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INSTRUCTION BOOK

FOR ALL

1939 MODELS

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SUNBEAM
MOTOR CYCLES

(Proprietors: ASSOCIATED MOTOR CYCLES LIMITED)

PLUMSTEAD, LONDON, S.E.18

15th Edition.

R. COTTON.
20, SILVERHALL ST.
ISLEWORTH,
MIDDX.

DRIVING & ADJUSTMENT INSTRUCTIONS FOR

1939 SUNBEAM MOTOR CYCLES

STANDARD O.H.V. MODELS.

Model.		Bore.		Stroke.		
B23,	250	62.5 m.m.		80 m.m.		246 c.c.
B24,	350	69 m.m.		93 m.m.		347 c.c.
B25,	500	82.5 m.m.		93 m.m.		498 c.c.
B28,	600	90.48 m.m.		93 m.m.		598 c.c.

SPORTS O.H.V. MODELS.

B23/S, 250	62.5 m.m.	80 m.m.		246 c.c.
B24/S, 350	69 m.m.	93 m.m.		347 c.c.
B25/S, 500	82.5 m.m.	93 m.m.		498 c.c.

COMPETITION O.H.V. MODELS.

B23/T, 250	62.5 m.m.	80 m.m.		246 c.c.
B24/T, 350	69 m.m.	93 m.m.		347 c.c.
B25/T, 500	82.5 m.m.	93 m.m.		498 c.c.

LION LONGSTROKE SIDE VALVE MODELS.

B29,	500	77 m.m.	105.5 m.m.	492 c.c.
B30,	600	85 m.m.	105.5 m.m.	598 c.c.

ISSUED BY THE MANUFACTURERS

SUNBEAM MOTOR CYCLES

(Proprietors: ASSOCIATED MOTOR CYCLES LIMITED)

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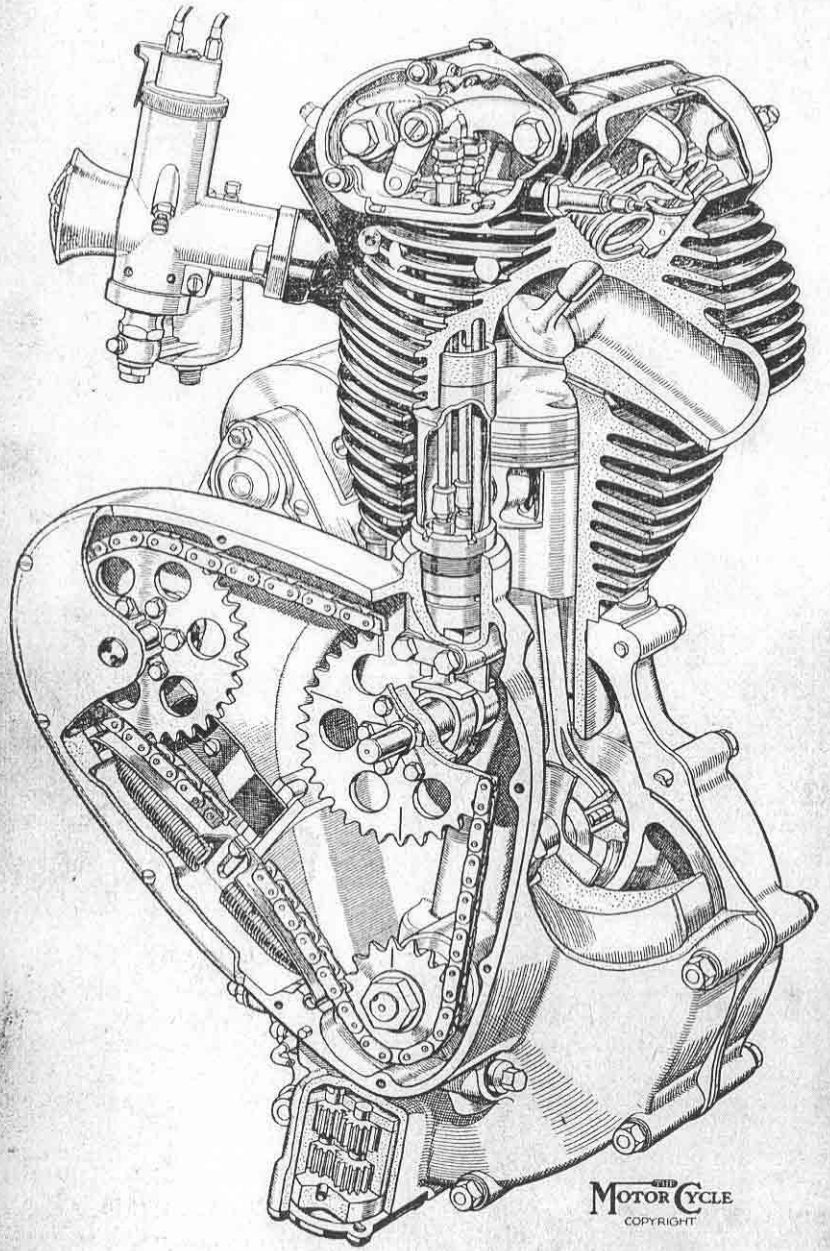


Illustration 1.
An " exploded " view of the 500 c.c. 1939 O.H.V. SUNBEAM engine. (250, 350 and 600 c.c. O.H.V. are similar.)

PREFACE.

Motorcycling is one of the most economical and pleasurable modes of transport. It is our sincere wish that every " SUNBEAM " owner should obtain, from his mount, the service, comfort and innumerable miles of low-cost travel that we have earnestly endeavoured to build into it.

However, it must be remembered, a motor cycle is a highly specialised piece of engineering, and must be treated with reasonable care and consideration. While it does not call for great skill in driving, the exercise of a little mechanical sense, and the occasional use of a spanner, cleaning cloth, etc., is very necessary if the maximum service is to be obtained with the requisite degree of satisfaction.

In the following pages we give, in simple and straightforward language, comprehensive instructions concerning the lubrication and adjustment of those parts likely to require attention. Neglect to make necessary adjustments, or only casual attention to the lubrication of important parts, will soon neutralise the best efforts of the designers, and may bring needless trouble to the owner.

We are always pleased to give " SUNBEAM " owners the full benefit of our wide experience in matters relating to motor cycles of our manufacture. Enquiries of a technical nature should be addressed to the " Service Department " and must necessarily include full particulars of the motor cycle concerned—i.e., engine number, in full (stamped on the driving side of the crankcase, immediately under the cylinder base), frame number and full details of the enquiry.

SPARES LIST.

A very comprehensive priced catalogue of spare parts for all 1939 " SUNBEAM " Motor Cycles is available. It costs one shilling, post paid, and we strongly recommend all owners of 1939 " SUNBEAM " Machines to obtain a copy.

CORRESPONDENCE.

Our routine is organised into different departments, therefore delay cannot be avoided if matters relating to more than one department are contained in one letter.

Consequently it is desirable, when communicating with more than one department, to do so on separate sheets, each of which should bear your name and address. In particular, requests for technical advice should not be on the same sheets as orders for spare parts.

CLAIMS UNDER GUARANTEE.

If it is necessary to make a claim under the guarantee, full particulars regarding the procedure to be adopted is detailed in paragraph 150.

DRIVING.

(1). CONTROLS.

The following controls are provided :—

CARBURETTER	Throttle	Quick action twist grip on the right handlebar. Twist inwards to open throttle.
	Air ...	Small lever on right handlebar. Pull inwards to open air valve.
IGNITION	Advance/Retard	Small lever on left handlebar. Pull inwards to advance ignition on side valve models, pull inwards to retard ignition on O.H.V. models.
VALVE LIFTER (or Decompressor)	...	Short lower lever on left handlebar.
CLUTCH	... ...	Large upper lever on left handlebar.
FRONT BRAKE	... ...	Large lever on right handlebar.
REAR BRAKE	... ...	Foot pedal on left-hand side of machine.
GEARS	... ...	The forward pedal on the right-hand side of the gear box. (See paragraph 4 for gear positions.)
HORN	... ...	Switch on right handlebar.
LIGHTS ...	Main Switch ...	Located in the head lamp. (See paragraph 121 for switch positions.)
	Dip Switch ...	Two-way switch on the left handlebar. This controls the normal and dipped beams.
STEERING DAMPER	...	Knurled ebonite knob on top of steering column. Turn in clockwise direction to increase damping action.
FORK DAMPER	... ...	Knurled ebonite knob on front fork lower front spindle. Turn in clockwise direction to increase the damping action. (Two knobs on Sports and Competition Models.)

(2). FUEL.

For machines fitted with standard pistons we recommend all makes of No. 1 quality Petrol. For machines fitted with high compression pistons use a fuel composed of half No. 1 quality Petrol and half pure Benzol. If an ultra high compression piston is used it is essential to use an Alcohol fuel.

The tap that controls the main fuel feed is of the two-level type. The tap has two knobs, one is round and the other is hexagonal in shape. Pull the round knob to "turn on" the main petrol supply, and, when this is exhausted, if the hexagonal knob is pulled, the reserve contents of approximately half a gallon can be drawn upon. This variety in the shapes of the two knobs enables the tap to be used, with certainty, in the dark. To stop the flow of fuel the knobs should be pushed "In."

(3). A SUGGESTION.

Before attempting to start the engine or to use the machine on the road, a new owner is advised, first of all, to place the machine on the rear stand, sit on the saddle, and become familiar with the position and operation of the various controls. Particular attention should be devoted to the various gear positions as detailed in paragraph 4.

(4). GEAR POSITIONS.

Before starting the engine, make sure the gear is in the neutral, or free, position. Make a habit of always placing the gear in neutral after a run on the machine.

Neutral is indicated by the pointer on the foot change pedal.

Every time the gear foot change pedal is fully depressed a higher gear is engaged and every time the pedal is raised to the limit of its movement a lower gear is engaged. The downward movement is best made with the toe and the upward by the instep.

Burman gear boxes are used on all 1939 "SUNBEAM" Motor Cycles.

The C.P. Box is fitted to all 250 and 350 machines.
The B.A.P. Box is fitted to all 500 and 600 machines.

On all gear boxes the neutral position is between the first (lowest) and the second gears. There are four gear ratios and the fourth is called "TOP."

On ALL GEAR BOXES the gear foot change pedal is raised upward, from the neutral position, to engage first (lowest) gear. Then to engage all the higher gears, the pedal must be pressed downwards, step by step, till, after three movements, the top gear is engaged. The next lower gear can always be engaged by an upward movement and the next higher gear engaged by a downward movement.

(5). STARTING THE ENGINE. (O.H.V. Models.)

(a) Make sure there is enough fuel in the petrol tank.

(b) Inspect the level of the oil in the oil tank (see paragraph 18.)

(c) Make sure the gear is in the neutral position.

(d) Pull "ON" the fuel supply tap.

(e) Place the air control lever in the closed position.

(f) Fully advance the ignition control lever and then slightly slack it back so that the ignition is slightly retarded from the fully advanced position.

(g) Slightly open the throttle by twisting the twist grip inwards not more than one-sixth of its total movement.

(h) Flood the carburetter by depressing the spring plunger in the top, or cap, of the float chamber and holding it down till fuel is seen emerging from the small holes bored in the knurled edge of the cap.

(i) Raise the exhaust valve by lifting the small lower lever on the left handlebar and, while this is kept raised, turn over the engine by depressing the kickstarter crank two or three times.

(j) Then give the kickstarter crank a vigorous downward kick and, when it is almost at the bottom of its movement, release the handlebar exhaust lifter lever, when the engine should commence to fire.

After the engine has started, let it run for a second or two and then open the air lever, a trifle at a time, till it runs evenly. Then, by flicking open the twist grip two or three times, allow the engine speed to increase and decrease in order to clear the combustion chamber and the silencing system of all condensed moisture, which otherwise has a heavy corrosive action on the silencer interior.

Do not let the engine race, neither let it just tick over, but set the twist grip so that it is running at a moderate speed in order to get "warmed up." While it is doing this take the opportunity of checking the oil circulation.

One or two minutes is ample time for starting, warming up and checking the oil circulation. The machine can then be taken on the road.

(6). DECOMPRESSOR. (500 and 600 Lion S.V. Models.)

Set the controls as described above, but with the throttle opened a trifle greater, raise the decompressor lever and revolve the engine by smoothly operating the kickstarter, when it should commence to fire. The lever must remain raised until the engine is running evenly.

Do not attempt to force the decompressor into position when the engine is stationary, as should the engine have come to rest at the beginning of the exhaust lift stroke, the decompressor cam cannot be moved. When this occurs the lever should be lightly held up and the engine moved by means of the kickstarter.

Do not use the decompressor control to regulate the speed of the machine.

This device is only to be used for starting.

(7). STOPPING THE ENGINE.

To stop the engine, close the throttle, raise the small lower lever on the left handlebar (exhaust lifter lever) and keep it raised till the engine has ceased to revolve.

(8). ON THE ROAD.

With the engine running, sit astride the machine, free the clutch by pulling up the large lever on the left handlebar, gently move the machine forward till the rear stand is released, and then engage the lowest gear. (See paragraph 4).

If, at first, the lowest gear will not engage after the clutch has been freed, release the clutch lever and, after a second or so, make another attempt. This condition may exist in the case of a new machine but it tends completely to disappear after some little use.

Next, slowly release the clutch handlebar lever, when the machine will commence to move forward. Guard against having the engine speed too high when first engaging the clutch and regulate the speed, as required, by moving the twist grip.

When well under way, disengage the clutch, slightly close the throttle, engage second gear, release the clutch lever and open up the throttle to increase the speed. Repeat these operations in order to engage third and top gears, respectively.

Immediately the machine is well under way the ignition should be fully advanced and it should be left in that position unless it is necessary to retard it to ease the engine. Never run for any considerable distance with the ignition retarded.

Always endeavour to make the movements of hand (on the clutch) and foot (on the gear pedal) as simultaneous as possible, but remember in all gear changes, a steady pressure of the foot is desirable, and this pressure should be maintained until the clutch lever is fully released. It is not sufficient to just jab the foot pedal and then release the clutch lever.

When actually in motion, it will be found sufficient merely to free the clutch a trifle to ease the drive when changing gear, and, with reasonable care, changes of gear can be made without a sound.

Avoid letting the engine race when changing gear. Normally, the movements of the clutch lever and the foot pedal are too quick to permit any appreciable rise in engine revolutions, but, until this stage of efficiency is reached, the beginner is advised to slightly close the throttle when making a change, because by suddenly engaging the clutch while the engine is racing an enormous load is imposed on both gears and chains.

When, by reason of travelling slowly in top gear, such as may be caused by traffic conditions, or by reason of travelling up a hill, the engine commences to labour, it is necessary to change to a lower gear in order to lessen the strain on the engine and transmission. A good driver is able to sense such conditions and will make the change before the engine has reached the stage of distress. Remember the gear box is provided to be used, and full use should be made of the lower gears in order to obtain effortless running and hill climbing.

Avoid slipping the clutch to control the speed.

(9). STOPPING.

To stop the machine, close the throttle, declutch by lifting the large lever on the left handlebar, and gently apply both brakes, increasing the pressure on them as the speed of the machine decreases.

Place the gear foot change pedal in the neutral position before releasing the clutch lever.

Stop the engine (see paragraph 7), and before leaving the machine turn off the fuel supply, because, should the carburetter flood while the machine is stationary, there is a possibility of neat petrol entering the cylinder via the inlet port.

When this occurs there is risk of fire and a real danger of the oil thinning with the consequent risk of engine seizure.

(10). RUNNING IN.

Driving on full throttle should be avoided for the first five hundred miles. A speed of thirty miles per hour should not be exceeded during this period, the engine should not be allowed to labour (so use the gear box) and it should not be allowed to attain a high rate of revolutions on the lower gears or in neutral.

After this initial "running in," short speed bursts are permissable, but it is recommended not to indulge in extended high speeds until at least a thousand miles have been covered.

At the conclusion of the first one hundred, and five hundred, miles, the adjustment of tappets, chains, brakes, contact breaker, wheel bearings, fork spindles and steering head bearings should be checked, and corrected if necessary. After the initial settling-down process, attention to such details will only be necessary at very infrequent intervals.

(11). "DON'TS."

DO NOT race the engine unnecessarily or let in the clutch sufficiently suddenly to cause the rear wheel to spin. Take a pride in making a silent, smooth get-a-way.

DO NOT use the brakes with violence. Brake early and drive on the throttle instead of the brakes.

DO NOT allow the engine to labour on a high gear on a steep gradient. Remember that an easier, faster and better ascent can be made on the next lower gear.

DO NOT force the engine, or drive above a maximum speed of 30 m.p.h. for the first 500 miles. Mention is made of this because of the natural desire of an owner to ascertain his new mount's maximum capabilities. Therefore, until all the bearings are well "run in," it is advisable to refrain from speed bursts with the accompanying possibility of seized bearings, piston rings, etc. The first 500 miles of an engine's existence is far more important than the next 5,000.

DO NOT race the engine in neutral gear position, accelerate violently from a standstill, or drive at full speed on open throttle when in a residential district. Any motor vehicle, when driven in such a manner, creates abnormal noise. In the interests of all motorists we earnestly implore every "SUNBEAM" owner studiously to refrain from any of the practices enumerated, or any calculated to cause annoyance to the public in general. Recollect that the degree of silence of your motor cycle is not judged by the actual noise it is making, but by comparison with other noises present. For example, in a busy street your motor cycle might be inaudible, while in a quiet narrow street of high buildings it might be heard for several hundred yards, although, in each case, being driven in exactly the same manner.

LUBRICATION.

(12). LUBRICATION.

Efficient lubrication is of vital importance, and it is false economy to use cheap oils and greases. The cost of exclusively using the best and most suitable lubricant will be repaid many times by long wear and good service.

We recommend the following oils and greases for use in "SUNBEAM" Motor Cycles:—

ENGINE LUBRICATION.

In Summer: Patent Castrol "XXL."
Golden Shell "Extra Heavy."
Mobiloil "D."
Essolube "Racer."
Motorine "B de Luxe."

In Winter: Patent Castrol "XXL."
Golden Shell "Extra Heavy."
Mobiloil "BB."
Essolube "Racer."
Motorine "B de Luxe."

The oils mentioned above flow freely when cold and, at the same time, have good heat resisting properties.

GEAR BOX LUBRICATION AND ALL FRAME PARTS USING GREASE.

Castrolease "Medium."
Shell "Retinax" Grease.
Mobilgrease "No. 2."
Esso Grease.
Belmoline "D."

When buying oils and greases it is advisable to specify the brand as well as the grade, and, as an additional precaution, to buy only in sealed containers or from branded cabinets.

(13). ENGINE LUBRICATION SYSTEM.

The engine is lubricated by the DRY SUMP system, the main bulk of oil is carried in a tank, and the pump forces the oil through to the various parts requiring lubrication. The oil then drains into the crankcase sump, from which it is extracted and returned to the oil tank by the pump. This process is continuous while the engine is revolving, and, because the oil pump is capable of exhausting a greater amount of oil than it is capable of injecting into the engine, the crankcase sump is kept free of excess oil.

(14). ENGINE OIL CIRCULATION. (All O.H.V. Models.)

Oil is fed by gravity from the tank to the pump, which is situated in the base of the timing gear case, a portion of the case forming the oil pump housing.

The top left-hand panel of the illustration on Page 12 shows the oil pump in diagrammatic form.

A spiral, cut on the outer end of the timing side flywheel axle "A," engages with a similar gear cut on the upper end of an almost vertical shaft "B." This shaft has a groove cut in it, and a small guide screw "C" enters this groove and so locates the shaft.

The lower end of the shaft "B" is slotted to engage with the top dog that forms a part of the oil pump gear "D." This gear also engages in the idle gear "E," and the two rotate under the influence of the rotation of the vertical shaft. These two gears rotate in a very close fitting housing, and the action of rotation forces oil out of the housing (to which it is fed by gravity) into the various channels provided in the engine.

Upon reference to the lower illustration on Page 12 it will be seen that after the oil leaves the pump it passes through:—

(a)—A ball valve.

(b)—A channel to the timing side flywheel axle bush and and ball bearing, and from there:—

(c)—Through the centre of the timing side flywheel axle and flywheel to the crankpin bearing, the splash from which passes into the interior of the cylinder.

(d)—A ball valve to a channel cut round the lower part of the cylinder, and from that channel, through holes drilled in the cylinder, to provide an additional feed for the piston, gudgeon pin, and gudgeon pin bush, the surplus falling into the flywheel chamber, or sump. This arrangement functions particularly at high engine speeds.

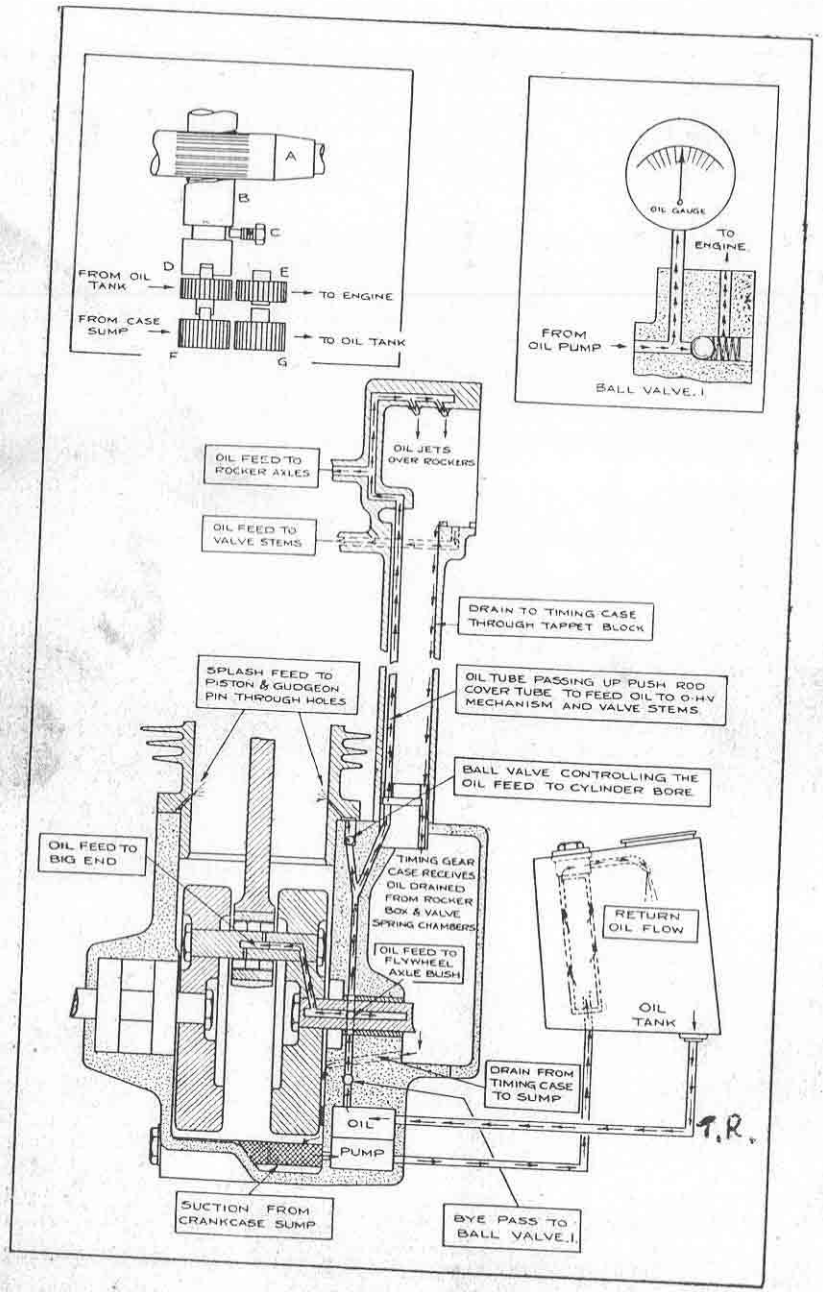


Illustration 2.

(e)—An oil pipe located inside the push rod cover tube to the cylinder head, in which are channels leading to the rocker axle bushes and to two jets located over the rocker arms, so that the ends of the arms and the tops of the push rods are kept bathed in oil. The surplus drains into the rocker arm chamber which has a tray-shaped base, and the oil trapped in this base is led to the valve guides. All oil that is not necessary to fill the tray-shaped base overflows and falls down the push rod cover tube into the timing gear case, lubricating the tappets in its passage. The oil builds up to a predetermined level in the timing gear case, to lubricate the timing gear chain, and all the surplus overflows through a hole between the timing gear case and the flywheel chamber into the flywheel chamber.

(f)—A channel leading to the oil pressure gauge. (Not on Competition Models.)

Owing to the high rate of revolutions, the interior of the crankcase, the timing gear case and the cylinder space under the piston, is always full of oil mist when the engine is running. This oil mist adequately lubricates the gudgeon pin and bush, the camshaft and magdyno driving shaft bearings and the driving side mainshaft bearings.

It will be noted that all surplus oil finally drains into the flywheel chamber. From here the oil pump pinions F and G, which are rotated by an extension on the oil pump pinion D, extract the oil. The oil first passes through a strainer, then passes through the pump, and is then returned to the oil tank, passing, on its way, through a felt filter cartridge that is located in the tank. After passing through the felt filter the oil emerges from a spout, situated just inside the oil tank filler orifice, and from there it falls into the tank, rejoining the main bulk of oil.

This circulation continues as long as the engine is rotating.

The oil pump is so designed that it is capable of injecting into the engine a smaller amount of oil than it is capable of exhausting from the flywheel chamber, from which it will be readily understood the flywheel chamber is kept dry of free oil. Because of the greater exhausting capacity of the pump the return flow, which can be inspected by removing the oil tank filler cap, is normally intermittent, and, from time to time, will be full of air bubbles. The only exception to this condition is that prevailing when the engine is started up after remaining idle for some time. In that condition, all surplus oil has condensed and had time to settle in the flywheel chamber, so that, upon starting the engine, there is a good supply of oil for the exhaust part of the pump to draw upon and the return flow, for a short

time, is steady and constant. That is the best time at which to inspect the return flow to ascertain if the oil circulation is functioning correctly and therefore, it is advisable, immediately after starting the engine, to check the circulation and to do this once every day. The opportunity should also be taken to observe the amount of oil in the tank, and, if necessary, fresh oil should be added to bring the level not lower than the half-way mark indicated on the outside of the tank.

The internal oil channels are all arranged to pass a predetermined amount of oil so that no external adjustment is provided other than that to the inlet valve guide and stem. That adjustment is made by a needle pointed screw in the cylinder head, located in the right-hand side of the head and locked in position by a nut. This adjustment is carefully set during the road tests, and we advise it should not be altered unless for some very good reason. In the case of a new machine, an oiled-up sparking plug and/or a smoky exhaust generally indicates this valve is passing too much oil and it should be screwed further into the head, a trifle at a time, till the symptoms disappear. On the other hand, a squeaky inlet valve indicates the oil valve is not passing enough oil, in which case it should be unscrewed a trifle. Very little movement of the needle screw is required to make a large difference in the amount of oil it can pass, and the approximate correct setting is half a turn open from the fully closed position.

The oil feed to the exhaust valve guide and stem has no adjustment. This feed is so arranged that fresh oil " bathes " the valve stem, and all surplus is immediately returned to the rocker box chamber, from which it drains into the timing gear case. This arrangement prevents any tendency there might be for the oil to be burnt by the hot valve stem, and so block the oil passage.

(15). ENGINE OIL CIRCULATION (ALL SIDE VALVE MODELS.

In the main, the oil circulation of the Lion Longstroke Side Valve Models is similar to that on all O.H.V. Models, except of course, for the overhead valve and rocker channels, and no felt filter is fitted in the oil tank. (A metal gauze filter is used.)

Crankcase pressure forces a certain amount of oil mist into the valve chamber, thereby ensuring lubrication of the valve stems and guides, and the surplus drains into the timing gear and lubricates it.

The oil is filtered at two points before entering the engine: (a) in the tank where the feed pipe is connected, and (b) at the front of the timing gear behind the screwed connection. These filters are easily accessible, and should be taken out and cleaned when the lubrication system is periodically drained and replenished.

Care must be exercised when removing the front filter, as the spring and ball which prevent oil syphoning into the engine when stationary are accommodated in the same housing, and these parts may spring out of position and get lost.

A third strainer is fitted in the sump to ensure a clean supply of oil being returned to the tank, and this filter is an integral part of the sump plug.

(16). ENGINE OIL CONNECTIONS.

On all O.H.V. models, three banjo pins are threaded into the oil pump housing to accommodate oil pipes. The top right pin takes the pipe that leads oil from the oil tank to the engine (the feed pipe). The top left pin takes the pipe that leads oil from the exhaust side of the pump back to the oil tank (the return pipe). The small bottom pin takes the oil pipe that leads to the oil pressure gauge. (Not used on Competition Models.)

On all Side Valve models the feed pipe is the upper of the two pipes, and the return pipe is the lower; while the lead to the oil pressure gauge is taken from a banjo pin screwed into the front of the oil pump housing. (Front of the timing gear case cover.)

(17). TO REMOVE THE OIL PUMP ON O.H.V. MODELS.

First, place a tray under the engine in which to catch whatever free oil may be released.

Next, remove the cap at the bottom of the oil pump housing. This is retained by four cheese headed screws, and there is a composition washer between the timing gear case and the cap.

Four cheese headed screws will then be noticed at the bottom of the oil pump casing, two with heads larger than the others. The two screws with the larger heads should be unscrewed until they are quite free and then, if before completely withdrawing these screws they are held together so that they bind in their accommodation holes in the pump casing, this action will provide sufficient grip on the pump casing to allow the complete pump to be withdrawn from its housing.

Having removed the oil pump it may be completely dismantled by merely removing the two remaining screws. The pump consists of a barrel body, a top cap (the thin cap), a bottom cap, a pair of narrow gears (the upper gears of the two pairs), a pair of wide gears and the four screws mentioned above. See illustration 1 for a sectional view of the oil pump.

When the oil pump has been removed from its housing the short vertical driving shaft can be extracted if the guide screw is first removed. (See illustration 2.)

A composition washer is fitted on top of the oil pump.

Oil pump end cap washer, part number, B23-E506, price 1d. each, postage 1½d. extra.

When replacing the oil pump it is only necessary to make sure the top dog on the injecting set of gears is lying in such a position that it can freely enter the slot cut in the bottom of the vertical shaft.

(18). THE OIL TANK. (O.H.V. Models.)

Oil for engine lubrication is carried in the tank situated immediately under the saddle. In use, the level of the oil in the tank should never be allowed to fall below the half-way mark that is indicated on the outside of the tank.

At periods, not greater than every 5,000 miles, the oil tank should be drained, thoroughly washed out with petrol, and then refilled with fresh, clean oil. A drain plug is provided in the bottom of the tank to facilitate this process.

The felt cartridge oil filter is located in the oil tank and on each occasion the engine is decarbonised, or not less frequently than every 1,500 miles, this filter should be removed and thoroughly washed in petrol.

The filter is situated under the hexagon headed cap in the top of the tank. By unscrewing this cap and lifting away the spring and dished washer, which will be found under it, access to the filter is possible in order to withdraw it from the tube in which it fits.

(19). THE OIL TANK. (Side Valve Models.)

The whole system should be drained, the oil tank thoroughly cleaned out and the strainers washed in petrol, every subsequent 5,000 miles of running. The tank should be flushed out with petrol which should be allowed thoroughly to drain away before re-filling the tank.

A drain plug is provided in the bottom of the tank to facilitate this process.

NOTE.—Before the engine is started, the oil feed pipe connection (the upper one at the pump), must be loosened until oil is observed dripping from it, whereupon the nut should be re-tightened. This action is necessary to prevent an air lock in the lubrication system.

(20). OIL GAUGE.

An oil guage is fitted to all models and is mounted in the top panel of the petrol tank. This gauge indicates whether the oil system is functioning satisfactorily. If the pointer remains at zero when the engine is running, immediate investigation into the cause is necessary.

When the engine is cold, and the oil is consequently thick, a high reading will be given by the pointer, but, after the unit has warmed up and the oil becomes thin, the reading will fall and may vary between 15 and 30 lbs.

(21). CHECKING OIL CIRCULATION.

Provision is made to observe the oil in circulation, and it is advisable to do this before each run.

If the filler cap is removed, the returning oil can be seen running from the small spout just inside the filler cap orifice. This check should be made immediately after starting the engine from cold. This is because, while the engine is stationary, oil from all parts of the interior of the engine drains back into the crankcase sump, so that until this surplus is cleared, the return flow is very positive and continuous. Therefore, if the oil circulation is deranged, the fact is apparent at once, by the lack of a steady return flow.

It should be remembered that normally the return flow is somewhat spasmodic and mixed with air bubbles. This is partly due to the fact the return portion of the oil pump has greater pumping capacity than that delivering fresh oil, and partly due to the variations in the amount of oil in suspense in the crankcase according to the engine speed. For example, upon a sudden acceleration, the return flow may completely cease for a time, only, of course, to resume at a greater rate than normal upon deceleration.

(22). POINTS TO REMEMBER.

Clean the oil filter as detailed in paragraphs 14 and 18, and, if necessary, replace with new. A dirty or choked filter will inevitably cause heavy oil consumption.

Make sure the oil tank has an ample supply of oil. The level should not be less than the half-way mark indicated on the outside of the oil tank, nor more than within one inch from the top of the filling orifice.

Before each run check the operation of the oil in circulation, by inspection through the oil tank filling orifice.

In the lower part of the driving side of the crankcase (on O.H.V. Models), a hexagon headed screwed plug will be noticed. This has a metal gauze strainer attached to it and all the oil that is returned to the oil tank passes through it. On those occasions when the oil tank is cleaned out this strainer should be withdrawn from the crankcase and cleaned with petrol.

(23). GEAR BOX LUBRICATION.

All mechanism inside the gear box is lubricated with grease.

Grease may be inserted through the round screwed plug mounted on the top edge of the kickstarter case cover.

The gear box must not be entirely filled with grease, and, under normal conditions, the addition of about two ounces of grease every 1000 miles will be sufficient.

In no circumstances must heavy grease be used for gear box lubrication.

(24). FRONT CHAIN LUBRICATION (O.H.V. Models).

The primary chain runs in an oil bath case. The inspection cap orifice in the chain case determines the correct oil level, and it is imperative that the level is not allowed to fall lower than about 3/16in. below the height of the bottom edge of this orifice. Add engine oil to maintain this level. It is advisable to check the oil level each week because failure to maintain it will result in rapid chain wear with the possibility of total destruction.

(25). FRONT CHAIN LUBRICATION (S.V. Models).

All models are fitted with an oil bath front chain case, and it will be noted that, in addition to a drain plug, an oil level plug is fitted to the front of the outer half to enable the rider to maintain the correct oil level. Use engine oil in the chaincase. It is necesary to check the level frequently, and add oil if required, because some of the oil is used for rear chain lubrication.

Rear Chain Lubrication. (When chain case is fitted.)

The rear chain is automatically lubricated by oil that is trapped in a reservoir in the front chaincase and led through a needle valve on to the lower run of the chain. This supply can be adjusted by slackening off the lock nut on the needle valve and screwing the valve out to increase the oil flow or inwards to decrease it. Make sure the lock nut is suitably tightened after making an adjustment. It is invariably found that the correct setting is approximately one complete turn from the fully closed position.

Rear Chain Lubrication. (When rear chain case is not fitted.)

The rear chain should be removed every 1,500 to 2,000 miles in Summer, and every 1,000 miles in Winter, and thoroughly washed in paraffin. After removing the paraffin by draining and wiping with a rag, it should be immersed, for several minutes, in a bath of molten tallow, or, as a poorer substitute, ordinary engine oil. If the latter is used, the chain should be laid in soak overnight in order to ensure penetration to all joints. If treated in this manner the maximum miles of satisfactory service will be obtained.

(26). HUB LUBRICATION.

The hubs are packed with grease when first assembled. This prevents the entry of mud and water, as well as lubricating the bearings. A small quantity of grease should be injected through the angular grease nipple in the centre of each hub shell every 500 miles.

It should be remembered that if too great a quantity of grease is injected there will be a tendency for some of the surplus to work into the brake drum, and the brake efficiency will be considerably reduced.

(27). FORK SPINDLE LUBRICATION.

To maintain an efficient front fork action, it is essential the fork spindles receive adequate lubrication. Two grease nipples are fitted in the fork girder, two are fitted in the fork crown, and one is fitted in the top lug, in front, on the steering stem. Grease should be injected through these nipples every 500 miles, until it is seen to exude from both ends of each bearing. This surplus should then be wiped off.

(On side valve models there are four grease nipples in the fork girder, two in the fork crown, and two in the clip lug on the top of the steering column).

(28). STEERING HEAD BEARING LUBRICATION. (O.H.V. Models.)

A grease nipple is fitted in the head lug of the main frame to lubricate the bottom steering head bearing, and another nipple is fitted to the head clip, at the top of the steering stem, to lubricate the top bearing. These bearings require very little grease, and only a small quantity should be injected every 1,000 miles.

Steering Head Bearing Lubrication. (S.V. Models.)

The steering head races are packed with grease on assembly, and this lasts for a considerable period. Immediately under the transfer on the head lug will be noticed a small cheese-headed screw, upon removal of which a few drops of oil can be inserted. Normally this is necessary every 1,000 miles.

(29). BRAKE CAM LUBRICATION.

A grease nipple is fitted to each brake cam expander bush, and a very small quantity of grease should be injected every 1,000 miles. Excessive quantities of grease may get on the brake linings. (See warning in Paragraph 26.)

(30). BRAKE ROD JOINT LUBRICATION.

About every 1,000 miles (more frequently in bad weather), place a drop or two of engine oil on each brake rod joint and on the threaded end of the brake rod.

(31). SPEEDOMETER LUBRICATION.

The speedometer driving gear box screws into the front brake cover plate, and on its end is a sunk grease nipple. A small quantity of grease should be injected every 500 miles. No other part of the speedometer requires lubrication.

(32). CONTROL CABLE LUBRICATION.

Control cables are very susceptible to the influence of dryness and rust, and they should be kept flooded out with lubricant. The effect of efficiently lubricating a dry control cable has to be tried to believe the immense difference it causes. In order to do this, we fit in a convenient position, a small metal clip to each control cable. These clips cover small bared patches on the outer casings through which lubricant can be injected by means of a specially constructed oil gun. (Special oil gun, for control cables. Part number B.G.G., price each 5s. 9d., postage 4d. extra.) This gun is not supplied with the standard tool kit.

The operation of flooding a control cable only takes a few minutes. It is necessary to slide the clip along the casing to enable the gun to be clamped to the casing so that the bared patch occupies a central position on the rubber pad that is on the nozzle of the gun. The clamping pressure is provided by the large, milled-edge disc just under the rubber pad. The screwed plunger of the gun is then given a few turns (in a clockwise direction), which action forces oil through the metal spiral of the outer casing, and floods the entire length of the cable with lubricant.

Avoid oiling the ignition control cable to excess, because, if this is done, there is a danger of oil collecting inside the contact breaker cover and thereby causing misfiring.

To fill the oil gun, unscrew the barrel from the end cap nearest to the nozzle. Unscrew the operating handle as far as it will go and then pour the lubricant into the barrel. (Engine oil or a very light grease may be used). Then replace the end cap and nozzle assembly and the gun is ready for use.

(33). CONTROL LEVER LUBRICATION.

A drop or two of engine oil should be placed on all the moving parts of the various control levers every 1,000 miles.

(34). BRAKE PEDAL LUBRICATION.

A grease nipple is provided in the heel of the foot brake pedal to lubricate the bolt and bush on which the pedal is hinged. a small quantity of grease should be injected every 1,000 miles.

(35). MAGDYNO LUBRICATION.

The magdyno bearings are packed with grease during assembly, and at least once every 10,000 miles the magneto should be dismantled for cleaning, adjustment and repacking the bearings with grease. This is preferably carried out at a Lucas Service Station.

(36). DYNAMO LUBRICATION. (Lucas Magdyno.)

The bearings are packed with grease during assembly, and at least once every 10,000 miles, the dynamo and magneto units of the magdyno should be dismantled for cleaning, adjustment and repacking with grease. This is preferably carried out at a Lucas Service Station.

In addition, a lubricator is provided in the end of the brush gear cover, in which a drop or two of thin oil should be inserted every 500 miles.

(37). FILLING THE GREASE GUN.

The standard grease gun consists of a barrel having a spring loaded end cap, to which is fixed a centre steel piston in the shape of a long rod. This piston fits into a small cylinder made in one with the screwed top cap, on the end of which is the cupped nozzle that fits over the grease nipples. In the barrel of the gun, and sliding on the central piston rod, is a cork piston.

The grease must be filled on the TOP of this cork piston. The gun may be filled with grease by inserting the grease in the barrel of the gun by means of a lath or similar "spoon." However, it is better to obtain the grease packed in the special containers that are supplied, having loose collars in which are holes so that, by placing the barrel of the gun over the hole in the central floating plate and pressing downwards, the gun is instantly charged with grease. Twisting the gun, and, at the same time, taking it away from the floating plate, leaves the top of the gun barrel flush with grease, and then all that remains to be done is to replace the screwed top cap.

(38). SPECIAL.

In addition to the parts mentioned in the preceding paragraphs, there are several parts of a motor cycle that have a very small moving motion which can, with benefit, be lubricated. Among these are the bolts on which the front and rear stands hinge. It is advised occasionally to remove these bolts and lightly smear them with grease before refitting.

Because grease prevents the entry of water, it is advisable, during the wet season, to smear grease round the contact breaker cover and the high tension pick-up on the magdyno.

MAINTENANCE.

(39). TO REMOVE AND REPLACE THE PETROL TANK.

To remove the petrol tank proceed as follows :—

Remove the two finger nuts on the under side of the tank that retain the oil pressure gauge. This will allow the gauge to be lifted upwards from the tank so that, by using a spanner on the oil pipe union nut, the pipe can be disconnected and the gauge taken away. (Note that Competition Models do not have an oil gauge.)

Remove the petrol feed pipe, drain the petrol from the tank, remove the petrol connection pipe and the two bolts, rubber pads and washers that retain the front of the tank to the main frame. (Nuts instead of bolts, on side valve models.)

Take out the bolt that retains the front of the saddle to the main frame, swing the saddle upwards out of the way, and remove the bolt, rubber pads and washers that secure the rear of the tank. (Nut, instead of bolt, on side valve models.)

This leaves the tank free to be taken away.

To replace the petrol tank, reverse the procedure described above.

(40). TO REMOVE AND REPLACE THE CYLINDER HEAD ON ALL O.H.V. MODELS.

To remove the cylinder head, first remove the tank, the carburetter, the exhaust pipe, the cap over the inlet valve spring chamber, the tappet inspection cover, and then proceed as follows :—

Remove the bolt that retains the inlet rocker arm to its axle. Insert the special screwed tool in the rocker axle and tap it inwards until the inlet rocker arm is free of its axle and take the arm away. (The inlet valve must be "closed" while doing this.)

Unscrew the ball cups from both long push rods, in turn, and lift the rods away.

Slacken (several turns) the gland nut that secures the push rod cover tube to the crankcase.

Disconnect the exhaust lifter cable from the lever on the handlebar and remove the cable from the clips retaining it to the handlebar and main frame.

Undo the four bolts that retain the cylinder head to the cylinder barrel. Access to the hexagon portions of these bolts can be obtained between the fourth and fifth cylinder fins, counting from the bottom of the cylinder.

Lift the cylinder head to the limit imposed by the top tube of the main frame and then rotate the head about the cover tube axis, in a clockwise direction, till it is clear of the top tube, when it may be taken away. The exhaust lifter cable comes away with the head and the push rod cover tube remains on the crankcase.

When taking away the head, hold it quite horizontal and keep it lifted upwards as far as the frame will permit, otherwise it will not clear the oil feed tube that is inside the push rod cover tube and which leads oil to the passages in the head.

A gasket is fitted between the cylinder head and the barrel, and if, in any way, this is damaged, a new gasket should be used when re-fitting the head.

CYLINDER HEAD GASKETS.

All 250 O.H.V. Models ... Part Number, B23-E4 ... 7d. each.
All 350 O.H.V. Models ... Part Number, B24-E4 ... 7d. each.
All 500 O.H.V. Models ... Part Number, B25-E4 ... 8d. each.
All 600 O.H.V. Models ... Part Number, B28-E4 ... 9d. each.

Postage on one gasket, 3d. extra.

To replace the cylinder head, reverse the procedure described above, taking care to replace the cylinder head gasket, and to see that the lower ends of the long push rods are lying in the cups of the tappets.

When refitting the cylinder head bolts, screw each bit by bit, in turn, until all are fully home.

REPAIRS.

When extensive engine repairs are required, owners of "SUNBEAM" Motor Cycles are strongly advised to send their engine, or complete machine, to the factory, where a special Repair Department is maintained. It is obvious that the manufacturers are in the best position to undertake repairs of that description.

(41). TO REMOVE AND REPLACE THE CYLINDER HEAD ON ALL S.V. MODELS.

To remove the cylinder head, proceed as follows :—

Slacken the nuts on the bolt that retains the front of the saddle to the frame and remove the two nuts that retain the engine steady stays to the two rear bolts on the cylinder head. This will allow the stays to be swung upwards, out of the way.

Remove the sparking plug and unscrew the eight bolts that hold the cylinder head to the cylinder barrel and the head will be free to be taken away.

If the head fixing nuts have a dry, rusted, appearance, it is advisable to soak them thoroughly with paraffin before attempting to unscrew them.

A gasket is fitted between the cylinder head and the cylinder barrel and, if this adheres to either head or barrel, it should be gently eased off. An ordinary table knife is an excellent "tool" with which to do this. If the gasket is damaged it should be replaced with a new one when refitting the head.

CYLINDER HEAD GASKETS.

All 500 S.V. Models ... Part Number, A29-E4 ... 2s. 3d. each.
All 600 S.V. Models ... Part Number, A30-E4 ... 2s. 3d. each.
Postage on one gasket, 3d. extra.

The top face of the cylinder barrel, the face of the cylinder head and both sides of the gasket, must be quite clean before they are refitted.

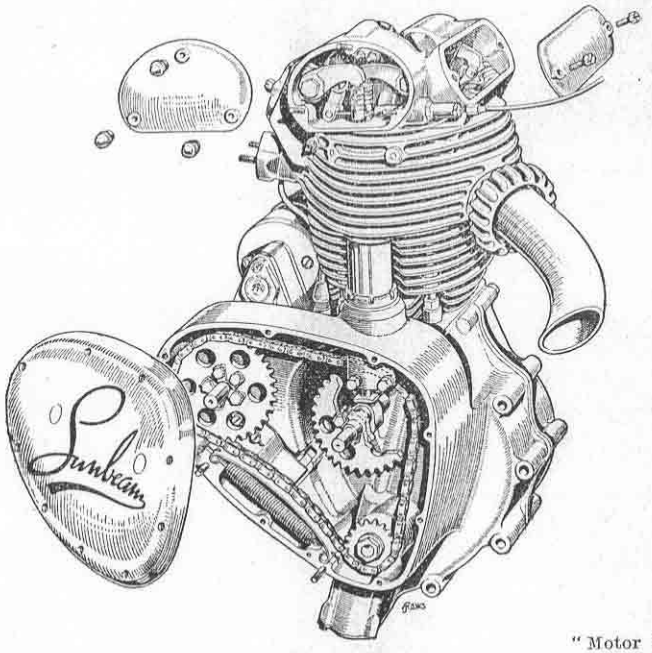
To replace the cylinder head, reverse the procedure described above, taking care to refit the cylinder head gasket and, when replacing the cylinder head fixing bolts, screw each down, bit by bit, in turn, until all are fully home.

To facilitate subsequent removal of the head fixing bolts, it is a good tip to smear the threads with graphite grease.

After the head has been replaced, and after the engine has run for a short time, it is advisable to go round all of the cylinder head fixing nuts, while the engine is warm, because it is most likely all can then be screwed up a bit tighter.

(42). RE-BORING.

Cylinders may be re-bored and oversize pistons and rings supplied at most economical prices as detailed in the spares list.



"Motor Cycling."

Illustration 3.

This shows the 350 c.c. 1939, O.H.V. SUNBEAM engine with the timing gear cover, tappet inspection cover and exhaust valve spring chamber cover removed (250, 500 and 600 c.c. O.H.V. are similar.)

(43). TO REMOVE THE CYLINDER BARREL ON ALL O.H.V. MODELS.

To remove the cylinder barrel, first remove the tank and cylinder head and then proceed as follows :—

Slacken (several turns) the two crankcase top clamping bolts. (The heads of these bolts are on the driving side of the crankcase, just underneath the cylinder.)

The barrel will then be free to be withdrawn from the crankcase. While doing this take care to ensure the piston assembly does not receive damage.

(44). TO REMOVE THE CYLINDER BARREL ON ALL SIDE VALVE MODELS.

To remove the cylinder barrel, first remove the cylinder head and then proceed as follows:—

Remove the petrol feed pipe and the carburetter. Remove the exhaust pipe and the cover over the tappets and valve springs.

Turn over the engine until both valves are closed and then remove the three nuts that retain the barrel to the crankcase. This leaves the barrel free to be taken away. While doing this take care to ensure the piston assembly does not receive damage.

(45). TO REMOVE A PISTON.

To remove a piston, having already removed the cylinder barrel, proceed as follows:—

Fill the throat of the crankcase with rag. Then, using the special pliers, included in the tool kit, compress the two ends of one of the gudgeon pin circlips and extract the circlip from the piston. It is immaterial which clip is extracted, because the gudgeon pin is parallel.

Next, push the gudgeon pin out of the piston, withdrawing it from the side from which the circlip was removed. This action frees the piston from the connecting rod so that it may be taken away.

The gudgeon pin is an easy sliding fit in the piston and the gudgeon pin bush, so that no difficulty should be met in removing it.

(46). PISTONS.

All pistons are grooved to accommodate three rings. The two top rings are of the compression type and the bottom ring is a slotted scraper ring.

Pistons providing standard compression ratios are sold as complete pistons and the various components (bare piston, gudgeon pin, rings) are also sold as separate spares.

All 250, 350 and 500 O.H.V. standard pistons have split skirts. The split should face towards the front of the machine.

All pistons for 500 S.V., 600 S.V. and 600 O.H.V. do not have the skirts split.

For the convenience of "SUNBEAM" owners, all standard piston rings are listed in paragraph 48.

(47). COMPRESSION RATIOS.

Compression ratios are detailed in paragraph 140. All Models, B/23, B/24, B/25, B/28, B/29, B/30 (Standard Models) are equipped with pistons providing Standard Compression Ratios.

Models B/23S, B/24S and B/25S are equipped with pistons providing High Compression Ratios but, included in the kit of each new machine is a piston that will provide a Standard Compression Ratio.

Models B/23T, B/24T and B/25T are equipped with pistons providing Standard Compression Ratios but, included in the kit of each new machine is a piston that will provide a High Compression Ratio.

Pistons can be provided to give an Ultra High Compression ratio on 250 and 350 O.H.V. Models.

(48). PISTON RINGS.

The following rings are for standard compression pistons:—

Rings for 250 O.H.V. Models.

Compression ring, 1/16" wide	DE-11	... 1s. 6d.	each
Scraper ring, $\frac{1}{8}$" wide	38-G2-E111	... 2s. 3d.	each

Rings for 350 O.H.V. Models.

Compression ring, 1/16" wide	D3-E311	... 1s. 6d.	each
Scraper ring, $\frac{1}{8}$" wide	38-G3-E111	... 2s. 3d.	each

Rings for 500 O.H.V. Models.

Compression ring, 1/16" wide	D5-E611	... 1s. 9d.	each
Scraper ring, $\frac{1}{8}$" wide	38-G8-E111	... 2s. 9d.	each

Rings for 600 O.H.V. Models.

Compression ring, 2 m.m. wide	39-B28-E11	... 1s. 9d.	each
Scraper ring, 4 m.m. wide	39-B28-E111	... 2s. 9d.	each

Rings for 500 S.V. Models.

Compression ring, 2 m.m. wide	3151	... 1s. 9d.	each
Scraper ring, 3 m.m. wide	11972	... 2s. 9d.	each

Rings for 600 S.V. Models.

Compression ring, 2 m.m. wide	3035	... 1s. 9d.	each
Scraper ring, 3 m.m. wide	11974	... 2s. 9d.	each

Piston rings for High and Ultra High compression pistons are detailed in the spares list.

(49). TO REMOVE AND REPLACE THE VALVES ON ALL O.H.V. MODELS.

First remove the cylinder head, and then proceed as follows :—

Remove the two screwed plugs on the left hand side of the cylinder head and the cover plate over the exhaust valve springs.

The inlet tappet rocker arm and bolt will have been withdrawn during the process of removing the cylinder head.

It is desirable to remove one rocker assembly and valve at a time in order to avoid the possibility of interchanging the parts.

Then, to remove the inlet valve and springs :—

Unscrew the bolt retaining the valve rocker arm to its axle (with special tubular spanner in tool kit). Insert the special screwed tool in place of the bolt and tap the tool so that the axle is driven to the right until the arm is free from the axle. Remove the arm and the axle.

Hardened caps are fitted to the valve stems. Be careful not to lose them.

Next, proceed to remove the valve. A special valve spring compressing tool is provided in the tool kit to facilitate this operation. The tool consists of a bar having two pointed screws threaded in it. The bar is fixed across the top face of the valve spring chamber with the two pointed screws engaging in the depressions cut in the valve spring top cap and is held in position by the two small bolts that normally secure the aluminium cover over the valve spring chamber.

After fixing the bar, the two pointed screws must be evenly screwed down, with their pointed ends engaging with the depressions in the valve spring top cap, until the springs are compressed sufficiently to permit the removal of the split taper collet that encircles the valve stem. Upon removing the collet the valve is free to be withdrawn.

Each pair of valve springs is positioned by a mounting block which is located by two dowel pins.

The exhaust valve and springs may be removed in exactly the same manner as described above, taking away the tappet rocker arm first, followed by the valve rocker arm and axle.

To re-assemble a valve, proceed as follows :—

The mounting block and the two valve springs must be laid in position. Then fix the valve spring compressing tool, as previously described, whereupon the valve springs may be compressed, the valve inserted, and the taper split collet placed in position. After which, evenly unscrew the two screws applying pressure to the springs, and, while doing this, observe that the collet is retained in its correct position.

Fit the hardened cap on the valve stem.

The overhead rocker may now be replaced.

The inlet tappet rocker arm, the two top aluminium covers and the side cover should be left off till after the head has been fitted to the cylinder barrel, so that the tappet adjustment may be reset.

(50). TO REMOVE AND REPLACE THE VALVES. (All S.V. Models.)

To remove a valve, first remove the cylinder head and the tappet chest cover, as already described, and then proceed as follows :

Using a stout screwdriver, or other suitable lever, raise the valve spring bottom collar, at the same time, holding the valve down on its seat, and withdraw the valve cotter. This action will free the valve so that it may be extracted.

To replace a valve, reverse the procedure described above.

(51). TO REFIT A PISTON AND CYLINDER BARREL.

All parts should be clean. Place the rings on the piston (see paragraph 52).

Smear the gudgeon pin with clean engine oil, and, placing the piston over the connecting rod so that the slit in the piston faces to the FRONT of the machine, and so that the holes for the gudgeon pin are in line with the bush in the rod, introduce the gudgeon pin in the piston and centralise it. (All pistons are not slit.)

Then fit the gudgeon pin circlip (or circlips, if both have been removed). To do this, the rounded ends of the special pliers should be inserted in the holes in the circlip and the pliers gently compressed. The circlip should then be introduced into the piston, with a rotary movement, until the whole of the circlip lies snugly in the groove which is machined in the gudgeon pin boss in the piston. This is most essential, because, if the circlips are not fitted properly, there is a possibility of the gudgeon pin working out of position and scoring the wall of the cylinder.

A paper washer is fitted between the base of the cylinder and the crankcase, and it is best to stick this to the base of the barrel with liquid jointing compound. Make sure none of the jointing compound closes the holes for lubricating the cylinder.

CYLINDER BASE WASHERS.

All 250 O.H.V.	Models ... Part Number,	B23-E3	... 1d. each.
All 350 O.H.V.	Models ... Part Number,	B24-E3	... 1d. each.
All 500 O.H.V.	Models ... Part Number,	B25-E3	... 1d. each.
All 600 O.H.V.	Models ... Part Number,	B28-E3	... 2d. each.
All 500 S.V.	Models ... Part Number,	13820	... 1d. each.
All 600 S.V.	Models ... Part Number,	13820	... 1d. each.

Postage 1½d. extra.

Next, smear the cylinder wall and the piston with clean engine oil, fit and space the three piston rings so that the gaps are evenly spaced at approximately 120 degrees to each other and proceed to fit the cylinder barrel, taking care that the piston rings are fully compressed into the grooves, in turn, as the barrel passes over them.

Then, on O.H.V. Models, proceed as follows :—

Refit the cylinder head and FINALLY, fully tighten the two crankcase top bolts that grip the cylinder in the crankcase.

Or, in the case of Side Valve Models :—

When the barrel is down on to the crankcase, replace the holding down nuts, screwing down each, bit by bit, in turn, until all are fully home.

(52). DECARBONISATION.

The period for which an engine will run satisfactorily without being decarbonised depends to a great extent, upon the driving conditions. Generally, this process should be carried out every 1,500 to 2,000 miles.

The need for decarbonising will be indicated by a tendency to "pink," or knock, when ascending hills, or upon accelerating after rounding a corner, and particularly so when the engine it hot.

Although it is only necessary to take off the cylinder head to remove carbon deposit, it is advisable also to remove the cylinder barrel every 5,000 miles to inspect the piston rings and to remove any carbon there may be in the piston ring grooves.

All piston rings should have a uniform matt appearance on their exterior, and any having black portions on their exterior (a sign leakage has occurred) should be replaced with new.

All carbon should be scraped off the top of the piston and the inside of the cylinder head, and do not overlook any deposit there may be in the inlet and exhaust valve ports.

A blunt screwdriver having a wide blade makes an excellent scraper for both piston and head. Do not use emery cloth or any other abrasive to remove carbon from the piston crown.

(53). VALVE GRINDING.

It is advisable to grind in the valves upon each occasion the engine is decarbonised.

First, scrape off all carbon deposit that is on the valve heads and clean the stems with very fine emery cloth by holding the cloth between the thumb and forefinger and moving it up and down the stem.

Then smear the face of each valve, in turn, with valve grinding paste and revolve the valve on its seat in a slight forward and backward direction, at the same time, maintaining slight pressure on the valve head to keep it on its seat.

During this operation, occasionally raise the valve off its seat and turn it slightly, afterwards lowering the valve to the seat and repeating the forward and backward movement.

Generally, one application of grinding paste will be ample for the inlet valve, but two or three applications may be necessary for the exhaust valve before the seating is restored. The grinding may be considered satisfactory and completed when a continuous matt ring is observed on both valve and valve seat.

Finally, remove all traces of grinding paste from the valves and seatings by washing off with petrol and pass a piece of clean rag through each valve guide to remove any abrasive that may have collected.

(60). SPECIAL TOOLS.

On some models, decarbonisation is considerably facilitated by the use of sundry special tools. These are described and priced below.

VALVE SPRING COMPRESSOR. Part Number 38-G4-TTK6, price each, 2s. 2d., postage 4d. extra. This is a bar type tool which compresses hair pin pattern valve springs and is suitable for all O.H.V. Models. This tool is included in the standard tool kit of the machine.

VALVE GRINDING TOOL. Part number 38-G4-TK9A, price each, 3s. 6d., postage 4d. extra.

This is a Tee shaped tool to clamp on to the valve stem to facilitate the rotation of the valve during valve grinding. It is suitable for all O.H.V. Models This tool is not included in the standard tool kit of the machine.

(55). GASKETS.

Although many of the gaskets used on " SUNBEAM " Motor Cycles can be used after being dismantled, it is never possible to be sure on that point until after the engine has been taken apart and the various gaskets carefully examined.

Therefore, we suggest that all " SUNBEAM " owners should keep a complete set of gaskets, so that, when one is required, it is instantly available.

We supply gaskets, either as individual spares, or in complete sets. Particulars of these sets are given below. We suggest, that before dismantling an engine for decarbonisation or other service work, a set or gaskets, suitable for the Model, is available.

(56). GASKET SETS SUITABLE FOR O.H.V. MODELS.

These gasket sets contain :—

1—Composition washer for cylinder base.
1—Composition washer for timing gear case cover.
2—Composition washers for valve spring chamber covers.
1—Composition washer for oil pump.
1—Composition washer for oil pump cover plate.
1—Composition washer for tappet guide.
1—Composition washer for carburetter flange.
2—Fibre washers for cylinder head end caps.
3—Fibre washers for tappet cover knurled nuts.
1—Fibre washer for crankcase sump strainer.
3—Fibre washers, large, for oil pipe connections.
3—Fibre washers, small, for oil pipe connections.
1—Asbestos gasket, for top of push rod cover tube.
1—C and A washer, for bottom of push rod cover tube.
1—C and A washer, for exhaust pipe union nut.
1—C and A Gasket for cylinder head.

GASKET SETS FOR O.H.V. MODELS.

	Part Number.	Price.
All 250 O.H.V. Models ...	39-EQ-16 ...	4s. 5d.
All 350 O.H.V. Models ...	39-EQ-17 ...	4s. 5d.
All 500 O.H.V. Models ...	39-EQ-18 ...	4s. 6d.
All 600 O.H.V. Models ...	39-EQ-19 ...	4s. 8d.

Postage 4d. per set extra.

(57). GASKET SETS SUITABLE FOR S.V. MODELS.

These gasket sets contain :—

1—Composition washer for cylinder base.
1—Composition washer for timing gear case cover.
1—Composition washer for magneto chain cover.
2—Composition washers for oil pump covers.
1—Composition washer for carburetter flange.
1—Fibre washer, for crankcase sump strainer.
3—Fibre washers, large, for oil pipe connections.
3—Fibre washers, small, for oil pipe connections.
4—Fibre washers for oil pump end cap screws.
1—Fibre washer for release valve adaptor.
1—Fibre washer for non-return valve body.
1—Cork washer for spring box cover.
2—Hallite washers for valve spring insulators.
1—C and A cylinder head gasket.
1—C and A washer, for exhaust pipe union nut.

GASKET SETS FOR S.V. MODELS.

	Part Number.	Price.
All 500 S.V. Models ...	39-EQ-20 ...	5s. 5d.
All 600 S.V. Models ...	39-EQ-21 ...	5s. 5d.

Postage 4d. per set extra.

(58). TAPPET ADJUSTMENT. (All O.H.V. Models.)

The top ends of the tappet long push rods have screwed extensions. These are locked in position by nuts, and this provides tappet adjustment.

The correct tappet clearance between the rocker ends and the valve ends, when the valves are completely closed (exactly at top dead centre) and the engine is cold, is the nearest possible approach to nil. This means the push rods should be free enough to be able to revolve them without any binding, and, at the same time, there should be no appreciable up and down movement possible. To adjust the tappet clearance, proceed as follows :—

Remove the tappet inspection cover from the right hand side of the cylinder head and turn over the engine until both valves are closed.

Remove the bolt retaining the inlet tappet rocker arm to its axle. Insert the special screwed tool in place of the bolt and tap inwards until the rocker arm is free of the axle, and remove the arm.

Unscrew the ball cup from the top of the inlet push rod (the outer rod) and extract the rod.

Then adjust the exhaust tappet clearance as under:—

With spanners, hold the body C and slacken lock nut B. Then screw, in or out, the head A until the clearance is nil. Next, tighten lock nut B and recheck the clearance. (See illustration 4.)

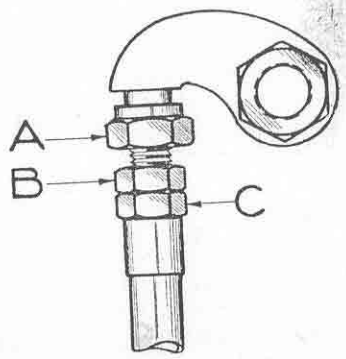


Illustration 4.

Next, replace the inlet push rod and its ball cup, taking care to get the bottom of the push rod in the recess in the tappet head.

Replace the inlet tappet rocker arm and set the tappet clearance, as described above.

Finally, replace the rocker cap, taking care to replace the fibre washer that is under each knurled nut.

Do not overtighten these nuts because the joint is made with a rubber fillet, and undue pressure is not necessary. Excessive pressure may crack the cap.

(59). TAPPET ADJUSTMENT. (All Side Valve Models.)

The top ends of the tappets have screwed heads. These are locked in position by nuts and this movement provides tappet adjustment. (See illustration 5.)

The correct clearances between the valve stems and the tappet heads, when the valves are completely closed and the engine is warm (not hot) are:—

Inlet clearance ... .004in.
Exhaust clearance .006in.

To adjust the tappet clearance, proceed as follows:—

Remove the tappet chamber cover and turn over the engine until both valves are closed.

With spanners, hold the body C and slacken the lock nut B. Then screw, in or out, the tappet head A, until the clearance is as set out in the above table. Next, tighten lock nut B and re-check the clearance.

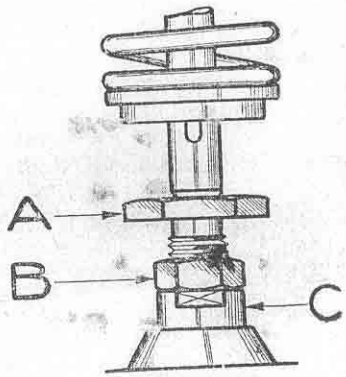


Illustration 5.

tighten lock nut B and recheck the clearance.

Finally, replace the tappet chamber cover. Note that this has a cork washer and it is advisable to stick this washer to the cover with some liquid jointing compound.

A feeler gauge will greatly facilitate setting the tappet clearances, and a set of feeler gauges can be purchased at all tool stores for a few pence.

(60). VALVE TIMING. (O.H.V. Models.)

The camshaft and magdyno are driven by a chain. The small 17 tooth chain wheel on the timing side flywheel axle, which is a parallel fit on the axle, is located by two keys and is secured by a nut having a RIGHT hand thread. This nut is locked in position by a tab washer and behind the sprocket is a spacing collar that is an easy sliding fit on the flywheel axle.

The two 34 tooth chain wheels (one on the camshaft and one on the magdyno driving shaft) are identical, and are secured to their shafts by five bolts, each bolt being locked in position by a tab washer. If ever these chain wheels are removed from their shafts, the relative position of a chain wheel on its shaft should be marked to ensure the wheel being replaced in its exact original position. (A line made by an indelible pencil across the shaft and wheel will serve this purpose).

The timing chain is rivetted up as an endless chain and is tensioned by a spring blade that is automatic in action.

To remove the timing chain, proceed as follows:—

Revolve the engine till the exhaust valve is just closing and the piston is on top dead centre.

(The tappet chamber cover must be removed to observe this.)

Remove the cover over the timing gear case and also flatten the tab washers under the magdyno driving shaft sprocket bolts and remove these bolts.

Next, pull the magdyno driving shaft sprocket outwards as far as it will go and then pull the timing gear camshaft and sprocket outwards as far as it will go. Repeat this sequence until the magdyno driving shaft sprocket is quite clear of its shaft, and the camshaft is also clear of its inside bearing.

This action will permit both sprockets being taken away from the timing chain and then the chain can be taken away from the small chain sprocket.

IN ALL THESE OPERATIONS IT IS ESSENTIAL THE MAGDYNO ARMATURE SHAFT (INCLUDING THE RUBBER COUPLING AND THE MAGDYNO DRIVING SHAFT) IS NOT MOVED IN EITHER DIRECTION.

To refit the timing gear chain, proceed as follows: (It is presumed the magdyno driving shaft has not been moved and the engine has not been rotated).

Place the timing gear chain on the small sprocket and connect the camshaft sprocket with the chain, showing the sprocket up in position and varying its engagement with the chain until the scribed marks that are on it are in line with the scribed mark on the small sprocket and the centre of the magdyno driving shaft.

Next, engage the magdyno sprocket in the chain (while still holding the camshaft sprocket engaged in the chain, as detailed above) and vary its position of engagement, tooth by tooth, until the scribed mark on it is in line with the centre of the camshaft.

Having determined the correct position, the camshaft can then be introduced into its rear bearing and the magdyno sprocket placed over the magdyno driving shaft, and these two should then be worked inwards, alternatively, until both are fully home.

If the sprockets have been engaged correctly the scribed marks on the small sprocket and the camshaft sprocket should be in line, as should the scribed marks on the camshaft sprocket and the magdyno driving shaft sprocket. These marks are clearly shown in Illustration Number 1.

Next, replace the five bolts in the magdyno sprocket, taking care to fit a tab washer under each bolt and to turn up the tab after each bolt has been fully tightened.

Finally, replace the timing gear case cover.

IF, BY ACCIDENT, THE MAGDYNO IS MOVED (ROTATED) WHILE PERFORMING THE OPERATIONS DETAILED ABOVE, IT WILL BE NECESSARY TO RE-SET THE IGNITION TIMING. INSTRUCTIONS TO DO THIS ARE GIVEN IN PARAGRAPH 129.

To re-set the valve timing, when the chain sprocket has been removed from the camshaft and its relative position on the camshaft lost (or if the engine has been rotated during the operation of removing the timing gear chain), proceed as follows:—(It is presumed the timing chain and the two large sprockets are already removed from the engine.)

Turn over the engine until the piston is at the top of its stroke, and insert the camshaft into its rear bearing so that both cams are slightly bearing on their tappets. (The noses of the two cams are at ten o'clock and two o'clock positions when doing this.)

Then, place the sprocket on the camshaft so that one of the scribed marks on it is in line with the scribed mark on the small sprocket and the second mark on it is pointing towards the centre of the magdyno driving shaft. When in that position replace the five fixing bolts, taking care to fit a tab washer under each bolt and to turn up the tab after each bolt has been fully tightened.

This operation will correctly locate the sprocket on the camshaft, after which, the camshaft and sprocket may be withdrawn from the engine, and then the timing gear chain and the camshaft and magdyno driving shaft sprocket may be replaced in the manner already described.

All oil in the timing gear case is liberated when the timing gear case cover is removed; therefore, always place a tray to catch this oil when about to remove the cover.

The timing gear chain tensioning device is very simple. It consists of a flat spring blade (that bears against the chain), a spiral spring, two pivot pins for the spiral spring, a sliding locating block that is square in section, a spring blade to locate the sliding block and two screws to secure the sliding block spring blade to the timing gear case. These screws are prevented from becoming loose by wiring them together.

Two notches are cut in the sliding block. One is wide and the other narrow. The edge of the spring tension blade should engage in the NARROW notch. (The wide notch is to provide clearance for the chain).

(61). ENGINE SERVICE NOTES. (O.H.V. Engines.)

If it is desired to separate the two halves of the crankcase, it is essential to remove the oil pump and to withdraw the short vertical shaft that drives the pump before attempting to separate the crankcase.

There are two flats on the heel of each tappet. When replacing the tappets, the flat that has a ground and polished finish should face the dividing plate that projects below the tappet guide.

There is a thin composition sealing washer on the tappet guide.

The exhaust valve lifter shaft, in the tappet inspection chamber, is located by a bolt that enters the cylinder head vertically above the shaft. This bolt must be unscrewed and withdrawn before the exhaust lifter lever shaft can be withdrawn from the head.

When the engine has been completely disembled, remember to place the magdyno securing bolt in position in the crankcase before the two halves of the crankcase are united. The bolt is the longer of the two that secure the magdyno to its platform.

The four cylinder and cylinder head retaining bolts are secured to the crankcase by four sleeve nuts that are screwed into the crankcase. These sleeve nuts should not be unscrewed during the operations of removing the head and the barrel.

(62). VALVE TIMING. (S.V. Models.)

The timing cams are marked so that the correct timing can be automatically obtained. The centre small pinion has a single punch mark on one tooth for the inlet setting, and either two punch marks or a line on another tooth for the exhaust setting. The inlet cam is punch marked between two teeth, and the exhaust cam is marked with two dots or a line. To reset the timing it is only necessary to replace the inlet cam with the punch mark in register with the one on the centre pinion, and, taking care not to move the centre pinion, refit the exhaust cam so that the marked tooth engages the marked gap of the centre pinion. There is no advantage in replacing the cams otherwise.

(63). COMPENSATING CAMS. (S.V. Models.)

These cams have been designed to eliminate backlash in the timing gear. In the event of the timing gear having been dismantled, it is necessary to re-adjust the cams in accordance with the following instructions.

INLET CAM.

(a) Hold the inlet cam in the left hand with the contour in a vertical position, the back of the gear facing you, and the small cam in the adjusting screw set as far as possible to the right.

(b) Fit the loose gear, with spring in position, to the cam and turn same in an anti-clockwise direction to remove all loose movement.

(c) Grip both gears firmly with the left hand and turn the adjusting screw until the spring locks the screw in its position. It is only necessary to give the adjuster approximately half a turn, and a slight click will be heard when the spring locks the screw. When the grip is gently eased off, the loose gear should move 2 to 2½ teeth backwards.

(d) Reset the adjusting screw to its original position and it will now be found a very simple matter to fit the cam into the timing case.

EXHAUST CAM.

To fit up the exhaust cam, follow the instructions given in paragraphs (a) and (b) above. Then the cam must be held firmly by the hand, or in a vice, and the loose gear turned in a clockwise direction 2 to 2½ teeth.

A suitable metal wedge must be inserted into the teeth to hold the gear in position while it is refitted to the timing case. The wedge will drop out when the cam is meshed with the small centre pinion.

When assembling the timing gear, it is most essential to see that the cams are fitted with the punch marks in register with those on the centre pinion.

(64). DECOMPRESSOR. (S.V. Models.)

The decompressor action is obtained by a sliding plunger in the exhaust cam, which is brought into operation by the bell crank lever pressing the operating plunger inwards when the control lever on the handlebar is compressed.

The adjustment of the control is by means of the adjuster on the cable at the point where it is attached to the bracket on the timing cover of the engine. With the handlebar lever in its free position, the bell crank lever should be adjusted so that it just makes contact with the plunger, but in no circumstances must it be set so that it is pressing hard on the plunger.

(65). VALVE TIMING ON O.H.V. MODELS.

The inlet valve opens 25° before top dead centre.
The inlet valve closes 50° after bottom dead centre.
The exhaust valve opens 65° before bottom dead centre.
The exhaust valve closes 25° after top dead centre.

(66). VALVE TIMING ON SIDE VALVE MODELS.

The inlet valve opens 22° before top dead centre.
The inlet valve closes 30° after bottom dead centre.
The exhaust valve opens 54° before bottom dead centre.
The exhaust valve closes 27° after top dead centre.

(With tappets set at .015in. clearance.)

(67). STEERING HEAD ADJUSTMENT.

The steering head races are of the floating, self-aligning type, and have spherical seats. The two races in the nead lug and the race in the head clip are all identical.

Occasionally test the steering head for correct adjustment by exerting pressure, upwards, from the extreme ends of the handlebars. (The steering damper should be completely slack.)

Should any shake be apparent, jack up the front of the machine so that all weight is taken off the front wheel, slacken the top nut on the steering column and screw down the lower nut until all trace of slackness has disappeared. Then tighten the upper nut, holding the lower nut while doing so. It is of the utmost importance that the upper nut is most securely tightened.

On Side Valve Models there is no lock nut on the steering stem. Its function is provided by the head clip which is locked in position by a horizontal bolt and nut. To adjust the head bearings the nut on the head clip bolt should be slackened, the adjustment made with the nut on the steering stem and then the clip bolt nut should be fully tightened.

(68). FORK SPINDLE ADJUSTMENT. (O.H.V. Models.)

Never attempt to adjust more than one spindle at a time. Slack off both spindle nuts, and, by means of the small hexagon on the right-hand side of the spindle, turn the spindle in a clockwise direction to take up play between the fork girders and the links. Do not turn the spindle more than half a revolution before tightening the two spindle lock nuts and testing the adjustment. Guard against having the adjustment too tight, because then the fork will be very stiff in action, or, most probably, refuse to function.

The washers, which are fitted on the spindle ends, are not provided for frictional purposes, but to prevent actual seizure in the event of the fork spindle adjustment being too tight.

FORK SPINDLE ADJUSTMENT. (S.V. Models.)

To adjust the fork spindles to take up end play, slacken the outside nut on the left of the spindle and then adjust as necessary by turning the inner nut on the left side, after which the outer nut must be fully tightened.

(69). FORK DAMPER ADJUSTMENT.

The fork damper is best adjusted when the machine is actually in motion. A road with a badly corrugated surface provides the best conditions for this purpose.

The ebonite hand nut should be screwed home, in a clockwise direction, sufficiently to make the fork action sluggish under the circumstances described above, and, subsequently, should require very little attention for other conditions.

(70). STEERING DAMPER ADJUSTMENT.

The steering damper is controlled by the ebonite hand nut mounted on top of the steering column. This nut should be turned in a clockwise direction to increase the damping action. Normally, very little damper action is required or is desirable.

(71). TO REMOVE THE FRONT WHEEL. (All O.H.V. Models.)

To remove the front wheel, proceed as follows:—

Place the machine on the rear and front stands. Remove the split pin and pin retaining the front brake cable yoke end to the front brake expander lever. Unscrew the speedometer driving cable from the speedometer gear box.

Remove the nuts and bolt that secures the front brake anchor plate to the left fork girder. Slacken both nuts on the front wheel centre solid spindle, unscrewing them several turns, and then, if the two washers on the centre spindle are slid outwards, along the spindle, till they are clear of the recesses in the fork end lugs, the wheel is free to drop out.

To refit the front wheel, reverse the procedure described above. It is essential the brake cover plate anchor bolt nuts are most securely tightened.

(72). TO REMOVE THE FRONT WHEEL. (S.V. Models.)

The front wheel is identical to the rear and is quickly detachable. To remove the front wheel, proceed as follows:—

Place the machine on the rear and front stands.

Remove the three square headed sleeve nuts that secure the hub flange to the brake drum. (A tubular spanner is included in the tool kit.)

Remove the extended nut, and the washer under it, from the left hand side of the centre solid spindle. Withdraw the centre solid spindle. This action will free the distance piece between the right hand end of the hub and the inside of the right fork girder. Remove this distance piece and then, by moving the wheel to the right, in order to clear the flange from the three studs in the brake drum, the wheel can be taken away.

(73). TO REMOVE THE REAR WHEEL.

The rear wheel is of the quick detachable type and, in order to remove it, there is no need to disturb any part of the rear brake and final drive.

To remove the rear wheel, proceed as follows:—

Place the machine on the rear stand and disconnect the rear lamp cable from the rear lamp.

Take away the two nuts and washers that retain the back half of the mudguard to the fixed front half, and slacken the two nuts that retain the rear tubular arch to the studs in the rear fork ends. This will enable the rear half of the rear mudguard with the tubular arch to be taken away from the machine.

Remove the three square headed sleeve nuts that secure the hub flange to the brake drum. (A tubular spanner is included in the tool kit.)

Remove the nut on the wheel centre solid spindle (left hand side of the machine), and withdraw the spindle from the right hand side of the machine. This action will free the distance piece fitted on the centre solid spindle and located between the inside of the right fork end and the hub.

Then, by moving the wheel to the right, in order to disengage it from the driving studs in the brake drum, it is free to be taken away from the machine.

To refit the rear wheel, reverse the procedure described above.

IN NO CIRCUMSTANCES MUST THE CENTRE SOLID SPINDLE BE REMOVED UNTIL THE MACHINE IS PLACED ON THE REAR STAND, AND THE SPINDLE MUST ALWAYS BE IN POSITION BEFORE THE MACHINE IS TAKEN OFF THE STAND.

If it is desired merely to remove the inner tube of the rear tyre, this can be done without removing the wheel from the machine.

To do this, proceed as follows :—

Place the machine on the rear stand, remove the tube from the tyre. (See paragraph 112.)

Remove the nut on the rear wheel centre solid spindle (on left side of machine), withdraw the spindle and spring the right fork sufficient to allow the distance piece, that is on the solid spindle and located between the inside side of the fork end and the hub, to drop out.

This will leave sufficient space between the fork end and the hub to enable the inner tube to be taken away.

To refit the inner tube, reverse the procedure described above.

PERIODICALLY TEST, WITH SPANNERS, THE NUT ON THE CENTRE SOLID SPINDLE AND THE THREE SLEEVE NUTS AND KEEP THEM TIGHT.

If the sleeve nuts are loose, a dull hammering will be felt, and heard, when driving at slow speeds. If this is noticed, tighten the three sleeve nuts without delay.

(74). WHEEL BEARINGS.

The wheel bearings are of the taper roller type.

A complete bearing, for one wheel, consists of the following parts :—

1 Hollow spindle.
2 Sets of rollers (mounted in 2 cages).
2 Outer bearing rings.

The above parts are only sold complete as one unit—i.e., parts cannot be supplied.

The outer bearings rings are pressed into the hub shell. That on the left hand side has a positive location. (A spring ring fits into the shell to locate this ring). That on the right hand side can be adjusted in position. The adjustment is obtained by a ring that is screwed into the hub shell and abuts against the movable bearing ring. The adjusting ring is locked in position by a large, circular locking ring.

It is of the utmost importance that the bearings are not adjusted too tightly, as this would ruin them in a very short distance. There must always be a slight degree of end play. This should be about .002in.

To adjust a wheel bearing, proceed as follows :—

Slacken the large locking ring on the right hand side of the hub. Then, screw inwards, or outwards, the adjusting ring on which the locking ring is threaded, until the correct adjustment is obtained. (Inwards to tighten, outwards to loosen the bearing adjustment.) (See Illustration 6.)

Finally, tighten the locking ring, taking care that the adjusting ring does not creep forward and make the bearings too tight.

Always check the adjustment after tightening the locking ring.

Special spanners are provided, in the tool kits, to facilitate these operations.

(75). TO DISMANTLE A WHEEL BEARING.

To dismantle the bearings in a wheel, having removed the wheel from the machine, proceed as follows :—

If the wheel is a front wheel, remove the nut on the left hand side of the centre solid spindle, withdraw the spindle and remove the brake cover plate.

(On Side Valve Models the spindle is withdrawn during removal from the forks.)

Then, slacken the locking ring B, that is on the right hand side of the hub (see illustration 6), and completely unscrew the adjusting ring A, which will come away with the locking ring B.

A dished plate, felt washer and a plain plate is then free to be removed. Do this and turn to the opposite side of the hub.

A spring ring will be observed, just under the hub shell, remove this and this will permit the removal of another felt washer assembly consisting of two metal plates, a felt washer and a spacing ring.

The hollow spindle, complete with rollers and cages and one outer bearing ring, can then be pressed out of the hub shell, from either end, leaving one outer bearing ring in position. If desired, this remaining ring can then be driven, or pressed, out.

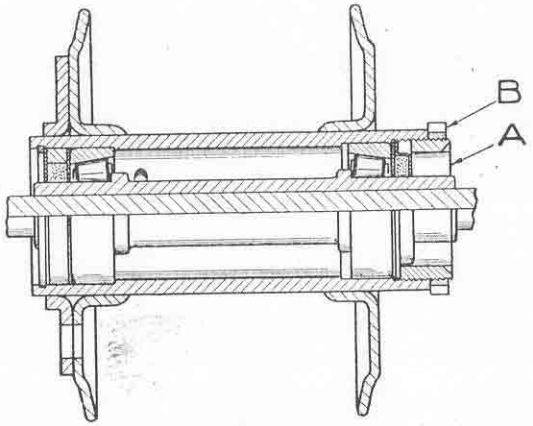


Illustration 6.

(76). TO ASSEMBLE A WHEEL BEARING.

It will be noticed that the tracks for the rollers on the hollow spindle are not evenly spaced. It is essential that the longer end of the spindle is assembled in the hub so that it is on the adjusting side. (Right hand side of wheel.) (See illustration 6.)

To assemble the wheel bearings, proceed as follows:—

First, thoroughly clean all parts as well as the interior of the hub.

Press one of the outer bearing rings into the plain end of the hub so that the thinner end of the ring is inward, and its position a little nearer the centre of the hub than it normally occupies. Take care, when pressing this ring into the hub, that it is quite square to the hub body.

Next, replace the felt washer and plate assembly that was removed from this end of the hub and finally, replace the spring ring. Illustration No. 6 clearly shows the order of assembly of these parts.

Then, from the threaded end of the hub, force back the outer bearing ring until the felt washer assembly is tight against the spring ring.

Next, from the threaded end of the hub, introduce the hollow spindle, entering the shorter end first, and push it, without undue force, as closely to the outer bearing ring as is possible.

Then press the second outer bearing ring (thinner edge inwards), into the hub shell until there is about 1/16in. play in the bearings.

Next, replace the right hand side felt washer assembly, followed by the screwed adjusting ring with its locking ring, and proceed to adjust the bearing as described in paragraph 81.

Inject a quantity of grease into the hub and the wheel is then ready for fitting to the machine.

(77). BRAKE PEDAL ADJUSTMENT.

The position of the rear brake foot pedal can be adjusted within narrow limits. This is done by means of a small bolt screwed into the heel of the pedal. The adjusting bolt is locked with a thin nut. After altering this adjustment, always check the rear brake rod adjustment as described in paragraph 85.

(78). BRAKE ROD ADJUSTMENT.

A finger operated nut on the rear end of the rear brake rod provides a means of making minor adjustment to the rear brake. This nut is locked in position by a spring that encircles the brake rod.

The finger nut should be screwed on the rod so far that the brake shoes are just clear of the brake drum when in the "Off" position.

When making this adjustment it is advisable to have the machine on the rear stand so that it may be observed the wheel is free to revolve when the brake is "Off."

(79). BRAKE SHOE ADJUSTMENT.

As the brake linings wear, this can be taken up by suitably adjusting the finger nut on the rear brake rod, but, after some considerable mileage, this continual adjustment causes the brake expander to lie in such a position that the leverage available is considerably reduced and consequently the brake loses in efficiency.

To overcome this difficulty, the brake shoes are fitted with detachable heel pads. As will be seen from illustration No. 7, these fit in the heel of each brake shoe and take the thrust of the brake cam or expander.

When it no longer becomes desirable to take up the wear of the brake linings by adjustment of the finger nut on the brake rod, the brake shoes should be removed and then, if the steel pads are taken away from the shoes, one or more steel shim washers can be placed on the stem of each pad. This will have the effect of centralising the cam expander, thereby restoring the efficiency of the brake to "as new condition."

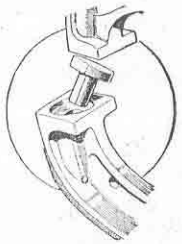


Illustration 7.
("Motor Cycling")

When the wear is taken up in this manner it is, necessary to slack out the brake rod finger nut adjustment, and to reset that adjustment to suit the new position of the brake shoes.

The front brake shoes are also fitted with detachable heel pads, thereby providing major adjustment for the front brake.

A supply of shim washers for the heel pads is sent out in the tool kit as part of the equipment of all new machines.

(80). **FRONT BRAKE ADJUSTMENT.**

Major adjustment of the front brake is made on the heel pads in the brake shoes, as described in paragraph 79.

Minor adjustment of the front brake is made by the front brake cable adjuster.

When adjusting the front brake it is advisable to place the machine on both rear and front stands.

The front brake cable adjuster is located at the top of the left side fork girder, and is locked in position with a nut. The brake cable passes through the adjuster, and both the adjuster and lock nut have large knurled bodies so they may be finger operated.

To "take up" the front brake adjustment, the adjuster should be unscrewed from the fork girder until the brake shoes are just clear of the brake drum, and the wheel consequently free to revolve. Then tighten down the lock nut.

(81). **TO REMOVE THE OUTER HALF OF THE FRONT CHAIN CASE. (All Models except 500 and 600 O.H.V.)**

To remove the outer half of the front chain case, proceed as follows:—

Place a tray under the chain case in which to collect the oil that will be released when the outer half of the case is free.

Remove the footrest rod nut on the left hand side and take away the left side footrest and footrest arm.

Remove all the screws round the edge of the chain case and then, if the footbrake pedal is fully depressed the outer half of the chain case is free to be taken away.

To replace the outer half of the chain case, reverse the procedure described above. The faces of the back and front halves of the case should be quite clean before refitting them, and it is advisable to smear some liquid jointing compound on one of the faces.

(82). **TO REMOVE THE OUTER HALF OF THE FRONT CHAIN CASE. (500 and 600 O.H.V. Models.)**

Remove the plated dome over the clutch. This is done by removing the six screws that retain it to the front half of the chain case and take away.

Next, remove the complete clutch from the gear box main shaft. To do this, proceed as follows:—

Unscrew the five clutch spring adjusting nuts and remove the spring pressure plate, complete with the five clutch springs and the five clutch spring cups.

Extract the clutch plain steel plates and the clutch friction plates and unscrew the centre nut that secures the clutch hub to the gear box main shaft and remove the spring and plain washers that are under it.

Then withdraw the clutch hub. This is a splined and parallel fit on the shaft, and no difficulty should be met in withdrawing it. Then lift away the large metal washer and the tubular spacing piece behind it.

The six bolts that fix the clutch case to the sprocket are now exposed. Under each pair of bolts is a tab washer, and the two extreme ends of each tab washer are turned up to lock the bolts in position. These turned-up ends must be flattened down, and the best way of doing so is to lever them away from the heads of the bolts by using a screwdriver and then tap them flat.

Next, unscrew the six fixing bolts and the clutch case may be taken away.

Then place a tray under the chain case in which to collect the oil that will be released when the outer half of the case is free, and proceed to remove the outer half of the case, as detailed above for other models.

To replace the outer half of the front chaincase.

After cleaning both sides of the outer half of the case and also the outer face of the rear half of the case, proceed to refit the outer half as follows:—

Place a line of liquid jointing compound on the face of the outer half of the case and place it in position, against the rear half and replace the fixing screws.

Then proceed to refit the clutch, as follows :—

Show up to the clutch sprocket the clutch case and fit the six fixing bolts, taking care that a tab washer is under each two adjacent bolts. Screw the bolts right home and then turn up the two ends of each tab washer, knocking the turned-up ends close against one of the flats of each bolt head.

Next, place the tubular spacing piece on the gear box main shaft, followed by the large metal washer. Then replace the clutch hub on the shaft and push it right home. Follow this, by replacing the plain metal washer, the spring washer, and, finally, the nut. Make sure the nut is fully tightened.

Next, replace the four clutch steel plain plates and the three clutch friction plates, taking care that each friction plate has a plain plate on either side of it. Follow this by replacing the spring pressure plate with the five clutch spring cups and five clutch springs and refit the five clutch spring adjusting nuts.

Screw these nuts right home as far as they will go, and then slacken each, in turn, five complete revolutions.

Finally, replace the clutch plated dome with its six fixing screws.

It will be noticed there is an adjusting sleeve in the centre of the back half of the front chain case. There is normally no need to remove this because the centre fixing bolt is a sliding fit through it. However, if for any reason, the back half of the front chain case is taken away from the machine and the adjusting sleeve is disturbed, the correct setting may be obtained as follows :—

Screw the adjusting sleeve into the back half of the case, so that the slotted end is outwards and the inner face is just clear of the back of the case. Place the rear half of the case in position on the two front fixing studs. (There is a paper washer between the case and the engine crankcase.) Replace the washers and nuts on the two front studs, fully tighten the nuts and replace the two split pins. Then, screw the sleeve into the case until its back face is just up against the hexagonal collar on the centre fixing stud, and, in that position, fully tighten the lock nut on the adjusting sleeve.

(83). FRONT CHAIN ADJUSTMENT. (O.H.V. Models.)

To provide front chain adjustment, the gear box hinges on its lower fixing bolt, while the top fixing bolt can slide in slots cut in the engine plates to allow the hinging movement.

This movement is controlled by an eyebolt which encircles the top fixing bolt, and the threaded end of which, passes through a block that is secured to the right side engine plate.

By altering the position of the eye bolt in the block, the gear box top fixing bolt can be moved in its slots. This action swings the gear box, and, according to the direction of the swing, the front chain can be tightened or loosened. The gear box must be swung backwards to tighten the chain.

The movement of the eyebolt in the block is controlled by two nuts that are threaded on it and are located on either side of the block.

To tighten the front chain, remove the inspection cap from the front chain case, and proceed as follows :—

Slacken the nuts on the right-hand ends of the top and bottom fixing bolts of the gear box and unscrew the forward nut that is on the eyebolt two or three complete turns.

Then, unscrew the rear nut that is on the eyebolt until, by testing through the front chain case inspection cap orifice, it is felt the front chain adjustment is correct.

If the chain can whip, or move, about $\frac{3}{8}$in. as it is pressed up and down, midway between the sprockets, the adjustment is correct.

Check the whip in more than one position. (See paragraph 86.)

Finally, tightly screw down the forward nut on the eyebolt, tighten the nuts on the top and bottom gear box fixing bolts, recheck the amount of whip and replace the chain case inspection cap.

(84). FRONT CHAIN ADJUSTMENT. (S.V. Models.)

Slacken the bolt which secures the top lug of the gear box to the frame, slacken the bolt on the right-hand side of the machine immediately under the gear box which passes through the bottom lug.

The adjuster is situated under the gear box at the rear, and to tighten the chain it is necessary to screw the adjuster in a clockwise direction. Then tighten the two bolts mentioned above.

(85). REAR CHAIN ADJUSTMENT.

To provide rear chain adjustment, the rear wheel is bodily moved in the frame. To provide this movement, the rear wheel axle is anchored in open-ended slotted fork ends, and the movement is controlled by a bolt screwed into each fork end. Each bolt impinges on the rear axle and is locked in position by a nut. (No nut on S.V. Models.)

To tighten the rear chain, slacken the nut on the centre solid spindle and the nut that locks the brake drum sleeve to the fork end. Both of these nuts are on the left-hand side of the machine and are concentric to each other.

Slacken the nut on each chain adjuster bolt and screw it two or three turns towards the hexagon head of the bolt.

Then screw each bolt further into the fork end, in turn, until the chain adjustment is correct, taking care to move each bolt an equal distance.

If the chain can whip, or move, about $\frac{3}{8}$in. to $\frac{1}{2}$in. as it is pressed up and down, midway between the sprockets, the adjustment is correct.

Check the whip in more than one position. (See paragraph 86.)

Finally, tighten the wheel spindle nuts, recheck the whip and screw the nuts on the chain adjusting bolts tightly down to the fork ends.

(86). NOTES ON CHAIN ADJUSTMENT.

Before tightening the rear chain, the adjustment of the front chain should be checked, and, if attention is necessary, this should be adjusted first.

It should be remembered that altering the adjustment of the front chain affects the adjustment of the rear chain. Also, that altering the adjustment of the rear chain will probably upset the adjustment of the rear brake.

Therefore, after altering the adjustment of the rear chain, always check the adjustment of the rear brake, and, if necessary, re-adjust the brake as detailed in paragraph 85.

The whip of chains should be tested midway between the two sprockets. Always turn the sprockets and test in several positions, and set the adjustment for the tightest position found. This is because chains never wear evenly, and there is usually one position where the chain is tighter than in any other.

When adjusting the rear chain care should be taken to leave the rear wheel in correct alignment.

When correct, a piece of thin string stretched taut across both wheels, about four inches from and parallel to the ground, should just touch each tyre at both sides of the wheel centres.

Alternatively, a straight wood batten, about five feet long, is handy to use for checking wheel alignment. This should be applied, as in the case of string, parallel to and about four inches from the ground.

A chain rivet extractor (Part Number LC25) can be supplied for 5s. 6d., plus 4d. postage.

(87). CHAIN CONNECTING LINKS.

The free ends of the front and rear driving chains are connected by a quickly removable link.

This link consists of three parts. One is a side plate having two pins rivetted to it. The second is a plain side plate, having two holes in it. These holes accommodate the two pins in the other plate. The third part is a flat spring clip, of hairpin shape. Two notches are cut in the spring clip. This spring clip lies against the outer face of the plain link and the notches lie in the grooves that are cut on each end of the two pins.

To demount a chain connecting link it is necessary to spring the open ends of the spring clip apart so that they disengage from the groove in the pin nearest to the open end of the clip. This can be done with a pair of pliers or a screwdriver. Then, if the clip is slid along the second pin till that pin is near the open end of the clip it may be removed by slightly springing it over the pin.

Next, lift away the plain link and the other link, with its pins, may be withdrawn from the two ends of the chain.

To refit a chain connecting link, reverse the procedure described above.

These operations are best performed when several links of chain, on either side of the connecting link, are engaged with teeth on the rear wheel sprocket (in the case of the rear chain) or clutch sprocket (in the case of the front chain).

The closed end of the spring clip should always face towards the direction of chain movement. (So that, in the event of it coming in contact with any part of the machine, there will be no tendency for it to be knocked out of position.) It is also more convenient to fit the connecting link so that the spring clip is facing away from the centre of the machine.

Dynamo and magneto driving chains are rivetted up as " endless " chains, and consequently are not fitted with detachable connecting links.

(88). MAGDYNO CHAIN ADJUSTMENT. (S.V. Models.)

The adjustment of the magdyno chain is made by sliding the instrument along the platform on which it stands. The magdyno is secured to the platform with two studs and fixing nuts, and after slackening the nuts it can be moved in either direction. It is recommended that the chain is adjusted so

that there is a whip of ¼in. It is essential the chain is not adjusted too tightly, as this will have a detrimental effect on the armature spindle. Do not forget to tighten the fixing nuts after making an adjustment.

(89). CONTROL CABLE ADJUSTMENT.

All flexible control cables have a screwed adjuster. Cables should be adjusted so that there is a definite amount of free movement of the control levers before the load resistance is felt. This free movement is most important, especially so in the case of the exhaust valve lifter and clutch controls.

To shorten the effective length of a control cable—i.e., to take up lost motion at the lever, unscrew the cable adjuster from its anchorage.

(90). STANDARD CARBURETTER SETTINGS.

The correct sizes of main jets, chokes and throttle slides, as per the table below, have been decided after much experiment and testing and should not be altered save for some very good reason.

Models.	Main Jet.	Choke.	Throttle Slide.
All 250 O.H.V.	120	5-3	5x3.
All 350 O.H.V.	150	4-5	6x4.
All 500 O.H.V.	180	5-4	29x4.
All 600 O.H.V.	180	5-4	29x4.
All 500 S.V.	160	5-1	6x4.
All 600 S.V.	160	5-1	6x4.

(91). CARBURATION.

The carburetter is tuned during the road tests of the machine, and it should not be necessary to interfere with the standard setting. However, we give below an outline of how the carburretter functions and how adjustment may be made.

The petrol level is maintained by a float and needle valve, and in no circumstances should any alteration be made to this. In the event of a leaky float or a worn needle valve the part should be replaced with new.

The petrol supply to the engine is controlled, firstly, by the main jet, and secondly, by means of a taper needle which it attached to the throttle valve and operates in a tubular extension of the main jet.

The main jet controls the mixture from three quarters to full throttle, and the adjustable taper needle from three quarters down to one quarter throttle, the cut away portion of the intake side of the throttle valve from one quarter down to about one eighth throttle, and a pilot jet, having an independently adjusted air supply, takes care of the idling from one eighth throttle down to the almost closed position.

These various stages of control must be kept in mind when any adjustment is contemplated.

With the standard setting it is possible to use full, or nearly full, air in all conditions, except, perhaps, when the engine is pulling hard up hill or is on full throttle, when some benefit may be obtained by slightly closing the air control.

Weak mixture is always indicated by popping, or spitting, at the air intake. A rich mixture usually causes bumpy, or jerky running, and, in some cases of extreme richness, is accompanied by the emission of black smoke from the exhaust.

A rough test to ascertain if the setting is correct, is to warm up the engine and, with the ignition fully retarded, and the air about three-quarters open, slowly open the throttle to full open, during which the engine should respond without a misfire, but, upon a sudden opening of the throttle, it should splutter and stop. (The engine should not be run more than a few seconds with the ignition fully retarded.)

To check the setting of the pilot jet and its air control, warm up the engine, then, with the ignition about two-thirds advanced and the air about three-quarters open, the engine should idle positively and evenly when the throttle is almost closed. If it fails to do so, adjust the pilot jet air screw, inwards or outwards, until even firing is obtained. (The pilot jet air screw will be observed at the base of the mixing chamber and its position is locked by a nut.) This adjustment is not unduly sensitive, and it should be possible to obtain the correct adjustment in a few seconds.

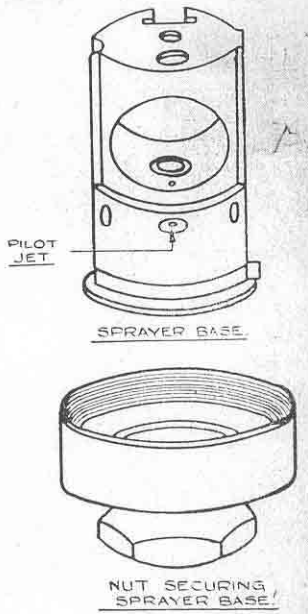


Illustration 8.

In the event of the adjustment of the air screw failing to provide the required result, it is possible the pilot jet is obstructed with dirt. The pilot jet is actually a passage cut in the sprayer base, or choke, and is very small, so there is always a latent danger of this becoming choked. Upon removing the float chamber and the large union nut at the bottom of the mixing chamber, the sprayer base can be pushed out of the mixing chamber and the jet can then be cleared by using a strand of fine wire. Illustration No. 8 shows clearly the location of the pilot jet in the sprayer base, or choke.

A throttle stop screw, that can be locked in position by a nut, is located in the side of the mixing chamber. This screw runs obliquely into the chamber and is situated above the pilot jet air adjusting screw.

The position of the throttle stop screw determines the position of the throttle when "closed."

Some riders prefer to set this so that when the throttle control (twist grip) is in the closed position, the throttle is completely closed and the engine cannot run. Others prefer to set it so that when the throtle control is "closed" the throttle is prevented from completely closing and the engine can therefore continue to run at idling speed.

Before concluding that incorrect carburation is responsible for heavy petrol consumption, and before carrying out any of the tests and adjustments described above, it is most important to make sure the ignition is set correctly. (See paragraph 126 for correct settings.) Late ignition usually causes a great increase in petrol consumption.

(92). POSSIBLE CARBURATION TROUBLES.

Poor idling may be due to:—

Air leaks. (Either at the junction of the carburetter and the engine, or by reason of a badly worn inlet valve stem or guide).

Faulty valve seatings. (Engine valves).

Faulty sparking plug or the points set too closely.

Ignition advanced too much.

Contact breaker points dirty, or set too closely.

Defective high tension cable.

Pilot jet not operating correctly. (May be choked).

Tappets adjusted too closely.

Heavy petrol consumption may be due to:—

Late ignition setting.

Bad air leaks. (Probably at carburetter and engine joint).

Weakened valve springs.

Leaky float. (Causing flooding).

Taper needle extension insufficient.

Poor compression, due to worn piston rings or defective valve seatings. (Always test compression with throttle wide open).

(93). TWIST GRIP ADJUSTMENT.

A screw is provided in one half of the twist grip body to regulate the spring tension on the twist grip rotating sleeve. This screw is locked by a nut and must be screwed into the body to increase the tension.

The most desirable state of adjustment is that when the grip is quite free and easy to turn, but, at the same time, will stay in the position in which it is placed.

(94). CARBURETTER CABLE ADJUSTMENT.

The throttle and air control cables are provided with screwed adjusters. The cables should be adjusted so that there is an appreciable degree of slack from the fully closed position of the control lever (or twist grip) before the valve commences to move.

This commencement of movement can always be felt on the control lever by virtue of the increased resistance, as the valve is lifted against the spring pressure that is used to return the valve to the closed position.

(95). GEAR BOXES.

Burman four-speed gear boxes, having foot gear control and hand clutch control, are fitted to all models. All the gears are constantly in mesh and the changes are made with dog clutches.

All 250 and 350 Models are fitted with Type C.P. boxes.

All 500 and 600 Models are fitted with Type B.A.P. gear boxes. The general design of these boxes is similar, and illustration No. 9 shows an exploded view of a typical box.

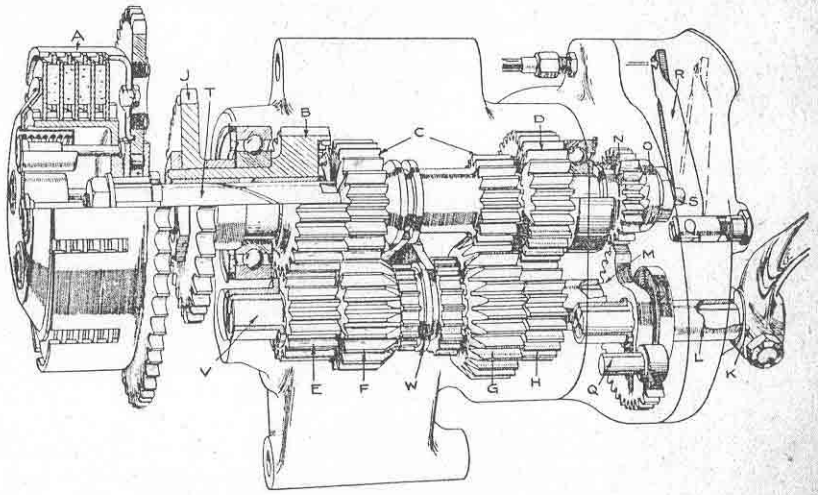


Illustration 9.

A is the clutch assembly.

B is the main gear wheel.

C is the mainshaft sliding gear. (It has a pinion each end.)

D is the mainshaft third gear.

E is the layshaft small gear.

F is the layshaft second gear.

G is the layshaft first gear.

H is the layshaft third gear.

J is the gear box final drive sprocket.

K is the kickstarter crank.

L is the kickstarter axle.

M is the kickstarter quadrant.

N is the kickstarter ratchet pinion.

O is the kickstarter ratchet driver.

P is the kickstarter return spring.

Q is the stop for the kickstarter.

R is the gear box clutch operating lever.

S is the clutch thrust rod.

T is the gear box main shaft.

V is the layshaft.

W is the sliding clutch on the layshaft.

The engine sprocket is connected to the clutch sprocket A by the front driving chain, and the sprocket on the rear wheel is connected to the gear box final drive sprocket J by the rear driving chain.

(96). KICKSTARTER OPERATION.

When the kickstarter crank K is depressed it rotates the axle L, and, in turn, the quadrant M. This quadrant engages in the ratchet pinion N, which, in turn, engages with the ratchet driver O, and as this is secured to the mainshaft T, the shaft turns, causing the clutch and the clutch sprocket A to rotate, thereby rotating the engine via the front driving chain and the engine sprocket. The kickstarter crank is returned to its upright position by a spring and located by a rubber covered stop pin Q.

Although the effective movement of the kickstarter crank is only about half a complete revolution this is geared up through the quadrant M and the ratchet pinion N and through the clutch sprocket to the engine sprocket so that one movement of the crank causes the engine to rotate three or four times.

(97). TRANSMISSION OF POWER THROUGH GEARS.

The transmission of power, or the drive, through the various gears may be easily traced on Illustration 9, as follows: —

When the first, or lowest, gear is engaged the sliding gear on the mainshaft remains in the position shown in the illustration—i.e., disengaged from pinions B and D, and the sliding clutch W moves to the right and engages with pinion G. The drive is taken through the clutch A, to mainshaft T, to sliding gear C, to pinion G, to clutch W, to layshaft V, to pinion E, to main gear B, to chain sprocket J, and thence, by the rear driving chain, to the rear wheel.

When the second gear is engaged the sliding gear on the mainshaft remains in the position shown in the illustration—i.e., disengaged from pinions B and D, and the sliding clutch W moves to the left and engages with pinion F. The drive is taken through the clutch A, to mainshaft T, to the larger gear on sliding gear C, to pinion F, to clutch W, to layshaft V, to pinion E, to main gear B, to chain sprocket J, and thence, by the rear driving chain, to the rear wheel.

When the third gear is engaged the sliding clutch on the layshaft remains in the position shown in the illustration—i.e., disengaged from pinions F and G, and the sliding gear on the mainshaft moves to the right and engages with pinion D. The drive is taken through the clutch A, to mainshaft T, to sliding gear C, to pinion D, to pinion H, to layshaft V, to pinion E, to main gear B to chain sprocket J, and thence, by the rear driving chain to the rear wheel.

When the fourth, or top gear is engaged the sliding clutch on the layshaft remains in the position shown in the illustration —i.e., disengaged from pinions F and G, and the sliding gear on the mainshaft moves to the left and engages with main gear B. The drive is taken through the clutch A, to mainshaft T, to sliding gear C, to main gear B, to chain sprocket J, and thence, by the rear driving chain, to the rear wheel.

No adjustment to any of the parts mentioned above is ever required, and no provision is made for adjustment.

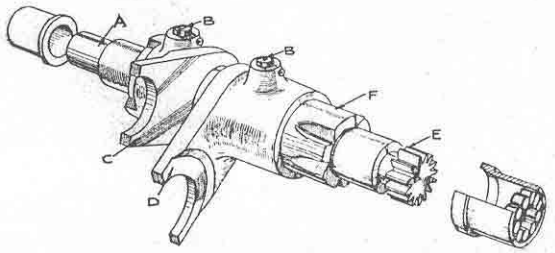


Illustration 10.

(98). GEAR BOX CAMSHAFT AND FORKS.

Illustration 10 shows the camshaft and shifting forks used in all gear boxes.

The shaft A has profiled grooves cut in it and the pegs B, in the forks C and D, engage in these grooves. The fork C engages in the sliding gear on the mainshaft and the fork D engages in the sliding clutch on the layshaft.

These forks cannot move in an up and down direction, in virtue of their fork like construction, but are free to slide endways on the shaft A. These sliding movements are controlled by the profiled cam grooves cut in the shaft and the partial rotation of the shaft will set up the endways sliding movements.

The rotation of the shaft is made by the small pinion E, which is an integral part of the shaft. This pinion meshes with the toothed sector which is a part of the foot control mechanism. The notches F which are cut in the shaft accommodate a spring loaded pawl, the function of which is to positively lock the shaft in any of the desired gear positions and thereby prevent the shaft from moving on its own account under the influence of vibration or other outside cause.

(99). THE CLUTCH.

Illustration 11 shows the clutch and gear box mainshaft with clutch operating mechanism as fitted on the B.A.P. gear boxes used on 500 and 600 O.H.V. Models. Except for detail differences, the design is similar on all other gear boxes.

The clutch operating lever A is in the dotted position when the clutch is engaged and in the firm line position when the clutch is free or "out."

When the handlebar clutch lever is lifted, this action moves the gear box operating lever A and causes the lever A to press against the fork B which, in turn, presses the steel ball C against the clutch thrust rod D which pushes against the clutch spring pressure plate F (shown immediately under the letters H and G in the illustration). This action compresses the clutch springs F so that their pressure is released from compressing the clutch plain plates G and the clutch friction plates H.

This enables the clutch sprocket L to revolve on its bearing K without rotating the clutch hub (which is secured to the mainshaft B). Consequently no power is transmitted to the rear wheel and the clutch is said to be "out," or free.

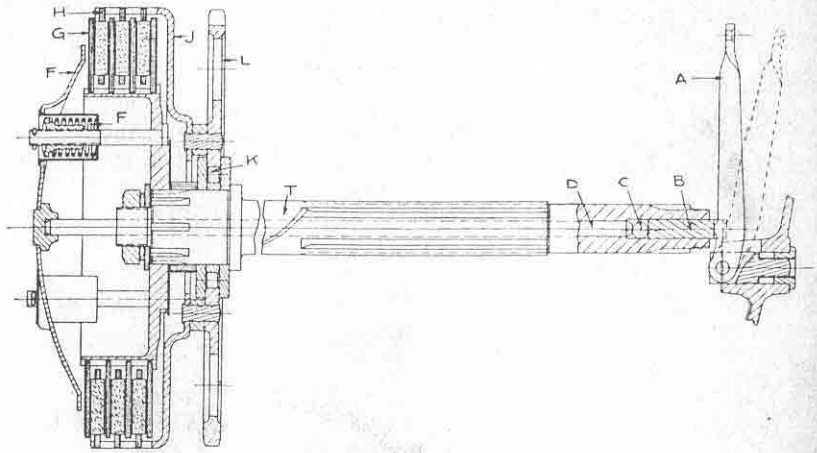


Illustration 11.

On allowing the handlebar clutch lever to return to its normal position so that the gear box clutch operating lever A is free, the clutch thrust rod D, ball C and fork B, move to the right, under the influence of the pressure exerted by the clutch springs F. The whole of the spring pressure is thereby transferred to the clutch spring pressure plate F (shown immediately under the letters H and G in the illustration), and this forces the clutch plain plates G tightly against the clutch friction plate H so that the power transmitted by the engine to the clutch sprocket is transferred, via the clutch case J to the friction plates H and through them to the steel plates G, to the clutch hub which causes the mainshaft T to revolve.

(100). CLUTCH OPERATION.

Illustration 12 shows the gear box clutch operating lever, and its parts.

175-X-4 is the gear box clutch operating lever and 66-X-7 is the pin on which it hinges. 329-X is the fulcrum for the lever and this slides in the kickstarter case cover, its position being determined by the sleeve nut 331-X.

The fork 330-X transfers the pressure from lever 175-X-4, through ball 67-X to the clutch thrust rod that passes through the centre of the gear box shaft.

The cap 328-X is secured to the outside of the kickstarter case cover by the two screws 333-X. The inner side of this cap has a hexagonal recess that just fits over the sleeve nut 331-X, thereby locking the position of that nut.

It is essential that there is about 1/32in. clearance between the fork 330-X and the nose on the lever 175-X-4 when the clutch is engaged.

This means that it must be possible to move the handlebar clutch lever about $\frac{1}{2}$in., measured at the tip of the lever, before the hand can feel the resistence set up when the lever 175-X-4 commences to overcome the spring tension on the clutch plates during the action of freeing the clutch. Full instructions on how to obtain this setting are given in paragraph 117.

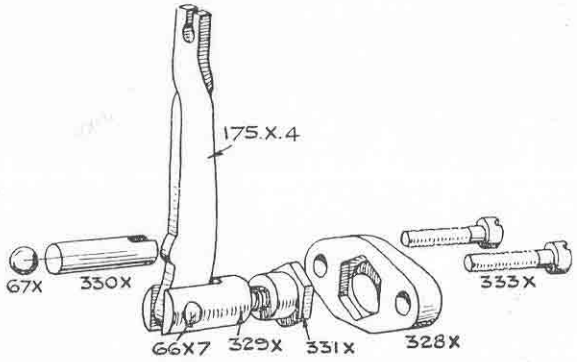


Illustration 12.

(101). CLUTCH CONTROL.

It will be appreciated that, as the result of wear on the clutch inserts (in the clutch friction plates) the plates will tend to close up towards each other. This action increases the effective length of the clutch rod, while, on the other hand, the clutch operating inner wire tends to stretch in use.

Although these two actions will neutralise each other, inasmuch as the first (plates closing down) make the effective length of the clutch thrust rod longer, and the second (inner wire stretch) will make the clutch rod effective length shorter, the fact remains it is necessary, from time to time, to adjust the rod clearance as well as take up cable stretch.

It has been shown in paragraph 100 it is essential there is about 1/32in. clearance on the clutch rod. Reference to illustration 11 will show the necessity for this clearance because it will be noticed if the clutch thrust rod is too long the clutch spring pressure will be exerted solely on the clutch rod and not on the clutch steel and friction plates. That condition will allow the clutch to slip instead of transmitting the engine power through the gears to the rear wheel.

Clutch slip caused in this manner will rapidly ruin the fabric inserts in the clutch friction plates and cause the clutch rod to wear in a most rapid manner. In addition, the slip may be so intensive that very considerable heat is generated, and this may ruin the hardening and tempering of the clutch springs and the two ends of the clutch thrust rod. Therefore, we must stress the importance of seeing that the clutch operating gear is adjusted correctly, and also the importance of regular inspection to see the adjustment is maintained.

The clearances mentioned in paragraph 100 may be set, by adjusting the clutch control cable stop and by adjusting the position of the clutch operating lever fulcrum in the kickstarter case cover.

Generally, it may be taken that minor adjustment should be made by adjusting the cable stop (see paragraph 102) and major adjustments should be made by the clutch lever.

(102). CLUTCH CABLE ADJUSTMENT.

The clutch cable adjustment is made at the clutch cable stop that is threaded into the kickstarter case. The clutch cable passes through it and its position is located by a lock nut. To decrease the effective length of the clutch operating cable—i.e., to take up play between the control and the clutch thrust rod, the adjuster should be unscrewed from the kickstarter case cover. The amount of play, or free movement, can easily be discovered by virtue of the greatly increased resistence of the handlebar lever as the declutching action commences.

(103). ACCESS TO CLUTCH CABLES.

Access to the gear box end of the clutch control cable can be obtained, by removing the screwed cap that is located on the top edge of the kickstarter case cover.

(104). CLUTCH ADJUSTMENT.

In the event of clutch slip being experienced, the most likely cause is incorrect cable adjustment. If the cable adjustment is found to be satisfactory—i.e., there is the clearance mentioned in paragraph 100, then the clutch spring adjuster nuts should be adjusted.

Each of these nuts (four on all Models except 500 and 600 O.H.V., which have five) should be screwed in exactly one half of a complete turn, when a retrial should be made. If necessary, repeat, but be careful to adjust each of the nuts a similar amount. (See paragraph 82 to obtain details of the standard setting of these nuts.)

If it is necessary to nearly completely screw home the clutch spring adjuster nuts in order to remedy clutch slip this is a clear indication the springs have lost their strength and/or the fabric inserts in the friction plates have worn so they are past further useful service. The obvious remedy then is to replace with new. (Clutch springs cost 6d. each, and new fabric inserts can be fitted to your plates at a cost of 3s. 0d. per plate, postage is extra.) (3s. 6d. per plate for 500 and 600 O.H.V. Models.)

It is very important, to obtain the full gripping power of the clutch, that the inserts are perfectly flat and to size. It is for this reason we recommend the clutch friction plates are returned to us when new inserts are needed.

(105). DISMANTLING AND ASSEMBLY.

We do not recommend the dismantling of gear boxes to any but those who have had a mechanical training. Though dismantling, in itself, is not a difficult task, the reassembly calls for accuracy in positioning and fitting that can easily lead a novice astray. To the latter we recommend the despatch of the box to ourselves or a competent mechanic.

All the nuts and bolts used in the box have right hand threads. When fitting the kickstarter return spring, it is best to tightly coil it up and bind with string or wire and then to release it after it is in position. Otherwise, attach each end of the spring to its pins and then, with the kickstarter axle only partly home " wind up " the axle two to two and a half complete turns, after which, push the axle right home.

When assembling the toothed sector of the foot change mechanism it is important to see that the sector meshes with the small pinion on the end of the camshaft so that the marks on each part are in mesh.

(106). GEAR BOX TROUBLES THAT MAY OCCUR AFTER EXTENSIVE USE.

GEARS JUMPING OUT. This may be due to weakening of the spring that operates the pawl in the gear box shell, the function of which is to lock the gear change mechanism when a gear has been selected. It might also be due to wear on the ratchet in the foot change mechanism. It can also be due to excessive wear on the two bushes in the main gear Pinion.

KICKSTARTER JAMMING. This may be due to the quadrant teeth and the ratchet pinion teeth not engaging properly, due to the sharp edge on the ratchet pinion teeth having worn. The cure for this is to file the teeth to a sharp point, and if the first tooth of the quadrant is damaged, this should also be filed to give a suitable lead. These "repairs" should only be considered a temporary nature and the first opportunity should be taken to replace the worn parts with new.

KICKSTARTER SLIPPING. This is due either to a stripped quadrant or worn ratchet teeth.

FOOT CHANGE LEVER NOT RETURNING TO POSITION. This, in most cases, is due to a broken centralising spring.

KICKSTARTER CRANK NOT RETURNING TO POSITION. This is generally due to a broken kickstarter return spring.

(107). GEAR RATIOS.

The engine sprockets on all " SUNBEAM " 1939 Motor Cycles are interchangeable, and can be supplied with 16, 17, 18, 19, 20, 21, 22, 23 and 24 teeth, at a cost of 8s. 3d. each for sprockets 16 to 21 teeth inclusive, and 8s. 10d. for 22 and 23 teeth, and 11s. for 24 teeth, plus 4d. each for postage.

In the following table the top gear ratio given by each size of sprocket is shown. It also indicates the size of sprocket that is fitted to each model as standard.

Engine Sprocket.	Top Gear Ratio on all O.H.V.	S.V.	Standard Fitting on Model
16 teeth	6.7	6.0	B23/T.
17 teeth	6.3	5.6	B23 and B23/S.
18 teeth	6.0	5.3	B24/T.
19 teeth	5.6	5.0	B24 and B24/S.
20 teeth	5.3	4.7	B25/T sidecar.
20 teeth	5.3	4.7	B29 and B30 solo.
20 teeth	5.3	4.7	B28 sidecar.
21 teeth	5.1	4.5	B25, B25/S sidecar.
21 teeth	5.1	4.5	B25/T solo.
22 teeth	4.8	4.3	B25, B25/S, B28 solo.
23 teeth	4.6	4.1	
24 teeth	4.4	3.9	
18 teeth	6.0	5.3	B29 and B30 sidecar.

(108). GEAR BOX RATIOS.

The ratios provided by the trains of gears in the gear boxes are as follows :—

Type of Box.	Fitted to Models.	Top Ratio.	Third Ratio.	Second Ratio.	First Ratio.
C.P.	B23, B23/S, B24, B24/S	1	1.28	1.76	2.67
C.P.	B23/T, B24/T	1	1.51	2.08	3.16
B.A.P.	B25, B25/S, B28	1	1.26	1.57	2.67
B.A.P.	B25/T	1	1.47	1.98	3.14
B.A.P.	B29 and B30	1	1.26	1.57	2.67

NOTE.—The C.P. gear boxes fitted to Models B23, B23/S, B24, B24/S, have main gear pinions with 30 teeth and layshaft small pinions with 20 teeth.

The C.P. gear boxes fitted to Models B23/T and B24/T have main gear pinions with 32 teeth and layshaft small pinions with 18 teeth.

The B.A.P. gear boxes fitted to Models B25, B25/S, B28, B29 and B30, have main gear pinions with 33 teeth and layshaft small pinions with 21 teeth.

The B.A.P. gear boxes fitted to Model B25/T have main gear pinions with 35 teeth and layshaft small pinions with 19 teeth.

To determine the actual gear ratio of any one gear, multiply the ratio, as given above, by the top gear ratio.

For example :—The second gear ratio on Model B25 is: top gear 4.8 (see Paragraph 107) multiplied by 1.57 (see Paragraph 108), which equals 7.5.

(109). TYRES AND SERVICE.

Obtaining satisfactory life and service from the tyres is largely a matter within the user's control, because the first essential to obtain this is proper inflation.

The correct pressure is substantially governed by the load to be carried and it is therefore somewhat difficult to lay down a hard and fast rule. Assuming the driver's weight to be normal, the pressures recommended in Paragraph 111 may be regarded as satisfactory. All users are urged to make a practice of checking the actual pressure in each tyre by a low pressure Schrader tyre gauge. This takes only a few seconds to do and will amply repay the owner by reason of additional service and immunity from failures.

This test should be made at least once a week.

Avoid unnecessary or " stunt " acceleration and fierce braking, which wear out tyres rapidly by causing wheel spin.

Avoid driving in tramlines. Apart from its danger, the upstanding edge often deeply cuts the loaded tyre.

Do not allow flints, etc., to remain embedded in the tread. They will work through, puncturing the tube and destroying the canvas casing.

Keep oil away from the tyres and from the spokes. If any finds its way on to the tyres, clean it off by using petrol sparingly.

(110). INFLATION PRESSURES. (General Table.)

The following are correct minimum inflation pressures for specified loads per tyre :—

Load per tyre, 200 lbs.—Presure, 16 lbs. per square inch.
Load per tyre, 240 lbs.—Pressure, 18 lbs. per square inch.
Load per tyre, 280 lbs.—Pressure, 20 lbs. per square inch.
Load per tyre, 350 lbs.—Pressure, 24 lbs. per square inch.
Load per tyre, 400 lbs.—Pressure, 28 lbs. per square inch.
Load per tyre, 440 lbs.—Pressure, 32 lbs. per square inch.

Consequently the best method of ascertaining the correct pressures is to actually weigh the loads on the front and rear tyres on a weighbridge and this is a service that can usually be provided by a corporation or railway company.

(111). INFLATION PRESSURES. (Approximate.)

For those owners who do not wish to go to the trouble of actually weighing the loads, we give below, in tabular form, suggested inflation pressures for solo riding, when the rider is of average weight. For riders of abnormal weight, or when a pillion passenger is carried, add 2 lbs. per square inch, to the rear tyre only.

Models.	Front lbs.	Rear lbs.
B23	16	18
B23/S	20	18
B23/T	20	18
B24	16	18
B24/S	20	18
B24/T	20	18
B25	18	20
B25/S	22	22
B25/T	22	22
B28	16	17
B29	18	20
B30	16	17

If it is desired to remove the cover from the rim, all that now has to be done is to push the side of the cover that is still on the rim, right into the well of the rim at one place, and pick up the opposite edge and slip the cover off the rim.

(112). TYRE REMOVAL.

To take off an outer cover and remove the inner tube, proceed as follows:—

Take off the valve cap and unscrew the nut on the valve stem.

Completely deflate the tube by removing the valve inside. (The valve cap is provided with a slotted top to facilitate this operation).

Then, push the edge of the cover, that is immediately opposite to the valve, into the well of the rim, and, using the tyre lever that is included in the tool kit, pick up the edge of the cover close to the valve, so that it comes off over the edge of the rim, and then it will be found quite easy to slip the remainder of the cover off the rim, without the need to use force.

Next, push the valve stem upwards, through the hole in the rim, and the inner tube can be taken away.

Next, half inflate the tyre and spin the wheel and test for trueness, because it is essential the pattern on the tread of the cover runs quite evenly and the cover must be manipulated until this condition is obtained. The tyre should then be fully inflated to the pressure recommended in paragraphs 110 and 111.

Finally, screw home the valve stem nut and replace the valve cap.

Never run without the valve caps in position, otherwise dirt will enter the valve and, upon the application of a tyre pump, some will get on the valve seating, thereby preventing the valve making an air tight seal and deflation will result.

(113). TYRE FITTING.

To refit an inner tube and outer cover, proceed as follows:—

Place one edge of the cover right into the well of the rim and, commencing opposite to that spot and using the hands only, work the cover over the edge of the rim. This is a very easy operation.

Replace the valve inside in the valve and slightly inflate the inner tube. (Do not distend the tube). Fit the valve into its hole in the rim and replace the valve stem nut, only screwing it on the stem about half an inch or so. Tuck in the inner tube so that it lies snugly in the cover. Then introduce the outer edge of the cover into the rim, at a spot opposite to the valve.

Get this edge right into the well of the rim and then, by working round the cover equally on either side, the cover will slip into place without excessive exertion. There should be no need to use the tyre lever when refitting the cover. That portion of the cover nearest to the valve should be refitted last.

(114). SECURITY BOLTS.

On those Competition machines that have tyre security bolts these should be released and removed exactly as would a valve.

When refitting, the security bolt, or bolts, should be replaced in the rim before the inner tube is inserted in the cover, and, when replacing the outer cover edge, it is necessary to take great care the edge of the cover lies UNDER the lip of the security bolt and also that the inner tube is not trapped between the lip and the cover.

ACCESSORIES.

(115). PILLION SEATS.

Pillion seats can be supplied for all models. Two types are available.

One pattern is secured to the rear mudguard by four bolts, washers and nuts. The other is designed to clamp to the rear carrier, that can be supplied, as an extra, to all standard models. (Not suitable for Competition Models).

Pillion seat, with fittings, mudguard fitting. All Models except 2 and 2A, part number 39-EQ-9, 12s. 6d.

Pillion seat, with fittings, carrier fitting. All Models except 22T, 26T and 18T, part number 39-EQ-10, 13s. 6d.

Postage 6d. extra on any of above items.

(116). PILLION FOOTRESTS.

Pillion footrests can be supplied for all models.

These fit into special sockets that are integral with the rear fork ends and are secured in position by lock nuts.

They are quickly and easily fitted or removed and fold so that, when not in use, they are well out of the way and are almost inconspicuous. (See Illustration No. 13.)

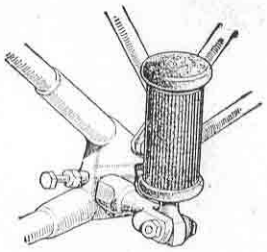


Illustration 13.

("Motor Cycling")

These pillion footrests, being designed and made exclusively for "SUNBEAM" Motor Cycles, are greatly superior to the type that are sold with adjustable fittings to enable them to be clamped to machines of any make.

The part number is 39/EQ/2 and the price 12s. 6d. per pair, complete, postage being 6d. extra.

If in difficulty with your
SUNBEAM MOTOR CYCLE
write to the Service Department for assistance.

ELECTRICAL SECTION.

(117). ELECTRICAL EQUIPMENT.

All machines are fitted with Lucas Electrical Equipment.

On all Models, the dynamo charge rate is automatically controlled by a constant voltage unit. This unit functions when the voltage, generated by the dynamo, rises above 7.3 to 7.5 volts and then, with a fully charged battery and under "No Load" conditions, only a small current flows through the system.

As the load is switched on, the dynamo output is automatically increased to meet the demand. Therefore, it is only when the battery is in a run down condition, and during daylight running, that the ammeter will show a high charging rate, when a charge rate as high as from 5 to 6 amps may be recorded. Under normal conditions, the charge rate is between 2 and 4 amps, according to the state of the battery.

This constant voltage system is designed to maintain a fully charged battery without the risk of overcharging, which was once so commonly experienced with lighting sets having only switch charging control.

All the wiring is the single pole type, the frame of the machine being used for the negative, or earth, return.

On all models, the main lighting switch is located in the back of the head lamp.

(118). BATTERY MAINTENANCE.

The electrolyte is a dilute solution of sulphuric acid. This has a corrosive action on most metals and burns fabric and human skin. Any that gets on the machine, hands or clothes, through being spilt, should be immediately washed off with plenty of water or else neutralised by washing with an alkaline solution made with ammonia or washing soda (sodium carbonate) and water.

At least once a month, the vent plugs in the top of the battery should be removed, and the level of the acid solution (electrolyte) examined. The solution should be just over the top of the lead plates of the battery. If necessary, distilled water, which can be obtained from all chemists and most garages, should be added to bring the level to just over the top of the plates. However, if any of the acid solution has been spilled, this should be replaced by a dilute sulphuric acid solution of the same specific gravity. When examining the cells, do not hold naked lights near the vents because there is a danger of igniting the gases coming from the plates.

It is advisable to complete the inspection by measuring the specific gravity of the acid in each cell, as this gives a very good indication of the state of charge of the battery.

An instrument known as a "Hydrometer" is employed for this purpose. This can be bought at any Lucas Service Station and from most garages.

The specific gravity figures are:—

1.285 to 1.300 when fully charged.
About 1.210 when half discharged.
About 1.150 when fully discharged.

These figures are given assuming the temperature of the solution is about 60 degrees F.

Take readings of the acid in each cell. The readings should be approximately the same for all of the cells. If one cell gives a reading very different from the rest it may be that the acid has been spilled or has leaked from this particular cell, or there may be a short between the plates. In this case we advise the owner to have the battery examined by a service depot to trace the cause and to prevent the trouble from developing.

If the equipment is laid by for several months, the battery must be given a small charge from a separate source of electrical energy about once a fortnight, in order to obviate any permanent sulphation of the plates. In no circumstances must the electrolyte be removed from the battery and the plates allowed to dry, as then certain changes take place which result in loss of capacity.

(119). DYNAMO.

A magdyno unit is fitted. This is a combined magneto and dynamo, and both are self contained units. The magneto portion forms the base part and takes the drive from the engine camshaft chain and the dynamo is secured to it by a strap and screws, and is driven from the magneto armature shaft by a train of gears.

To remove the dynamo from the magneto base:—

Remove the nut that is situated on the right hand side of the unit right in the apex of casing over the dynamo driving gears, and slacken the screws that retains the clamping strap. This permits the dynamo to be removed, endways, towards the left.

The dynamo is fitted with two brushes, the positive is insulated and the negative is earthed.

Before removing the dynamo cover for any reason, disconnect the positive wire from the battery, otherwise there is a danger

of reversing the polarity of the dynamo or short circuiting the battery, either of which might cause serious damage.

Occasionally examine the dynamo brushes. They can be removed from their holders when the spring lever is held aside. They should slide freely in their holders and make good contact with the commutator. If the brushes are dirty or greasy, clean them with a cloth moistened with petrol. Replace the brushes in their original position.

After long service, when the brushes have become so worn that they will not bear properly on the commutator, they should be replaced with new. Brushes are sold in complete sets.

Keep the commutator clean and free from oil. The best method of cleaning is, without disconnecting any leads (wires), to remove one of the brushes from its holder and, inserting in its place a soft duster, hold the duster, by means of a suitably shaped piece of wood, against the surface of the commutator, at the same time, turning the engine so as to rotate the armature.

(120). VOLTAGE CONTROL UNIT.

The voltage control unit consists of a regulator which is mounted together with the cut-out.

The regulator causes the dynamo to give an out-put which varies according to the load on the battery and its state of charge.

When the battery is discharged the dynamo gives high out-put, so that the battery receives a quick recharge which brings it back to its normal state in the minimum possible time. On the other hand, if the battery is fully charged, the dynamo is arranged to give only a trickle charge which is sufficient to keep it in good condition without the possibility of causing damage to the battery by overcharging.

In addition to controlling out-put of the dynamo according to the condition of the battery, the regulator provides for an increase of out-put to balance current taken by the lamps or other accessories whenever they are switched on.

This compensated voltage control system ensures the battery is charged, even during the winter, and it eliminates the danger of a discharged battery.

Should the battery become disconnected, or is removed, the machine may still be used without fear of damage to the electrical equipment.

The cut-out is an automatic switch which prevents the discharge of the battery when the dynamo is stationary. Its contacts close when the dynamo voltage rises above that of the battery, as the engine speed rises, and open when the speed drops and the voltage falls below that of the battery.

The cut-out is incorporated with the voltage control regulator and the complete assembly is located under the saddle.

(121). **LIGHTING SWITCHES. (Magdyno Models.)**

On all models, the main lighting switch is located in the back of the head lamp.

The switch has three positions, marked, "OFF," "L" and "H." When in the "OFF" position no lamps are alight. In the "L" position the pilot bulb in the head lamp, the rear lamp and the speedometer bulb are alight. In the "H" position the main bulb in the head lamp, the rear lamp and the speedometer bulb are alight.

The switch must be in either the "L" or "H" position before the inspection lamp can be lit.

The dynamo can charge the battery in all switch positions (including the "Off" position). There is no risk of over charging the battery because the Voltage Control Unit automatically looks after that. (See Paragraph 120.)

(122). **HEAD LAMPS.**

The head lamps are fitted with double filament bulbs, 6 volts, 24 and 24 watts. One filament is arranged to be at the focus of the reflector and gives a normal driving light, while the other, mounted slightly above the first, gives a dipped, anti-dazzle beam for use when meeting other traffic or driving in fog. This anti-dazzle device is controlled by the two way switch on the left handlebar. A small pilot bulb, 6 volts, 3 watts, is provided for use when the machine is stationary or for town riding.

To remove the front of the head lamp, it is necessary to release the clip at the bottom of the rim. Then pull the bottom of the rim outwards and it will come away from the body, complete with the reflector and bulb assembly, which are attached to it.

The main bulb can be focussed by altering its position in the holder.

The bulb holder is a sliding fit in the reflecter and is locked in position by a small clamp and screw. If this screw is slackened a few turns the holder can be slid inwards or outwards to the required position, after which the screw should be tightened.

To fit a new main or pilot bulb it is necessary to detach the bulb holder assembly from the reflector.

First of all, remove the front rim from the body of the lamp, as already explained. Then it will be seen the bulb holder assembly is retained by two long wire springs, these can be pushed sideways, away from the centre, and this releases the holder assembly and allows it to be taken away from the reflector.

On all models it is not necessary to disconnect any of the wiring in order to fit a new bulb.

The tilt of the headlamp can be adjusted by slightly slackening the two bolts fixing the lamp to the brackets, placing the lamp in the desired position, and tightening the bolts.

(123). **HEAD LAMP REMOVAL.**

On Competition machines provision is made to quickly and easily remove the head lamp without disturbing any of the wiring.

This is done by fixing a four point socket to the fork girder, to which the cables from dynamo and battery are attached, and, on the companion four point plug, fixing the cables leading from the lamp.

Therefore, when it is desired to remove the head lamp, all that has to be done is to take away the two fixing bolts in the side of the lamp body and to separate the connection socket and plug. This leaves the lamp, with its cables, free to be removed.

Finally, if the four bolts that retain the lamp stays to the fork girder are slackened, the stays can be swung back, in line with the girder and then, if the bolts are tightened, the stays will be retained in that position, out of the way.

(124). **REAR LAMPS.**

The rear lamp is in two pieces. The portion that carries the ruby glass is fixed to the number plate, the other portion, which carries the bulb, is attached to the main body by a bayonet clip.

To remove the portion carrying the bulb, it is necessary to rotate it in an anti-clockwise direction, about a third of a turn.

The bulbs used in the rear lamps are identical with those used in the pilot position in the head lamps. (6 volts, 3 watts).

(125). THE MAGDYNO.

Occasionally remove the high tension pickup, remove the carbon brush and spring that slide in the brass lined sleeve of the pickup and, with petrol and rag, clean away all traces of oil and carbon dust. Then clean the slip ring, which is on the end of the magneto armature and on which the carbon brush presses. The best way of doing this is to take an ordinary lead pencil and, on the unsharpened end, wrap one or two folds of a soft duster, insert this in the opening disclosed by the removal of the pickup and push gently against the bottom of the slip ring, at the same time revolving the engine.

Then replace the carbon brush and spring in the pickup and fix the pickup to the magneto. Take the opportunity of examining the high tension cable, and, if it appears perished, denoted by the surface being covered by a multiplicity of small cracks, it is advisable to replace with new.

About every three months, it is advisable to remove the contact breaker cover and examine the contacts. One contact point is mounted on the narrow end of the spring blade. The other point is adjustable and screws into the face of the magneto and is locked in position by a nut. If the points are burned or blackened, clean them with the finest grade of emery cloth and afterwards clean with a rag that is moist with petrol.

Check the gap between the two points by turning the engine till both points are separated and measure the gap. The gap should be .012in. and a gauge this thickness is a part of the magneto spanner. The gauge should just pass between the points without any binding or slackness. If necessary, adjust the gap by slackening the lock nut on the adjustable point and screwing the point inwards, to increase the gap, or outwards, to decrease it. Then tighten the lock nut and recheck the gap.

(126). SPECIAL NOTE RE CONTACT BREAKERS.

Check the contact breaker point gap after the first 100 and 500 miles. Owing to an initial settling down, there is a tendancy for the gap to alter in the first few hundred miles of use. This may seriously affect the ignition setting. Subsesequent adjustment will only be required at long intervals, but it is as well to check the gap every 2,000 miles.

A gap that is too small, or too large, will affect the ignition setting and may produce symptoms that might be mistaken as being due to carburation trouble.

(127). SPECIAL NOTE RE IGNITION TIMING.

Before timing the ignition, check the gap between the contact points, as described in paragraph 125, and adjust, if necessary.

To find the exact moment for the commencement of the point separation, place a piece of tissue paper between the points and turn the magneto armature until the paper is just released, and no more, upon a gentle pull.

(128). IGNITION TIMING ON O.H.V. MODELS.

The magdyno is driven by the timing gear chain. The chain sprocket is mounted on a short shaft and, on the left hand side of the shaft, which is tapered, is a driving disc, this being secured to the tapered shaft by a nut.

A loose plate is fitted over a boss on the driving disc, and this is secured to the driving disc by two bolts. These two bolts pass through slots in the driving disc. The resulting amount of relative movement that is possible between the loose plate and the driving disc allows critical adjustment for the ignition timing. The loose plate has two pins projecting from it, diametrically opposite to each other, and these pins engage in a rubber coupling.

Another driving disc is secured by a nut to the tapered armature shaft of the magdyno. This disc also has two pins projecting from it, also diametrically opposite to each other, and these engage in the rubber coupling at 90° to the two pins on the loose driving plate.

This method of drive provides a cushioned drive for the magdyno and also relieves the magdyno armature shaft of all torsional strain.

(129). TO CHECK, OR VARY, THE IGNITION TIMING ON O.H.V. MODELS.

Have available a short metal bar about 3/16in. in diameter and about 5½in. long. (The tommy bar of a tubular spanner is suitable.) Place the handlebar ignition control lever in the closed (fully advanced) position, and proceed as follows :—

Remove the tappet inspection cover from the right hand side of the cylinder head and also remove the sparking plug.

Turn over the engine until both of the valves are closed and, with the tommy bar passed through the sparking plug hole in the cylinder head, feel the piston till it is at the top of its stroke. (Slightly rotate the engine, forwards or backwards, to find this position.)

Then, place a mark on the tommy bar in line with the top face of the sparking plug hole, remove the bar and measure above the mark 7/16in., placing a second mark on the bar to record that measurement.

Next, replace the bar in the plug hole and turn the engine BACKWARDS until the second mark on the bar is in line with the top face of the sparking plug hole.

Next, remove the inspection cap over the contact breaker of the magdyno and notice the contact breaker points. The contact breaker rotates in an anti-clockwise direction (as seen facing the contact breaker), and the points should be just commencing to break (or separate).

If the points are not just on the position of separation the two bolts on the metal coupling disc, nearest to the engine timing gear case, should be slackened and the rubber coupling slightly turned, forwards or backwards, to the position where the points just commence to separate.

Then tighten the bolts on the coupling disc and finally recheck the setting.

IF ALL THE IGNITION TIMING PARTS HAVE BEEN DISMANTLED, TO RESET THE TIMNG, PROCEED AS FOLLOWS:—

(It is presumed the valve timing has also been disturbed and reset as the instructions given in paragraph ?, and the coupling discs have been removed from the magdyno driving shaft and the magdyno armature shaft.)

First, make sure the valve timing has been correctly reset and the sprocket on the magdyno driving shaft has been replaced so that the scribed mark on it is in line with the horizontally scribed line on the camshaft sprocket WHEN THE VERTICAL MARK ON THE CAMSHAFT SPROCKET IS IN LINE WITH THE SCRIBED MARK ON THE SMALL SPROCKET THAT IS MOUNTED ON THE ENGINE MAINSHAFT.

Next, take the coupling disc, that is normally fixed to the magdyno driving shaft, and place on it the loose plate and tighten the two fixing bolts so that they occupy a position midway in the slots of the driving disc.

Then, replace the driving disc assembly on the magdyno driving shaft and fully tighten its retaining nut.

Next, push the rubber coupling over the two pins of the metal coupling and also push into the rubber coupling the driving disc that is normally secured to the magdyno armature shaft.

Then, turn over the engine and find the firing point exactly as detailed in paragraph ?

Next, take the magdyno and rotate the armature shaft in an anti-clockwise direction (as seen when looking at the contact breaker), until the points are just about to separate and, holding the contact breaker so that the armature shaft

cannot rotate, place the magdyno on its platform and push the tapered end of the armature shaft well into the coupling.

Use sufficient force to ensure the magdyno metal coupling gripping the armature shaft taper and, gently separating the rubber and metal coupling, remove the magneto.

Next, replace the nut on the armature shaft and fully tighten it, taking care, while doing so, not to move the relative position of the metal coupling on the shaft.

Finally, replace the magdyno on its platform and engage the rubber coupling, tighten the bolts that secure the magdyno to its platform and then recheck the ignition setting in the manner already described, making any final adjustment that may be necessary by the method described in that paragraph.

The magdyno cannot be removed from its platform until the front chain case has been completely removed, because the chain case masks access to the base fixing bolts.

(130). IGNITION TIMING ON SIDE VALVE MODELS.

The maximum recommended ignition advance is ⅛in.

To check, or reset, the ignition timing, remove the magdyno driving chain case cover, the cover over the tappets and valve springs, the sparking plug and the cover over the magdyno contact breaker. Have available a bar of metal about 3/16in. in diameter and about 5½in. long (the tommy bar of a tubular spanner is suitable) and proceed as follows:—

Unscrew the nut that retains the sprocket to the magdyno shaft and remove the sprocket. A special withdrawal tool, Part Number 61, price each 1s. 2d., plus 2d. postage, can be supplied. To use this tool, after the sprocket retaining nut has been removed, screw the tool into the sprocket until the sprocket is released from the armature shaft, then remove the tool.

Turn over the engine until both valves are closed and, with the bar inserted through the sparking plug hole, feel the piston till, by partially rotating the engine, forwards or backwards, it is felt the piston is at the extreme top of its stroke.

Place a mark on the bar, level with the top face of the sparking plug hole. Remove the bar and measure above the mark ⅛in. and record that measurement on the bar.

Place the handlebar ignition control lever in the fully advanced position (drawn inwards as far as it will go), re-insert the bar in the plug hole and slighty rotate the engine BACKWARDS until the upper mark on the bar is level with the top face of the plug hole.

Rotate the control breaker in a clockwise direction (as seen looking at the contact breaker), until the points of the contact breaker are just about to separate. Hold the contact breaker in this position and press the sprocket into intimate contact with the tapered armature shaft, replace the sprocket retaining nut and fully tighten it, taking care not to move the engine and/or the magdyno shaft.

Recheck the setting and finally replace the contact breaker cover, the sparking plug, the valve spring and tappet cover and the chain case cover. (There is a composition washer between the chain case and its cover.)

(131). DIRECTION OF MAGDYNO ROTATION.

All O.H.V. Models are fitted with clockwise magdynos and all Side Valve Models with anti-clockwise magdynos. The contact breakers are of the face cam type and the points are just about to separate when the "point" end of the contact breaker is in a position about mid-way between "two and three o'clock."

(132). SPARKING PLUGS.

All Models, except Models B29 and B30, are equipped with LODGE Type H 53 sparking plugs. Models B29 and B30 are equipped with LODGE Type C 14 plugs.

These plugs have a 14 m.m. thread and are of the detachable type. The gap between the points should be from .018in. to .020in. and when buying new plugs it is necessary to see that the new purchase is a plug set to that gap.

To clean the plug it should be dismantled. To do this, unscrew the gland nut that retains the centre of the plug to the body. This is best done by placing the body of the plug in a vice (do not squeeze the body more than just enough to hold it in the vice) and, using a spanner that is a good fit on the smaller hexagon, unscrew the gland nut. A sharp tap on the spanner may be necessary to release the nut.

The inside of the body of the plug should be scraped clean and the point made bright with fine emery cloth.

The mica insulation on the plug centre should be cleaned with a rag moistened with petrol and the metal point made bright with fine emery cloth.

When replacing the plug centre make sure the small copper washer is in position and finally screw the gland nut completely home.

If a difficulty is found in making a gas tight joint between the plug centre and the body, the copper washer should be annealed.

This can be done by holding the copper washer in a flame till it is bright red hot and then dropping it into cold water. (Hold the washer on a piece of wire when heating it.)

If the plug points are set too closely there will be a tendancy to misfire and this may be accompanied with explosions in the silencer.

If the plug points are set too far apart, starting will be difficult and, in any case, an undue strain will be placed on the insulation of the magneto armature, or, in the case of coil ignition, on the coil.

GENERAL INFORMATION.

(133). MECHANICAL TROUBLES.

Sudden failures are generally due to one definite thing. Gradual failure may be due to a combination of circumstances.

In any case of failure in operation no adjustments should be made, nor should any part be tampered with, until the cause of the trouble has been located. Otherwise adjustments which are correct may be deranged.

In paragraphs 134 to 139, inclusive, are particulars of failures and troubles that can occur together with the probable reasons. These troubles are arranged in the order of possibility.

(134). ENGINE FAILS TO START OR IS DIFFICULT TO START.

May be due to:—

Throttle opening too large.
Petrol tap closed.
Air lever in open position.
Ignition not set just off the fully advanced position.
Not enough petrol in the tank.
Lack of fuel because of insufficient flooding.
Lack of fuel because of pipe or tap obstruction.
Excessive flooding of carburetter.
Pilot jet choked.
Oiled up or fouled sparking plug.
Stuck up engine valve.
Valve stem sticky with burnt oil.
Weak valve spring.
Valve not seating properly.
Contact points dirty.
Incorrect contact point gap.
Water on high tension pickup.
Water on sparking plug.
Vent hole in filler cap choked.

(135). ENGINE MISSES FIRE.

May be due to :—

Defective or oiled sparking plug.
Incorrect contact point gap.
Contact breaker blade sticking.
Tappet adjustment incorrect.
Oil on contact breaker points.
Weak valve springs.
Defective sparking plug cable.
Partially obstructed petrol supply.

(136). LOSS OF POWER.

May be due to :—

Faulty sparking plug.
Lack of oil in tank.
No tappet clearance or to much clearance.
Weak valve spring or sticky valve stem.
Valve not seating properly.
Brakes adjusted too closely.
Ignition lever creeps to full retard position.
Badly fitting or broken piston rings.
Punctured carburetter float.
Engine carbonised.
Choked silencer.

(137). ENGINE OVER HEATS.

May be due to :—

Lack of proper lubrication. (Quantity or quality of oil).
Faulty sparking plug.
Air control to carburetter out of order.
Punctured carburetter float.
Engine carbonised.
Weak valve springs.
Pitted valve seats.
Worn piston rings.
Ignition lever creeps to full retard position.
Ignition setting incorrect.
Choked silencer.

(138). ENGINE STOPS SUDDENLY.

May be due to :—

No petrol in tank, or choked petrol supply.
High tension wire detached from sparking plug.
Choked main jet.
Oiled up or fouled sparking plug.
Water on high tension pickup.
Water in float chamber.
Choked vent hole in petrol tank filler cap.

(139). EXCESSIVE OIL CONSUMPTION.

May be due to :—

Clogged, or partly clogged, felt filter in oil tank.
High crankcase pressure, caused by in-operative release valve action. (The disc in the valve may be damaged or jammed with dirt).
Stoppage, or partial stoppage, in the pipe returning oil from the engine to the oil tank.
Badly worn, or stuck up, piston rings. (Causing high pressure in the crankcase).
Air leak in dry sump oiling system.

(140). USEFUL INFORMATION.

Bore (in millimetres)	All 250 O.H.V. Models..	62.5
	All 350 O.H.V. Models..	69
	All 500 O.H.V. Models..	82.5
	All 600 O.H.V. Models..	90.48
	All 500 S.V. Models ...	77
	All 600 S.V. Models ...	85.
Stroke (in millimetres)	All 250 O.H.V. Models..	80.
	All 350, 500 and 600 O.H.V. Models ...	93.
	All S.V. Models	105.5
Capacity ..... (in cubic centimetres)	All 250 O.H.V. Models..	246
	All 350 O.H.V. Models..	347
	All 500 O.H.V. Models..	498
	All 600 O.H.V. Models..	598
	All 500 S.V. Models ...	492
	All 600 S.V. Models ...	598
Horse Power ..... (A.C.U. rating)	All 250 O.H.V. Models..	2.46
	All 350 O.H.V. Models..	3.47
	All 500 O.H.V. Models..	4.98
	All 600 O.H.V. Models..	5.98
	All 500 S.V. Models ...	4.92
	All 600 S.V. Models ...	5.98

Valve Timing

Inlet opens B.T.D.C. ...	All O.H.V. Models	25°
Inlet opens B.T.D.C. ...	All S.V. Models	22°
Inlet closes A.B.D.C. ...	All O.H.V. Models	50°
Inlet closes A.B.D.C. ...	All S.V. Models	30°
Exhaust opens B.B.D.C.	All O.H.V. Models	65°
Exhaust opens B.B.D.C.	All S.V. Models	54°
Exhaust closes A.T.D.C.	All O.H.V. Models	25°
Exhaust closes A.T.D.C.	All S.V. Models	27°

Tappet Clearance.	Inlet ...	All O.H.V. Models	Nil
	Inlet ...	All S.V. Models	.004"
	Exhaust	All O.H.V. Models	Nil
	Exhaust	All S.V. Models	.006"
Ignition Advance (maximum)		All O.H.V. Models	7/16"
		All S.V. Models	$\frac{1}{2}$"
Sparking Plug (Lodge) ...		All O.H.V. Models	H53
		All S.V. Models	C14
Sparking Plug Gap		All Models, from .018" to .020"	
Size of Main Jet		All 250 O.H.V. Models..	120
		All 350 O.H.V. Models..	150
		All 500 O.H.V. Models..	180
		All 600 O.H.V. Models..	180
		All S.V. Models	160
Size of Choke		All 250 O.H.V. Models..	5-3
		All 350 O.H.V. Models..	4-5
		All 500 O.H.V. Models..	5-4
		All 600 O.H.V. Models..	5-4
		All S.V. Models	5-1
Size of Throttle Slide		All 250 O.H.V. Models...	5x3
		All 350 O.H.V. Models...	6x4
		All 500 O.H.V. Models...	29x4
		All 600 O.H.V. Models...	29x4
		All S.V. Models	6x4
Petrol Tank Capacity (gals.)		All Standard Models ...	3
		All Sports Models	3
		All Competition Models...	2
		All S.V. Models	3
Oil Tank Capacity (pints)...		All Models	5
Piston Ring Gap		Genuine "SUNBEAM" piston rings are "fitted" before despatch from the factory and are ready for fitting to the engine.	

Standard Compression Ratio	All 250 O.H.V. Models	7.0 to 1
	All 350 O.H.V. Models	6.2 to 1
	All 500 O.H.V. Models	6.1 to 1
	All 600 O.H.V. Models	6.1 to 1
	All 500 S.V. Models....	5.25 to 1
	All 600 S.V. Models...	4.75 to 1
High Compression Ratio ...	All 250 O.H.V. Models	9.2 to 1
	All 350 O.H.V. Models	8.1 8 to 1
	All 500 O.H.V. Models	7.4 to 1
Ultra High Comp'n. Ratio	All 250 O.H.V. Models	10.8 to 1
	All 350 O.H.V. Models	11.0 to 1

(141). TO DETERMINE GEAR RATIOS.

Top gear ratio equals :—

$$\frac{\text{Rear Wheel Sprocket}}{\text{Small gear Box Sprocket}} \times \frac{\text{Large Clutch Sprocket}}{\text{Engine Sprocket}}$$

For example :—If the rear wheel sprocket has 50 teeth, the small gear box sprocket has 20 teeth, the clutch sprocket has 40 teeth and the engine sprocket has 25 teeth, the resulting equation would be :—

$$\frac{50}{20} \times \frac{40}{25} = \text{Top gear ratio of 4 to 1.}$$

(142). CLEANING THE MACHINE.

Do not attempt to rub, or brush, mud off the enamelled surfaces because this will soon destroy the sheen of the enamel. Mud, and other road dirt, should be soaked off with water.

The best method is to use a small hose, taking care not to direct the water on to the engine, carburetter, magneto and other such parts. As a poorer substitute, a pail of water and a sponge can be used.

After washing down with water, the surplus moisture should be removed with a chamois leather, and, when the enamelled surfaces are thoroughly dry, they may be polished with a good wax polish and soft dusters.

Such parts as the engine crankcase and the gear box can be cleaned by applying paraffin with a stiff brush, and, with a final application of petrol, will come up like new.

(143). CHROMIUM PLATING.

To preserve the condition of parts that are plated with chromium they should be frequently cleaned with a damp chamois leather. If the lustre of the plating deteriorates a special chromium cleaning compound should be used on it. The plating may be polished with a soft duster, or, better still, with a polisher of the "Selvyt" type.

Ordinary metal polishing liquids or paste must not be used on chromium plating, because these, almost without exception, contain oleic acid, and this attacks chromium.

It is quite a common assumption that chromium plating is impervious to rust. This is incorrect. Chromium plating is used chiefly because of the oily character of its surface, as a result of which, it has great resistence to moisture.

Under some climatic conditions, a rusty looking deposit may be noticed on parts that are chromium plated. This is not ordinary rust (ferric oxide) but is a salt deposit that can, in most cases, be quickly and easily removed with a damp chamois leather. In stubborn cases it may be desirable to use a special chromium cleaning compound.

1939 STANDARD "SUNBEAM" MOTOR CYCLES.

These models have fully valanced mudguards, three-gallon petrol tanks finished in black and gold, low exhaust pipes, and 26in. by 3.25in. tyres. (26in. by 3.50in. on 600 c.c.) The rims are enamelled black with black spokes.

1939 SPORTS "SUNBEAM" MOTOR CYCLES.

These models have sports mudguards (enamelled black), three-gallon petrol tanks chromium plated with black panels and gold and blue lines, upswept exhaust pipes, check spring front forks, specially tuned engine with high compression piston, polished cylinder head and ports. Dunlop Speed Universal 26in. by 3.50in. tyres are fitted to the rear wheels and Dunlop ribbed 26in. by 3in. to the front. The rims have plated edges with black centres and blue lines. The spokes are bright.

1939 COMPETITION "SUNBEAM" MOTOR CYCLES.

These models are specially prepared for competition work. The tanks are small (two-gallon capacity) finished in black and gold. Special plated mudguards are fitted and upswept pipes are standard. Check spring front forks and Dunlop saddles are fitted, and the choice is given of Dunlop Sports and Universal tyres. The rear wheels are fitted with 27in. by 4in. tyres, and the front wheels have 27in. by 2.75in. tyres. The engines are specially tuned and have polished heads and ports. Pistons to give a normal ratio are fitted. The rims are enamelled black and the spokes are bright.

(144). PROPRIETORY FITTINGS.

No expense is spared to secure and fit the most suitable and highest quality instruments and accessories for the standard equipment of our machines. Nevertheless, our 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:—

Carburetters.	Messrs. Amalgamated Carburetters, Ltd., Perry Barr, Birmingham.*
Chains.	The Renold and Coventry Chain Co., Ltd., Didsbury, Manchester.*
Electrical Equipment.	Messrs. Joseph Lucas, Ltd., Great King Street, Birmingham, 19.*
Gear Boxes.	Messrs. Burman and Sons, Ltd., Ryland Street, Birmingham.*
Horns.	Messrs. Joseph Lucas, Ltd., Great King Street, Birmingham, 19.* Messrs. Clear Hooters, Ltd., 79-81, Lombard Street, Birmingham, 12.*
Saddles.	Messrs. Lycetts and Motor Accessories Co., Ltd., Western Works, Arthur Street, Small Heath, Birmingham, 10. Messrs. Herbert Terry and Sons, Ltd., Redditch. Messrs. Dunlop Rubber Co., Ltd., Fort Dunlop, Birmingham.
Sparking Plugs.	Messrs. Lodge Plugs, Ltd., Rugby.*
Speedometers.	Messrs. S. Smith and Sons (M.A.), Ltd., Cricklewood, London.*
Tyres.	Messrs. Dunlop Rubber Co., Ltd., Fort Dunlop, Birmingham.*

*These manufacturers issue instructive literature regarding their products which are fitted to "SUNBEAM" Motor Cycles.

(145). REPAIRS.

The instructions regarding repairs should be clear and definite, otherwise the cost may be greater than that expected. We shall be pleased to give estimates for repairs if parts are sent to us for that purpose. If the estimate is accepted, no charge is made for the preliminary examination, but, should it be decided not to have the work carried out, it may be

necessary to make a charge to cover the cost of whatever dismantling and re-assembly may have been done to prepare the estimate.

Parts sent to us as patterns, or for repair, should have attached to them a label bearing the sender's full name and address. The instructions regarding such parts should be sent under separate cover.

If it is necessary to bring a machine, or parts, to the works for an urgent repair, it is essentail you make an appointment beforehand to avoid disappointment. This can be done by letter or telephone.

(146). SERVICE.

The SERVICE AND REPAIR DEPARTMENT is situated in BURRAGE GROVE, PLUMSTEAD, LONDON, S.E.18, and is open on Mondays to Fridays from 9 a.m. to 6 p.m., and on Saturdays from 9 a.m. to 1 p.m. It is closed on Sundays and National Holidays.

Burrage Grove is the first turning on the left from Burrage Road when entering Burrage Road from the Plumstead Road.

The nearest Railway Station is WOOLWICH ARSENAL, SOUTHERN RAILWAY. This Station is five minutes' walk from our Service Station in Burrage Grove. There is an excellent service of Electric Trains from Charing Cross, Waterloo, Cannon Street and London Bridge Stations.

Bus services, 53, 54, 99, 122, 153 and 154. Trolleybus services, 696 and 698, and tram services, 36, 38 and 40 pass the end of Burrage Road (one minute from Service Department).

Visitors from the North can pass into Woolwich via the Free Ferry between North Woolwich and Woolwich. North Woolwich is a L.N.E.R. terminus, and is also served by bus services 15, 25c, 101 and 104. There is also a tunnel under the River Thames at this point for foot passengers. The Free Ferry accommodates all types of motor vehicles, and there is a very frequent service (10 minutes). The Southern landing stage is less than a mile from the Service Department.

Visitors arriving by road, if they are strangers to the locality, should enquire for Beresford Square, Woolwich. Upon arrival there, the road skirting the Royal Arsenal should be followed in an eastward direction for about four hundred yards, and Burrage Road is the second turning on the right after leaving the Square.

LEGAL SECTION.

(147). THE DRIVER AND THE LAW.

The driver of a motor cycle MUST be INSURED against Third Party Claims and MUST be able to produce an INSURANCE CERTIFICATE showing that such an insurance is in force.

If your Insurance Certificate specifies you can only drive one particular machine you MUST NOT DRIVE any other machine, unless its owner has a current Certificate covering "ANY DRIVER," and it is advisable to remember the penalties for doing so, in the absence of such a provision, are very heavy.

The driver of a motor cycle MUST hold a current DRIVING LICENCE. If you are a learner, and hold a provisional driving licence, your machine must show, front and back, the standard "L" plates, and you must not take a PILLION PASSENGER unless that passenger is the holder of a current UNRESTRICTED driving licence.

As soon as you receive your driving license, sign it in the appropriate place. It is an offence not to. Also make sure you are well acquainted with the recommendations set down in the "HIGHWAY CODE," a copy of which can be obtained at any Post Office.

(148). THE MACHINE AND THE LAW.

All 1939 "SUNBEAM" Motor Cycles comply with the legal requirements regarding construction and equipment.

Every motor cycle MUST be registered and carry the registration numbers and license disc allotted to it.

To register a new machine, you must send to the Local Registration Authority the following: —

(A) Form "RF 1/2" (duly completed).
(B) The Certificate of Insurance.
(C) The appropriate registration fee.
(D) The Invoice you received from your Dealer when you purchased the motor cycle.

In due course you will receive:—

(1) A Registration Book.
(2) A Licence Disc.
(3) Your Insurance Certificate.
(4) Your Invoice.

The Registration Book and the Licence Disc will bear the Registration Numbers that have been allotted to your machine and will also show the date the Road Licence expires.

Your Number Plates must bear the Registration Numbers in characters as follows:—

The Front numbers must be 1⅜ins. high, 1¼ins. wide and 5/16in. thick, with spaces ½in. wide between each two characters.

The Rear numbers must be 2½ins. high, 1⅜ins. wide and ⅜in. thick, with spaces ½in. wide between each two characters.

There must be a clear margin round each plate of not less than ½in.

The Licence Disc must be enclosed in a water tight container and this must be fixed to the machine in a conspicuous position, near the front and on the left hand side.

It is not necessary to carry your Driving Licence, Insurance Certificate and Registration Book. In the interests of safety we advise drivers to leave these documents at home, because, in the event of the Police requiring to inspect any, or all, you have the right of stating which Police Station you can most conveniently take them for inspection, and you have three clear days in which to do that.

Of course, if you are on holiday, or likely to be away from home for some time and it would be inconvenient to have to return home to get these, it would then be prudent to have them with you.

The dealer from whom a new machine is purchased will always attend to the Registration, and will paint the number plates, if requested to do so.

A speedometer must be fitted and it must be so illuminated that it is possible to read the dial at night.
During official "LIGHTING UP" hours, the machine must exhibit a white light facing forwards, and a red light facing rearwards. Also one of the number plates must be illuminated.

Each electric light bulb MUST be marked with the "Wattage." (Beware of cheap, imported, bulbs that do not have this marking).

All "SUNBEAM" electric equipment complies with the law as regards position, size of bulbs and the correct illumination of a number plate.

The above are the bare Legal requirements before a new motor cycle is used on a public road. There are dozens of other things a motorist may do and should not do, but, if you comply with the above and also follow out the suggestions given in the "HIGHWAY CODE," there is no reason why you should fall foul of "THE LAW."

(149). GUARANTEE.

We do not appoint agents for the sale on our behalf of our motor cycles or other goods, but we assign to motor cycle Dealers areas in which we supply to such Dealers exclusively for re-sale in such areas. No such Dealer is authorised to transact any business, give any warranty, make any representation, or incur any liability on our behalf.

We give the following guarantee with our motor cycles, motor cycle combinations and sidecars, which is given in place of any implied conditions, warranties or liabilities whatsoever, statutory or otherwise, all such implied conditions, warranties and liabilities being in all cases excluded. Any statement, description, condition, or representation contained in any Catalogue, advertisement, leaflet or other publication shall not be construed as enlarging, varying or over-riding this guarantee. In the case of machines which have been used for "hiring out" purposes, or racing, or from which the trade mark name or manufacturing number has been removed, no guarantee of any kind is given or is to be implied.

WE GUARANTEE, subject to the conditions mentioned below, that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, but this guarantee is to extend and be in force for six months only from date of purchase, and damages for which we make ourselves reponsible under this guarantee are limited to the free supply of a new part in exchange for the part of the motor cycle, motor cycle combination, or sidecar which may have proved defective. We do not undertake to replace or refix, or bear the cost of replacing or refixing, such new part in the motor cycle, motor cycle combination or sidecar. We undertake, subject to the conditions mentioned below, to make good at any time within six months any defects in these respects. As motor cycles, motor cycle combinations and sidecars are liable to derangement by neglect or misuse, this guarantee does not apply to defects caused by wear and tear, misuse or neglect.

The term " misuse " shall include amongst others the following acts :—

1. The attaching of a sidecar to the motor cycle in such a manner as to cause damage or calculated to render the latter unsafe when ridden.
2. The use of a motor cycle or motor cycle and sidecar combined, when carrying more persons or a greater weight than for which the machine was designed by the manufacturers.
3. The attaching of a sidecar by any form of attachment not provided, supplied or approved by the manufacturers, or to a motor cycle which is not designed for such use.

Any motor cycle, motor cycle combination or sidecar sent to us to be plated, enamelled or repaired will be repaired upon the following conditions—i.e., we guarantee that all precautions which are usual and reasonable have been taken by us to secure excellence of materials and workmanship, such guarantee to extend and be in force for three months only from the time such work shall have been executed or until the expiration of the six months above referred to, and this guarantee is in lieu and in exclusion of any common law or statute warranty or condition and the damages recoverable are limited to the cost of any further work which may be necessary to amend and make good the work found to be defective.

(150) **CONDITIONS OF GUARANTEE.**

If a defective part should be found in our motor cycles, motor cycle combinations or sidecars, or in any part supplied by way of exchange before referred to, it must be sent to us CARRIAGE PAID, and accompanied by an intimation from the owner that he desires to have it repaired or exchanged free of charge under our Guarantee, and he must also furnish us at the same time with the number of the machine, the date of the purchase, or the date at which the alleged defective part was exchanged, as the case may be.

Failing compliance with the above, such articles will lie here AT THE RISK OF THE OWNER, and this guarantee and any implied guarantee, warranty or condition shall not be enforceable.

We do not guarantee specialities such as tyres, saddles, chains, magnetos, lamps, etc., or any component parts supplied to the order of the purchaser differing from standard specifications supplied with our motor cycles, motor cycle combinations, sidecars or otherwise.

IMPORTANT NOTE.—Any part sent to us for any reason whatsoever must bear distinctly the sender's name and address and instructions or requests relative to parts must be sent parately by letter post.

(151). **" MY DATA."**

We suggest it is advisable for you to record particulars regarding your own machine. These details may be very helpful when about to order spares or to complete a competition entry form.

MODEL ..... B.25.S.

ENGINE NUMBER ..... E 698

FRAME NUMBER 1184

REGISTRATION NUMBER ..... J.P.E. 387

BORE ..... 82·5 m.m.

STROKE ..... 93·0. m.m.

CUBIC CAPACITY ..... 498 c.c.

SIZE OF FRONT TYRE ..... 3·00 x 19

SIZE OF REAR TYRE ..... 350 x 19

DATE OF PURCHASE .....

NAME OF DEALER ..... E.R. FISHER MOTORS. LTD

ADDRESS OF DEALER 6. THE PARADE. BATH RD. HO

TELEPHONE NUMBER OF DEALER HOU. 1852

NAME OF INSURANCE COMPANY .....

ADDRESS OF INSURANCE COMPANY .....

NUMBER OF INSURANCE CERTIFICATE .....

EXPIRY DATE OF INSURANCE .....

DRIVING LICENCE NUMBER .....

EXPIRY DATE OF DRIVING LICENCE .....