

Price 2/6



Instruction Manual

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1938 to 1953

Models

C10 250 c.c. S.V.

C11 250 c.c. O.H.V.

C12 350 c.c. S.V.

FOREWORD

This Instruction Manual is intended to acquaint the B.S.A. owner with details of the controls, general maintenance and technical data which may be required for normal operation of the machine.

It does not contain the information necessary to carry out complete stripping for major overhauls but if any owner feels he is competent to carry out this type of work a Service Manual and an illustrated, priced, Spares Catalogue for post-war machines only can be obtained from your B.S.A. spares stockist or local distributor.

Owners in the British Isles can obtain these publications direct from B.S.A. Motor Cycles Ltd., Service Dept., Montgomery Street, Sparkbrook, Birmingham 11. The Service Manual is priced at six shillings plus sixpence postage and the Spares Catalogue is five shillings plus sixpence postage. Always quote full engine and frame numbers when ordering these publications.

Instruction Manual

for



250 c.c. S.V. Model C10

250 c.c. O.H.V. Model C11

350 c.c. S.V. Model C12

1938—1953

B.S.A. Motor Cycles Ltd. Birmingham 11

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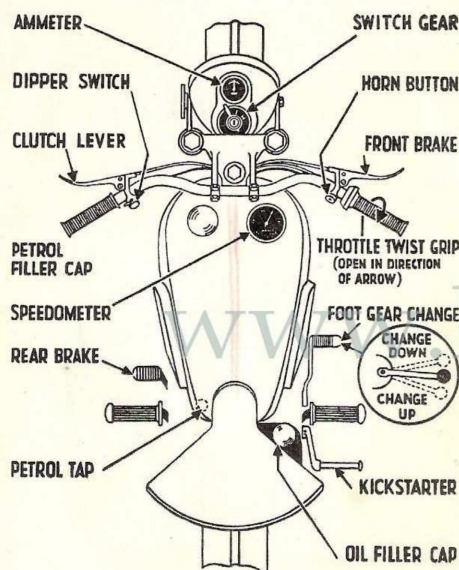


Fig. 1. The Controls.

Note—On late production the speedometer is fitted on the top of the front fork yoke.

Note.—All references to the C10 throughout this book also apply to the C12 model.

HANDLEBAR CONTROLS

Twist Grip Throttle

Controls the engine speed. To open the throttle (i.e., to increase the engine speed) turn the grip towards the rider. Full movement is about one-quarter of a turn.

Front Brake

The lever is on the right bar, below the twist grip throttle. Pull the lever towards the bar to apply the brake, and note that this lever operates the front brake only.

Clutch Lever

Below the left bar. Pull towards the bar to declutch (i.e., to disengage the drive between the engine and the rear wheel). As the clutch lever is slowly released the drive is engaged gradually. Always declutch when changing gear.

Dipper Switch

Fitted on the left bar next to the clutch lever, and actuates the double filament bulb in the headlamp, giving either a normal or a dipped beam.

Horn

The control button is fitted on the right handlebar.

FOOT CONTROLS

Rear Brake Pedal

On the left-hand side of the machine. It operates the rear brake only.

Early models with hand gear change, brake pedal was on the right-hand side of the machine.

Foot Gear Change Pedal

On the right-hand side of the machine. It is used to effect the change from one gear to another. To engage first gear from the neutral position, the pedal is moved upwards. Second and top gears are engaged by moving the pedal downwards. In the case of the four-speed gearbox there is, of course, a third speed which must be engaged before top gear is used. The pedal automatically returns to the central position, ready for the next gear change. When engaging a gear the pedal should be moved to its extreme limit, since the gear change is of the positive-stop type.

Kickstarter Pedal

Also on the right-hand side of the machine, but situated behind the gear change pedal. Depression of the kickstarter rotates the engine.

MISCELLANEOUS CONTROLS

Lighting Switch

On the panel at the rear of the headlamp and controls the lighting of the lamps as indicated by the following markings:—High—head, tail and speedometer lamps. Low—pilot, tail and speedometer lamps. Off—lights not in use but battery on charge when the engine is running.

Ammeter

On top of the headlamp. Enables the rider to see at a glance whether the battery is being charged or discharged.

Ignition Switch

The ignition switch is incorporated in the centre of the lighting switch in the back of the headlamp. To switch on, push the key in and turn clockwise. **It is imperative to switch off when the engine is stopped for any length of time otherwise the battery will become discharged.** The red light serves as a reminder that the ignition is switched on, but it should disappear when the engine is started up.

Central Stand

This is of the spring-up type and so designed that when the machine is pushed forward off the stand, the latter springs upwards and is automatically retained clear of the road.

PREPARATION OF THE MACHINE FOR THE ROAD

In order to obtain the maximum riding comfort from his machine, the owner should carry out two adjustments to suit his own requirements. These are to the footrest and handlebar positions. The footrest lugs fit on to a hexagonal connection and after removal of the locking nut, the footrest may be moved to a suitable position. Take care to tighten the nuts securely. The handlebars pivot at the clamps in the centre of the bar, and if these are slackened the bar may be moved. *Make certain that the clamps are tight following the adjustment.*

RIDING

To obtain first or bottom gear, raise the clutch lever (on the left handlebar) fully, and move the gear lever upwards to its limit (or push lever into

the forward position if hand gear change). If this is not directly obtainable, do not exert excessive force, but gently press the lever while moving the machine a little backwards and forwards, with the clutch disengaged, of course. Engage the clutch gently, and at the same time gradually open the throttle.

To change gear perfectly it is necessary to accelerate the engine when changing down, and to slow it down when changing up. This is due to the relative speeds of the engine and road wheels in the different gears. To change up, raise the clutch lever to its fullest extent. Then, as rapidly as possible, close the throttle, move the gear lever downwards to the next higher gear (rearwards hand change models), and re-open the throttle, at the same time slowly releasing the clutch lever. Changes can be effected, of course, by declutching and moving the lever into the required position. Nevertheless a little time spent in learning the correct method is distinctly advantageous. If the clutch does not free itself properly (due to push rod wear, etc.) gear changing will become difficult. In this event adjust the clutch mechanism according to instructions on page 34.

Do not use an excessive opening of the throttle when starting, and do not allow the engine to "rev" unduly when stationary. Use the throttle control to govern the speed of the machine. Quite definite deceleration is obtained by merely closing the throttle. To lift the clutch and use the brakes, when sufficient retardation can be obtained with a closed throttle, is wasteful. On very greasy roads, the use of the engine as a brake is to be advocated, particularly in conjunction with a change to a lower gear. It is never advisable, except in cases of emergency, either to accelerate or brake fiercely: both are signs of an inconsiderate

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driver, and, when the roads are greasy, both are extremely dangerous.

A good driver is the most unobtrusive.

RUNNING-IN

The running-in process is the most important period in the life of the engine, and the handling it receives during the first 1,000 to 1,500 miles will determine the service it will provide in return.

It is advisable not to exceed a cruising speed of 30-35 m.p.h. in top gear under favourable conditions, with correspondingly lower speeds in the other gears. If excessive speeds are used there is risk of piston seizure and other troubles, and in any event until the machine has been run-in it cannot be expected to give its best performance. In particular, avoid rapid acceleration especially when the engine is not under load, and do not allow the engine to labour on hills in a high gear when a change to a lower gear would ease the load on the engine.

Do not let the oil level in the tank get too low, as economy in oil may prove very expensive at a later date. Running consistently with the level too low may cause the oil to become unduly hot. It must be remembered that the oil cools as well as lubricates, and a new or reconditioned engine tends to run a little hotter than one that is well run-in. After the first 250 miles, drain and refill the oil tank with fresh oil and clean the filter (see below). Repeat this process after 1,000 miles and thereafter every 2,000 miles. The correct grades of oil are given in the lubrication chart on page 44. The gearbox should be drained after the first 500 miles and thereafter every 2,000 miles.

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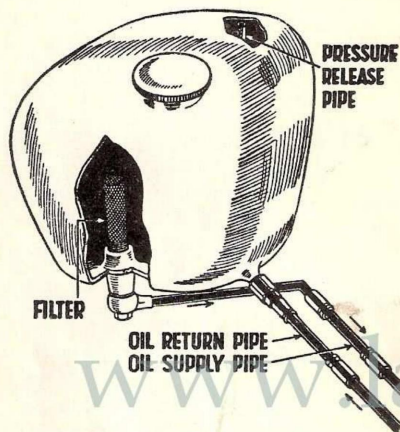


Fig. 2. The Oil Tank.

THE LUBRICATION SYSTEM

The engine lubrication system (see Fig. 3) is of the dry sump type operated by a double gear pump, situated in the bottom of the crankcase. All oil-ways are internal except for the supply and return pipes from the tank. The oil flows from the tank (Fig. 2)—through a filter in the tank—to the supply portion of the pump, which delivers it past a pressure valve *A* (Fig. 3) to the crankshaft and the big-end bearing.

After lubricating the big-end and circulating through the engine in the form of mist, the oil

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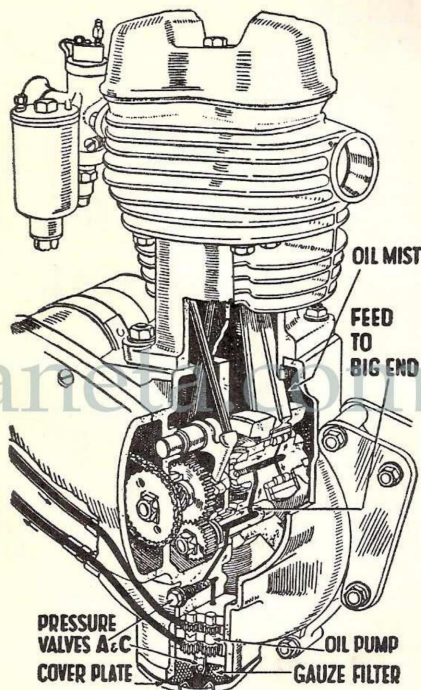


Fig. 3. Lubrication System, Model C11
(Model C10 is similar)

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drains through a filter in the bottom of the crankcase, from which it is drawn by the return portion of the pump past another ball valve *C* and delivered through the return pipe to the tank.

To check the flow of oil in the lubricating system, remove the tank filler cap whilst the engine is running. Oil should be seen issuing from the return pipe from the crankcase. The tank and crankcase should be drained periodically, and replenished with clean oil (see Periodical Maintenance, page 14).

On pre-war models the oil tank was fitted in the petrol tank (see fig. 4).

Ball Valves

Incorrect seating of the ball valve *A* will allow oil to transfer from the tank to the engine whilst the machine is stationary. In this event, unscrew the plug over the valve, and remove spring and ball. Clean the ball and its seating and replace.

If the ball valve *C* in the base of the pump should adhere to its seating, there will not be any return flow of oil to the tank. To correct this, remove the cover plate *B*, insert a piece of wire into the valve orifice, and lift the ball off its seating to free it.

Tank Pressure Release (separate Oil Tank Only)

Any restriction in the pressure release pipe in the oil tank will cause an increase in pressure inside it, and will result in leakage of oil at the filler cap. This can be rectified by inserting a length of flexible wire into the pipe at its lower end (just in front of the rear mudguard) and pushing the wire right up the pipe, thus clearing any obstruction.

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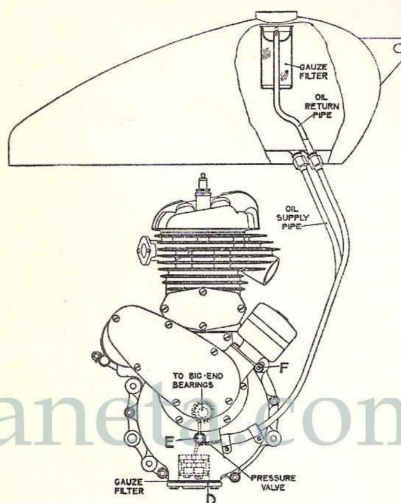


Fig. 4. Lubrication System (Saddle Tank Type).

Filters (separate Oil Tank Only)

To remove the oil tank filter (Fig. 2) for cleaning, unscrew the oil pipe union at the bottom of the tank, when filter will come out with the plug.

Filters (Saddle Tank Type)

To remove the filter in the oil tank (Fig. 4), unscrew the filler cap, and lift the filter out. (Note.—When refilling with oil do not remove the filter.)

All Models

The crankcase filter (Fig. 3) can be withdrawn after removing the cover plate *B*.

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The filters should be thoroughly washed in petrol and carefully dried before replacement.

Oil

The correct grades of oil are given in the chart on page 44.

PERIODICAL MAINTENANCE

WEEKLY

Oil Tank

Inspect the level of oil at least once a week. When topping-up do not fill the tank completely; leave about one-inch margin between the oil and top of tank. If this precaution is not observed, it is possible that oil will seep from the filler cap.

Tyres

Check the pressures with a gauge, and inflate to correct pressure if necessary (see pages 85 to 87).

Examine carefully for cuts and remove any flints or metallic scraps which may have become embedded in the cover.

Gearbox

Examine oil level and top up if necessary. The oil is added through the filler cap aperture on the right-hand side of the box, and the plug at *E* (Fig. 12) is removed, thus providing a pre-determined oil level.

Brake Pedal Control Rod Joints Exposed Cables

A few drops of oil are required to ensure smooth operation.

Steering Head Saddle Nose Bolt Rear Suspension (when fitted) Fork Spindles (Girder Forks)

A few strokes of the grease gun will be sufficient to ensure satisfactory lubrication.

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Battery

Top-up as often as necessary to maintain the level of electrolyte one-quarter inch above the top of the plates. ALWAYS USE DISTILLED WATER WHEN TOPPING UP. See page 74.

EVERY 1,000 MILES

Hubs

Inject grease through the nipple in the centre of the hub. Do not over-lubricate as grease may be forced on to the brake linings and cause ineffective brakes. Three or four strokes of the grease gun should be ample. *Do not lubricate with oil.* Check the hub bearing adjustment by testing the side play at the wheel rim. Only a small amount of play is necessary and if excessive, adjust as described on pages 39 to 41.

Steering Head

Lift the machine and place a box under the crankcase so that front wheel is clear of the ground. Test for play in the steering head by trying up-and-down movement. Check also that steering is free (i.e., that the ballrace adjustment is not too close). If necessary, adjust as explained on pages 46 and 47.

Brake Cam Spindles

A few drops of oil are all that is required.

Tappet Adjustment

The tappet clearances must be checked when the engine is cold. The clearances for both models are given on page 86. The correct method of checking and adjusting is explained on page 16 for C11 and page 17 for C10.

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Clutch

Examine the clutch control arm behind the gearbox for free movement, or alternatively, there must be a short length of slack cable at the handle-bar lever. If excessive, difficulty will be experienced in changing gear, since the clutch will not disengage completely. The amount of free movement which must be present can be adjusted as explained on page 33. **Note.**—In the case of the four-speed gearbox, the control arm is on the top of the box.

Chains

Check the primary chain tension, which should not exceed a total up-and-down movement of half an inch. Remove the chaincase filler cap for this purpose.

The rear chain movement should not exceed three-quarters of an inch, on a machine with a rigid frame. For a spring frame machine the allowance is half an inch, with the machine on its stand and wheel set at the lowest point in the suspension unit.

If the play exceeds the above figures, adjust as described on pages 28 to 33.

Sparkling Plugs

Examine and clean and adjust points if necessary (see page 26).

EVERY 2,000 MILES

Oil Tank

Drain out the old oil (preferably after a run while the engine is still warm), wash out with flushing oil or thin machine oil—NOT paraffin or petrol—and refill with new oil. The correct grades of oil are given in the lubrication chart on page 44.

Filters

There are two filters which require attention:—

The Oil Tank Filter (separate Oil Tank)

Accessible by unscrewing the supply pipe union at the bottom of the tank (Fig. 2).

The Oil Tank Filter (Saddle Tank Type)

Accessible by unscrewing the filler cap, and lifting the filter out (Fig. 4).

The Crankcase Filter (All Models)

The filter can be withdrawn after removing the cover plate *B* (Fig. 3).

Wash the filters thoroughly in petrol, and dry them carefully before replacing.

Gearbox

Remove the inspection cap and the level plug *E* (Fig. 12) at the rear of the gearbox. Unscrew the drain plug underneath the box and drain out the old oil, preferably after a run while the oil is still warm. Wash out the gearbox with flushing oil and re-fill with new oil through the inspection cap until it issues from the level hole. Replace the level plug and the inspection cap. The correct grades of oil are given in the lubrication chart on page 44.

Primary Chain Oilbath

Top up with engine oil if necessary, through the filler orifice. A level plug is provided on the side of the case and this *must* be removed to prevent over filling with oil. Take care to replace before using the machine, which should be on level ground when the check is being carried out. If the chaincase is overfilled it is possible that clutch slip may be caused. The approximate capacity of the case is given on pages 84 and 85.

Central Stand Fulcrum

A few strokes of the grease gun will be sufficient.

Dynamo Contact Breaker

} See Electrical Section pages 73/82.

Chains

Remove the rear chain which should be cleaned and lubricated as indicated on page 35.

HOW TO CARRY OUT THE VARIOUS ADJUSTMENTS

1. THE ENGINE

Valve Clearances (C11)

The camshaft fitted to the machine when it left the works required valve clearances of .003in. for both inlet and exhaust. The camshaft now supplied as a replacement, however, has been re-designed and the appropriate clearances are .010in. for the inlet valve and .012in. for the exhaust.

Checking or adjustment of the valve clearances must always be carried out when the engine is cold.

Remove the rocker box after undoing the central retaining bolt. Take care not to damage the gasket, as unless it is in perfect condition it must be replaced by a new one.

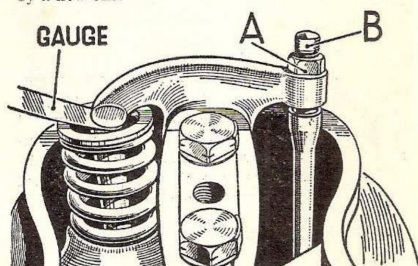


Fig. 5. Tappet adjustment (C11)

Detach the sparking plug so that the engine can be rotated easily by means of the kickstarter lever.

Rotate the engine forward until the inlet valve has just closed, i.e., the push-rod is just free to rotate. This is the correct position for checking or adjusting the exhaust valve clearance. Slide a feeler gauge between the end of the valve and the rocker, as shown in Fig. 5. If the clearance requires adjusting slacken the locknut *A* and adjust the pin *B* until the correct feeler gauge will just slide between the valve and the rocker.

Hold the pin *B* in its correct position and tighten the locknut *A*. Check the clearance to ensure that tightening the locknut has not affected the setting.

When the exhaust valve clearance has been adjusted, rotate the engine forward again until the exhaust valve clearance is just taken up, but before the valve actually starts to lift. This is the correct position for checking and adjusting the inlet valve clearance.

The valve clearance should be adjusted in a similar manner to that described for the exhaust valve.

When the adjustment is complete, replace the sparking plug and the rocker box cover, taking care not to damage the gasket.

Valve Clearances (C10)

The camshaft fitted to the machine when it left the works required valve clearances of .004in. for the inlet and .006in. for the exhaust. The camshaft now supplied as a replacement, however, has been re-designed and the appropriate clearances are .012in. for the inlet valve and .015in. for the exhaust.

Checking or adjustment of the valve clearances must always be carried out when the engine is cold.

Remove the tappet chest cover after undoing the retaining screws. Take care not to damage the gasket as unless it is in perfect condition, it must be replaced by a new one.

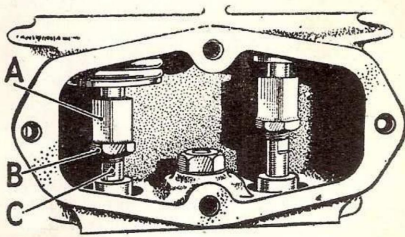


Fig. 6. Tappet adjustment (C10).

Detach the sparking plug so that the engine can be rotated easily by means of the kickstarter lever.

Rotate the engine forward until the inlet valve has just closed, i.e., the tappet is just free to rotate. This is the correct position for checking or adjusting the exhaust valve clearance. Slide a feeler gauge between the end of the valve and the tappet head *A* (see Fig. 6). If the clearance requires adjusting slacken the locknut *B*. Hold the tappet stem at *C* and adjust the tappet head *A* until the correct feeler gauge will just slide between the valve and the tappet head.

Hold the head *A* in its correct position and tighten the locknut *B*. Check the clearance to ensure that tightening the locknut has not affected the setting.

When the exhaust valve clearance has been adjusted, rotate the engine forward again until the exhaust valve clearance is just taken up, but before

the valve actually starts to lift. This is the correct position for checking and adjusting the inlet valve clearance.

The valve clearance should be adjusted in a similar manner to that described for the exhaust valve.

When the adjustment is complete, replace the sparking plug and the tappet chest cover, taking care not to damage the gasket.

Camshaft Type (all Models)

If there is any doubt as to the type of camshaft fitted, rotate the engine until it is at top dead centre on the compression stroke. This can be simply ascertained if a long piece of wire is inserted through the sparking plug hole so that the top of the piston can be felt. On some S.V. models it is necessary to remove a compression plug in the cylinder head in order to reach the piston. At the top of the compression stroke both valves will be closed and slight movement of the engine backwards or forwards will not cause either valve to open appreciably.

Check the valve clearances in the top dead centre position. If the earlier type of camshaft is fitted, the clearances will be substantially the same as when they were set up as described under Valve Clearances. If the replacement type of camshaft is fitted the valve clearances will be considerably reduced. Thus, if a model with the replacement type camshaft fitted is set up with the smaller valve clearances applicable to the original camshaft, the clearance will be completely eliminated when the engine is at top dead centre on the compression stroke. It is, therefore, particularly important that the camshaft is correctly identified.

If the machine is dismantled the two types of camshaft can be easily distinguished. The original type is stamped C10 or C11 on the cheek of the outer cam, while the replacement camshaft is stamped with an additional Part Number, i.e., C10 8 or C11 9.

Ignition Timing

If the contact breaker unit is removed for any purpose, it will be necessary on replacement to re-set the ignition timing. No difficulty should be experienced if the various items are removed (or otherwise dealt with) in the following order.

1. *Examine the fully open gap between the contact breaker points.* Remove the moulded cover (held on by two spring clips) and adjust the points if necessary to between .010in. and .012in. (see Fig. 29, page 79).
2. *Remove the sparking plug (C11) or the compression plug (C10).* This enables the engine to be turned easily by hand, by means of the kickstarter.
3. *Rotate the engine until the piston is at top dead centre on the compression stroke.* This can be simply ascertained if a long piece of wire is inserted through the sparking plug hole, so that the top of the piston can be felt. At the end of the compression stroke the valves will be closed and slight movement of the engine backwards or forwards will not open either of the valves.
4. *Rotate the engine in the reverse direction until the piston has descended 1/32in. from the top of its stroke.* This is best accomplished by engaging top gear and revolving the rear wheel by hand.

A little care is necessary to ensure that the dimension given above is rigidly maintained.

5. *Place the cam and follower in the correct relation to each other.* Turn the centre spindle until there is approximately 3/16in. in between the follower and the point where it begins to rise on the cam.
6. *Insert the unit into the housing.* The flat side of the body must be towards the rear of the machine. Push the unit well down into the housing and note that as the spindle gear meshes with its driving pinion, the shaft turns slightly and takes up a new position.
7. *Set the contact points in the firing position.* Rotate the body of the unit in the normal direction of rotation until the points are just opening (not more than .002in. open).
8. *Lock in position.* Tighten the clip bolt on the locking plate just below the housing.
9. *Check the setting.* With the contact points just opening the piston must be 1/32in. before top dead centre.
10. *Replace sparking plug (or compression plug) and the moulded cover.*

It should be noted that the timing mechanism is automatically advanced or retarded by means of a governor mechanism in the base of the contact breaker housing (see page 79). As a consequence when the engine is stationary the timing is fully retarded and this is the normal position for setting the ignition timing.

It is not advisable to interfere with the standard setting, unless it is strongly suspected to be at fault. After any attention to the contact breaker points

it is advisable to check the timing since opening the points advances the timing, and closing them retards it.

Valve Timing

Under normal running conditions the valve timing cannot become disturbed and it is inadvisable to dismantle the timing gear train unless absolutely essential. Should it be necessary, however, to check the timing, the following procedure should be observed, components being removed in the following order :—

1. *The timing cover.* Note the positions of the fixing screws, which have varying lengths.
2. *Dynamo driving chain.* This is of the endless type (i.e., there is no connecting link), and before the chain can be removed the large sprocket must be taken off its shaft. For this purpose, take off its nut and locking washer when the sprocket itself may be withdrawn from the shaft by means of two screws inserted into the extractor holes. ($\frac{1}{4}$ in. B.S.C.). The chain may now be lifted clear of the dynamo sprocket.
3. *The contact breaker unit.* This must be withdrawn slightly from its housing, otherwise its driving pinion may be damaged. Slacken the clip bolt on the locking plate below the body and raise the latter about $\frac{1}{4}$ in. *Note.*—Once this unit has been withdrawn it will be necessary to re-time the ignition setting as given on page 20. It may be necessary to slacken the strap which secures the dynamo in position so that the latter may be rotated in order to facilitate removal of the timing case.

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4. *The timing case.* This is attached to the crankcase by means of six screws and two dowels. Take care to ensure that the camshaft and the rocker spindle are not withdrawn as the case is taken off.

5. *The timing marks.* The engine shaft pinion and the cam pinion are both marked, the former with a dash on one of the teeth and the latter with a dash between two of the teeth. Note that when the piston is at T.D.C. of the compression stroke, the two marks register one with the other (Fig. 7). Alternatively, they should register at every second revolution of the engine shaft.

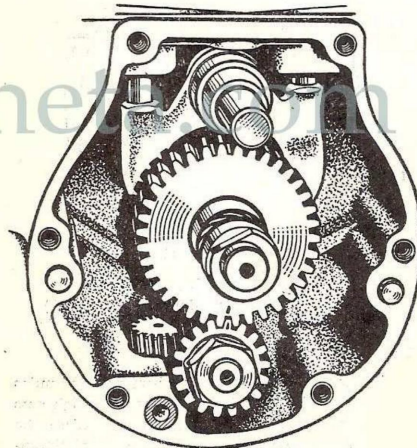


Fig. 7. Valve timing marks.

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6. *Re-assembly notes.* Make sure that the paper gaskets on both sides of the timing case are in good order, otherwise there may be oil leakage. Adjust the dynamo driving chain by rotating the dynamo which is eccentrically mounted until the chain has a small amount of slack. Press the dynamo firmly against the timing case to ensure a good oil seal and tighten the dynamo strap. Re-time the ignition as given on page 20.

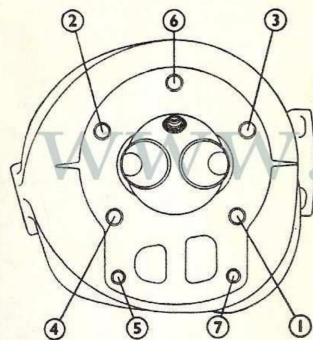


Fig. 8.

Order of tightening cylinder head nuts (C11).

Cylinder Head

After the machine has covered its first 250 miles when new or after decarbonising, check the tightness of the cylinder head bolts. This is because the gasket tends to settle down after the initial clamping. To ensure even distribution of pressure with

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consequent freedom from distortion, tighten the bolts; C10 (see Fig. 9); nuts, C11 (see Fig. 8), as indicated.

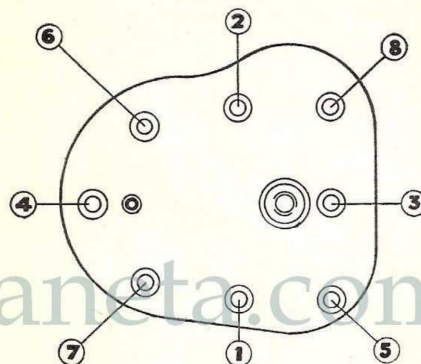


Fig. 9.

Order of tightening cylinder head bolts (C10).

Automatic Advance Unit

This is contained within the base of the contact breaker unit and attention to the governor weights can be given when the contact breaker platform is removed together with the cam on the central spindle.

Examine the automatic advance unit making sure that the governor bob-weights move freely and that if the unit is turned by hand to the advance

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position (weights fully extended outward) and released, the springs withdraw the weights to the inner position (retarded).

If necessary, lubricate thoroughly with cycle oil.

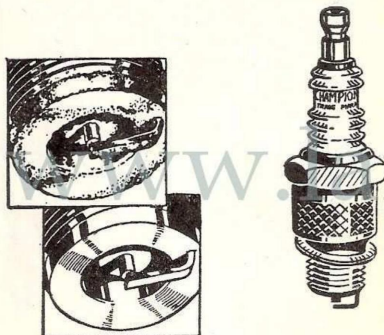


Fig. 10. The sparking plug.

Sparking Plugs

The sparking plug is of great importance in satisfactory engine performance, and every care should be taken to fit the correct type when replacements are necessary. There is little to be gained by experimenting with different plugs as the make and type fitted by us as official factory equipment is best suited to the requirements of the motor. This is Champion Type No. L10 for C10 (N8B with alloy cylinder head), L10S for C11 as illustrated in Fig. 10.

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Remove each sparking plug every 1,000 miles (1,500 km.) or so for inspection. If the carburation system is in correct adjustment the sparking plug points should remain clean almost indefinitely. An over-rich mixture from the carburetter will, however, cause the formation of a sooty deposit on the points and, later, on the plug end face (as upper view, Fig. 10). If therefore such a deposit is found, clean it off carefully and check your carburetter.

The continued use of leaded fuel may also eventually produce a deposit on the plug—this time of a greyish colour.

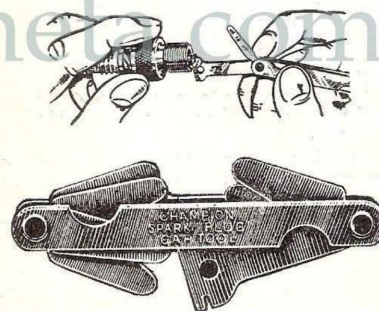


Fig. 11. Setting the plug points.

A light deposit due to any of these causes can easily be cleaned off, but if it is allowed to accumulate, particularly inside the body, the plug may spark internally with an adverse effect on engine performance—if, indeed, it does not stop the engine altogether. The plugs should be cleaned and tested

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at regular intervals, and it is suggested that this service be performed at your garage on a special 'Air Blast' service unit. If eventually the cleaning process fails to restore the plug to its original condition of efficiency, it should be replaced by a new one.

When inspecting a plug, also check the gap between the points. This should be .018-.020 in. (.45-.50 mm) and adjustment should be made by bending the side wire (see Fig. 11). **Never attempt to move the centre electrode**, and it is always advisable to use the special plug gap tool illustrated, obtainable at 2/- from any Champion Plug stockist or from the Champion Sparking Plug Co. Ltd., Feltham, Middlesex. Feeler gauges are attached to verify correct gap.

When refitting a plug, make sure that the copper washer is not defective in any way. If it has become worn and flattened, fit a new one to ensure a gastight joint.

Screw the plug down by hand as far as possible, then use a spanner for tightening only. Always use a tubular box spanner to avoid possible fracture of the insulator, and do not in any circumstances use an adjustable spanner.

Paint splashes, accumulation of grime and dust, etc., on the top half of the insulator are often responsible for poor plug performance. Plugs should be wiped frequently with a clean rag.

2. TRANSMISSION

Primary Chain

The adjustment of this chain is made by movement of the gearbox. The procedure is as follows:

1. Remove the chaincase filler cap. Through the

orifice the chain can be seen and its tension checked with the fingers; it is not necessary to move the outer half of the case.

2. The gearbox clamping nuts. These are below the gearbox on the right-hand side and are shown at D in Fig. 12.

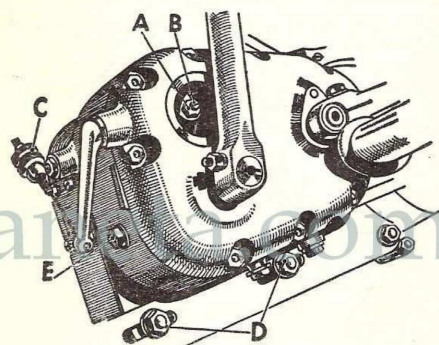


Fig. 12.

Clutch and front chain adjustment 3-speed gearbox.

3. Move the gearbox backwards. Rotate the engine slowly and at intervals check the up and down movement mid-way between the sprockets which should not exceed $\frac{1}{4}$ in. at the tightest point.
4. Retighten the gearbox nuts. These must be securely locked since otherwise the pull on

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the rear chain when the machine is running may cause the box to slide backward, thus slackening the chain. Note that after adjusting the front chain it is possible that the rear chain may also need adjustment, owing to the fact that the gearbox has been moved.

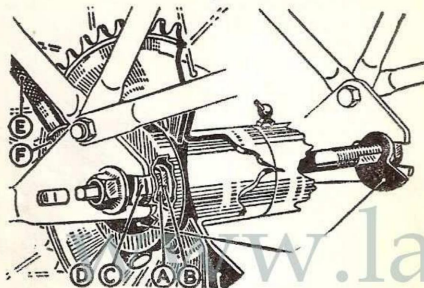


Fig. 13.

Rear hub adjustment (rigid frame).

Rear Chain (rigid frame)

In order to adjust the tension of the rear chain, the position of the rear wheel in the frame is altered in accordance with the chain requirements. Adjust the various items in the following sequences:—

1. *The rear brake adjuster.* This must be slackened off, as otherwise the brake rod may prevent free movement of the wheel.

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2. *The spindle nuts.* These must be slackened off to ensure easy movement of the wheel spindle in the fork ends.
3. *Speedometer locknut 'C',* Fig. 13 when fitted (3-speed model only). This must be released so that the speedometer cable can take up a new position as the wheel is drawn back.
4. *Adjust wheel position.* Apply a spanner to the square spindle end at the left-hand side and turn the spindle. This will have the effect of rotating the cams which are attached to the spindle so that the wheel will move rearwards. Revolve the wheel slowly and check the chain tension; there should be $\frac{1}{2}$ in. up and down movement in the centre of the chain at the tightest point. Make sure that the cams are hard against the stops and then tighten the spindle nuts—first the left-hand nut and then the right-hand.
5. *The brake adjustment.* Screw up the brake adjuster until the rear brake operates with its normal efficiency.
6. *Wheel alignment.* This should be checked carefully in accordance with the instructions given on page 41. Any mis-alignment may cause excessive tyre wear and uncomfortable steering.

Rear Chain (spring frame)

As with the rigid frame, the tension of the rear chain is modified by altering the position of the rear wheel. This is carried out in a slightly different manner from that of the rigid frame, and the various

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adjustments should be made in the following order:

1. *Set the machine on its stand.* The wheel must be in its lowest position in the suspension unit for the purpose of this adjustment.

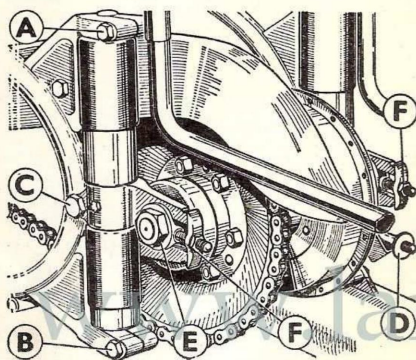


Fig. 14.

Adjustment of rear wheel (spring frame).

2. *Rear brake adjuster (D, Fig. 14).* This must be slackened off as otherwise the brake rod may prevent free movement of the wheel.
3. *The spindle nuts (E, Fig. 14).* These must be released to ensure easy movement of the wheel spindle in the fork ends.
4. *The adjusters F.* These should be tightened so that the wheel spindle is drawn rearwards. Make sure that the movement is equal on both sides of the wheel so that the latter is kept in correct alignment in the frame.

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5. *Retighten the wheel spindle nuts E.*
6. *The brake adjustment.* Screw up the brake adjuster D until the rear brake operates with its normal efficiency.
7. *Wheel alignment.* This should be checked carefully in accordance with the instructions given on page 41. Any mis-alignment may cause excessive tyre wear and uncomfortable steering.

Clutch Control

The clutch operating mechanism is totally enclosed in the gearbox outer cover and adjustment is a simple matter, if carried out in the following manner:—

1. *The inspection cover (Fig. 12).* Remove this and take care not to damage the gasket. On the three-speed gearbox the cap is screwed in position, but in the case of the four-speed gearbox it is held by two screws.
2. *Locknut A.* Slacken this nut just sufficiently to allow movement of the pin B.
3. *The pin B.* Adjust with a screwdriver so that there is just a trace of play between the inner end of the pin and the clutch operating rod. This is essential to ensure that the clutch engages fully.
4. *The locknut A.* When re-tightening this nut after completing the adjustment, make sure that the adjustment itself is not disturbed. In addition, finger adjustment to the length of the cable is provided by the adjuster

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behind the gearbox at 'C' (three-speed gearbox), and above the gearbox in the case of the four-speed type.

Remember, however, that some free movement in the control arm is necessary, as if the adjustment is too tight, there will be constant pressure on the clutch with consequent wear and loss of efficiency.

Clutch Spring Pressure

After a considerable mileage has been covered it may be desirable to increase the spring pressure a little. Items to be adjusted or removed in the following sequence :—

1. *The outer half of the primary chaincase.* This is attached by 16 screws.

Note.—It may be necessary to remove the footrest before the case itself can be taken off.

2. *The locknuts A (Fig. 15).* These must be slackened off and it is only necessary to hold the nuts B stationary with another spanner while locknuts A are released.

3. *Adjusting nuts B.* Tighten in order to increase the spring pressure on the plates (turned in a clockwise direction). Nuts must be tightened equally to ensure even pressure, otherwise the plates will slide unevenly, causing clutch drag.

4. *Check the adjustment.* Depress the clutch lever and spin the clutch by operating the kickstarter. The outer clutch plate should revolve parallel with the other plates.

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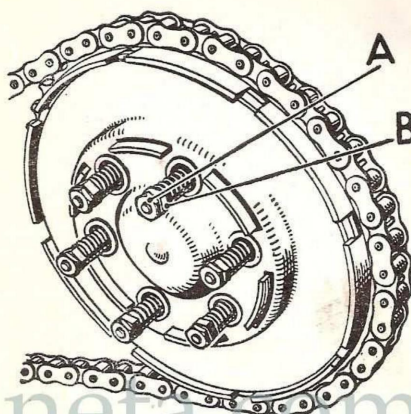


Fig. 15. Clutch spring adjustment.

5. *Rectify any plate eccentricity.* Adjust individual springs until the plates are true as tested in the previous paragraph.
6. *Re-tighten locknuts A.*
7. *Replace the chaincase cover and lock the footrest securely in position.*

Chain Lubrication

It is a good plan to remove the rear chain periodically, clean it thoroughly in petrol or paraffin, and then gently warm in a mixture of grease and

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graphite. When cool, wipe off excess grease, clean the sprockets and replace the chains.

Remember, when replacing a chain fitted with a detachable connecting link, that the spring fastener must always be put on with the closed end facing the direction of travel of the chain.

3. WHEELS

Front Wheel Removal (telescopic fork models)

Dismantle the assembly in the following order :—

1. *The brake cable.* This must be uncoupled, first at the lever on the brake cover plate, and then unscrewed from the stop.

2. *The pinch bolt (A, Fig. 16).* The wheel spindle is locked by means of this bolt, which is fitted to the nearside fork leg only. It is only necessary to slacken the pinch bolt.

3. *The wheel spindle.* To unscrew, apply a spanner to the spindle head B. Hold the nut on the other end of the spindle.

Note that the spindle has a left-hand thread and unscrews by turning in a clockwise direction.

4. *Withdraw the spindle from the nearside.* Note that the spindle fits into the bush C which in turn registers in the fork end. Once the spindle has been withdrawn, for which purpose the weight of the wheel should be supported by hand, the bush should be pushed through the fork end (outwards) as far as possible, thus allowing clearance for wheel removal.

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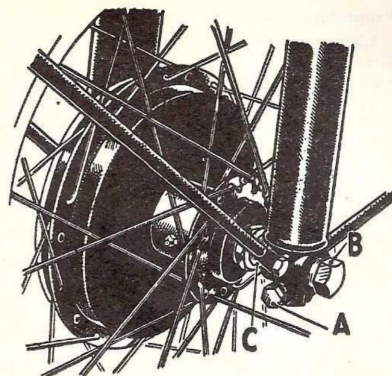


Fig. 16. Removal of front wheel.

Front Wheel Replacement (telescopic fork models)

Make certain that the stud on the brake cover plate fits properly into its socket, otherwise the brake will be inoperative.

Before the pinch bolt A is tightened the forks must be depressed sharply several times to enable the nearside fork leg to align itself on the spindle. If this precaution is not observed, the leg may not be aligned properly, in which case it will not function correctly. Do not forget to tighten the bolt A.

Front Wheel Removal (girder fork models)

To remove the front wheel lift the front of the machine on a box placed under the crankcase. Detach the speedometer drive and front brake cable and then unscrew the two spindle nuts. Wheel should then drop clear of forks.

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Front Wheel Replacement (girder fork models)

Make certain that the stud on the brake cover plate fits properly into its socket, otherwise the brake will be inoperative.

Rear Wheel Removal

In order to take out the rear wheel the various items should be dismantled in the following order :

1. *The mudguard tail.* To facilitate removal of the wheel the mudguard tail is detachable. Disconnect the tail lamp wire at the coupling specially provided for this purpose and remove the two nuts and bolts holding the tail to the mudguard ; slacken the nuts to the fixing stays which secure them to the tail unit by slotted tabs, when the tail unit can be removed.
On machines fitted with rigid frames it is necessary to remove the two nuts and bolts holding the lifting handle to the mudguard as well.
2. *The rear chain.* This should be disconnected at its spring link and unwound from the rear wheel sprocket. It is advisable to leave the chain in position on the gearbox sprocket.
3. *Rear brake adjuster.* This is the knurled screw on the end of the brake rod, and it should be unscrewed completely.
4. *Speedometer drive* (on 3-speed models only). The cable must be disconnected at the point where it enters the speedometer gearbox. It can be unscrewed at the point *F* (see Fig. 13).
5. *The spindle nuts.* These need not be completely removed but slackened back far enough to allow the wheel to be withdrawn.
6. *Withdraw the wheel.*

Front Wheel Bearings (telescopic fork models)

The hub is fitted with cup and cone type bearings and adjustment can only be carried out in a satisfactory manner when the wheel is removed from the forks.

To adjust proceed as follows :—

1. *Slacken the locknut (A, Fig. 17).*

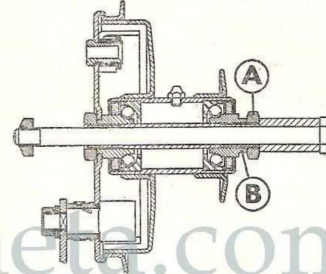


Fig. 17. Front hub adjustment.

2. *Adjust the nut B.* This should be tightened or loosened according to requirements, but note that it is most important that this nut is not over-tightened—the wheel must have just perceptible side play at the rim.

When this setting is obtained, re-tighten the locknut *A* against the adjusting nut *B*, and finally re-check.

Rear Wheel Bearings

(rigid frame telescopic fork models)

The method of adjustment is the same for the rear wheel as for the front wheel. After the wheel has been removed from the frame, the nut *C* (Fig. 13) should be unscrewed and the speedometer

1. Check that the chain adjusters are firmly against their stops. This should of course be the normal condition after chain adjustment.
2. Apply a straight-edge along the sides of the wheels. A narrow plank is a suitable gauge which should be applied at a point immediately below the silencer and kept in a horizontal position. It may be necessary to cut pieces from the straight-edge in order to clear other portions of the machine.
3. Check for fit. With the front wheel set straight ahead the gauge should touch both wheels at two points.

4. FRONT FORK AND STEERING HEAD TELESCOPIC FORK MODEL

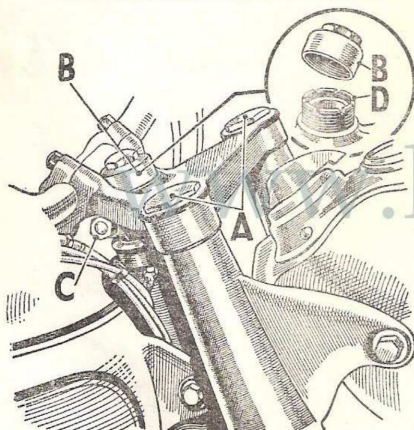


Fig. 19. Front fork and steering head.

Front Forks

If after considerable mileage, the forks appear to develop excessive up-and-down movement, replenish the hydraulic system as follows :—

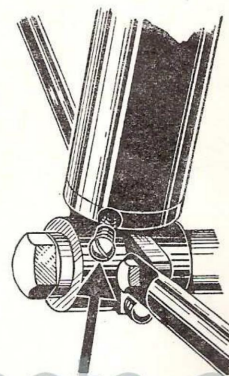


Fig. 20. Front fork drain plug.

1. Remove the hexagon headed cap (A, Fig. 19) at the top of each fork leg. A special spanner is provided in the kit for this purpose.
2. Unscrew the drain plug (Fig. 20) at the bottom of each fork tube.
3. Drain out the old oil. It will help this operation if the owner stands astride the machine, grasps the handlebars, and oscillates the forks sharply up and down a few times.

LUBRICATION CHART

No.	Part	Attention required	Mobil	Shell	Castrol	Esso	B.P. Energol
1	Oil tank (capacity 4 pints) Crankcase	Inspect level frequently. Top up as required. Drain every 2,000 miles.	Summer	X100-50	Grand Prix	50	S.A.E. 50
2	Drain every 2,000 miles. Clean pump filter.						
3	Gearbox level plug	Inspect level weekly and top up to level of plug.	Winter	X100-30	XL	30	S.A.E. 30
4	Gearbox drain plug	Drain every 2,000 miles and fill with new oil.					
5	Fork links	A few strokes of the grease gun weekly.					
6	Steering head	A few strokes of the grease gun weekly.					
7	Hubs	Several strokes of the grease gun every 1,000 miles.					
8	Brake cam spindles	A few spots of engine oil every 1,000 miles.					
9	Central stand	A broken of the grease gun every 1,000 miles.	For Grease No. 2	Retrax A or CD	Castrol- ease Heavy	Esso Grease	Energasee C3
10	Rear brake pedal	A few strokes of the grease gun every 1,000 miles.	Gun				
11	Distributor advance mechanism	A few spots of engine oil every 2,000 use					
12	Speedometer drive	A few strokes of the grease gun every 1,000 miles.					
13	(3-speed only) Chaincase	Drain every 2,000 miles and refill with engine oil to level plug.					
14	Saddle nose	A few strokes of the grease gun every 2,000 miles.					
15	Telescopic forks	Top up as described on page 43.					

As for Engine.

