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SERVICE SHEETS

BSA SERVICE SHEET No. 608

"B" and "M" Group Models

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Removing, Dismantling and Re-assembly of the Gearbox and Gear Change

The illustrations on this Service Sheet show the gearbox fitted to all "M" group models up to Engine No. ZM—101.

The gearbox fitted to "M" group models after this Engine No. and to "B" group models after Engine No. ZB—101 is identical except that a speedometer drive is taken from the layshaft, through a mechanism fitted to the outer cover, and the clutch operating mechanism is fully enclosed.

All instructions given for removal, dismantling and re-assembly will apply, but the speedometer drive must be removed before the inner cover is dismantled and replaced after it is assembled. Detailed instructions for removal and re-assembly are given below,

REMOVAL.

Instructions as to the procedure to be adopted for removal of the chaincase and clutch are contained in Service Sheet No. 610 in the case of "M" group machines or Service Sheet No. 304 in the case of "B" group machines. In this case, however, there

The oil tank breather pipe is next to be removed and this is only a matter of releasing the clip bolts.

Turning now to the right-hand side of the machine, first take off the footrest, then uncouple the clutch cable from its operating arm and unscrew the cable adjuster from the gearbox.

In order that the bolts which hold the gearbox to the yoke plates may be removed it is necessary to take off the exhaust pipe and silencer.

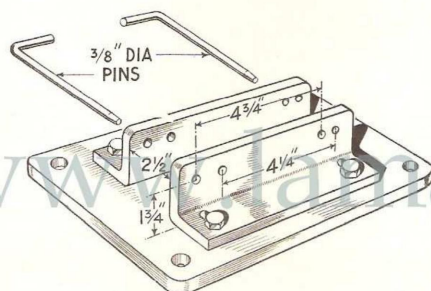


Fig. M26 Gearbox fixture

is no need to dismantle the clutch entirely; it is only necessary to take off the cover plate (if fitted) and thrust plate when the clutch may be withdrawn from its shaft as a complete unit. Before this is done, i.e., with chain and clutch still in position, it is advisable to engage a gear, and get an assistant to apply the rear brake, so that the engine shaft cush drive ring nut may be unscrewed, thus releasing the cush drive assembly. Uncouple the primary chain and remove the clutch using the extractor shown in Fig. M36.

The inner half of the chaincase can now be taken off. Note that in addition to the three bolts holding it to the crankcase, there is a nut attaching the rear chainguard to the chaincase and this must also be removed. Access to the nut will be made much easier if the three crankcase bolts are unscrewed first and the chaincase pulled off the crankcase register.

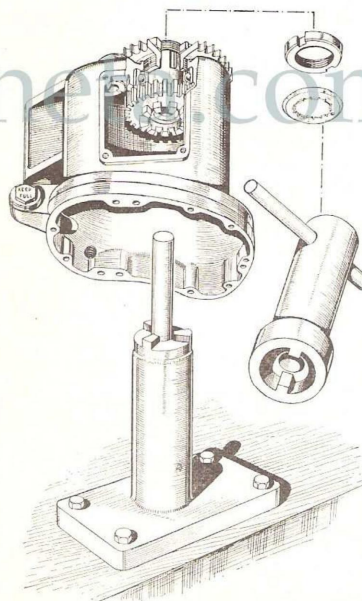


Fig. M27 Pinion sleeve removal tool 61-3064.

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The box itself can be prised upwards out of the yoke plates. If the latter grip the gearbox lugs too tightly for this to be carried out easily, slacken the bolts and studs which clamp the yoke plates to the crankcase. No difficulty should then be experienced in removing the gearbox.

DISMANTLING THE GEARBOX.

It will greatly help work on the gearbox if it is held in a simple fixture such as that illustrated in Fig. M26. The device can be made from suitable pieces of angle iron, spaced to suit the gearbox lugs. If it is not possible to make the fixture, gearbox can be held in a vice.

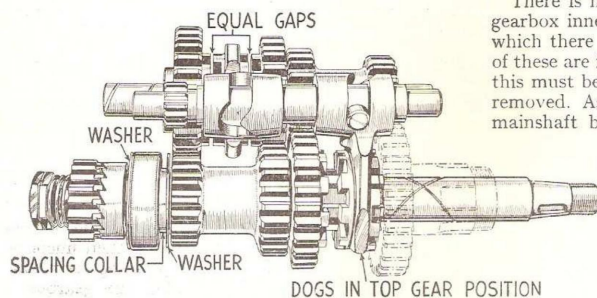


Fig. M28. Gear train.

Commence dismantling by taking off the rectangular inspection cover and follow this with kickstarter crank. The latter is fixed by means of a cycle type cotter. The foot change pedal is held in position by means of a pinch bolt which must be slackened off before the pedal can be removed.

On models before Engine No. ZM-101, there are two circlips behind this pedal. The larger circlip retains the gear indicator disc in position, and the circlip and disc should be removed. No indicator disc is fitted to later models. Leave the small circlip in position for the time being.

The gearbox outer cover is, now ready for removal. On earlier models it is held on by seven cheese head screws, and, on the face behind the gear change mechanism, by three bolts and one nut. On later models seven cheese head screws and four nuts, all on the outer cover hold it in position. When the outer cover is taken off, it will contain the kickstarter quadrant and spring, but these need not be disturbed unless obviously requiring attention.

Next, remove the pin from the link rod between the selector quadrant and the gear change mechanism at the latter end and unscrew the nut off the rear of the gearchange spindle. The gearchange mechanism can now be taken out as a complete unit, and dismantled later. Take care not to lose the small plunger and spring exposed by the removal of the previous parts.

The ratchet mechanism on the mainshaft must be dismantled next. First unscrew the locknut, straighten the tag washer, and remove it. By

unscrewing the next nut, all the remaining parts of the ratchet mechanism will be free and can be taken off.

REMOVING THE SPEEDOMETER DRIVE.

Slack off the large nut on the drive and give the end of the drive a tap with a hide mallet. Remove the locating screw.

The large nut can now be used to withdraw the drive, distance pieces being built up behind the nut until the drive is fully withdrawn.

When replacing, after fitting the locating screw, fully tighten the large nut. Do not omit the fibre washer behind the nut or oil leaks may result.

There is now no obstacle to the removal of the gearbox inner cover except for its fixing screws of which there are four (three on later models). Two of these are fixed by a locking strip and the ends of this must be straightened before the screws can be removed. As the cover comes off, it will contain the mainshaft ballrace, and leave exposed loosely on

the mainshaft an oil flinger (thin) and spacing collar (thick). Also assembled on the inner cover is the gear selector quadrant, but here again this need not be disturbed unless attention is obviously required. If it has to be removed, take care not to lose the plunger and spring and make sure they are refitted when assembling.

If, when the inner cover is withdrawn, the three shafts (main, lay and selector) also come out still assembled in the cover, they may be quite easily detached, as they are a running fit in their bushes. In the same way if the shafts are still in the box, after removing the gearbox cover, they can be withdrawn with similar ease by removing all the shafts together. The layshaft bushes are, of course, a press-fit in the gearbox and, if necessary, must be driven out with the aid of a soft punch (15/16 ins. diameter).

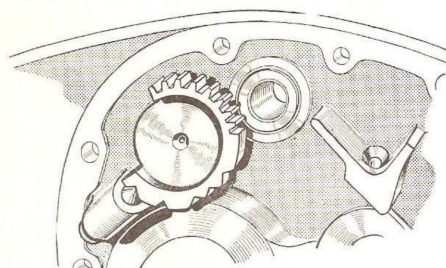


Fig. M29. Selector quadrant.

The top gear pinion sleeve is now the only part still left in the gearbox, and if the sprocket locknut is unscrewed, after suitable attention to the tag washer, the sprocket may be removed and the pinion tapped into the gearbox with the aid of a wooden mallet. If difficulty is experienced in holding the pinion whilst the sprocket is unscrewed, a fixture similar to that in Fig. M27 will solve the problem.

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Do not disturb the ballrace unless it is suspected of being faulty. Wash it thoroughly in paraffin, to remove all traces of oil, when any play will be immediately detected.

Examine the various parts for wear and if the forks which actuate the sliding dogs show signs of seizure it is advisable to replace them. Attempts to erase the seizure marks will result in excessive side play. Replacement sliding dogs may be found to have convex faces on the dogs but this will not affect interchangeability, if the originals had flat faces.

Loose pinions on the lay and mainshafts may be rebushed if required, and of course, pinions with damaged teeth should also be replaced.

Fixed pinions on the layshaft and mainshaft are pressed on and new components must be a tight fit.

shaped a new one must be fitted, otherwise rapid chain wear will result. Do not forget to set the lockwasher into the grooves machined in the locknut after the latter has been tightened up. The tabs in the centre of the locknut washer must fit properly into the sprocket splines.

It is only possible to refit the shafts and their pinions in the box provided that the shafts are first assembled (with pinions in top gear position) outside the gearbox and then all fitted together.

Commencing with the layshaft, take off the low gear pinion only (this is the largest on the shaft) and hold the shaft in the left hand with the drilled end towards the wrist. Take up the selector shaft and fit the fork nearest to the small pinion into the dog clutch on the layshaft. Pick up the mainshaft, which should be complete with its dog clutch, and put it in position so that the second

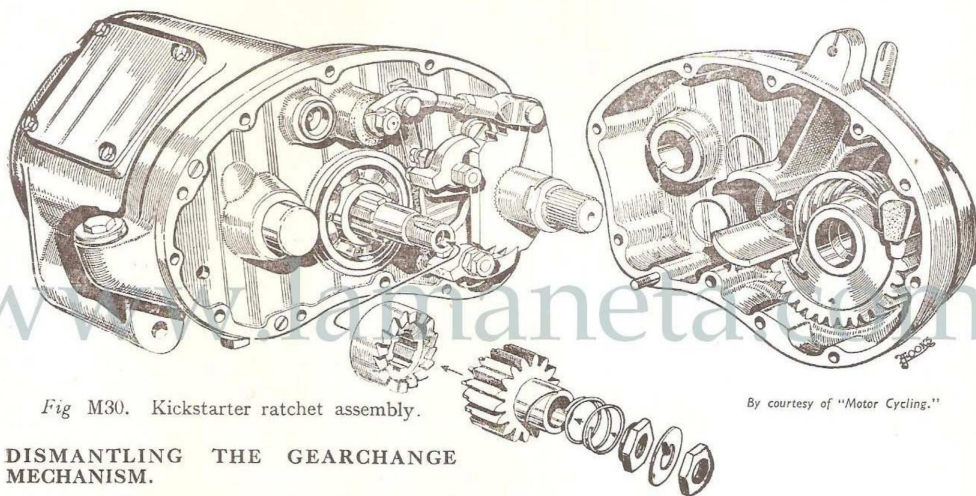


Fig M30. Kickstarter ratchet assembly.

DISMANTLING THE GEARCHANGE MECHANISM.

It is only necessary to prise the two pawl springs off their pegs, and to remove the circlip, when the whole unit can be stripped into separate components. The only parts which are likely to show signs of excessive wear are the pawls and the ratchet plate, and new components should be fitted if required. If the pawl springs show signs of stretching, they too, should be replaced.

RE-ASSEMBLY OF THE GEARBOX AND GEARCHANGE MECHANISM.

If it has been decided to fit a new ballrace to the top gear pinion, make sure that the oil flinger washers are correctly positioned. In order to remove the ballrace easily, warm the gearbox in boiling water. The flat washer should be placed between the pinion teeth and the bearing while the remaining washer fits on the opposite side of the bearing with its depressed face against the bearing. If the sprocket teeth are worn hook

selector fork engages with the mainshaft dog clutch. The whole assembly can now be fitted into the gearbox, the mainshaft being the first to enter its bearing. Verify again through the inspection cover that the pinions are set in the top gear position (see Fig. M28). In this position the dog clutch on the mainshaft is in mesh with the pinion sleeve.

Replace the low gear pinion on the layshaft and if all has been assembled correctly, the face of this pinion should be just flush with its mating pinion on the mainshaft. The oil flinger washer and spacing collar can now be refitted to the mainshaft (see Fig. M28).

The inner cover is next to be assembled. Set the selector quadrant in the top gear position (see Fig. M29) and replace the cover. The paper washer between the inner cover and the gearbox shell should be smeared with jointing compound before final assembly. If the cover will not fit properly at

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the first attempt, a slight movement of the selector, by means of a spanner, will cause the selector teeth to mesh properly with the selector shaft pinion and then the cover may be pressed home. Replace the four screws and locking strip, bending the corners of the latter to suit. All shafts should have the minimum of end play, and engagement of dogs should be checked in each gear.

The ratchet mechanism may now be refitted to the mainshaft, the parts assembling in the following order: Ratchet, bush, ratchet pinion, spring and shouldered nut. The latter should be tightened by finger pressure only. Replace the lockwasher and note that the tongue in this washer engages with the groove machined in the mainshaft. Screw up the locknut very tightly, and tap the edge of the washer over the nut.

RE-ASSEMBLY OF THE GEARCHANGE.

The ratchet sleeve plate (i.e., the plate in which there are a series of teeth) should be held in the left hand with the shortest diameter of the sleeve uppermost (see Fig. M31). One of the pawl carrier plates will be seen to have thin washers welded on to both faces, and this plate should now be superimposed upon the ratchet plate so that the pawl fits into one of the teeth adjacent to the link pin hole. Place the remaining pawl carrier on top of the original one so that its pawl engages with the second set of teeth on the ratchet plate.

Still holding the gearchange assembly in the left hand, take up the gearchange spindle in the right hand, holding it by the threaded end and fit it into the ratchet sleeve so that the plate fixed to the spindle lies between the spring anchor pegs. With the aid of a pair of pliers, replace the two springs and then fit the circlip in position. The whole process of re-assembly of the gearchange mechanism will be made much easier by a study of the illustration (Fig. M31).

The unit is now ready for re-assembly into the gearbox. Make sure that the spring loaded plunger is in position behind the unit before it is replaced. Couple the link arm to the ratchet plate and take care to replace the split pin. It should not be necessary to make any adjustment to the length of the link itself; this has been set when the gearbox was originally built, but if the gears will not engage properly a slight adjustment to the length of the link will be sufficient.

Before the re-assembly is carried a stage further, loosely replace the gearchange pedal and **check the operation of all gears by inspection through the cover.** It will, of course, be necessary to move the gearbox sprocket by hand when endeavouring to engage the gears.

When all is found to be correct, set gears in top gear position again, and remove the gearchange pedal. The clutch push rod is next to be replaced, and with this in position the small felt washer must be added. This washer is important since its

function is to prevent any possibility of oil passing along the hollow mainshaft, to the clutch plates.

Finally, put back the gearbox cover, carefully tighten all screws, and replace the kickstarter crank and gearchange pedal. As the gearbox is still set in the top gear position when the indicator disc (if fitted) is replaced this also should be set to top gear.

REPLACEMENT OF THE GEARBOX.

The replacement of the gearbox should not present any difficulties. When the box is in position and the fixing bolts are about to be tightened up, make sure that the flats just below the bolt heads register properly in the slots

machined in the yoke plates. Also, on the rear bolt, an adjuster is provided for tensioning the primary chain; this must be in position and the chain tension adjusted before the gearbox bolts are finally tightened. The latter must be really tight after the adjustment is made. There should be about $\frac{1}{2}$ in total play in the chain (see "Front Chain," Service Sheet No. 609).

Replace the oil tank pressure release pipe together with the clutch cable and its adjuster.

The inner half of the primary chaincase may now be fitted, followed by the

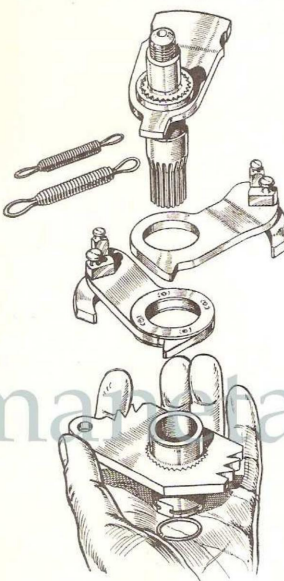


Fig. M31.

Gear change mechanism

and clutch, together with its pressure plate and cover. Finally refit the outer half of the chaincase and then the footrest.

The re-fitting of the clutch and primary chaincase is described in "Re-assembly of the Clutch" in Service Sheet No. 610. The clutch adjustment may require setting and this should be carried out in accordance with the instructions given in Service Sheet No. 609. It is also possible that the rear chain will require re-tensioning and this may be done by movement of the rear wheel (Service Sheet No. 609).