane.

Fig. 15

N.B.: The dimensions "C" is as indicated in Fig. 15 for the pistons actually supplied as spares. For the models prior to the VSBI the dimension "C" is measured at 15 mm. (perpendicular to the gudgeon pin axis) from the piston base.

Please note; All measurements are in millimetres.

ASSEMBLY TOLERANCES—CYLINDER AND PISTON

- N.B.** Pistons and cylinders supplied by the factory as spares are marked with letters of the alphabet. In the case where, a cylinder or a piston is to be replaced, it should bear the same letter as on the mating component.
- In the case of a rebored cylinder, the dimension "E" should exceed that of dimension "C" on the piston to be mounted (marked on the piston itself), by the value indicated in the column; clearance "A" on assy.
- On assembling the piston in the cylinder ensure that the arrow stamped on the piston crown is facing towards the cylinder exhaust port.**



PISTON RINGS

Part name	Normal dimensions	Clearance "A" on assy	Max. clearance "A" admissible after use
Piston ring, normal (upper and lower)	58	$0.2 \div 0.35$	2 mm
Piston ring, 1st o/s	58.2		
Piston ring, 2nd o/s	58.4		
Piston ring, 3rd o/s	58.6		
Piston ring, 4th o/s	58.8		

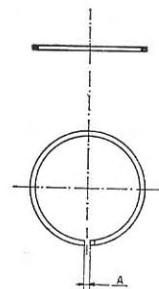


Fig. 16

PISTON AND GUDGEON PIN

Part name	Normal dimensions	Clearance "R" on assy	Max. clearance "R" admissible after use +
Piston, normal	P = 15 -0.005 -0.016	0	2/100
Gudgeon pin, normal	Q = 15 -0.009 -0.017		

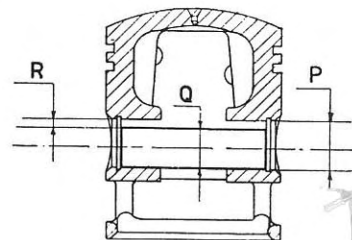


Fig. 17



CON-ROD-GUDGEON PIN

Part name	Normal dimensions	Clearance "I" on assy	Max. clearance "I" admissible after use
Con-rod, normal	$G = 15 \begin{matrix} + 0.005 \\ + 0.005 \end{matrix}$	0.014 ÷ 0.035	5/100
Gudgeon pin, normal	$H = 15 \begin{matrix} - 0.009 \\ - 0.017 \end{matrix}$		

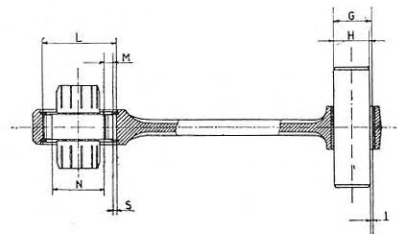


Fig. 18

N.B.: When substituting the crankshaft always use the type with floating washer (indicated on Spare parts catalogue), recognisable in that the con-rod bronze spacer washers are visible.

N.B.: For Vespa. The max. axial clearance admissible after use, of the con-rod (longitudinal run on crank-pin) is of 0.6 mm.

SPACER WASHERS

Part name	Normal dimension	Clearance "A" on assy	Max. clearance "A" admissible after use
Space washer, normal	2.05 $\begin{matrix} + 0 \\ - 0.06 \end{matrix}$	0.15 ÷ 0.40	0.50
Spacer washer, 1st o/s	2.20 $\begin{matrix} + 0 \\ - 0.06 \end{matrix}$		
Spacer washer, 2nd o/s	2.35 $\begin{matrix} + 0 \\ - 0.06 \end{matrix}$		
Spacer washer, 3rd o/s	2.50 $\begin{matrix} + 0 \\ - 0.06 \end{matrix}$		
Spacer washer, 4th o/s	2.65 $\begin{matrix} + 0 \\ - 0.06 \end{matrix}$		

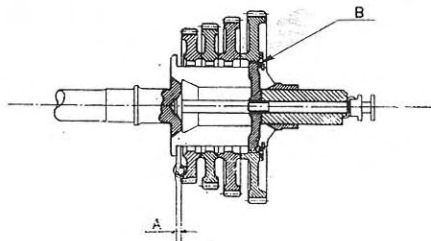


Fig. 21

N.B.: If the clearance "A" is not obtained using the normal spacer washer "B", substitute the latter with a suitable oversize washer, so as to obtain the prescribed clearance, use a feeler gauge (e.g. drg. 0018094), for inspection.



FLYWHEEL MAGNETO TESTING AND TIMING

With normal flywheel overhauls (e.g. replacement or magnetization of the flywheel rotor, cam or coil replacement), using the **flywheel test bench**, the contact breaker points should start to open when the keyway on the cam passes the centre line of the H.T. coil, opposite to said keyway, by 8° to 12° (as indicated in Fig. 27). With this angle the minimum efficiency should be as follows:

Vespa G. S.:

$$\left\{ \begin{array}{l} 1.5 \mu S \text{ at } 7000 \text{ revs;} \\ 7 \mu S \text{ at } 2000 \text{ revs.} \end{array} \right.$$

The gap between the contact breaker points should be 0.5 mm. (0.019").

N.B. For the Vespa G. S. with **battery** ignition, only the max. opening should be checked.

For timing of **engine and flywheel magneto** proceed according to instructions at page 183 to 188.

Terminal voltage of the double filament bulb:

With stabilized flywheel – i.e. units which have completed 10 hours of operation on the vehicle – with good magnetic properties and efficient lighting circuit, the terminal voltage at the main beam filament of the double filament bulb of 6 V-25/25 W should be as follows:

6.8 ÷ 7.6 V at 6000 revs.

N.B. On remagnetized flywheels, not “yet stabilized” the tension across the bulb is to be considered approx. 10% in excess of that above mentioned.

CHECKING THE RECTIFIER

If the d.c. circuit should become defective (battery discharging or inefficient charging, short circuits, etc.), apart from carrying out the inspections indicated in the chapter “Fault finding and their remedies”, it is advisable to also check the efficiency of the rectifier. This inspection consists in checking the “inverse” current which the unit permits to pass through its elements and that of the “through resistance”.

For checking the inverse current the following apparatus is necessary:

- D.C. moving coil voltmeter, category I, Scale 0 to 30 V.
- D.C. moving coil milliammeter, category I, Scale 0 to 50 mA.
- Variable resistance $R = 1000 \Omega$ – Capacity 100 mA
- Battery made up of 4 accumulators of 6V, 4.5 Ah, connected in series.



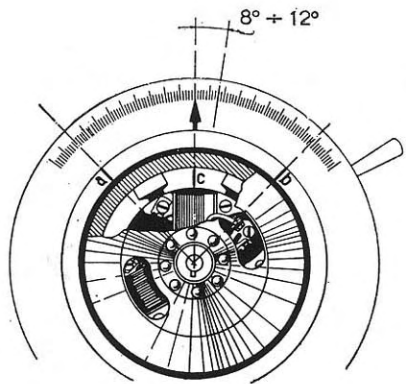


Fig. 27
Timing control on test bench.

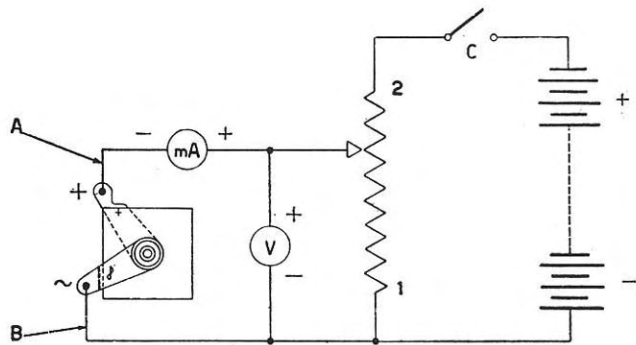


Fig. 30
Measuring the "inverse current".



Test: With the variable resistance regulated at the point I (see Fig. 30) connect the terminals A and B respectively with those + and ~ of the rectifier. Close the switch C. Regulate voltage so as to obtain values of 6 and 20 V.

The inverse current should not exceed:

- (a) at 6 V tension:
 $1 \div 1.5$ mA.
- (b) at 20 V tension:
 $5 \div 10$ mA.

For checking the "through resistance" the following apparatus is necessary:

- (a) D.C. moving coil voltmeter, category I, Scale 0 to 2 V.
- (b) D.C. moving coil ammeter, category I, Scale 0 to 3A.
- (c) Variable resistance $R = 11 \Omega$ approx., capacity 3A.
- (d) 6V – 23 to 24 Ah Accumulator.

Test: With the variable resistance set at the point I, insert the rectifier connecting the terminals A B with those ~ and + of the rectifier (i.e., **invert the rectifier connections** with respect to those illustrated in Fig. 30).

Close the switch C. Regulate the tension so as to obtain a reading of 2A; with this current the tension indicated on the voltmeter should enter between the values 1 to 1.4 V (see wiring diag. at Fig. 31).

If the millammeter does not register it indicates that there is a defect in the circuit connections.

N.B. It is of particular importance to ensure a complete efficiency of the rectifier, insomuch as, the engine has a "battery" ignition which necessitates that the d.c. circuit be always maintained in perfect working conditions.

In the case of a defect verified to the rectifier, before replacing, check the battery charging circuit (defective fuse, inaccurate connections or inefficient due to oxidation or defects; short circuiting; discharged battery, etc.) to avoid subsequent ignition defects, immediate breakdown, or breakdown after brief use – of the new rectifier.

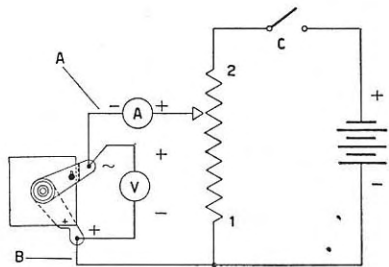


Fig. 31
Measuring the "through resistance"

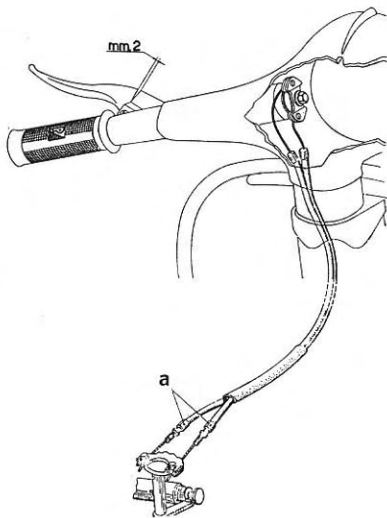


Fig. 33
Control adjustments

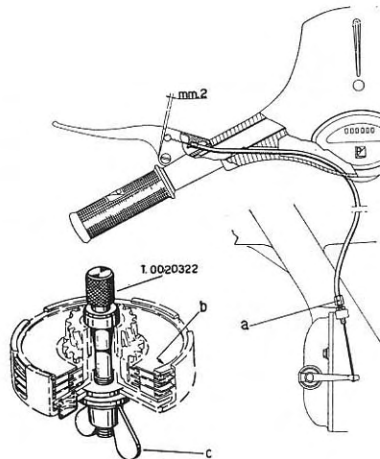


Fig. 34 - 35
Dismantling clutch unit - Adjusting clutch control

N.B.: To dismantle the clutch, first remove the ring nut retaining the gear using the tool T.0025124.



Control adjustment

- (1) If in the " O " position the lever has an excessive play, suitably adjust one of the two cables by rotation of the relative adjusting screw " a " (Fig. 33).
- (2) If the marking of the handlebars do not coincide with the appropriate index mark, tighten the appropriate adjusting screw and slacken the corresponding counterpart so as to maintain the existing cable tension.

CLUTCH

(a) Replacement of plates

For dismantling the clutch unit, proceed as follows using the tool T.0020322 illustrated in Fig. 34.

On having set up the clutch unit in the tool, tighten the wing nut " c " which will compress the clutch springs and permit the extraction of the plate retainer circlip " b ". The tool can be used in a similar manner on reassembling the unit.

(b) Control adjustment

The clutch lever should have a free run of about 2 mm, as in Fig. 35, before movement is transmitted to the clutch actuating arm at the cable extremity.

If this free run of the lever should be lacking the clutch can be easily damaged. The unit can be adjusted by rotation of the nut " a ".

CRANKSHAFT: REPLACEMENT OF SMALL END BUSH

1. Centre and secure the con-rod using the tool illustrated at Fig. 36. The operation is to be carried out as follows:
 - (a) Mount and secure the detail " a " of the tool on the crankcase studs.
 - (b) Slide the pin " c " with the detail 3 mounted, through the apposite hole into the small end bore.
 - (c) Tighten the four screws, component 2, so as to lock the con-rod in position.
 - (d) Secure the lock nuts on the above mentioned screws, bring the butt plate into contact with the con rod by acting on the lateral screw and then tighten the nut " d " to extract the bush.
 - (e) Repeat and check that the screws are tightened as indicated at points (c) and (d).
 - (f) Remove the component mounted on the pin and apply the detail 7 and the new bush to be mounted proceeding as for the dismantling operation: screw in the nut " d " until the component 7 butts against the con rod small end face.

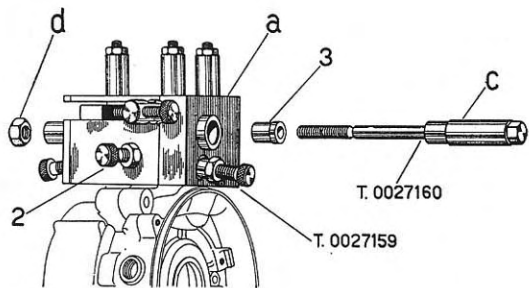


Fig. 36
Centering con-rod.

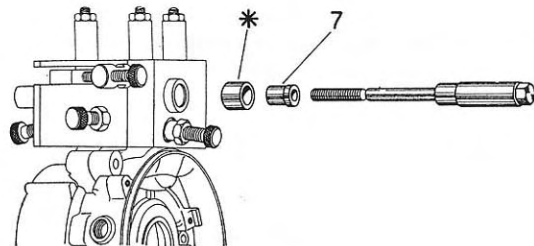


Fig. 37
Replacement of small end bush.

- (g) Ream the bush using the tool 381500/7 illustrated in the figure.
- (h) After having introduced the reamer into the guide bush of the detail "a" ream out the small end bush until the tool reaches the end of its stroke.
- (i) Spot punch the bush on the con-rod and machine a cut out, using a drill or handsaw, in correspondence to the slot in the con rod small end.
- (l) Run the reamer 381500/7 through again.

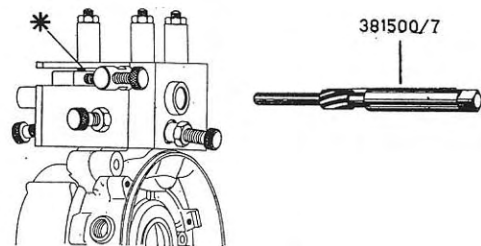


Fig. 38
Reaming small end bush.
* Interpose spacer washer between tool and clamp.

To facilitate the flow of lubrication when the engine is functioning, on fitting the gudgeon pin and small end bush execute four "lead chamfers" as indicated in Fig. 39.

If available it is preferable that this operation be carried out on a machine using the milling cutter as indicated: however a rat tail file of dia. 2.5 to 3 mm can be used to obtain the required results.

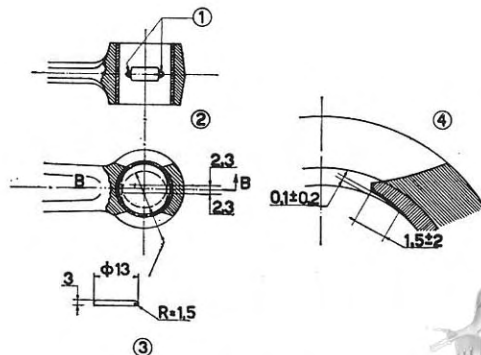


Fig. 39
Lead chamfer dimensions.
1. Lead-in - 2. Sec. B-B - 3. Cutter profile - 4. Detail of lead-in.

Having completed the operation carefully clean the machined area so as to remove all the residual swarf.

STRIPPING DOWN THE MULTIPLE GEAR

This operation is necessary when the springs, helical gear or cluster are to be replaced.

For extracting the rivets connecting the spring retainer plates use the tool 0015413 indicated in the Fig. 46. After having cut off the heads the rivets can be extracted using a punch. The tool can be used in the same manner for remounting the assembly.

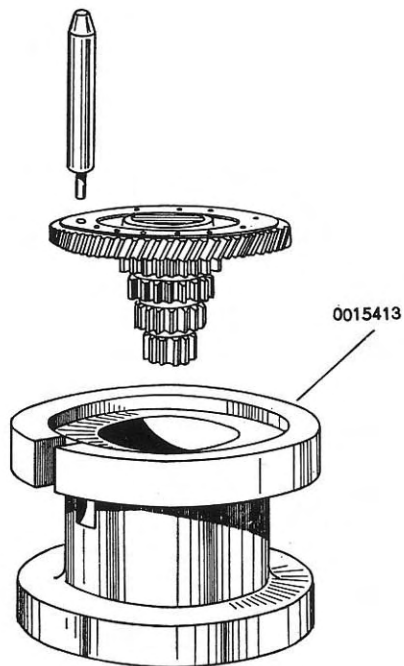


Fig. 46
Multiple gear overhaul.

CARBURETTOR DATA

- (**) Mixer coded BE 2 from vehicle VSB I T-0025248 (having the air filter equipped with a flame trap) to VSB I T-0029750.
- (* °) From vehicle VSB I T-0029751 the carburettor SI 27/23 has a main jet of 115/100; mixer air calibrator vent of 160/100; mixer coded BE 3; the body with atomiser having the outlet section cut at 63° 30'. The above mentioned carburettor is immediately recognisable in that the screws securing the float chamber cap are copper plated.

NOTES Check that the carburettor, float chamber cap and jet cover are securely fitted so as to avoid undesirable air filtrations which could affect the carburation. After a few minutes that the engine is running set the slow running revs. by adjusting the throttle set screw and that for regulating the air flow to the slow running jet (by respectively screwing in or unscrewing a richer or weaker mixture can be obtained).

On cleaning, wash the parts in neat petrol and air blast dry; under no conditions should the jets or calibrator holes be cleared using steel wire or similar devices which could easily damage them.

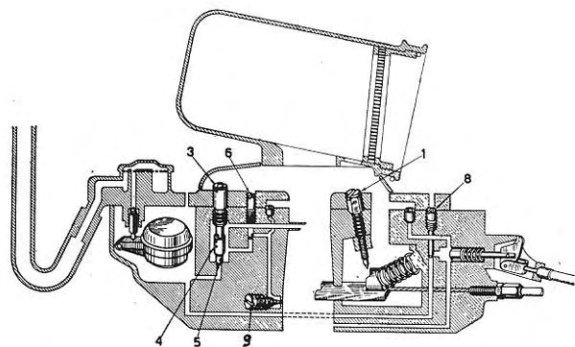


Fig. 49

Carburettor type SI 27/23.

1. Throttle slide set screw - 2. Air corrector jet - 3. Mixer - 4. Main jet - 5. Slow running jet - 6. Starter device jet - 8. Starter device jet - 9. Slow running regulation screw.

REPLACEMENT OF HANDLEBAR SLEEVE

(a) Dismantling (Fig. 58/A).

Dismantle the speedometer, headlamp, dip switch, and disconnect the relative wiring.

Disconnect the front brake cable (at both extremities) and throttle control cable; slide out the brake cable from the housing to be extracted.

Set up the tool T.0022460 as in Fig. 58/A, after having previously mounted the component indicated by an asterisk (from the standard equipment of this tool select the component suitable for the switch housing to be extracted); insert said component into the switch housing.

Screw down the component (1) (without over-tightening), ensuring that the component (2) is mating with the inclined plane of the switch housing "a". Introduce the extractor guide until it butts up against the handlebar casting and turn the screw (3) to expel component.

(b) Reassembly (Fig. 58 B).

Introduce the sleeve with the housing "a" into the tool and set up as indicated in the figure.

For aligning the housing cut outs on the component "a" (for passing through the brake cable and electrical wires to switch unit) with

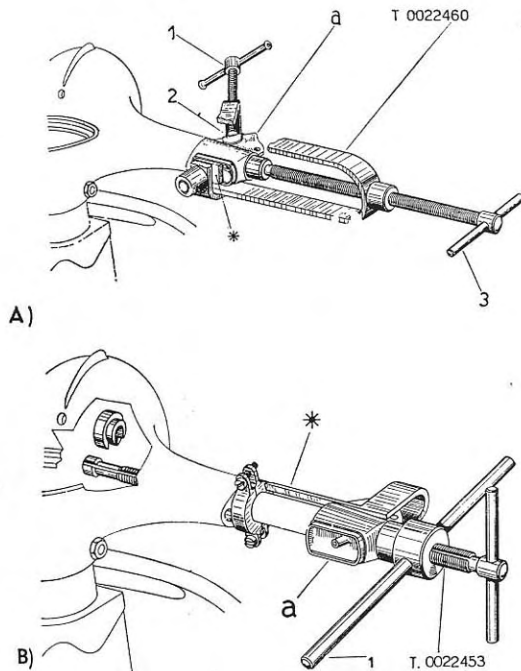


Fig. 58

- (A) Dismantling the handlebar sleeve with brake lever housing.
(B) Reassembly.



the corresponding cut outs on the handlebar casting, apply the detail indicated by an (*) (setting piece, detail 13 of the tool).

Screw in the component (1) until the sleeve "a" butts against the setting flange (*) of the tool. Remove the setting piece and continue to screw in the component (1) until the part "a" is completely assembled, ensuring that the cut-outs on sleeve and handlebars coincide.

ROAD CONSUMPTION TEST

For obtaining accurate test results it is advisable use an auxiliary tank of known capacity which can be inserted and disconnected from the circuit, respectively at the start and finish of the test.

- (a) The test should be carried out with only one up, riding in top gear and seated in an upright position. The driver should be at least 5'4" tall.
- (b) Distance of test run 30 miles (15 mls. going, 15 mls. return) on a dry and level trunk road.
- (c) Max. admissible wind speed: 6.6 ft/sec; air temperature from 5 to 25° C.
- (d) Tyre pressures: Solo. See tyre chart.

N.B. The fuel consumption **after running in and with the vehicle in working efficiency**, should be between 87 and 98 m.p.g. at an average speed of 37 m.p.h.

For overhauled vehicles suitable increases in fuel consumption should be taken into consideration in relation to the vehicles conditions and relative engine; similar increases should be considered on vehicles after considerable running, in proportion to the mileage and conditions of maintenance.



REASSEMBLY



REASSEMBLY

NOTICE

In this chapter are illustrated the principle operations of reassembly which require special tooling and expedients. Operations easily executed using standard screwdrivers, wrenches, pliers, etc. are not demonstrated.

Before carrying out any operation whatsoever, we recommend you to consult the Spare Parts Catalogue which illustrates the component parts of the group.

On reassembly check that all parts are clean and if necessary wash and dry; lubricate all engine parts which have a rotary or sliding motion.

Always use new gaskets and split pins.



Components of engine group (crankcase half, clutch side)

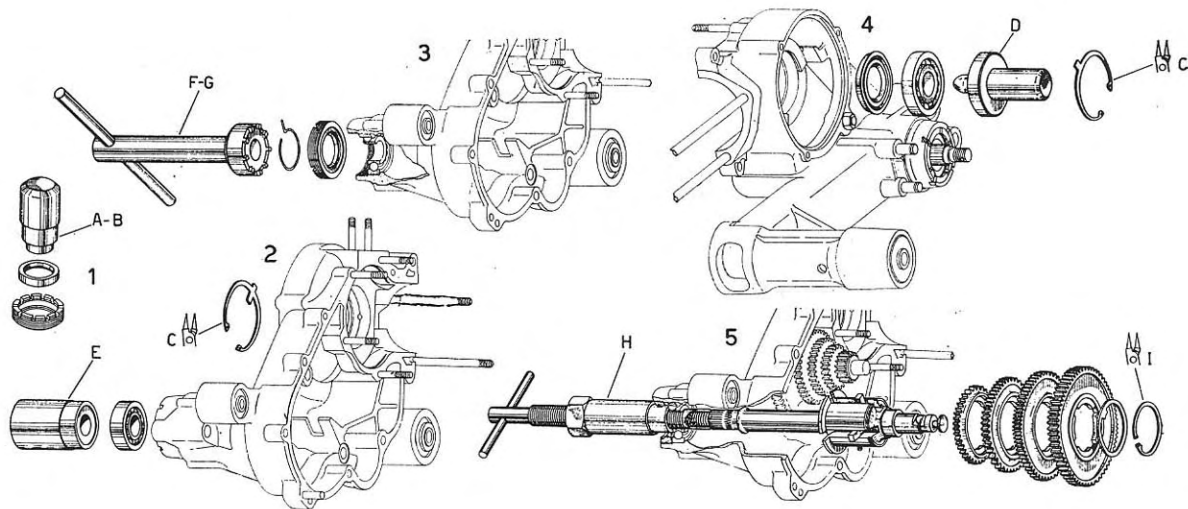


Fig. 69
(See instructions on the following page)



REASSEMBLY

Opn. No. (see Fig. 69)	DESCRIPTION	Fig. tool	Tool Drg. No.	NOTES
1	Oil seals on bearing retainer ring nut	B	T.0027345	(°) For a correct assembly operation of the main bearings, first heat the housing with 0019978 (see Fig. 70 also).
2	Mainshaft bearing	E	T.0020781	
3	Ring nut for locking bearing	G	T.0024912	
4	Oil seal; main bearing (°); circlip	{ C D	T.0022465 T.0023589	
5	Mainshaft	{ H I	T.0018119 0023638	



Crankcase half, flywheel side

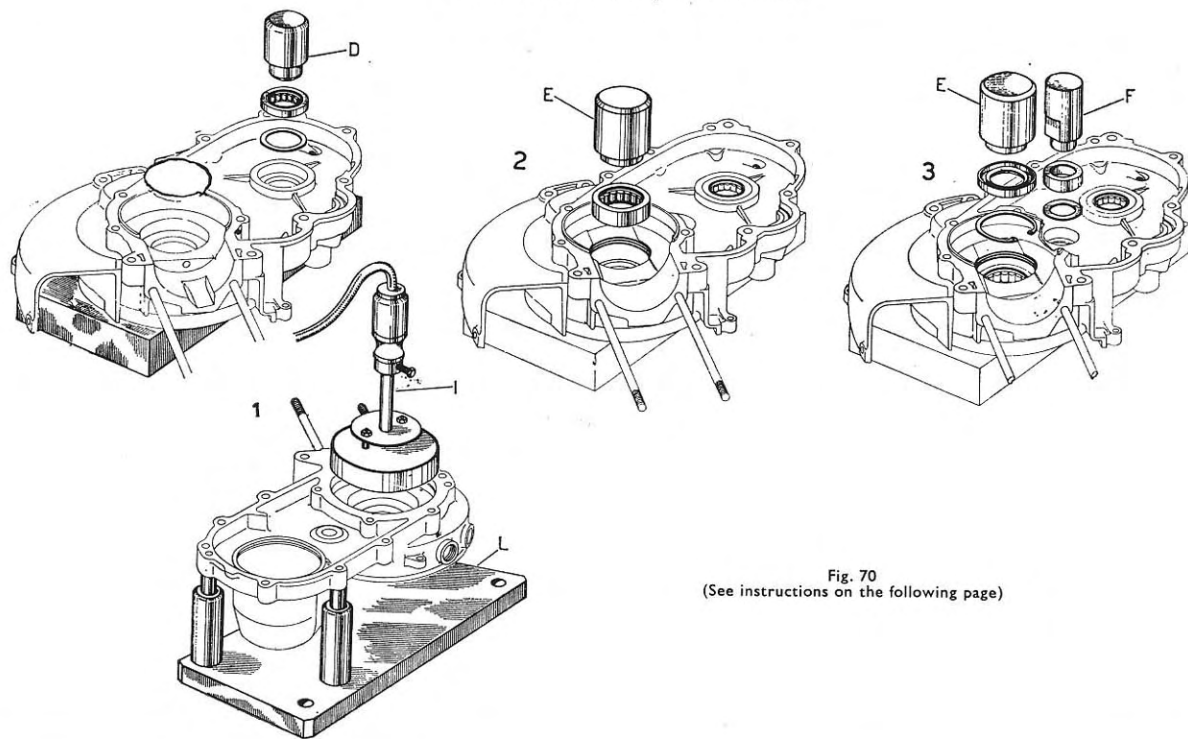
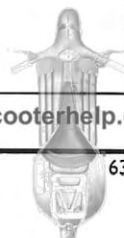


Fig. 70
(See instructions on the following page)

REASSEMBLY

Opn. No. (see Fig. 70)	DESCRIPTION	Fig. tool	Tool Drg. No.	NOTES
1	<p>N.B. The main bearing clutch side is lubricated by the oil in the gear box</p>			
	Mainshaft bearing (coat the cage with grease)	D	T.0022473	
	<p>CAUTION: For mounting the main bearings and relative oil seals heat the housings on the crankcase to about 80° C with a heater.</p>	{ I —	0019978 (^{oo})	<p>The roller bearing is located between two grease seals: the assy. of the inner seal is illustrated in the opn. 3; the outer ring is illustrated on Fig. 71 opn. No. 5.</p> <p>(^{oo}) The tool T.0019859 is utilisable for all Vespa mods. 125, 150, G.L. and G.S. prior to VNA, VBA, VGLA VSB 1.</p>
2	Main roller bearing (**): heat the crankcase half as indicated above	E	{ Rod, O.D. 44.5 ÷ 44.8	<p>(**) It is important that the bearing is mounted so that the exposed face of the cage is facing towards the inside of the engine.</p>
3	Circlip; inner oil seal on main roller bearing; cluster gear bearing	{ E F	Rod, O.D. 33 Machined as in figure	



Fitting the crankcase halves

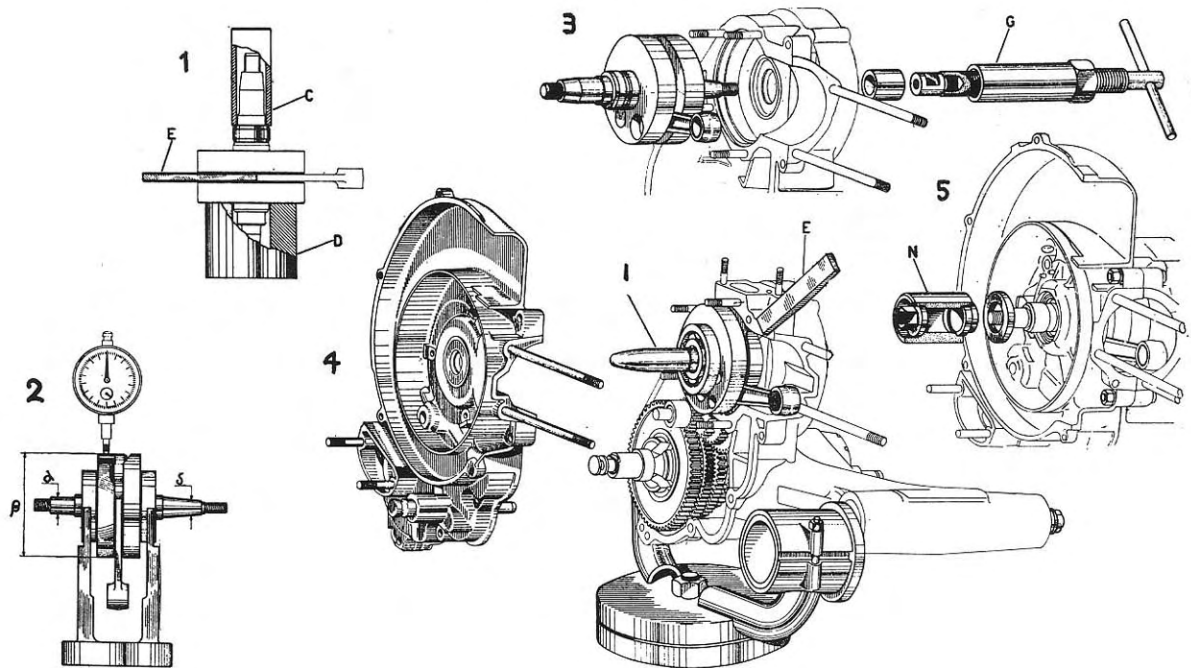


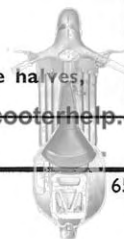
Fig. 71
(See instructions on the following pages)



REASSEMBLY

Opn. No. (see Fig. 71)	DESCRIPTION	Fig. tool	Tool Drg. No.	NOTES
1	Internal track of roller bearing; cam on crankshaft (flywheel side)	{ C D E	{ For bearing: tube, I.D. 26 mm For cam: tube I.D. 20 mm Base with 35 mm dia. through bore T.0025127	
2	Inspection of crankshaft on V. blocks The crankshaft is checked without the main bearings mounted.		(°)	(*) Use the tool with the components 7-8-9.
3-4	Reassembly of crankshaft and fitting crankcase halves	{ G I	T.0018119 (*) T.0027346	(**) Before assy. fill the roller bearing chamber with 5 to 7 cc. of Esso Multi Purpose Grease 2 (or Shell Alvania 3; Mobilgrease Special) after having previously cleaned out the old grease with petrol.
5	Outer oil seal for main bearing flywheel side (**)	N	T.0027338	

NOTE: For correctly reassembling the main bearings, checking the crankshaft and fitting crankcase halves, see next page (66) for the necessary instructions.



REASSEMBLY

1. Checking the crankshaft

Assemble the crankshaft on suitable Vee blocks as in Fig. 71, the eccentricity of the surfaces of the diameters " α " and " δ " should enter between the following maximum limits **as read** on the dial indicator gauge:
VSBI 0.05 m/m.

2. Fitting the crankcase halves

The crankshaft should be equipped with the protective sleeves so as not to damage the oil seals. Both the crankshaft and the components of the gear change mechanism should be assembled in the crankcase half, clutch side; the kickstart quadrant to the crankcase half, flywheel side, carefully checking the anchorage of the return spring.

The ratchet gear ring of the kickstart unit should be fitted to the crankcase half flywheel side, as if it were mounted on the cluster Gear shank before mating the crankcase halves, it would create interference.

For mating the crankcase halves proceed as follows:

- Carefully clean the mating surfaces; spread seal paste (on both surfaces) of the gasket and fit it on the crankcase half flywheel side.

- Check that the rubber buffers which determine the kickstart quadrant end of run are not damaged (if necessary replace) and ensure that they do not project beyond the mating planes of the crankcase halves.

- Mount the pilot sleeve (for protecting the oil seal flywheel side) and the prescribed edge; for easing the insertion of the crankshaft unit into the crankcase half clutch side.

- For obtaining a perfect fit when mating the crankcase halves, tap on the flywheel side using a mallet; **under no circumstances should the crankshaft extremity be struck for easing the operation.**

If necessary operate the kickstarter so that the kickstarter gear is positioned for assembly.

- After having removed the wedge from the crankshaft, tighten down the central bolts alternately and progressively with their relative nuts and washers, check that the crankshaft rotates without rubbing against the crankcase.

N.B. As the main bearings are mounted on the crankcase independent to crankshaft: on assy. of the crankshaft it is not necessary to heat the crankcase.



Engine timing

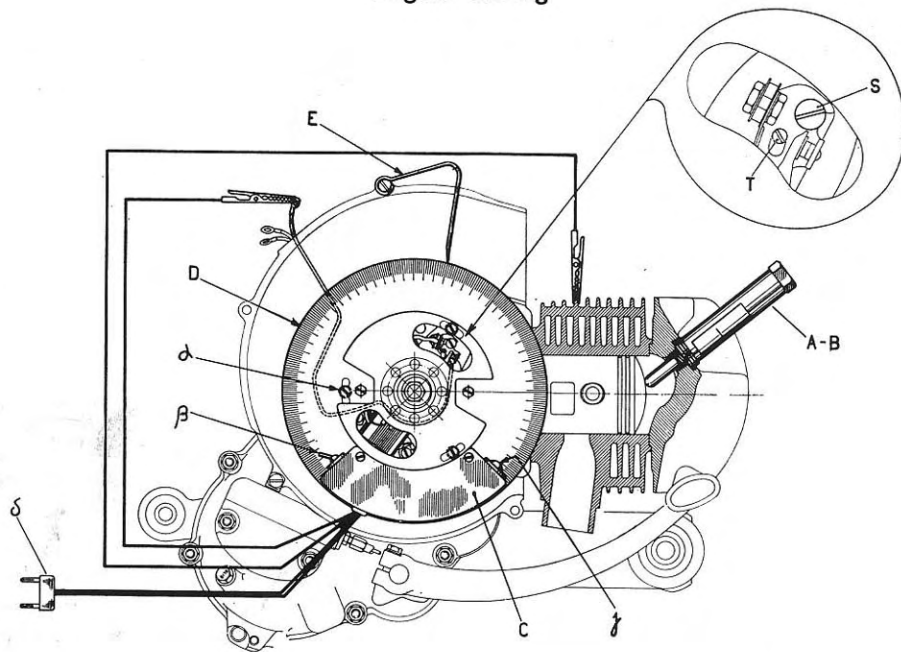


Fig. 72
(See instructions on the following pages)



REASSEMBLY

ENGINE AND FLYWHEEL MAGNETO TIMING

For engine and flywheel timing proceed as follows:

- (a) Bring the piston to a position corresponding to the spark advance angle.
- (b) Bring the contact breaker group in contact with the cam so that the contact breaker points start to open after having obtained the conditions indicated at "a".
- (c) Check that the max. opening of the contact breaker points is 0.5 mm (0"·019).

For carrying out the timing procedure as indicated in the previous paragraphs, **operate as for the sequence** illustrated in detail at pages 68 and 69.

DESCRIPTION OF TIMING OPERATIONS

- (1) Slacken the screws "a" (Fig. 72) securing the stator to crankcase.

- (2) Mount the indexing fixt. "A" (tool T.0023853) using stem T.0026362 in place of the sparking plug and fix the graduated disc "D" (drg. n. T.0023465) directly to the crankshaft with the bracket T.0023465/2, after removing the rotor of the flywheel magneto and after having applied the apparatus "C" (tool T.0027533, which functions with a.c. at 220 V). The indexing fixture "A" should be assembled in conjunction to the cursor "B" (drg. T.0023853).
- (3) Secure the fixed steel wire index "E" (see figure) to one of the crankcase bolts.
- (4) Rotate the disc clockwise by hand, so that the piston nears the T.D.C.: at this points align the mark on the cursor of the indexing fixture "A" with that on the sleeve and mark the position indicated by the fixed pointer.
- (5) Continue rotating the disc clockwise so that the piston proceeds on its upwards stroke, passes the T.D.C. and returns to the original position; i.e., when the mark on the indexing device are once more aligned. Note the new reading on the disc relative to the mark previously signed: the T.D.C. corresponds to the half way mark between the two readings previously mentioned.



REASSEMBLY

- (6) **From the graduation corresponding to the T.D.C. mark of the spark advance, i.e., 26° BTDC $\pm 1^{\circ}$; now rotate the disc a anticlockwise so as to bring the piston in the position corresponding to said spark advance angle.**
- (7) Loosen the screw "S" securing the contact breaker and turn the eccentric "T" to shift the contact breaker so that it touches the cam: the moment when the contact breaker points start to open can be noted when the indicator on the apparatus T.0027533 lights up (the switch " β " should be in the on position) Tighten screw "S".
- (8) With a feeler gauge check the maximum opening of the contact breaker points: which should be 0.019" 0.5 mm. Tighten the screws securing stator. If after having carried out the operations indicated on the previous point **it is not possible to obtain that the opening of the contact breaker points is 0.019" \div 0.5 mm, it is usually advisable to replace the contact breaker and repeat the timing operations.**
- N.B.** For checking timing the apparatus T.0023278 can be used; it is similar to the T.0027533 illustrated in Fig. 72 but functions with a d.c. supply at 4 V.

Steering column and front suspension

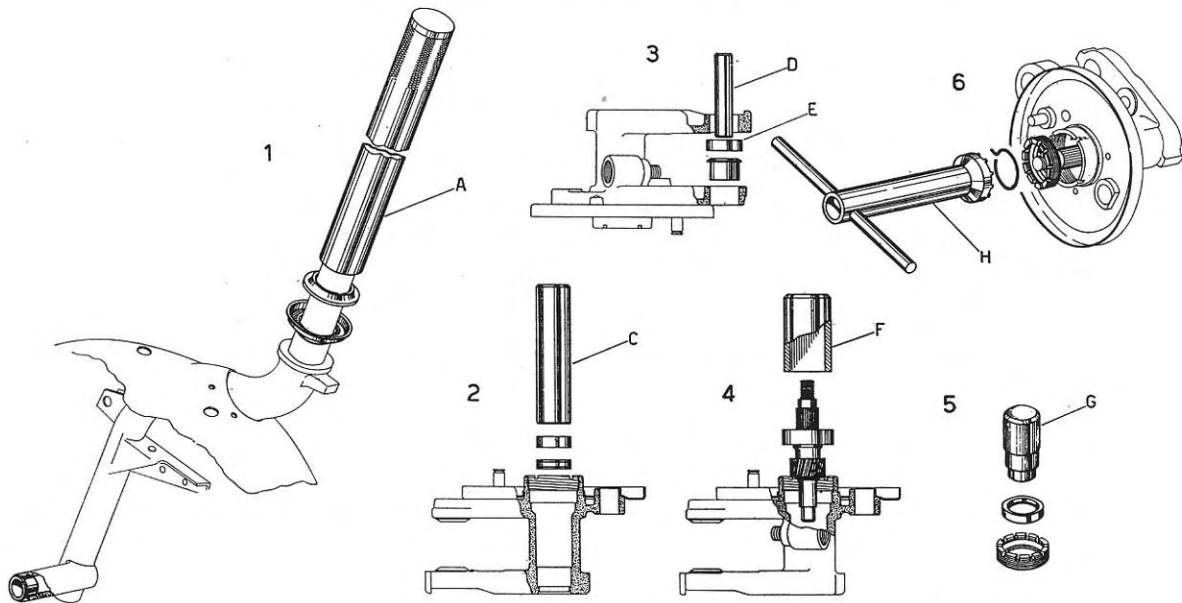


Fig. 73
(See instructions on the following page)



REASSEMBLY

Opn. No. (see Fig. 73)	DESCRIPTION	Fig. tool	Tool Drg. No.	NOTES
1	Bearing track (and dust cover) of lower steering column bearing	A	T.0016029	
2	Inner axle bearing on wheel hub; dust cap	C	Punch \varnothing 30	
3	Roller bearing bush	D	{ Punch \varnothing 12 Spacer \varnothing 30 Thickness 10 mm	
		E		
4	Wheel axle	F	Tube O.D. 45	
5	Oil seal in ring nut	G	T.0022473	
6	Ring nut and circlip on wheel hub	H	T.0022407	



Steering column ball bearing

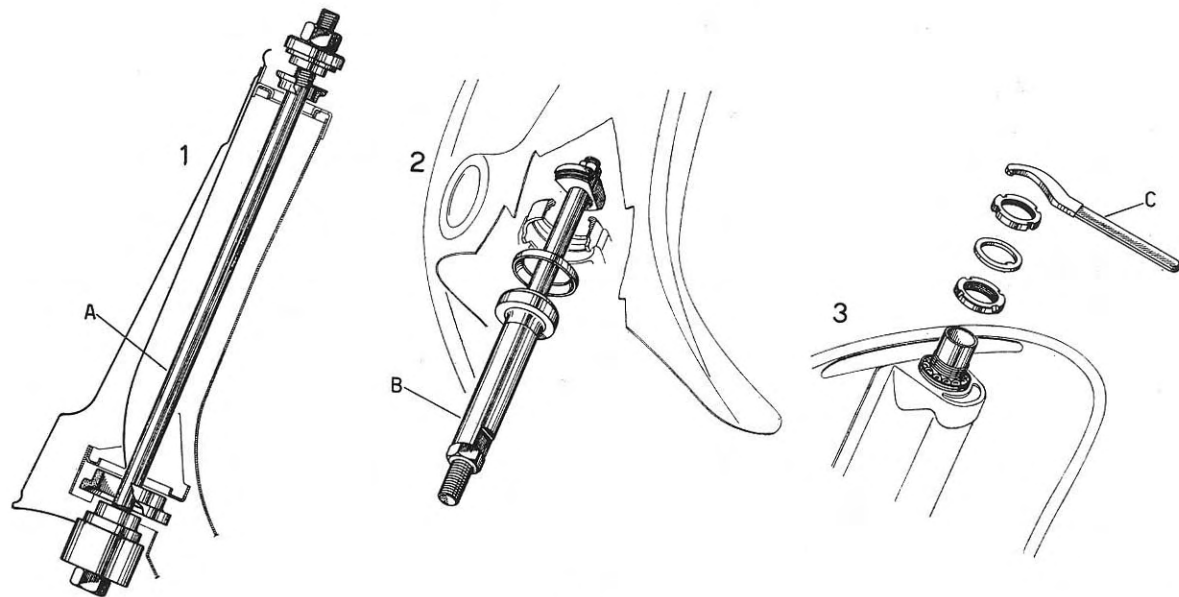


Fig. 74
(See instructions on the following page)



REASSEMBLY

Opn. No. (see Fig. 74)	DESCRIPTION	Fig. tool	Tool Drg. No.	NOTES
1	Steering column bearing races	A	T.0021330	
2	Upper race of lower steering column bearing	B	T.0021096	
3	Ring nut of upper steering column bearing	C	0014566	



REASSEMBLY

Opn. No. (see Fig. 74)	DESCRIPTION	Fig. tool	Tool Drg. No.	NOTES
1	Steering column bearing races	A	T.0021330	
2	Upper race of lower steering column bearing	B	T.0021096	
3	Ring nut of upper steering column bearing	C	0014566	



10. Adjust clutch and gear change controls.
11. Check steering.
12. Check functionality of steering lock.
N.B. Under no conditions should said device be oiled.
13. Cleaning down vehicle: for external engine surfaces use paraffin; for the paintwork use water and chamois leather. When cleaning the headlight reflector use a very soft feather duster (avoid finger contact).

NOTICE:

Dealers are advised to carry out the above indicated operations also on new vehicles after unpacking and prior to consignment.

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GS. VSB.I. 160cc/1500/6.63/L.B.3020

