BSA SERVICE SHEET No. 201

Reprinted March, 1960

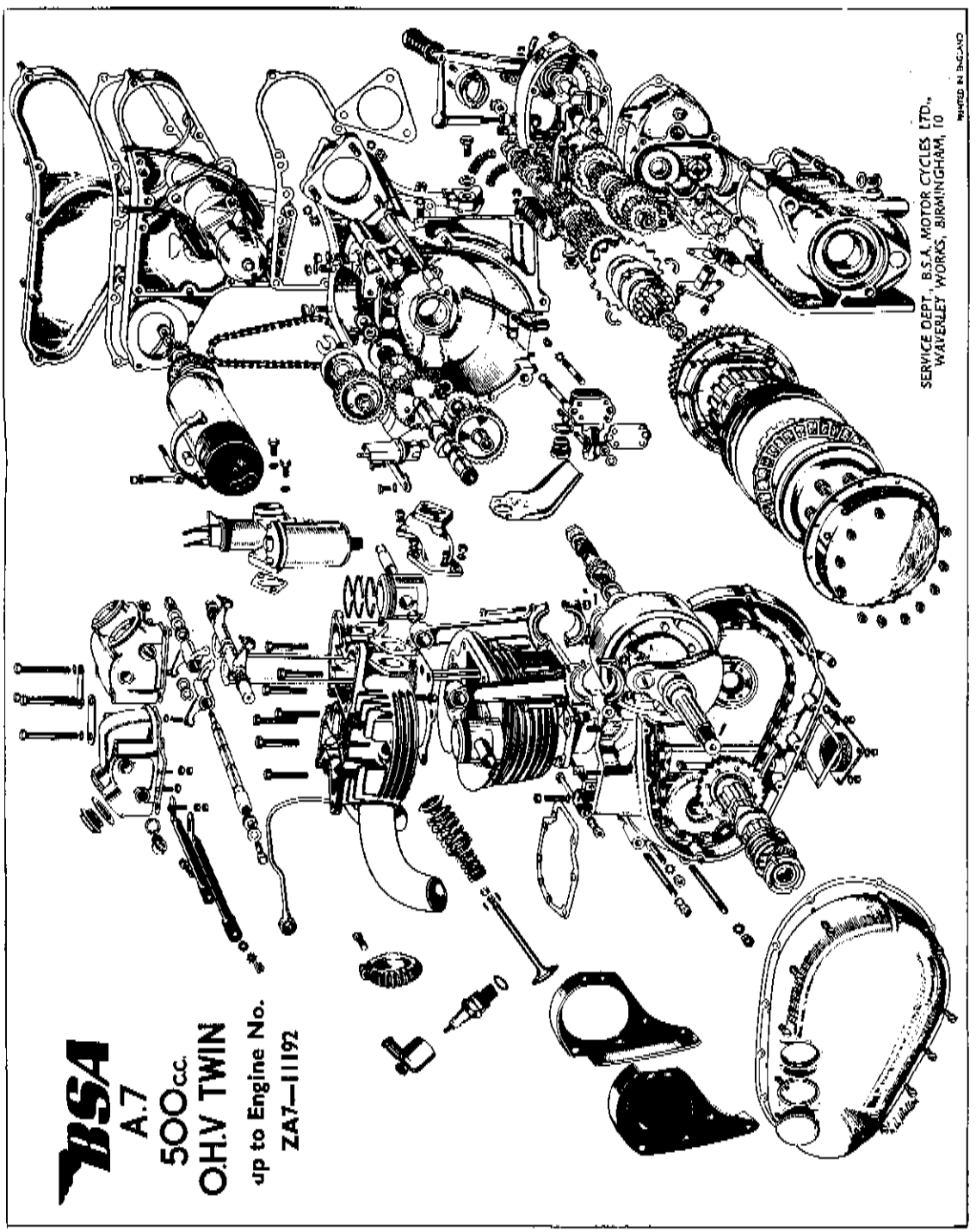

Fig. A1. The A7 Engine and Gearbox (Exploded View)

BSA SERVICE SHEET No. 201A

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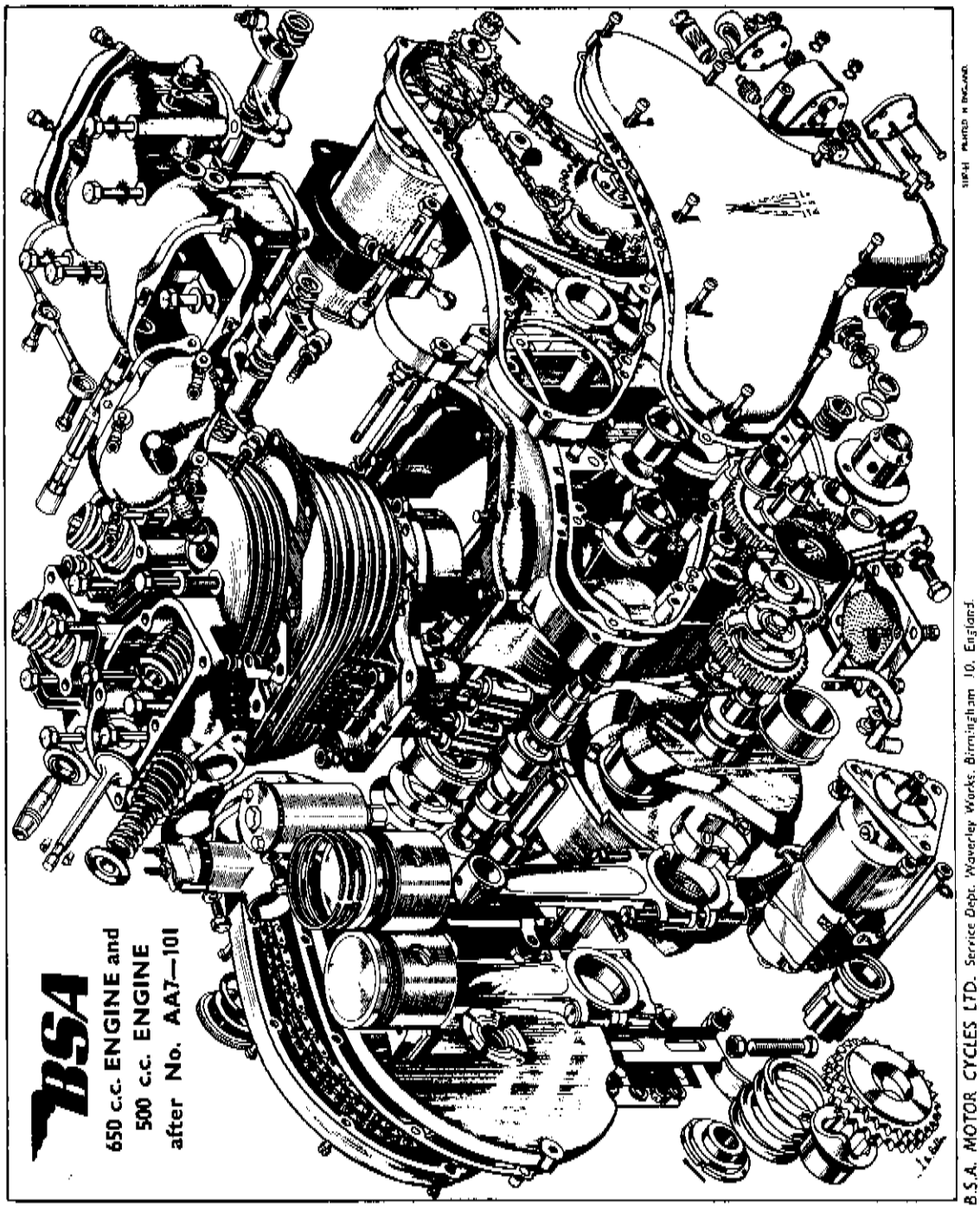
A GROUP

(Except Swinging Arm Type Frame)



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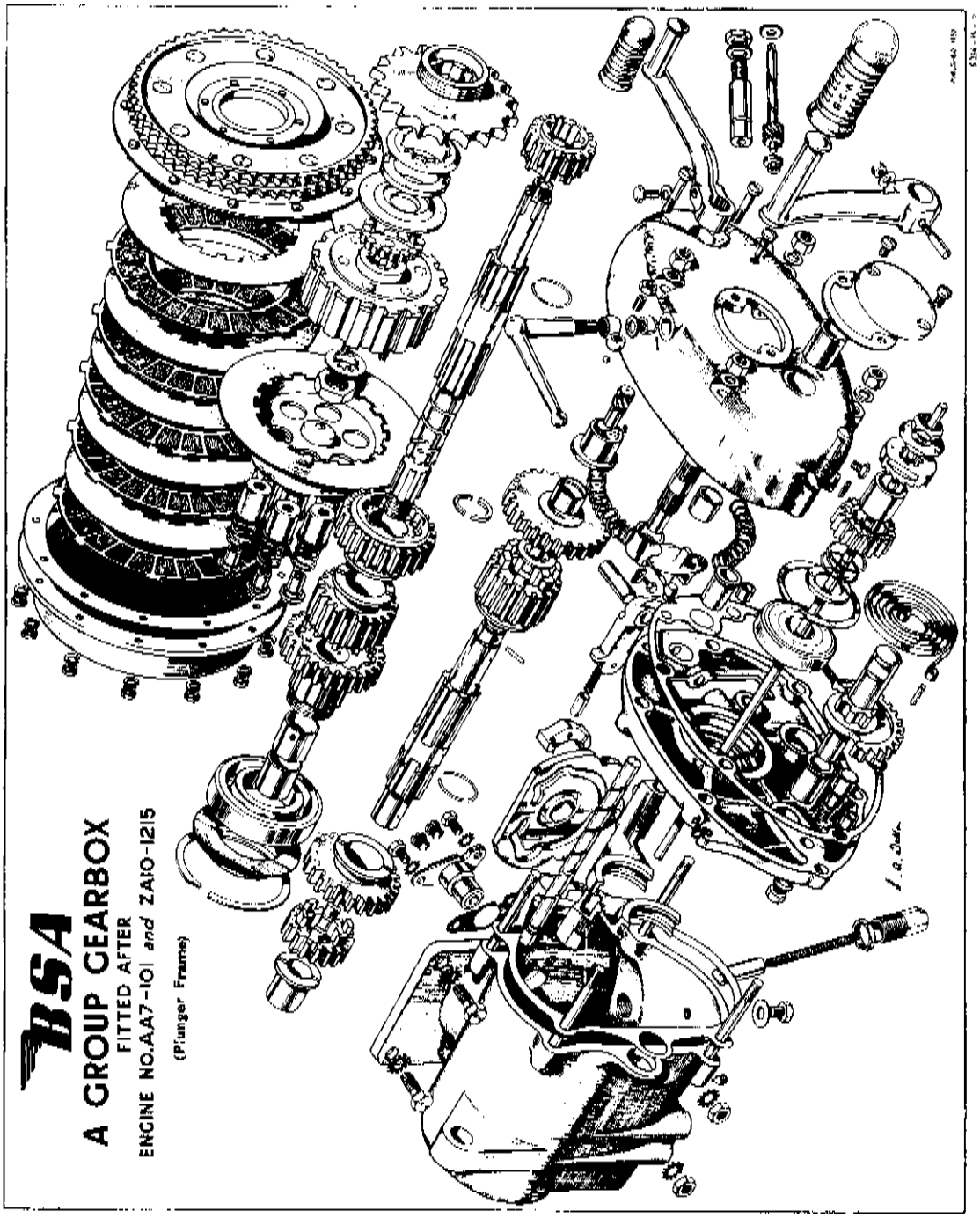

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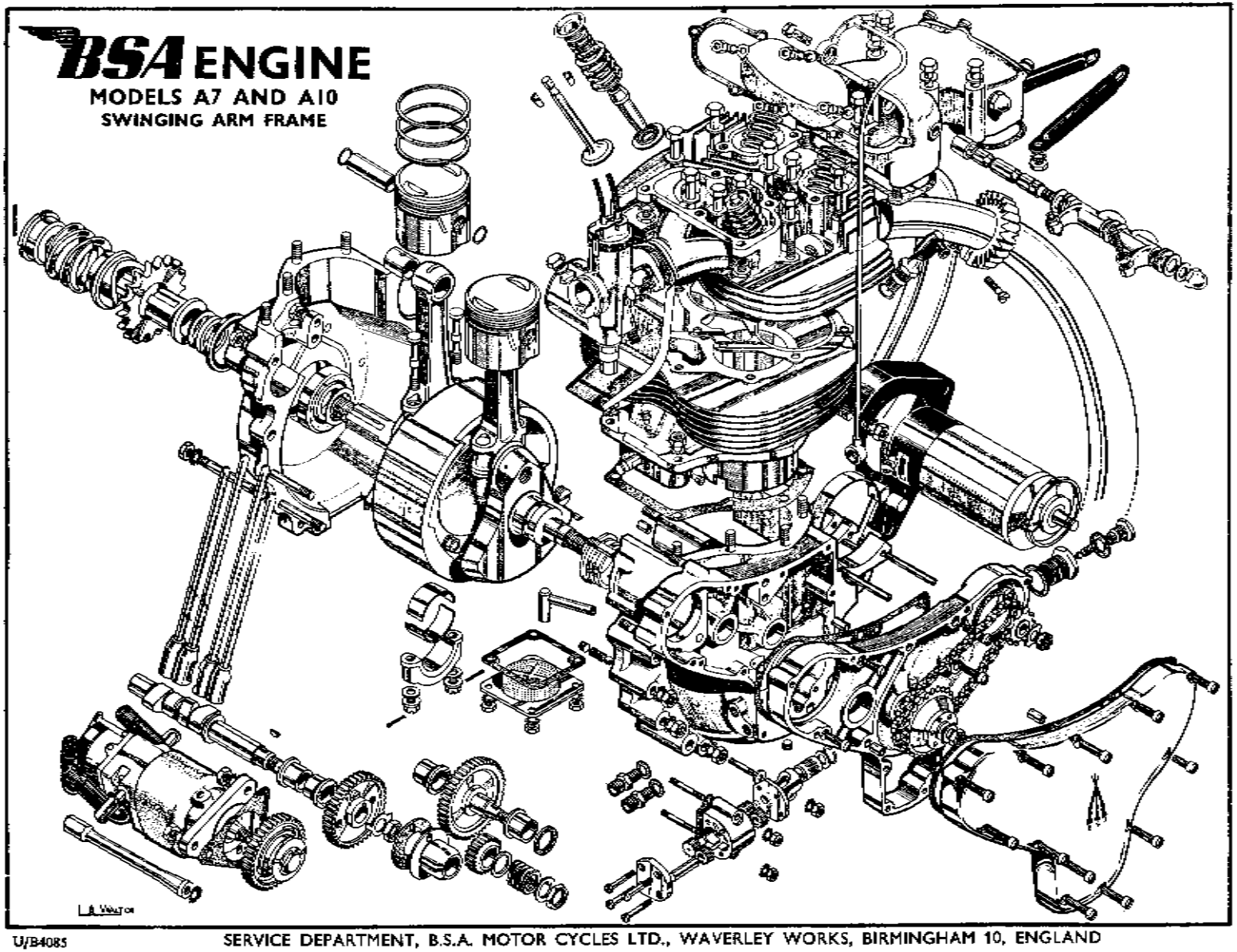
BSA ENGINE

MODELS A7 AND A10

SWINGING ARM FRAME



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SERVICE DEPARTMENT, B.S.A. MOTOR CYCLES LTD., WAVERLEY WORKS, BIRMINGHAM 10, ENGLAND

A7 and A10 Engine (Swinging Arm Frame) Exploded View

BSA SERVICE SHEET No. 201C

Reprinted Nov. 1959

BSA SERVICE SHEET No. 202

"A" Group Models

Reprinted June 1959.

THE LUBRICATION SYSTEM

The engine lubrication system is of the dry sump type operated by a double gear pump situated in the bottom of the timing case. All oilways are internal except for the supply and return pipes to the tank and the feed to the rocker spindles. The oil flows from the tank—through a filter in the tank—to the supply portion of the pump, which delivers it past an automatic valve to the timing side main bearing, and thence to the hollow crankshaft and the big-end bearings.

Oil pressure in maintained at the big-ends by the pressure release valve *A* (Fig. A2). When the pressure in the system exceeds 50/60 lbs. per square inch, this valve opens and allows surplus oil to be passed into the bottom of the timing case.

On A10 machines after Engine No. ZA10-4712, and A7 machines after Engine No. AA7-101, the crankcase has been modified to provide an additional oil supply to the cylinders. The oil by-passed by the pressure release valve is now fed through drilled oilways to the camshaft trough, and is then directed on the cylinder walls (Fig. A2A). A small bleed hole also provides additional lubrication to the timing gear.

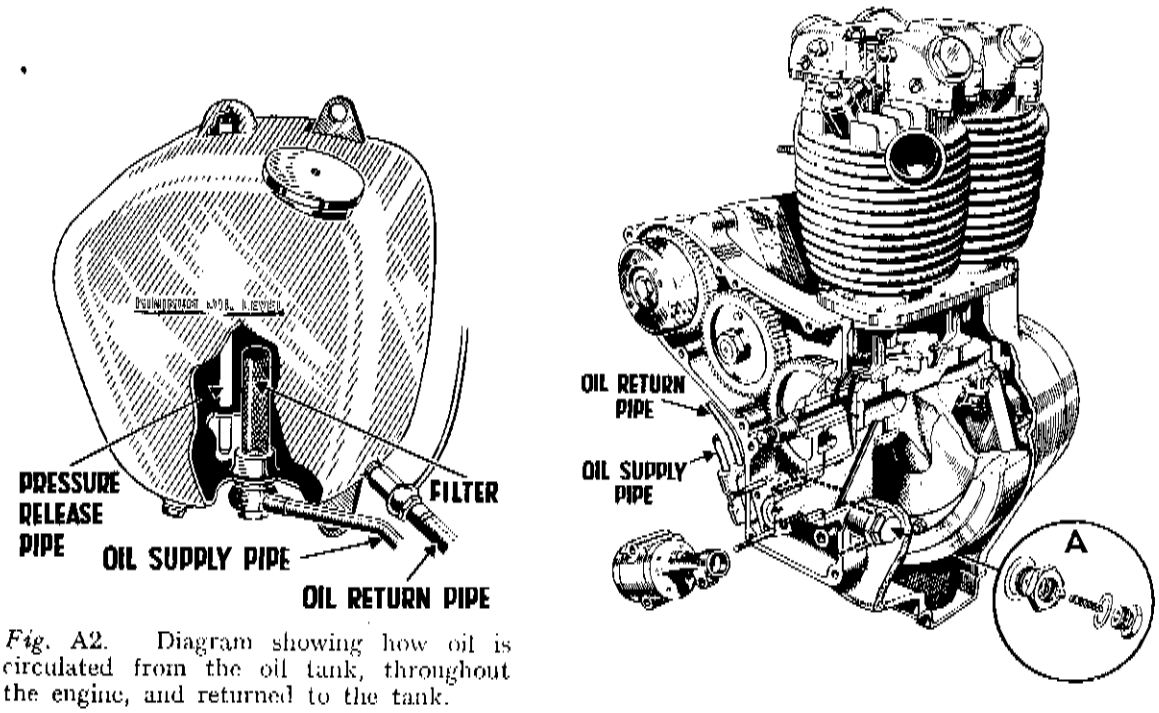

Fig. A2. Diagram showing how oil is circulated from the oil tank, throughout the engine, and returned to the tank.

After lubricating the big-ends and circulating through the engine in the form of mist, the oil drains down through a filter in the bottom of the crankcase.

From there it is drawn through a non-return valve by the return portion of the pump (large gear set) and delivered up the return pipe to the tank.

To check the flow of oil in the lubricating system, remove the tank filler cap while the engine is running. Oil should be seen issuing from the return pipe from the crankcase.

Any restriction in the pressure release pipe in the tank will cause an increase in pressure inside the oil tank, and will result in leakage of oil at the filler cap. This can be remedied by inserting a piece of flexible wire into the outer end of the pipe to clear any obstruction.

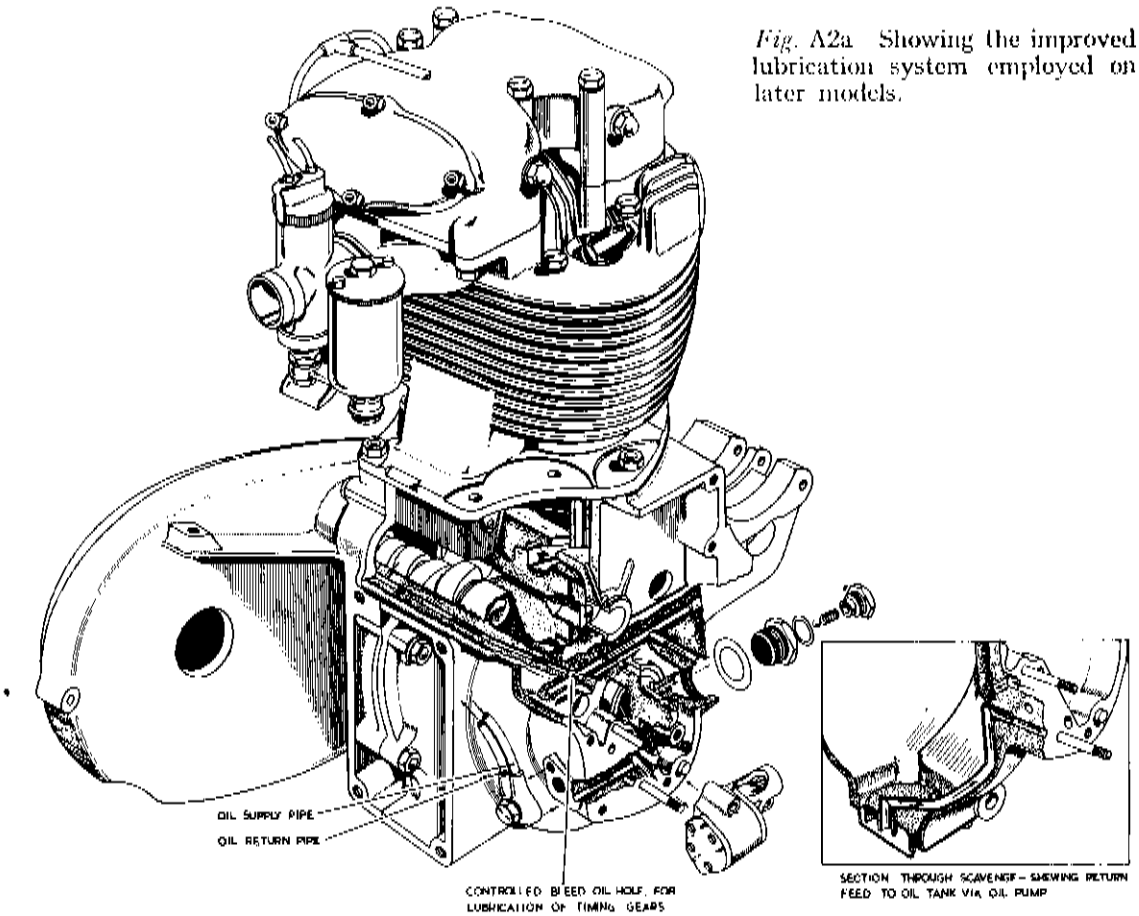

Fig. A2a Showing the improved lubrication system employed on later models.

LUBRICATION OF THE ROCKERS

On machines before Engine No. XA7 450, all the valves and rockers are lubricated by oil mist from the crankcase.

On machines from Engine No. XA7 450, and before YA7-3402 oil is fed to the exhaust rocker spindle only.

On all A7 engines after YA7-3402 and on all A10 machines oil is fed to both the inlet and exhaust rockers and lubricates the remainder of the valve gear in the form of oil mist.

The rocker box oil supply is obtained from a union to the point where the oil return pipe is attached to the oil tank.

THE OIL PRESSURE RELEASE VALVE.

This valve should open when the pressure in the supply system reaches 50/60 lbs. per square inch. The valve ball is of 5/16in. diameter. Remove the valve when oil changing, clean it and ensure that it is operating freely. See Service Sheet 203 for further details of dismantling.

OIL CHANGE.

In case of new or re-conditioned engines, the oil should be drained and renewed after the first 250 miles, and again after 500 miles. Then periodically every 2,000 miles.

Drain the oil tank and the sump, preferably when the engine is hot, by removing the drain plug and the banjo with the filter at the bottom of the tank. Also the drain plug and the cover with the filter on the bottom of the crankcase. Clean by washing in petrol. Before replacing make sure that the parts are quite dry.

On Swinging Arm models the construction of the oil tank is slightly different, but the system of oil flow is the same. The oil filter is attached to the hexagon nut in the side of the tank and unscrewing it will provide access to the filter without disturbing the oil supply pipes.

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BSA SERVICE SHEET No. 203

A Group Models

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ENGINE ADJUSTMENTS WHICH CAN BE DONE WITHOUT DISMANTLING

Oil Pressure Release Valve

This valve (Fig. A3) is interposed between the delivery side of the pump and the Big End bearings. It is pre-set to control the pressure in the supply system and it should be examined periodically when changing the oil to ensure that it is operating freely and not impeded by the presence of even tiny particles of foreign matter. If the ball is prevented from seating properly there is a danger of oil starvation at the big ends.

After dismantling all parts of the valve should be thoroughly rinsed in petrol and allowed to dry before re-assembly. Note that both hexagons must be screwed right home and made really tight.

Fig. A3. The Pressure Release Valve (exploded view).

Valve Clearances

Valve clearance checking or adjustment should only be carried out when the engine is quite cold. Remove the sparking plugs, and the rocker inspection covers A, Figs. A4 or A4a. On the early models with separate rocker boxes, illustrated in Fig. A4, it is also necessary to remove the small plugs D, to permit insertion of the feeler gauges and a special tool from the tool kit will assist in removing the caps A.

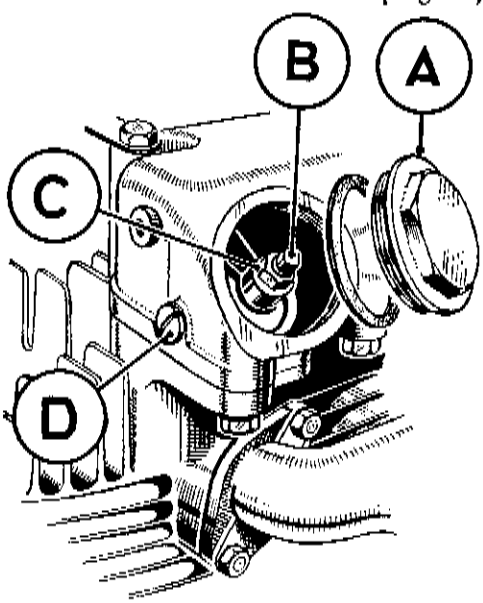

Fig. A4. Tappet Adjustment.

On A10 and Swinging Arm models the petrol tank should be removed to provide access to the rocker box covers. Do not forget to disconnect the fuel pipes and the strap beneath the tank, connecting the two halves.

The cams are of special design. Because of this it is essential that when checking or adjusting the clearance of any valve it should be closed, with its tappet on the base circle, or neutral portion of the cam. To obtain this position for the drive-side inlet valve turn the engine until the gear-side inlet valve is fully open. Similarly, to set the gear-side inlet valve in the correct position, turn the engine until the drive-side inlet valve is fully open. Follow the same procedure exactly for the two exhaust valves.

Having turned the engine until the valve under consideration is in its correct position, insert a feeler gauge between the adjusting pin 'B' and the valve stem or valve end cap The clearances should be as follows:

	Inlet	Exhaust
All A7 Engines up to Engine No. XA7.601	.003 in.	.003 in.
All A7 Engines from Engine No. XA7.601 to ZA7.11192 ..	.015 in.	.015 in.
A10 Engines and A7 Engines after Engine No. AA7.101 ..	.010 in.	.016 in.
A10 Super Flash	.008 in.	.008 in.
A7 Shooting Star	.008 in.	.012 in.
A10 Road Rocket	.008 in.	.008 in.
A10 and A10 S/R with frame prefixed "GA"	.008 in.	.010 in.

To adjust the clearance; if it is found to be incorrect, hold the pin with one of the tappet spanners and with the other tappet spanner release the locknut 'C'. Then, holding nut 'C', screw pin 'B' up or down as required until the correct amount of play is obtained.

Hold the pin 'B' with its spanner and tighten nut 'C' very securely. When 'C' is properly tightened, check the play again, to make certain that it has not been altered while tightening the nut. Check and adjust all four adjusters in the same manner, and do not forget that this must be done while the engine is quite cold. Finally, replace the rocker box covers, the caps 'D', and the sparking plugs.

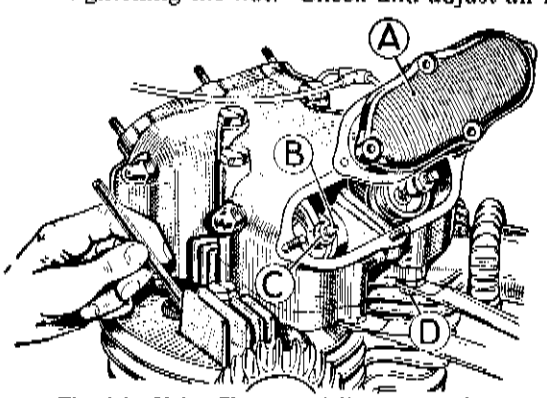

Fig. A4a. Valve Clearance Adjustment and Ignition Setting.

Clearances tend to increase slightly when the engine warms up to its working temperature, and if an attempt is made to adjust clearances while the engine is warm there may be insufficient clearance when the engine is cold. Running an engine without enough tappet clearance is harmful to the valve seats, and is one of the commonest sources of trouble in this direction.

Ignition Timing

It is a rare occurrence for the magneto pinion to slacken off and disturb the ignition setting, and it is not advisable to interfere with the standard setting unless it is known to be at fault.

Before checking the timing it is advisable to check and if necessary adjust the contact breaker points, as a slight variation of the points tends to advance or retard the timing (opening the points advances the timing, closing them retards timing). The fully opened gap at the points should be .010 in. –.012 in.

To check the timing remove the rocker box caps and the sparking plug from the gear-side cylinder.

Turn the engine forward until the gear-side piston is at the top of its compression stroke. This can be checked by means of a rod inserted through the sparking plug hole and resting on the piston head. If, when the piston is in this position, either of the valves is found to be partly open, this means that the piston is at the top of the wrong stroke, and the engine must accordingly be turned through one complete revolution. If tappet clearance can be felt at both valves (see Tappet Adjustment) the piston will be at its correct top dead centre for ignition timing.

The Timing points for the different A Group Models are as follows:

A.7 Standard	$\frac{4}{16}$in. before T.D.C. fully advanced
A.7 Star Twin, A.7 Shooting Star	$\frac{3}{8}$in. before T.D.C. fully advanced
A.10 Golden Flash	$\frac{11}{32}$in. before T.D.C. fully advanced
A.10 Super Flash, A.10 Road Rocket	$\frac{3}{8}$in. before T.D.C. fully advanced
A.10 and A.10 S/R with frame No. prefixed "G.A"	$\frac{18}{32}$in. B.T.D.C.

Having satisfied yourself that the piston is at the correct top dead centre, turn the engine back until the piston has descended by the amount shown in the above table.

Leaving the engine set in this position, turn the contact breaker in its normal direction of rotation, until it is in the fully advanced position, the points should just be beginning to open, by not more than .002 in. on the bottom contact breaker cam. (A, Fig. A5.)

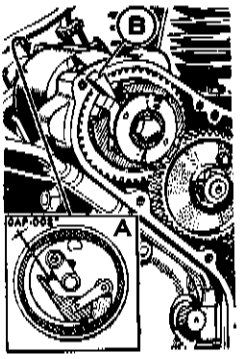

Fig. A5. The Contact Breaker Mechanism.

If the timing requires resetting, remove the timing cover and unscrew the bolt locking the magneto pinion and automatic advance mechanism on its shaft.

Note that the pinion is self extracting, and as the bolt is unscrewed the pinion will be drawn from its taper.

Leaving the engine set in the position described for checking the ignition, turn the contact breaker in its normal direction of rotation, i.e. clockwise, until the points are just beginning to open, by the action of the arm on the bottom cam.

Wedge the automatic advance mechanism in the advanced position as shown at B, Fig. A5, and holding the contact breaker in position tighten the magneto pinion bolt, Finally re-check the ignition setting.

It cannot be too strongly emphasised that the ignition timing must be correctly set for satisfactory engine performance, and also that any temptation to improve upon the maker's setting should be avoided, as this setting has been found best after careful trial and experiment. The fact that this engine is fitted with automatic ignition advance makes it all the more necessary that the above timing instructions should be faithfully carried out.

Sparking Plugs

The machine is supplied with Champion non-detachable type sparking plugs to suit the characteristics of the engine. If the best performance with regard to both power and economy is to be obtained then they must remain clean and properly gapped.

The sparking plugs should be removed periodically for examination. If the carburation is correct and the engine is in good condition the plugs will remain clean for considerable periods. An over-rich mixture will however cause the formation of a sooty deposit on the plug points and eventually on the plug body (see upper view of Fig. A6). Heavily leaded fuels may form a greyish deposit

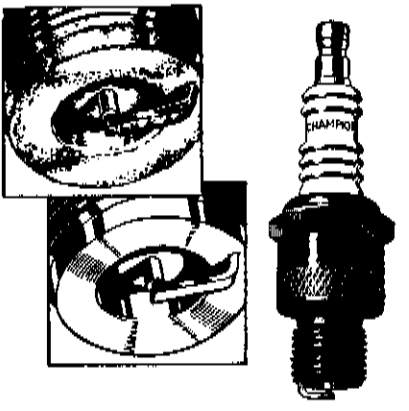

Fig. A.6. The Sparking Plug.

in a similar manner. If a heavy deposit is found, the plug should be cleaned, with the aid of the sand blast type of plug cleaner found at most garages, as otherwise the performance of the machine may be affected. If a heavy deposit is allowed to build up inside the plug it may prevent the engine from firing altogether. A weak mixture will cause burning of the plug points and give the plug a whitish appearance. See Service Sheet 708.

Check that the gap between the sparking plug points is correct and if necessary re-set to .018—.020 in. (.45—.50 mm.) by bending the side wire. In no circumstances attempt to move the central electrode as this may damage the insulation. If the points are badly burnt away or cleaning fails to restore the plug to its full efficiency, then it should be replaced by a new one.

When replacing the plug make sure that the copper washer is in good condition. Use a tubular spanner to prevent damage to the plug and keep the outside of the insulation free from oil and dirt by wiping with a clean rag.

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A Group Models

ENGINE DISMANTLING FOR DECARBONISING

Decarbonising and 'top overhaul' of an engine is extremely simple, but it should be carried out only when the engine really needs it. The usual symptoms are an increased tendency to 'pink' (a metallic knocking when under heavy load) due to the building-up of carbon on the tops of the pistons and inside the cylinder heads, a general falling-off of power noticeable mainly on hills, and a tendency for the engine to run hotter than usual.

It is first necessary to remove the petrol tank. To do this turn off the petrol taps and detach the petrol pipes. If the speedometer is mounted in the tank, disconnect the drive by releasing the strainer bolt under the tank, raising the speedometer clear of the tank and unscrewing the knurled nut connecting the drive to the instrument. At the same time, disconnect the cable for the speedometer light. The tank is secured to the frame by a bolt through the steering head lug and another through the seat lug at the rear of the frame top tube. When these bolts are removed, the tank can be taken off. The tanks on certain models are quickly detachable and it is only necessary to slacken the nuts to enable the tank to be lifted at the rear end and withdrawn from the frame. On Swinging Arm Models it is only necessary to remove the central retaining bolt beneath the rubber plug on top of the tank. On A10 and all Swinging Arm Models a metal strap beneath the tank joins the two halves and this must be removed to allow the tank to be withdrawn.

Next detach the high tension leads and remove the sparking plugs. Disconnect the steady-stays from the cylinder head to the frame, and then take off the carburetter by removing the flange bolts and sliding it off sideways after freeing it from the rubber sleeve which connects it to the air cleaner. By unscrewing the ring nut at the top of the carburetter, the slide can be pulled right out and tied up to the top tube out of the way, while the main body of the instrument can be completely removed. By unscrewing the exhaust pipe and silencer brackets to the frame, the pipes and silencers can be removed complete. Note that the silencer brackets are attached by means of the pillion footrest bolts on models with rigid frame.

A7 Models up to Engine No. ZA7-11192

Remove the rocker box connecting links and oil feed pipe. The rocker boxes are bolted to the head by bolts above and studs and nuts from underneath. Take off all nuts and bolts and lift the rocker boxes clear. Remove the hardened valve end caps. (A.7 standard models only).

The cylinder head holding-down bolts can now be removed. There are seven of these, including the central one which is inclined at an angle, and which should be removed first, and replaced last. The head unit is attached to the cylinder block at the rear by means of two inverted studs, and the nuts must be removed from these before the head can be lifted off. These nuts are situated between the fins, adjacent to the inlet manifold.

A10 Models and A7 Models after Engine No. AA7-101

Remove the rocker box oil feed pipe. The rocker box is held in position by four bolts on the outside, one inside and one stud with nut and washer at each corner.

Remove the inspection covers, take out the bolts. Remove the nuts and washers. On 650 c.c. models it is necessary to remove the top stud for the rear inspection cover and flats are formed on the stud for this purpose. The box can now be lifted clear of the cylinder head.

When the rocker box is removed the nine cylinder head bolts will be exposed. Remove the bolts, carefully noting the position of the various lengths of bolt. Fig. A6 a.

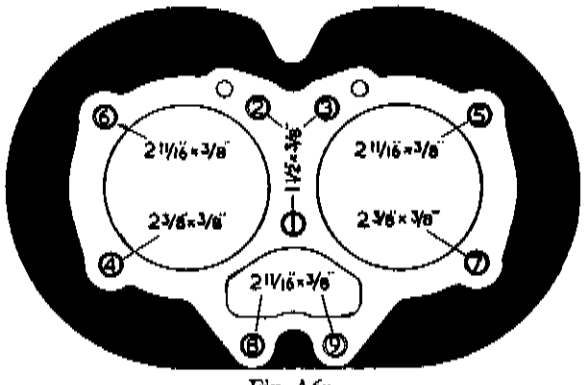


Fig. A6a.

All Models

The cylinder head unit can now be removed. If it shows a tendency to stick, a few light taps with a wooden mallet under the exhaust ports will loosen it. There is no necessity to remove the separate inlet manifold fitted to Shooting Star and Road Rocket models.

Rotate the engine by means of the kickstarter until the pistons are at the top of their stroke, and remove the carbon deposit with a suitable scraper, taking care not to damage the piston crowns.

All traces of carbon must be cleaned from the cylinder heads and valve ports. Where the head is an aluminium casting, particular care must be taken to ensure that the head is not scored or the joint faces damaged.

Grinding in Valves

Using Service Tool 61-3340 compress the valve springs until the split collets can be removed. When the collets are out, the valve springs and top collar can be lifted from the valve stem.

Check the play of the valves in the guides. If it is excessive the valve guides should be replaced and it may be necessary to change the valves at the same time. The old guides may be driven out from the inside and the new ones may be driven in from the outside of the cylinder head by means of the valve guide fitting punch, Service Tool No. 61-3265. When removing guides from the aluminium heads, the head should first be heated in a degreaser or hot water.

If new valve guides have been fitted or deep pit marks appear, the valve seats in the cylinder head should be re-cut. When pitting in the valve heads is deep, they should be re-faced. Then the valves can be ground in with fine grinding compound, each valve to its own seat.

Smear a small quantity of grinding compound (obtainable from any garage or accessory shop) over the face of the valve, and return the valve to its seat. Note that a light spring inserted under the valve head greatly facilitates the grinding-in operation, allowing the valve to lift and be rotated to a new position periodically. Hold the valve with the special tool provided in the tool kit, and rotate the valve backwards and forwards whilst maintaining a steady pressure. The valve should be raised and turned to a new position after every few strokes. Grinding should be continued until the valve seat and face show a uniformly smooth matt surface all round.

Valve grinding without re-facing should only be attempted if pitting is not deep.

Before replacing the valves and springs all traces of grinding compound must be removed from both face and seat, and the valve stems smeared with engine oil.

Valve Springs

After a period of several thousand miles it may be desirable to renew the valve springs as these tend ultimately to lose their efficiency due to heat. If the springs are renewed whilst decarbonising, it will save dismantling specially to replace them at a later date.

Valve Rockers

To remove the rockers from the rocker boxes, if this should be required for any reason, it is only necessary to undo the acorn nuts on the rocker spindles, and also the banjo oil pipe unions on the rocker spindles, if fitted, and tap the spindles out, applying a small centre punch to the threaded ends exposed when the nuts are removed, so as to avoid damaging the threads. Careful note should be kept of the rocker assembly for replacement, as the various washers must obviously be inserted in the correct order (see Fig. A.7.)

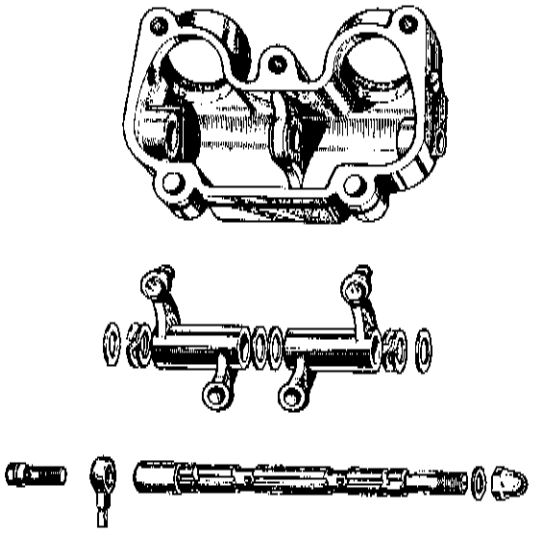
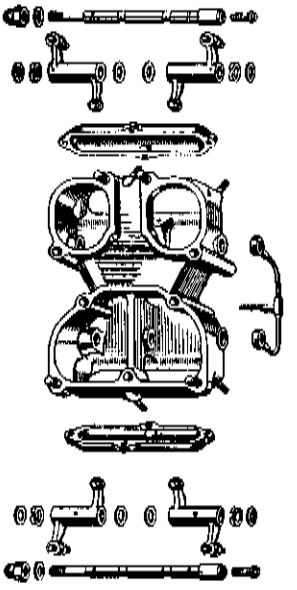


Fig. A.7. The Rocker Assembly Model A7.



The Rocker Assembly Model A10 and Model A7 after AA7-101.

Cylinder Block

In the ordinary course of events it should rarely be necessary to remove the cylinder block, since top overhaul, already described, usually suffices to keep the machine in first-class working condition. In any case, this operation is difficult to carry out without the help of an assistant, and unless the condition of the engine indicates that the pistons, rings or cylinder bores require attention, the cylinder block should not be disturbed.

Symptoms indicating faulty piston rings might include heavy oil consumption, poor compression (but only if the valves are in good order; otherwise they are much more likely to be the cause) and excessive piston slap when warm. This latter might be due to worn bores, which could be checked without removing the block, if the pistons were moved to bottom dead centre, thus exposing the bores for examination and measurement.

To remove the cylinder block, undo the cylinder base nuts, turn the engine until the pistons are at bottom dead centre, and then, preferably getting astride the machine, carefully lift the block up until the pistons are clear of the bores. While this is being done, get an assistant to steady the pistons as they emerge and to relieve you of the weight of the block, so that it may be lifted clear. When the block is removed, cover the mouth of the crankcase with rag to prevent dust and grit falling in. To remove a piston from its connecting rod it is first necessary to take out one of the gudgeon pin circlips. This is best accomplished with a pointed instrument such as the tang of a file suitably ground.

Before a gudgeon pin can be withdrawn it may be necessary to heat the piston with the aid of rags immersed in hot water, wrung out, and held round the piston. Then, supporting the piston, tap the gudgeon pin through, using a light hammer and a punch.

When the piston is free, mark the inside of the piston skirt at the back, so that it can be replaced the correct way round and on the same connecting rod.

If the rings are stuck in their grooves they will need to be carefully prised free and removed from the piston. All carbon deposit should be carefully scraped from the grooves and the inside edges of the rings. If any of the rings show brown patches on the surface, replace with a new ring.

Check the piston ring gaps by inserting each piston in its bore and sliding each ring independently up to the skirt of the piston. Check the gap with feeler gauges. This should not be less than .010in. or more than .013in. for the two upper rings, and .008in. and .011in. respectively for the bottom ring, which is the slotted scraper ring. These are the correct gaps for new rings. Fit new rings if the gap greatly exceeds the figure stated, although a few thousandths of an inch extra gap are not serious. It is advisable to check the gap of new rings before fitting, and if the gap is less than the minimum stated above the ends of the rings should be carefully filed to the correct limit. Ensure that when the piston ring gaps are measured the rings are in the position of minimum bore wear.

It should be noted that piston rings are very brittle, and unless handled carefully are easily broken.

The procedure for re-assembly is in the reverse order to that for dismantling but for further details see Service Sheet 208 or 215.

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BSA SERVICE SHEET No. 205

A Group Models
(Rigid and Plunger Type Frames)

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REMOVAL OF THE ENGINE GEAR UNIT FROM FRAME

It is first necessary to remove the petrol tank. To do this turn off the petrol taps and detach the petrol pipes. If the speedometer is mounted in the tank, disconnect the drive by releasing the strainer bolt under the tank, raising the speedometer clear of the tank and unscrewing the knurled nut connecting the drive to the instrument. At the same time, disconnect the cable for the speedometer light. The tank is secured to the frame by a bolt through the steering head lug and another through the seat lug at the rear of the frame top tube. The saddle nose bolt may also be taken out. When these bolts are removed, the tank can be taken off. The tanks on certain models are quickly detachable and it is only necessary to slacken the nuts to enable the tank to be lifted at the rear end and withdrawn from the frame. In some instances a metal strap beneath the tank joins the two halves and this must be removed to allow the tank to be withdrawn.

The left and right hand exhaust pipes and silencers should now be removed. These are secured to the frame by means of a long bolt passing through the front of the crankcase underneath the engine, and at the rear by the pillion footrest securing bolts, the nearside nut of which is inside the lower rear chain cover. (Rigid frame models only).

The exhaust pipes are a push fit into the cylinder head, and the finned collars, when fitted, need not be detached.

Remove the carburetter by releasing the two $\frac{5}{16}$in. Whitworth bolts from the manifold. The carburetter may then be tied to the rear of the frame out of the way of possible damage during the ensuing work.

Release the two $\frac{5}{16}$in. Whitworth nuts on the underside of the front rocker boxes and allow the two steady straps to fall away from the engine.

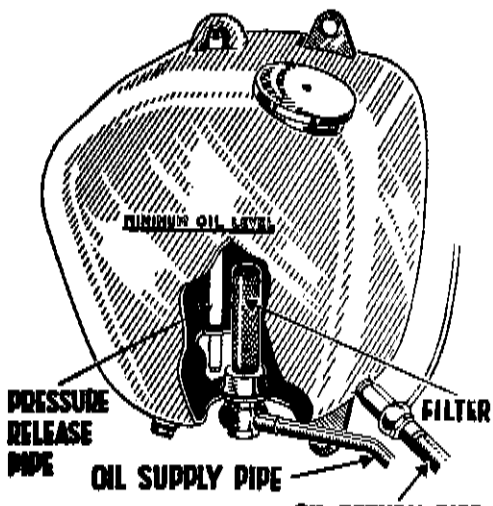

Fig. A8.

It is now necessary to drain the oil from the oil tank, this is accomplished by unscrewing the $\frac{5}{16}$in. Whitworth hexagon-headed plug at the rear corner of the tank, or by unscrewing the supply pipe banjo union when no drain plug is fitted (Fig. A8).

When the oil tank is empty, remove the two oil pipe unions secured to the underside of the oil tank, using the B.S.A. combination spanner from the tool kit. Observe that the rear joint houses the oil filter unit, and take care to avoid damaging this component during removal.

The front pipe union also secures the O.H.V. rocker oil supply pipe, and this may be left attached to the engine.

Release the rear chain spring link and rotate the wheel to remove the chain from the gearbox sprocket.

Now remove the remaining front engine securing bolt. This bolt passes through the dynamo cover, and the frame distance piece, which will fall away when the bolt is removed (A, Fig. A10).

The dynamo cover is secured to the engine by three bolts (B, Fig. A10), which must now be removed, noting that three plain washers are situated between the engine crankcase and the dynamo cover, left hand side only, one on each bolt. These must be replaced on reassembly.

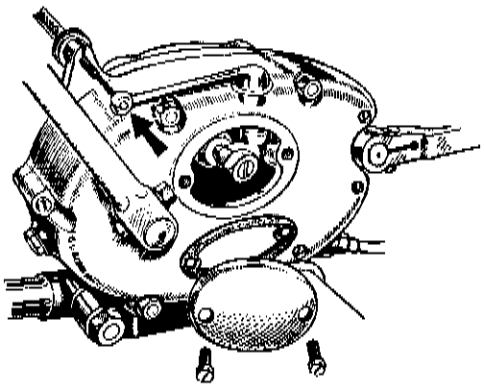

Fig. A9.

The rear of the power unit assembly is secured to the frame by three further bolts, two underneath the gearbox and one behind the magneto. A bolt at the rear of the primary chaincase casting, by the magneto, holds the front of the chainguard, which together with the bolt passing through a bracket on the lifting stay, must be released, and the chainguard drawn away towards the rear wheel.

The nut on the central rear cheese-headed primary chain cover screw should be released, allowing the bottom chainguard (rigid frame models) and the oil tank breather pipe clip to become free from the engine unit.

It will be observed that the engine unit is now entirely free from the frame except for the speedometer cable and the clutch cable on top of the gearbox. Push the clutch lever towards the centre of the machine, allowing the inner cable nipple to be removed from the arm, and screw back the cable adjuster on the gearbox to release the outer cable from the unit (Fig. A9).

It is now advisable to obtain the help of an assistant who should place a lever, such as a 12 in. tyre lever, under the front of the unit between the frame and crankcase. Depression of the lever will cause the engine unit to pass over the lower frame tubes to the offside, at which point the engine should be steadied, before removing to a substantial wooden box set on this side of the machine.

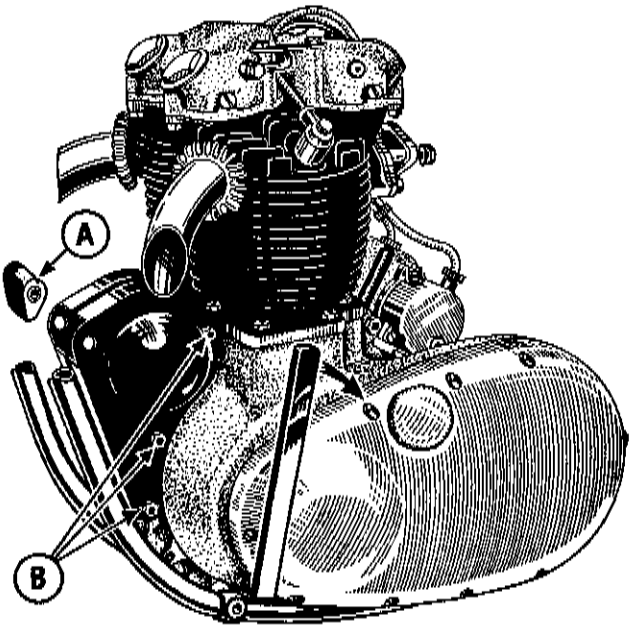

Fig. A10.

Now lift the power unit complete on to the wooden box, crankcase downwards, taking care that the unit does not fall over.

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Service Dept., Waverley Works, Birmingham, 10
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BSA SERVICE SHEET No. 206

October 1948
Revised November, 1951
Reprinted Jan. 1958

"A" Group Models
(Rigid and Plunger type frames)

COMPLETE DISMANTLING OF THE ENGINE

The procedure for the dismantling of the engine will be described from the point reached on Service Sheet No. 204, when the cylinder head and barrel have been removed.

NOTE: The A10 instructions apply to all A7 models after engine No. AA7 101.

Before commencing to dismantle the engine it will be advantageous to construct a fixture and wooden block such as those illustrated in Figs. A11 and A15(a).

Detach the foot gear change lever from its spindle on the gearbox, and then withdraw the twelve cheese headed screws to allow the removal of the outer timing cover, noting that the lower five screws on the A7 and four on the A10 are the longest screws in the set, and the three at the dynamo end of the cover are the shortest.

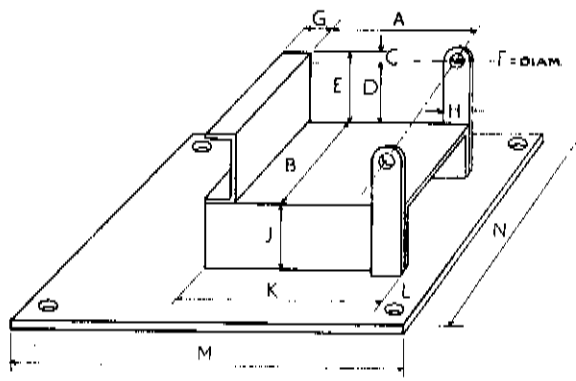

Fig. A11. Engine Bench Fixture.

	Inches.	mm.
A	4⅞–5	120 125
B	3½	85 90
C	⅜	9
D	1⅝	41
E	2	50
F	7/16 dia.	11.5 ø
G	1	25
H	¾	20
J	2	50
K	6¼–6½	155 160
L	1	25
M	12	300
N	8	200

A pan should be placed under the engine before the cover is finally removed to hold the waste oil which will fall from the inside of the cover.

Release the dynamo securing strap and turn the dynamo in its housing to allow the tension on the dynamo chain to be relaxed. Remove the large dynamo driving sprocket, that is secured on its taper seat, by a nut and locking washer. After the nut and washer have been removed, a light tap with a hammer on a soft drift placed against the side of the sprocket will loosen it. The sprocket can then be withdrawn together with the chain.

The inner cover is held in position by five screws on the A7 and four on the A10. Take out the screws, remove the cover, and expose the timing gears.

The camshaft gear carries the crankcase breather Part No. 67/130 and a ⅛in. thick cork washer between the gear and the breather.

The automatic ignition device may now be removed by releasing its central securing nut. The mechanism is self extracting and as the nut is unscrewed the gear will be pulled from its taper.

Remove the breather Part No. 67/130 if this was not removed at the withdrawal of the inner cover, followed by the circular cork washer in the centre of the pinion.

The camshaft pinion is keyed and screwed by means of a locknut and washer. Release this nut and washer, and the pinion may be drawn from its shaft in the same manner as the dynamo driving sprocket using Tool No. 61 3256.

Now follows the removal of the idler pinion and its shaft complete, by pulling away from the crankcase bush with the fingers.

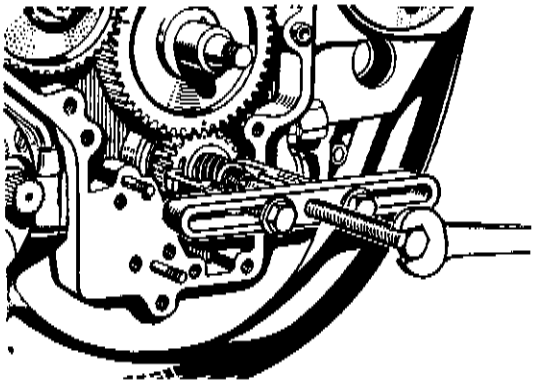

Fig. A12. Timing Pinion Extractor No. 61 3256.

The three securing nuts and washers holding the oil pump in position may now be removed. Undo the locknut and washers from the end of the crankshaft, as the pump is withdrawn, release the hexagon headed worm gear from the crank shaft. Note that both locknut and worm gear are left-hand threaded.

The timing pinion which is keyed to the crankshaft may now be extracted. On all engines after ZA7 1400, AA7 101 and all A10 engines by means of Service Tool 61-3256. Pinions on earlier engines should be removed by the insertion of a small lever behind the gear, care being taken not to damage the bearing or crankcase during the removal of the pinion.

Fig. A13 The Oil Pressure Release Valve.

Remove the oil pressure release valve from the crankcase to clean and check it, see Service Sheet No. 202.

If a composition washer has been inserted into the crankcase below the release valve, a new washer should be used when re-assembling.

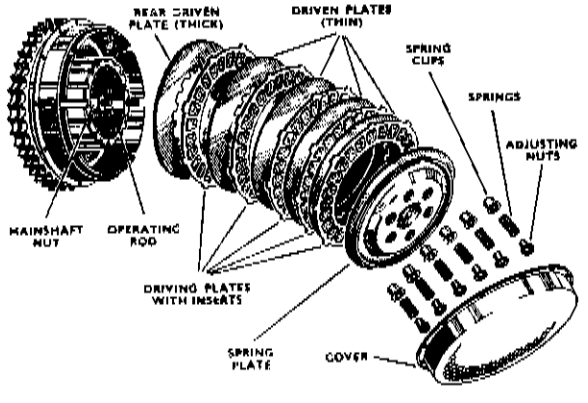

Fig. A14.

Three studs, the one underneath having a long nut, secure the magneto to the crankcase. After the nuts have been removed, the magneto can be pulled from its housing.

Remove the primary chain cover by releasing the twelve securing pins, observing that these are of varying lengths and must be replaced in their correct positions when re-assembling. Access to the clutch is gained by the removal of a cover held in position by twelve nuts and bolts. Take care not to damage the oil sealing washer between the cover and the clutch body, when the clutch cover is drawn off.

Withdraw the six hexagon headed clutch spring adjusting nuts, together with the springs and cups. The spring plate should now be removed and the clutch mainshaft nut unscrewed after "punching up" the securing washer. Do not remove the clutch plate assembly until the cush drive assembly has been released and removed by taking out the split pin and unscrewing the circular slotted nut on the mainshaft. The two assemblies, with the duplex primary chain, can then be drawn together. Take care that the 18 clutch centre race rollers do not fall out during this operation.

Draw the ground faced clutch thrust plate, Part No. 67–3250, along the splined shaft and remove the two halves of the abutment ring, Part No. 67 3251, from the rear of this plate.

It is now necessary to remove the two securing nuts and the two bolts from the crankcase to release the gearbox. Early A7 models have four bolts.

Remove the sump plate and filter from the base of the engine, allowing the waste oil to drain into the pan. Do not withdraw the pump suction pipe from the crankcase.

The tappet guide fixing plate can now be removed (A7 only).

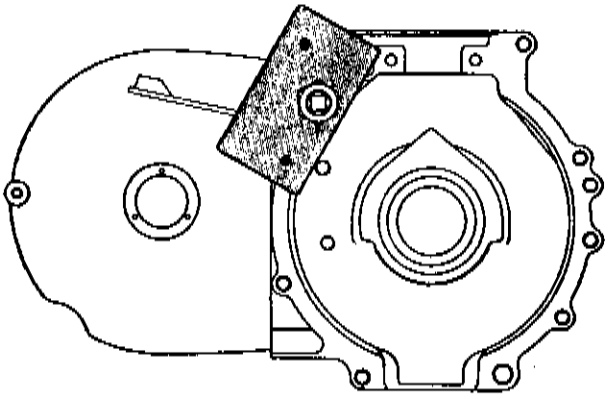

Fig. A15. Withdrawing blind camshaft bush (Service Tool No. 61 3159)

Remove the engine from the bench fixture, and place on a wooden block, drive side downwards. After all the crankcase securing bolts have been slackened, the crankcase halves can be separated. On A7 models it is advisable to leave nuts and washers on one side of the studs between the gearbox flange, as these cannot be replaced after the crankcase has been reassembled.

Gently tap the front and rear of the cases with a soft mallet to part the halves.

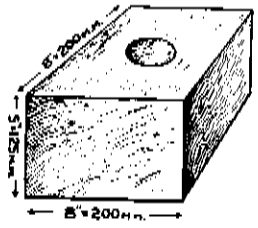

Fig. A15(a).

Note the number of shims, if any, on the mainshaft, between the mainshaft bearing and the crankshaft web.

The drive side ballrace on the A7, roller race on the A10 models, and the gear side white metal bearing, may now be pressed from their respective cases to the inside if in need of attention. It is advisable to warm the crankcase halves in a degreasing plant, or hot water, before attempting to remove the bearings.

Note that there is a steel washer between the drive side race and the case. This acts as an oil seal.

Service Tool No. 61 3159 will withdraw the blind camshaft bush from the drive side crankcase (see Fig. A15).

The tappet and tappet guides will not normally require attention. If they must be removed, they can be taken out as follows:—

A7 Models. The tappets are carried in the crankcase. The exhaust centre double tappet block will fall away when the crankcase halves are separated. The inlet tappet guides may be removed using Service Tool No. 61 3069.

A10 Model & A7 after Engine AA7-101. The tappets are carried in the cylinder block. Remove the two setscrews "A" (Fig. A15b) and remove the inlet tappets "B." Remove the setscrew "C" taking care not to lose the 3/16in. ball. Push out the retaining pin from the inside of the barrel, and remove the exhaust tappets. Note that the exhaust and inlet tappets are not interchangeable.

Withdrawal of the two securing bolts attaching each of the big end bearing caps to the crankshaft allows the removal of the connecting rods and completes the dismantling of the A7 engine. No useful purpose will be served by attempting to split the actual flywheel assembly, if of the earlier built-up design, because crankshaft grinding can be done in the same way as the normal car engine crankshaft.

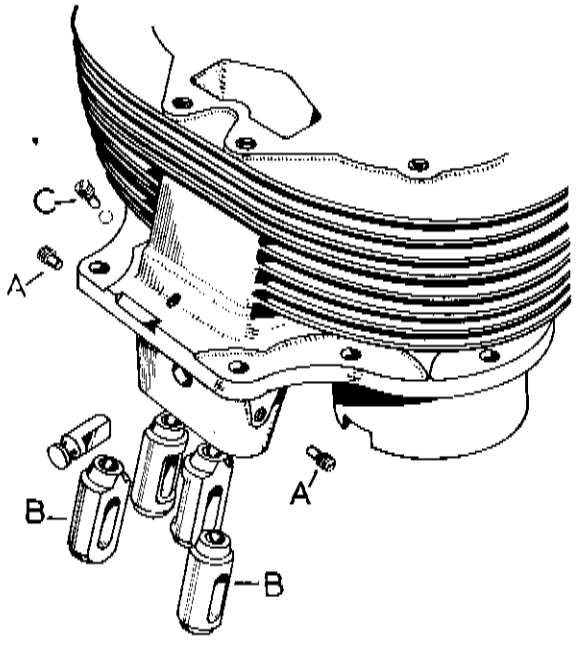

Fig. A15(b).

The big end bearing liners cannot be replaced in the caps otherwise than in the correct position because these are indented, and fit into their respective slots in the rods and caps.

Dimensions for the regrinding of the crankpins are given in Service Sheet No. 207 and must be strictly adhered to, because the bearing liners are manufactured for these dimensions.

The flywheel is bolted to the crankshaft, and should only be disturbed if a new crankshaft has to be fitted. The oilways in the crankshaft should be cleared of any sludge that may have formed. The plugs at each end of the crankshaft may be removed for this purpose.

Three steel rivets passing through the rear end of the drive side crankcase casting hold the gearbox oil seal in position between two steel plates, and their removal for replacement of the oil seal must be effected with due care, so as not to damage case. (*See Fig. A16, Sheet* 208).

The suction pipe from the sump to the pump on the gear side case must not be disturbed because this is cemented into the case before leaving the works, and a new pipe is supplied as a standard fitting with a new gear side crankcase. This also applies to the small grub screw by the mainshaft plain bearing behind which is situated a ball valve and this must not be disturbed.

There is no need to remove the chain tensioner or adjuster unless a new crankcase is being fitted. After Engine No. AA7-101 the A10 instructions will apply.

B.S.A. MOTOR CYCLES LIMITED, Service Dept. Birmingham, 11.
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BSA SERVICE SHEET No. 207

"A" Group Models

Revised January, 1958.
Reprinted November, 1959.

CRANKSHAFT RE-GRINDING.

It will be necessary to regrind the bearing surfaces of the crankshaft when the overall wear of the crankpins or gear side journal exceeds .002", or if the surfaces have been damaged by bearing seizure.

Worn bearings will develop a distinct "knock" and the engine will become generally rough.

Suitable undersized big end bearing shells and gear side bushes can be supplied for crankshafts ground to the dimensions shown.

The crankshafts fitted to A7 models having engine numbers from XA7 101 to XA7 600 have crankpins of larger diameter than those fitted to later models. Provision is made for one regrind only on this earlier crankshaft, after which connecting rods 67–1200 and standard bearing shells 67-320 must be fitted. No subsequent regrinding is recommended.

Although only the left hand connecting rod is drilled for lubrication purposes, all shells are now drilled for standardisation. The plain shell 67-226 is no longer being supplied.

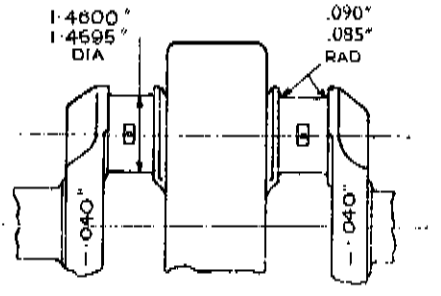
The following tables give dimensions of reground bearings, for both crankshafts, together with the part numbers of undersize shells and bushes. **These numbers must be quoted when ordering.**

Engine Nos. XA7-101 to XA7-600.
First Regrind.

Grind the crankpins to 1.4600" -1.4595" with a .090"/.085" face radius both sides. This is the standard dimension on machines Engine Nos. XA7 601 upwards.

Fit connecting rod assembly 67–1200(2) with standard bearing shell 67-320(4).

Mark webs as shown below:



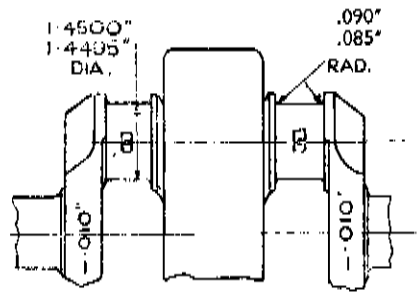
(P.T.O.)

Engine Nos. XA7-601 upwards and A10 Models.

CRANKSHAFT ASSEMBLIES
Part No. 67-384
Part No. 67-664

Grind the crankpins to 1.4500/1.4495" diameter with .090"/.085" face radius. Fit bearing shell 67-244 (4 off) marked .010" undersize.

FIRST REGRIND.



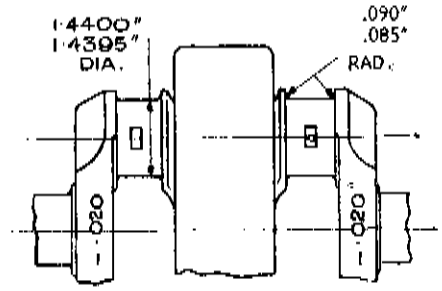
Mark crankshaft web face as shown.

CRANKSHAFT ASSEMBLIES
Part No. 67-1149
Part No. 67-1218

Grind the crankpins to 1.677"/1.6765" diameter with .120"/.115" face radius. Fit bearing shell 67-1177 (4 off) marked .010" undersize.

SECOND REGRIND.

Grind the crankpins to 1.4400"/1.4395" diameter with .090"/.085" face radius. Fit bearing shell 67-245 (4 off) marked .020" undersize.

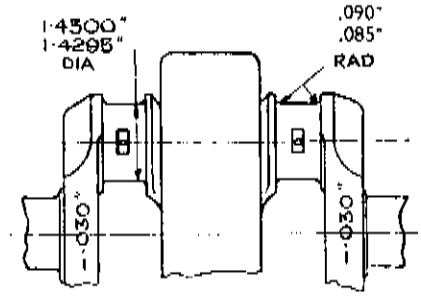


Mark crankshaft webs as shown.

Grind the crankpins to 1.667"/1.6665" diameter with .120"/.115" face radius. Fit bearing shell 67-1178 (4 off) marked .020" undersize.

THIRD REGRIND.

Grind the crankpins to 1.4300"/1.4295" diameter with .090"/.085" face radius. Fit bearing shell 67-246 (4 off) marked .030" undersize.

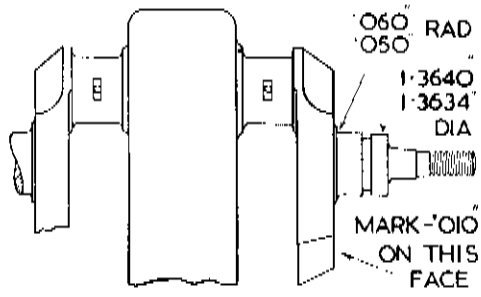


Mark crankshaft webs as shown.

Grind the crankpins to 1.657"/1.6565" diameter with .120"/.115" face radius. Fit bearing shell 67-1179 (4 off) marked .030" undersize.

GEAR SIDE JOURNAL.

Grind the journal 1.3640"/1.3634" with .060"/.050" face radius.



Mark crankshaft web face as shown.

Fit .010" undersize bush 67-799 (use bush 67-652 for engines XA7-101 to XA7-600).

B.S.A. MOTOR CYCLES LIMITED, Service Dept., Waverley Works, Birmingham, 10.
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BSA SERVICE SHEET No. 208

October, 1948
Reprinted June, 1960

A Group Models
RE-ASSEMBLY OF THE ENGINE

The need for cleanliness cannot be over emphasised; all parts should be clean and free from dirt or rust.

The A10 instructions apply to all A7 Models after Engine No. AA7-101.

Smear all bearing surfaces with engine oil.

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 ends of the cranks. See service sheet No. 712X for balancing.

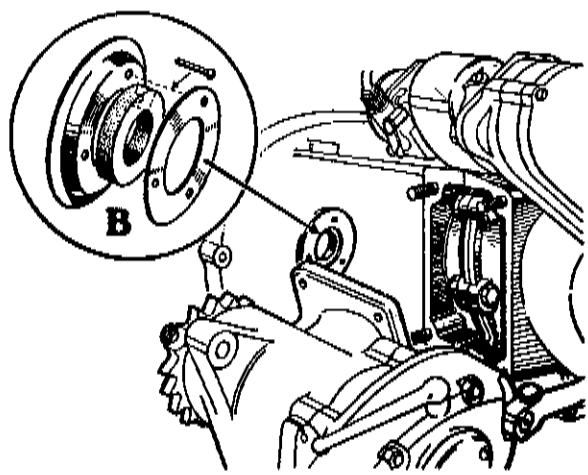

Fig. A.16.

If the chaincase oil seal is to be renewed, this is effected by placing the actual composition seal Part No. 67-1242, round end outward, into the hole in the crankcase casting extension, and riveting two steel plates, the larger, Part No. 67-1241 inside, and Part No. 67-1243 outside, by three steel rivets, Part No. 67-1244, care being taken not to damage the aluminium case during the riveting operation. (Fig. A.16.)

Having warmed the crankcase halves in a degreasing plant, or hot water, insert the steel oil seal washer into the race recess in the drive-side crankcase. Then, by means of an arbor press, insert the race and the blind camshaft phosphor bronze bush. Now press the plain main bearing into the gear-side crankcase. The cases must be suitably supported during these operations to prevent damage.

Press the two camshaft bushes into the case, one from inside and one from outside, and also the idler pinion spindle bush if these parts have been removed.

A phosphor bronze bush is also inserted into the inner cover to carry the outer end of the idler pinion spindle.

If new camshaft and 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 Service Tools No. 61-3275 for A7 or 61-3281 for A10 and A7 after AA7-101 use reamer 61-3167 to ream the bushes to .7495/.7485 ins. internal diameter. (Fig. A.17.) These reaming jigs should also be used to locate the mainshaft reamer if a new mainshaft bush has been fitted. See Service Sheet 711 for details of reamer.

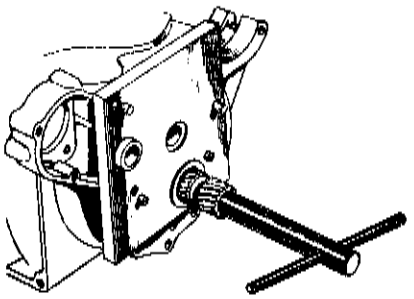

Fig. A.17. The Reaming Jig. Service Tool 61-3275 for A7, 61-3281 for A10 and A7 after eng. AA7-101.

Then unbolt the crankcase and remove the inner timing cover. Remove all trace of swarf after the reaming operation.

At this point it is advisable to obtain a fixture such as shewn in Fig. A.11 Service Sheet No. 206 and a wooden block with a hole through the centre as shewn in Fig. A.15a.

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 to the A10 it should be noted that each set of four has a small central drill hole. One 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.

Connect each rod and cap to its crank journal, noting that their numbers correspond, and insert the big end bolts and tighten them. On no account must the castellated nuts be slackened back to allow the insertion of the split pins. If the nut slot 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 in the pin and nut slot line up.

A torque spanner should be used for tightening these nuts to ensure that they are not over-tightened. Two types of big end bolts have been employed. Early models use 22 T.P.I. B.S.F. bolts and for these the torque spanner should be set at 10 lb. ft. The later type bolt is 26 T.P.I. C.E.I. and a setting of 8½ lb. ft. is correct. The later type bolts complete with nut can be used as replacements for the earlier type. From 1956 onwards the torque spanner setting is 22 lbs. ft.

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

Crankshaft end play: On the A.7 when the sprocket is tightened up, the float is taken up. Before tightening, the float should be .005"-.010".

A.10. On this engine the float is not taken up when tightening the sprocket. The maximum float should be .005". Any error should be corrected with additional packing shims.

Replace on the drive-shaft of the crankshaft assembly any packing shims which were removed in the dismantling of the engine.

Place this assembly on a thick wooden block through which a hole large enough to take the gear-side main shaft has been bored. Then place the drive-side crankcase half over the drive-shaft and gently tap into position, making sure that the shaft 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. On the A.7 place the large twin tappet block with tappets into the recess at the top of the case, so that the oil hole in the block faces towards the gearbox end of the engine, and the opposite side of the block, with slope for securing plate, faces the inside of the engine. On the A.10 the tappets are in the cylinder block.

Smear the joint face 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. The two top inside securing bolts have plain locking washers, one side of which is bent over to form a securing tab on the nut.

Insert the two inlet tappet blocks with tappets (A.7 only) and before finally tightening the two top inside crankcase securing bolts and the top rear outside bolt, the tappet blocks should be finally lined up by placing a 6 in. steel rule across the milled flats.

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

The crankcase breather pipe is a push fit into a hole at the top of the drive-side case, immediately behind the primary chaincase casting and should be cemented, the lower end being secured by a clip.

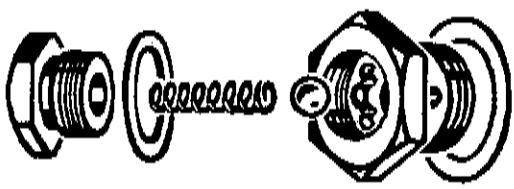

Fig. A.19.

Attach the sump plate filter, with the pump suction pipe from the inside of the crankcase passing through the hole in the filter gauze, a paper washer being inserted between the case and plate.

Now bolt the twin oil tank pipes to the gear-side of the crankcase using jointing compound, and insert the oil release valve unit and rubber washer, if fitted, into its socket (Fig. A.19).

The dynamo securing straps and offside dynamo cover plate, if previously removed, should now be attached to the gear-side case. The nearside dynamo cover plate was removed when the engine was taken from the frame, and will be replaced when the engine is again inserted into the frame.

On A.7 engines replace the tappet block securing plate at the top inside of the crankcase.

Attach the gearbox to the engine by the two securing studs and two bolts in the crankcase, making them really tight. On certain models a fibre or hallite separating washer is used between the two units and care should be taken that this is not omitted on re-assembly.

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

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 camshaft key has not become dislodged from the pinion.

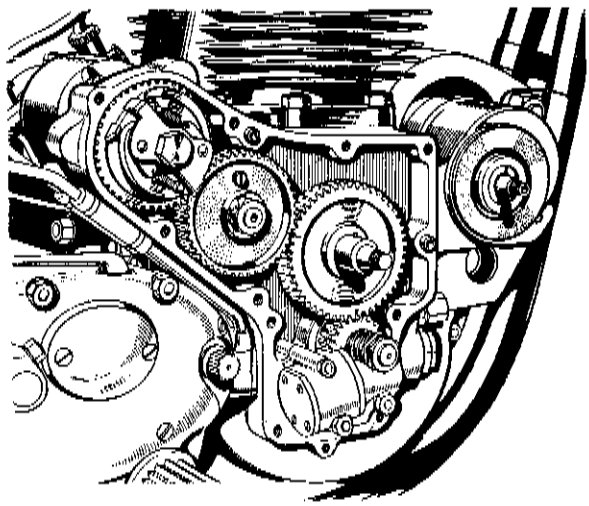

Fig. A.20. Valve Timing.

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. A.20).

The magneto should now be bolted in position by its three securing bolts, the two short bolts on top and the long bolt 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 up. Smear the inner joint face of the inner timing cover with jointing compound, and place the paper joint washer in position on the inner side of the inner cover.

The crankcase breather should now be inserted on to the cam pinion, with a 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.

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.

On the A.10 replace the tappets in the reverse order to that for dismantling (see Sheet No. 206).

Place the paper cylinder base washer in position on the top of the crankcase, and rotate engine to bring the connecting rods to top dead centre. Turn the piston rings so that the gaps, which should be .008/.012 in. are not in line with each other. Smear the pistons with engine oil.

Now lower the cylinder block over the pistons, compressing the rings, preferably by the use of Tool No. 61-3061, on the A.7 (Tool No. 61-3334 after Engine No. AA7-101), or 61-3262 for the A.10, which should be removed when the rings have fully entered the cylinders, and secure the block to the crankcase with the holding down nuts and shakeproof washers.

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 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 sprocket and case. 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 approx. $\frac{1}{8}$ 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 aperture in which the dynamo chain drive runs should now have approx. $\frac{1}{4}$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, place a paper washer on the face when the compound is tacky. Place the cover on to its dowels, and secure 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 61-3340 as before, compress 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 the cylinder head bolts, and on the A.7 the nuts on the two inverted studs at the rear. Make them all really tight, working diagonally in order to secure even tightness, and leaving the central inclined bolt to the last. When they are all right down give them a final wrench to make certain that they really are tight.

Now replace the rocker box or boxes, making sure that the push rods are correctly inserted into the rocker ends, and thoroughly tighten the various nuts and 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 of A10 models and A7 after Engine No. AA7-101. 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. A21. The rocker box should then be tightened down and the tool removed just before it is gripped between the rocker box and cylinder head.

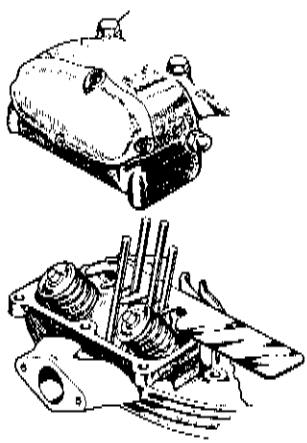

Fig. A.21 Push Rod Assembly Tool.

Unless care is exercised when replacing the one piece rockerbox fitted to the later models it is possible to cause damage to the valve stems. To fit the rockerbox, place in position over the valves, and gently ease the four holding down studs through their locating holes in the cylinder head. Check that the rockerbox is well clear of the valve spring collars and push it firmly down to its seating on the cylinder head. No force must be used in this operation. After ensuring that the box is firmly seated, fit and tighten the bolts.

Failure to use this method may result in the valve stems being bent, by fouling the rockerbox. Although not noticeable in the test run of the engine, this will result in sticking valves and loss of power at high speeds.

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

Replace the rocker box connecting links on the A.7 and rocker box oil supply pipe.

Replace the primary chain tensioner and adjuster, locking the securing nuts with a length of wire as in Fig. A.22.

Place the two halves of the clutch thrust plate abutment ring, in position in the groove at the rear of the splined shaft, with a smear of grease to hold them in position.

Slide the clutch thrust washer along the splines over the abutment ring.

Place the clutch centre on a table, rear end upwards, put the clutch chainwheel over the clutch centre, chainwheel upwards, and insert a small quantity of grease into the space between the clutch centre and the chainwheel centre, to hold the eighteen $\frac{1}{4}$ in. $\times \frac{1}{4}$ in. rollers in position.

Insert the rollers, bring the chain tensioner to its lowest point of adjustment downwards, and then place the duplex chain over the clutch and engine sprockets.

Taking the engine sprocket in the left hand and the clutch chainwheel, including the clutch centre with rollers in the right hand, slide the whole on to the engine and clutch splined shaft at one and the same operation, making sure that no rollers fall from the clutch centre race.

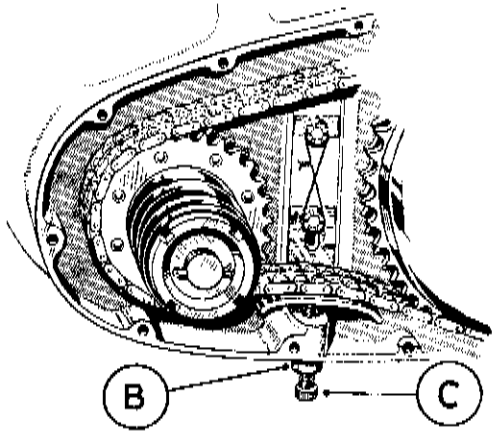

Fig. A.22.

Insert the main shaft locking washer over the splined shaft, with a smear of grease to hold the washer in position. Screw the gearbox mainshaft nut on to the mainshaft, turning the edge of the locking washer over to lock the nut.

Slide the clutch plates into the chainwheel housing, rear, driven plate first. (See Fig. A.23).

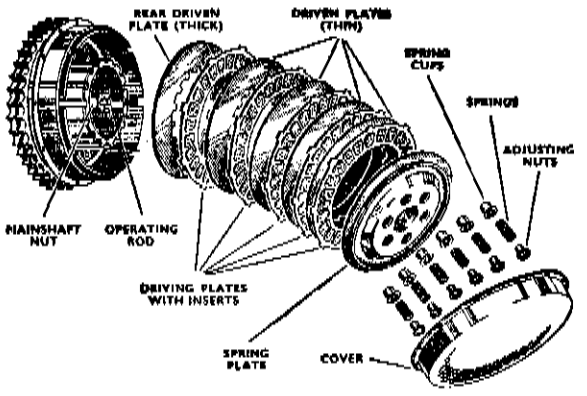

Fig. A.23 The Clutch (Exploded View).

Fit the spring plate last, and then insert the spring cups and springs into the spring plate, and secure by the six adjusting nuts, screwing these into the spring plate until the collars on the adjusting nuts are flush with the face of the plate.

Place the cush-drive sleeve over the engine shaft, followed by the cush-drive spring over the sleeve, and screw the mainshaft nut on to the engine shaft with a C Spanner, tightening the mainshaft nut up as securely as possible. Put a split cotter pin through the hole in the engine mainshaft, and spread open the split ends.

Adjust the chain by raising the chain tensioner by means of its adjusting screw (C, Fig. A22) in the lower part of the chaincase until there is $\frac{1}{2}$ in. total up and down movement at the tightest point. Tighten the locknut B and check the adjustment.

Smear the outer primary chaincase jointing edge with jointing compound, allow it to become tacky, place a paper washer on the jointing edge of the cover, and secure in position by means of the twelve cheese-headed screws, noting that these are of varying lengths and must be replaced in their correct positions. Note also that one of the screws is painted red. This serves as an oil level plug and should be located in the screw hole adjacent to the chain tensioner. On earlier models the oil level screw was located in the next hole forward, but the rearward position providing a slightly lower oil level is more suitable. The new position can be obtained on the earlier models by cutting away the rear screw hole on the inside of the outer cover in a similar manner to the existing cutaway. Remove the paint from the original screw and put a dab of red paint on the head of the new drain screw. The screws are of different length and therefore not interchangeable.

After Engine No. AA7-101 the A.10 instructions will apply to the A.7.

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BSA SERVICE SHEET No. 209

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C Group, 4 Speed (1951-57) & A Group Rigid & Plunger

DISMANTLING AND RE-ASSEMBLY OF GEARBOX AND GEARCHANGE

Removal

In most cases it will be found convenient to dismantle the gearbox while it is in position in the frame. If it is necessary to remove the gearbox sprocket or sleeve pinion on an 'A' Group machine, the engine-gearbox unit must be removed from the frame and the gearbox separated from the crankcase (see SERVICE SHEET No. 206). To remove the gearbox from the frame of a 'C' Group machine for attention to bearings see Service Sheets Nos. 308 and 411.

Dismantling the Gearbox

Move the gears to the neutral position between first and second. Next remove the gearbox outer cover which is held in position by three screws and four nuts. The cover will come away with the kickstarter, the gear change and the clutch lever still in position, and these need not be disturbed unless obviously requiring attention. Note that as the cover is withdrawn, the spring pressure on the kickstarter pedal is released. The clutch operating lever should be pulled out to the fullest extent, allowing the kickstarter lever to come to rest against it, thus preventing the kickstarter return spring from being released.

Pull out the clutch operating rod which passes through the centre of the mainshaft, and then release the nut on the mainshaft which holds the kickstarter ratchet pinion and spring, laying the latter aside. The gearbox partition can then be removed together with the foot gear-change rocking lever M. (Fig. A24).

The rod G is pressed into the gearbox shell at the clutch end and secured by a grub screw which is accessible under the gearbox. Release this grub screw and then pull out the rod. It should then be possible to withdraw the entire gear cluster complete with shafts and the two sliding forks bodily from the gearbox, although, if preferred, the components may be withdrawn separately. This may call for a certain amount of manoeuvring, but the experienced mechanic will have no difficulty. Before removing the gear selector plate H, note the notch in which the gear control plunger engages. This is the neutral position between first and second gear, and the plate must be rotated to this position before the box can be reassembled. Unscrew the selector plunger housing locknut and remove the plunger assembly from the gearbox shell. The gear selector plate will now slide from its pivot. The layshaft bushes are a press fit in the gearbox and if necessary must be driven out with the aid of a soft punch.

The top gear pinion sleeve is now the only part still left in the gearbox, and if the sprocket locknut is unscrewed, after suitable attention to the tab washer, the sprocket may be removed and the pinion tapped into the gearbox with the aid of a wooden mallet.

Do not disturb the ballrace unless it is suspected of being faulty. Wash it thoroughly in paraffin, to remove all traces of oil, and any play will then be immediately detected.

Examine the various parts for wear, and if the forks which actuate the sliding pinions show signs of seizure it will be advisable to replace them. Attempts to erase the seizure marks will result in excessive side play

The fixed pinions on the layshaft and mainshaft are pressed on, and new components must be a tight fit. Examine the selector plate for worn cam grooves and for wear on the ratchet members on the boss in which the selector claw P engages, and replace if necessary. The selector claw should be replaced if the teeth show signs of wear as, of course, should pinions with damaged or worn teeth.

Re-assembly of the Gearbox and Gearbox Mechanism

If it has been decided to fit a new ballrace to the top gear pinion, remove the spring circlip and oil flinger washer with the aid of a screwdriver. In order to remove the ballrace easily, warm the gearbox shell in boiling water. If the sprocket teeth are worn hook-shaped, a new sprocket must be fitted; otherwise rapid chain wear will result. Do not forget to set the lockwasher into the grooves machined in the locknut after the latter has been tightened up. The tabs in the centre of the locknut washer must fit properly into the sprocket splines.

Assemble the layshaft with selector fork "F", with the exception of the low gear pinion (this is the largest on the shaft). Replace the selector plate and gear control plunger, rotating to the neutral position between first and second gears. Slide the layshaft complete with gears and selector fork into the box and engage the fork peg in the track of the cam plate.

Assemble the mainshaft pinions on the shaft and the selector fork "E", and insert the complete assembly into the gearbox shell engaging the peg of the selector fork in the cam plate. Slide the gear control shaft through the selector forks and press home into the gearbox case, replace the grub screw turning the edge of the hole over to prevent loss of the screw Replace the thrust washer and low gear pinion on the layshaft.

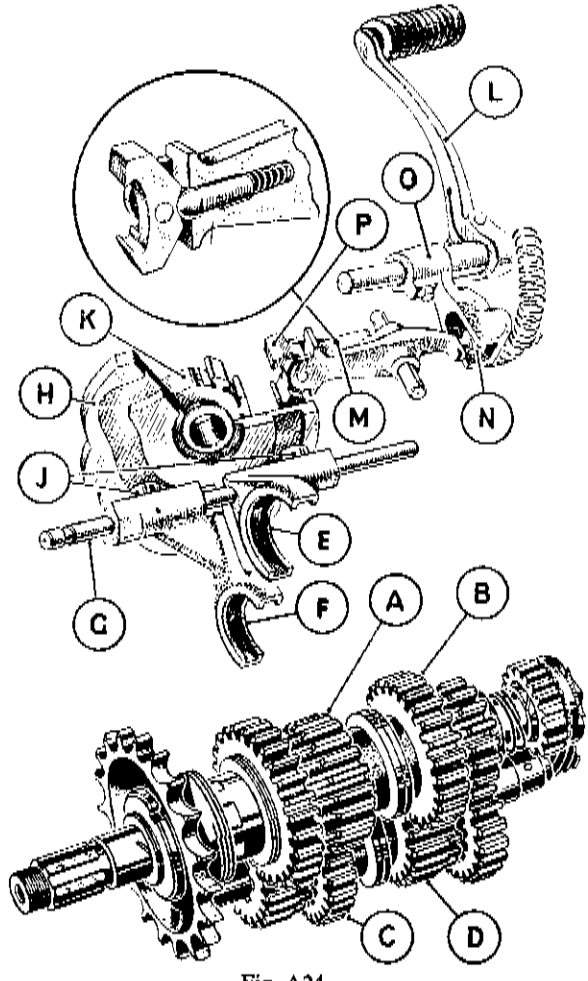

Fig. A24.

The inner cover should next be assembled. Coat the paper washer between the inner cover and the gearbox shell with jointing compound, hold the gear change rocking lever in a central position, slide the inner cover on to the four studs and push it "home". The gear selector claw must engage on the ratchet members on the selector plate boss.

The ratchet mechanism may now be fitted to the mainshaft, the parts assembling in the following order—spacing washer, sleeve bush, spring, ratchet pinion, locking washer, and nut. Tighten the nut and turn over the tab on the washer as a means of locking the nut.

The outer cover can now be replaced. Coat the paper washer with jointing compound. Take up the outer cover with the kickstart lever in the left hand and the footcharge lever in the right hand. Slide the cover onto the gearbox studs and press home, entering the kickstart quadrant in the ratchet pinion and the footcharge slotted lever over the ball end of the rocking lever. Replace the four nuts and three screws on the outer cover.

The unit is now ready for reassembly to the engine (see Service Sheet No. 208).

A.10 & AA.7. Machines

After engine numbers ZA.10-1215, ZA.7-11192 are fitted with a modified layshaft and gear cluster to obtain improved gear selection and the engine number should be specified when ordering spares.

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A Group Models
(Without Swinging Arm Frame)
TRANSMISSION

Clutch Adjustment

Two adjustments are provided at the clutch control arm on the gearbox outer cover. The first of these is at the clutch push rod and is exposed when the inspection plate (Fig. A25) is removed. It consists of a grub screw and lock nut. Between the inner end of the screw and the clutch push rod a steel ball is inserted, and the grub screw must be adjusted so that there is just a little clearance between the ball and push rod.

To carry out this adjustment loosen the lock nut A and with the aid of a screwdriver adjust the grub screw B. Then re-tighten the lock-nut.

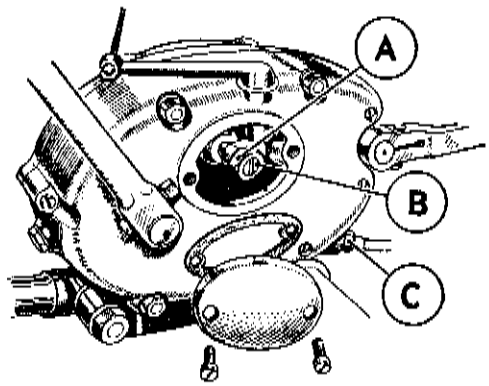

Fig. A25. Clutch control adjustment.

The other adjustment, to be used only if necessary, is provided by the cable adjuster on top of the gearbox, just under the magneto. Remember, however, that some free movement in the control arm is necessary, as if the adjustment is too tight there will be constant pressure on the clutch, with consequent wear and loss of efficiency.

Clutch Spring Pressure

After a considerable mileage it may be desirable to increase the spring pressure a little. First remove the outer half of the primary chaincase and then the domed clutch cover A (Fig. A26), which is secured to the clutch body by twelve screws. It will then be seen that the clutch plates are pressed together by springs, the tension of which is controlled by the nuts B. To increase the spring pressure tighten these nuts B a few turns. It is important that each of the six adjusting nuts be given an equal number of turns to ensure even pressure; otherwise the plates will slide unevenly and clutch drag may result. After adjustment, replace the cover and chaincase.

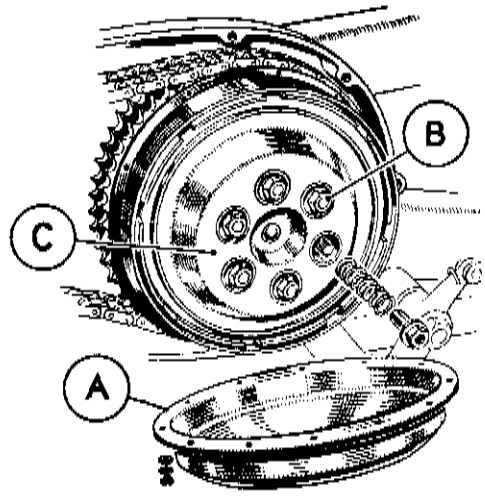

Fig. A26. Clutch spring adjustment.

Front Chain Adjustment

To adjust the front chain, remove the inspection plate plug A (Fig. A27) and then slacken off locknut B on the chain tensioner adjuster. Turn the adjuster C, screwing it up to reduce the slack in the chain, and down to increase it. Feel the tension by inserting the fingers through the inspection plug hole. The correct amount of slack, or up and down movement, on the front chain is half an inch. If the play is being increased, pressure on the kick starter will help to move the tensioner plate down. This is of course unnecessary when play is being reduced.

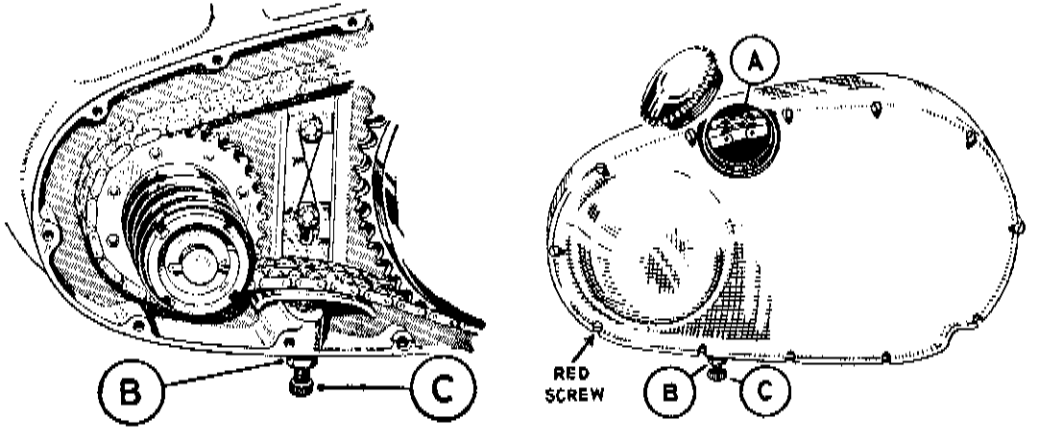

Fig. A27.

Rear Chain Adjustment (Rigid Frame)

The rear chain is adjusted by means of screw adjusters in the fork ends in front of the wheel spindle. Slacken off nut A (Fig. A29) and then unscrew the spindle a little by means of a tommy bar inserted in the hole in the spindle end B. Screw the adjusters C in or out until the chain tension is correct, with an up and down movement of three quarters of an inch. Make sure that the wheel is hard up against the adjusters when checking, and also that the adjustment is equal on both sides of the wheel, so that the latter is in correct alignment in the frame. This can be done either by glancing along the line of both wheels when the front wheel is set straight, or by means of a long straight-edge, or the edge of a plank placed along the sides of the wheels. The straight-edge should touch both walls of both tyres, if the tyres are of the same section.

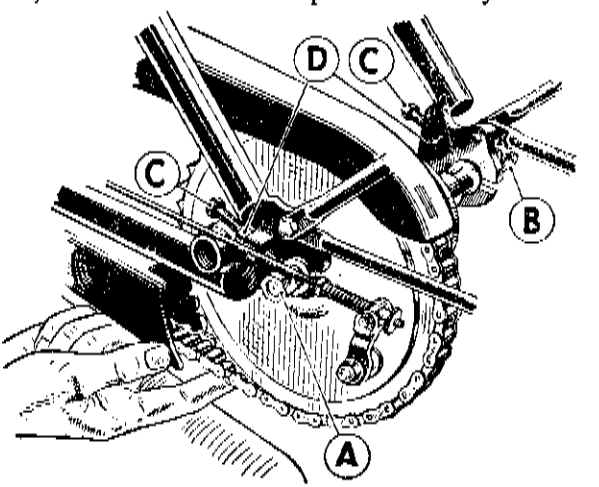

Fig. A29.

For rear chain adjustment on spring frame models see Service Sheet 212C.

NOTE. It may be necessary to re-adjust the rear brake, since this will have been altered by movement of the rear wheel.

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A Group
(Except Swinging Arm Models)
DISMANTLING AND RE-ASSEMBLING THE CLUTCH

Take off the nearside footrest, and then undo all the screws round the rim of the chaincase, noting the position of the red screw, which also serves as an oil-level plug. The joint washer should be carefully preserved.

The clutch is revealed by removal of the cover held in position by twelve nuts and bolts. Take care not to damage the oil sealing washer between the cover and the clutch body, when the clutch cover is drawn off.

The clutch spring plate which is now revealed may be removed after the six adjusting nuts have been unscrewed and the clutch springs and spring cups withdrawn.

The clutch plates may now be withdrawn. Take note of their position so that they may be re-assembled in the same order. Examine the clutch plates for oil or wear. The plates will require a thorough washing in petrol if there is any trace of oil on them. If the inserts are badly worn or glazed they must be renewed. The steel plates should be smooth and if badly scored they must be replaced.

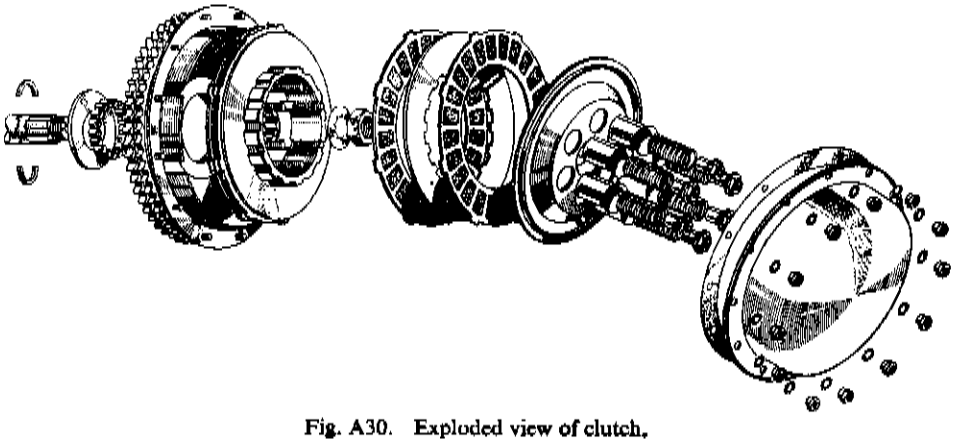

Fig. A30. Exploded view of clutch.

Removal of the clutch body entails removal of the engine shaft shock absorber and sprocket, and the operation is described fully in Service Sheet No. 206.

The clutch sprocket and clutch centre can then be examined for wear. Special attention should be paid to the slots in which the steel plates slide; if any grooves or notches are worn in the sides of these, they may be filed smooth if not too deep. If the sprocket teeth are worn to a hook shape, the sprocket must be replaced; otherwise rapid chain wear will

result. Finally, examine the rollers and tracks. If wear on the chainwheel bush or on the bearing boss of the clutch centre exceeds .0015 in. the bush or centre should be replaced.

Re-assembly of the clutch and mainshaft sprocket is described in Service Sheet No. 208. Reference to Fig. A.30 and Fig. A.23, Service Sheet No. 208, will show the order and method of assembly.

It is important that the pressure plate and clutch plates should slide out evenly when the clutch is operated, and if necessary the clutch springs should be adjusted to achieve even pressure all round.

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BSA SERVICE SHEET No. 212

A Group Models before Engine No. ZA7-101

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Reprinted Jan., 1958

ADJUSTMENT, DISMANTLING AND RE-ASSEMBLY OF HUBS AND BRAKES

Both wheels are of the quickly detachable type and are interchangeable.

Front Wheel Removal and Replacement

Slacken the pinch bolt A, Fig. A31, at the front of the nearside fork end. Insert a tommy bar in the hole in the spindle end B and unscrew. Note that the spindle has a left hand thread, and therefore unscrews clockwise. The spindle can then be pulled right out, and the wheel should be pulled sideways toward the nearside of the machine, so as to disengage the coupling splines on the hub from the brake. As this is done, the distance bush C will slide into the fork end. The wheel can now be dropped out.

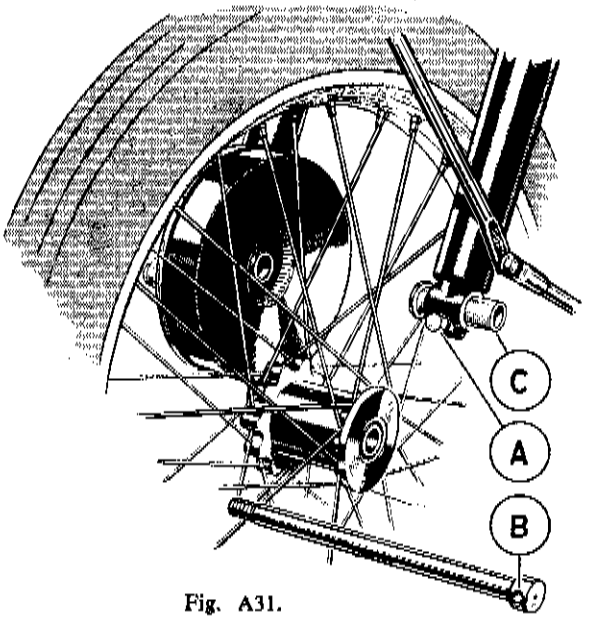

Fig. A31.

To replace the wheel the above operations are carried out in the reverse order. The action of tightening the wheel spindle restores the bush C to its correct position. **Do not forget finally to tighten the pinch bolt A.**

Rear Wheel Removal and Replacement

The rear wheel is removed in a somewhat similar manner. The spindle A, Fig. A32, has a right hand thread and therefore unscrews in an anti-clockwise direction. The distance bush B falls clear of the machine when the spindle is removed, or alternatively the spindle can be pulled out until it is clear of the hub and then slid backwards out of the slotted chainstay end, carrying the bush with it.

This is the most convenient way of dealing with the bush when refitting the wheel. When detaching the rear wheel, it is quite unnecessary to touch the hexagon nut C on the nearside.

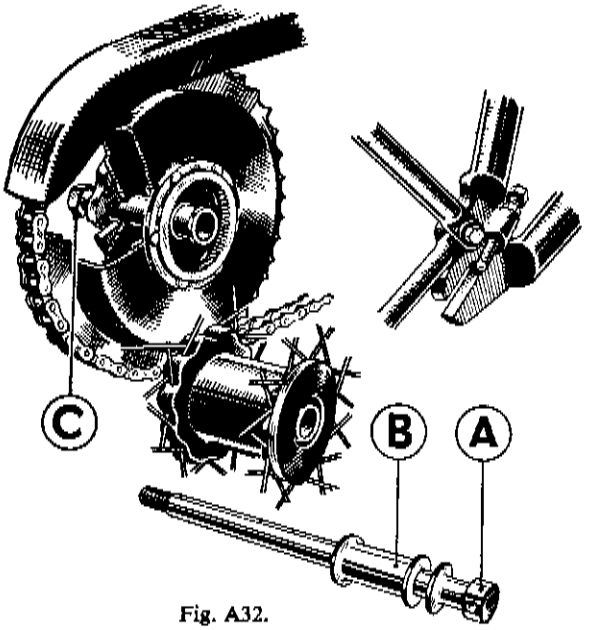

Fig. A32.

Dismantling and Re-assembly of the Hubs

The hubs are fitted with two ballraces which are a light press fit on the hollow spindle and in the hub shell. Remove the dust cap A, Fig. A33 and felt washer B. Unscrew the ballrace retaining ring C. This ring has a left hand thread and therefore unscrews in a clockwise direction.

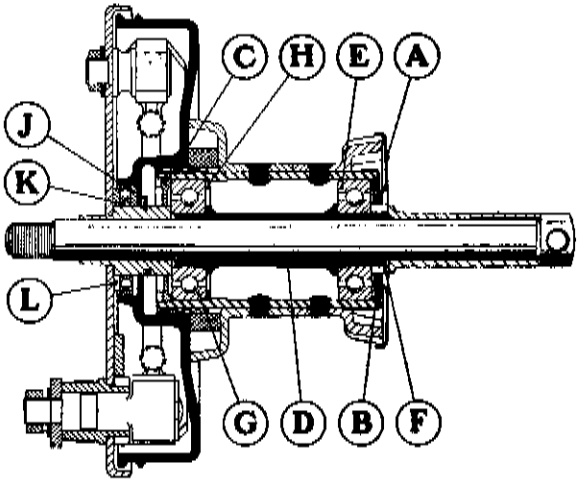

Fig. A33. Section through the front hub.

With the aid of a suitable soft drift applied to the end of the hollow spindle D, drive out the spindle and ballrace E. As the spindle comes away the distance bush F will be released. The only parts remaining in the hub are the ballrace G and the shim H, and these need not be disturbed unless the ballrace is suspected of being faulty. Wash it thoroughly in paraffin to remove all trace of grease when any play will be immediately detected. If it is decided to replace the race it can be driven from the hub shell with the aid of a soft drift.

Removal and Dismantling of the Front Brake Drum

After removal of the wheel the brake drum is held in position in the frame by means of a stud which passes through a lug on the fork leg. With the nut removed the complete drum can be withdrawn.

The brake drum cover plate can be withdrawn from the brake drum after removal of the spring circlip J, Fig. A33. The plate will be seen to carry the brake shoes together with their fulcrum pin and operating arm and a thrust race with its accompanying washers. Note that the smaller diameter washer goes next to the cover plate.

It is unlikely that the brake shoes, fulcrum pin and operating arm will require attention, although the latter should be checked for freedom of movement and greased if necessary.

To remove the brake shoes, lay the drum cover plate flat on a bench (shoes uppermost) and lever the shoes upwards. They can then be drawn over and free of the cam and fulcrum pin. To replace, attach the springs and reverse the method of removal. If the cam pads show excessive wear, new shoes should be fitted. If only the brake linings are worn, these alone need be replaced.

If examination of the brake drum shows that the splines have become worn and the braking surface scored, a new drum must be fitted. The drum must not be machined to produce a new braking surface. To do so is only a temporary cure and further attention would be required later.

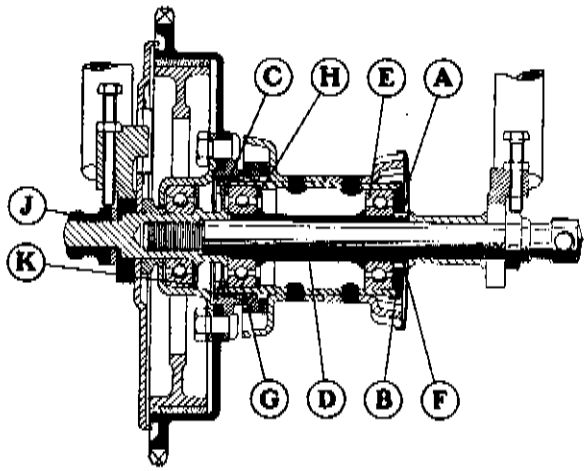

Fig. A34. Section through the rear hub.

When new linings or new shoes have been fitted, the brakes must be centralised after refitting the wheel. To do this, replace the brake cover plate, complete with shoes, fulcrum pin and cam, in the brake drum. Slacken the fulcrum pin nut, and turn the cam so as to open the brake shoes in the normal manner. The fulcrum pin will then move in its slot until both shoes are pressing equally on to the drum. Tighten the fulcrum pin nut firmly and release the brake.

Removal and Dismantling of the Rear Brake Drum

After removal of the rear wheel the brake drum is held in position in the wheel by nut J, Fig. A34. To remove the drum disconnect the chain and rear brake rod, slacken nut J, move the drum towards the offside of the machine until the lug on the frame disengages from the slot in the brake anchor plate, and then slide the drum to the rear, until it is clear of the chainstay ends.

With the brake drum removed from the frame, the brake drum cover plate, to which are attached the brake shoes, can be withdrawn, together with their fulcrum pin and operating arm. It will be seen that these are similar in construction to those of the front brake, and the instructions given for the front brake will apply.

The hub ballrace, which is totally enclosed in the brake drum, should not normally require attention. If it has been decided to replace this race, however, its housing can be removed from the brake drum by unscrewing the nuts and withdrawing the bolts that pass through the splined ring, the brake drum and the ballrace housing. Note that the nuts are locked in position by three locking strips: it is essential that these are fitted on re-assembly.

The brake drum ballrace is held in position in its housing by means of a spring circlip K, which can be removed with the aid of a screwdriver. The replacement ballrace should be well greased before fitting the washer in place to prevent grease entering the brake drum. When replacing the bearing housing in the drum, make sure that its face is clean and free from burrs, as failure to do this may result in the brake drum running out of truth.

Brake Adjustment

The front brake is adjusted by means of the screwed sleeve on the cable stop, fitted to the brake cover plate.

The rear brake is adjusted by means of a knurled nut on the end of the brake rod.

Brake Re-lining

After removal of the brake shoes (see Dismantling of Brake Drums), the old lining is easily taken off by gripping the shoe in a vice, inserting a chisel under one end and shearing the rivets off in sequence. The rivet ends can then be punched out of the shoe.

New linings are die-pressed to suit the curvature of the shoes, but will require drilling and counter-boring for the rivets. Position the lining and hold it in place at one end by means of clamps. Using the holes in the shoes as guides, drill holes of the correct size ($\frac{5}{32}$ in. dia.) for the rivets adjacent to the clamp. Turn the shoe over, and counterbore the holes just drilled sufficiently deep so that the rivet heads will stand below the lining surface; this is important, since the rivets will otherwise score the brake drum.

Insert rivets into the holes and rivet them over on the inside of the shoe. This is easily accomplished by holding in a vice a short length of rod, whose diameter is equal to that of the rivet head, and using it as an anvil upon which to rest the rivet head while hammering the shank over. This will also make sure that the rivets do not stand proud of the lining.

Move the clamps to the next pair of holes, taking care that the lining is kept in firm contact with the shoe the whole time, and repeat the above procedure. When the lining is finally riveted down, bevel off the ends of the linings and file off any local high spots.

Precautions to be observed when fitting the relined shoes to the hubs are given in the chapter on 'Dismantling of the Brake Drums.'

J.U.B1283

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BSA SERVICE SHEET No. 212A

May 1954
Reprinted May 1960

A, B and M Group Models

(For A7 Models before Engine No. ZA7 101. See Service Sheet 212)

ADJUSTMENT, DISMANTLING AND RE-ASSEMBLY OF FRONT HUB AND BRAKE (7 in. Brake)

Wheel Removal and Replacement

To remove the front wheel, first disconnect the brake cable, then slacken the pinch bolt *A* (Fig. A31(a)). Insert a tommy bar in the hole in the head of the spindle at *B* and unscrew the spindle, noting that it has a left hand thread and therefore unscrews in a clockwise direction. With the spindle withdrawn the bush *C* should be pulled out to its fullest extent. This will leave the wheel free to be pulled away from the right hand fork leg and withdrawn from the machine.

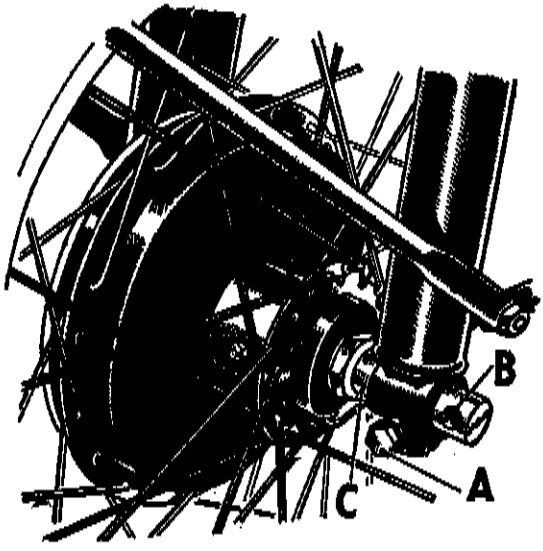

Fig. A31(a). Wheel Removal

The wheel is replaced in the reverse order, noting that the brake plate stop must be located in its recess at the rear of the right hand fork leg. It is most important that after the spindle has been tightened and before the pinch bolt is tightened, the forks are depressed once or twice to enable the left hand fork end to position itself on the distance bush. If this precaution is not observed, the fork leg may be clipped out of position and will not function correctly.

Dismantling and Re-assembly of the Hub

This is fitted with ball journal bearings and therefore no adjustment is necessary or provided for. The only attention required is periodical grease gun lubrication.

If it becomes necessary to replace the bearings unscrew the nut retaining the brake anchor plate and remove the plate together with the brake mechanism.

Unscrew the cap *A* (Fig. 32(a)) noting that this has a left hand thread and therefore unscrews in a clockwise direction. Using a hide mallet from the brake drum side, drive out the hollow spindle *B* which will carry with it the nearside ballrace *C*, dust Cap *D*, and distance piece *E*.

Only the offside ballrace *F* now remains in the hub and this should be driven out with the aid of a soft drift.

During re-assembly ensure that the ballrace *F* is fully home and that the retaining collar *A* is quite tight.

Brake Relining

To remove the brake shoes lay the drum cover plate flat on a bench and lever the shoes upwards. They can then be drawn over, and free of the cam and fulcrum pin. If the cam pads show excessive wear the brake shoes should be renewed.

When the brake shoes are removed the linings can be replaced as described in Service Sheet 612.

When new linings or new shoes have been fitted, the brakes must be centralised after refitting the wheel. To do this, replace the brake cover plate, complete with shoes, fulcrum pin and cam in the brake drum. Slacken the fulcrum pin nut, and turn the cam so as to open the brake shoes in the normal manner. The fulcrum pin will then move in its slot until both shoes are pressing equally on to the drum. Tighten the fulcrum pin nut firmly and release the brake.

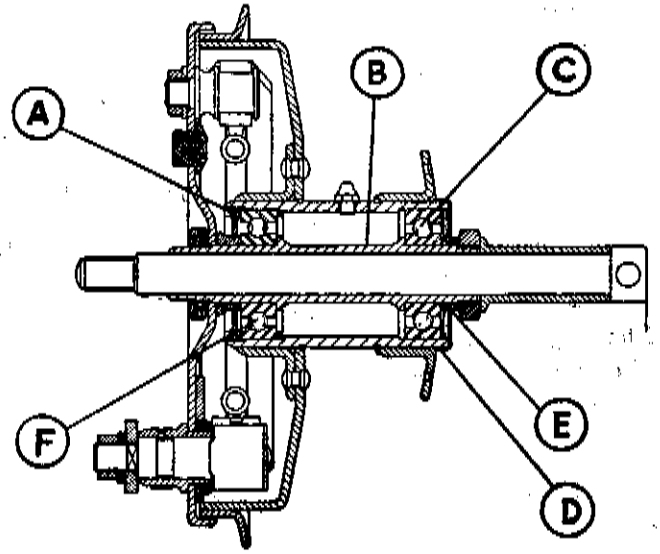

Fig. A32(a). Section of Front Hub (7 in. Brake)

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BSA SERVICE SHEET No. 212B

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A, B and M Group Models

ADJUSTMENT, DISMANTLING AND RE-ASSEMBLY OF FRONT HUB AND BRAKE (8 in. Brake)

Wheel Removal and Replacement

To detach the wheel, first disconnect the brake cable by pushing it out of the brake clip at *E* and unscrewing it from the bracket at *F*. Remove the torque arm nut *C* and undo the pinch bolt *A*. Insert a tommy bar in the hole in the head of the spindle at *B* and unscrew the spindle, noting that it has a left hand thread and therefore unscrews in a clockwise direction. Support the wheel as the spindle is withdrawn, and when it is clear the wheel can be pulled away from the right hand fork leg and removed from the machine.

After removal do not let the wheel fall on to the bush which projects from the brake drum side of the hub. Although the bush is pressed in, it may, if subjected to a sharp blow, be forced back into the hub. If this should happen the bush can be retrieved and re-positioned with the aid of the wheel spindle.

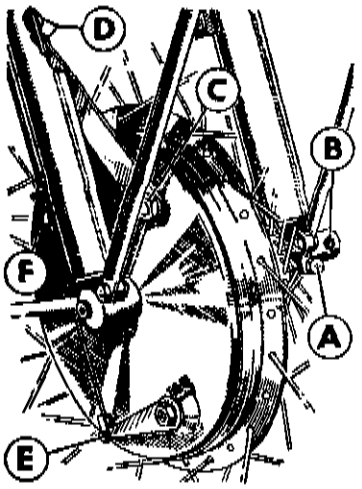

Fig. A31(b). Wheel Removal

The wheel is replaced in the reverse order to that for removal. It is most important that after the spindle has been tightened and before the pinch bolt is tightened, the forks are depressed once or twice to enable the left hand fork end to position itself on the spindle shank. If this precaution is not observed, the fork leg may be clipped out of position and will not function correctly.

Dismantling and Re-assembly of the Hub

Withdraw the brake plate which is a push fit on the bush *B* (Fig. A32(b)). Remove the locking split pins and unscrew the bearing retaining collars *C* and *D*, which have normal right hand threads. Replace the spindle and drive out the brake side ball race *E* together with the bush *B* by striking the end of the spindle with a hide mallet. Only the ball race *F* now remains in the hub and can be removed with a suitable soft drift.

Before replacing the bearing retaining collars ensure that the rubber oil seals in them are in good condition. The collars should be done up quite tight and if necessary fresh holes should be made for the locking split pins.

Brake Relining

To remove the brake shoes lay the drum cover plate flat on a bench and lever the shoes upwards. They can then be drawn over, and free of the cam and fulcrum pin. If the cam pads show excessive wear the brake shoes should be renewed.

When the brake shoes are removed the linings can be replaced as described in Service Sheet 612.

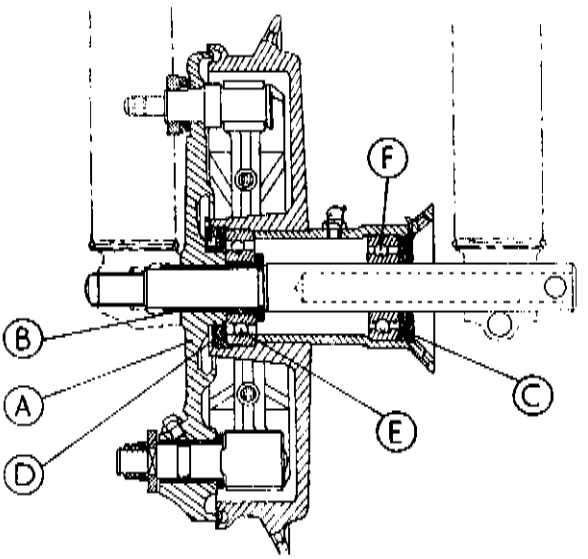

Fig. A32(b). Section of Front Hub (8 in. Brake)

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BSA SERVICE SHEET No. 212C

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A, B and M Group Models

(With Plunger Type Rear Suspension)

ADJUSTMENT, DISMANTLING AND RE-ASSEMBLY OF REAR HUB AND BRAKE

Rear Wheel Removal and Replacement

Remove the smaller outer nut *C* (Fig. A.31(c)) on the left hand side of the rear wheel spindle, and withdraw the spindle *A*, from the right hand side of the machine.

The distance bush *B* will normally fall clear when the spindle is removed. The wheel should then be pulled towards the right hand side of the machine until it is free from the spline engaging it with the brake drum. When the hub is free from the drum the wheel can be dropped out. To replace the wheel the operations are carried out in the reverse order. When detaching the rear wheel, it is quite unnecessary to touch the larger of the two hexagonal nuts on the left hand side of the spindle.

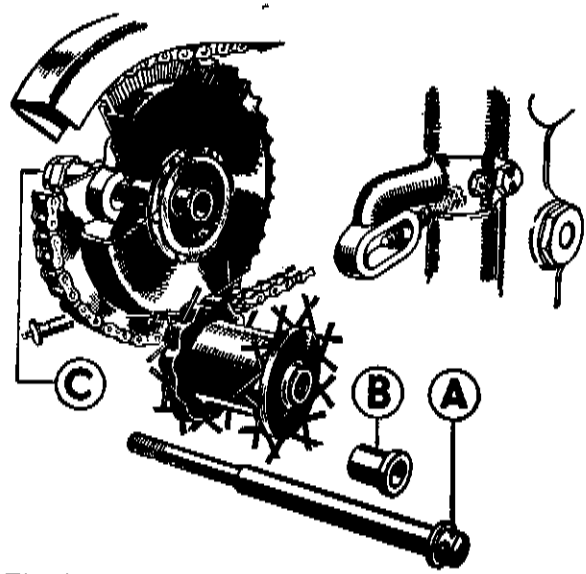

Fig. A31(c) Rear Wheel Removal (Spring Frame)

Dismantling and Re-assembly of the Rear Hub

The hub is fitted with two ballraces which are a light press fit in the hub shell. Remove the dust cap *A* (Fig. 32(c)). Unscrew and remove the two screwed rings *C* and *M*. These rings are left hand threaded, and therefore unscrew clockwise. Remove distance piece *F*.

Place the wheel spindle through the hub from the offside. Using a hide mallet tap the head of the spindle so as to drive the offside ballrace toward the centre of the hub shell. By this means the brake drum side race will be driven out, after which the distance pieces *D* and *H* can be removed.

The only part now remaining in the shell will be the offside ballrace which can be driven out with a soft drift.

Removal and Dismantling of the Brake Drum

After removal of the rear wheel the brake drum is held in position in the wheel by nut *J* (see Fig. A32(c)). To remove the drum disconnect the chain and rear brake rod, remove nut *J* and withdraw the drum.

With the brake drum removed from the frame, the brake drum cover plate, to which are attached the brake shoes, can be withdrawn, together with their fulcrum pin and operating arm.

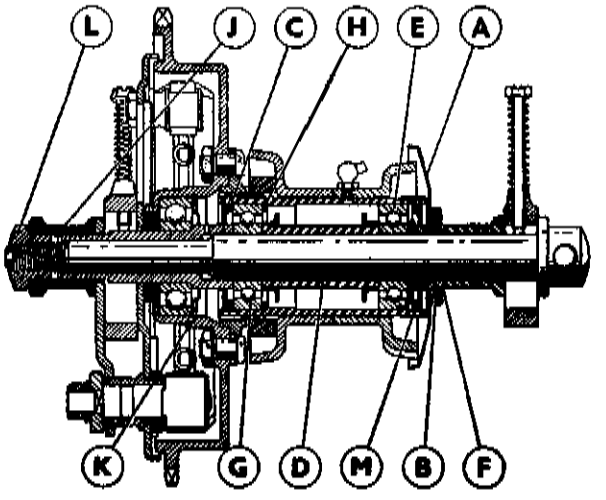

Fig. A32(c). Section through the Rear Hub

The brake drum ballrace is held in position in its housing by means of a spring circlip *K*, which can be removed with the aid of a screwdriver. The replacement ballrace should be well greased before fitting the washer in place to prevent grease entering the brake drum.

If examination of the brake drum shows that the teeth have become worn and the braking surface scored, a new drum must be fitted. The drum must not be machined to produce a new braking surface. To do so is only a temporary cure and further attention would be required later. The spline bolted to the brake drum should be replaced if there is any play between it and the spline on the wheel hub.

Brake Relining

To remove the brake shoes lay the drum cover plate flat on a bench, and lever the shoes upwards. They can then be drawn over, and free of the cam and fulcrum pin. If the cam pads show excessive wear the brake shoes should be renewed. When the brake shoes are removed the linings can be replaced as described in Service Sheet 612.

Rear Chain Adjustment

Put the machine on its stand. The rear wheel must be at its lowest point in the suspension unit when the adjustment is made. Undo nut *A* (Fig. A33(c)) several turns and slacken nut *B* just sufficiently to allow the wheel to move.

Screw in the adjusters *D* to tighten the chain. There should be a total up and down movement of half an inch at the centre of the chain span. See that the wheel spindle is up against the adjusters and that the wheels are in line. Check the alignment by means of a taut piece of string, which should be equidistant from the front and rear of each wheel.

Tighten the large hexagon nut *B* very firmly, followed by the smaller nut *A*. Readjust the rear brake.

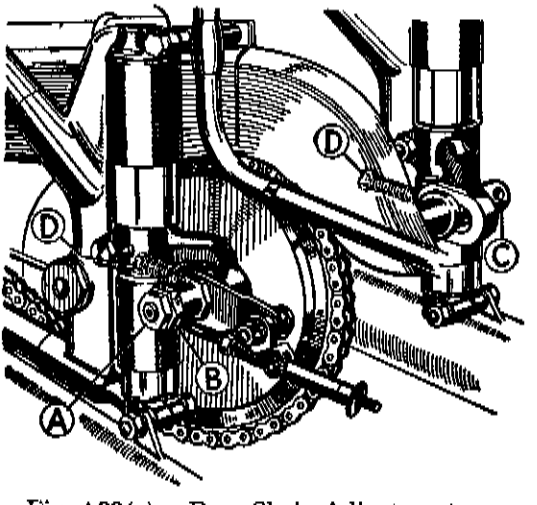

Fig. A33(c). Rear Chain Adjustment

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May 1954
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A and B Group Models

(With Welded Type Frame)

ADJUSTMENT, DISMANTLING AND RE-ASSEMBLY OF REAR HUB AND BRAKE

(FOR FULL WIDTH TYPE HUB SEE SHEET No. 212E)

Wheel Removal

Removal of the wheel does not affect the chain or brake adjustment. Remove the spindle *B* (Fig. A31(d)), it has a normal right hand thread and therefore unscrews in an anti-clockwise direction. The distance bush *E* falls clear when the spindle is removed and the wheel can then be pulled away from the brake drum and withdrawn from the machine.

When detaching the rear wheel it is quite unnecessary to touch the hexagon nut *A* on the left hand side.

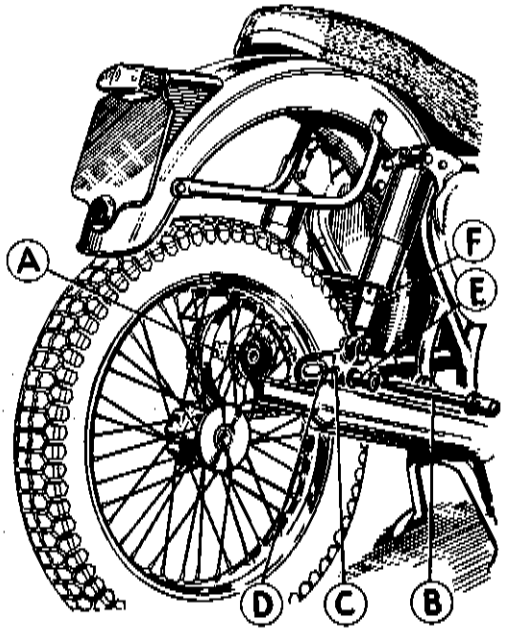

Fig. A31(d). Rear Wheel Removal

Hub Dismantling and Re-assembly

The hub is fitted with two ballraces which are a light press fit on the hollow spindle and in the hub shell. Remove the dust cap *A* (Fig. A32(d)), and felt washer *B*. Unscrew the ballrace retaining ring *C*. This ring has a left hand thread and therefore unscrews in a clockwise direction.

With the aid of a suitable soft drift applied to the brake drum end of the hollow spindle *D*, drive out the spindle and ballrace *E*. Then tap the spindle from the bearing, as the spindle comes away the distance bush *F* will be released. The only parts remaining in the hub are the ballrace *G* and the spacing washer *H*, and these need not be disturbed unless the ballrace is suspected of being faulty. Wash it thoroughly in paraffin to remove all trace of grease when any play will be immediately detected. If it is decided to replace the race it can be driven from the hub shell with the aid of a soft drift. During re-assembly ensure that this bearing is fully home and that the locking ring *C* is quite tight.

Removal and Dismantling of the Brake Drum

After removal of the rear wheel the brake drum is held in position by the nut *J* and by the nut securing the brake anchor strap. To remove the drum, first disconnect the rear chain and brake rod, then remove the nut *J* and the nut retaining the torque arm to the brake plate. The brake drum can then be pulled away from the brake plate and

removed from the machine. Pivot the brake plate support strap on the cam lever boss so that the brake plate is free to be withdrawn from the fork leg.

To remove the brake shoes lay the brake plate on a bench (shoes uppermost) and lever the shoes upwards. They can then be drawn over and free of the cam and fulcrum pin. The operating cam and fulcrum pin should be inspected but it is unlikely that more than greasing will be necessary. If the cam pads on the brake shoes show excessive wear then new shoes should be fitted. To replace the shoes, attach the springs and push the shoes over the cam and pivot by reversing the dismantling procedure.

If examination of the brake drum shows that the teeth have become worn and the braking surface scored, a new drum must be fitted. The drum must not be machined to produce a new braking surface. To do so is only a temporary cure and further attention would be required later.

The brake drum ballrace, which is totally enclosed in the drum, should not normally require attention. The ballrace is held in position in its housing by a dished washer and a spring circlip *K*, which can be removed with the aid of a screwdriver. The replacement ballrace should be well greased before fitting the dished washer which prevents the entry of grease into the brake drum.

Brake Shoe Relining

After removal of the brake shoes (See Dismantling of Brake Drum) the old lining can be removed as described in Service Sheet 612.

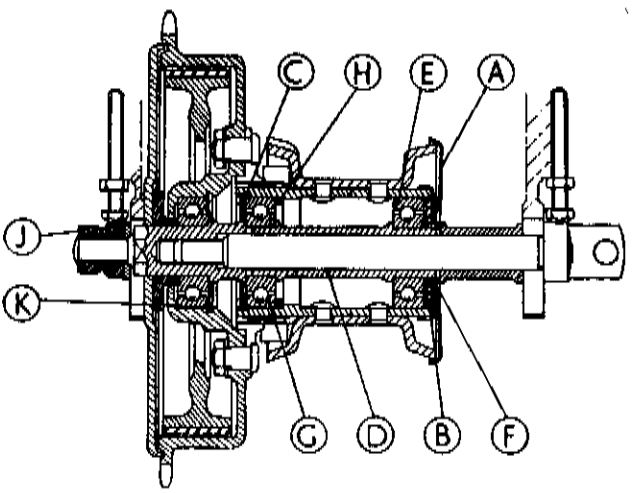

Fig. A32(d). Section through the Rear Hub

Wheel Re-assembly

Wheel re-assembly involves no difficulty and should be carried out in the reverse order to dismantling.

Rear Chain Adjustment

First put the machine on its centre stand. Whenever the rear wheel is adjusted, the nut securing the torque arm to the brake plate must be slackened slightly so that the plate may pivot freely. Undo the spindle *B* (Fig. A31(d)), on the right hand side of the machine, a few turns, and slacken nut *A* just sufficiently to allow the wheel to move.

Slacken the locknuts *C* and screw out the adjusters *D* to tighten the chain. With the wheel in its lowest position there should be a total up and down movement of 1¼ ins. in the centre of the chain at its tightest point. Ensure that the wheel spindle is against the adjusters and that the wheels are in line. Check the alignment by means of a taut piece of string which should be equidistant from the front and rear of each wheel.

Tighten the nut *A*, the spindle *B* and the nut securing the torque arm to the brake plate. Re-check the chain adjustment and the wheel alignment.

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A and B Group Models

(With Welded Type Frame)

ADJUSTMENT, DISMANTLING AND RE-ASSEMBLY OF REAR HUB AND BRAKE

(FOR FULL WIDTH TYPE HUB SEE SHEET No. 212E)

Wheel Removal

Removal of the wheel does not affect the chain or brake adjustment. Remove the spindle *B* (Fig. A31(d)), it has a normal right hand thread and therefore unscrews in an anti-clockwise direction. The distance bush *E* falls clear when the spindle is removed and the wheel can then be pulled away from the brake drum and withdrawn from the machine.

When detaching the rear wheel it is quite unnecessary to touch the hexagon nut *A* on the left hand side.

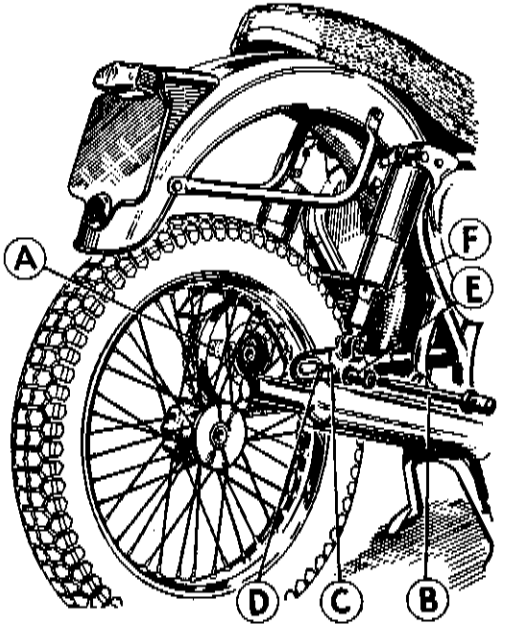

Fig. A31(d). Rear Wheel Removal

Hub Dismantling and Re-assembly

The hub is fitted with two ball-races which are a light press fit on the hollow spindle and in the hub shell. Remove the dust cap *A* (Fig. A32(d)), and felt washer *B*. Unscrew the ball-race retaining ring *C*. This ring has a left hand thread and therefore unscrews in a clockwise direction.

With the aid of a suitable soft drift applied to the brake drum end of the hollow spindle *D*, drive out the spindle and ballrace *E*. Then tap the spindle from the bearing, as the spindle comes away the distance bush *F* will be released. The only parts remaining in the hub are the ballrace *G* and the spacing washer *H*, and these need not be disturbed unless the ballrace is suspected of being faulty. Wash it thoroughly in paraffin to remove all trace of grease when any play will be immediately detected. If it is decided to replace the race it can be driven from the hub shell with the aid of a soft drift. During re-assembly ensure that this bearing is fully home and that the locking ring *C* is quite tight.

Removal and Dismantling of the Brake Drum

After removal of the rear wheel the brake drum is held in position by the nut *J* and by the nut securing the brake anchor strap. To remove the drum, first disconnect the rear chain and brake rod, then remove the nut *J* and the nut retaining the torque arm to the brake plate. The brake drum can then be pulled away from the brake plate and

removed from the machine. Pivot the brake plate support strap on the cam lever boss so that the brake plate is free to be withdrawn from the fork leg.

To remove the brake shoes lay the brake plate on a bench (shoes uppermost) and lever the shoes upwards. They can then be drawn over and free of the cam and fulcrum pin. The operating cam and fulcrum pin should be inspected but it is unlikely that more than greasing will be necessary. If the cam pads on the brake shoes show excessive wear then new shoes should be fitted. To replace the shoes, attach the springs and push the shoes over the cam and pivot by reversing the dismantling procedure.

If examination of the brake drum shows that the teeth have become worn and the braking surface scored, a new drum must be fitted. The drum must not be machined to produce a new braking surface. To do so is only a temporary cure and further attention would be required later.

The brake drum ballrace, which is totally enclosed in the drum, should not normally require attention. The ballrace is held in position in its housing by a dished washer and a spring circlip *K*, which can be removed with the aid of a screwdriver. The replacement ballrace should be well greased before fitting the dished washer which prevents the entry of grease into the brake drum.

Brake Shoe Relining

After removal of the brake shoes (See Dismantling of Brake Drum) the old lining can be removed as described in Service Sheet 612.

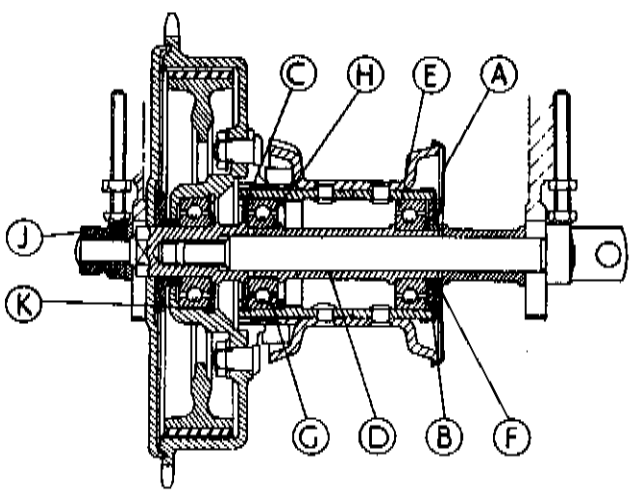

Fig. A32(d). Section through the Rear Hub

Wheel Re-assembly

Wheel re-assembly involves no difficulty and should be carried out in the reverse order to dismantling.

Rear Chain Adjustment

First put the machine on its centre stand. Whenever the rear wheel is adjusted, the nut securing the torque arm to the brake plate must be slackened slightly so that the plate may pivot freely. Undo the spindle *B* (Fig. A31(d)), on the right hand side of the machine, a few turns, and slacken nut *A* just sufficiently to allow the wheel to move.

Slacken the locknuts *C* and screw out the adjusters *D* to tighten the chain. With the wheel in its lowest position there should be a total up and down movement of 1¼ ins. in the centre of the chain at its tightest point. Ensure that the wheel spindle is against the adjusters and that the wheels are in line. Check the alignment by means of a taut piece of string which should be equidistant from the front and rear of each wheel.

Tighten the nut *A*, the spindle *B* and the nut securing the torque arm to the brake plate. Re-check the chain adjustment and the wheel alignment.

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BSA SERVICE SHEET No. 212E

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A and B Group Models

(With Full Width Hubs)

ADJUSTMENT, DISMANTLING AND RE-ASSEMBLY OF HUBS AND BRAKES

FRONT WHEEL REMOVAL AND REPLACEMENT

To remove the wheel, place the machine on both front and centre stands, take out the two bolts securing the brake anchor strap to the fork leg, and unscrew the large nut from the right-hand side of the wheel spindle. Disconnect the brake cable completely from the brake plate. If sufficient slack cannot be obtained by screwing down the cable adjuster, the outer casing may be released from its holder at the handlebar end.

Next, slacken the pinch bolt in the left-hand fork leg and draw out the spindle by inserting a tommy bar in the hole provided, and using a pulling and twisting motion. At the same time support the weight of the wheel to avoid damaging the bush which projects through the brake plate and partly enters the right-hand fork leg. Should this bush be pushed inadvertently back inside the hub, it can be re-positioned by inserting the wheel spindle from the left-hand side.

There is no distance piece fitted outside the hub, location being maintained by means of a shoulder formed on the spindle meeting the bush already referred to. Once the spindle has been removed, the wheel can be pulled away from the right-hand fork leg and withdrawn.

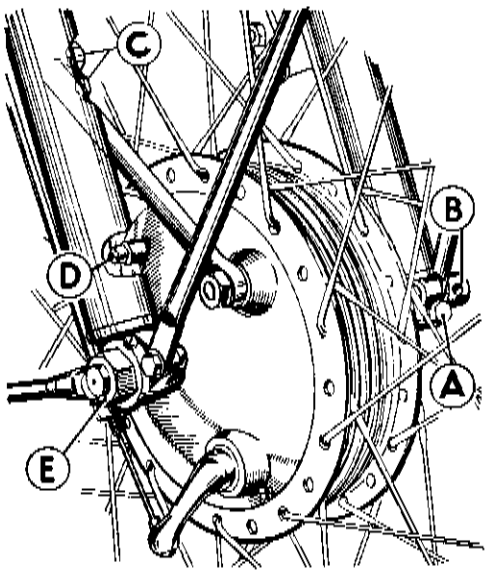


Fig. A31 (e). Front Wheel Removal.

A. Fork Leg Pinch Bolt
B. Wheel Spindle
C. Anchor Strap Securing Bolts
D. Brake Fulcrum Adjuster
E. Wheel Spindle Nut

Refitting is carried out by reversing the procedure for removal, except that tightening the pinch bolt must be left until the machine has been taken off the stands. The forks should then be fully depressed and released several times to ensure that the left-hand leg takes up the correct position on the wheel spindle. The inner edge of the tommy bar hole should be approximately level with the outer face of the fork leg. Finally, tighten the pinch bolt and check the tightness of all other bolts and nuts which have been disturbed.

Models with Frame prefix letters FA or FB

FRONT WHEEL REMOVAL AND REPLACEMENT

To remove the wheel, place the machine on the stand, disconnect the brake cable by removing the split pin and clevis pin on the brake arm. Unscrew the four bolts holding the fork end caps when the wheel will then drop to the ground. Note that there is a register at each end of the spindle to clear the bolts, these also serve to locate the wheel in the forks.

REFITTING

This is simply the reverse of the above procedure but care must be taken to locate the the lug on the R/H leg in the groove on the brake cover plate.

Do not omit the split pin when re-connecting the brake cable.

REAR WHEEL REMOVAL AND REPLACEMENT

Place the machine on the centre stand, and remove the right-hand silencer. Unscrew the four nuts securing the sprocket to the hub. Where the rear chain is totally enclosed, access to these nuts is gained by removing the rearmost of the two rubber plugs in the chaincase. Disconnect the brake cable completely from the brake plate. It may be necessary to disengage the ferrule of the outer casing from the frame lug, in order to obtain enough slack in the inner cable. Take off the brake anchor strap by removing the nut holding it to the brake plate, and loosening the bolt fixing the forward end to the swinging arm fork.

Next, unscrew and take out the wheel spindle from the right-hand side, and extract the distance piece. The large nut on the left-hand fork end should not be disturbed, as this holds the fixed spindle of the sprocket, which remains in position. The wheel can now be pulled away from the sprocket. By standing on the left-hand side of the machine and tilting it in that direction, the wheel can be taken out. If the rear part of the wheel is brought clear of the mudguard first, this is a simple operation.

The wheel is replaced by reversing the order of the instructions given for removal. Make sure that the four sprocket retaining nuts are fully and evenly tightened, and that the washer beneath the head of the wheel spindle has not been omitted.

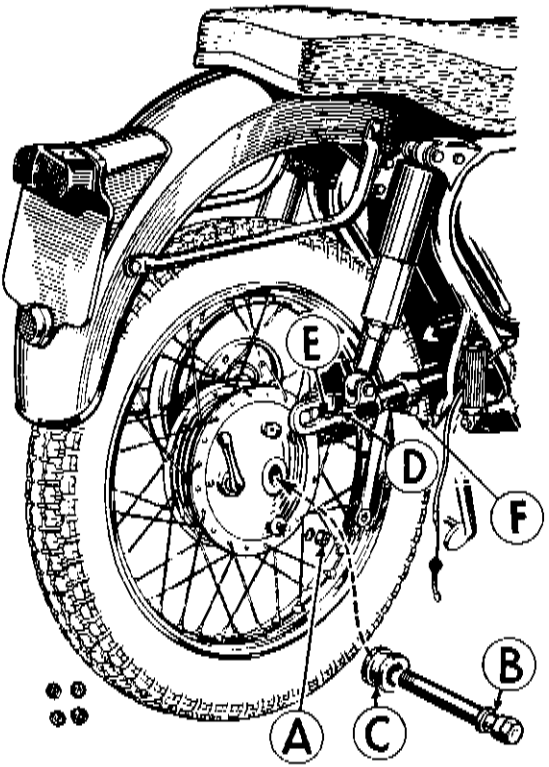


Fig. A32 (e). Rear Wheel Removal and Rear Chain Adjustment

A. Anchor Strap Securing Nut
B. Wheel Spindle
C. Distance Piece
D. Chain Adjuster Locknut
E. Chain Adjuster Screw
F. Anchor Strap Bolt

REAR CHAIN ADJUSTMENT

The chain must be adjusted while the machine is on the centre stand, with the swinging arm fork at the lower limit of its travel. When a chaincase is fitted, access to the chain is gained by removing the foremost of the two rubber plugs. Rotate the wheel several times to find the position in which the chain is tightest. The total up and down movement in the centre of the top run should be 1¼". If the setting varies appreciably from this, the chain should be readjusted as follows :—

Slacken the wheel spindle and the fixed spindle nut. Release the two locknuts and screw the adjusting screws in or out as required. Take care that both are turned an equal amount to avoid putting the wheel out of line.

When the tension is correct, secure the locknuts, press the wheel forward in the fork ends and tighten, first the fixed spindle nut and finally the wheel spindle.

WHEEL ALIGNMENT

It is advisable to check the alignment of the wheels periodically, particularly after the chain has been adjusted. A long straight-edge is placed alongside and close to, the two wheels, and supported as high up from the ground as possible. The distances from the straight-edge to the rims, measured at the front and rear of each wheel, should all be equal.

Tyres are unreliable guides in checking wheel alignment, since tyres of different section will give the appearance of error when, in fact, everything is in order.

BRAKE ADJUSTMENT

A fulcrum type adjuster is provided on each brake (except those models with engine prefix letters FA or FB, where adjustment is carried out by screwing in or out, as required, the finger adjusters on the brake cables), in addition to the usual cable adjuster. The adjusting pin should be turned in a clockwise direction until it will turn no further, then slackened off until the wheel rotates freely. The adjusters have a click action, each click representing one-twelfth of a turn.

The brake shoes must not be allowed to bind even slightly, as this may generate sufficient heat to distort the drum, or cause the grease to melt and impregnate the linings.

BRAKE SHOE RECONDITIONING

After the brake plate has been taken from the hub, the adjusting pin should be slackened right off, and the plate laid flat with the shoes uppermost. They can then be levered up at right angles to the plate, pivoting on their ends, until the tension of the springs has been relieved.

Should new linings be required, full instructions for fitting are contained in Service Sheet No. 612.

SPROCKET ASSEMBLY—REMOVING AND DISMANTLING

Before the sprocket assembly can be removed, the chaincase must first be taken off. The rear section is held by two hexagon-headed set screws, while the top and bottom sections are secured by two bolts in each, passing through lugs on the swinging arm fork. The large nut on the fixed spindle must also be loosened.

If a chainguard instead of a chaincase is fitted, the four bolts holding it to the swinging arm fork can be taken out to allow the guard to be raised sufficiently to clear the sprocket.

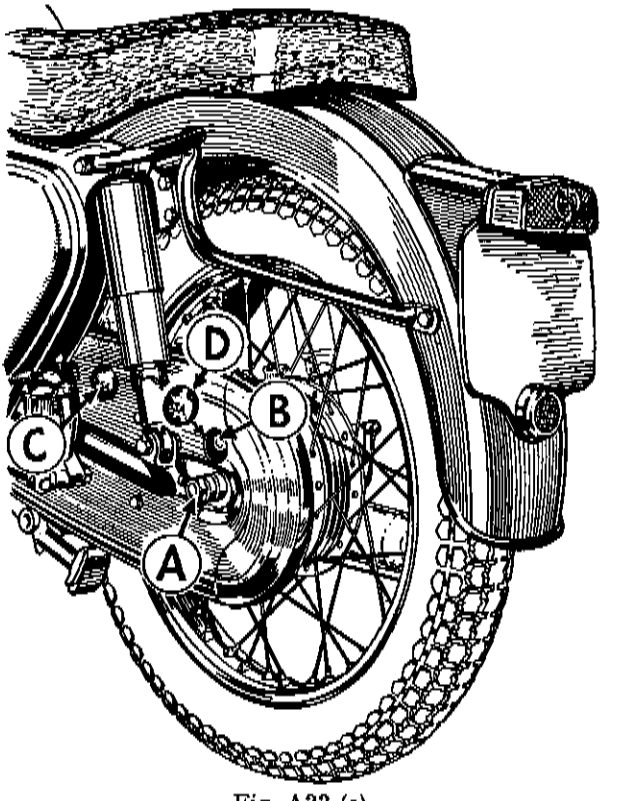


Fig. A33 (e)

A. Fixed Spindle Nut
B. Rear Sprocket Retaining Nut
C. Chain Inspection Rubber Grommet
D. Sprocket Nut Rubber Grommet

After parting the chain at the spring link, the large nut on the end of the fixed spindle is screwed off. The sprocket can then be dismounted and the spindle tapped out. The bearing and the grease retainer are pressed in, and may be driven out with a suitable drift.

When reassembling note that there should be a large washer between the sprocket and the fork end, and also a smaller washer between the fork end and the fixed spindle nut.

HUB DISMANTLING AND REASSEMBLY

The front hub contains two ball journal bearings which require no adjustment. They are secured by locking rings on the outside, and are located by circlips in the hub shell on the inside. Both locking rings have a right-hand thread, the one on the brake drum side being split-pinned to the hub for additional security. A special peg spanner (Part No. 61-3542), is used to unscrew the locking rings, which incorporate felt grease seals. Early models had separate seals and steel retainers, the concave sides of which should face the bearings. The bearings themselves are pressed into the hub shell, and can be tapped out with a soft metal drift, taking care not to damage the circlips.

When reassembling, make sure that the circlips are properly seated in their grooves before refitting the bearings. Do not omit the bush from the right-hand bearing, as this has a shoulder on the inner end and cannot be replaced from outside the hub. Note that the locking rings have different sized centre holes, the larger being for the right-hand side.

The rear hub carries only one bearing, on the right-hand side, which is held by a locking ring and split pin in exactly the same way as already described for the front hub. It is removed and replaced in a similar manner.

On the left-hand side is a pressed in grease retainer. There is also a loose distance piece inside the hub.

If the bearing locking rings have been renewed it will be necessary to drill fresh split pin holes.

The other rear wheel bearing is housed in the sprocket itself. All four bearings are identical, the Part No. being 89-3022. No grease nipples are provided on these hubs; the bearings are packed with grease during assembly and they should be re-packed at intervals of 10,000 to 15,000 miles.

The brake cam spindle housings have grease nipples, but these should be used sparingly to avoid forcing grease into the brakes.

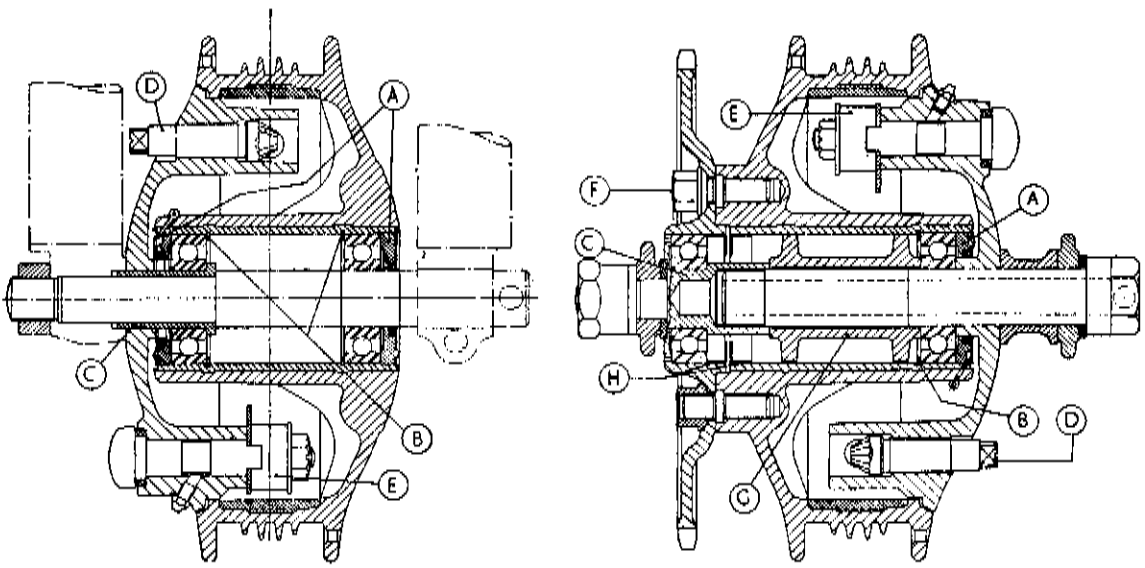


Fig. A34 (e). Front and Rear Hub Arrangement

A. Bearing Locking Ring
B. Bearing Locating Circlips
C. Bearing Sleeve
D. Brake Fulcrum Adjuster
E. Brake Operating Cam
F. Sprocket Retaining Nut
G. Hub Distance Piece
H. Grease Retainer

HUB DISMANTLING AND RE-ASSEMBLY

(Models with engine prefix letters FA or FB)

The front hub has two bearings Part No. 42-5819, the R/H side can be driven out from the L/H side using the spindle as a drift, after the brake cover plate and bearing lockring have been removed.

To remove the L/H side bearing, take out the circlip and dust cover and drive out the bearing from the R/H side using the spindle reversed.

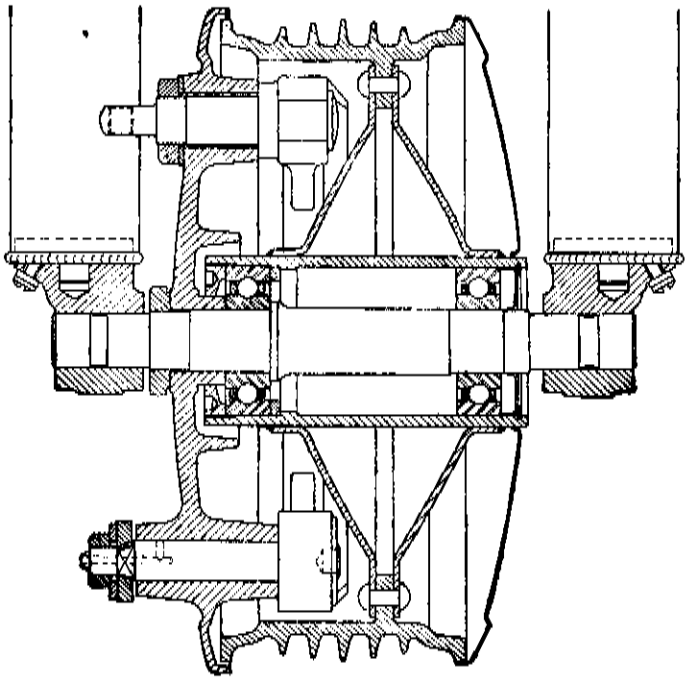
When replacing the bearings do not omit the ring behind the bearing on the R/H side.

REAR HUB

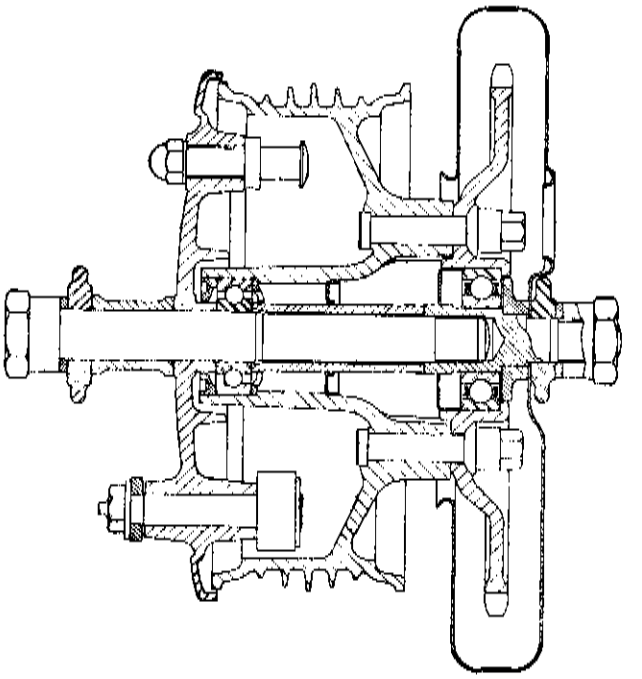
The rear hub is similar to the earlier type except that there is only one grease retainer on the sprocket side (Bearing No. 89-3022) and the R/H bearing is Part No. 42-5819, no split pin being used to secure the lockring.

There is a smaller grease retainer midway along the centre distance tube.

NEW SERIES HUBS



Front hub arrangement



Rear hub arrangement

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Birmingham 10

BW

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"A," "B" and "M" Group Models

THE SPRING FRAME

The B.S.A. Rear Suspension is entirely automatic, and no adjustment is required or provided for. The only maintenance necessary is lubrication by grease gun every thousand miles.

TO DISMANTLE.

First remove the rear wheel (see Service Sheet No. 212A), detach the silencers by removing the nuts "A," Fig. A35, and slacken the clip bolts to the exhaust pipes. Take off the nuts "B," spring washers "C" and remove the pinch bolts "D." Remove plug "E" and in the space vacated, screw in the formed end of Service Tool 61–3222 (Fig. A36).

The centre column "F" (Fig. A35) can now be tapped out through the lower frame lug and Service Tool 61–3222 withdrawn.

Grip the top and bottom suspension shrouds "G" and press the bottom shroud up and out from the frame lugs. A kick is experienced as the suspension unit leaves the frame, and a firm grip on the shrouds is necessary to control the springs. When the bottom of the column is clear the whole unit can be removed from the frame, and placed on the bench for complete dismantling. The inner and outer shrouds, springs "J," washers "K" (if fitted) and locating pieces "L" may be withdrawn, carefully noting their respective positions for subsequent reassembly.

The wheel spindle brackets "M" together with the bearing sleeves "N", to which they are attached, form the spring plunger, and can be separated from the sleeves when the pinch bolts "O" are withdrawn. Note that each

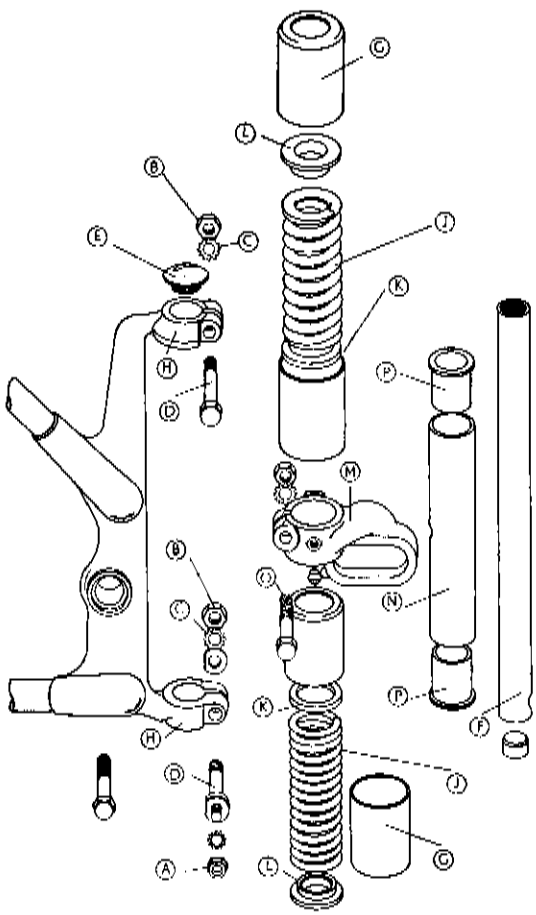
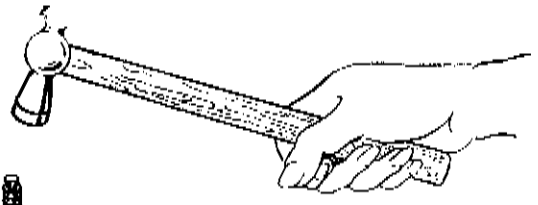


FIG. A35 THE SUSPENSION COLUMN (EXPLODED VIEW)



pinch bolt engages in a notch in the bearing sleeve, and also that the bottom bolts "D" similarly engage in notches in the centre column. Particular attention must be paid to the correct alignment of these notches on reassembly.

REASSEMBLY.

Reassemble all units of the suspension column, except the centre column "F" in the same order in which they were dismantled. Pass Service Tool 61 3222 through the assembly and position the top and bottom slotted plates (Fig. A37). Pass the distance piece down the shaft of the tool on to the top plate, and screw up the nut, at the same time supporting the two plates so that they do not come out of position. The nut must be screwed down until the column with the tool in position can be passed up through the top lug of the frame and the bottom of the tool dropped vertically into the bottom lug.

Now unscrew the nut until the top and bottom slotted plates are in contact with the frame lugs. Pass a tommy bar through the holes in the plates and withdraw them. As the plates come away the column will spring into position.

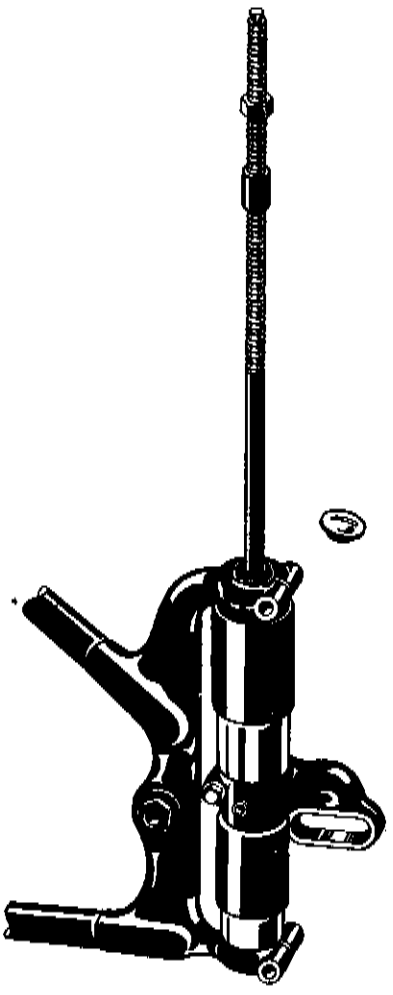


Fig. A36. Removing the centre column with Service Tool 61-3222

Withdraw Service Tool 61 3222 from the top to ensure alignment of the suspension unit with the frame lugs.

Replace the centre column in the reverse order to that for dismantling. Refit and tighten the pinch bolts.

Replace the cap "C" and the silencers.

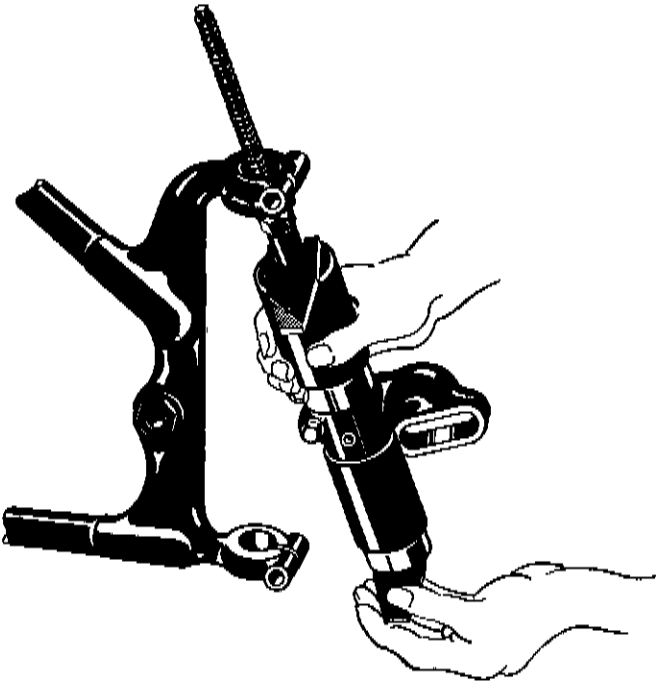


Fig. A37. Using Service Tool 61-3222 for reassembling.

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A GROUP MODELS

(with Swinging Arm Type Frame)

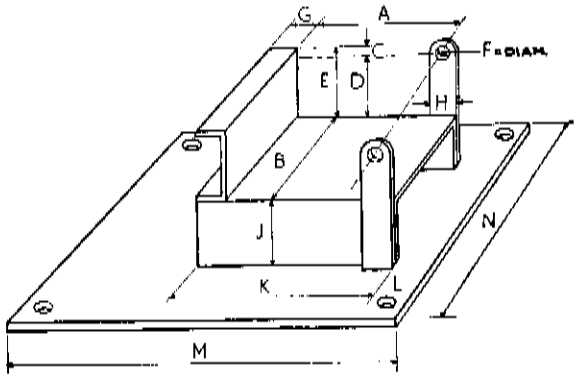
ENGINE REMOVAL AND COMPLETE DISMANTLING

The dismantling procedure will be described from the point reached in Service Sheet No. 204, when the cylinder head and barrel have been removed.

Before commencing to dismantle the engine it will be advantageous to construct a fixture such as that illustrated in Fig. A38.

Drain the oil tank and disconnect the oil pipes. Detach the dynamo leads and the stop button lead from the magneto end cap.

Remove the primary chaincase as described in Service Sheet No. 310 on Primary Transmission.



	Inches	mm.
A	4¾–5	120–125
B	3½	85–90
C	⅜	9
D	1⅝	41
E	2	50
F	7/16 dia.	11.5 ø
G	1	25
H	¾	20
J	2	50
K	6¼ 6½	155 160
L	1	25
M	12	300
N	8	200

Fig. A38 Engine Bench Fixture

Engine Removal.

Remove the studs securing the engine plates to the crankcase, and the studs holding the front engine plates in the frame. Slacken the gearbox bolts and the lower front stud of the rear engine plate as these tend to clamp the rear engine plates on to the crankcase. The engine is now ready to be lifted from the frame.

Dismantling the Engine.

Set the engine up in the bench fixture and undo the twelve timing cover securing screws, noting that the four lowest screws are the longest in the set and the three at the dynamo end of the cover are the shortest

A pan should be placed under the engine to collect the oil which will fall from the timing chest when the cover is removed.

Remove the dynamo securing strap and turn the dynamo in its housing until the chain is slack enough to permit it to be removed from the smaller sprocket. The dynamo can then be removed complete with its sprocket. To remove the larger sprocket, undo the retaining nut after prising back the lockwasher, then with the aid of a soft drift give a light tap on the side of the sprocket. This should free it, but if it does not do so then engine should be rotated slightly so that the punch is applied to another point on the sprocket. This should be repeated until the sprocket is jarred free from its taper.

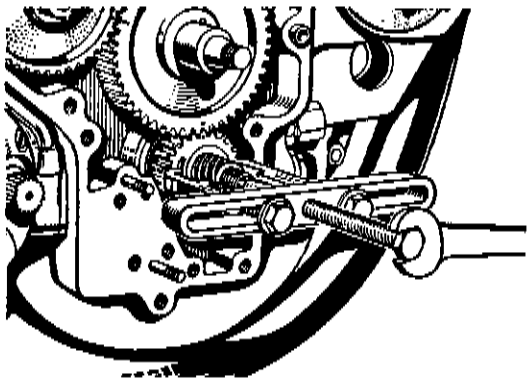


Fig. A39 Timing Pinion Extractor No. 61-3256

Undo the four retaining screws and withdraw the inner timing cover to expose the timing gears. The crankcase breather will probably come away with the inner timing cover, but care should be taken that the thick cork washer which separates it from the camshaft gear is not damaged.

The magneto advance and retard mechanism may now be removed by undoing its central securing nut. The mechanism is self extracting and as the nut is unscrewed the gear will be pulled from its taper.

The camshaft pinion is keyed on and is retained by a nut and lockwasher. Prise back the tab of the washer and remove the nut. With the aid of Service Tool No. 61-3256, draw the pinion off the shaft taking care not to lose the locating key.

The idler pinion with its shaft can now be pulled free with the fingers.

Remove the three securing nuts and washers holding the oil pump in position. Bend back the lockwasher and undo the locknut from the end of the mainshaft, noting that it has a left-hand thread. Remove the washer, then free the hexagon headed worm gear, which also has a left hand thread. Withdraw the oil pump gradually from the studs and at the same time unscrew the worm gear from the mainshaft. It may be advantageous to remove the oil pump studs to prevent them being bent.

Fig. A40 The Oil Pressure Release Valve.

The oil pump should not be dismantled unless it is known to be faulty. If the worm shaft is worn it may be removed by simply removing the circlip and end pad.

The timing gear which is keyed to the crankshaft may now be extracted with the aid of Service Tool No. 61–3256, as shown in Fig. A39. Do not lose the mild steel washer which lies between the timing gear and the worm gear.

Remove the oil pressure release valve from the crankcase to clean and check it (see Service Sheet No. 202).

Three studs, the one underneath having a long nut, secure the magneto to the crankcase. After the nuts have been removed, the magneto can be pulled from its housing.

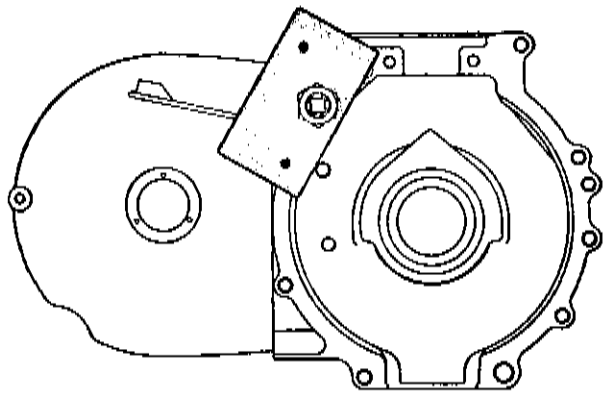


Fig. A41 Withdrawing Blind Camshaft Bush. (Service Tool No. 61-3159).

Remove the sump plate and withdraw the crankcase filter but do not attempt to withdraw the oil return pipe. The four studs should be left in position to protect the projecting part of the pipe.

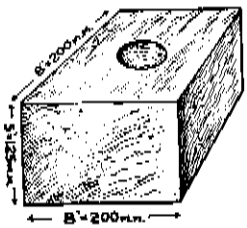


Fig. A42.

Remove the engine from the bench fixture and place it on a wooden block, similar to that illustrated in Fig. A42, drive side downwards. If the crankshaft splined sleeve has not already been removed it should be withdrawn from the shaft. After all the crankcase securing bolts have been removed, separate the crankcase halves by gently tapping the front and rear of the cases with a soft mallet. With the crankcase halves parted, the complete crankshaft and con rod assembly can be detached and laid aside.

Prise the oil seal out of the drive side crankcase. The drive side roller-race and the gearside white metal bearing can then be pressed from their respective halves to the inside if they are in need of attention. It is advisable to warm the crankcase halves in a degreasing plant, or hot water, before attempting to remove the bearings.

Service Tool No. 61-3159 will withdraw the blind camshaft bush from the drive side crankcase (see Fig. A41).

The tappets are carried in the cylinder block and will not normally require attention. To remove them, undo the two setscrews *A* (Fig. A43) and withdraw the inlet tappets *B*. Remove the setscrew *C* and the steel ball which it retains. The locating pin between the two exhaust tappets can then be pushed out from the inside of the barrel and the tappets withdrawn. The inlet and exhaust tappets are not interchangeable.

Withdraw the split pins and unscrew the big end cap retaining nuts. The con rod can then be pulled away from the crankshaft. Mark the con rods and bearings, etc., to ensure that they are replaced in the same position and the same way round.

The flywheel is bolted to the crankshaft and need only be disturbed if a new crankshaft has to be fitted. The plugs at each end of the crankshaft should be removed and the internal oilways cleared of sludge. The inner race of the drive side bearing should not be removed unless a replacement is required, as it may be damaged during removal. Take careful note of the shims fitted behind the bearing and ensure that they are not omitted during re-assembly.

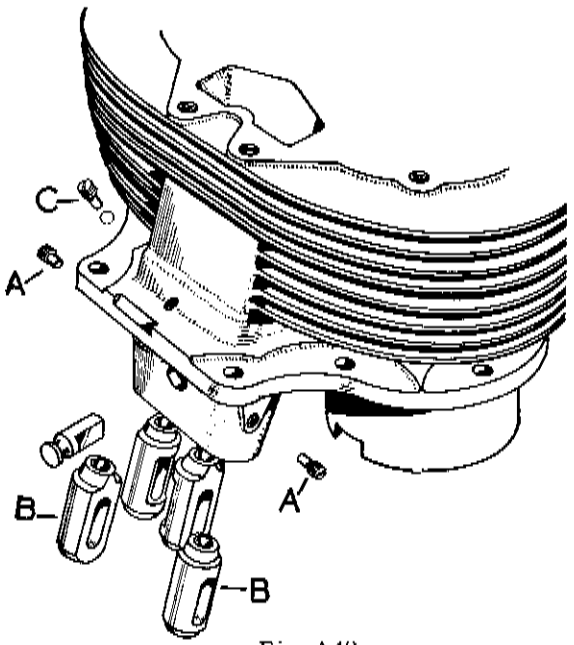


Fig. A43

Dimensions for regrinding the crank-pins, as given in Service Sheet No. 207, must be rigidly adhered to, as the bearing liners are manufactured to match these dimensions.

The return pipe from the sump is cemented into the case and should only be disturbed if it is damaged. This also applies to the non-return ball valve which is retained by a small grub screw near to the crank-shaft main bearing. Check that the internal oilways are clear and if necessary flush out with petrol.

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(Printed in England)

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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.

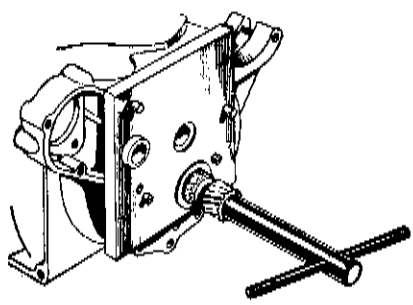

Fig. A42 Reaming Jig.

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 will be noticed that each half has a small central drill hole. Originally, only one drilled liner was used. The left-hand con-rod has a bleed hole to supplement the lubrication of the cylinder bore. This should be positioned so that the hole faces the flywheel.

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 8½lbs. ft. should be used for tightening these nuts to ensure that they are not over-tightened.

NOTE. On and after the following engine numbers, the torque spanner setting must be 22lbs.

BA10-13830 CA10-7998 CA10R 2006 CA7 2686 CA7SS 2256

The maximum crankshaft end float should be .003in. 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.

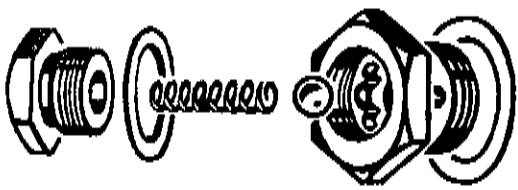

Fig. A43.

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.

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).

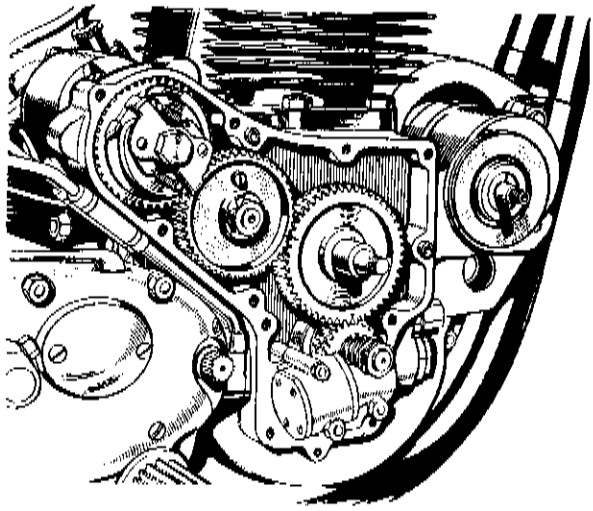

Fig. A44 Valve Timing.

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).

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.

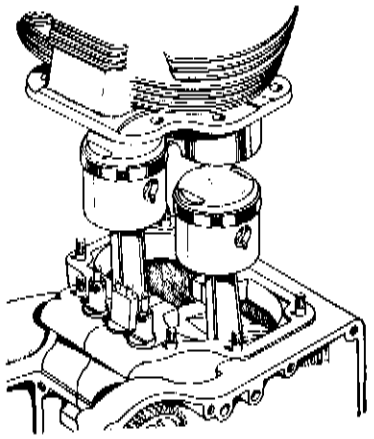

Fig. A45 Replacing the Cylinder Block.

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-

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.

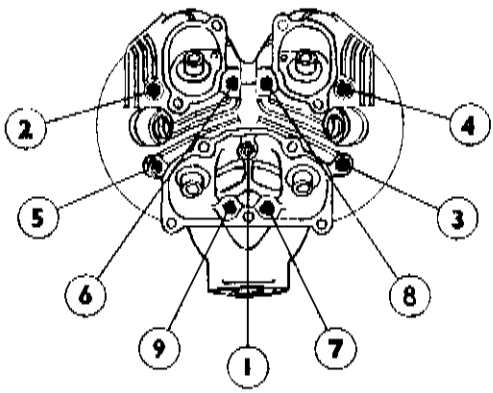

Fig. A46 Cylinder Head Bolts

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.

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

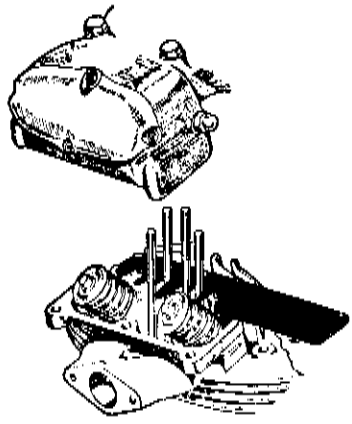

Fig. A47 Push Rod Assembly Tool

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.

B.S.A. MOTOR CYCLES LTD., Service Dept., Waverley Works, Birmingham, 10.
(Printed In England)

BSA SERVICE SHEET No. 216

October, 1956
Revised April, 1960

A Group (Swinging Arm Frame)

USEFUL DATA

Model	A7	A7 Shooting Star	A10	A10 Road Rocket and Super Rocket
Engine Stroke	72.6 mm.	72.6 mm.	84 mm.	84 mm.
Engine Bore	66 mm.	66 mm.	70 mm.	70 mm.
Engine Capacity	497 mm.	497 mm.	646 mm.	646 mm.
Petrol Tank Capacity	2 or 4 galls.	2 or 4 galls.	2 or 4 galls.	2 or 4 galls.
Oil Tank Capacity	5½ pints	5½ pints	5½ pints	5½ pints
Gearbox Capacity	1 pint	1 pint	1 pint	1 pint
Gearbox Capacity (after 1956)				
fluid ozs. and c.c.	14–(400)	14–(400)	14–(400)	14–(400)
Front Fork Capacity (each leg)	7⅛ fl. ozs.	7½ fl. ozs.	7½ fl. ozs.	7½ fl. ozs.
	(213 c.c.)	(213 c.c.)	(213 c.c.)	(213 c.c.)
Chaincase Capacity	8 fl. ozs.	8 fl. ozs.	8 fl. ozs.	8 fl. ozs.
	(225 c.c.)	(225 c.c.)	(225 c.c.)	(225 c.c.)
	Note:—½ pint = 5 fluid ozs. = 8 tablespoons.			
Tappet Clearance (engine cold)	(See note below)			
Inlet	.010 in.	.008 in.	.010 in.	.008 in.
Exhaust	.016 in.	.012 in.	.016 in.	.008 in.
Piston Ring Gap (compression)	.013 in.	.013 in.	.013 in.	.013 in.
Piston Ring Gap (oil control)	.011 in.	.011 in.	.011 in.	.011 in.
Piston Ring Side Clearance	.002 in.	.002 in.	.002 in.	.002 in.
Piston Clearance (split skirt)	.0011/.0031 in.	.0011/.0031 in.	.0011/.0031 in.	.0011/.0031 in.
Piston Clearance (solid skirt)	.002/.004 in.	.0035/.005 in.	.0035/.005 in.	.004/.0055 in.
Ignition Advance before T.D.C.	1/16 in.	⅜ in.	11/32 in.	⅜ in.
Ignition Advance (For machines with	frame No. prefixed 'G.A.')			
	1/16 in.	⅜ in.	11/32 in.	11/32 in.
Contact Breaker Gap	.012 in.	.012 in.	.012 in.	.012 in.
Compression Ratio	6.6—1	7.25—1	6.5—1	8.0—1
Compression Ratio (after 1957)	6.6—1	8.0—1	7.25—1	8.26—1 S/R.
Compression Ratio (after 1959)	7.25—1	8.0—1	7.25—1	8.26—1 S/R.
Sparking Plug (Champion)	L.7	N.3	L.7	N.3
Sparking Plug Gap	.018/.020 in.	.018/.020 in.	.018/.020 in.	.018/.020 in.
Valve Timing—Inlet				
Opens before T.D.C.	30°	42°	30°	42°
Closes after B.D.C.	70°	62°	70°	62°
Valve Timing—Exhaust				
Opens before B.D.C.	65°	67°	65°	67°
Closes after T.D.C.	25°	37°	25°	37°

Note:—After Engine Nos. CA7—5232 and DA10—1647, the valve timing for the A7 and A10 is the same as the Shooting Star and Rocket machines. Tappet clearances for quiet running should be .008 in. inlet; .010 in. exhaust, but for maximum power .010 in. inlet and .016 in. exhaust.

Model	A7		A7 Shooting Star		A10		A10 Road Rocket and Super Rocket	
Carburetter (up to 1959)	Std.	Mono.	Std.	Mono.	Std.	Mono.	R/R 10TT9	S/R Mono.
Bore	1 1/8	1 1/8	1	1	1 1/16	1 1/16	1 1/16	1 1/16
Main Jet	140	210	160	270	170	240	360	250
Throttle Valve	6/4	376/3½	6/4	376/3½	6/4	376/3½	6	376/3½
Needle Position	4	2	3	3	2	3	4	3
Needle Jet	.107	.1065	.107	.1065	.107	.1065	9	.1065
Carburetter (1960)								
Bore	—	1 1/8	—	1	—	1 1/8	1 5/32	1 5/32
Main Jet	—	210	—	270	—	250	410	420
Throttle Valve	—	376/3½	—	376/3½	—	389/3½	7	389/3
Needle Position	—	2	—	3	—	3	4	2
Needle Jet	—	.1065	—	.1065	—	.106	.109	.106
Gear Ratios								
Top	5.28		5.28		4.52		4.52	
3rd	6.38		6.38		5.47		5.47	
2nd	9.28		9.28		7.95		7.95	
1st	13.62		13.62		11.67		11.67	
Rear Chainwheel. No. of Teeth ..	42		42		42		42	
Engine Sprocket. No. of Teeth ..	Solo 18 S/C 18		Solo 18 S/C 18		Solo 21 S/C 18		21	
Clutch Sprocket. No. of Teeth ..	43		43		43		43	
Gearbox Sprocket. No. of Teeth ..	Solo 19 S/C 17		Solo 19 S/C 17		Solo 19 S/C 19		19	
Front Chain, ½ × .305 in.	Solo 67 S/C 67		Solo 67 S/C 67		Solo 69 S/C 67		69	
Rear Chain, ⅜ × ⅜ in.	Solo 98 S/C 97		Solo 98 S/C 97		Solo 97 S/C 98		97	
Tyres : front	3.25 × 19		3.25 × 19		3.25 × 19		3.25 × 19	
rear	3.50 × 19		3.50 × 19		3.50 × 19		3.50 × 19	
Tyre Pressures (Solo): front	17 lbs. p.s.i.		17 lbs. p.s.i.		17 lbs. p.s.i.		17 lbs. p.s.i.	
rear	19 lbs. p.s.i.		19 lbs. p.s.i.		20 lbs. p.s.i.		19 lbs. p.s.i.	
Total Front Fork Movement	5¾ in.		5¾ in.		5¾ in.		5¾ in.	
Rear Suspension Movement	4 in.		4 in.		4 in.		4 in.	
Brake Dimensions: front (in.)	8 × 1⅜		8 × 1⅜		8 × 1⅜		8 × 1⅜	
1954 and 1955 rear (in.)	7 × 1¼		7 × 1¼		7 × 1¼		7 × 1¼	
Brake Dimensions: front (in.)	7 × 1¼		7 × 1¼		7 × 1¼		7 × 1¼	
1956 and 1957 rear (in.)	7 × 1¼		7 × 1¼		7 × 1¼		7 × 1¼	
Brake Dimensions: front (in.)	7 × 1⅜		7 × 1⅜		7 × 1⅜		7 × 1¼	
1958 to 1960 rear (in.)	7 × 1¼		7 × 1¼		7 × 1¼		7 × 1¼	