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SERVICE SHEETS

BSA SERVICE SHEET No. 215

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A GROUP MODELS (with Swinging Arm Type Frame).

RE-ASSEMBLY OF THE ENGINE.

The need for cleanliness cannot be over emphasized; all parts should be clean and free from dirt or rust. Smear all bearing surfaces with clean engine oil during re-assembly.

If the crankshaft has been replaced, the original flywheel, if serviceable, may be retained and fitted by passing it over the drive side of the crankshaft and bolting to the flange by six high tensile steel bolts. After securely tightening the bolts, they should be peined over on to the nuts to lock them.

The flywheel is positioned with the counter-weight part at the opposite side to the big end journals (see Service Sheet No. 712X for balancing).

Heat the crankcase halves in a degreasing plant or hot water, then by means of an arbour press insert the bearings and bushes into their respective housings. The cases must be suitably supported during these operations to prevent damage.

Press the two camshaft bushes into the timing side case, one from inside and one from outside, and the idler pinion spindle bush also from the outside.

If new camshaft or idler pinion bushes have been fitted it is now necessary to bolt the crankcase together and attach the inner cover, then with the aid of Jig, Part No. 61-3281, use reamer 61-3167 to ream the bushes to .7495 to .7485 inches internal diameter (Fig. A42). This reaming jig should also be used to guide the mainshaft reamer if a new mainshaft bush has been fitted (see Service Sheet No. 711 for details of this reamer).

Then unbolt the crankcase and detach the inner timing cover. Remove all traces of swarf left from the reaming operation.

At this point it is advisable to obtain a fixture such as shown in Fig. A38, Service Sheet No. 214, and a wooden block with a hole through the centre as shown in Fig. A40.

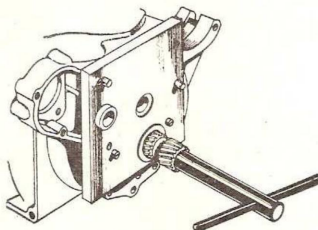


Fig. A42 Reaming Jig.

The big end bearing liners should now be placed in the end caps and connecting rods. Note that these can only be put in the correct way, because the liners are lipped, but they must, of course, be replaced in their original positions.

When fitting new liners it should be noted that one of each set of four has a small central drill hole. This liner should be fitted in the left-hand con rod to line up with the bleed hole which supplements the lubrication of the cylinder bore. The con rod should be positioned so that the bleed hole faces the flywheel side of the bore.

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No scraping is necessary with these big end liners, and it must not be attempted or damage will result.

Connect each rod and cap to its crank journal, making sure that their marks correspond, and insert the big end bolts and tighten them. On no account must the castellated nuts be slackened off to allow the insertion of the split pins. If one of the slots on the nut does not line up with the hole in the pin when the nut has been fully tightened, the latter must be removed and filed on its flat face until the hole and the slot coincide. A torque spanner set at 8½ lbs. ft. should be used for tightening these nuts to ensure that they are not over-tightened.

The maximum crankshaft end float should be .005in. and this is controlled by the shims between the inner race of the drive side roller bearings and the crankshaft web.

If the original crankshaft is to be replaced, then it is merely necessary to ensure that the original shims are used. Where a new crankshaft is fitted it should be assembled into the crankcase and the two halves bolted tightly together to enable the end float to be checked. The shims should then be regulated to ensure that the end float is correct.

Place the crankshaft assembly on a thick wooden block through which a hole large enough to take the gear side mainshaft has been bored. Then place the drive side crankcase half over the drive shaft and push into position, making sure that the bearing enters the race squarely and goes right home.

Reverse the whole assembly on the block, and then insert the camshaft into the blind phosphor bronze bush in the drive side crankcase half. Smear both joint faces of the crankcase with jointing compound, and after it has become tacky, place the gear side crankcase in position and bolt the crankcases together, making sure that each nut has a shakeproof washer.

When the cases are bolted securely together, the camshaft and crankshaft must rotate freely; otherwise the case alignment is incorrect.

Attach the sump plate filter and its paper washer, making sure that the pump suction pipe from the inside of the crankcase passes freely through the hole in the filter gauze. Replace the oil release valve unit after assembly, as shown in Fig. A43.

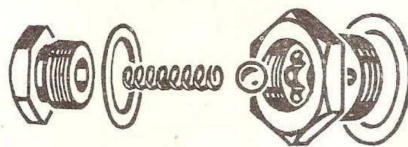


Fig. A43.

The dynamo securing straps and timing side front engine plate, if previously removed, should now be attached to the gear side case. The left-hand engine plate was removed when the engine was taken from the frame, and will be replaced when the engine is being rebuilt into the frame cradle.

The keyed timing pinion should be pushed on to the crankshaft, concave side to crankcase, followed by the mild steel plain washer. Before mounting the pump, replace the thick washer so that the holes match, and the round fibre washer on the third stud. Slide the pump and the driving worm on together, turning the worm anti-clockwise. The driving worm is left-hand threaded and care must be taken to avoid damage to the worm gears during assembly.

B.S.A. Service Sheet No. 215 (cont.)

The driving worm is secured by a keyed washer and a left-hand nut, the outside edge of the washer being subsequently turned over on to the nut to form a locking device.

Place a screwdriver inside the engine against one of the cams and the inside top crankcase lug, to prevent the camshaft from sliding inwards and so disturbing the key when putting the cam pinion on the shaft. Now, holding the screwdriver, the cam pinion may be inserted, with the breather actuating stud outwards, on to the keyed end of the camshaft, and secured by its locknut and special locking washer, the tabs of which must be turned down on to the nut after tightening.

Check to see that the cam shaft key has not become dislodged from the pinion.

Rotate the crankshaft until the dot on the timing or crankshaft pinion is upwards, and insert the idler pinion so that the dot on the crankshaft pinion meshes with the dot on the idler pinion and the dash mark on the camshaft pinion meshes with the corresponding dash mark on the idler pinion (Fig. A44).

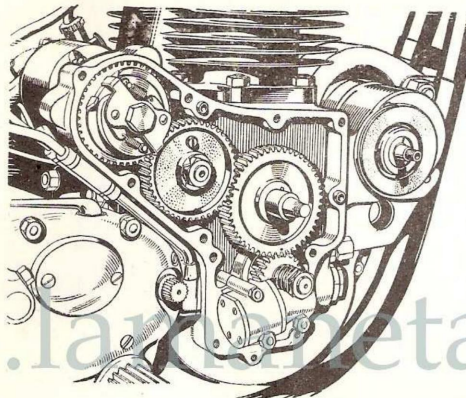


Fig. A44 Valve Timing.

The magneto should now be fixed in position by its three securing nuts, the two short nuts on top and the long nut underneath the magneto, with a paper washer between the magneto and crankcase.

Timing of the magneto is carried out at a later stage in the assembly, and the magneto drive pinion with its automatic ignition advance device should now be only loosely attached to the magneto spindle.

Place the dynamo in position in its securing carrier on the front of the engine without tightening the securing strap. Smear the inner joint face of the inner timing cover with jointing compound, and place its paper joint washer in position so that it is held by the jointing compound.

The crankcase breather should now be placed on the cam pinion, with the cork washer between the pinion and breather. Smear the breather with engine oil, and place the inner cover in position, securing with the screws. Check end float on the breather and correct if necessary by fitting a thicker cork washer to eliminate any play.

Now fit the pistons to the connecting rods, making sure by the marks previously scribed on the inside of each piston, if they are the original ones that they are in the correct positions. The split portion of the skirt should face towards the front.

Replace the tappets in the reverse order to that for dismantling. (see Service Sheet No. 206).

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Place the paper cylinder base washer in position on the top of the crankcase, and rotate the engine to bring the connecting rods to top dead centre. Turn the piston rings so that the gaps, which should be .011 to .013in., are not in line with each other. Smear the pistons with engine oil.

Place two thin wooden strips across the mouth of the crankcase so that they support the front and rear of the piston skirts. Compress the piston rings with the aid of two Slipper Rings, Part No. 61-3334 (A7) or 61-3262 (A10), noting that the bevelled edge of the slipper should be at the bottom (see Fig. A45). Now lower the cylinder barrel over the pistons until the full length of the pistons is in the cylinder bore. Raise the barrel and pistons to permit the wooden strips and piston ring slippers to be removed. The block can then be lowered into position on the crankcase and secured with the holding down nuts and shakeproof washers.

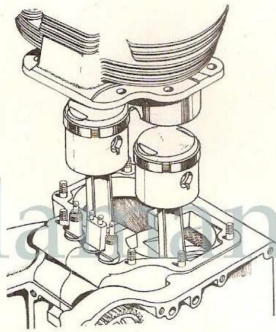


Fig. A45 Replacing the Cylinder Block.

Replace the four push rods through the tunnel on to their tappets. The two long rods are the inner ones and the two short rods the outer ones.

The magneto should now be timed. To do this, see Service Sheet No. 203.

Place the chain on the dynamo driven sprocket and the dynamo driving sprocket, which should now be inserted on to the shaft, the concave side of the sprocket inwards, a cork washer being placed between the sprocket and the inner timing cover. Fit the nut and a plain washer, turning the edge of the washer on to the nut to lock it after securely tightening.

Adjust the dynamo chain by rotating the dynamo in its cradle to give approximately $\frac{1}{8}$ in. to $\frac{3}{16}$ in. up and down play on the chain, but not sufficient to foul the inner case retaining screw boss in the centre of the cover, near which the chain passes. Then tighten up the dynamo in its cradle. The dynamo will tend to rotate as the strap is tightened and the adjustment must be checked when the strap is quite tight.

The aperture in which the dynamo chain drive runs should now have approximately $\frac{1}{4}$ lb. of light grease inserted, as no other means of lubrication is provided.

Smear the inner side of the outer cover joint face with jointing compound, and position a paper washer on the face when the compound is tacky. Place the cover on to its dowels and secure it with the twelve securing screws, the longest screws at the lower end of the case, and the three shortest screws at the dynamo end of the case.

Next replace the valves into their respective ports, place the springs over the stems and with the top collars in position, and using Service Tool No. 61-3340 as before, com-

B.S.A. Service Sheet No. 215 (cont.)

press the springs until the split collets can be inserted. A dab of grease on the inside of the collets will serve to hold them in position, until the spring is released. Make quite sure that the collets are correctly located.

Check that the push rods are on their respective tappets, position the cylinder head gasket and then lift the cylinder head into position. Replace and tighten the cylinder head bolts, commencing with the centre bolt and then working diagonally in order to secure even tightness, as shown in Fig. A46. Tighten each bolt a little at a time, and when they are all right down give them a final wrench to make certain that they are really tight.

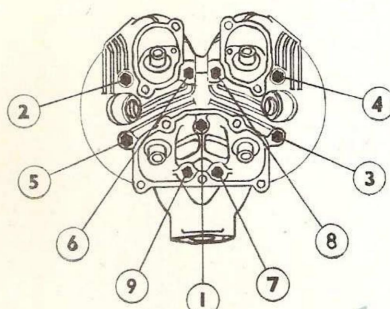


Fig. A46 Cylinder Head Bolts

Now replace the rocker box making sure that the push rods are correctly inserted into the rocker ends, and thoroughly tighten the retaining nuts and bolts. Unless care is exercised when replacing the rocker box it is possible to cause damage to the valve stems. When fitting, place it in position over the valves, and gently ease the four holding down studs through their locating holes in the cylinder head. Check that the rocker box is well clear of the valve spring collars and then push it firmly down to its seating on the cylinder head. No force must be used in this operation.

Failure to use this method may result in the valve stems being bent, by fouling the rocker box. Although not noticeable in the test run of the engine, this will result in sticking valves and loss of power at high speeds. Do not forget the engine steady plates which are retained by the rocker box bolts.

A special push rod locating tool Part No. 67-9114 is available which facilitates the location of the push rods while replacing the rocker box. The tool should be inserted between the cylinder head and the rocker box from the right-hand side, with the shaped edge to the rear and with the outside recesses located by the two rear rocker box holding down bolts, as shown in Fig. A47. Rotate the engine until the push rods are level. The rocker box should then be tightened down and the tool removed just before it is gripped between the rocker box and cylinder head.

Before replacing the rocker box covers, check the tappet clearances and adjust if necessary. For correct clearances, see Service Sheet No. 203.

The engine is now completely assembled and ready to be replaced in the frame. Lower the engine into position in the frame and move it backwards into its position between the rear engine plates and secure with the aid of the fixing studs.

Slide the left-hand front engine plate into position and secure with the frame and engine studs. Later models have both the distance pieces attached to the left-hand engine plate, but on some early models the lower distance piece is separate and must be slid into position before replacing the lower frame stud.

B.S.A. Service Sheet No. 215 (cont.)

Replace the nuts and washers and tighten all the engine plate securing nuts.

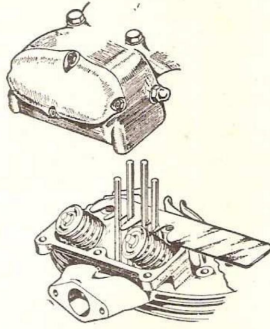


Fig. A47 Push Rod Assembly Tool

Refit the primary chaincase as indicated in Service Sheet No. 310.

Replace the exhaust pipes and electrical connections, noting that the dynamo plug should be replaced with its convex side facing outwards. Reconnect the rocker box oil supply pipes.

Screw the pipes from the oil tank on to the crankcase unions noting that the outside union is the inlet and the inner union the return. The oil return pipe on the oil tank can be identified by the rocker box supply pipe leading from it.