



SERVICE SHEETS

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BSA SERVICE SHEET No. 506

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Models D1 and D3

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 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.

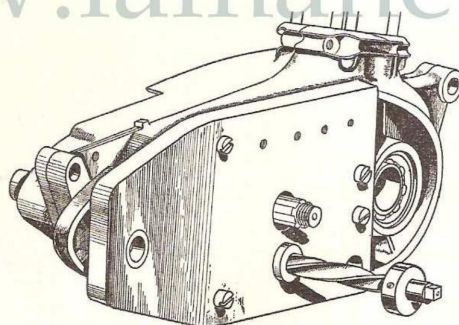


Fig. D11—Line Reaming the Gearbox Bushes with Service Tool 61-3199.

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.

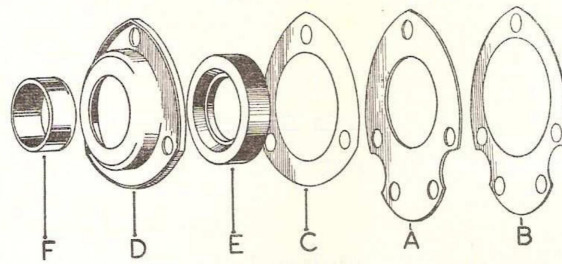


Fig. D11A—The Oil Seal Assembly

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.

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 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 $\frac{9}{64}$ 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 with Wipac equipment, must be positioned so that the keyways are $27\frac{1}{2}$ degrees from T.D.C. as shown in Fig. D12.

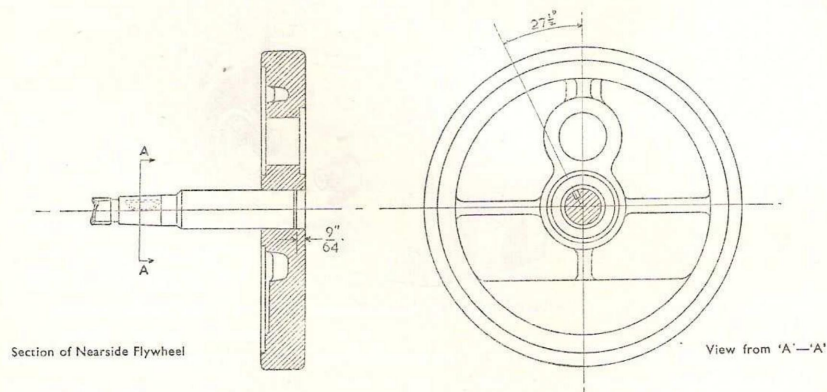


Fig. D12

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

If the big-end assembly is to be renewed it is as well to check the weight of the new components against those which have been removed. A slight variation in the weight is inevitable, but provided that the discrepancy does not exceed $1\frac{1}{2}$ ozs. no further action need be taken. This tolerance should not be exceeded since in the first instance the flywheels have been balanced to suit the original parts, and the balance may be adversely affected if the weight of the new component varies considerably from that of the original one. 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 on a bench, take up the big-end assembly and enter the crankpin in the crankpin hole in the flywheel. Place this sub-assembly in the flywheel bolster, Service Tool No. 61-3206, and position the remaining flywheel. Now using the bridge piece, Service Tool No. 61-3210, placed in position over the crankpin hole, drive the crankpin fully 'home' in the two flywheels (Fig. D13).

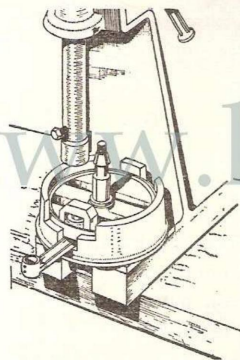


Fig. D13—Reassembly of the Flywheels.

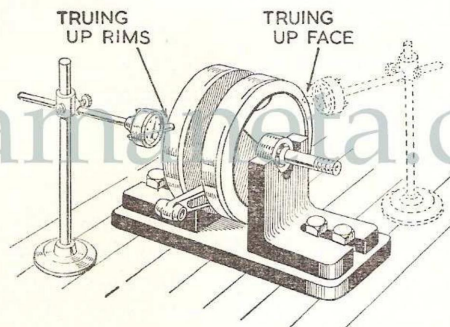


Fig. D14—Checking Flywheel Alignment.

The flywheels will now be only approximately aligned and further steps must be taken to ensure that the wheels are aligned as true as possible. Two of the actual (or similar) bearings to be used in engine should be fitted to the mainshafts and the latter mounted on vee-blocks (Fig. D14). The flywheels must be trued up, both on faces and rims, for which purpose a dial micrometer is necessary. A mallet or lead hammer applied to the flywheels will provide a sufficiently heavy blow for final truing to within .002ins. and will not harm the flywheels. The shafts must not be struck. The shafts should be finally trued to within .002ins. max.

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).

RE-CHECK THE FLYWHEELS FOR TRUTH.

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

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.

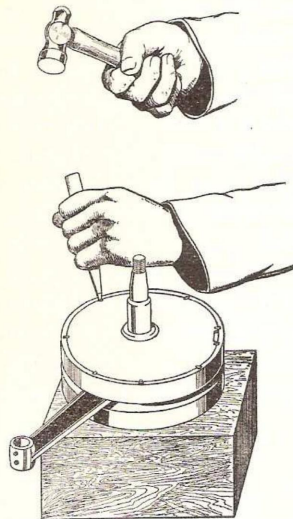


Fig. D15.

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', Part No. 90-74, and then the mainshaft primary gear, Part No. 90-65.

Now place the large layshaft gear 'D', Part No. 90-82 (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', Part No. 90-81, the upperside of this gear track engaging with the solid machined ring on the mainshaft sliding gear 'C', Part No. 90-74.

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

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

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.

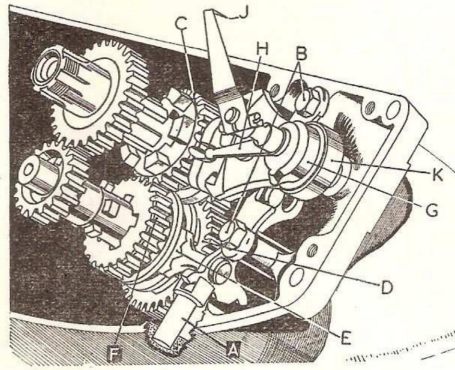


Fig. D16.—The Gear Cluster.

Apply jointing compound evenly to the edge of one crankcase and allow it to become 'tacky'. Insert the gear position indicator spindle 'H' Part No. 90-94, into its bearing hole in the nearside crankcase, and attach the indicator lever 'J' Part No. 90-93, 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 Part No. 90-759.

Secure the two crankcase halves together by means of the eleven cheese-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.

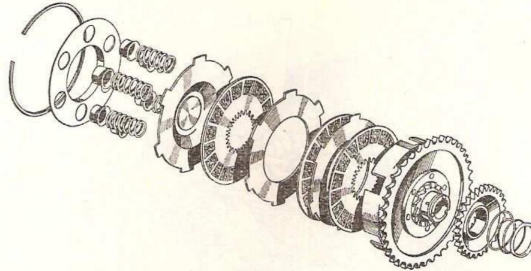


Fig. D17—The Clutch, Exploded View.

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. 90-31, 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, Part No. 21-7, 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, Part No. 90-68, 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, Part No. 90-831 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.

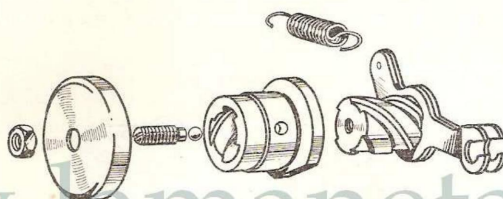


Fig. D18.—The Clutch Actuating Mechanism.

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 $\frac{3}{16}$ 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 $\frac{5}{32}$ 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).

Re-assembly of the Lucas Generator

The procedure for re-assembly of the Lucas Generator is merely the reverse to that described on Service Sheet No. 505 for dismantling, but the following should be specially noted: Provision is made for the easy removal and replacement of the steady bearing and bearing plate; the cam and steady bearing journal are both press fits on to the rotor shaft and can be removed by means of a suitable extractor of standard pattern. On re-assembly, it is imperative that the cam is correctly fitted in relation to the rotor shaft or the performance of the machine will be adversely affected when the engine is run with the ignition switch in the 'emergency start' position.

The following precaution must be taken in order that the steady bearing is correctly aligned. During the re-fitting operation, the four contact plate fixing screws should be slackened off and should not be retightened until the remainder of the re-fitting operations are completed, i.e., the Alternator fixing bolts and the rotor retaining bolt should be fully tightened before finally tightening the contact-plate fixing screws. The fixing screw holes in the contact plate are drilled oversize and providing the foregoing precautions are observed the contact plate will automatically align the steady bearing with the rotor shaft.

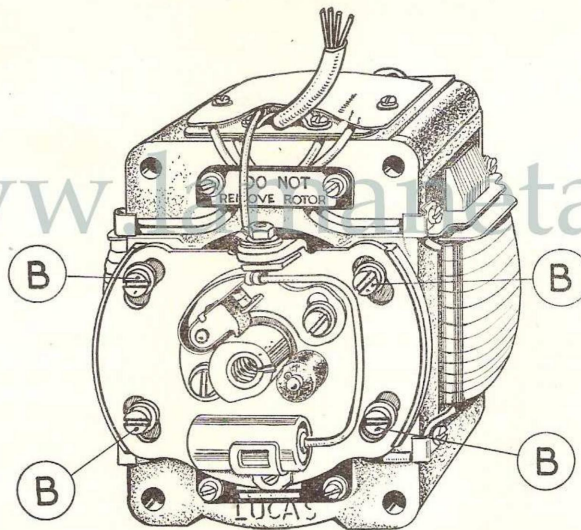


Fig. D18A.

Timing with the Lucas Generator

Variation of the ignition timing is obtained by slackening off the four screws ('B' Fig. D18A) and turning the timing control in the desired direction.

Movement in an anti-clockwise direction will retard the spark, and in a clockwise direction will advance the spark.