BSA SERVICE SHEET No. 607

"M" Group Models

October, 1948
Reprinted December, 1958

RE-ASSEMBLING THE ENGINE

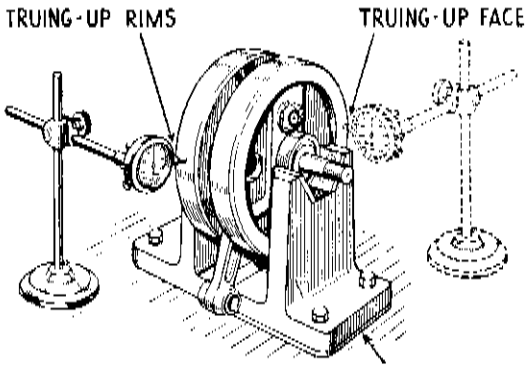
The need for extreme cleanliness cannot be over emphasized. Parts should be thoroughly cleaned and all trace of any antirust preparations with which new parts may be coated must be removed. All bearing surfaces should be liberally smeared with engine oil when assembling.

FLYWHEELS.

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 weights is inevitable, but provided that the discrepancy does not exceed 1½ 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 components varies considerably from that of the original ones.

The driving side flywheel should now be fitted to the crankpin (this is the side with the keyway) and the nut tightened up by hand. Fit the timing side flywheel and again tighten the crankpin nut by hand.

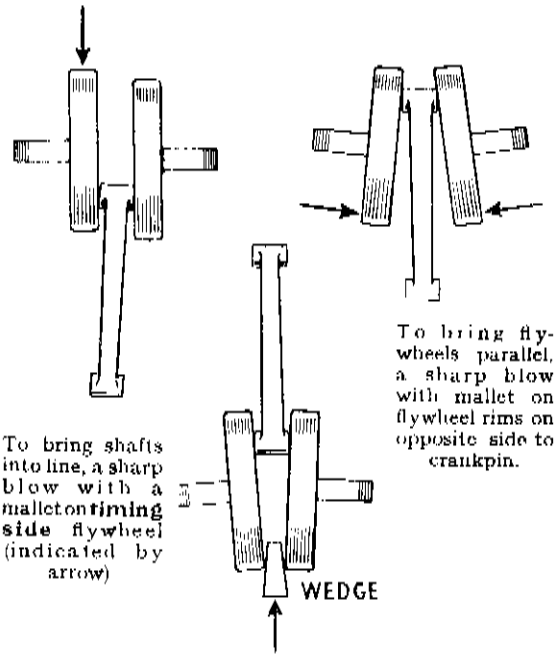
In order to tighten the crankpin nuts, properly, the whole flywheel assembly must be held rigidly. For this purpose, it should be mounted in a large vice (fitted with lead clamps) with the driving side flywheel uppermost. If a large enough vice is not readily available an alternative method is to fix rigidly to the bench in a vertical position, two 1$\frac{1}{16}$ in. diameter posts, the distance between their centres being 3$\frac{7}{8}$ in. Midway between the posts a hole of 1in. diameter should be bored in the bench to receive the mainshaft. The flywheel assembly is mounted on these posts so that they pass through the holes bored in the flywheels and the driving side flywheel should be uppermost. Tighten the crankpin nut **very firmly**, using a tubular extension to the spanner as when dismantling, and fit the locking plate and screw.



Suitable packing under timing side "vee" block to compensate for smaller diameter bearing.

Fig. M21. Checking flywheel alignment. "Vee" block 61-692 and base plate 61 1821.

Now turn the assembly over, so that the gearside flywheel is on top and tighten the crankpin nut lightly. **The grub screw in the end of the crankpin must be riveted over or centre-punched to prevent its unscrewing. If it unscrews serious damage may result to the engine.** Check that the side clearance of the connecting rod in the flywheels does not exceed .012 in. and is not less than .010 in.



To bring flywheels parallel when sides opposite crankpin are converging insert wedge as shown and deal sharp blow with mallet.

Fig. M22. Method of correcting flywheels out of alignment. Note that above illustrations are greatly exaggerated.

The flywheels will now be aligned only very approximately 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 the engine should be fitted to the mainshafts and the latter mounted on vee-blocks. The flywheels must be trued up, both on faces and rims, for which purpose a dial micrometer is necessary (Fig. M21), and after the wheels are trued to within at least .005in. tighten the timing side crankpin nut fully. A mallet or lead hammer applied to the flywheels will provide a sufficiently heavy blow for final truing, and will not harm the flywheels (Fig. M22). The shafts must not be struck. The shafts should be finally trued to within .002 in. maximum.

CRANKCASE.

Withdraw the bearings from the shaft and press them into their appropriate positions in the crankcase halves. A new washer will be required behind small drive side bearing and a new retaining ring must be fitted. In the case of single lipped roller bearings only the outer race can be so fitted. Do not omit the retaining ring which holds the driving side bearing in position, and check that the ends of the spacing sleeve between the bearings are parallel to within .002 in. In order that the inner bearing and the sleeve will stay in position it is advisable to lay the crankcase half on a bench with the outer bearing lowest.

Fit the oil flinger washer to the driving side mainshaft and note that this washer is bent over in one place to prevent accidental movement when fitting. If a new washer is being used it should be bent in a similar manner to the one which has been removed. Insert the driving shaft carefully into the crankcase, taking care not to disturb the flinger washer. The shaft should fit into the bearing without the use of unnecessary force and although the shaft must be a fairly tight fit in the bearings, it should be possible to assemble it by hand. If necessary ease the shaft with emery cloth, **carefully cleaning off any trace of emery afterwards.**

It is advisable to attend to the timing side of the crankcase before continuing further. Replace the oil pump driving spindle together with its locating pin (see Fig. M17) and then fit the oil pump in position. The fibre washer between the pump and the crankcase should be smeared with jointing compound, **but an excessive amount must not be used, since any surplus will be squeezed out and may find its way into the oil passages.** The pins securing the oil pump must not be screwed up too tightly. Check that the pump spindle can be rotated between finger and thumb.

Now replace the tappets and guides, the latter being screwed well home, and insert the cam pinion spindles. **These should be pressed home taking great care to keep them dead square, and must be fitted so that the flat on the spindle shoulder is parallel to the tappet foot, for which it provides clearance and consequently its position is most important.**

Assembly of the crankcase will be made easier if the flywheel assembly, together with the driving side portion of the crankcase fitted on as previously explained, is mounted in a vice. Lead clamps must be used and the splined portion of the shaft held.

The mainshaft bearings may now be pressed into the gearside half of the crankcase and the latter replaced on the mainshaft. Bolt up the crankcase and check that the flywheels, etc., spin easily. Fit sprocket centre, tighten up, and verify also that the connecting rod is centrally disposed in the crankcase mouth. Provided that the connecting rod is not visibly out of centre, there is no necessity for any adjustment to be made. If the connecting rod is out of centre, it will invariably be towards the driving side of the crankcase. In this event a shim will have to be made and inserted between the driving side flywheel and the oil flinger washer. It may also be that the distance sleeve between the driving side bearings has become a little worn on its end faces, and a new component (one specially chosen so that its length is on the maximum limit) will rectify the connecting rod alignment. The maximum length for the distance sleeve is 1.005 in. and the minimum is 1.000 in.

When the connecting rod alignment is found correct, remove the gearside half of the crankcase and clean the joint of any compound used previously. Fit the magdyno straps on their hinge pins, smear jointing compound lightly on the crankcase joint face and again bolt up the crankcase. Check that top of crankcase, where cylinder base flange fits, is dead flat.

TIMING GEARS.

Replace the engine shaft pinion, taking special care to note that the worm is engaging properly with the oil pump spindle and that rotation of the flywheels drives the pump

The cam pinions are interchangeable and consequently the timing marks are duplicated on both pinions. This should not cause any difficulty when timing the valves if it is remembered that the dash mark only is used for the inlet cam and the dot for the exhaust cam. (Fig. M23).

The magdyno can now be fitted to the crankcase and its straps loosely coupled up. Make sure that the dowels in the base engage properly in their holes in platform and that any packing shims are refitted. Refit the idler pinion between the inlet cam pinion and the magdyno pinion, but do not replace the pinion retaining plate at this stage.

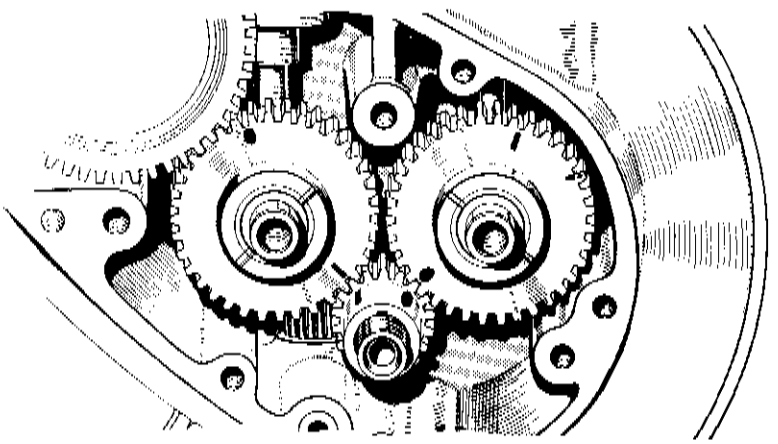


Fig. M23. Valve timing marks.

An oil sealing washer is fitted behind the magdyno pinion and this should be temporarily removed. Replace the magdyno pinion on its taper; it need

not be driven on very firmly but just tightly enough to prevent slip. Check the backlash between this pinion and the idler. If excessive, the gears will be noisy; if insufficient, a whining noise will result.

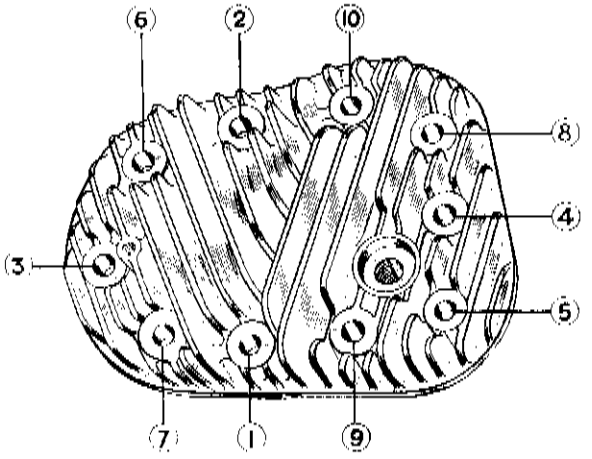


Fig. M24. Cylinder head bolts.

In order to adjust the backlash, shims are fitted under the magdyno if necessary, when the engine is first built. If a different magdyno is being fitted it is essential this backlash be checked carefully, shims of a different thickness being used as required.

Remove the magdyno pinion once more, replace the oil sealing washer and again fit the magdyno pinion **loosely** in position. It is preferable to leave the setting of the ignition until the barrel and piston are in position, and for this reason the magdyno pinion should not be tightened up. The valve timing can now be set. Replace the pinion retaining plate, noting that the coarse threaded bolts screw into the crankcase bosses and then fit the lockwasher and nut on the engine mainshaft. Play between the pinions and the retaining plate should be .002 in./.003 in.

ASSEMBLY FROM THIS POINT WILL BE THE SAME AS AFTER DECARBONISING

CYLINDER AND PISTON

The gap between the ends of the rings should be checked with the ring in the cylinder. If the gap is excessive new rings should be fitted with gaps of .008 in./.012 in.

Replace the piston and gudgeon pin on the connecting rod and if the original piston is used make sure that it is the correct way round (see Service Sheet No. 606). Do not omit the gudgeon pin circlips and verify that they are properly fitted.

Set the tappets on their lowest position, fit the paper washer on the cylinder base and replace the cylinder barrel on the crankcase. The piston rings may be compressed quite easily by hand while the barrel is being replaced.

Tighten the barrel down, not forgetting one nut is inside the tappet chest. The tappet clearances should be set very carefully as described in Service Sheet No. 604.

Next set the ignition timing as described in Service Sheet No. 604. Note that as the magneto cable is disconnected the cam will be in the "full retard" position, and it must be held in the "full advance" position.

The resetting of magneto timing will not apply after decarbonising as there is no necessity to disturb the timing to remove cylinder head and barrel.

Replace the timing cover after lightly smearing both sides of its paper washer with jointing compound, **taking care that the oil hole** (Fig. M16) **is not obscured.** (This does not apply after decarbonising.) Bolt the cylinder head and gasket in position, but if the latter shows signs of leakage from previous use (indicated by black patches) a new one should be fitted. The cylinder head bolts must be tightened down in the order shown in Fig. M24.

The exhaust valve lifter body may now be screwed into its original position. Before the sparking plug is replaced it should be dismantled and cleaned, or if the machine has covered a large mileage a new plug should be used.

Replace the tappet cover and lightly smear the washer with jointing compound before fitting.

The engine is now ready for bolting into the frame (this does not apply after decarbonising), and after replacement check that the bolts are really tight, and that the gearbox bolts have not been forgotten. Refit the offside footrest assembly pushing rod fully home. The near-side footrest sleeve and distance piece (behind chaincase) should now be placed in position. Then refit the

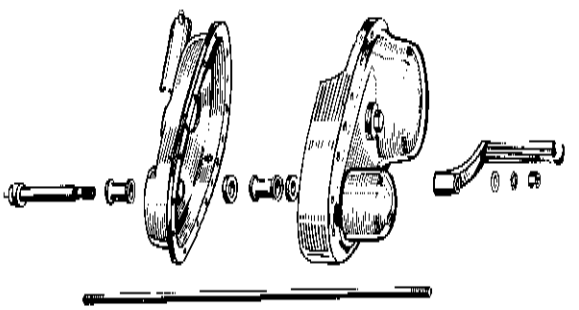


Fig. M25. Assembly of chaincase and footrest.

inner half of the chaincase (first checking that oil seal washer is in good condition) and when the bolts holding it to the crankcase have been finally tightened, wire them together with a fresh piece of wire for locking purposes.

The engine shaft cush drive can be replaced by hand, without the need for special tools to compress

the spring (this does not apply after decarbonising) Lock the central nut up tight, when the clutch and primary chain are in position.

Fit the clutch on the gearbox mainshaft (this does not apply after decarbonising)—see re-assembly of clutch, Service Sheet No. 610– and replace the chain. On fastening the spring link it is important that it should be fixed so that the closed end is pointing in the direction of the "run" of the chain.

When replacing the chaincase outer cover, make sure that the washers, etc., on the footrest bar are in the correct position (see Fig. M25) and that the jointing washer is properly fitted. The chaincase must be refilled with engine oil to the level plug, before the machine is used

If there is any suspicion that the pipes from the oil tank to the crankcase are faulty they should be replaced, otherwise the engine may suffer harm through insufficient oil.

All the control cables (i.e., carburetter, magneto and exhaust valve lifter) should be re-coupled next. followed by the dynamo leads and the earth wire, Finally, replace the petrol pipe and then the exhaust pipe and silencer.

B.S.A. MOTOR CYCLES LIMITED, Service Dept., Birmingham. 11.
PRINTED IN ENGLAND)