

# **BSA** SERVICE SHEET No. 506

*Revised Feb. 1959.*

## **Models D1, D3 and D5**

### **RE-ASSEMBLY OF THE ENGINE - GEARBOX UNIT**

#### **Crankcase**

If new ball races and bushes are to be inserted, warm the two crankcase halves suitably support them to avoid damage, and press in the new parts in their appropriate positions. When dealing with a D1 engine manufactured before 1955, do not forget that the oil seal Part No. 90-284, is located between the two driveside main bearings. Later D1 and all D3 and D5 engines have a different oil seal Part No. 90-749, and this is placed next to the flywheels, inside both bearings.

On the generator side, the oil seal Part No. 90-147, should be fitted outside the main bearing. Care must be taken not to press in the seal too far, so as to obscure the oil passage to the main bearing. Engines after Nos. DD-101 and BD3-5138 have a circlip between the oil seal and bearing. This means that the oil seal is located approximately 0.10" further out, and the parallel portion of the flywheel spindle is extended by this amount. If the later type crankcase assembly Part No. 90-826, is used to replace a 1954 D3 crankcase assembly Part No. 90-777, the circlip should be removed and the oil seal placed closer to the bearing, unless a later type flywheel and con-rod assembly Part No. 90-823, or a flywheel spindle Part No. 90-821, is fitted at the same time.

Replace the spring loaded ball socket 'A' (Fig. D16) in its recess in the bottom of the offside crankcase.

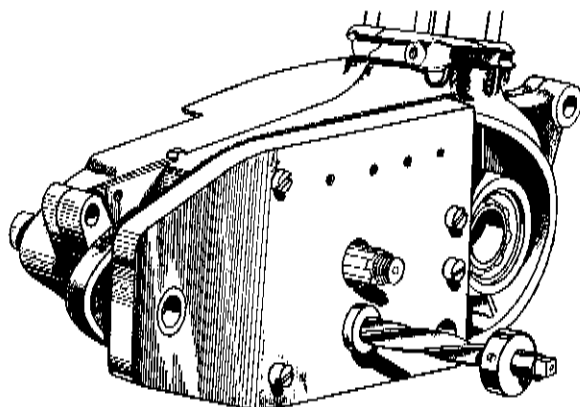


Fig. D11—Line Reaming the Gearbox Bushes with Service Tool 61-3199.

If the gearbox phosphor bronze bushes have been renewed, bolt the two crankcase halves together and line-ream the bushes, using Service Tool No. 61-3199 and Reamer No. 61-3205 (Fig. D11). Make sure that all swarf is removed after this operation.

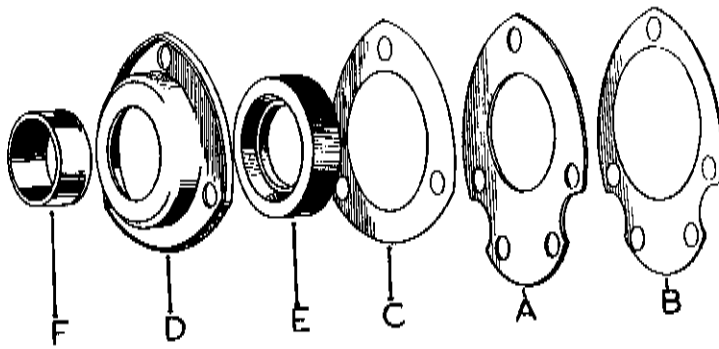


Fig. D11A—The Oil Seal Assembly

Next secure the gearbox mainshaft ballrace and layshaft bush retaining end plate 'A' (Fig. D11A), Part No. 90-133, on the nearside case with its two  $\frac{3}{16}$  in. cheese-headed screws, followed by the triangular oil seal housing washer 'C', Part No. 90-73, the mainshaft oil seal housing 'D', Part No. 90-72, and the oil seal 'E', Part No. 89-3006, with the steel sleeve 'F', Part No. 90-71, in the centre of the assembly. Note that a gasket 'B' is fitted between the end plate and the crankcase.

The following details are intended to assist people who wish to complete their own flywheel repairs. Owners are reminded, however, that fully reconditioned and guaranteed flywheel assemblies are available through the B.S.A. Exchange Replacement Service and can be purchased from appointed B.S.A. Dealers or Stockists.

This Service is recommended in view of the skill and specialised equipment necessary to make a first-class job.

### Flywheel Assembly

The 1955 pattern flywheel spindles 90-821 (nearside) and 90-505 (offside), can be used as replacements in all earlier engines having a Wipac generator. For Lucas equipment, flywheel spindles 90-605 (nearside) and 90-505 (offside) should be used. When fitted to

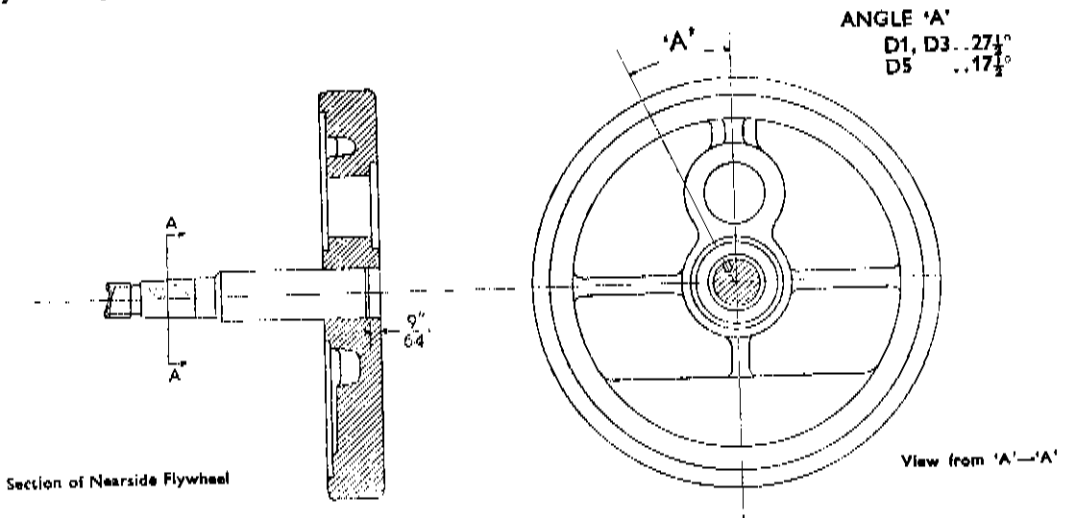


Fig. D12

## B.S.A. Service Sheet No. 506 (continued)

flywheel assemblies which have the narrow type of big end bearing ( $\frac{1}{4}$ " x  $\frac{1}{4}$ " rollers), these spindles must be assembled so that they are recessed  $\frac{3}{8}$ " from the inside faces of the flywheels. With the wide big end bearing ( $\frac{1}{4}$ " x  $\frac{3}{8}$ " rollers), the spindles must be assembled flush with the faces of the big end recesses in the flywheels. The nearside spindle on all models must be located as shown in Fig. D12.

It is not advisable to attempt to take up wear in the big-end assembly by fitting oversize rollers, since the connecting rod, rollers, and crankpin are carefully matched before leaving the works. We strongly recommend that a complete replacement assembly be used.

To assemble place the nearside flywheel in bolster, Service Tool 61-3206, and using a suitable hand press insert one side of the new crankpin. Position the second flywheel over the crankpin and using bridge piece Service Tool 61-3210 press the flywheel on to the crankpin as illustrated in Fig. D13.

The flywheel will now be only approximately aligned and further steps must be taken to ensure that the wheels and shafts are brought within necessary limits. Two of the actual or similar bearings used in the engine should be fitted to the main shafts and the assembly mounted in Vee blocks as in Fig. D14.

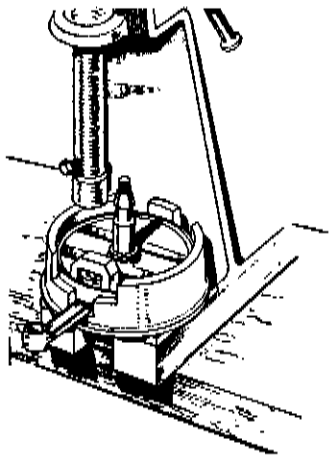


Fig. D13—Reassembly of the Flywheels.

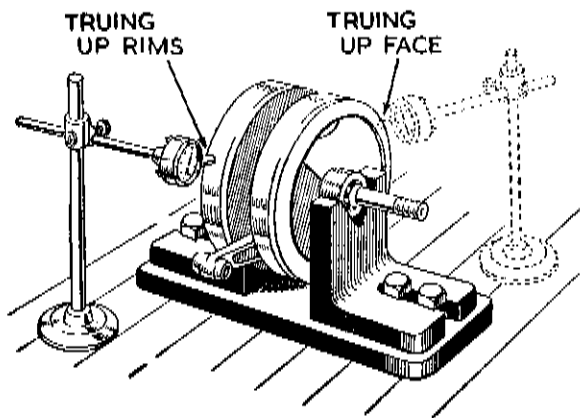


Fig. D14—Checking Flywheel Alignment.

Using a dial micrometer the accuracy of the assembly can be measured. Any necessary corrections should be done by the careful use of a mallet or lead hammer applied to the flywheels and the wheels should be brought within the limit of .004ins. on the rims and .006ins. on the inner faces. Shafts should be trued to within .002ins. maximum.

The big-end assembly having been renewed and the flywheels checked for balance and concentricity, replace the flywheel side plates into their recesses and secure by 'dot' punching the edge of the flywheels over the edges of the sheet metal plates (Fig. D15).  
*Note.* No side plates are used on the D5.

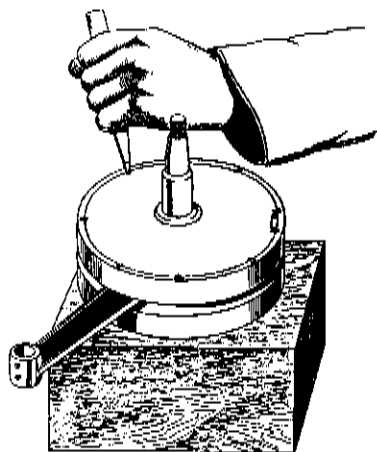
**RE-CHECK THE FLYWHEELS FOR TRUTH.**

The next step is to check the end float of the flywheel assembly in the crankcase, and adjust if necessary. Shim washers of various thicknesses are supplied for this purpose.

Place a .010" shim on the offside spindle, and insert the latter through the main bearings and oil seal in the offside crankcase. Fit the distance collar Part No. 90-243, or the oil drag fan Part No. 90-750, in position over the near-side spindle. The nearside crankcase should then be replaced, and the two halves screwed together temporarily. Measure the amount of end float on the flywheel assembly, which should be .004" to .006". Remove the nearside crankcase and fit any shims which may be required on the nearside spindle, next to the flywheel.

If the flywheel assembly has not been disturbed, replace the original shims in their original positions.

Later models with engine prefix letters DD, DDB or ED5, use shims only between the L/H flywheel and the bearing, these are available in sizes .003"/4"/5"/.010".



**Fig. D15.**

## **Gearbox**

Now fit the gear quadrant selector mechanism to the off-side crankcase. Engage the quadrant with the spring-loaded locating plunger in the bottom of the case, 'A' (Fig. D16), the quadrant to be at its innermost position in relation to the plunger; this is bottom gear. Secure in position by fitting the two bolts 'B' with their tab locking washers, turning over the tabs to lock the bolts.

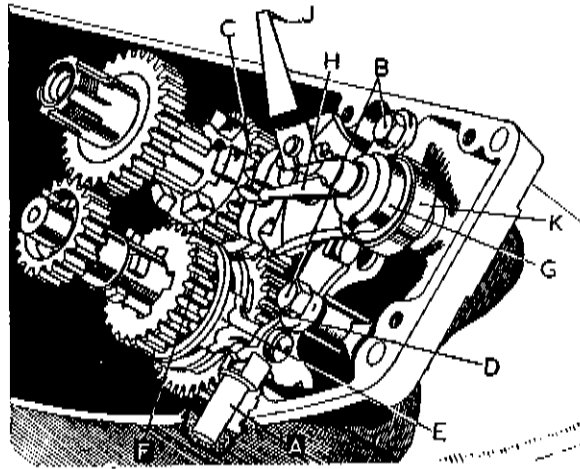
Next pass the splined end of the gearbox mainshaft through the offside ballrace already placed in its recess, followed by the mainshaft sliding gear 'C', and then the mainshaft primary gear.

Now place the large layshaft gear 'D', (this is the gear having the centre machined to engage with the dogs of the selector gear) concave side downward against the phosphor bronze bush in the bottom of the case in mesh with the small main-shaft pinion.

Engage the two central selecting or sliding gears, one already in position on the mainshaft, so that the small dog on the gear selector arm 'E' enters the track machined on the side of the lower or layshaft gear 'F', the upperside of this gear track engaging with the solid machined ring on the mainshaft sliding gear 'C'.

Insert the layshaft through the lower gears and engage the gear train (see Fig. D16).

Next pass the footchange pedal lever shaft with its spring-loaded claw assembled 'G' through its bearing hole in the offside case. Engage the ends of the spring attached to the claw on either side of the projection on the gear selector mechanism, securing the bridge piece between the two bolts, the claw facing the gears.



**Fig. D16. The Gear Cluster.**

Apply jointing compound evenly to the edge of one crankcase and allow it to become 'tacky'. Insert the gear position indicator spindle 'H', into its bearing hole in the nearside crankcase, and attach the indicator lever 'J', to the outer end of the spindle, pointing upwards. Place the nearside crankcase in position, passing the engine mainshaft and gearbox pinion sleeve through their respective races, taking care that the ball end of the inside gear indicator lever enters its recess on the gear selector arm. Later models do not have this indicator, its place being taken by a thrust pad.

Secure the two crankcase halves together by means of the eleven cheesc-headed screws (thirteen on later models), tightening them evenly all round to avoid distortion. Note that a spring washer is fitted behind the head of each screw.

Place the kickstarter clock-type return spring, Part No. 90-89, in position on the kickstart quadrant shaft, then slide the circular distance plate, Part No. 90-90 on to the quadrant shaft against the spring between the spring and the alloy case. Insert the assembly on to the gear selector shaft, placing one end of the spring into the recess at the rear of the case above the dowel hole. Give one turn of tension to the spring and push the kickstart quadrant home into its recess in wall of alloy case with the quadrant against its stop below the dowel hole.

### **Clutch and Transmission**

Enter the clutch chainwheel with its centre bush in position, flange at the rear, on to the splined end of the gearbox shaft, which is projecting through the case, having previously assembled the ratchet and spring on to the shaft. (See Fig. D.17).

## B.S.A. Service Sheet No. 506 (continued)

Place the thrust washer into its recess on the inside of the clutch chain-wheel assembly, slide the clutch hub, Part No. 90-28, on to the splines and secure by the large nut, Part No. 21-7. Enter the mushroom-headed clutch push rod, Part No. 90-98, into the hole in the centre of the shaft.

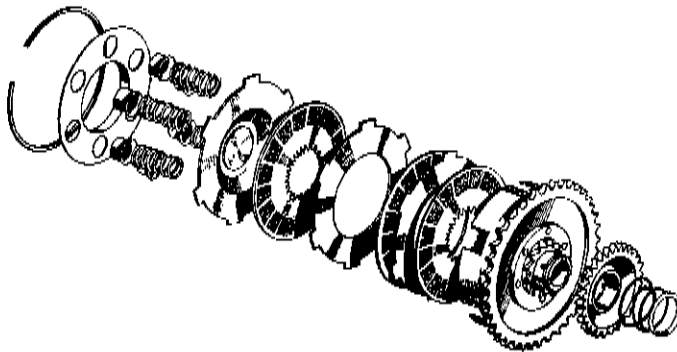


Fig. D17—The Clutch, Exploded View.

The clutch plates are now inserted into the centre of the chain-wheel assembly, cork plate first then steel plate in sequence, the last plate being the domed clutch actuating plate, Part No. 90-37 (Fig. D17).

Next insert the six springs into the spring cups and place them in the holes in the spring plate, Part No. 90-341, the raised centre of the plate outwards. Using Service Tool No. 61-3191, compress the springs, and place the large circlip, Part No. 90-27, into its groove on the inside of clutch plate housing (Fig. D8, Service Sheet No. 505).

The crankshaft sprocket should now be placed on its taper keyed engine shaft, followed by the double tab washer, Part No. 90-121, one tab resting on the flat on the engine sprocket. Screw the securing nut, up tightly, and turn the second tab over on to the nut face.

Place primary chain over the sprockets and fit the spring link. Now fit the dome-shaped alloy primary chain cover with a cemented paper washer on the jointing face, over the primary drive assembly, passing the kickstart quadrant shaft through its hole in rear of the cover. Secure with five cheese-headed screws, the two longest screws in the front holes in the cover. Note that each screw is fitted with a fibre washer.

Fit kickstart pedal and foot gear change lever to their respective shafts.

Now turn the unit round and insert the second clutch push rod, Part No. 90-99, into the hole in gearbox mainshaft. Slide the rubber oil seal washer, Part No. 90-132, on to the rod.

The gearbox sprocket, is pushed on to the splines projecting through the gearbox end of the nearside case, then secured by nut and splined washer, the edge of which is turned over on to the nut as a locking device.

## B.S.A. Service Sheet No. 506 (continued)

The flywheel generator alloy cover carries the clutch actuating lever and quick-action mechanism, which is pressed into this cover from the inside when the cover has been warmed. A flat on the collar of the actuating screw positions this part in the cover (Fig. D18).

In the centre of the quick-action screw is a ball and adjusting screw, Part No. 90-105, with locknut, Part No. 89-366. The metal cover, Part No. 90-106, presses over the quick-action screw from the outside of the cover. Attach the extension spring, Part No. 90-122, to its hole in the lever and the hole in the inside of the cover.

Place the crankcase outer cover, in position on the nearside case. This cover carries the clutch operating lever and adjuster. Five cheese-headed screws, two inside and three outside, secure the cover to the crankcase.

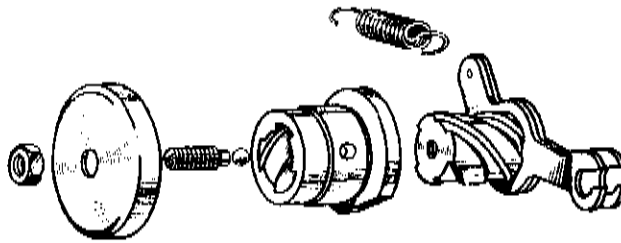


Fig. D18.—The Clutch Actuating Mechanism.

### **Flywheel Generator (Wico Pacy)**

Place flywheel on the keyed taper of the engine mainshaft, followed by the large shakeproof washer, and tighten the nut. Make sure key has not fallen out.

Now insert the electrical ignition unit carrying the plug lead into its recess. Three elongated ears on the outside of this unit allow the screws to be passed through the unit securing it to the flywheel cover (Fig. D4.)

The 'make and break' cam is now inserted into the centre of this unit on to the keyed end of the engine mainshaft and secured by a  $\frac{3}{8}$  in. screw and spring washer.

Variation of the ignition timing is obtained by moving the whole unit to and fro' on the elongated slots on the outside of the unit. Adjust 'make and break' points if necessary. See Service Sheet No. 503. Set the ignition timing so that the points are just breaking with the piston  $\frac{1}{2}$  in. (3.75 mm.) before top dead centre.

The watertight cover is now placed in position and secured by the two screws.

The remainder of the unit is assembled as after decarbonisation. (See Service Sheet No. 504).

## B.S.A. Service Sheet No. 508 (continued)

Place the thrust washer into its recess on the inside of the clutch chain-wheel assembly, slide the clutch hub, Part No. 90-28, on to the splines and secure by the large nut, Part No. 21-7. Enter the mushroom-headed clutch push rod, Part No. 90-98, into the hole in the centre of the shaft.

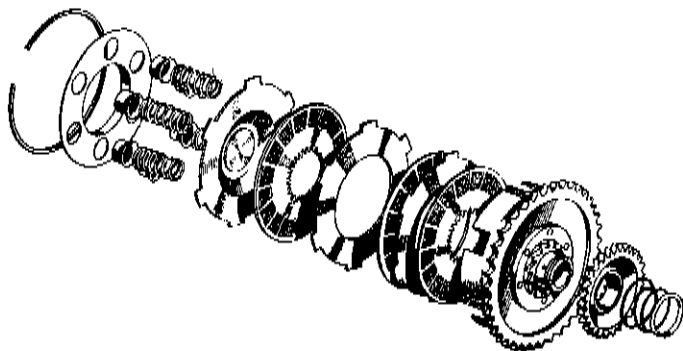


Fig. D17--The Clutch, Exploded View.

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Place primary chain over the sprockets and fit the spring link. Now fit the dome-shaped alloy primary chain cover with a cemented paper washer on the jointing face, over the primary drive assembly, passing the kickstart quadrant shaft through its hole in rear of the cover. Secure with five cheese-headed screws, the two longest screws in the front holes in the cover. Note that each screw is fitted with a fibre washer.

Fit kickstart pedal and foot gear change lever to their respective shafts.

Now turn the unit round and insert the second clutch push rod, Part No. 90-99, into the hole in gearbox mainshaft. Slide the rubber oil seal washer, Part No. 90-132, on to the rod,

The gearbox sprocket, is pushed on to the splines projecting through the gearbox end of the nearside case, then secured by nut and splined washer, the edge of which is turned over on to the nut as a locking device.