



Instruction Manual

Models

M21 600 c.c. S.V.

M33 500 c.c. O.H.V.

INSTRUCTION MANUAL

for



M21 600 c.c. S.V. Model

M33 500 c.c. O.H.V. Model

The information contained in this manual applies equally to earlier M Group machines, including Model M20, from 1949 to 1955.

B.S.A. MOTOR CYCLES LTD., BIRMINGHAM 11

Telephones : Birmingham VICTORIA 2381

Telegrams and Cables : "SELMOTO", Birmingham

Service, Spares and Repairs Department—

MONTGOMERY STREET, BIRMINGHAM 11.

Telephones : Birmingham VICTORIA 2234

Telegrams and Cables : "SELSERV", Birmingham

B.S.A. Motor Cycles Ltd., reserve the right to alter the designs or any constructional details of their manufacture at any time without giving notice.

Copyright B.S.A. Co. Ltd.

Reprinted Aug. 1958

Printed in England.

MC837-9

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 Spares Catalogue for this machine 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 Department, Birmingham 11. The Service Manual is priced at seven shillings plus sixpence postage and the Spares Catalogue is five shillings and sixpence plus sixpence postage. Always quote full engine and frame numbers when ordering these publications.

CONTENTS

	<i>Page</i>
Battery - - - - -	53
Brakes - - - - -	41
Carburetter - - - - -	29
Chains - - - - -	31, 45
Cleaning - - - - -	12
Clutch - - - - -	33, 37
Controls - - - - -	6
Data - - - - -	4
Decarbonising - - - - -	22
Dynamo - - - - -	54
Electrical Equipment - - - - -	53
Engine Lubrication - - - - -	15
Forks - - - - -	48
Gearbox - - - - -	38
Ignition Timing - - - - -	21
Magneto - - - - -	58
Piston and Rings - - - - -	27
Primary Chaincase - - - - -	33
Rear Suspension - - - - -	52
Running-in - - - - -	11
Spares Stockists - - - - -	60
Sparking Plug - - - - -	19
Steering Head - - - - -	49
Transmission - - - - -	31
Valve Clearances - - - - -	18
Valve Timing - - - - -	22
Wheels - - - - -	41
Wiring Diagram - - - - -	57

TECHNICAL DATA

				M21	M33
Petrol tank capacity	..	..	galls.	3	3
Oil tank capacity	..	..	pints	5	5
Gearbox capacity	..	..	fl. ozs.	13 (370 c.c.)	13 (370 c.c.)
Front fork capacity	..	..	fl. ozs.	5 (142 c.c.)	5 (142 c.c.)
Primary chain oil bath	..	..	fl. ozs.	2 (55 c.c.)	2 (55 c.c.)
Bore	..	..	mm.	82	85
Stroke	..	..	mm.	112	88
Capacity	..	..	c.c.	591	499
Valve clearance: cold	..	..	inlet	.010"	.003"
			exhaust	.012"	.003"
Compression ratio	..	..		5—1	6.5—1
Piston ring gaps	..	..	maximum	.012"	.012"
			minimum	.008"	.008"
Valve timing	..		inlet opens b.t.d.c.	25°	25°
			closes a.b.d.c.	65°	65°
			exhaust opens b.b.d.c.	65°	65°
			closes a.t.d.c.	25°	25°
Contact breaker gap	..	..		.012"	.012"
Ignition timing—piston distance					
b.t.d.c. with points just opening				$\frac{7}{16}$ " (11.1 mm.)	$\frac{3}{8}$ " (9.5 mm.)
Spark plug	..	..		N8B (N8)*	L10S (L7)*
Plug points gap	..	..	maximum	.020"	.020"
			minimum	.018"	.018"
Gear ratios: (solo)	..	..	top	4.75	4.75
			third	6.25	6.25
			second	9.77	9.77
			first	14.15	14.15
(sidecar)	..	..	top	5.94	5.59
			third	7.82	7.37
			second	12.2	11.5
			first	17.7	16.72
Clutch friction plates	..	..		4	4
Tyre size	..	..	front	3.25 × 19	3.25 × 19
			rear	3.50 × 19	3.50 × 19
			sidecar	3.25 × 19	3.25 × 19
**Tyre pressure: (solo) (p.s.i.)	..		front	16	17
			rear	18	19
(sidecar)	..		front	22	23
			rear	22	23
			sidecar	17	18
Wheel rims	..	..	front	WM2-19	WM2-19
			rear	WM3-19	WM3-19
			sidecar	WM2-19	WM2-19
Chain size	..	..	front	$\frac{1}{2}$ " × 305"	$\frac{1}{2}$ " × 305"
			rear	$\frac{5}{8}$ " × $\frac{1}{4}$ "	$\frac{5}{8}$ " × $\frac{1}{4}$ "
No. of pitches:					
†(rigid frame, solo)	..	..	front	70	—
			rear	95	—
(spring frame, solo)	..	..	front	70	70
			rear	97	97
(spring frame, sidecar)	..	..	front	68	69
			rear	97	97
Teeth on: rear chainwheel	..			42	42
engine sprocket	..		solo	20	20
			sidecar	16	17
clutch sprocket	..			43	43
gearbox sprocket	..			19	19

Total front fork movement ..	6" (15.2 cm.)	6" (15.2 cm.)
Total rear suspension movement	2½" (5.7 cm.)	2½" (5.7 cm.)
	(when fitted)	
Brake dimension front	8" × 1½"	8" × 1½"
	rear	7" × 1½"
Carburettor : bore	1 1/16"	1 1/16"
main jet	250	260
pilot jet	30	25
throttle valve	376/5	376/3½
needle position	2	3
needle jet	1065	1065
Air cleaner	Vokes.	Vokes.

*New Champion rating in brackets.

**The recommended inflation pressures are based on the M21 with a rigid frame and M33 with plunger frame, with a rider's weight of 140lb. If the rider's weight exceeds 140lb. increase the tyre pressure as follows:—

Front tyre: Add one lb. per square inch for every 28lb. increase above 140lb.

Rear tyre: Add one lb. per square inch for every 14lb. increase above 140lb.

If the M21 is fitted with plunger type rear suspension (20lbs.) or both models carry a pillion passenger or luggage, the actual load bearing upon each tyre should be determined and the pressures increased in accordance with the Dunlop Load and Pressure Schedule.

†The M21 with a rigid frame (sidecar), front 70; rear 97.

Technical Data for Model M20 are as M21 above except for the following see also pages 59 and 60) :—

Piston stroke	94 mm.
Capacity	496 c.c.
Compression ratio	4.9
Sparking Plug (C.H. head)	L10
Gear ratios: (solo)	
top	5.23
third	6.95
second	10.87
first	15.76
Rear tyre	3.25-19
Rear tyre pressure: (solo)	22 p.s.i.
Rear tyre pressure: (sidecar)	26 p.s.i.
Primary chain: (solo)	69 pitches
primary chain: (sidecar)	68 pitches
Monobloc Carburettor	
Main jet	240
Needle position	3

CONTROLS

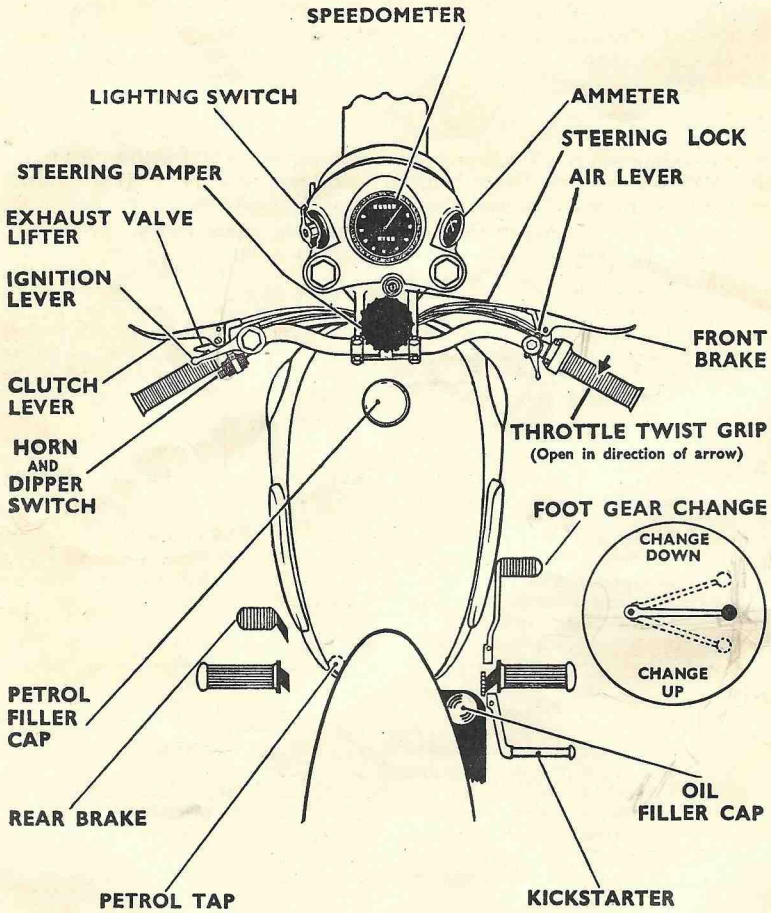


Fig. 1. The Controls.

TAKING OVER THE MACHINE

Before running the machine make sure that the oil tank, gearbox, primary chaincase and front forks are properly topped up with oil and that the battery is filled and charged. (See appropriate chapters for filling instructions). Normally these preparations will be carried out by the dealer who is selling the machine and the new owner has only to arrange the controls to his liking and the machine is ready for the road.

The Controls.

The new rider should make sure that he is quite familiar with all the controls before attempting to ride the machine. Most of the controls are adjustable and should be positioned so that they can be reached without moving the hands from the grips or the feet from the footrests. Handlebars and footrests should be adjusted so that a comfortable and natural riding position is achieved. Make sure that the bolts retaining the handlebar clamps are tight after completing any adjustment. Badly positioned controls cause poor control of the machine and will bring discomfort on long journeys.

Handlebar Controls.

Twist Grip.

Mounted on the right handlebar it controls the throttle opening. To open the throttle (i.e. to increase engine speed) turn the grip so that the top moves towards the rider. Full movement is about a quarter of a turn.

Front Brake.

Hand lever mounted on the right handlebar in front of the twist grip. Squeeze the lever towards the bar to operate the brake.

Clutch.

Hand lever mounted on the left handlebar in front of the grip. Squeeze the lever towards the bar to free the clutch, i.e. disengage the drive between the engine and the rear wheel.

Air Lever.

Mounted on the right handlebar attached to the rear of the brake lever it controls an air valve in the carburetter by means of a bowden cable. The air valve should be closed when starting with the engine cold.

Ignition Lever.

Mounted on top of the left handlebar and controls the amount of ignition advance or retard.

Exhaust Valve Lifter

A small trigger mounted beneath the left handlebar and operates, by means of a cable, a small cam which raises the exhaust valve from its seat. It is used to enable the engine to be rotated easily when starting and to stop the engine. It must not be operated when the engine is revving fast.

Horn.

The horn button is mounted on the left handlebar in a combined mounting with the headlamp dipper switch.

Headlamp Dipper Switch.

On the left handlebar attached to the rear of the clutch lever. It controls the switching from main to dipped headlamp bulb filaments.

Foot Controls.

Rear Brake Pedal.

On the left-hand side of the machine and controls the rear brake only.

Gear-change Pedal

On the right-hand side of the machine and effects the change from one gear to another. The lever is of the positive stop type and returns to the central position after each change. Upward movement of the lever selects the next lower gear, downward a higher gear. Neutral is between first and second gear.

Kickstarter.

The kickstarter is on the right-hand side of the machine behind the footrest. Depression of the lever rotates the engine.

Other Controls.

Petrol Tap.

Under the left-hand rear end of the petrol tank. To turn the petrol on pull out the round serrated button. To operate the reserve supply turn the button clockwise and pull it out again. To turn the petrol off reverse the procedure.

Lighting Switch.

Mounted on the left of the headlamp cowl and has three positions—OFF—all lights off but dynamo charging when the engine is running, L—pilot bulb, rear lamp and speedometer bulbs illuminated, H—headlamp bulb, rear lamp and speedometer bulbs illuminated and the switching from main to dipped beam controlled by the dip switch.

Ammeter.

Mounted on the right of the headlamp cowl and indicates the rate at which current flows into or out of the battery.

Speedometer.

Set in the centre of the headlamp cowl. The trip mileage recorder can be turned back to zero by pulling out the spring loaded flexible control under the cowl and turning it in a clockwise direction.

Steering Damper.

Situated above the steering column at the centre of the handlebars. Tightening down the knob increases the friction damping. The damper should only be used for high speed solo riding.

Carburetter Tickler.

This is a small plunger in the top of the carburetter float chamber. Pressing it down pushes down the float and frees the needle valve thus permitting the carburetter to receive excess petrol.

Steering Lock.

Mounted in the top fork yoke. To operate the lock turn the forks to the left, then turn the key in the lock to release the plunger. This prevents the machine being driven or wheeled.

To Start the Engine.

Stand astride the machine. Make sure that the gearbox is in neutral, i.e. between first and second gear. If the machine is in gear it will move forward as the kickstarter is pushed down.

When starting the machine the ignition should be half retarded and if the engine is cold close the air lever and flood the carburetter slightly by depressing the tickler momentarily. Open the throttle very slightly as excessive throttle opening will prevent easy starting. Rotate the engine until stopped by the compression, then allow the kickstart lever to rise nearly to the top of its travel. Pull up the exhaust valve lifter, give the kickstart lever a vigorous kick downwards, and at the same time release the exhaust valve lever. When starting with the engine warm there is no need to close the air lever or flood the carburetter. Under all normal driving conditions the ignition should be kept fully advanced. It can be retarded for idling and momentarily to prevent pinking under sudden acceleration, but driving the machine with the ignition retarded will quickly cause over-heating.

To Stop the Engine.

Close the throttle and raise the exhaust valve lifter.

To Engage First Gear.

With the engine idling slowly disengage the clutch by pulling in the handlebar lever and, after a moment, lift the gear lever as far as it will go so that first gear is selected. If the lever will not move through its full travel and the gear does not engage, move the machine backwards and forwards slightly maintaining a light pressure on the lever until the gear is felt to engage.

Open the throttle slightly and gently release the clutch lever until the clutch can be felt to take up the drive. Open the throttle a little more and very slowly release the clutch as the machine moves away. Do not rev. the engine excessively or allow the clutch to slip for longer than is necessary to get the machine away in first gear.

To Change Gear (Up).

Close the throttle, disengage the clutch and press the gear-change pedal downwards as far as it will go. All these operations should be performed simultaneously. Immediately after changing gear, re-open the throttle and re-engage the clutch. Violent pressure on the gear lever is not desirable and a smooth firm movement of the pedal is most effective. After a little practice, smooth and quiet gear changes will be possible at all times.

To Change Gear (Down).

Open the throttle slightly, disengage the clutch and draw the gear-change lever upwards to its limit, all these operations being performed simultaneously. Return the throttle to its original position and re-engage the clutch as soon as the gear change has been completed.

To Select Neutral.

Neutral is situated between first and second gear. To select neutral from first gear, with the clutch withdrawn push the gear-change pedal down gently until it is felt to click into position. If the lever is pushed down too far it will travel through to second gear. To select neutral from second gear, pull the lever up until it is felt to click into position.

Riding Hints.

Avoid violent acceleration and braking, particularly on wet roads. Always use both brakes together and apply them smoothly and progressively. Try to anticipate the need to change gear or brake, so that your riding is not jerky or untidy. Maintain a natural riding position as this provides maximum control and prevents discomfort on long journeys.

Running In.

The rider who has just purchased a new machine will do well to remember that all the internal parts are just as new as the enamel and plating which can be seen, and they must be well 'run-in' before the engine can be given any really hard work.

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 one-third throttle in any gear during the early stages. 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, 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.

As the mileage builds up the permitted throttle opening may be increased until, when the 'running-in' process has been completed, full throttle can be employed.

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 oil 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 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 filters. Repeat this process after 1,000 miles, and thereafter every 2,000 miles. The correct grades of oil are given in the lubrication chart. The oil in the gearbox should also be changed at 500 miles and further changes made every 2,000 miles.

During the 'running-in' period it is advisable to check the various adjustments such as tappet clearances, contact breaker gap, clutch adjustment, etc., rather more frequently than usual, and to check the tightness of all nuts and bolts to make sure that the initial bedding down does not loosen any components.

It is a good idea to add a small quantity of upper cylinder lubricant to the petrol each time the tank is replenished. If this is difficult to obtain, add about an eggcupful of engine oil to every two gallons of petrol.

Routine Maintenance.

To keep the machine in good condition and provide trouble-free running, maintenance must be regularly carried out. The following list of items requiring regular attention will serve as a guide to the periods between servicing and the method of carrying out the various adjustments will be found under the appropriate headings in the later chapters.

Weekly.

Check tyre pressures and remove any embedded stones or pieces of metal.

Oil the brake pedal pivot and all exposed joints and cables.

Monthly.

Examine the battery and top up if necessary. More frequent examination is advisable in a hot climate.

Every 300 Miles.

Check oil levels in oil tank, gearbox and primary chaincase and top up if necessary.

Every 1,000 Miles.

Grease steering head, clutch arm, central stand (when fitted).

Grease front brake cam spindle.

Oil rear brake cam spindle.

Check rear chain adjustment.

Check bearing adjustment on M21 rear wheel (rigid frame).

Every 2,000 Miles.

Grease rear suspension when fitted.

Change the engine oil and clean the filters.

Change the oil in the gearbox.

Check primary chain adjustment.

Check tightness of all nuts and bolts.

Every 3,000 miles.

Check contact breaker adjustment and grease the felt pad.

Cleaning.

Take care when cleaning the machine that dirt is not introduced into the carburetter, hubs, magneto, etc. Do not attempt to rub off dry dirt or mud as this will damage the enamel. Wash off any dry dirt with a copious supply of clean water, preferably from a hose. Any oily areas should be treated with a detergent before being hosed down. Dry the machine with a piece of clean rag and, if possible, clean it on a warm dry day so that all moisture is removed before polishing with a good wax polish. Exposed threads and controls which might suffer from rusting should receive a smear of oil to protect them.

Maintenance and Overhaul.

Whenever any work is carried out on the machine attention to detail and scrupulous cleanliness must be observed. All joints must be clean and gaskets in good condition before re-assembly. Threads must be kept clean and free from grit, and exposed threads should be oiled or greased before assembly. Good fitting spanners should be used at all times and nuts must be done up quite tight, but spanners of greater than standard length should not be employed as they may cause failure through overtightening.

Always use



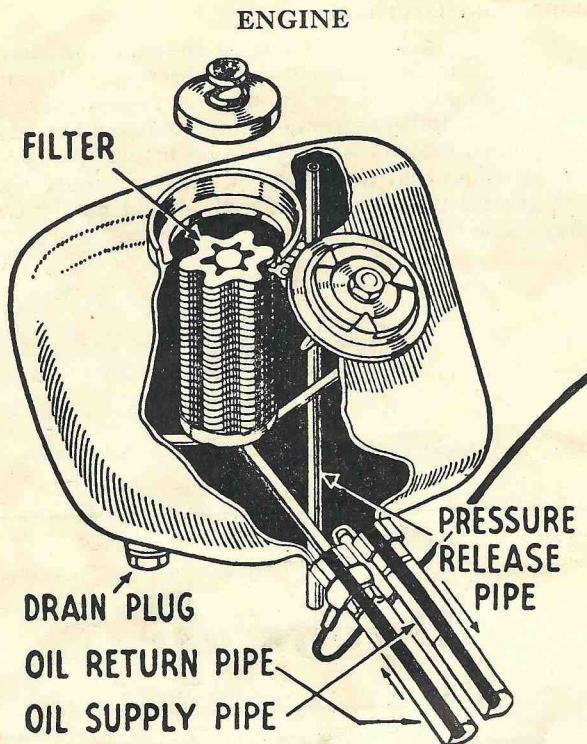


Fig. 2. The Oil Tank

Lubricating System.

The lubrication system is of the dry sump type and is operated by a double gear pump situated in the bottom of the crankcase on the right-hand side (see Fig. 3). The oil tank capacity is 5 pints. Oil is drawn from the oil tank, to the supply pump (top set of gears). It is then pumped past the non-return valve A to the camshaft spindles and along the hollow mainshaft to the big-end.

After lubricating the engine the oil drains down through a filter to the bottom of the crankcase, from which it is drawn by the return pump (lower pair of gears), past the non-return valve C and delivered up the return pipe to the tank. On Model M33 an additional oil supply is fed through a union situated in the pipe between the return pump and the tank, to the rocker spindles. After lubricating the rockers and enclosed valves, it is returned to the crankcase through an external oil pipe attached to the base of the inlet valve spring housing.

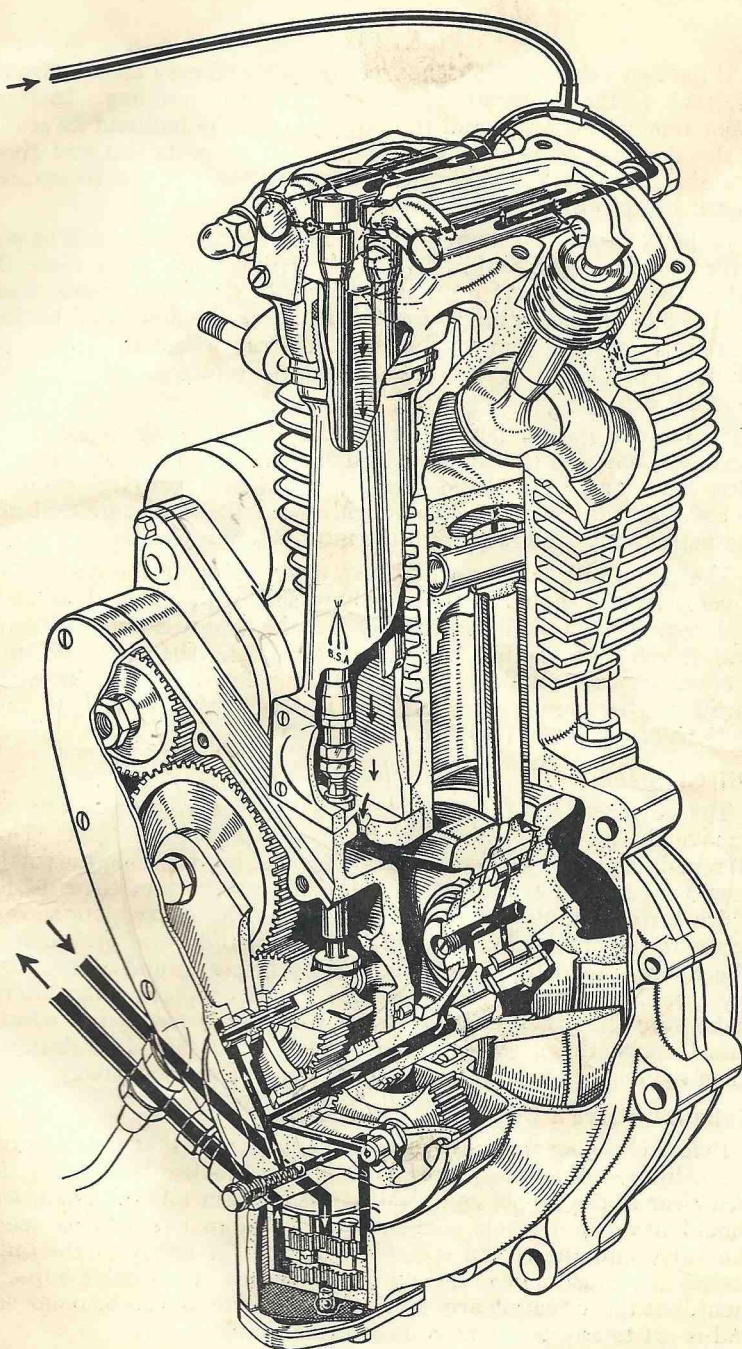


Fig. 3. Lubrication System

If the ball valve at A does not seat properly oil may transfer from the tank to the crankcase while the machine is standing. In this event remove the valve and thoroughly clean the ball and its seat. If this does not prove effective replace the ball on its seat and give it a sharp tap with a light hammer and suitable punch to ensure that it has properly bedded down.

If the ball valve C should get stuck in its seating, there will be no return of oil to the tank. To correct, remove the cover plate B below the pump, insert a piece of wire into the valve orifice, and lift the ball off its seating to free it. 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 just inside the filler cap.

To remove the oil tank filter (Fig. 2) for cleaning, release the tank filler cap and the spring loaded cap thus exposed, and lift the filter out. The filter should then be placed in a can large enough to cover it with petrol, and thoroughly washed. Make sure that all the petrol has evaporated from the filter before replacing.

The pump filter can be withdrawn after removing the crankcase cover plate and should be thoroughly washed with petrol, dried and replaced. The oil pump is extremely reliable and it is most unlikely that it will give trouble, therefore it should not be disturbed unnecessarily. The pump is held in position by the two bolts with spring washers under their heads. The two other bolts hold the sections of the pump together.

Oil Changes.

The oil should be changed every 2,000 miles. To drain the oil remove the hexagonal head bolt in the bottom of the tank. The oil remaining in the crankcase can be drained by removing the small hexagonal headed drain plug or the crankcase bottom cover plate which is retained by four studs. Removal of this cover plate allows access to the crankcase filter which can be withdrawn for cleaning. The filters should be washed thoroughly in petrol and allowed to dry completely before being replaced. When replacing the filters make sure that they engage correctly with the feed pipes which pass through them. Whenever possible the oil should be drained when the engine is warm, as the oil will then flow more freely.

Exhaust Valve Lifter. (Figs. 4 and 5).

Before checking the valve clearances make sure that the exhaust valve lifter, inside the tappet chest (M21), rocker box (M33), is well clear of the tappet collar (M21), rocker arm (M33). The lever should have appreciable free movement before it starts to open the valve and the return spring must retain it firmly in the 'off' position. Adjustment is carried out by means of the cable adjustment, but the actuating arm on the M33 (see Fig. 5) can be removed and re-set to any position on its serrated shaft.

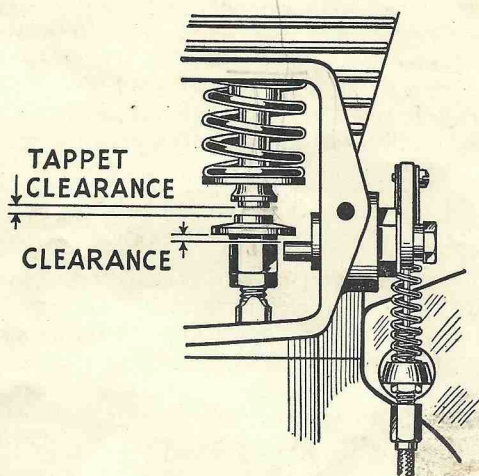


Fig. 4. Tappets and Exhaust Valve Lifter (M21).

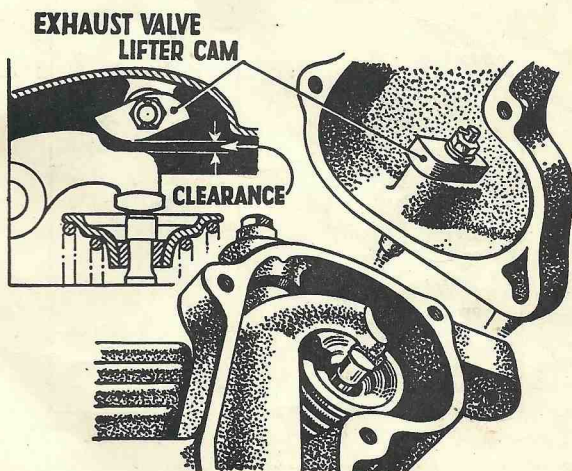


Fig. 5. Exhaust Valve Lifter Adjustment (M33).

Valve Clearances.

Owing to the quietening ramps fitted to the cams, a special procedure must be followed when checking or adjusting the valve clearances. Remove the tappet cover plate just above the timing cover by undoing the four screws which hold it in position. Rotate the engine forward until the inlet valve has just closed. This is the correct engine position for adjusting the exhaust valve clearance.

Turn the engine forward again until the exhaust valve clearance is just taken up, but before the valve actually starts to lift. This is the best position for checking or adjusting the inlet valve clearance.

The valve clearances must only be checked or adjusted when the engine is quite cold. The clearances are critical and no attempt should be made to experiment with different settings as damage to the engine may result.

Valve Clearance Adjustment.

The adjuster, which is of the screwed type, is at the top of the tappet. The clearance is measured by means of feeler gauges inserted between the bottom of the valve stem or push rod and the tappet head (see Fig. 6). It is advisable to lift the push rod on Model M33 with the fingers when measuring the clearance as otherwise the weight of the push rod may give a false impression of reduced clearance.

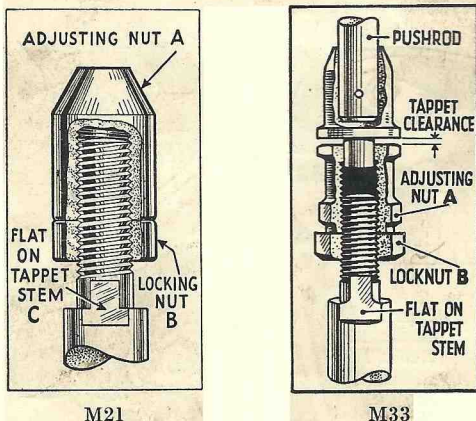


Fig. 6. Tappet Adjustment.

If adjustment is necessary hold the tappet head A and undo the locknut B. Then hold the tappet by means of the flats on its stem and screw the tappet head up or down until the clearance is correct.

Tighten the locknut B and re-check the adjustment. The correct valve clearance is as follows :

	Inlet.	Exhaust.
M21	•010"	•012"
M33	•003"	•003"

Sparking Plug.

Adequate attention to the sparking plug is of great importance in obtaining 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. These are Champion type No. N8B for Model M21 and L10S for Model M33, as illustrated in Fig. 7 (Note : According to the new Champion rating these plugs will be designated N8 and L7 respectively.)

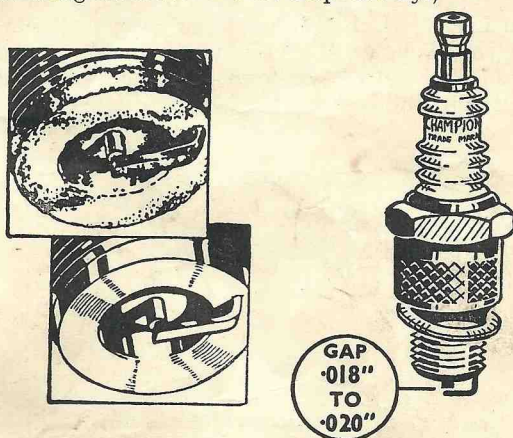


Fig. 7. The Sparking Plug.

Remove the plug every 1,000 miles (1,500 kms.) or so, for inspection. Providing that the carburation is correct the sparking plug points should remain clean almost indefinitely and should appear as shown in the lower view, Fig. 7. The bottom of the plug body should remain a smooth black and the central insulation should retain its natural colour. If the mixture is too rich, a sooty deposit will form on the body of the plug as in the upper view of Fig. 7, but a weak mixture will cause the end of the plug to go white. A heavily leaded fuel may cause a greyish deposit to form on the plug and excess oil will show its presence by a shiny black deposit and gum.

A light deposit due to any of these causes can easily be removed by cleaning the plug on a proper air blast unit such as is to be found

at most garages, but if it is found necessary to clean the plug frequently the cause should be investigated. If the deposit is allowed to accumulate, particularly inside the plug body, the plug may spark internally with an adverse affect on performance and it may even stop the engine altogether. If eventually the cleaning process fails to restore the plug to its original efficiency, then a new one should be fitted.

It is most important that the plug gap is kept correct. Whenever the plug is removed for inspection, the gap should be tested and if necessary, re-set. The correct gap is $\cdot 018$ – $\cdot 020$ inches ($\cdot 45$ – $\cdot 50$ mm.) and it should be measured by means of feeler gauges inserted between the side wire and the central electrode. If the gap is not correct it should be adjusted by bending the side wire, but in no circumstances must any attempt be made to bend the central electrode as this will damage the insulation and make the plug ineffective.

The gap is most easily adjusted with the aid of the special tool illustrated in Fig. 8, which also has feeler gauges attached to assist in measuring the plug gap. This tool is obtainable priced 2/- from any Champion Plug stockist or from the Champion Sparking Plug Co. Ltd., Feltham, Middlesex.

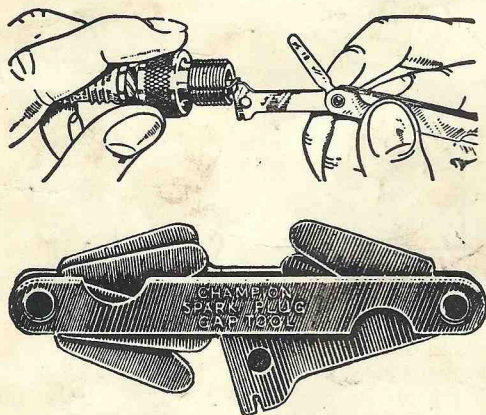


Fig. 8. Setting the Plug Points.

Before replacing the plug make sure that the threads are clean and that the copper washer is in good condition. If it has become worn or badly flattened a new one must be fitted to ensure a gas-tight seal. Screw the plug in as far as possible by hand then use a tubular box spanner for final tightening to avoid the possibility of damage to the insulator. In no circumstances should an adjustable spanner be used.

The insulation on the top of the plug should be wiped quite clean before replacing the cap, and then finally, the cap itself should be wiped to remove dirt and grease.

Ignition Timing.

It is unlikely that the ignition timing will alter, but if, for any reason, it is found necessary to check or re-set the ignition timing it is advisable to first check the magneto contact breaker gap and, if necessary, re-adjust as described on page 58.

To check the timing, remove the small hexagon headed compression plug from the centre of the cylinder head on the M21, or the sparking plug M33 and the magneto end cover. Insert a slim rod through the hole to feel the top of the piston, then rotate the engine until the piston is at top dead centre on the compression stroke (i.e. with both valves closed). Keep the rod as vertical as possible and mark the T.D.C. position on it. The best way of rotating the engine is to engage top gear and turn the rear wheel.

Turn the engine backwards through about 45° then bring it forward again until the contact breaker points are just on the point of opening. This is best determined by inserting a piece of fine paper (such as cigarette paper), between the points. The points are just about to open when the paper is only lightly gripped and can be withdrawn with a gentle pull.

The piston should then be:—

M21	$\frac{7}{16}$ " before T.D.C.
M33	$\frac{3}{8}$ " before T.D.C.

as measured by the rod through the hole.

If the timing requires re-setting, the timing cover must be removed, taking care that the small nozzle on the inside of the cover which feeds oil to the mainshaft, is not damaged as the cover is withdrawn. As a precautionary measure leave three screws in position (half unscrewed and spaced evenly round the cover) to act as guides when the joint is broken.

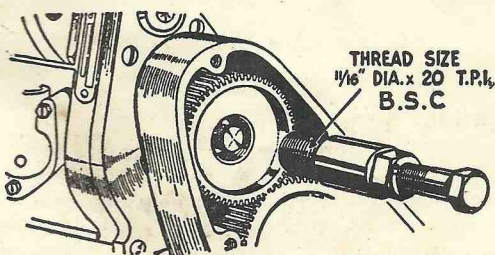


Fig. 9. Removing the Magneto Pinion.

With the cover removed, take off the nut locking the magneto pinion on its shaft and with the aid of a magneto pinion extractor Part No. 61-1903, withdraw the pinion as shown in Fig. 9. Do not attempt to remove the pinion without the proper extractor as it is usually quite tight on its taper and damage to the magneto or crankcase can easily result.

Turn the engine until it is in the correct position before T.D.C., set the magneto so that the contact points are just opening, then tap the pinion on to the magneto shaft and tighten the nut. Re-check the setting.

Cams.

Access to the cams is gained by removing the timing cover as described above under Ignition Timing. This exposes the cam pinion outrigger plate which can be pulled away after removing the retaining bolts, including the nipple-headed bolts which screw into the cam spindles.

If the cams are removed for any reason, note that the engine shaft pinion and cam pinions are marked to facilitate assembly. As the cams are interchangeable the timing marks are duplicated on both pinions. The 'dash' mark only is used for the inlet cam, and the 'dot' for the exhaust cam. (See Fig. 10.)

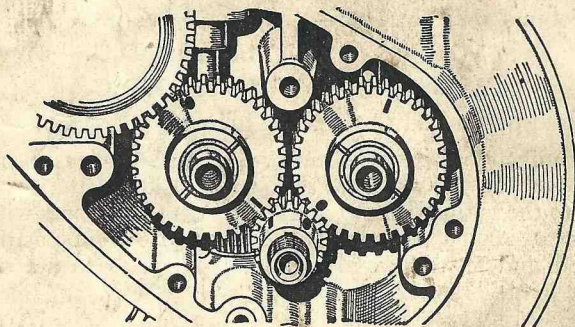


Fig. 10. Cam Pinion Markings.

Decarbonisation.

Decarbonisation should only be carried out when there are definite symptoms that excessive carbon build up inside the engine is interfering with performance. The usual symptoms are an increased tendency to pink (a metallic knocking when under load) and a general falling off in performance with a tendency for the engine to run hotter than usual.

It is customary to attend to the valves during decarbonisation as this provides a reasonable interval between valve overhaul and avoids the necessity for dismantling the engine especially for this purpose at a later date.

It is necessary to remove the petrol tank in order to carry out decarbonisation. Turn off the petrol tap and detach the petrol pipe.

The tank is secured to the frame by one bolt through the steering head lug and two bolts to a special lug at the rear of the frame top tube.

M33. Before commencing complete dismantling rotate the engine until the piston is at T.D.C. on the compression stroke, i.e. with both valves closed. This will prevent any pressure on the valves during the operation.

M21. Remove the cylinder head bolts in the reverse order to that shown in Fig. 11. The head should now lift off, but if it appears to have stuck, a sharp blow with a wooden mallet low down on the head will free it. Do not strike too forcefully as the aluminium fins can be broken.

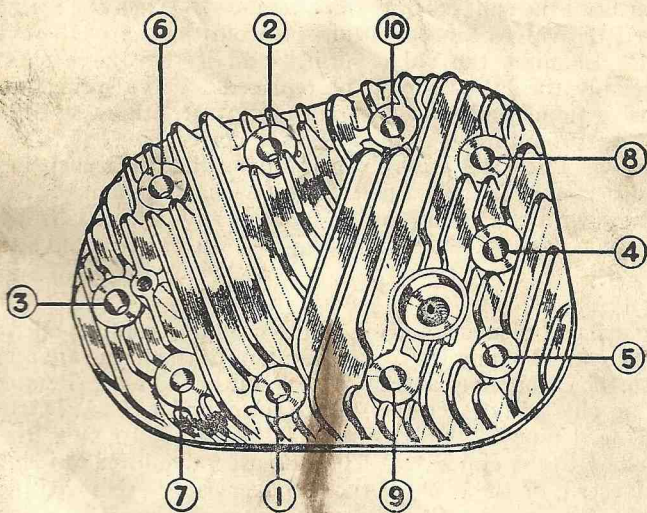


Fig. 11. Order of Tightening Cylinder Head Bolts.

Examine the cylinder head gasket carefully and replace it unless it is in perfect condition. Both sides should be clean and bright and any darkened patches probably indicate leakage and that a new gasket is required.

Carefully scrape all the carbon from the inside of the head, taking care not to scratch the soft aluminium surface. The best tool for this job is an old screwdriver, the edges of which have been rounded by wear and, provided that a little patience is employed, all traces of carbon can be removed to leave the surface smooth and unmarked.

Rotate the engine by means of the kickstarter until the piston is at the top of its stroke, then scrape off all the carbon on top of the piston and cylinder barrel. Again take care that the aluminium surface of the piston is not scored.

Rotate the engine so that each of the valves are opened in turn. If, on examination, they show a bright unbroken surface all the way round the valve seat, then they need not be disturbed, but unless an unusually short period has elapsed since the last decarbonisation then it is likely that there will be slight traces of discoloration or pitting and it is advisable to remove them for grinding. Remove the tappet cover after undoing the four retaining screws. Take care that the gasket is not damaged as, unless it is in perfect condition, it must be replaced.

Compress each valve spring with a suitable valve spring compressor until the split collets can be removed. When the springs are released the valves can be withdrawn from the top of the cylinder barrel. Examine the valve springs and if they have shortened appreciably then they should be replaced. Valve springs are not expensive items and it is false economy to continue to use them when their useful life is exhausted. The correct free length of these springs when new is 2 inches. The inside of the valve ports must be carefully scraped free of carbon. Take care not to damage the valve seat faces with the decarbonising tool. If any carbon falls into the valve guide it must be carefully removed with a piece of clean rag.

M33.

The exhaust pipe is a push fit in the head and can be pulled away when the nuts holding the exhaust system to the frame are released. Detach the carburettor and tie it back out of the way. Remove the sparking plug and detach the stay to the cylinder head. Disconnect the oil feed pipe to the rockers and the oil return pipe from the rocker box to the crankcase. The exhaust valve lifter can either be disconnected, or the exhaust rocker cover can be removed, leaving the cable intact. Remove the inlet rocker box cover. Slacken the castellated gland nut securing the push rod cover tube to the cylinder head (using the special 'C' spanner provided in the tool kit) and remove the two acorn nuts clamping the base of the tube to the crankcase.

Lastly, unscrew the four long bolts holding the cylinder head and barrel to the crankcase, applying the spanner to the smaller diameter

hexagon. The larger diameter hexagon screws the bolt sockets into the crankcase and should not be touched unless it becomes necessary to replace a holding down bolt, when the complete assembly of bolt and socket must be replaced.

The cylinder head, complete with push rod cover tube can now be raised a little, this enables the push rods to be lifted off the tappets and lowered to the crankcase face. Note that the head has a plain ground joint at the barrel—no gasket is used. If the head shows a tendency to stick, a few light taps with a wooden mallet under the exhaust port will loosen it. With the head clear the push rod cover tube can be detached.

Carefully scrape all the carbon from the inside of the head, then rotate the kickstarter until the piston is nearly at the top of its stroke and scrape off the carbon on top of the piston. As the carbon deposit at the extreme edge of the piston acts as an effective oil seal, it is a good idea to leave this undisturbed. This can be done by placing an old piston ring on top of the piston, just inside the top of the bore and, using this as a guide, remove all the carbon not covered by the ring. Take great care that the soft aluminium surface of the piston is not scored. The best tool for the job is an old screwdriver, the edges of which have been rounded by wear, and provided that a little patience is employed all traces of carbon can be removed to leave the surface smooth and unmarked.

It is unlikely that any attention to the rockers will be required, but if it is desired to remove them, the acorn nuts should be removed from the ends of the spindles. The spindles should then be tapped out from the threaded end using a soft punch to avoid damaging the threads. Take careful note of the rocker assembly for replacement—the spring, followed by the steel washer, and finally the aluminium oil seal washer.

To remove the valves, 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. Compress the valve springs until the split collets can be lifted out. When the collets are out, valve springs and top collar can be removed. Examine the valve springs and if they have shortened appreciably they should be replaced. Valve springs are not expensive items and it is false economy to continue to use them when their useful life is exhausted. The correct free length of these springs when new is: Inner spring— $1\frac{13}{32}$ inches; Outer spring— $2\frac{5}{32}$ inches.

The inside of the valve ports must be carefully scraped free of carbon. Take care not to damage the valve seat faces with the decarbonising tool. If any carbon falls into the valve guides, it must be carefully removed with a piece of clean rag.

Both Models.

If the valves and their seats are only discoloured or lightly pitted, then it will be sufficient merely to grind them in with a little grinding paste, but if there is considerable evidence of pitting, then the faces must be re-cut with proper equipment. If the valve is pitted it should be returned to a dealer for re-grinding, as attempts to grind the valve in with grinding paste will only cause excessive wear of the valve seat in the cylinder barrel on the M21 and the cylinder head on the M33. These may be in good condition, but if they are pitted then the barrel M21, or head M33 must be removed and sent to your dealer for re-facing with a proper valve seat cutting tool. The valve seat angle is 45° .

With the valves and seats in good condition or if they have been refaced then they will require lightly grinding in to ensure that a good gas seal is created. Smear a small quantity of fine grinding paste onto the face of the valve head and return the valve to its seat. A light spring inserted under the valve head greatly facilitates the grinding operation as it assists in raising the valve so that it can be rotated to a new position. Grip the valve head with the suction cup provided in the tool kit and rotate the valve backwards and forwards whilst maintaining light pressure. Raise the valve and turn it to a new position after every few movements. Grinding should be continued until the mating surface of the valve and seat show uniform metallic surfaces all round.

M21.

If the valve guides are worn the old ones can be driven out by means of a simple punch applied through the lower end of the cylinder barrel. New guides can be driven in through the top of the cylinder barrel but as there is no locating step on the guides they must be carefully positioned so that the top of the inlet guide is $1\frac{1}{8}$ inches, and the top of the exhaust guide $\frac{15}{16}$ inch, below the top of the cylinder barrel.

M33.

If the valve guides are worn the old ones can be driven out by means of a single punch applied from inside the cylinder head. New guides should be driven in from the top as far as they will go.

Both Models.

Whenever new guides have been fitted the valve seats must be refaced with a proper valve seat cutter to ensure that the seat is concentric with the guide bore.

Before re-assembling the valves and springs all traces of grinding paste must be removed from both the valve seat and the valve stem smeared with clean engine oil. Replace the valve, then compress

the valve springs with the aid of a suitable tool until the collets can be inserted. A blob of grease on the valve stem will assist in keeping the collets in position as the valve spring is released. Make sure that the split collet retaining the valve spring collar is correctly seated in the recess on the valve stem.

Removing the Cylinder Barrel.

It should not be necessary to remove the cylinder barrel unless it is felt that the piston rings require attention. This may be shown by such symptoms as excessive blue smoke in the exhaust and by lack of compression although if the valves are not in good condition this is more likely to be the cause of the latter symptom.

M21.

Before the cylinder barrel can be removed it is necessary to detach the carburettor and exhaust system. The exhaust pipe is a push fit in the cylinder and can be withdrawn when the nuts holding the exhaust system to the frame are released. When the carburettor is removed it can be tied back out of the way.

Undo the five nuts retaining the cylinder to the crankcase noting that one of these is inside the tappet chest between the tappets.

Both Models.

Rotate the engine until the piston is at the bottom of its travel.

Lift the barrel upwards and forwards into the front angle of the frame and as the piston emerges from the barrel it should be steadied to prevent possible damage. As soon as the cylinder has been withdrawn cover the crankcase with a clean piece of rag to prevent the entry of foreign matter.

Examine the cylinder carefully for wear and if a deep ridge has formed at the top of the bore then a rebore may be necessary and you should consult your dealer for confirmation. Pistons $\frac{1}{2}$ mm. and 1 mm. oversize are available for rebore purposes but owners in Great Britain can take advantage of the Exchange Replacement System to obtain a rebored barrel with matched piston through their local B.S.A. spares stockist. The barrel will also require a rebore if there are any deep scores as this will cause loss of compression and excessive oil consumption. Any shiny marks on the bore are indications of seizure and the cause of this should be determined and rectified.

The outside face of the piston rings should possess a smooth metallic surface and any signs of discoloration or shiny portions mean that the rings must be replaced. The rings must also possess a certain amount of springiness so that the ends lie at least $\frac{3}{16}$ inch apart when released from the barrel.

The rings should be free in their grooves but with a minimum side clearance. If the rings are stuck in the grooves remove them and clean out all the carbon from the groove and the inside face of the ring. Care is necessary when removing the rings as they are brittle and only permit a minimum amount of movement. A suitable tool for removing the carbon from the ring grooves is a piece of old piston ring ground as a chisel.

To check the piston ring gaps place each ring in the least worn part of the cylinder bore and make sure that it is square in the bore by locating it with the top of the piston. Measure the gap between the end of the ring with a feeler gauge. The correct gap when new is .008-.012 inches and although an increase of a few thousandths of an inch is not important any large increase to say 25 thou. means that the ring should be replaced. If a new ring is being measured the gap may be less than the amount specified and in this case the ends of the ring must be opened out with careful use of a very fine file. Take care that no ridge is left on the edges of the ring which could score the barrel.

It is not necessary to remove the piston unless it requires replacement or further dismantling of the engine is to be carried out. If removal is necessary first prise out one of the wire gudgeon pin circlips by inserting a suitable pointed instrument in one of the two notches provided. Before the gudgeon pin can be withdrawn the piston must be warmed by wrapping it in rag that has been soaked in boiling water and wrung out. Alternatively an electric iron can be applied to the crown of the piston until it is thoroughly warmed. When the piston is warm withdraw the gudgeon pin with a suitable extractor. If an extractor is not available the gudgeon pin can be driven out with a good fitting punch but the piston must be carefully supported to avoid any side strain on the connecting rod. As soon as the piston is removed mark the inside of the skirt so that it can be replaced the correct way round.

While the cylinder barrel is off the crankcase is a good opportunity to try the connecting rod for signs of wear. The rod should revolve freely without any signs of up and down movement at the big end. Rotate the flywheel until the crankpin is uppermost with the connecting rod vertical. Grasp the rod firmly and try to move it up and down. If any play can be detected the big end and connecting rod assembly will require replacement. Do not confuse sideways movement at the little end with up and down play. The big end should have approximately 10 thou. side play and this permits some sideways movement at the other end of the connecting rod.

Re-assembly is carried out in the reverse order to dismantling. Scrupulous cleanliness must be observed and the components should be smeared with fresh oil before replacing. Warm the piston before

inserting the gudgeon pin and make sure that the new circlip is correctly located in its groove. Slide each piston ring carefully over the piston until it reaches its groove. The barrel should be slid over the piston, at the same time compressing the rings so that they pass smoothly into the lower end of the bore. Take great care that the rings are not trapped or damaged and if the job is being done single-handed a band for compressing the piston rings will facilitate the operation.

M21. Replace the cylinder head and tighten the eight bolts in the order shown in Fig. 11, not forgetting the engine steady stay. Replace the carburetter and the exhaust system.

Adjust the valve clearances as described on page 18, and replace the sparking plug and finally the petrol tank and petrol pipe.

M33.

Insert the push rod cover tube into position in the cylinder head, but do not screw up the gland nut. Place the push rods inside the tubes and then lift the cylinder head into position. It will be necessary to keep the head raised whilst the push rods are positioned on the tappets, and then the rods must be correctly located on the rockers. Lower the head into position, replace the acorn nuts securing the push rod tube, and then screw up the long cylinder head and barrel bolts, working in a diagonal order until they are dead tight. The push rod gland nut can now be tightened up. Before replacing the inspection and tappet covers, check the tappet clearances as described on page 18. Connect up the oil feed and return pipes to the rockers, replace engine steadying stay.

Replace the rocker box covers, the carburetter, the sparking plug, the exhaust system, and finally, the petrol tank and petrol pipe.

CARBURATION

The carburetter is of simple and robust construction and the only attention that may be required is adjustment of the pilot jet and throttle stop.

An exploded view of the carburetter is shown in Fig. 12. Opening the twist grip throttle control raises the throttle slide thus controlling the supply of air to the engine. The tapered needle controlling the supply of fuel is attached to the throttle slide so that a balanced mixture is always provided. The needle has five notches at its upper end and it is secured in the throttle slide by a spring clip which locates in one of these notches. The throttle valve size and the needle position are carefully set before despatch from the factory and no alteration to these settings is necessary or desirable. An air valve controlled by the lever on the handlebar is used to restrict the air supply when starting the engine from cold.

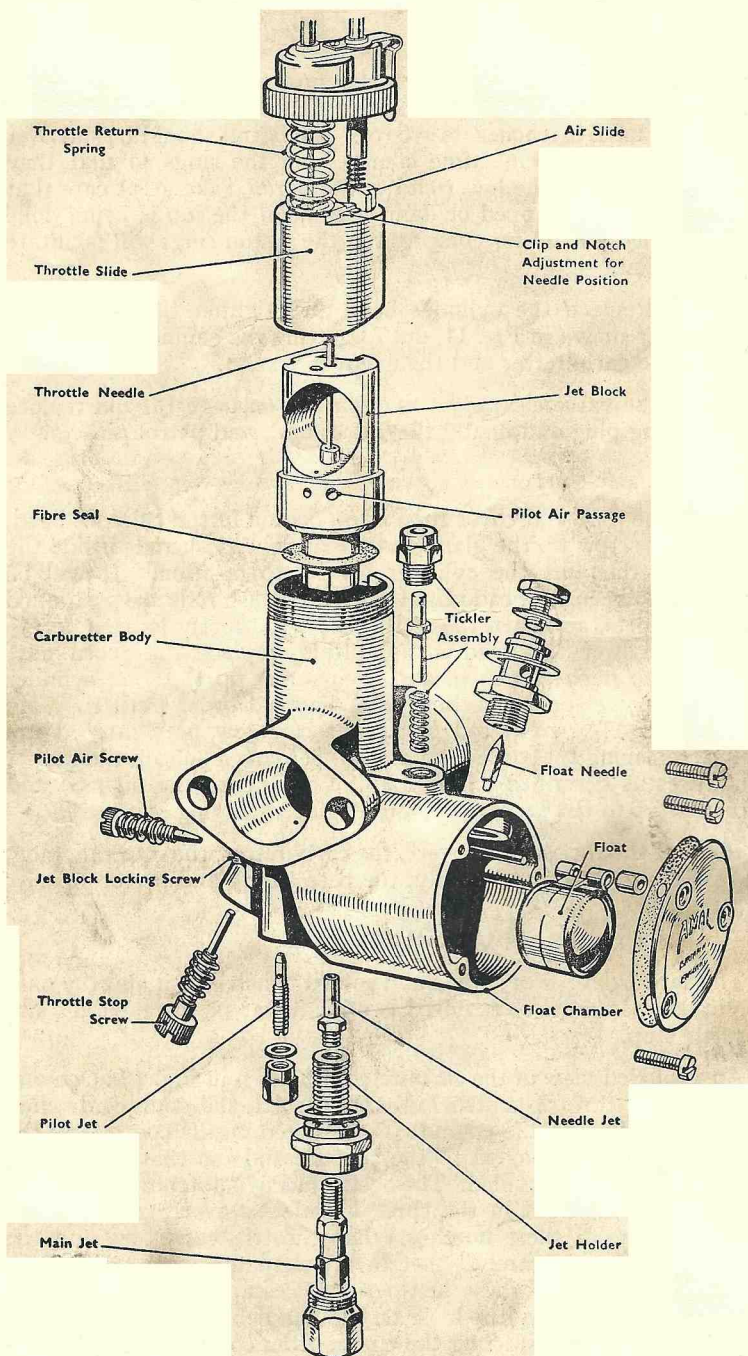


Fig. 12. The Carburettor.
(See also page 60)

Mixture control at tickover and low speeds is controlled by the pilot jet which has an adjustable air supply. An adjustable throttle stop is also provided to regulate the slow running speed.

To achieve good petrol economy accurate adjustment of the pilot jet and throttle stop is important. These are adjusted before the machine leaves the Works, but the best setting may vary slightly to suit riders requirements or particular localities. The adjustment should be made with the engine warm.

Screwing in the pilot air screw restricts the air supply thus giving a richer mixture, and unscrewing it weakens the mixture. The best way to adjust is to screw in the pilot air screw until the mixture is obviously too rich and the engine starts to run irregularly, and then unscrew the adjuster until the engine runs evenly. If it is unscrewed too far the engine may cut-out or may spit back through the carburetter when the throttle is opened. When the proper adjustment has been determined, the engine may be running too fast and in this case the throttle stop should be unscrewed until a steady and even tickover is achieved. If considerable alteration to the throttle stop has been made, the pilot air screw should be re-adjusted. Do not attempt to obtain an excessively slow tickover as it will probably become unreliable under different atmospheric conditions. In the case of blockage, the jets are easily exposed for cleaning by simply removing the covering caps. The main jet can then be unscrewed with a suitable spanner and the pilot jet with a screwdriver. No advantage will be gained by altering the jet sizes from those recommended.

Air Cleaner (when fitted).

The air cleaner should be removed occasionally for cleaning. Every 5,000 miles should be sufficient in the British Isles, but more frequent attention is necessary in dustier regions. Unscrew the filter from the carburetter body. The filter is held in the cleaner cover by a single screw. Remove this screw to detach the filter.

Wash the filter thoroughly in petrol to remove all embedded dirt, then allow it to dry thoroughly. Finally, immerse the filter in a thin oil (S.A.E. 20), allow the surplus to drain off, then re-assemble.

TRANSMISSION

Primary Chain Adjustment.

Adjustment of the primary chain is effected by pivoting the gearbox about its lower support. The chain is correctly adjusted when it has $\frac{1}{2}$ in. total up and down movement in the centre of the chain span and at its tightest point. This can be gauged by removing the primary chaincase inspection cover and moving the chain up and down. Make sure that the chain is at its tightest spot. If the

chain requires adjustment slacken the two nuts D (Fig. 13). Screw the adjuster E backwards or forwards as necessary until the adjustment is correct. Tighten the nuts D and re-check the adjustment. Whenever the primary chain adjustment has been altered, the rear chain must be readjusted. (See page 45).

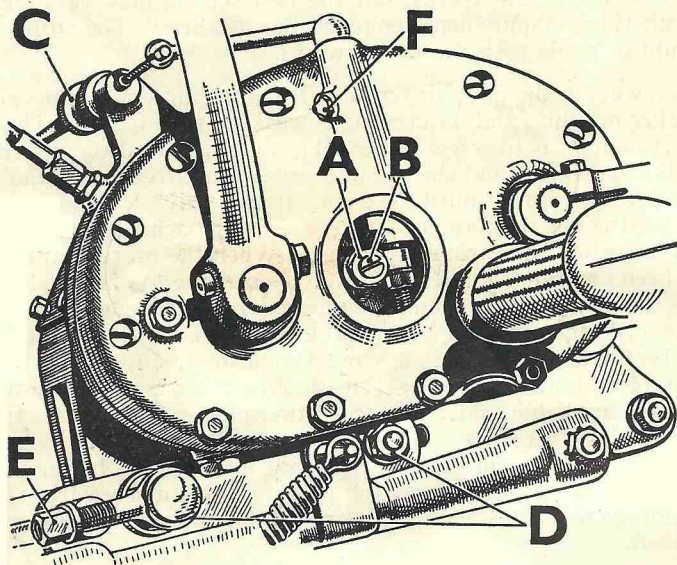


Fig. 13. Clutch and Front Chain Adjustment.

Care of the Rear Chain.

To maintain the rear chain in good condition it must be lubricated regularly. Every 1,000 miles or so remove the chain and wash it thoroughly in petrol to remove all dirt and grease. Allow the chain to dry completely, then immerse it in a tray containing warm graphited grease. Allow the mixture to cool, then remove the chain and wipe off all surplus grease. When replacing the chain make sure that the spring clip of the connecting link has its closed end pointing in the direction of travel of the chain (i.e. forwards on the top run).

Rear chain adjustment involves moving the rear wheel and is described on page 45.

Clutch Adjustment.

The main clutch adjustment is inside the inspection cover on the gearbox. Remove the knurled filler plug. Slacken the locking nut A (Fig. 13) to free the adjusting screw B. The adjustment should be made so that when the clutch is fully withdrawn the lever on

top of the cover is at right angles to the clutch push rod. This ensures that the minimum side thrust is imposed on the push rod. When this adjustment has been completed the cable should be adjusted by means of the adjuster at C until it has approximately $\frac{1}{8}$ in. free play at the handlebar end.

Primary Chaincase.

When topping up the primary chaincase remove the inspection cover and pour oil in until it flows from the oil level hole (see Fig. 14). Allow any surplus oil to escape before replacing the level plug. Mineral base seasonal engine oil should be used in the primary chaincase (see page 34). The chaincase oil capacity is 2 fl. oz. (55 c.c.).

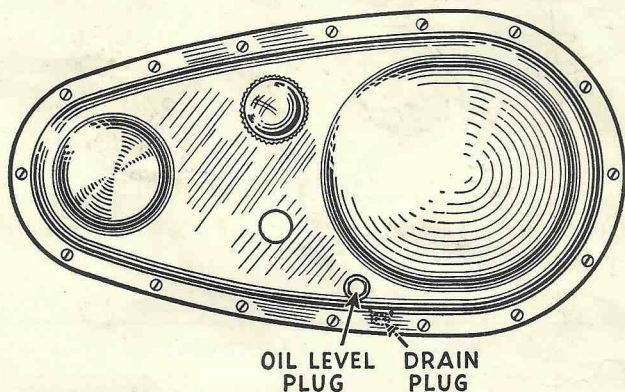


Fig. 14. The Primary Chaincase.

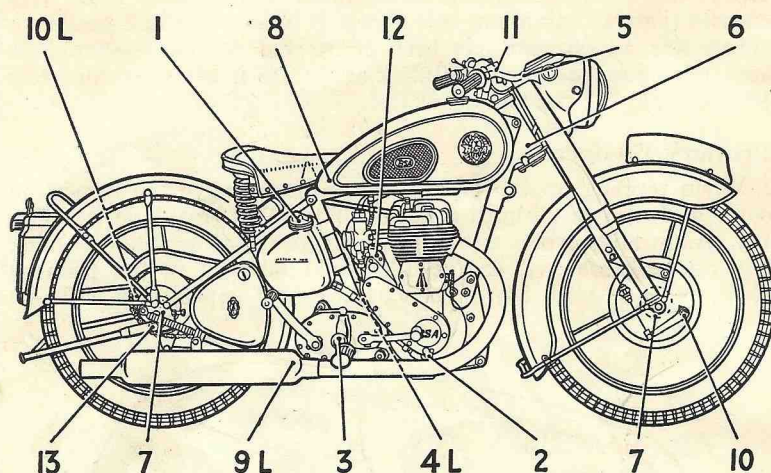
Primary Chaincase Removal.

Removal of the retaining screws and the left-hand footrest will permit the primary chaincase outer cover to be withdrawn. The engine sprocket and clutch must be removed to allow further dismantling. The inner portion of the chaincase is secured to the crankcase by three bolts behind the engine sprocket and these can be undone after breaking the locking wire through the head of the bolts. A single stud secures the rear of the chaincase to the front of the chainguard.

Clutch Spring Adjustment.

When new the clutch springs are adjusted so that approximately one thread of the stud is showing above the locknut A (Fig. 15). After considerable use it may be necessary to increase the spring pressure a little. In this case slacken the locknuts A and tighten down the nuts B by a few turns. Withdraw the clutch to ensure

MODEL M21



KEY LUBRICATION POINTS

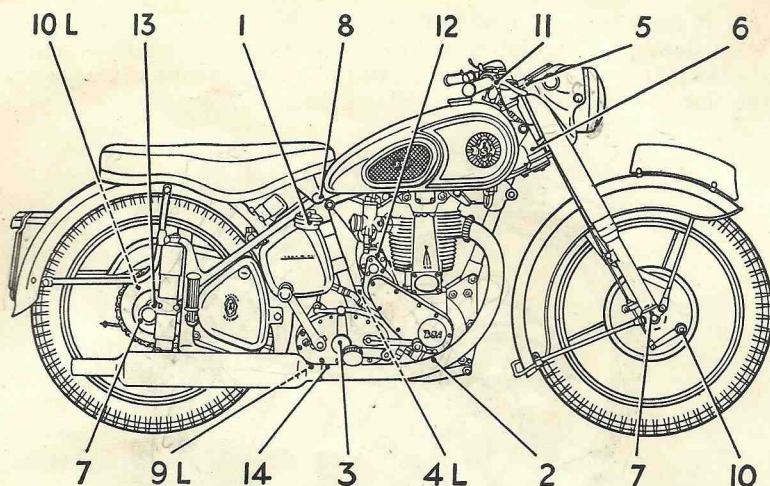
(L indicates left-hand side ; remainder right-hand or both sides.)

RECOMMENDED LUBRICANTS			
OILS Engine and Gearbox			
Brand	Summer	Winter	GREASE
Mobiloil ..	D	A	Mobilgrease No. 2
Shell ..	X100-50	X100-30	Retinax A or CD
Castrol ..	Grand Prix	XL	Castrolase Heavy
Esso ..	50	30	Essogrease
B.P. Energol	S.A.E. 50	S.A.E. 30	Energrease C3

FOR OVERSEAS. Recommendations as above if obtainable. If not the following rule should be observed :—the higher the temperature the higher the S.A.E. number required.

(Engine and Gearbox)	Summer ..	S.A.E. 50
	Winter ..	S.A.E. 40-30
(Front Forks) ..	.. ..	S.A.E. 20

MODEL M33



	Ref.	GREASE	Page	Ref.	OIL	Page
WEEKLY LUBRI-CATION				1	Oil Tank ..	—
				3	Gearbox ..	—
				9	Brake Pedal ..	12
				11	Control Joints Exposed Cables	12
EVERY 1,000 MILES	6	Steering Head	12	10	Brake Cam Spindle, rear ..	12
	—	Clutch Control Arm	12	—	Rear Chain ..	32
	7	Hubs	—			
	10	Brake Cam Spin- dle, front brake	12			
	14	Central Stand (Spring Frame)	12			
EVERY 2,000 MILES				1	Oil Tank ..	—
				3	Gearbox ..	—
				4	Oilbath ..	33
				12	Magneto ..	12
				13	Rear Stand (Rigid Frame)	—

Special Notes : 1, 2. Clean Oil Tank and Crankcase Filters at 2,000 miles.
1, 3. Drain and Refill Oil Tank and Gearbox at 2,000 miles.
5. Check Front Fork Oil Level at 10,000 miles.

that it frees properly and that the end plate does not tilt. If the plate does tilt the clutch will not free properly and the springs should therefore be readjusted until the plate remains square when the clutch is withdrawn, then tighten the locknuts.

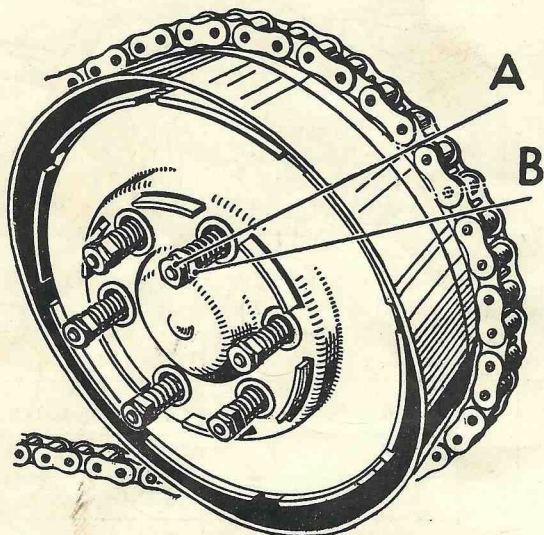


Fig. 15. Clutch Spring Pressure.

Engine Sprocket Removal.

Insert a screwdriver between the coils of the engine shaft shock absorber spring and prise up the bent-over tab of the lockwasher. The mainshaft nut can then be undone. If any difficulty is experienced due to the engine rotating, engage top gear and apply the back brake. Remove the spring and sliding sleeve. Detach the primary chain by undoing the spring link.

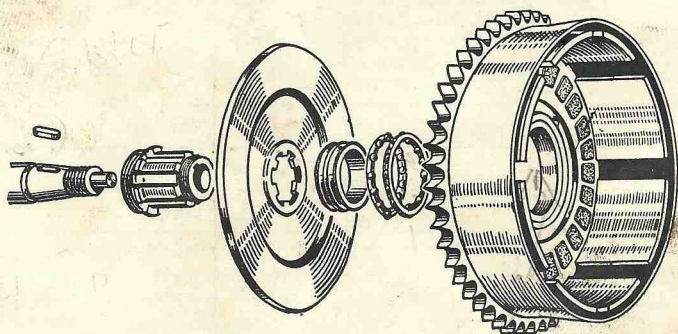


Fig. 16. Exploded View of Clutch.

The engine sprocket and the central splined sleeve can then be withdrawn from the engine mainshaft.

Clutch Dismantling.

Removal of the six locknuts and spring retaining nuts will allow the clutch end plate to be withdrawn. Bend back the locking washer and undo the large central nut. To prevent the shaft turning, engage top gear and apply the back brake. With this nut removed the complete clutch, with the exception of the central splined sleeve, can be withdrawn. Wash the plates in petrol to remove any surplus oil, and examine them carefully. If obvious signs of glazing are present the friction plates must be replaced. Replacements must also be made if any of the plain plates are scored.

The chain wheel and central cage must be examined for burrs which might prevent the plates sliding freely. If these are not serious they can be removed with a smooth file. In the case of a machine which has seen considerable service the sprocket teeth should be examined for wear, as worn teeth cause the chain to deteriorate very rapidly. The ball race must not possess more than $\cdot0015$ in. diametral play, as wear in this bearing may provoke clutch slip.

The central splined sleeve engages on a taper on the gearbox mainshaft, and can only be removed with the aid of a special screwed extractor, Part No. 61-3362, which can be obtained from a B.S.A. spares stockist. A key also serves to locate the sleeve, and this must be replaced correctly during re-assembly. The order for re-assembly is as shown in Fig. 16. Take particular care that the large central nut is done up quite tight after the locking washer has been correctly located on the splined sleeve. Turn the washer down over the flat on the outside of the nut.

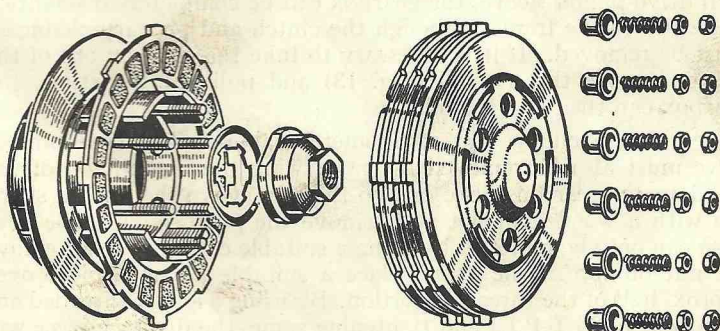


Fig. 16. Exploded View of Clutch. (contd.)

Gearbox.

The gearbox is of straightforward design employing constant mesh gears. Apart from occasionally topping up or changing the oil, very little maintenance should normally be required.

Remove the clutch adjustment inspection cover and pour oil in until it reaches this level. Whenever possible the gearbox should be drained immediately after a run when the oil is warm. A mineral type of oil should be used, of the same grade as that specified for the engine (see page 34). The gearbox capacity is 13 fl. oz. (370 c.c.).

Access to the gear-change and kick starter mechanism inside the outer cover is simply obtained. Move the gears to the neutral position, and detach the gear-change lever. Then remove the four nuts, and the seven screws round the **outside** edge of the gearbox outer cover. Do not touch the nut which is behind the kickstarter lever as this does not prevent its removal. The outer cover will then come away complete with kickstarter, and clutch levers. Tap the front of the cover with a wooden mallet and withdraw the cover away by pulling the kickstart lever, at the same time pressing downwards so as to relieve pressure on the rubber stop. As the cover is withdrawn the kickstarter will tend to rotate under the pressure of the spring, and the clutch lever should be used as a stop to prevent the complete release of the spring. With the outer cover removed the kickstarter spring or any other parts of the gear-change or kickstarter mechanism can be attended to.

If the gear-change mechanism requires attention remove the cotter pin on the ratchet lever and pull out the swivel pin. Take off the larger nut behind the gearbox inner cover and pull the gear-change mechanism away. Examine the springs for stretching if either of these springs have stretched dismantle as follows:—remove one side of each spring by inserting a screwdriver or suitable tool and levering upwards. Prise off the circlip, the whole assembly can then be taken apart.

Unless it is necessary to replace the ball bearing carrying the final drive pinion sleeve, the gearbox can be completely dismantled while still in the frame, although the clutch and primary chaincase must be removed. If it is necessary to take the gearbox out of the frame, remove the nuts D (Fig. 13) and pull out the studs, the gearbox can then be lifted out.

Detach the clutch and speedometer cables. The speedometer drive must also be removed by unscrewing the nut on top of the speedometer gear bush one or two threads. Give the bush a sharp tap with a wooden mallet and remove the grub screw. The gear bush can only be removed by using a suitable extractor, e.g. remove the nut on top of the drive, place a suitable distance piece over approx. half of the threaded portion. By using a longer threaded nut ($\frac{1}{2}$ in. B.S.C. 26 T.P.I.) and tightening same, the distance piece will act as an extractor. The speedometer drive can then be pulled out.

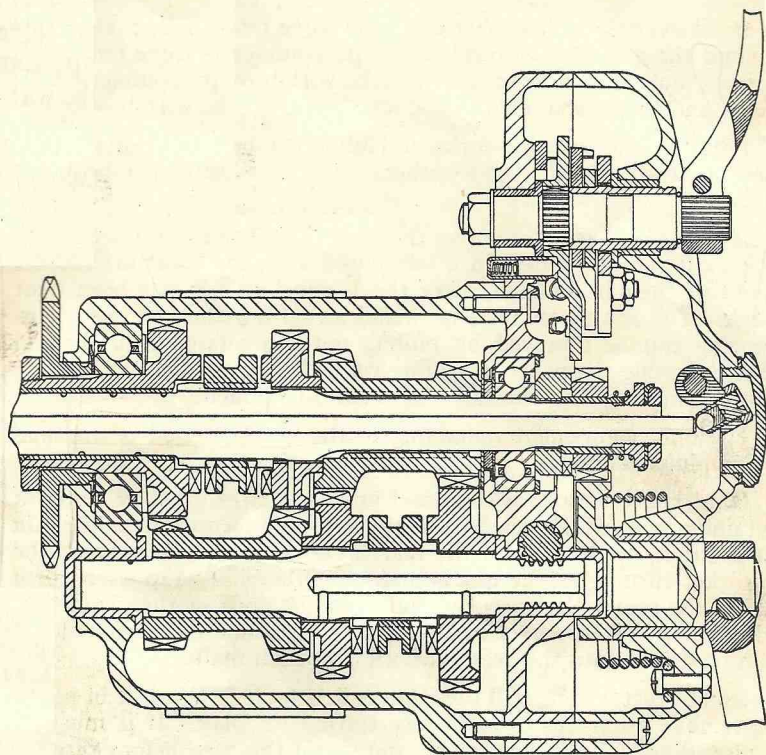


Fig. 17. Gearbox Arrangement.

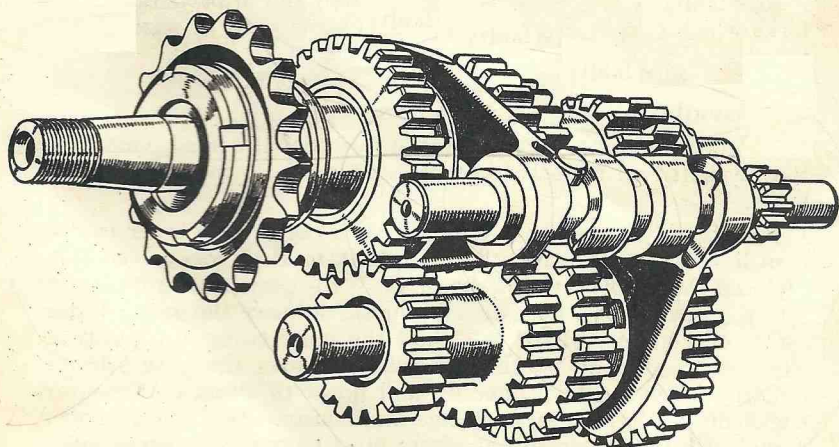


Fig. 18. View of Gear Cluster.

Bend over the tab washer and remove the two bolts ; these are behind the gear-change mechanism. Take out the three remaining screws, and the inner cover mainshaft, layshaft, complete with gears and gear selector forks and shaft can then be withdrawn.

Lift the gear selector forks and fork shaft off the gears. This permits the gear cluster together with the layshaft to be withdrawn.

If it is necessary to remove the mainshaft from the inner cover the shaft should be held in a soft jawed vice, the kickstart ratchet nut can then be undone, after the locking washer has been bent back. The shaft can then be withdrawn from the bearing. This bearing can be removed by pulling out the retaining circlip and then warming the cover in boiling water before pressing or tapping the bearing from its housing with a suitable punch.

The only component remaining in the gearbox shell is the final drive pinion sleeve.

Bend back the lock washer and undo the large gearbox sprocket retaining nut. If the gearbox is still in the frame and the rear chain in position, application of the rear brake will serve to prevent the sprocket turning as the nut is undone. Otherwise wrap a length of old chain round the sprocket and hold the ends of the chain in a vice. With the sprocket removed from its spline the pinion sleeve can be driven into the gearbox with a wooden mallet.

Do not disturb the ball race unless it is faulty. Wash it in petrol to remove all traces of oil before testing for play. If it must be removed, withdraw the oil seal and warm the case before tapping out the bearing with a suitable punch.

Any faulty components must be renewed and in particular if the forks which operate the sliding pinions show signs of seizure they must be replaced.

Re-assembly.

If new gears are to be fitted make sure that the fixed pinions on the layshaft and mainshaft are pressed right up to their locating stops.

Re-assembly generally is carried out in the reverse order to dismantling. Having fitted the mainshaft to the inner cover, and replaced the gears on to the shafts, place the gear selector quadrant into the neutral position (second notch). Replace the gear selector forks (one on each shaft), and bolt the inner cover into position. Place a spanner on to the nut which locates the gear selector quadrant, move the spanner up and down to check correct gear engagement. Replace gear-change mechanism. As the outer cover is replaced, the kickstarter quadrant must be pushed down slightly, otherwise the quadrant may foul the rubber stop.

WHEELS

Both wheels are fitted with ball journal bearings (except for the M21 with rigid frame which is fitted with taper roller bearings—see page 44), and no adjustment is necessary. A few strokes of the grease gun on the central grease nipples every 2,000 miles provide sufficient lubrication. The following greases are suitable for the hubs: Mobilgrease No. 2, Retinax A or CD, Castrolase Heavy, Essogrease, Energrease C.3. These greases can also be used for lubricating any other points on the machine.

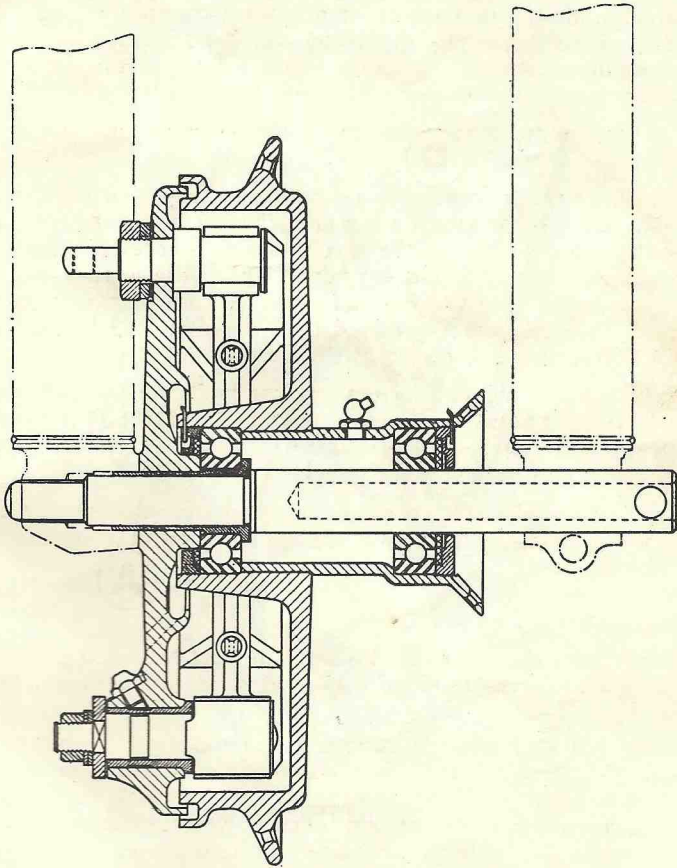


Fig. 19. Front Hub Arrangement.

Brake Adjustment.

In the case of the rear brake, a knurled nut on the brake rod

effects any adjustment necessary, and a few turns are all that is required to improve braking efficiency. The front brake is adjusted by means of the knurled thumb nut on the cable stop at the lower end of the forks.

Front Wheel Removal.

To remove the front wheel from the forks, first disconnect the brake cable at E Fig. 20, and unscrew it from the bracket at F. Remove the torque arm nut C and undo the pinch bolt A. Insert a tommy bar in the hole in the head of the spindle at B and unscrew the spindle, noting that it has a left-hand thread and unscrews in a clockwise direction. The spindle can then be withdrawn and the wheel removed.

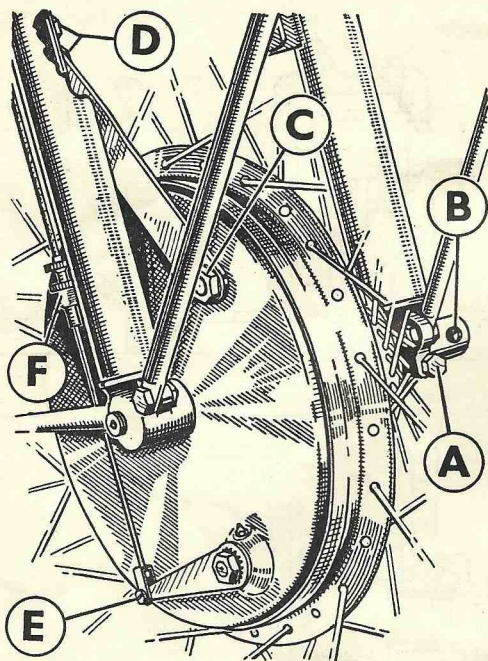


Fig. 20. Front Wheel Removal.

After removal, do not let the wheel fall on 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.

Front Wheel Replacement.

The wheel is replaced in the reverse order to that for removal. It is most important that after the spindle has been tightened, but 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.

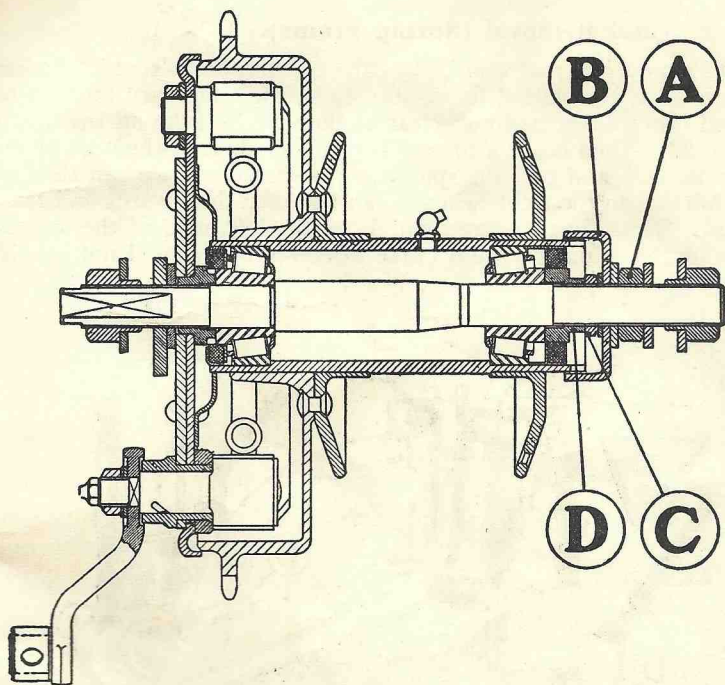


Fig. 21. Rear Hub Adjustment (rigid frame).

Rear Wheel Removal (Rigid Frame).

To remove the rear wheel, place the machine on its stand. Undo the spring link and unwind the rear chain from the rear wheel sprocket but take care that it remains on the gearbox sprocket. Take out the split pin, and remove the nut holding the brake anchor strap in position. Unscrew the knurled brake adjuster on the brake rod. Slacken the two nuts on the rear of the mudguard, and lift the rear of the guard upwards by its hinge. Then loosen the two wheel spindle nuts, and the wheel will slide out.

Rear Wheel Bearing Adjustment (Rigid Frame).

The bearings are correctly adjusted when there is just perceptible play (about $\frac{1}{64}$ inch) detectable at the wheel rim. If the bearings require adjustment, slacken the wheel spindle nut and the nut A (Fig. 21). Withdraw the dust cap B, the locknut C will then be revealed. Release the locknut C in order that the adjuster D may be screwed in or out as required. Tighten the locknut C and re-check the adjustment. Re-assemble in the reverse order.

Rear Wheel Removal (Spring Frame).

To remove the rear wheel, place the machine on its stand. Slacken the nuts at the slotted fixing stay ends, the mudguard tail can be lifted upwards on its hinge clear of the wheel. Take off the nut A (Fig. 22). Then insert a tommy bar into the hole in the head of the spindle at C and pull the spindle. The distance piece can then be withdrawn to the right, when it can be taken downwards and rearwards. Note that the large nut B on the left hand of the spindle retains the chainwheel and brake assembly and should not be disturbed.

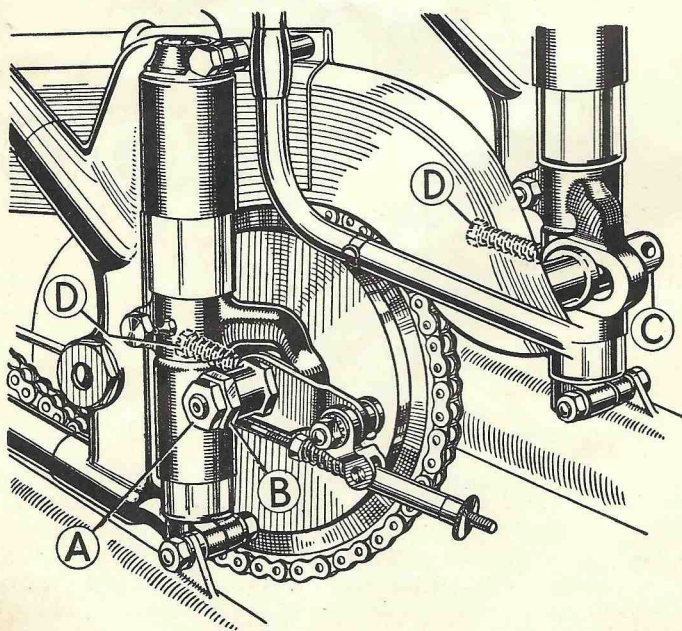


Fig. 22. Rear Wheel Removal (spring frame).

Wheel Re-assembly.

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

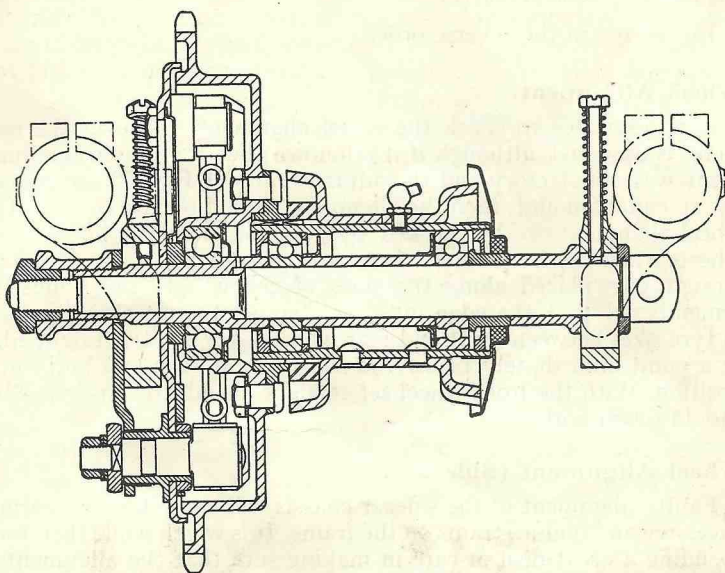


Fig. 23. *Rear Hub Arrangement (spring frame).*

Rear Chain Adjustment.

The rear chain must be adjusted when the machine is on its stand, and the wheel is at the lowest point in the suspension. Rotate the wheel slowly until the tightest point on the chain is found, then check its up and down movement in the centre of the chain span. The total movement should be : rigid frame : $\frac{3}{4}$ inch ;

spring frame : $\frac{1}{2}$ inch ;

and if it varies from this setting then the chain must be adjusted by moving the rear wheel.

Rigid Frame.

The adjustment is by means of a cam on the left-hand end of the spindle operating against a stop on the frame stay. Loosen the two wheel spindle nuts. By applying a spanner to the square on the left-hand side of the spindle and turning clockwise, the left-hand side of the wheel will slide backwards, tightening the chain. Revolve the wheel slowly and check the chain tension. Screw in the chain adjuster on the right-hand side, until the wheel is correctly aligned (see page 46).

Spring Frame.

Slacken the hexagons A and B (Fig. 22), and after slackening the locknuts, screw the adjusters D in or out as the case may be, until the chain tension is correct.

Re-tighten in the reverse order.

Wheel Alignment.

It is advisable to check the wheel alignment whenever the rear chain is adjusted, although if it is known that the previous adjustment was satisfactory and the adjuster nuts D Fig. 22 are moved by an equal amount, then the alignment should remain correct. The wheel alignment can be checked by glancing along the line of both wheels when the front wheel is set straight, or by means of a long straight edge placed along the sides of the wheels, but it must be remembered that the edge must be stepped to suit the difference in tyre sizes between front and rear wheels. Apply the straight edge at a point immediately below the silencer and keep in a horizontal position. With the front wheel set straight ahead, the straight edge should touch both wheels.

Wheel Alignment (Sidecar).

Faulty alignment of the sidecar chassis will cause heavy steering, excessive and undue strains on the frame. It is worth while therefore, spending a great deal of care in making sure that the alignment is correct.

Adjustment is provided at several points on the B.S.A. chassis as indicated below.

Check the alignment of the motor cycle alone. (See previous heading.)

Fit a straight edge against the sidecar wheel as shown in Fig. 24. Measure the distances A-C and B-D. These should differ by one inch, A-C being the smaller. If adjustment is necessary, the two front connections to the frame can be varied for length. The lower one is of the telescopic type and it is only necessary to release the clip bolt on the connecting lug at the crankcase when the tube may be telescoped in or out as required. The upper connection is adjustable at the chassis. Release the clip bolt on the chassis lug and slide the tube through the lug as required.

The rear connection is fitted with spring loaded spherical seatings to facilitate vertical alignment. Tighten the nut securing the rear connection to the chainstay and then slacken it back sufficiently to allow the insertion of the split pin.

It is important that the machine leans slightly outwards i.e. away from the sidecar. The connection to the seat lug is telescopic and can be adjusted.

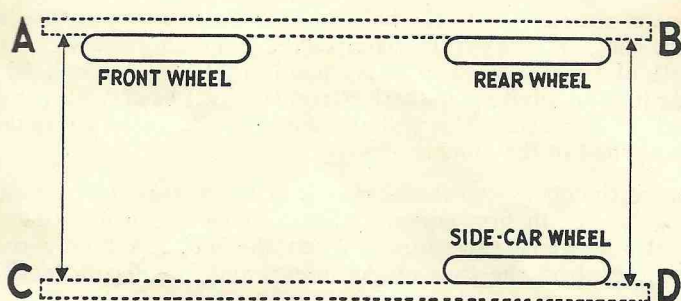


Fig. 24. Sidecar Alignment.

Finally, check that all nuts are tight and that split pins are fitted where required.

Brake Shoe Removal and Replacement.

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

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

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

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

Brake Shoe Relining.

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

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

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

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

Complete relined brake shoes are available through the Exchange Replacement Service, which operates in the British Isles only.

FRAME AND FORKS

Front Forks.

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

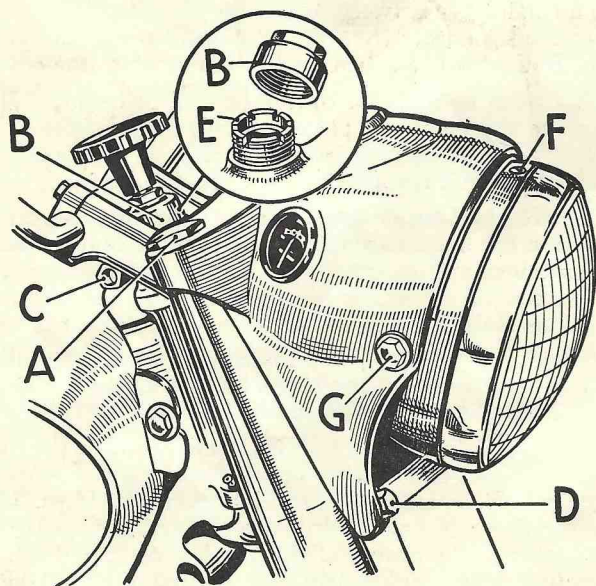


Fig. 25. Front Fork and Steering Head.

Remove the plug A (Fig. 25) and the drain plug in the lower end of the fork sliding member (see Fig. 26).

Allow all the oil to drain out, then apply the front brake and depress the forks a few times to drive out any oil remaining in the system.

Replace the drain plugs and pour 5 fl. oz. (142 c.c.) of an S.A.E. 20 oil into each leg. Replace the top plug and tighten it firmly.

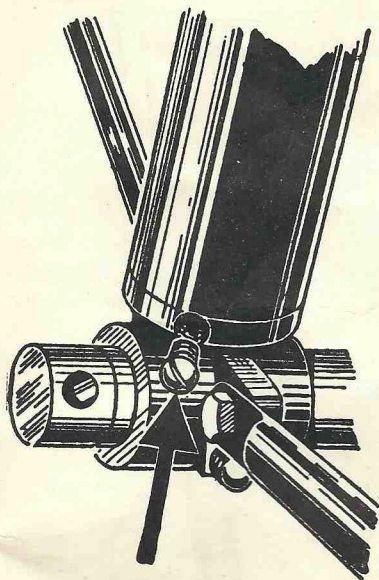


Fig. 26. Front Fork Drain Plug.

and move them round slowly. The steering should be free, and the forks must rotate smoothly. If the movement is 'lumpy' it is a sign that the adjustment is too tight, or that the ball races are damaged. When the adjustment is correct tighten the clamping nut C, replace the cap B and the steering damper.

Fork Dismantling.

Complete dismantling of the forks should not be attempted without two special tools, Part Nos. 61-3350 and 61-3005.

Remove the front wheel and front mudguard. Remove the cap A (Fig. 29) and screw tool 61-3350 into the thread in the top of the main fork shaft. Slacken the pinch bolt B. By striking the top of tool smartly with a hammer the fork shaft will be freed from its taper in the top fork yoke and the complete fork leg can be pulled out from the bottom of the fork. Repeat the operation for the other

The following oils are recommended for use in the front forks: Mobiloil Arctic, Shell X100-20, Castrolite, Esso 20, B.P. Energol S.A.E. 20.

Steering Head Adjustment.

The steering head should be tested occasionally for play and to ensure that it rotates freely. Support the crankcase on a box so that the front wheel is clear of the ground, then grasp the front fork legs and attempt to push them backwards and forwards. If any play is detected the steering head must be adjusted.

Unscrew the steering damper and remove the chromium plated top cap B (Fig. 25). Slacken the clamping nut C, then tighten down the sleeve E until the adjustment is correct. Hold the handlebars lightly

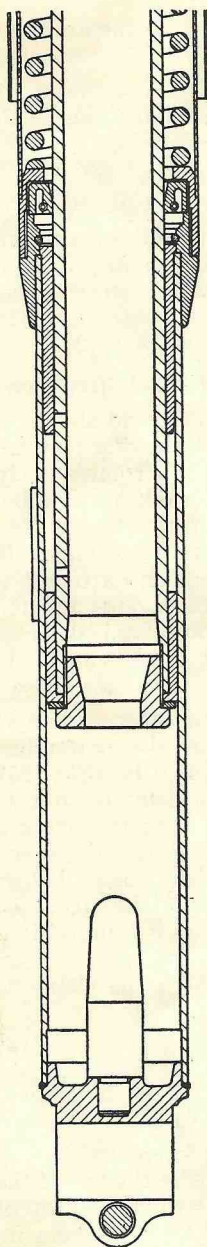


Fig. 27. Fork Section.

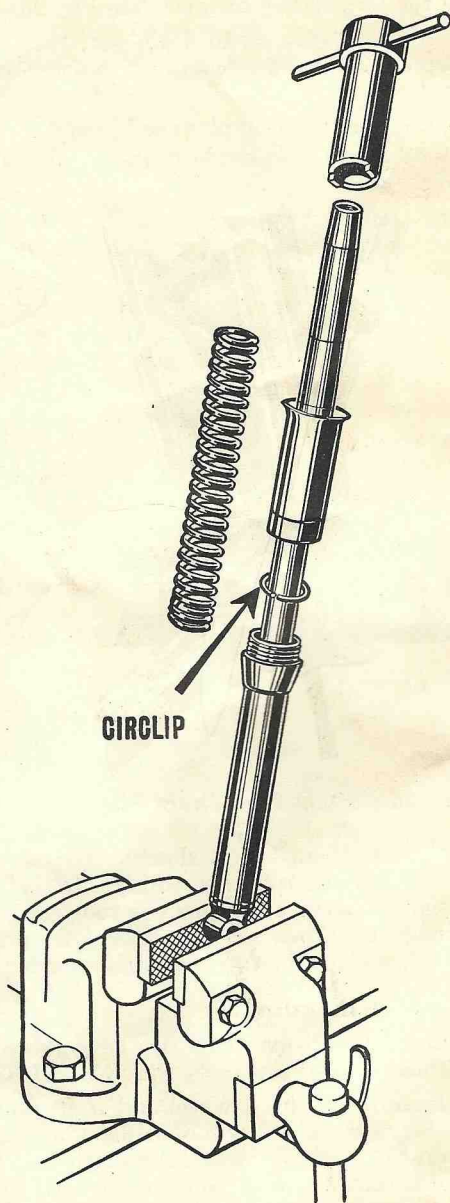


Fig. 28. Fork Dismantling.

leg. Note that the smaller of the two fine threads on the extractor tool is used for dismantling the forks on another model and will therefore not be used. In an emergency the chromium plated cap can be used in place of the extractor, but it is likely to be damaged.

Hold the bottom of the sliding member by gripping the wheel spindle lug in a soft jawed vice and lift off the spring (see Fig. 28). The special unscrewing tool 61-3005 consists of a tubular member with two dogs which engage in slots cut in the bottom spring seating. Engage the tool and unscrew the chromium plated spring shroud. The oil seal is contained in the bottom of the spring shroud and can be pressed out with a punch passed through the two slots. Do not remove the oil seal unless it requires replacing.

The top bearing of the sliding member is now retained only by a circlip which can be prised out with a suitable sharp tool. Note that a number of shims may be fitted between the circlip and the top of the bearing. These must be replaced during re-assembly and if any movement of the bearing is still apparent when the circlip has been replaced additional shims should be used. If there is any play at this point a clicking noise may be heard when the forks are operating.

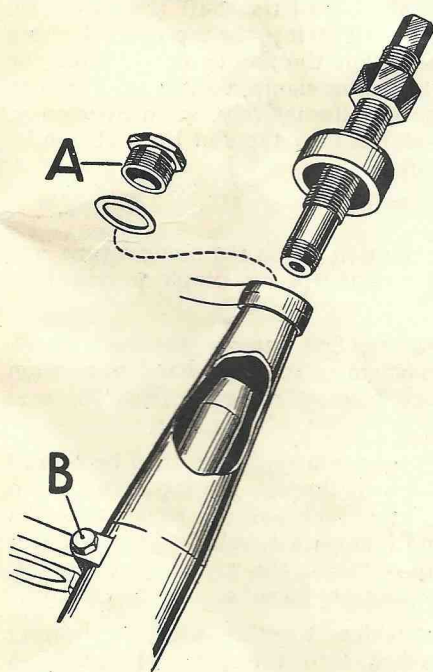


Fig. 29. Fork Assembly.

With the circlip removed the complete fork shaft and bushes can be withdrawn from the sliding member.

The bottom nut retaining the bronze bushes can be unscrewed with the fork shaft gripped in a soft jawed vice to prevent it turning.

To remove the two yokes and the steering stem from the frame, undo the clamping nut C (Fig. 25). Remove the steering damper knob and the cap B. Unscrew the sleeve E until it comes free, and then lift off the top yoke. Take care that the balls from the head bearings are not lost when the head is loosened.

The bearing cups which remain in the head can be withdrawn with the aid of a screwed extractor, Part No. 61-3063. This should be

screwed firmly into the threaded centre of the cup, then extractor and cup can be driven out from the opposite end with a suitable punch. The races must be replaced if they show any signs of pitting, as damaged head races will affect steering.

If the forks have been damaged in any way the shafts must be checked to ensure that they are perfectly straight. It is also possible to twist the yokes so that even if new shafts are used they will not be in line. This can be checked by clamping the new shafts into the lower yoke, then check that the shafts are not twisted by placing them on a surface plate or on two parallel straight edges. Also check that when the top yoke is slid down the head stem sleeve on to the shafts, the tapers meet squarely. If they are only slightly twisted it is possible to reset the yokes, but replacements are preferable.

Re-assembly is carried out in the reverse order to dismantling. Make sure the oil seal lip is facing downwards. Before screwing down the oil seal holder pass one turn of medium twine round the undercut at the base of the thread to provide an additional seal. When replacing the legs pass the main fork shaft up through the bottom yoke as far as it will go, then pass the tool 61-3350 down through the top yoke and screw it into the top of the shaft (Fig. 29). Do up the nut on the tool to pull the shaft up into the top yoke. Tighten the clamp B in the bottom yoke while the tool is removed and the top plug A replaced. Slacken the lower clamp, tighten the top plug firmly, then do up the clamp again. Alternatively, in an emergency, a suitable sized length of wood, cut to a taper at the end, can be screwed into the top of the shaft.

Rear Suspension

In normal service the only attention which the plunger type rear suspension requires is routine greasing of the nipple provided on each plunger.

To dismantle the plunger units, first remove the rear wheel. Detach the silencer from the bottom of the right-hand suspension member, then remove the pinch bolts at A and B (Fig. 30), and remove the plugs C.

The central columns of the suspension units can then be tapped out from underneath and withdrawn through the top lugs. When this has been done, the remainder of each unit can be slid out sideways from the bottom lug, and laid on a bench for complete dismantling. This consists merely of taking the various pieces apart, carefully noting their respective positions for subsequent re-assembly.

The wheel spindle brackets which, together with the bearing sleeves to which they are attached, form the spring plungers, can be separated from the sleeves when the pinch bolts D are withdrawn.

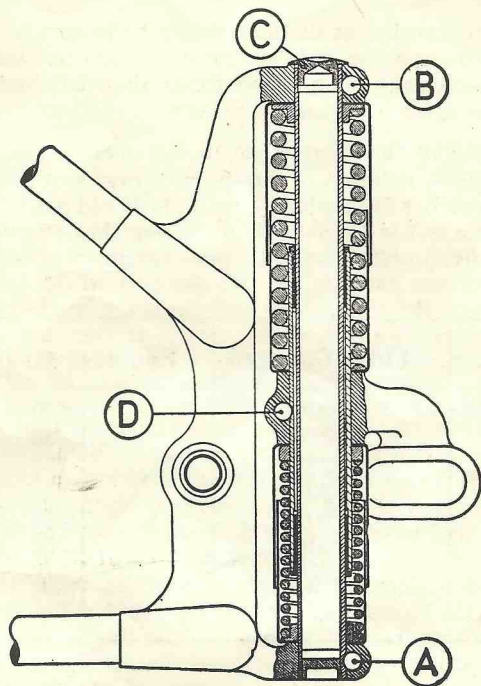


Fig. 30. The Rear Suspension.

During re-assembly note that each of the pinch bolts locates in a groove in the column on which it clamps. Correct alignment of the columns is essential before replacing the bolts.

Frame.

The frame will not require any attention unless the machine has been involved in an accident. It should then be inspected very carefully and the wheel alignment checked. If the frame is damaged or distorted it must be replaced, or taken to your B.S.A. dealer for rectification if feasible.

ELECTRICAL EQUIPMENT

The electrical equipment fitted requires very little attention, but the few instructions given in this chapter should be followed carefully to provide maximum life and reliability.

Battery.

About once a month take off the battery lid, remove the filler plugs from each of the cells and examine the level of the electrolyte.

If necessary add sufficient distilled water to bring the level of the electrolyte up to the top of the separators. Do not use tap water and do not use a naked light when examining the condition of the cells.

The condition of the battery should occasionally be checked by taking hydrometer readings of the specific gravity of the electrolyte. If distilled water has been added a reading should not be taken until after the machine has been used, to ensure that the electrolyte is thoroughly mixed. The specific gravity readings should be as follows :—

Temp.	Fully Charged	Requires Charging
120°F.	1.270	1.220
100°F.	1.280	1.230
80°F.	1.285	1.235
60°F.	1.295	1.245
40°F.	1.305	1.255
20°F.	1.310	1.260
0°F.	1.320	1.270
-20°F.	1.325	1.275

The readings for each of the three cells should be approximately the same. If one cell gives a reading very different from the others it may be that electrolyte has been spilled or has leaked from this particular cell or there may be a short circuit between the plates. If leakage from the top of the battery is known to have occurred, due to a spill, the battery should be topped up with battery acid of suitable specific gravity.

Never leave the battery in a discharged condition as it will suffer permanent damage. Keep the top of the battery clean and smear the terminals with vaseline to prevent corrosion.

All models employ a positive earth wiring system. Make sure that the battery is connected correctly.

Dynamo.

The two-brush dynamo is coupled to a cut-out and regulator unit fitted under the dual seat or saddle. The regulator varies the output of the dynamo to match the lighting load and the state of charge of the battery. When the battery is in good condition the charge rate will be only one or two amps. A discharge reading may sometimes be observed immediately after switching on the lights, but as soon as the battery voltage falls the regulator causes the dynamo output to balance the load.

About every 10,000 miles, take off the cover band and check the brushes and commutator. See that the brushes move freely in their holders by holding back the brush springs and pulling gently on the flexible connectors. If a brush is inclined to stick, remove it from its holder and clean its sides with a petrol moistened cloth. Be careful to replace the brushes in their original positions in order to retain bedding.

The commutator should be clean, free from oil or dirt and should have a polished appearance. If it is dirty, clean with a dry duster while the engine is rotated slowly. If the commutator is very dirty, moisten the cloth with petrol.

The armature is mounted on ball bearings which are packed with high melting point grease during initial assembly. This grease will last until the machine is in need of a complete overhaul, and no other lubrication is required.

The dynamo is gear driven from the magneto shaft and can be simply removed from the machine after slackening the strap which secures the magdyno and removing the small nut which secures it to the top of the gear drive compartment. If it is desired to run the machine without the dynamo a suitably shaped dummy must be used to allow the securing strap to be tightened properly. It is also advisable to fit a plate over the hole exposed in the gear drive compartment by the removal of the dynamo.

Electric Horn.

The horn is adjusted at the works to give its best performance and will give a long period of service without any attention. If it becomes uncertain in action, giving only a choking sound, or does not vibrate, it does not follow that it has broken down. First ascertain that the trouble is not due to some outside source such as a discharged battery, or a loose connection or short circuit in the wiring.

If none of the previous suggestions proves successful, the horn may be re-adjusted as follows :—

Turn the adjusting screw in the rear of the horn body slightly to left or right while depressing the horn button until the best note is obtained.

If the horn still gives trouble it should be removed and returned to the manufacturers.

Headlamp.

The headlamp is of the sealed unit type employing a pre-focus bulb. To gain access to the bulbs, the headlamp rim complete with light unit must be removed by slackening the screw on top of the

headlamp shell and pulling the rim away at the top. The headlamp bulb is retained by a bayonet fitting cap. Push on the cap, turn it to the left, and then withdraw. The bulb is located by a flange which has a notch engaging with a projection inside the holder to ensure that it is correctly positioned. Note that the prongs of the bayonet fitting cap are not symmetrical so that it can only be replaced in the correct position.

The headlamp requires no maintenance except to ensure that the contacts are kept clean and tight. The reflector is sealed to the glass and in the event of either becoming damaged the complete unit must be replaced.

The best way to obtain the initial setting of the main headlamp beam is to stand the machine about 25 feet away from a wall and move the headlamp until the beam is parallel to the ground and strikes the wall at the same height off the ground as the centre of the headlamp. A final check should be made on the road to ensure that the beam strikes the road as far away as possible but in no circumstances must the beam point above the horizontal.

Stop Light Switch.

This is operated by the brake rod through a spring. Keep the switch free from grit and water and occasionally apply a little thin oil to the operating mechanism.

Tail Lamp.

Access to the tail lamp is obtained by removing the two screws securing the red transparent plastic cover. Note that the locating prongs of the bulb are offset so that it can only be replaced one way round.

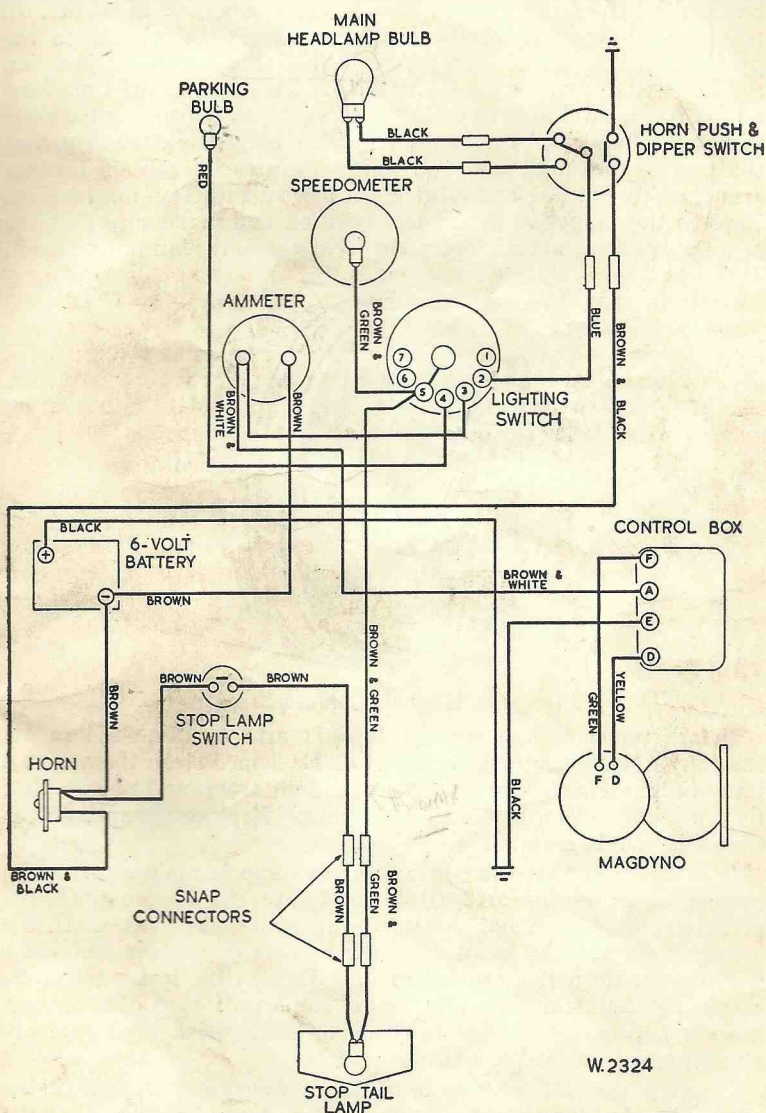
Bulbs.

The correct replacement bulbs are as follows :—

Head	...	...	...	Lucas No. 312	30/24 watts
Pilot	...	...	...	Lucas No. 988	3 watts
Stop/Tail	...	...	...	Lucas No. 384	6/18 watts
Speedometer	...	...	...		6.5v. .3 amp.

Circuit Diagrams.

A diagram of the charging and lighting circuit appears on page 57. The insulation of the wires is individually coloured and these colours are shown on the diagram.



W.2324

Fig. 31. Wiring Diagram (Positive Earth).

(See also page 59)

Magneto (Magdyno type).

The operating face cam of the magneto is lubricated from a wick retained by the screw B (Fig. 32). Every 3,000-4,000 miles remove the screw A and lift off the backing spring C together with the contact breaker arm. The screw B with the wick attached can then be withdrawn for the addition of a few drops of light machine oil. It is also advisable to undo the screw D, after bending back the lockwasher, and pull the contact breaker body from the armature shaft. Pull the small push rod which operates the contact breaker arm from its housing and lubricate it lightly with thin machine oil. Replace the tappet in its original position and make sure that the contact breaker body is correctly located on the armature shaft.

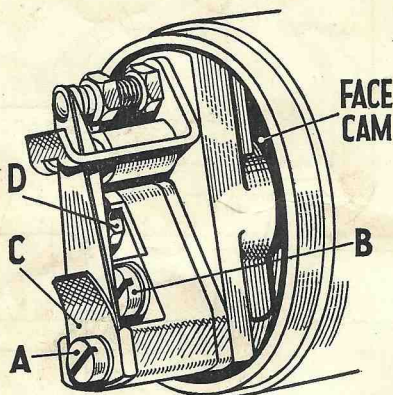


Fig. 32. Magneto Contact Breaker.

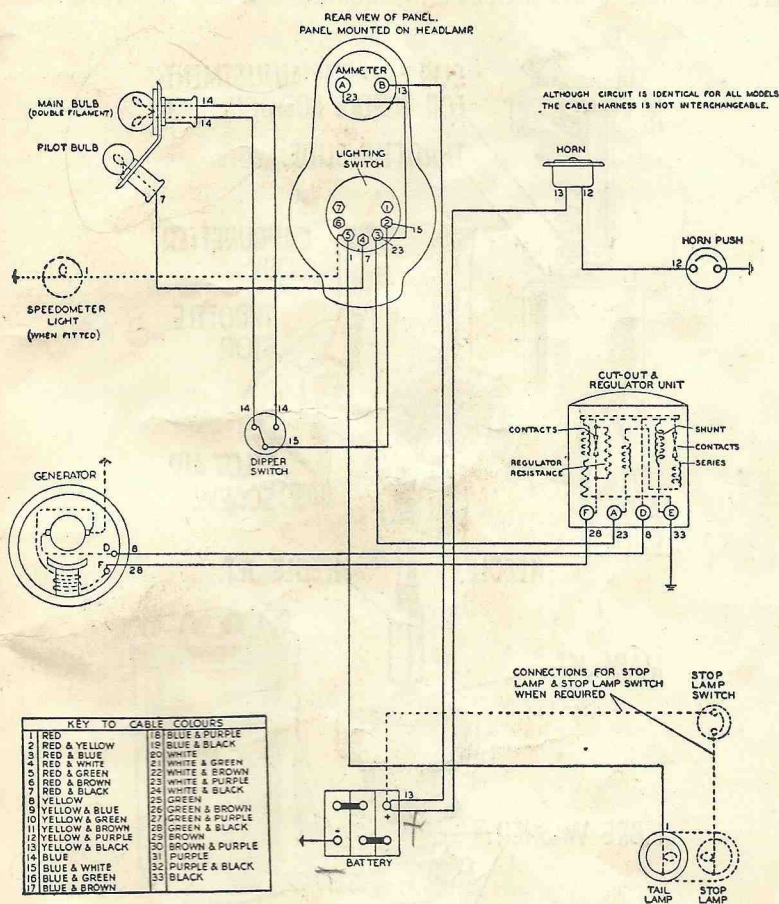
Before replacing the contact breaker arm examine the points carefully. If the contacts are burnt or blackened clean them with a piece of fine emery cloth or carborundum stone and ensure that they are quite clean before re-assembling. Replace the spring C as shown in the diagram.

It is essential that the contact breaker gap is maintained at its correct clearance of .012-.015in. Rotate the engine until the points are fully open and check the gap with feeler gauges. If it is incorrect slacken the locknut on the adjustable contact and screw it in or out until the gap is correct. Tighten the locknut and re-check the adjustment. It is most important that the contact breaker gap is checked before checking the ignition timing as any alteration will affect the setting.

Examine the H.T. pick-up brush and the earthing brush periodically. The earthing brush is retained by a cheese head screw at the drive end of the magneto. See that the brushes are free in their holders, and if there is any evidence of oil the tracks should be wiped with a piece of clean rag inserted on the end of a pencil. When wiping the pick-up track do not rotate the engine too rapidly or a shock may be received.

ELECTRICAL EQUIPMENT

Early models were fitted with a negative earth system, but after 1950, a positive earth system was adopted. The wiring is similar for both systems, except for the battery connections.



Numbers indicate cable identification colours. See key.

Fig. 31s. Wiring Diagram (Negative Earth).

REPLACEMENT BULBS

Headlamp (main)	...	Lucas No. 168	...	24/24 Watts
Headlamp (main) pre-focus	...	Lucas No. 312	...	30/24 Watts
Headlamp (pilot) S.C.C.	...	Lucas No. 200	...	3 Watts
Headlamp (pilot) M.C.C.	...	Lucas No. 988	...	3 Watts
Tail Lamp S.C.C.	...	Lucas No. 205	...	6 Watts
Stop/Tail Lamp	...	Lucas No. 384	...	6/18 Watts

THE STANDARD AMAL CARBURETTER (As fitted up to 1955)

Adjustment is carried out in the same manner as with the Monobloc instrument, but there is no removable pilot jet. The main jet is accessible after the float chamber holding bolt has been removed.

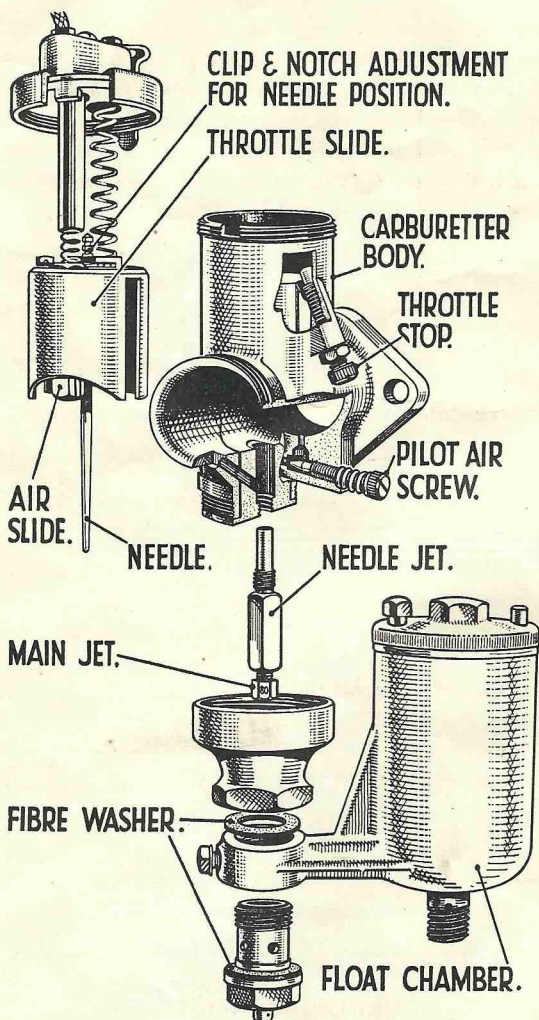


Fig. 12s. The Carburetter Dismantled

			M20	M21	M33
Main jet	...	...	170	160	200
Needle position	...	...	2	2	3
Throttle valve	...	...	6/4	6/4	29/4

PROPRIETARY INSTRUMENTS, FITTINGS AND ACCESSORIES

No expense is spared to secure as standard equipment the most suitable and highest quality instruments and accessories. Nevertheless, the Company's guarantee does not cover such parts, and in the event of trouble being experienced the parts in question should be returned to and claims made direct on the actual manufacturers, who will deal with them on the terms of their respective guarantees, as follows :—

Batteries :

Joseph Lucas Ltd., Birmingham.

Carburettors :

Amal Ltd., Holford Works, Perry Barr, Birmingham.

Dual Seats :

Motoplas Co. Ltd., Armoury Road, Birmingham 11.

Electrical Equipment :

Joseph Lucas Ltd., Birmingham.

Horns :

Joseph Lucas Ltd., Birmingham.

Speedometers :

Smiths Motor Accessories Ltd., Cricklewood, London, N.W.2.

Tyres :

Dunlop Rubber Co. Ltd., Fort Dunlop, Birmingham.

SPECIAL NOTE

Claims under guarantee, whether to B.S.A. Motor Cycles Ltd., or any of the manufacturers listed above, should be submitted through the B.S.A. dealer from whom the machine was purchased.

B.S.A. MOTOR CYCLE SPARES STOCKISTS



Save time and postage by contacting your nearest B.S.A. Stockist for B.S.A. Spare Parts, Spare Part Catalogues, Instruction Books, Transfers, etc.

All B.S.A. Dealers carry stocks of B.S.A. Spare Parts but the following appointed Stockists maintain a comprehensive range.

<i>Town</i>	<i>Name of Stockist</i>	<i>Address</i>	<i>Telephone No.</i>	<i>Telegraphic Address</i>
Aberdeen	J. Dawson	24-26 Thistle Street ..	25556	
"	George Cheyne (Cycles) Ltd.	147-149 Holburn Street	50341/2	Motobyke Aberdeen
Aberystwyth	Gwalia Motor Co. ..	North Parade ..	525	
Accrington	Bill Snape Ltd. ..	396 Blackburn Road	4724	
Aldershot	Phillips Bros. (Aldershot) Ltd.	Birchett Road ..	1111/2	Phillips, Cycles Aldershot
Alloa	J. G. Robertson ..	55-57 High Street ..	193	
Andover	Corbett & Ellis (Andover) Ltd.	Weyhill Road ..	2991	
Ashington	Mains of Ashington ..	Laburnum Terrace ..	3204	
Aylesbury	Eborn's Garage ..	44 Walton Street, Aylesbury.	3150	Eborn's Aylesbury
Banbury	Trinder Bros.	2 & 3 Broad Street ..	2546	
Barnsley	T. Garner & Son ..	Sheffield Road ..	2866	
Barnstaple	Rob Ray Ltd.	43 High Street ..	4266	
Bath	R. U. Holoway & Son	32-34 St. Johns Road, Bathwick.	5084	R. U. Holoway & Son Bath
Bedford	The Imperial Cycle Co.	58 St. Loyes	2374	
Belfast	W. J. Chambers & Co.	106 & 108 Donegall Pass	27253/4	Fastmote, Belfast
Biggleswade	Bryants	25, 27, 72 and 74 Shortmead Street.	3108	
Birkenhead	Bob Simister Ltd. ..	540 New Chester Road, Rock Ferry.	1452	Rock Ferry
Birmingham	County Cycle & Motor Co. Ltd.	266 Broad Street	Mid. 2671	
"		104 Bath Row (Repairs) (closed Saturday 1 p.m.).	" 2817	
"	C. E. Cope & Sons Ltd.	481-487 Hagley Road, Edgbaston 17.	Bearwood 2246/7	
"	Shovelbottom's Ltd. ..	376 Bathpool Road, Sparkbrook 12.	South 2212	
"	Aston Auto Motors ..	172 Aston Road, 6 ..	Aston Cross 3201/2	

B.S.A. MOTOR CYCLE SPARES STOCKISTS—continued.

<i>Town</i>	<i>Name of Stockist</i>	<i>Address</i>	<i>Telephone No.</i>	<i>Telegraphic Address</i>
Blackburn	S. & G. Motor Cycles (Blackburn Ltd.)	15 Great Bolton Street	6678	
Blackpool	J. Hall & Son ..	102-6 Devonshire Road (opposite School).	22130	
Blandford	The Badger Garages Ltd.	Salisbury Road	615	
Bolton	Charlie Robinson ..	119 and 121 Higher Bridge Street.	3931	
Boscombe, (Bournemouth)	Craze Bros. ..	473-475 Christchurch Road.	Boscombe 33231/2	
Bournemouth	Jenkins & Purser ..	960-970 Wimborne Rd.	Winton 2988	
Bradford	C. Sidney Ltd. ..	107 Manningham Lane	29889	
"	J. K. Hirst ..	41 Wakefield Road ..	22543	
Bridgwater	Anderson & Wall ..	18 St. Mary Street ..	2416	Anderson & Wall, Bridgwater
Brighton	Redhill Motors .. (Brighton) Ltd.	104 North Road ..	5281	
Bristol	S. J. Fair Motors Ltd.	201-3 Cheltenham Rd.	4-6238/4-1015	
Bromsgrove	Harold Tozer (Bromsgrove) Ltd.	110 Birmingham Road	3228	
Brynmawr	Jayne's Motors ..	Cymbach Garage ..	271	
Bury St. Edmunds	Barclay Motors ..	Kings Road Corner ..	2345/9	
Cambridge	King & Harper Ltd. ..	Milton Road Corner ..	3201	Motors, Cambridge
Canterbury	Hallets of Canterbury	St. Dunstan's Street	2275/6	
Cardiff	Car Distributors (Cardiff) Ltd.	134-140 City Road ..	30022	
"	Robert Bevan & Son ..	29-35 Castle Street ..	27477/8	
Carlisle	W. T. Tiffen & Son	Irishgate Brow ..	25024	Tiffen, Irish- gate, Carlisle
Carmarthen	Eddie Stephens Motors	22-23 Water Street ..	6233	
Castleford	Barrets Motor Cycles ..	27-35 Aire Street ..	2983	
Chapel-en-le- Frith	E. W. Bowers ..	129 Town End ..	144	
Chatham	Gray's of Chatham Ltd.	3-9 High Street ..	44005	
Chelmsford	Hadlers Garage Ltd. ..	New Street ..	4844/5	Hadlers, Chelmsford
Cheltenham	Leslie Paynter ..	Bath Street ..	2887	
Chester	Davies Bros. ..	34 Bridge Street ..	25510	
Chichester	W. Goodridge & Co. Ltd.	East Street ..	2033	
Clydebank	John A. Weddell ..	7/114 Dumbarton Road	Clydebank 1429	
Colchester	G.B.R. Motors ..	1-2 East Hill ..	6131-2	
Colne	C. H. Schofield (Motors Ltd.)	Market Place ..	859	
Coventry	Coventry Motor Mart, Ltd.	86 London Road ..	2146/7	Coventry Motor Mart
Crewe	Cookes Garages (Crewe) Ltd.	10-20 Nantwich Road	2011	Cookes Motors, Crewe
Croydon	Godfreys Ltd. ..	228-234 London Road	Croydon 3641/2	Gofrabike, Croydon
Dagenham	Reginal Smith (Motor Cycles) Ltd.	Imperial House, New Road	Rainham 3284-2786	

B.S.A. MOTOR CYCLE SPARES STOCKISTS—continued.

<i>Town</i>	<i>Name of Stockist</i>	<i>Address</i>	<i>Telephone No.</i>	<i>Telegraphic Address</i>
Dalton-in-Furness	H. Holme	24-26 Ulverston Road	25	
Darlington	The Duplex Motor and Cycle Co. Ltd.	10-16 Grange Road ..	2071	Duplex, Darlington
"	White Bros.	201/205/9 Northgate	67757	
Dartford	Schweizo Bros. ..	177 Lowfield Street ..	4279	
Derby	Ingle's Provincial Garages Ltd.	Walbrook Road ..	45289	
Doncaster	W. Cusworth (Doncaster) Ltd.	7 Hall Gate	4594	
Douglas, I.O.M.	Gilbert Harding ..	18 Duke Street ..	170	
Dudley	Chas. E. Cope & Sons Ltd.	193 High Street ..	3464/5/6	
Dundee	George McLean Ltd. ..	Ward Road, Riverside Drive.	5087	Vehicles Dundee
Dunstable	B. G. England (Dunstable) Ltd.	Half Moon Hill, London Road.	843/4	
Eastbourne	Jempsons	118 Seaside	756	Jempsons Eastbourne
Edinburgh	J. R. Alexander & Co. Ltd.	10-14 Lothian Road	Fountainbridge 4455	Motocycles, Edinburgh Elgin 7188
Elgin	Farquharsons	55-57 High Street ..	7188	
Enfield	D. J. Shepherd & Co. (Enfield) Ltd.	434-6 Hertford Road, Enfield Highway.	Howard 1631	
Exeter	P. Pike & Co. Ltd. ..	Alphington Street ..	58241	Piko, Exeter
Frome	J. Difazio	25 Catherine Street ..	2913	
Gateshead, 8	O. Carmichael & Son ..	75, 83 and 87 High West Street.	71815	
Glasgow, C.3	Bell Bros. (H.P.) Ltd.	215-223 St. Georges Road.	Douglas 6414	Douglas 6414 Glasgow
" C.4	J. R. Alexander & Co. Ltd.	264-280 Gt. Western Road.	Douglas 7516	Alex. Moto, Glasgow
Gloucester	Harpers of Gloucester ..	23a Worcester Street	23187	Gloucester 23187
Grimsby	H. J. Gresswell & Sons Ltd.	13-15 Osborne Street	2202	
Guernsey	Millard & Co. Ltd. ..	Victoria Road ..	777	Millard Motors, Guernsey
Guildford	E. Pascall (Guildford) Ltd.	11-12 Woodbridge Rd., Guildford.	Guildford 2274/5/6	
Harrogate	H. Aclam (Proprietor H. Baynes).	11 Bower Road ..	5125	
Harrow	Pinks of Harrow ..	Station Road ..	0044/5 Spares 3328	Pink, Harrow
Hatfield	W. Waters & Sons Ltd.	32 Gt. North Road ..	2255	
Hereford	A. Kear & Co. ..	52b Commercial St. ..	2239	Kear, Hereford
Holbeach, Lincs.	G. Woodman	34 Fleet Street ..	3221	
Hornchurch	T. W. Kirby Ltd. ..	10 Roneo Corner ..	8785	
Hounslow	Stanley's Motors ..	46-48 Lampton Road	1949	

B.S.A. MOTOR CYCLE SPARES STOCKISTS—continued.

<i>Town</i>	<i>Name of Stockist</i>	<i>Address</i>	<i>Telephone No.</i>	<i>Telegraphic Address</i>
Huddersfield	Earnshaw	Manchester Road ..	1232	
Hull	Browns (Witham) Ltd.	47-49 Witham ..	29802	
"	Jordan of Hull ..	Story Street	16131	Gumpton Hull
Ilford	J. J. Double (Motor Cycles) Ltd.	14 Mildway Parade Cranbrook Road	Valentine 0191	
Ilkeston	Ray Gamble	Pelham Street ..	3301	
Ipswich	Revetts Ltd.	Clarkson Street ..	3726/7	
Jersey	Colebrooks (J. D. Poingdestre)	1 and 11 New Street	Central 642	Colebrooks, Jersey
Keighley	Dick Ratcliffe	Coldshaw Garage, Haworth.	Haworth 3133	
Kendal	Tom O'Loughlin ..	66 Stricklandgate ..	315	
Kirkcaldy	County Motors (Kirkcaldy) Ltd.	Junction Road ..	Dysart 5631	
Lancaster	Pye Motors	Parliament Street ..	3553	
Launceston	J. Wooldridge & Son ..	Western Road ..	21	Wooldridge Launceston
Leeds	Watson-Cairns & Co. Ltd.	157-8 Lower Briggate	33024/5	Watson-Cairns, Briggate, Leeds
Leicester	E. W. Campion & Son Ltd.	Welford Place ..	58054	
Lincoln	West's (Lincoln) Ltd. ..	116 High Street ..	21262	
Liverpool 7.	Bee Cycle & Motor Co. Ltd.	17-19 Renshaw Street	Royal 6375/6	Bee Cycles, Liverpool
" 3.	Cundles	41 & 61 Byrom Street	Central 4148	Cundles, Central 4148
Llawhaden	James Bowen & Sons	Llawhaden, nr. Narberth, Pem.	Llawhaden 6	
London, E.6	Godfreys Ltd.	220 Barking Road, East Ham.	Grangewood 8088	Gofrabike, Forgate
" N.5	Glanfield Lawrence (Highbury) Ltd	28-32 Highbury Corner	North 2791	
" E.7	Godfreys Ltd.	418 Romford Road, Forest Gate.	Grangewood 1234/5	Gofrabike, Forgate
" E.8	Eleanor Motors ..	275-7-9 Mare Street, Hackney.	Amherst 5134-3923	
" N.12	George Grose Ltd. ..	834 High Road, Finchley.	Hillside 2149	
" N.12	Glanfield Lawrence ..	Junct. Gt. North and North Circular Road.	Finchley 0091	Glanfin Norphone
" N.15	Godfreys Ltd.	94-96 High Road, Tottenham.	Sta. Hill 9960	Gofrabike London
" N.W.1.	J. Grose Ltd.	379 381 Euston Road	Euston 5231	
" N.W.10	Slocombes Ltd.	269 Neasden Lane, Neasden.	Gladstone 3355	
" S.E.11	Writers Ltd.	161-5 Kennington Lane.	Reliance 1362	
" S.E.13	F. Parks & Son Ltd. ..	404 High Street, Lewisham	Lee Green 0535	
" S.E.15	West End Motors Ltd.	171 High Street, Peckham.	New Cross 2589	

B.S.A. MOTOR CYCLE SPARES STOCKISTS—continued.

<i>Town</i>	<i>Name of Stockist</i>	<i>Address</i>	<i>Telephone No.</i>	<i>Telegraphic Address</i>
London, S.E.18	Cleares	1 & 125 High Street, Woolwich.	Woolwich 0174	
"	S.W.6 Claude Rye Ltd. ..	897-921 Fulham Road, Fulham.	Renown 6174	Ryebikes, Walgreen, London
"	S.W.9 Pride & Clarke Ltd. ..	Stockwell Road, Brixton.	Brixton 6251 Ext. 14	Priclarke
"	S.W.11 Owen Bros.	19 Battersea Rise, Clapham Junction.	Battersea 7816/7	
"	S.W.17 Elite Motors (Tooting) Ltd.	951/61 Garratt Lane, Tooting Broadway.	Balham 1200	Elite Motor Toot London
"	W.1. Godfreys Ltd.	208 Gt. Portland Street	Euston 4632/4	Gofrabike, London
"	W.3 Whitby's of Acton Ltd.	273 The Vale, Acton	Sh. Bush 5355/6	
"	W.5 Kays of Ealing	8-10 Bond Street ..	Ealing 2387	Sparesokay, Ealux London
"	W.12 Turners Stores	81-83 Goldhawk Road, Shepherds Bush.	Sh. Bush 2436	
Lowestoft	R. Wright	67-69 London Rd. S'th.	645	
Macclesfield	A. Watling	49 Buxton Road ..	3592	
Maidstone	Redhill Motors (Maidstone) Ltd.	The Broadway ..	3096	
Manchester	Tom Davies (Motors) Ltd.	233 Deansgate ..	Blackfriars 0681	
"	Fred Fearnley Ltd.	692-4 Ashton Old Road	East 1445/6	Fernbike Manchester
"	Alex Parker	31 Palatine Road, Northenden.	Wythenshaw 2062	
Mansfield	Henstocks	128 Chesterfield Rd.	329	Henstock 329 Mansfield
Middlesbrough	J. T. Dickinson (Middlesbrough) Ltd.	160-162 Lindthorpe Rd.	3861	Payacob Middlesbrough
Neath	Fred Rist	16 Windsor Road ..	780	
Newcastle-on-Tyne	Dene (Newcastle) Motor Co. Ltd.	Haymarket	N'castle 2-9165/6	Ened, N'castle on-Tyne
Newton Abbot	J. E. Green & Co.	87 Queen Street ..	653	
Newport (Mon.)	R. J. Ware & Sons	69 Commercial Street	66206	
Northampton	P. C. Spokes & Son	1 Henry Street ..	1160	
Norwich	Chapmans (Norwich) Ltd.	38-42 Duke Street ..	24727	
Nottingham	E. W. Campion & Son Ltd.	Queens Road ..	83444	
Oswestry	Roy Evans	Willow Street ..	Oswestry 1144/5	
Oxford	H. F. Temple	69 High Street, St. Thomas.	2485	
"	John Avery	228/230 Banbury Road	57362/3	
"	Faulkener & Son	12 Cardigan Street ..	57279	
Parkstone	Bob Foster	472-4 Ashley Road ..	3500	
Perth	M. Shaw & Sons	143 High Street ..	483	
Peterborough	Burrows Bros.	55-57 Westgate ..	2154	

B.S.A. MOTOR CYCLE SPARES STOCKISTS—continued.

<i>Town</i>	<i>Name of Stockist</i>	<i>Address</i>	<i>Telephone No.</i>	<i>Telegraphic Address</i>
Plymouth	P. Pike & Co. Ltd. ..	Millbay Road ..	63018	Piko, Plym'th
Pontardulais	T. Griffiths	Forest Garage ..	323	
Portsmouth	Jenkin & Purser ..	277-281 Copnor Road	2339	
"	Glanfield Lawrence ..	147-151 Fratton Road	74331	
Preston	Loxhams Garages Ltd.	Central Garage, Charnley Street, Fishergate.	Sales Dept. 4242 S'vice Dept. 4243	Loxhams Preston
Pulborough	Gray & Rowsell ..	Bury Gate	Bury 4	
Radcliffe	Will Lord	115 Blackburn Street	2002	
Reading	Phillips & Bloomfield Motors Ltd.	10-24 South Street ..	2635	
"	Stocker & Shepherd ..	Waylen Street and 131 Oxford Road.	2212-3983	
Redhill	The Redhill Motor and Cycle Works Ltd.	50 Brighton Road ..	327	
Rotherham	Ernest Cross	55 Drummond Street	3987	
Salisbury	Pankhurst (Weymouth) Ltd.	78 Exeter Street ..	5222/3	
St. Helens	Geoff. Duke Ltd. ..	Greenfield Road Garage.	3918	
St. Ives, Hunts.	Hallens (Hunts.) Ltd.	8-10 The Broadway ..	3071	Hallens, St. Ives
Scarborough	E. Andrew	Roscoe Street ..	1857	
Sevenoaks	Angus Motor Cycles ..	Station Parade ..	3338	
Sheffield	Walter Wragg Ltd. ..	Stanley Works, Wellington Street.	26098	Sheffield 26098
Shrewsbury	J. R. Meredith ..	Coleham Head ..	6529	
Sittingbourne	Scoones' Garage ..	9 West Street ..	66	Scoones, Sittingbourne
Slough	Sid Moram	Wexham Corner, High Street.	23767	
Southampton	Alec Bennett Ltd. ..	152 Portswood Road	54081/2/3	
Southport	H. F. Brockbank ..	62 King Street ..	5054	
Southsea	Percy Kiln	65 Elm Grove, Southsea	Portsmouth 4793	
Stockport	Theobald & Coppock ..	6 Chestergate ..	2843	Theobald, Coppock, Stockport
Stoke-on-Trent	J. & N. Bassett ..	Howard Place, Shelton	2890	
Stourbridge	Pearson's Cycle Depot	31 Market Street ..	5677	
Sunderland	Dunns Garage Ltd. ..	Wheatsheaf Corner, North Bridge Street.	57666	
Swansea	Handel Davies Ltd. ..	230 Oxford Street ..	50311	
Swindon	Easters of Swindon ..	73-75 Cricklade Road	4196	
Taunton	W. P. Edwards (Motors) Ltd.	58 East Street ..	2943	Edwards Motor Cycles, T'ton
Thames Ditton	Comerfords Ltd. ..	Oxford House, Portsmouth Road.	Emberbrook 5531	
Torquay	P. H. Sharam Ltd. ..	244-6 Union Street ..	4184 & 7255	
Troon	Cooper Bros.	125-129 Temple Hill	925	
Truro	W. H. Collins	Kenwyn Mews ..	Truro 2168	

B.S.A. MOTOR CYCLE SPARES STOCKISTS—continued.

<i>Town</i>	<i>Name of Stockist</i>	<i>Address</i>	<i>Telephone No.</i>	<i>Telegraphic Address</i>
Tunbridge Wells	G. E. Tunbridge Ltd...	21 London Road ..	416	Motors T'bridge Wells
Twickenham	C. A. Blay	192 Heath Road ..	Popesgrove 2103 & 1435	
Uxbridge	J. H. Miles Ltd. ..	60 High Street ..	6000	
Wakefield	Parkinson (Wakefield) Ltd.	38-40 Ings Road ..	2087	
Walsall	The Motor Cycle Mart	12 Ablewell Street ..	3363	
Warrington	Jack Frodsham Ltd. ..	37a Winwick Street ..	34713	
Watford	Lloyd Cooper & Co. ..	61 Queens Road ..	2125	Lloyd Cooper, Watford
Westcliff-on-Sea	J. Costin & Sons ..	233-5-7 London Rd.	Southend 42215	
Weston-super-Mare	Wyverns of Weston Ltd.	3 Locking Road ..	524	Wyverns, Weston-s-M.
Weybridge	W. L. Lewis & Sons ..	51 Church Street ..	2210	
Weymouth	Tilleys	9 Frederick Place ..	72	
Whitehaven	Mark Taylor	21 King Street ..	252	
Wolverhampton	C. E. Cope & Sons ..	168-9 Stafford Street	24605/6	
Worcester	W. J. Bladder & Son	52 Sidbury	2438	Bladder, Sidbury, Worcester
Worksop	Ezra Sugden Ltd. ..	109 Gateford Rd. ..	3053	
Worthing	Gray & Rowsell ..	56 Broadwater Street (West).	1224	
Yeovil	The Yervil Motor Mart	Hendford	267	Motor Mart, Yeovil
York	C. S. Russell (York) Ltd.	Lawrence Street ..	23793	Russell, L'rence St., York

