BSA SERVICE SHEET No. 408

October, 1948
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C Group Models with 3 speed gear box.
(4 speed models, except C15, use Service Sheet 209).

REMOVING, DISMANTLING AND RE-ASSEMBLING OF GEARBOX AND GEAR CHANGE

To remove the gearbox from the machine proceed as for engine dismantling up to removal of the clutch (Service Sheet No. 406). Unscrew the two nuts D (Fig. 3.24) and drive out the bolts. Slacken off the nuts clamping the rear engine plates and the chain stays. Take off the rear chain and guard, and the oil pipes.

It is not necessary to remove the oil tank and battery carrier, but if time permits removal of these fittings will enable the operator to raise the gearbox upwards and out of the plates more easily.

Dismantling the Gearbox

The operator should first consider carefully before attempting this operation as considerable trouble and damage can be caused by lack of experience. **If in doubt consult your dealer.**

To assist re-assembly, the positions of the various gears should be carefully studied (Fig. C.22).

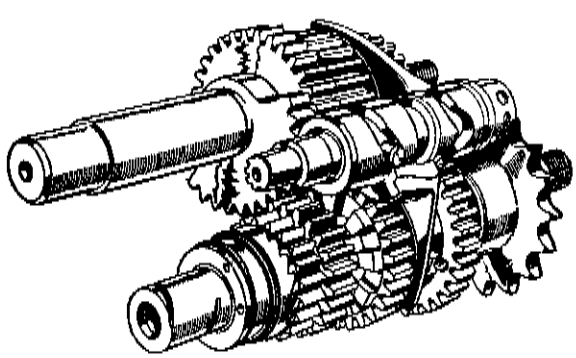

Fig. C.22. The gear cluster.

First of all secure the gearbox in a vice or suitable fixture, with clamps on the clamping lugs. Remove the kickstarter crank B and footchange pedal C (Fig. C.23). The former is removed by unscrewing the nuts and extracting the cotter pin. The latter pedal can easily be taken off when the pinch bolt is released.

Next remove the outer cover by taking out the 3 screws and 7 nuts which hold the cover in position. Unscrew plunger housing underneath the outer cover, the housing will come away complete with the plunger E and the plunger spring. Tap off the outer cover with a wooden mallet, at the same time holding the gear control shaft with a tommy bar so that the gear selector mechanism is retained in position.

Next remove the control plunger housing O from the inner cover; this will release the gear selector mechanism comprising footchange operating plate D, pawl plate and spring G and gear selector quadrant H. After dismantling these the inner cover is fully exposed and the 3¼ inch (21-2889) Whitworth bolts should be unscrewed. The inner cover may now be tapped off its seating on the 7 studs.

By means of a screwdriver undo the control shaft pin plug which is situated at the nearside end of the gearbox shell, and then insert a ¼in. B.S.F. bolt or stud into the dowel to enable it to be drawn from its seating. The gear control shaft with operating forks, layshaft gear cluster, and mainshaft and sliding gear can now be taken out.

Next undo the tab washer which secures the sprocket locking nut, and remove the locking nut. Remove the locking washer and pull off the gearbox sprocket. Then tap the sleeve pinion from its seating in the bearing, using a hide or wooden mallet.

If it is necessary to remove the ballrace, a hand press is the best method, but if this is not available, warm the shell, and the ballrace can then be easily tapped from the housing.

Turn to the inner cover and the removing of the kickstarter quadrant. Unlock the quadrant from the kickstarter spring, and tap the quadrant from position through the two kickstarter return stops.

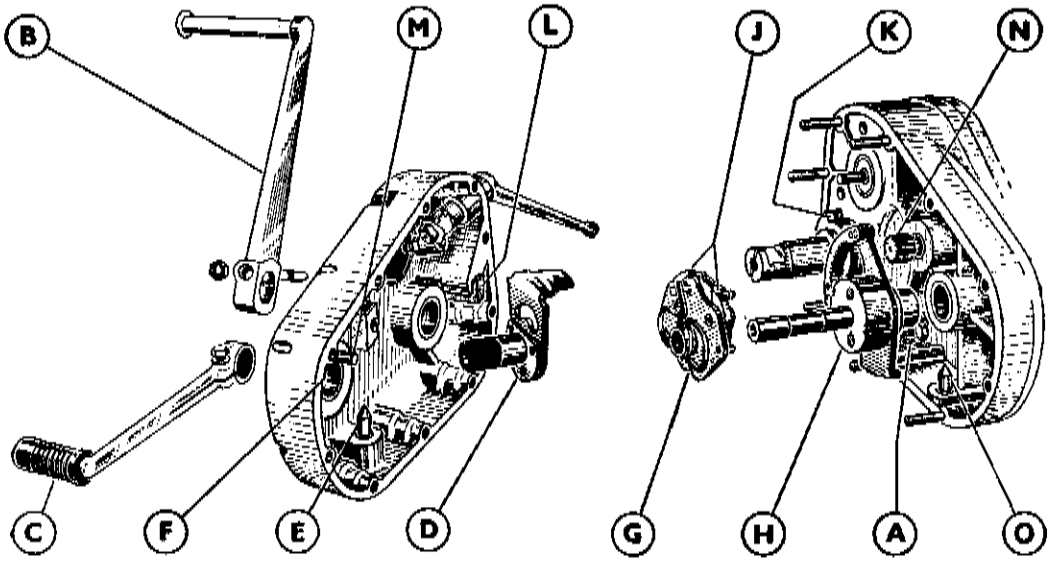

Fig. C.23. Foot gear change mechanism.

Dismantling the Gear Cluster

The sliding gear comes away easily from the mainshaft; then remove the kickstarter ratchet pinion by unscrewing the left-hand kickstarter ratchet sleeve nut. The kickstarter ratchet and shim can then be removed.

To remove the bottom gear pinion, the outer retaining ring has to be split by means of a chisel, so that the ring may be removed in two portions. Extract the two portions of the inner retaining ring with the tang end of a file, the pinion will then slide off the shaft.

To dismantle the layshaft gear cluster remove the 1st gear pinion. This is pressed on to the layshaft pinion sleeve and can be removed by holding the gear in a vice and tapping from position with a piece of hard wood a shade larger in diameter than the phosphor bronze bearing.

To dismantle the operating forks, hold the shaft in a vice and tap out the central shaft pegs with a punch. The forks can then be removed from the shaft, but careful note should be taken of the position of the forks on the shaft before taking them off.

Re-assembling

Hold the shell in a vice or suitable fixture. First of all fit the oil seal with recess inwards, the oil seal shim and the roller bearing. If the case is first warmed, the bearing can easily be pressed into its seating. Fit the sleeve pinion, ensuring that the oil retaining washer is fitted between the sleeve pinion and the ballrace. Then tap the sprocket into the splines in the sleeve pinion, securing by means of the tab washer and locknut. Ensure that the tab washer is turned over into the recesses in the locknut.

Fitting the selector forks to the shaft is the reverse operation to that for dismantling. Use new control shaft pegs.

Next replace the low gear pinion on the mainshaft, and fit the inner and outer rings to secure the pinion on the shaft. The outer ring is tapped into position and the pinion should then revolve easily on the shaft. Fit the kickstarter pinion 27–4106, and then the ratchet 27–4112, following that, the ratchet spring 27-4447. Then fit the kickstarter sleeve nut 15–267 (left-hand thread).

Fit the mainshaft sliding pinion, ensuring that the fork track is nearest the sleeve pinion. Next fit the layshaft sliding pinion on the sleeve pinion and press the layshaft first gear pinion on to the sleeve pinion (hexagon end).

Pair the layshaft and mainshaft gear clusters together, fit the operating forks, ensuring that one fork is engaging in the mainshaft sliding pinion and the other fork in the layshaft sliding pinion. Ensure that the teeth on the gear control shaft are at the reverse end to the threads on the mainshaft end.

Before entering the mainshaft and gear clusters into the G/B shell, lubricate the gears and both shafts. Enter the clusters, locate the selector shaft and enter the retaining pin in the groove in the selector shaft. Then fit control pin plug 29–3243 and secure with the locking tab washer.

Next fit the inner cover using a new joint washer coated with jointing cement and tap into position with a wooden mallet. Secure the cover by a bolt either side, check for end-play in the layshaft and mainshaft, and if there is end-play in the former, fit shims underneath the kickstarter quadrant (.005 clearance). If there is play in the mainshaft, fit shims underneath the mainshaft bush (inner cover) 15–268. The mainshaft must be free without end-play.

Fit the remaining $\frac{1}{4}$in. Whitworth cover bolt.

Next fit the gear control quadrant 29-3298, ensuring that the mark on the foot gear change selector shaft is lined up with the mark cut on the quadrant.

With the aid of a screwdriver, fit the spring to the pawl carrier plate, with the end of the right-hand coil to the left of the stud, and the end of the left-hand coil to the right of the stud.

Fit the pawl carrier plate G (Fig. C.23) to the gear control quadrant, followed by the operating plate and sleeve complete, D.

The action of the footchange pedal return spring tends to throw off the operating plate, to prevent this happening a small clip should be made up from light strip and placed in position over the assembly.

Replace the two return stops on the Kickstart Quadrant Stem followed by the cork washer.

Take up the outer cover, place a tommy bar through the operating plate sleeve bush and hold the operating plate in position as the cover is entered on its studs. Remove the clip which was placed over the footchange mechanism and, still holding the operating plate with the tommy bar, push the outer cover home.

Ensure that the dowel peg in the outer cover is located between the ends of the spring on the pawl carrier plate. If this is not so positioned the footchange pedal will not return to neutral.

Secure the outer cover with fixing screws and nuts, and fit the footchange pedal C and kickstarter crank B. Replace filler cap and inspection cover.

Replacement of Gearbox

The replacement of the box should not present any difficulties. When the box is in position and the fixing bolts are ready to be tightened up, make sure that the flats on the heads of the bolts register in the slots of the yoke plates, and that the chain is correctly tensioned. There should be about ¾ inches up and down play in one run of the chain when the other run is taut.

Make sure that the gearbox bolts are finally tightened before readjusting the rear chain, and refill the gearbox with oil to the correct level.

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BSA SERVICE SHEET No. 408A

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1956 C10L AND C12 MODELS WITH LIGHT FOUR-SPEED GEAR-BOX

(1954/5 Four-speed Models use Service Sheet 209)

Removal of Gearbox

In most cases it will be found convenient to dismantle the gearbox whilst it is in position. However, if attention to the bearings is required it may be found advisable to remove the complete gearbox. The primary transmission, clutch and chain-case must be removed. (See Service Sheet 411).

To remove the gearbox from the frame, first detach the clutch and speedo cables. Remove the cover plates. Unscrew the gearbox holding bolts and lift the box clear.

Dismantling

In order to obtain access to the gearchange and kickstart mechanism the outer cover must be removed. Drain off the oil, if this has not already been done, and move the gear to neutral. Remove the three stud nuts and four screws securing the outer cover and the cover can be drawn away together with the kickstarter and gearchange levers. The internal clutch operating lever will fall away. The ratchet pinion assembly is secured by a large nut, remove this and the ratchet, ratchet pinion, bush spring and washer can be taken away.

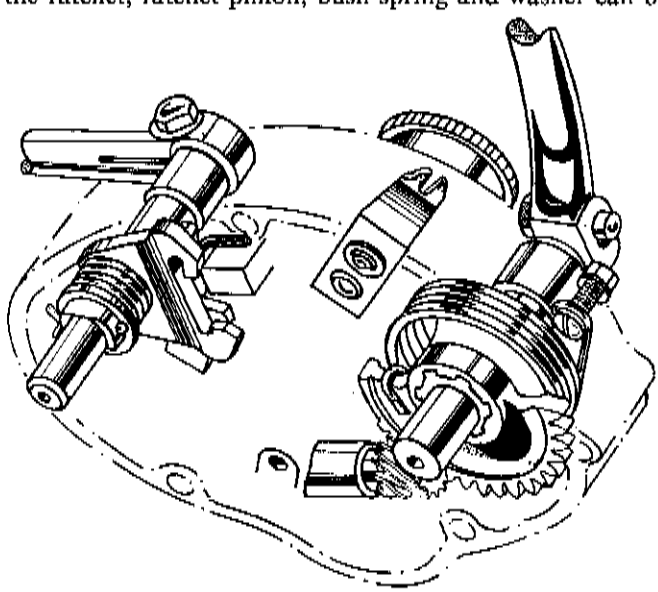

Fig. 2. C4 Kick-start and foot-change mechanism.

The gearchange mechanism need not be dismantled unless it needs attention. If this is the case remove the gear lever and the small circlip behind it. The spindle and gearchange mechanism can now be withdrawn.

To obtain access to the gearbox internals the gearbox inner cover must first be removed. After the ratchet assembly has been removed it will be seen that the inner cover is held in position by one nut, undo this and remove the circlip located on the end of the layshaft and adjacent to the speedo drive. The inner cover and mainshaft can now be withdrawn. If it is required to remove the gearchange control quadrant from the inner cover, press out the gearchange spindle bush and expose the end of the control quadrant spindle. The spindle is threaded $\frac{1}{4}$" B.S.C. and by using a suitable bolt as a draw tool the spindle can be withdrawn.

The selector shaft is secured in the gearbox shell by a grub screw which passes through the gearbox shell and engages in an annulus in the shaft. Slacken the grub screw and pull out the shaft. The gear cluster, forks and layshaft can now be withdrawn. Remove the gearbox sprocket by unscrewing the large ring nut and tap the pinion sleeve from its bearing. Lift the spring loading selector arm and slide the cam plate from its bearing. To remove the pinion sleeve bearing take out the retaining circlip, withdraw the oil seal and warm the case before tapping out the bearing.

Should the needle roller layshaft and bearing need replacing, removal is also facilitated by warming the gearbox shell.

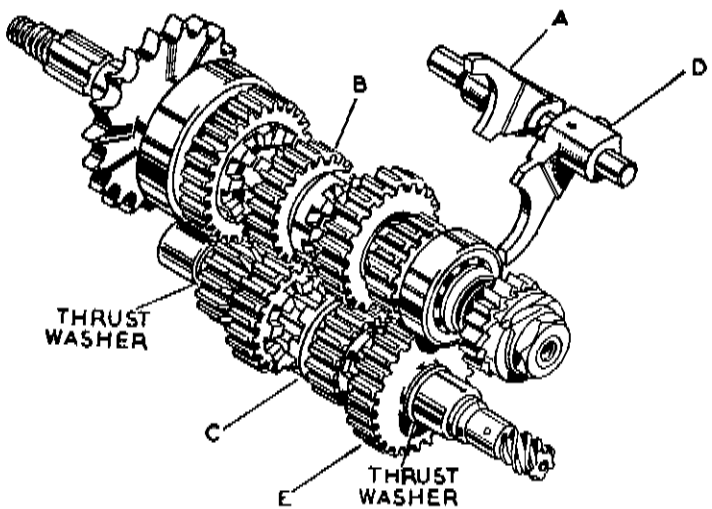

Fig. C43. Gear cluster.

Assembly

Lift the spring loaded selector arm and fit the cam plate with the selector arm in the bottom gear position. If the pinion sleeve bearing and oil seal have been removed for any reason it is advisable to fit a new oil seal.

Warm the gearbox and press in the bearing. Fit the oil seal and circlip, making sure that it is correctly located. Fit the pinion sleeve.

Replace the layshaft ensuring that one of the hardened steel thrust washers is in its correct place as shown in Fig. (1). Layshaft thrust washers are available in three sizes.

Part No.	29-3645	Layshaft	Thrust	Washer	.075/.076
„ „	29-3646	„	„	„	.084/.085
„ „	29-3626	„	„	„	.092/.093

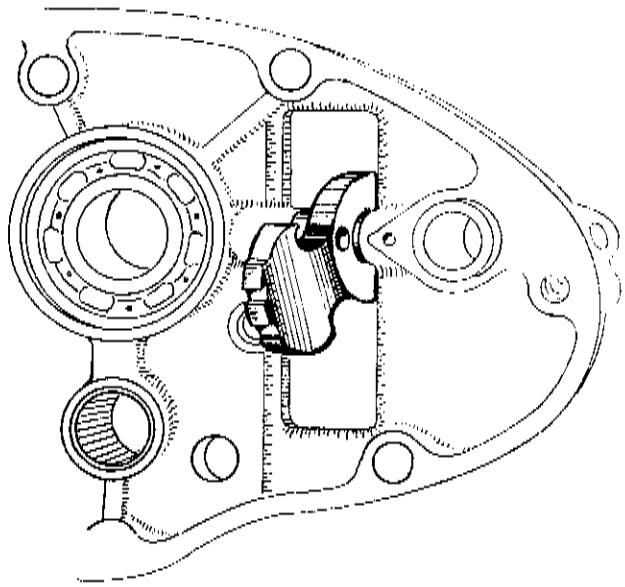

Fig. C44. Timing of gear-change operating lever.

Fit the mainshaft sliding gear fork (A) with its peg in the cam plate slot. Correct location is assisted by sliding the selector shaft through the fork and into its position in the gearbox shell. Fit the mainshaft sliding pinion (B) into its place on the fork and then place the layshaft sliding pinion (C) onto the layshaft. Carefully remove the selector shaft. Fit the layshaft sliding pinion fork and engage the peg in the slot on the cam plate.

Slide the selector fork shaft through the two forks and into position in the gearbox shell. Tighten the small grub screw making sure that it engages in its annulus.

Slide the mainshaft into position, fit the layshaft pinion (E) and place the other hardened steel washer in position.

Place the mainshaft and inner cover in position but before they are pushed home the operating lever must be set so that the red dot on the lever and the cover coincide in the bottom gear position. Push the cover home and fit the securing nut.

Assemble the ratchet and pinion assembly. First place in position the steel washer and then the steel bush. Fit the spring ratchet pinion and ratchet. Finally, secure with the nut and tab washer.

Replace the outer cover, ensuring that the clutch operating lever is correctly positioned. To do this remove the inspection cap and fit the push rod in position. Moving the kickstart will prevent jamming and will assist engagment of the speedo drive.

Should the mainshaft ballbearing, located in the inner cover, need replacing it is necessary to extract the circlip, warm the cover and tap the bearing out. Refitting is self-explanatory.

Below is a list of useful part numbers:-

29-3608	Gearbox Sprocket Oil Seal.
29-3598	27T Pinion Sleeve.
29-3603	Outer Cover Stud. (long).
29-3604	,, ,, ,, (short).
29-3589	Cam Plate.
29-3636	Kickstart Ratchet
67-3376	,, ,, Pinion
29-3637	,, ,, ,, Bush
29-3585	,, ,, and Mainshaft Nut Lockwasher
29-3628	Selector Fork
29-3627	,, ,, Shaft
29-3614	Mainshaft Sliding Pinion 21T
29-3621	Layshaft ,, ,, 18T
29-3616	,, complete
29-3643	Clutch Push Rod
67-3340	Footchange and Stop Plate Return Spring
67-3174	Kickstart Spring
29-3611	Mainshaft complete
29-3639	Layshaft Bearing Circlip

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