BSA SERVICE SHEET No. 401

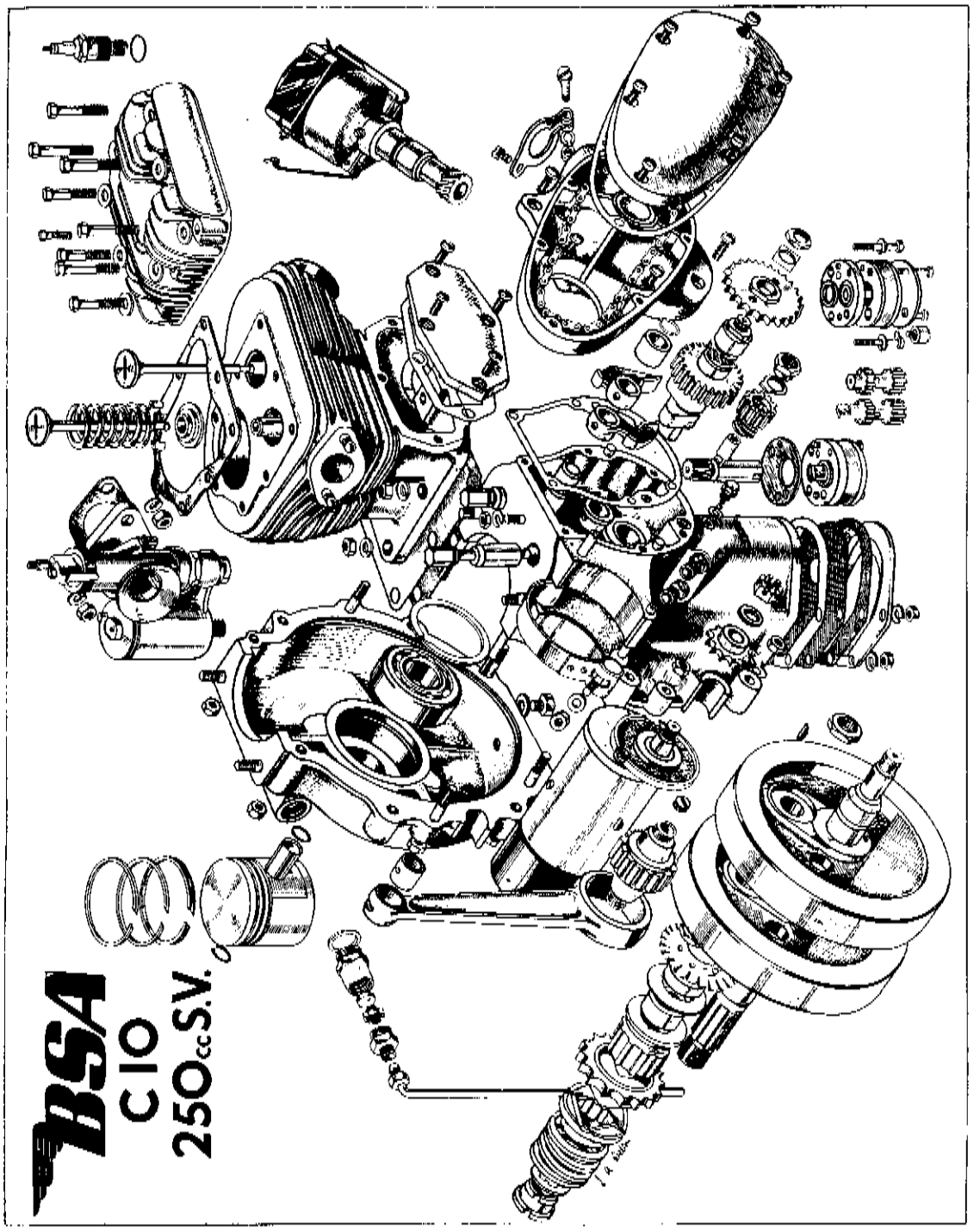

Fig. C1. The C10 Engine (Exploded View)

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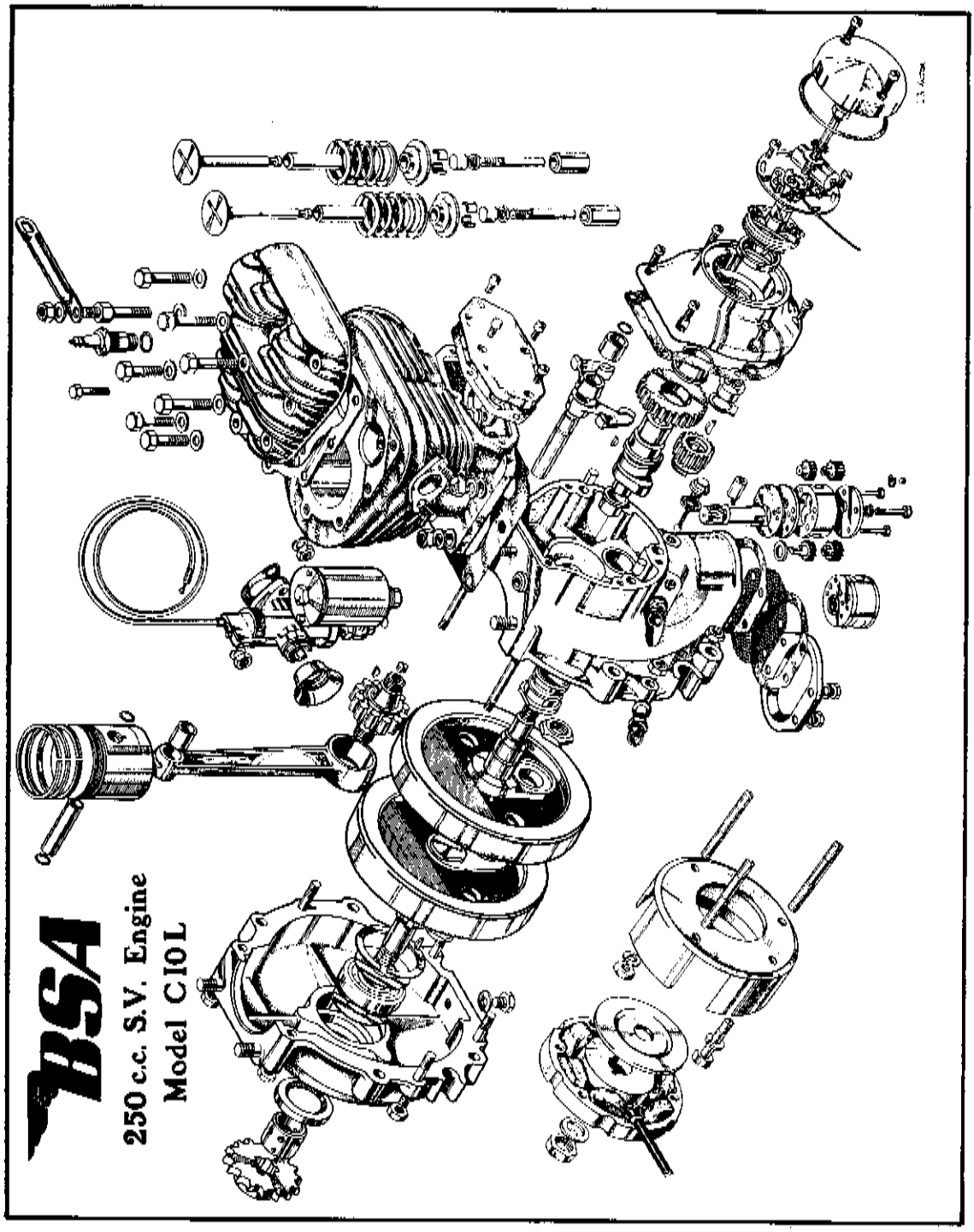

BSA

250 c.c. S.V. Engine
Model C10L

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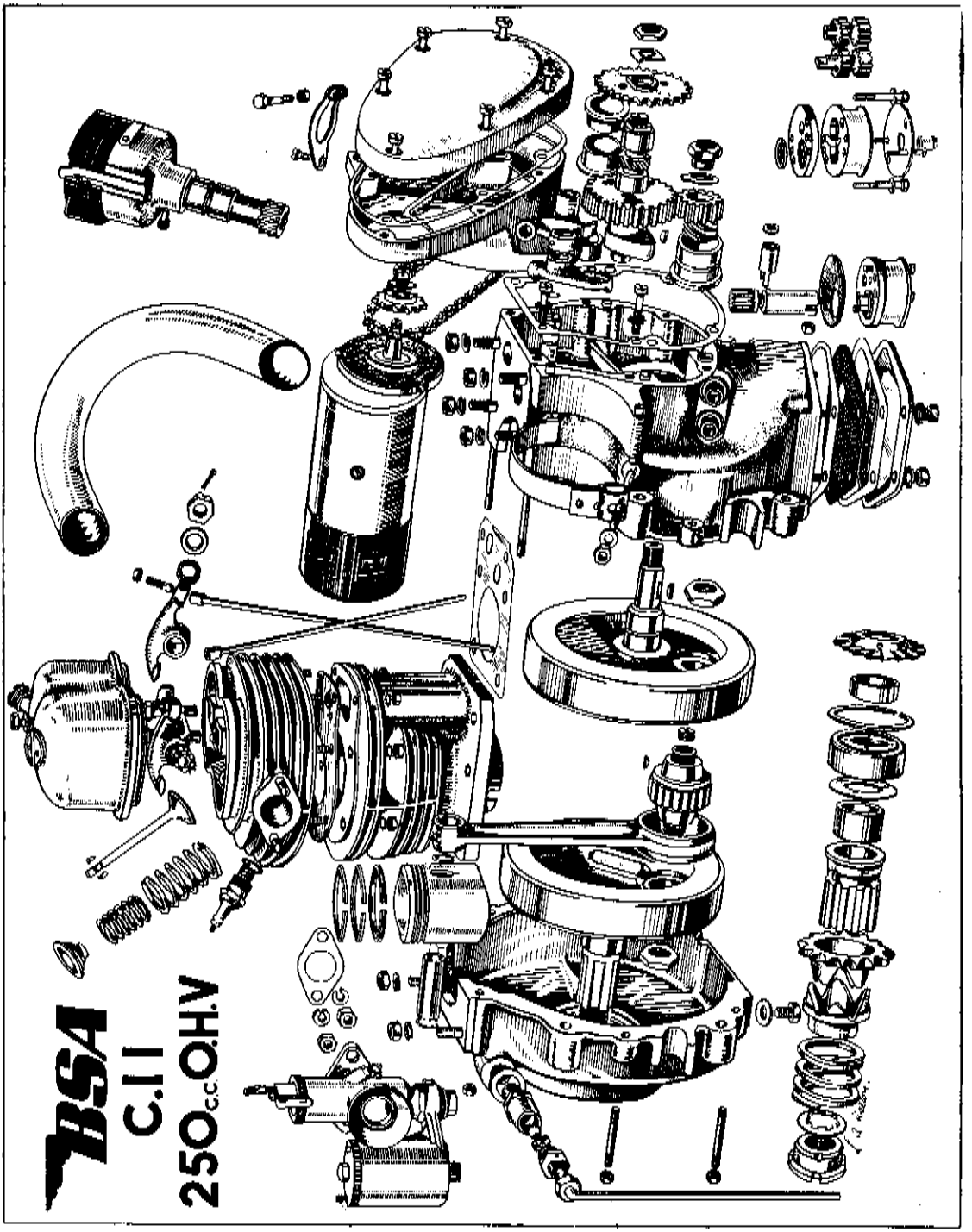

Fig. C2. The C11 Engine (Exploded View)

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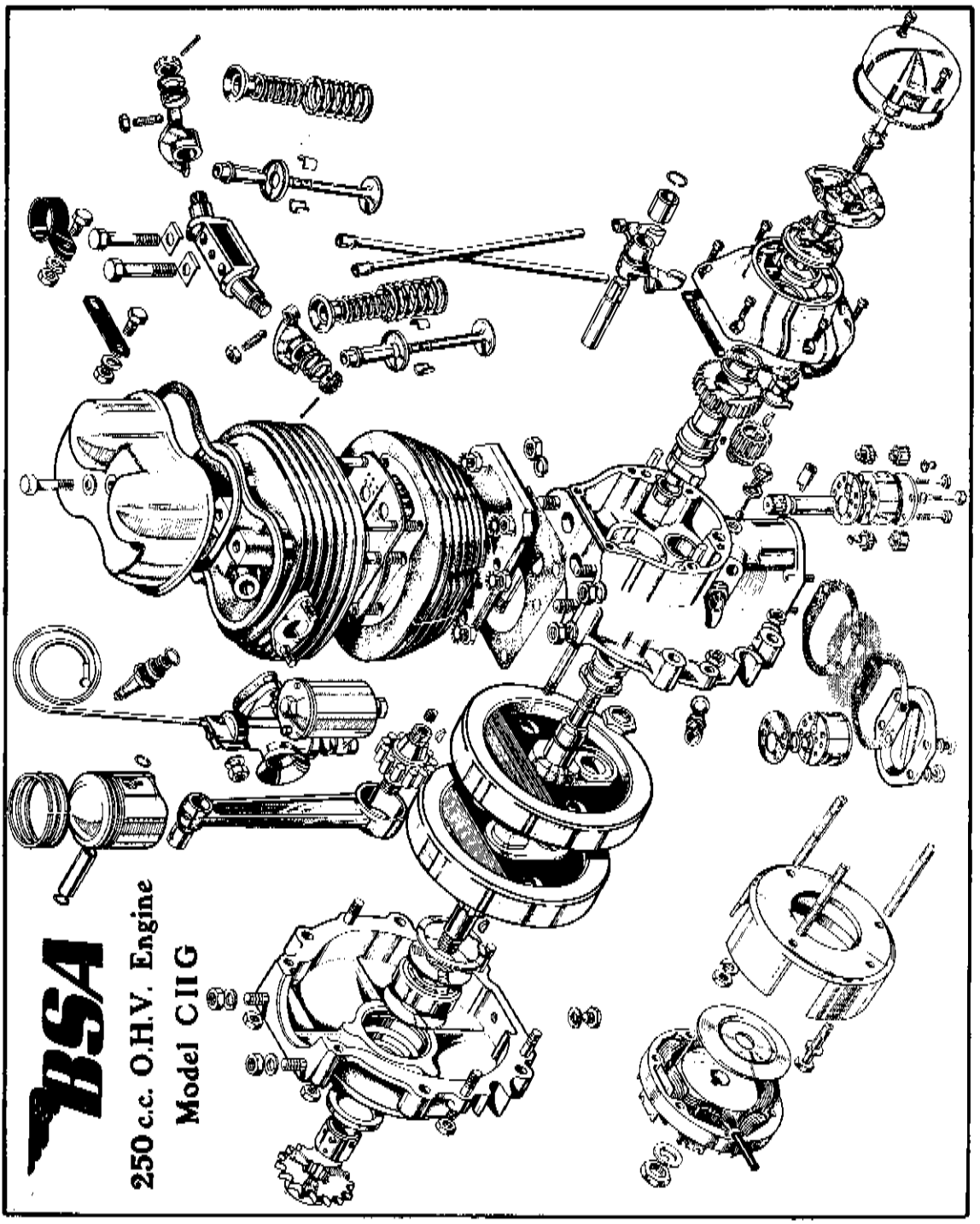

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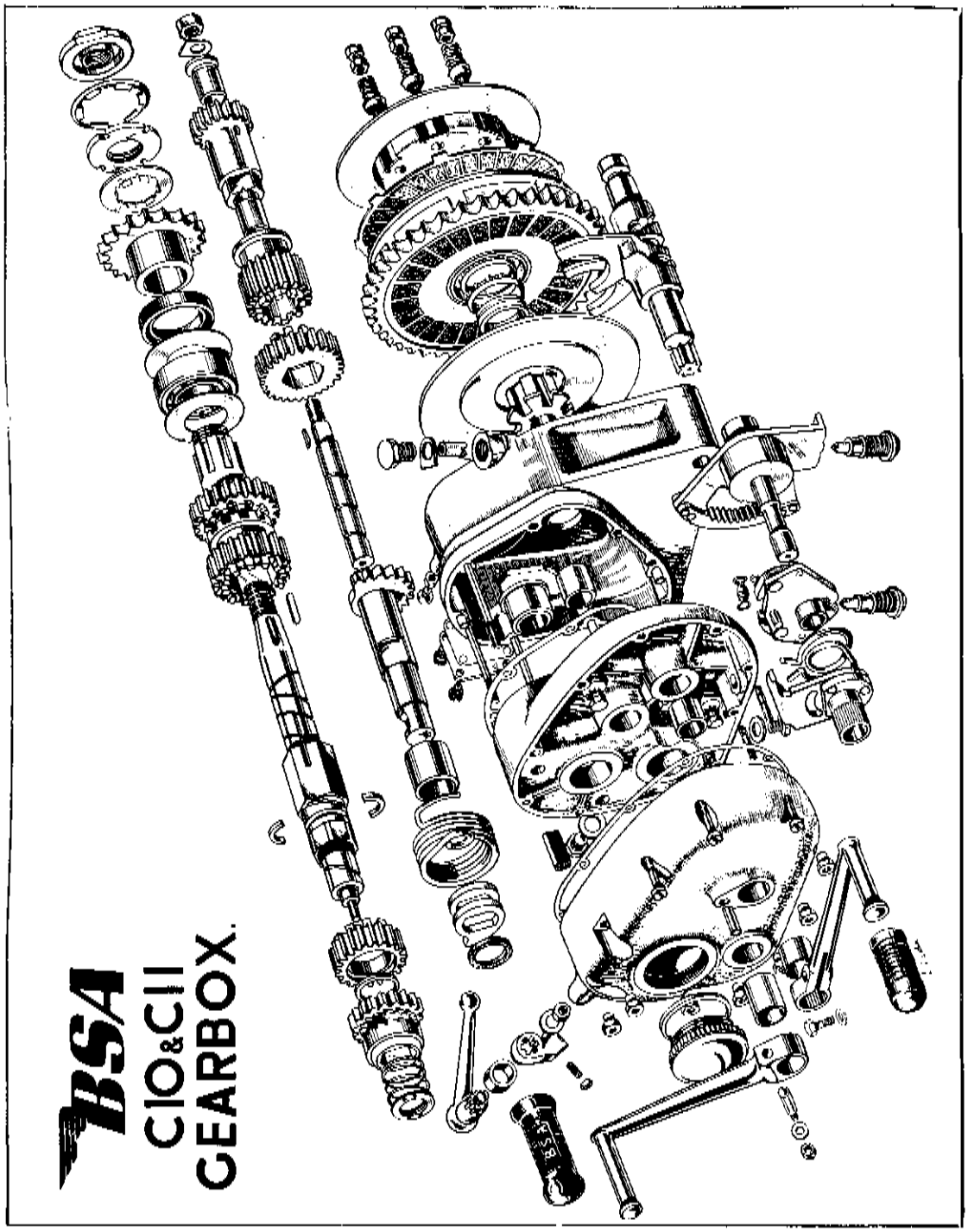

Fig. C3. The "C" Group 3-speed Gearbox (Exploded View)

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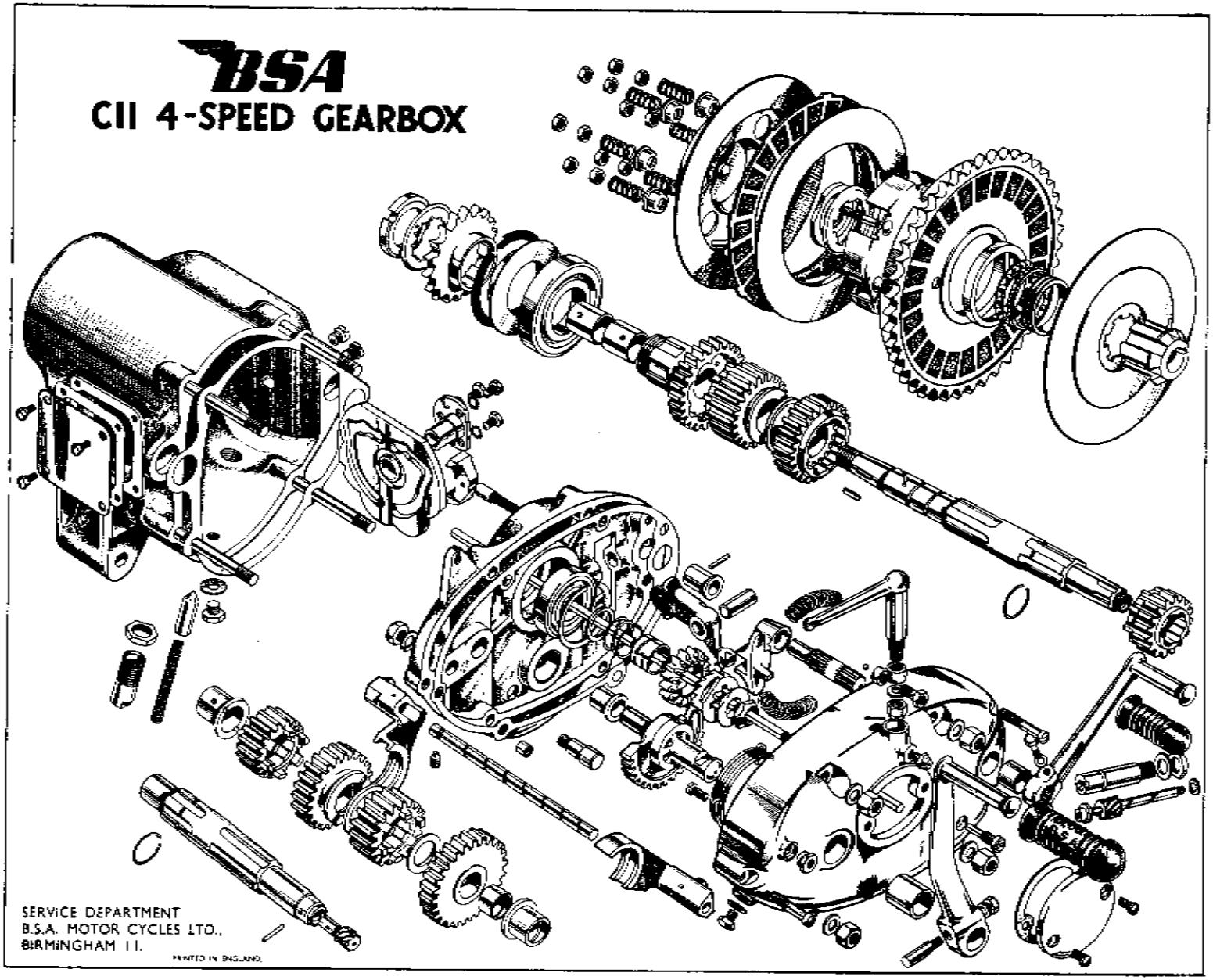
BSA

C11 4-SPEED GEARBOX



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BSA SERVICE SHEET No. 403A

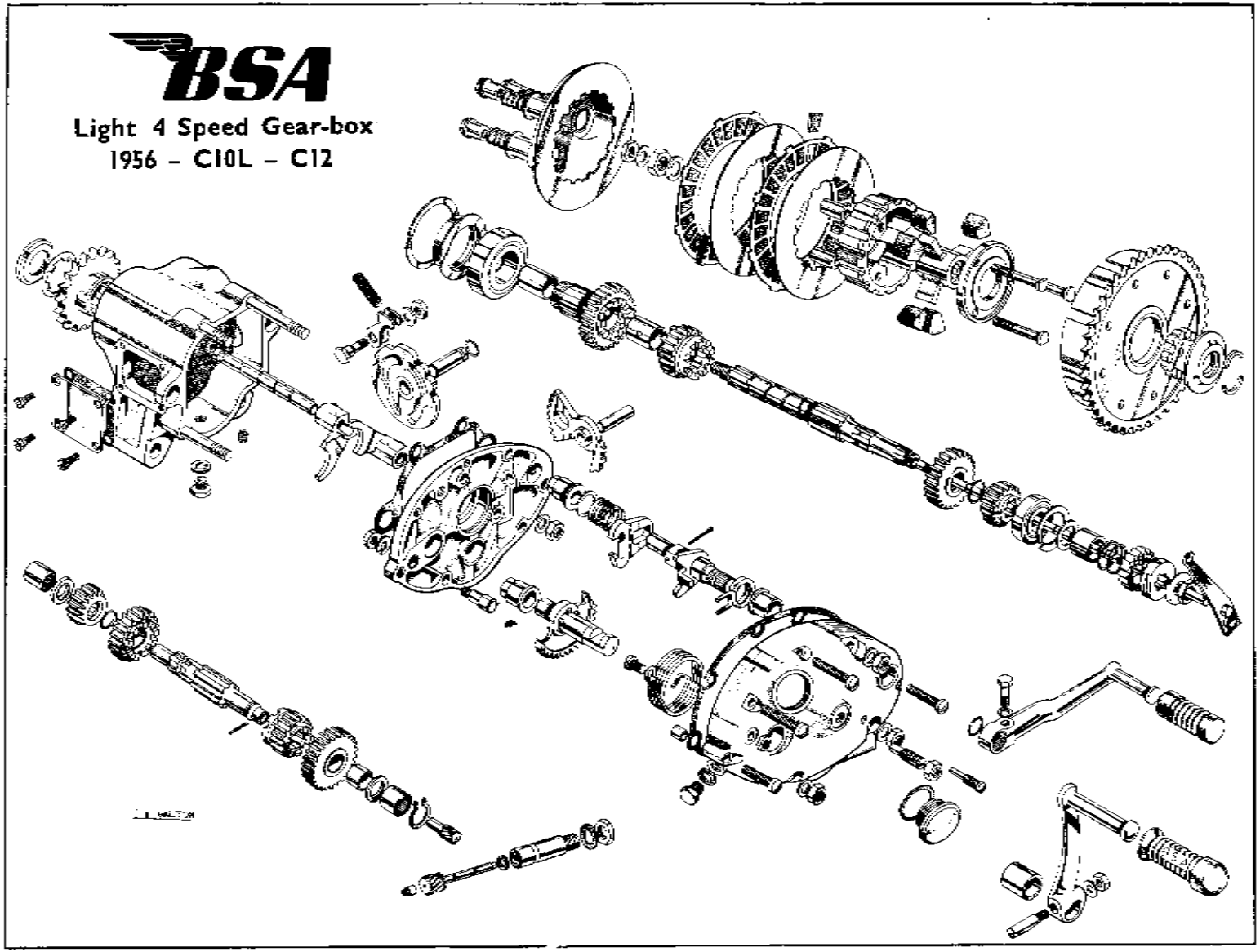
Reprinted Jan., 1958.

U/B1281

C11 Gearbox 4-Speed (Exploded View)

BSA

Light 4 Speed Gear-box
1956 – C10L – C12



BSA SERVICE SHEET No. 403B

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Printed in England

BSA SERVICE SHEET No. 404

Reprinted, April 1960

C Group Models
(EXCEPT C15)

ENGINE ADJUSTMENTS WHICH CAN BE CARRIED OUT WITHOUT DISMANTLING

Oil Pressure Valves

As described under 'How the lubrication system works', two ball valves are incorporated in the system, to prevent the transfer of oil from the tank to the crankcase.

The spring loaded valve is located in the delivery passage between the pump and the big end, and lies behind the hexagon-headed plug situated in the side of the crankcase just below the lowest part of the timing cover (see Fig. C4).

Should any foreign matter lodge between the ball and its seating, oil will gradually transfer from the tank when the machine is left standing, and when the engine is started up there will be a heavy discharge of smoke from the exhaust.

To rectify, remove the plug, spring and ball. The simplest way of removing the ball is to hold the hand close to the orifice and gently turn the engine over, when the ball will be forced out by oil pressure.

Clean the ball and seating, and if on replacing there is still a doubt as to whether the ball is seating properly, insert a small punch against the ball and deal it a sharp tap with a light hammer. Finally replace the spring and ball.

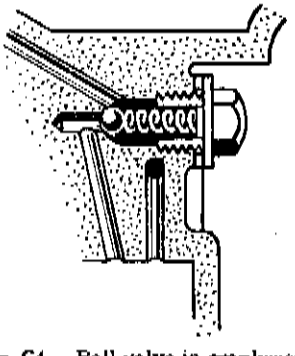

Fig. C4. Ball valve in crankcase.

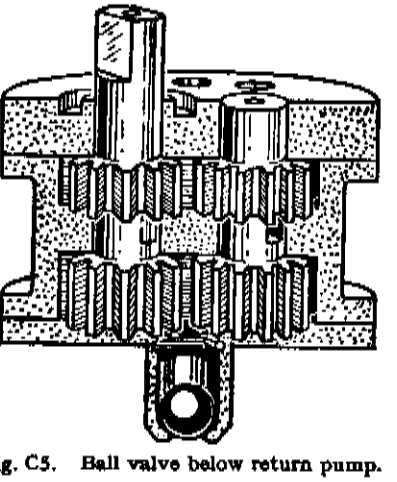

Fig. C5. Ball valve below return pump.

The other ball valve is located beneath the return pump (Fig. C5) and apparent failure of the return pump may be due to this ball having stuck in its seating.

To rectify, remove the pump cover plate, insert a piece of wire into the orifice and lift the ball off its seating. Should the trouble keep recurring, it may be necessary to fit a new base plate to the pump.

ON NO ACCOUNT REMOVE THE OIL PUMP UNLESS IT IS ABSOLUTELY NECESSARY.

Tappet Adjustment

It is most important that tappet clearances are correctly maintained, and they should be frequently checked and adjusted if necessary, always when the engine is cold.

Before checking, make sure that the cams are in the correct position; otherwise an incorrect measurement may result.

The correct position is arrived at by turning the engine over until the piston is at the top of the compression stroke.

The simplest method is to lift the machine on to its stand and engage any gear. Then remove the compression plug in the cylinder head (on side valve models) or the sparking plug (on O.H.V. models) and with a piece of wire feel the top of the piston while rotating the engine a little in both directions by turning the rear wheel. When the piston is at the top of its stroke with both valves closed, and neither valve is opened by slight backward or forward rotation of the engine, proceed to check the clearances.

S.V. Model

Remove the tappet cover by unscrewing the four securing bolts. Check the clearance between the head of tappet base of valve stem with feeler gauge. This should be .004 in. in the case of the inlet valve and .006 in. in the case of the exhaust valve.

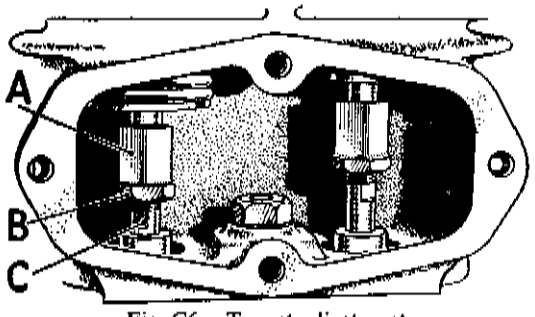

Fig. C6. Tappet adjustment.

If clearances are incorrect hold the tappet head (A, Fig. C6) with a spanner and unscrew the locking nut B. Now hold the stem C, rigid with another spanner, and turn the tappet head to the right to reduce clearance, or left to increase it. When the correct adjustment is obtained, lock B hard against A, and then finally check.

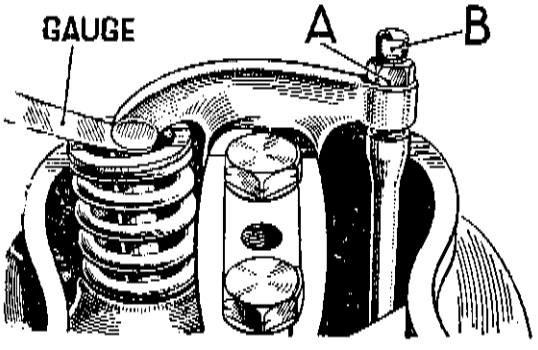

Fig. C7.

O.H.V. Model

Remove the rocker box cover by unscrewing the central bolt. Check the clearance by inserting a feeler gauge between the end of the rocker and the valve stem (Fig. C7). The correct clearance for both valves is .003 in. when the engine is cold. If the adjustment is incorrect, slacken locknut B and screw adjusting pin A downwards to reduce clearance, and upwards to increase it.

When correct, tighten the locknut against the rocker, finally check the clearance and replace the rocker cover.

Tappet Adjustment (Ramp Cams)

On C10L Models from Engine No. BC10L.3562 and C11G Models from Engine No. BC11G.10438, ramp cams were fitted, and it is essential to adhere to the following procedure when carrying out tappet adjustment.

To check and adjust exhaust valve clearances, rotate the engine forward until the inlet valve has just closed and set the EXHAUST valve clearance to .015 in. (C10L) or .012 in. (C11G).

To check and adjust inlet valve clearance, rotate engine forward again until exhaust valve clearance is just taken up, but before the valve actually starts to lift. Set the INLET valve clearance to .012 in. (C10L) or .010 in. (C11G).

Ignition Timing (C10 and C11)

If the distributor is removed for any purpose, it will be necessary on replacement to retime the ignition, but before doing this, the contact breaker point gap should be checked.

Turn the distributor shaft until the points are fully open and check the gap. This should be .012 in. If the gap differs from this the points should be adjusted. This is carried out by slackening the screws 'B' Fig. C8, moving the contact plate 'C' until the correct gap is obtained, and finally tightening screws 'B'.

Ignition timing can now be carried out. Set the piston at the top of the compression stroke (as explained under Tappet Adjustment) and insert a piece of wire through the sparking plug hole so that it is resting upright on top of the piston.

Now turn the engine backwards until the piston has descended $\frac{1}{4}$ in.

Remove the distributor cover and turn the centre spindle until there is approximately $\frac{1}{8}$ in. between the fibre pad and the start of the lift of the cam. Insert the distributor into its housing with the flat side towards the rear, and push well down on its seating, noting that as the gear meshes with the driving pinion the distributor shaft turns slightly and takes up a new position. Now rotate the distributor body until the points are just opening, and then tighten the locking screw located under the distributor body at the front.

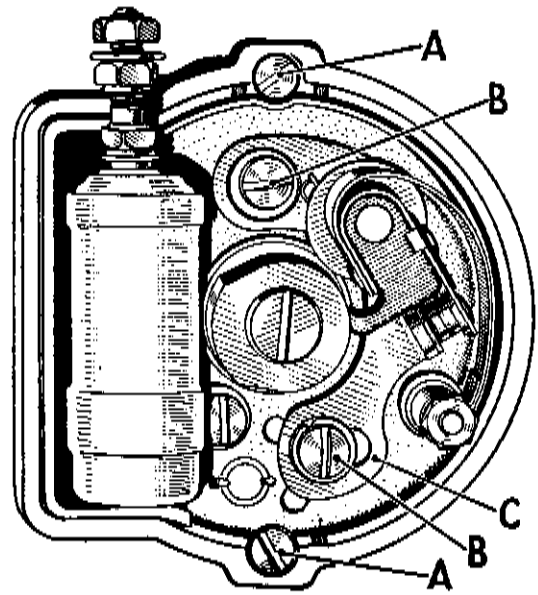

Fig. C8. The distributor.

The C Group of machines are fitted with an automatic advance and retard mechanism, which is housed under the contact breaker base. This mechanism requires periodical lubrication. First remove the distributor top and disconnect the low tension lead at the side, and then unscrew the two bolts 'A' (Fig. C8). The complete contact breaker unit on its base can now be removed and the advance and retard mechanism will be revealed.

Lubricate with thin engine oil but do not overdo it, then replace the contact breaker base, not forgetting the low tension lead. There is also a small lubricator below the main body for lubricating the distributor spindle. Apply a few drops of oil and be sure to close the thimble to exclude dust.

Ignition Timing (C10L and C11G)

The contact breaker mechanism is exposed by undoing the two retaining screws and removing the domed cover A (Fig. C9).

Before inspecting the ignition setting, the contact breaker gap should always be checked. Turn the engine over until the contact breaker gap at B is at its maximum, and then insert a suitable set of feeler gauges between the points. The correct gap is .015 in. and if it differs from this setting, the two screws at D should be slackened slightly and the contact support plate moved until the gap is correct. Tighten the screws and re-check the gap. In no circumstances must the plate be bent to alter the adjustment.

The ignition setting can best be checked in the fully retarded position. Rotate the engine until the piston is at T.D.C. on the compression stroke (as described in Tappet Adjustment).

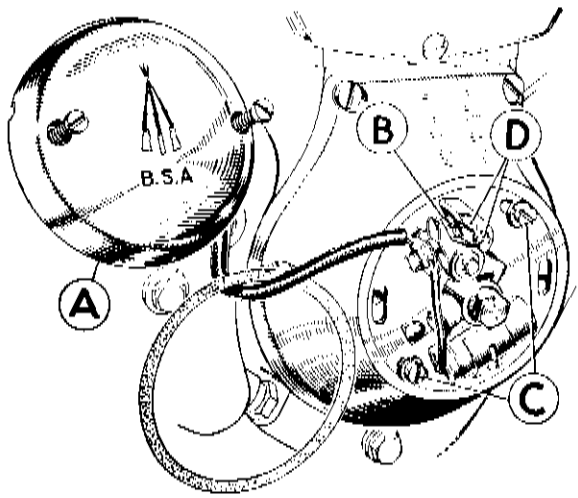

Fig. C.9. Contact Breaker Mechanism

In the case of the C11G the contact breaker points should just be opening, but when dealing with the C10L insert a piece of thin rod through the plug hole until it rests on the piston crown and rotate the engine backwards (by engaging top gear and turning the rear wheel) until the piston has descended $\frac{1}{32}$" (12° if using a Timing Disc), the points should now be just opening. This can be checked by inserting a piece of very thin paper between the points, the setting is correct when the paper is only lightly gripped. Make sure when withdrawing the paper that no particles adhere to the contact points.

If the ignition timing is not correct, the two screws C (Fig. C9) should be slackened and the contact breaker back plate rotated until the points are just on the point of opening. Tighten the screws and re-check the setting.

A drop of thin oil should be applied occasionally to the felt cam lubricating pad, but over lubrication should be avoided, as the excess oil may be thrown on to the contact breaker points.

Removal of the two screws C, will permit the contact breaker back plate to be withdrawn, to provide access to the advance and retard mechanism, which should receive occasional lubrication with thin oil.

Sparking Plug

If satisfactory performance is to be obtained, it is most important that the sparking plug is maintained in good condition. The Champion Sparking Plug supplied with the machine is of the non-detachable type and can only be cleaned satisfactorily by using the sand blast type of cleaner which is standard equipment at most garages. All traces of deposit should be cleaned off the points and the inside of the plug to prevent internal shorting.

Re-set the sparking plug points gap to .018—.020 in. by bending the side contact. In no circumstances should the centre electrode be moved as this will crack the insulation. Ensure that the copper sealing washer is in good condition before replacing the plug, and make sure that the thread and plug seat in the head are clean and free from grit. When the plug has been replaced, wipe the outside of the insulation with a piece of clean rag to prevent external shorting.

If it is found that the plug requires frequent attention then the carburettor settings should be checked to ensure that the mixture is correct (See Service Sheet No. 708).

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C Group Models (except C15)

Reprinted March, 1960.

ENGINE DISMANTLING FOR DECARBONISING

When decarbonising, it is not necessary or desirable to dismantle the cylinder barrel unless it is suspected that the valves, piston, or its rings are the cause of some trouble.

It is sufficient to remove the cylinder head and gasket, thus exposing the piston crown and valves.

Removing Cylinder Head C10 and C10L

Detach the high-tension lead to the sparking plug and remove the plug. Slacked the cylinder head bolts in the reverse order shown in Fig. C.10. If, when the bolts are removed, the head is inclined to stick, a few taps with a wooden mallet low down on the vertical fins will loosen it, but be careful not to crack or break the fins.

With the head removed, the piston and valves are now exposed. Set the piston at the top of its stroke and scrape off all carbon with an old blunt penknife or similar tool, taking care not to damage the piston crown.

Scrape all carbon from the cylinder head. Rotate the engine so that both valves are open and examine the seatings.

If these show a bright unbroken surface all round, leave well alone, but if they show traces of pitting, it is necessary to remove them for grinding in. This will be facilitated if the barrel is removed.

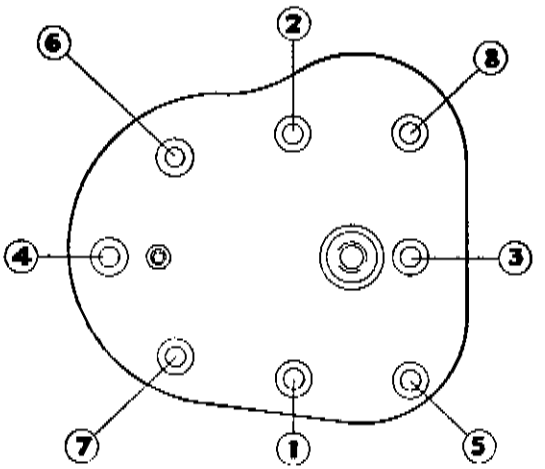


Fig. C.10. Order of tightening cylinder head bolts (S.V.)

Removing Cylinder Head C11 and C11G

It is easier to detach the cylinder head if the petrol tank is first removed. This is attached at the front to the steering head lug and at the rear to the frame top tube. Before removing the tank, turn off the petrol tap, and detach the petrol pipe. The rubber pads on which the tank is mounted should be marked so that they can be replaced in their original positions.

Detach the high-tension lead and the sparking plug. Next disconnect the petrol pipe at the carburetter and remove the carburetter. Take off the exhaust pipe. Take off the rocker box cover after removing the central bolt.

Unscrew the six nuts holding the cylinder head to the barrel. These are located between the fins at the sides of the barrel.

A gentle tap with a wooden mallet under the exhaust port will free the head, which should be raised just sufficiently at first to enable the push rods to be freed from the rocker ballpins and the push rods withdrawn. Then the head can be lifted right off.

Removing the Valves C10 and C10L

Stand the cylinder on a bench with valve heads downwards, and with a screwdriver or similar tool, press hard on the valve spring collars until the springs are compressed sufficiently to clear the cotters. The split cotters can then be freed, and the valves removed from the cylinder. A special spring compressor tool Part No. 61-3340 can be purchased from your B.S.A. dealer if desired. Scrape all carbon from the valve pockets but be careful not to damage the valve seats.

Removing the Valves C11 and C11G

Place a wooden block which will fit inside the cylinder head on a bench and then lay the head on to the block with the valve heads resting on it. Then compress the valve springs and remove collets as described for the side valve model.

Scrape all carbon from the piston and from the cylinder head and ports. The head may be polished with emery cloth, but take care not to damage the valve seats, and to remove all traces of dust before reassembly.

Valve Springs

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

Grinding in Valves

Valve grinding should only be attempted if pitting is not deep. If deep pit marks appear, the valve should be refaced, as attempts at grinding in this case will cause wear of the seats and the valves may become pocketed.

Smear a small quantity of grinding compound—obtainable from any garage or accessory shop —over the face of the valve and return it to its seat. On the S.V. model a screwdriver can be used to rotate the valve, but on the O.H.V. model the stem of the valve must be gripped by the special tool provided in the tool kit.

The valve should be rotated backwards and forwards while a steady pressure is maintained, and every few strokes the valve should be lifted and turned to a new position. Continue this operation until the valve face shows a smooth polished surface all round.

It is most important that the valves should be ground in on their correct seats, and for this reason both valves are marked, one 'IN' and the other 'EX'.

After grinding, remove all traces of compound from both valve face and seat, and before replacing the valves, smear the stems with engine oil.

When replacing the springs make sure that the split collets are located correctly.

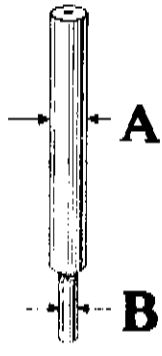
Removing Cylinder Barrel C10 and C10L

First turn off the petrol and detach the carburetter, which can be tied to the frame out of the way.

Next take off the exhaust pipe which is a push fit into the cylinder and can be pulled out when the clip bolts holding it to the frame are slackened.

Now remove the five cylinder base nuts (four outside and one inside the tappet chamber), and then the cylinder barrel can be lifted off.

When removing the cylinder barrel the simplest way is to lift it up and tilt it forward into the front angle of the frame. The piston should be steadied as it emerges from the barrel to prevent possible damage. Cover the crankcase mouth with clean rag to prevent dust and grit falling in.



"A" ⅛in. dia.
"B" .310in. dia.

Fig. C.11. Valve guide fitting punch. Service Tool 61-3264 complete with gauges for Model C.10. Punch only 61-3265 for C.11., C.12 models.

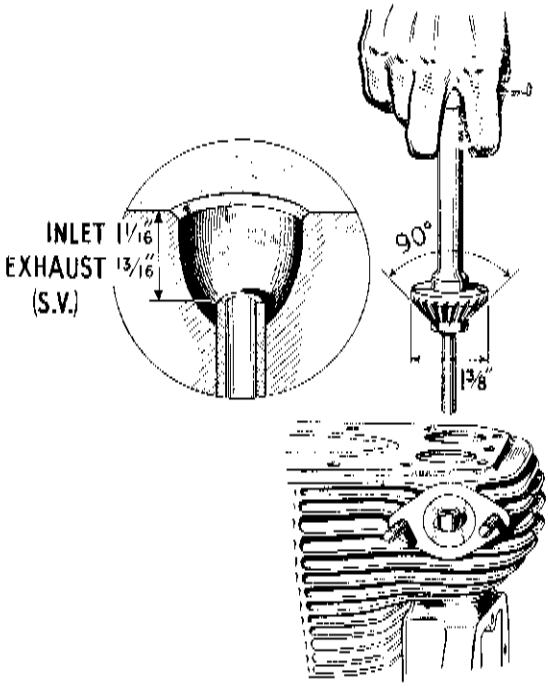


Fig. C.12. Cutting the valve seats. Service Tool 61-3305.

Fitting New Guides

If new guides are to be fitted, the old ones can be driven out by means of a simple punch made from a bar of steel not more than $\frac{1}{2}$ in. dia. (see Fig. C.11). Service Tool 61-3264 includes gauges which control the position of the guides.

The new guides can be driven in from the top using the same punch.

After fitting new guides the valve seats must be re-cut with a pilot cutter to ensure concentricity of seats and stems (Fig. C.12).

Piston Rings

The gudgeon pin is located by means of wire circlips which must be removed with the tang of a file or similar tool. Withdraw the gudgeon pin, thus freeing the piston, and immediately after its removal mark the inside of the piston so that it may be re-assembled in its original position.

If inspection of the piston rings shows that they are stuck, prise them out very carefully, and clean them. Remove any carbon from the grooves and rings, but before replacing them, check them in the cylinder for gap. (Fig. C.13.) If the gaps are excessive, new rings having gaps of between .008 in. and .012 in. when in position must be fitted.

At this stage it is advisable to check the big-end bearing for wear. Turn the engine until the piston is at the top of its stroke, and resting both hands on the sides of the crankcase mouth, hold the connecting rod between fingers and thumbs, and feel for up and down play. It should be remembered that, even though there may be a little play present, it will not necessarily mean sudden failure of the bearing, though it will inevitably become worse. Where play seems excessive, and big-end noise has been noticed with the engine running, the engine should be completely dismantled, and a new big-end assembly fitted.

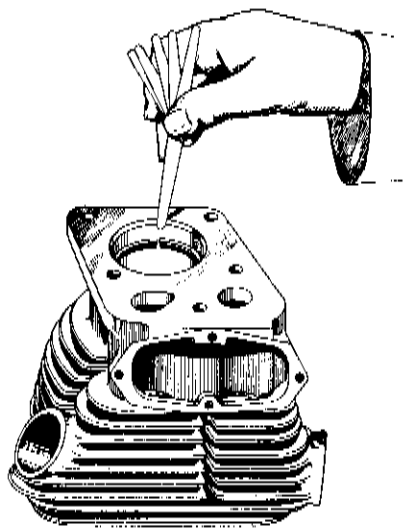


Fig. C.13. Checking piston ring gaps.

Assembly after Decarbonising

Side Valve Model. Replace the valves and springs in the cylinder barrel, making sure that the valves are assembled on the seats from which they were removed, and take care to see that the split collets are seated correctly in their grooves in the valve stems.

Pour a little oil into the crankcase, and smear the cylinder walls liberally with oil. See that the cylinder base washer is in good condition—if damaged, replace, otherwise oil leaks will develop. Turn the engine until the crankshaft is a little past bottom dead centre, then compressing the top piston ring with the fingers, slide the cylinder barrel over the piston and top ring. Each ring must be compressed in turn as the barrel is refitted, and care is necessary to avoid breaking the rings. It is essential to see that the mouth of the crankcase is completely covered with rag before commencing to replace the cylinder, as if it is left uncovered, and a ring is broken, the pieces may drop into the crankcase and will be difficult to recover.

Before trying to bolt the cylinder down, make sure that both tappets are in their lowest positions, otherwise the cylinder may not seat properly due to the pressure of the valve springs. Screw up the base nuts lightly at first, and then tighten one quarter turn at a time, working on the outer nuts in diagonal order and then the nut inside the tappet chest.

When the cylinder is finally tightened down, replace the cylinder head gasket—first seeing that the latter is undamaged. If is it damaged, or shows sign of leakage (indicated by black patches) replace with a new one. Now fit the cylinder head, tightening the bolts one quarter turn at a time in the order shown in Fig. C.10. Check these bolts for tightness after 250 miles—particularly if a new head gasket has been fitted.

Replace the exhaust pipe, tightening the frame clips when in position, and then the carburetter. When replacing the carburetter slide take care not to damage the point of the needle. Next fit the petrol pipe.

If the sparking plug is of the detachable type, dismantle and clean it before refitting. If it is non-detachable, and obviously dirty, have it cleaned by a garage equipped for this purpose, or, failing this, fit a new one.

Finally check the tappet clearances and if necessary, adjust. Note, that if a new cylinder base washer has been fitted, it is advisable to check the nuts for tightness after 250 miles, and then again to check the tappet clearances.

O.H.V. Model. Replace the cylinder barrel as described for the side valve model, first checking that the base washer is undamaged. Now replace the valves and springs in the cylinder head, making sure that they are on the correct seats and that the split collets are positioned correctly.

See that the cylinder head gasket is in good condition, replace it, and then fit cylinder head loosely in position. Before the head is bolted down the push rods must be fitted. It should be noted that these are crossed, and the exhaust must be fitted first, the plain end fitting into the cup formed on the cam rocker (bottom left), and the cupped end fitting over the rocker ball end (top right). Fig. C.14, shows a section illustrating how the push rods are fitted.

With the push rods in position, the cylinder head can be bolted down. Before replacing the rocker box cover, check tappet clearances and adjust if necessary. Note that the tightness of the head should be checked after the first 250 miles, and that if the nuts are tightened at this period it will probably be necessary to re-adjust the tappets.

Next replace carburetter, taking care not to damage the needle when inserting the slide, and see that the flange washer is in good condition. Then fit exhaust pipe, and finally, replace the petrol tank and petrol pipe.

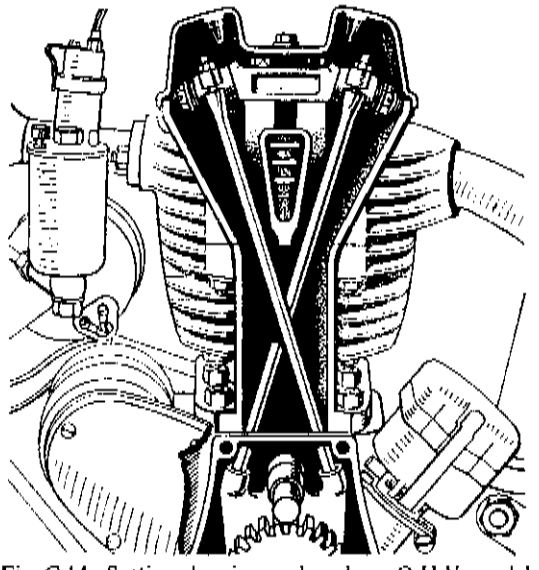


Fig. C.14. Section showing push rods on O.H.V. models.

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C10 and C11 Models

REMOVING ENGINE FROM FRAME AND COMPLETE DISMANTLING

The procedure for the removal of the engine and dismantling will be described from the point reached in the section on decarbonising, when the cylinder head and barrel had been removed.

The next step is to drain the oil tank or remove the oil pipes and plug the holes in the tank. Remove the oil pipes by disconnecting at the crankcase end.

Detach the leads to the dynamo (both of which are held by a small plate and single screw), and the lead to the distributor.

Removing Chain Case

The oil bath chain case follows next. Take off the footrest and undo all the screws round the rim of the case. The nuts of the screws are welded to the rear half of the case and so cannot be lost.

When the outer case is being taken off, careful note should be made of the position of the cork washers and distance pieces to facilitate re-assembly. Before removing the chain, loosen the clutch (as described in the next Section), and then dismantle the engine shaft cush drive.

Tap the lock washer clear of the slot in the cush drive retaining nut and unscrew the nut. Then withdraw the spring and cam sleeve, leaving the sprocket and chain in position.

Removing Clutch

Remove the clutch actuating cap by unscrewing the spring retaining nuts and lock nuts.

Tap the lock washer back, unscrew the clutch retaining nut, and withdraw the long push rod.

The clutch can then be removed with the aid of Extractor 61-3362 which screws into the threads provided in the clutch hub. Now uncouple the chain, take off the clutch as a unit, and then the cush drive hub. (See also Section dealing with Clutch Assembly.)

The inner half of the primary chain case is attached to the crankcase by three bolts, and it can be detached when these are removed.

Undo the engine bolts, taking great care to avoid damaging the threads, and remove the front engine mounting plates. If the rear engine and gearbox plates have been slackened sufficiently, the engine can now be withdrawn if it is tilted slightly to release it.

It is advisable to replace the various bolts and studs loosely in their respective locations to ensure correct re-assembly.

Dismantling the Engine

Before commencing to dismantle the engine, a simple fixture as illustrated in Fig. C.15 will facilitate matters considerably.

Alternatively, clamp the engine in a vice by means of one of the mounting lugs supporting the crankcase on the bench.

Remove the crankcase drain plug and drain the oil. Take out the timing cover screws and pull off the cover. Clean it and place on one side.

Flatten the turned over end of the camshaft nut locking washer and remove the nut. Slacken the dynamo strap nut and turn the dynamo to slacken the chain.

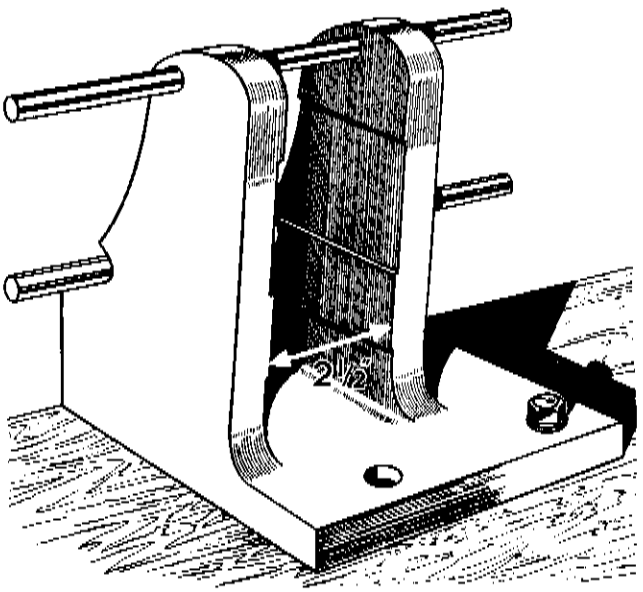

Fig. C.15. Angle bracket for mounting engine.

Take off the dynamo drive sprocket (Service Tool 61-3256) and chain. Remove the dynamo, clean the chain and sprocket in paraffin, and set aside.

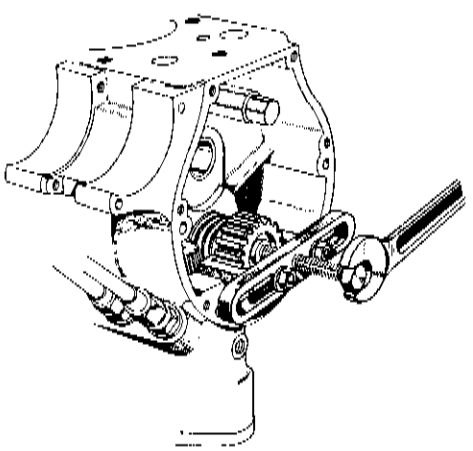

Fig. C.16—Engine shaft pinion extractor. (Service Tool 61-3256.)

Slacken off the clamp nut immediately below the distributor head and withdraw the distributor complete. Take out the screws retaining the inner timing cover, noting the locations of the longer screws. Remove the cover, clean it, and set aside.

Withdraw the camshaft complete, flatten out the tab washer and remove the mainshaft nut. The mainshaft pinion can now be drawn off, using Service Tool 61-3256 (see Fig. C.16).

The oil pump drive spindle which meshes with the mainshaft pinion is retained in position by a dowel covered by a plain washer, situated just below the mainshaft to the left, in the edge of the timing chest.

Prick out the plain washer and pull out the dowel by screwing in one of the timing cover screws. The pump spindle can now be drawn upwards into the timing chest.

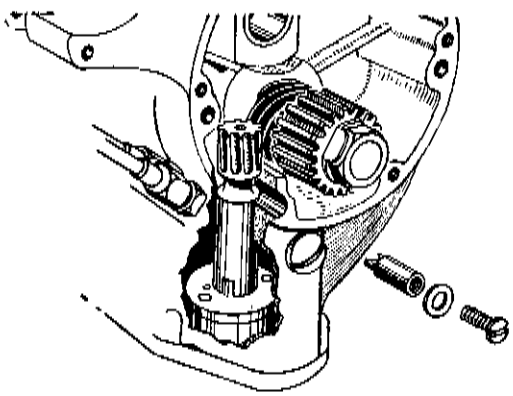

Fig. C.17— Oil pump spindle locking plunger.

Remove the nuts from the crankcase studs and take out the loose studs, noting the locations. Place the engine on its side, with the thumbs on the ends of the engine shaft and, gripping the gear-side crankcase half with the fingers, pull off the gear-side half.

The halves may not separate without some persuasion, but great care is necessary if damage to the casting is to be avoided.

Lift the flywheel assembly clear of the drive-side half, and remove the distance collar and oil flinger.

Take off the four nuts and lock washers at the base of the gear-side crankcase, and remove the filter. DO NOT REMOVE THE OIL PUMP UNLESS IT REQUIRES ATTENTION.

If new bushes and bearings are being fitted, the bushes must be reamed in position in line with the opposite bearing.

Old bushes can be driven or drawn out, but it will be necessary to heat the case in hot water to remove ball or roller bearings (see Fig. C.18). The new one should then be immediately fitted while the case is warm. (See Service Sheet No. 702 for dimensions of bushes.)

It is advisable to check and if necessary correct the flywheel alignment. For procedure see the Section dealing with engine re-assembly.

SPECIAL NOTE

The crankcase bearing drive side is held in position by a spring ring, and this must be removed before attempting to remove the bearing. Careful note should also be made of the way the oil flinger is fitted to ensure correct re-assembly.

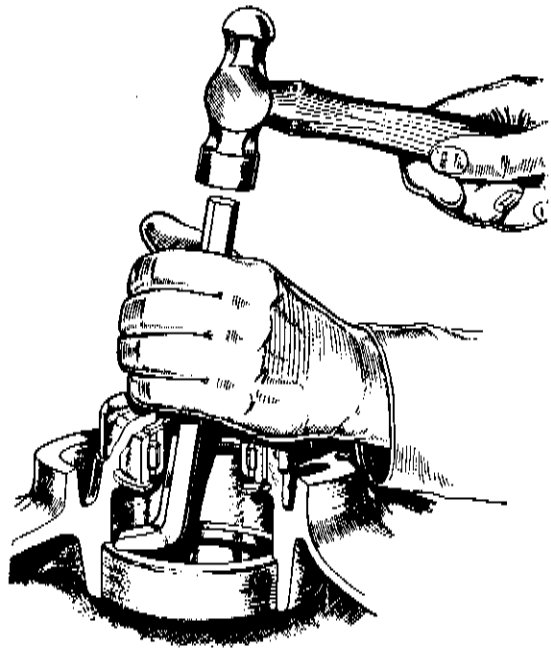

Fig. C.18.– Ballrace extraction (drive-side).

Finally, if the flywheels are to be separated they must be held securely on the bench, as extreme pressure will be required to release the crankpin nuts.

Special spanners are used, and it is usually necessary to add a piece of tubing to obtain additional leverage.

The crankpin is a taper fit in the flywheels, and can be released by a sharp blow with a mallet.

It is now only necessary to decide which parts require renewal, and the following may assist you in your decision:

We do not advise the fitting of over-size rollers to the big end assembly. The whole assembly, comprising crankpin, connecting rod and rollers, should be changed. All these components are carefully matched, working to one ten-thousandth part of an inch, and supplied in complete sets, ready for fitting.

If the bore of the cylinder, when measured at right angles to the gudgeon pin, shows wear to the extent of .010 in. or more, the cylinder should be rebored, and an oversize piston fitted. (Oversize pistons are available in 0.5 mm. (.020 in.) and 1 mm. (.040 in.)

Wear in mainshaft bearings or bushes will be readily apparent, and bearings showing signs of damaged balls, rollers or tracks should be replaced.

Special clearances are specified for mainshaft bearings used on B.S.A. motor cycles, and it is NOT advisable to fit other than genuine B.S.A. replacements.

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C10 and C11 Models

RE-ASSEMBLING THE ENGINE

The need for extreme cleanliness cannot be over-emphasized. Parts should be thoroughly cleaned, and all traces of any anti-rust preparations with which new parts may be coated must be removed.

Flywheels

If the big-end assembly is to be renewed it is as well to check the weights of the new components against those which have been removed. A slight variation in weights is inevitable, but provided that the discrepancy does not exceed 1½ ozs. no further action need be taken. This tolerance should not be exceeded since when first assembled the flywheels were balanced to suit the original parts, and the balance may be adversely affected if the weights of the new components differ considerably from those of the original ones.

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

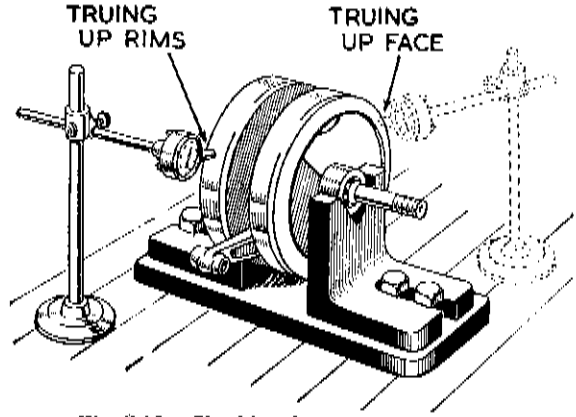
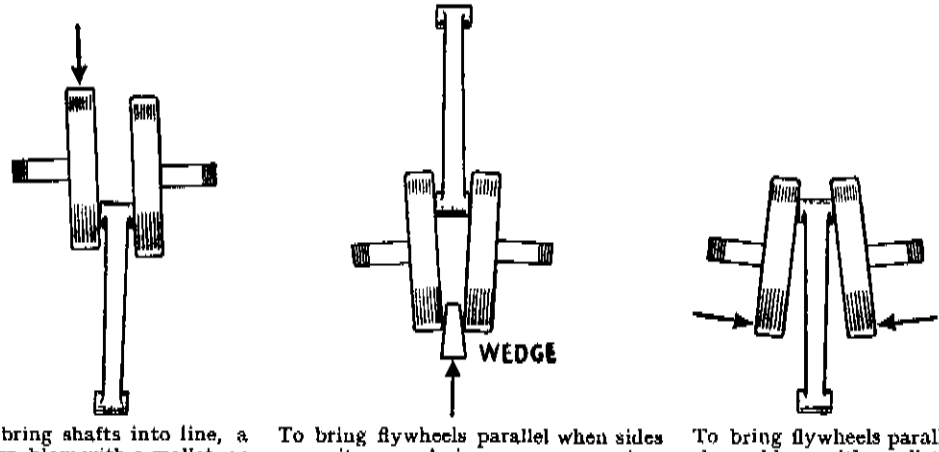


Fig. C.19. Checking flywheel alignment.

In order to tighten the crankpin nuts properly, the whole flywheel assembly must be held rigidly. For this purpose it should be mounted in a large vice (fitted with lead clamps) with the driving side flywheel uppermost. If a large enough vice is not readily available, an alternative method is to fix two $\frac{5}{16}$in. diameter posts rigidly to the bench in a vertical position, the distance between their centres being $3\frac{7}{8}$in. Midway between the posts a hole of 1in. diameter should be bored in the bench to receive the mainshaft. The flywheel assembly is mounted on these posts so that they pass through the holes bored in the flywheels, and the driving side flywheel should be uppermost. Tighten the crankpin nut very firmly, using a tubular extension to the spanner as when dismantling, and punch over the edge of the crankpin with a centre punch to lock the nut.



To bring shafts into line, a sharp blow with a mallet on **timing side** flywheel (indicated by arrow).

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

To bring flywheels parallel a sharp blow with mallet on flywheel rims on opposite side to crankpin.

Fig. C.20. Method of correcting flywheels out of alignment. Note that above illustrations are exaggerated.

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

The flywheels will now be aligned only very approximately and further steps must be taken to ensure that the wheels are aligned as true as possible. Two driveside bearings Part No. 24-732 should be fitted to the mainshaft and the latter mounted on vee-blocks. The flywheels must be trued up, both on faces and rims, for which purpose a dial micrometer is necessary (Fig. C.19), and after the wheels are trued to within at least .005in., tighten the timing side crankpin nut fully. A mallet or lead hammer applied to the flywheels will provide a sufficiently heavy blow for final truing, and will not harm the flywheels (Fig. C.20). The shafts should be finally trued to within .002 in. maximum.

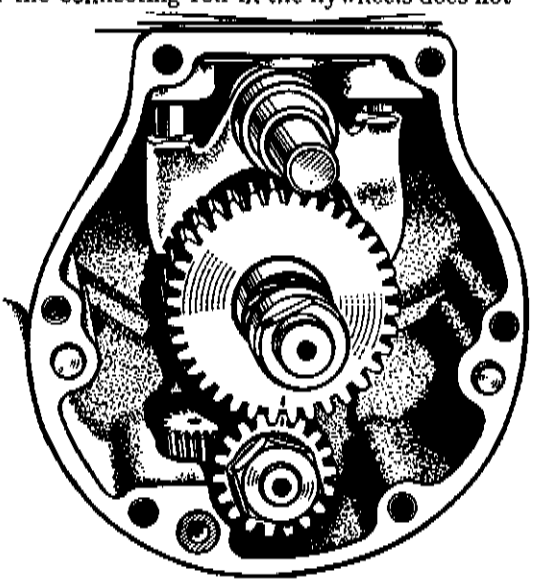


Fig. C.21. Valve-timing gears.

All parts having been cleaned, they must be perfectly free from paraffin, grit or other foreign matter, and all traces of old jointing compound and washers must be removed.

Fit the oil flinger with the boss towards the flywheel; the action of the vanes is to throw the oil away from the bearing.

Replace the distance washer between oil flinger and bearing.

Fit the drive side crankcase half and, after coating the mating portion with jointing compound, replace the gear side half. The two halves must be perfectly mated and the flywheels must rotate freely as the halves are bolted up.

Replace the oil pump spindle and its retaining pin. Fit the oil filter and cover plate at the base of the sump, making sure that the lock washers are replaced under the nuts.

Having bolted up the crankcase, fit the timing pinion key and pinion, apply the lockwasher and nut and turn over the lockwasher after securing the nut.

Fit the cam followers, and also the tappets in the case of the C10, and replace the camshaft, ensuring that the mark on the camshaft pinion meshes with the mark on the timing or mainshaft pinion. (Fig. C.21).

Apply clean engine oil to the pinions and cams.

Now replace the small plain washer in the pump spindle locking plunger hole, and fit the inner timing cover, using a new joint washer coated with cement, and ensure that the star washers are fitted to the two long screws. Tighten the screws down a little at a time to ensure that the cover is not distorted.

Re-fit the dynamo, ensuring that the cork washer is in position, and replace the dynamo drive sprocket and chain.

Fit the camshaft nut washer, turning over the washer to lock the nut.

Now adjust the dynamo chain, and securely tighten the dynamo. Pack the chain housing with grease.

Refit the outer timing cover again, using a new joint washer and cement, and tighten the screws evenly.

Assembly from this point will be the same as after decarbonising.

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C Group Models with 3 speed gear box.
(4 speed models, except C15, use Service Sheet 209).

REMOVING, DISMANTLING AND RE-ASSEMBLING OF GEARBOX AND GEAR CHANGE

To remove the gearbox from the machine proceed as for engine dismantling up to removal of the clutch (Service Sheet No. 406). Unscrew the two nuts D (Fig. 3.24) and drive out the bolts. Slacken off the nuts clamping the rear engine plates and the chain stays. Take off the rear chain and guard, and the oil pipes.

It is not necessary to remove the oil tank and battery carrier, but if time permits removal of these fittings will enable the operator to raise the gearbox upwards and out of the plates more easily.

Dismantling the Gearbox

The operator should first consider carefully before attempting this operation as considerable trouble and damage can be caused by lack of experience. **If in doubt consult your dealer.**

To assist re-assembly, the positions of the various gears should be carefully studied (Fig. C.22).

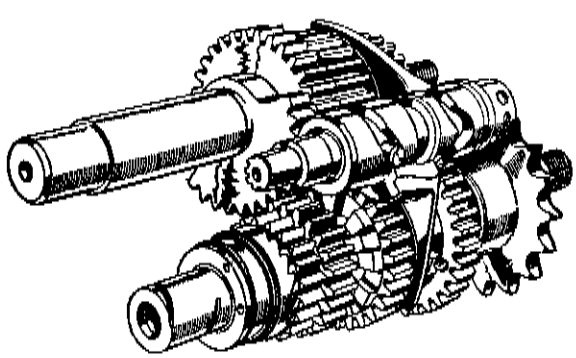

Fig. C.22. The gear cluster.

First of all secure the gearbox in a vice or suitable fixture, with clamps on the clamping lugs. Remove the kickstarter crank B and footchange pedal C (Fig. C.23). The former is removed by unscrewing the nuts and extracting the cotter pin. The latter pedal can easily be taken off when the pinch bolt is released.

Next remove the outer cover by taking out the 3 screws and 7 nuts which hold the cover in position. Unscrew plunger housing underneath the outer cover, the housing will come away complete with the plunger E and the plunger spring. Tap off the outer cover with a wooden mallet, at the same time holding the gear control shaft with a tommy bar so that the gear selector mechanism is retained in position.

Next remove the control plunger housing O from the inner cover; this will release the gear selector mechanism comprising footchange operating plate D, pawl plate and spring G and gear selector quadrant H. After dismantling these the inner cover is fully exposed and the 3¼ inch (21-2889) Whitworth bolts should be unscrewed. The inner cover may now be tapped off its seating on the 7 studs.

By means of a screwdriver undo the control shaft pin plug which is situated at the nearside end of the gearbox shell, and then insert a ¼in. B.S.F. bolt or stud into the dowel to enable it to be drawn from its seating. The gear control shaft with operating forks, layshaft gear cluster, and mainshaft and sliding gear can now be taken out.

Next undo the tab washer which secures the sprocket locking nut, and remove the locking nut. Remove the locking washer and pull off the gearbox sprocket. Then tap the sleeve pinion from its seating in the bearing, using a hide or wooden mallet.

If it is necessary to remove the ballrace, a hand press is the best method, but if this is not available, warm the shell, and the ballrace can then be easily tapped from the housing.

Turn to the inner cover and the removing of the kickstarter quadrant. Unlock the quadrant from the kickstarter spring, and tap the quadrant from position through the two kickstarter return stops.

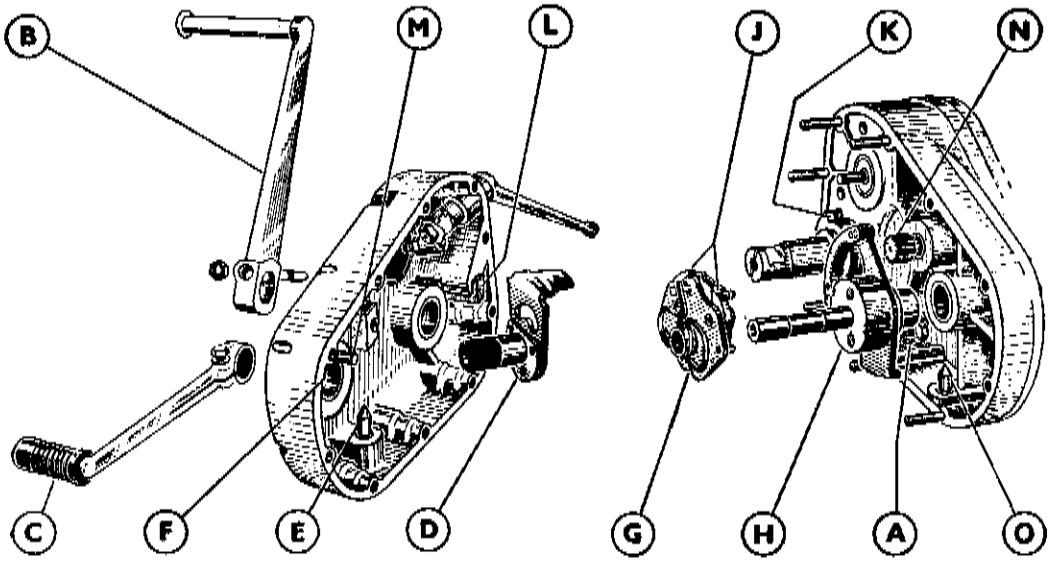

Fig. C.23. Foot gear change mechanism.

Dismantling the Gear Cluster

The sliding gear comes away easily from the mainshaft; then remove the kickstarter ratchet pinion by unscrewing the left-hand kickstarter ratchet sleeve nut. The kickstarter ratchet and shim can then be removed.

To remove the bottom gear pinion, the outer retaining ring has to be split by means of a chisel, so that the ring may be removed in two portions. Extract the two portions of the inner retaining ring with the tang end of a file, the pinion will then slide off the shaft.

To dismantle the layshaft gear cluster remove the 1st gear pinion. This is pressed on to the layshaft pinion sleeve and can be removed by holding the gear in a vice and tapping from position with a piece of hard wood a shade larger in diameter than the phosphor bronze bearing.

To dismantle the operating forks, hold the shaft in a vice and tap out the central shaft pegs with a punch. The forks can then be removed from the shaft, but careful note should be taken of the position of the forks on the shaft before taking them off.

Re-assembling

Hold the shell in a vice or suitable fixture. First of all fit the oil seal with recess inwards, the oil seal shim and the roller bearing. If the case is first warmed, the bearing can easily be pressed into its seating. Fit the sleeve pinion, ensuring that the oil retaining washer is fitted between the sleeve pinion and the ballrace. Then tap the sprocket into the splines in the sleeve pinion, securing by means of the tab washer and locknut. Ensure that the tab washer is turned over into the recesses in the locknut.

Fitting the selector forks to the shaft is the reverse operation to that for dismantling. Use new control shaft pegs.

Next replace the low gear pinion on the mainshaft, and fit the inner and outer rings to secure the pinion on the shaft. The outer ring is tapped into position and the pinion should then revolve easily on the shaft. Fit the kickstarter pinion 27–4106, and then the ratchet 27–4112, following that, the ratchet spring 27-4447. Then fit the kickstarter sleeve nut 15–267 (left-hand thread).

Fit the mainshaft sliding pinion, ensuring that the fork track is nearest the sleeve pinion. Next fit the layshaft sliding pinion on the sleeve pinion and press the layshaft first gear pinion on to the sleeve pinion (hexagon end).

Pair the layshaft and mainshaft gear clusters together, fit the operating forks, ensuring that one fork is engaging in the mainshaft sliding pinion and the other fork in the layshaft sliding pinion. Ensure that the teeth on the gear control shaft are at the reverse end to the threads on the mainshaft end.

Before entering the mainshaft and gear clusters into the G/B shell, lubricate the gears and both shafts. Enter the clusters, locate the selector shaft and enter the retaining pin in the groove in the selector shaft. Then fit control pin plug 29–3243 and secure with the locking tab washer.

Next fit the inner cover using a new joint washer coated with jointing cement and tap into position with a wooden mallet. Secure the cover by a bolt either side, check for end-play in the layshaft and mainshaft, and if there is end-play in the former, fit shims underneath the kickstarter quadrant (.005 clearance). If there is play in the mainshaft, fit shims underneath the mainshaft bush (inner cover) 15–268. The mainshaft must be free without end-play.

Fit the remaining $\frac{1}{4}$in. Whitworth cover bolt.

Next fit the gear control quadrant 29-3298, ensuring that the mark on the foot gear change selector shaft is lined up with the mark cut on the quadrant.

With the aid of a screwdriver, fit the spring to the pawl carrier plate, with the end of the right-hand coil to the left of the stud, and the end of the left-hand coil to the right of the stud.

Fit the pawl carrier plate G (Fig. C.23) to the gear control quadrant, followed by the operating plate and sleeve complete, D.

The action of the footchange pedal return spring tends to throw off the operating plate, to prevent this happening a small clip should be made up from light strip and placed in position over the assembly.

Replace the two return stops on the Kickstart Quadrant Stem followed by the cork washer.

Take up the outer cover, place a tommy bar through the operating plate sleeve bush and hold the operating plate in position as the cover is entered on its studs. Remove the clip which was placed over the footchange mechanism and, still holding the operating plate with the tommy bar, push the outer cover home.

Ensure that the dowel peg in the outer cover is located between the ends of the spring on the pawl carrier plate. If this is not so positioned the footchange pedal will not return to neutral.

Secure the outer cover with fixing screws and nuts, and fit the footchange pedal C and kickstarter crank B. Replace filler cap and inspection cover.

Replacement of Gearbox

The replacement of the box should not present any difficulties. When the box is in position and the fixing bolts are ready to be tightened up, make sure that the flats on the heads of the bolts register in the slots of the yoke plates, and that the chain is correctly tensioned. There should be about ¾ inches up and down play in one run of the chain when the other run is taut.

Make sure that the gearbox bolts are finally tightened before readjusting the rear chain, and refill the gearbox with oil to the correct level.

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1956 C10L AND C12 MODELS WITH LIGHT FOUR-SPEED GEAR-BOX

(1954/5 Four-speed Models use Service Sheet 209)

Removal of Gearbox

In most cases it will be found convenient to dismantle the gearbox whilst it is in position. However, if attention to the bearings is required it may be found advisable to remove the complete gearbox. The primary transmission, clutch and chain-case must be removed. (See Service Sheet 411).

To remove the gearbox from the frame, first detach the clutch and speedo cables. Remove the cover plates. Unscrew the gearbox holding bolts and lift the box clear.

Dismantling

In order to obtain access to the gearchange and kickstart mechanism the outer cover must be removed. Drain off the oil, if this has not already been done, and move the gear to neutral. Remove the three stud nuts and four screws securing the outer cover and the cover can be drawn away together with the kickstarter and gearchange levers. The internal clutch operating lever will fall away. The ratchet pinion assembly is secured by a large nut, remove this and the ratchet, ratchet pinion, bush spring and washer can be taken away.

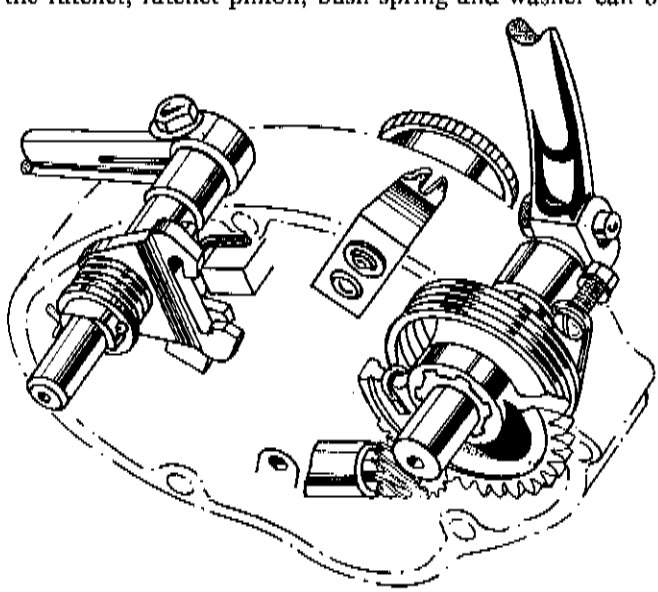

Fig. 2. C4 Kick-start and foot-change mechanism.

The gearchange mechanism need not be dismantled unless it needs attention. If this is the case remove the gear lever and the small circlip behind it. The spindle and gearchange mechanism can now be withdrawn.

To obtain access to the gearbox internals the gearbox inner cover must first be removed. After the ratchet assembly has been removed it will be seen that the inner cover is held in position by one nut, undo this and remove the circlip located on the end of the layshaft and adjacent to the speedo drive. The inner cover and mainshaft can now be withdrawn. If it is required to remove the gearchange control quadrant from the inner cover, press out the gearchange spindle bush and expose the end of the control quadrant spindle. The spindle is threaded $\frac{1}{4}$" B.S.C. and by using a suitable bolt as a draw tool the spindle can be withdrawn.

The selector shaft is secured in the gearbox shell by a grub screw which passes through the gearbox shell and engages in an annulus in the shaft. Slacken the grub screw and pull out the shaft. The gear cluster, forks and layshaft can now be withdrawn. Remove the gearbox sprocket by unscrewing the large ring nut and tap the pinion sleeve from its bearing. Lift the spring loading selector arm and slide the cam plate from its bearing. To remove the pinion sleeve bearing take out the retaining circlip, withdraw the oil seal and warm the case before tapping out the bearing.

Should the needle roller layshaft and bearing need replacing, removal is also facilitated by warming the gearbox shell.

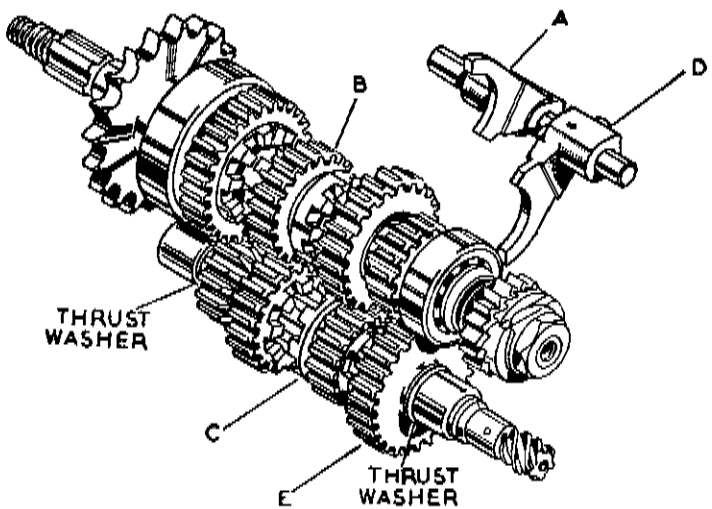

Fig. C43. Gear cluster.

Assembly

Lift the spring loaded selector arm and fit the cam plate with the selector arm in the bottom gear position. If the pinion sleeve bearing and oil seal have been removed for any reason it is advisable to fit a new oil seal.

Warm the gearbox and press in the bearing. Fit the oil seal and circlip, making sure that it is correctly located. Fit the pinion sleeve.

Replace the layshaft ensuring that one of the hardened steel thrust washers is in its correct place as shown in Fig. (1). Layshaft thrust washers are available in three sizes.

Part No.	29-3645	Layshaft	Thrust	Washer	.075/.076
" "	29-3646	"	"	"	.084/.085
" "	29-3626	"	"	"	.092/.093

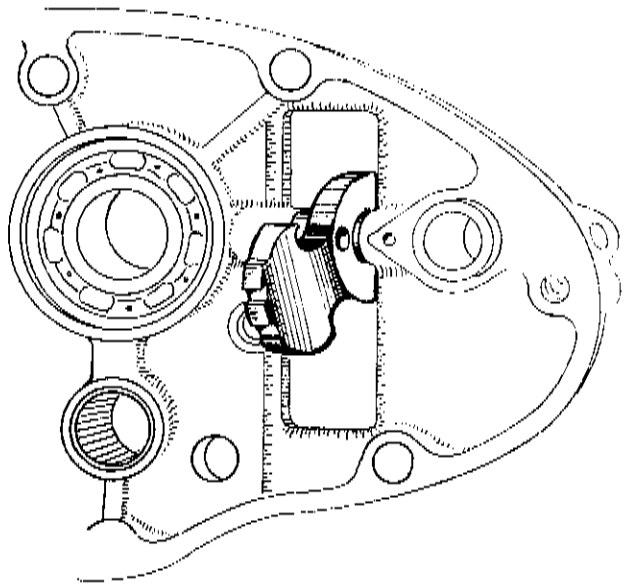

Fig. C44. Timing of gear-change operating lever.

Fit the mainshaft sliding gear fork (A) with its peg in the cam plate slot. Correct location is assisted by sliding the selector shaft through the fork and into its position in the gearbox shell. Fit the mainshaft sliding pinion (B) into its place on the fork and then place the layshaft sliding pinion (C) onto the layshaft. Carefully remove the selector shaft. Fit the layshaft sliding pinion fork and engage the peg in the slot on the cam plate.

Slide the selector fork shaft through the two forks and into position in the gearbox shell. Tighten the small grub screw making sure that it engages in its annulus.

Slide the mainshaft into position, fit the layshaft pinion (E) and place the other hardened steel washer in position.

Place the mainshaft and inner cover in position but before they are pushed home the operating lever must be set so that the red dot on the lever and the cover coincide in the bottom gear position. Push the cover home and fit the securing nut.

Assemble the ratchet and pinion assembly. First place in position the steel washer and then the steel bush. Fit the spring ratchet pinion and ratchet. Finally, secure with the nut and tab washer.

Replace the outer cover, ensuring that the clutch operating lever is correctly positioned. To do this remove the inspection cap and fit the push rod in position. Moving the kickstart will prevent jamming and will assist engagment of the speedo drive.

Should the mainshaft ballbearing, located in the inner cover, need replacing it is necessary to extract the circlip, warm the cover and tap the bearing out. Refitting is self-explanatory.

Below is a list of useful part numbers:-

29-3608	Gearbox Sprocket Oil Seal.
29-3598	27T Pinion Sleeve.
29-3603	Outer Cover Stud. (long).
29-3604	,, ,, ,, (short).
29-3589	Cam Plate.
29-3636	Kickstart Ratchet
67-3376	,, ,, Pinion
29-3637	,, ,, ,, Bush
29-3585	,, ,, and Mainshaft Nut Lockwasher
29-3628	Selector Fork
29-3627	,, ,, Shaft
29-3614	Mainshaft Sliding Pinion 21T
29-3621	Layshaft ,, ,, 18T
29-3616	,, complete
29-3643	Clutch Push Rod
67-3340	Footchange and Stop Plate Return Spring
67-3174	Kickstart Spring
29-3611	Mainshaft complete
29-3639	Layshaft Bearing Circlip

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C Group Models

PRIMARY TRANSMISSION

Clutch Adjustment, C10, C11, C10L 1954/5 & C11G.

Removal of the knurled filler plug from the gearbox outer cover will expose the clutch adjusting screw 'A' and locknut 'B' (Fig. C24). Loosen the locknut and turn the screw with a screwdriver until the angle between the operating lever and the cable is slightly less than a right-angle when the clutch is fully withdrawn. It will probably be necessary to alter the length of the cable by means of the adjuster 'C', to obtain the correct position for the lever. Re-tighten the locknut, and replace the filler plug.

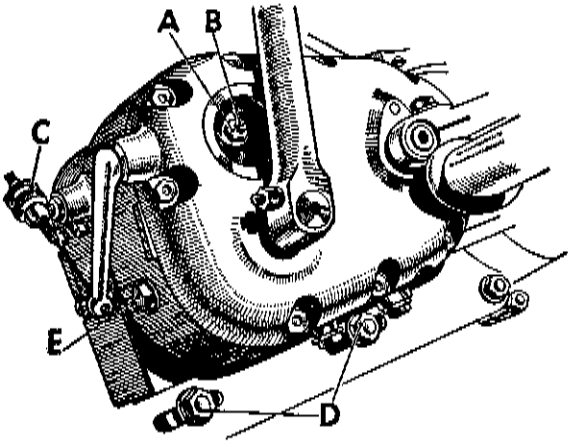

Fig. C24 Clutch and front chain adjustment.

When the clutch is engaged, it is essential that the cable has approximately $\frac{1}{8}$" free play to avoid a constant pressure on the clutch push rod, with consequent wear and loss of efficiency.

On four-speed models, the positioning of the components is slightly different and the inspection cover is retained by two screws, but the adjustments are identical.

Clutch Adjustment, C10L & C12 (1956 onwards)

The main clutch adjustment consists of a screwed pin C and locknut D, Fig. C24*a*, on the outside of the gearbox cover. Remove the large round screwed cap to expose the end of the clutch operating lever, There should be approximately $\frac{3}{16}$ inch play between the back of the clutch lever and the inside of the cover when the clutch is released. If the clearance varies appreciably from this, the locknut must be undone and the central pin screwed in or out until the adjustment is correct. The pin is the pivot on which the operating lever rotates and, therefore, screwing the pin in reduces the clearance. Tighten the locknut and re-check the adjustment.

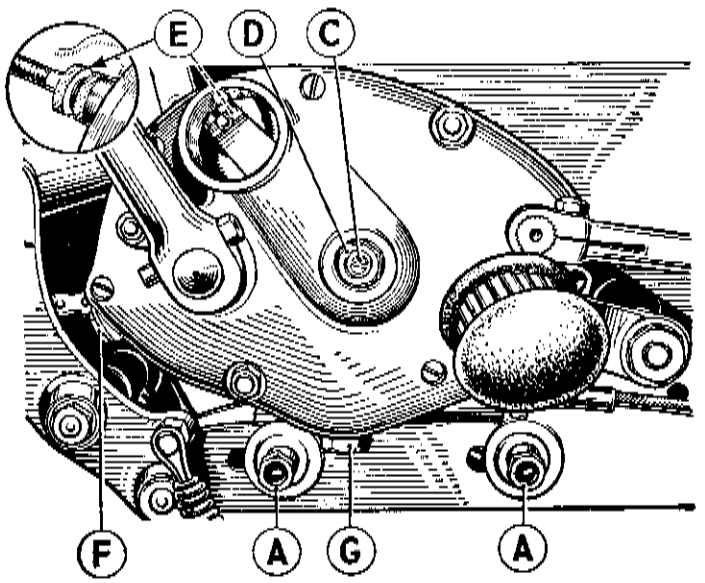

Fig. C24*a*. Clutch and Front Chain Adjustment.

When the adjustment has been completed the cable should be adjusted by means of the screw adjuster at the back of the gearbox inner cover E (Fig. C24*a*) until there is approximately $\frac{1}{8}$ inch free play at the handlebar end.

Front Chain Adjustment

The adjustment of the chain can be checked by removing the inspection cover from the chaincase. Turn the engine over slowly, and find the position in which the chain is tightest There should be a total up and down movement of $\frac{1}{2}$" at this point.

To adjust, slacken the two nuts ('D' Fig. C24 or 'A' Fig. C24*a*) and move the gearbox backwards or forwards as necessary, until the adjustment is correct. Then tighten the nuts and re-check the adjustment.

Note that, if the position of the gearbox has been altered, the rear chain will need adjusting also.

Chaincase Removal

Remove the drain plug from the rear of the case, and drain off the oil. Take off the left-hand footrest and undo the screws round the rim of the case, together with the two screws which secure it to the gearbox shield (when fitted). The nuts for these screws are welded on and cannot be lost. The chaincase outer cover can then be removed, taking careful note of the positions of the washers and distance pieces.

On C10 and C11 models, the engine drive shaft assembly is removed by prising back the tab of the lock washer with a screwdriver inserted between the coils of the shock absorber spring, and unscrewing the large nut on the end of the shaft. If the nut is very tight, engage top gear and apply the rear brake to prevent the engine turning. The spring and cam sleeve can then be withdrawn.

Rotate the clutch until the spring connecting link in the chain is on the top run, and in line with the recess in the back of the chaincase. Remove the spring link, followed by the chain and engine sprocket.

Take off the clutch, as described in Service Sheet No. 308, and withdraw the rear part of the chaincase after unscrewing the bolts which secure it to the crankcase.

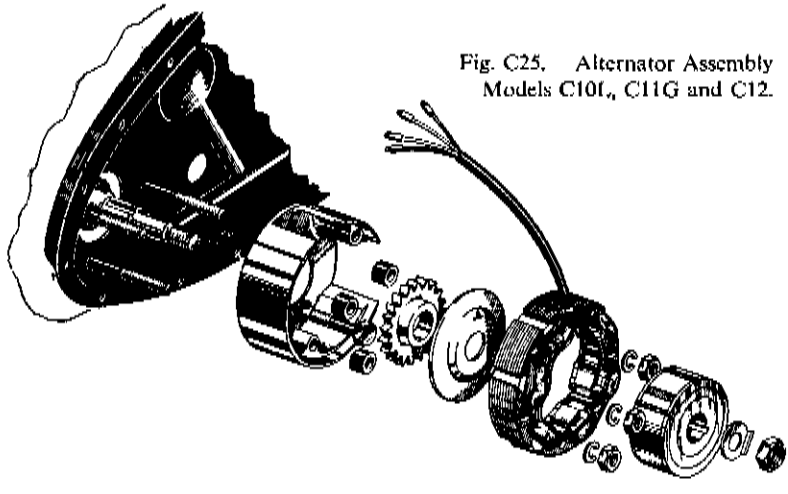

Fig. C25. Alternator Assembly Models C10L, C11G and C12.

The alternator assembly on C10L, C11G, and C12 models is dismantled by prising back the tab on the lock washer and unscrewing the large nut on the end of the engine shaft. If the nut is very tight, engage top gear and apply the rear brake to prevent the engine turning. Next take off the three nuts (four on some early models) which retain the coil assembly. Lift this off the studs and withdraw the rotor, which is keyed to the shaft, also the dished aluminium washer. Should the coil assembly prove difficult to remove, it may be gently prised off with a screwdriver, taking great care not to damage the windings.

A limited number of machines was produced employing a brass shield behind the rotor, in conjunction with a plain steel washer on the shaft, in place of the dished aluminium washer. The four stud fixing for the coil assembly was used with this arrangement.

Rotate the clutch until the spring connecting link is on the top run, and in line with the recess in the back of the chaincase. Remove the spring link, followed by the chain and engine sprocket.

The alternator housing can now be withdrawn, after removing the retaining bolt and the three distance pieces from the studs. On models having four studs, the housing is retained by two nuts.

Take off the clutch, as described in Service Sheet No. 411, disconnect the wires from the alternator at the push-in connectors, and withdraw the rear part of the chaincase.

Chaincase Re-assembly

Reassembly of the front chaincase is carried out in the reverse order to dismantling.

Ensure that the alternator (when fitted) is correctly assembled (see Fig. C25), and that the washer between the rotor and the engine sprocket has not been omitted. The wires from the alternator must be positioned so that they cannot foul the chain.

New lock washers should be used for the large nut on the engine shaft, and the nut must be fully tightened before the tab is bent over.

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C10, C11 and C11G Models

ADJUSTMENT, DISMANTLING AND RE-ASSEMBLY OF HUBS AND BRAKES

(For Spring Frame Rear Hub, see Service Sheet No. 412)

Front Wheel Removal and Replacement

To remove the front wheel, place a suitable support under the engine crankcase so that the wheel is held clear of the ground. Disconnect the brake cable from the brake arm clip and unscrew the wheel spindle nut which has a left hand thread. Slacken the pinch bolt A (Fig. C27) and pull out the spindle B. Slide the distance bush C outwards to allow the wheel to drop out of the forks.

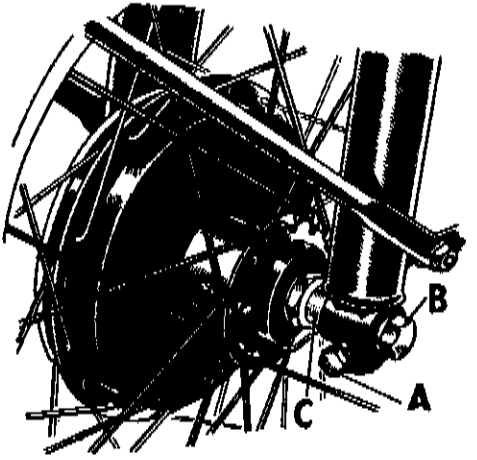

Fig. C.27. Removal of front wheel.

The wheel is replaced in the reverse order to that for removal. It is most important that after the spindle nut 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 the fork will not function correctly.

Rear Wheel Removal (Rigid Frame)

Disconnect the rear chain, then remove the bolt holding the brake anchor plate and the knurled brake adjuster nut on the rear brake rod. Disconnect the speedometer drive by unscrewing the nut F (Fig. C28), then loosen the two spindle nuts and the wheel should slide out of the fork ends.

When replacing the rear wheel note that the spindle nuts are shouldered and must be correctly located in the fork ends.

Rear Chain Adjustment (Rigid Frame)

The rear chain must be re-adjusted after the rear wheel has been replaced or when chain wear has taken place. With the spindle nuts just slack, rotate the spindle by means of a spanner on the flats at its left hand end. Clockwise rotation will move the spindle backwards by the action of the two cams bearing on the frame stops.

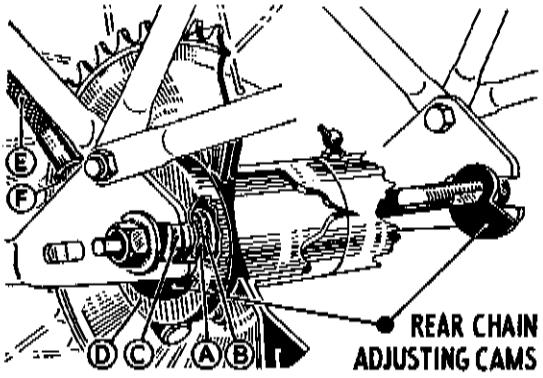

Fig. C.28. Section of hub showing adjustment.

The chain should be adjusted so that there is a total up and down movement of ½ in. in the centre of the chain run and at its tightest point. Tighten the spindle nuts and check the wheel adjustment by means of a taut piece of string which should be equidistant from the front and rear of each wheel.

Note: Where the speedometer drive gearbox is attached to the rear wheel, it must be correctly aligned so that the speedometer cable is not kinked. Slackening nut C (Fig. C28) will permit the gearbox to be rotated, but the left hand spindle nut must be slackened first.

Bearing Adjustment (Front Hub and Rear Hub Rigid Frame)

Both hubs are adjusted in a similar manner. Cup and cone type bearings are employed and the adjusting cone B (Fig. C28) with its locknut A, are on the left hand side of the hub. Where the speedometer drive gearbox is fitted to the rear wheel it must be removed, after undoing the retaining nut and washer at C, to gain access to the adjuster cone.

To carry out the adjustment, remove the wheel then slacken the locknut and screw the adjuster cone in or out until, with the locknut re-tightened, the spindle rotates freely but without any appreciable end play.

Hub Dismantling and Re-assembly

With the wheel removed, undo the locknut A (Fig. C28) and unscrew the adjuster cone B which will permit the brake plate, fixed cone and spindle to be withdrawn from the other side of the hub. The balls will fall free during the operation and care should be taken to prevent their loss, and to avoid the inter-mixing of one set with the other.

Removal of the retaining nut will permit the brake plate to be withdrawn from the spindle. The bearing cups can be tapped from the hubs by means of a suitable drift applied from the opposite end, and will carry with them the felt washers and their retainers. These items should only be removed if they require replacement.

Re-assembly is carried out in the reverse order. After the cups have been positioned insert the plain steel washer, followed by the felt washer and the felt washer retainer to complete the assemby of the oil seal for each bearing. Pack the cups with grease and insert the ball bearings. The front hub should have eleven 5/16 in. balls in each cup and the rear hub ten 5/16 in. balls.

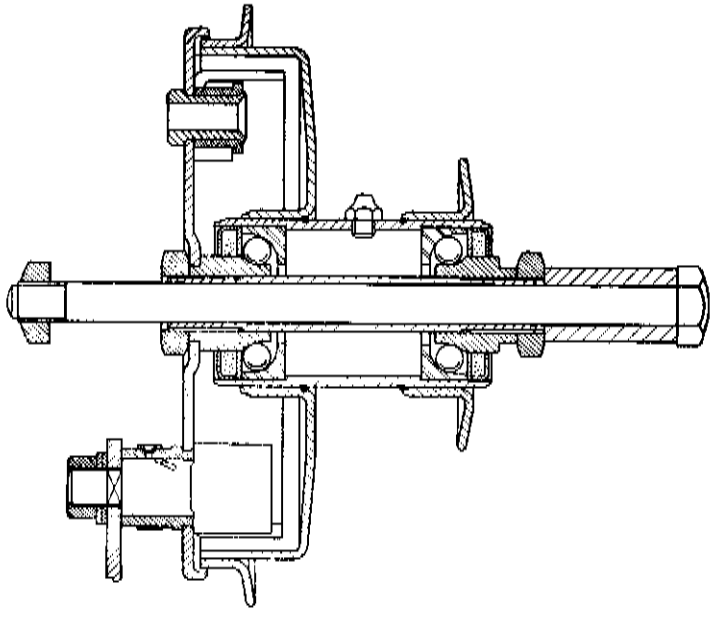

Fig. C.29. Front hub. Section view.

If the non-adjustable cone has been removed from its spindle or spindle sleeve it should be screwed into position again, noting that it screws on to the shorter thread of the rear spindle.

Replace the spindle in the hub and screw the adjustable cone and locknut into position to secure the spindle. Replace the brake plate and its retaining nut or distance piece and adjust the bearings as described in the earlier paragraph. The brake plate should rotate freely without binding.

Brake Re-lining

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 removed.

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

Chain Wheel Replacement

The rear chainwheel is of the bolted on type and can be simply replaced after removing the rear wheel and the speedometer drive gearbox. Make sure that the retaining bolts are quite tight as, if they are allowed to work loose, fracture is likely.

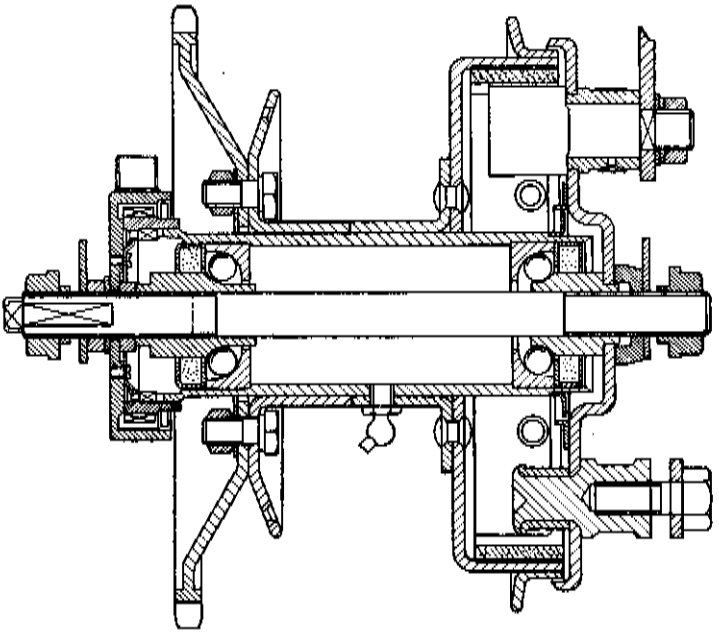

Fig. C.30. The Rear Hub. Section view.

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C10L, C11G and C12 MODELS

CLUTCH

Dismantling

Remove the nearside footrest and then undo the small screws round the rim of the chaincase. As the outer half of the chaincase is taken off, careful note should be made of the positioning of the distance pieces and washers, etc., for replacement purposes. The joint washer should be carefully preserved.

Remove the three spring retaining nuts and withdraw the springs, spring cups and distance pieces. The spring pressure plate and other clutch plates can then be removed, and if only attention to these items is required the clutch need not be dismantled further. The steel plates should be smooth, and if badly scored must be replaced, while the cork inserts will require washing in petrol if there is any trace of oil on them. If the inserts are burnt or glazed they should be replaced.

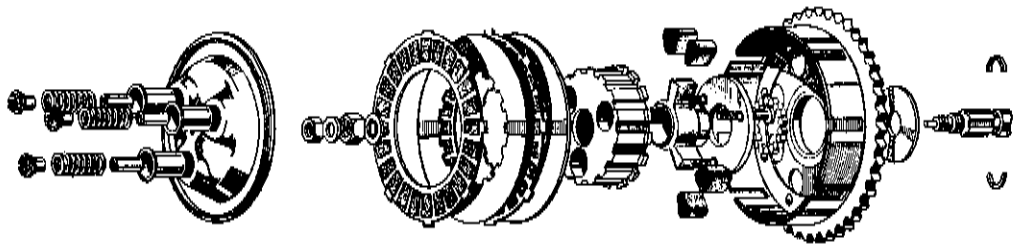

Fig. C31. Exploded View of Clutch.

To dismantle the remainder of the clutch, remove the outer mainshaft nut, which has a left-hand thread. Remove the washer and unscrew the inner nut, which has a right-hand thread. The complete clutch can then be withdrawn from the mainshaft, making sure that the rollers do not fall out from between the clutch centre and the chainwheel. The clutch thrust washer and its split circlip will probably remain in position on the mainshaft, but can easily be withdrawn.

Lift the chainwheel from the clutch centre and remove the 18 rollers. The three bolts and the cover plate from the clutch centre can also be removed to expose the vane and shock absorber rubbers. If the rubbers require attention, the vane must be pushed out with the aid of a suitable drift.

Re-assembly

Before commencing re-assembly examine the roller tracks on the chainwheel bush and clutch centre, and if the wear on either of these components exceeds .0015 in. it should be replaced.

If the chainwheel teeth are worn to a hook shape, the chainwheel must be replaced or rapid wear on the chain will result.

To re-assemble the vane into the clutch centre, first replace the vane and the three thicker rubbers which should be on the left-hand side of each vane arm. (A, Fig. C32). Hold an old gearbox mainshaft in a vice and position the vane centre on it to prevent it rotating.

Rotate the clutch centre so as to compress the rubbers and slip the remaining three rubbers into position. The clutch centre can best be gripped with the aid of a plain clutch plate. Replace the clutch centre cover plate B and the three bolts.

The remainder of the clutch assembly is quite straightforward. Ensure that the split circlip is properly located on the mainshaft before the clutch thrust washer is positioned against it. A dab of grease will serve to hold them in place. Position the 18 rollers carefully on the clutch centre before sliding the chainwheel over them. Re-position the remainder of the clutch on the shaft and replace the two nuts and washers, noting that the inner nut has a right-hand thread and the outer a left-hand. Make sure that the inner nut is fully tightened before the outer is replaced.

Replace the clutch plates ensuring that the thick plain back plate is put in first. When the spring assemblies have been replaced the retaining nuts should be tightened down firmly on to the distance pieces.

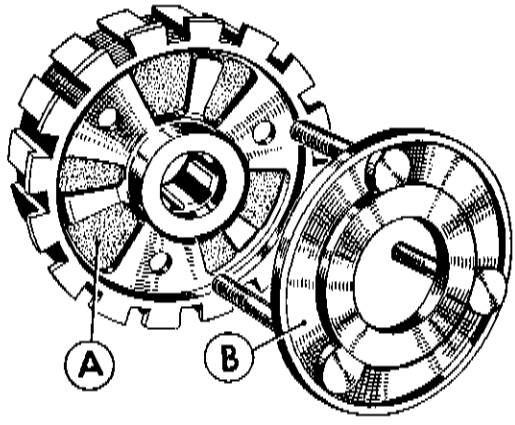

Fig. C32. Vane Assembly.

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Models C10, C11 and C11G
(With Plunger Type Rear Suspension)
ADJUSTMENT, DISMANTLING AND RE-ASSEMBLY OF REAR HUB AND BRAKE

Wheel Removal

Undo the spring link of the rear chain and allow the chain to hang down. A piece of clean paper should be placed below the machine so that the chain does not pick up grit.

Remove the brake rod adjuster D (Fig. C33) and loosen the nuts E. On three-speed models the speedometer drive cable must also be detached. The wheel can then be moved to the rear and withdrawn from the machine.

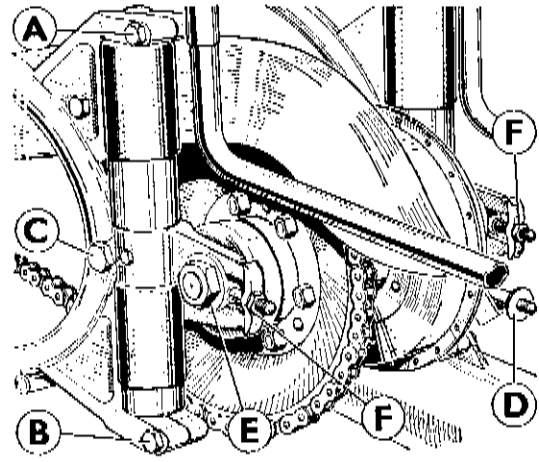

Fig. C33. Rear Wheel Removal

When replacing the rear wheel ensure that the slot in the brake torque plate is located on the extended head of the pinch bolt on the right hand rear suspension lug, and that the wheel alignment has not been disturbed.

Hub Dismantling and Re-assembly

After unscrewing its retaining nut D (Fig. C34) withdraw the brake plate complete with brake shoes.

Removal of the sleeve nut C will permit the spindle, complete with speedometer drive or dust cover, to be pulled out of the hub from the chainwheel end.

Prise off the dust cap and remove the felt oil seal from the brake drum end of the hub. Then with the aid of a suitable soft drift unscrew the bearing retaining ring A which has a left hand thread. Displace the central distance piece J in the hub and drive out the bearing E with the aid of a suitable drift. As the bearing comes away it will carry with it the oil seal, oil seal holder and oil seal retaining washer.

Remove the distance piece and drive out the other bearing. Unscrewing the nut H will permit the speedometer drive or dust cover to be withdrawn, to leave only the short distance collar F and its retaining nut G on the spindle. The chainwheel can be detached after bending back the lockwashers and undoing the retaining nuts.

Re-assembly is carried out in the reverse order to that for dismantling. Both bearings should be greased before re-assembly. Position the distance collar L in the brake drum side of the hub and insert the bearing B until it is firmly against the collar. Replace the flat oil seal washer and then screw in the bearing retaining collar A which has a left hand thread. Ensure that this collar is quite tight before replacing the felt oil seal and its retaining dust cap.

The centre distance piece J can then be replaced, followed by the chainwheel side bearing and its oil seal assembly. Pass the spindle through the two bearings and the central distance piece and lock the assembly up tight with the sleeve nut C. Replace the speedometer

drive gearbox (3-speed models) making sure that the dogs on the inside of the gearbox sleeve engage in the two notches on the end of the hub. Ensure that the washers fitted one on either side of the speedometer drive or dust cover are not omitted.

Replace the brake plate and secure with the aid of the spigot nut D. This completes the re-assembly.

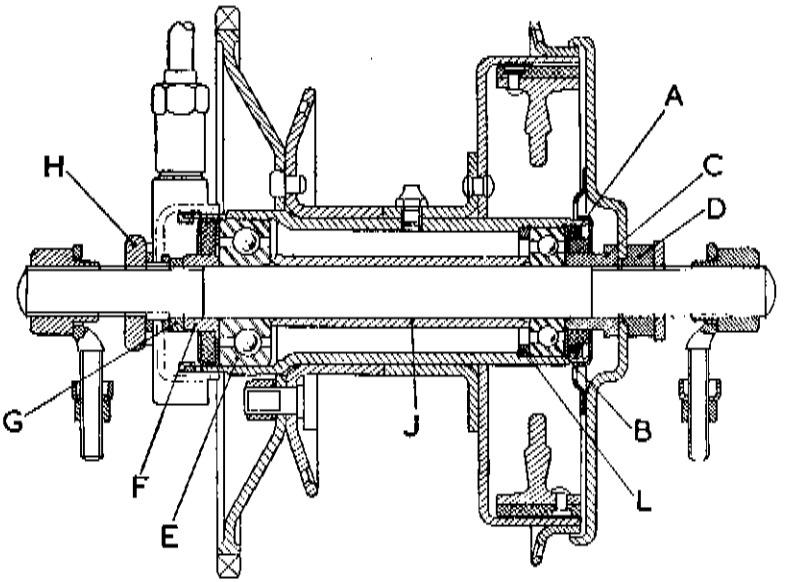

Fig. C34
Section view of the Rear Hub.

Brake Shoe Re-lining

When the brake plate is removed from the drum it should be laid on a bench, shoes uppermost. Insert two small levers under the edge of the shoes and lever them up and away from the plate. 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.

For instructions on removing and replacing the brake shoe linings see Service Sheet No. 612.

Rear Chain Adjustment

First place the machine on its centre stand so that the rear wheel is clear of the ground. The wheel must be at its lowest point in the suspension when the adjustment is made. Slacken the two nuts E (Fig. C33) then draw the wheel rearwards by means of the two chain adjusters F to tighten the chain. Turn each nut by an equal number of turns so that the wheel alignment is not altered. The chain should be adjusted so that there is a total up and down movement of ½ in. at its tightest point. Tighten the nuts E and check the adjustment.

The wheel alignment can be checked by means of a taut piece of string which should be equidistant from the front and rear of each wheel. Note that the rear brake may need adjusting when the chain adjustment has been altered.

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BSA SERVICE SHEET No. 412A

Nov., 1959

C Group Models
(Except C15)

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. C33a). 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.

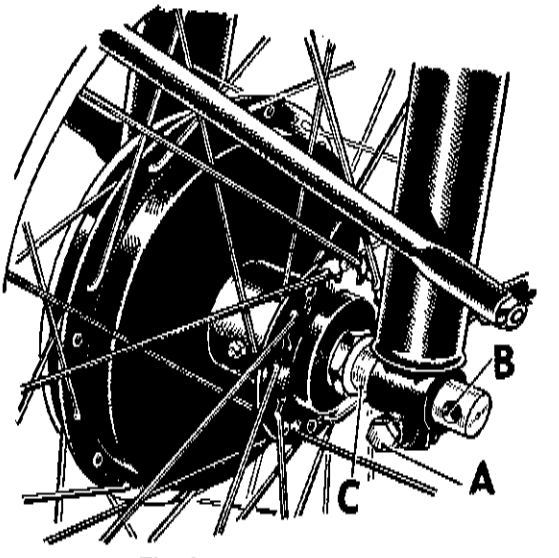

Fig. C33a. Wheel Removal

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. C34a). 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 ballrace *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 commencing re-assembly make sure that the hub distance collar behind each bearing is in position. Press the bearings in as far as they will go and secure with the screwed collars.

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 No. 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.

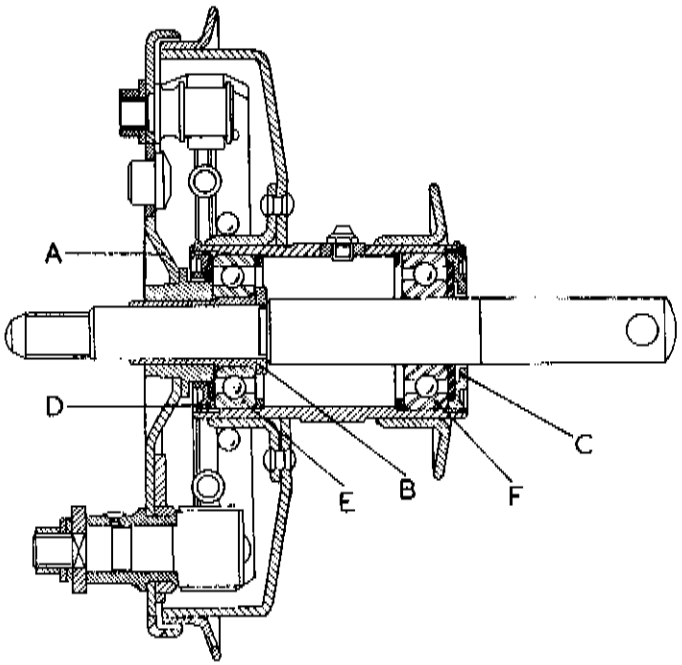

Fig. C34a. Section of Front Hub (7 in. Brake)

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C12 Model

ADJUSTMENT, DISMANTLING AND RE-ASSEMBLY OF HUBS AND BRAKES

Wheels

Both wheels are fitted with ball forward bearings which require no adjustment. The bearings are packed with grease during reassembly and should last until the machine is overhauled. The brakes are provided with knurled finger adjusters and should not be adjusted too closely as any 'rubbing' will generate heat which may distort the drum and melt the grease in the hub.

Front Wheel Removal

Place the machine on the stand with the front wheel clear of the ground. Disconnect the brake cable and slacken pinch bolt 'A' (Fig. C42), insert a tommy bar in the wheel Spindle 'B' and unscrew the spindle which has a left-hand thread. Support the wheel and withdraw the spindle. The wheel can be pulled away from the right-hand fork leg and removed from the machine.

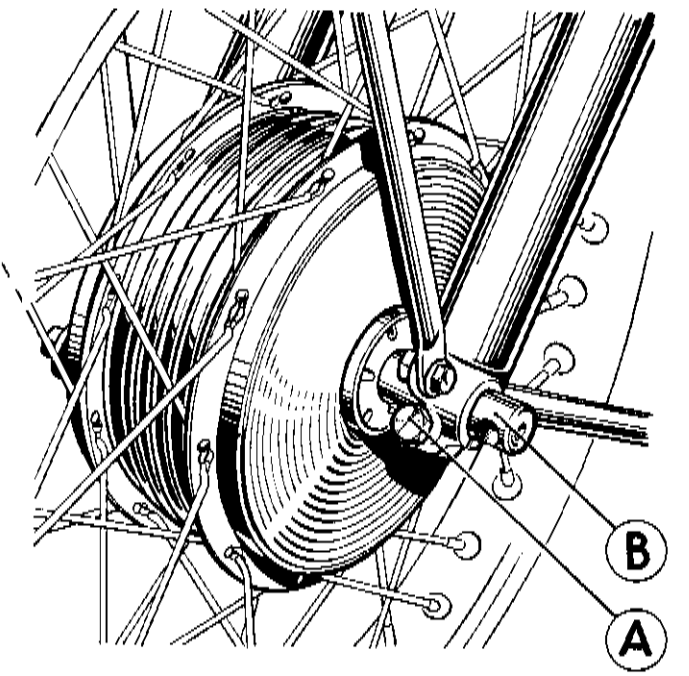

Fig. C42. Front Wheel Removal.

After removal take care that the wheel is not allowed to fall on to the bush which projects from the brake drum side of the hub or it may be forced back on to the hub. If this should happen the bush can be retrieved and repositioned with the aid of a wheel spindle.

The wheel is replaced in the reverse order. After the spindle has been tightened and *before* the pinch bolt is tightened, depress the forks several times with the wheel on the ground to enable the left-hand fork end to position itself in the spindle shank otherwise the fork leg may be clamped out of position.

Rear Wheel Removal

Place the machine on the stand and remove the rear chain. Do not allow the chain to unwind itself from the gearbox sprocket. Undo the knurled brake adjuster and slacken the two spindle nuts 'B' (Fig. C43). The wheel can now be withdrawn to the rear and removed from the machine under one side of the rear mudguard.

The wheel is replaced in the reverse order. Ensure that the slot in the brake plate is engaged on its locating peg and that the chain adjusters are up against the fork ends.

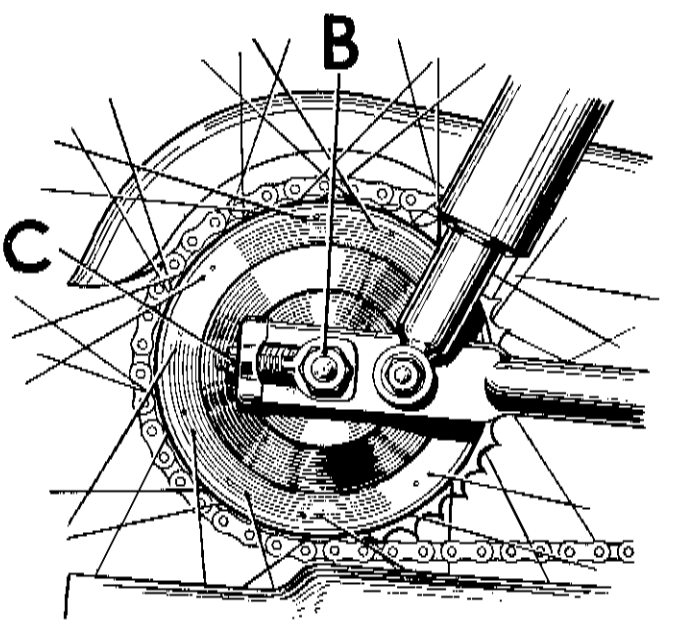

Fig. C43. Rear Wheel Removal and Chain Adjustment.

Rear Chain Adjustment

The rear chain must be adjusted when the machine is on the stand and the suspension is at its lowest point. Rotate the wheel and find the tightest point on the chain. The total up and down movement at this point should be $1\frac{1}{2}$" measured at the centre of the chain run. If it varies from this the chain must be adjusted by moving the rear wheel. Slacken the spindle nuts 'B' and screw the adjusters 'C' in or out as required. When the chain tension is correct tighten the spindle nuts and recheck. Finally, ensure that the adjusting nuts are tight.

Wheel Alignment

During chain adjustment it is important to see that the wheel alignment remains correct. If the adjusters are moved an equal amount alignment will not be disturbed assuming that it was originally corrected, but it is wise to check it occasionally by means of a long straight edge placed along the sides of the wheels. The straight edge should touch the front and rear walls of both tyres. Where different sizes of tyres are used allowance must be made.

Dismantling Front Hub

This should not be necessary unless it is intended to renew the bearings. Withdraw the brake plate, which is a push fit on the bush 'B' (Fig. C44). After removing the locking cotters unscrew the bearing retaining collars 'C' and 'D' which have right-hand threads. Replace the spindle and drive out the brake side ballrace 'E' together with bush 'B' by striking the spindle with a soft mallet. Ballrace 'F' can now be removed with a suitable drift.

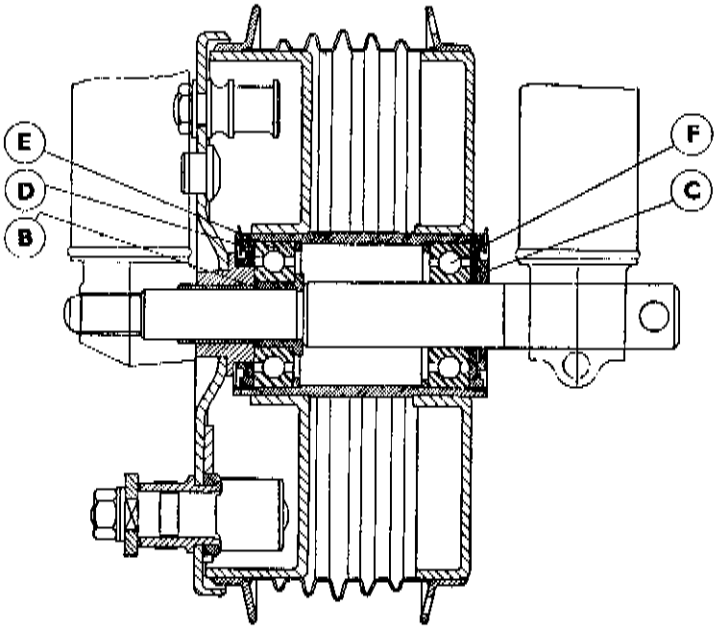

Fig. C44. Front Hub.

Re-assembly

Ensure that the hub distance collar located behind each bearing is in position. Press in the bearings until they are fully home and screw in the retaining collars making sure that the oil seals are serviceable lock the collars up tight. It may be found necessary to drill fresh holes for the split pins.

If the brakes have been relined or new shoes fitted it will be necessary to centralise the brakes. Replace the brake cover plate complete with shoes, cam and fulcrum pin into the drum. Slacken the fulcrum pin nut and turn the cam so as to operate the shoes in the normal way. The fulcrum pin will move in the slot until the shoes press equally on to the drums. The fulcrum pin should be fully tightened and the brake cam can then be released.

Dismantling Rear Hub

Remove the retaining nut 'A' (Fig. C45) and left of the brake plate and shoes. The spindle nut 'B' is now exposed, remove this and tap the spindle through until it can be withdrawn. Prise off the dust caps 'C' and felt washers 'D'. Unscrew the locking ring 'E' (Note:- this has a left-hand thread.) Drive out the ballraces using a suitable drift inserted through the hub.

Re-assemble in the reverse order. Grease the bearings thoroughly and ensure that the bearings are up against the distance collar. Tighten the locking ring fully.

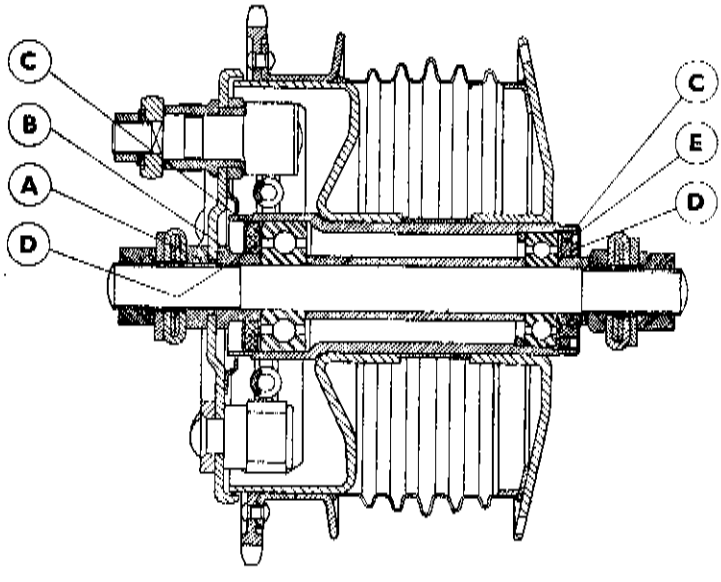

Fig. C45. Rear Hub.

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BSA SERVICE SHEET No. 413

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C10L and C11G Models

REMOVING ENGINE FROM FRAME AND COMPLETE DISMANTLING

Engine Removal

The procedure for removal and dismantling of the engine will be described from the point reached in Service Sheet No. 405 on decarbonising, when the cylinder head and barrel have been removed.

Remove the primary chaincase as described in Service Sheet No. 409 on Primary Transmission.

Remove the contact breaker cover and disconnect the lead from the terminal. Undo the retaining bolt and place the crankcase and gearbox shield on one side.

Drain the oil tank and disconnect the oil pipes from the crankcase unions.

Remove the nuts securing the front engine plates and the rear crankcase fixing studs. Remove the front engine plates and slacken the frame and gearbox nuts clamping the rear engine plates, as these tend to hold the engine in position. Withdrawal of the rear crankcase securing studs will permit the engine to be lifted from the frame.

Engine Dismantling

Whilst working on the engine, a simple fixture as illustrated in Fig. C35 will facilitate matters considerably. Alternatively, clamp the engine in a vice by one of the mounting lugs, supporting the engine on a bench.

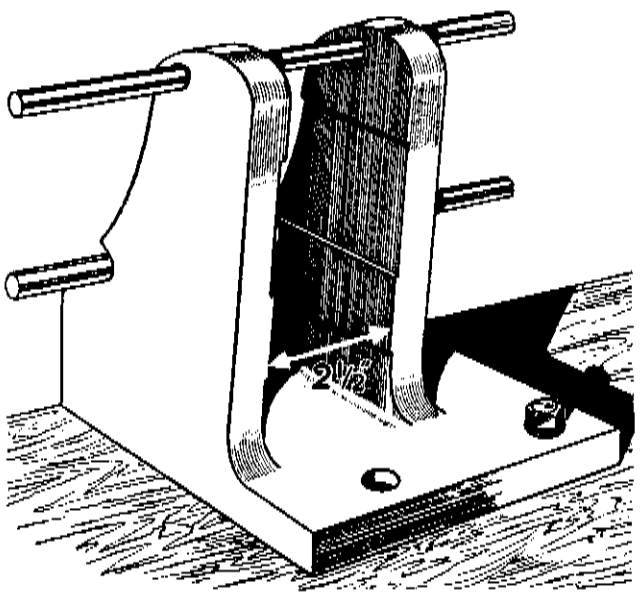

Fig. C35. Angle bracket for mounting engine.

Undo the two screws and withdraw the contact breaker back plate. Then remove the advance and retard mechanism by undoing the central bolt. Resistance will be felt after a few turns of the bolt and further rotation will pull the shaft from its taper.

Early models did not have this self-extracting device, but an effective extractor can be simply made. Remove the retaining bolt and pass a piece of $\frac{3}{16}$ in. steel rod down the bolt hole as far as it will go. Mark the rod at a point flush with the end of the shaft, then remove the rod and cut it off $\frac{3}{8}$ in. short of this mark. Replace the rod and screw a $\frac{5}{16}$ in. C.E.I. bolt into the end of the shaft. As this bolt is tightened down on to the rod it will pull the mechanism from its taper.

Take out the timing cover screws and pull off the cover. Clean it and place on one side. If the oil seal requires replacing, it can be prised from the cover with the aid of a screwdriver.

Withdraw the camshaft complete, then flatten out the tab washer and remove the mainshaft nut. The mainshaft pinion can now be drawn off with the aid of Service Tool, Part No. 61–3256. (See Fig. C36.)

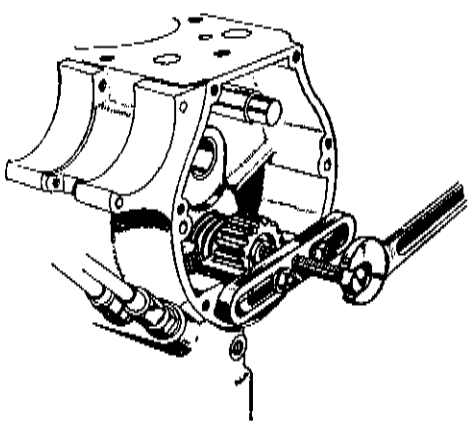

Fig. C36. Engine shaft pinion extractor (Service Tool 61–1735)

The oil pump driving spindle is located by a dowel situated in the bottom left-hand edge of the timing chest. Screw one of the timing screws into the dowel and use it to pull the dowel from the crankcase. The pump driving spindle can then be drawn upwards into the timing chest (Fig. C37.). In some instances the dowel will be found to be covered by a small washer which must be removed before the screw can be inserted.

Before parting the crankcase halves remove any distance washers from the drive side crankshaft and withdraw the sleeve which projects through the crankcase oil seal.

Remove the nuts from the crankcase studs and take out the free studs, noting their locations. The halves may now be separated. This may be somewhat difficult but a little care will allow them to be parted without damage. A few careful blows with a hide mallet will serve to break the joint if the jointing compound prevents separation.

Pull the gearside crankcase half away from the flywheel assemby, then lift the flywheel assembly from the other crankcase half, taking care not to lose the oil retaining washer which lies between the flywheel and the mainshaft ball bearing.

Take off the four nuts and lock washers at the base of the gearside crankcase, and remove the base plate and filter.

The two bolts retaining the pump can be unscrewed to permit the pump to be withdrawn, but it should not be removed unless it requires attention. The bolts retaining the pump in position can be identified by the spring washers underneath their heads.

If the drive side ballrace requires replacing, remove the retaining circlip and after heating the case in a degreaser or hot water, the bearing should be driven out with a suitable drift applied from the outside of the case. The new bearing should be fitted while the case is still warm, and the drift used should fit the outer race of the bearing. Do not omit the oil retaining washer behind the bearing.

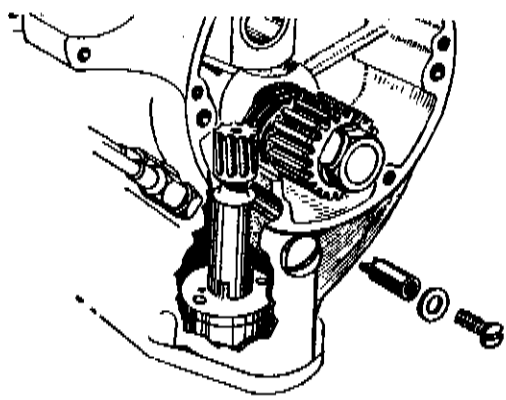

Fig. C37. Oil pump spindle locking plunger.

The case should also be heated before attempting to remove any of the bushes in the timing side crankcase half or timing cover.

The cam pinion spindles should also be inspected for wear and, if necessary, removed while the case is hot.

Finally, if the flywheels are to be separated they must be held securely on the bench, as extreme pressure will be required to released the crankpin nuts.

Special spanners are used, and it is usually necessary to add a piece of tubing to obtain additional leverage.

The crankpin is a taper fit in the flywheels, and can be released by a sharp blow with a mallet.

It is now only necessary to decide which parts require renewal, and the following may assist you in your decision:

We do not advise the fitting of over-size rollers to the big end assembly. The whole assembly, comprising crankpin, connecting rod and rollers, should be changed. All these components are carefully matched, working to one ten-thousandth part of an inch, and supplied in complete sets, ready for fitting.

If the bore of the cylinder, when measured at right angles to the gudgeon pin, shows wear to the extent of .010 in. or more, the cylinder should be rebored, and an oversize piston fitted. (Oversize pistons are available in 0.5 mm. (.020 in.) and 1 mm. (.040 in.).

Wear in mainshaft bearings or bushes will be readily apparent, and bearings showing signs of damaged balls, rollers or tracks should be replaced.

Special clearances are specified for mainshaft bearings used on B.S.A. motor cycles, and it is NOT advisable to fit other than genuine B.S.A. replacements.

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Models C10L and C11G

RE-ASSEMBLING THE ENGINE

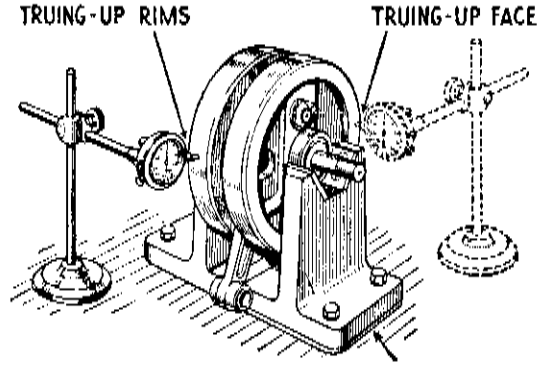
The need for absolute cleanliness cannot be over-emphasized. Parts should be thoroughly cleaned, and all traces of any anti-rust preparation with which new parts may be coated must be removed. All bearings should be smeared with fresh engine oil before re-assembly.

Flywheels

If the big-end assembly is to be renewed it is as well to check the weight of the new components against those which have been removed. A slight variation in weight is inevitable, but if it does not exceed 1½ ozs. no action need be taken; otherwise the flywheel assembly should be re-balanced. This tolerance should not be exceeded since, when first assembled, the flywheels were carefully balanced to suit the original parts, and the balance may be adversely affected if the weights of the new components differ considerably from those originally fitted.

Fit the flywheels to the crankpin, making sure that the key on the drive side is properly engaged in its keyway, and tighten the crankpin nuts by hand.

In order to tighten the crankpin nuts properly, the whole flywheel assembly must be held rigidly, preferably with the aid of a flywheel bolster. Alternatively, fix two $\frac{9}{16}$ in. diameter posts rigidly to the bench with their centres $3\frac{7}{8}$ in. apart. Midway between these posts a hole of 1 in. diameter should be bored to receive the mainshaft. The flywheel assembly can be mounted on these posts so that they pass through the holes bored in the flywheels. Tighten the drive side crankpin nut very firmly, using a tubular extension piece on the spanner, and punch over the edge of the crankpin with a centre punch to lock the nut.



Suitable packing under timing side 'vee' block to compensate for smaller diameter bearing.
Fig. C38. Checking flywheel alignment.

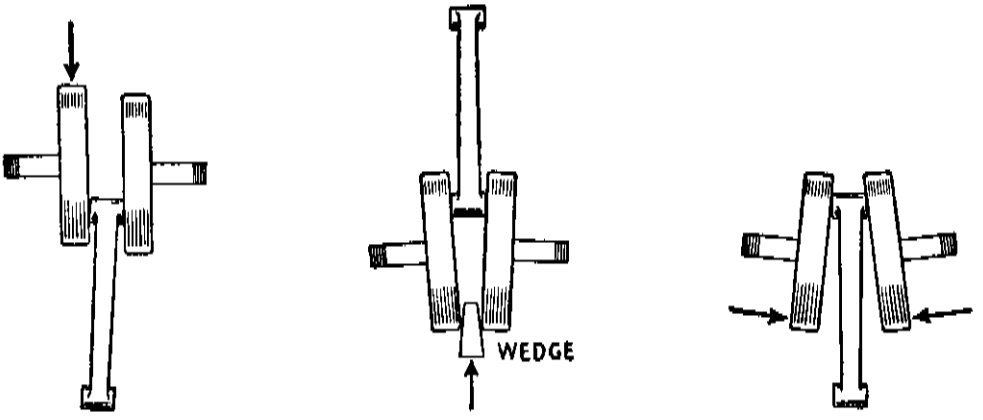
Now turn the assembly over, so that the gearside flywheel is on top and tighten the crankpin nut lightly. The grub screw in the end of the crankpin must be riveted over or centre-punched to prevent it unscrewing. If it unscrews, serious damage may result to the engine. Check that the side clearance of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

The flywheels will now be aligned only very approximately and further steps must be taken to ensure that the wheels are as true as possible. Two of the actual (or similar) bearings to be used in the engine should be fitted to the mainshaft and the latter mounted

on vee-blocks. The flywheels must be trued up, both on faces and rims, for which purpose a dial micrometer is necessary (Fig. C38), and after the wheels are trued to within at least .005 in., tighten the timing side crankpin nut fully. A mallet or lead hammer applied to the flywheels will provide a sufficiently heavy blow for final truing, and will not harm the flywheels (Fig. C39). The shafts should be finally trued to within .002 in. maximum. The shafts must not be struck.

All parts must be thoroughly clean and free from paraffin, grit or other foreign matter, and all traces of old jointing compound should be removed. If any bushes have been replaced then they must be reamered out to the correct dimensions.

The mainshaft bearing should be reamered with the aid of Service Tool, Part No. 61–1932, as shown in Fig. C40. The reamer holder should be passed through the drive side ballrace before engaging the reamer in the bush, thus ensuring correct alignment. Clear the case of any swarf resulting from the reaming operation and commence re-assembly.



To bring shafts into line, a sharp blow with a mallet on **timing side** flywheel (indicated by arrow).

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

To bring flywheels parallel a sharp blow with mallet on flywheel rims on opposite side to crankpin.

Fig. C39. Method of correcting flywheels out of alignment. Note that above illustrations are exaggerated.

Place the oil flinger washer on the drive side mainshaft and push the flywheel assembly into position in the drive side crankcase half. Thinly coat the mating faces of the crankcase with jointing compound and slide the gear side half into position. The two halves must be perfectly mated and the flywheel assembly must rotate freely when the halves are bolted firmly together.

Replace the oil pump and bolt it into position making sure that the spring washers beneath the bolt heads are not omitted. Slide the pump driving spindle into position and retain it with its pin. Make sure that the blade of the pin is fully engaged in the spindle groove, and if necessary a small washer should be placed over the end of the pin to prevent its moving away from the spindle, but ensure that it does not force the pin too tightly into the groove when the timing cover is replaced.

Replace the key and push the small timing pinion into position on the mainshaft. Tighten the retaining nut and turn over the lockwasher.

Fit the cam followers, also the tappets in the case of the C10L, then replace the camshaft, ensuring that the mark on the camshaft gear coincides with the marked tooth on the mainshaft pinion. (See Fig. C41.).

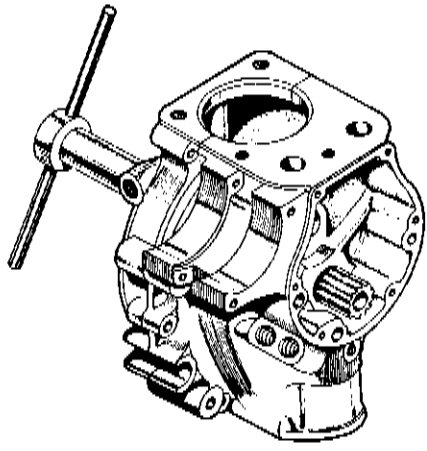


Fig. C40. Main Bearing Reamer.

Apply clean engine oil to the pinions and cams, then replace the timing cover using a new joint washer. Make sure that the oil seal passes easily over the shaft, or if a new oil seal is to be fitted, it can be pushed into position after the timing cover has been replaced.

Replace the advance and retard mechanism, making sure that, as the taper is engaged, the peg on the advance and retard spindle locates in the groove in the camshaft, then tighten down the retaining bolt.

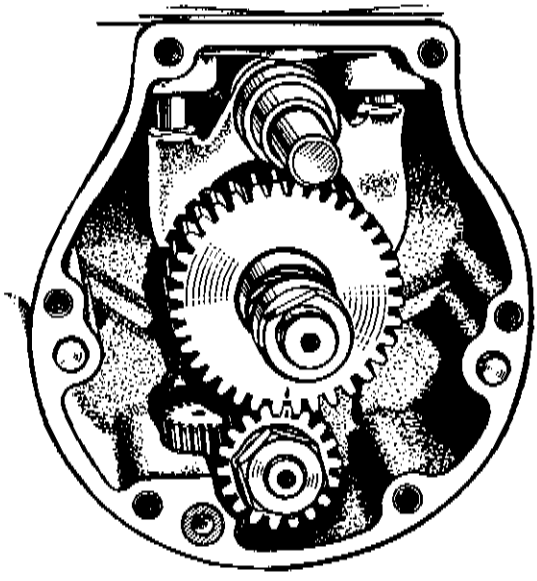


Fig. C41. Timing Gear Marks.

Finally time the engine as described in Service Sheet No. 404.

Assembly from this point is the same as after decarbonising. Replace the engine in the frame and tighten the engine and gearbox plate stud nuts.

Replace the primary chain case as indicated in Service Sheet No. 409. Make sure that the ported mainshaft sleeve which passes through the drive side oil seal is correctly positioned with the ports nearest the flywheel. It is immaterial which of the mainshaft grooves engages with the peg on the inside of the sleeve.

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Revised December, 1957

Models C10L and C11G

USEFUL DATA

	C10L	C11G & C12
Cylinder bore (mm.)	63	63
Engine stroke (mm.)	80	80
Engine capacity (c.c.)	249	249
Standard compression ratios	5 : 1	6.5 : 1
1954 Camshaft, Part No.	29 1993	29 2025
Tappet clearance, Inlet	.004 in.	.003 in.
Exhaust	.006 in.	.003 in.
Valve timing, Inlet opens before T.D.C.	25°	25°
Inlet closes after B.D.C.	70°	70°
Exhaust opens before B.D.C.	70°	70°
Exhaust closes after T.D.C.	25°	25°
1955-56 Camshaft, Part No.	29 2075	29-2076
Tappet clearance, Inlet	.012 in.	.010 in.
Exhaust	.015 in.	.012 in.
Valve timing, Inlet opens before T.D.C.	29°	29°
Inlet closes after B.D.C.	84°	84°
Exhaust opens before B.D.C.	80°	80°
Exhaust closes after T.D.C.	28°	28°
Piston ring gap, Compression	.010 in.	.010 in.
Oil control	.010 in.	.010 in.
Piston ring side clearance	.002 in.	.002 in.
Piston clearance at base of skirt	.0045/.0065 in.	.0035/.0055 in.
Contact breaker gap	.015 in.	.015 in.
Ignition setting, Fully advanced before T.D.C.	$\frac{5}{32}$ in.	$\frac{1}{4}$ in.
Fully retarded before T.D.C.	$\frac{1}{32}$ in.	T.D.C.
Plug type, Champion	N8B	L10S
Plug gap	.018/.020 in.	.018/.020 in.
Carburetter, Standard type	274BT/3EG	274BU/1EH
Choke size	$\frac{5}{8}$ in.	$\frac{5}{8}$ in.
Throttle slide	4/4	4/4
Needle position	2	3
Needle jet	.1055	.1065
Main jet	90	80
Carburetter, Monobloc type	375/2	375/4
Choke size	$\frac{5}{8}$ in.	$\frac{5}{8}$ in.
Throttle slide	375/3$\frac{1}{2}$	375/3$\frac{1}{2}$
Needle position	2	3
Needle jet	.1055	.1055
Main jet, without air cleaner	120	140
Main jet, with air cleaner	85	100

	C10L	C11G & C12
Petrol tank capacity (galls.)	2½	2½
Oil tank capacity (pints)	4	4
Gearbox capacity (pints) 1954-55	½ (3 speed)	½ (3 speed) 1 (4 speed)
Standard gear ratios 4th	-	6.2
3rd	6.6	6.2 7.6
2nd	9.8	9.25 11.1
1st	14.5	14.1 16.15
Gearbox capacity (pints) 1956 4 speed	½	½
Standard gear ratios, 4th	6.6	6.26
3rd	8.0	7.64
2nd	11.7	11.1
1st	17.1	16.15
Engine sprocket	16T	17T
Clutch sprocket	43T	43T
Gearbox sprocket	19T	17T (C12 19T)
Rear wheel sprocket	47T	42T (C12 47T)
Primary chain size	½ × .305 in.	½ × .305 in.
No. of links	69	69 (C12 70)
Rear chain size	½ × .205 in.	½ × .305 in.
No. of links, Rigid frame 1954-55	-	104
No. of links, Spring frame 1954-55	110	107
No. of links, Spring frame 1956	111	115
Front fork movement, 1954-55	3¾ in.	6 in.
Front fork movement, 1956	6 in.	6 in.
Rear suspension movement	2 in.	2 in. (C12 2¾ in.)
Front fork capacity (engine oil) 1954-55	Grease	¼ pint (142 c.c.)
Front fork capacity (engine oil) 1956	¼ pint (142 c.c.)	¼ pint (142 c.c.)
Front brake size, 1954	5½ × 1 in.	5½ × 1 in.
Front brake size, 1955-56	5½ × 1 in.	7 × 1¼ in.
Rear brake size	5 × ⅝ in.	5½ × 1 in.
Rim sizes	WM1 × 19	WM1 × 19
Standard tyre sizes	2.75 × 19	3.00 × 19
Tyre pressures, p.s.i. Front	18	18
Rear	27	26
Wheelbase	52½ in.	53½ in. (C12 54 in.)
Ground clearance	5 in.	4½ in. (C12 4 in.)
Saddle height	29½ in.	29½ in.
Dry weight (Rigid frame) 1954		301 lbs.
(Spring frame) 1954	256 lbs.	316 lbs.
(Spring frame) 1955	256 lbs.	304 lbs.
(Spring frame) 1956	260 lbs.	312 lbs.

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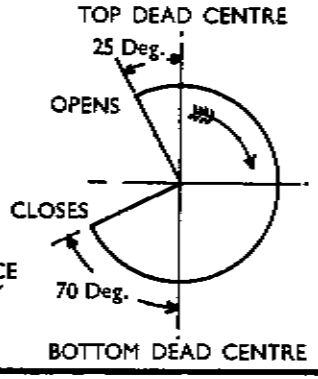
Fig. 1. 'C' GROUP MODELS VALVE TIMING CHART

INLET

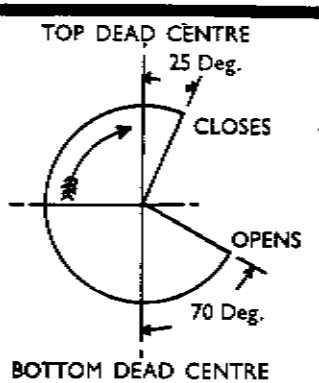


TAPPET CLEARANCE FOR TIMING ONLY .010ins. (Cold)

WORKING CLEARANCE

C10	.004ins.	
C11	.003ins.	Engine
C10L	.004ins.	Cold
C11G	.003ins.	

EXHAUST

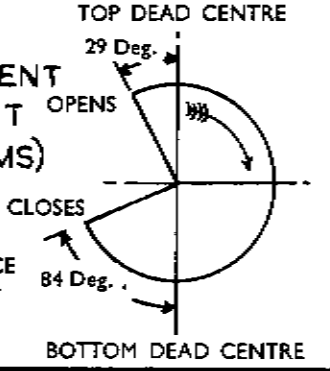


TAPPET CLEARANCE FOR TIMING ONLY .010 Ins. (Cold)

WORKING CLEARANCE

C10	.006ins.	
C11	.003ins.	Engine
C10L	.006ins.	Cold
C11G	.003ins.	

REPLACEMENT CAMSHAFT (RAMP CAMS)



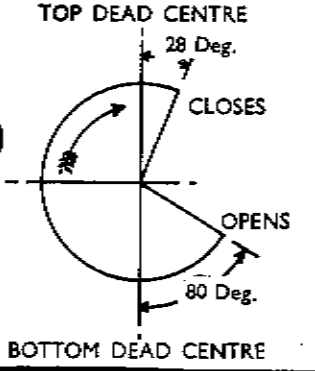
TAPPET CLEARANCE FOR TIMING ONLY .015ins. (Cold)

ACTUAL TIMING

WORKING CLEARANCE

C10	.012ins.	
C11	.010ins.	Engine
C10L	.012ins.	Cold
C11G	.010ins.	
C12	.010ins.	

REPLACEMENT CAMSHAFT (RAMP CAMS)



TAPPET CLEARANCE FOR TIMING ONLY .015ins. (Cold)

ACTUAL TIMING

WORKING CLEARANCE

C10	.015ins.	
C11	.012ins.	Engine
C10L	.015ins.	Cold
C11G	.012ins.	
C12	.012ins.	

NOTE: Ramp type camshafts bear the following part numbers:—
C.10—29-2078; C.11—29-2079; C.10L—29-2075; C.11G—29-2076, and can be used to replace the original camshafts in early models.

They are fitted as standard on and after Engine numbers:—
BC.10L—3562 and BC.11G—10438.

When ramp cams are fitted, the inlet valve clearance must be checked or adjusted when the exhaust valve is about to open. The exhaust valve clearance must be checked or adjusted when the inlet valve has just closed.

July, 1955
Revised Nov. 1957

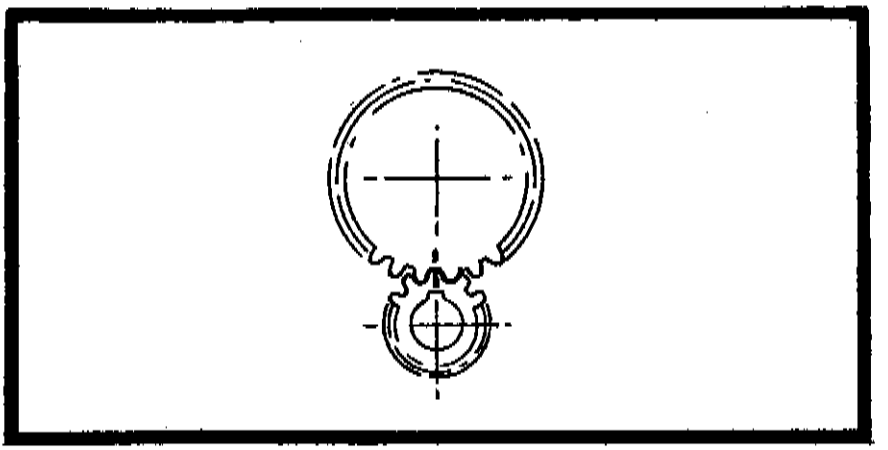


Fig. 2. VALVE TIMING MARKS

U/B1099

B.S.A. MOTOR CYCLES LTD.
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BSA SERVICE SHEET No. 421

Printed December, 1958.

MODEL C15
ENGINE DISMANTLING FOR DECARBONISING

It will facilitate this work if the dual seat and petrol tank are removed. Take off the seat which is attached to the frame by the top bolts of the rear suspension units and clipped to a cross tube at the front.

Turn off the petrol tap and detach the petrol pipe by unscrewing the union nut. The tank is mounted on rubber pads and secured by a single bolt which passes through a rubber sleeve in the centre of the tank. Remove the rubber cap on the tank top, unscrew the nut, and withdraw the tank leaving the bolt in the frame.

Disconnect the engine steady bracket from the frame and the rubber connection between the air cleaner and carburetter.

The exhaust pipe is a push on fit and can be removed after the finned collar has been slackened and the bolts securing the pipe to the frame released.

Removing the Cylinder Head and Valves

Take off the oil feed pipe to the rocker spindles and remove the sparking plug.

Remove the two 5/16 in. nuts holding the engine steady bracket to the rocker box, revolve the engine to set the piston at T.D.C. on the compression stroke, i.e., with both valves closed, and take off the four nuts *H* (Fig. C1A) holding the cylinder head and barrel.

With the rocker box in position on the head raise the head until it clears the fixing studs, rotate the whole assembly about the push rods to clear the frame tube, and lift off.

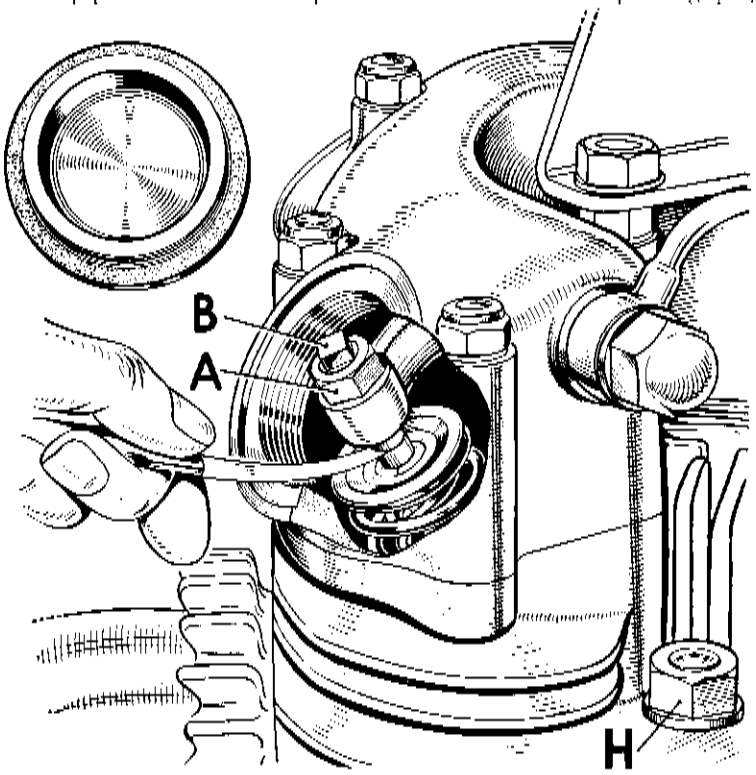

Fig. C1A. Tappet Adjustment.

Take the push rods out of the tube and remove the tube. There are sealing rings at each end, and if there has been any sign of leakage the seals should be replaced.

Now take off the two thin nuts on the steady stay studs and the seven 1/4 in. nuts holding the rocker box to the head, unscrew the two circular inspection covers, remove the cover above the push rod tube by unscrewing the centre bolt, and lift the rocker box from the head.

There should be no need to disturb the rockers unless it is known that they require attention. Carefully remove the head gasket.

It is not necessary or desirable to remove the cylinder barrel unless it is suspected that the piston or its rings are the cause of some trouble.

Compress the valve springs with Service Tool 61 3340 and remove the split cotters and springs. Take out the valves.

Scrape all carbon from cylinder head and ports and from the top of the piston, finally polishing with fine emery cloth. Take care not to damage the valve seats. Remove all traces of loose carbon and dust. Rotate the engine so that the piston descends to allow removal of dust from the upper cylinder walls.

Valve Springs

After a period of several thousand miles, valve springs tend to lose their efficiency due to heat, and as their cost is relatively low, it is good policy to renew them at this stage rather than dismantle specially for this purpose at a later date. The correct free length is, inner 1-5/8 in., outer 2-1/32 in.

Grinding in Valves

Valve grinding should only be carried out where the pitting is not deep. If deep pit marks are evident the valve should be refaced on a machine, as grinding in would only cause wear of the seats and the valve may become pocketed.

Clean all carbon off the valve and from the stem underneath the head, being careful not to damage the face or the portion of the stem which moves in the valve guide.

Smear a small quantity of grinding compound obtainable from any garage, over the valve face and return it to its seat.

Using Tool number 65 9240 rotate the valve backwards and forwards maintaining a steady pressure, every few strokes lifting the valve from its seat and turning to a new position.

Continue until the face shows a smooth surface all round with no dark spots.

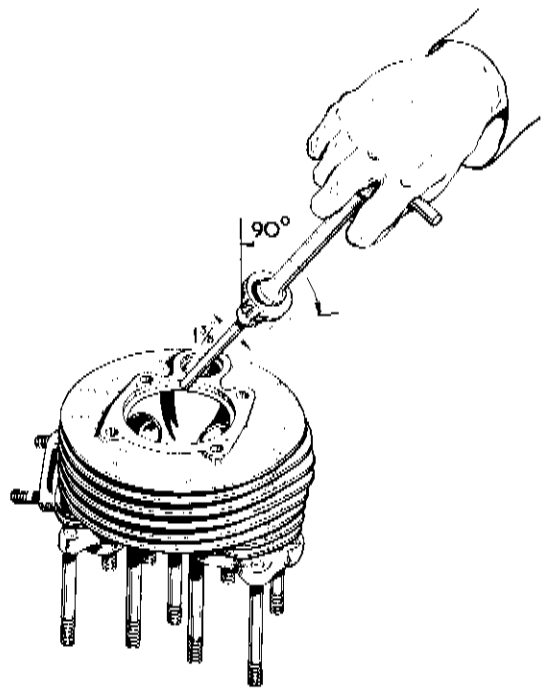

Fig. C2A. Cutting the Valve Seats.

It is most important that valves are ground in on their correct seats, for this reason both valves are marked, one "IN" and the other "EX."

After grinding remove all traces of compound from both valve face and seating, and smear the stems with clean engine oil.

If the valve seats in the head require re-cutting, use Service Tools number 61 3293 Pilot, 61 3298 Cutter (Fig. C2A).

Fitting New Guides

When new guides are to be fitted, the old ones can be driven out with Service Tool number 61 3265 from inside the combustion chamber and new ones fitted with the same punch from above.

Before driving in the new guides make sure that the circlips are a good fit. Valve seats in the head must always be re cut when new guides are fitted to ensure that the seat is concentric with the guide bore.

Removing the Cylinder Barrel

Slacken off the two nuts on the crankcase at the base of the cylinder and slide the cylinder off, steadying the piston as it emerges from the barrel. Cover the crankcase mouth with clean rag to prevent dust and grit falling in.

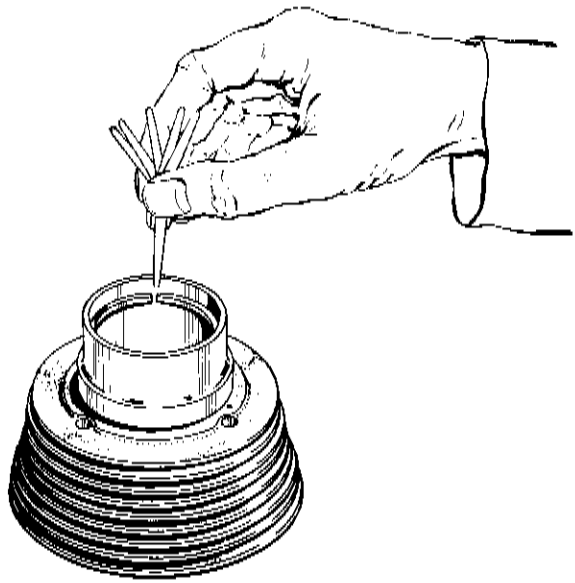

Fig. C3A. Checking Piston Ring Gap

Piston Rings

The gudgeon pin is located by means of wire circlips which must be removed with the tang of a file or similar tool. Warm the piston and withdraw the gudgeon pin, thus freeing the piston, and immediately after its removal mark the inside of the piston so that it may be reassembled in its original position.

If inspection of the piston rings shows that they are stuck, prise them out very carefully, and clean them. Remove any carbon from the grooves and rings, but before replacing, check them in the cylinder for gap. (Fig. C3A). If the gaps are excessive, new rings having gaps of between .009 in and .013 in. when in position must be fitted.

At this stage it is advisable to check the big end bearing for wear. Turn the engine until the piston is at the top of its stroke, and resting both hands on the sides of the crankcase mouth, hold the connecting rod between fingers and thumbs, and feel for up and down play. It should be remembered that, even though there may be a little play present it will not necessarily mean sudden failure of the bearing, though it will inevitably become worse. Where play seems excessive, and big end noise has been noticed with the engine running, the engine should be completely dismantled, and a new big end assembly fitted.

Assembly after Decarbonising

Replace the valves and springs in the cylinder head, making sure that the valves are assembled on the seats from which they were removed, and take care to see that the split collets are seated correctly in their grooves in the valve stems a dab of grease on the stem will assist this operation.

Pour a little oil into the crankcase, and smear the cylinder walls liberally with oil. See that the cylinder base washer is in good condition—if damaged, replace, otherwise oil leaks will develop. Turn the engine until the crankshaft is a little past bottom dead centre, then compressing the top piston ring with the fingers, slide the cylinder barrel over the piston and top ring. Compress each ring in turn as the barrel is refitted, and take care to avoid breaking the rings. It is essential to see that the mouth of the crankcase is completely covered with rag before commencing to replace the cylinder as if it is uncovered, and a ring is broken, the pieces may drop into the crankcase and will be difficult to recover. Return the piston to top dead centre on the compression stroke, ready for the cylinder head to be fitted.

Replace the push rod tube in position alongside the cylinder barrel, apply a little grease to the lower ends of the push rods and place the rods in position on the tappets. Replace the head gasket.

Refit the rocker box to the cylinder head leaving off the inspection covers, and slacken off the rocker adjusting screws.

Place the head in position over the studs, locate the outer push rod in the inlet rocker (rear) and the inner push rod on exhaust rocker (front) as in Fig. C4A.

Screw on the four cylinder head nuts and washers and tighten down firmly and evenly. Check that the push rods are correctly fitted and replace the inspection covers and washers.

Securely tighten the two nuts on the crankcase immediately below the cylinder base and check over the rocker box nuts.

Replace the engine steady stay over the two thin 5/16 in. nuts screw on the thick 5/16 in. nuts and spring washers and tighten securely, re-connect the steady stay to the frame.

Tappet Adjustment

Rotate the engine forward until the inlet valve is just closed and the push rod is free to rotate and set the exhaust valve clearance to .014 in. by screwing the adjuster pin *B* (Fig. C1A) in or out and tighten the locknut *A* (Fig. C1A) securely.

Rotate the engine forward again until the exhaust valve clearance is just taken up but before the valve starts to open, and set the inlet valve clearance to .012 in. Check both settings after the locknuts have been tightened to make sure that they have not altered.

Finally replace the tappet inspection covers, sparking plug, H.T. lead, carburetter, air cleaner connection, petrol tank, petrol pipe and dual seat.

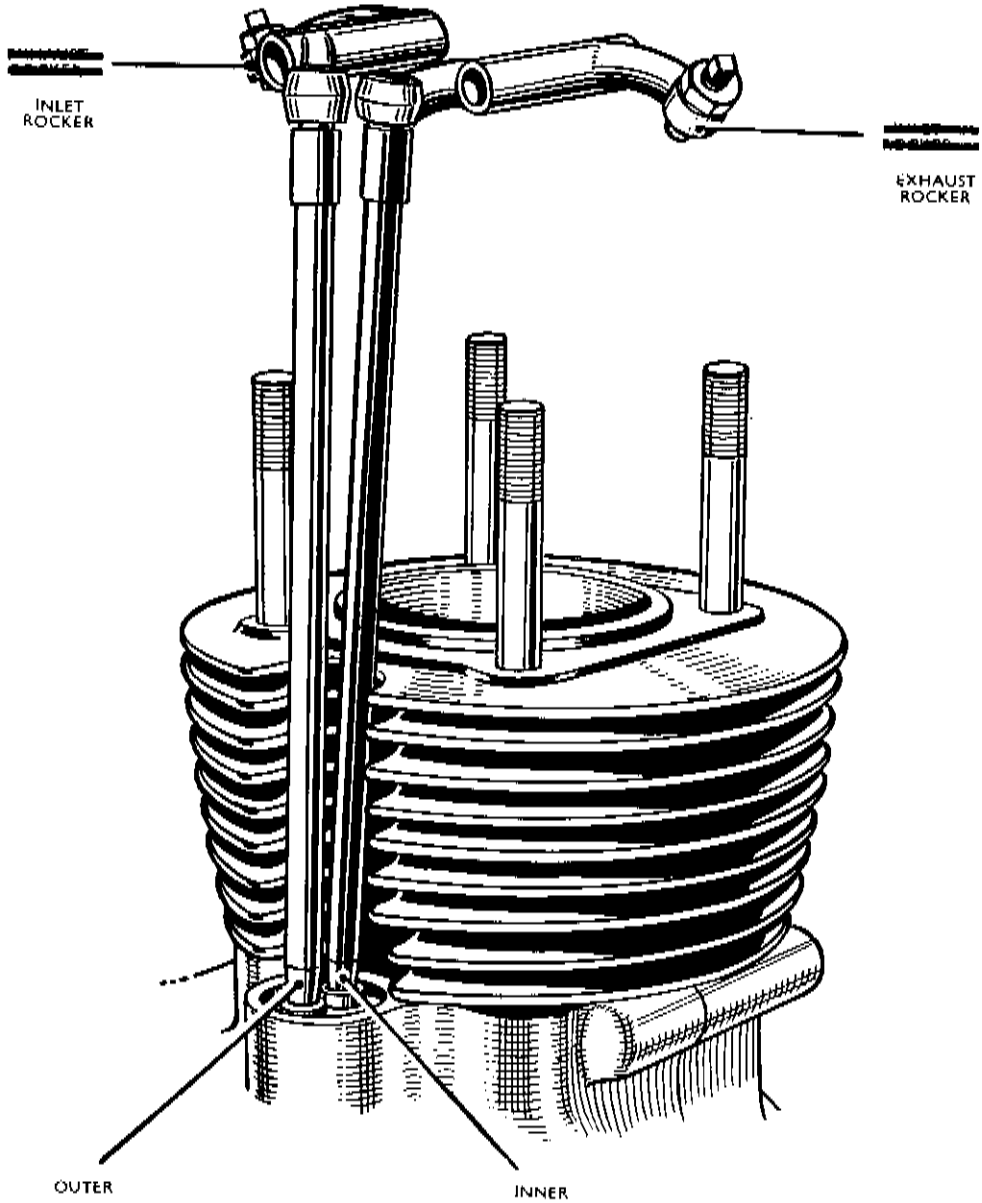

Fig. C4A. Fitting the Push Rods.

BSA SERVICE SHEET No. 422

Printed December, 1958

MODEL C15
DISMANTLING AND REASSEMBLING THE CLUTCH, GEARBOX AND GEARCHANGE

The gears are contained in a separate housing formed in the rear portion of the crankcase and become accessible after the inner and outer timing covers have been removed from the R/H side of the unit, so that the valve timing pinions are uncovered at the same time.

Parts such as the kickstart spring and pawl, cam plate and spring, selector forks and footchange return spring, can be replaced without removing any other parts but if the gears are to be removed then the whole of the primary drive must be dismantled first.

Primary Drive

Disconnect the alternator lead by pulling out the three connectors. Remove the left hand footrest, it is fitted to a taper shaft and will require a sharp blow with a mallet to release it after the nut which has a L/H thread, has been removed.

Place a large flat tin under the primary chain case to catch the oil, and take out the 10 screws holding the cover. The screws are of three different lengths and careful note should be taken of their respective positions to facilitate refitting, screw *M* (Fig. C5A) also serves as the level plug.

Depress the rear brake pedal and take off the primary chain case cover.

To remove the stator take off the three nuts and washers *E* (Fig. C6A) and pull the alternator lead through the rubber grommet in the back of the chain case.

Note carefully that the stator plate is fitted with the lead on the outside.

Bend back the tab of the lock washer *B* (Fig. C6A) under the engine main shaft nut and remove the nut *C* which has a R/H thread.

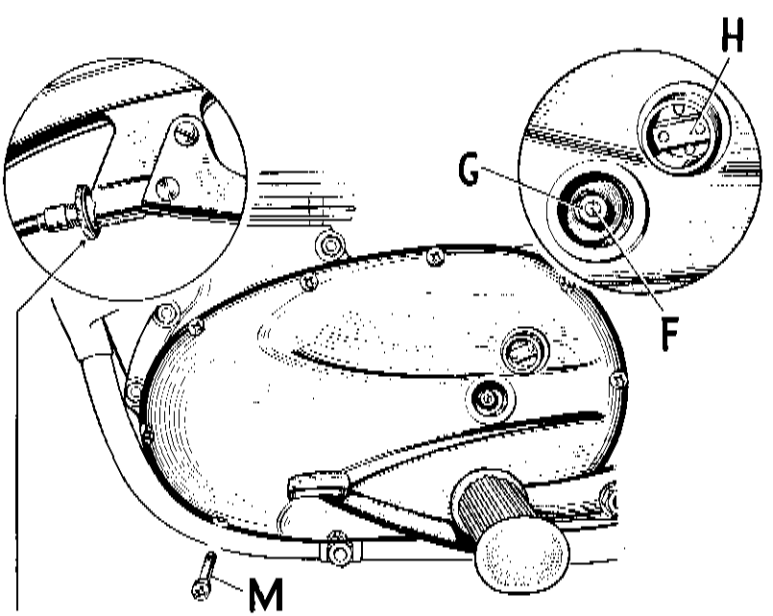

Fig. C5A. Clutch Adjustment

It will facilitate the removal of the nut if top gear is engaged and the rear brake applied.

Pull off the rotor and take out the Woodruff key to avoid it being lost.

Remove the four spring retaining nuts *P* (Fig. C6A) on the clutch, and withdraw the springs and cups. The pressure plate *L* (Fig. C6A) and the remaining clutch plates can now be removed but note should be made of the order in which they are fitted.

Bend back the tab of the lock washer and unscrew the gearbox main shaft nut. The lock washer has a special tongue which engages in the hub of the clutch and it must be refitted in the same way.

The thrust washer which will now be exposed is recessed on one side and must be fitted with the recess outwards.

Pull out the clutch push rod, engage top gear, apply the rear brake, and unscrew the gearbox main shaft nut.

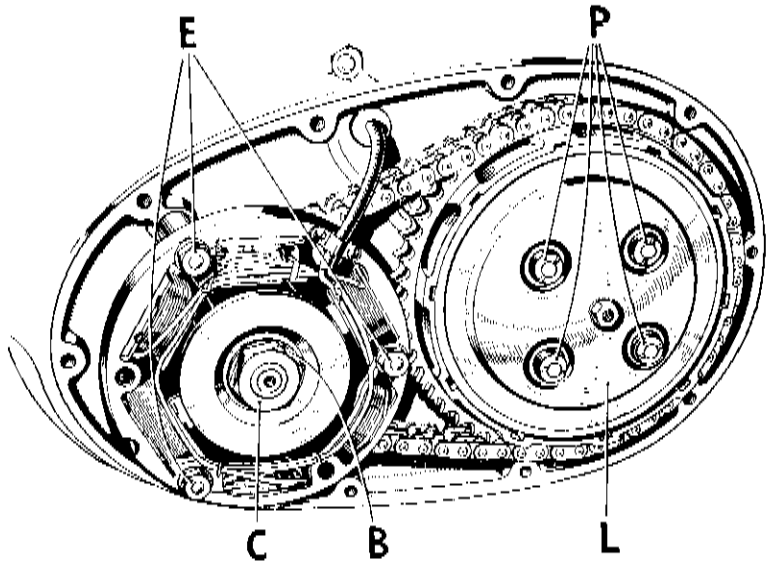

Fig. C6A. Clutch and Generator Removal.

With extractor number 61 3583 (Fig. C7A) the clutch sleeve can be freed from the tapered main shaft and the chainwheel, chain and engine sprocket withdrawn together and laid face down on the bench with the spring studs uppermost.

The clutch centre *B* (Fig. C8A) can be lifted out leaving the sleeve *C* and rollers in the chainwheel.

To examine the cush drive rubbers take out the four counter sunk head screws and lift off the front cover plate, unless wear or damage is suspected however the rubbers should not be disturbed.

New rubber inserts *E* (Fig. C8A) should be fitted as shown with the thicker segment being inserted first on the pressure or driven side of the vane and compressed by slightly rotating the vane, when the thinner segments can be pressed into position.

When reassembling the clutch, note that the plates are alternately plain and segmented, the first plate next to the chainwheel being plain.

With the clutch removed the detachable plate registered in the rear half of the chain case is now exposed.

Take out the six counter sunk head screws and remove the plate complete with the oil seal.

If the oil seal is suspected of being faulty or leakage has occurred it should be replaced, care being taken not to damage the outer surface of the bush on which the seal bears.

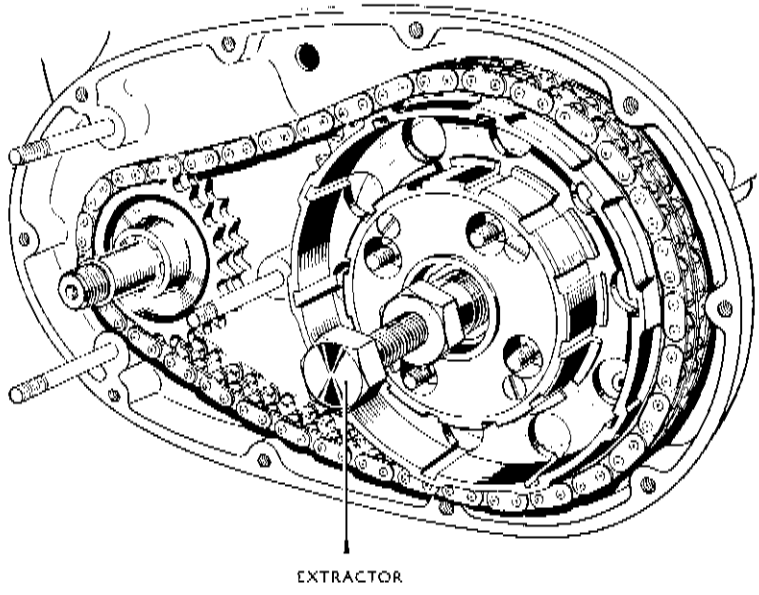

Fig. C7A. Removing the Clutch.

Between the circular plate and the end of the pinion sleeve is a felt washer, the purpose of this washer is to prevent grit damaging the oil seal.

At this stage the gearbox can be dismantled providing the main shaft high gear (or pinion sleeve) is not being disturbed, but if complete dismantling is required the tab washer under the sprocket nut should be turned back and the nut slackened off while it is still possible to engage the gears.

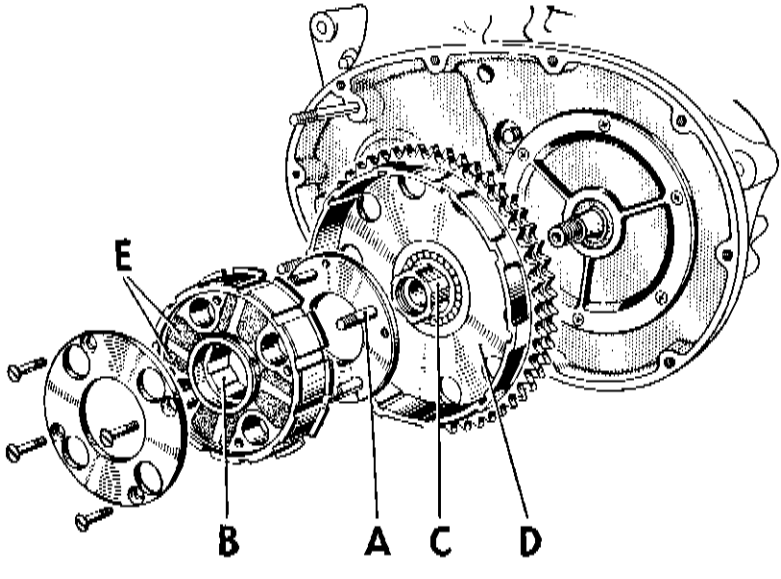

Fig. C8A. Cush Drive Unit.

It is now necessary to turn to the other side of the engine unit to remove the inner and outer timing covers.

Take off the exhaust system by slackening the pinch bolt in the finned collar and removing the bolts securing the pipe and silencer to the frame.

Scribe a pencil mark across the body of the distributor and the top of the crankcase to assist in resetting the ignition timing.

Release the pinch bolts in the kickstart and foot change levers and remove the levers, slacken the R/H footrest nut and tap the footrest down out of the way.

Unscrew the seven outer cover retaining screws, noting their respective locations, particularly the long small headed screw which also clamps the contact breaker unit.

With the outer cover removed disconnect the clutch cable and withdraw it through the back of the inner cover, being careful not to lose the ball located in the thrust button on the clutch actuating lever.

Prise the kickstart return spring anchor plate (Fig. C9A) off the two flats on the spindle and remove the plate and spring.

Turn back the tab on the lock washer under the cam shaft nut and remove the nut, lock washer, thrust washer and the small locating peg for the thrust washer.

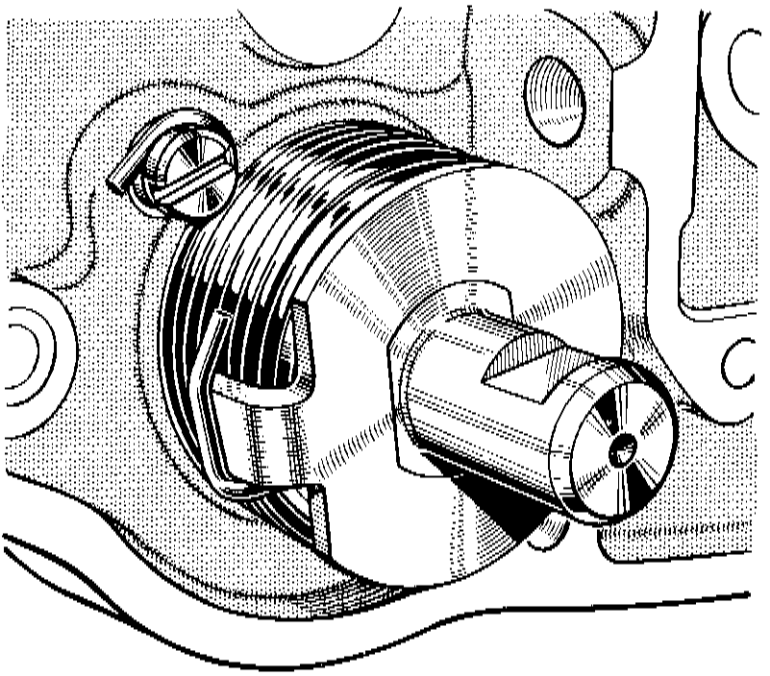

Fig. C9A. Fitting the Kickstarter Spring.

Take off the cover plate adjacent to the gear change spindle by removing the two screws and remove the split pin from the cam plate pivot.

The pivot pin can now be withdrawn towards the L/H side leaving the cam plate in the gearbox.

After removing the eight recessed screws the inner cover joint can be broken by tapping the kickstart spindle boss with a mallet. Ease the cover off gently, applying finger pressure to the spindle ends to avoid displacing other components.

The gear cluster, shafts and actuating parts are now exposed together with the valve timing gears and dismantling on the R/H side is therefore the same as for exposing the valve timing pinions.

Unscrew the fulcrum bolt *E* (Fig. C10A) carrying the return spring when the plunger quadrant, shaft and spring can be removed. The cam plate can now be taken away from the selector forks.

If the cam plate spring blade *B* (Fig. C11A) attached to the rear wall of the gearbox is satisfactory it need not be disturbed.

The gear cluster together with the main shaft, lay shaft and selector forks can now be withdrawn leaving the selector fork shaft and pinion sleeve in position in the box.

While the gears can be removed from the shafts it should be noted that the smallest gear on the mainshaft is a press fit, thus retaining the adjacent gear, similarly the inner most gear on the lay shaft is a press fit also retaining the adjacent gear.

Note position of thrust washers.

Do not disturb the high gear (or pinion sleeve unless it is known that the bearing or oil seal is faulty, but if it is to be removed, take off the rear chain, sprocket, locknut and tab washer.

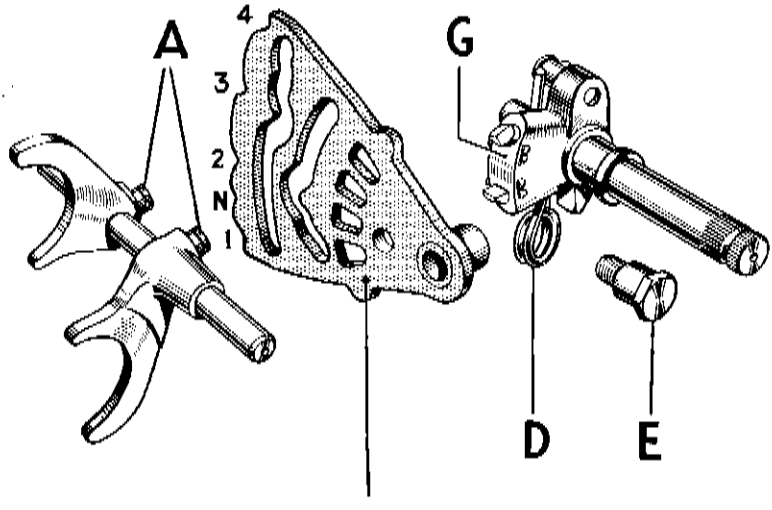

Fig. C10A. Gearchange Mechanism.

Heat the portion of the gearbox round the pinion sleeve by applying rag dipped in boiling water and tap the bearing and pinion into the gearbox shell. The replacement should be inserted while the gearbox is still warm and driven well home.

Reassembly

Pick up the main shaft and lay shaft complete with the gear cluster and the selector forks as shown in Fig. C11A.

The selector forks are interchangeable but it is advisable to replace them in their respective positions.

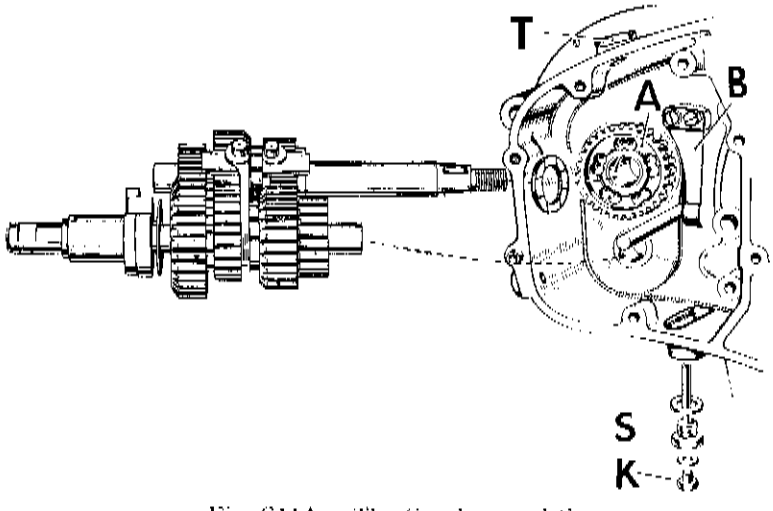

Fig. C11A. The Gearbox and Gears.

Now slide the whole assembly carefully into position locating the selector forks over the spindle as the assembly enters. Engage the cam plate in the 2nd gear notch (Fig. C10A) on the leaf spring at the back of the box and over the rollers on the selector fork pegs.

Replacing the Footchange Return Spring

Hold the shaft in a vice using soft clamps, with the short end and the peg uppermost, then with two substantial tools such

as screwdrivers, one through the loop and the other between the prongs twixt the spring *D* (Fig. C10A) and force it over the short end of the shaft so that the prongs lie in the position shown in Fig. C12A. The spring will be squared up when the pivot bolt *E* is screwed home.

Insert the footchange lever quadrant shaft into the box and start the bolt *E* (Fig. C10A) with the fingers, twisting the spring slightly at the same time, finally locking the bolt securely.

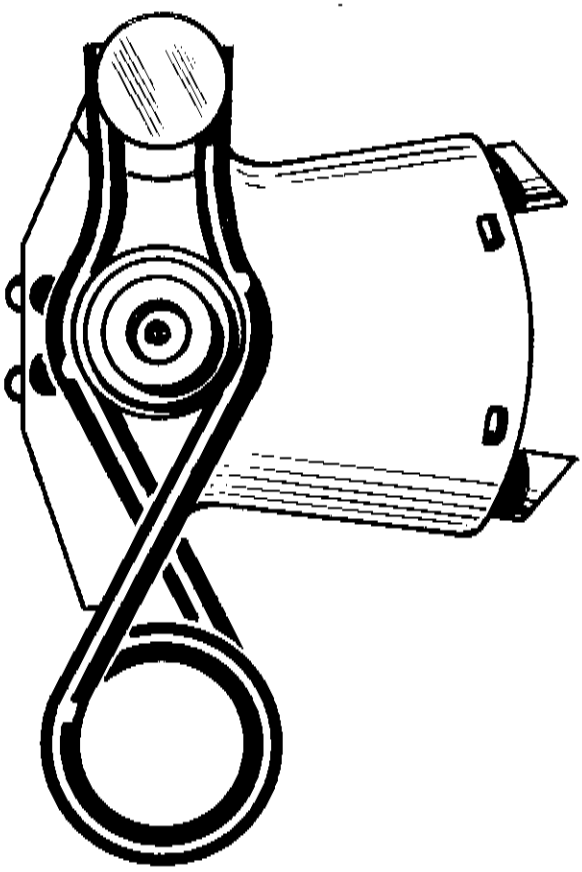

Fig. C12A. Fitting Footchange Return Spring.

See that the crankcase and inner cover joint faces are clean, apply a thin film of jointing compound and slide the inner cover over the various spindles at the same time carefully guiding the cam plate into the slot in the inner cover. Make sure that the cover is close up to the crankcase, replace the eight screws, the cam plate pivot pin, split pin, the washer and cover over the pivot and the two screws.

Before proceeding further check the gear selection.

Place the kickstart spring in position with hook over the stop plate screw, engage the tag on the anchor plate in the outer end of the spring and turn the plate anti clockwise approximately 180° to engage the plate over the two flats on the spindle as shown in (Fig. C9A).

Pass the clutch cable through the back of the inner cover, apply a dab of grease to the pad on the clutch thrust arm and insert the small steel ball, then connect the cable to the arm.

Replace the thrust washer on the cam shaft with counter sunk face outwards and insert the small peg in the shaft, fit the tab washer and nut, tighten securely and turn the tab over.

Now replace the outer cover being careful to screw the small headed screw into the distributor clip.

Fit the remaining screws and the kickstart and foot change levers.

Primary Case

If the gearbox sprocket has been removed it must now be replaced with the boss inwards, then the tab washer and nut.

Thread the rear chain over the sprocket and couple up the ends, select top gear, apply the rear brake then tighten the sprocket nut securely, finally turning over the tab washer.

Where the oil seal is being replaced in the chain case back, it should be pressed in from the gearbox side flush with the cover and the lip inwards.

Place the felt grit protection washer in position over the bronze bush and against the end of the pinion sleeve.

Refit the cover with a paper gasket which need only be jointed on one side and screw in the six counter sunk head screws. Place the felt washer over the gearbox main shaft next to the cover. Replace clutch push rod.

Smear the clutch sleeve *C* (Fig. C8A) with grease and place the 24 rollers in position. Next slide the chain wheel over the rollers and the clutch centre *B* (Fig. C8A) over the splines of the clutch sleeve. Place the engine sprocket on the bench alongside with the boss upwards and thread the primary chain over both the sprocket and chain wheel pulling the chain taunt.

The engine main shaft distance piece should not have been disturbed but if it was removed for any reason it must now be replaced with the chamfered side inwards.

See that the Woodruff keys are fitted to both main shafts and that they are a good fit in the keyways.

Pick up the engine sprocket, chain and chain wheel in both hands and slide them over their respective shafts. Place the thick washer with the recess outwards in position against the clutch sleeve then the tab washer which has a special tongue fitting into the clutch centre, then the lock nut. Turn the tab washer over the nut after tightening.

Now place the clutch plates in position starting with one plain plate then one segmented plate and so on alternately, there being five plain plates and four segmented plates.

Place the pressure plate in position then the four spring cups and springs which should be of equal length. If there is any doubt about the condition of the springs, replace them since they are quite cheap to buy.

Screw on the four spring nuts until the underside of each head is approximately 1/8 in. from the face of each cup.

If the springs are compressed excessively, the handlebar lever will be stiff to operate, alternatively, if the spring pressure is insufficient the clutch will tend to slip. Adjust for true running of the plates by declutching and depressing the kickstart lever, when it will be seen if the plates are running true or not. If necessary, adjust the nuts individually to correct any run out.

Replace the rotor with the recessed face outwards, fit the tab washer and nut, turning the tab over the nut after tightening securely.

Place the three distance pieces on the stator plate studs and replace the stator with the lead wires on the outside and at the top.

Screw on the three nuts and spring washers and tighten evenly.

The air gap between the rotor and stator should be equal all round, when correct thread the lead wires through the rubber grommet in the back of the case.

Refit the primary case and the 10 screws, shortest at the rear and longest at the front.

Connect up the lead wires, check the ignition timing, and finally tighten the distributor clamp screw and replace the exhaust system.

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Printed in England.

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MODEL C15
COMPLETE DISMANTLING OF THE ENGINE - GEARBOX UNIT

The procedure for complete dismantling of the engine and gearbox unit will be described from the point reached in the section on decarbonising (Service Sheet No. 421), continuing with dismantling of the gearbox (Service Sheet No. 422). Further dismantling will be assumed to commence at this point.

Pull out the distributor noting the way the clip is fitted (see Fig. C13A) inset.

Lift the tappets to the highest position and take out the camshaft, the tappets can now be withdrawn downwards into the timing chest. Note that the lubrication holes are facing towards the gearbox.

Take off the sump cover and filter.

Remove the three screws marked J (Fig. C14A) holding the oil pump and draw the pump down and out of the crankcase.

It is not advisable to attempt dismantling of the oil pump, should a fault be suspected a serviced unit can be obtained through your dealer.

Using a brass or copper drift 3/8 in. dia. through the pump drive aperture, tap the distributor drive shaft and bush upwards clear of the mainshaft worm wheel.

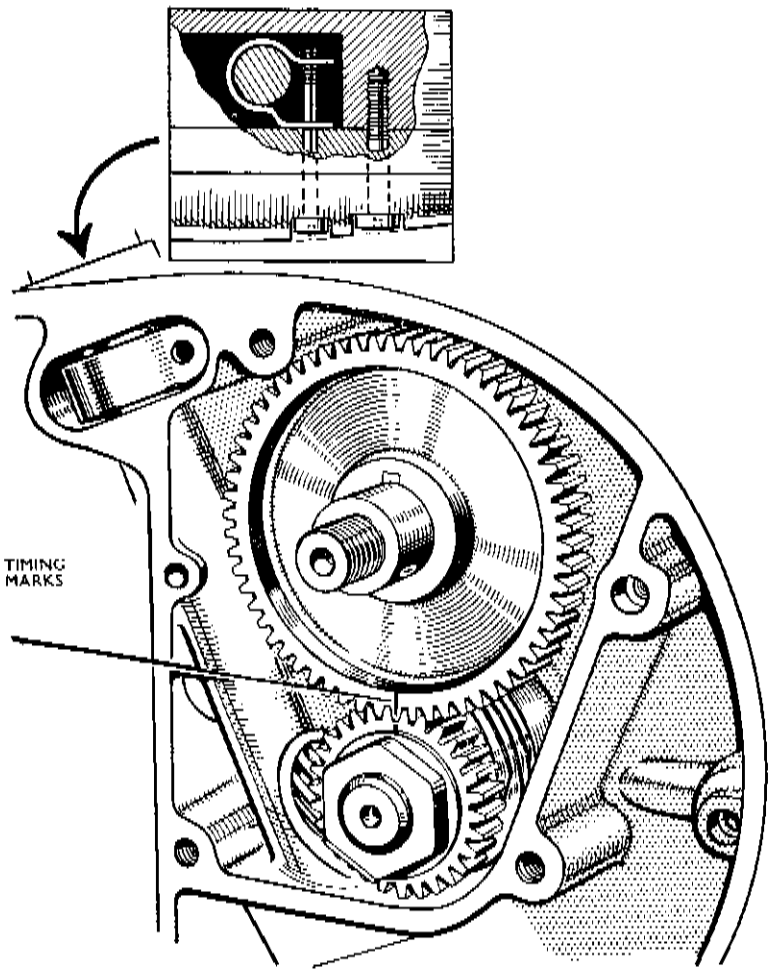

Fig. C13A. Valve Timing Marks.

Flatten the tab washer on the mainshaft, unscrew the nut (R/H thread) and with extractor 61 3256, fitted with legs 61 3588, pull off the mainshaft pinion.

The same extractor now fitted with legs number 61 3585 can be used to draw off the mainshaft worm wheel. If the Woodruff key is loose in the shaft it should be replaced, also take careful note of the way in which the worm wheel is fitted.

Unscrew the four 5/16 in. nuts (two in the primary case and two at the base of the cylinder) and take out the three bolts at the front of the crankcase to split the case.

Part the case by drawing off the drive side together with the flywheel assembly.

Carefully tap out the flywheel assembly from the drive side half noting the position of the main shaft distance piece which has the chamfer facing inwards.

The spacer on the drive side shaft can be drawn off with tool number 61 3593 if necessary.

If any of the bushes in the crankcase are to be replaced the case should be heated in hot water and each replacement bush fitted immediately the old bush has been extracted and while the case is still hot.

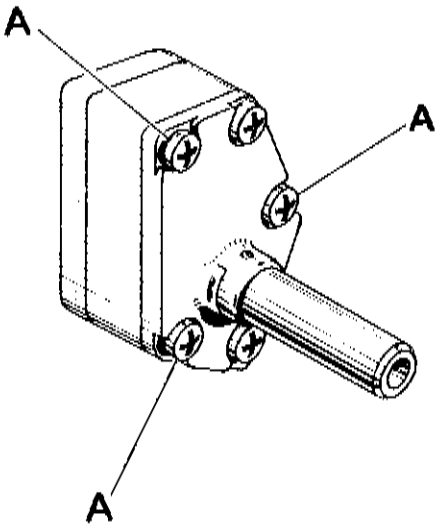

Fig. C14A. Oil Pump.

Parting the Flywheels

The flywheels are a press fit on the crankpin and no attempt should be made to part them unless the services of an expert mechanic and fully equipped workshop are available.

Should the big end assembly require replacement it is advisable to obtain a works reconditioned unit through the medium of your dealer.

If it has been decided that the big-end bearing must be replaced the flywheels should now be parted, using Service Tool number 61 3589 (Fig. C15A). Place the flywheels in the bolster and position the stripping bars Service Tool number 61 3590. Use the punch Service Tool number 61 3601 to drive out the crankpin. Take off the uppermost flywheel and reverse the lower one in the bolster. Again using Service Tool number 61 3601 drive out the crankpin.

Reassembly of the unit is described on Service Sheet number 424.

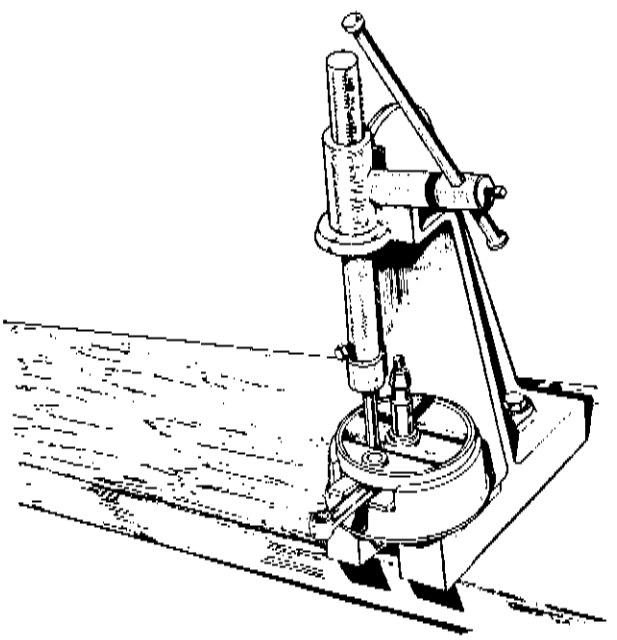

Fig. C15A. Parting the Flywheels with Service Tool 61 3589.

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Printed May, 1960

MODEL C15
REASSEMBLY OF THE ENGINE GEARBOX UNIT

Before commencing to assemble it is important to see that all parts are quite clean and free from road grit and dust both inside and outside as some of the grit may get transferred to vital bearing surfaces during handling.

Crankcase

Clean off all the old jointing compound being careful not to damage the joint faces.

If new bushes or ball races are to be inserted, warm the crankcase halves, extract the old part and press in the new part while the case is still hot.

Where oil ways are drilled in bushes it is essential that the holes are correctly positioned so that the oil ways are not blocked.

On the drive side the bearings are fitted from inside the case and the oil seals from the outside. When fitting a replacement seal note that the lip must be facing inwards.

Flywheel Assembly

To fit a new connecting rod and big end assembly, place the gear side flywheel in the bolster number 61-3589, take up the big end assembly and locate the crankpin in the hole in the flywheel using gauge number 61-3597 so that the oil hole is in line with the oil way in the flywheel and press right home. Now place in position the drive side flywheel, and using the bridge piece, Service Tool number 61-3591 over the crankpin hole press the crankpin fully "home" into the drive side flywheel. (Fig. C16A).

The flywheels will now be only approximately aligned and must be trued.

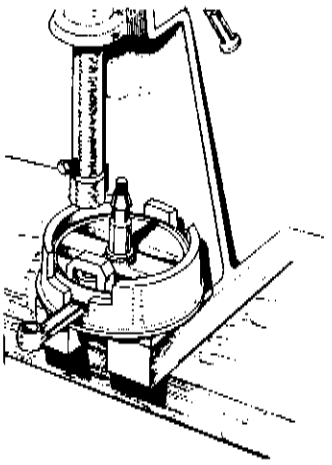


Fig. C16A. Reassembly of the Flywheels.

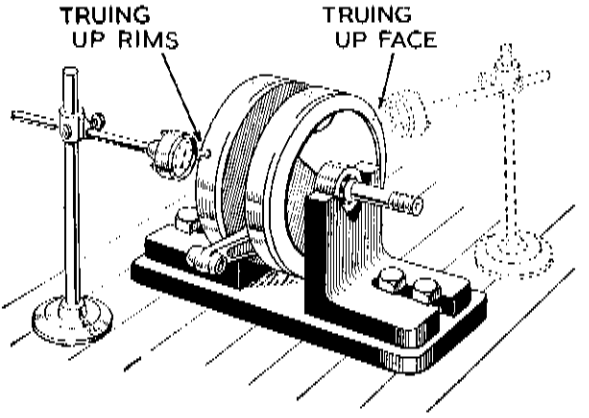
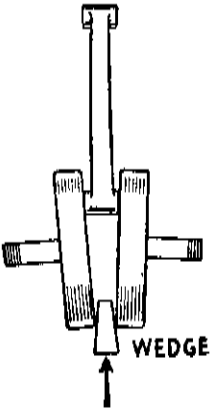


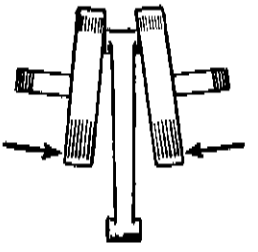
Fig. C17A. Checking Flywheel Alignment.

Mount the assembly in vee blocks with the mainshaft bearing on the drive side shaft and Service Tool number 61-3592 on the gear side shaft over the drilled bush. True up as indicated in Fig. C18A using a dial indicator gauge for checking.

True the wheels to within .005 in., the drive side shaft to within .002 in. and the gear side shaft to within .0005 in.



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



To bring fly wheels parallel, a sharp blow with mallet on flywheel rims on opposite side to crankpin.

Fig. C18A.

Having renewed the big end assembly and checked for balance and concentricity, replace the L/H side half crankcase over the flywheel assembly. This operation will be simplified if a block of wood is used, it should be deep enough to keep the end of the shaft clear of the bench and wide enough to support the flywheels.

Apply a coating of jointing compound to the joint faces, fit the R/H half case and replace the three bolts at the front of the case and the four nuts (two at the base of the cylinder and two in the primary case). Tighten the bolts and nuts evenly to avoid distorting the joint faces.

Replace the Woodruff key on the R/H side mainshaft and refit the worm gear and timing pinion with the extension inwards, fit the tab washer and nut, turning over the tab onto the nut after tightening securely.

In order to ensure correct positioning of the distributor, pick up the drive and holding it with the slot in line with the crankshaft, mesh the teeth with those on the mainshaft worm wheel.

Place the distributor drive bush in position on top of the drive and tap gently down until the circular groove is in line with the screw hole in the housing.

Replace the oil pump using a new paper gasket.

The oil pressure release valve is situated on the front R/H half of the crankcase and may not have been disturbed, but it is as well, at this stage, to make sure that it is clean and free from grit.

After thoroughly cleaning the sump filter replace the filter and cover using a new gasket, which need only be "jointed" on one side, tighten the four nuts onto shakeproof washers. Turn the crankshaft to T.D.C.

Now pick up the tappets and insert them into the holes from inside the timing chest and with the lubrication holes in the tappets towards the gearbox. Holding the tappets up insert the camshaft with the screwed end outwards and mesh the timing mark with the mark on the mainshaft pinion.

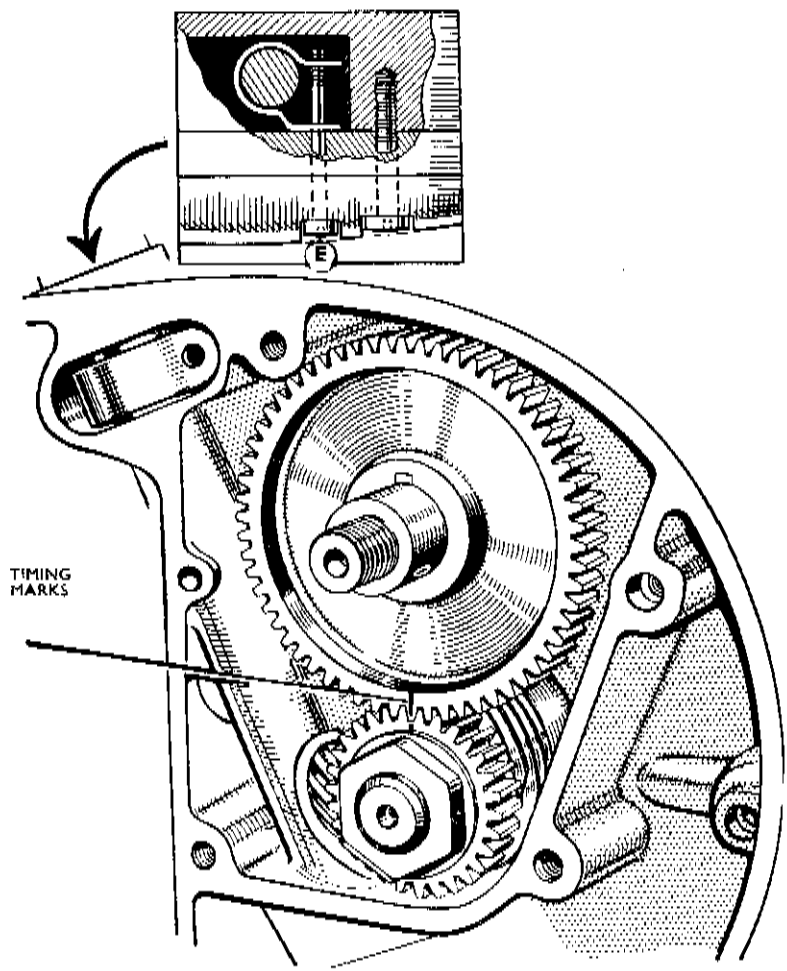


Fig. C19A. Valve Timing Marks.

Insert the distributor clip into the aperture in the crankcase as shown in Fig. C19A, and fit the distributor loosely in position with the wire clip away from the cylinder.

Assembly from this point is described in Service Sheet number 422 continuing with Service Sheet number 421.

After assembly of the engine and gearbox it is only necessary to re-time the ignition. Expose the contact breaker by taking off the cover *A* as shown in Fig. C20A and with the sparking plug out, insert a thin rod through the plug hole, rotate the crankshaft until the piston is at top dead centre on the compression stroke with both valves closed.

Now keeping the rod as vertical as possible rotate the engine backwards until the piston is 1/16 in. from the top of the stroke when the contacts should be just about to open. This is best determined by inserting a piece of cigarette paper between the points which are about to open when the paper can be withdrawn by a gentle pull.

If the setting is incorrect with the piston set as above, rotate the distributor gently until the points are about to open then tighten the clip screw and re-check the setting. The fully open gap *B*, should be .015 in.

Finally reconnect the distributor and alternator leads and replace the spark plug and high tension lead.

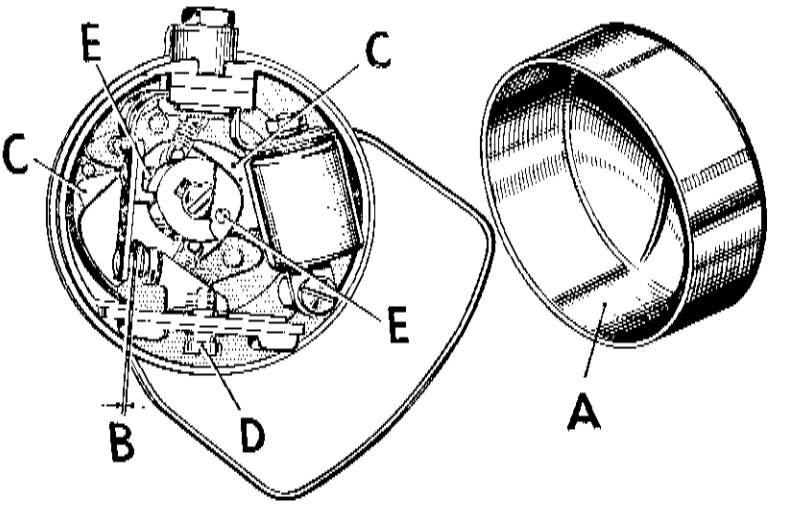


Fig. C20A. Contact Breaker and Auto Advance Mechanism.

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MODEL C15
DISMANTLING AND REASSEMBLY OF HUBS AND BRAKES

Both wheels are fitted with ball journal bearings which do not require adjustment. The bearings are packed with grease during assembly and this should last until the machine is in need of a major overhaul.

Front Wheel Removal

With the machine on its centre stand place a box or small wooden trestle underneath the crankcase so that the front wheel is clear of the ground.

Disconnect the brake cable by removing the split pin *A* and the clevis pin *B*, Fig. C21A at the brake drum end, and withdraw the cable from the lug on the lower fork end. Remove the end caps *D* by unscrewing the four bolts (two in each cap) and as the last bolt is removed support the wheel to avoid damage to the threads on the bolts or the screwed sockets. The wheel will now be free.

Front Hub Dismantling

This should only be necessary when the bearings require replacement or greasing.

Unscrew the large nut on the spindle *E*, Fig. C21A this will be facilitated if the brake is applied using a short length of tubing, such as a box spanner, over the brake lever.

Take off the brake cover plate complete with shoes, cam and fulcrum pin.

The bearing retainer which is now exposed has a left-hand thread and can be removed by unscrewing in a clockwise direction with a suitable peg spanner.

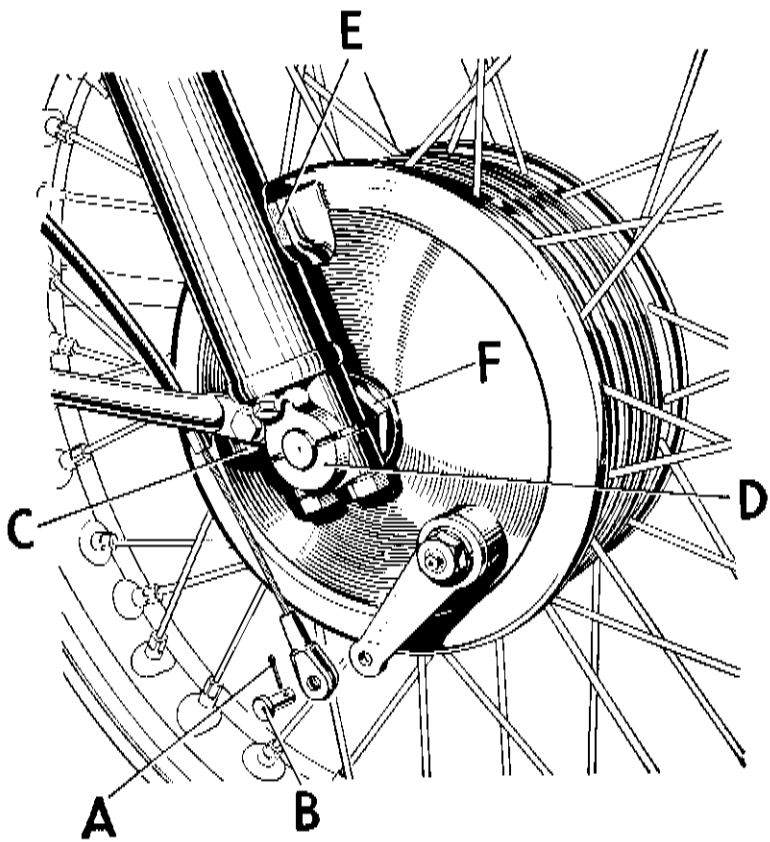

Fig. C21A. Removing the Front Wheel.

Now drive out the R/H or brake side bearing by striking the L/H side of the spindle with a mallet or copper hammer, if neither of these is available use a piece of hard wood placed against the end of the spindle to protect it.

To remove the L/H side bearing prise out the circlip and using a suitable drift, drive out the bearing and dust cover from the R/H side. If a suitable drift or punch is not available the spindle can be used but care should be taken to avoid damage.

Fitting New Bearings

Place the bearing squarely in position on the R/H side and drive in using a piece of tubing on the outer ring of the bearing. When it is resting on the abutment face in the hub, screw in the lock ring using a peg spanner and turning anti-clockwise (L/H thread).

Insert the spindle, screwed end first from the L/H side, and tap it gently home so that the bearing inner ring is seated against the shoulder on the spindle.

Place the L/H bearing over the spindle and drive it into the housing until the dust cap just clears the circlip groove and replace the circlip.

Brake Shoes

Before replacing the cover plate make sure that the brake linings are fit for further use and that the cam spindle is quite free in the cover plate.

Replacement shoes can be fitted either by springing the old ones off the fulcrum and cam spindles, or the shoes complete with spindles can be removed from the cover plate by taking off the domed nut on the fulcrum pin and the nut and lever on the cam spindle.

Replacing the Wheel

Make sure that the cover plate nut *F* (Fig. C21A) is securely tightened, engage the tongue *E* in the slot in the cover plate, replace the two caps and four bolts in the fork ends, but before final tightening pull the wheel to the R/H side so that the cover plate nut is resting against the R/H fork end.

Replace the brake cable, clevis pin and split pin and check over the fork end bolts for tightness.

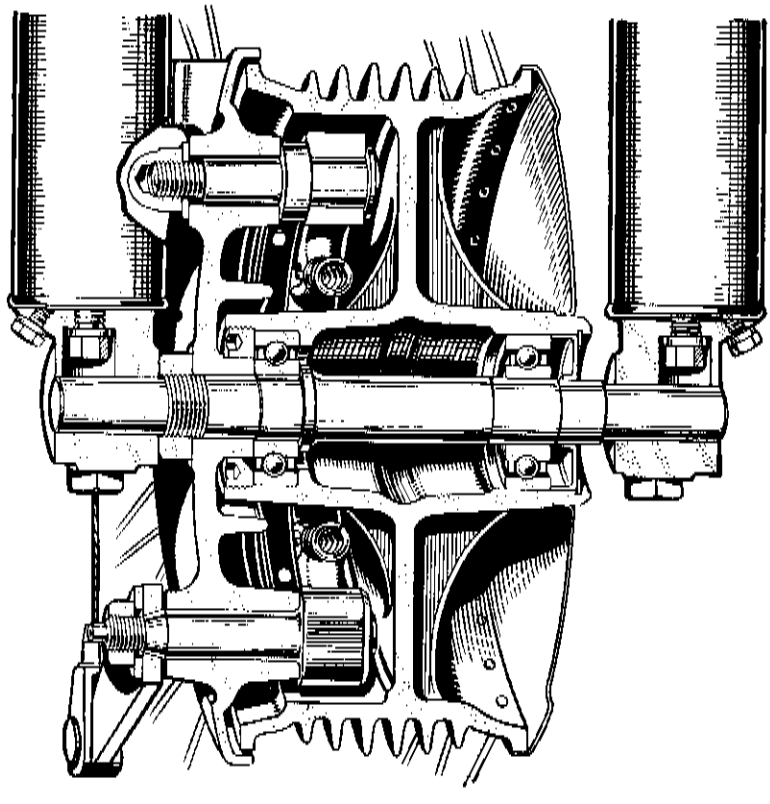

Fig. C22A. Front Hub Arrangement.

Rear Wheel Removal

With the machine on its stand, disconnect the rear chain at the spring link, place a sheet of paper on the ground under the run of the chain and wind the chain off the sprocket onto the paper but leaving it on the gearbox sprocket.

Take off the brake rod adjusting nut *A* (Fig. C23A) and the anchor arm *D* and disconnect the speedometer drive by unscrewing the union nut at the end of the cable.

Unscrew the spindle nuts *B* (Fig. C23A) and pull the wheel out of the fork ends at the same time freeing the brake rod from the swivel pin in the lever. Cant the machine over slightly towards the L/H side and remove the wheel from the R/H side.

Rear Wheel Dismantling

Unscrew the large central nuts on the spindle locking the spindle in the same way as described for the front wheel, and remove the brake cover plate complete with shoes and the speedometer drive gearbox from the R/H side. (Note the distance piece and driving dogs).

Next unscrew the bearing retainer which has a R/H thread and is therefore removed by using the peg spanner in an anti-clockwise direction.

Now drive the spindle through the bearing on the brake side so driving out the R/H bearing together with the felt washer, housing, and plain washer.

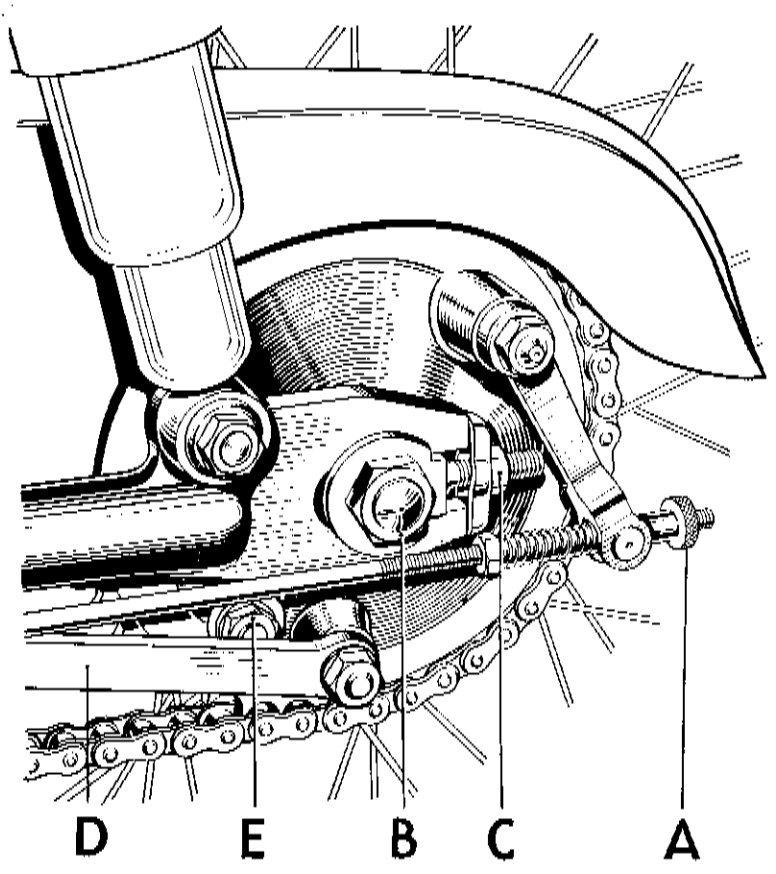

Fig. C23A. Rear Chain Adjustment.

The brake side bearing can now be driven out from the opposite side using a suitable drift or the spindle, but care must be taken not to damage the spindle threads if the spindle is used.

Fitting New Bearings

New bearings can be fitted in the reverse order but care must be taken to see that the drive side bearing, which is the larger of the two, is close up to the abutment in the hub shell and the shoulder on the spindle.

After fitting the drive side bearing and its retainer, insert the spindle from the R/H side, drive in the R/H bearing until it is seated against the shoulder on the spindle, insert the plain washer, felt washer and housing and press down into the recess. Slide the distance piece over the R/H side spindle end, then the speedometer drive gearbox, taking care to mesh the driving dogs, and screw on the spindle lock nut, this nut can be finally tightened after the brake cover plate is fitted.

Brake Shoes

These are dealt with in the same manner as described for the front wheel and are interchangeable with the front shoes, the only difference being that there is the normal type of nut used on the fulcrum pin.

After replacing the cover plate and nut, tighten the lock nut on the speedometer drive.

Brake Drum and Chainwheel

This is registered onto the hub shell and retained by six bolts and three tab plates and should not be disturbed except for replacement purposes of either the drum or spokes on that side.

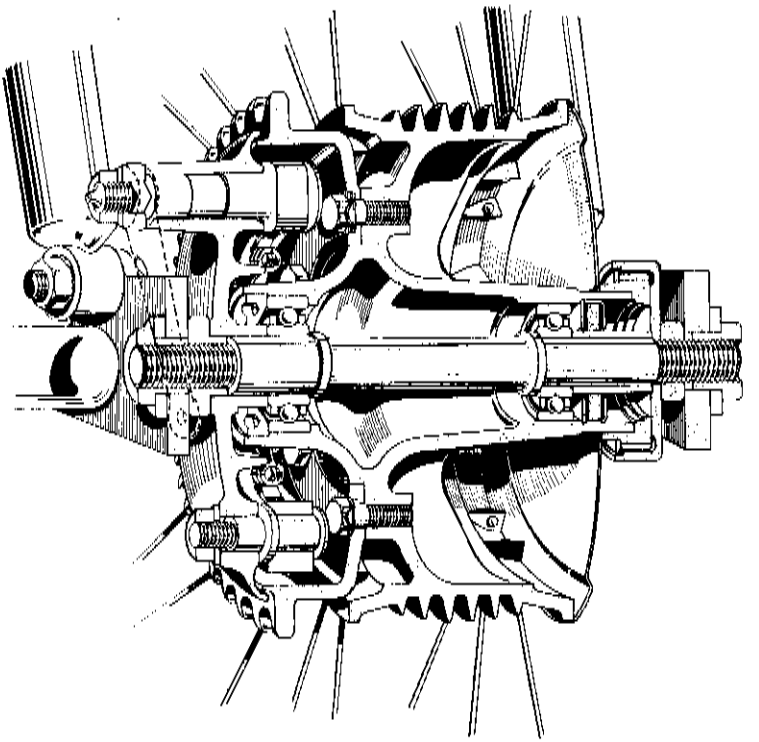

Fig. C24A. Rear Hub Arrangement.

Rear Wheel Replacement

Procedure is the reverse of that for removal but care should be taken to see that the wheel is in alignment with the front. This is done by applying a straight edge against the wheels which must touch the front and rear of both tyres. Also the spring on the chain connecting link must be fitted with the open end towards the rear on the top run.

It is most important to see that all nuts are securely tightened particularly those on the brake anchor strap.

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Printed December, 1958

Model C15

FRONT FORK AND STEERING HEAD

Under normal conditions the only servicing which the front forks will require is occasional renewal of the oil. The need for this may be indicated by excessive movement, but it should only be necessary after considerable mileage.

Changing the Oil

First remove the plugs marked *A*, Fig. C25A, and take out the drain plugs shown at *B*, Fig. C26A. After allowing the oil to drain out, apply the front brake and depress the forks a few times to drive out any oil remaining.

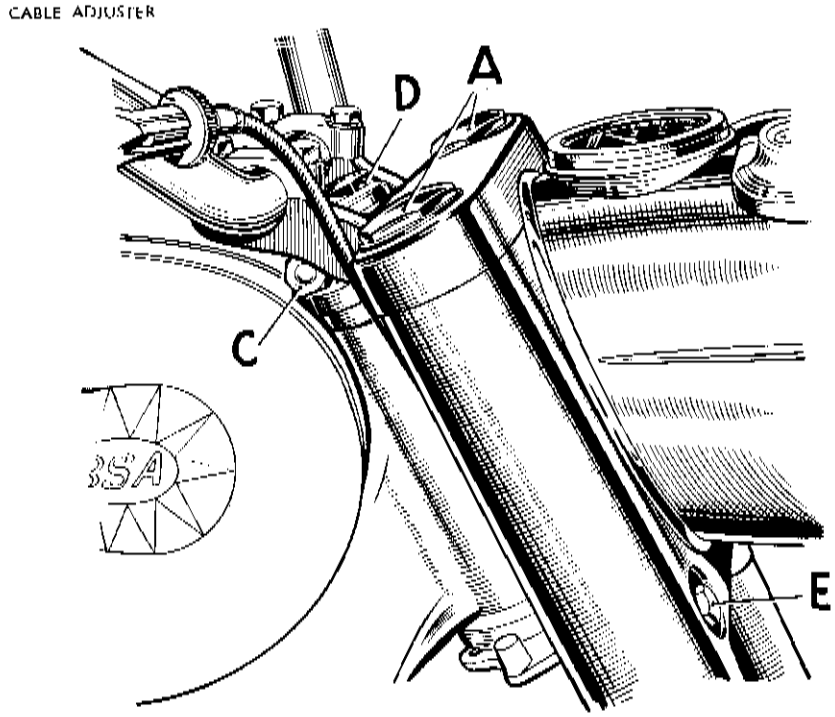

Fig. C25A. Front Fork and Steering Head.

Replace the drain plugs after ensuring that the fibre washers are in good condition and refill each leg with 3½ fluid ounces of an S.A.E. 20 oil, replace the top plugs and tighten securely.

Steering Head Adjustment

To test the head for play support the crankcase on a box so that the front wheel is clear of the ground, then standing in front of the machine with the legs together against the front tyre, push and pull alternately on the handlebars.

If any play is apparent the steering should be adjusted.

Slacken the clamping nut *C*, Fig. C25A, and tighten the cap nut *D* until the adjustment is correct. The handlebars should turn freely, if the movement is "lumpy" it indicates that the top nut is too tight or the ball races are damaged.

When the adjustment is correct, tighten the clamp nut *C* securely.

Dismantling the Forks

It should only be necessary to dismantle the forks after a very large mileage has been covered and special Service Tools will be required.

Drain off the oil as previously described on this sheet and remove the front wheel, followed by the front mudguard complete with the stays which are retained by four nuts and bolts on each side.

Unscrew the cap nuts *A*, Fig. C25A, take out the fork springs and slacken the pinch bolts *E* in the bottom yoke.

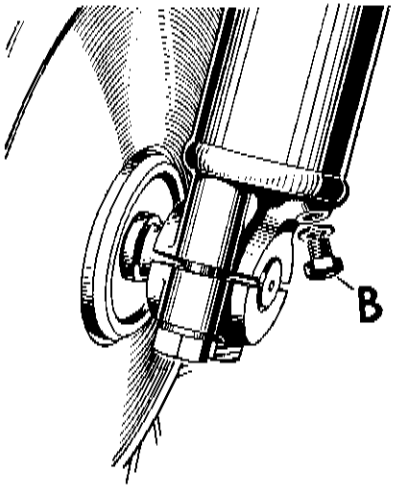

Fig. C26A. Front Fork Drain Plug.

To release the legs from the top yoke screw in Service Tool number 61 3350 in place of the top cap *A*, strike the end of the tool a sharp blow with a hammer and draw the leg down through the bottom yoke. Repeat the procedure for the other leg. (See Fig. 27A).

The collar at the top of the sliding shaft carries an oil seal and dust shroud, on early machines only one oil seal is fitted, later models have two oil seals, one above and one below the dust shroud.

To remove the collar, hold the leg in a soft jawed vice by gripping the wheel spindle lug and unscrew using Service Tool 61 3586. The dust shroud is a press fit into the screwed collar and retains the lower oil seal. Note that the oil seal must always be fitted with the lip downwards.

If new bushes are to be fitted the restrictor rod must now be removed. Unscrew the small headed 5/16 in. bolt which is recessed into the wheel spindle lug, a 1/8 in. Whit. socket or tubular spanner is the most suitable. When the bolt is out, turn the leg upside down when the restrictor rod will drop out of the main tube.

Note that there is a milled slot in the end of the rod, this is for drainage and the slot must be positioned over the drain screw when the rod is replaced.

Bolt the assembly into Service Tool 61-3587 using the two spindle lug bolts and draw the main tube and alloy spacer out of the sliding member. The top bush can now be lifted off and the lower bush removed after the castellated nut has been unscrewed

Reassembling the Forks

After replacing the lower bush, slide on the alloy spacer tube then the top bush with the flange uppermost.

Insert the main tube into the sliding member, lower bush first and press in the distance piece and top bush.

Service Tool 61-3587 with 61 3602 can be used for this purpose or a long piece of tube having an inside diameter of 1⅛ in, but great care must be exercised not to damage the top bush. Screw on the collar using Tool number 61 3586.

Now insert the restrictor rod slotted end first, and with the aid of the spring locate the slot over the drain plug, screw in the small headed 5/16 in. diameter bolt and secure.

Take out the spring and slide the assembly up through the bottom yoke and using Service Tool 61 3350 draw the leg up tight into the top yoke tightening the pinch bolt *E*, Fig. C25A before releasing the Service Tool.

The top cap *A*, Fig. C25A can be used in place of the Service Tool but it must be removed again to refill with oil and to replace the spring.

After replacing both legs slacken off the top caps and the pinch bolts in the bottom yoke, replace the guard and front wheel, remove the support from underneath the engine and pump the forks up and down a few times to line up the legs, finally tightening up all nuts and bolts from the bottom upwards.

Do not forget that the front wheel must be drawn close up to the brake side before the clip bolts are tightened.

Suitable oils for the forks are Mobiloil Arctic, Shell X100 20, Castrolite, Esso 20, B.P. Energol S.A.E. 20.

Dismantling the Steering Head

The steering can be dismantled without stripping the forks but sufficient slack must be obtained in the lighting cables and the front brake cable disconnected, to allow the column to be drawn down out of the head.

Take out the four bolts securing the handlebar and lift the bar to one side. Slacken the pinch bolt *C*, Fig. C25A and take off the caps *A* and *D*, Fig. C25A and the top fork cover.

Now with a rawhide or copper mallet strike the sides of the top yoke alternately to release it from the tapered legs.

Lift the top yoke to one side and draw the steering column down and out of the head but be careful to catch the bearings which will be released as the column is withdrawn. There are 24 3/16 in. diameter steel balls in each race.

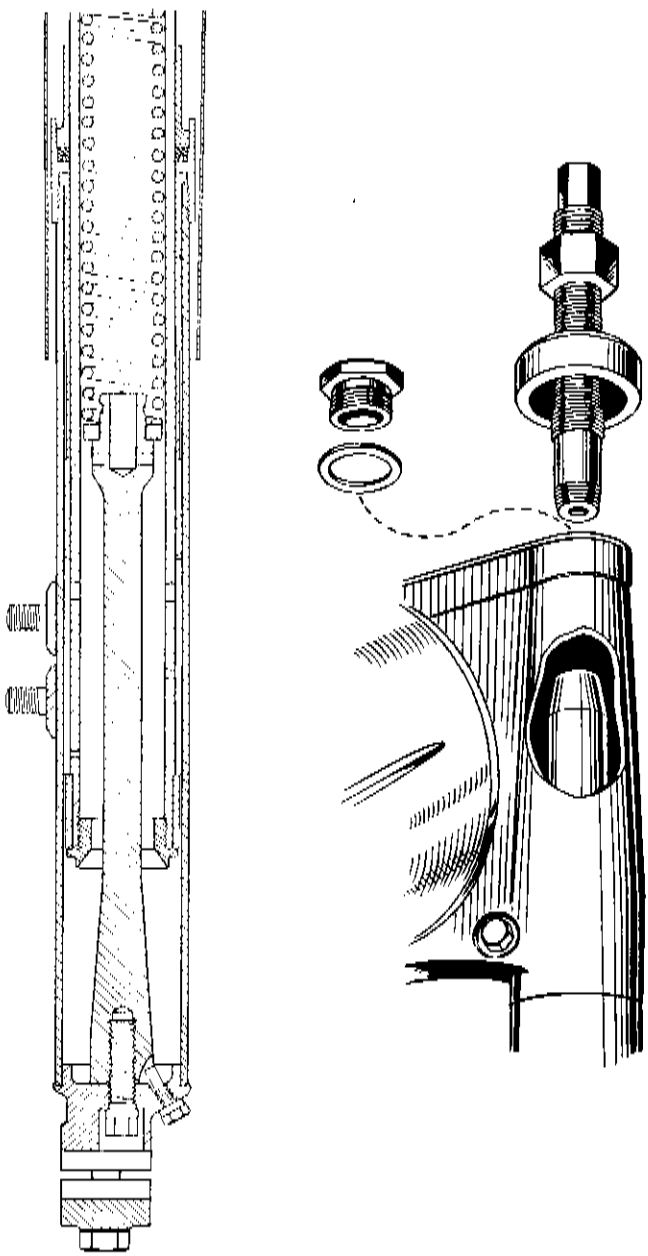

Fig. C27A. Dismantling the Front Fork.

The two inner cones are the same, Part number 40 5027, and the two cups are also identical, Part number 40 4074.

The cups are a press fit into the head lug and can be driven out from opposite ends with the aid of a suitable drift.

If there are small indentations in either the cups or cones or the steel balls are pitted, they should be replaced.

Reassembling the Steering

Drive the new cups into the head lug using a flat plate or bar across the top of the cup and make sure that they enter the seatings squarely.

Grease the cups and press 24 balls into each. Slide the column carefully up into the head and place on the top cone and dust cover, next the top yoke and cap *D*, Fig. C25A. Screw in the caps *A*, and replace the handlebar.

Check over the adjustment of the steering finally tightening nut *C* and replacing the brake and lighting cables.

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MODEL C15

ATTENTION WHICH CAN BE GIVEN WITHOUT DISMANTLING

Oil Pressure Valves

There are three ball valves in the lubrication system but only two can receive attention without complete dismantling of the engine.

The pressure release valve is situated at the front of the timing case on the R/H side and is accessible when the plug *D*, Fig. C28A is removed.

It is advisable to clean the ball, spring and ball seating every few thousand miles or when the oil is changed.

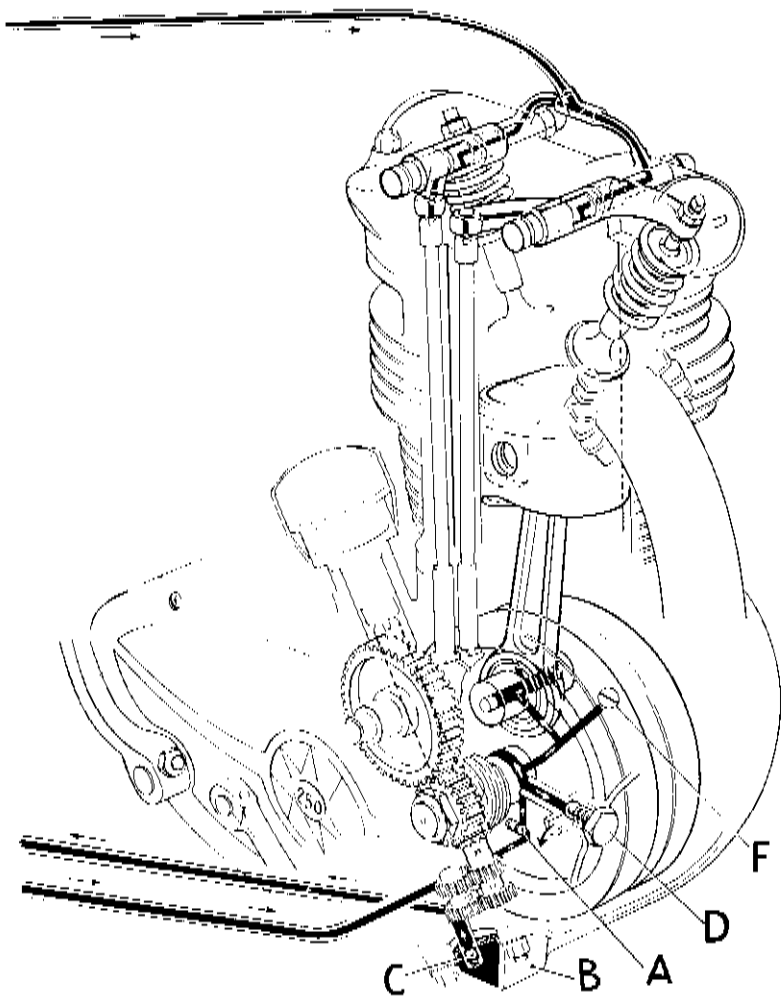

Fig. C28A. Lubrication System.

If the ball valve *C*, Fig. C28A should be stuck on its seating it will prevent the return of oil to the tank. In this event, remove the cover plate *B* below the pump, insert a suitable piece of wire and lift the ball off its seating to free it.

Tappet Clearance

The engine must be quite cold whenever the tappet clearance is checked. Remove the inspection covers and take out the spark plug.

Rotate the engine forward until the INLET valve has just closed and the push rod is just free to rotate, this is the correct position for checking the EXHAUST valve.

Slide a feeler gauge between the end of the valve and the adjusting pin as shown in Fig. C29A.

If adjustment is necessary slacken the locknut *A* and adjust pin *B* until the correct gauge will just slide between the valve and the pin. Hold the pin firmly in position and tighten the locknut. Check the clearance again in case tightening the locknut has altered the setting.

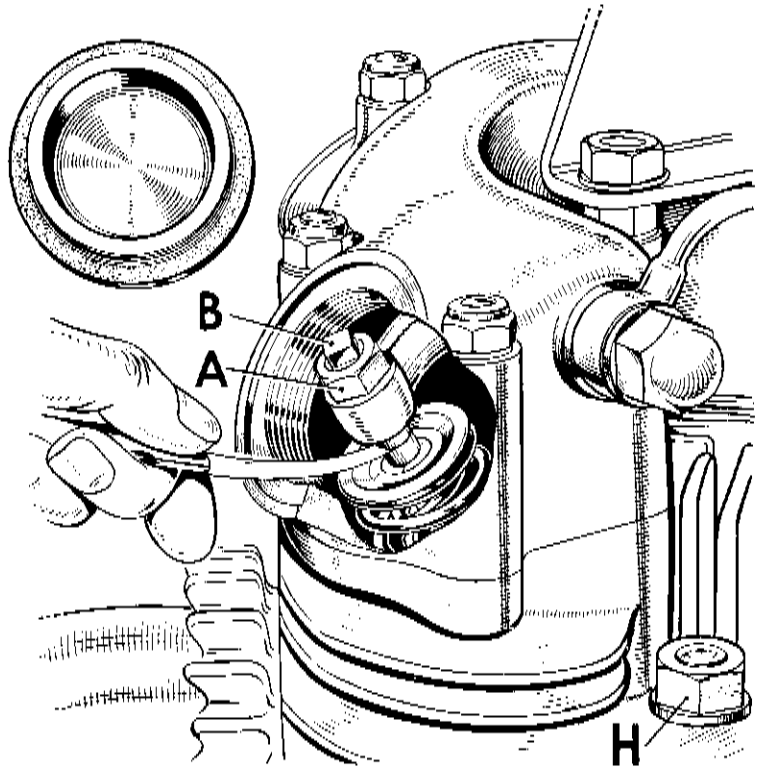

Fig. C29A. Tappet Adjustment.

After the exhaust valve has been adjusted rotate the engine forward again until the exhaust valve clearance is just taken up, but before the valve actually starts to open.

This is the correct position for checking the inlet valve which is adjusted in a similar manner to that described for the exhaust valve.

Correct clearances are: -

Inlet valve ...	.012 inches.
Exhaust valve	.014 inches.

Contact Breaker Gap

Remove the cover *A*, Fig. C30A after pressing aside the spring clip.

The gap between the points when fully open should be .015 inches. Rotate the engine slowly until the foot of the rocker arm is on the peak of the cam, then check the gap between the contacts at *B* with the feeler gauge.

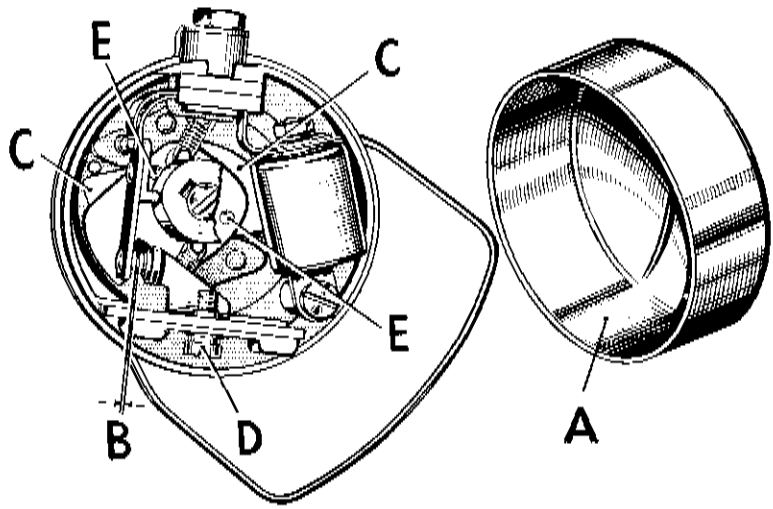

Fig. C30A. Contact Breaker and Auto Advance Mechanism.

If the gap requires adjusting, slacken the screw *D* and move the plate until the gap is correct, then re tighten the screw and re-check the setting.

No oil or grease should be allowed to get on the contact breaker points which should always be clean and dry.

Ignition Timing

To check the ignition timing expose the contact breaker as previously described. As a slight variation in the contact breaker gap alters the timing (wide gap advances and narrow gap retards the timing), it is advisable to check after adjusting the points.

With the spark plug out, engage top gear and turn the engine by means of the rear wheel until the piston is at the top of its stroke with both valves closed, if either valve is open rotate the engine one complete revolution to bring the piston to the correct position, that is: top dead centre on the compression stroke.

Insert a slim rod, such as an old spoke, through the spark plug hole and keeping the rod as vertical as possible, make a mark in line with some point on the head such as one of the fins, now make a second mark 1/16 in. above. Re insert the rod and, again keeping it as vertical as possible, turn the engine back by revolving the rear wheel backwards until the piston has descended to bring the second mark on the rod in line with the point chosen on the head.

The piston should now be at the firing point (1/16 in. B.T.D.C.) and the contact breaker points should be just about to open.

If the setting is incorrect, slacken the clip screw *E*, (Fig. C31A) which is situated at

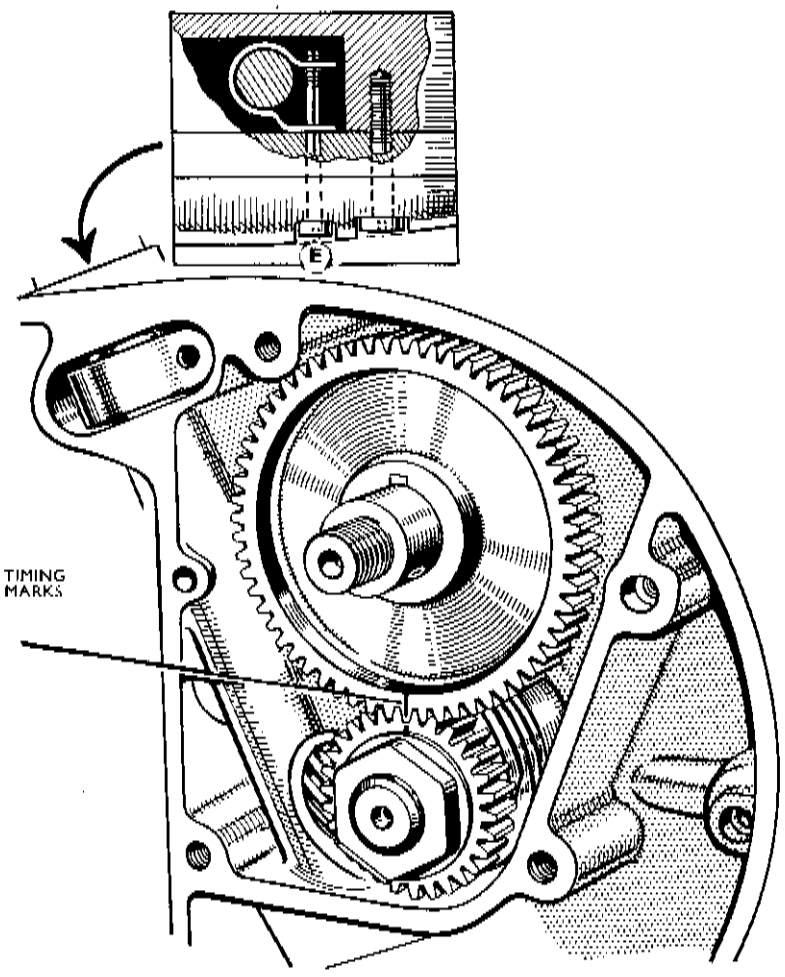

Fig. C31A. Valve Timing Marks.

the top of the outer timing cover and rotate the body of the distributor gently either way until the foot of the rocker arm is at the base of the cam when the points should be just about to separate.

Sparking Plugs

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

The sparking plug should be removed periodically for examination. If the carburation is correct and the engine is in good condition the plug 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. C32A). Heavily leaded fuels may form a greyish deposit 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.

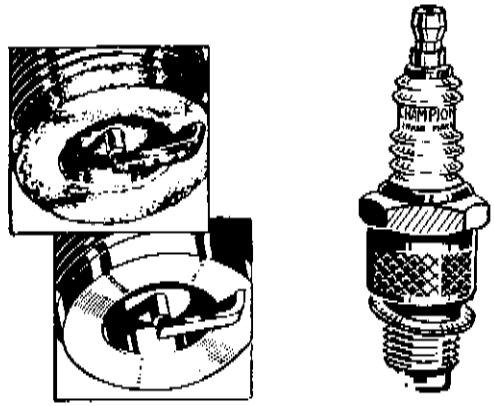

Fig. C32A. The Sparking Plug.

Check that the gap between the sparking plug points is correct and if necessary re-set to .020 .025 in. by bending the side wire. In no circumstances attempt to move the central electrode as this may damage the insulation. If the points are badly burnt away or cleaning fails to restore the plug to its full efficiency, then it should be replaced by a new one.

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

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Model C15

USEFUL DATA

Engine

Capacity		249 c.c.
Cylinder Bore		67 mm.
Stroke		70 mm.
Compression Ratio		7.5 to 1.
Valve Timing	Inlet Opens	26° before T.D.C.
	Inlet Closes	70° after B.D.C.
	Exhaust Opens	61½° before B.D.C.
	Exhaust Closes	34½° after T.D.C.
Ignition Timing		1/16 in. before T.D.C.
Piston Rings (Compression)		.0625 in. wide
(Scraper)		.125 in. wide.
Piston Ring Gap	Minimum	.009 in.
	Maximum	.013 in.
Spark Plug	Champion	N5
Plug Point Gap	Minimum	.020 in.
	Maximum	.025 in.
Contact Breaker Gap	Fully Open	.015 in.
Tappet Clearance	Inlet	.012 in.
	Exhaust	.014 in.

Carburetter

Bore	⅞ in.
Main Jet	140.
Pilot Jet	25.
Throttle Valve	4.
Needle Position	3.
Needle Jet	105.
Air Cleaner	Cheswick and Wright.

Transmission

Gear Ratios	Top	5.98.
	Third	7.65.
	Second	10.54.
	First	15.96.
Clutch Friction Plates		4.
Chain Sizes	Front	⅜ in. Duplex 70 pitches.
	Rear	½ in. × .335 in. Roller 113 pitches.
Sprocket Sizes	Engine	23 teeth.
	Gearbox	17 teeth.
	Clutch	52 teeth.
	Rear Chainwheel	45 teeth.

Capacities

Fuel Tank	2½ Imperial Gallons	(11¼ litres).
Oil Tank	4 pints	(2¼ litres).
Gearbox	½ pint	(285 c.c.).
Front Forks	3½ fluid ounce	(100 c.c.).
Primary Chaincase	¼ pint	(140 c.c.).

Wheels

Rim Size	WM2 17.
Tyre	3.25 × 17.
*Tyre Pressures Front	16 lbs. per square inch.
Rear	22 lbs. per square inch.
Brake Size Front and Rear	6 in. dia. ⅞ in. wide.

General Details

Front Suspension movement	5 in.
Rear Suspension movement	2⅜ in.
Generator output	50 watts.
Battery capacity	13 amp. hour at 10 hour rate.
Overall length	78 in.
Wheel base	51¼ in.
Ground clearance	5 in.
Saddle height	30 in.
Overall height	37 in.
Handlebar width	26 in.
Steering head angle	65°.
Steering lock angle	50°.
Weight	280 lbs.

*Recommended pressures based on rider's weight of 140 lbs. If the rider's weight exceeds 140 lbs. increase pressure as follows:

Front: Add 1 lb. per square inch per 28 lbs. increase in weight above 140 lbs.

Rear: Add 1 lb. per square inch per 14 lbs. increase in weight above 140 lbs.

When a pillion passenger or luggage is carried, the actual load bearing upon each tyre should be determined and the pressures increased in accordance with the Dunlop load and pressure schedule.

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