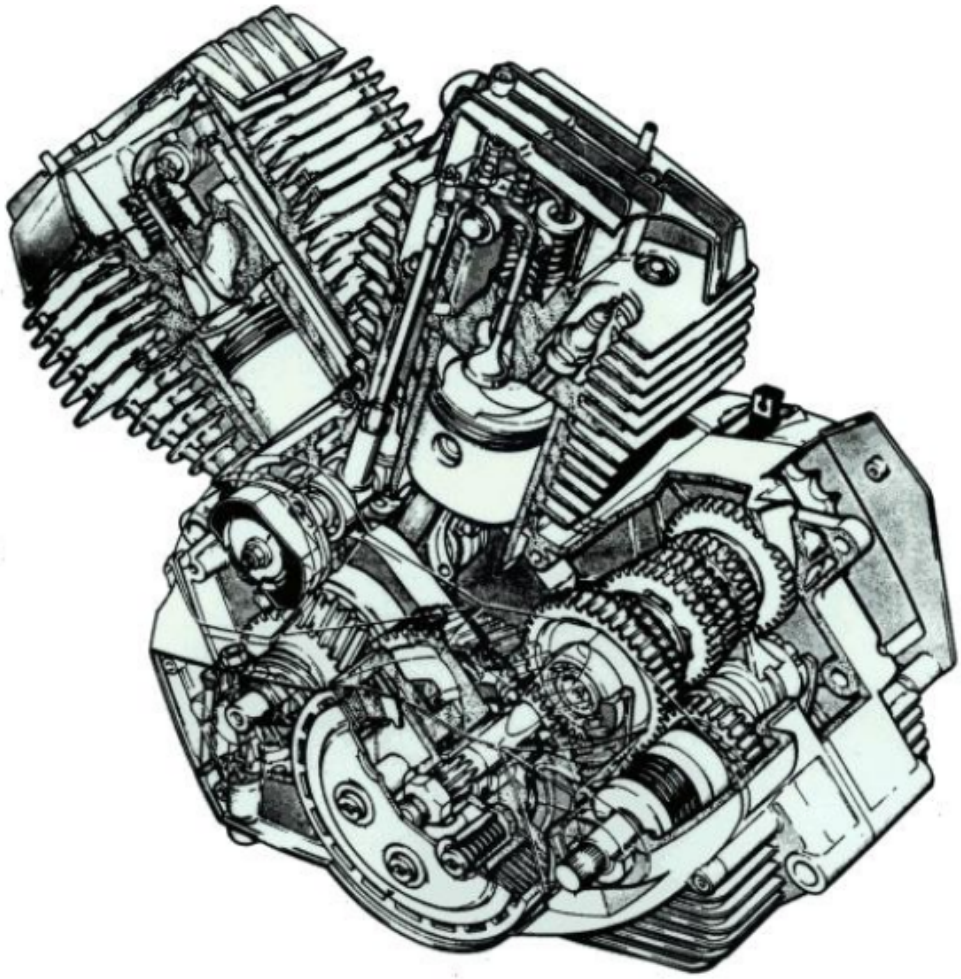
The Harglo Manual



WORKSHOP DATA

Torque Settings:

	Kgm	lbs/ft
Connecting rod bolts	3.0	22
Cylinder head nuts	2.5	18
Magneto flywheel nut	5.5	40
Gearbox sprocket nut	5.0	36
Primary drive gear nut	5.0	36
Clutch centre nut	5.0	36
Rocker trunnion nuts	2.3	15

* Piston Clearance (measured half way up thrust faces of cylinder on gudgeon pin axis): 0.10 mm. - 0.12 mm.

* Gudgeon Pin Clearance: 0.02 mm. - 0.035 mm. (Gudgeon pin drops slowly through bush)

Piston Ring Gap: 0.15 - 0.25 mm.

Oversize Pistons: Standard plus 0.2 mm, 0.4 mm and 0.6 mm.

* Big End Bearing Clearance: Initial assembly 0.025 - 0.056 mm. (Absolute maximum 0.08 mm.)

* Big End Side Clearance: 0.3 mm. - 0.4 mm.

Undersize Big End Bearings: Standard minus 0.2 mm. and 0.4 mm.

Crankshaft Main Bearing Sleeves available in various undersizes - grind crankshaft to suit (tight press fit).

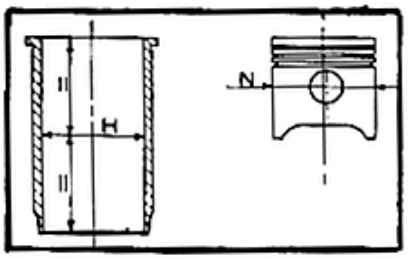
Push Rods: Front cylinder 2 mm. shorter than rear cylinder.

Valve Clearances: 0.1 mm (0.004") all valves with cold engine.

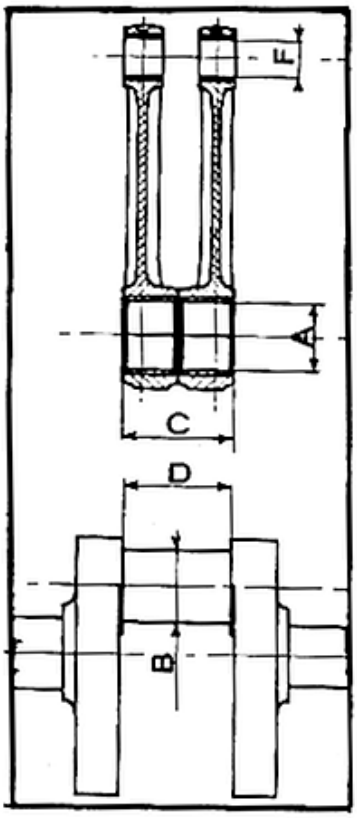
Valve Timing:
Inlet opens 12° BTDC
Inlet closes 42° ABDC
Exhaust opens 42° BTDC
Exhaust closes 12° ATDC

* Illustrated on page 3 or 4.

WORKSHOP ILLUSTRATIONS



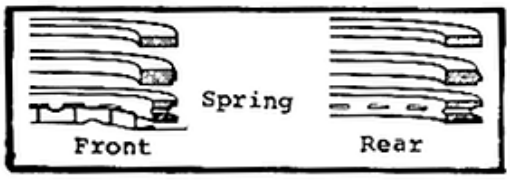
Piston clearance measured at points N - H from front to rear of piston and cylinders.



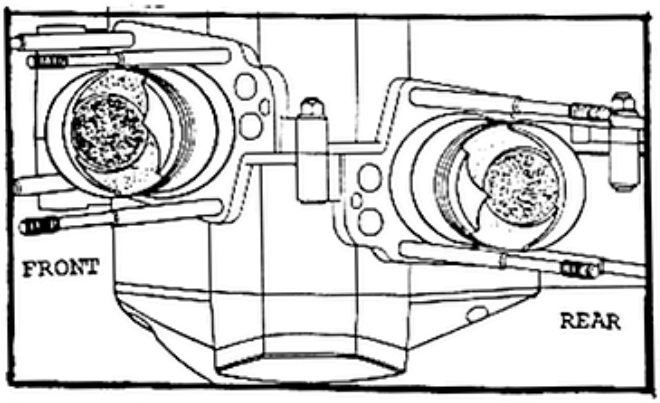
To measure "A" first tighten con rod bolts to 3.0 Kgm - with bearing shells fitted.

Note position of rods for re-assembly on crankshaft.

When checking clearance C/D ensure that journal radius does not touch bearing shell.

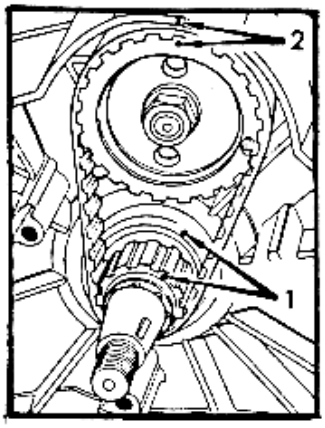


When fitting rings note position of shamfer on middle ring and spring on front piston.

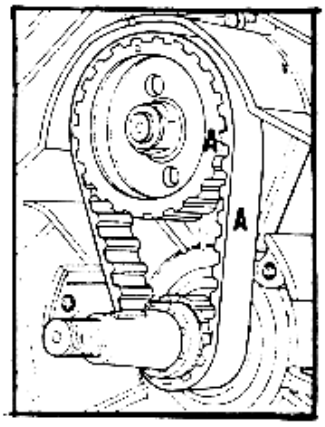


Note position of pistons for re-assembly.

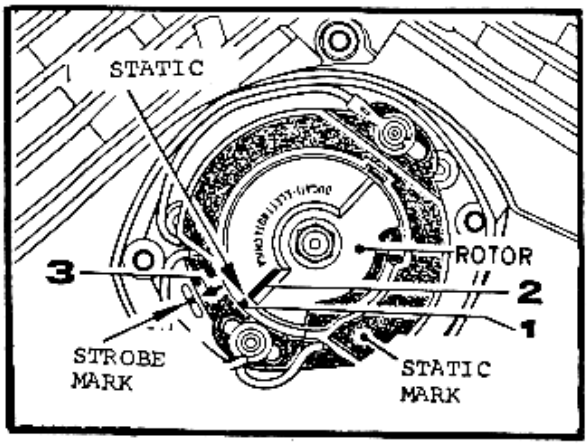
WORKSHOP ILLUSTRATIONS



Cam belt timing marks.



Belts are graded A, B and C to suit original assembly conditions. Dimensions change with replacement of either or both pinions and after a very high mileage.



Pick up markings for static and strobe ignition timing. (It is more usual to strobe check at magneto flywheel - see page 6)

ROUTINE SERVICE - MILEAGE CHART

	TASK	3000 Miles	Every 6000 Miles	12000 Miles
	Strip and clean carburettors - reset		/	
	Clean and reset plugs	/		
*	Strobe check ignition timing	/		
*	Check and adjust tappets	/		
*	Check condition of cam belt		/	
*	Replace cam belt			/
	Change engine oil and clean filter	/		
*	Check, adjust and lubricate rear chain	/		
	Adjust brakes - drum	/		
	Examine linings - drum brakes		/	
	Examine brake pads - disc brakes	/		
	Check hydraulic brake lines and master cylinder fluid level	/		
	Lubricate and adjust all cables	/		
	Grease swinging arm bushes	/		
	Re-torque head bolts - first service, then		/	
	Check all external nuts and bolts	/		
	Clean air filters	/		
	Check and adjust steering head bearings	/		
	Check battery and electrics	/		
	Check tyre pressures	/		
	Examine tyre treads	/		
	Check spokes (wire wheels only)	/		
	Change fork oil			/

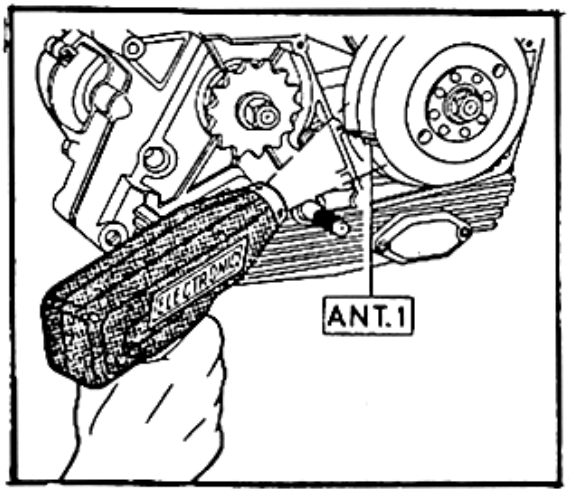
LUBRICANTS: Engine/Gearbox - Castrol GP.

Front fork - Chevron ATF or any reputable fork oil from Morini Dealers.

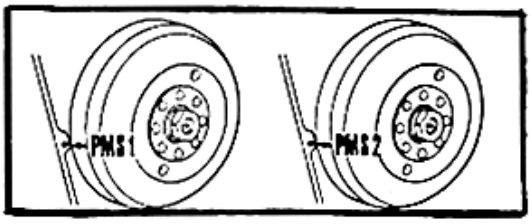
Note: In addition to the routine checks at 3000 miles items underlined require regular attention between major services. They should be checked at intervals not exceeding 500 miles or weekly.

* Illustrated on page 6.

ROUTINE SERVICE - ILLUSTRATIONS



Strobe check ignition at 6000 rpm.

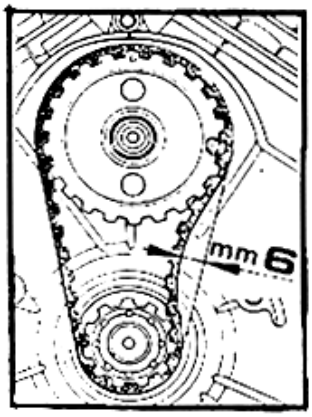


Adjust valve clearances with generator flywheel at these positions.

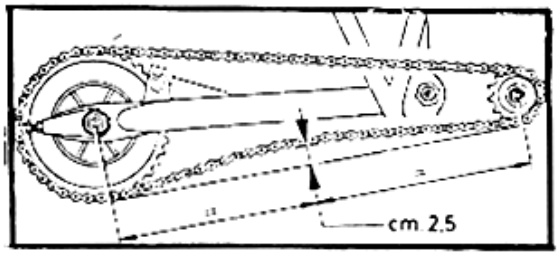
PMS 1 - Adjust front cylinder

PMS 2 - Adjust rear cylinder

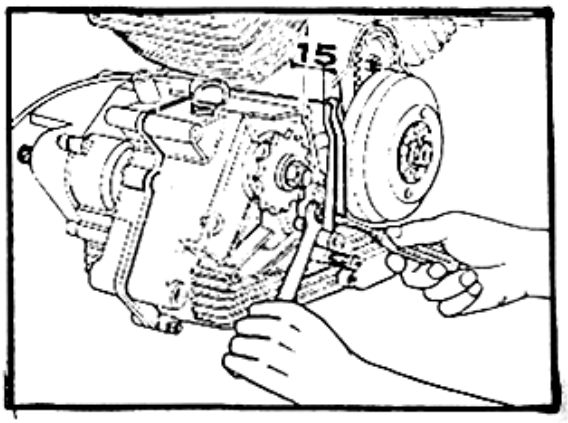
Clearances 0.1 mm. (0.004") cold.



Check timing belt - if distortion under light pressure exceeds 6 mm. replace belt.



Check rear chain tension at tightest point. Always adjust each side by same number of turns.



If clutch cable cannot be adjusted at handlebar check clearance at gearbox end.

REMOVAL OF ENGINE FROM FRAME

(With re-assembly notes)

Remove sump plug (18 mm) and drain oil into a container with a minimum capacity of 3 litres.

Remove seat. Grease securing knob screw threads on re-assembly.

Disconnect battery and store where it will not be knocked over.

Pull fuel pipes from both taps, disconnect leads to electrotap (blue to bottom connector; twin brown to top) release rear securing bands and remove two 11 mm. bolts from front of tank. Replace all rubbers on re-assembly if there is any sign of deterioration.

Remove side panels. Grease threads on re-assembly.

Remove 17 mm. bolts or rear footrests securing silencers, release both silencer clamps - 10 mm - and pull off silencers, slacken 10 mm. balance pipe clamp screws and with service tool MOR-T5 remove castellated nuts from cylinder head exhaust ports. Take out the two bronze half rings from each port. (There are two types of exhaust pipe flanges - early models were formed from the exhaust tube, whilst later models have 4 mm. collars. These call for different half rings and when ordering replacement rings the flange type must be quoted.) Remove pipes by twisting left hand pipe from head and balance pipe. (Always replace asbestos washers between exhaust flanges and cylinder head).

Remove $\frac{5}{8}$ x $\frac{3}{8}$ rear chain. Check for wear and replace as necessary - 96 pitches).

Unscrew clamp screws from air intake rubbers and pull rubbers from carburettors and filter box.

Slacken 8 mm. carburettor clamp screws and pull off carbs. These can be very tight and a twisting action will be required.

Remove two 10 mm. through bolts securing air cleaner box to frame and take off the box. Remove six 7 mm. screws holding the two halves of the cleaner box together and separate the sections to reveal two air cleaner elements (these can be cleaned in petrol but after 6000 miles replacement is advisable).

Remove right hand footrest - Strada and drum brake Sport models. On disc brake Sport models release 10 mm. clamp bolt securing gearshaft trip lever to quadrant shaft and with 8 mm. Allen key remove the footrest bolt. Take off footrest and shift linkage together.

Pull off plug leads and breather pipes. Disconnect earth wire from top rear crankcase bolt and remove short chainguard by releasing one 10 mm. bolt.

Pull two yellow, one red and one green generator leads from fuse box and tie neatly to avoid interference on engine removal.
Note - colour of red wire may not be identical to other red wires or to the colour indicated on fuse box. Take care with re-location.

Slacken handlebar end clutch adjuster and remove cable from gearbox end. Tie neatly out of the way.
(Clutch cable efficiency is vital to riding comfort as well as clutch performance - replace if in doubt about condition).

Pull red wires from transducers (No. 1 - front - cylinder is usually marked with a white band round the end of the red wire. It is possible to transfer the transducers from one cylinder to the other for test purposes but if this is done both low tension and high tension leads must be changed).

Remove four 13 mm. short bolts from front of forward engine plates and two 13 mm. through bolts from rear of forward plates.

Support engine under sump with a wide flat lever and remove two rear engine bolts. Slowly release pressure on lever allowing engine to settle onto frame tubes.

Lift engine out to right side to avoid ignition switch and left footrest/brake lever assembly.

REMOVAL OF CYLINDERS AND PISTONS

The removal sequence is as indicated by numbers on the detailed illustrations. Where replacement, adjustment or other information is considered useful it is given below against the appropriate number.

Rebuild by commencing at paragraph 62 and work in reverse reading each paragraph complete in turn.

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1. Three 5 mm. Allen screws.

3. Always clean old gasket material from joint faces and renew gasket part number 21-01-61 on re-assembly.

4. Alternative plugs to the standard AC42 XLS and 41-2 XLS are : - Champion N3 and NGK B8ES.
Always fit new plugs after a complete overhaul.
Otherwise, examine condition, clean and reset as necessary.
Correct plug gap is 0.9 mm.

5. Turn engine so that both valves are closed, i.e., there

is clearance between the rocker and valve stem, on the cylinder on which you are working. Remove four 11 mm. nuts.
Tappet clearance on re-assembly is 0.10 mm (0.004") cold on all valves.

6. Trunnion blocks are marked with a letter on the top surface. Re-assemble this way up. Check for wear on rocker faces, adjuster screws and valve stems. Replace with new parts as necessary.
Re-adjust all valve clearances on rebuilding to 0.10 mm. or 0.004" with engine cold (see page 6).

7. Push rods are different lengths. The rear cylinder are 2 mm. longer than front. Check for wear or loose ends. Replace if in doubt.

8. Mark cylinder No. 1 (front) or 2 (rear). Four 13 mm. nuts per cylinder.
Re-torque to 18 lbs/foot (2.5 Kgm) on re-assembly.

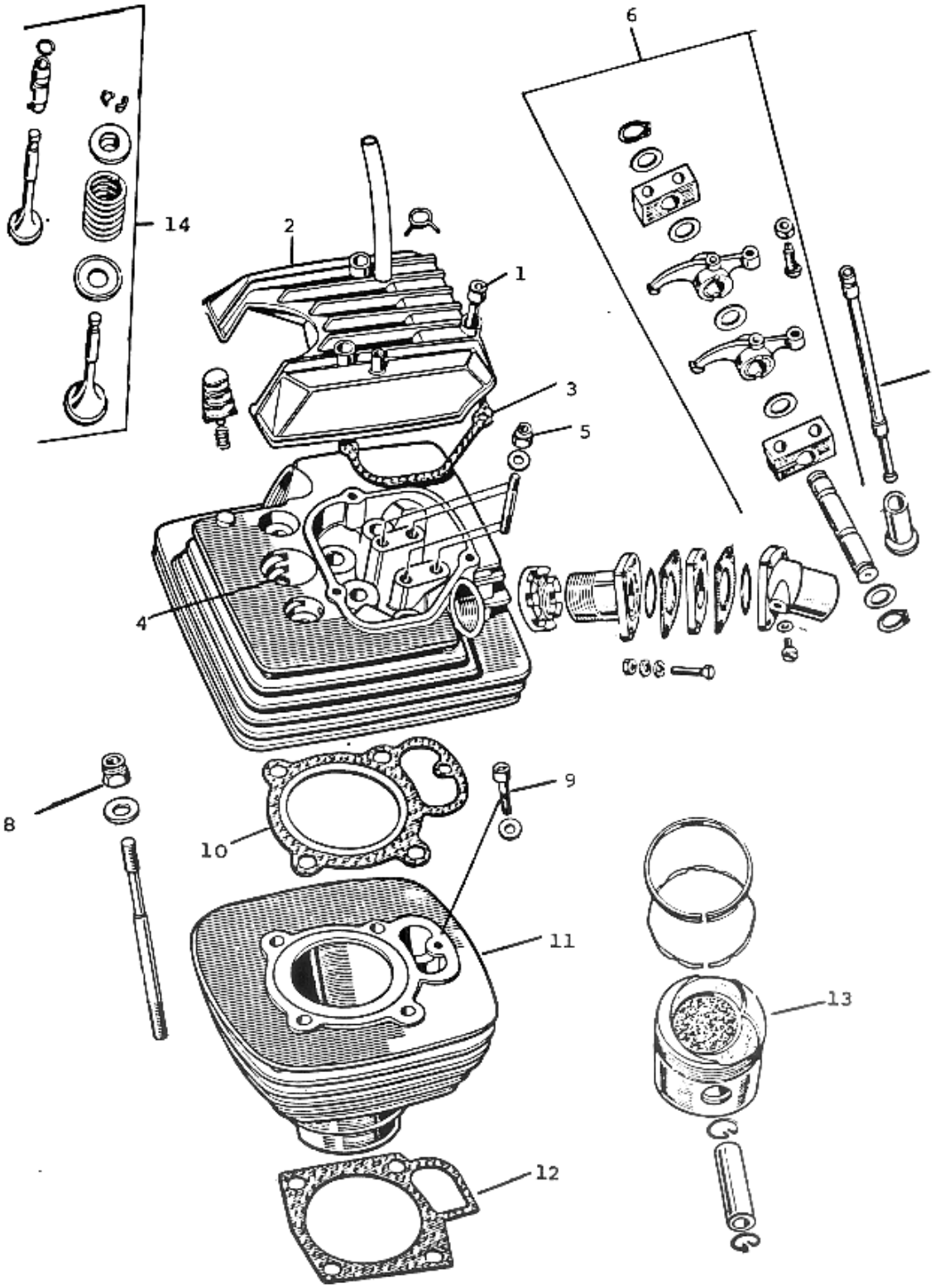
9. One 5 mm. Allen screw. Re-tighten to reasonable limits using standard 5 mm. key.

10. Always renew head gaskets 21-01-60 on re-assembly. Fit with wide copper circle uppermost.

11. Support piston as barrel is removed. Plug crankcase hole with clean rag before proceeding.

12. Clean old gasket from both faces. Renew gasket 21-01-59 on re-assembly. Mark piston to identify cylinder from which it was removed.

13. Support piston to prevent contact with cylinder studs and to avoid strain on connecting rod. Remove circlips and tap gudgeon pin clear of small end bush and lift off piston. Examine piston for damage, signs of overheating, over-oiling, etc. White deposit signifies overheating, probably through weak mixture: sooty black indicates rich mixture: oily black indicates worn rings, valve stems or guides, or at high mileage a worn bore.
Check ring gaps by removing rings from piston and re-inserting in bore one at a time. Position ring in bore by using bare piston as plunger. Measure ring gap at bottom of bore and half way up cylinder.
Correct ring gap is 0.15 - 0.25 mm. If gap is correct at bottom but excessive at half stroke the cylinder should be carefully measured using an internal micrometer or by measuring piston clearances using an undamaged standard piston. Correct piston clearance at gudgeon pin height but measured at 90° to pin is 0.10 - 0.12 mm.
If clearance is within these tolerances new rings will correct the condition. Otherwise a re-bore is necessary.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Oversize pistons and rings are available to suit standard bore sizes plus 0.20 and 0.40 mm.
Refit pistons with "new moons" on crowns to the "outside" of the engine, i.e., to front on No. 1 cylinder and to rear on No. 2 cylinder (see page 3). Ensure that the ring gaps are at approximately 120°. Fit a new base gasket on both cylinders and carefully refit cylinders, compressing rings as they enter the base of the bore.

14. Compress springs with G clamp and release split collets. Carefully check for damage to valve seats and re-grind if necessary.
In cases of severe damage seek advice from your Morini Dealer as re-cutting of valve seats will be necessary.

DISMANTLING CRANKCASE ASSEMBLY

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a) ELECTRONIC PICK-UP

16. 11 mm. nut, right-hand thread.

17. Two 3 mm. Allen screws. The black earth wire is mounted with a washer either side of the tag. The rotating magnet pulls off by hand from two flats on the camshaft. It is possible to change the camshaft bearing seal without further dismantling. To re-time on rebuilding turn the flywheel so that ANT 1 mark lines up with the timing mark on the crankcase (front cylinder on compression stroke with both valves closed). Fit the pick-up as one unit with timing marks on rotor and stator aligned with the cover mark at 6 o'clock (see pages 6 and 4). This gives accurate static timing but it is wise to re-check with a stroboscope on final testing by ensuring that the flywheel ANT 1 and crankcase mark are correctly aligned with the engine running at 6000 r.p.m. (see page 6).

b) CLUTCH COVER AND KICKSTART LEVER

18. Four countersunk screws. Two short at the front, two long at the rear. No gasket is used, but a plastic sealant is recommended.

c) CLUTCH

19. Five clutch nuts, righthand thread, requiring a slotted screwdriver. This can be home-manufactured from a suitable standard driver by forming the end in the shape

of a square letter 'U'. Before refitting, check springs for equal pressure by selecting one as a standard and compressing with others in turn in a suitable vice. Placed end to end in the vice jaws, with a piece of thin metal between, the lengths of each spring should remain equal as the jaws close.

22. With a screwdriver knock back the overturned locking washer.

23. Remove clutch plates in sequence. There are five thick lined plates, five steel plates and one thin lined plate which is the last to be removed. Replace if oil soaked or worn on faces or splines.

24. With Service tool No. MOR-T1 hold the clutch centre and with a 22 mm. socket undo the righthand thread sealed clutch nut. Check the fit of the seal on push rod No. 21 and replace on assembly if this is not a perfect seal.
Early models had unsealed nuts - always replace with sealed type on re-assembly.

25. Located on a spline and pulled off by hand. Always use new lockwasher on re-assembly and re-check sealed nut.

26. Brass bearing. Refitted with ears towards the clutch housing. Replace if any signs of wear.
Grease lightly on re-assembly and position dogs in the screw recesses.

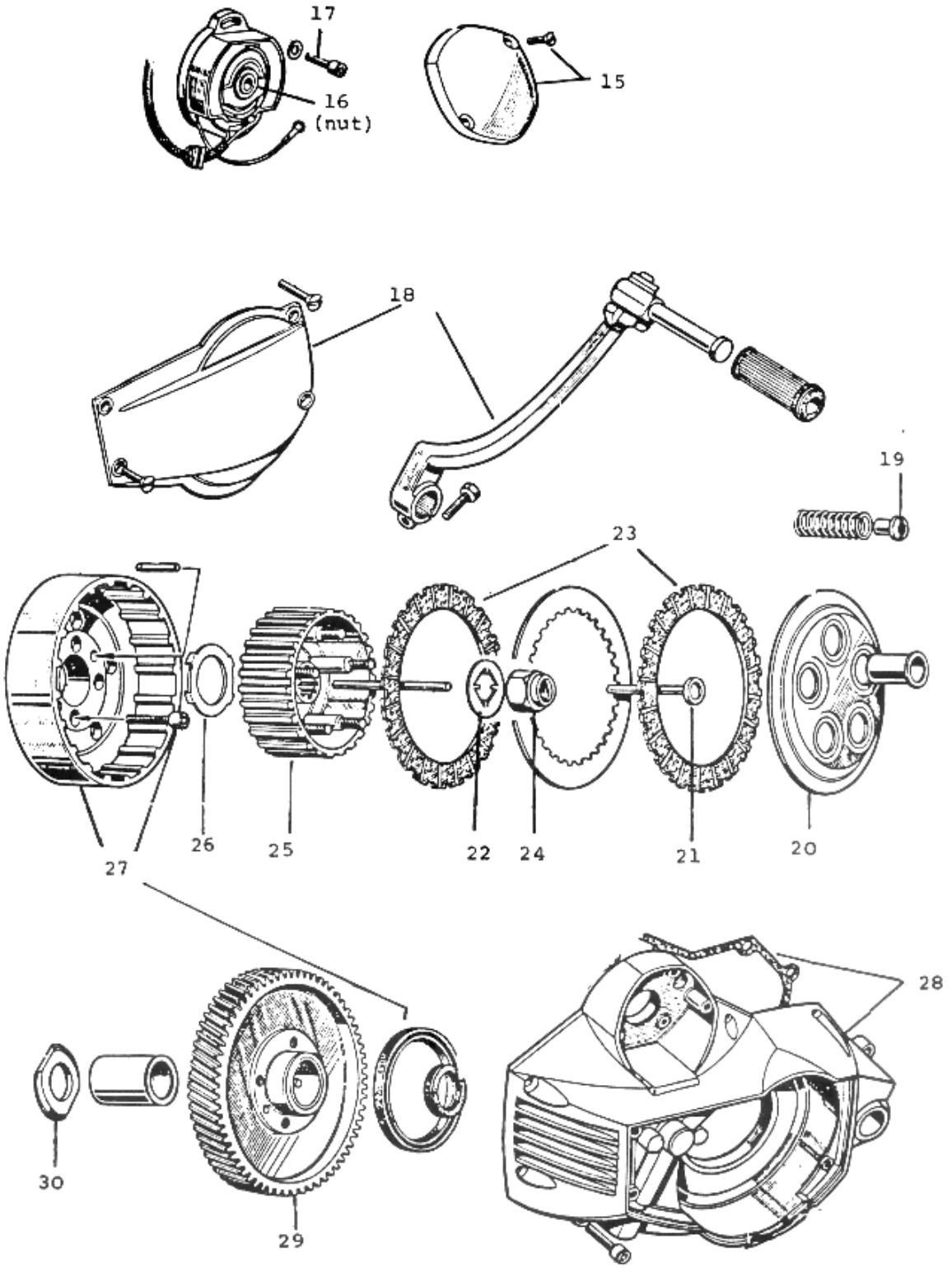
27. Four 5 mm. Allen screws hold the clutch housing to the primary driven gear which at this point cannot be seen because it is inside the crankcase cover. Two dowel pegs remain in the clutch housing. Removal of the clutch housing reveals two seals. One in the clutch housing seals the mainshaft to the housing (small). The other, in the inner cover, seals the housing to the cover (large). Both can be changed without further dismantling.

d) PRIMARY DRIVEN GEAR

28. Place an oil tin under the lefthand cover joint. Remove eleven 5 mm. Allen screws (two of which are in the pick-up housing), tap the cover with a hide mallet to break the joint. Remove old gasket by careful scraping and replace on reassembly (Part No. 21-01-58).

29. The primary driven gear can now be pulled off the mainshaft. It runs on a replaceable bush number 14-04-12.

30. Distance washer fitted with the shamfer towards the bearing.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Page 15.

e) STARTER RATCHET ASSEMBLY

31. Remove the starter ratchet assembly complete. Remember there is a small 'O' ring at the outer end of the shaft. Before refitting the starter assembly rebuild the primary driven gear/clutch housing assembly (29 - 27) in the right hand cover. This facilitates oil seal fitting and eases the "winding up" and relocation of the starter assembly. Use 4 black screws. Re-enter the starter assembly with the spring hook at two o'clock. Fit the starter lever and lubricate all internal parts including crankshaft oilways. Fit a new cover gasket and mate cover assembly to crankshaft turning the starter lever clockwise as the cover is finally positioned. This ensures location of the internal lever return stop which is a tapered "cushion" as opposed to a solid stop plate. When finally refitted the lever must rest against the external cover stop.

32. The spring stop can now be pulled out of the case. Refit with recessed pin outward.

f) OIL PUMP AND PRIMARY DRIVE GEAR

33. The green neoprene bush seals the main oil feed and must be a perfect fit. Replace (with bevel out) if there are any signs of damage. Remove the oil pump complete after undoing three 5 mm. Allen screws. Do not lose the small 'O' ring behind the pump. Damage to the gear type pump is unlikely but it can be dismantled for inspection by undoing four cheese-headed screws.
Replace the small 'O' ring before refitting the pump.

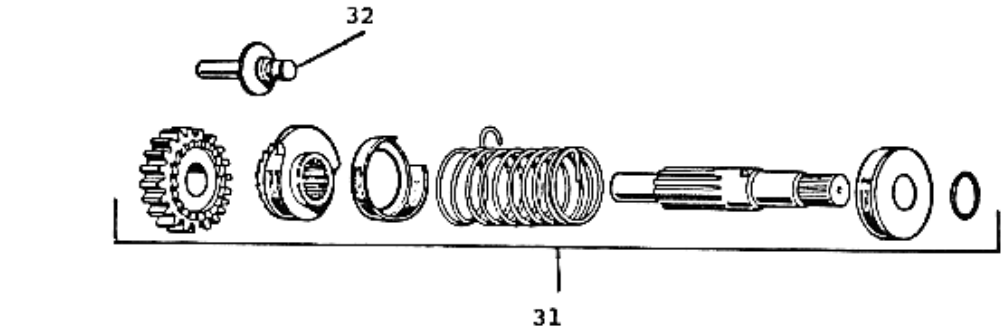
34. 27 mm. nut, righthand thread. Replacement of the nut on re-assembly is recommended. This nut may be tight and require the crankshaft to be held by Tool No. MOR-T6 whilst it is undone. If the tool is not available, place two hard wood blocks across one crankcase mouth and a suitable mandrill through the small end eye of the connecting rod. Turn slowly until the mandrill is held by the wood blocks and undo the nut. Do not use a mandrill without hard wood blocks. Refit in the same way.

35. Because the thrust faces of this worm gear "run-in" to those of the pump, it is wise to replace it in the same position. Mark the outer face and then pull off the crank shaft. There is no key or spline.

36. Distance washer assembled with bevel outwards.

37. Usually easy to remove, the primary gear is located by a large square section key. Any slight tendency to tightness can be overcome by a suitable wide lever but care must be taken in application of pressure to avoid damage to cases.
Refit with holes out.

38. There is no right or wrong way for this distance piece.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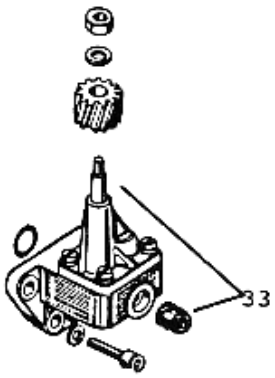
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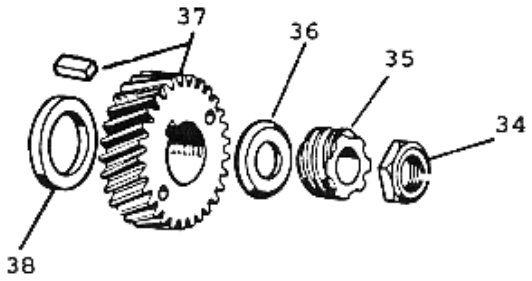
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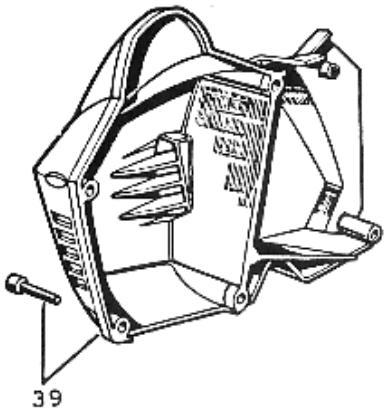
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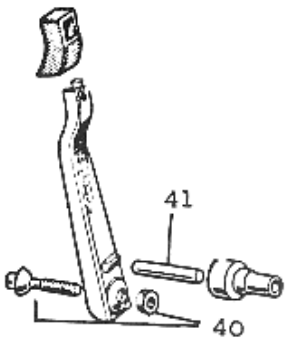
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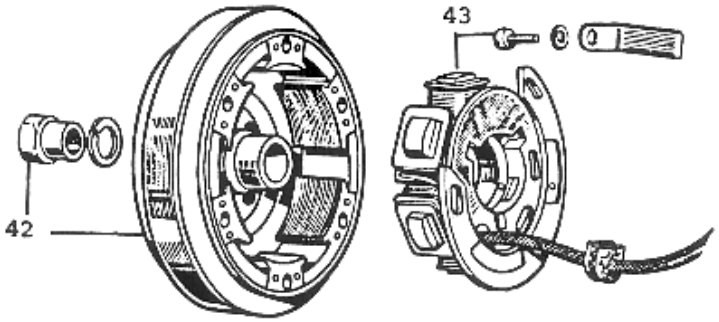
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g) RIGHT HAND COVER AND GENERATOR ASSEMBLY

39. Remove five 5 mm. Allen bolts and take off the right-hand engine case. There is no gasket.

40. There is an 11 mm. lock nut inside the clutch arm. Release this before attempting to turn the locating/adjusting screw.

41. Remove three push rods. One short (large diameter) is nearest the clutch arm and two of equal length and smaller diameter are further inside the gearbox shaft.

42. Hold the magneto flywheel with Tool No. MOR-T2 and undo the 22 mm. nut with a right hand thread. Remove magneto flywheel with extractor No. MOR-T3. Be sure to screw the body right home in the flywheel before tightening the extractor bolt, otherwise thread damage may occur.

43. Loosen three cheese-headed screws (the left top screw also holds the cable tidy strap). Before attempting to remove individual screws turn the stator so that the screw head clears the appropriate coil. Refit with wires inside the crankcase lugs and the cam drive belt clearance section properly positioned over the belt. Centralise in screw slots.

Page 18.

h) CAM DRIVE BELT

45. Remove the circlip using circlip pliers. Take off the spring and belt guide washer noting that this is fitted with the radius towards the belt.

46. Take off the cam drive belt by pulling with a pair of smooth jaw pliers whilst turning the camshaft. Belts must be replaced at 12,000 miles. If for any reason you are dismantling the engine well short of this mileage, take care not to damage the belt.

47. Use Service tool No. MOR-T4 to extract the cam drive gear. This can be extremely tight and to endeavour to remove it without the proper equipment is unwise. Fit the tool over the pinion, replace the circlip and extract the pinion using the circlip as a pulling face.
In some cases heat may be necessary for the removal of this pinion, and this must be very carefully applied.
On re-assembly, clean up the inner diameter of the cam drive pinion and push half way on after locating the woodruff key. Do not push right home as this makes refitting of the belt more difficult.
NOTE The Pinion can be assembled using any of the internal splines as a keyway, but there is only one correct position.
Pinions fitted on production are marked with a dot to indicate the correct internal spline. Some spares pinions

are not marked but the correct inner spline can be identified by cross reference to the outer spline. The correct internal spline is that which is bisected by a line following the right edge of an outer raised spline through to the pinion centre (looking at the outer face of pinion). Mark the outer spline used in identification of the inner with a dot. When the pinion is located by the key turn the crankshaft so that the dot is in line with the mark on the crankcase under No. 1 cylinder (front). Turn the camshaft so that the timing marks coincide (between the cylinders). Line up the belt letter with the letter on the driven pinion whilst ensuring that neither crankshaft nor camshaft move from their respective timing marks. Push belt and drive pinion right home (see page 4). Replace outer guide washer and spring.

48. Rotate the inner cam guide washer so that the slot lines up with the keyway and remove. Note that this washer is also fitted radius towards the belt.

49. A 17 mm. right-hand thread nut. Hold driven sprocket with Service Tool No. MOR-T6. When this nut is undone pull off the sprocket which is keyed to the camshaft.

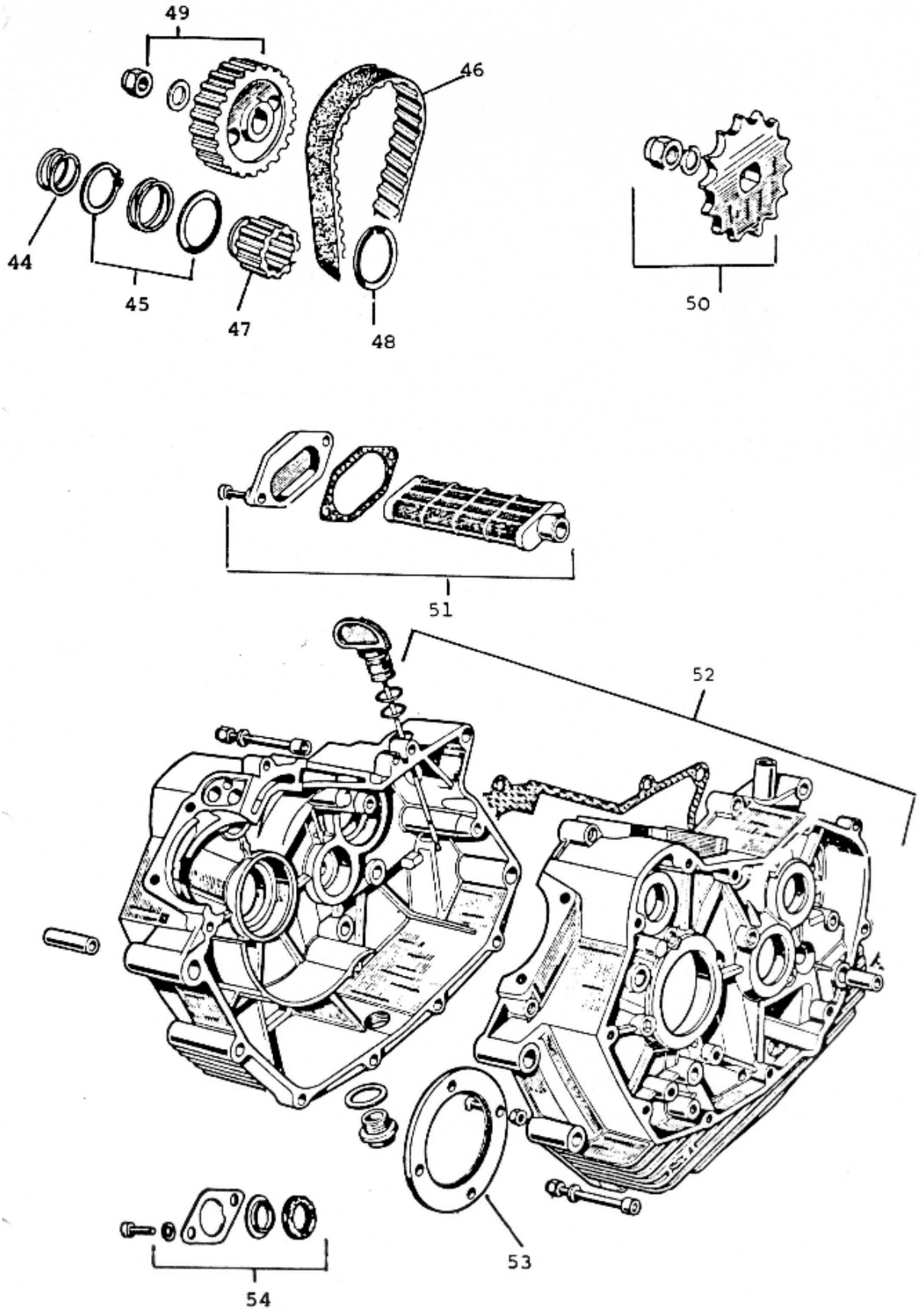
i) GEARBOX SPROCKET AND OIL FILTER

50. 22 mm. nut with a right-hand thread. It will be necessary to hold the sprocket whilst this nut is released and a chain sprocket locking tool can easily be made using a short length of old chain and a suitable piece of piping. Fit the chain inside the pipe allowing sufficient to protrude for it to be wrapped slightly more than once round the sprocket. Flatten the tube against the chain. Application of this tool will be self-evident. The sprocket is usually easy to remove. Refit with flange to the outside.

51. Two 5 mm. Allen screws. Pull out the filter, remove the old gasket and always replace on reassembly (part No. 21-01-63) Refit with wide face towards cylinders.

j) SPLITTING THE CRANKCASE ASSEMBLY

52. There are nine 5 mm. Allen bolts with 10 mm. nuts holding the two crankshaft halves together. Two of these are in recesses at the rear and the centre of the cover and they have oil sealing copper washers. Replacement of these washers on re-assembly is vital to avoid external oil leaks. Now remove two dowels, one at the top front and one at the bottom rear engine mounts. These are driven out by suitable drifts and separation of the crank cases will be impossible until this is done. Gently tap one crank case half with a hide mallet to break the joint. Lift both rear cylinder cam followers to the highest point possible, lie the crankcase on its left-hand side and lift off the right side crankcase.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The crankshaft and camshaft may or may not separate with the right-hand side case. As they are to be removed from both cases this is immaterial. There is a paper gasket between the two crankcase halves. Clean both faces very carefully as damage to the surface will inevitably result in oil leaks on re-assembly.

Always fit a new gasket on reguilding engine (Part No. 21-01-57) and apply a gasket sealant.

Before fitting the right-hand case to the left-hand case assembly ensure that the cam followers are properly located and at the top of their stroke. Once the two crankcase halves are mated drive in the two dowels (central along holes) and bolt all round, remembering the two copper washers.

At this stage check all gears by fitting the gearlever and selecting gears in turn whilst rotating the output shaft. Check free rotation of camshaft and movement of cam followers.

53. The drive side main bearing housing is located by four 4 mm. Allen screws. Remove this housing before attempting to withdraw the bearing.

54. There is a vital seal in the left-hand crankcase. The purpose, like the neoprene bush at the pump, is to ensure no loss of oil pressure between the pump and crankshaft. It is wise to replace this seal whilst the engine is dismantled.

Pages 20 and 23

k) THE CRANKSHAFT AND CAMSHAFT, AND THE GEARBOX

55. Remove camshaft from the crankcase to which it is still fitted.

56. Drive the crankshaft from the case to which it remains fitted. This must only be done with the careful application of a hide mallet as irreparable damage will be done to the crankshaft if any other tool is used.
Undo two clamp bolts in each rod to remove the connecting rods from the crankshaft. Details of the crankshaft measurements, bearing fits, etc., are given in the Workshop Data Section (page 2).
There are two drillway plugs in the shaft and whether or not the shaft is to be reground it is wise to remove these whilst the engine is dismantled. This permits the thorough cleaning of the oilways within the shaft and is an essential part of a complete overhaul. These crankshaft plugs always need replacing on re-assembly (Part Nos. 26-01-09/26-01-08).
Refit the crankshaft with careful use of a hide mallet. Replace two cam followers and position them at the top of their stroke. Refit the camshaft taking care that the cam followers do not move to obstruct its entry.

57. The right-hand side main bearing locates on a sleeve which is a separate and replaceable part. If wear has occurred on this sleeve the shaft will be a loose fit in the bearing

56A/ 57A From 1977 engines have been fitted with plain white metal bearings to support the crankshaft in the right hand case. These bearings are located by means of 3 Allen bolts (B Fig. 20A) passing through the crankcase and screwing into the steel bearing cage (57A). Copper washers (C Fig. 20A) are fitted under the heads of these screws and are essential to ensure a perfect seal. Three serations in the bearing cage allow oil which reaches the bearing through drillings in the crankshaft to return to the sump. These serations must always be at the bottom of the assembly. To ensure security of the fixing screws always use Loctite "Threadlock" on re-assembly.

It is possible to modify early crankcases to accept the white metal bearing and special workshop tools are available for this purpose. This modification will only be carried out in the event of a new crankshaft being fitted and a new oil pump driving worm (D Fig. 20A) must be included in the modification.

Latest crankshafts have three sludge trap plugs which should always be replaced by new plugs after removal for cleaning.

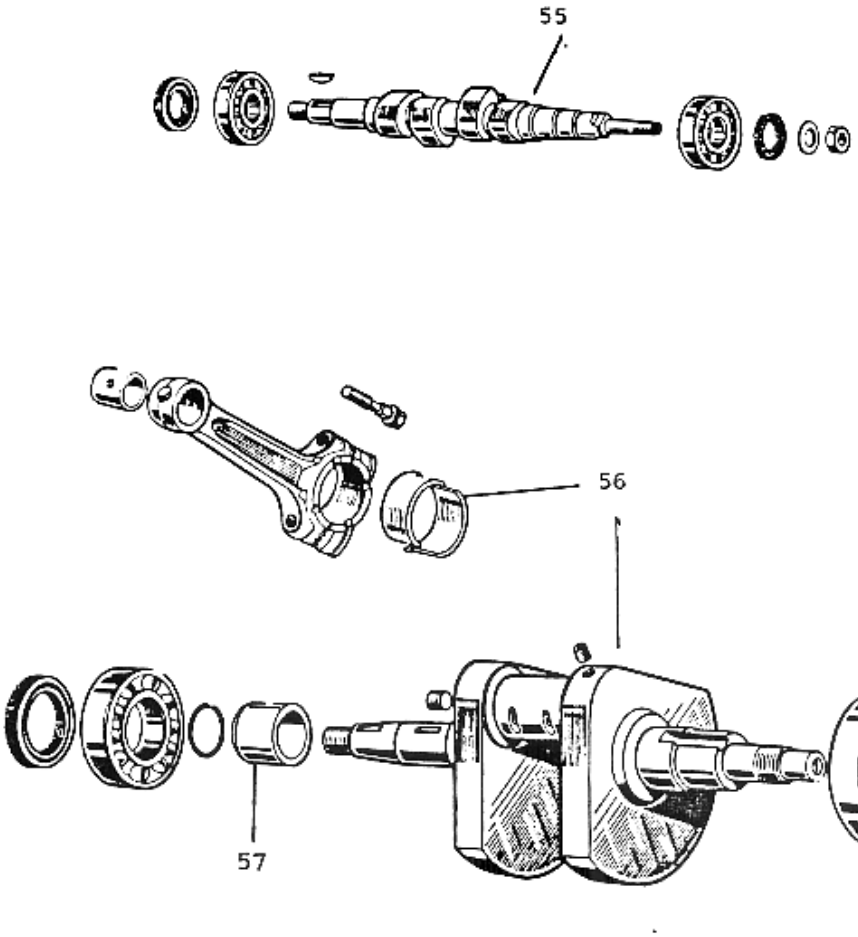
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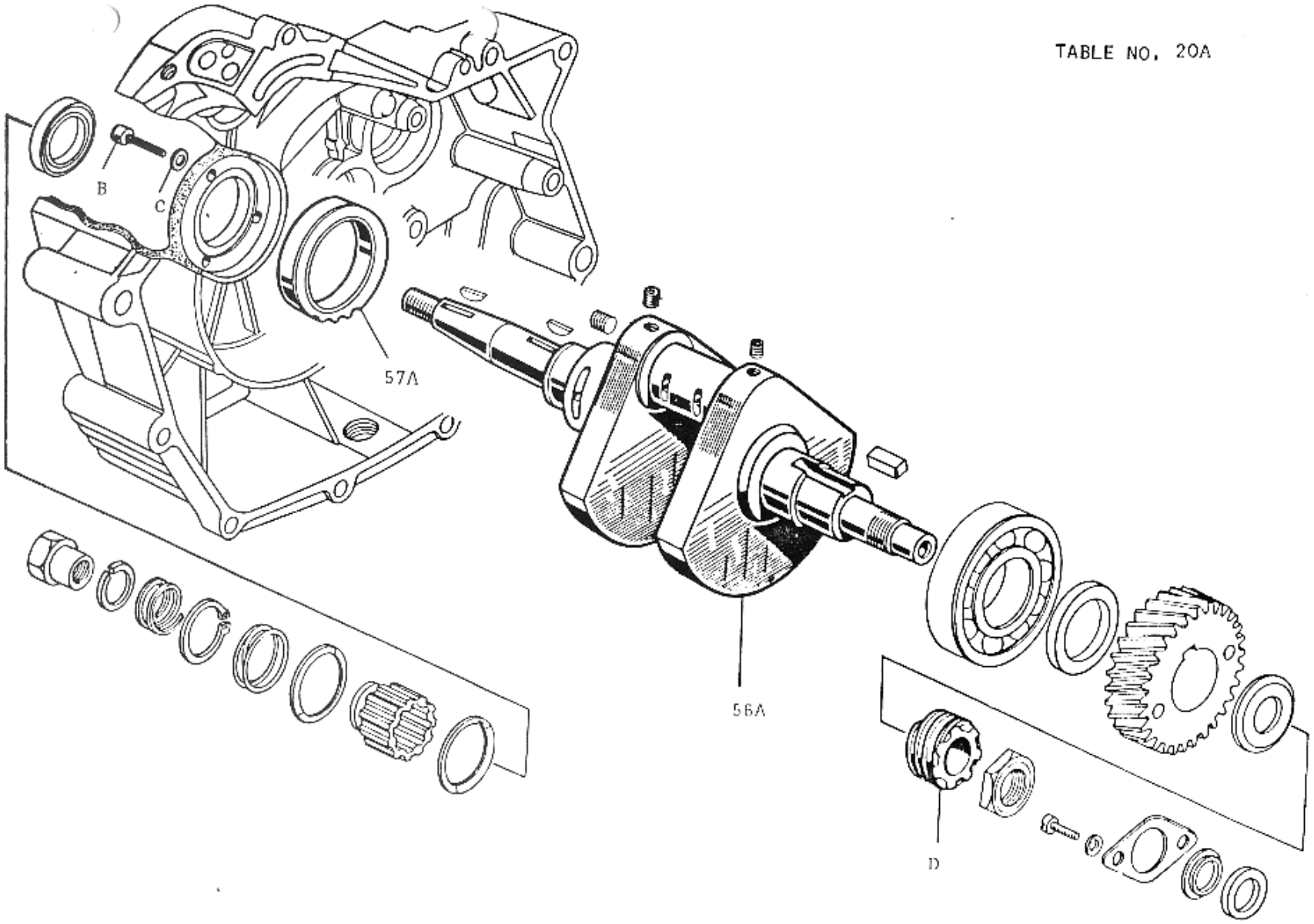
TABLE NO. 20A



and noise and further damage are inevitable. Both sleeve and bearing must be replaced in these circumstances. Replacement sleeves are undersize on the inner diameter, and the crankshaft will need grinding for a proper repair job. Shafts should be reground to permit the new sleeve to be a tight press fit.

58. Note the position of the gear index and selector springs and then remove the complete assembly from the left-hand case. The selector arms are held on by circlips. To remove the spindle from the selector block (A) first drive out the spring pin which locates in an annular groove. To remove the return spring take off the circlip followed by the spring cage.
Re-assemble as illustrated. To refit to case pull the index and selector arms apart to allow them to pass over the index cam. Ensure accurate location on the cam and selector faces.

NOTE - The long arm of the gear index spring must be located on the long peg (62). In early models this peg is plain but on later production an annular slot is ground in for positive spring location. Early boxes can be modified. Failure to properly locate the index spring will inevitably lead to poor or impossible gear selection.

59. Lift off the second gear pinions noting the position of various thrust washers.

60. Remove the remaining cluster as a complete assembly. The input shaft may be tight in the bearing, in which case tap out with a hide mallet.
Shafts can now be separated and the remaining gears taken off in sequence. Note the position of the various thrust washers and circlips so that you can re-assemble in the proper order (see page 23).

To rebuild place the left-hand crankcase, inner face up, on top of an open wooden box. Place the layshaft first gear, with its floating bush in position on bearing with dog recesses up (early models had through holes).

NOTE - a thrust washer is fitted either side of this gear and care should be taken to use those washers which just pass over the shaft. Re-assemble the layshaft following the diagram if in doubt.
Ensure proper fitting of circlips each side of third and fourth gears.
Re-assemble the mainshaft and match both assembled shafts to the selector assembly. Two selector forks mesh with sliding gears on the layshaft and one fork meshes with the mainshaft sliding gear.
Oil liberally all over and fit the sub assembly to the left-hand crankcase. Make sure each shaft mates with its bearing hole before lightly tapping the mainshaft through its inner race.
If preferred, it is possible to leave off the second gear pinions (nearest the top of the shafts) whilst the above

assembly is carried out as they can be fitted with the shafts in position in the left-hand case.

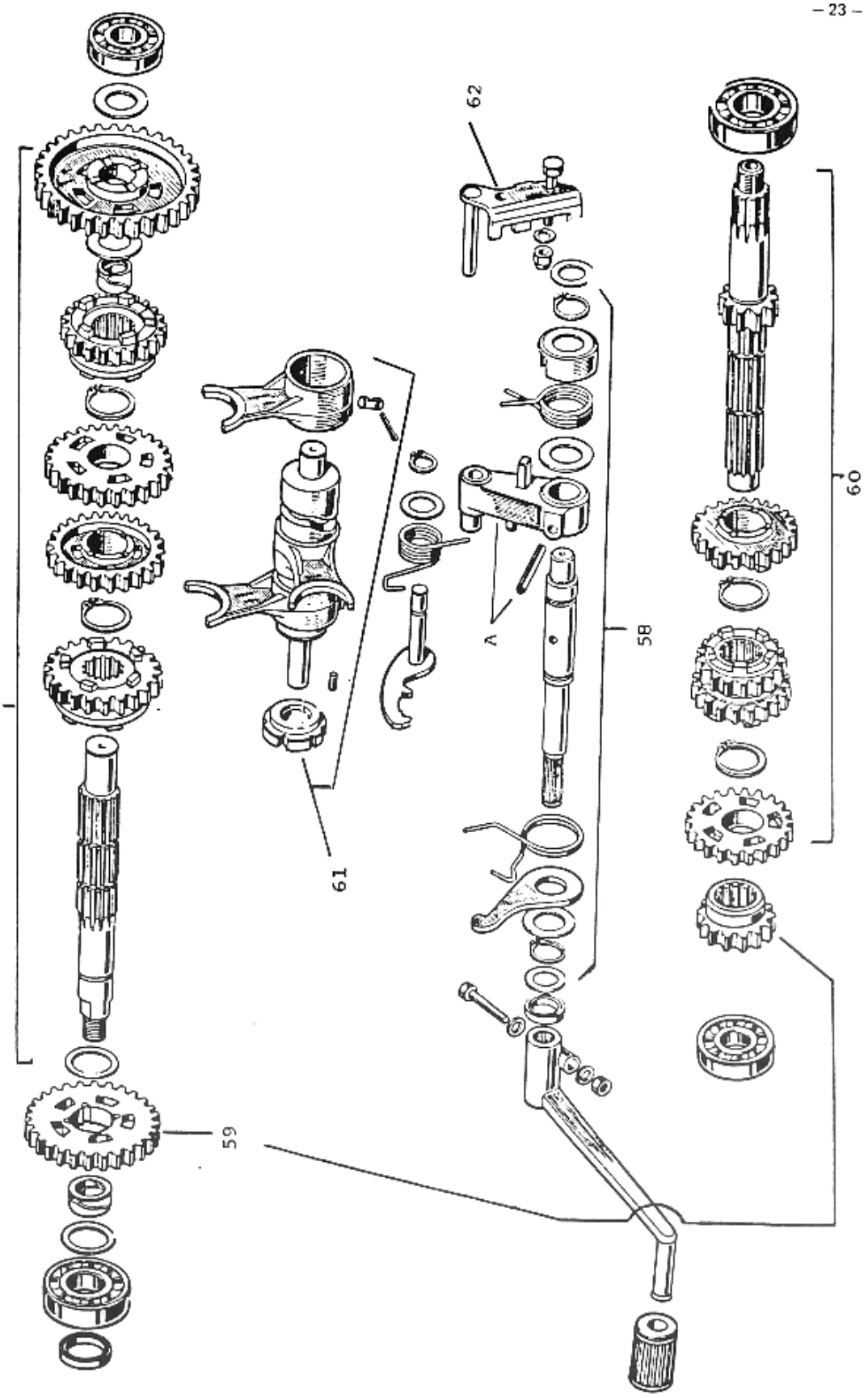
Various modifications have been made to the gearbox since the model was introduced and all can be interchanged individually or in pairs. Steel thrust washers have been introduced in 1976/77 models to improve the life of non sliding intermediate pinions. Where these thrust washers are used the respective gear has been recessed to accommodate the washer within the original overall width. Where recessed gears are fitted thrust washers must be used. They are not illustrated on page 24.
Fit selector index cam (61) with dowel down into selector shaft.

61. The quadrant simply lifts off the shaft. To remove the forks take out the split pins and pull out the small locating pins (B) from the back of the forks. The two forks nearest to the quadrant fit with the radius on the raised back section towards the quadrant. The third fork fits the opposite way.

Since the introduction of the model three types of selector forks have been used. All are interchangeable with each other individually or in sets. Refit guide pins with holes to the top and always use new split pins on re-assembly.

62. Two 10 mm. nuts. The gearbox input shaft bearing is located by two washers. Remove before attempting to take out the bearing.

To facilitate removal of any bearing from the crankcase halves, warm the case carefully but not excessively. Boiling water can be used providing the case is thoroughly dried before re-assembly (requires the use of a pressure air line up the oil-ways). Alternatively, the case can be locally heated by the careful use of a small flame.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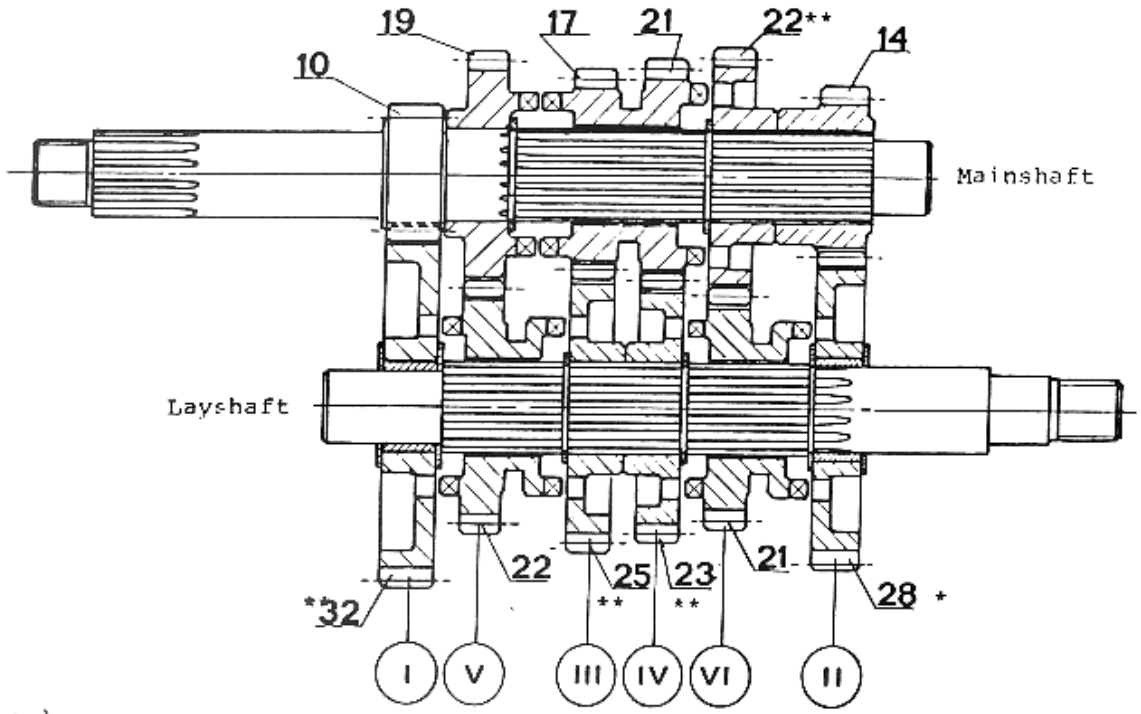
GEARBOX INTERNAL LAYOUT



(II) Patio (gear)

32 Number of teeth on pinion

* Later models have blind dog slots

** Later models have blind dog slots and thrust washers.

ELECTRONIC IGNITION SYSTEM

The ignition is powered from a separate coil in the flywheel generator. The battery does not provide any part of the ignition power. The machine can therefore be started with the battery in a discharged condition, but the lighting, horn, electrotap and rev counter will not function in these circumstances.

There is no contact breaker in the accepted sense of the word. This is replaced by a magnetic pickup unit driven from the left-hand end of the camshaft (see page 4).

Two electronic transducers replace conventional coils and are mounted beneath the tank. Each cylinder has its own transducer.

The function of the pickup is to generate control impulses to the transducers, releasing high tension current at the correct time in relation to engine revolutions. A 4° advance is provided automatically within the electronic pickup design.

Ignition timing is variable only within limits provided by slots in the stator part of the pickup unit - assuming that the camshaft timing has not been disturbed by removal of the camdrive belt. Details of ignition timing are given in the engine dismantling section.

Failures of electronic components are rare and, because of the nature of these components, are not difficult to trace by substitution. There are five possible causes of ignition failure disregarding leads and cables. These are:-

1. The spark plugs.
2. One or both transducers.
3. The pickup.
4. The ignition switch.
5. The generator.

In the event of failure, proceed as follows:-

IF THE ENGINE WORKS ON ONE CYLINDER -

(a) Remove the offending plug lead and by normal kickover check the strength of the spark. This should jump a gap of at least 5 mm.

(b) If the spark is insufficient the probability is that the appropriate transducer is defective. This can be checked by changing the red wires between the two transducers. These are the sender leads from the pickup and if, when they are reversed, the weak spark moves to the other plug lead then the problem lies in the pickup. Under no circumstances should you

attempt to start the engine having reversed the red leads, as the spark will be provided on the wrong stroke and there is danger of fire.

(c) Assuming that the weak spark has been transferred by test (b) replace the pickup.

(d) If exchanging the red leads does not interchange the spark the problem is in the transducer which continues to give a weak spark. Replace the transducer.

IF THE ENGINE WILL NOT START -

(a) Examine the spark plugs for gap and condition. Check the strength of the sparks by holding the plug leads 5 mm. from earth.

(b) If there is no spark or the sparks are weak on both cylinders pull the green lead from the switch to the terminal block and repeat the test. This isolates the ignition switch.

(c) If the spark strength is now satisfactory the problem is in the ignition switch which should be replaced.

(d) If, having removed the green lead and checked all connections, the spark is still insufficient and the engine still fails to start, the problem is probably in the pickup, although it may be the result of simultaneous failure of both transducers. This latter possibility is remote.

(e) If replacement of the pickup and/or transducers fails to provide a cure consideration must be given to the possibility that the flywheel generator is not producing sufficient power. This could result from slight demagnetisation of the flywheel and the only solution is to replace the unit.

Probability of faults in the ignition system expressed as a percentage:-

If the engine works on one cylinder -

Transducer	70%
Pickup	20%
Other causes	10%

If the engine will not start -

Switch	50%
Connections, contacts etc.,	20%
Transducers and pickup	20%
Flywheel and alternator	10%

NOTE: In view of the fact that substitution is the easiest and most positive way of isolating causes of failure, it is recommended that private owners contact their Morini Dealer for assistance or, in the event of difficulty, Harglo Limited of 462 Station Road, Dorridge, Solihull, West Midlands.

THE CHARGING CIRCUIT

Faults in the charging circuit are almost unknown, but as with any mechanical or electrical device difficulties are possible. Failures would be evident from -

(a) Absence of charge in the battery, leading to complete failure of lights, horn, tap and tachometer circuits.

(b) Overcharging leading to excess gassing of the battery, rapid loss of electrolite and damage to surrounding paintwork.

The battery is charged from coils within the generator via an electronic control pack which reads the state of charge of the battery and permits current to pass only when it is required.

To check the generator function, remove the two yellow wires from the control unit and place a 12 v bulb between the two wires. This should flash brightly on kickover. The yellow wires are interchangeable and it is not necessary therefore to note from which connection they are removed.

Assuming current is being provided by the generator, check regulator function by replacement.

Should no current be provided by the generator, remove the flywheel and examine the coils for signs of damage or overheating. The likely causes of damage to the generator would be:-

(a) Inverted polarity, i.e., battery terminals connected in reverse. This leads to a rapid discharge of the battery through the flywheel coils with consequent overheating, and partial demagnetisation of the flywheel.

(b) Failure of one of the regulator diodes. This would also lead to rapid discharge of the battery through the coils of the generator.

Probability of faults expressed as percentages of the whole battery and charging systems :-

Battery	60%
Polarity reversed	20%
Regulator	15%
Demagnetisation of the flywheel	5%

Because substitution is the simplest way to check the function of the regulator always contact your Dealer or, if in difficulty, Harglo Limited.

FRONT FORKS - STRIPPING AND REMOVAL FROM FRAME

Remove front wheel as follows:-

DRUM BRAKE STRADA MODELS

Remove main spindle nut from left-hand end of spindle - 21 mm
Release 13 mm. bolt clamping spindle in right fork leg.
Disconnect brake cable.
Disconnect speedo cable.
Remove four 13 mm. bolts from front mudguard mounting - note that the front left-hand bolt also secures the brake anchor strap.
Remove wheel spindle and wheel is free to come away from the fork assembly.

DRUM BRAKE SPORT

As for Strada except that this model is fitted with a single leading shoe brake on each side of the hub.

DISC BRAKE MODELS (Wire and Cast Alloy Wheels)

Remove main spindle nut from left-hand end of spindle - 24 mm
Release 13 mm. clamp bolt from right fork leg.
Disconnect speedo drive.
Remove wheel spindle and wheel is free to be taken from fork assembly. Note that on re-fitting the wheel it is necessary to open the brake pads to allow the disc to enter the caliper.
Remove the caliper unit - two 17 mm. bolts. Tie carefully to main frame avoiding stress on hydraulic fluid lines.
Remove front mudguard - four 13 mm. bolts.
Remove both headlamp brackets - take care not to damage the lamp - by undoing four 10 mm. bolts. Protect lamp before proceeding.

The fork assembly can now be dismantled progressively. The sequence of removal is indicated on page 30 and useful information is given below against the appropriate number.

Three different assemblies - 2 Marzocchi and 1 Paioli - have been used but all are similar in design. Differences are also noted below.

Page 30

1/2. Four 8 mm. Allen screws - slacken but do not remove.

3. Use 12 mm. Allen key. Two different threads have been used - do not attempt to fit course to fine threads. Examine 'O' ring for signs of damage. An air release valve is fitted to each top plug - this should not normally be removed but if removal is essential (leaks, etc.) unscrew the valve before taking out the plug.

4. Place a tray underneath before removing. Note condition of sealing washer.

5. One Paioli tube length 62 cms. and two Marzocchi tubes 65 cms. long have been used. Early models of Marzocchi forks used different dampers which required 5 cm. counterbores in the bottom of main fork tubes. These early tubes are not now available and replacements of the later (2 cm. counterbore) type must be used together with the appropriate damper assembly.

6. Spacers of different length have been used.

9. Use an 8 mm. Allen key. Note that the soft alloy washer must be refitted or replaced to avoid oil leaks.

10. The bottom slider can be pulled off once (9) is complete.

12. Replace with lips downwards. Two seals in each leg.

15. This control valve group must fit securely in the main tube counterbore. Later models use tubes with 2 cm. counterbore and these tubes must be used with the appropriate damper assembly to replace earlier pattern.

16. Floating rebound spring.

17. Damper piston assembly with external nylon rings and inner spring pressure rings. Only after a very high mileage will these rings require replacement.

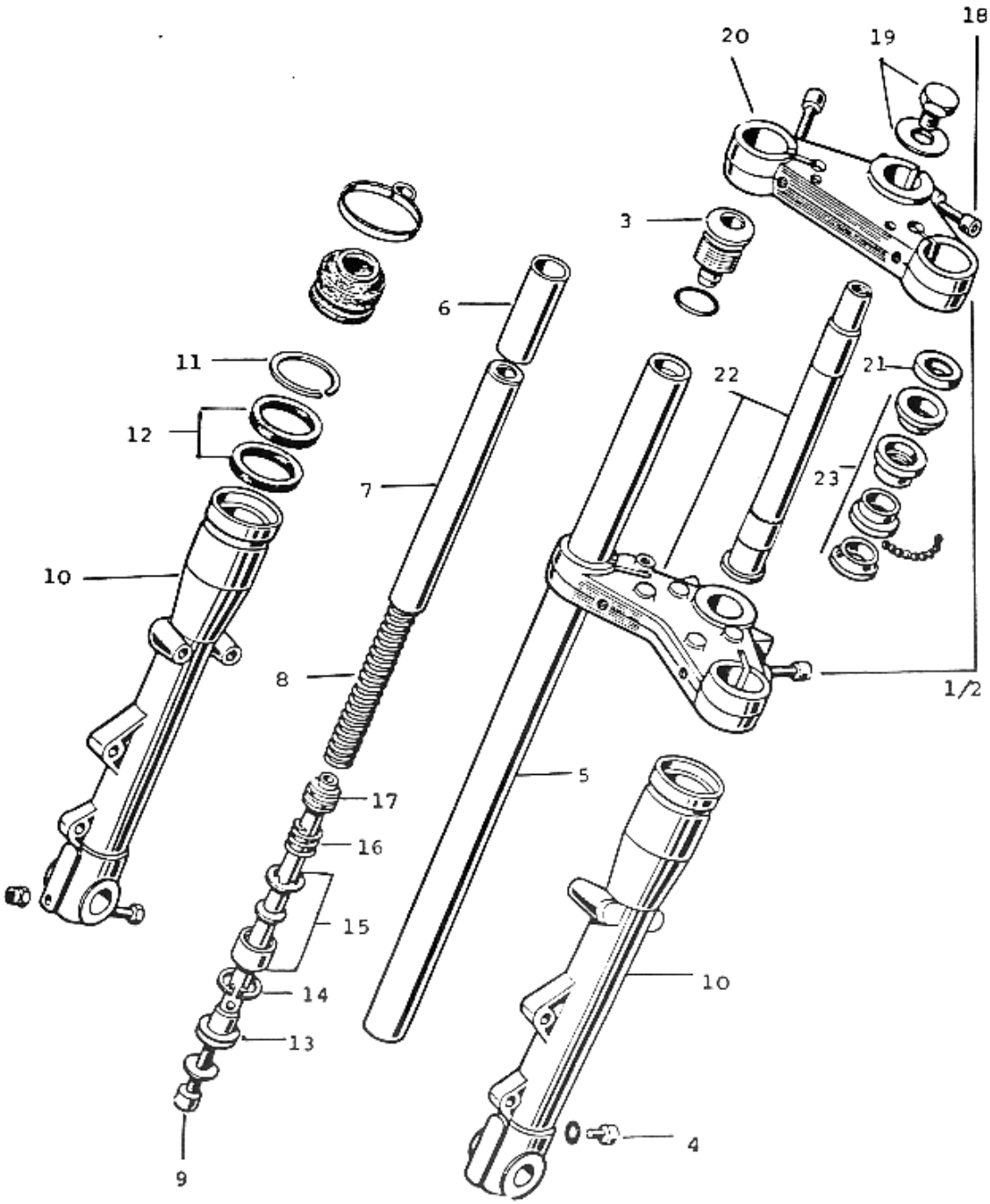
18. Disc brake models 6 mm. Allen screw. Drum brake models 13 mm. through bolt.

19. Disc brake models 28 mm. Drum brake models 30 mm.

20. Tap upwards with a soft mallet whilst supporting the bottom yoke.

22. One piece. Withdraw downwards, noting that bearings will be released by this operation.

23. Examine balls and tracks for signs of wear. Replace if any evidence of wear or damage. This assembly is vital to the general safety and handling of the machine. On re-assembly adjust this bearing to allow free movement of the forks but with no fore and aft rock.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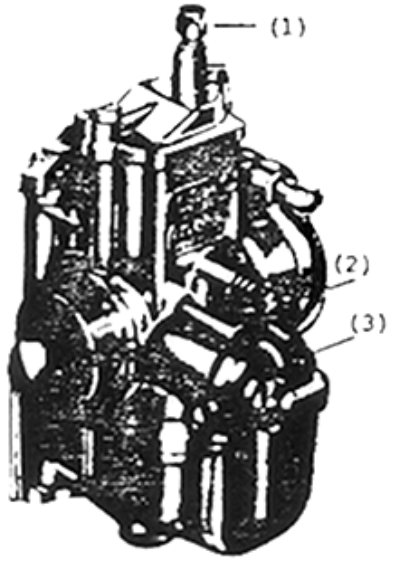
THE DELLORTO VBH 25 BS CARBURETTOR

Carburettors are set at the factory and will normally require only limited attention for many thousands of miles. However, at first service it is wise to recheck synchronisation and idle adjustment as follows:-

1. Check that full throttle at the twistgrip gives full throttle on each carburettor and that, with the throttle twistgrip fully closed, there is about 1 mm. of free play on each cable. If not, adjust the play using screw (1) first slackening its locknut.
2. Unscrew each idle mixture screw (3) one full turn from the fully closed position.
3. Connect each air intake to a mercury monometer using the tapped connections on each carubrettor.
4. Start the engine and leave it running until normal running temperature is reached; then set the idle speed using the screws (2) just enough to keep the engine running.
5. By adjusting the slide screws (2) align the mercury columns; unscrewing raises the level and vice versa.
6. Adjust the idle mixture with screws (3) to obtain the most even running; remember that unscrewing enriches the mixture and vice versa.
7. Now realign the mercury column levels by readjusting the throttles with screws (2).
8. Recheck and, if necessary, readjust the free play on each throttle cable.
9. Now set the engine running speed to around 2000 rpm. with the twistgrip and then realign the mercury columns by adjusting the screws (1) having slackened the locknuts; unscrewing raises the level and vice versa.
10. Stop the engine, having locked the nuts on the cable screws and remove the manometer replacing the blanking plugs.

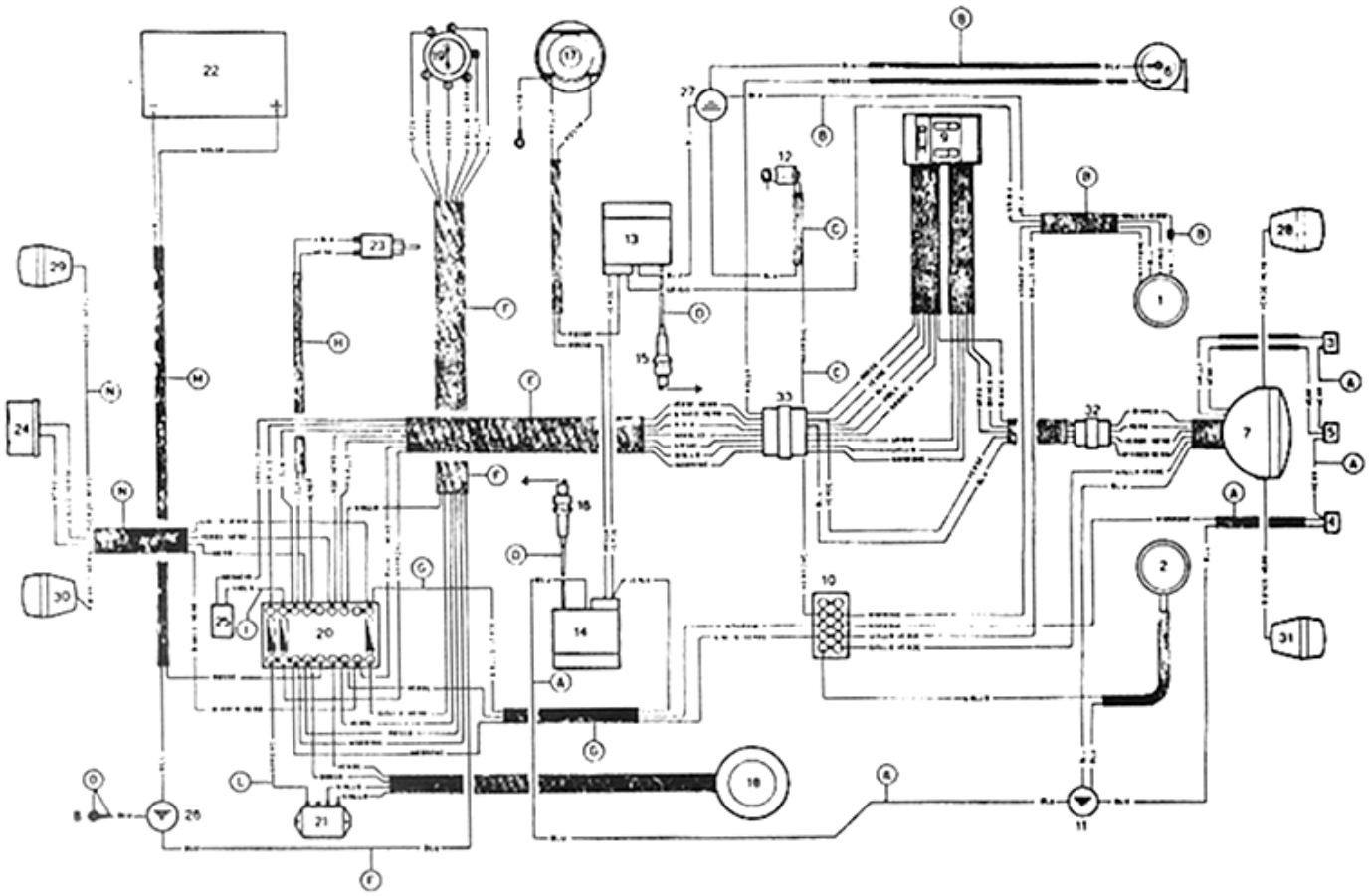


Unless the engine and/or exhaust system has been modified it is unlikely that alternative settings or jets to those specified will be required. It may, however, be desirable under certain circumstances to adjust the cruising mixture strength by raising or lowering the fuel needle. This is normally set in the middle position and should only be adjusted if there is real evidence of need.

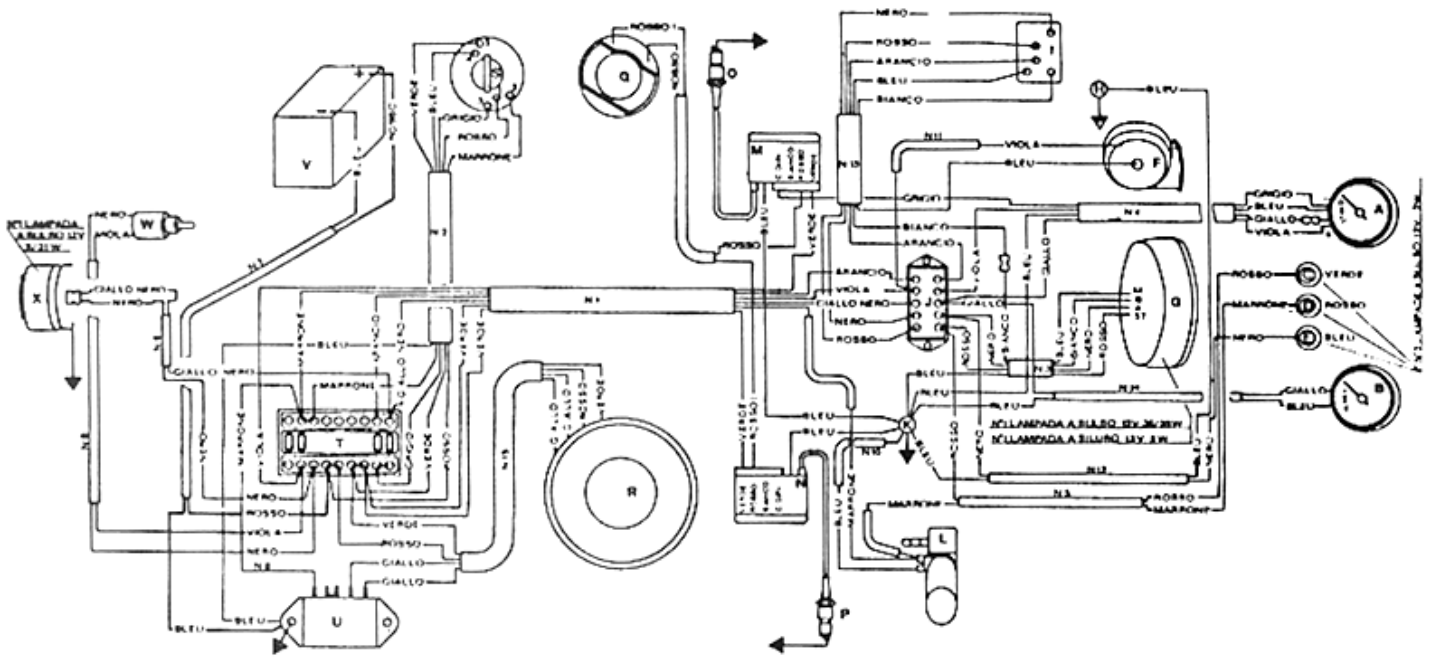
KEY

1. Tachometer
2. Speedometer
3. Mainbeam
4. Pilot
5. Ignition
6. Horn
7. Headlamp
8. Earth
9. Light switch
10. Connection block
11. Earth
12. Electrotap
13. Transducer
14. Transducer
15. Spark plug
16. Spark plug
17. Pick-up
18. Magneto
19. Main switch
20. Fuse block
21. Regulator
22. Battery
23. Stop switch
24. Rear lamp
25. Flasher relay
26. Earth
27. Earth
28. Signal light
29. Signal light
30. Signal light
31. Signal light
32. Minor trunking
33. Major trunking

WIRING DIAGRAM - Models with 6 pole ignition switch



WIRING DIAGRAM - Models with 5 pole ignition switch



A. TACHOMETER
B. SPEEDOMETER
C. PILOT LIGHT
D. IGNITION
E. MAIN BEAM
F. HORN
G. HEADLAMP
H. EARTH
I. LIGHT SWITCH
J. TERMINAL BOX
K. EARTH
L. ELECTROTAP
M. TRANSDUCER
N. TRANSDUCER
O. SPARK PLUG
P. SPARK PLUG
Q. PICK-UP
R. ALTERNATOR
S. IGNITION SWITCH
T. FUSE BOX
U. REGULATOR
V. BATTERY
W. STOP SWITCH
X. TAIL LAMP

REAR SUSPENSION DAMPERS

The Marzocchi dampers can be dismantled for repair but in the absence of a spring compression tool great care must be taken to avoid accidents as the pressure is released by removal of the collets (2). Do not attempt this without help and never look over the damper whilst working.

1. Pull off cover.

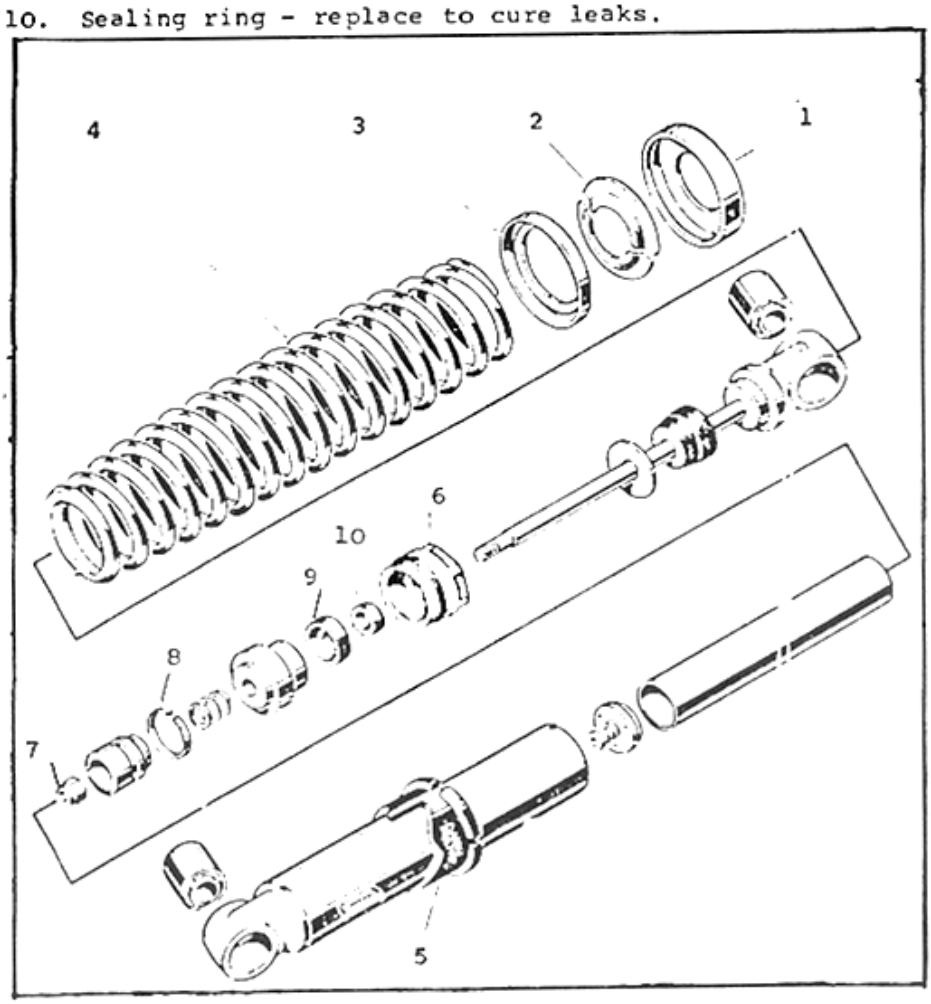
2. Turn adjuster to lowest position, hold unit in vice and compress main spring. Remove collets. Two types are used - early models have two half rings, later models are almost complete circles.

7. Use 11 mm. socket spanner.

8. Nylon piston seal.

9. Main oil seal - replace to cure leaks.

10. Sealing ring - replace to cure leaks.



SERVICE TOOLS

MOR-T1	Clutch Holding Tool
MOR-T2	Flywheel Holding Tool
MOR-T3	Flywheel Extractor Tool
MOR-T4	Cam Drive Pinion Extractor Tool
MOR-T5	Intake and Exhaust Flange Tool
MOR-T6	Primary Gear Holding Tool