

CAUTIONARY NOTE : This translation was produced by non-technical people on an Apple Mac computer and whilst the script quality is generally good, inevitably there will be a few inaccuracies to contend with. In addition, the illustrations and tables of data were scanned in direct from the original manual – often with mixed results. As a consequence, some important details in the diagrams and tables are not entirely clear and in case of doubt, users would be well advised to obtain an original, Italian copy of this 'Astore' manual in order to confirm any vital pieces of information which may prove difficult to decipher. So far as I am aware, copies of this factory publication are widely available at Italian auto-jumbles and from Italian specialist suppliers.

This actual translation was made from an official 1950 factory workshop manual for the Moto Guzzi ASTORE motorcycle and undertaken by my good friends, Helen and Laurie North. The work was started in May 2009 and completed on 5th August 2009. Helen and Laurie's services, over many years, to the Moto Guzzi single-cylinder fraternity have been simply invaluable.

Dave Thomas (Bristol, England) August 2009

THE BOOK COVER & FIRST PAGE

Moto Guzzi Astore Motorcycle 500 cc

Manual for:

Dismantling, Checking and Re-assembling

Page 5

Preface

The purpose of this manual is to provide, in succinct but practical form, rational instructions for the general checking and repair of the Moto Guzzi "Astore" motorcycle.

For this reason the manual has photographs, drawings and technical data so as to enable the processes of dismantling, checking and reassembling to be carried out securely and efficiently.

The manual must also be a guide for those who want to know the construction details of the model under examination. The knowledge of such particulars, for those with ability in maintenance and repair, is an essential part in the correct execution of the work.

MANDELLO LARIO, Maggio 1950

S.p.a MOTO GUZZI

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N.B. *The descriptions, RIGHT and LEFT are as when sitting on the bike.*

TRANSLATOR'S NOTE : In order to simplify the need for possible cross-referencing, all page numbers quoted in this translation are taken direct from the original Italian manual.
(05/08/2009)

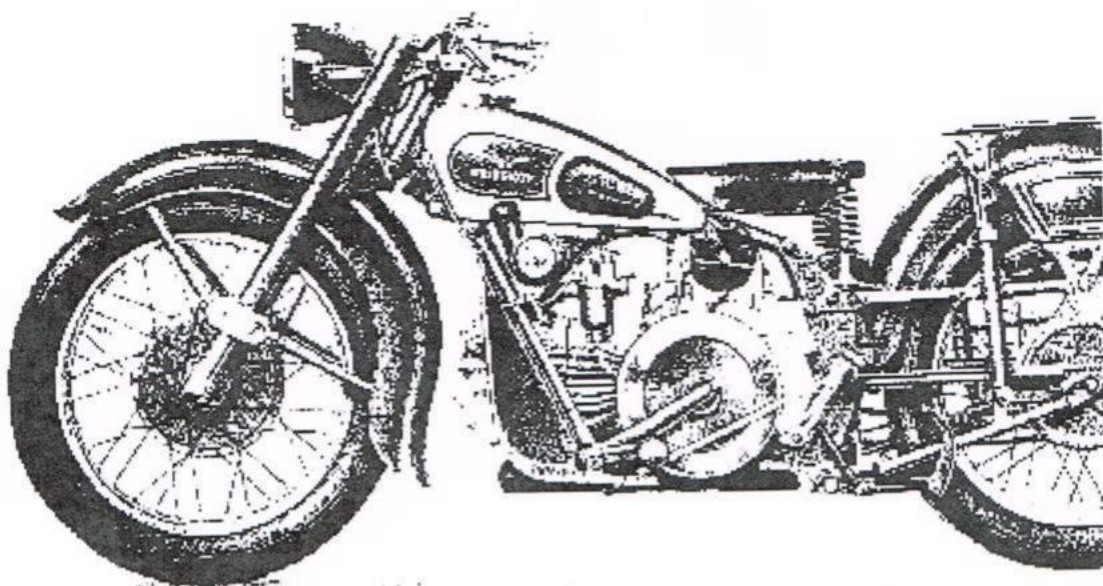


Fig 1 - The Astore Motorbike (flywheel / primary side)

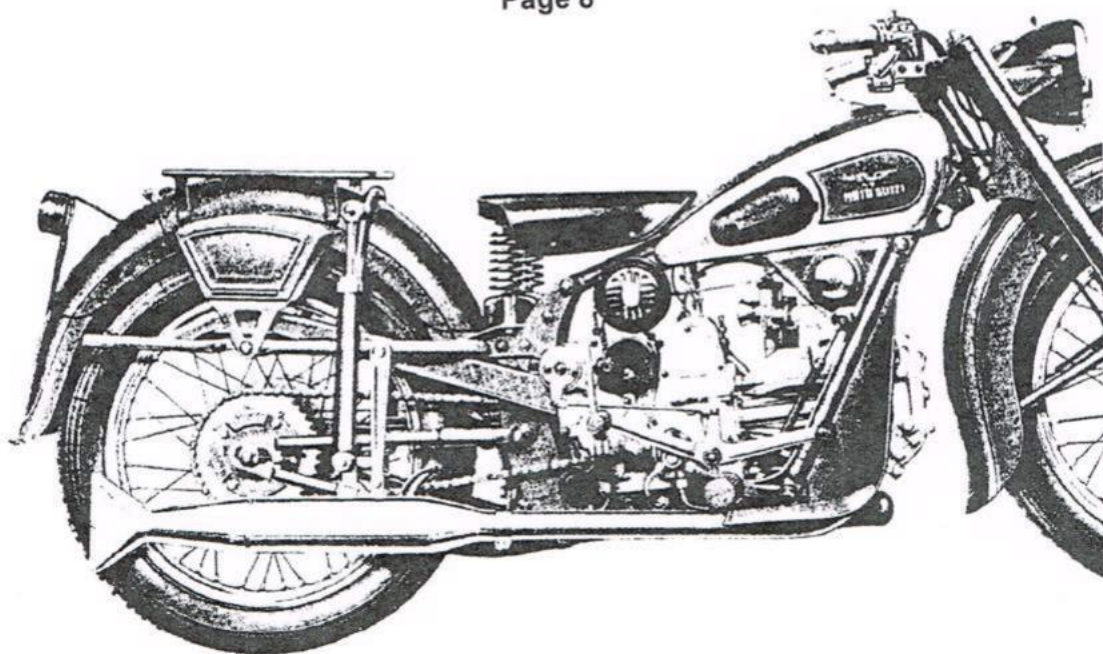


Fig 2 –
T

The Astore Motorbike
(Timing side)

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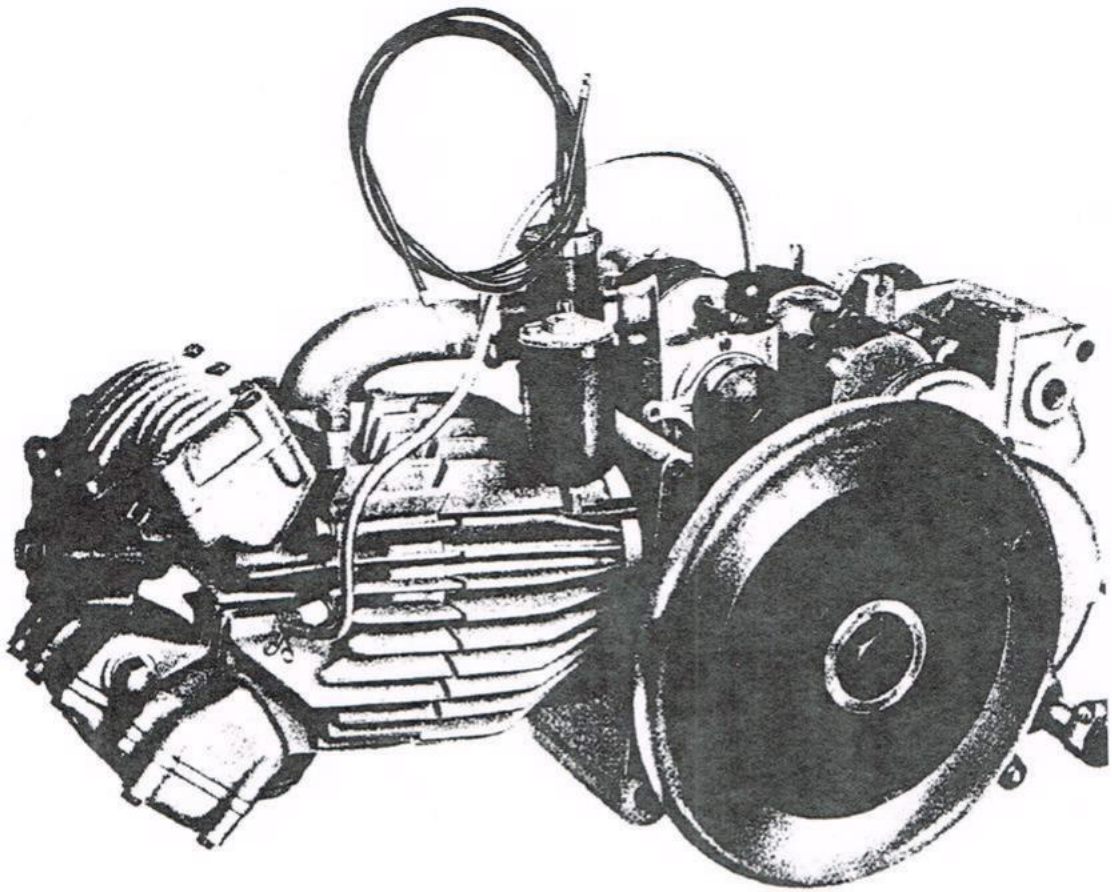


Fig 3 - Engine (flywheel side)

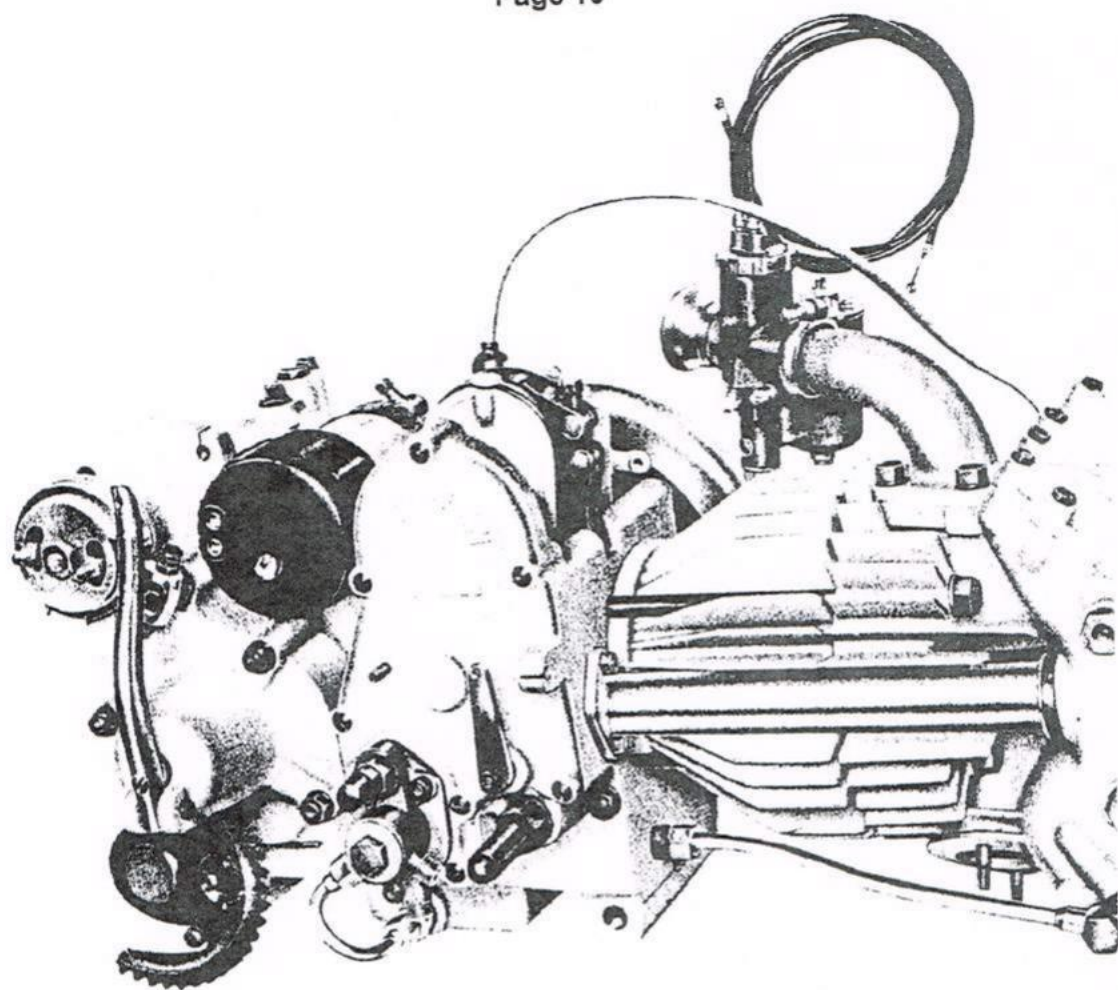


Fig 4 - Engine (Timing side)

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GENERAL CHARACTERISTICS OF THE ENGINE

4-stroke engine with valves enclosed in the head

Cylinder head: in light alloy, with the valve gear completely enclosed and bathed in oil

Number of cylinders: 1 in light alloy, with special cast iron connecting rod

Bore and stroke 88 x 82 mm

Capacity 500 cc

Power output at 4300 rpm 18.9 BHP
Compression ratio : 5.5 to 1

TIMING

VALVES - With tappet clearance set at 0.20 mm = 8 thou (inlet and exhaust)
NB. This clearance of 0.20 mm is to be used only to set the valve timing. For adjusting the valves see the chapter "Settings between the rocker and pushrod"

IGNITION

By magneto, rotation anti-clockwise, driven by gearing, Marelli type M.L.A. 53 with manual advance/retard.

Lever operated – slack wire for full advance, (i.e. pulling the lever retards the ignition).

Firing point at full advance, measured on the flywheel periphery is 110 mm BTDC (equivalent to 45°).

(SPECIAL NOTE : TODAY'S UNLEADED FUELS (2009) BURN HOTTER AND MORE RAPIDLY THAN IN 1950 AND MOST EXPERT OPINION SUGGESTS THAT FULL ADVANCE SHOULD NOW BE REDUCED BY AT LEAST 10% i.e. DOWN TO 100 mm / 40 degrees IN THIS CASE)

FUEL

By Gravity - Tank capacity 13.5 litres

Carburettor with fuel regulation by screw and air by lever. Dell'Orto type MD 27 (1 and 1/16ths of an inch)

Regulator screw for tick-over

Normal carburettor settings:

Main jet: Summer **118/100** - Winter **122/100** Idle jet **50/100** Throttle Slide. **70**

Needle No. **5**

LUBRICATION

Forced by geared sending pump, with recovery blades

Maximum flow approximately 60 litres per hour

Oil tank capacity 3 litres

Minimum amount of oil needed for efficient engine lubrication 2.5 litres

COOLING

By air - head and cylinder are provided with fins disposed radially with respect to the axis of the engine

CLUTCH

Dry - Multiple metal discs. Total number of discs 12, comprising 5 in steel, 5 in bronze, 2 in ferodo

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GEARING

By 4 running gears

Ratios 1st 17.27 x 18.26 1 : 2.30

2nd 20.24 x 18.26 1 : 1.73

3rd 23.21 x 18.26 1 : 1.32

4th direct 1 : 1

TRANSMISSION

Gears with helicoidal teeth between engine and gearbox

Chain with rollers 5/8" x 1/4" between final drive sprocket (gearbox) and rear wheel sprocket

Transmission ratio: Between engine and gearbox 1.77 : 1 44-78.
 Between final drive sprocket and rear wheel sprocket 2.44 ; 1
 (16 & 39 teeth)
 Total transmission ratio (engine wheel)
 Top gear 4.32 : 1
 3rd 5.73 : 1
 2nd 7.47 : 1
 1st 9.93 : 1

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GENERAL CHARACTERISTICS OF THE FRAME

Wheelbase 1.475 m.
 Overall Length 2.280 m.
 Width 0.800 m.
 Height 0.970 m.
 Minimum ground clearance (loaded) 0.160 m.

SUSPENSION

Front: Telescopic forks with hydraulic damping
Rear: Swinging forks with spiral springs mounted horizontally under the engine and hydraulic dampers

WHEELS

Front with spokes circumference 19" x 21/2" Rear with spokes
 circumference 19" x 21/2"

TYRE INFLATION PRESSURES

Front wheel Kg/cm² 1.25 (roughly 19 p.s.i.) * increase to
 approximately 25 p.s.i.
 Rear wheel Kg/cm² 1.75 (roughly 24 p.s.i.) *increase to
 approximately 30 p.s.i.

(*) NOTE: THESE COMPARATIVELY LOW PRESSURES ARE NO LONGER VALID FOR TODAY'S TYRES
 i.e. INCREASE BY 20 - 25%)

BRAKES

Expansion type. In light alloy. Front brake is actuated by a lever on the right handlebar; the rear brake is actuated by a heel-operated pedal on the left of the motorcycle.

ELECTRICS

Lighting: consisting of Marelli dynamo type DN 19G 30/6.2000 D with in-built 6V 30 W regulator. Clockwise rotation and driven by light alloy gear.
 Ratio engine to dynamo 1 : 1.32
 Warning light Marelli T 38 with switch on the handlebar type M A 800
 Battery Marelli 3 M E 7/5*
 Rear light reflecting type T 16166

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SPEED

Maximum possible with two people up in various gears on a well maintained road.

In 1st maximum incline of 22.5% at 31 kph

In 2nd maximum incline 15.5% at 41 kph

In 3rd maximum incline 9.4% at 54 kph

In 4th maximum incline 4.1% at 71 kph

Maximum distance on roads in good condition
in hilly area: circa. 270 Km

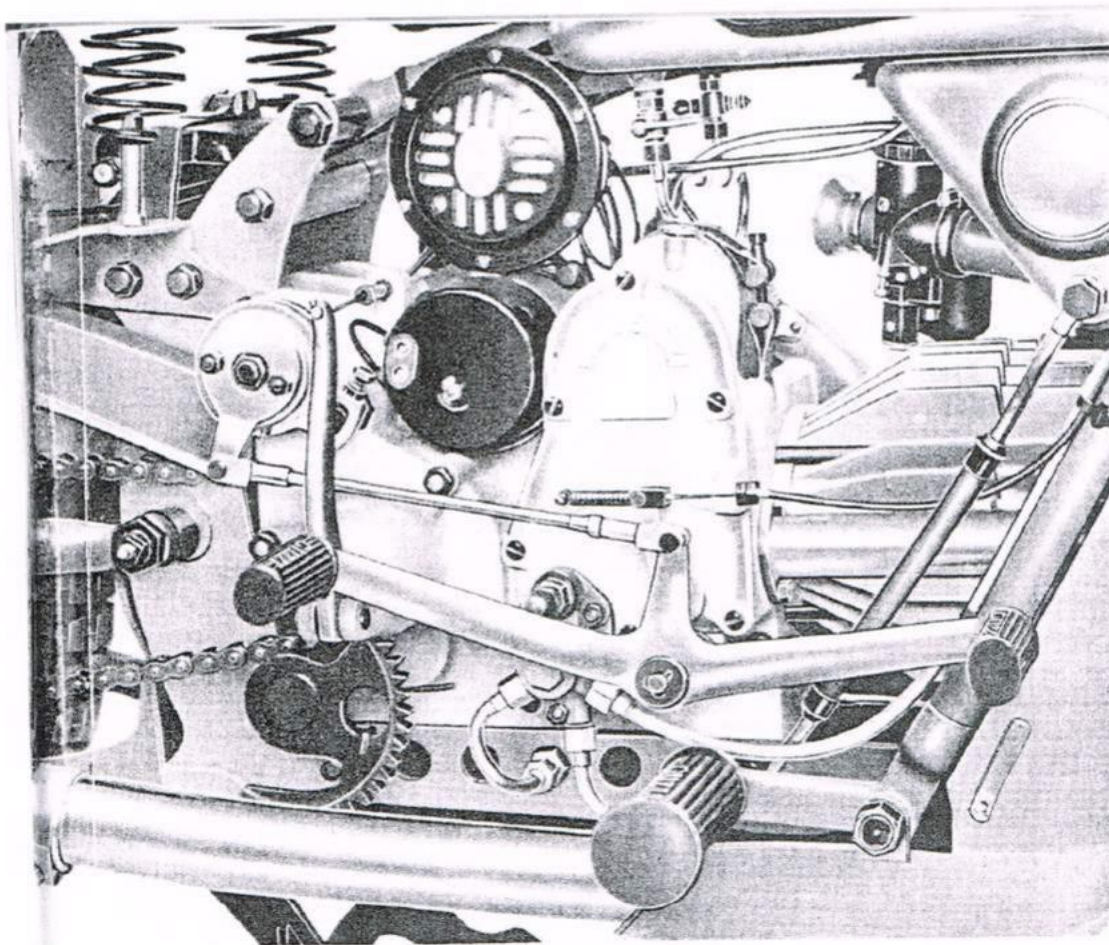
Maximum speed in each gear at 4300 revs

In 1st 53.2 kph

In 2nd 70.7 kph

In 3rd 93 kph

In 4th circa 120 kph (= 75 miles per hour)



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Engine mounted in the frame

Page 16

ENGINE

Warning: In the various adverse conditions in which you sometimes use the bike (rain, mud, dust) it is advisable always to remove parts to enable a good general cleaning to be achieved.

Removing engine from the frame

Remove the legshields undoing the fixing nuts on the footrest and the fixing bolts where they are attached to the frame

Remove the left footrest pedal and the rear brake pedal

Remove the petrol pipe from the carburettor and the filter case having closed the taps

Remove the inlet pipe from the engine complete with the carburettor after having completely removed the notched ring from the body of the carburetor in order to extract the throttle valve

Remove the breather tube that connects the upper part of the oil tank with the gearbox

Remove the right footrest Before removing the flywheel read the advice on p. 28

— You remove the flywheel by unscrewing the castellated locking ring with the special Guzzi tool for about 3/4 of a turn only (N.B. this ring is threaded *left hand* so to remove it you need to turn it clockwise). The internal crankshaft nut is then unscrewed (*right hand* thread) - some force may be required if there is resistance to the unscrewing. (A 'Dave Thomas' Note : A POWERFUL AIR-DRIVEN SOCKET IS SOMETIMES

NECESSARY TO OVERCOME A REALLY
STUBBORN NUT AND LOCK RING THAT MAY HAVE BEEN UNDISTURBED FOR
DECADES AND BECOME CORRODED)

Remove the exhaust pipe from the head and from the frame support.

Remove the wire connecting to the advance/retard of the magneto. You must first disconnect it from the lever on the handlebars, then remove the small magneto pin so completely undoing the tensioner.

Remove the gear lever pedal and the chain cover

Remove the oil delivery pipe from the from the bottom of the pump repositioning the tube so as to avoid oil spillage. (see Fig. 7)

— The inlet pipe from the pump to the tank (the front connection of the pump)

— The return pipe from the tank to the pump with wire [?] (rear connection of the pump)

Remove the valve lifter cable by [?] the return spring, removing the pin unscrewing the tensioner

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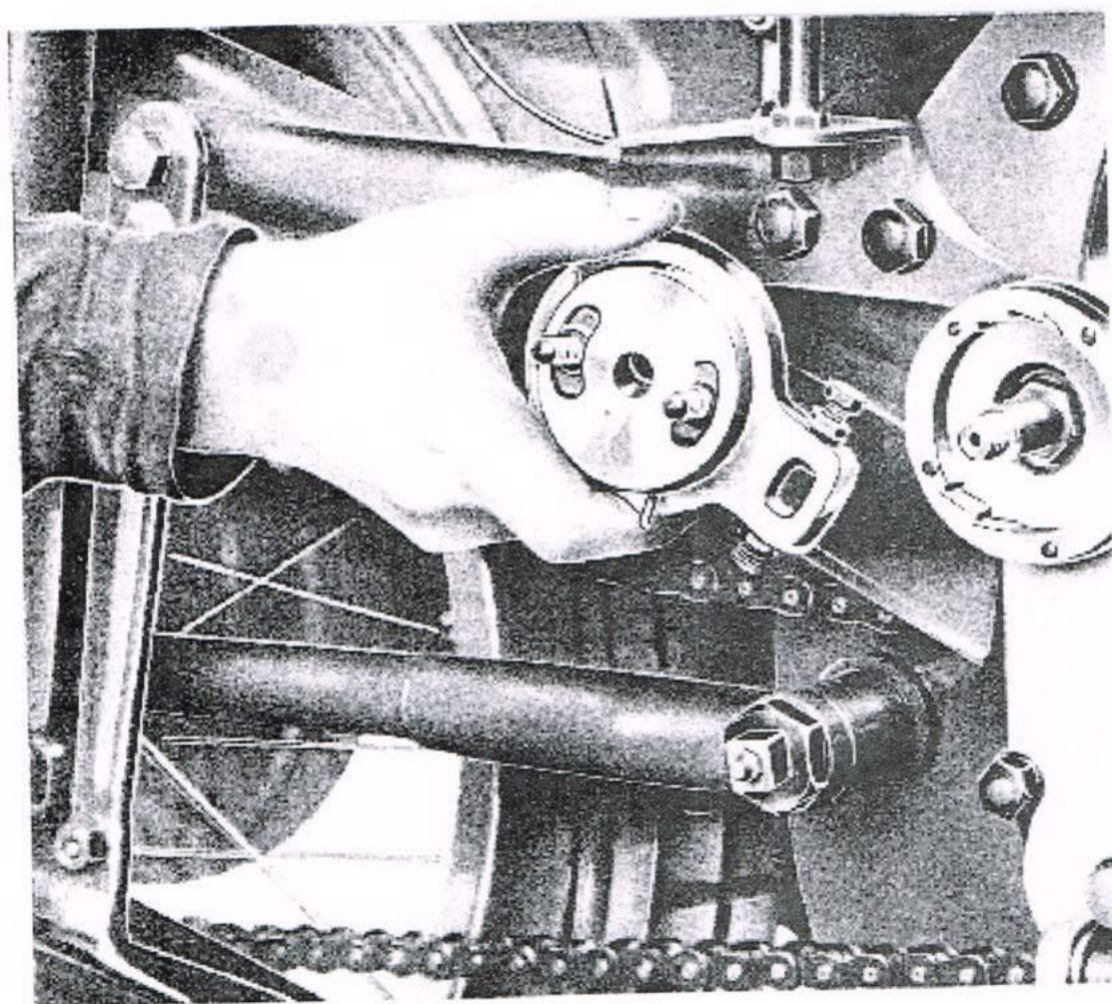


Fig 6 How to dismantle the gear selector lever

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Remove the electric warning lamp, the wires and the wires from the dynamo. To be certain to avoid electrical "shorts", it is wise to remove the earth wire under the

saddle before carrying out these operations.

Remove the clutch cable by compressing the lever so as to free up the wire from the hole with the slot from the lever itself. Slacken then completely the regulatory tensioner extracting it from the gearbox support.

Remove the gear selector completely

Remove the rear chain by extracting the connecting link. Then slide out the chain so exposing the final drive (gearbox) sprocket.

Remove the kick-starter assembly by extracting the cotter pin from the pedal on the left side, then sliding out the kick start shaft with its toothed, spring-loaded quadrant from the right hand side.

Detach the clip that holds the plug lead to the frame and the petrol filter.

Remove the cylinder head by detaching the inlet and return oil pipes, remove the plug lead and slacken off the nuts holding the pushrod cover. Using a special spanner undo the four head bolts and with a soft hammer slacken and remove the head.

Remove the studs that fix the engine to the base plates. There are three of them, which can be removed in any order (left to right or vice versa) (see fig. 7). The engine can then be removed, sliding it out on the right side of the bike. Having pushed the engine forward about 5 cm, lift the back end as demonstrated in fig. 8

Dismantling the engine

Having once removed the engine from the frame proceed with the dismantling (see fig. 9) as follows:

Remove the pushrods and their cover.

Remove the piston, removing the clip that fixes the pin on the flywheel side and remove from the same side.

NB Whenever you have to refit the piston it is necessary to replace it in the same position in which you found it when dismantling.

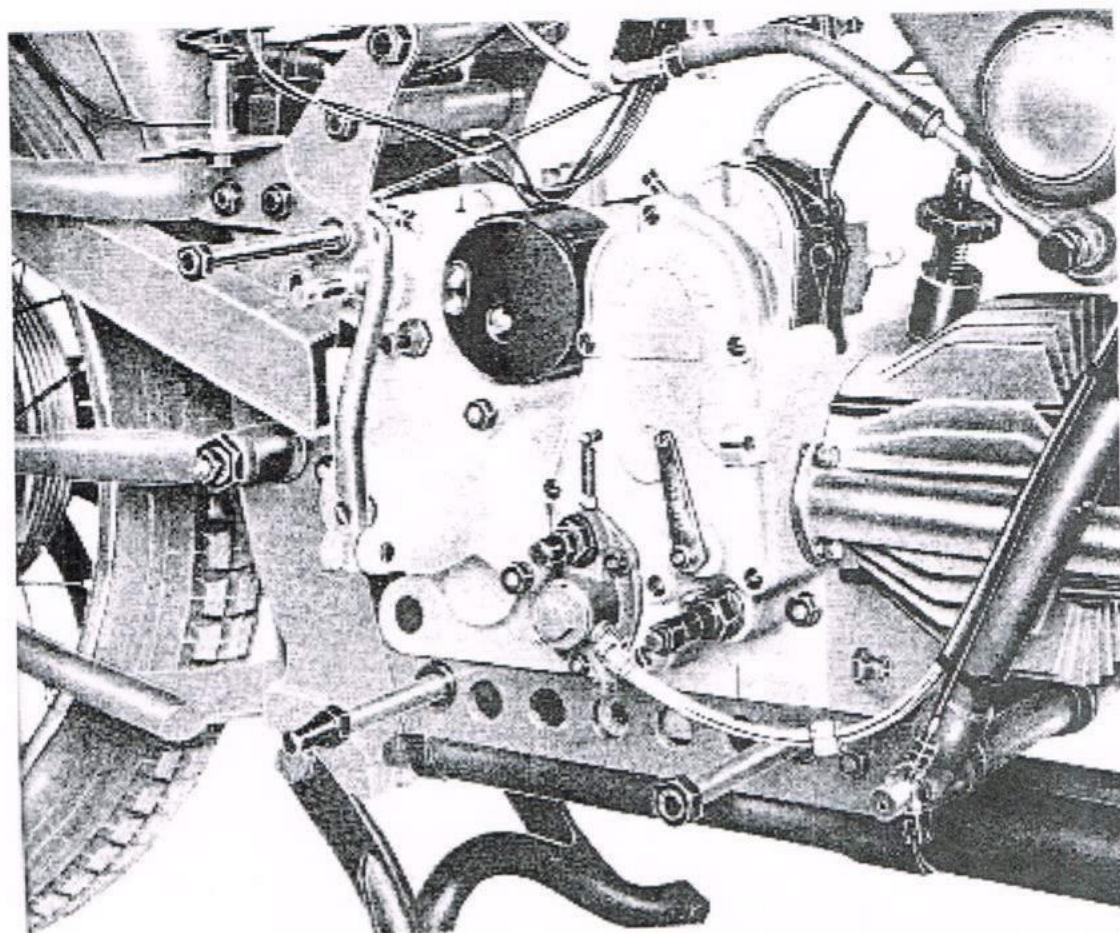


Fig. 7 - Motore pronto da togliere dal telaio, si notano i perni per fissare motore parzi

Fig. 7 - Engine ready for removal from the frame. Note the three fixing bolts, partially withdrawn

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In order to avoid mistakes it is sufficient to remove the left circlip (flywheel side) leaving the right circlip on the piston in place, sliding the gudgeon pin towards the left as already mentioned above. In this way it will be impossible to replace the piston the wrong way round.

Lift off the cover on the timing side by removing the eight fixing screws. The oil pump will remain on the cover together with the valve lifter assembly.

— The magneto: slacken off by the nut that holds the control gear to the shaft (2 or 3 turns) and the securing bolt of the two retaining straps. Striking the nut, with a lead mallet will separate the gear from the keyed taper of the shaft. Slide the magneto out to the left. The oil retaining felt washer remains on the gear.

You can now remove by sliding towards the right (timing side) the inlet and exhaust cam with the control gear and the control lever shaft with the lever support pin. The inlet and exhaust cam pin should be withdrawn after which one can open the two halves of the gear box.

Unclip the chain sprocket cover mounted with the clutch control lever.

Remove the primary drive cover by unscrewing the 6 fixing screws.

Warning: The 6 screws must be simultaneously loosened because the crankshaft pinion, no longer located by the flywheel, and being "sprung", is pressed against the

cover. This procedure is essential, since otherwise the primary drive cover could be deformed during removal or replacement.

Remove the dynamo in the same way as the magneto is removed.

Unscrew the milled shouldered nut (which is threaded *left hand*) carrying the two concentric clutch springs.

Remove the two springs and internal control rod, unscrewing completely (see fig. 10). So that it may rotate to push the threaded sleeve against the serrated sleeve for starting.

Remove the threaded sleeve that, having removed the control rod, will be now free.

Remove the key that holds the helicoidal drive gear on the primary side crankshaft. After removing the key slide the drive gear out together with the pressure spring and the spring locating washer. Remove the clutch (flywheel side) by removing the pressure plate, the steel and bronze discs, and the helicoidal gear. All these parts are removed by sliding towards the rear.

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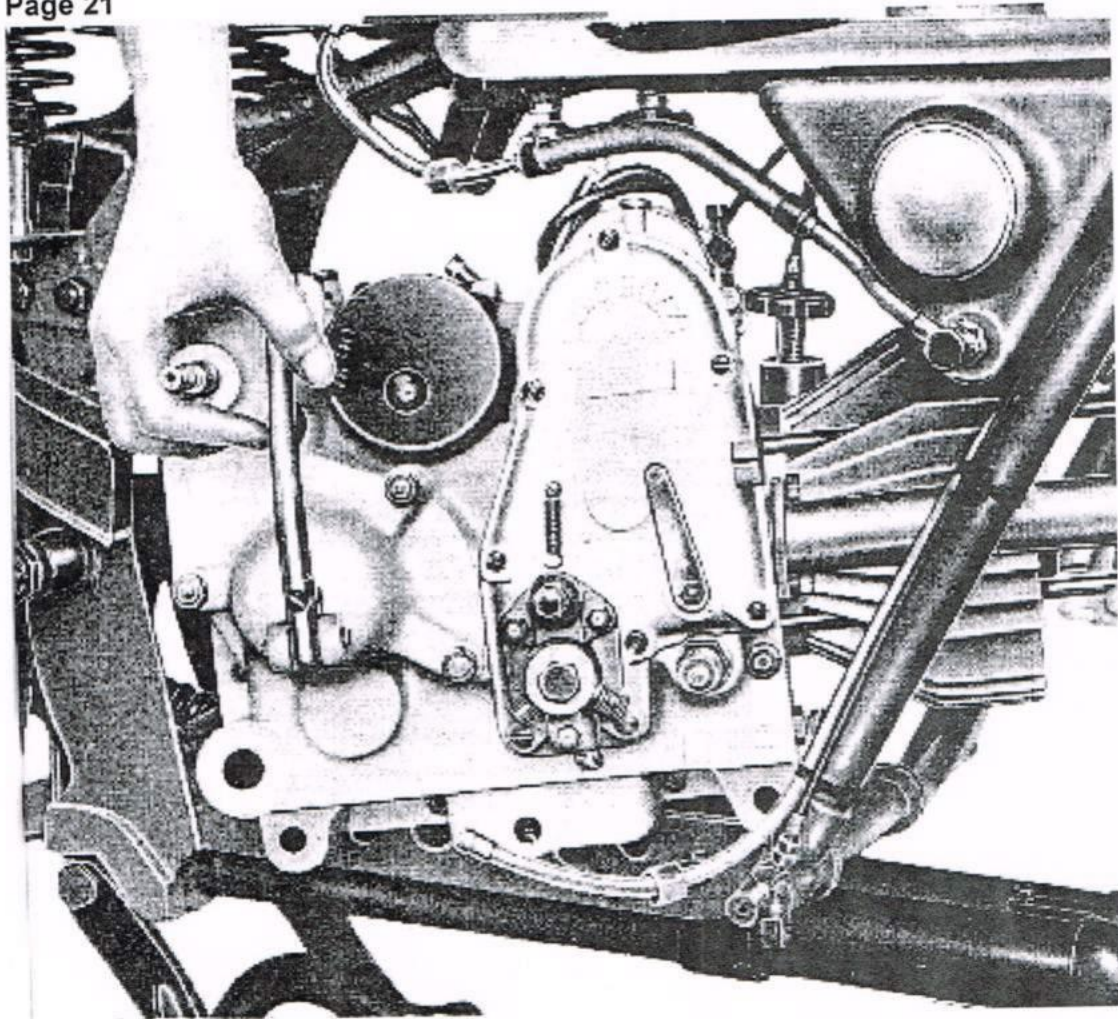


Fig. 8 - Removing the engine from the frame

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You will notice, having completed this manoeuvre, that the clutch carrier is fixed to the gearbox main-shaft on a keyed taper and held with a nut. **N. B. These parts**

must not be dismantled / removed unless the two halves of the crankcase are separated.

Remove the toothed sleeve of the kick-starter ratchet gear assembly by unscrewing it completely (whilst holding the gearbox mainshaft nut with a box spanner (see fig. 11) In this way the floating gear of the pair of kick-starter ratcheted gears plus the pressure spring and the cupped retaining washer can be removed.

Remove the stop screw in the final drive (gearbox) sprocket — and unscrew the castellated ring nut to enable the sprocket to slide off the captive direct drive gear (otherwise known as the "constant mesh pinion").

Remove from the crankshaft on the timing side - the nut, the half time pinion, the associated key and shouldered distance piece.

After doing this, proceed to split the crankcase by undoing the three captive nuts, removing the three small bolts and two from the front of the crankcase.

Holding up the crankcase (see figs. 12 & 13) hit with a wooden mallet alternating between the end of the gear selector shaft and main gear shaft (timing side) and the two halves will separate. In the right half of the crankcase (timing side) there will be still attached the crankshaft complete and the constant mesh pinion (see fig. 15). In the left half crankcase (flywheel side) - still attached - will be with the one-piece layshaft and gears; the gearbox mainshaft with the change (sliding) gears; the selector drum with its forks plus the selector shaft and its toothed quadrant (see fig. 14)

Remove the crankshaft complete with conrod holding the right half of the crankcase and hitting from the outside towards the inside with a wooden mallet.

Remove the constant mesh pinion in the same way.

Remove the selector drum with its forks, the sliding gears on the gearbox mainshaft. Remove the layshaft extracting it from the ball race at its end. You free two spacer washers and the shaft with toothed block controlling the drum. All these parts are withdrawn towards the inside.

Hold the gearbox mainshaft in a vice with lead jaws (this part is still in the flywheel side crankcase) in order to remove the locking nut which secures the clutch carrier on its keyed taper. Slide over the gearbox mainshaft a metal tube about 280 mm. long with an internal diameter about 27 mm. such that the end of the tube rests on the washer that abuts onto the internal ring of the support ballrace.

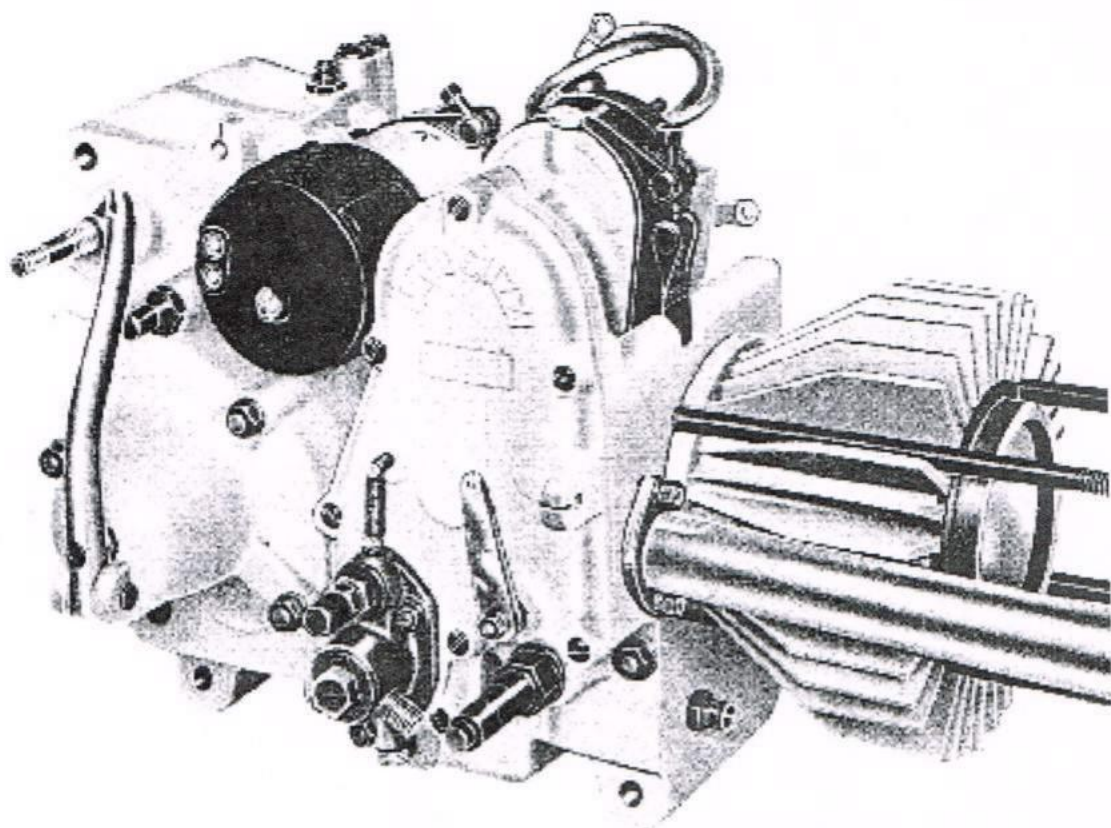


Fig. 10 - The engine removed from the frame

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Place the other end of the tube on the solid base and hit it with an aluminium drift and hammer, from external to internal. The gearbox main shaft will slide out and free the bearing washer. (see fig. 16).

Turn the gearbox over and using an aluminium drift knock out (from the inside towards the outside) the fixed body of the clutch: in this way one achieves its separation from the supporting and the extraction of the ballrace out of the left hand side (flywheel side)

Inspection and overhaul of the engine

Remove the engine, ensure that all the parts are clean, washing with petrol or diesel and drying with clean rag or better with air jet.

RIGHT HALF OF THE CRANKCASE *(timing side)* Fig 17.

Inspection.

After having cleaned it carefully (see above):

Check for cracks everywhere. If present weld or replace the part. Rely on welding only for the smallest cracks. After welding always check that the crankcase has not become distorted. Check with particular care the surfaces of the crankcase and covers.

Check that the fixed studs for tightening the cylinder head and for fixing the crankcase are well fixed; if not so screw them down. If the threads are damaged in the crankcase hole, fill with a suitable welding metal, drill out and rethread.

Check the condition of the mating surfaces of the cover and the left half of the

crankcase. To remove all traces of sealing compound visible, use a blunt scraper or better, wash with alcohol and dry with a clean rag. Note that if the surfaces are not perfect there will be oil loss.

Looking at the right half of the crankcase you will see:

— The large ballrace for the crankshaft — The ballrace for the direct drive (constant velocity pinion) — The right ballrace for the layshaft of the gears. Check that they are well fixed in place.

For the control measures see pag. 28.

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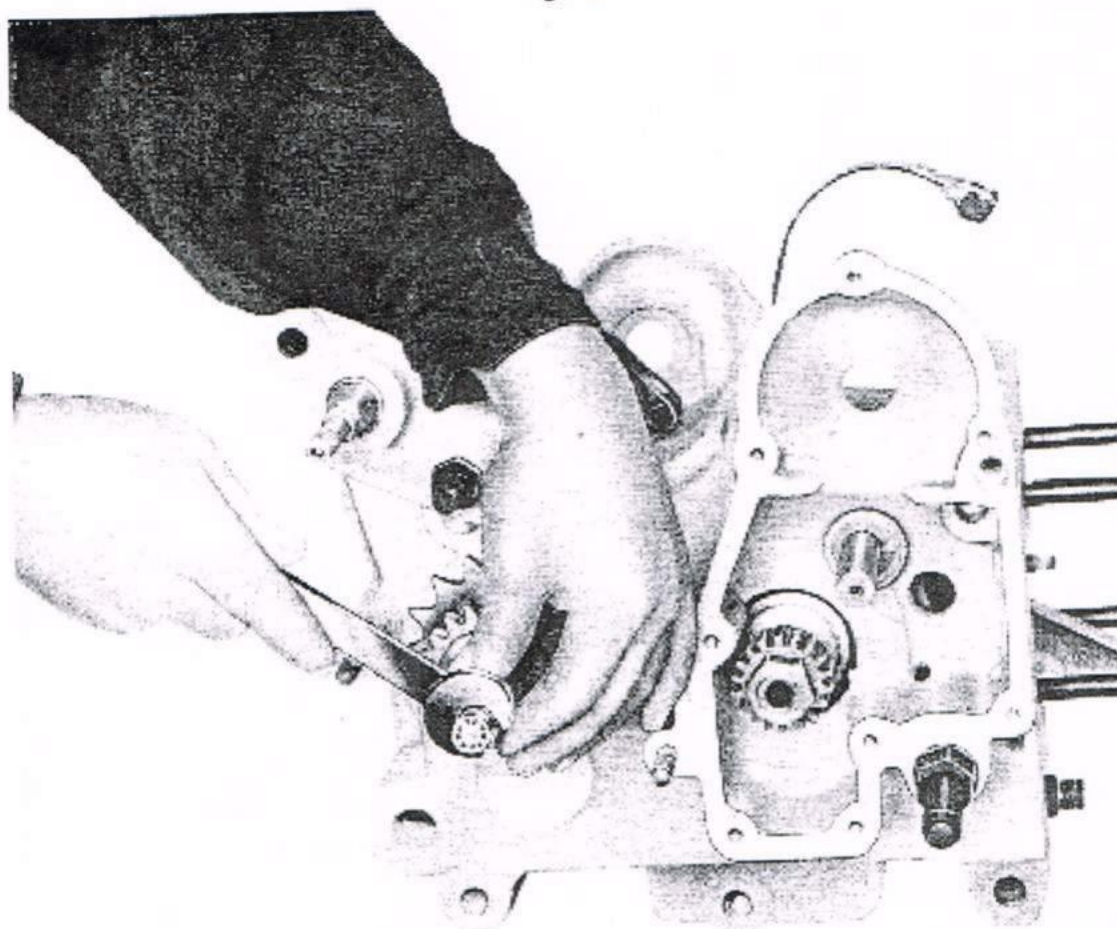


Fig. 10 - Removal of the clutch control shaft

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— Check that the inside surface of the gear change support: it must be smooth.
Check its dimensions, new it is 14H8 (tolerance 0 to +0.027) mm. Maximum wear + 0.04 mm

— Check the bearing for the shaft of the toothed selector of the drum
Check the internal surface: it must be smooth
Check the measurements. The internal diameter of the bearing when new is 19H8 (tolerance 0 to +0.038) mm. Maximum wear + 0.038 mm.

RIGHT HALF OF CRANKCASE COVER (timing side)

Check the mating surface (see page 24)

— The valve lifter pivot bush has a more or less unlimited lifespan having little work to do. To check it, remove the control lever on the outside, and slide the pivot with the nib towards the inside. Reverse the process to install.

— The oil pump complete. To remove this it is necessary to remove the three captive fixing nuts on the timing cover, and slide it towards the outside. For checking, overhaul etc. See page 72. To fit back onto the cover reverse the procedures for removing.

LEFT HALF OF CRANKCASE (*flywheel side*) Fig. 18

Check the mating surfaces, fixed parts etc. (see page. 24)

Check the internal parts, note:

— The bush bearing the shaft of the toothed block. It is worth referring to the analogous part on the right half of the crankcase. The internal diameter of a new part is 15 H 8 (tolerance 0 to + 0.027) mm, maximum wear + 0.04 mm.

— the bush bearing the gear lever drum. Measurements and tolerances are identical to those of the right half.

— The ballrace for the fixed clutch part. Below the ballrace there is a oil retention washer..

— The left ballrace for the secondary shaft of the gears.

— The external ring of the roller bearing for the engine shaft. To check it see page 28.

Above the bush supporting the drum there is a hole that connects the inside of the gearbox with the enclosed space between the flywheel side cover and the left half of the gearbox. In the upper part of this hole there is a 3/8th of an inch steel ball that functions as a valve permitting flow only in the direction above described. To check and clean it is sufficient to remove the screw plug situated above on the outside of the left gearbox cover, to the right of this plug

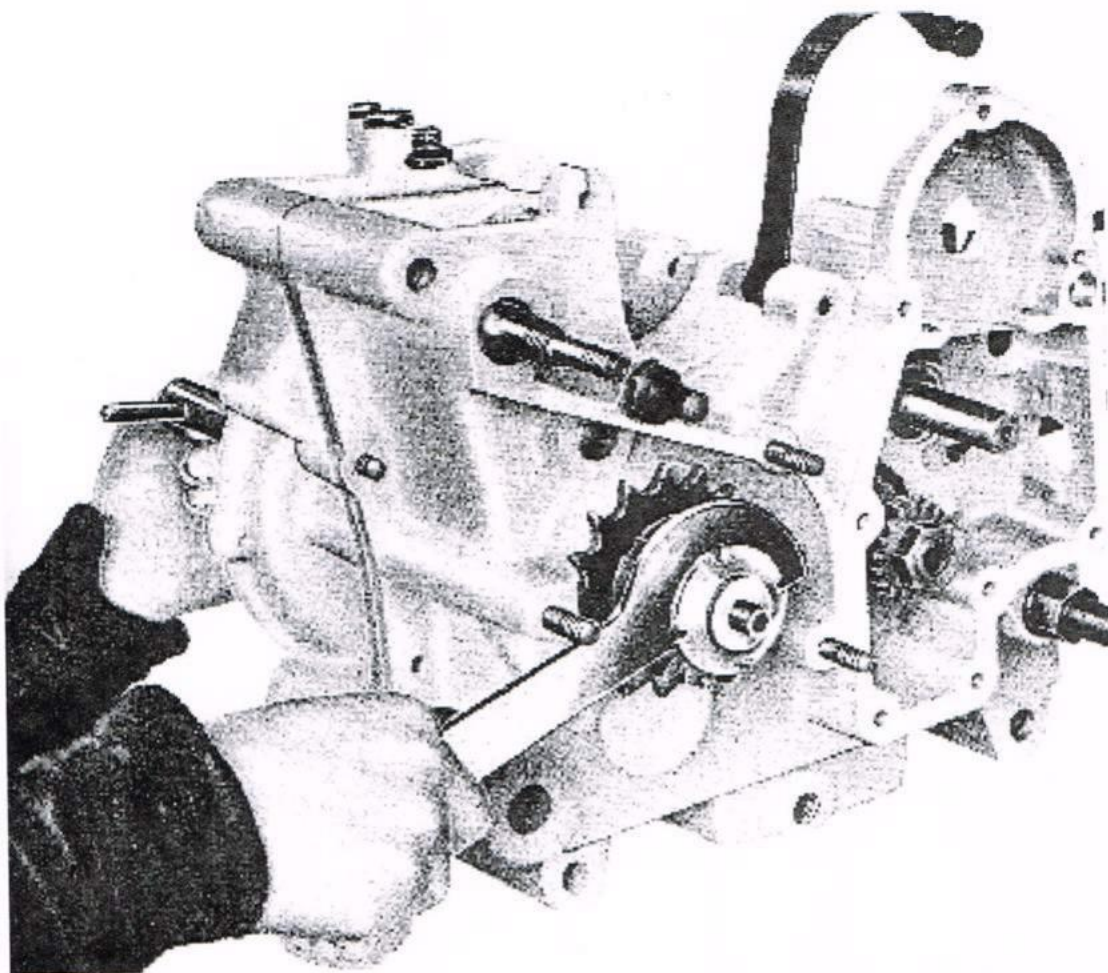


Fig. 11 - How to remove the starter toothed coupling

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There is the hole for connecting the breather pipe with the oil tank. To the left a small plug.

Warning: Carefully clean these three holes

Often there is oil loss from the gland due to blockage of these channels.

COVER FOR THE LEFT HALF OF THE GEARBOX (flywheel side)

Ball Bearings

General information: All the ball and roller bearings used by GUZZI are large in order to last a long time (more than a thousand hours)

Inspection.

Take careful note:

— The external surfaces of the internal race, and the inside of the external race (rolling surfaces) - they must appear perfectly smooth and smooth. Check for cracks, or superficial roughness, if faulty replace.

— The balls or rollers must be seen to be unbroken and completely smooth. On finding faults, change the bearing. Remember replacing parts of a bearing should not be attempted, it being extremely difficult to obtain good results from such. On fitting ballraces be careful always to only press on the race. Remember that new ball bearings have a little radial play (in the order of thousandths of a millimetre) in the fitting and housing: such play reduces wear, and must not be prevented otherwise the balls or rollers will jam, and the bearing will be ruined in no time. The support and pressure bearings may have axial play up to hundredths of a millimetre.

Drive shaft bearings. There are two, a roller bearing on the left (flywheel side) and a ballrace on the right (timing side).

The roller bearing is only for support and the ballrace is for support and pressure. It is wise to check the state of wear of these two bearings before removing the flywheel. Gripping the flywheel in your hands attempt to move it axially (pushing and pulling) and radially

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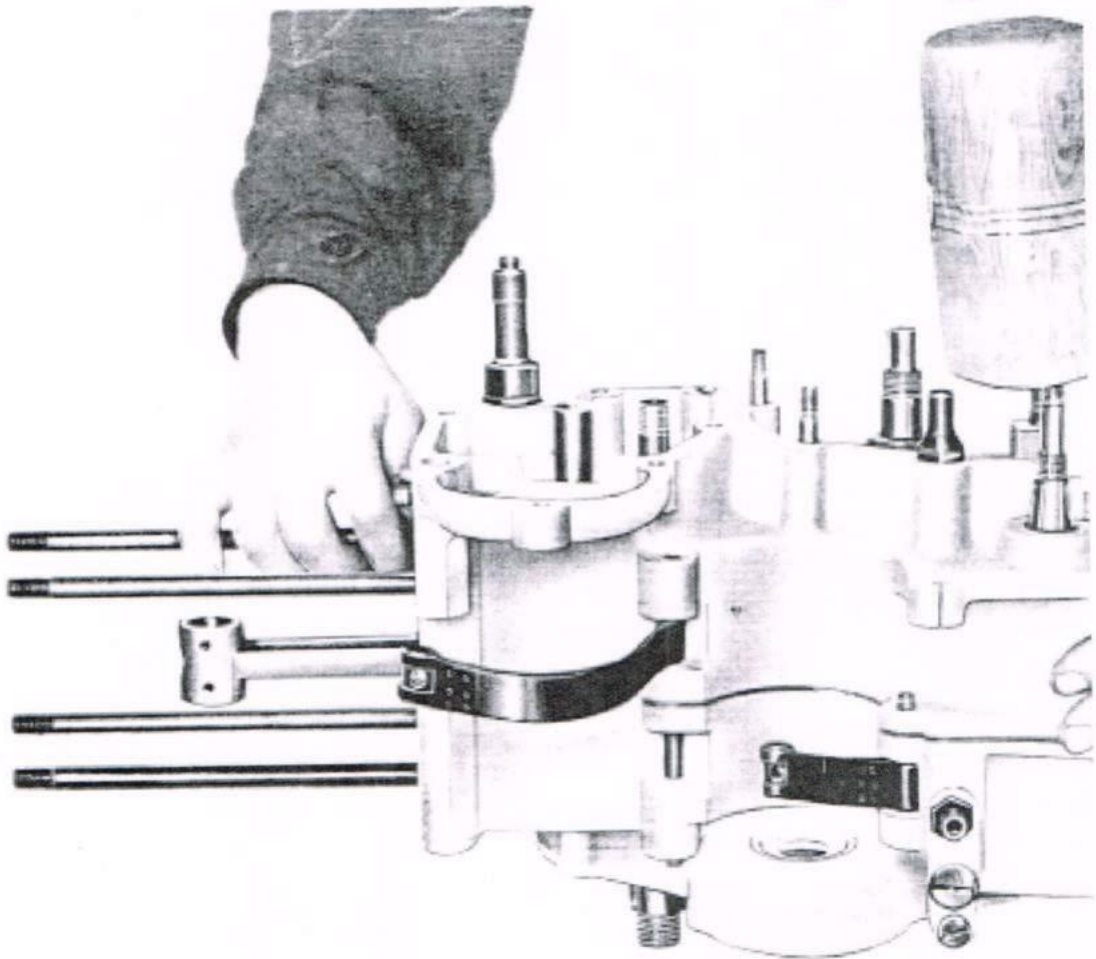


Fig. 12 - How to split the gearbox

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A slight radial play (0.03 - 0.05 mm) is allowable, and even more axial play but less than ca. 0.10 mm..

If there is excessive radial play the roller bearing must be changed.

With excessive axial play replace the ball race.

With both radial and axial play replace both bearings.

First gear shaft bearings. There are two ball races

That on the left half of the gearbox (flywheel side) is the bearing for the fixed part of the clutch.

That on the right half (distributor side) is the bearing for the direct drive gear.

Both are pressed from the inside of the box.

Oil Seals

There are six oil seals.

- One in the left half of the gearbox casing (flywheel side) mounted under the engine shaft roller bearing.
- A rubber one in the left half of the gearbox casing above, to allow the shaft of the dynamo through
- One in the left half of the gearbox casing mounted under the fixed clutch body bearing;
- One in the left right of the gearbox casing (distributor side) mounted under the direct drive gear ball race
- One fitted to the magneto drive gear;
- A rubber one on the pushrod cover tube.

If losing oil via these seals check that the oil breather is not obstructed, check that the oil return pump is working correctly (see pag. 73) and for wear on the cylinder, piston and rings (see p. 36)

In fact if the breather is blocked, if the pump is damaged, or if the piston allows noticeable amounts of gas into the gearbox, notwithstanding the condition of the seals there will be a loss of oil.

Noting all that and oil loss persists, proceed with the replacement of the seals.

The second, fifth and sixth are easy to get at and replaceable. To change the first, third and fourth it is necessary to remove the associated ball races.

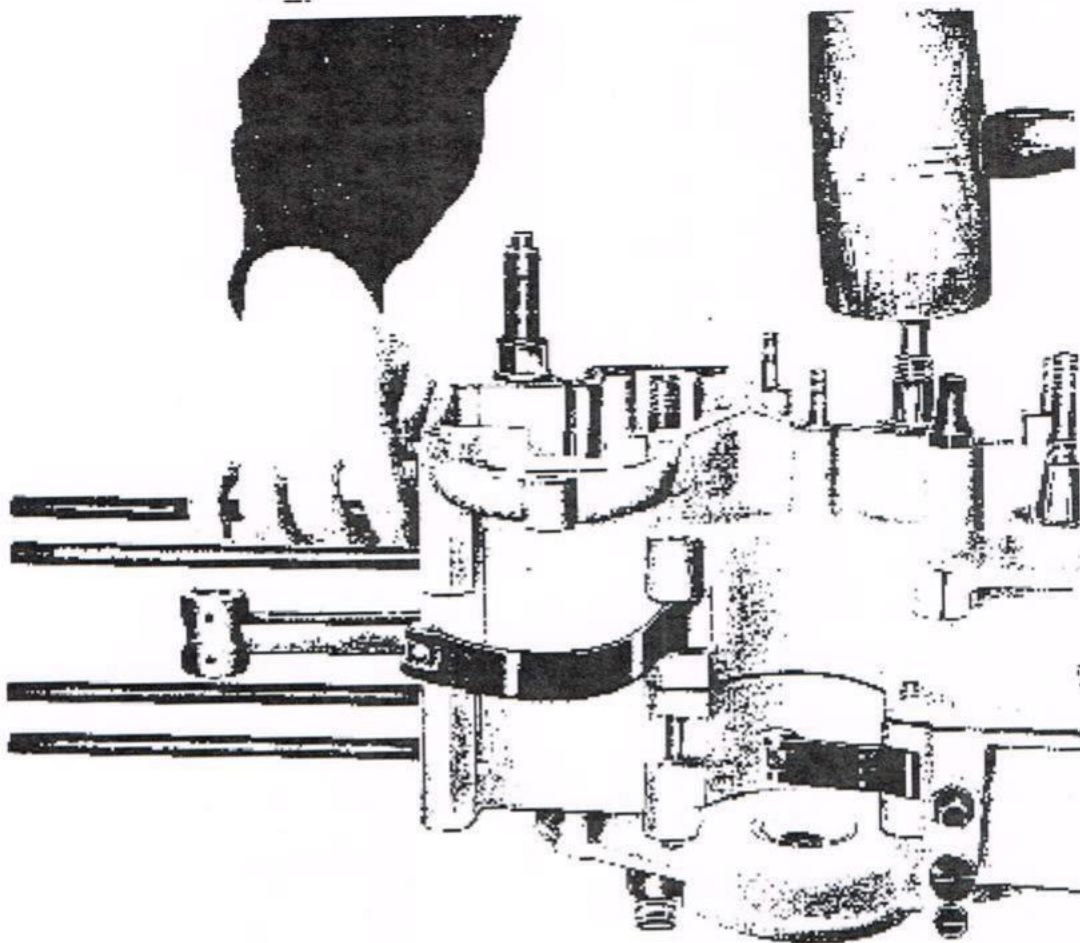


Fig. 13 - Opening the gearbox

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HEAD & VALVES

REMOVAL

Having removed the head (see p. 18), to completely dismantle it you need to remove one of the two rocker box covers by the removal of eleven bolts, and the valve cap; then unscrew the nut on the gudgeon pin of the rocker, slide out the pin and remove the rocker. With the special extractor (see fig. 19) compress the spring to separate it from the top disc with the two half collars, remove the springs with the lower plate and slide the valve out. The same process is used for the other half of the head. Remove the spark plug and plug with gasket for tappet adjustment.

Inspection

Having removed the gaskets, check the condition of the mating surfaces of the covers and head.

Remove all traces of sealing compound using a blunt scraper or better, use alcohol and dry with a clean rag. Note that if the surfaces are not perfect you will lose oil. Carefully remove the carbon deposits (taking care to clean the less accessible areas) using scrapers and wire brushes. Wash with paraffin and dry with compressed air or rag.

Check the state of the head. If the captive bolts are sound and the threads are good (otherwise, replace). If the cooling fins are not broken or damaged - if there are a lot change the head. Check that there are no cracks or fissures in the valve seats and guides. Check the bedding of the valve seats (especially for the exhaust valve, see table No.1, and Tab. Check for wear in the valve guides. If the inlet valve guide must be replaced drive it from inside towards the outside. If the exhaust valve guide is badly deformed and cracked on the inside, it is an idea to remove it by breaking the outside seating with a chisel and drive the guide out with a drift from the outside towards the inside..

valve guide, having replaced them to check with a 10 mm. Broach for the inlet valve guide and an 11 mm. Broach for the exhaust valve guide.

The Valves. Check the stem and the head against the seat (see Table 1, Tab. 1). On discovering excessive wear or deformities, cracks, deep holes etc., substitute valves and guides.

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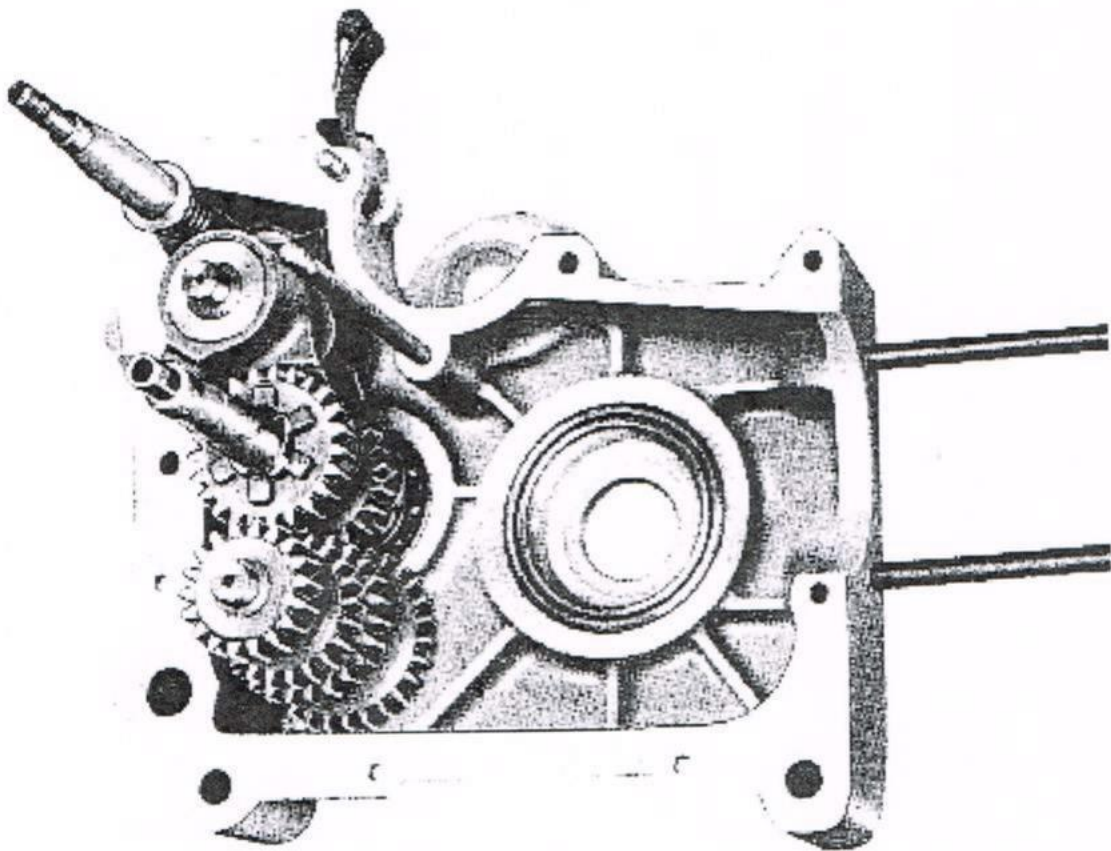


Fig. 14 - The appearance of the left half of the gearbox after separation

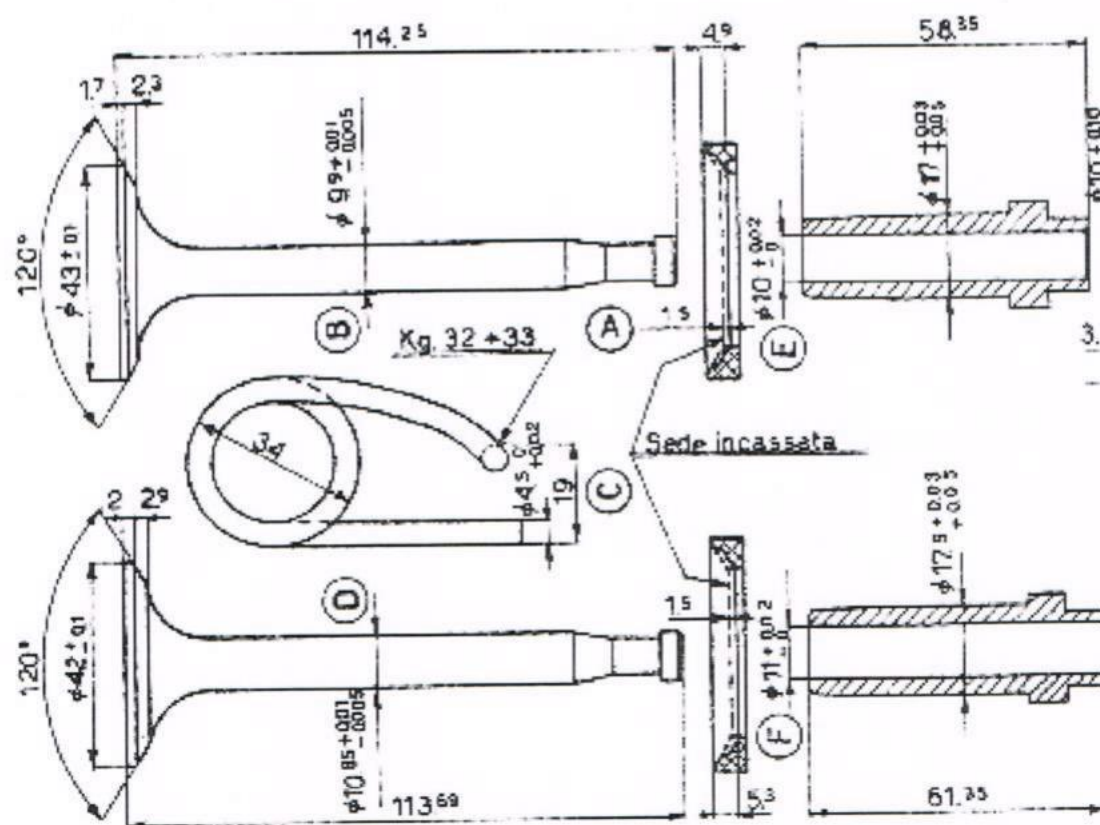
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Table No. 1

Name	Measure	Size New Mm	Tolerances +mm — mm	Max. Wear Mm
------	---------	-------------	---------------------	--------------

Inlet valve seat 120°	B	9.9	0.01 0.005	—0.05
Exhaust valve seat 120°	D	10.85	0.01 0.005	—0.05
Inlet valve guide	E	10	0.02 0.000	+ 0.10
Exhaust valve guide	F	11	0.02 0.000	+ 0.10
Valve cap (Inlet & exhaust)	G	2	— —	—0.80
Valve seat embedding	A	0	— —	1.5

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Tab. 1

NB. It is always advisable, when it is necessary to replace a valve, to replace the guide as well. And vice versa. Doing thus guarantees a perfect fit.

Note: It is always wise in fitting valves and guides, or using the originals following the process of reseating to return the valves to their original seats.

The inlet and exhaust valve springs - check them to measure the recession: to compress them to 19 mm. should require a pressure of 32-33 Kg. If less than 30 Kg is required, replace them. Check the spring where it abuts the valve cap. If there is much wear replace the spring and the valve caps.

REBUILDING

The reverse of removal.

Note.

This is the time to place the gasket between the head and cylinder. It is a good idea to lubricate the gasket before fitting.. Remember to tighten down the four nuts that fix the head to the cylinder. After testing the motor and while it is still hot, you must retighten the nuts to guarantee that the gasket is seated properly.

CYLINDER & PISTON

DISMANTLING. - See P. 18

Remove the piston with its three compression rings and oil retainer ring.

NB. - If it is the intention to return the original piston, note carefully the positions of all the rings before taking the piston out. On replacing the piston the rings must be exactly as they were before, to avoid a new embedding.

INSPECTION

Cylinder

Note the internal surface of the cylinder. It must be smooth and free from grooves and notches etc.

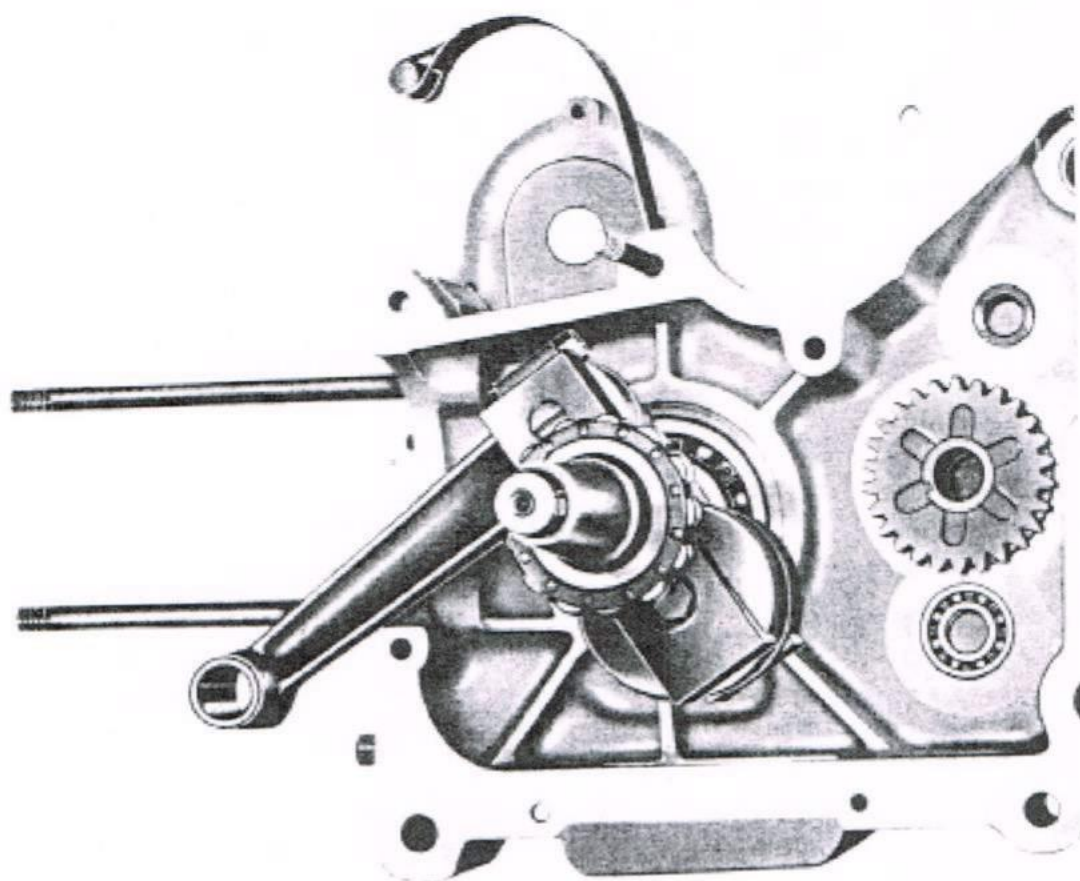


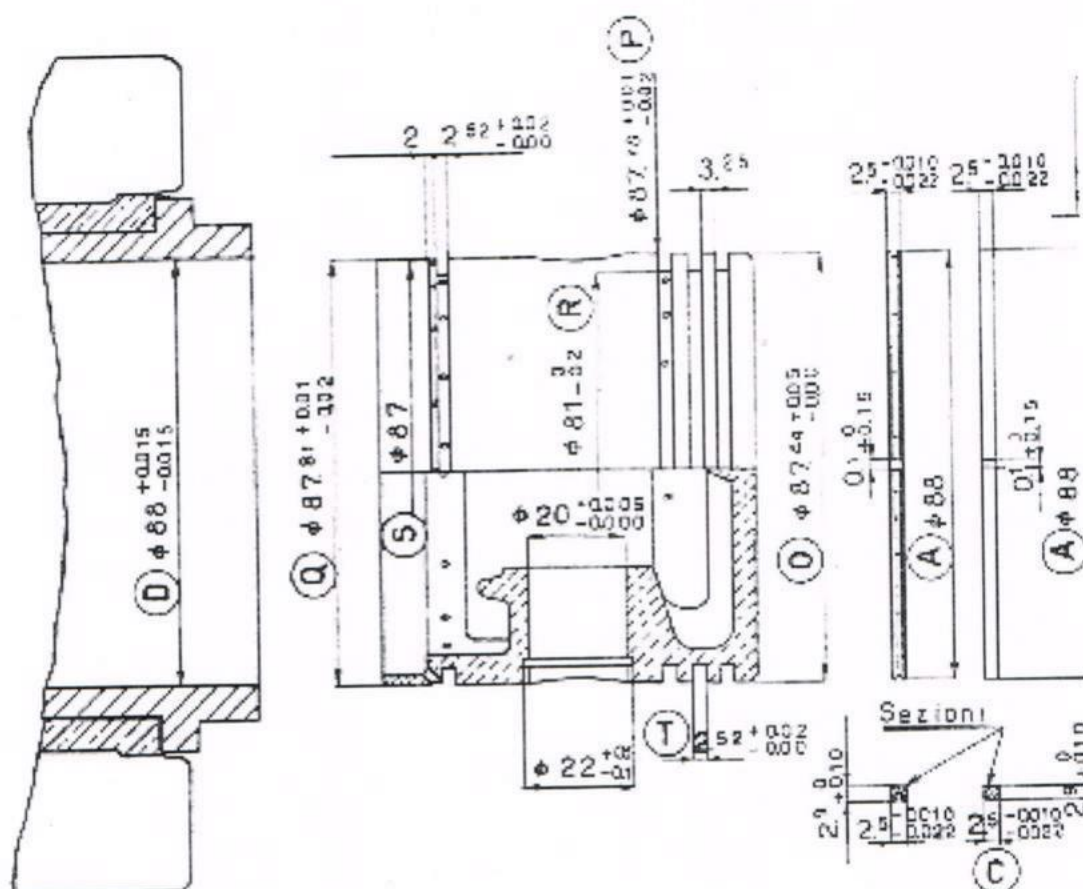
Fig. 15 - The appearance of the right half of the gearbox after separation

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Table No. 2

Name	Measure Ment	New mm.	Tolerance		Maximum Wear
			+ mm	—mm.	
Cylinder	D	88	0.015	0.015	+ 0.08
	O	87.44	0.05	0.00	—
	P	87.78	0.01	0.02	—
	Q	87.81	0.01	0.02	—
Piston	R	81	—	0.02	—
	S	87	—	—	—
	T	2.52	0.02	—	+ 0.08
Piston Rings	B	2.9	0.10	—	— 0.20
	C	2.5	—	0.01 0.022	— 0.05

NB Wear on the measurements O,P,Q,R,S IS the minimum\ Sizes for replacement pistons: 0.2, 0.4, 0.6, 0.8, 1.00 mm.



Tab. II

If not bore out the cylinder or if the grooves are deep, replace the cylinder.
 Check the external surfaces and the state of the mating surfaces of the gearbox and head.
 Check the cooling fins
 Remember to use new gaskets: between the cylinder and head of copper and asbestos, between cylinder and gearbox: paper with a thickness of 0.025 — 0.30..
 — Measure the internal diameter of the cylinder (see table 2, tab. II).

PISTON

Carefully examine the head and the side. Remove the carbon, the surfaces must be

smooth. If you see deep scratches or grooves or signs of seizure it is wise to replace the piston. For sizes see table 2, tab.II.

NB. Look up the chart for which oversize of piston to choose.

Fit the oversize piston, the cylinder must be bored out (measurement D) 2 - 4 - 6 - 8 - 10 tenths to match the piston

Check the seating of the rings on the piston

Ensure that the small holes situated below the oil scraper ring are not blocked.

If, after checking, you decide to use the old piston take note of the warning on P18.

Fitting oversized pistons requires to carry out the boring out of the cylinder according to the size of the piston.

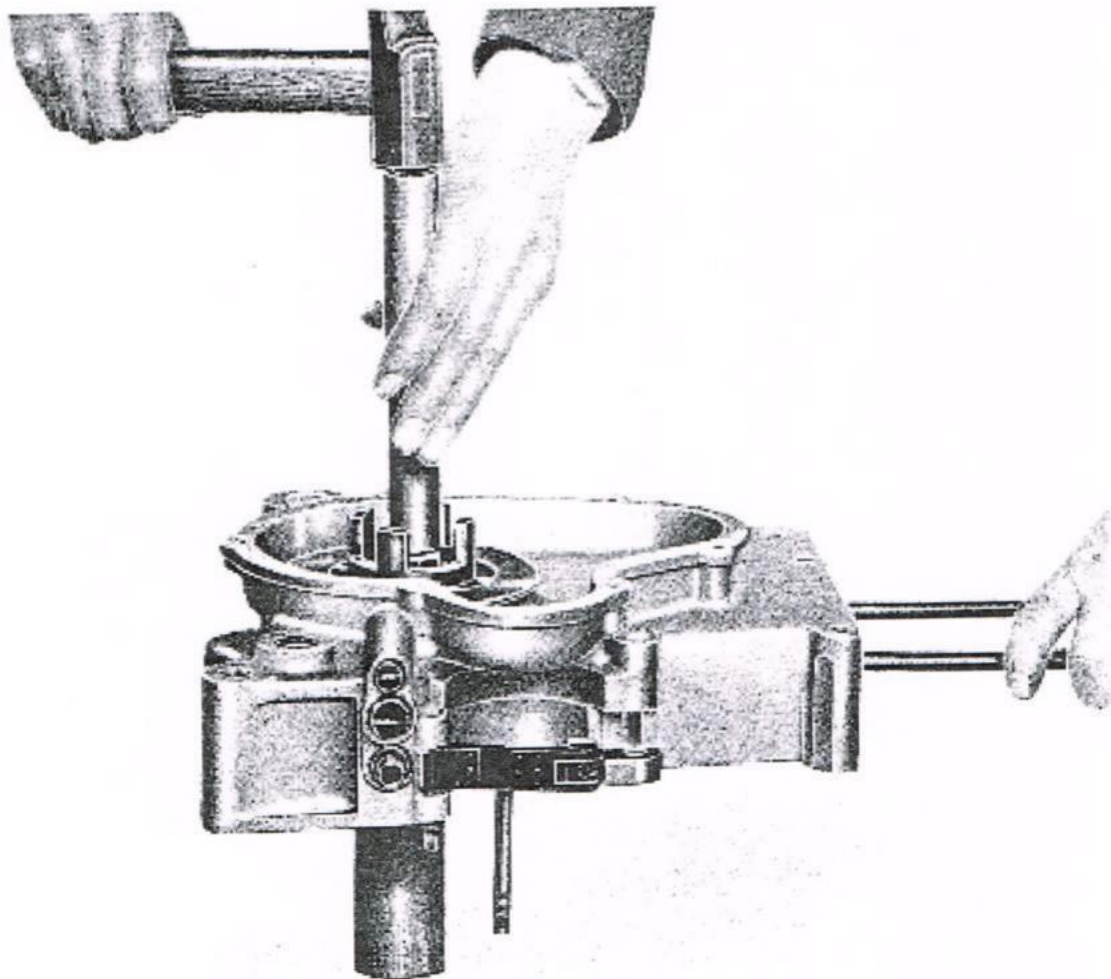
Gudgeon pin. It must fit precisely in the bush of the con rod and lightly pressed in the piston bearing. If changing the piston, the gudgeon pin must also be changed. For sizes see tab. II

Check the seating of the rings.

The rings must be able to move freely, even with a little play in its seat (see table 2, tab.II). Introduce the ring into the cylinder and ensure that it rides in the correct plane (so one can introduce the piston upside down and making contact with the edge of the spring ring). Measure the distance between the closing ends of the new ring, it must be 0.1 ± 0.25 mm.

For oversize pistons, according to the size, check that the rings are appropriate.

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ASSEMBLING.

Fit the rings in the order illustrated in tab.II, the two compression ring on top and the oil scraper below the the compression rings. Check, before fitting the piston into cylinder, that the ring ends of the three top rings are about 120° apart. This facilitates the starting of a rebuilt engine. However not being fully closed they will move during running in, changing the 120° arrangement. This is not important because when the rings are bedded there will be good compression whatever the the angle between the ring ends.

CRANKSHAFT & CON-ROD

DISMANTLING

Remove the nuts and withdraw the two headbolts. Remove the cap so as to be able to remove the ball bearings (there are 33) and the conrod.

INSPECTION

Conrod

The internal surface of the small end of the conrod must be completely smooth. The bearing of the big end must be firmly fixed (pressed in), it must have no cracks or scratches. Clean the oil holes.

Maximum wear: see table 3, tab. III

If it is necessary to replace the bearing, press the big end so as have 0.5 mm. out and ream to 20 20.

Ball bearings

Carefully check each one. They must be whole and completely smooth. Replace any not perfect.

Small End

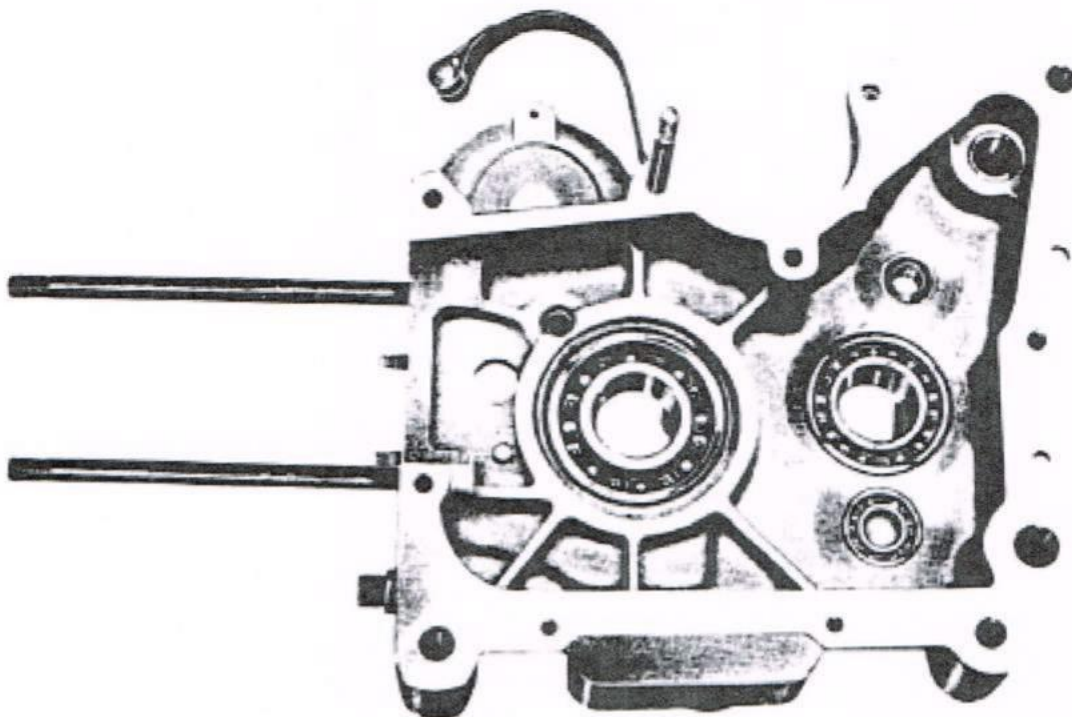
Check the internal surface, it must be completely smooth

Head Bolts

Important Note: Never reuse the old head bolts and nuts, even if replacing the head, always use new nuts and bolts

Crankshaft

Check the surface of the gudgeon pin. It must be completely smooth, if not replace it.



Crankcase - Right Half

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If it is necessary to replace the gudgeon pin, the counterweight must be removed. Proceed thus:

*Remove the locking wire on both sides, the two bolts with their washers and the counterweights, sliding them *towards the inside* (bringing them together)*

If it is necessary to replace the pin, then you must also do the small end and replace the ball bearings with oversize ones (see p. 28)

Clean the oil canal of the crank. To do this remove the locking wire on the inspection plug on the left side (flywheel side) and remove it completely. Wash the canal with paraffin injected into the hole in the crank (timing side) and dry with an air jet.

Examine the bearing ballrace (see p. 28)

- the flywheel fixing cone;
- the thread of the clamping nut on the flywheel;
- The surfaces upon which are pressed the internal ring of the roller and ball bearings

ASSEMBLING

To replace the roller bearing, the counterweights and the inspection plug, carry out the reverse procedure of the removal.

Before replacing the conrod check the alignment by making sure the holes of the big and small ends are parallel and aligned. If deformed it can be corrected using an open ended spanner and twisting in in the contrary direction to the deformation. To mount the bearings and conrod onto the crank proceed as follows:

Place the conrod in a vice, drop on some thick oil and place the bearings on it. Put the crankshaft on the conrod, smear with thick oil and add the roller bearings (see fig. 20)

Replace the cap with new bolts. Tighten the nuts to lightly grip the cap to the conrod,

then with a wooden mallet gently tap the cap onto the conrod on both sides to ensure a perfect seat on the roller bearings, tightening each nut alternately. Peen the end of each bolt to prevent accidental loosening of the nuts.
 Warning. - Don't forget to lock with wire the oil channel inspection plug and the balance weights bolts. Forgetting can lead to grave consequences to the engine.
 The sprocket wheel, the key, oil pump gear and the clamp nut are mounted when the crankshaft is already enclosed in the two halves of the crankcase (see general mounting of the engine)

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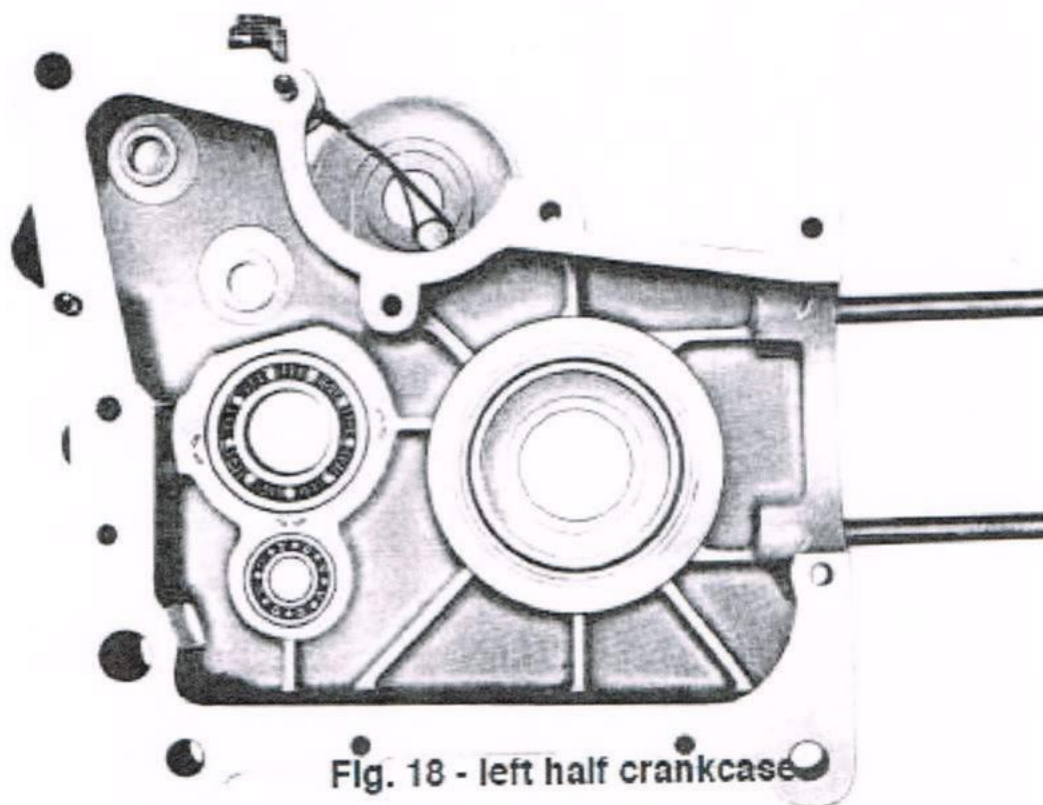


Fig. 18 - left half crankcase

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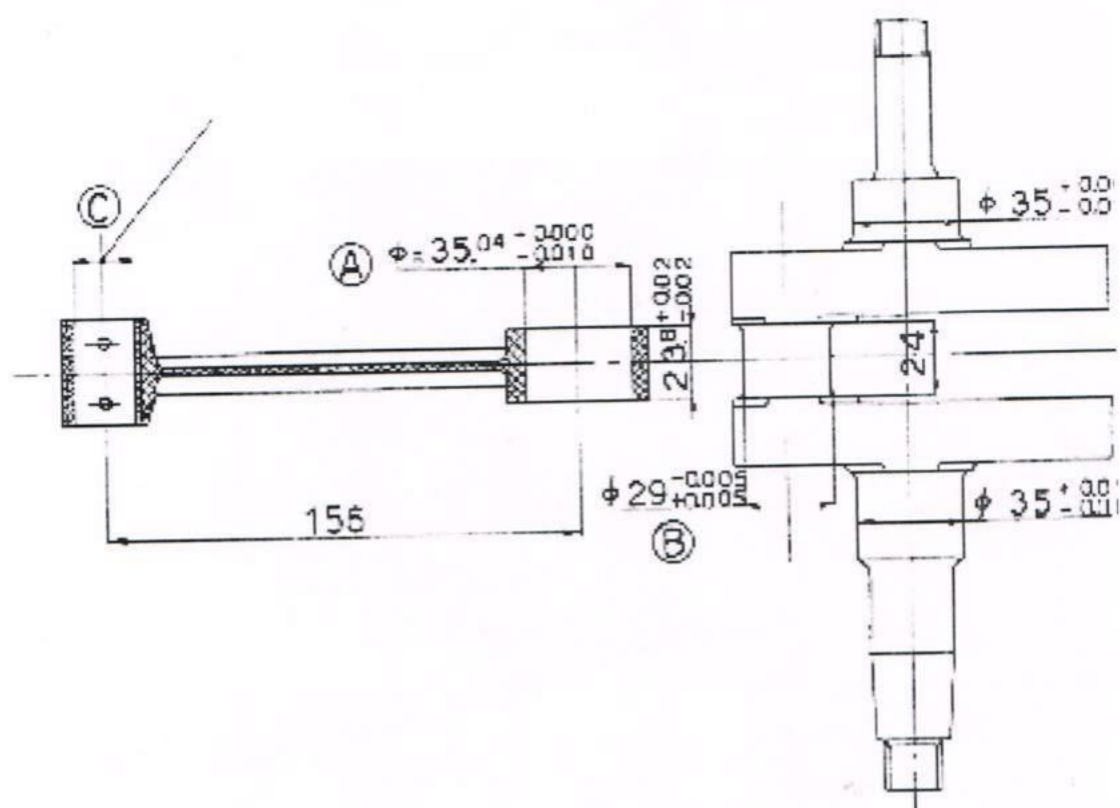
Table No. 3

Name	Measure	Size when new mm.	Tolerances +mm. — mm.	Max. Wear	Notes
------	---------	-------------------	--------------------------	-----------	-------

Big End	A	35.04	— 0.010	—	The 33 roller bearings have a normal diameter of 3 mm.
Gudgeon pin	B	29	0.005 0.005	—	
Small End	C	20	0.007 0.028	—	
1st resizing Big end	A	35.29	— 0.010	—	Roller bearings size 3.25 mm. must be used after this boring
1st resizing Crank bearing	B	28.75	0.005 0.005	—	
2nd resizing Big end	A	35.54	— 0.010	—	Roller bearings size 3.5 mm. must be used after this boring
2nd resizing Crank bearing	B	28.5	0.005 0.005	—	

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After pressing into the small end
ream out to $\varnothing = 20$



Tab. III

CAM & DISTRIBUTOR (?) SHAFTS

This includes:

- The inlet and exhaust cam spindle
- The inlet and exhaust cam with its control gear in one piece
- The spindle with lever and roller bearings of the shaft control
- The shafts
- The rockers

Inspect the inlet and exhaust cam spindle that is lightly pressed into the case. Check the external surface of the piece: it must be shiny and smooth.

Look for cracks , scratches etc. if present, replace. For play between the spindle and bush see Table 4, Tab. IV *Inspect* the working surfaces of the cam. They must be smooth. If there are deep scratches or cracks replace the piece.

- The teeth of the control gear. if worn or damaged replace.
- The condition of the bronze bearing inside. For wear tolerances see table No. 4
- Carefully clean the oil channel

Spindle with cam followers and roller bearings for the control shaft.

DISMANTLING

Slide the spindle towards the outside. This releases (from the inside towards the outside) the inlet cam follower, the separating washer, the exhaust cam follower.

INSPECTION

Examine the condition of the pin that supports the cam followers that is lightly pressed into the case; check the external surface: it must be shiny and smooth. Look for cracks , scratches etc. if present, replace. For play between the spindle and bush see Table 4, Tab. IV

- The internal surfaces of the two bronze bushes of the cam followers must be smooth, if not replace. . To do this press in the appropriate bearing and ream out to 13 mm.
- The washer must be smooth on the edges and the hole. Thickness when new 2mm., maximum wear 0.3 mm., diameter of the hole 03.2 mm.
- The state of the external surface of the roller bearings which must be smooth and roll freely around their pin.
- The play in the roller bearings of the cam followers. It must not be more than 0.3 mm. If more, replace pin, bus and roller. After clinching the pin you must remove the protrusions on both sides. The play of a new piece must not be less than 0.1 mm. This will avoid the roller bearings seizing, and damaging the profile of the cam.

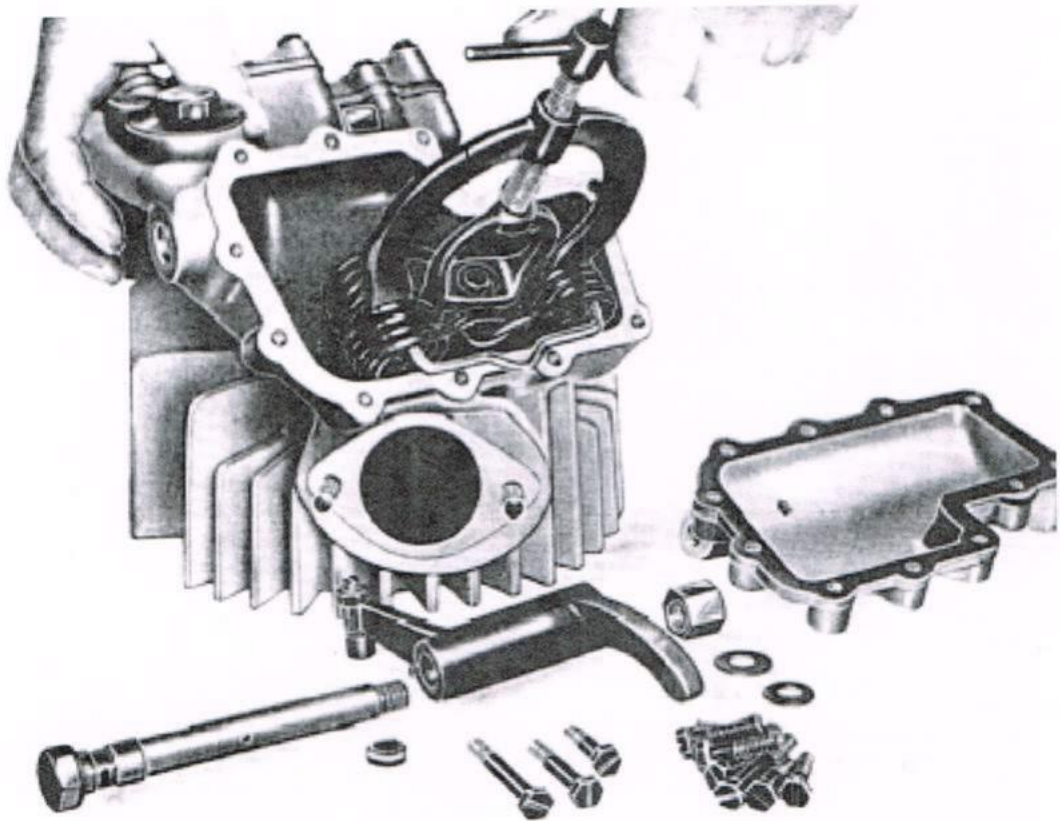


Fig. 19 - How to extract the springs from the head

ASSEMBLING

Reverse the removing process

Inspection

The pushrods are in dural with pressed on hemispherical ends (see Table IV)
Check that the shafts are straight and that the wear at the ends is not excessive. If there are any irregularities it is a good idea to change the complete shaft

ASSEMBLY

Put mastic on the flange of the pushrod cover tube, and mount it on the crankcase using the two nuts, then slide in the two pushrods.

EXHAUST & INLET ROCKERS

DISASSEMBLY

After removing the rockers as described on p. 32, To disassemble completely it is necessary to remove the bush; verify the size by referring to Table 4, tab. IV.

Remove the adjustment screws from the rockers.

NB. - Check the internal and external measurements of the rocker bushes.

Clean the oil holes and key-ways in the bushes

Rocker adjustment screws

Inspection

Check the screw threads of the screws and locking nuts. If necessary replace.

Check for wear on the convex part of the screws and if worn, replace (see table 4, tab. IV)

Clutch and starting gear

DISASSEMBLY

See the chapter on "Engine disassembly"

Inspection

These parts include (from left to right)

Pressure plates

Check with a straightedge that the faces of the discs are flat. If not flat, replace.

— if there are light lines, reface on a lathe. If deep, replace— that the command shaft thread is entire.

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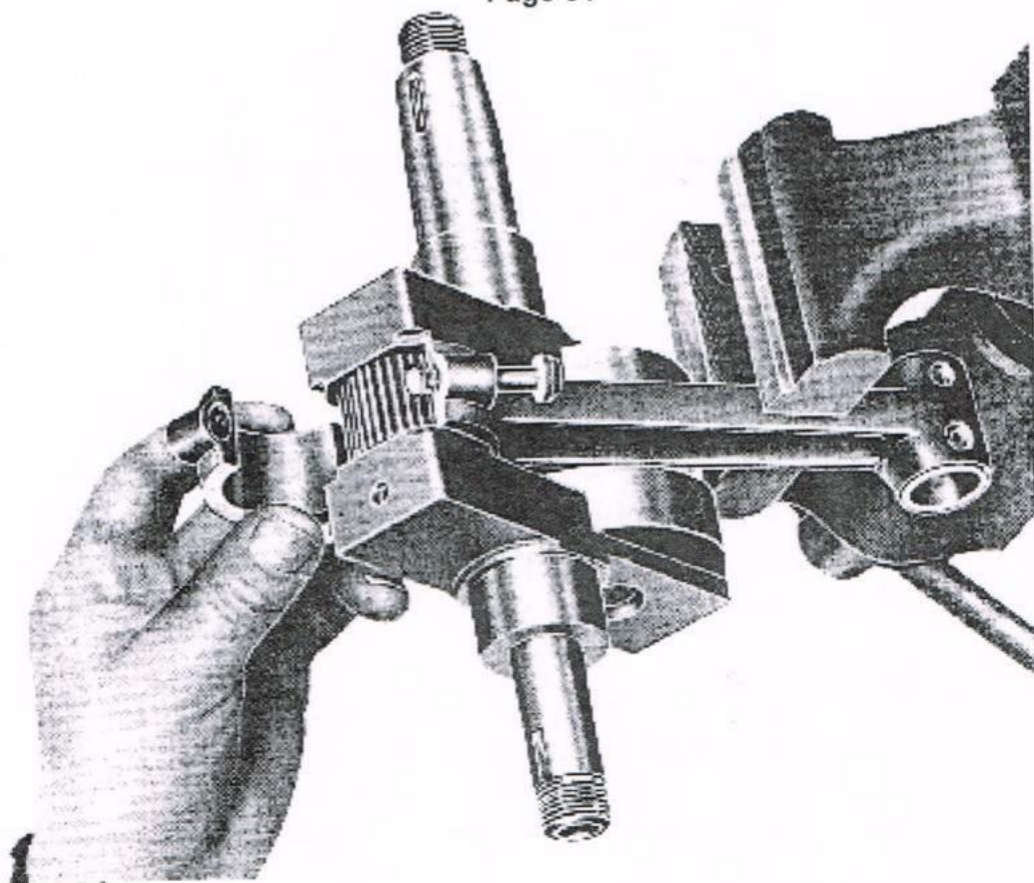


Fig. 20 Assembling the conrod and the roller bearings on the crankshaft

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Table No. 4

Name	Measure	Size when new mm.	Tolerances +mm — mm.	Maximum wear	Notes
Rocker shaft					See text
Inlet & exhaust rockers	A	17	0.018	+ 0.05	
Rocker bushes	B	17	— 0.034 0.016	—0.15	
Inlet & exhaust lever pivot	C	13	0.012 0.006		
Inlet & exhaust cam lifters	D E	13 5	0.016 0.034	+0.15 +0.5	
Rocker screw adjusters	F	5		+0.5	
Inlet & exhaust pivot	G	16	0.012 0.006	—0.1	
Cam pivot bush	H	16	0.032 0.050	+0.15	

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Clutch discs

Two of ferodo, five of steel and five of phosphor bronze. They should have no grooves, deformations or be very worn. If faulty, replace

Initial thicknesses: phosphor bronze - 1 mm. reducible to 0.8mm.

Ferodo - 3mm. reducible to ca, 2.5 mm.. If however there are faults it is wise to replace with new, even if not completely worn.

Steel - 2mm. They are not subject to much wear; replace only if deformed.

THE HELICAL GEAR AND CLUTCH BODY WITHIN THE PRIMARY DRIVE CASE

Check the profile and wear on the teeth of the gear; see if there are chipped or broken teeth, check the pressed in bush is not cracked or wear beyond 0.3 mm. If necessary replace one or both.

	+0.06
(bearing measurement when new Ø 60	)
	+0.10

Fixed clutch body

This is part of the gearbox main shaft with which it is fixed by means of a tapered joint, key and fixing nut.

DISASSEMBLY

See the chapter "Engine disassembly"

Check that the plate, from the external part (where the disc works) is free of scratches and is flat.

- that the four teeth of the dog are straight and smooth outside.
- that the internal cone is in perfect condition.
- that the keyway is not worn.

Any worn or damaged parts should be replaced.

Clutch push rod

Check that the thread that screws the rod onto the pressure plate is unbroken.

- that the rod is straight
- that the thrust bearing (on the far right) fitted on the rod is working smoothly. If worn replace the whole part.
- That the tempered cover that works with the thrust bearing is not worn. Maximum wear at the centre 0.8 mm.

Thrust spring plate, spring, floating starting gear.

Examine the condition of each piece. That the plate is not deformed.

- The spring. New and not compressed is 20 mm. long and needs 2 Kg to compress it to 6 mm. (a shortening of 14 mm.).

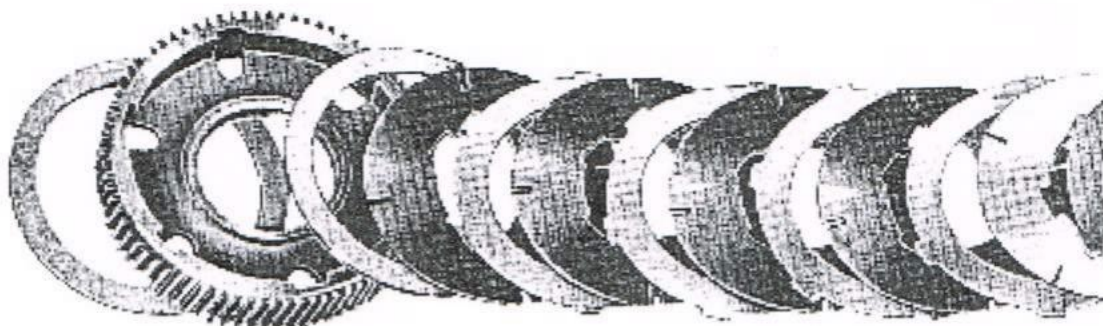


Fig. 21 Dismantled clutch: note the order of the various parts

If it compresses to 6mm. with less than ca. 1.5 Kg it should be replaced.

— The gear. Teeth must not be broken or damaged. Check also the teeth at the front that they have retained their original condition, which is a right angle. If not, replace.

Toothed sleeve on the starter motor.

Check the thread that functions to join the primary gear shaft

— The teeth at the front (as for the starter gear)

Clutch springs

Two concentric springs. The outside spring when new is 45 mm. long unloaded and it needs circa. 86 Kg to compress it to 25 mm. (a shortening of 20 mm.) If it requires less than circa. 78 Kg, replace it. The internal spring when new and unloaded is 43mm. Long and needs 70 kg to compress to 25 mm. (a shortening of 18 mm.) If it requires less than circa. 63 Kg to compress, replace it.

Sleeve for the clutch control

Check that the thread is OK

Clutch spring knurled disc

Check that the thread is OK

External lever on the aluminium cap

Check the play between the rod and lever. It should not exceed 0.2 mm. On the diameter

— Wear on the screw that presses upon the tempered cap mounted on the thrust bearing of the clutch control rod. On a new part the tempered hemispherical part of the screw juts out from the flat of the lever by ca. 305 mm.. If there is a flattening of the head, replace it.

CLUTCH ASSEMBLY

ASSEMBLING

Reverse the order of disassembly (see the chapter "Disassembling the engine")

Mount the discs in the order in which they were removed (see fig.21). They must be clean and lightly greased.

(.... but, regarding greasing these plates, see note below)

The clutch control rod must sit on the pressure plate in such a way as to be one thread proud. It is a good idea to check that the maximum travel of the rod and plate (when the drive is completely disengaged) prevents the escape of the plate from the front block of the jaw and the discs of the keyway of the revolving part. If this occurs it will be necessary to screw in the control rod.

The knurled disc that regulates the compression of the spring must be adjusted such that its length is reduced to 27 mm.

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After assembling, check the centering of the two springs with respect to the primary axis of gear on which they are mounted, so they rotate all together.

ADJUSTMENT

In practice there are three problems that can arise:

1st The clutch *snatches*, that is the drive "take up" is sharp and rough; this will arise from:

Springs too heavily loaded. Remedy: slacken the knurled disc.

Worn or bent discs: replace them

Dirt between the discs. Clean with paraffin, introducing it through the hole of the upper plug situated on the left side of the crankcase and draining it, after having turned by hand and repeatedly working the lever, through the hole of the lower plug.

2nd The clutch *slips*. This can be caused by:

Springs too slack. Remedy: turn the knurled disc or replace the springs.

Lack of play between the external control lever and the internal control rod. Adjust the play (ca. 0.2 mm.) using the adjuster on the clutch cable cover. Excessive oil in the clutch. Remedy: wash with paraffin.

If it happens repeatedly, check the condition of the gland and clean the channel that carries the oil away onto the chain.

3rdThe clutch doesn't *disengage* completely. Check for dragging between the fixed part of the clutch and the moving part when the clutch is "fully disengaged". So causing take off difficult and noisy gear changing. This can be caused by excessive play between the lever and the internal control rod (regulate the play; see above). Excessive play in the clutch cable cover; replace it. Discs dirty: wash (see above)

STARTER GEAR

Check the teeth of the dog.

- Control shaft. It must be straight.
- The return spring: if weak replace it.

GEARS

DISMANTLING

See the chapter "Engine disassembly"

GEARBOX MAINSHAFT

Check the condition of the threads at both ends.

- The surface of the tapered end which connects with the clutch carrier must be completely smooth.
- The state of preservation of the key. Check that it enters without play in its keyway.
- The state of preservation of the of the four grooves on which the two free gears slide (see table V)

- The bearing surface of the direct gear and its bronze bearing; it must be smooth
- The centering of the shaft. Do this by fitting it between two centres, and oscillating it while checking with a centering gauge. Revealing a displacement of more than 0.025 mm. means straightening with a press.

THE FOLLOWING TWO PARAGRAPHS ARE NOT PART OF THE
ASTORE MANUAL

A rather special washer !

(**AN ENGLISH AMATEUR'S CAUTIONARY NOTE :** I RAN INTO ALL SORTS OF TROUBLE WHEN ASSEMBLING THE GEARBOX MAINSHAFT OF MY 1948 MOTO GUZZI GTV AS PART OF A MAJOR REBUILD. THE PROBLEMS WERE CAUSED BY MY LACK OF ATTENTION TO THE PROCEDURES SET OUT IN THE FOLLOWING PARAGRAPH AND ALSO TO THE FAILURE OF THE FACTORY "PARTS BOOK" TO SHOW A **CLEAR & ACCURATE** ILLUSTRATION OF THE VITAL WASHER INTERPOSED, AT THE CLUTCH END, BETWEEN THE SPLINES OF THE GEARBOX MAINSHAFT AND THE LARGE BALL BEARING INNER RACE. THE PARTS BOOK DEPICTS A PLAIN(ISH) WASHER OF INDETERMINATE THICKNESS AND I WAS LOOKING AROUND FOR JUST SUCH A PIECE – WITHOUT SUCCESS. IN FACT, THE ACTUAL PART IS VERY MUCH A 'ONE-OFF', HAVING A KEYWAY SLOT CUT OUT OF ITS INNER CENTRE TO ALLOW IT TO BE SLIPPED OVER THE GEARBOX MAINSHAFT'S KEY AND TAPER PLUS, A PRONOUNCED BEVELLED SHAPE ON THE SIDE WHICH BUTTS AGAINST MAINSHAFT SPLINES. WHEN THIS SPECIALLY-SHAPED WASHER IS FITTED CORRECTLY, ITS BEVELLED SIDE SHOULD SIT TIGHT AGAINST THE SPLINES SO THAT ITS "FLAT" FACE IS TRAPPED AGAINST THE LARGE CRANKCASE BEARING'S INNER RACE. FAILURE TO GET THIS RIGHT – OR OMITTING THE WASHER ALTOGETHER AS I DID – WILL ALMOST CERTAINLY ENTAIL A COMPLETE ENGINE STRIP DOWN TO SORT THINGS OUT).

Dave Thomas, Bristol, England 18th November 2009)

VERY IMPORTANT PROCEDURE : Prior to fitting the gears, the selector mechanisms and assembling the crankcase halves, it is vital that this bevelled pressure washer (the one with a 'cut-out' for the key) is fitted over the tapered end of the gearbox mainshaft so that when the shaft, with its key in place, is introduced into the large bearing - its flat side butts up against the inner race of the ball bearing.. This washer therefore acts as a locked distance piece sandwiched between the end of the mainshaft splines and the ball bearing thereby preventing two potentially serious outcomes 1.The entire gearbox mainshaft and clutch + all its assembled parts from sliding sideways into the primary drive case and 2. As a consequence of Item 1, the inevitable failure of the pair of kickstart ratcheted gears to disengage when the kickstart lever is released (Refer also to the remarks at the start of Page 22)

Running gears

There are two of them. One simple with frontal grooves, works with third and fourth gears. One double for the first and second gears, Check the play between the selector forks and the grooves: play must not exceed 0.4 mm.

Fixed direct gear (Constant velocity pinion)

Check the state of the teeth and the six recessed frontal gates.

- The thread on which runs the clamping nut securing the final drive sprocket (rear chain)
- The surface that abuts the inner ring of the ball race, It must be completely smooth.
- The internal bronze bearing must be free from cracks and grooves etc. Ensure the cleanliness of the oil channel by clearing with air jet.

For play on the shaft bearing and its wear, see table No. 5 table V.

Layshaft of the gears

Check the state of the teeth of each gear and the centering of the shaft (see first gear)

- The two ends (that are pressed into the internal rings of the small ball races), must be absolutely smooth
- Check the two washers. They are of different thickness. The thinner is fitted on the right (that is on the direct drive side).

Toothed barrel with running gear selectors

Check the two ends of the barrel (supported by the bushes in the crankcase); they must be smooth.

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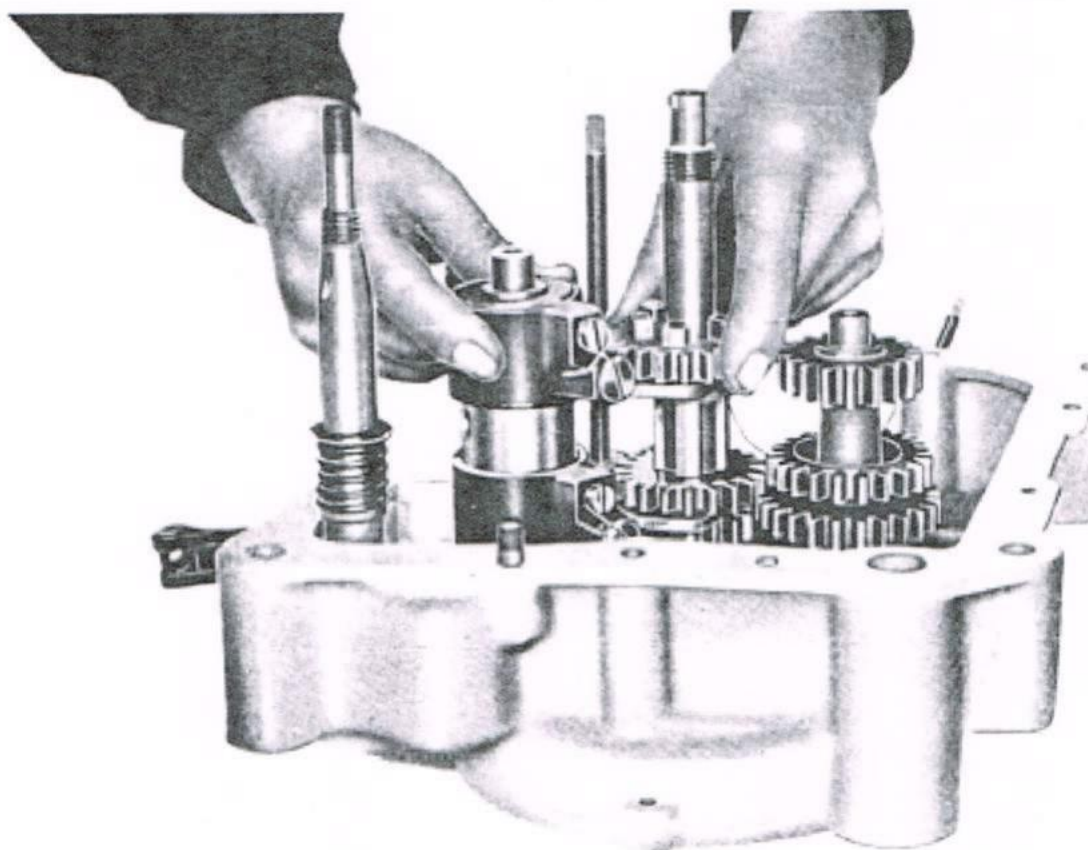
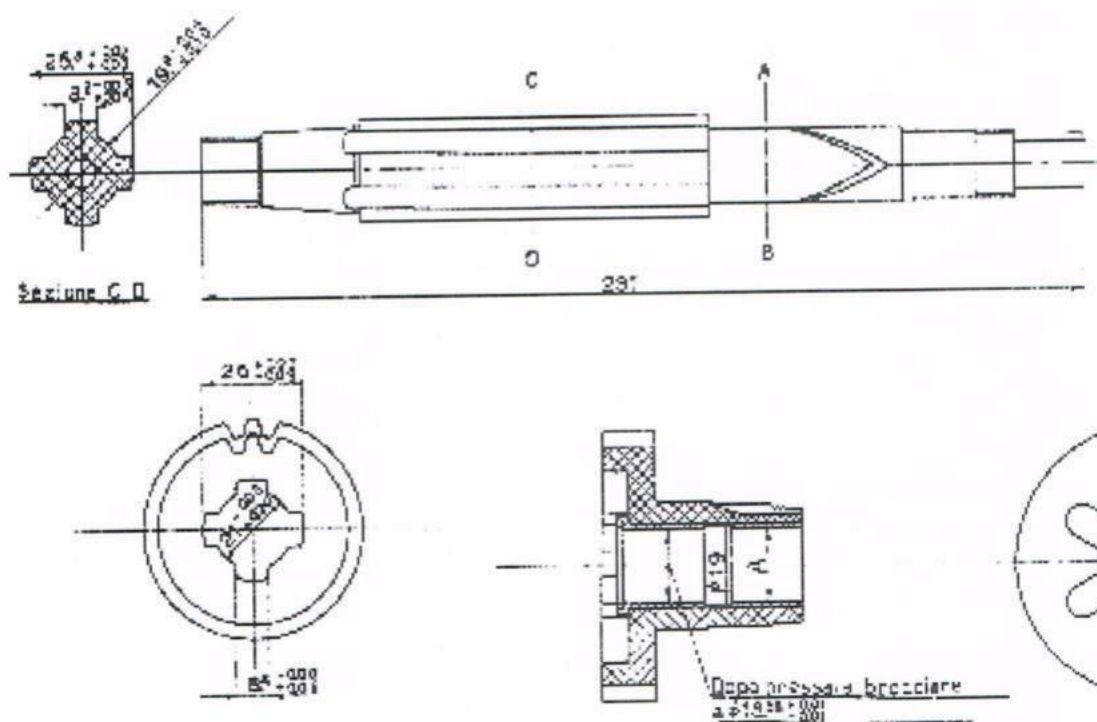


Fig 22 - How the gears must be fitted in the left half of the crankcase

Name	Measure	New	Tolerances		Max. wear
		mm.	+ mm. mm.	—	
Direct gear bush	A	18.58	0.01	0.01	+0.06

Table No. 5



Tab.V

Pages 62 & 63

- The condition of the teeth on the small pinion
- If you feel it is necessary remove the forks from the barrel, you need:

Remove the locking wire

- The hardened screw that runs in the groove of the barrel.
- The plug, the spring and the ball for stopping.

Then you can remove the two forks.

Check the surface of the barrel it must be smooth

- The groove must have smooth sides
- The hardened screw must not be worn at the end.
- The selector forks must not be worn.

ASSEMBLY

To assemble reverse the disassembly process.

Shaft with toothed sector

Check the ends (where it is in the crankcase bearings), They must be smooth.

- The state of the thread: it must be undamaged.
- The condition of the teeth on the sector: they must not be worn

Important advice on the correct sequence of operations for assembling the gears :

All the parts comprising this group must be assembled in the left half of the crankcase (see fig. 22), except for the direct drive (constant velocity pinion) that is mounted on its correct ballrace on the right half. Press the clutch carrier into the inner race of the large ball-bearing mounted in the left half of the crankcase inboard of the clutch. To avoid damaging the bearing, it is necessary to deploy the tube that was used in its dismantling (see p.22), placing one end on a solid base and the other end against the bearing's inner race.

Replace the gearbox mainshaft shaft into the gearbox compartment of the left-hand crankcase – working from the inside towards to primary drive case - introducing the tapered end of the shaft into the clutch body having first inserted the shaft key. **Do not forget the washer which must be placed with its flat face against the ball bearing inner race.** (Refer also to the instructions in heavy type on Page 58)

Tap the primary shaft lightly with a wooden mallet in such a way as to ensure a good contact between the two tapers Turn the crankcase over and put the primary shaft into a vice. Put the fixing nut on and tighten fully.

Check finally that the shaft is centered; if not centre with light taps with a wooden mallet, checking it by turning it by hand, measuring for displacement of the free end. Mount the shaft with toothed sector in position 4. To do this it is necessary to shift the sector of the shaft in a position such that you are able to check that the toothed part coincides with the line marked on the crankcase side on No. 4

Mount the layshaft with the small pinion uppermost. Do not forget the two thrust washers.

Take the fork assembly and place it such that the upper fork (right) is in line with the upper edge of the barrel. The lower fork (left) must be in line with the first. You can then slide into the forks the two running gears on the mainshaft, the single uppermost (in the first fork) the double underneath (in the second fork).

The complete group is assembled in the right half of the drum.

Direct drive gear (constant velocity pinion)

Before fitting it in the correct bearing in the right half of the crankcase check for play between the front of the notches in the primary shaft and the bearing surface of the bronze bearing in the direct drive gear. Slide this gear on to the mainshaft until there is a gap of 0.2 mm.- 0.3 between it and the edge of the notches

Measure carefully between the right end of the mainshaft and the external surface of the direct drive gear.

Assemble the constant drive gear (not forgetting the pressure washer that abuts with the flat part towards the bearing) then temporarily close the two halves of the crankcase, and having ensured that edges abut, measure again the abovementioned distance. If the measurement remains unchanged, it shows that it is as required (ie 0.2-0.3mm.)

If it is reduced, the internal play is increased (a play of up to 1mm. is permissible with the consequent reduction of the external measurement). If it is more replace the washer with a thicker one.

If increased change the washer for a thinner one. N.B. —This check is necessary whenever there is a replacement of the mainshaft, the direct drive gear, its bronze bush or the pressure washer.

TRANSMISSION

This includes:

- Helical gear of the engine transmission change
- chain pinion;
- rear rim;
- rear chain;
- rear shockers

ENGINE HELICAL GEARED PINION *Dismantling, see page. 20*

Inspection

Check the teeth and the two front notches of the connection of the flywheel. They must be in perfect condition. The key must have no crack and must engage with the keyway of the engine shaft without play (gently pressed)

The spring

When new, loaded is 32 mm. Long and requires ca. 70 Kg to reduce it to 19.5 mm. If compressible to 19.5 mm. With less replace it.

Spring washer

Check that it is flat and not worn (if so, replace)

Gland ring

It must be smooth and free of grooves. Mount it with the lead towards the inside

THE HELICAL GEAR AND CLUTCH HOUSING See p. 54

Chain pinion

Check the teeth profiles. If very worn, replace.

Castellated locking ring of the final drive (gearbox) sprocket

Check that the internal thread is unbroken

Rear sprocket

Check the profiles of the teeth, if very worn replace

Transmission chain

Examine the rollers and the links for stretching.

To do this: put one end of the chain in a vice and count the number N of pins. The pitch in a new chain is 15.875, the length L of the chain measured between two fixed pins will be $L = (N-1) \times 15.875$.

An old chain, assuming an increase of pitch $A=0.16$ mm. The length will be:

$$L'=(N-1) \times (15.875+A)=(N-1) \times 16.035$$

A chain length greater than L' must be replaced. When doing this, check both sprockets. If these have worn teeth it is wise to replace them. A new chain will only fit properly to new sprocket teeth; it can happen that if you do not follow the above advice you will have problems.

REAR WHEEL SHOCK ABSORBER

DISMANTLING. Remove the rear wheel then remove from the inside of the flange of the spring the 4 nuts that hold together the body of the shock absorber bearing the chain gear. Slide from the outside the 4 bolts and remove completely the shock absorber. Check the condition of the 8 rubber blocks. If worn or deformed, replace.

Adjusting the chain tension

To do this:

Loosen the nut on the central pinion on the right side, and the locking nuts of the two bolts of the

Adjuster, then move the adjusters equally so as not to alter the wheel centering.

With the bike on the stand the chain must not be too tight (check that it has a play between 25 and 30 mm.) This is necessary because if not it will be too tight when the swinging arm is in mid position. After adjusting the chain it is always necessary to check (& possibly, adjust) the rear brake.

FUEL & EXHAUST (This includes the petrol tank)

REMOVAL (see p. 84)

Inspection

Check that the breather hole in the filler cap is not blocked.

If there is fuel loss, before starting to repair by soldering make sure the tank is empty, then leave the inside to dry completely to ensure that there is no trace of petrol fumes.

It is always wise to solder with the petrol cap open.

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Carefully clean inside with paraffin or petrol.
Put a length of chain into the filler hole, and holding one end shake the tank. Doing this will remove dirt and rust on the base of it.

Filter, taps and tubes.

Wash the filter and check it is complete.
If there is leakage from the tap lightly grind the cone, eventually changing the return spring. Clean pipes with a jet of air.

CARBURETTOR Dell'Orto type M.D.27 (approximates to 1 & 1/16ths of an inch choke size)

REMOVAL. Having removed the engine as per p. 16, proceed as follows:
Remove the screw from the cover of the float chamber, and remove it.

- the float. Slide it up.
- the needle. Slide it down.
- The nut found at the bottom of the carburettor.
- The jet
- The jet holder.
- The air control screw.
- The idling jet.

NB. — The valve that controls the petrol/air mixture is the needle that abuts on the jet - remove before removing the engine from the frame.

Checking

Carry out a thorough cleaning of the float chamber and blow through the petrol inlet with an air jet to ensure it is clear

Check the seating where the needle seals. It must be smooth

- The float; if it is dented or is not perfectly airtight, replace it.
- The needle cone must sit perfectly on the float. If not grind it in the seat.

— The jet. Ensure that it has the correct number (see registration) and that the hole has not been tampered with. Clean with an air jet.

^1. For cleaning all the holes use an air jet, it is unwise to use wire, needles etc. This could enlarge the holes and make the carburettor difficult to tune.
Clean the hole in the cover.

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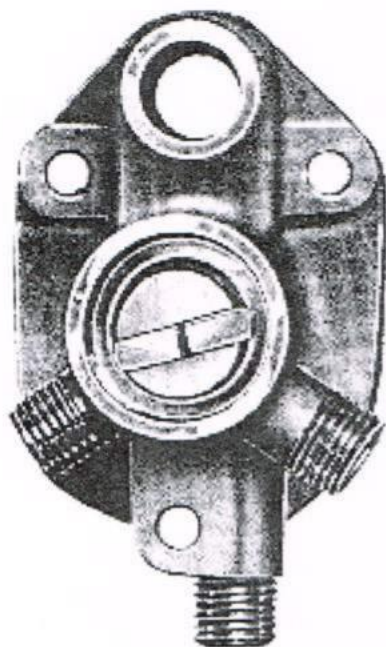


Fig. 23

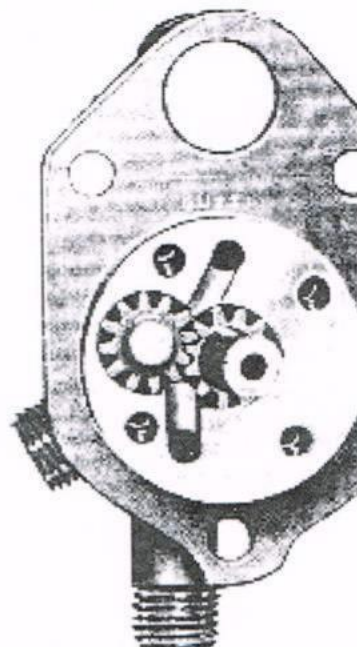


Fig. 24

Fig. 23 Pump external view

Fig. 24 Pump internal view

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Check the choke. Clean the air hole to the jet and the little hole of the idling jet blowing from the hole in the base of the body.

Examine the seats of the gas and air valves and the hole across which passes the pivot of the jet. If there is noticeable wear, replace the part.

— The throttle slide and air valve and the jet needle will remain on the engine when the carburettor is removed, (see p.16). They should not show visible wear.

Check the position of the needle before removing it, it must be put back in the same groove.

Check the small spring that holds the needle and the control spring to see that they function properly.

FITTING

Reverse the process of dismantling making sure not to forget the fibre washers.

REGULATION

Regulation for top speed and everyday running.

— this is done via the jet size (higher or lower number) and on the position of the

needle. Increasing jet size and raising the needle enriches the mixture, the reverse happening with a smaller jet and lowering the needle.

— Indicators of a rich mixture: black exhaust, irregular running and missing, plug blackened and sooty.

— Indicators of a weak mixture: backfiring; plug pale and burnt.

— Remember in lower ambient temperatures to enrich the mixture: and vice versa with a rise in temperature. With heavy (?) petrol it is necessary to increase the jet size and raise the needle.

Standard Specification

Maximum jet size: Summer **118/100** — Winter **122/100**. Idle jet: **50/100**

Throttle Valve **70**

Tick-over regulation.

To be done with a warm engine. It is done via two screws; a horizontal one immediately after the diffuser adjust to slowest running. Turning this screw adjusts the petrol / air mixture.

— The other screw, inclined with respect to the axis of the carburettor body determines the "closed position" of the throttle slide

— Start by adjusting the inclined screw such that with the twistgrip closed, the engine can still run slowly.

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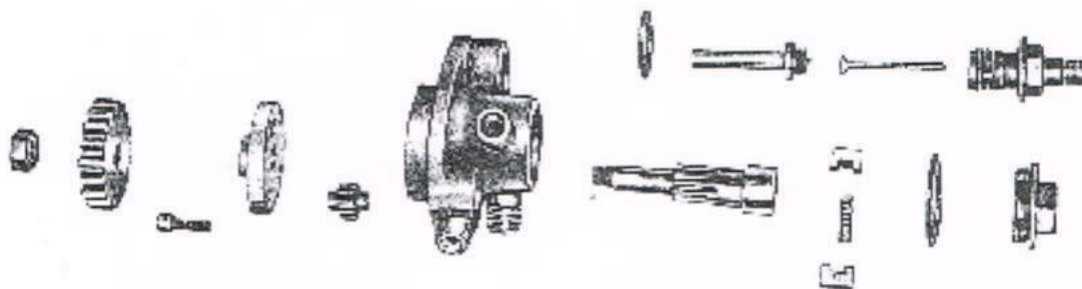


Fig. 25 - Exploded view of pump

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Screw the horizontal in or out to get the minimum tickover desired.

Note: check carefully that there is no air leakage in the inlet pipe (between

carburettor and pipe and between pipe and head). If there is a leak, this can prevent proper setting of the slow running.

Exhaust Pipe

Remove carbon deposits with a wire brush in the curved part of the pipe.

Silencer

Dismantling: Remove the fishtail section of the silencer by loosening the three holding screws

Check the perforated sheets for rust or damage, if necessary replace

— Carefully clean the perforations with a wire brush.

— When refitting take care that the parts fit together perfectly to avoid gas escape.

LUBRICATION SYSTEM

Important Notice: For engine lubrication use Shell oils with the following grades:
under 10°C Double Extra Shell; over 10°C Triple Shell

The system includes: the oil tank. (removal see p. 84)

Inspection.

Check there is no oil loss.

Clean the inside of the tank with paraffin and carefully dry.

Remove the filter to ensure that the gauze filter is intact. Wash with paraffin.

Pipes. Wash with paraffin and dry with compressed air.

Mating. Ensure that the unions are not deformed, replace if necessary. This is particularly important because poor fitting can cause the pump to draw in air and cause serious problems.

Oil Pump

Removal from the crankcase (see fig. 13-24)

Remove the three self-locking nuts from the timing cover studs. The complete pump can be slid out together with its drive gear.

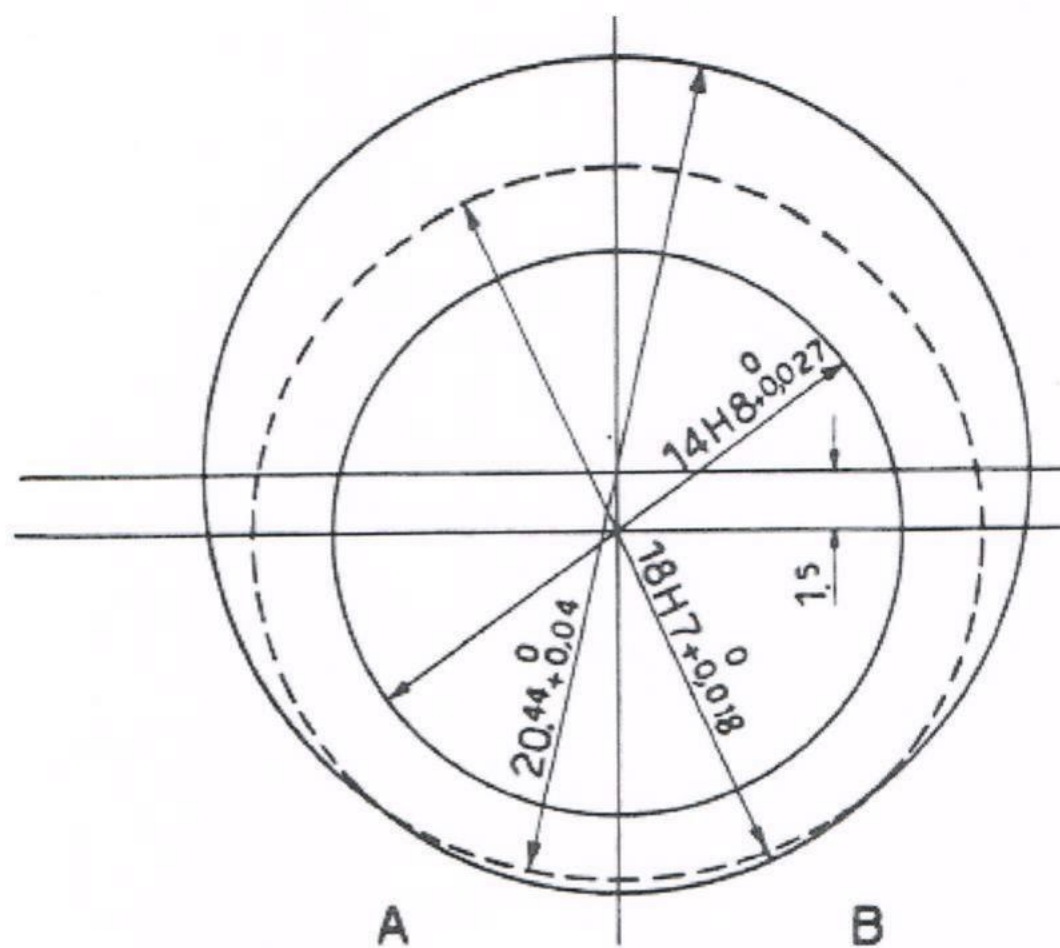


Fig. 26 - Diagram of the oil pump blade

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Remove the automatic valve unscrewing it completely from its seat.

Dismantling the automatic valve (see fig.25)

Remove the cap —, the little tube — the split pin and withdraw the valve

Dismantling the oil pump

Remove the fixing screws and drive gear.

- the external tap
- the internal cap removing the four fixing screws
- The gear withdrawing it from its seat towards the inside
- the little toothed shaft withdrawing it towards the outside. In this way two blades and the small spring.... (?)

Important note: Do not tamper with the spring which is factory set.

Inspection

Drive gear

Check the state of the teeth

External oil tap

Check that the thread is not worn. Replace the leather washer if not in perfect condition

Internal cap

Check the mating surface with that of the pump body

Check the hole through which passes the shaft. When new it has a diameter of 9.5 mm. H7 0-0.015

Finding wear of more than 0.05 mm. Replace it.

The blind hole where the the gear shaft sits. When new the diameter is $7 + 0.04 - 0.00$ max. wear 0.08

Toothed shaft. Check the state of the thread on the internal end. It must be entire.

— The surface of the engagement cone in the seat of the gear. It must be smooth and free from grooves

— the state of the gear teeth

— The cylindrical surface that sits in the bronze bush. It must be smooth.

As the piece is made of steel the wear is minimal and the eventual play that will occur will be due to wear of the seats of the bronze body of the pump.

Pump body.

It is made of bronze. After having cleaned it carefully with paraffin and dried it with an

air jet, proceed with the following checks:

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Examining the inside of the body note the seating of the two gears. A new part has a diameter of $14 \text{ H}+0-0.027 \text{ mm}$. Maximum wear 0.08 mm.

The seat where the gear shaft rests. A new part has a diameter of $7+0.04-0.00 \text{ mm}$. Maximum wear 0.08 mm.

Turning over the part and examining the external, note:

- the cylindrical support of the shaft.
- A new part has a diameter of $14\text{H}8+0-0.027$. Maximum wear 0.08 mm.
- The running seat of the two pegs. It is not circular but has the form and dimensions shown in fig. 26.

It is very important for the good function of the oil pump to check the play between the lower part of The running seat (A-B in the diagram) and the cylindrical surface to the shaft in which are mounted the two blades.

For this reason fit the shaft of the pump body and turn it by hand. the play between the cylindrical surface of the shaft that drives the two blades and the lower part of the seat *A-B in the pump body must be minimal and not exceed 0.03 mm.

ASSEMBLY

Warning. When assembling, do not forget the gaskets; the pump must be fixed perfectly because, if not, it can draw in air and function badly when filling - causing a defective circulation.

As soon as the assembly is finished, before fitting the pump on the cover of the distributor it is a good idea to check that it is working turning the shaft in an anti-clockwise direction looking at the mechanism.

Looking the lower and rear connection with a container full of oil the flow of lubricant must be seen from, the lower connection and from the automatic valve.

Circulation of oil.

After assembling the pump to the engine check that the oil circulates correctly. The pump being empty it is convenient to remove a connection and fill it with oil. To check that the oil circulates properly when running it is well to touch the walls of the tank; it must be warm after a few minutes of running.

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IGNITION

The ignition is provided by Magneto, a high voltage "Marelli" type MLA 53. To dismantle (see page 20).

Inspection

Check the platinum points of the distributor cleaning them with a fine cut file. If worn change them always using original spares.

Remove the hammer (?) and lubricate the shaft with a little mineral grease. Moisten the surface of the cam and the timing guide of the head with mineral oil. When mounting the trembler (?) ensure that the key sits exactly in its seat. Check the points gap; it must be 3 or 4 tenths of mm.

- **The armature ball bearings.**

They do not need particular attention, since having been filled with grease on assembly lubrication is assured for a more or less indefinite period.

They can be checked by removing the breakers of the complete magneto; replenish them with special mineral grease.
Whenever possible, after inspection, it is convenient to check the working of the magneto on a proper bench fitted with a spark gap meter.

Important warning; on assembling the magneto on the engine don't forget the correct spacers. if the latter were unusable or have been lost , carefully check:

- 1) the alignment between the axis of the magneto and the axis of the cam;
- the distance between the axis. This must be such as to allow the correct contact between the teeth of the gears.

The cable that connects the magneto to the plug.

Check the condition of the remote connections. If burnt or cut areas are noticed where there are sparks (causing the engine to miss) replace the cable.

Spark plug (Marelli CW 175 A).

Check the state of the isolator; if cracks or brakes are noticed replace the plug.
-the distance between the electrodes must be 0.5 mm.

Check for compression leakage.

Pour a little oil between the isolator and the body of the plug. While the engine is running check if bubbles appear in the oil; if so replace the plug.

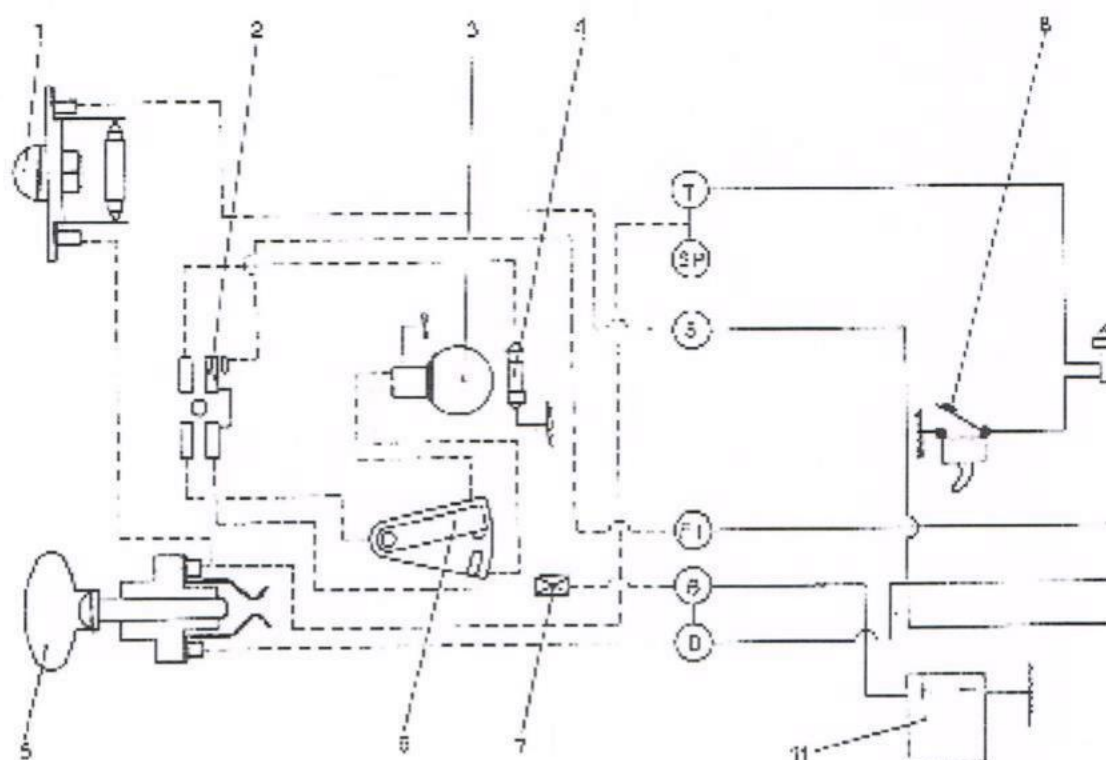


Figure 27

1 Battery Warning light	7 Fuse	D
Dynamo		
2 Head/Riding Light Switch	8 Horn button and Direction Indicator	B
Battery		
3 Head Light	9 Horn	FT
Tail Light		
4 Riding Light	10 Number Plate Light	S
Battery light		
5 Locking Switch	11 Battery	SP
Distributor		
6 Dip Switch	12 Dynamo	T
Horn		

THAT THE SIX
ABOVE, ARE
"INSIDE" THE
SHELL

NOTE
TERMINALS,
LOCATED
HEADLAMP

Also note : Wiring shown as dotted lines signifies that the wires are located "inside" the headlamp shell whereas continuous lines indicate that the wiring is 'external'

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It is inadvisable to dismantle the plug into its separate parts.

- it is well not to change the type of plug. Remember that many problems with the engine can be avoided by using the correct plug.

Bench testing of the magneto; first test. With the standard spark tester set at 5 mm one should obtain a spark at a speed not above a 100 revs with the timing set at "fully advanced"; at a speed not above a 200 revs with the timing set at "fully retarded";

- second test at compression. At a speed of 3000 revs the sparks between the electrodes of the plug mounted
- in a compression chamber must follow one another regularly whilst raising the compression up to 5 atmospheres and at fully advanced.

DYNAMO & BATTERY

Removing the dynamo from the engine: see page 20.

Inspection

DYNAMO (DN 19 G 30/6-2000 D).

Check the state of the brushes. These must run freely in their guides. If they are dirty they must be cleaned and if worn replaced.

- The state of the commutator. If it's blackened clean it with petrol (never use paraffin for this job). It is unwise to use sandpaper if it is very fine grain. If the commutator has deep grooves it is advisable to trim it on a lathe.
- the armature ball races require lubrication only at very long intervals. Dismantle the rotor and fill the ball races with special mineral grease.
- -The calibration of the automatic voltage regulator must be done on a test bed and it is unwise to vary it.

Cables

Check the outside especially where the metallic and the isolated parts run. See if there are faults and replace the cables.

Headlight. (FMN 150).

It is waterproof; which renders practically superfluous internal inspection. Note that the reflective surface of the beam unit must not be cleaned because it can be easily scratched and lose its reflectivity.

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MAGNETO PINION
HALF-TIME PINION

CAM PINION

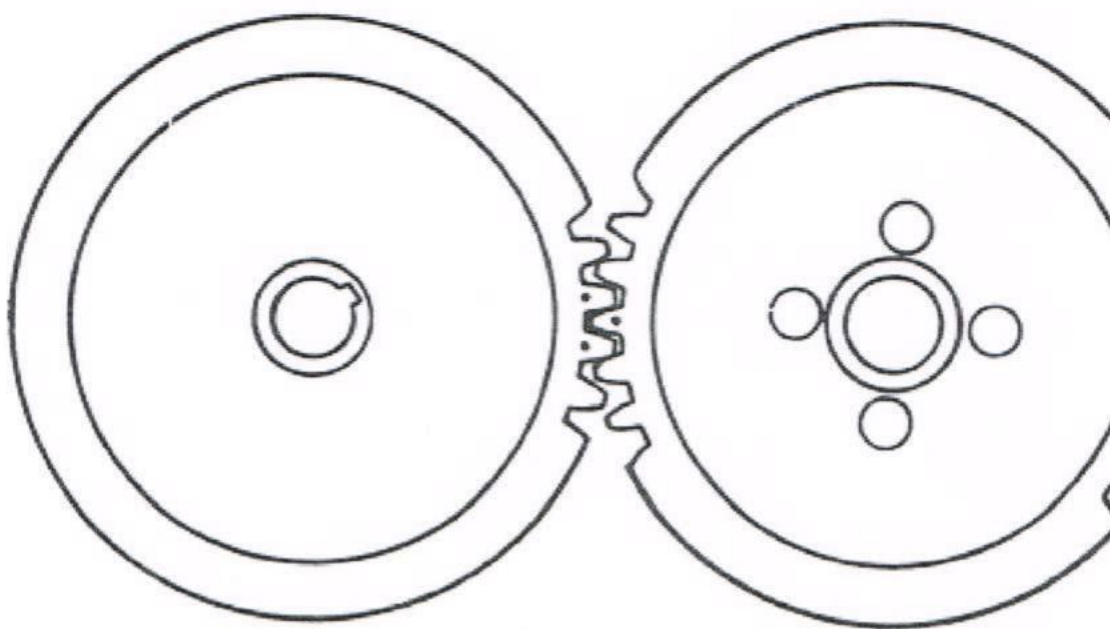


Fig. 28

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Focusing. It is fixed; the focus is accomplished by the filament in the bulb.

Bulbs. Use bulbs of the same size and type as those fitted of 25/25 watts.

Dip-switch

Lubricate the dip-switch placed on the handlebars and the movement of the switch placed inside the headlight.

For good functioning of the headlight it is necessary to check if at the 2 extreme positions of the lever in the switch they correspond with the electrical contacts inside the headlight. If not regulate the sheath via the tightener placed on the outside of the headlight.

This refers to the Marelli FMN 150 headlight. On the headlights S.I.E.M. and E.C.I. the dip-switch does not require adjustment it being electrically set.

The horn - regulation of the sound.

With prolonged use of the horn it can happen that, either by adjustment of some parts or by the the wearing out of others the sound is not that as when firsts used and it must, therefore, be regulated. After having checked that the battery is fully charged, with a screwdriver go behind the horn and proceed with the regulation of the sound adjusting the round-headed screw on the left side of the support. This screw has the taper under the knurled head, such that, turning it to the right or the left, a clicking of teeth will be heard. Remove the screwdriver, it will stay in the position set producing the best sound.

BATTERY

Carry out a careful cleaning especially of the top and check there are no cracks. Remove the caps and check the levels and the density of the electrolyte (with a suitable densitometer). If the battery is efficient the electrolyte should have a density

of 28 BE in each cell if not recharge it. The level must be about 1 cm above the plates, when low, add distilled water. This operation must be carried out with greater frequency in summer (about every 30 days) while in winter carry it out every 50 days. It is wise to keep the terminals and the top of the battery clean and dry. It is a good idea to grease the threaded part of the terminal with vaseline.

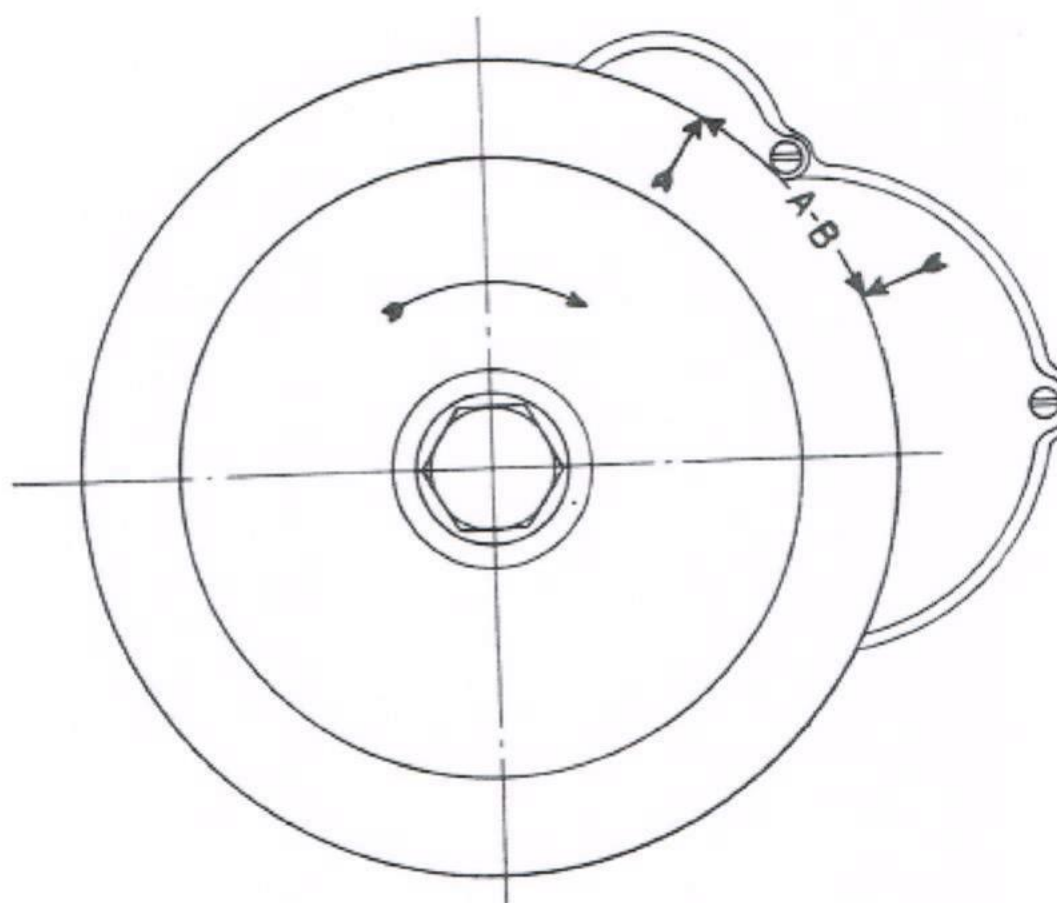
NB. - If the battery doesn't maintain its charge take it to an electrical workshop equipped with all the tools necessary for taking it apart.

Diagram of the electrical connections.

See figure 27

The conductors shown as continuous lines are the external ones, the dotted lines are those inside the headlight.

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$$A = \text{mm. } 55 \div 60$$

$$B = \text{mm. } 109 \div 111$$

Fig. 29

THE INLET VALVE OPENS
THIS POINT
AT THIS POINT (B.T.D.C.)

IGNITION OCCURS AT
(B.T.D.C.) ON THE

COMPRESSION

WITH THE PISTON COMING
ADV. / RET.

UP ON THE **EXHAUST** STROKE
FULLY ADVANCED

JUST OPENING)

STROKE - WITH THE

LEVER SET IN THE

POSITION (i.e. POINTS

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The six terminals with the letters D - B - FT - S - SP - T (are found in the inside of the headlight) they are connected respectively; the terminal D to the dynamo (51) the terminal B to the battery, The terminal FT to the number plate light, the terminal S to the dynamo warning light (61), the terminal T to the horn.

If the facilities are available it is a good idea to check the functioning of the dynamo. Here are the new settings; Power 30 watts. Auto-regulation of the voltage is between 6.3 to 7.3 according to the level of charge and of the temperature (up to +50°) with respect to the ambient temperature Charging starts at 1000 revs.

Normal power at 1900 revs. Maximum output at 5500. Clockwise rotation. Ratio of engine to dynamo 1:1.32.

Normal assembly of the Engine

In order to assemble the engine first place the groups as were obtained during normal disassembly.

At this stage, do not fit the cylinder head or the flywheel or the timing cover; these will be fitted after having put the bottom half of the engine into the frame. Replacing the timing cover is the last operation to carry out and must be done after having fitted the engine. Check the mating surfaces of the gear box cover, the cover etc. (?) that they are clean and smooth Before re-fitting them, apply an even coat of sealant.

Timing the Engine

The following operations must be carried out, after having refitted the complete

engine.

VALVE TIMING (first operation)

- Remove the spark plug then adjust the rockers such that the play is 0.20 mm (= 8 thou) for both valves.
- When the arrow on the flywheel is 55-60 mm. measured on the periphery of the flywheel from that marked on the cover (see figure 29 A), the inlet valve must start to open. Setting the inlet valve opening point automatically sets the closing point. Ditto for the exhaust settings, being on a common cam.
REMEMBER THAT VALVE TIMING IS CARRIED OUT ON THE EXHAUST STROKE !

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When there has been no replacement of timing gears the timing is facilitated by the signs marked on the teeth of the gears. Set the piston at top dead centre before fitting the timing gears. The marked tooth of the crankshaft ($\frac{1}{2}$ time) pinion must be between the marked teeth of the gear of the camshaft and the tooth marked of this latter must go between the marked teeth of the magneto gear. (see fig. 28)

Adjustment between rockers and pushrods

Adjustment in carried out on a cold engine.

Using the special box spanner (provided) and a screwdriver, loosen the nut and tighten or loosen the slotted screw which acts upon the cap of the pushrod. In adjusting do not leave play (?) taking care that when removing play the screw doesn't press on the cap of the pushrod. Having made the adjustments hold the screw firmly and tighten the nuts.

NB. – These tappet clearances are set on the compression stroke with the piston at top dead centre with both valves closed.

IGNITION TIMING (second operation):

When the piston is coming up to compression (approaching top dead centre) with valves closed and the ignition lever in the fully advanced position, the contact breaker points must start to open at a point on the flywheel periphery which is 109-111 mm from the arrow cast into the primary cover. The firing point therefore, at full advance, takes place at 45 degrees before TDC.

REMEMBER THAT IGNITION TIMING IS CARRIED OUT ON THE COMPRESSION STROKE !

Testing the Engine

Having carried out the general check it is always wise, where possible, to bench-test the engine. If the piston has been replaced and the cylinder reamed one must run in the engine, that is let it run with little use of the brake for about three hours using a regime of increasing the revs from 800 to 2.500. Briefly try maximum power; at 4.300 revs one should obtain free run-in HP 18-18.9. It is strongly recommended not to

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overload the rebuilt engine before the bike has travelled about 1500 Km and do not

over-rev during the first 500 Km in the bedding of the engine being careful not to exceed half throttle.

If you haven't got a test-bench make sure it is done on the bike keeping to the advice mentioned above.

It is recommended to change the oil and to wash the filters well after the first 500 Km.

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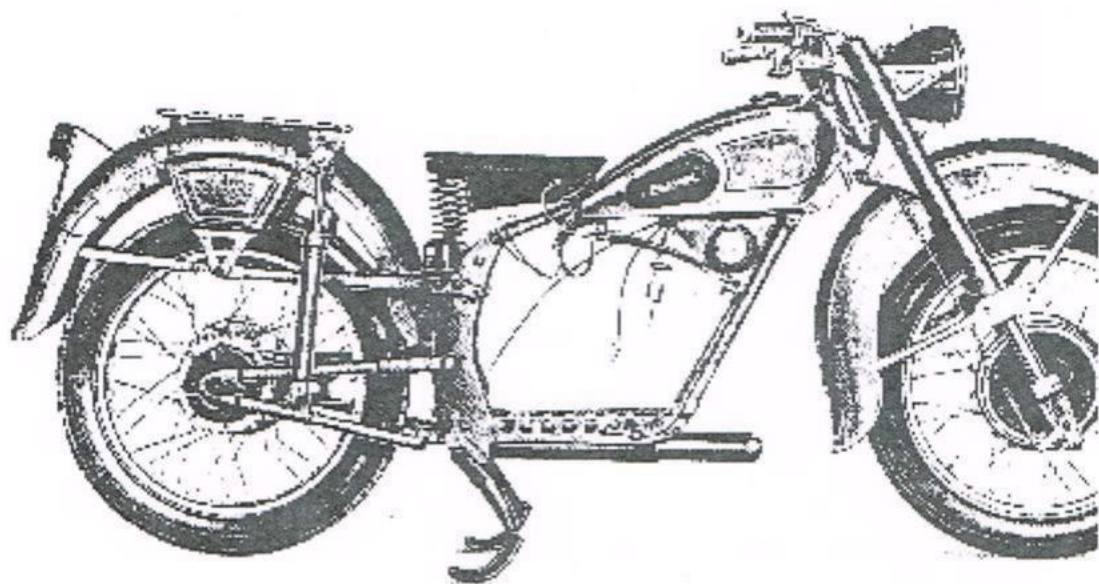


Fig. 30 - Complete frame ready for dismantling

FRAME

Dismantling of the Frame

Carry out the following tasks to start the dismantling of the frame once the engine has been removed :

(see chapter "Removing the engine from the frame" and fig. 30)

Remove the saddle and the battery after having slackened the respective fixing bolts

Remove the petrol tank. Having removed the filter and slackened the fixing bolts the tank is lifted off.

Remove the oil tank slackening the two fixing bolts after having detached the return pipe.

Dismantling of the rear part of the Frame

Remove the rear brake rod undoing the small bolt that fixed the swiveling joint on the pinion of the swinging arm and the pin that fixes the brake rod to the brake lever.

Remove the rear wheel undoing the nut of the central hub on the right and sliding the axle to the left. (To dismantle the wheel see page 90).

Remove the dampers undoing the four acorn nuts, the shaft that joins the shock absorber and anchors the brake.

Remove the shock absorber U-bolt, the panniers the tool boxes with the respective frames, the rear light, the mudguard and the two rear forks.

Dismantling of the Rear Spring and Swinging Forks

Remove the cap of the spring cover undoing the locknuts and the wing nuts on the two stay rods of the suspension.

Remove the nuts of the main pin of the swinging arm.

Undoing completely the pin itself (by using the appropriate spanner) it slides out to the right.

In this way one can remove the complete swinging arm and the integral stay rods.

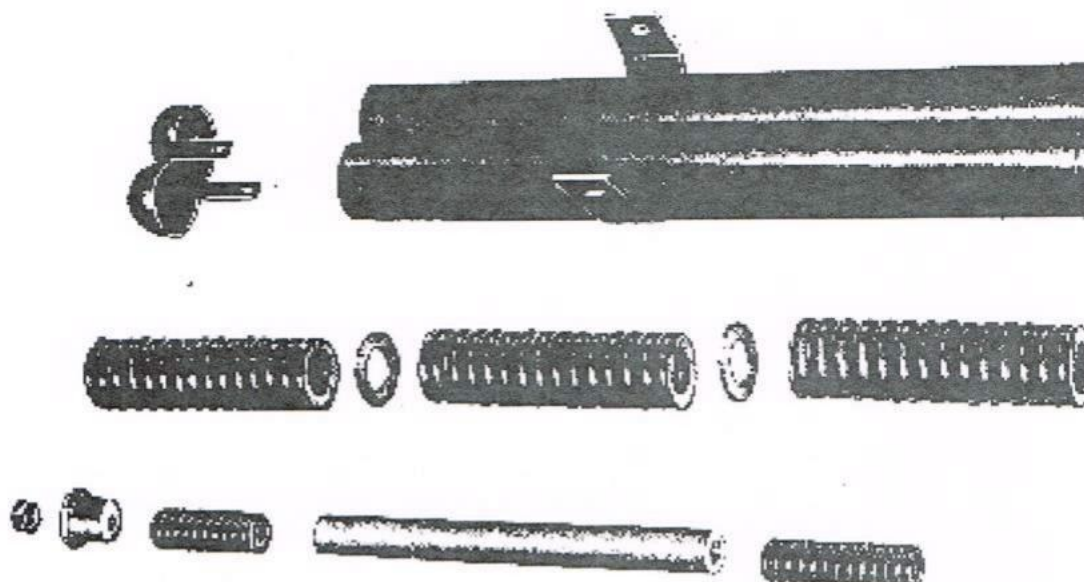


Fig. - Spring tube: exploded view

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Slide out from the forks the two tie rods, remove the covers and the axles of the suspension extracting them sideways.

Loosen the two bolts that fix the spring covers, removing them and slide out from these the inside of the suspension (see fig. 31).

NB. - *Check* the exact order in which each piece comes out to be able then to reassemble them exactly. For the servicing and fixing see page 98.

Dismantling of the Telescopic Forks (see fig. 32)

Remove the headlight unscrewing the two fixing bolts, it can be removed with all the cables and dip-switch.

Slide out the internal parts of the fork. To do this unscrew nut No. 1, the cap of the cover No. 2, remove the spring, No. 3 and (using the special box spanner) unscrew the ring nut No. 4; then slide out the internal parts slowly having care to let drip the internal liquid of the arm where it is contained before removing the parts completely.

Remove the wheel. To do this remove the front brake lever cable, removing the pin and the ???.

Remove the four bolts and the lower part of the left clamp (to dismantle the wheel see p 88)

Remove the forks from the steering by removing the two attachment bolts.

Remove the forks sliding the arm No. 5 pulling it with one hand and at the same time turning it slowly. Be careful not to spill the liquid contained at the same time.

In order to remove the mudguards from the forks and the inside of the housing one must:

Remove the attachment bolt from the upper part of the mudguard and the four bolts No. 6 on the housing, one can then remove the mudguard and the two plates, No. 7 unscrew from the cover No. 8 of the housing the two screws, having removed the cover together with the pin no 12, now remove the eccentric pin no 9, the spacer No. 10, the roller no 11, and the sliding block no 13.

To remove the spring no 14 and the ring No. 15 one must unscrew the three bolts No. 16 that hold the upper guide. Remove these pieces from the upper part of the fork.

NB. - the dismantling is the same for both tubes.

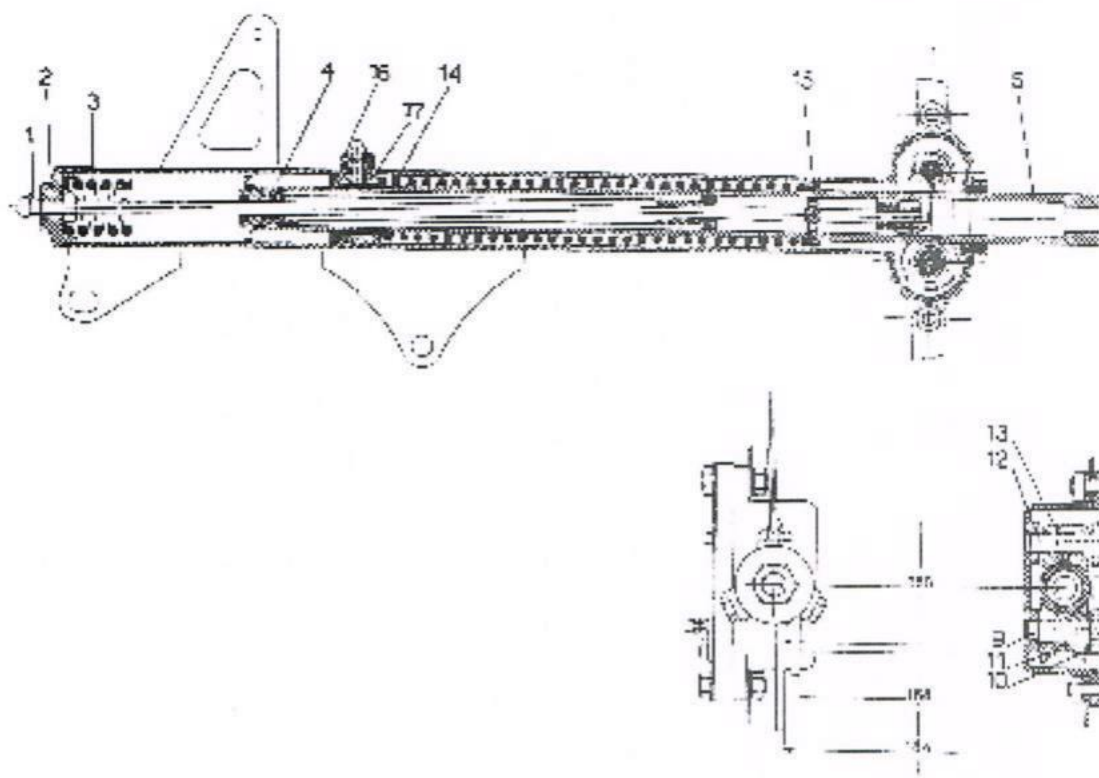


Fig. 32 - Inside the telescopic fork

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Dismantling the Rear Shock Absorbers (see fig. 33)

Unscrew the plug No.1 and slowly slide out (to avoid spilling the liquid) the complex formed from the body No. 2 and the shaft No. 3 with the mounted piston.

Remove from the tube with two fingers the internal cylinder No. 4, before doing this it is well to pour out the fluid from the shock absorber.

Dismantling the Steering Gear

*Remove the headlight dipper switch and the horn button from the handlebars.
Remove the handlebars by dismantling the two clamps holding it.*

Remove the damper knob of the steering adjuster unscrewing it completely and the nut of the of the steering head

Loosen the nut that tightens toe head of the steering. With light blows of a wooden mallet on the base of the steering, alternately right and left one withdraws the steering blank from the head of the steering gear. Having done that one can easily withdraw the complete group from the steering pipe.

Note: immediately remove and count the support balls of the caps that, no longer held, could fall. There are 18 ¼ " balls in the upper part and the same amount in the lower race.

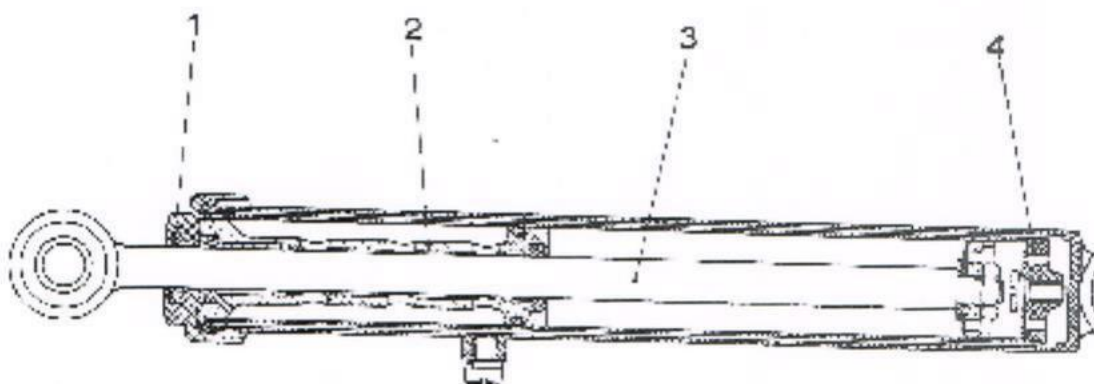
Remove the supporting stand by removing the two fixing bolts and unhooking the

return spring.

Dismantling the Front Wheel Hub complete with wheel

Fix in a vice the central spindle of the wheel on the opposite side from the drum. Unscrew the nut that holds the brake fixing then remove the disk, the spring holding the spring holding the gland, the washers and the gland itself. Remove the wheel from the vice and put it on the other side. Undo the nut holding the dust cover and remove the cover. Unscrew the locking nut and the bearing adjustment nut, remove the felt holding spring, the washers and the felt. Again remove the wheel from the vice and with a lead mallet hit the central axle on the opposite side from the from to extract from the hub the axle and bearings.

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Inside the rear shock absorbers

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Dismantling Rear Hub complete with Wheel

Remove the brake disc. Fit the perforated axle on the drum side into a vice, then unscrew the nut holding the bearing. Remove the wheel from the vice and with a lead mallet hit on the threaded part of the perforated axle to remove it; then remove the spring holding the felt, the washers, the felt and the bearing. Unscrew the threaded ring part of the drum that holds the bearing from the hub. Remove the ????? by dismantling the 4 holding bolts and the brake drum by removing 5 holding bolts.

Overhaul and Assembly

Warning the overhaul can be normal or accidental. The first is carried when the machine is given a general service, and is particularly concerned with the wear between the fixed and moving parts (bronze bushes, pinions etc.); the second is carried out independently from the first, following a violent impact; some parts may

have been deformed. This will be explained under normal servicing and the amount of checking that must be done, always assuming it is possible, the squaring of the bent parts.

Telescopic Forks

Inspection.

After having dismantled each part (see page 86) proceed as follows:

Forks

Check the measurements of the centre of the tubes and of the attachment flanges (see fig. 32).

Gaskets

Clean and check all the gaskets, check whether they have lost their perfect retaining elasticity, if they are worn or broken. If so replace them.

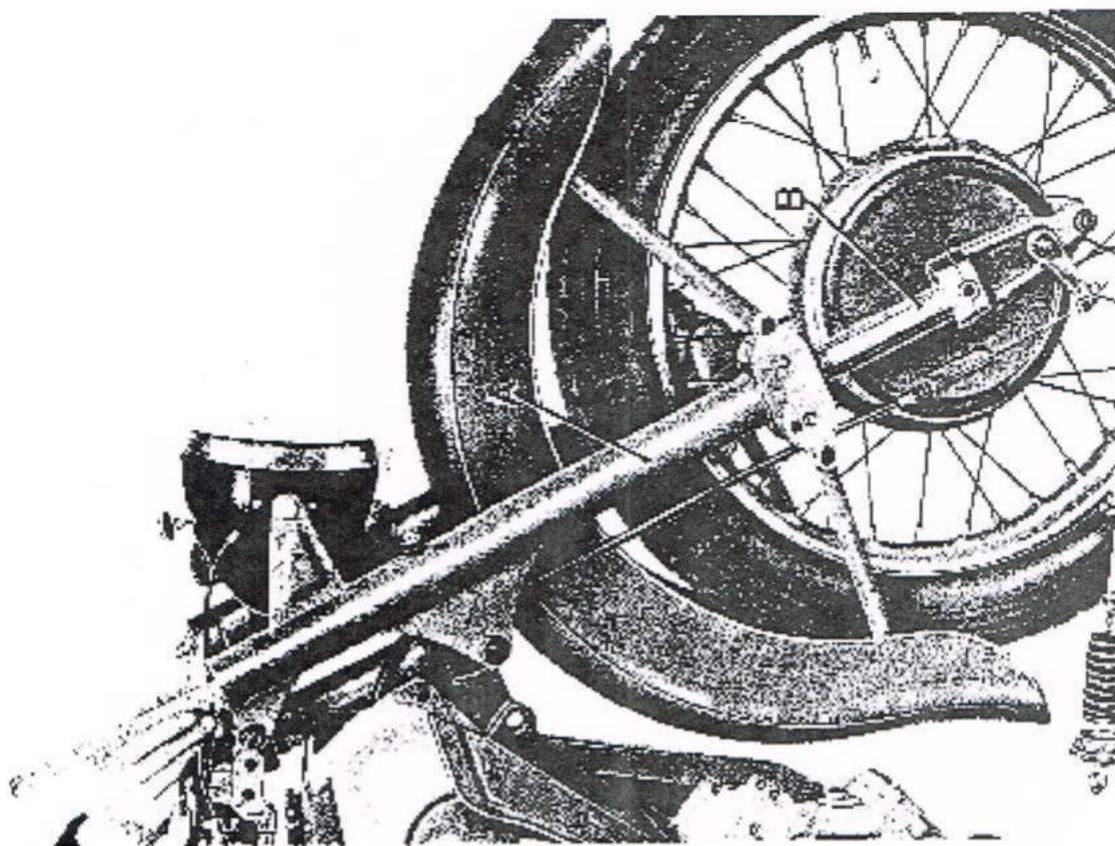


Fig. 34 - Checking the fluid level in the telescopic fork

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Springs

When new the unloaded fork spring is 310 mm long and needs 49 Kg to shorten it to 247 mm. Check the load; if less than 42 Kg. replace.

The supplementary unloaded fork spring when new is 74 long and needs 74 Kg. to reduce it to 65 mm. Check the load; if less than 63 Kg. replace.

Top fork bearings

Check the bronze bush of the top fork bearing, they must be free of scratches, cracks etc.

Check the play between the fork (?) and its bush. Such play must not exceed 0.3mm. If otherwise replace the bush.

The wheel forks.

Check the upper part of the fork where the bush is; it must have a play not more than 0.3 mm. Check the lower part of the fork where it runs between the sliding block and the roller; if there is scratches or light wear it will be necessary to return the arm to $\varnothing 30 -0.10$ by straightening. If the wear is more than that above it must be corrected to $\varnothing 30 \text{ b } 8 -0.160 - 0.193$ then, by means of thick chrome plating and straightening return the fork to $\varnothing 30 \text{ h } 8 0 -0.0.33$. If the scratches or the wear are deep replace the fork.

Sliding blocks

If the surface which slides against the fork is ridged or baldly worn replace it.

Rollers

Check that the surface which slides against the fork is not worn that some flats have not formed; if they have replace the roller. Check the play between the eccentric

pinion and roller; it must not be more than 0.2 mm; if it is replace the roller.

ASSEMBLY

To assemble reverse the process of dismantling.

Warning

Check that all the gaskets are in perfect condition; see fig. 32 how to fit them.

Check the spring bearing ring (see fig. 32 No. 15) Place the flat part against the spring. In mounting the sliders and rollers take care when mounting the thickness is turned towards the inside of the box and the spacer (see fig. 32 no. 10) is mounted towards the outside.

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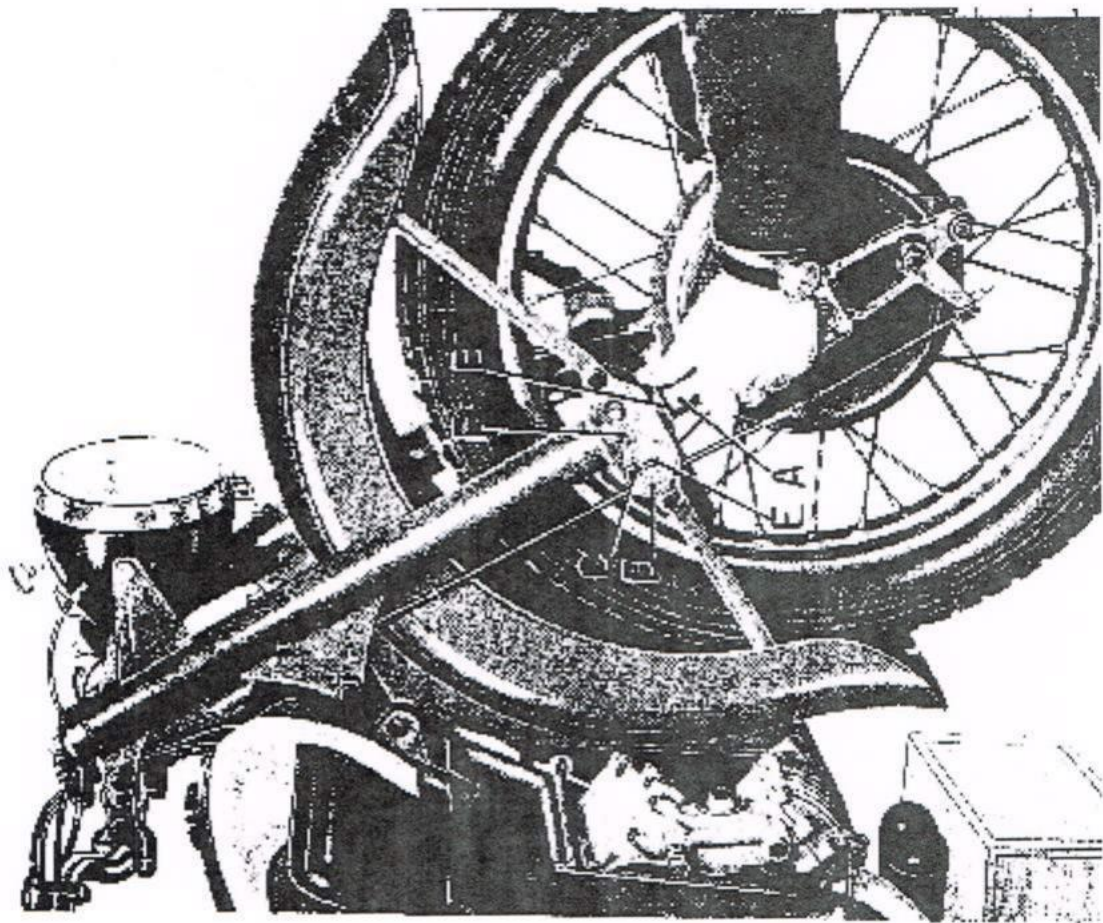


Fig. 35 - Adjusting the telescopic fork

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After having fitted the cover of the box, putting a finger in check that the rollers turn with normal play. If the roller is blocked or has too much play the spacer must be replaced with another spacer thicker or thinner than the original.

Insert the two forks and fix them temporarily by closing the rollers. Put the forks on the frame, the mudguards and the wheel. Having done this put the shock-absorber fluid in; to put it into the sliding arms B (see fig. 34) it is wise to use a piece of suitable tubing to such that the liquid is not spilt between the running arm B and the inside of tube A. Check the level of the liquid which must be 26/28 cm. measured

from the inside bottom of are B. The use of SHELL Donax A 1 special shock-absorber liquid is recommended. After inserting the body of the shock-absorber C remember to fit the ferodo ring on the guide.

After having completely fitted the fork it must be now checked (see fig. 35) check the play between the running arms, sliding blocks and rollers. To do this the front of the machine must be lifted enough to free the wheel from the ground. Then take hold of the two forks A, with care place the thumb of each hand on the lower border of the Box B and at the same time in the sliding fork A to feel for eventual play. Adjust the forks in the following way; loosen the bolt C on the disc of the guide roller D and with a suitable spanner turn the head of the pinion E clockwise for the tight fork and the opposite for the left fork. Enough to take the adjustment roller of the fork that is being adjusted to eliminate play completely. Under these conditions the fork A cannot slide between the roller and plate. Turn the head of the pinion E in the opposite direction such as to move the disc D 3 or 4 mm. measured on the edge of the disk itself. To get this measurement it is necessary to make a mark between the disc D and the cover of the box F before carrying out this movement. Having adjusted this tighten the bolt C on disc D checking as above and as shown in fig. 35 that there exists a minimum play between forks, plates and rollers, however so as not to stop the movement. It is absolutely necessary to keep the forks well adjusted, because if there is any noticeable play, forks, plates and rollers will be worn making every following adjustment difficult with consequent unsatisfactory functioning. Remember to lubricate the forks with SHELL Retinax C D grease.

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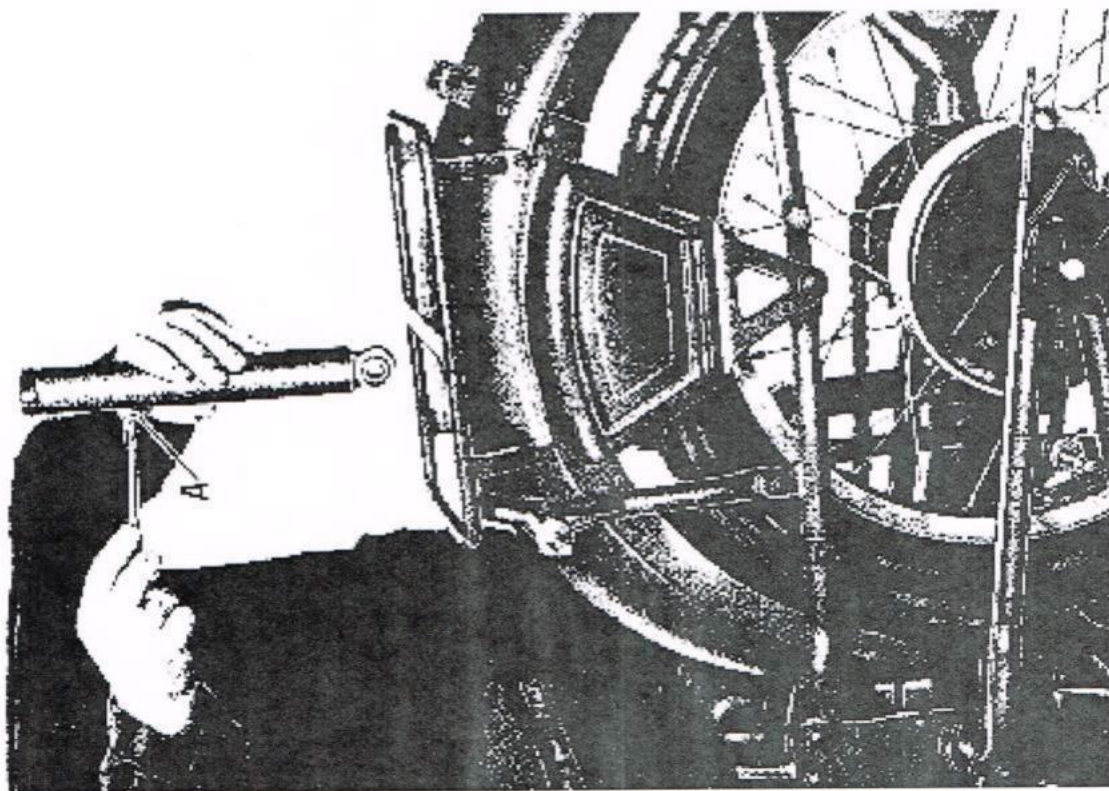


Fig.36 - Checking the shock absorber fluid

REAR SHOCK ABSORBERS

Inspection

Having dismantled each part (see chapter "dismantling the shock-absorbers") proceed as follows:

Gaskets.

Clean and check all the gaskets, see if they have lost their elasticity and their ability for perfect retention and if they are worn or broken.

Piston

Check that there are no lines and that the play between the piston and the cylinder is not more than 0.2 mm; if it is replace the piston.

Control Shaft

Check that the bronze bush for the shaft is not lined and that the play between the bush and the shaft does not exceed 0.1 mm; if it is replace the bush.

ASSEMBLY

After having mounted the internal cylinder (see fig 33 no 4) pour the fluid into the shock-absorber. To verify the level (see fig 36) you will need to remove screw A on the external on the tube of the shock-absorber and pour in the fluid until it comes out of the whole. It is recommended to use SHELL Donax A1. After having assembled the shock-absorber check that the shaft B of the piston slides to the end.

Warning

Check that the retention of all the gaskets is perfect. See fig 33 how they must be assembled.

CENTRAL FRAME

DISMANTLING

See chapter "Dismantling the frame"

Inspection

Check the play between the steering shaft and the tube. This play and the existing one between the balls and the caps (two upper and two lower). If you find either in the top or in the bottom play exceeding 1 mm replace the caps and the balls.

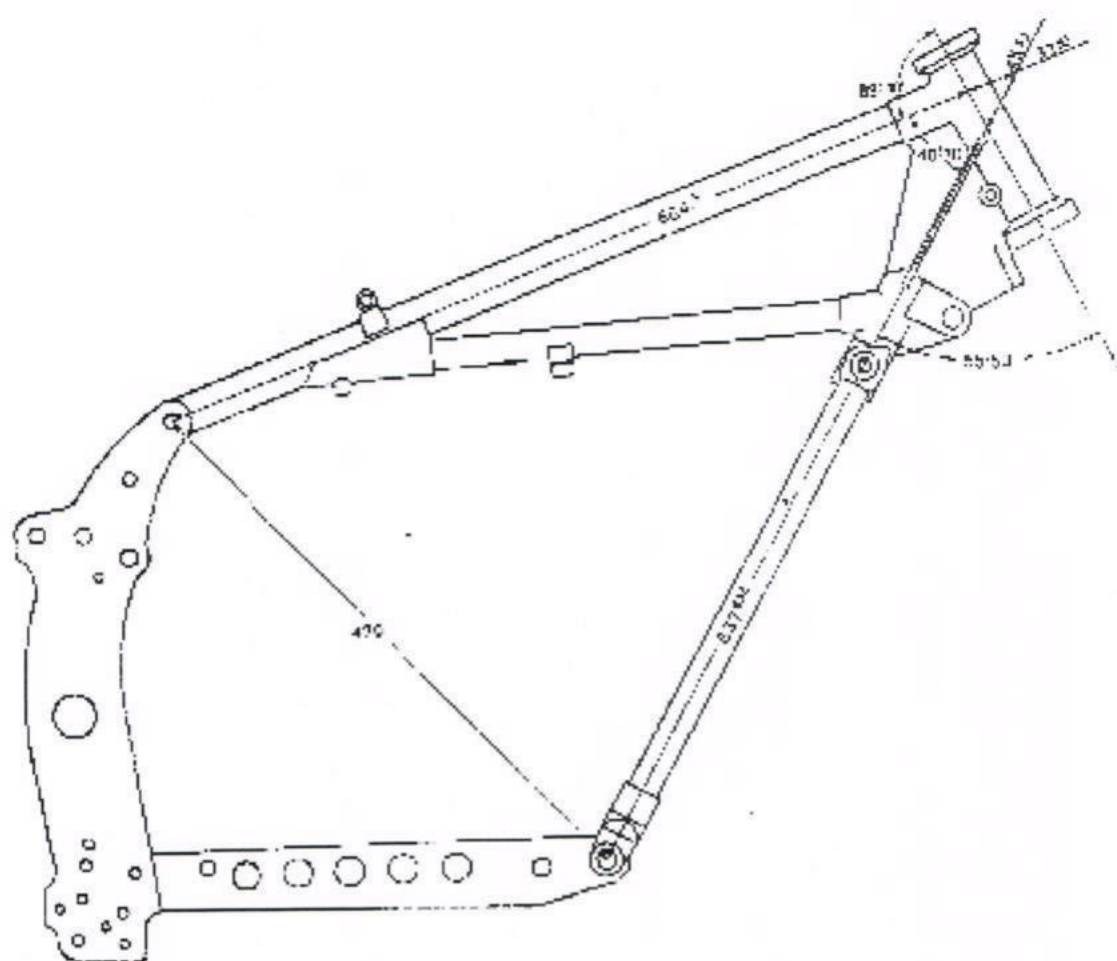


Fig. 37

Advice; to make fitting the balls easier smear grease on the bed to hold the balls (18 upper and 18 lower).

(The following recommendation does not appear in the ASTORE manual, but is well worth heeding

THERE IS A GOLDEN RULE WHEN ASSEMBLING BALLS IN THE STEERING COLUMN "CUP AND CONE" SETS WHICH APPLIES TO ALL BIKES – SEEMINGLY REGARDLESS OF MAKE : -

To avoid problems caused by steering column bearings that appear impossible to adjust correctly it is absolutely essential to pack each "cup and cone" pair fully with ball bearings **and then remove one ball from each race.** Only then will you be able to achieve perfect, hands-off steering after you've carried out the correct, standard adjustment procedure).

(Dave Thomas, Bristol, England)

Steering damper

The steering damper must be regulated according to road conditions and speed. Check the play between the pinion of the oscillating forks and the bearing. It must not exceed 0.15 mm. Fig. 37 gives the main measurements of the frame. Having to check the frame after an impact, it must be placed on a flat surface to check all the marked measurements.

It includes a fixed part and an articulated part of the central frame.

In the fixed part of the central frame note: mudguard, saddle, fixed arms etc, all these parts do not require particular attention except the condition of the paint.

The articulated parts include the oscillating forks with swivel points and stay rods.

DISMANTLING see page 84

If it is necessary to replace the tie rods or the entire forks it is unwise to remove swivel point between the two parts.

Oscillating forks

For checking the measurements of the swinging forks see fig. 38.

Swivel points

Fill with grease after fitting.

NB. - for this process it is not necessary to dismantle the swivel point.

Tie rods

Check the condition of the threads at the ends.

Check that they are straight.

They are two long internal springs (15 coil), 4 long internal springs (12 coil), 2 intermediate internal springs and 2 short internal springs.

Check that they are not broken; below are the lengths and the loads.

Long springs (15 coil).

The length of a new piece unloaded is 161 ± 1 mm requiring 216 ± 5 Kg to reduce the length to 145 mm.

Long springs (12 coil)

The length of a new piece unloaded is 161 ± 1 mm requiring 130 ± 5 Kg to reduce the length to 150 mm.

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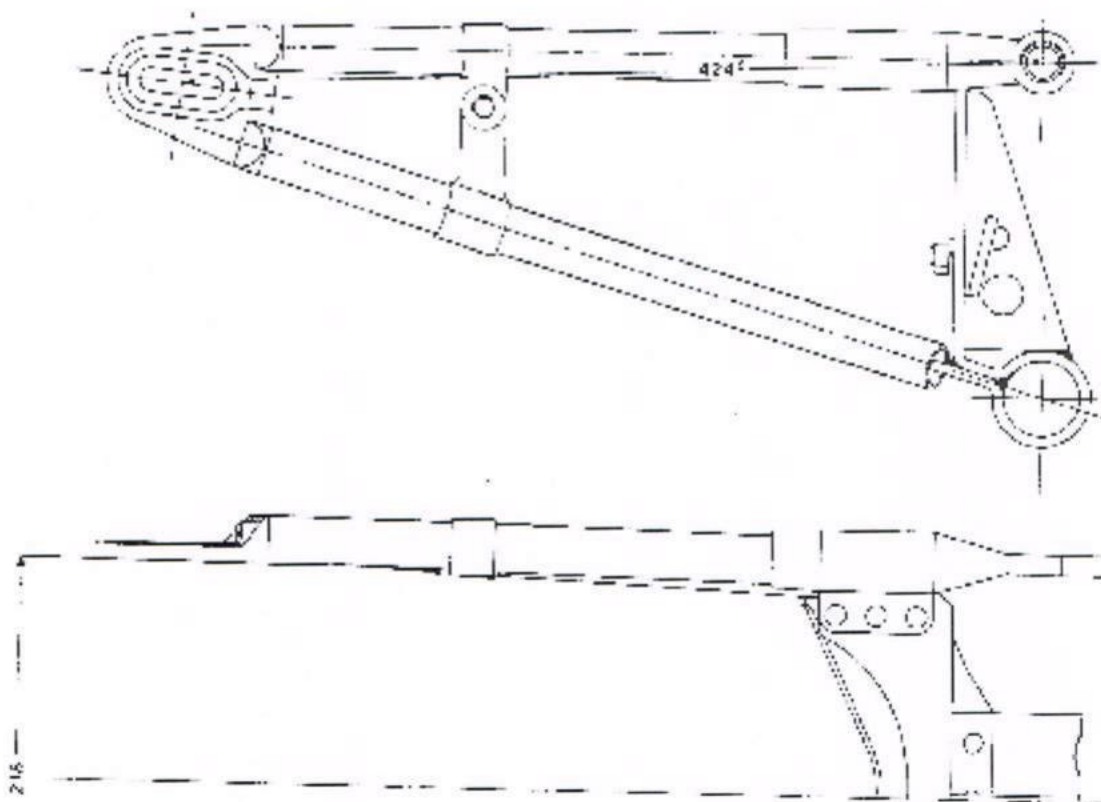


Fig. 38

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Intermediate springs

The length of a new piece unloaded is 87 ± 1 mm requiring 84 ± 5 Kg to reduce the length to 80 mm.

Short springs

The length of a new piece unloaded is 75 ± 1 mm requiring 108 ± 5 Kg to reduce the length to 70 mm.

Tolerances

To the measurements above allow about a 5% load lower than when new.

ASSEMBLY

For the spring set, for the forks with tie rods and swivel points reverse the operation of dismantling.

Warning: In order to fit the spring pack it is necessary to compress the springs to about 31 mm on both sides, keeping the bike on its stand and therefore with wheel raised.

WHEELS, BRAKES & HUBS

After having dismantled each part (see page 88 - 90) proceed as follows:

Inspection

check that the rim does not have dents or cracks. If so replace it.

- if there are broken spokes or threads damaged, replace them. when fitting new spoke one must check the centering of the wheel.

To do this proceed as follows:

- fit the front fork in a vice, fit the wheel and spin it checking the displacement at the periphery radially and axially (lateral).
- To correct radial displacement you must tighten or loosen the spokes (right and left) diametrically opposed to the point of maximum displacement.
- To correct lateral displacement you must tighten the right spokes and loosen the left (or vice versa).

Brake drums

Check that there are no deep grooves. If so replace it.

Check that the internal surface (where the brake lining works) is centered with respect to the axis of rotation.

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Brake shoes

Check the state of the lining material.

Front brake

The thickness of a new piece is 4 mm. If reduced to 3 mm replace both segments.

Rear brake

The thickness of a new piece is 4 mm. If reduced to 3 mm replace both segments.

Use the correct copper rivets to fit the segments to the shoes.

- It is wise to replace whenever one comes across cracks or cuts on the part.
 - when carrying out the replacement, take care to insure that the rivets are below the surface of the lining, to avoid scraping the drum.
 - check the loading of the return springs between the shoes.
 - the rear brake shoe spring must bear 60 K. when it is 125 mm long.
 - the front brake shoe spring must bear 10-12 Kg. when it is 96 mm long.
- Load tolerance 10%.

Brake adjustment

For a correct adjustment there must be play (measured at the extremity of the pedal when dealing with the rear wheel with the hand lever when dealing with the front wheel) of about 10-15 mm before the brake material makes contact with the drums.

Such play is adjusted using the adjuster which is on the right hand side of the fork for the front brake, and with the wing nut on the brake rod for the rear brake.

Hubs

The wheel hubs of the GUZZI motorcycles are sealed, not requiring lubrication except at long intervals.

For bearings see the general information on page 28. Gland; if damaged replace the parts.

ASSEMBLY

Wheels, brakes, bearings.

Reverse the operation of dismantling.

Check the order in which the various parts are fitted. Fill the bearings with grease.

Adjustment of the front bearing.

The front bearing being with conical roller bearings is adjustable.

To get back lateral play it is necessary to loosen the locknut and screw the nut as far as required for adjustment, then tighten the locking nut.

It is necessary (after having tightened the locknut) to have a little lateral play (0.01 mm); it is certain that the rollers of the bearing are not causing resistance to turning and rapid wearing of the parts.

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PAINT

The following are painted with nitro-cellulose; mudguards, petrol and oil tanks, leg shields chain cover and tool box.

The following have baked on paint: telescopic forks, frame, swinging forks, pedals, brakes, flywheel and shock-absorbers.

For small parts it is generally wise to repaint the entire part.

After having completely cleaned the surface to be painted apply, with a spray gun, antirust paint that is dried in an oven at a temperature of 90-100° for about three hours.

After this first general process, common to all the systems above mentioned, proceed with filling and rubbing down of the part. If the part is heat painted one gives a first coat (opaque colour) and let dry in an oven for two hours at a temperature of 90-100°. Then spray on the first coat of varnish and dry for about three hours at 60-70°. Then apply the second and last coat drying at 60-70° for three hours.

If the part is painted with nitrocellulose, after the application of the rust paint proceed with the filling and rubbing down and apply with a spray gun isolating mastic and leave to dry in the air for about two hours. Proceed then with the spraying of nitrocellulose, leaving it to dry in the air for about two hours after each coat.

It is wise to apply three coats of varnish for the best results; then polish rubbing with cotton wool impregnated with suitable paste prepared for such use.

TRANSFERS

The transfers with the eagle and words MOTO GUZZI are applied on the tank and the mudguards with suitable adhesive varnish (flattening). After about an hour remove the paper with a damp sponge and remove any unwanted traces of varnish with suitable solvent, then wash everything with clean water.