BSA

SERVICE SHEETS

500 OHV Twin
650 OHV Twin

A group models

except Swinging Arm

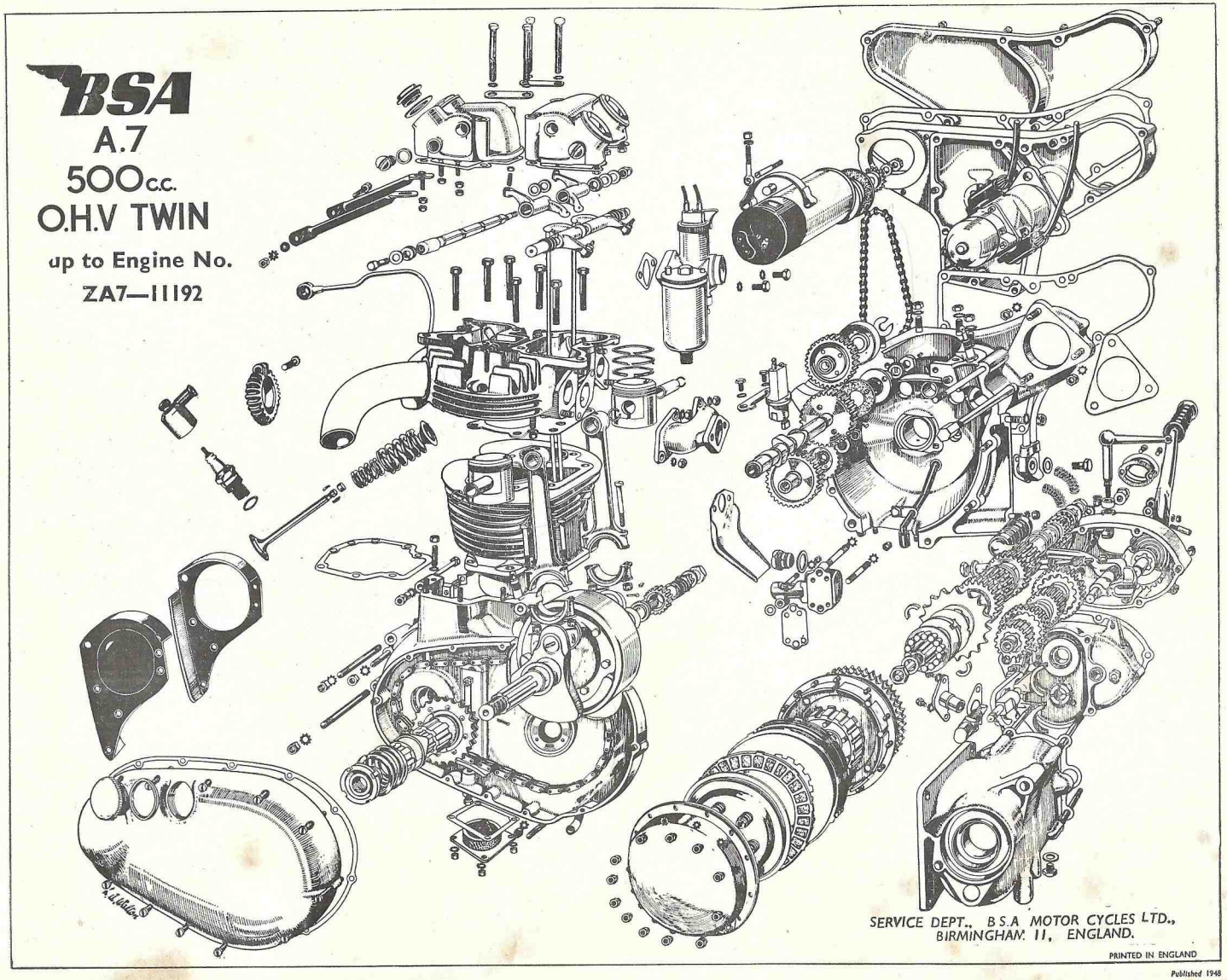


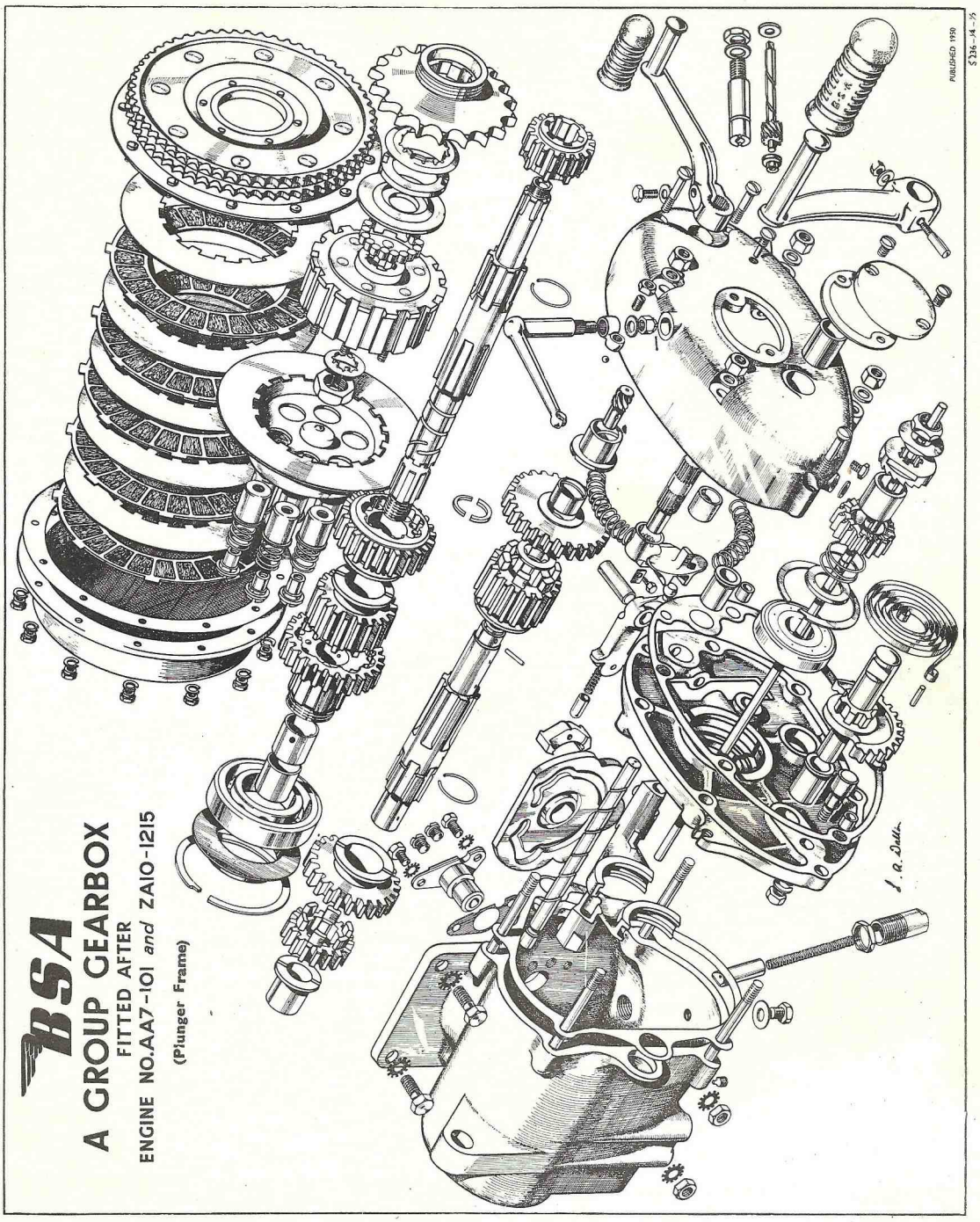
Fig. A1. The A7 Engine and Gearbox (Exploded View)

BSA SERVICE SHEET No. 201

Reprinted August, 1957

BSA SERVICE SHEET No. 201B

Reprinted Jan. 1958.



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

BSA SERVICE SHEET No. 202

"A" Group Models

Reprinted Jan. 1958.

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.

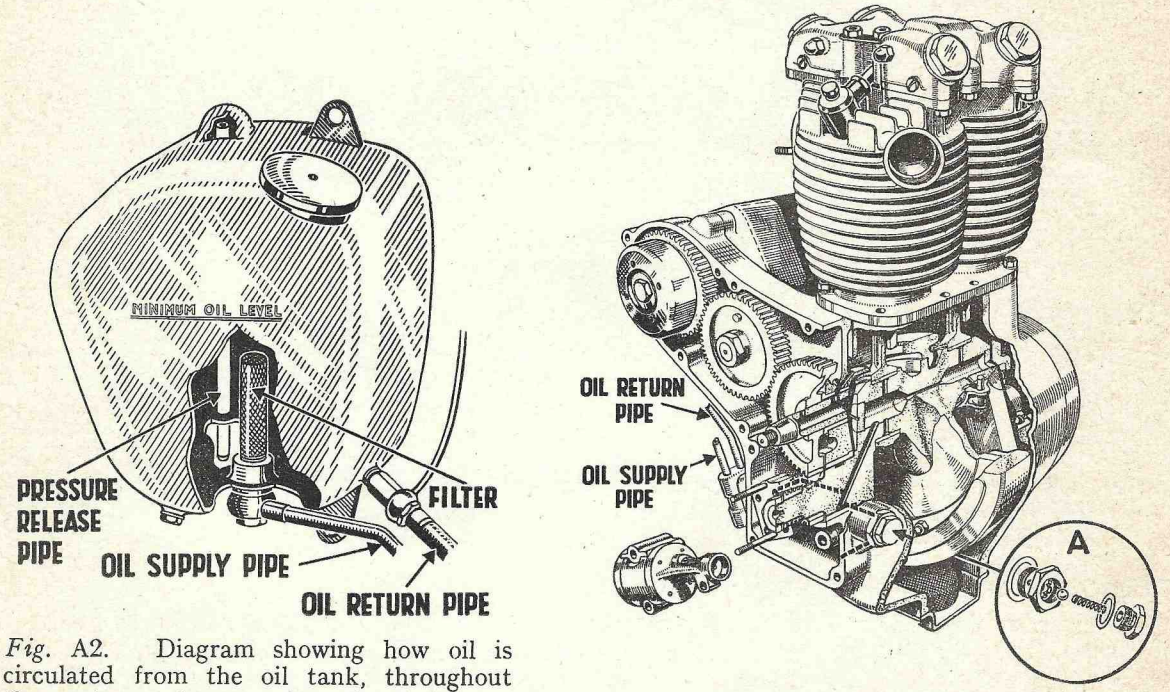


Fig. A2. Diagram showing how oil is circulated from the oil tank, throughout the engine, and returned to the tank.

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.

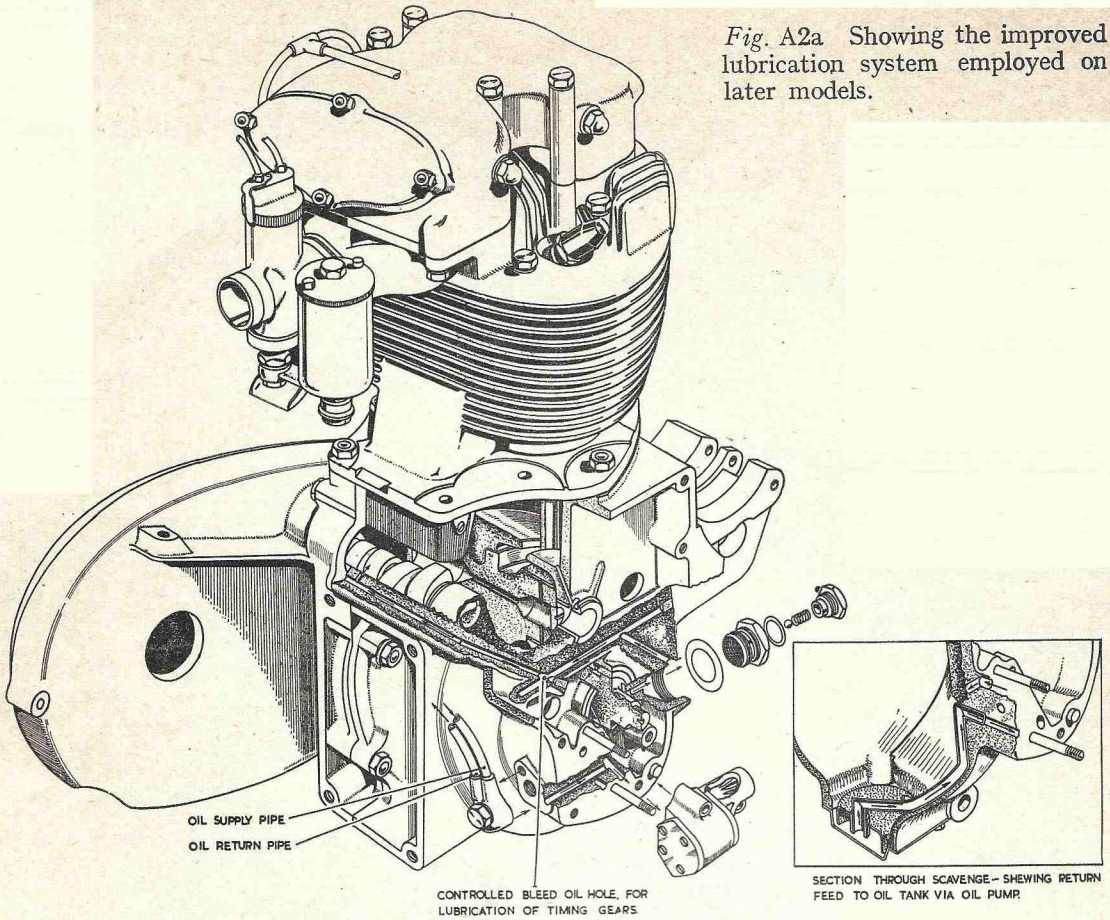


Fig. A2a Showing the improved lubrication system employed on later models.

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.

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

BSA SERVICE SHEET No. 203

Reprinted Jan., 1958

A Group Models

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.

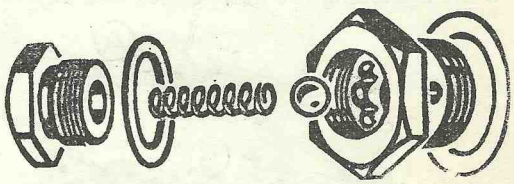


Fig. A3. The Pressure Release Valve (exploded view).

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.

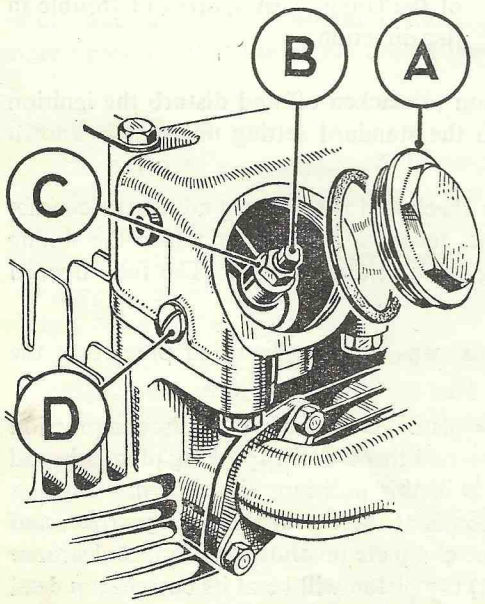


Fig. A4. Tappet Adjustment.

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.	.010 in.
A10 Super Flash	.008 in.	.010 in.
A7 Shooting Star	.008 in.	.012 in.
A10 Road Rocket	.008 in.	.008 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.

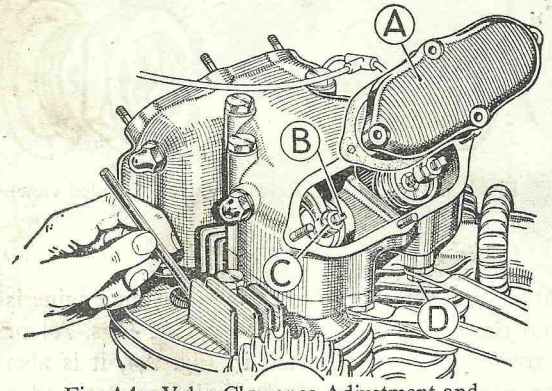


Fig. A4a. Valve Clearance Adjustment and Ignition Setting.

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	$\frac{5}{16}$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

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.)

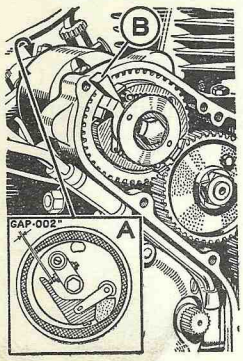


Fig. A5. The Contact Breaker Mechanism.

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

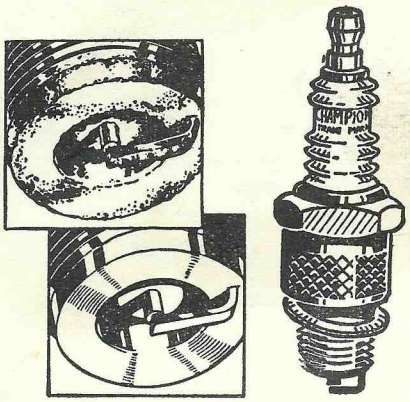


Fig. A.6. The Sparking Plug.

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.

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 11
Printed in England.

U/B1283

BSA SERVICE SHEET No. 204

October, 1948
Revised June, 1950
Reprinted January, 1958

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.

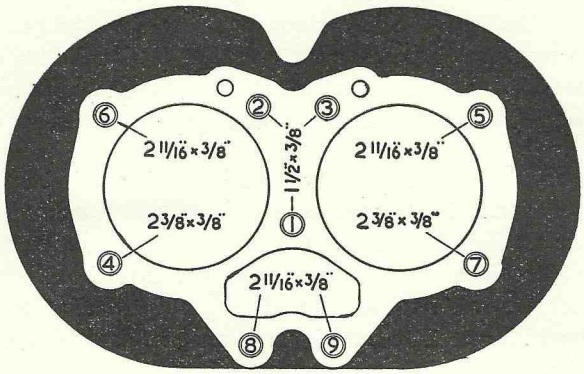


Fig. A6a.

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. 61-3264. 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.)

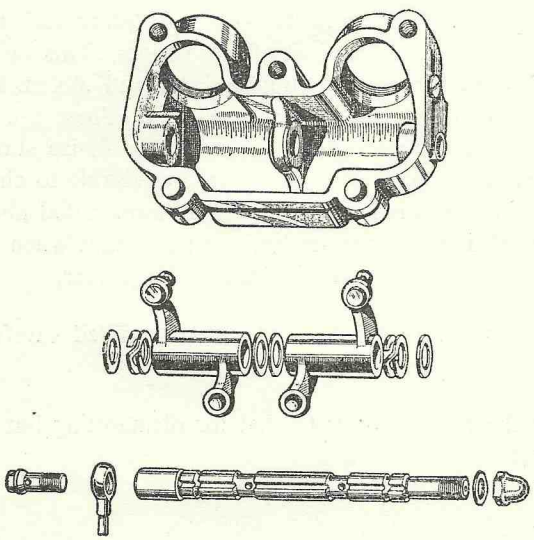
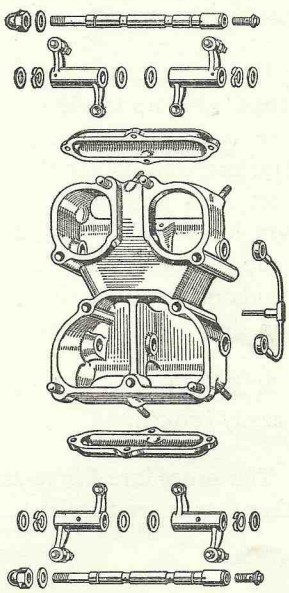


Fig. A.7. The Rocker Assembly Model A7.



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.

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 11
Printed in England.

U/B1283

BSA SERVICE SHEET No. 205

A Group Models

(Rigid and Plunger Type Frames)

October, 1948
Reprinted July, 1956

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.

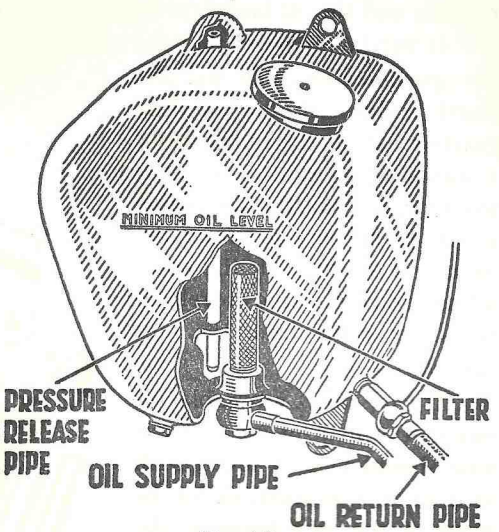


Fig. A8.

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.

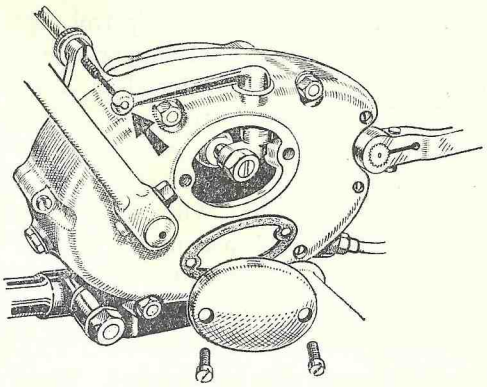


Fig. A9.

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.

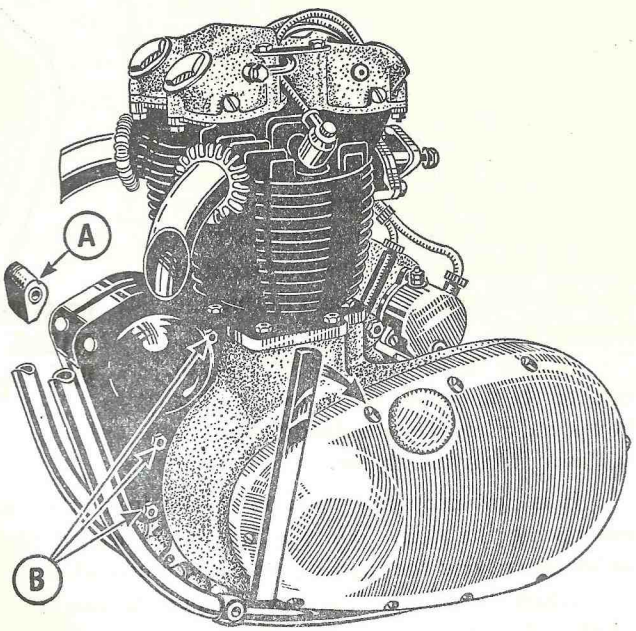


Fig. A10.

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

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 11
Printed in England.

U/A752

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.

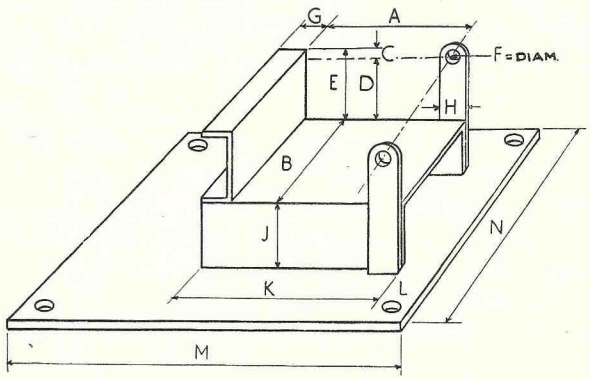


Fig. A11. Engine Bench Fixture.

	Inches.	mm.
A	$4\frac{3}{4}$–5	120–125
B	$3\frac{1}{2}$	85–90
C	$\frac{3}{8}$	9
D	$1\frac{5}{8}$	41
E	2	50
F	$\frac{7}{16}$ dia.	11.5 ⌀
G	1	25
H	$\frac{3}{4}$	20
J	2	50
K	$6\frac{1}{4}$–$6\frac{1}{2}$	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 $\frac{1}{8}$in. 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.

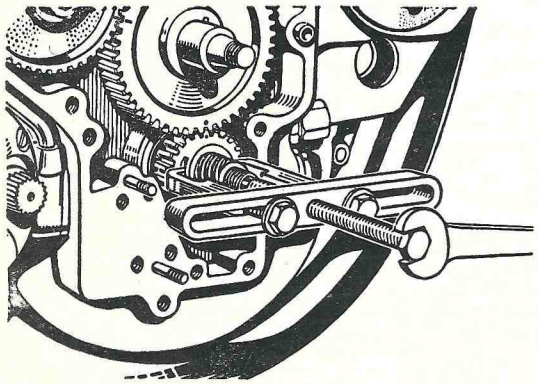


Fig. A12. Timing Pinion Extractor No. 61–3256.

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 crankshaft. 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.

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

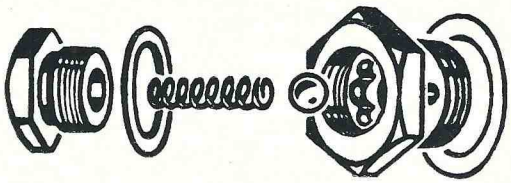


Fig. A13 The Oil Pressure Release Valve.

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

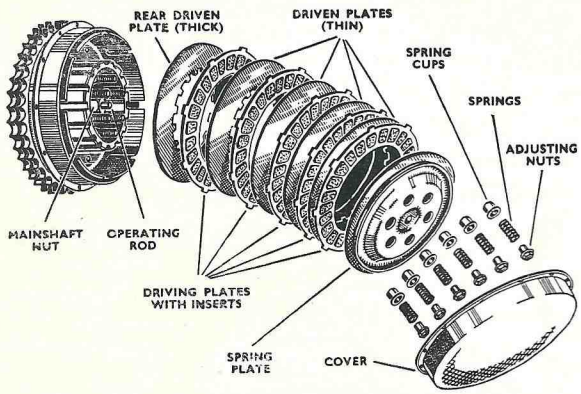


Fig. A14.

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).

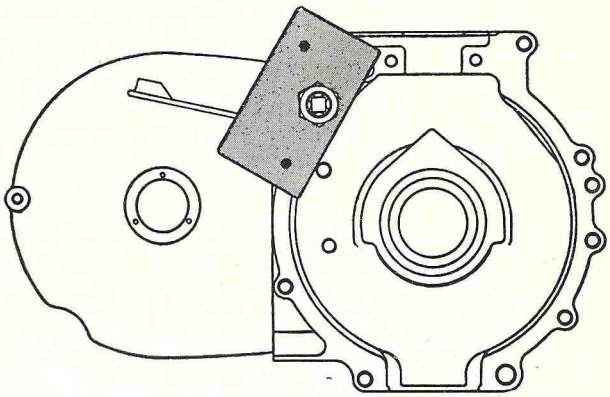


Fig. A15. Withdrawing blind camshaft bush (Service Tool No. 61–3159)

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.

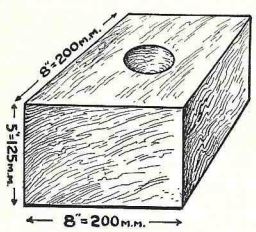


Fig. A15(a).

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.

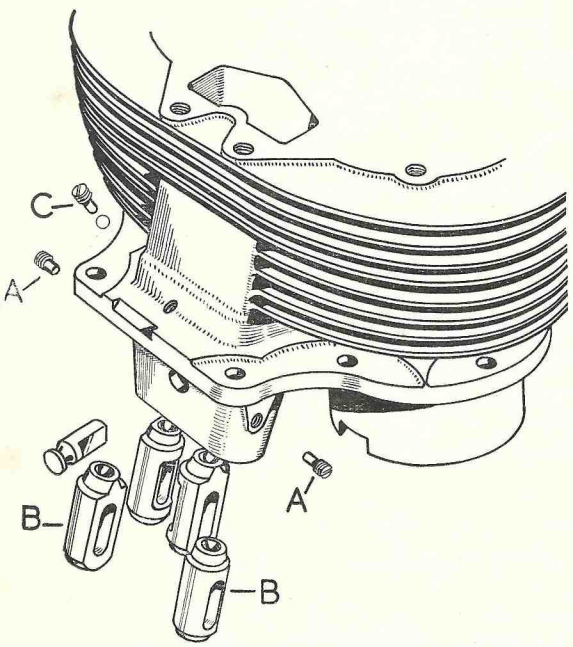


Fig. A15(b).

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. A*16, *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.
(PRINTED IN ENGLAND)

BSA SERVICE SHEET No. 207

"A" Group Models

October, 1948.
Revised January, 1958.

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.

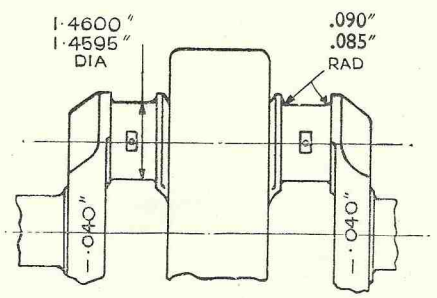
The following tables give diamensions of reground bearings, for both crankshafts, together with the part numbers of undersize shells and bushes. **These numbers must be quoted when ordering.**

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:—



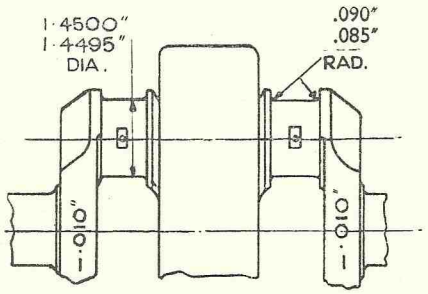
(P.T.O.)

Engine Nos. XA7-601 upwards and A10 Models.

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

FIRST REGRIND.

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



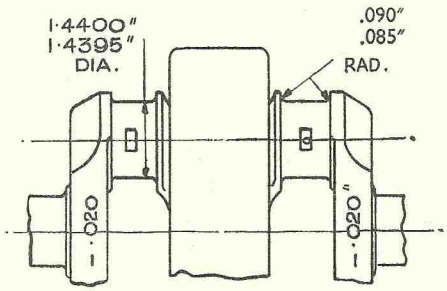
Mark crankshaft web face as shown.

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

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

SECOND REGRIND.

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

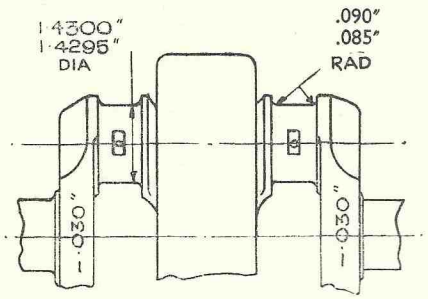


Mark crankshaft webs as shown.

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

THIRD REGRIND.

Grind the crankpins "A" to 1.4300"/1.4295" diameter with .090"/.085" face radius at "B." Fit bearing shell 67–246 (4 off) marked .030" undersized.

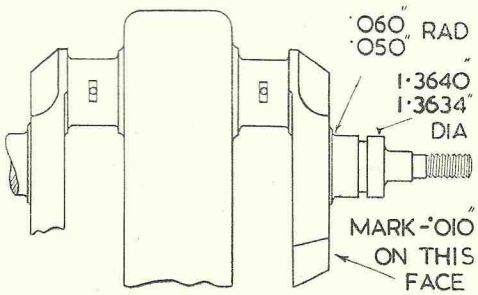


Mark crankshaft webs as shown.

Grind the crankpins "A" to 1.657"/1.6565" diameter with .120"/.115" face radius at "B." 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 CYCLE LIMITED, Service Dept., Birmingham, 11.
(PRINTED IN ENGLAND)

BSA SERVICE SHEET No. 208

October, 1948
Revised August, 1957

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.

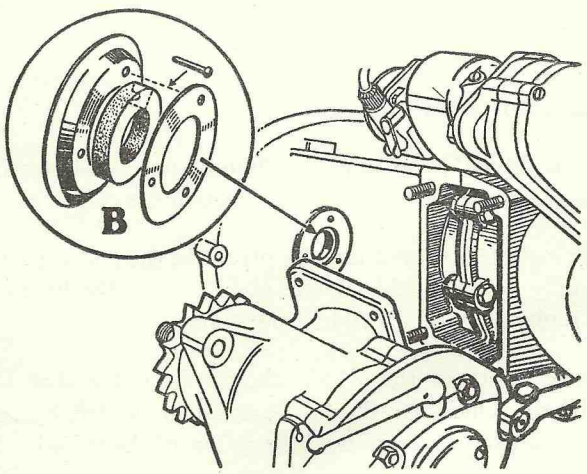


Fig. A.16.

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.

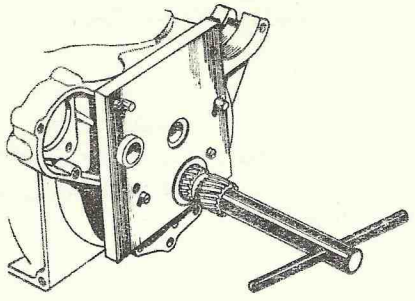


Fig. A.17. The Reaming Jig. Service Tool 61-3275 for A7, 61-3281 for A10 and A7 after eng. AA7-101.

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.

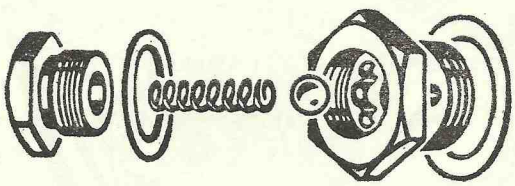


Fig. A.19.

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 screw driver 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.

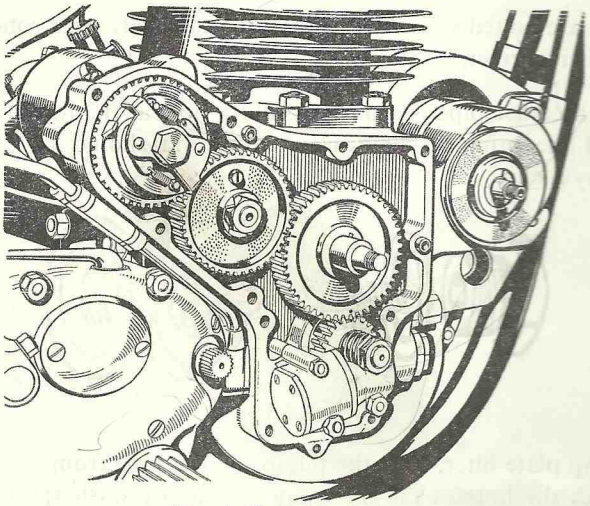


Fig. A.20. Valve Timing.

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.

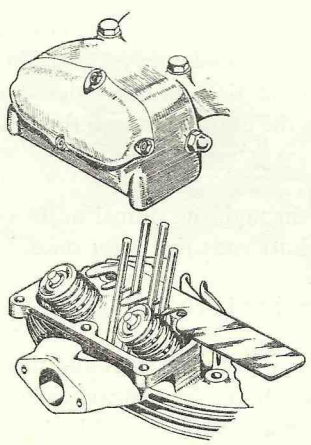


Fig. A.21 Push Rod Assembly Tool

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.

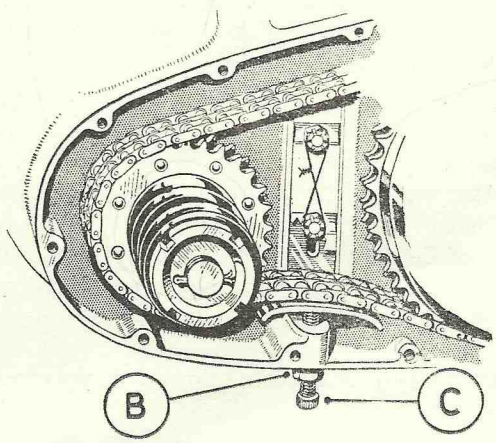


Fig. A.22.

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).

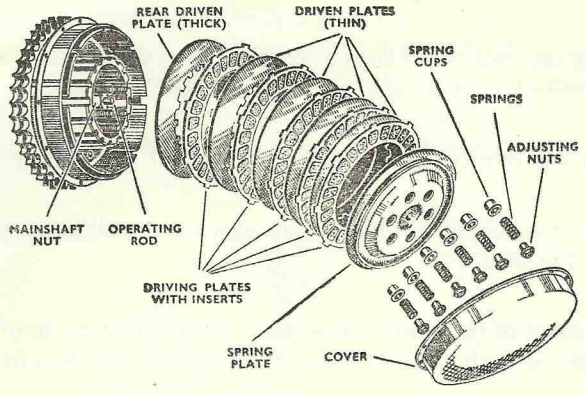


Fig. A.23 The Clutch (Exploded View)

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.

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 11
Printed in England.

BSA SERVICE SHEET No. 209

Reprinted January, 1958

C Group, 4 Speed (1951-55) & 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.

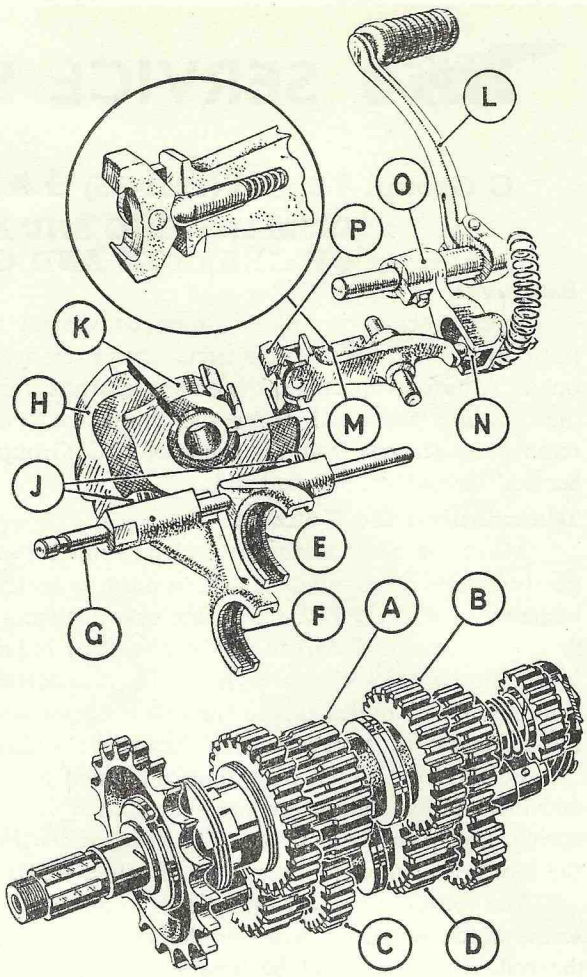


Fig. A24.

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.

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham. 11
Printed in England.

B1280

BSA SERVICE SHEET No. 210

October, 1948
Reprinted Aug., 1958

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.

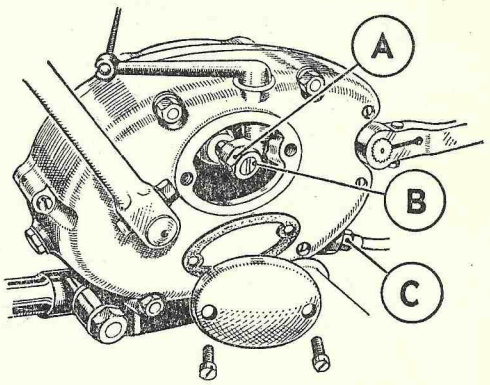


Fig. A25. Clutch control adjustment.

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.

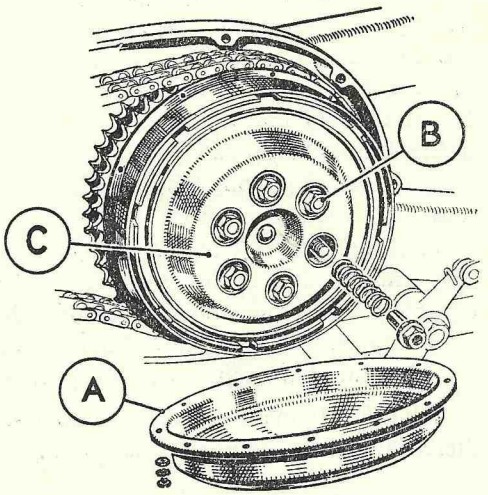


Fig. A26. Clutch spring adjustment.

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.

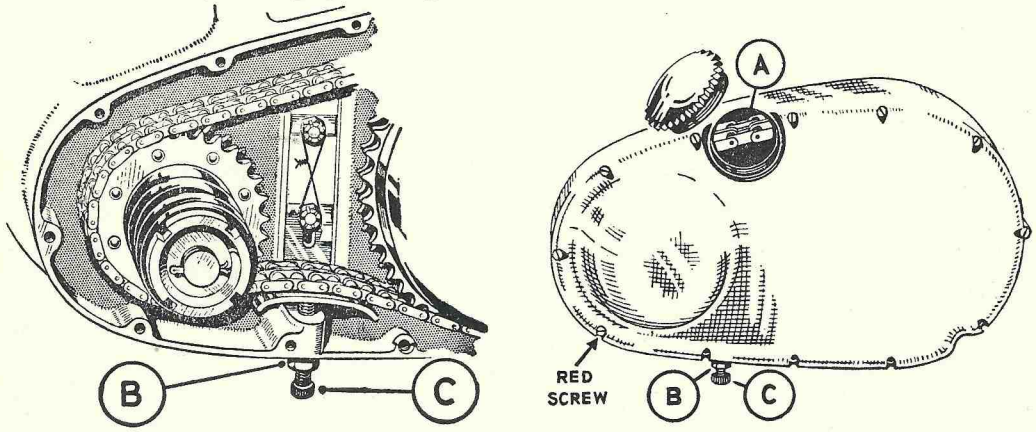


Fig. A27.

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.

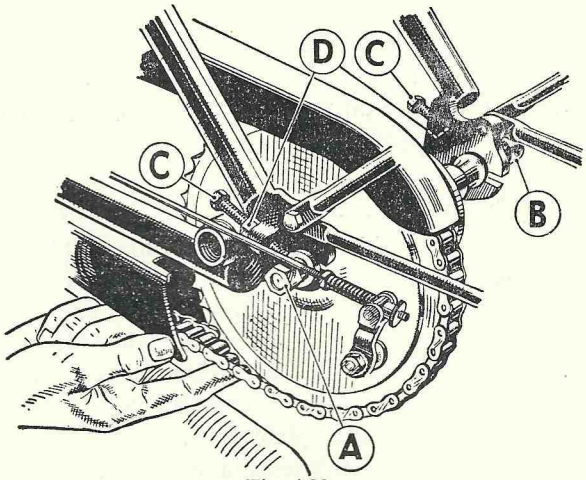


Fig. A29.

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.

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 11
Printed in England.

U/B2179

BSA SERVICE SHEET No. 211

October, 1948
Reprinted, Oct., 1955

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.

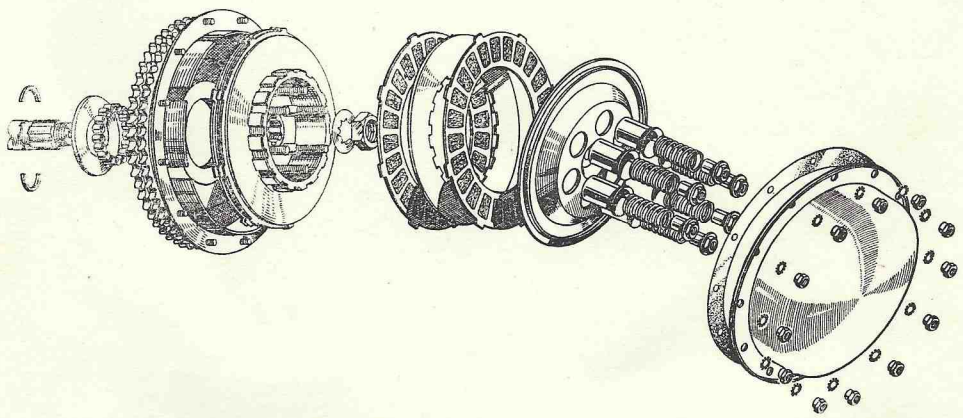


Fig. A30. Exploded view of clutch.

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.

U/804

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 11
Printed in England.

BSA SERVICE SHEET No. 212

A Group Models
before Engine No. ZA7-101

Oct., 1948
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.

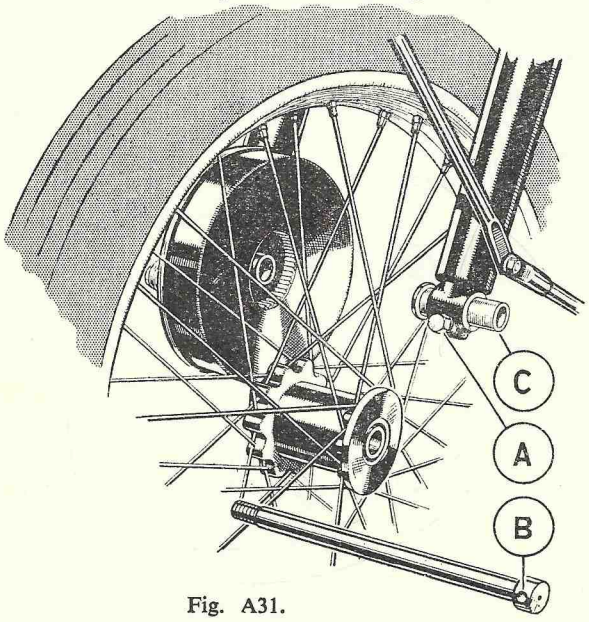


Fig. A31.

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.

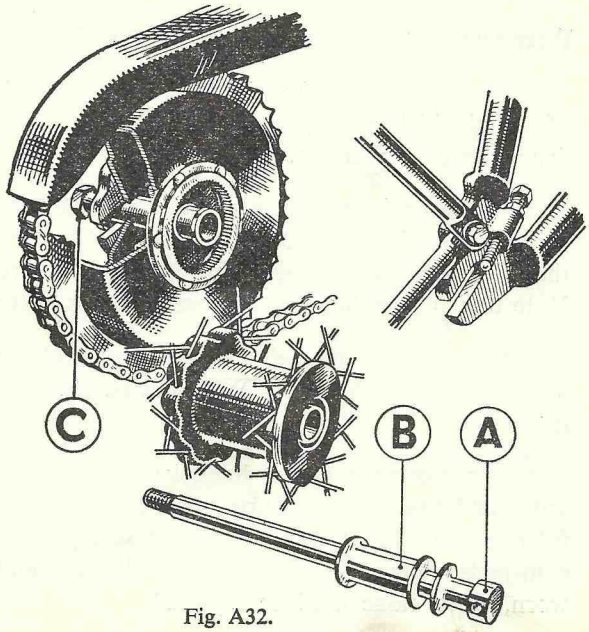


Fig. A32.

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.

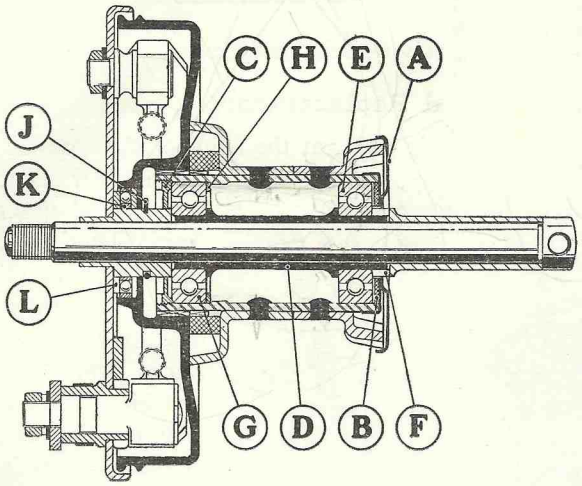


Fig. A33. Section through the front hub.

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.

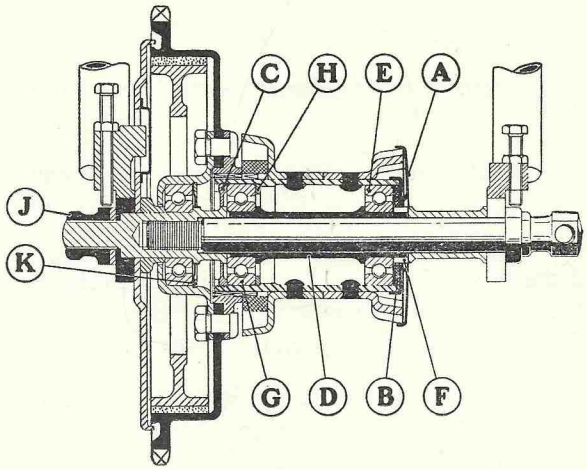


Fig. A34. Section through the rear hub.

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

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham 11
Printed in England.

BSA SERVICE SHEET No. 212A

May 1954
Reprinted Jan. 1958

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.

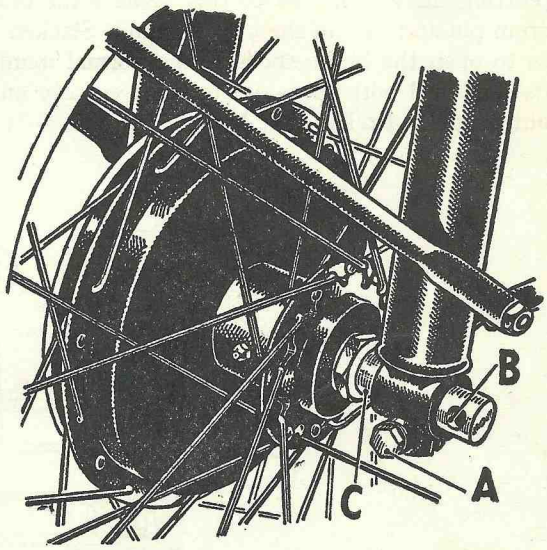


Fig. A31(a). Wheel Removal

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.

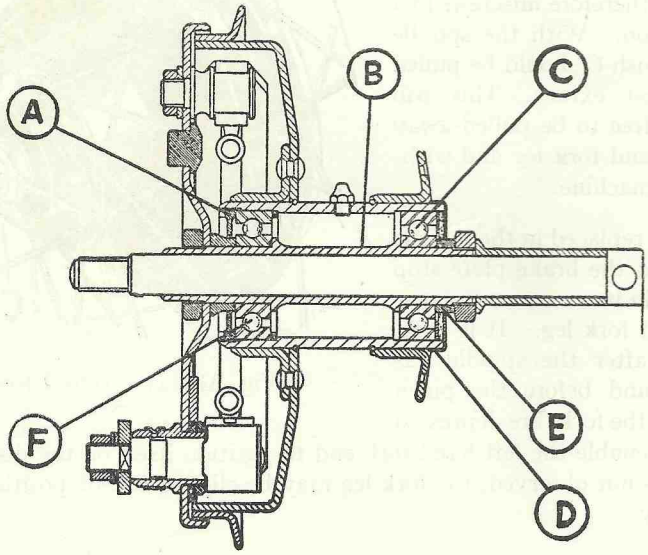


Fig. A32(a). Section of Front Hub (7 in. Brake)

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham 11
Printed in England.

BSA SERVICE SHEET No. 212B

Reprinted December 1958

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.

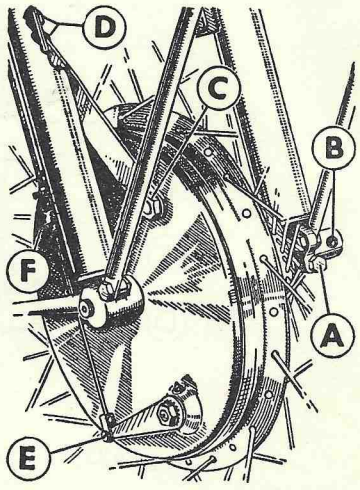


Fig. A31(b). Wheel Removal

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.

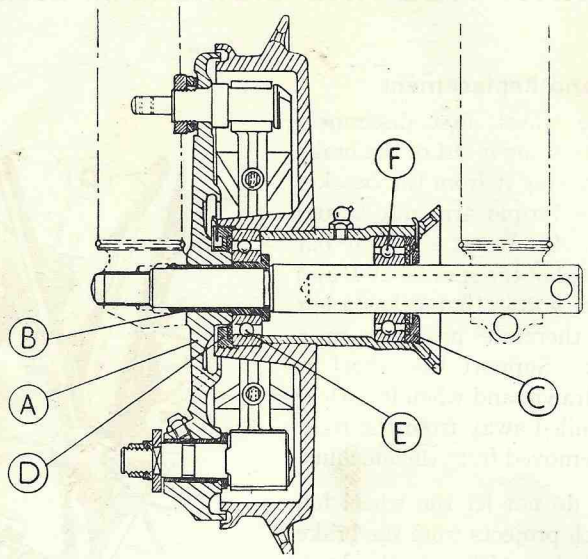


Fig. A32(b). Section of Front Hub (8 in. Brake)

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham 11
Printed in England.

BSA SERVICE SHEET No. 212C

Reprinted June 1959

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.

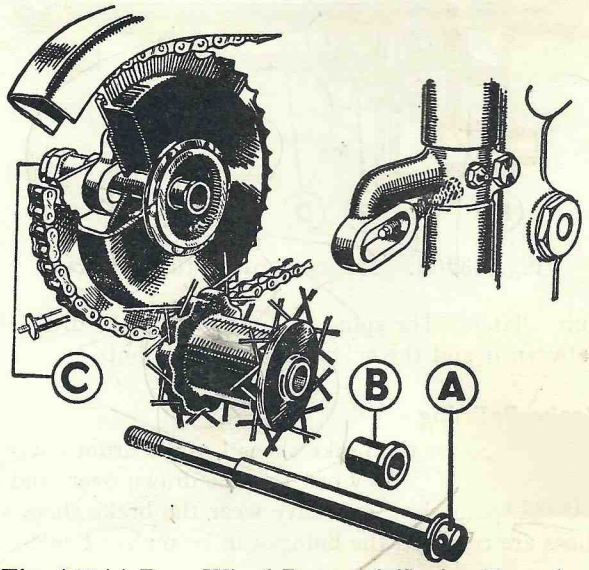


Fig. A31(c) Rear Wheel Removal (Spring Frame)

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.

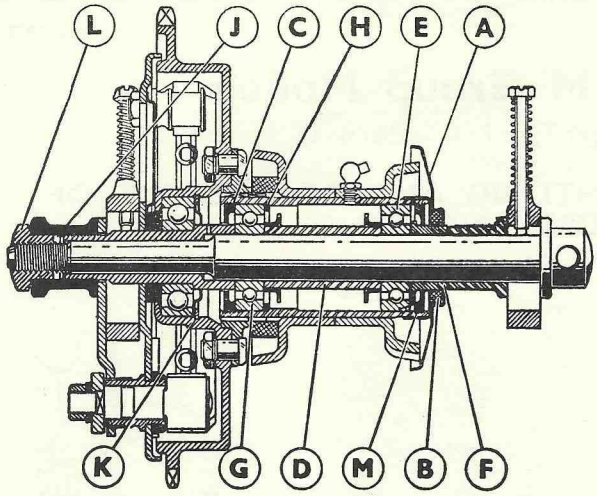


Fig. A32(c). Section through the Rear Hub

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.

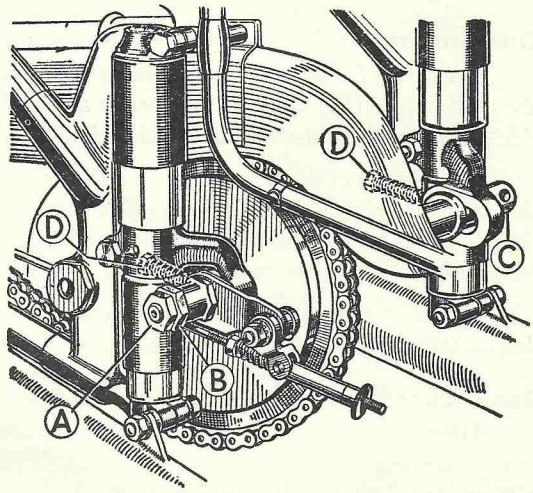


Fig. A33(c). Rear Chain Adjustment

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

B.W.

BSA SERVICE SHEET No. 212D

May 1954
Reprinted Aug. 1958

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.

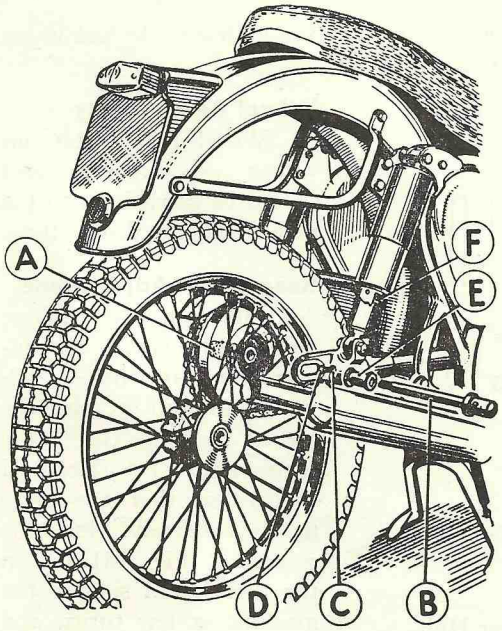


Fig. A31(d). Rear Wheel Removal

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**.

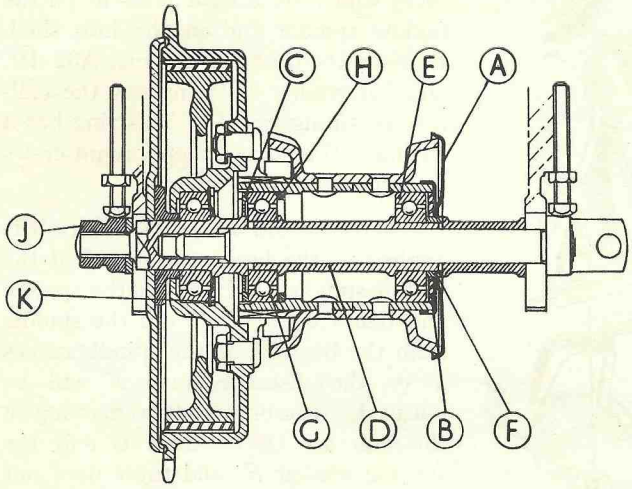


Fig. A32(d). Section through the Rear Hub

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 $1\frac{1}{4}$ 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.

B.S.A. MOTOR CYCLES LTD
Service Dept., Birmingham 11
Printed in England.

B.W.

BSA SERVICE SHEET No. 213

Reprinted August, 1958.

"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

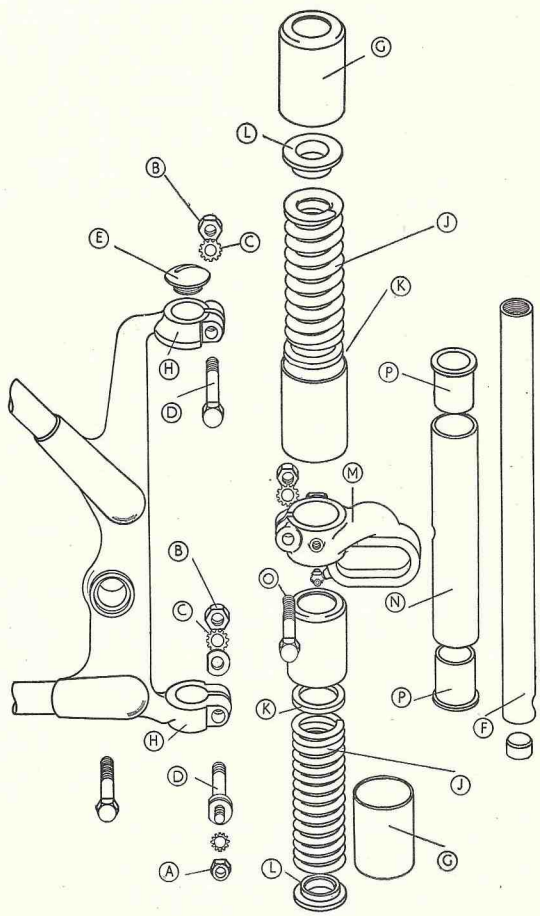
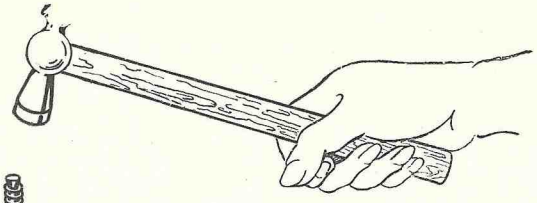


FIG. A35. THE SUSPENSION COLUMN (EXPLODED VIEW)



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.

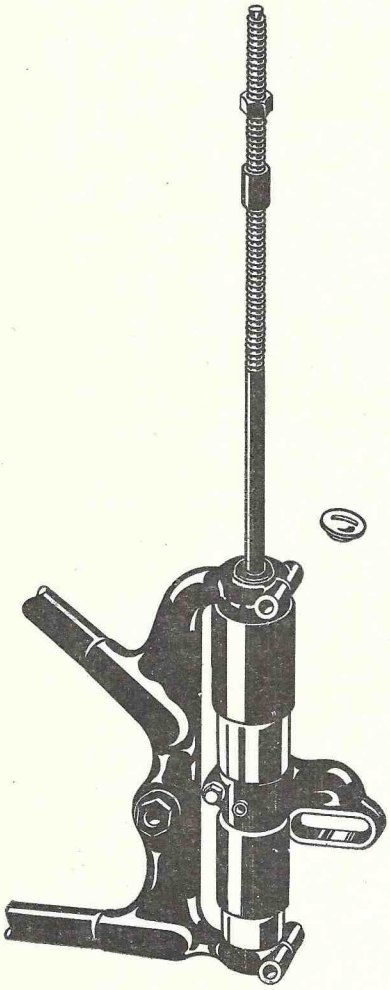


Fig. A36. Removing the centre column with Service Tool 61–3222

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.

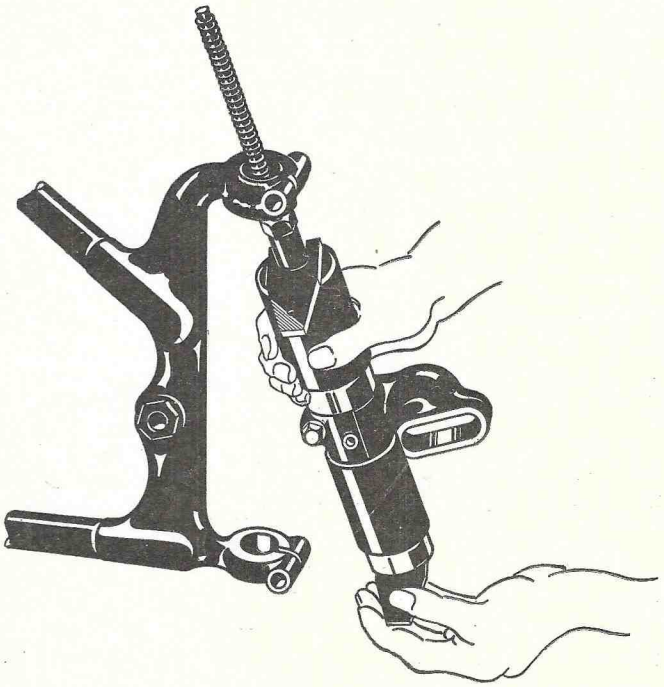


Fig. A37. Using Service Tool 61–3222 for reassembling.

BSA SERVICE SHEET No. 612

Reprinted December 1958

All Models

BRAKE RELINING

Brake Shoe Removal and Replacement

After the brake plate has been removed from the wheel, the brake cam lever A (Fig. M40) should be detached and the cam spindle B pushed in slightly to allow the shoes to clear the brake plate. Insert a screwdriver between the brake shoes at the fulcrum pin C and twist the screwdriver.

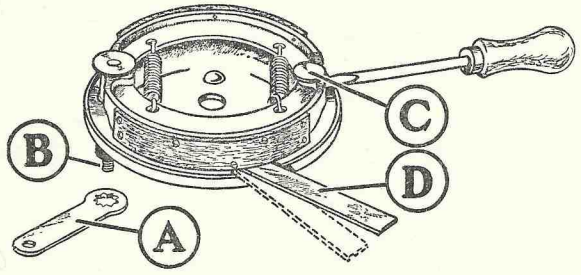


Fig. M40. Removing the Brake Shoes

Place a small lever D between one of the shoes and the cover plate and lever the shoe away from the cover plate until the spring pressure is released. Both shoes can then be lifted from the brake plate.

The shoes can be replaced by the reverse procedure. Hook the springs on to the shoes and place the ends of the shoes in position on the fulcrum pin and cam lever. Then push the shoes outwards until the springs pull them into their correct position.

NOTE: The brake shoe springs are quite strong and care should be taken that the fingers are not trapped by the brake shoes during these operations.

Brake Shoe Relining

With the shoes removed the linings can best be removed by drilling away the heads of the rivets and punching the shanks out to the inside of the shoe with a suitable drift.

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 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 the 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. (See Fig. M41.) 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 Service Sheet on Hubs and Brakes.

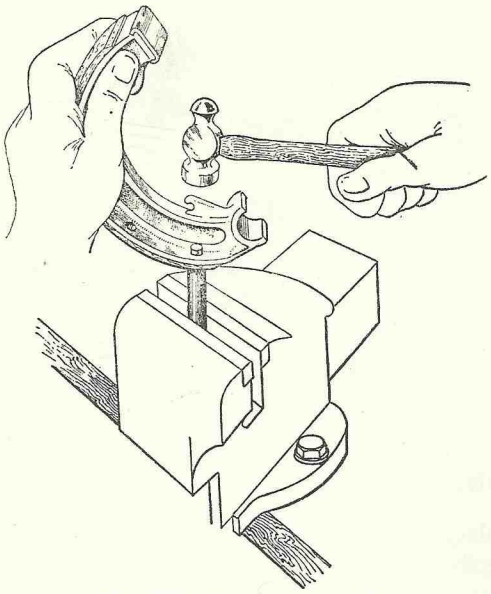


Fig. M41. Riveting the Linings

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham 11
Printed in England.

BSA SERVICE SHEET No. 701

Revised September 1958

ALL MODELS — USEFUL DATA

Model	C10	C11	B31	B32	B33	B34	M20
Engine bore	63mm.	63mm.	71mm.	71mm.	85mm.	85mm.	82mm.
Engine stroke	80mm.	80mm.	88mm.	88mm.	88mm.	88mm.	94mm.
Engine capacity	249c.c.	249c.c.	348c.c.	348c.c.	499c.c.	499c.c.	496c.c.
Petrol tank capacity	2½ galls.	2½ galls.	3 galls.	3 galls.	3 galls.	3 galls.	3 galls.
Oil tank capacity	4 pints	4 pints	4 pints	4 pints	4 pints	4 pints	5 pints
Gearbox capacity	*½ pint	*½ pint	1 pint	1 pint	1 pint	1 pint	1 pint
Tappet clearance (cold):							
Inlet	.004″	.003″	.003″	.003″	.003″	.003″	.010″
Exhaust	.006″	.003″	.003″	.003″	.003″	.003″	.012″
Tyres (front)	3.00×19	3.00×20†	3.25×19	2.75×21	3.25×19	2.75×21	3.25×19
Tyres (rear)	3.00×19	3.00×20†	3.25×19	4.00×19	3.25×19	4.00×19	3.25×19
Piston ring gap (plain)	.010″	.010″	.010″	.010″	.010″	.010″	.010″
Piston ring gap (oil control)	.010″	.010″	.010″	.010″	.010″	.010″	.010″
Piston ring side clearance	.002″/.004″	.002″/.004″	.002″/.004″	.002″/.004″	.002″/.004″	.002″/.004″	.002″/.004″
Piston clearance—bottom of skirt	.0045″/.0065″	.0035″/.0055″	.0040″/.0055″	.0040″/.0055″	.0045″/.0065″	.0045″/.0065″	.0040″/.0060″
Gear ratios:							
Top	6.6.	6.6	5.6	7.1	5.0	5.6	5.3
3rd	—	—	7.3	9.2	6.5	7.4	7.0
2nd	9.8	9.8	11.1	14.2	10.0	11.5	10.9
1st	14.5	14.5	15.9	20.2	14.2	16.8	15.8
Ignition setting (inches before T.D.C. fully advanced	—	—	7/16″	7/16″	7/16″	7/16″	7/16″
Fully retarded	1/32″	1/32″	—	—	—	—	—
Carburetter:							
Jet	90	80	150	150	200	200	170
With air cleaner	90	80	150	150	170	170	—
Sparking plug C.I. cyl. head	L.10	L.10S	L.10S	L.10S	L.10S	L.10S	L.10
Al. alloy cyl. head	N8	—	—	NA8	—	NA8	N8
Compression ratio	5.1-1	6.5–1	6.5–1	6.5–1	6.8–1	6.8–1	4.9–1
Valve timing—inlet:							
Opens before T.D.C.	25°	25°	25°	25°	25°	25°	25°
Closes after B.D.C.	70°	70°	65°	65°	65°	65°	65°
Valve timing—exhaust:							
Opens before B.D.C.	70°	70°	65°	65°	65°	65°	65°
Closes after T.D.C.	25°	25°	25°	25°	25°	25°	25°
Distributor points gap	.012″	.012″	—	—	—	—	—
Magneto points gap	—	—	.012″	.012″	.012″	.012″	.012″
Plug points gap	.015″ to .018″	.015″ to .018″	.015″ to .018″	.015″ to .018″	.015″ to .018″	.015″ to .018″	.015″ to .018″
Tyre pressures:							
Front (per square inch)	20 lb.	20 lb.	16 lb.	—	16 lb.	—	17 lb.
Rear (per square inch)	28 lb.	28 lb.	20 lb.	—	17 lb.	—	22 lb.

NOTE. For Swinging Arm and other models not listed see appropriate series.

* 4 Speed Gearbox 1 pint.

† 3.00×19 on later models.

Model	M21	M33	A7 Up to Engine No. ZA7 11192	A7 S.T. Two Carburetters	A7 On and After Engine No. AA7 101.	A7 S/T & S/S On and After Engine No. AA7S 101.	A10	R/R and S/R
Engine bore	82mm.	85mm.	62mm.	62mm.	66mm.	66mm.	70mm.	70mm
Engine stroke	112mm.	88mm.	82mm.	82mm.	72.6mm.	72.6mm.	84mm.	84mm
Engine capacity	591c.c.	499c.c.	495c.c.	495c.c.	497c.c.	497c.c.	646c.c.	646c.c.
Petrol tank capacity	3 galls.	3 galls.	3 galls.	3½ galls.	3½ galls.	3½ galls.	4¼ galls.	2 or 4 galls.
Oil tank capacity	5 pints	5 pints	4 pints	4 pints	4 pints	4 pints	4 pints	5½ pints
Gearbox capacity	1 pint	1 pint	1 pint	1 pint	1 pint	1 pint	1 pint	14 fl. ozs.
Tappet clearance (cold):								
Inlet	.010″	.003″	.015″	.015″	.010″	.008″	.010″	.008″
Exhaust	.012″	.003″	.015″	.015″	.016″	.012″	.016″	.008″
Tyres (front)	3.50×19	3.25×19	3.25×19	3.25×19	3.25×19	3.25×19	3.25×19	
Tyres (rear)	3.50×19	3.50×19	3.50×19	3.50×19	3.50×19	3.50×19	3.50×19	
Piston ring gap (plain) ...	010″	.010″	.013″	.013″	.013″	.013″	.013″	
Piston ring gap (oil control)	.010″	.010″	.011″	011″	.011″	011″	.011″	
Piston ring side clearance ...	.002″/.004″	.002″/.004″	.002″/.004″	.002″/.004″	.002″/.004″	002″/.004″	.002″/.004″	.002″/.004″
Piston clearance—bottom of skirt	.0040″/ .0060″	.0045″/ .0065″	.0030″/ .0050″	.0030″/ .0050″	.0030″/ .0050″	.0030″/ .0050″	.0030″/ .0050″	.003″/ .005″
Gear ratios:						S/T S/S		
Top	5.9	4.8	5.1	5.1	5.1	5.0 5.28	4.42	4.53
3rd	7.8	6.3	6.2	6.2	6.2	6.05 6.38	5.36	5.48
2nd	12.2	9.9	9.0	9.0	9.0	8.8 9.28	7.77	7.96
1st	17.8	14.3	13.2	13.2	13.2	12.9 13.62	11.41	11.68
Ignition setting (inches before T.D.C. fully advanced) ...	7/16″	7/16″	3/8″	3/8″	5/16″	3/8″	11/32″	3/8″
Carburetter:								
jet	170	200	—	110	—	—	—	250
With air cleaner	—	170	140	—	140	160	170	240
Sparking plug C.I. cyl. head...	L.10	L.10S	L.10S	L.10S	L.10S	L.10S	L.10S	NA 10
A.1 alloy cyl. head	N8	—	—	—	—	—	—	
Compression ratio	5–1	6.8–1	6.6–1	7–1	6.6–1	7.25–1	6.5–1	R/R 8-1 S/R 8.26–1
Valve timing—inlet:								
Opens before T.D.C. ...	25°	25°	24°	24°	30°	42°	30°	42°
Closes after B.D.C. ...	65°	65°	65°	65°	70°	62°	70°	62°
*Valve timing—exhaust: ...								
Opens before B.D.C. ...	65°	65°	60°	60°	65°	67°	65°	67°
Closes after T.D.C. ...	25°	25°	21½°	21½°	25°	37°	25°	37°
Distributor points gap ...	—	—	—	—	—	—	—	
Magneto points gap	.012″	.012″	.012″	.012″	.012″	.012″	.012″	.012″
Plug points gap	.015″ to .018″	.015″ to .018″	.015″ to .018″	.015″ to .018″	.015″ to .018″	.015″ to .018″	.015″ to .018″	.018″/.020″
Tyre pressures:								
Front (per square inch)...	16lb.	17lb.	17lb.	17lb.	17lb.	17lb.	17lb.	17lb.
Rear (per square inch) ...	18lb.	18lb.	18lb.	18lb.	18lb.	18lb.	18lb.	19lb.

*NOTE:— Standard A7's after Eng. No. CA7–5232 and Standard A10's after Eng. No. DA10–1647 have the same camshaft as the S/S and R/R machines and valve timing is therefore the same.

B.S.A. MOTOR CYCLES LTD.,
Service Dept., Birmingham, 11
Printed in England.

BSA SERVICE SHEET No. 703

Revised Dec. 1958.

All Models

WORKSHOP DATA (BEARINGS) 1956

B.S.A. Part No.	Hoffman No.	Skefko No.	Ransome & Marles No.	British Timkin No.	Fischer No.
24–722	RM.9L	CFM7/C2	MRJA.$\frac{7}{8}$	—	RFM.9
24–724	R.325L	402454.B	MRJA.25	—	MFM.25
24–732	325	6305	MJ.25	—	6305
24–4065	135	6207	LJ.35	—	6207
24–4217	L.S.8	RLS.6	LJ$\frac{3}{4}$	—	LS.8
24–6860	—	2K.1178X 2K.1130N1	—	1178X 1130.N1	—
27–261	MS.9	RM.S7	MJ.$\frac{7}{8}$	—	MS.9
27–4027	LS.11	RL.S9	LJ.1$\frac{1}{8}$	—	—
29–3857	130	6206	LJ.30	—	6206
29–6211	MS.7	RM.S5	MJ.$\frac{5}{8}$	—	MS.7
42–5819	120	—	—	—	—
65–1388	RMS.11	CRM.9	MRJ.1$\frac{1}{8}$	—	RMS.11
65–2045	125	6205	LJ.25	—	6205
65–5883	LS.9	RLS.7	LJ.$\frac{7}{8}$	—	LS.9
67–670	R.130L	NFL.30	LRJA.30	—	NFL.30
89–3022	LS.10	RLS.8	LJ.1	—	LS.10
89–3023	LS.8	RLS.6	LJ.$\frac{3}{4}$	—	LS.8
90–10	117	6203	LJ.17	—	6203
90–11	LS.7	RLS.5	LJ.$\frac{5}{8}$	—	LS.7
90–12	S.9	EE.8J	KLNJ.$\frac{7}{8}$	—	EE.8
90–5525	112	6201	LJ.12	—	6201
90–5559	—	—	—	A.2126	—
90–6063	115	6202	LJ.15	—	6202

LOCATION OF BEARINGS

Model	Crankcase Roller Bearing Driveside	Crankcase Ball Bearing Driveside	Crankcase Roller Bearing Gearside	Crankcase Ball Bearing Gearside	Crankcase Ball Bearing (Small)	Crankcase Ball Bearing (Large)	Gearbox Pinion Sleeve Ball Bearing	Gearbox Mainshaft Ball Bearing	Front Hub Ball Bearing	Rear Hub Ball Bearing	Rear Hub Brake Drum and C/Wheel Ball Bearing
Dandy	—	—	—	—	90–6063	24–4217	90–6063 (Output shaft)	90–6063 (Input shaft)	—	—	—
D1, D3 & D5	—	—	—	—	90–10	24–4217	90–12	90–11	90–5525	90–6063	—
D1, D3 (Comp.)	—	—	—	—	—	—	—	—	90–5559	—	—
C10L	—	24–732	—	—	—	—	29–3857	90–11	—	90–6063	—
C12	—	24–732	—	—	—	—	29–3857	90–11	65–5383	90–11 O/S 29–6211 N/S	—
C15	—	24 782	—	—	—	—	29–3857	—	90–10	90–10 O/S 42–5819 N/S	
B31 S/A	24–724	65–2045	24–722	—	—	—	24–4065	24–4217	89–3022	89–3022	89–3022
B31 S/A (1958)	—	—	—	—	—	—	—	—	42–5819	42–5819	89–3022
B32 Comp. Rigid	24–724	65–2045	24–722	—	—	—	24–4065	24–4217	65–5883	65–5883	65–5883
B32/34 Gold Star	65–1338	65–2045	24–722	—	—	—	24–4065	24–4217	65–5883	65–5883	65–5883
B33 S/A	24–724	65–2045	24–722	—	—	—	24–4065	24–4217	89–3022	89–3022	89–3022
B33 S/A (1958)	—	—	—	—	—	—	—	—	42–5819	42–5819	89–3022
B34 Comp. Rigid	24–724	65–2045	24–722	—	—	—	24–4065	24–4217	65–5883	65–5883	65–5883
M21 Rigid	24–724	65–2045	24–722	27–261	—	—	24–4065	24–4217	65–5883	24–6860 (Tapered Roller)	—
M21 Plunger	24–724	65–2045	24–722	27–261	—	—	24–4065	24–4217	65–5883	65–5883	89–3022
M33	24–724	65–2045	24–722	—	—	—	24–4065	24–4217	65–5883	65–5883	89–3022
A7 and Shooting Star	67–670	—	—	—	—	—	24–4065	24–4217	89–3022	89–3022	89–3022
A7 & S/S (1958)	—	—	—	—	—	—	—	—	42–5819	42–5819	89–3022
A10 S/A	67–670	—	—	—	—	—	24–4065	24–4217	89–3022	89–3022	89–3022
A10 S/A (1958)	—	—	—	—	—	—	—	—	42–5819	42–5819	89–3022
A10 Plunger	67–670	—	—	—	—	—	24–4065	24–4217	65–5883	65–5883	89–3022
A10 Road Rocket	67–670	—	—	—	—	—	24–4065	24–4217	65–5883	89–3022	89–3022
A10 Super Rocket	67–670	—	—	—	—	—	24–4065	24–4217	42–5819	42–5819	89–3022

BSA SERVICE SHEET No. 704

Reprinted December, 1958

All Models

PISTON CLEARANCES

To avoid the possibility of seizure or piston tap, pistons must be fitted with adequate but not excessive clearance.

The following are the recommended total clearances between the bottom of the piston and the cylinder wall.

MODEL			Tolerances
D1			.0027″/.0045″
D3, C15			.0025″/.004″
D5			.003″/.005″
C10, C10L			.0045″/.0065″
C11, C11G, C12			.0035″/.0055″
B31			.004″/.0055″
B31.	(Split skirt)		.0005″/.0016″
B32A			.002″/.004″
BB32.	Gold Star	8 : 1	.003″/.0045″
		6.5 : 1	.004″/.0055″
		7.5 : 1	.002″/.004″
		9 : 1	.003″/.0045″
CB32.	Gold Star	6.5 : 1	.002″/.004″
		8 : 1	.003″/.0045″
		8.5 : 1	.003″/.0045″
		9 : 1	.003″/.0045″
		12.25 : 1	.004″/.0055″
		13 : 1	.004″/.0055″
DB32.	Gold Star	7.25 : 1	.0025″/.004″
		8 : 1	.003″/.0045″
		9 : 1	.003″/.0045″
B33			.0045″/.0065″
B33.	(Split skirt)		.0006″/.00275″
B34A			.0045″/.0065″
BB34.	Gold Star	7.5 : 1 Std.	.0045″/.0065″
		8 : 1	.0025″/.0045″
		9 : 1	.0025″/.0045″
		6.8 : 1	.0045″/.0065″
		11 : 1	.0025″/.0045″
CB34.	Gold Star	7.25 : 1	.003″/.0045″
		8 : 1	.003″/.0045″
		9 : 1	.003″/.0045″
DB34.	Gold Star	8 : 1	.003″/.0045″
DBD34.	Gold Star	8.75 : 1	.003″/.0045″
M20			.004″/.006″
M21			.004″/.006″
M33			.0045″/.0065″
M33.	(Split skirt)		.0006″/.00275″

B.S.A. Service Sheet No. 704 (*continued*)

A7	... ...	6.7 : 1	.002″/.004″
	(Split skirt) ...	6.7 : 1	.0011″/.0031″
		7.25 : 1	.002″/.004″
	(Split skirt) ...	7.25 : 1	.0011″/.0031″
A7.	(Star Twin) ...	... ...	.002″/.004″
A7.	(Split skirt) ...	(Star Twin and Shooting Star) ...	.0011″/.0031″
A10.	(Golden Flash) ...	6.5 : 1	.003″/.0045″
	(Split skirt) ...	6.5 : 1	.0025″/.0045″
	(Split skirt) ...	7.25 : 1	.0025″/.0045″
A10.	(Super Flash and Road Rocket).	8 : 1	.003″/.0045″
A7.	(Shooting Star) ...	8 : 1 (after Engine No. CA7S.S.4501)	.0035″/.005″
A10.	(Golden Flash) ...	7.5 : 1 (after Engine No. DA10–651)	.0035″/.005″
A10.	(Super Rocket) ...	8.5 : 1 (after Engine No. CA10R6001)	.004″/.0055″
Dandy 70	...	7.25-1	.003″/.0048″

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 11.
Printed in England.

BSA SERVICE SHEET No. 705

All Models

October, 1948
Reprinted Dec. 1958.

PERIODICAL ATTENTIONS.

HUBS. **Every 1,000 miles.**

Inject grease through the nipples located in the centres of the hubs. Do not overdo this, otherwise grease will penetrate to the brake linings and cause ineffective brakes. Three or four strokes of the gun should be ample. Where no grease nipple is provided the bearings should be removed and packed with grease when the machine is in need of complete overhaul.

BRAKE CAM SPINDLES.

Grease sparingly. Two or three strokes of the gun only, or if no grease nipple is provided, apply a few drops of engine oil between the brake arm and the spindle.

SPEEDOMETER DRIVE.

Grease well. Three or four strokes of the gun regularly.

ENGINE OIL. **Every 2,000 miles (except 2-stroke models).**

The oil tank and sump should be drained (preferably when the engine is warm after a longish run), and the tank refilled with fresh oil.

In case of new or re-conditioned engines, the oil should be drained and renewed after the first 250 miles, and again after 1,000 miles.

REAR CHAIN.

Remove the rear chain, clean thoroughly in paraffin, and soak in engine oil or molten grease and graphite.

CONTACT BREAKER (except A and C Group Models).

A very small quantity of thin oil should be injected into the lubrication wick, and the face cam smeared with oil. The wick is accessible after removing the spring contact arm (held by the round-headed screw at the opposite end to the contact point) and is located in the hollow end of the round-headed screw which is revealed when the spring arm is removed.

When replacing the arm, it is important that the small curved backing spring is refitted correctly, i.e., with the bent portion facing outwards.

DYNAMO ARMATURE BUSH (A and C Group Models fitted with lubricator).

A few drops of oil injected through the lubricator are sufficient.

Every 5,000 miles.

Drain the gearbox and refill with new oil up to the level of the filler plug.

Drain the telescopic forks and refill each leg with correct amount of new oil.

In the case of new or re-conditioned gearboxes, change the oil after the first 1,000 miles.

New Machines.

CYLINDER HEAD BOLTS (except B and M O.H.V. engines).

Examine the cylinder head joint daily, and if leakage becomes apparent, tighten the bolts, working diagonally so as to pull the head down evenly. Do not over-tighten otherwise there is a possibility of distortion or bolt stretch.

CYLINDER BASE NUTS (except B and M O.H.V. engines).

There are five of these—one at each of the four corners outside, and one inside the tappet chest on the single cylinder models. A Group Models have eight cylinder base nuts and Model C11 six nuts. Tighten after the first 100 miles.

CYLINDER BARREL AND HEAD FIXING (B and M O.H.V. engines).

The barrel and head are both secured to the crankcase by four long bolts coupled to bushes screwed into the latter. Apply a spanner to the upper hexagon for tightening. These bolts have right-hand threads, and, being inverted, are tightened by turning the spanner to the right.

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

BSA SERVICE SHEET No. 708A

"A" Group Models

Reprinted February, 1956.

CARBURATION
(Twin Carburetters).

The instructions given in Service Sheet No. 708 for Carburetter Tuning on Single Cylinder machines will apply equally to the early Star Twin models, where Twin Carburetters were employed. There are, however, three points which require special attention, they are:—

1. If the engine does not respond immediately after opening up from tickover speeds, in other words, if a flat spot should be apparent when just opening up, it may be due to either one, or the other, or both throttle slides, and/or needle valves, being worn, and they should be replaced before attempting to tune.

2. For slow running, each carburetter should be tuned separately for its own cylinder: Remove the plug lead from the offside cylinder and run the engine on the nearside cylinder only. Adjust the throttle stop and pilot air screw on the nearside carburetter as for the single carburetter (see Service Sheet 708).

   Stop the engine, remove the plug lead from the nearside cylinder and reconnect the plug lead to the offside cylinder. Start the engine on the offside cylinder only, and adjust the carburetter throttle stop and air screw as for the nearside cylinder.

   Stop the engine, replace both plug leads and restart the engine on both cylinders. The tickover may have increased slightly. If it has, reset both throttle slides by the same amount until the tickover is even.

3. When even slow running is achieved and the throttle slides are resting on their respective stops, the throttle cable adjusting screws should be accurately set with the twist grip in the closed position, to take out any backlash in the cables. This ensures that both throttles open the same amount, an important point particularly at low speeds

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

BSA SERVICE SHEET No. 709

All Models

October, 1948.
Reprinted Sept., 1958.

FAULT FINDING

No adjustments should be made, or any part tampered with, until the cause of the trouble is known. Otherwise adjustments which are correct may be deranged.

Engine Stops Suddenly.

Petrol shortage in tank, or choked petrol supply pipe or tap.
Choked main jet, or water in float chamber.
Oiled up or fouled sparking plug.
Water on high tension pick-up or on sparking plug.

Engine Fails to Start, or is difficult to start.

Lack of fuel, or insufficient flooding if cold.
Excessive flooding, allowing neat petrol to enter the cylinder.
Oiled sparking plug, or stuck-up valve or valve stem sticky.
Weak valve spring, or valve not seating properly.
Throttle opening too large, or pilot jet choked.
Contact points dirty, or gap incorrect.
Flat battery, if coil ignition, or faulty electrical connections in ignition circuit.

Loss of Power.

Valve, or valves, not seating properly.
Weak valve spring or springs, or sticking valve.
No tappet clearance, or excessive clearance.
Lack of oil in tank.
Brakes adjusted too closely.
Badly fitting or broken piston rings.
Punctured carburetter float.
Incorrect ignition timing.

Engine Overheats.

Lack of proper lubrication.
Weak valve springs, or pitted valve seats.
Worn piston rings, or late ignition setting.
Carburetter setting too weak, or partly choked petrol pipe

Engine Misses Fire.

Weak valve spring.
Defective or oiled sparking plug, or oil on contact points.
Incorrectly adjusted contact points or tappets.
Faulty condenser.
Defective sparking plug or H.T. cable.
Loose sparking plug terminal.
Carburetter flooding, due to stuck or defective float.
Partly choked main jet.
Choked vent hole in petrol tank filler cap.

Excessive Oil Consumption.

Stoppage, or partial stoppage, in pipe returning oil from engine to tank.
Clogged, or partially clogged, filter in sump, or oil tank.
Badly worn or stuck-up piston rings, causing high pressure in engine crankcase.
High crankcase pressure, caused by release valve (breather) action.
Air leak in dry sump oiling system.
Non-return valve in system not seating.
Ball valve in oil pump stuck on its seat.

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

BSA SERVICE SHEET No. 710

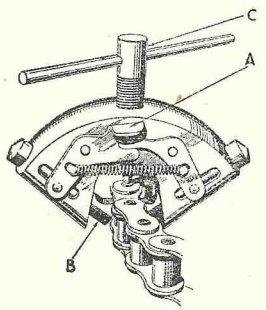
Oct., 1948
Reprinted Sept., 1958

All Models
CHAIN ALTERATIONS AND REPAIRS

A chain rarely breaks if it is kept properly lubricated and adjusted. Usually it is worn out long before it reaches breaking point. The rear chain is the most heavily stressed and is therefore the one most likely to give trouble. Spare parts should be carried to enable the rider to carry out a repair on the road with the aid of a chain rivet extractor (see Fig. X7). The front chain will probably be worn out before it requires shortening.

How to use the chain rivet extractor

First press down lever A (Fig. X7) to open the two jaws (B). Insert the link to be removed so that the jaws grip the roller and support the uppermost inner side plate. The punch (C) is then screwed down on to the rivet head until the rivet is forced through the outer plate.



Ffg. X7.

To shorten a worn rear chain

After a big mileage, the rear chain may have stretched so that no further adjustment is possible by the usual method. In this case it is possible to shorten the chain by one link or pitch, so increasing its useful life. First remove the single connecting spring link (A) securing the two ends of the chain (Fig. X8). If the chain terminates in two ordinary links as in Fig. X8 (in which case the chain will be of an even number of pitches) extract the third and fourth rivets (B) from the end and replace the detached three pitches by a single connecting link (C). The connection is made with an additional spring link (D). If one end of the chain has a double cranked link (Fig. X9)—in which case the

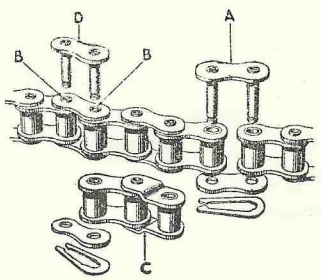


Fig. X8.

chain will have an odd number of pitches—extract the second and third rivets (A), releasing the cranked link unit complete, which can be retained for further use. Replace with one inner link (B) and again connect up with an additional single connecting link (C).

To repair a damaged chain

If a roller or link has been damaged (X, Fig. X9) remove rivets (D), take out the damaged link and replace with one inner link, secured by two single connecting links.

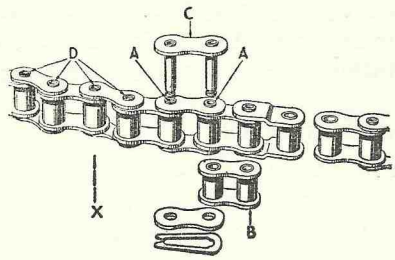


Fig. X9.

It is important that the spring clip fastener should always be put on so that the CLOSED end faces the direction of travel of the chain—i.e., when clip is on top run of chain, closed end is toward front of machine—when clip is on bottom run, closed end is towards rear of machine.

It should be noted that once a rivet has been extracted it must not be used again, so that it is important to check that the correct rivet is being removed before actually removing it. In the case of double cranked links, the complete unit comprises an inner link and the cranked outer link—three rollers in all—and these must never be separated.

Fitting rear chain

To fit a new rear chain, turn wheel until the spring link of the old chain is located on rear sprocket. Disconnect, and allow the lower run to drop down. Join the top run of the old chain to the new chain by means of the connecting link, and then by pulling on the bottom run of the old chain the new one will be carried round gearbox sprocket. Then the old chain can be disconnected and the ends of the new one joined together.

When the rear chain breaks and falls from its sprockets, the new or repaired chain can be replaced without taking off the chainguards. One end of the chain must be fed (from the rear) under the front end of the rear top chainguard on to the gearbox sprocket. A long bladed screwdriver or a piece of stiff wire may assist this operation. When the chain has located on the sprocket teeth, engage a gear and gently turn gearbox over with the kick-starter. This will feed chain round gearbox sprocket. When sufficient length of chain is hanging below sprocket, disengage gear and chain can then be pulled round until both runs can be fed inside rear chainguard and engaged on rear wheel sprocket.

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 11
Printed in England.

U—B.2388

BSA SERVICE SHEET No. 713

This sheet supersedes No. 411
Revised Nov., 1958

ALL MODELS EXCEPT D GROUP AND C15
DISMANTLING OF STEERING HEAD

Remove the headlamp from the forks after undoing the two retaining bolts, and allow it to hang in a position where it cannot be damaged. If a headlamp cowl is fitted, it should be removed complete with the headlamp.

On later models of the type shown in Fig. C31A the lamp is not removed, but it is necessary to take off the lamp front by unscrewing pin *F* and to disconnect the speedometer cable and the leads to the switch.

Detach the handlebars complete with controls, and lay them on top of the petrol tank, using a piece of rag to protect the enamel. Remove the chromium plated top caps *A* and *B* (Fig. C31). Slacken the pinch bolt *C* and remove the adjusting sleeve *D* or *E*, Fig. C31A. Tap off the fork top yoke by striking it with a mallet underneath its two sides alternately.

The steering column can now be drawn downwards from the head, and the top ballrace removed. Note: If the bearings are dry a means of catching the steel balls should be arranged as they will fall as the column is drawn out.

The cups which remain in the head can be withdrawn by means of extractor No. 61–3060 for "C" Group, and 61–3063 for "A," "M" and "B" Groups. This is screwed firmly into the cup, then extractor and cup are driven out from the opposite end with the aid of a suitable bar.

If the cups and cones are pitted to even a slight degree, they must be replaced, otherwise steering will be adversely affected and will rapidly become worse.

Pitting is invariably due to "hammering" of the balls in their tracks, caused by slack adjustment.

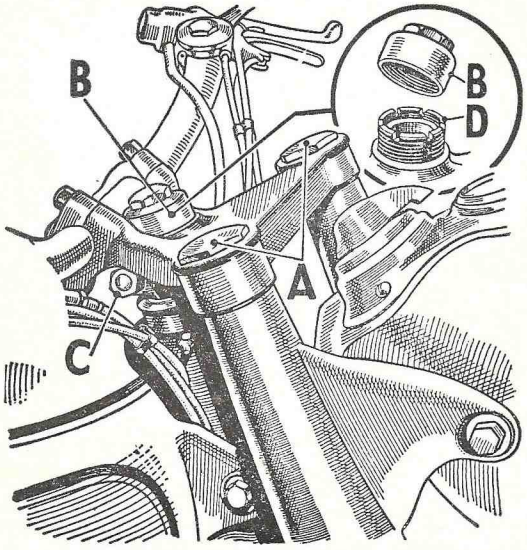


Fig. C31. The front fork and steering head.

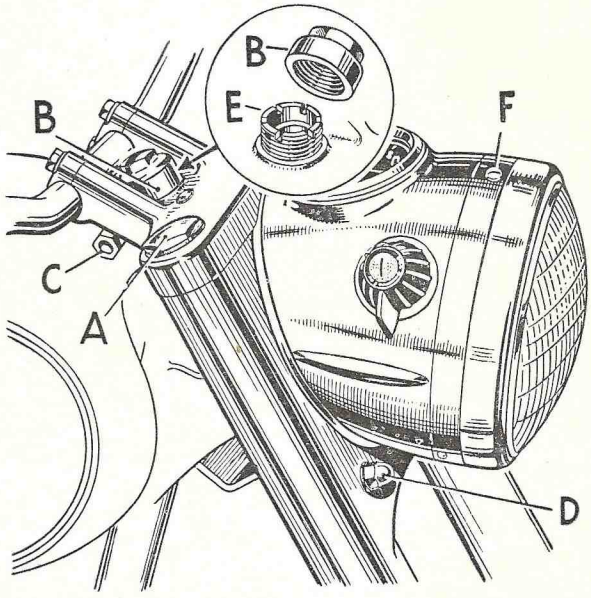


Fig. C31A.

Reassembly of Steering Head

When fitting new ballrace cups make sure that they are driven in squarely and that they are pressed well home. Replace the steering column balls, cone, adjusting sleeve and top-yoke. If any difficulty is experienced in retaining the balls in position, smear the tracks heavily with grease.

Adjust the column so that it turns freely without play and tighten the pinch bolt *C*. Finally replace headlamp and handlebar controls.

B.S.A. MOTOR CYCLES LTD.,
Service Dept., Birmingham 11.
Printed in England.

BSA SERVICE SHEET No. 801

Reprinted Dec. 1958

A Group Models
MAGNETO

These magnetos are of the rotating armature pattern. The magnet is cast into the body, so eliminating joints and improving the weatherproof properties of the magneto. The magnetos also incorporate an automatic timing control.

The automatic timing control (Fig. Y1) employs a driving gear carrying a plate fitted with two pins. A weight is pivoted on each pin and the movement of the weight is controlled by a spring connected between the pivot end of the weight and a toggle lever pivoted at approximately the centre of the weight. Holes are provided in each toggle lever, in which pegs on the underside of a driving plate secured to the magneto spindle are located. This plate is also provided with stops which limit the range of the control. When the magneto is stationary, the weights are in the closed position and the magneto retarded for starting purposes. As the speed is increased, centrifugal force acting on the weights overcomes the restraining influence of the springs and the weights move outwards, causing relative movement to take place between the driving gear and the magneto spindle, so advancing the timing. By careful design of the springs, the characteristics of the control can be arranged to conform more closely with the engine requirements than is the case with other types of control.

ROUTINE MAINTENANCE

Lubrication

To be carried out every 3,000 miles.

The cam is supplied with lubricant from a felt pad contained in a pocket in the contact breaker housing. A small hole in the cam, fitted with a wick, enables the oil to find its way on to the surface of the cam. Remove the contact breaker cover and turn the engine over until the hole in the cam can be clearly seen and then carefully add a few drops of thin machine oil. Do not allow any oil to get on to the contacts. When the magneto is dismantled the felt pad should be removed, soaked in thin machine oil and after removing surplus oil, replaced.

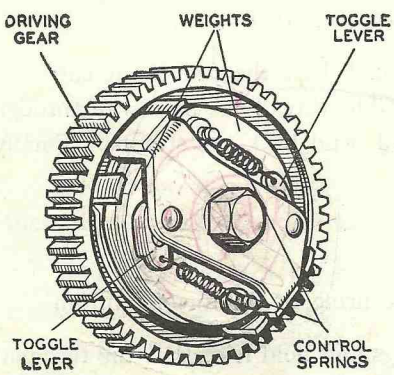


Fig. Y1. Automatic timing control

The contact breaker rocker arm pivot also requires lubrication and the complete contact breaker must be removed for this purpose. Take out the hexagon-headed screw from the centre of the contact breaker and pull the contact breaker off the tapered shaft on which it fits. Then push aside the rocker arm retaining spring, prise the rocker arm off its bearing and lightly smear the bearing with clean engine oil. At the same time, also lightly smear the contact breaker with clean engine oil.

When replacing the contact breaker, take care to ensure that the projecting key, on the tapered portion of the contact breaker base, engages with the keyway cut in the magneto

spindle, otherwise the timing of the magneto will be upset. Tighten the hexagon-headed screw with care ; it must not be too slack, nor must undue force be used.

Adjustment

To be carried out every 3,000 miles.

Remove the contact breaker cover and turn the engine until the contacts are fully opened. Check the gap with a gauge having a thickness of .012in. If the setting is correct, the gauge should be a sliding fit, but if the gap varies appreciably from the gauge it should be adjusted. Keep the engine in the position to give maximum opening of the contacts, slacken the locknut and turn the contact screw by its hexagon head until the gap is set to the gauge. Finally tighten the locknut and re-check the setting.

Cleaning

To be carried out every 6,000 miles.

Take off the contact breaker cover and examine the contact breaker. If the contacts are burned or blackened, clean them with fine carborundum stone or with very fine emery cloth, and afterwards wipe away any dust or dirt with a petrol-moistened cloth. Cleaning of the contacts is made easier if the contact breaker is removed. Procedure is given above.

Remove the high tension pickups, wipe clean and polish with a fine dry cloth. The high tension pickup brush must move freely in its holder. If it is dirty, clean with a cloth moistened with petrol. If the brush is worn to within $\frac{1}{8}$in. of the shoulder it must be renewed. While the high tension pickup is removed, clean the slip ring track and flanges by holding a soft cloth on the ring by means of a suitably shaped piece of wood, while the engine is slowly turned.

Replacement of High Tension Cable

If, on inspection the high tension cable shows signs of perishing or cracking it must be replaced by a suitable length of 7 mm. rubber-covered ignition cable.

To fit a new high tension cable to a pick-up terminal, bare the end of the cable for about $\frac{1}{4}$in., thread the knurled moulded nut over the cable, thread the bare wire through the washer removed from the end of the old cable and bend back the strands. Finally screw the nut into the pick-up.

SERVICING

Testing Magneto in position on engine

Testing magneto in position to locate cause of misfiring or failure of ignition

Disconnect the cable from one of the sparking plugs and hold it so that the terminal end is about $\frac{1}{8}$in. from some part of the cylinder block while the engine is turned over.

If the spark that jumps from the cable end is strong and regular the fault lies in the sparking plug which must be removed for examination and if necessary cleaned and adjusted or replaced.

Next examine the high tension cable. After long service it may have become cracked or perished and the magneto may be sparking through to a metal part of the engine or frame.

If the magneto has been replaced recently it may be incorrectly timed. Refer to Service Sheet No. 203.

If the performance of the magneto is still not satisfactory, the contact breaker may require cleaning or adjustment. If the contacts are badly burned they should be renewed by a replacement contact set. If the contact breaker is in good order, there may be an internal fault in the magneto (see paragraph below).

To Dismantle

First remove the safety gap screw and the earthing brush otherwise the armature and slip ring may be damaged whilst dismantling. The safety gap screw is usually fitted in the underside of the magneto and the earthing brush under the name plate at the contact breaker end.

Remove the high tension pick-ups, secured by spring clips. Take care to retain the gasket fitted under the pick-up for use when reassembling.

Take off the contact breaker cover and remove the contact breaker and cam as follows :—

Unscrew the hexagon headed bolt from the centre of the contact breaker and draw the contact breaker off the tapered shaft on which it fits. The cam can then be pulled out of its housing. The cam is then free to be taken out.

Take out the screws securing the contact breaker housing to the magneto body, and pull the contact breaker housing away from the magneto body. Retain the sealing gasket and shims for use when reassembling.

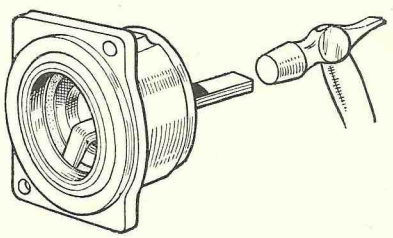


Fig. Y2. Removing outer race

Draw the armature out of the magneto body. There is no need to put a keeper across the magnet, as it retains its properties more or less indefinitely. Although it loses a certain immaterial amount of power on the first removal of the armature, subsequent removals do not affect it.

Do not allow the magneto body to come into close contact with any iron filings as they may become attracted to the magnet and cause the armature to bind.

When the armature is removed it should be examined for mechanical faults such as a cracked or bent shaft. Any defect in the winding or condenser needs special equipment to detect, and in the event of trouble being suspected, a complete service armature should be fitted.

It is important that the two ball bearings which support the armature shaft are in good condition. If they are packed on assembly with a suitable high melting point grease they will stand an almost unlimited amount of normal wear, but if they start to fail due to a bent shaft or other cause, they must be replaced. The balls and cages can readily be removed off the inner races which can then be pulled off the armature shaft using an extractor. The outer races can be removed with an expanding collet type extractor or by means of a tool as shown in Fig. Y2.

Carefully examine the slip ring and if it is damaged in any way it must be replaced. To do this take off the inner race of the bearing using an extractor, lift off the shims and the grease flinging plate and pull the slip ring off the shaft. (Note : When removing the inner race the extractor must bear on the brass shaft extension and not on the electric contact or insulator down the centre of the shaft. A disc of appropriate diameter can be placed across the face of the shaft extension). Carefully straighten the wire coming from the armature and see that the bared end is clean, then fit the new slip ring over the shaft, taking care that the wire enters the hole in the boss in the slip ring and that it goes fully home without bending. Seal the lead-in to the slip ring boss with varnish—a special air drying varnish is used at the works but shellac varnish can be used in an emergency.

Replace the grease flinging plate, the full number of shims and inner race of the bearing.

Testing

If test apparatus is not available, a rough check of the armature windings can be made by means of a two-volt battery (a tapping across one cell of the motor cycle battery) and an ammeter.

To check the primary winding of the armature

Screw the contact breaker retaining screw into the end of the armature shaft.
Connect one terminal of the battery to one terminal of the ammeter.
Connect the second terminal of the ammeter to the screw in the armature shaft.
Connect the second terminal of the battery to the metal body of the armature.

The ammeter will record the current taken by the armature primary winding and should be approximately 4 amperes.

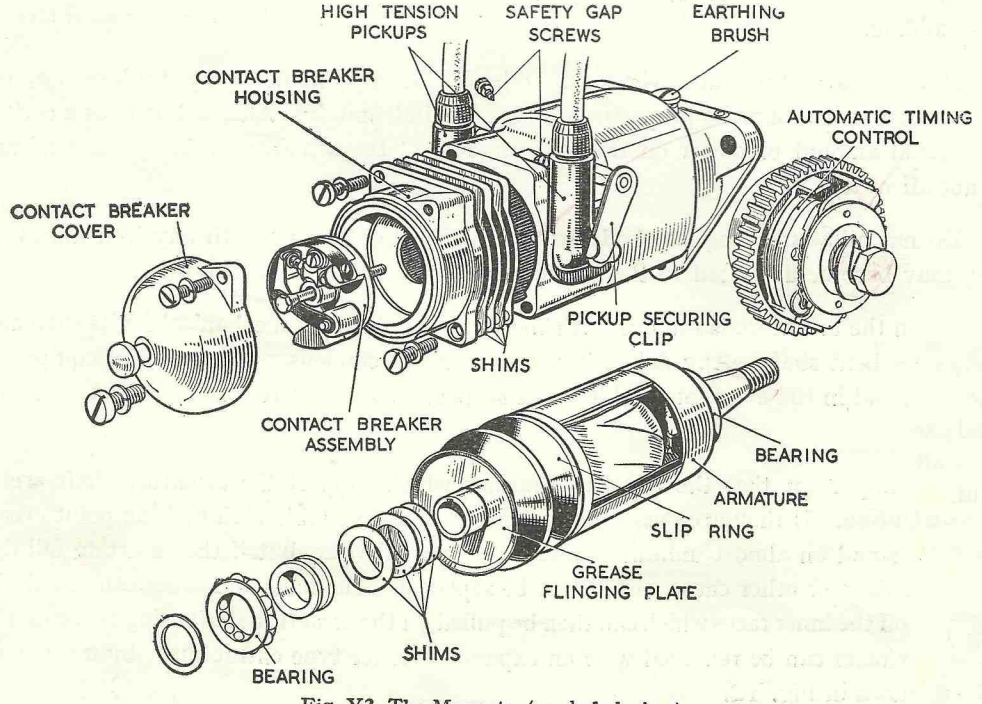


Fig. Y3. The Magneto (exploded view)

To check the secondary winding of the armature

Leave the connections as detailed for the primary winding check.

Take a piece of high tension cable about 15in. long and bare one end back about ½in. and the other end about 4in. Wrap the longer bared end round the brass insert of the slip ring and hold the other end about ⅛in. from the body of the armature.

If the lead from the battery which was connected to the armature body to test the primary winding is then flashed quickly on and off the body a spark should occur between the high tension wire and the armature body.

Failure to spark indicates a fault either in the armature windings or the condenser and a replacement armature must be fitted.

An armature test can be carried out by connecting in series an 8-volt accumulator, a four lobe cam and contact breaker (having 45° closed period) and the armature under test, the contact breaker to coil connection being at earth potential. A 0.2 mfd. condenser must be connected across the contacts. Run the contact breaker at 750 r.p.m. giving 3,000 operations of the contacts per minute, and connect the high tension cable from the coil to either a 3-point spark gap or rotary gap set to 13 kv. Regular sparking should occur under these conditions. Explore the surface of the winding with an earthed pointer—no flashover must occur.

It should be noted that in the above test, sparking will occur, provided that the armature winding is in order, even if the condenser in-built with the armature is open-circuited. Disconnect the 0.2 mfd condenser from the supply circuit above when regular sparking should continue. Failure to do so indicates that the armature condenser is faulty and a replacement armature must be fitted.

If satisfactory performance is not obtained during the above test, measurement should be made of the maximum primary running current. To do this, include also in the above series circuit a moving coil ammeter (of not more than 5 amperes full scale deflection) and a variable resistance of approximately 5 ohms (of adequate current rating for cool running). Connect the H.T. cable from the coil to a 3-point spark gap set to 5.5 mm. or a rotary gap set to 9.5 kv. Run the contact breaker as before, and adjust the variable resistance until occasional missing occurs, that is, when the coil is just failing to spark regularly. Under these conditions, the permissible primary current as read on the ammeter should be not more than 1.2 amperes.

In both the above tests, it is important that the supply voltage be maintained at 8 volts, that the cam speed be kept constant, and that the winding under test is not subjected to any external magnetic influence (e.g., it must not be tested on an iron bed-plate).

Reassembly

See that the bearings are clean and if necessary wash them in petrol and dry thoroughly. Lightly pack them with high melting point grease. Fit the inner races on the armature shaft using a hand press and a length of tube fitting over the shaft and locating on the race. Fit the balls and cages in position over the inner races. Place a new oil seal in the bearing housing at the driving end of the magneto body and press the outer races

into their housings with a mandrel of the type shown in Fig. Y4, taking care that a suitable serrated insulating washer is positioned between each race and its housing, to ensure that the race is a tight fit in its housing.

See that the slip ring and metal insert are clean ; if necessary carefully wipe it clean with a petrol moistened cloth. See that the inside of the magneto body is clean and free from swarf and insert the armature in the body, drive end first.

Refit the contact breaker end plate taking care that the end plate shims and gasket are in position, and replace and tighten the end plate fixing screws.

Check the armature for end play. It should revolve freely when turned by hand, but no end play should be felt. If necessary adjust by adding or removing shims behind the contact breaker plate until adjustment is correct.

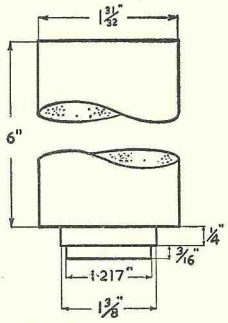


Fig. Y4. Mandrel for replacement of outer races

Replace the cam and contact breaker as follows :—

First add a few drops of thin machine oil to the felt contained in the contact breaker housing.

Insert the cam in the housing so that the broad slot locates over the two pegs in the contact breaker housing. Fit the contact breaker in position, ensuring that the projecting key on the tapered portion of the contact breaker base engages with the keyway cut in the magneto spindle otherwise the magneto timing will be upset. Tighten the hexagon-headed screw with care ; it must not be too slack, nor must undue force be used.

Adjust the contacts to the correct setting and replace the contact breaker cover.

See that the pick-ups are clean and the brushes move freely. Place the cork washers in position on the magneto body, followed by the pick-ups and secure by means of the spring arms.

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 11
Printed in England.

U/B2766

BSA SERVICE SHEET No. 804

Reprinted August, 1958

C10, C11, A, B and M Group Models

REGULATOR UNIT—Models MCR1 and MCR2

This unit houses the generator voltage regulator unit and the cut-out. Although combined structurally, the regulator and cut-out are electrically separate.

On machines fitted with an E3L Dynamo the regulator unit is type MCR2, this unit is slightly different in construction to the MCR1. The procedure for testing and adjusting is, however, unaltered.

Positive Earth Lighting Sytems

Some machines have the battery positive terminal connected to the frame instead of the negative terminal. This does not affect the Regulator Adjustment except that the voltmeter connections should be reversed.

The Regulator

The regulator unit is arranged to work in conjunction with the shunt-wound generators described in Service Sheet No. 809. The regulator is set to maintain a pre-determined generator voltage at all speeds, the field strength being controlled by the automatic insertion of a resistance in the generator field circuit, and a current or series winding on the same regulator compensates this voltage figure in accordance with the output current, to ensure that the battery does not receive an excessive charging current when in a discharged condition. Hence the charging current depends upon the difference between the controlled generator voltage and the battery terminal voltage and is therefore at a maximum when the battery is discharged, automatically tapering off to a minimum as the battery becomes charged and its voltage rises. In addition, a form of temperature compensation ensures that the voltage characteristics of the regulator are matched to those of the battery for large variations in working temperature.

Normally, during day-time running, when the battery is in good condition, the generator gives only a trickle charge, so that the ammeter reading will seldom exceed 1—2 amperes

The Cut-Out

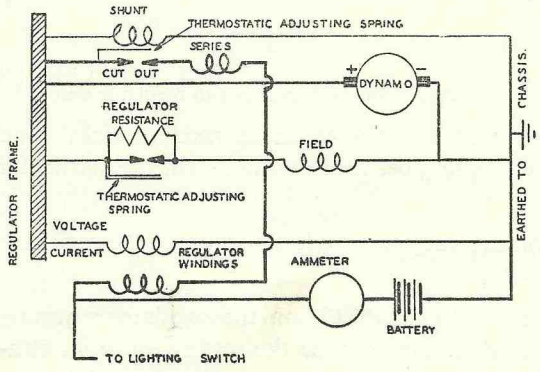


Fig. Y.15. Circuit diagram of charging system

The cut-out is an automatic switch which is connected between the dynamo and battery. It consists of a pair of contacts held open by a spring and closed magnetically. When the engine is running fast enough to cause the voltage of the generator to exceed that of the battery, the contacts close and the battery is charged by the generator. On the other hand, when the speed is low or the engine is stationary, the contacts open, thus disconnecting the generator from the battery and preventing current flowing from the battery through the windings.

Test Data

CUTOUT	MCR.1	MCR.2
Cut-in voltage	6.2—6.6 volts	6.3—6.7 volts
Drop-off voltage	3.5—5.3 volts	4.5—5.0 volts
Reverse current	0.7—2.5 amperes	3.0—5.0 amperes

Regulator

SETTING IN OPEN CIRCUIT

10°C.	50°F.	8.0—8.4 volts	7.7—8.1 volts
20°C.	68°F.	7.8—8.2 volts	7.6—8.0 volts
30°C.	86°F.	7.6—8.0 volts	7.5—7.9 volts
40°C.	104°F.	7.4—7.9 volts	7.4—7.8 volts

Servicing

TESTING IN POSITION TO LOCATE FAULT IN CHARGING CIRCUIT

If the procedure given in Service Sheet No. 809 shows the generator to be in order, proceed to check further as follows:—

First ensure that the wiring between regulator and battery is in order. To do this, disconnect the wire from the "A" terminal of the regulator (Fig. Y.16). It may be necessary in some cases to remove the regulator from the motorcycle.

Connect the end of the wire removed to the positive terminal of a voltmeter, and connect the negative voltmeter terminal to an earthing point on the machine.

If a voltmeter reading is given, the wiring is in order and the regulator must be examined. If there is no reading, examine the wiring for broken wires or loose connections.

Regulator Adjustment

Remove the cover of the regulator unit, insert a piece of paper between the cut-out contacts, and proceed as follows:

Connect the positive terminal of the moving coil voltmeter (0—10 volts) to the D terminal on the regulator and connect the other lead of the voltmeter to an earthing point on the engine.

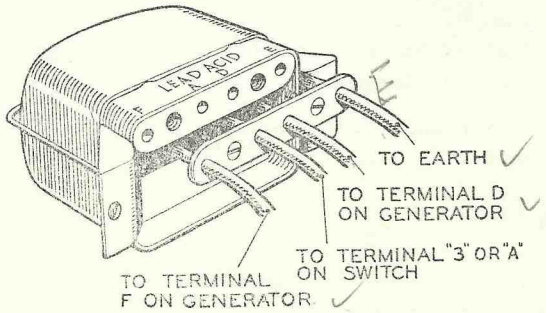


Fig. Y.16. Connections to regulator unit

Start the engine and slowly increase the speed until the voltmeter needle "flicks" and then steadies; this should occur at a voltmeter reading between the limits for the particular atmospheric temperature.

If the voltage at which the reading becomes steady is outside these limits, the regulator must be adjusted.

Shut off the engine, release the locknut "A" (Fig. Y.17) on the regulator adjusting screw "B" and turn the screw in a clockwise direction to raise the setting, or in an anti-clockwise direction to lower the setting. Turn the screw a fraction of a turn at a time and then tighten the locknut.

When adjusting, do not run the engine up to more than half-throttle, as while the dynamo is on open circuit, it will build up to a high voltage if run at a high speed and so a false voltmeter reading would be obtained.

Remove paper from between cut-out contacts.

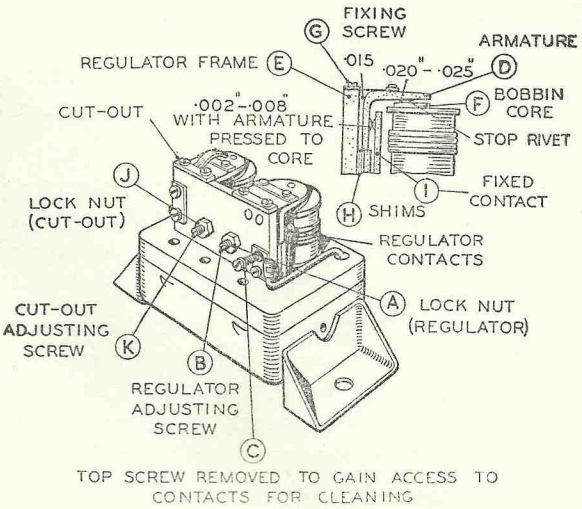


Fig. Y.17. Regulator and cut-out adjustment and setting.

Cleaning the Regulator Contacts

After long periods of service it may be found necessary to clean the vibrating contacts of the regulator. These are accessible if the top screw "C" securing the fixed contact is removed and the bottom screw slackened to permit the fixed contact to be swung outwards. The contacts can then be polished with fine emery cloth.

Mechanical Setting of Regulator

The armature carrying the moving contact of the regulator is accurately set and should not be removed. If, however, it does become necessary to re-set the contacts, slacken the two fixing screws "G" Fig. Y.17, and proceed as follows:—

Insert a .015 in. (0.20 in.) feeler gauge between the back of the armature "D" and the regulator frame "E".

Press back the armature against the frame and down on to the top of the bobbin core with the gauge in position, and lock the armature by tightening the two fixing screws "G". Check the air gap between the top of the bobbin core "F" and the underside of the armature "D" (not under the stop rivet). Adjust if necessary to .025 in. (.012″—.020″), by removing shims "H" at the back of the fixed contact on an MCR.1 regulator or by bending the fixed contact bracket on an MCR.2 regulator. The gap between the regulator contacts when the armature is pressed down should now be .002″—.008″ (.006″—.017″). Finally check, and if necessary re-set, the electrical adjustment of the regulator.

The figures in brackets refer to the MCR.2 regulator.

Electrical Setting of Cut-out

If the regulator setting is within the correct limits, but the battery is still not receiving current from the dynamo, the cut-out may be out of adjustment or there may be an open circuit in the wiring of the cut-out and regulator unit.

Remove the cable from the terminal on the regulator marked A. Remove the voltmeter lead from the D terminal of the regulator unit and connect it to terminal A. Run the engine as before: at a fairly low engine speed, the cut-out should operate, when a voltmeter reading should be given of the same value as that when the voltmeter was connected to terminal D. If there is no reading, the setting of the cut-out may be badly out of adjustment and the contacts not closing.

To check the voltage at which the cut-out operates, the voltmeter must be connected between the D terminal and earth. Start the engine and slowly increase its speed until the cut-out contacts are seen to close, noting the voltage at which this occurs. This should be 6.2—6.6 volts.

If operation of the cut-out is outside these limits, it will be necessary to adjust. To do this slacken the locknut "J" (Fig. Y.17) on the cut-out adjustment screw "K" and turn the screw in a clockwise direction to raise the voltage setting or in an anti-clockwise direction to reduce the setting, testing after each adjustment by increasing the engine speed until the cut-out is seen to operate, and noting the corresponding reading.

Tighten the locknut after making the adjustment. If the cut-out contacts appear burnt or dirty, place a strip of fine glass paper between the contacts then, with the contacts closed by hand, draw the paper through. This should be done two or three times with the rough side towards each contact.

Mechanical Setting of Cut-out

If, for any reason, the armature has to be removed from the cut-out frame, care must be taken to obtain the correct air-gap settings on reassembly. These can be obtained as follows:—

Slacken the two armature fixing screws, adjusting screw "K" and the screw securing the fixed contact. Insert a .014″ gauge between the back of the armature and the cut-out frame. (The air-gap between the core face and the armature shim should now measure .011″—.015″. If it does not, fit a new armature assembly). Press the armature back against the gauge and tighten the fixing screws. With the gauge still in position, set the gap between the armature and the stop plate arm to .030″—.034″ be carefully bending the arm. Remove the gauge and tighten the screw securing the fixed contact.

Insert a .025″ gauge between the core face and the armature. Press the armature down on to the gauge. The gap between the contacts should now measure .002″—.006″ and the drop-off voltage should be between the limits given in the test data. If necessary, adjust the gap by carefully bending the fixed contact bracket.

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 11
Printed in England.

U/B2176

BSA SERVICE SHEET No. 804A

Reprinted May 1958

A, B and M Group Models

Control Box - Model BR107

General.

The regulator and cut-out contacts are positioned, for ease of access, above their respective armatures. It will be noticed that some of the internal electrical joints are resistance brazed.

SETTING DATA.

Cut-Out.

Cut-in voltage	...	...	6.3—6.7 volts.
Drop-off voltage	...	...	4.8—5.3 volts.
Reverse current	...	...	3.0—5.0 amps.

Regulator.

Setting on open circuit relative to ambient temperature.

10°C.	50°F.	...	...	7.7—8.1 volts.
20°C.	68°F.	...	...	7.6—8.0 volts.
30°C.	86°F.	...	...	7.5—7.9 volts.
40°C.	104°F.	...	...	7.4—7.8 volts.

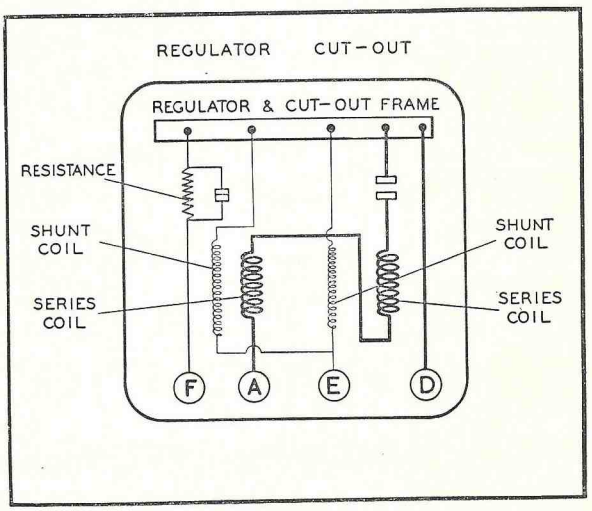


Fig. Y.15A.
Internal Connections of Control Box.

Servicing.

Before making any adjustment to the regulator, ensure that the dynamo, dynamo drive and battery are in order.

If the machine is used regularly and a sound battery does not keep in a charged condition, or if the dynamo output does not fall when the battery is fully charged, the following procedure should be adopted:—

Withdraw the cable from terminal *A*, Fig. Y.16A, and connect it to the negative terminal of a voltmeter. Connect the positive voltmeter terminal to an earthing point on the machine. If a voltmeter reading is given, the circuit from the battery to terminal *A* is in order.

If there is no reading, examine the wiring for defective cables or loose connections. Re-connect the cable to terminal *A*.

Check that the wiring between dynamo terminal *D* and control box terminal *D*, and between dymano terminal *F* and control box terminal *F*, is in good condition.

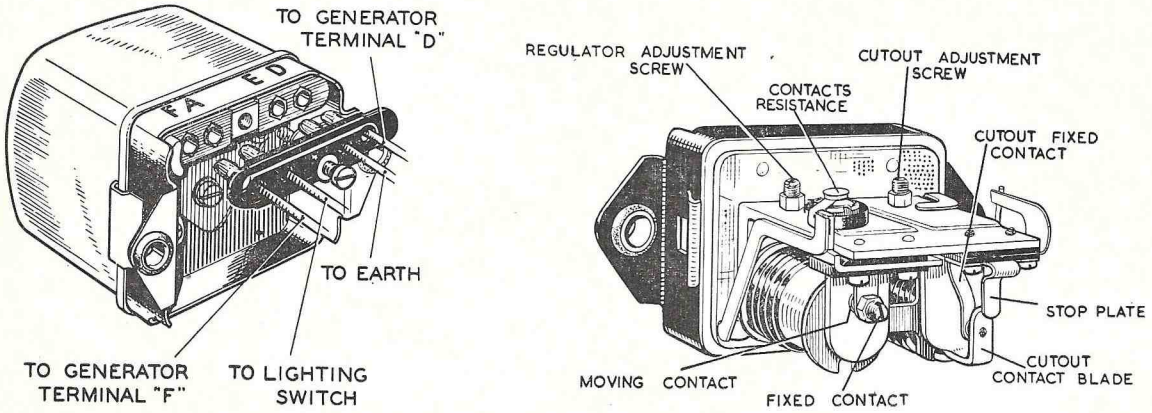


Fig. Y.16A. Control Box Connections and Internal Layout.

Electrical Setting of Regulator.

The regulator is carefully set during manufacture and it should not be necessary to make further adjustment. If the charging system is suspect, it is important that only a good quality moving coil voltmeter (0–20 volts) is used for checking.

Connect the negative voltmeter lead to terminal *D* and the positive lead to terminal *E* on the control box. Remove the negative cable from the battery.

Start the engine and slowly increase the speed until the voltmeter needle "flicks" and then steadies. Note the reading and stop the engine.

If the voltage lies outside the limits given in the setting data, the regulator must be adjusted.

Remove the control box from the machine and take off the cover. It is important that adjustments are carried out with the control box supported in a similar position to that in which it is mounted on the machine. Re-start the engine.

Slacken the locknut of the adjusting screw, Fig. Y17A, and turn the screw clockwise to raise, or anti-clockwise to lower the setting. Turn the screw only a fraction of a turn at a time and then tighten the locknut. Repeat until the correct setting is obtained. Then stop the engine.

Adjustment should be completed within 30 seconds, otherwise heating of the shunt winding will cause false settings to be made. A dynamo run at high speed on open circuit will build up a high voltage; therefore, do not run the engine up to more than half full speed.

Mechanical Setting of Regulator.

If the armature has been removed, the air gap settings will have to be re-adjusted. Otherwise, they should not be altered. To adjust, proceed as follows:—

Slacken the locknut on the voltage adjusting screw and unscrew the adjuster until it is well clear of the armature tension spring. Also slacken the two armature securing screws, Fig. Y.17A.

Insert a .015 in. feeler gauge wide enough to cover completely the core face between the armature and the core shim, taking care not to damage the shim. Press the armature squarely down against the gauge and tighten the two securing screws. With the gauge still in position, screw the adjustable contact down until it just touches the armature contact.

Tighten the locknut, and re-set the voltage adjusting screw as described above.

Cleaning Contacts.

After long periods of service it may be found necessary to clean the contacts. Use a fine carborundum stone or fine emery cloth. Wipe away all traces of dust or other foreign matter with methylated spirits.

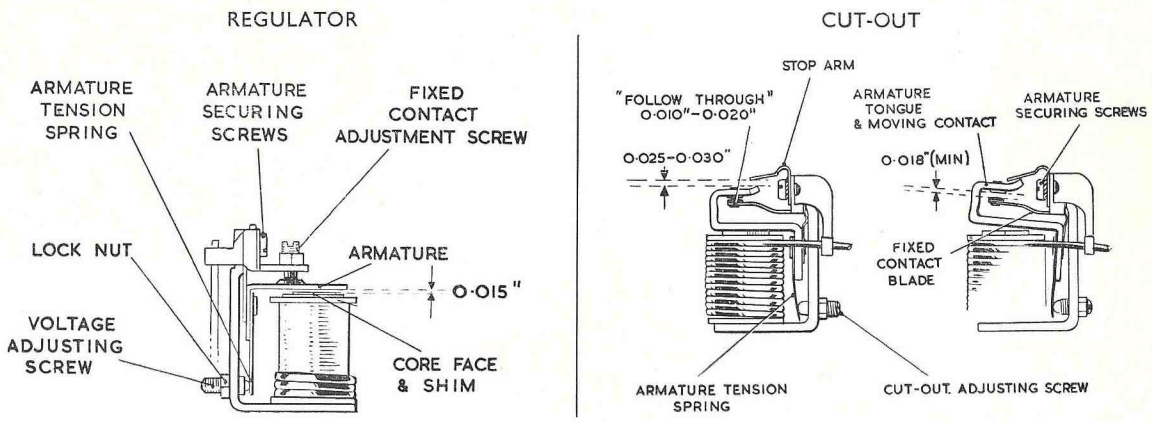


Fig. Y.17A. Regulator and Cut-Out Adjustment and Setting.

Electrical Setting of Cut-Out.

If the regulator is correctly set but the battery is still not being charged, the cut-out may be out of adjustment.

Connect a voltmeter between terminals *D* and *E* on the control box, start the engine and slowly increase the speed until the contacts close. Note the reading, and stop the engine. If outside the limits of 6.3—6.7 volts, it will be necessary to adjust the cut-out.

Re-start the engine, and slacken the locknut securing the cut-out adjusting screw, Fig. Y.17A. Turn the screw clockwise to raise, or anti-clockwise to lower the setting. Move the screw only a fraction of a turn at a time and then re-tighten the locknut. Test after each adjustment by increasing engine speed and noting the voltmeter reading at the instant of contact closure. Stop the engine.

Setting of the cut-out, like that of the regulator, must be made as quickly as possible because of temperature rise effects.

If the cut-out fails to operate, there may be an open circuit in the wiring of the control box, in which case the unit should be replaced.

Mechanical Setting of Cut-Out.

If, for any reason, the armature has been removed from the frame, the correct air-gap settings must be obtained on re assembly.

Slacken the adjusting screw locknut and unscrew the adjuster until it is well clear of the tension spring. Press the armature squarely down on the core face and tighten the securing screws. Adjust the gap between the armature tongue and the stop arm by carefully bending the arm. The gap must be .025 in.—.030 in. when the armature is pressed down, Fig. Y.17A. Similarly, the fixed contact blade must be bent so that, when the armature is pressed down, there is a minimum "follow-through" or blade deflection of .010 in. To prevent contact chatter, the "follow-through" must not exceed .020 in.

With the armature in the free position, the contact gap must be .018 in. minimum.

Finally, re-set the cut-out adjusting screw.

Cleaning Contacts.

If the cut-out contacts appear rough or burnt, place a strip of fine glasspaper between them, close the contacts by hand and draw the paper through two or three times with the rough side towards each contact in turn. Wipe away dust or other foreign matter with methylated spirits.

Do not use emery cloth or carborundum stone for cleaning cut-out contacts.

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham 11
Printed in England

BSA SERVICE SHEET No. 805

Reprinted Feb., 1959

All Models

BATTERY — LEAD-ACID TYPES

The range of Lucas batteries listed here covers those models fitted to B.S.A. motor cycles in recent years.

PU5E and LVW5E	Small capacity batteries for lightweight machines.
PU7E	Standard battery for cradle mounting.
GU11E	Larger capacity battery for sidecar machines.
SC7E	Large capacity lightweight battery for machines fitted with starting motors or two-way radio equipment, e.g. police machines.

All current Lucas motor cycle batteries are 'dry charged', and do not require initial charging. Except that these batteries have porous rubber separators, they are identical with earlier models supplied wet or uncharged and require the same routine maintenance when in service.

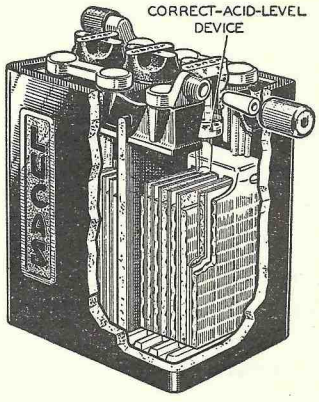


Fig. Y18. Sectioned battery, model PU7E/9

STORAGE

Used batteries must be fully charged before storing. In temperate climates they should be examined fortnightly, or weekly in the case of model LVW5E and all models when stored in the tropics. If necessary, give them a short refreshing charge.

After a long period of storage, the condition of the battery will often improve if it is put through a 'cycle', as described on page 4.

MAINTENANCE

Every fortnight, or more frequently in hot climates, examine the condition of the battery. Examine five-plate batteries every week.

Never use a naked light when examining the condition of the cells, as there is a danger of igniting the gas coming from the active materials.

Cleaning

Remove the battery cover and clean the cell tops. Examine the connections. If they are loose or dirty, remove them and scrape the contact surfaces clean. Coat them with petroleum jelly before replacing.

Remove the filler plugs and check that the vent holes are clear and that the rubber washer fitted under some plugs is in good condition.

Topping-up

During charging, water is lost by gassing and evaporation. Examine the electrolyte level in each cell and, if necessary, add distilled water to raise the electrolyte level with the top edges of the separators.

SC7E batteries have a woven glass pad fitted in each cell to reduce splashing when the battery is gassing during charging. When 'topping-up' this type of battery it is useful to note that the correct electrolyte level is reached when moisture appears through the porous glass pad.

The Lucas Battery Filler

The use of a Lucas motor cycle Battery Filler will be found helpful in this 'topping-up' process, as it ensures that the correct electrolyte level is automatically attained and also prevents distilled water from being spilled over the battery top.

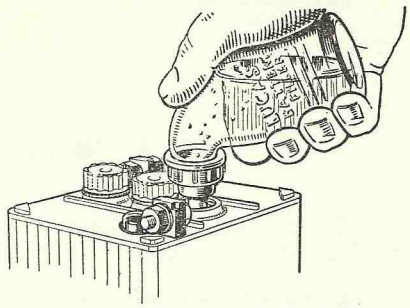


Fig Y19. The Lucas battery filler

Correct-Acid-Level-Devices

The correct-acid-level-device fitted to some Lucas batteries consists of a central tube with a perforated flange which rests on a ledge in the filling orifice.

When 'topping-up' a battery fitted with these devices, pour distilled water round the flange (not down the tube) until no more drains through into the cell. This will happen when the electrolyte level reaches the bottom of the central tube and prevents further escape of air displaced by the 'topping-up' water. Lift the tube slightly to allow the small amount of water in the flange to drain into the cell. The electrolyte level will then be correct.

If a battery requires 'topping-up' too frequently, the voltage regulator (on machines fitted with d.c. generators) may be out of adjustment, i.e. set too high, and should be checked. Conversely, a persistently low state of charge may be due to a regulator being set too low.

If one cell in particular needs 'topping-up' more than another, it is likely the container is cracked, in which event replace the battery and clean the carrier, using a solution of ammonia or bi-carbonate of soda in water. After cleaning and drying, paint the battery carrier and other surfaces affected by the electrolyte with anti-sulphuric paint.

TABLES OF SPECIFIC GRAVITIES AND CHARGING RATES

Battery	Plates per cell	Amp. Hr. Capacity		Electrolyte to fill one two-volt cell		Home Trade and Climates Ordinarily below 90°F. (32°C.) Specific Gravity of Acid (corrected to 60°F.)		Climates frequently over 90°F. (32°C.) Specific Gravity of Acid (corrected to 60°F.)		Initial Charge Current	Re-charge Current
1	2	3		4		5	6	7	8	9	10
		At 10 hour rate	At 20 hour rate	Pint	c.c.	Filling	Fully Charged	Filling	Fully Charged	Amp.	Amp.
LVW5E	5	5	5.7	1/8	71	1.270	1.270–1.290	1.210	1.210–1.230	0.3	0.5
PU5E	5	8	9	1/6	94	1.270	1.270–1.290	1.210	1.210–1.230	0.6	1.0
PU7E	7	12	13.5	1/5	113	1.270	1.270–1.290	1.210	1.210–1.230	0.8	1.5
GU11E	11	20	22.8	1/3	189	1.270	1.270–1.290	1.210	1.210–1.230	1.3	2.2
SC7E	7	22.5	26	—	250	1.270	1.270–1.290	1.210	1.210–1.230	1.5	2.5

The maximum permissible electrolyte temperature during charging is given below. Should the temperature of the electrolyte exceed this value interrupt the charge and allow the battery temperature to fall at least 10°F. (5.5°C.) before charging is resumed.

Climates normally below 80°F. (27°C.)	Climates between 80°–100°F. (27°–38°C.)	Climates frequently above 100°F. (38°C.)
100°F. (38°C.)	110°F. (43°C.)	120°F. (49°C.)

The specific gravity of the electrolyte varies with temperature. For convenience in comparing specific gravities, they are always corrected to 60°F., which is adopted as the reference temperature. The method of correction is as follows:

For every 5°F. *below* 60°F., *deduct* 0.002 from the observed reading to obtain the true specific gravity at 60°F. For every 5°F. *above* 60°F., *add* 0.002 to the observed reading to obtain the true specific gravity at 60°F.

The temperature must be that indicated by a thermometer having its bulb actually immersed in the electrolyte, and not the ambient temperature.

SERVICING

Battery Persists in Low State of Charge

First consider the conditions under which the battery is used. If the battery is subject to continuous discharge, e.g. long periods of night parking with lights on without suitable opportunities for recharging, a low state of charge is inevitable.

A fault in the dynamo or regulator, or neglect during a period out of commission, may also be responsible.

Vent Plugs

See that the ventilating holes in each vent plug are clear, and that the rubber washer fitted under the plug is in good condition.

Level of Electrolyte

The surface of the electrolyte should be level with the tops of the separators. If necessary, top-up with distilled water. Any loss of acid from spilling or spraying (as opposed to normal loss of *water* by evaporation) should be made good by dilute acid of the same specific gravity as that already in the cell.

Cleanliness

See that the top of the battery is free from dirt or moisture which might provide a discharge path. Check that the battery connections are clean and tight.

Hydrometer Tests

The space between each separator is not wide enough to permit the nozzle of an hydrometer to be inserted. Before taking a sample, tilt the battery to bring sufficient electrolyte above the separators. If the level of the electrolyte is so low that an hydrometer reading cannot be taken, no attempt should be made to take a reading after adding distilled water until the battery has been on charge for at least 30 minutes.

Measure the specific gravity of the acid in each cell in turn. The reading given by each cell should be approximately the same; if one cell differs appreciably from the others, an internal fault in that cell is indicated.

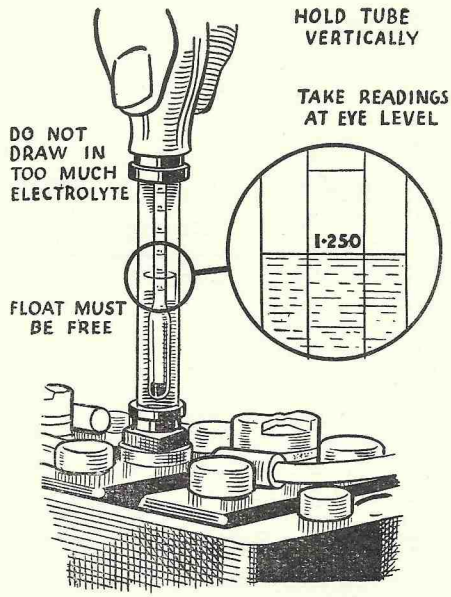


Fig Y20. Taking hydrometer readings

Specific gravity readings and their indications are as follows:

Climates under 90°F.			Climates over 90°F.
1.270—1.290	..	Cell fully charged	1.210—1.230
1.190—1.210	..	Cell about half discharged	1.130—1.150
1.110—1.130	..	Cell fully discharged	1.050—1.070

The appearance of the electrolyte drawn into the hydrometer when taking a reading gives a useful indication of the state of the plates: if it is very dirty, or contains small particles in suspension, it is possible that the plates are in a bad condition.

Discharge Test

Motor-cycle batteries must *not* be subjected to the heavy discharge test, as recommended for motor-car and commercial vehicle batteries.

RECHARGING FROM AN EXTERNAL SUPPLY

If the hydrometer test indicates that the battery is merely discharged, and is otherwise in a good condition, it should be recharged, either on the motor-cycle by a period of daytime running, or on the bench from an external supply.

If the latter, the battery should be charged at the rate given in the table until the specific gravity and voltage show no increase over three successive hourly readings. During the charge the electrolyte must be kept level with the tops of the separators by the addition of distilled water.

A battery that shows a general falling-off in efficiency, common to all cells, will often respond to the process known as 'cycling'. This process consists of fully charging the battery by passing through it from an external source the appropriate re-charge current given in the table. The battery is then discharged by connecting to a lamp board, or other load, taking a current equal to the normal re-charge current. The battery should be capable of providing this current for at least 7 hours before it is fully discharged, as indicated by the voltage of each cell falling to 1.8. If the battery discharges in a shorter time, repeat the 'cycle' of charge and discharge.

PREPARING BATTERIES FOR SERVICE

All new batteries are supplied without electrolyte but with the plates in a charged condition. When they are required for service it is only necessary to fill each cell with sulphuric acid of the correct specific gravity. No initial charging is required.

Preparation of Electrolyte

The electrolyte is prepared by mixing together distilled water and concentrated sulphuric acid. The mixing must be carried out either in a lead-lined tank or in suitable glass or earthenware vessels. Slowly add the acid to the water, stirring with a glass rod. *Never add water to acid*, as the resulting chemical reaction causes violent and dangerous spurting of the concentrated acid. The specific gravity of the filling electrolyte depends on the climate in which the battery is to be used.

The approximate proportions of acid and water are indicated in the following table:

To obtain Specific Gravity (corrected to 60°F.) of	Add 1 vol. of acid 1.835 S.G. (corrected to 60°F.) to
1.270	2.8 vols. of water
1.210	4.0 vols. of water

Heat is produced by the mixture of acid and water, and the electrolyte should be allowed to cool before pouring it into the battery.

The total volume of electrolyte required can be estimated from the figures quoted in the table on page 2.

Filling the Battery

Carefully break the seals in the cell filling holes and fill each cell with electrolyte to the top of the separators, *in one operation*. The temperature of the filling room, battery and electrolyte should be maintained between 60°F. and 100°F. If the battery has been stored in a cool place, it should be allowed to warm up to room temperature before filling.

Putting into Use

Batteries filled in this way are 90 per cent charged. If time permits, however, a freshening charge of four hours at the normal recharge rate given in the table would be beneficial.

During the charge the electrolyte must be kept level with the top edge of the separators by the addition of distilled water. Check the specific gravity of the acid at the end of the charge; if 1.270 acid was used to fill the battery, the specific gravity should now be between 1.270 and 1.290; if 1.210, between 1.210 and 1.230.

Maintenance in Service

After filling, the battery needs only the recommended attention.

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 10
Printed in England.

JU/B2984

BSA SERVICE SHEET No. 806

Reprinted Feb., 1959

All Models

LAMPS

LUCAS LIGHTING

Headlamps

Although the headlamps fitted to individual models may vary in detail, they remain similar with regard to the general features described below. All headlamps are fitted with a double filament main bulb and a pilot bulb. One of the double filaments provides the main riding beam while the second, brought into operation by means of the dipper switch, provides the dipped beam.

On some models the headlamp incorporates a panel containing the ammeter and lighting switch but if a cowl is fitted then it carries these components externally to the headlamp shell.

Other headlamps contain wire wound resistances for the purpose of reducing the charging rates under certain conditions and these are described under the appropriate lighting circuit.

Setting and Focusing

The best way of checking the setting of the lamp is to park the motor cycle in front of a light coloured wall at a distance of about 25 feet. If necessary, slacken the bolts securing the headlamp and move the lamp until, with the main driving light switched on, the beam is projected straight ahead and parallel with the ground. With the lamp in this position, the height of the beam centre from the ground should be the same as the height of the centre of the headlamp from the ground.

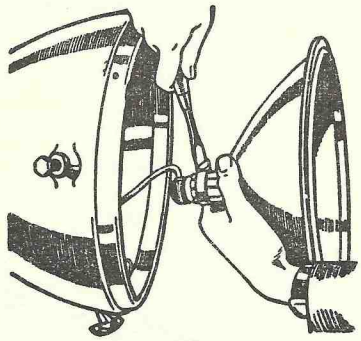


Fig. Y.22 Headlamp Focusing.

The headlamp must be focused so that, when the main driving light is switched on, a uniform beam without any dark centre is given. If the bulb needs adjusting, remove the lamp front and reflector, as described below, and slacken the bulb holder clamping clip at the back of the reflector. Move the bulb holder backwards and forwards until the correct position is obtained, and then tighten the clamping clip.

More sealed beam light units are fitted with the pre-focus type of bulb and therefore no focusing is necessary.

Removal of Front and Reflector, pre-1948 models

Press back the fixing clip at the bottom of the lamp. The front and reflector can now be taken off. The bulb holder is secured to the reflector by means of two fixing springs. When replacing the front, locate the top of the rim first, then press on at the bottom and secure with the fixing clip.

1948 Models (Fig. Y.23)

Press back the fixing clip at the bottom of the lamp, and remove the lamp front. The reflector is secured to the lamp body by means of a rubber bead. When refitting the rubber bead, locate its thinner lip between the reflector rim and the edge of the lamp body. To replace the front, locate the metal tongue in the slot at the top of the lamp, press the front on, and secure by means of the fixing catch.

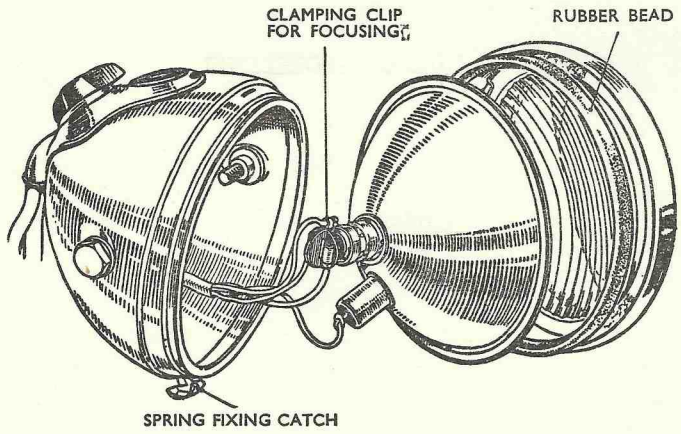


Fig. Y.23.

Sealed Beam Headlamps

Later models are fitted with a sealed light unit having the reflector and glass sealed together. After slackening the securing screw on the top of the headlamp, the rim, complete with light unit, may be removed. To replace, locate the rim on the lip at the bottom of the lamp body, press the light unit assembly and rim into position and tighten the securing screw. The main headlamp bulb in some of these headlamps is of the pre-focus type and is held in position by a cap with bayonet type fitting. In all cases access to the main or pilot bulbs is obtained by removal of the light unit assembly.

Breakage of the headlamp glass with this type of unit involves replacement of the glass and reflector complete. The light unit may be removed from the headlamp rim after prising out the retaining clips.

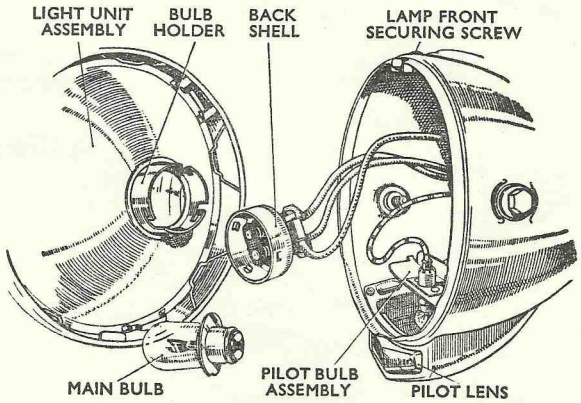


Fig. Y.24 Sealed Beam Unit.

Replacement of Bulbs

When the replacement of a bulb is necessary, it is important not only that the same size bulb is fitted, but that it has a high efficiency and will focus in the reflector. Cheap and inferior replacement bulbs often have the filament of such a shape that it is impossible to focus correctly; for example, the filament may be to the one side of the axis of the bulb resulting in loss of range and light efficiency.

Lucas Genuine Spare Bulbs are specially tested to check that the filament is in the correct position to give the best results with Lucas lamps. To assist in identification, Lucas bulbs are marked on the metal cap with a number. When fitting a replacement, see that it has the same number as the original bulb.

When fitting a main headlamp bulb, care must be taken to insert it the correct way round, i.e. with the dipped beam filament above the centre filament.

The pre-focus type bulb is located by a flange and there is a notch which engages on a raised portion of the bulb holder to ensure correct positioning.

Where the pilot bulb is contained in an underslung cowl, the metal strip on which the bulb is mounted should be pushed to the rear and lifted away in order to provide access to the bulb.

Tail Lamps

Where the tail lamp is of the metal type the body or back should be removed by pushing it in, rotating to the left, and pulling away, thus providing access to the bulb. The moulded plastic type of rear lamp can be dismantled by unscrewing the two screws in the cover.

When a stop lamp is fitted, a two-filament type of bulb is employed with offset bayonet type fixing pins to ensure that it can only be fitted correctly.

MAIN BULBS

Models A7, A10, B31, 32, 33, 34, C12 and M20, M21.

Lucas No. 168, 6v. 24/24w. (with E3H Dynamo). Lucas No. 169, 6v. 30/30w. (with E3L Dynamo). Lucas No. 312, 6v. 30/24w. (Pre-focus type Bulb).

Models C10 and C11.

Lucas No. 180, 6v., 18/18w. (with E3H Dynamo). Lucas No. 168, 6v. 24/24w. (with E3L Dynamo).

Models C11G and D1 (early) Lucas

Lucas No. 312, 6v. 30/24w. (Pre-focus type Bulb).

PILOT

Lucas No. 200, 6v. 3w. Lucas No. 988, 6v. 3w. (with Sealed Beam Light Unit).

TAIL

Lucas No. 205, 6v. 6w.
Lucas No. 384, 6v. 6/18w. (Stop/Tail Lamp).

JU/B2984

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 10
Printed in England

BSA SERVICE SHEET No. 807

Reprinted Feb., 1959

All Models

ELECTRIC HORN—HIGH FREQUENCY MODELS

General

Electric horns are adjusted to give their best performance before leaving the Works, and will give long periods of service without any attention.

Servicing

If the horn becomes uncertain in action or does not vibrate, it does not follow that the horn has broken down. The trouble may be due to a discharged battery or a loose or broken connection in the horn wiring.

The performance of the horn may be upset by the fixing bolt working loose, or by the vibration of some part adjacent to the horn. To check this, remove the horn from its mounting, hold it firmly in the hand by its bracket and press the push. If the note is still unsatisfactory, the horn may require adjustment, but this should only be necessary after a very long period of service.

Method of Adjusting

The adjustment of a horn does not alter the characteristics of the note but merely takes up wear of vibrating parts.

If the horn is used repeatedly when badly out of adjustment, due usually to unsuccessful attempts at adjustment, the horn may become damaged, due to the excessive current which it will take. When testing, do not continue to operate the push if the horn does not sound. If, when the push is operated, the horn does not take any current (indicated by an ammeter connected in series with the horn) it is possible that the horn has been adjusted so that its contact breaker is permanently open.

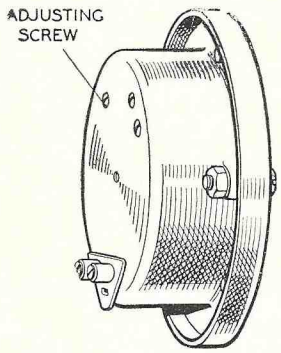


Fig. Y26.
Typical electric horn, showing adjustment screw.

After adjusting, note the current consumption, which must not exceed 3—4 amperes. A horn may give a good note, yet be out of adjustment and taking an excessive current. When adjusting do not attempt to unscrew the nut securing the tone disc or any other screw in the horn.

The adjustment is made by turning the adjustment screw, usually in a clockwise direction. The underside of the screw is serrated, and the screw must not be turned for more than 2 or 3 notches before re-testing. If the adjustment screw is turned too far in a clockwise direction, a point will occur at which the armature pulls in but does not separate the contacts.

Some models have no adjustment screw at the back of the horn. Adjustment is carried out by means of the grub screw and locking collar which are revealed upon removal of the large domed nut on the front of the horn. Take care that the large nut securing the sounding disc is not disturbed. The locking collar requires a special tool, or a large screw-driver with the blade ground so as to leave two projecting prongs, in order that it may be undone. No attempt should be made to loosen the collar without a proper tool as it is very tight and may become damaged so that it cannot be removed. The adjustment should be carried out in a similar manner to that described for the other type of horn, but the locking collar should be firmly tightened after each adjustment as this affects the note.

B.S.A. MOTOR CYCLES LTD.,
Service Dept., Birmingham, 10.
Printed in England.

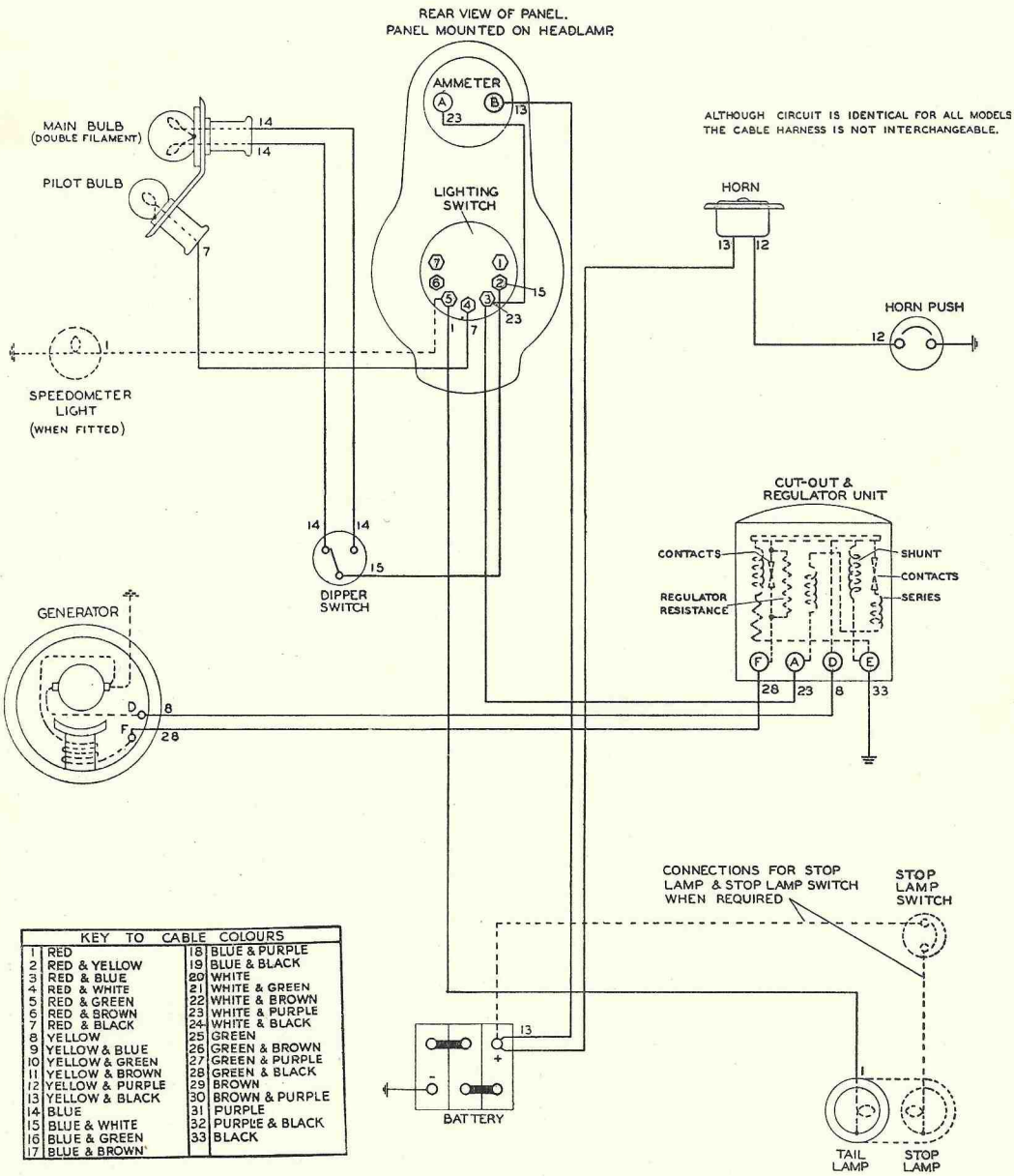
BSA SERVICE SHEET No. 808

Oct., 1948
Reprinted Aug., 1958

A, B and M Group Models

WIRING DIAGRAMS

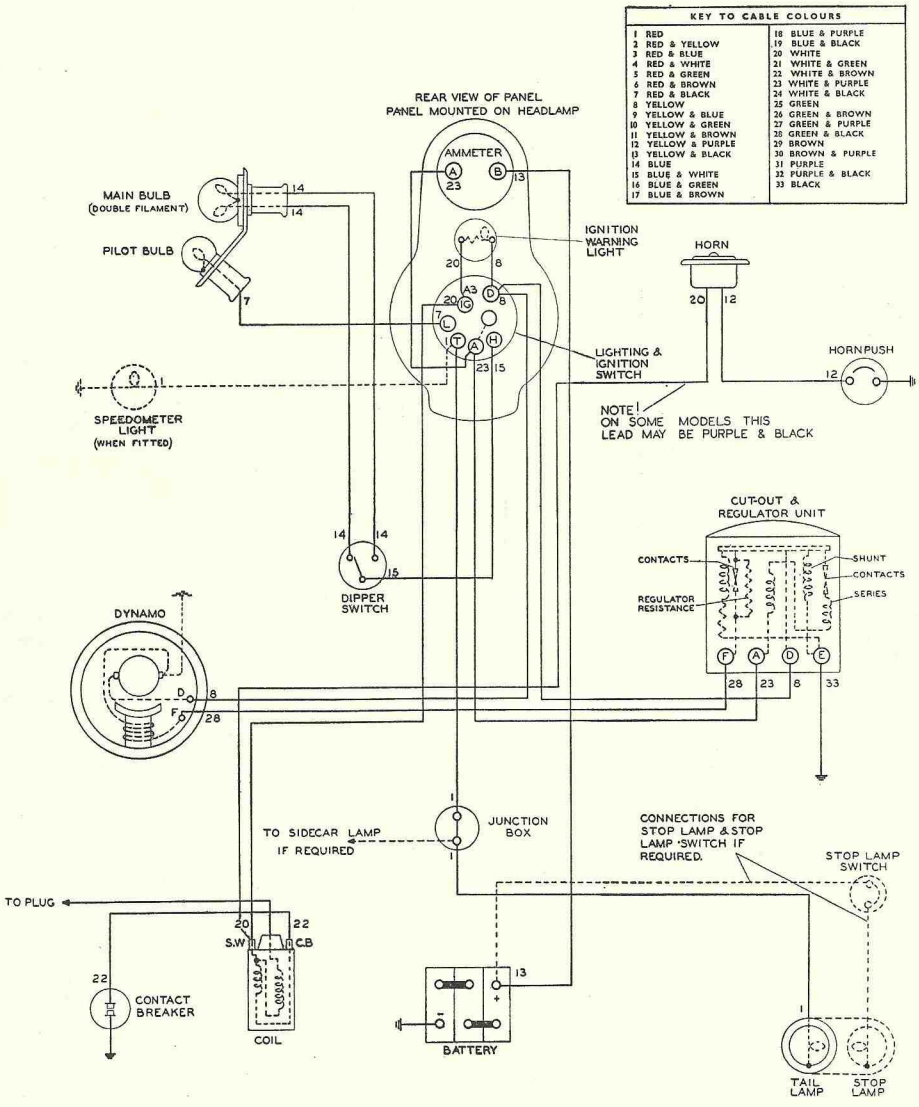
(NEGATIVE EARTH)



KEY TO CABLE COLOURS			
1	RED	18	BLUE & PURPLE
2	RED & YELLOW	19	BLUE & BLACK
3	RED & BLUE	20	WHITE
4	RED & WHITE	21	WHITE & GREEN
5	RED & GREEN	22	WHITE & BROWN
6	RED & BROWN	23	WHITE & PURPLE
7	RED & BLACK	24	WHITE & BLACK
8	YELLOW	25	GREEN
9	YELLOW & BLUE	26	GREEN & BROWN
10	YELLOW & GREEN	27	GREEN & PURPLE
11	YELLOW & BROWN	28	GREEN & BLACK
12	YELLOW & PURPLE	29	BROWN
13	YELLOW & BLACK	30	BROWN & PURPLE
14	BLUE	31	PURPLE
15	BLUE & WHITE	32	PURPLE & BLACK
16	BLUE & GREEN	33	BLACK
17	BLUE & BROWN		

Numbers indicate cable identification colours. See key.

C10 and C11 Models
WIRING DIAGRAM
(NEGATIVE EARTH)



Numbers indicate cable identification colours. See key.

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 11
Printed in England.

J.U. B2175

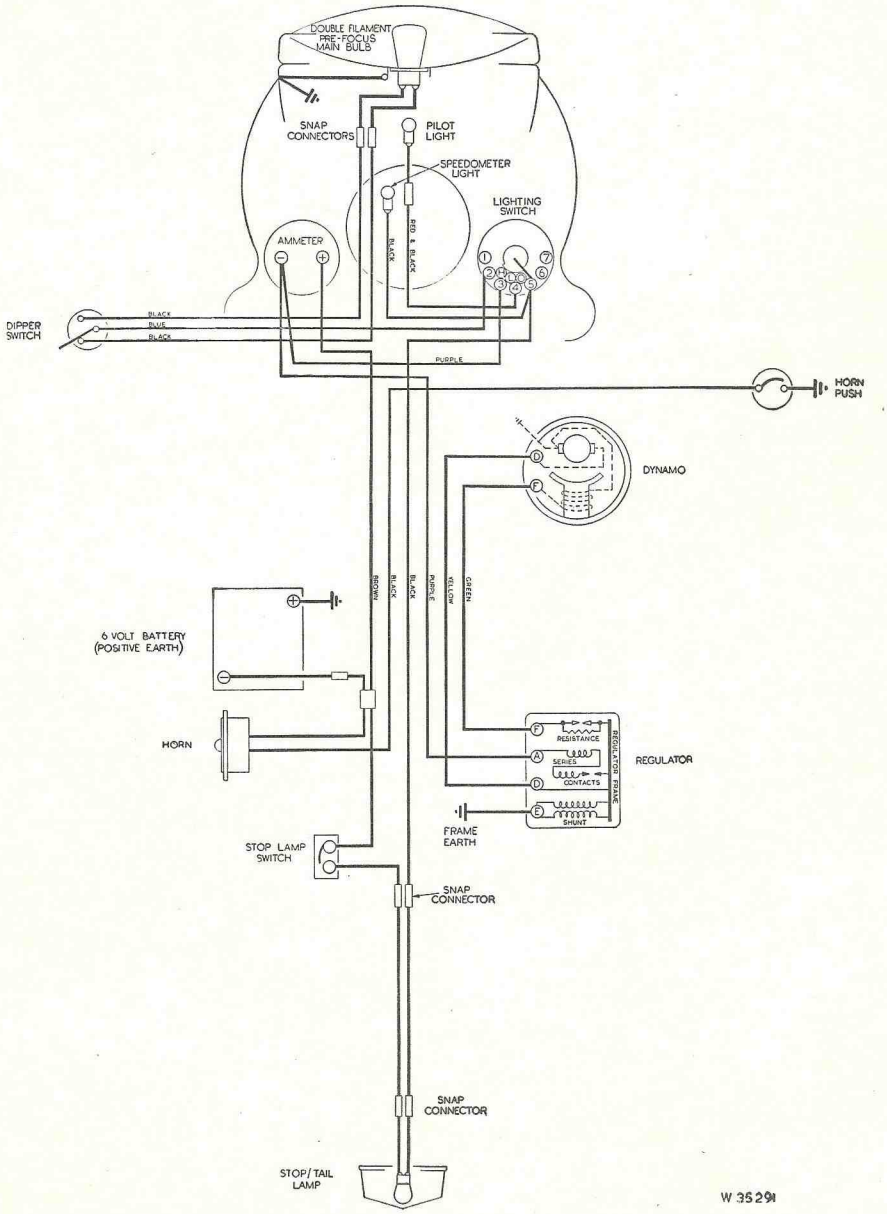
BSA SERVICE SHEET No. 808A

Reprinted December, 1958

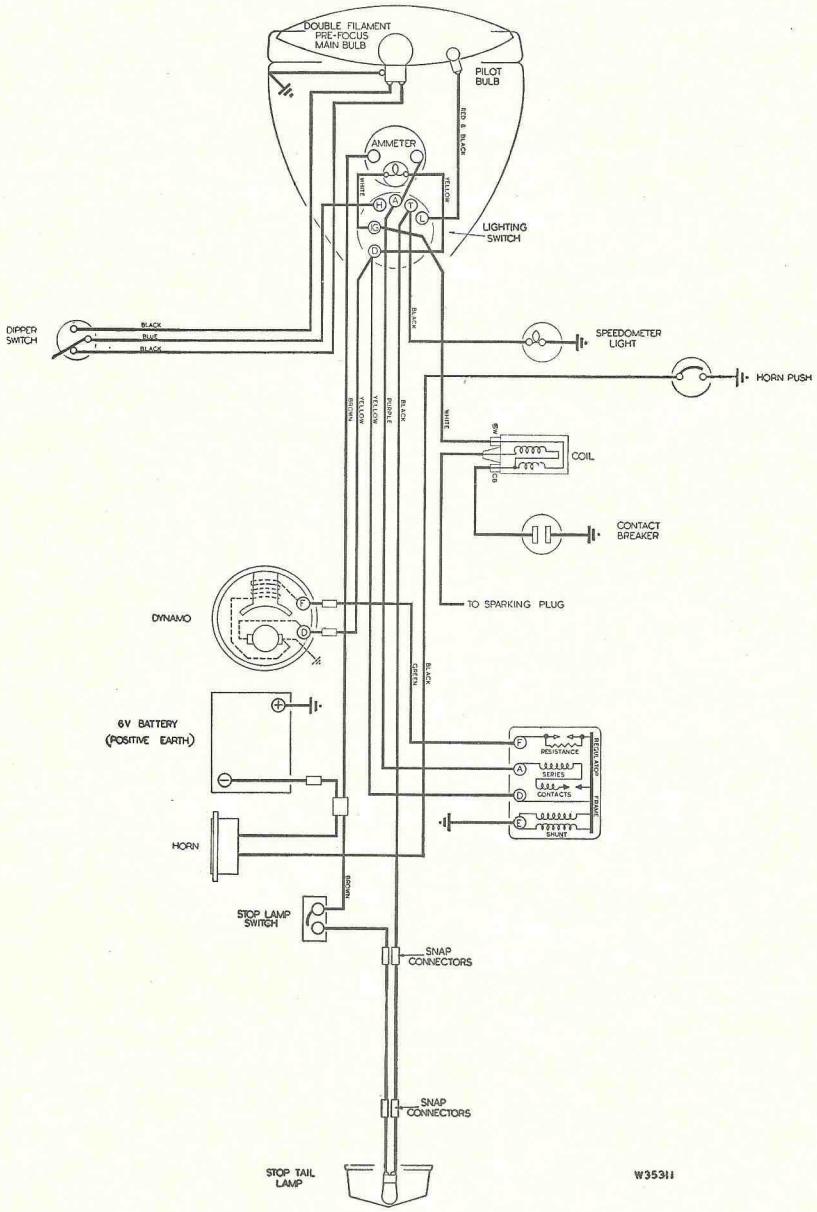
A, B and M Group Models

WIRING DIAGRAM

(Positive Earth System)



C Group Models
WIRING DIAGRAM
(Positive Earth System)



Printed in England.

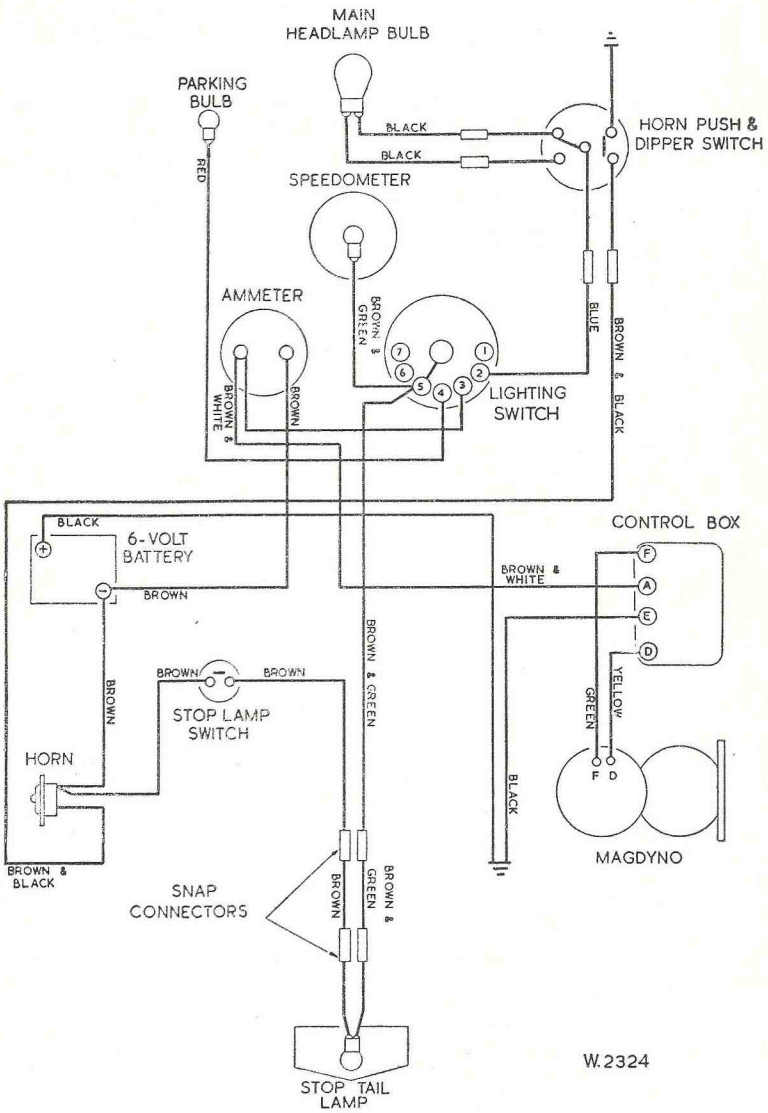
B.S.A. MOTOR CYCLES LTD.,
Service Dept., Birmingham 11.

BSA SERVICE SHEET No. 808F

March 1957

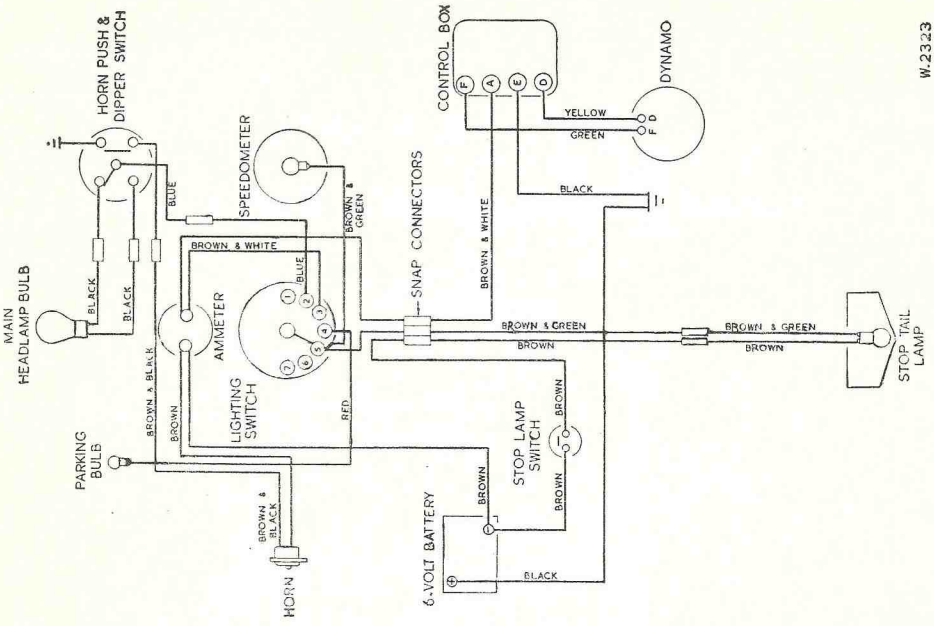
M Group Models

WIRING DIAGRAM (Positive Earth System)

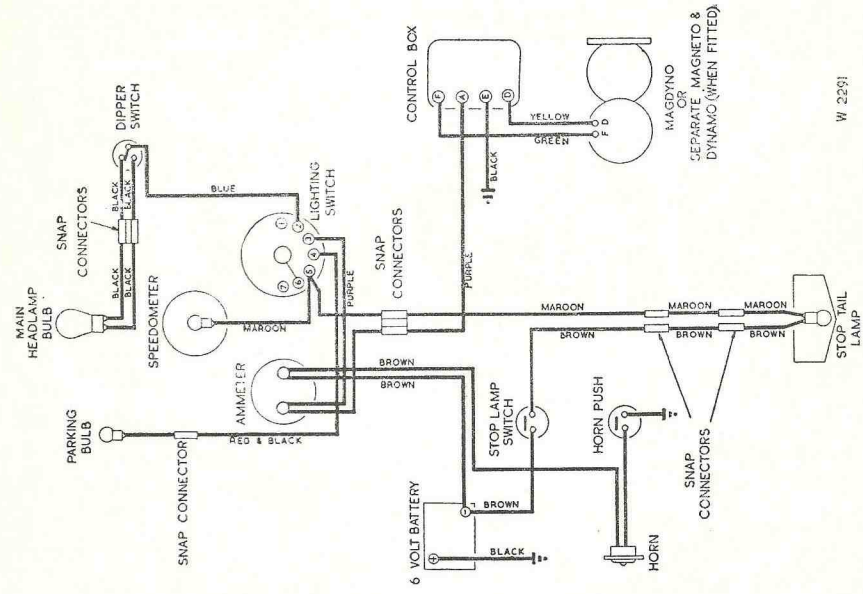


1956/57 Models

A and B Group Models. Wiring Diagrams



1956-57 Models (Positive Earth)



1955-56 Models (Positive Earth)

Printed in England

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham 11

BSA SERVICE SHEET No. 809

October, 1948
Revised October, 1958

All Models except D1, C10L, C11G, C12, C15 & B group fitted with alternators

GENERATORS—MODELS E3H and E3HM

The generator is a shunt-wound two pole machine, arranged to work in conjunction with a regulator unit to give an output which is dependent on the state of charge of the battery and the loading of the electrical equipment in use. When the battery is in a low state of charge, the generator gives a high output, whereas if the battery is fully charged the generator gives only a trickle charge to keep the battery in a good condition without overcharging. In addition, an increase of output is given to balance the current taken by the lamps when in use.

Models E3H and E3HM are similar in construction. The former will be found on motor cycles having separate magneto or coil ignition, while Model E3HM is the generator portion of the combined unit known as the "Magdyno".

ROUTINE MAINTENANCE

Lubrication

The lubricator at the commutator end bracket must be given a few drops of good grade thin machine oil every 1,000—2,000 miles. The bearing at the driving end is packed with H.M.P. grease and will last until the machine is taken down for a general overhaul, when the bearing should be repacked.

Inspection of commutator and brushgear

About once every six months remove the cover band for inspection of commutator and brushes. The brushes are held in contact with the commutator by means of springs. Move each brush to see that it is free to slide in its holder; if it sticks, remove it and clean

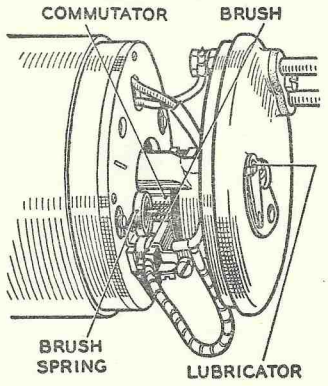


Fig. Y.30. Commutator and bracket assembly

with a cloth moistened with petrol. Care must be taken to replace the brushes in their original positions, otherwise they will not "bed" properly on the commutator. If, after long service, the brushes have become worn to such an extent that the brush flexible in

exposed on the running face, or if the brushes do not make good contact with the commutator, they must be replaced by genuine Lucas brushes. The commutator should be free from any trace of oil or dirt and should have a highly polished appearance. Clean a dirty or blackened commutator by pressing a fine dry cloth against it while the engine is slowly turned over by means of the kick starter crank. (It is an advantage to remove the sparking plug before doing this). If the commutator is very dirty, moisten the cloth with petrol.

Test Data

Cutting-in speed: 1250—1500 r.p.m. at 7 generator volts.

Output: 6.5 amps. at 1900—2200 r.p.m. at 7 generator volts, taken on 1.1 ohm resistance load. Resistance to be capable of carrying 10 amps. without overheating.

Field resistance 3.2 ohms.

SERVICING

Testing in position to locate fault in charging circuit

In the event of a fault in the charging circuit, adopt the following procedure to locate the cause of trouble.

Check that the generator and regulator unit are connected correctly. The generator terminal "D" should be connected to the regulator unit terminal "D" and generator terminal "F" to regulator unit terminal "F".

Remove the cables from the generator terminals "D" and "F" and connect the two terminals with a short length of wire. Start the engine and set to run at normal idling speed.

Connect the positive lead of a moving coil voltmeter, calibrated 0—10 volts, to one of the generator terminals and connect the negative lead to a good earthing point on the generator yoke or engine.

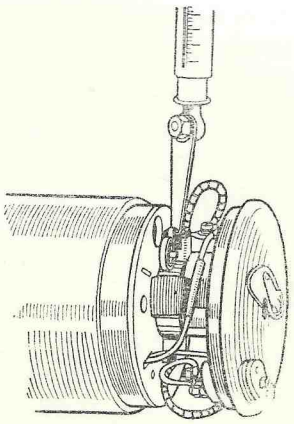


Fig. Y.31. Testing brush spring tension

Gradually increase the engine speed, when the voltmeter reading should rise rapidly and without fluctuation. Do not allow the voltmeter reading to rise above 10 volts, and do not race the engine in an attempt to increase the voltage. It is sufficient to run the generator up to a speed of 1,000 r.p.m. If there is no reading, check the brush gear as

described below. If there is a low reading of approximately ½ volt, the field winding may be at fault. If there is a reading of approximately 1½ to 2 volts, the armature winding may be at fault.

Remove the cover band and examine the brushes and commutator. Hold back each of the brush springs and move the brush by pulling gently on its flexible connector. If the movement is sluggish, remove the brush from its holder and ease the sides by lightly polishing on a smooth file. Always replace brushes in their original positions. If the brushes are worn so that they do not bear on the commutator, or if the brush flexible is exposed on the running face, new brushes must be fitted.

Test the brush spring tension with a spring scale. The correct tension is 10—15 oz., and new springs must be fitted if the tension is low.

If the commutator is blackened or dirty, clean it by holding a petrol-moistened cloth against it while the engine is turned slowly by means of the kick start (with sparking plug removed).

Re-test the generator as above. If there is still no reading on the voltmeter, there is an internal fault and the complete unit, if a spare is available, should be replaced. Otherwise the unit must be dismantled for internal examination.

If the generator is in good order, restore the original connections. Connect regulator unit terminal "D" to generator terminal "D" and regulator terminal "F" to generator terminal "F". Proceed to test the regulator unit as described in Service Sheet No. 804.

To Dismantle

Remove the generator from the motor cycle. To remove the generator from the Magdyno, unscrew the hexagon-headed nut from the driving end cover and slacken the two screws securing the band clip. Proceed to dismantle, as follows:

On E3HM machines, bend back the tag on the washer "B" Fig. Y.33, locking the screw "A" securing the driving gear "C" and remove the screw. On E3H machines, withdraw the cotter pin "A" and remove the nut "B" from the armature shaft. Withdraw the gear

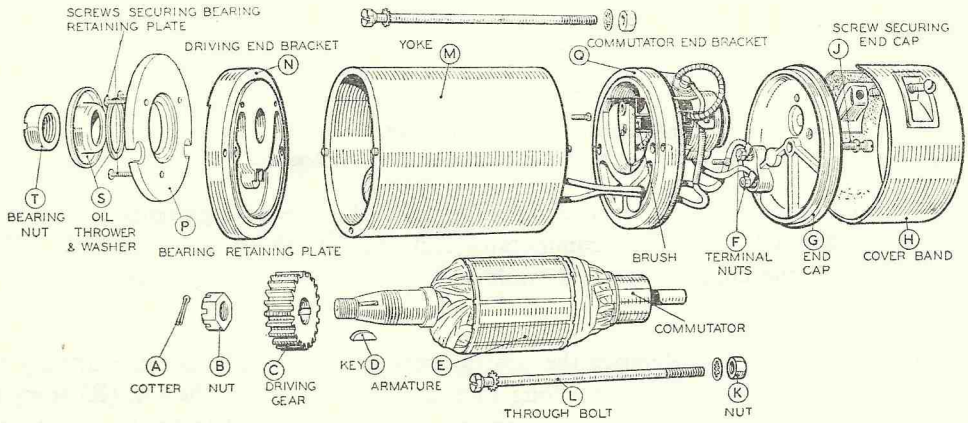


Fig. Y.32. Generator, model E3H (with oil seal)

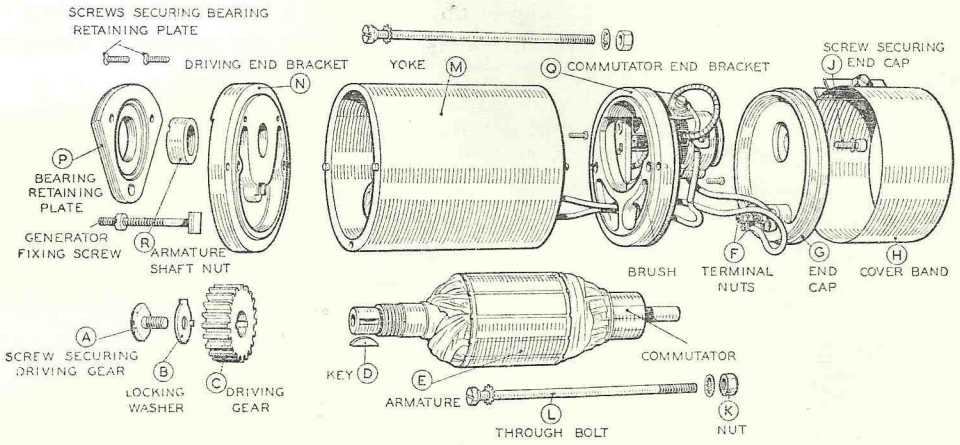


Fig. Y.33. Generator, model E3HM

from the shaft by carefully levering it off or by means of an extractor. Remove the key(s) "D", from the shaft.

Remove the cover band "H", hold back the brush springs and lift the brushes from their holders.

Take out the screw "J", with spring washer, from the centre of the black moulded end cap "G". Draw the cap away from the end bracket, take off terminal nuts "F", and spring washers, and lift the connections off the terminals.

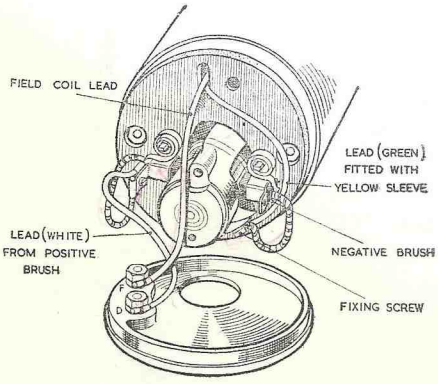


Fig. Y.34. Generator connections

Note.—On later machines, the white lead is omitted, the brush flexible lead being connected direct to terminal "D"

Unscrew and remove from the driving end bracket the two through bolts "L" securing the driving end bracket "N" and commutator end bracket "Q" to the yoke "M". Hold the nuts "K" at the commutator end while unscrewing the bolts, and take care not to lose the nuts.

On E3HM Machines. Remove the bearing retaining plate (P) from the driving end bracket secured by two screws and a long threaded bolt. Unscrew the nut (R) from the end of the armature shaft and the armature can then be removed from the driving end bracket (N) by means of a hand press.

On E3H Machines remove the bearing nut (T) and the oil thrower and washer (S). Withdraw the three screws securing the retaining plate (P). The armature can then be removed from the driving end bracket (N) by means of a hand press.

Take out the screw securing the green field coil lead with the yellow sleeve to commutator end bracket and remove the end bracket "Q", withdrawing the connectors through the slot in the insulating plate.

Unscrew the three screws securing the insulating plate to the commutator end bracket and remove the plate complete with brushgear.

Commutator

Examine the commutator. If it is in good condition, it will be smooth and free from pits or burned spots. Clean with a petrol-moistened cloth. If this is ineffective, carefully polish with a strip of very fine glasspaper while rotating the armature. To remedy a badly worn commutator, mount the armature with or without the drive end bracket in a lathe, rotate at high speed and take a light cut with a very sharp tool. Do not remove more metal than is necessary. Polish the commutator with very fine glasspaper.

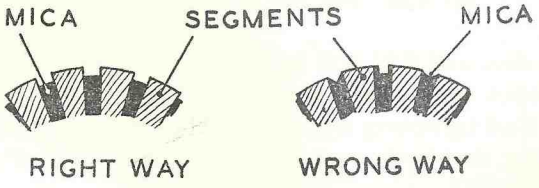


Fig. Y.35 Method of undercutting commutator insulation

Undercut the mica insulation between the segments to a depth of $\frac{1}{32}$in. with a hacksaw blade ground down until it is only slightly thicker than the mica.

Field Coil

Measure the resistance of the field winding by means of an ohm meter. If this is not available, connect a 6-volt D.C. supply with an ammeter in series across the coil. The ammeter reading should be approximately 1.9 amperes. No reading on the ammeter indicates an open circuit in the field winding.

To check for earthed coil, connect a mains test lamp between one end of the coil and the yoke. If the bulb lights, there is an earth between coil and yoke.

In either case, unless a replacement generator is available, the field coil must be replaced, but this should only be attempted if a wheel-operated screwdriver and pole shoe expander are at hand, the latter being especially necessary to ensure that there will not be any airgap between the pole shoe and the inner face of the yoke.

To replace the field coil, proceed as follows:

Unscrew the pole shoe retaining screw (Fig. Y.36) by means of the wheel-operated screwdriver.

Draw the pole shoe and field coil out of the yoke and lift off the coil.

Fit the new field coil over the pole shoe and place it in position inside the yoke. Take care to ensure that the taping of the field coil is not trapped between the pole shoe and the yoke.

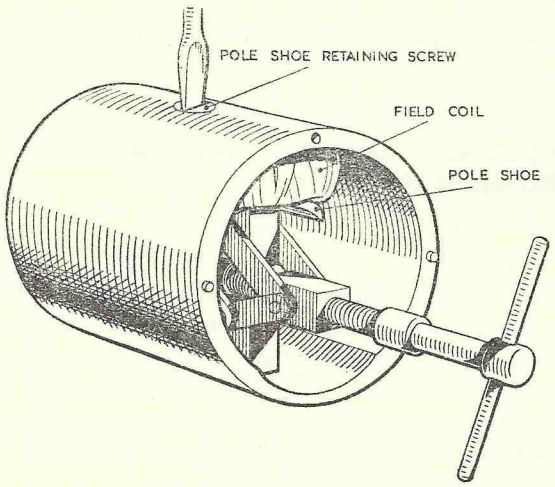


Fig. Y.36. Pole shoe and field coil assembly

Locate the pole shoe and field coil by lightly tightening the fixing screw. Insert the pole shoe expander, open to its fullest extent and tighten the screw. Remove the expander and give the screw a final tightening with the wheel-operated screwdriver. Lock the screw in position by caulking, that is, by tapping some of the metal of the yoke into the slot in the head of the screw.

Armature

The testing of the armature winding requires the use of a voltdrop test or a growler. If these are not available, the armature should be checked by substitution. No attempt should be made to machine the armature core or to true a distorted armature shaft.

Bearings

A ball bearing is fitted at the driving end and a plain porous bronze bearing bush at the commutator end.

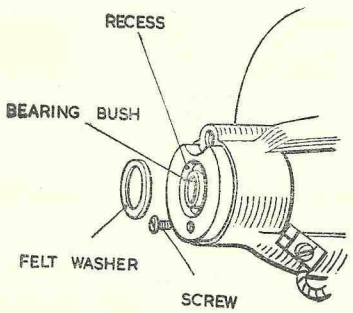


Fig. Y.37. Commutator end bracket with bearing bush

Bearings which are worn to such an extent that they will allow side movement of the armature shaft must be replaced. To replace the bearing bush at the commutator end, proceed as follows:

Remove the screw, press the bearing bush out of the commutator end bracket and remove the felt washer. (See Fig. Y.37.)

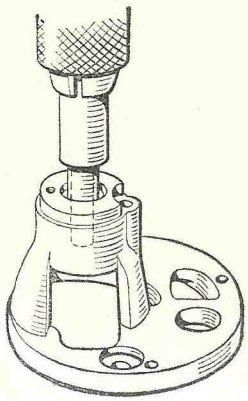


Fig. Y.38. Fitting bearing bush using a shouldered mandrel

Press the new bearing bush into the end bracket using a shouldered mandrel (Fig. Y.38) of the same diameter as the shaft which is to fit in the bearing. (Note: Before use, new bearing bushes should be stored in a covered container and fully covered with oil of a grade equivalent to Mobiloil Arctic, or other good thin mineral oil. The minimum time of soaking should normally be 24 hours, but in cases of extreme urgency this period may be shortened by heating the oil to 100°C., when the time of immersion may be reduced to 2 hours). The bush should be pressed in until it is flush with the face of the end bracket. Fit the felt washer in the space between the bearing and the wall of the bearing housing.

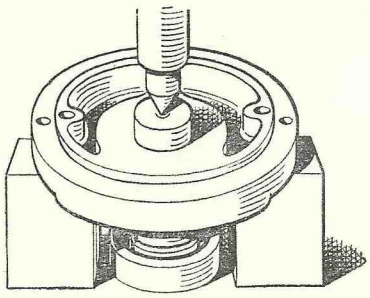


Fig. Y.39. Removing the ball race

The ball bearing at the driving end is replaced as follows:

Remove bearing retaining plate from driving end bracket as previously described.

Press the bearing out of the end bracket, using a metal drift locating on the inner journal of the bearing (Fig. Y.39).

Wipe out the bearing housing and pack the new bearing with H.M.P. grease.

Position the bearing in its housing and press it squarely home, applying pressure on the outer journal of the bearing (Fig. Y.40).

Reassembly

In the main, the reassembly of the generator is a reversal of the operations described in the paragraph on dismantling, bearing in mind the following points:

The field coil lead fitted with the short length of yellow tubing must be connected together with eyelet of the negative brush to the commutator end bracket by means of the screw provided.

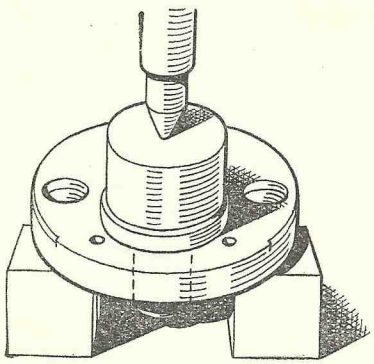


Fig. Y.40. Fitting the ball race

The second field coil lead must be connected to terminal F on the moulded end cap.

The lead (coloured white) from the terminal on the positive brush box must be connected to terminal D on the moulded end cap.

(Note: On later machines, the brush flexible lead is connected direct to terminal D and the white lead is omitted.)

Take care to refit cover band in original position and make sure that the securing screw, when of flush-fitting pattern, does not short on brushgear.

E3L Dynamo

On some models an E3L dynamo is fitted. This is an higher output machine and the test figures are as follows. Cutting in speed 1050—1200 r.p.m. at 6.5 dynamo volts. Output 8.5 amps. at 1850—2000 r.p.m. at 7 dynamo volts taken on .8 ohm resistance load. Resistance to be capable of carrying 10 amps. without overheating. Field resistance 2.8 ohms. The dismantling and testing instructions are similar to those given for the E3H Dynamo except for the following:

(1) Ball Bearing fitted at commutator end.
(2) Brush Spring Tension, 13—20 ozs.
(3) Testing Field Coils, the ammeter reading will be 2.1 amperes.

J.U. B.2410

B.S.A. MOTOR CYCLES LTD.
Service Dept., Birmingham, 11
Printed in England.

BSA SERVICE SHEET No. 813A

April 1958

C12, A Group and M21 Models

ADJUSTING THE CHARGING RATE OF LUCAS ALTERNATORS ON RADIO EQUIPPED MACHINES.

GENERAL.

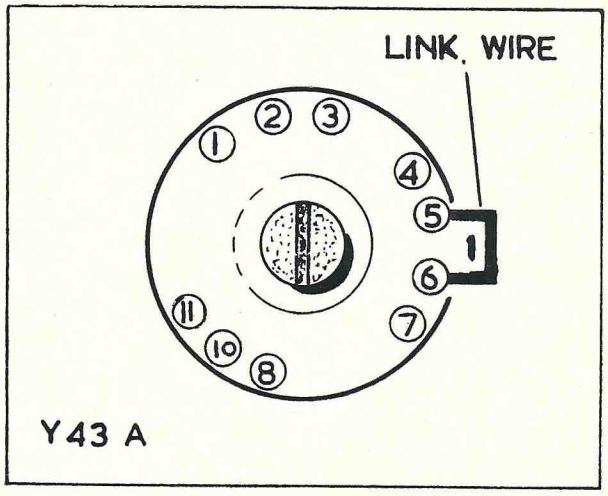
The running conditions of radio equipped machines vary from long distance daylight patrol work with occasional use of the radio, to slow running convoy or short distance local work involving considerable use of the radio and possibly of the lights as well. There is a heavy load on the battery while transmitting, and the receiver may be left switched on for long periods representing a constant drain on the battery.

Obviously, the charging rates necessary to balance these varying loads must differ widely. Lucas alternators are designed to provide three alternative charge-rates which are selected by inter-changing the wiring connections.

The adjustments are simple to perform but the responsibility for making them should rest with the Maintenance Personnel who, being familiar with the running conditions and the state of charge of the batteries, are best placed to judge when any alteration is necessary. In the event of doubt, advice should be sought from Lucas Service Organisation.

It must be emphasised that battery charging from an external source may become necessary if a large proportion of night riding with the radio in use, or transmitting for long periods with the engine stopped is involved.

The C12 is fitted with a Model RM 13/15 Alternator in conjunction with a PRS 8 Lighting and Ignition Switch.



By connecting or removing a wire link between switch terminals 5 and 6, two intermediate charge-rates can be obtained in addition to the three already mentioned.

With the link in place the switch automatically increases the alternator output in the "Pilot" and "Head" positions. When the link is removed, the output increases only in the "Head" position.

If the alternator wiring is connected as in Stage 3 maximum output is developed in all switch positions.

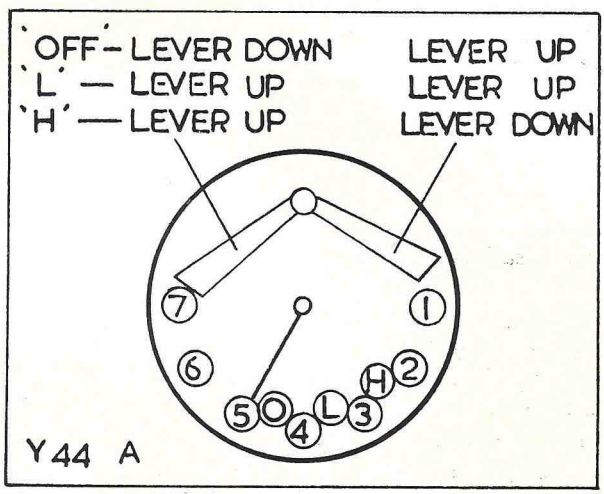
A GROUP and M21 MODELS.

These machines are fitted with a Model RM 15 Alternator as well as the normal 60w., E3L Dynamo, and have a Model U39 Lighting Switch. This is similar to the switch fitted to standard models, but it is provided with two toggle arms to control the alternator output in the various switch positions.

As on C12, Stage 3, connections give maximum alternator output in all switch positions.

Current for all normal purposes is supplied by the alternator. This is supplemented by the dynamo as necessary when a heavy load is placed on the system. For servicing and testing purposes the two instruments should be dealt with separately, one being disconnected while testing the other.

When the radio is out of use for a prolonged period, it is important that the light green wire from the alternator is disconnected and the end taped up, otherwise the battery will become over-charged.

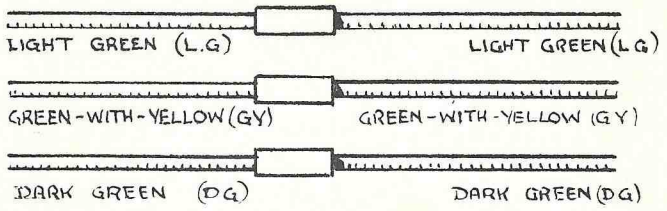


TESTING.

As the radio is connected directly across the battery, the current taken will not be shown on the ammeter. To check whether the charging ouput is sufficient to balance the load, a second ammeter must be inserted in the cable between battery and radio. The reading on this ammeter must then be deducted from the charge shown on the ammeter fitted to the machine.

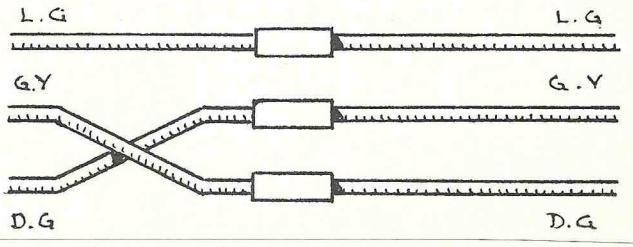
DAYTIME CHARGING RATES.

Alternator Cable Connections—Stage 1.



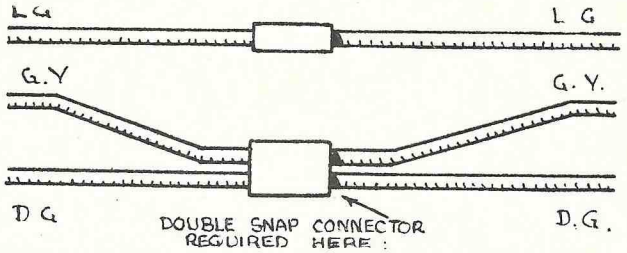
	OUTPUT IN AMPERES	
	2,000 r.p.m.	5,000 r.p.m.
C12 (with terminals 5 and 6 linked)	2.4 min.	2.75 min.
C12 (with terminals 5 and 6 not linked)	3.75 min.	4.5 min.
A Group and M21	3.75 min.	4.5 min.

Alternator Cable Connections—Stage 2.

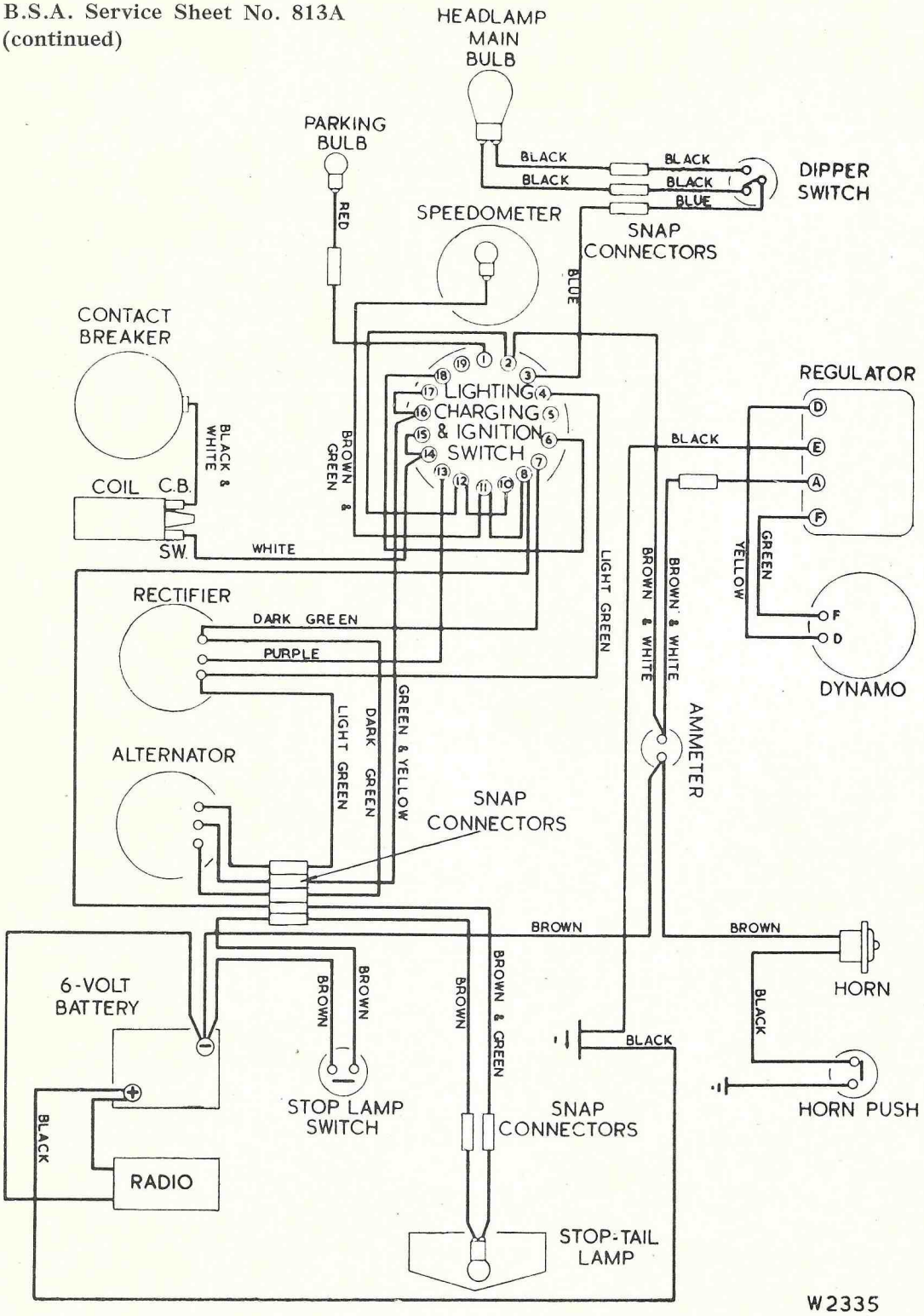


	OUTPUT IN AMPERES	
	2,000 r.p.m.	5,000 r.p.m.
C12 (with terminals 5 and 6 linked)	5.25 min.	6.25 min.
C12 (with terminals 5 and 6 not linked)	6.5 min.	7.5 min.
A Group and M21	6.5 min.	7.5 min.

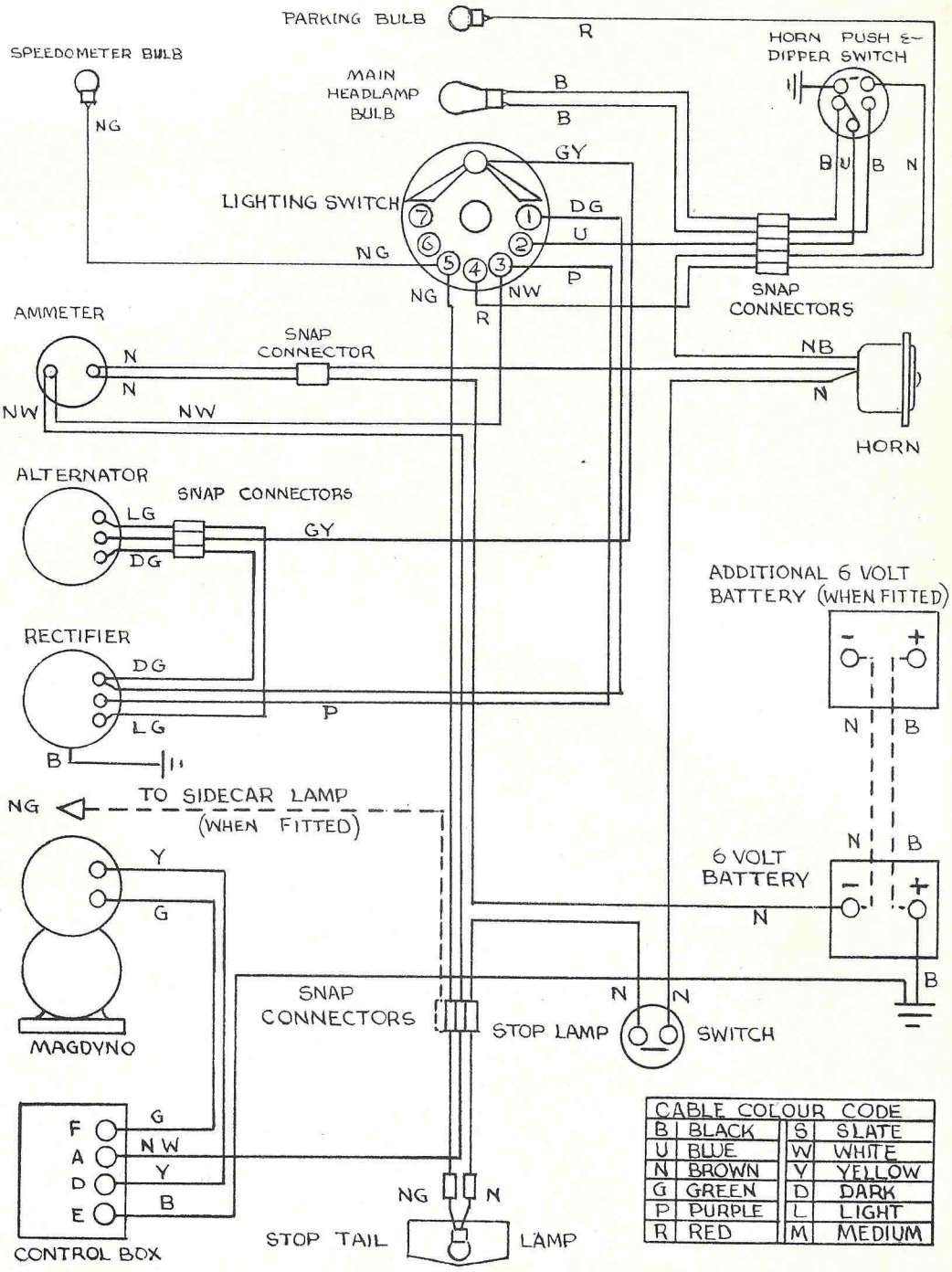
Alternator Cable Connections—Stage 3.



	OUTPUT IN AMPERES	
	2,000 r.p.m.	5,000 r.p.m.
C12 (with terminals 5 and 6 not linked)	8.5 min.	9.5 min.
A Group and M21	8.5 min.	9.5 min.

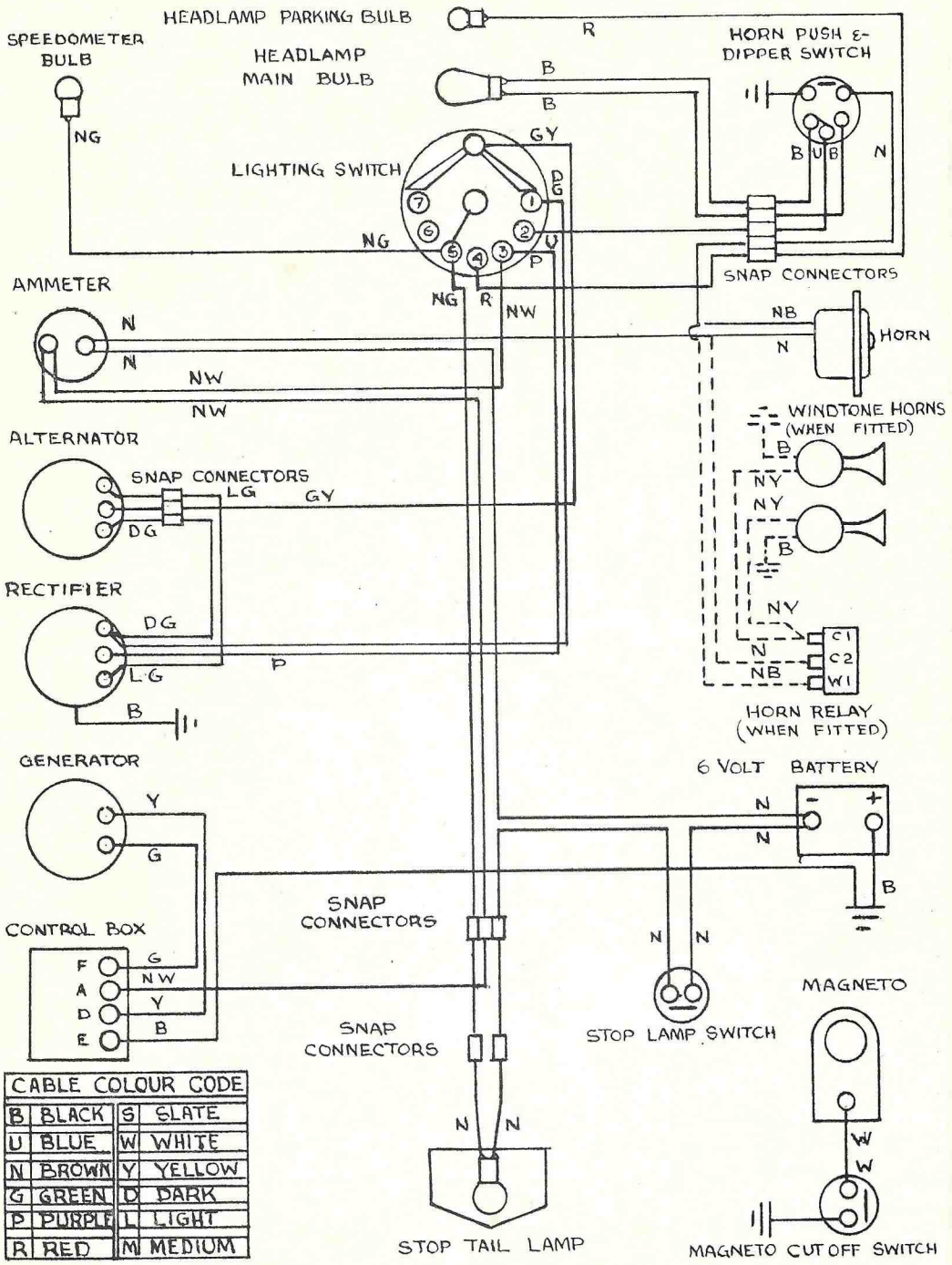


C12 WIRING DIAGRAM



M21 WIRING DIAGRAM

B.S.A. MOTOR CYCLES LTD., Service Dept., Birmingham, 11.
Printed in England



A GROUP WIRING DIAGRAM