The MORRIS MINOR AND EIGHT MANUAL

PRICE 1/6

PUBLISHED BY

MORRIS MOTORS LTD.
COWLEY, OXFORD

THE MANUAL
OF THE
MORRIS MINOR
AND
MORRIS EIGHT
CARS

1930 EDITION

A copy of this book is sent out with every Morris Minor car. Additional copies can be obtained at 1s. 6d. each

Published by
MORRIS MOTORS LIMITED
COWLEY, OXFORD

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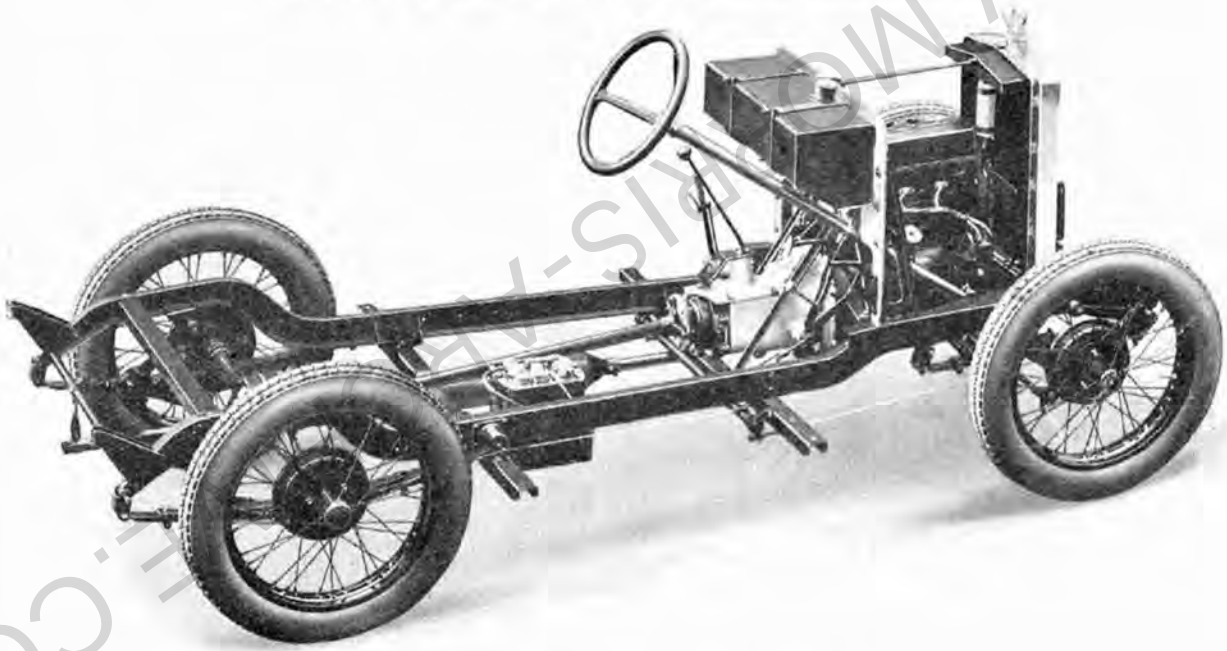
Phone: 7101 Cowley (Oxford), Six lines (Private Branch Exchange)
Grams: "Voiturette," Cowley, Oxford

THE 1930 MORRIS MINOR CHASSIS



THE

MORRIS MANUAL

On the Management, Care and Upkeep of the 1929—1930 Morris Minor and Morris Eight Cars

MORRIS MOTORS LTD. : : : : : COWLEY, OXFORD

FILLING UP

(1) PETROL

Before starting out for a run always make a point of seeing that the tank contains sufficient petrol. The quantity of petrol in the tank can very easily be seen by removing the large filler-cap under the bonnet. The tank capacity of the Morris Minor is approximately five gallons.

Do not forget also to see that the two-level tap which is provided is turned anti-clockwise with the arrow pointing to "Main," so that you have a reserve supply for emergency use.

Any good quality petrol as sold to-day will give satisfactory running on a Morris Minor car. A mixture of benzole and petrol will give a better mileage and also allow the engine to run for long periods before decarbonisation is essential. Morris cars are tuned up on Shell petrol at the Works and the carburetter is set to give the maximum results from No. 1 grade Shell.

(2) OIL

Before starting out see that there is a plentiful supply of oil in the engine sump. To check this remove the dipper rod with hooked end which will be found projecting on the right-hand side of the engine between the filler spout and the dash. Carefully wipe the lower portion of the rod, reinsert it and withdraw. Oil will cling to the rod, thus showing the actual quantity present in the sump. The normal oil level is indicated by a deep depression on the rod, and the engine should not be run for long periods when the oil has dropped below the half-full level. A further deep depression at the extreme end of the rod indicates the danger mark, to which the oil level should never be allowed to drop.

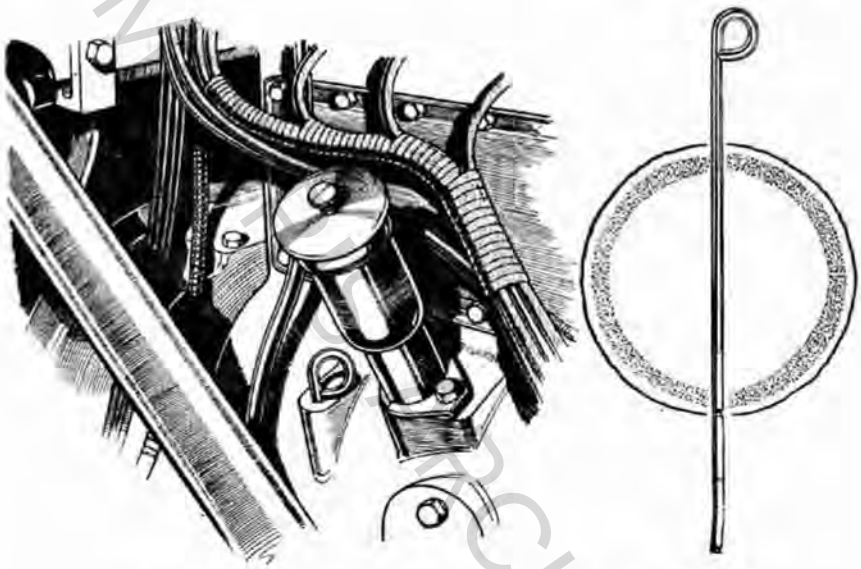
The filling orifice is provided with a quick-action cap. To remove this cap pull on the central knob, which will release the expanding locking device. After the cap is replaced the central knob should be pressed inwards to lock the cap firmly in position.

When filling the engine with oil do not attempt to expedite matters by removing the filter in the oil filler. This should always remain in position. *Clean fresh oil is essential.*

We recommend the use of "Double Shell," Gargoyle Mobiloil "A," Sternol "WW" Medium, "Filtrate Medium," Adcol "NP2," or Castrol "XL" oils for normal use in the Morris Minor engine. *Avoid mixing oils of different makes in the sump. This is definitely bad practice.*

(3) WATER

To ensure proper functioning of the calormeter the radiator when cold should be filled with clean water to a point within two inches of the top of the filler-cap funnel. If filled above this level the additional water will be forced out through the overflow pipe by expansion. When possible, rain water should be used for filling the radiator.



The oil filler and graduated dipper rod on the Morris Minor O.H.V. and Morris Family Eight.

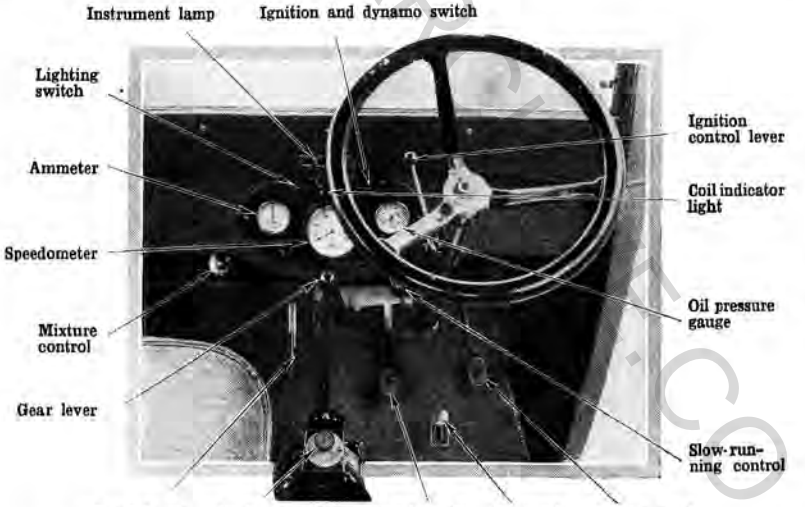
IMPORTANT TO THE NEW OWNER

In order to obtain the Certificate of Guarantee operative with your car, it is essential that you should fill in and post the special post card which will be found with this Manual.

CONTROLS

Mixture Control

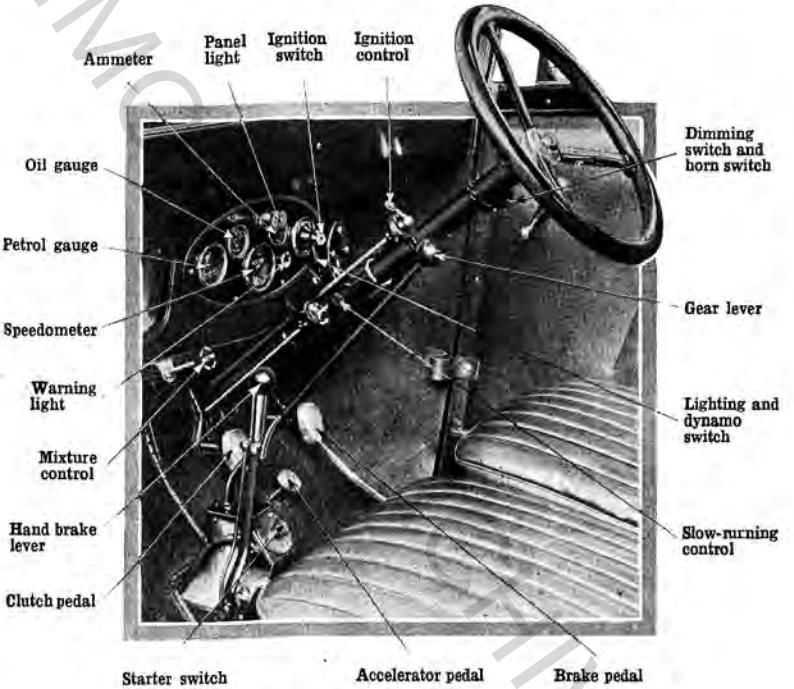
On the left of the facia board will be found a round black projecting knob. This controls the strength of the mixture (that is, the amount of petrol in proportion to the amount of air) that is fed by the carburetter to the engine. For getting away from cold and when starting, this knob should, in the case of the Morris Minor, be pushed as far as it will go towards the black disc, *but on no account should the engine be run for any length of time with the knob in this position*. If this is done neat petrol may be drawn into the cylinders, which will wash the oil away from the working parts and may cause considerable damage. On later models the control is spring-loaded to ensure its return to the weak position, in order to prevent, as far as possible, damage of this nature. As soon as the engine is under way this knob should be pulled outwards as far towards the driver as it is possible without causing the engine to splutter or run with hesitation. In the case of the Morris Family Eight the control works in the opposite direction ; that is to say, it must be pulled out as far as it will go when starting from cold and pushed in as the engine warms up. No automatic return is provided on the Morris Eight control. A very little practice will soon familiarise the driver with the correct use of this control. If the engine fails to run evenly with the mixture control knob in the "weak" position, it is usually an indication that the engine is not warm enough.



The controls of the Morris Minor O.H.V. car.

Slow-running Control

A similar round black knob will be found to the right of the facia board, next to the steering column. This is the slow-running adjustment, controlling the speed of the engine when the foot is right off the accelerator pedal. Turning it to the right increases the engine speed; turning it to the left reduces the engine speed. It should be set so that the engine idles over easily and not too fast,



The controls of the Morris Family Eight car.

and is intended to control the slow running when the engine is cold. Slow running when the engine is warm is controlled by the correct setting of the carburetter jet (see page 38).

Switches (Morris Minor)

On the instrument board in front of the driver are two black switches. These control the electrical circuits, the one on the right serving the dual purpose of switching the ignition—and therefore the engine—on and off, and allowing the dynamo to charge the battery. The switch on the left controls the lights. Each of these

switches has three positions. When it is desired to start the engine the right-hand switch is turned until the white line coincides with the "½ charge" or "Full C." mark. This indicates that the ignition is now on and that the dynamo is on half charge or full charge respectively. Generally speaking, the switch should be kept on the "½ charge" mark during the Summer months and on the "Full C." mark during the Winter months, when greater use is made of the lamps. To the left of this switch, in the centre of the instrument panel, is a red indicator light. When the dynamo output is insufficient to supply the needs of the ignition system, the red light appears, indicating that current is being drawn for ignition purposes from the battery. *Under no circumstances should the engine be left idling or stationary for anything but a few moments with this red light showing, or you may find that your battery has been drained. Never leave the car with the ignition switch on and the engine stationary.*

The left-hand switch scarcely needs explanation. When the white line coincides with the letter "S" it means that the sidelamps and tail-lamp are alight. When it coincides with the letter "H" it means that all five lamps (headlamps, sidelamps, and tail-lamp) are alight.

Switches (Morris Family Eight)

On the right of the instrument board in front of the driver is a large black switch set in a circular dial. This controls the electrical circuits, serving the dual purpose of controlling the dynamo output and the lights. The switch has four positions. When in the position that the pointer head coincides with the words "Summer Half," it indicates that the dynamo is on half charge and only giving half its normal output. When the pointer head coincides with the words "Winter Full," the dynamo is delivering its full output.

Generally speaking, the switch should be kept on the "Summer" mark during the Summer months and on the "Winter" mark during the Winter months, when greater use is made of the lamps.

The remainder of the switch scarcely needs explanation. When the white line coincides with the letter "S" it means that the sidelamps and tail-lamp are alight. When it coincides with the letter "H" it means that all five lamps (headlamps, sidelamps and tail-lamp) are alight.

In the centre of the switch is a removable key. This serves to switch the ignition—and therefore the engine—on and off. Turning the key clockwise switches on the ignition, turning it anti-clockwise switches off the ignition. Care should be taken not to lose the key.

Switching on the ignition also switches on the electric petrol lift on the Morris Eight, which will then be heard pumping for a few moments, and also the electric petrol gauge, which will now register the tank contents. Next to this switch, towards the centre of the instrument panel, is a red indicator light. When the dynamo output is insufficient to supply the needs of the ignition system, the red light appears, indicating that current is being drawn for ignition purposes from the battery. *Under no circumstances should the engine be left idling or stationary for anything but a few moments with this red light showing, or you may find that your battery has been drained. Never leave the car with the ignition switch on and the engine stationary.*

Ignition Control

Mounted on the steering column underneath the steering wheel will be found a lever. This lever controls the advance and retard of the ignition. Generally speaking, when the engine is running slowly or when it is being started the ignition should be retarded

The ignition control on the steering column of the Morris Minor.

—that is, the lever should be pushed to the left. When the engine is running fast the lever should be pushed to the right, thus advancing the ignition. Considerable use should be made of this lever it saves petrol. It should always be kept as far advanced as is possible without the engine showing signs of distress.

Instruments

The instruments provided on the Morris Minor 10 H.V. and Family Eight indicate to the driver everything he really needs to know. In the centre of the instrument panel is the speedometer, which gives the speed of the car in miles per hour, and also gives indication of the mileage it has run. Next to this is a smaller

instrument, which is the ammeter. Its vertical finger swings both to the right and to the left, showing that the battery is being charged or discharged. When no lights are on and the engine dynamo switch is turned to the " Full C." position, the ammeter needle should swing over to the right-hand side until it reads about 8 amperes when the car is running between 20 and 25 miles

The ignition control on the steering column of the Morris Family Eight. The arrow indicates the direction of motion for advancing the ignition.

per hour. If the ammeter does not register when the dynamo and ignition switch is on and the car is travelling at this speed it means either that the fuse has blown or attention is necessary to the electrical system (see section on electrical equipment).

The Morris Family Eight is fitted with a dash recording electric petrol gauge. It should be noted that this gauge only functions when the ignition is switched on.

Petrol Tap

On the Morris Minor O.H.V. car a two-way "reserve" petrol tap is fitted that in one position does not completely drain the tank, but leaves about three-quarters of a gallon in reserve. When the tap handle is turned anti-clockwise with the handle pointing to " Main " a reserve supply of petrol is maintained. When the tap is turned clockwise with the handle pointing to " Reserve " is the position in which it will empty the tank completely. When the handle is in a vertical position the petrol is turned off.

There is only one point which the driver must watch when using this tap, which is that every time he fills up the tank the tap must be turned with the handle pointing to "Main." Otherwise, if he is relying on the system to indicate to him any approaching shortage of petrol, he may find that instead of having a reserve in his tank it is completely drained, and he will be sadly disappointed.

On the Morris Family Eight car an S.U. Petrolift is fitted, which is automatically switched off when the ignition is switched off. No separate petrol tap is therefore necessary and none is fitted.

Starting Up

Before starting up the engine make sure that the gear lever is in the central or neutral position—that is to say, it is free to move sideways. Turn the right-hand switch on the Morris Minor switchboard to the "½ charge" or "Full C." position and see that the petrol is turned on. On the Morris Eight the ignition key should be inserted in the centre of the lighting switch and turned to the "on" position.

The engine starting switch is controlled by a round black knob in the centre of the floorboard next the gear lever. When this knob is pressed it closes the switch and permits current to pass from the battery to the starting motor. The engine will be heard revolving and after a second or two should fire; the starter switch should then be immediately released. It is bad practice to keep the starter switch depressed if the starter is not turning the engine round, as may happen if the battery becomes run down, or in very cold weather. The method adopted of starting engines in cold weather at the Works is to get an assistant to press the starter switch while the engine is hand-swung by the starting handle. Using the starter intelligently on the lines indicated will greatly prolong the life of the battery.

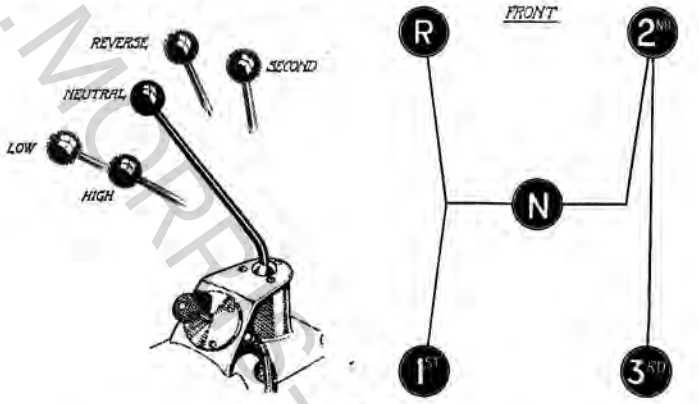
Gear Changing

After getting into the car, press the left pedal down and keep it there for a few seconds with the engine idling slowly. The clutch is thereby released and the gear lever is now swung to the left and drawn back, when the first or low gear is engaged.

The gears should engage easily. Do not use force. Should the gears not engage readily, repeat the instructions in the previous paragraph. The hand brake should now be released and the clutch pedal gradually let up; at the same time the engine should be accelerated by a gentle pressure of the foot on the accelerator pedal. The car will now move off.

When it has gained some headway change into second speed. To do this again depress the clutch pedal, bring the gear lever into the neutral position, then swing it to the right and push it forward, which will engage the second-speed gear. The clutch pedal should now be again gradually released.

To change into third or top speed repeat the foregoing operation, but bring the gear lever straight back on the right-hand side.



The gear positions.

The driven plate of the Morris Minor and Family Eight clutch is very light and therefore ceases spinning very quickly, particularly when the engine is cold and the gearbox oil thick. Under these conditions it will be necessary to effect the change from first to second and second to top smartly if a quiet change is to be carried out.

If you have made a bad change, with the result that you cannot move the lever into the desired position, and cause considerable noise when you attempt to do so, do not endeavour to force the lever into position, but stop the car and start again from neutral. In this way you will avoid damaging the gears and incidentally gain additional practice. If you experience any difficulty in changing gear you should practise on a reasonably level road until you can do so easily and confidently.

The reverse position of the gear lever is forward on the left-hand side. Care should be exercised when changing from low speed into second to avoid pushing the gear lever beyond the neutral position into the reverse, as this would result in setting up a tremendous strain on the gear wheels and might cause a serious breakdown. This can always be guarded against by maintaining a light pressure to the right of the gear lever while effecting this change. The same would result if the reverse gear were engaged before the car had lost its forward motion.

Never engage a "forward" speed while the car is still running backwards, even though the clutch is kept disengaged. If this is done considerable damage to the gearbox may ensue. *Always wait until the car is at rest before engaging a gear which will reverse the direction of travel.*

The diagram herewith clearly illustrates the position of the gear lever for the different speeds.

When changing gear upwards from first to second, or second to top, the clutch pedal should be pressed down and the foot momentarily taken off the accelerator whilst the change is being made. A slight pause in the neutral position may be advisable when the engine is hot.

When changing down from top to second, or second to first, the clutch pedal should only be lightly depressed, and after waiting for half a second with the throttle remaining open for the engine to gain speed, the change can be made noiselessly. The expert driver will have recourse to double declutching, but this requires a little tuition and practice, and is dealt with in the pages of *The* MORRIS *Owner* from time to time. *Learn to change properly from the beginning.*

It must always be remembered that the engine should have the opportunity of increasing its speed when changing to a lower gear, but must lose speed when changing to a higher. The engine power, and thus its speed, is controlled by the small central accelerator pedal with circular head, situated directly beneath the steering column.

Stopping the Car

To stop, take the foot off the accelerator and apply the foot brake gently. When the speed of the car has fallen to approximately five miles an hour, declutch and place the gear lever in the neutral position—that is, in the centre. Always endeavour to pull up as though the car had no brakes when opportunity allows. This saves tyre wear and transmission stress, and generally helps to prolong the life of the car.

Do not "coast" downhill with the clutch out. There is no advantage gained in this, and it is bad practice, causing unnecessary wear on the clutch withdrawal mechanism.

Brakes

The foot brake operates on drums fitted to the front and back wheels. For this reason the foot brake will be found the handiest to use. For emergency and as a parking brake, an additional hand-operated brake is provided.

Adjustments

Windscreen

The single-panel windscreen fitted to the Morris Minor and Morris Eight Saloon models is provided on either side with quadrant levers, the slots of which engage with guide pins equipped with wing nuts.

The quadrant lever slot is so shaped at its inner end that when the lever is pushed into a vertical position the windscreen is firmly

The windscreen cannot be opened until the quadrant levers have been pulled down in the direction of the arrow.

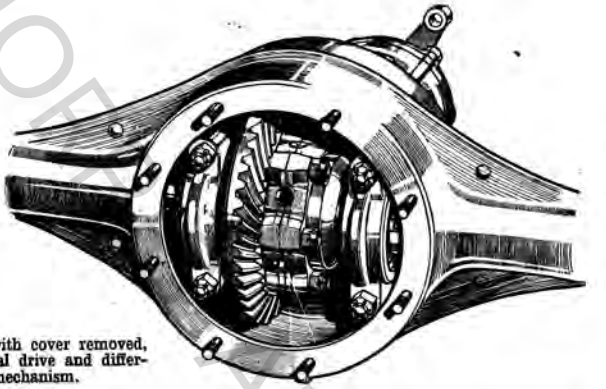
locked in the closed position. *It is therefore impossible to open the windscreen, even though the wing nuts have been slackened off, until these quadrant levers have been pulled downwards by hand into their lower position,* which will release the windscreen.

Windows

The sliding windows which are standard equipment on the Morris Minor Saloon models are provided with means for preventing them from sliding open of their own accord. Just below the centre of each window will be found a lever. When this lever is pointing to the left the windows are released and are free to slide along their guiding channels. Rotation of the lever towards the right slightly raises the lower channel, thus locking the windows in whatever position they have been set. Do not attempt to move the windows with the lever in the right-hand position, as this produces needless wear and strain. Before resetting the windows always rotate the lever until it is horizontal and pointing to the left when looking towards the window from the inside of the car.

Rear Axle

The Morris Minor rear axle is of the three-quarter floating type, where the driving shafts only transmit the driving torque and do not carry any of the load. The bearings are therefore not mounted on the driving shaft itself, but on the axle casing, and the wheel hub with driving shaft attached can be withdrawn without interfering with any other part, after the wheels and brake-drum have been removed. If the brake linings require attention, access to them is attained in the way detailed on page 23.



The rear axle with cover removed, showing the final drive and differential mechanism.

The differential, with spiral bevel gear, can be removed after withdrawing the driving shafts, taking off the housing cover and the differential bearing caps, since the whole unit will then slip through the openings covered by the housing cover.

If any adjustments to the differential bearings are required, this work should be entrusted to your nearest authorised Morris Dealer, who is equipped with necessary facilities and has the experience to carry out this work effectively.

When the differential has been remounted, adjustment to the drive pinion may be required, and such corrections entail considerable experience if satisfactory results are to be obtained. The owner is therefore advised not to tamper with this portion of the car.

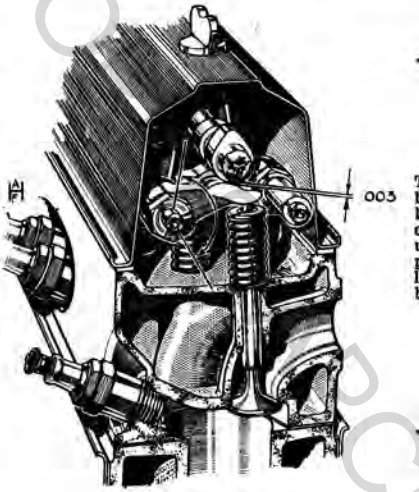
Valve Rockers

These should be adjusted to give a clearance of .003 in. between the rocker and cam when the engine is hot.

When the valves are ground the rocker clearances must be reset *and it is advisable again to check the clearances when the car has run 50 to 100 miles after grinding, as the valves have a tendency to "bed down" a little after having been disturbed.*

The good tune of engines is frequently spoilt through the owner seeking silence by cutting down the rocker clearance.

The valve rockers are mounted on the rocker-shaft by means of eccentric bronze bushes which are normally locked to the rockers by means of thin hexagon steel nuts. Adjustment of the rocker clearance is easily and quickly effected by holding the hexagon head of the bronze bush (found on one side of the rocker) by the thin spanner provided, and slacking off the steel lock nut on the other side. Rotation of the bronze bush in one direction or the other will enable the operator accurately to set the clearance. When the correct clearance has been obtained the bush must be



The rocker clearance should be .003 in. Should the rockers be dismantled at any time care must be taken to see that upon replacement the thick portion of the eccentric bush lies within the area indicated by the arrow, or the oil supply to the cam will be stopped.

The valve opening mechanism of the Morris Minor and Morris Eight engine.

relocked to the rocker by tightening up the steel lock nut. While tightening up this nut it is of course essential not to disturb the position of the bronze bush which has just been reset, and it should be rigidly held in position, by the spanner provided, during the relocking operation. (See also pages 64-65.)

Piston and Piston Rings

To remove a piston it is first of all necessary to remove the engine oil sump, and then the connecting rod assembly, and this is work which is outside the scope of the average owner. You are therefore advised to entrust any attention these parts may require to your nearest authorised Morris Dealer, who is not only competent to deal with this work, but has all the necessary facilities for carrying it out speedily and satisfactorily.

Connecting Rods

It should be distinctly understood by the owner that the white-metalled bearings in the Morris Eight engine are of the full-ring butted type—that is to say, the two halves of the white-metalled bearing completely encircle the connecting rod and make contact with each other at their joint without leaving a gap and without the use of packing shims.

On no account whatever must these bearings be closed together for any reason by the process of filing the caps, as this will immediately render the whole bearing non-standard and render the connecting rod valueless for future bearing replacement. The bearings are made on a system which ensures a sufficient degree of accuracy to make it totally unnecessary for the caps or rods to be touched by a file or scraper, and, in fact, renders any hand fitting superfluous. The bearings are of a heavy type in which the white metal is run direct on to the connecting rod, and if this white metal should run in use or become worn, the connecting rods should be replaced by new ones. Under no circumstances can Morris Motors Ltd. recognise any trouble consequent on interference with these bearings by owners. Any attention required to connecting rods should be entrusted to a competent Morris Dealer.

Morris Motors Ltd. make a special feature of rapid connecting rod service, under which your old connecting rods may be returned to the Works and a reconditioned set immediately forwarded to you for the bare cost of remetalling, plus carriage charges.

The correct working clearance between the big-end bearing and the crankshaft journal is rather larger than was accepted practice a few years back, and is such that an appreciable rocking is present in the bearing when it is in an unlubricated state. The correct clearance is automatically allowed for in the machining process, and no hand work whatever is necessary or advisable. This relatively large clearance permits a substantial protective film of oil to exist between the bearing surfaces, and the connecting rod under these circumstances should fall quite freely in its journal when the big-end bearing is bolted up quite tight.

It is important to note that when a connecting rod has been removed for any purpose it should be reassembled with the little-end clamp bolt on the opposite side of the oil filler orifice.

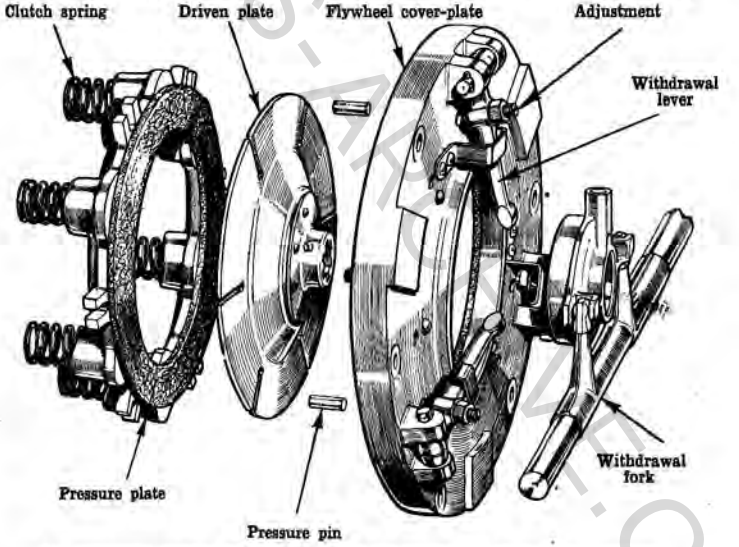
Clutch

The clutch is provided with two friction surfaces. The driving surfaces comprise two rings of bonded asbestos fabric, one attached to the flywheel cover-plate and the other attached to the pressure plate. Six driving pins pass through the flywheel, pressure plate and flywheel cover-plate, all of which consequently revolve together.

The driven surfaces comprise both sides of a single steel disc splined to the driven shaft. Driving pressure for the clutch is derived from six helical springs housed between the pressure plate and the flywheel.

The clutch must be run dry, and persistent slipping of the clutch is usually an indication that oil has found its way into the clutch compartment, in which case it will be necessary to remove the drain plug in the bottom of the clutch housing and drain away any oil which may be present. Oil which may then be still adhering to the surface of the clutch plates will soon be burnt away after a little use.

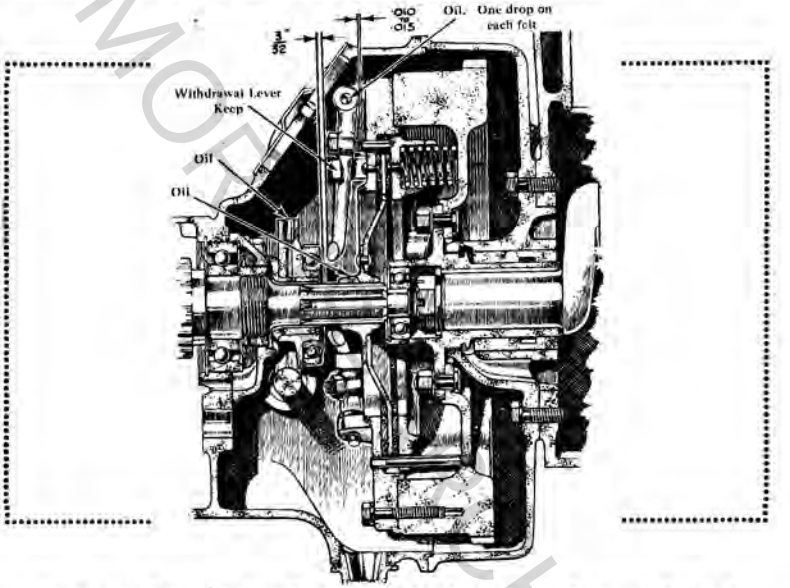
If the clutch is allowed to slip continuously the centre driven plate very quickly becomes excessively hot, and the heat and friction will very soon destroy the surface of the fabric facings.



The component parts of the Morris Minor clutch separated to show their construction.

During the life of the car a certain amount of wear takes place, which will permit the pressure plate to take up a position nearer the withdrawal mechanism, and thus reduce the necessary clearance between the withdrawal levers, the withdrawal race and the lever restraining springs. If this clearance is completely taken up and

the withdrawal levers actually bear either against the restraining springs or against the withdrawal race, it will be realised that a great deal of the spring pressure which should be forcing the friction surfaces together will be dissipated at these two points, thus preventing the clutch springs from exerting their full pressure on the clutch plates. When this occurs, slipping of the clutch will take place, and it will be necessary to readjust the clutch withdrawal mechanism in order to obtain the required clearance.



This sectional illustration of the Morris Minor clutch clearly indicates the correct adjustment and oiling points.

Removal of the small rectangular plate in the top of the clutch housing will give access to the adjustment for the withdrawal levers. The withdrawal lever restraining springs are for the purpose of preventing the withdrawal levers from being forced against the withdrawal race under the influence of centrifugal action and thus produce undue wear of the race itself and the ends of the levers. They are carefully positioned at the Works and should not be unnecessarily interfered with. If on inspection it is found that there is insufficient clearance between the lever ends and the face of the withdrawal race, the lock nut on each lever should be released and the adjusting screw slackened back by means of a screwdriver until there is a clearance of $\frac{3}{32}$ of an inch between the end of each lever and the face of the clutch withdrawal race. *It is of utmost importance that each of these levers should be so adjusted that they all have exactly the same clearance.*

There should now be a clearance of .010 in. between the end of the adjusting screw and the pressure pin when the lever is in contact with the restraining spring.

If difficulty is experienced in obtaining the necessary clearance between the adjusting screws and their pressure pins when the clearances at the ends of the withdrawal levers are correctly set, the withdrawal lever restraining springs should be gently opened out with a screwdriver.

Tighten up the adjusting screw lock nuts, taking care not to disturb the setting just obtained, and the clutch adjustment is complete. If this procedure has been correctly carried out, each lever should have an appreciable amount of play when the clutch is fully released.

The clutch plate is carried on the splined end of the driven shaft, and may stick if lubrication is not correctly carried out. A drop or two of thin oil on the spline will rectify matters, but care must be taken not to use too much or allow any to reach the fabric facings. Every 500 miles the cover-plate should be removed and a few drops of engine oil introduced to the clutch withdrawal race through the projecting oil duct provided, to the clutch plate hub, to each of the six felt washers (one on each side of the withdrawal levers) and to the withdrawal fork bearings through the oil holes provided.

When replacing the inspection cover do not straighten out the lip at the end. This cover-plate is intended to function as a breather.

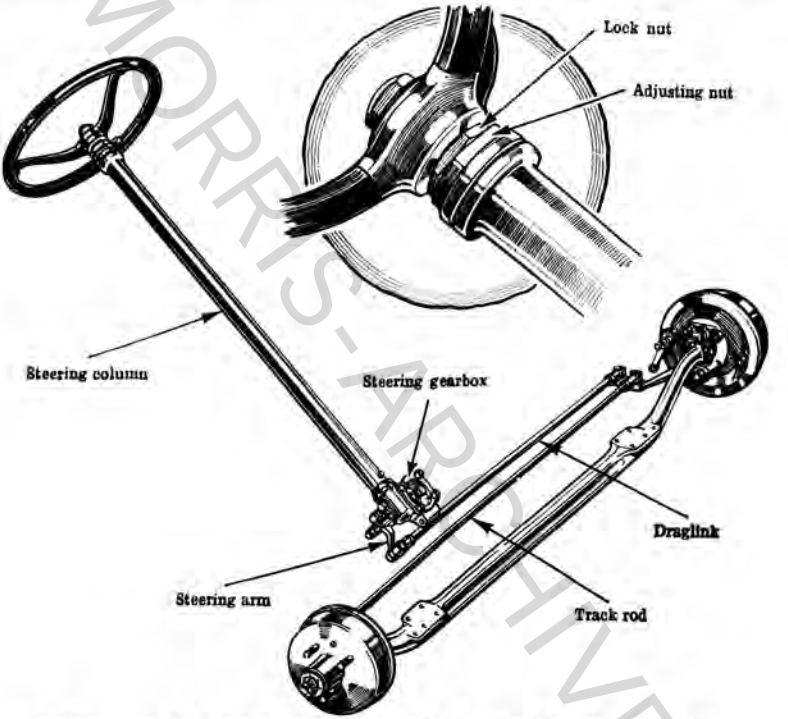
Fan Driving Belt

The fan belt should be kept fairly taut and adjusted from time to time by moving the fan lever so as to take up the slack. To do this loosen the clamping screw, when the fan will be released and can be reset by pushing the spindle up against the tension of the belt and locking it in the new position. During the cold weather it may be advisable to remove the fan to enable the engine to attain its correct temperature.

The fan belt may be adjusted by slackening the nut indicated and gently pulling upon the fan spindle by hand.

Steering Gear

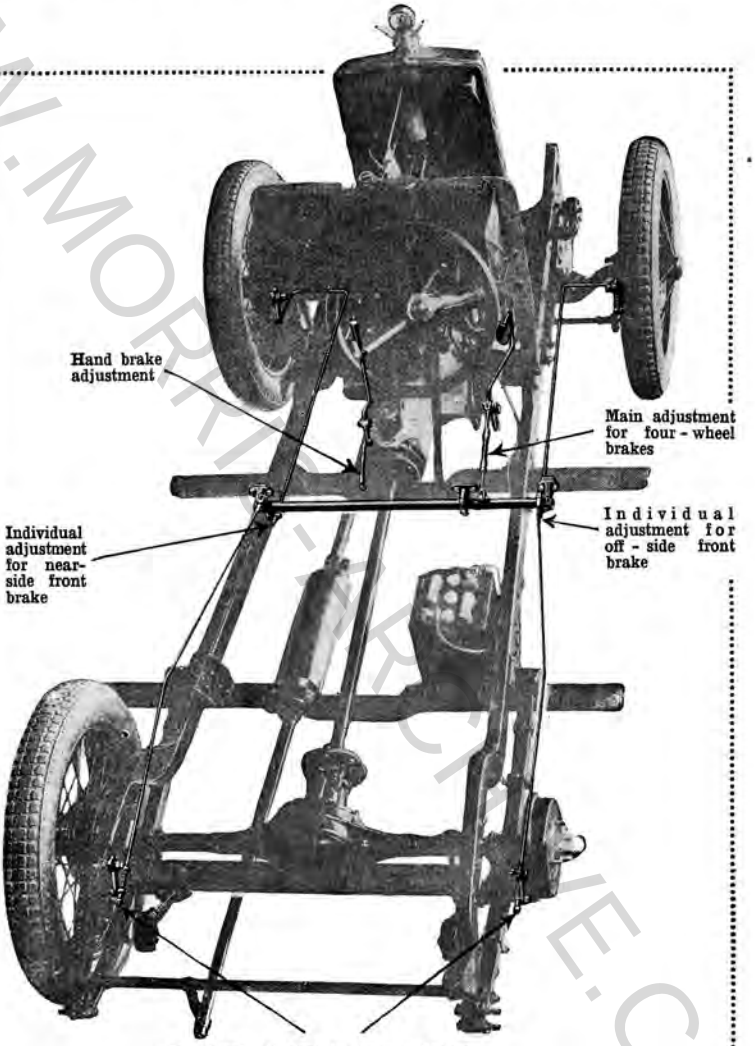
If the steering column shows signs of end play, this may be corrected by slacking back the lock nut which is to be found immediately below the steering wheel and giving the adjusting nut a fraction of a turn. Care should be taken to lock the lock nut in position again. A complete worm wheel is provided and may be set in a number of alternative positions. Should the steering wheel show an excessive amount of play, all the connections between the



The arrangement of the steering mechanism of the Morris Minor O.H.V. and (inset) where to adjust the steering column to rectify end play.

steering gearbox and the front axle should be examined to detect any looseness. If no looseness is apparent there is probably some wear in the steering worm wheel, which should be turned 90 degrees to a new position. To effect this the steering arm below the steering gearbox should be removed, after removing the stop plate which spans it. The worm wheel can then be turned through 90 degrees by rotating the steering wheel, and the lever put on in the new position. The stop plate should then be replaced.

THE MORRIS MINOR O.H.V. BRAKE ADJUSTMENTS



Here are shown the adjustments provided for the brakes of the Morris Minor O.H.V. The four-wheel brakes are equipped with individual adjustments so that they may be accurately balanced, and all four can be taken up simultaneously to compensate for wear by means of the main turnbuckle adjustment indicated.

THE MORRIS MINOR BRAKES

Adjustments

Brake adjustments on the Morris Minor O.H.V. are of a very simple nature, and take the form of a main adjustment by a turnbuckle situated between the brake pedal and the brake countershaft. This adjustment is revealed by removing the floorboard just in front of the driver's seat. Slackening the lock nuts at either end of the turnbuckle (it must be remembered that one is threaded right-hand and the other left-hand) will enable all four brakes to be taken up simultaneously.

To equalise the brakes on the Morris Minor O.H.V. car all four wheels should be raised from the ground and the individual brake adjustments made use of.

It is important with any system of four-wheel brakes that the pressure on all four wheels should be equal—that is to say, that when the pedal is depressed one wheel should not be braked more than is another, and therefore the careful owner will periodically carry out the following procedure.

Some blocks of wood or bricks of such a size that they will support the wheels clear of the ground should be obtained. Each wheel in turn is then jacked up, the blocks being placed underneath the axle (thus leaving the jack free to carry on with the operations on the other wheels). When all four wheels are clear of the ground they should be turned one by one, and nuts on the corresponding brake cable be screwed up until the shoes can just be heard rubbing

on the drum when the wheel is revolving. Each nut should then be slackened back one full turn and the brake on that wheel will be properly adjusted. This should be done to all four wheels in turn.

If when on tour (or almost at any other time during the life of the car) the foot brakes should require adjustment, this can very simply be effected by means of the turnbuckle previously described.

It is important that during the life of the car all the oiling nipples on the braking gear should receive a proper charge of oil at frequent intervals (see page 34).

Should the brakes not be satisfactory at any time it is always as well to ascertain that they are operating freely inside the brake-drums, as although every precaution has been taken in the design to exclude dirt and wet, it is still possible after continuous running in bad weather to have some trouble from this source. To ascertain if this is the cause it is necessary to disconnect the cables at their junction to the brake camshaft levers and see if these levers can be easily applied by hand. If not, remove the brake-drums as detailed in the following paragraphs, and thoroughly scrape out and oil cams and camshaft bearings until they work quite freely; then reassemble the brake-drum, reconnect the brake-application cables and readjust. All this work should never become necessary unless the brakes have been previously neglected. We give this information, however, in case it may be required.

The Rear Brakes

Removal of the wheel will reveal three countersunk headed screws between the wheel studs. Withdrawal of these screws permits the brake-drum to be drawn off the wheel studs (when the brake is released), thus exposing the brake-shoes for examination. Should the brake linings require renewal, the brake-shoes can be removed by unhooking their return springs. This is best accomplished by passing a length of stout string through the end of the spring, which can then be extended sufficiently to permit of its being passed out of the eye on the brake-shoe.

The Front Brakes

These are exposed for examination in the same way as the rear brakes. Removal of the shoes for re-lining is also effected in the same way.

Brake Linings

Complete sets of brake linings and the necessary rivets can be obtained from your local Morris Dealer or from the Works at Cowley.

Replacing the Brake-shoes

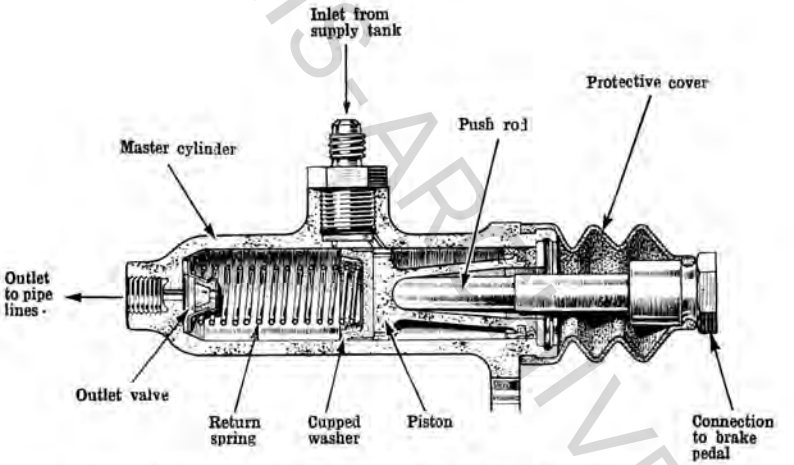
When replacing the brake-shoes, care must be taken to see that they are replaced in the right position. The spring eyes are not quite in the centre of the shoes, but are offset. The shoes should be replaced so that the spring eyes are on that half of the shoe which is towards the centre of the car, or the springs may foul the wheel stud bosses at the back of the hub flange.

THE MORRIS EIGHT HYDRAULIC BRAKES

The brakes fitted to the Morris Family Eight are of the Lockheed self-equalising hydraulic type. They are actuated by a master cylinder operated from the brake pedal. Pressure on the brake pedal is conveyed to fluid contained within the master cylinder and equally distributed by special pipe lines to each individual wheel brake.

The Master Cylinder and its Supply Tank

These are of the automatically compensating type and maintain a constant volume of fluid in the braking system at a uniform pressure of some 8 lb. per square inch when the brake pedal is in



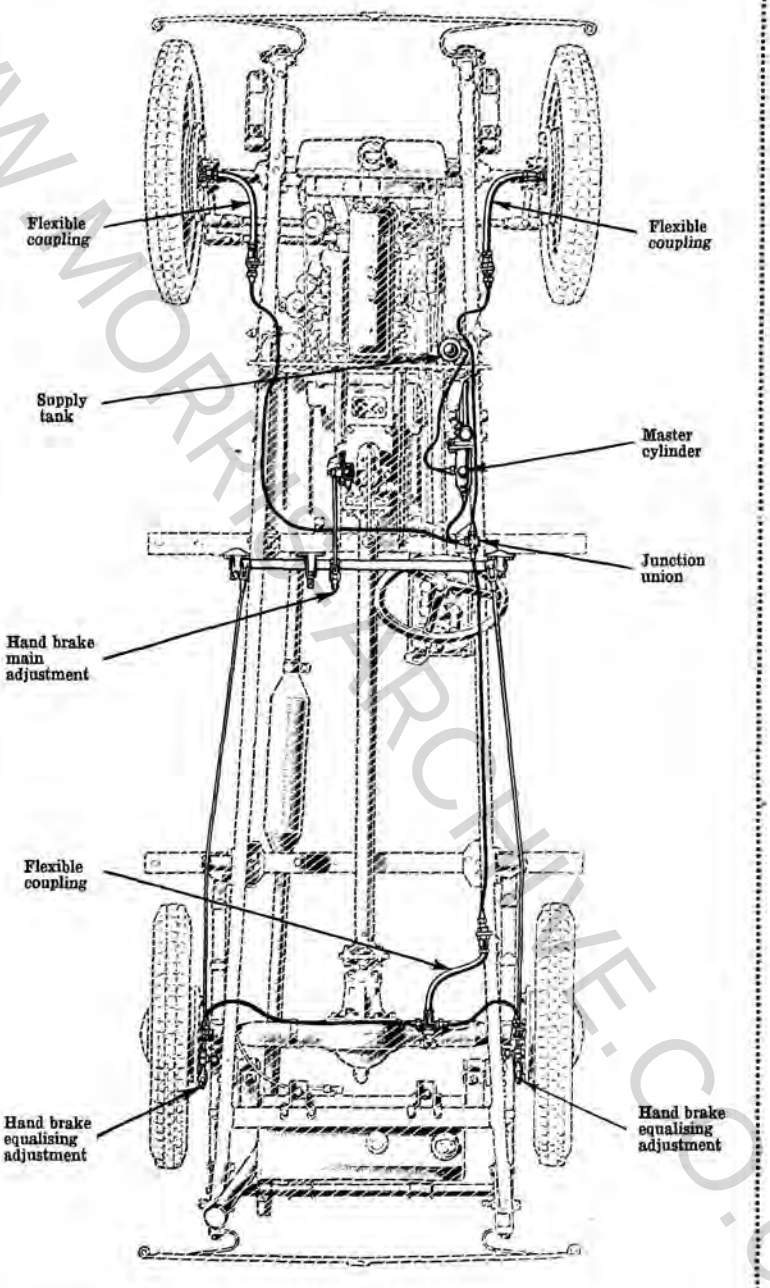
The Lockheed master cylinder in section, clearly showing its component parts.

the "off" position. This pressure expands all the cup joints, ensuring that the system is completely sealed and leak-proof.

Provision is made automatically to compensate for expansion and contraction of the fluid in the system due to temperature changes.

The supply tank is merely a simple reservoir containing a sufficient quantity of fluid to feed the braking system under all conditions.

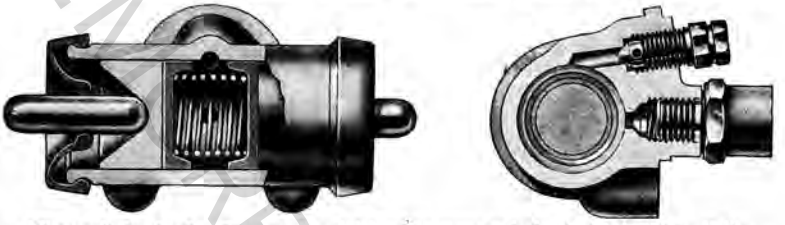
MORRIS EIGHT BRAKE GEAR



The Wheel Cylinders

The wheel brake-shoe cylinders are open at both ends, rigidly attached to the brake dust cover, and are each equipped with two opposed pistons with cup washers and push rods for connection to the brake-shoe ends. The open mouths of these cylinders are covered with rubber boots to prevent the entry of dirt.

Depression of the brake pedal introduces fluid to the centre of



Wheel cylinder details. The conical-ended bleeding screw and plug is clearly shown at the top of the right-hand illustration.

the cylinder between the opposed pistons, and they are as a result forced apart, thus applying the brakes.

Since it is imperative that all air should be withdrawn from the braking system, provision is made at each wheel brake cylinder to expel any air which may be present in the pipe line. This consists of a "bleeder valve" with plug situated at the top of each cylinder immediately above the pipe line union.

The Pipe Line

The pipe line is of stout gauge copper tubing, specially prepared and cleaned, and should not be replaced by piping of an inferior quality. Where spring deflection and steering movement must be provided for, special patent flexible hose connections are fitted. These, though flexible, are non-expansible, and are capable of withstanding a pressure of 6000 lb. per square inch.

Brake-shoes

The brake-shoes are pivoted at their lower extremities to anchorage pins, their upper ends bearing against the push rods of the wheel brake cylinder pistons.

When pressure is applied to the brake pedal this pressure is transmitted to the master piston and thence, equally and undiminished by the fluid in the system of pipe lines, to each wheel cylinder. These being of the same size, it follows that the pressure applied to each individual brake-shoe of all four wheels is equal.

Brake return springs are provided to return the brake-shoes and pistons to the "off" position upon release of the brake pedal.

Adjustments and Replacements

The supply tank filler plug should, however, be removed once every 1000 miles, and the level of the fluid checked. If it is found to be particularly low it is an indication that a leak has developed somewhere in the system, and it should be traced and rectified without delay. The supply tank should be about three-quarters full of fluid, and never less than half full. *Always use Lockheed brake fluid.*

No equalisation adjustment is required, since the pressure applied to the shoes will always be precisely equal. It must be remembered, however, that the presence of oil, grease, or similar foreign matter

The Morris Eight brake-drum removed, showing the rear brake-shoe assembly. The assembly for the front shoes is identical, with the exception of the hand-operating mechanism.

on the braking surfaces will seriously affect the coefficient of friction, and in consequence the retarding effect on that particular brake, in spite of the fact that it is being applied with the same force as the others. In such cases it is necessary thoroughly to clean the brake lining with petrol, and slightly roughen its surface with a file.

The only adjustment required is that needed to compensate for the wear of the brake-shoe linings, and the frequency for such adjustment is, of course, dependent upon the character of the service to which the brakes have been submitted.

When the linings have worn so far that the brake pedal is in danger of coming into contact with the floorboards, it is necessary to bring the brake-shoes in closer relation to the brake-drums.

Indicating the brake-shoe adjusting nuts. These should be rotated in the direction indicated by the small arrows to bring the shoes farther away from the drum and in the opposite direction to bring the shoes closer to the drum.

It is advisable to have at least 1 in. clearance between the head of the pedal and the floorboard when the brake is fully applied. Adjustment is effected by jacking each wheel in turn, spinning the wheel and partly rotating the hexagon adjustment bolts which are to be found on either side of the wheel cylinder until the brake-shoes just come into contact with the drums, then slackening back this adjustment until the wheel just rotates freely and without drag. The adjustment bolts, which operate snail-type cams bearing against the shoes, are frictionally held, and require no locking device ; they can easily be rotated with a spanner into the desired position. To bring the shoes closer to the drums the adjustment bolts should be rotated away from the centre of the wheel, and to bring the shoes farther away from the drums they should be rotated towards the centre of the wheel, with the spanner above the nut. *Only a slight rotation of the adjustment nuts is needed, and no attempt should be made to give them a whole turn.* When these operations have been carried out on all four wheels, all brakes should be in correct adjustment.

Brake Linings

It is of importance that the brake linings of all brakes be of the same kind, or equalisation of the braking will not be achieved. Brake linings of the correct size and material can be supplied by your Morris Dealer.

Brake re-lining entails the use of special tools. All brake re-lining should therefore be entrusted to a competent Morris Dealer, who is also a Lockheed service agent. During the first 500 miles after re-lining the maximum braking effect may not be available, and adjustments may have to be carried out, at fairly frequent intervals, by the owner in order to take up the natural surface wear inevitable with the new brake lining. (See Adjustments on page 27.)

Access to Brake-shoes

Access to the brake-shoes for attention is achieved by jacking the wheel and removing it from the hub. This will reveal three large countersunk screws spaced between the three wheel studs. Withdrawal of these three screws will permit the brake-drum to be drawn off quite easily, providing the brakes are completely released. Removal of the brake-drum reveals the entire brake-shoe assembly, and the brake-shoes can now be detached for cleaning in the following way :—

Unhook the brake return springs from their anchorage to the brake-shoes. A piece of stout string or wire passed through the spring eye will greatly facilitate this.

The shoes are released from the pivot pins by removing the nuts fastening the pivot pins to the brake cover, thus releasing the pivot pins. This will allow the shoes to come away.

Do not interfere with the wheel brake cylinders unless they are found to be leaking, and obviously need attention, and do not operate the brake pedal while the drums are removed, or the wheel cylinder pistons may be forced out of their cylinders.

Bleeding the System

The process of bleeding is necessary only when a portion of the system has been disconnected, thus permitting air to enter the fluid circuit. It consists of removing any air which may have found its way into the system. Although not a difficult operation, it entails the use of a good supply of Lockheed fluid and a special bleeding tube. You are therefore advised to entrust this work to the nearest Morris Dealer, who is also a Lockheed service agent.

The Brake Fluid

The Lockheed fluid used in the Morris Family Eight braking system is specially prepared for the purpose, and it is important that no other fluid be introduced into the system for replenishment

or serious trouble will ensue. This special fluid is unaffected by high temperatures, and is immune from freezing. *Oil, petrol, paraffin and similar mediums are definitely injurious to some parts of the system, and should on no account be introduced to the system or used for cleaning purposes.* If it is required to clean any parts of the braking system, they should be washed either in the special brake fluid supplied or alcohol. If alcohol is used, the parts should be well dried and treated with brake fluid before being replaced.

Lockheed fluid is stocked by all Morris Dealers.

Leakage of Brake Fluid

Excessive consumption of brake fluid is an indication of a leak somewhere in the system. A leak may be traced by applying very heavy pressure to the brake pedal with the car stationary and checking over the various connections until the point of leakage is found. *Note.*—The pistons of the wheel or master cylinders should never be removed. Special tools are required correctly to assemble these components and there is nothing in them to give trouble. In cases of damage a complete cylinder replacement should be employed.

In Conclusion

DON'T use any substitute for the special brake fluid, or you will have trouble.

DON'T permit grease, paint, oil or brake fluid to get into contact with the brake linings.

DON'T use packing compounds for the joints ; only straight metal-to-metal joints should be made.

DON'T use paraffin or petrol for cleaning purposes. Nothing but alcohol or brake fluid should be used.

DON'T re-line one wheel with a different make of lining to that used on the others. Always use genuine Morris linings.

DON'T allow the supply tank to become less than half full of brake fluid.

The Hand Brake

The hand brake on the Morris Family Eight operates shoes in the rear brake-drums by cables of large dimensions.

The outstanding feature of this hand brake is its simplicity of adjustment, a large wing nut on the end of the rod connecting the brake lever to the brake cross-shaft, which can be operated after the smaller locking wing nut has been released.

Great care must be taken, however, not to take up the adjustment too tightly.

Lubrication

CORRECT lubrication of any piece of mechanism is of paramount importance, and in no instance is it of greater importance than in the correct choice of lubricant for a motorcar engine. It will be understood that all automobile engines have individual characteristics, such as operating temperatures, oiling systems, size of oil ways, clearances and similar technicalities, and it is therefore extremely important that an oil which is specifically suited to the needs of a particular engine should always be used.

With the object of enabling Morris owners and operators to obtain the best possible results from their cars, Morris Motors Ltd. have arranged for the production and marketing of "Morrisol (Sirrom Registered Brand)," a high-grade superfine lubricant that is specifically prepared for Morris and certain other engines. This oil is specially manufactured to Morris specification by Alexander Duckham & Co. Ltd., and its use in Morris engines is recommended —indeed urged—by us because a long series of careful research and exacting tests has proved its superiority and entire suitability.

One convenient feature in connection with "Morrisol (Sirrom Registered Brand)" Engine Oil is that it can be used Winter and Summer, no change in grade being warranted as the oil has such a remarkable viscosity curve, remaining fluid at low temperatures and yet retaining excellent viscosity and lubricating properties at even the highest temperatures encountered.

As regards the gearbox, steering and chassis lubrication generally, another special superfine grade of "Morrisol" is marketed under the name of "Morrisol (Sirrom Registered Brand)" Transmission Oil. This again can be used all the year round and has also been specifically prepared for the duty it has to perform.

Both "Morrisol (Sirrom Registered Brand)" Engine Oil and "Morrisol (Sirrom Registered Brand)" Transmission Oil can be obtained from any authorised Morris Distributor or Dealer.

Engine

The oil supply is carried in the pressed-steel sump below the cylinder block. On the right hand side of the cylinder block an oil filler and an oil indicator rod are fitted. The indicator rod has two marks on its lower extremity, indicating the maximum and minimum levels for the oil. By drawing the indicator rod out, the quantity of oil in the sump can be read off from where the oil adheres to the rod. When the oil level reaches the upper or "full" mark on the indicator rod the sump contains approximately half a gallon of oil. The oil level should never be allowed to fall below the lower mark. Inspect at intervals of 250 miles.

In checking the quantity of oil in the sump the rod should be withdrawn, wiped clean, and reinserted before taking the reading. Owing to the surging and splashing of the oil when the engine and car are in motion, an accurate reading is not otherwise possible.

The sump should occasionally be dismantled and cleaned. To do this remove the screws attaching the oil sump to the bottom of the cylinder block, and the union connecting the oil suction pipe at the front of the sump, when the sump may be withdrawn. It is advisable to remove the cover from the external filter and fill it full of oil, after the sump has been replaced, before running the engine.

Every 500 miles the gauze cylinder should be removed from the external oil filter and thoroughly cleaned in paraffin. *After cleaning, the filter should be filled with clean oil and care should be taken to screw the filter cover on tightly before starting the engine. On no account introduce paraffin into the filter.*

The Oil Restrictor (Illustration on page 35)

At the junction of the oil delivery pipe to the cylinder head is the oil restrictor or metering pin, regulating the quantity of oil which is delivered to the overhead valve gear. Every 500 miles this restrictor pin should be withdrawn by passing a piece of stiff wire, hooked at its end, through the hole which can be seen in the end of the pin. The restrictor and its housing should be carefully cleaned before replacement. On no account file the pin, alter its shape or otherwise interfere with it.

Should the oil gauge suddenly show a steady rise in pressure when the engine is hot, it is an indication that the restrictor is choked and requires immediate cleaning.

Clutch Withdrawal Race

Every 500 miles the clutch housing cover-plate should be removed and a *few* drops of oil introduced to the withdrawal race through the oil duct projecting from the withdrawal race sleeve, to the clutch plate hub, to each of the six felt washers (one of which is found on each side of the withdrawal levers) and to the withdrawal fork bearings through the oil holes provided. (See illustration on page 18.)

The Ignition Distributor

Every 500 miles give the greaser two turns. Replenish with good quality grease when necessary. (See page 75.)

Gearbox

It is of the utmost importance to keep this filled to the correct level. If the level is too low harsh running of the gears results. If it is too high oil may get into the clutchcase and cause clutch slip.

To fill the gearbox, remove the oil-filler and inspection plug on the side of the gearbox. When the gearbox has been drained empty, approximately one pint of oil is required.

If the oil-filler orifice provided is always used there is no possibility of overfilling, but if—as some owners prefer—the gear lever is removed and oil poured in from the top, the filler plug should be taken out, so that if too much oil is poured in the surplus may be

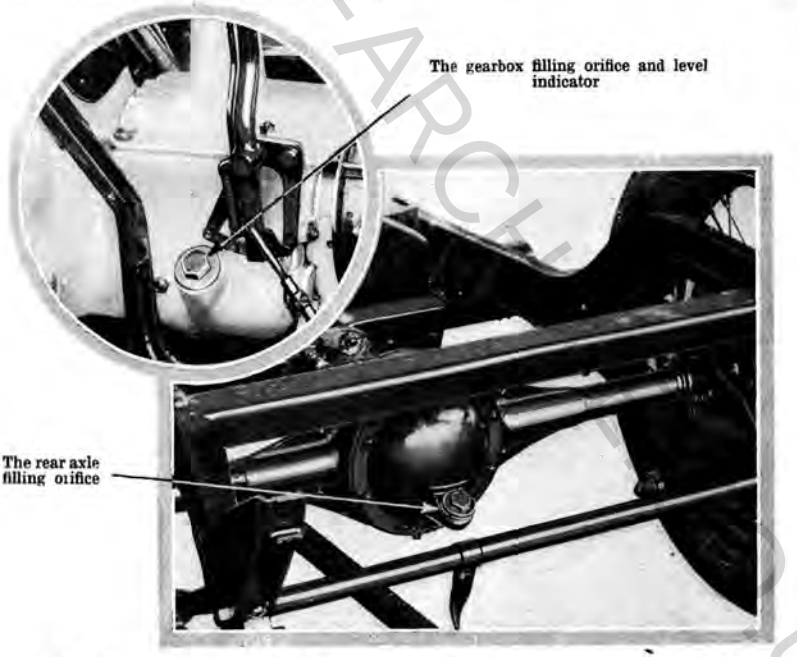
free to escape. When using the filler orifice make sure that the neck of this orifice is not choked with congealed oil and that the oil poured in is actually getting to the gearbox and not merely filling the spout.

Use " Morrisol (Sirrom Registered Brand) " Transmission Oil.

Draining the Sump

For the reason that all oil loses some of its lubricating properties after it has been in use for some time, we recommend that the sump should be drained every 1000 miles.

To drain the oil, the following procedure is adopted. Underneath the engine assembly three plugs will be found. These, reading in order from the front of the car, are for draining the engine sump, the clutch housing, and the gearbox. After unscrewing the plug which drains the sump, we do *not* recommend that paraffin should be swilled through the engine or that the engine should be run without oil in the sump with the plug removed. Occasionally the second drain plug from the front of the power unit may with advantage be removed to drain off any oil which has found its way into the clutch compartment. When the sump has been drained approximately ½ gallon of oil is required to fill it, and the external oil filter must also be filled.



The filling and inspection plugs on both gearbox and rear axle are at the same time level indicators, preventing overfilling.

Rear Axle

This should be filled to the level of the top of the filler with approximately one and a half pints of oil, and this supply well kept up. Use " Morrisol (Sirrom Registered Brand) " Transmission Oil. The rear axle should be drained every 1000 miles and refilled with fresh oil.

Chassis Lubrication

At all points of the chassis of the Morris Minor and Morris Eight cars that require lubrication the new type Enots nipples are fitted, and in the tool kit should be found an Enots "Autolub" oilgun. This gun should be filled with " Morrisol (Sirrom Registered Brand)" Transmission Oil, by unscrewing the large cap on the end of the container and removing the automatic feed plunger by pulling on the chain attached to it. When the gun is sufficiently full of oil, the plunger and end cap should be replaced. Removal of the cover on the other end of the gun displays an extension piece with a strong recoil spring surrounding it. This extension is really a type of high-pressure pump, and it has at its end a recess with a hole in the centre. By applying this recess to the projection presented by a nipple and pushing the whole of the pump inwards, oil will be forced under pressure into the nipple, and as soon as pressure is removed from the oilgun the extension will be forced out again by its return spring, and the vacuum created will cause the automatic plunger to take up a new position ready for delivery of the next charge. After using the gun replace the cap over the extension, screwing it up reasonably tightly. This will prevent leakage of the oil from the gun while it is not in use.

Steering Gear

Two Enots lubricators are provided on the steering gearbox. The oilgun should be attached to the lower one and the pump worked until oil begins to exude from the worm wheel bearing. The upper one, situated at the bottom end of the steering column, needs but two or three strokes of the pump.

Brake Gear

The intermediate brake-shaft is carried in brackets riveted to the chassis frame cross member. On this shaft are mounted the levers operating the four-wheel brakes. An Enots is provided on each of the intermediate brake-shaft brackets for the purpose of introducing lubricant to the bearings, and these must not be overlooked.

Enots are provided on the brake camshaft brackets on the brake flanges also. Care should be taken not to over-lubricate these or oil may find its way on to the brake-drums, seriously reducing the brake efficiency. One pump stroke every 1000 miles is quite sufficient.

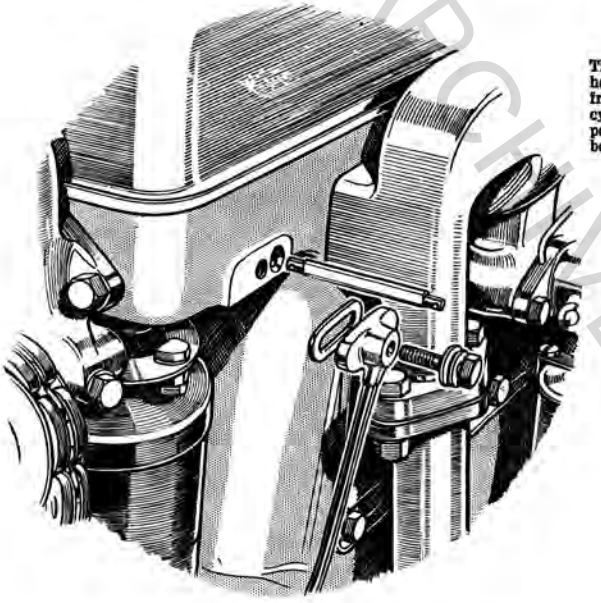
Wheel Hubs

The wheel hubs should be kept well greased in order to guard against the formation of rust. Every 1000 miles the front wheels should be removed and the hub caps replenished with thin grease. Care should be taken not to overdo this filling. When the car is in use the grease gradually warms up, and expands, and sufficient pressure may be generated to force this grease past the felt retaining washer, at the inner end of the hubs, into the brake-drums. It is advisable, before finally screwing on the wheel stud nuts, again to withdraw the wheel and empty a portion of the grease remaining within the hub.

Every 1000 miles the rear wheels should be removed, the Enots oilgun applied to the nipple on the end of the axle flange and given two strokes.

Alternative Oils

In case "Morrisol (Sirrom Registered Brand)" be not available we approve the use of the following makes of oil in Morris engines :— Shell, Adcol, Mobiloil, Castrol, Filtrate, Motorine, Sternol, Pratt's. Reference to the charts published by the individual oil companies will show which grade of each particular make is suitable for Summer or Winter use. It should be borne in mind that should oil of a different make be used, the sump should be drained completely, as it is bad practice and risky to mix oils of different grades in the sump of any engine.



The oil restrictor pin is here shown withdrawn from the housing in the cylinder head. It is imperative that it should be kept absolutely clean.

Items Requiring Attention

Every 250 miles : Inspect oil level in engine. Refill if necessary. (Page 31.)

Every 500 miles : See that wheel hub nuts are tight. Remove oil restrictor and clean. Clean external oil filter. (Page 32.) Add a few drops of engine oil to the clutch withdrawal race sleeve. (Page 18.) Grease distributor ; two turns of greaser. (Page 75.) Oil up the steering gear, attach oilgun to Enots fittings, and give pump three or four strokes. (Page 34.) These Enots are situated as under :—

12 on shackle bolts ; 4 on front axle knuckles ; 2 on steering track link ; 1 on steering gearbox ; 1 on steering column ; 3 on intermediate brake-shaft ; 1 on fan ; 2 on steering draglink ; 1 on brake pedal ; making 27 in all. Early Morris Minors have in addition a nipple on each of the two front brake cable pulleys, making 29 in all.

See that **radiator** is full of water. The water level should never be allowed to sink so low that the opening for cylinder outlet-pipe is not fully covered.

Every 1000 miles : Drain engine and refill with *fresh* oil. Drain gearbox and rear axle. Refill with fresh oil. Give two drops of thin machine oil to distributor cam lubrication wick when fitted. (Page 75.)

Remove all four detachable wheels, clean, rub over with grease and replace, taking care to put a little oil on the detachable wheel nuts. Fill front hub caps with thin grease before replacing. (Page 35.) Remove rear wheels and apply Enots oilgun to nipple on end of axle flange and give pump one stroke. (Page 35.)

Clean petrol filter and petrol pipe. Examine the valve tappet clearances. (Page 14.)

Examine the gaps of the sparking plugs and make sure that they are not too wide ; they should be .020 to .025 inch. (Page 54.)

Apply Enots oilgun to nipples on brake camshaft bearings, and give pump two strokes.

Every 6000 miles : Examine valves and valve seatings, and scrape off carbon deposit from pistons and head. (Pages 55–68.) Remove and clean sump. Remove and clean filter. (Page 33.)

The Carburetter and its Adjustments

The S.U. Carburetter with Controllable Jet

THE function of the carburetter is to supply to the engine a correctly proportioned mixture of petrol and air under all conditions of engine speed and load. Since these conditions are constantly varying within very considerable limits, means must be taken automatically to adjust the mixture proportions as the demands upon the engine change.

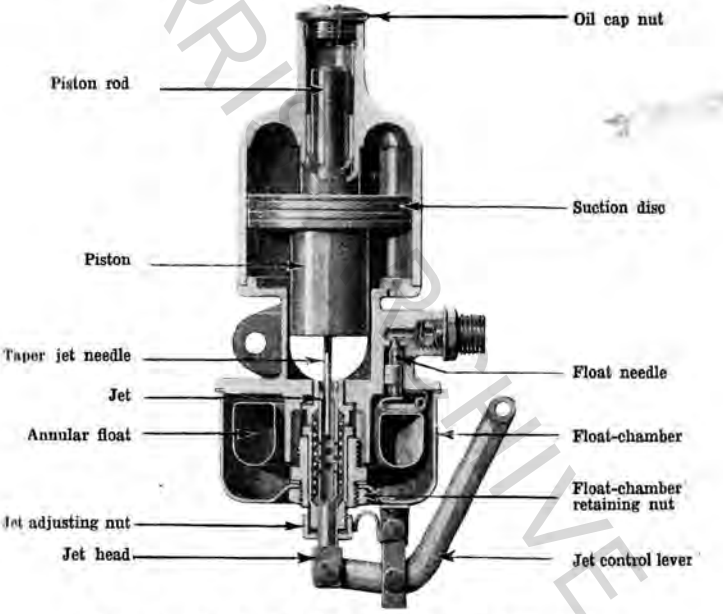


Fig. 1. The S.U. Type MM. Carburetter in sections clearly showing its internal construction.

The S.U. carburetter fitted to Morris Minor and Morris Eight cars achieves this through the medium of a suction-operated piston which varies the size of the choke area, and, in addition, controls the delivery from the jet by means of a tapered needle.

The functioning of the carburetter can be followed in detail by reference to the illustrations. In some Morris Minor cars the petrol

ADJUSTING THE S.U. CARBURETTER

RUN the engine until it attains its normal running temperature. Screw the jet adjusting nut upwards as far as it will go and disconnect the mixture control rod from the end of the brass lever actuating the jet. Push this jet actuating lever towards the body of the carburetter as far as it will go, then slowly move it away from the carburetter (thus gradually weakening the mixture) until the engine idles evenly, firing on all four cylinders regularly.

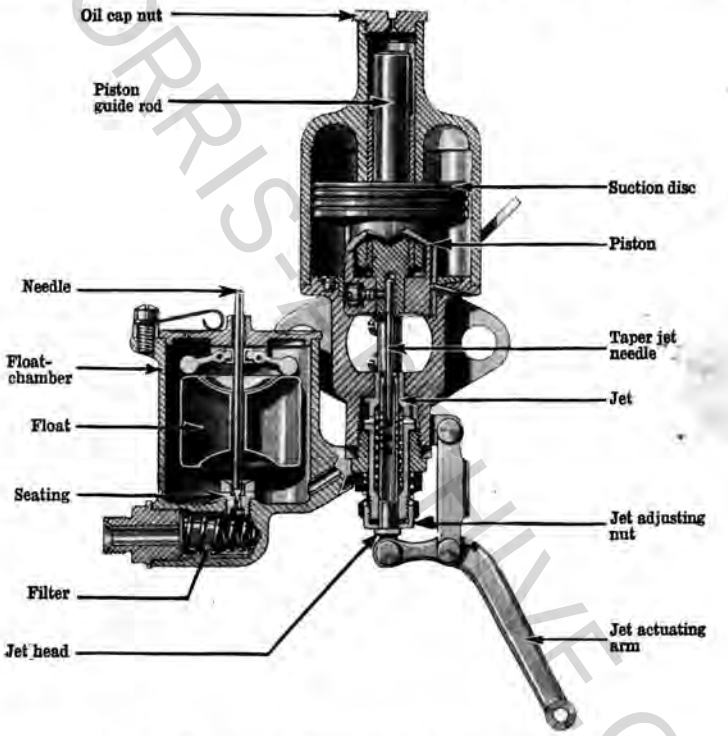
The jet adjusting nut should now be unscrewed until its head just comes into contact with the jet head. This will be the normal slow-running position when the engine is hot, and as the jet needle is of the correct size the general performance of the carburetter on the road should be entirely satisfactory.

The mixture control rod may now be reconnected to the jet actuating lever, taking care to see that there is ample clearance at all points of the actuating mechanism to allow full movement.

The correct position for the tapered needle is with its shoulder flush with the face of the piston.

flow to the jet is governed by a float mechanism of annular type, where the rising petrol lifts the hinged float, forcing it against the lower end of a needle. The upper end of the needle terminates in a cone that engages in the conical orifice of the petrol feed pipe, upon which it is forced by the action of the float, thereby shutting off the petrol supply when the petrol level in the float-chamber has reached a predetermined level.

On the carburetter fitted to the Morris Eight car the petrol flow to the jet is governed by a float mechanism of the more common type, where the rising petrol lifts the float, forcing it against weighted levers engaging in a collar at the upper end of a needle. The lower



The S.U. Carburetter in sections clearly showing its internal construction.

end of the needle terminates in a cone that engages in the conical orifice of the petrol feed pipe, upon which it is forced by the action of the weighted levers, thereby shutting off the petrol supply when the petrol level in the float-chamber has reached its correct level. The weighted levers are attached to the lid of the float-chamber

and the lid can readily be detached after sliding the retaining spring catch to one side.

Petrol from the float-chamber is led to a jet, the size of whose orifice—and consequent delivery—is regulated by means of a tapered needle attached to the lower end of a piston controlled by the suction from the engine. As this suction increases the needle is gradually withdrawn from the jet, enlarging its effective opening and permitting it to pass more petrol.

The jet is so mounted that it may readily be moved up or down relative to the tapered needle, in order to weaken or strengthen the mixture over the whole working range, by a lever operated from the mixture control situated on the facia board. This control provides an enriched mixture to ensure easy starting and even running when the engine is cold. The minimum jet opening can accurately be set by means of the adjusting nut, which forms an abutment for the enlarged head of the jet.

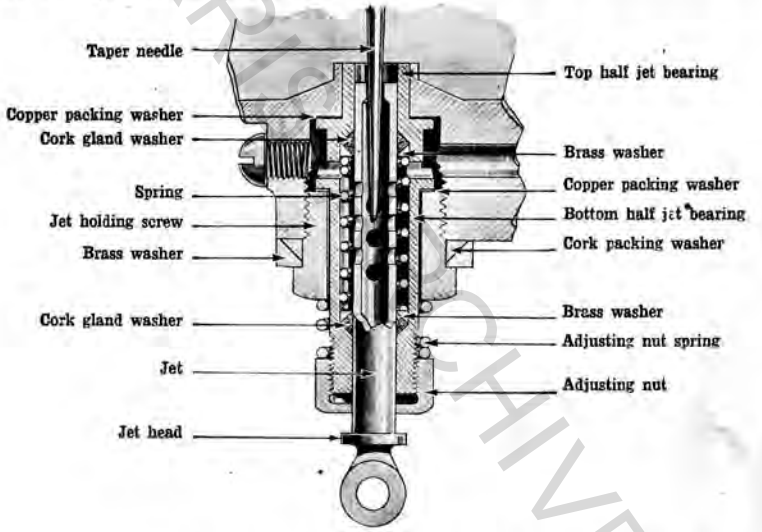


Fig. 2.

An enlarged section of the jet assembly. It will be noticed that the junction between the jet and the casing is rendered perfectly petrol-tight by means of two cork washers which are forced against the sides of the jet by a coil spring and conical washers. If the jet is dismantled great care must be taken not to lose these washers.

The carburetter is extremely simple, and its adjustment is equally simple if it is remembered that the jet is of a fixed standard size and cannot be altered. The only possible adjustment, other than the slow-running adjustment, is the fitting of a new needle of a different size. Since a needle of the correct size is fitted at the Works before the car is dispatched, this adjustment should not be required, and the suction chamber is therefore sealed.

Sources of Trouble

There are only three troubles which may affect the functioning of the S.U. carburetter.

1. The piston may be sticking and not functioning properly.
2. There may be dirt or water in the carburetter.
3. The float mechanism may have become deranged, and the carburetter is in consequence flooding.

Piston Sticking

The suction piston consists of the piston proper forming the choke; the suction disc, into which is inserted the hardened and ground piston rod working in a bearing in the suction chamber; and a tapered needle regulating the jet opening. If the piston is sticking this can easily be ascertained by inserting a finger in the air intake and raising the piston. The piston should come up quite freely and return to its seat with a click as soon as it is released.

The piston rod sliding within its bearing is the only part which is in actual contact with any other part, the suction piston and its needle possessing a clearance space around them. If, therefore, the piston does not return readily to its seat it is probable that the piston rod has become dry or sticky.

To free this, remove the oil cap nut to be found at the top of the suction chamber, pour in a few drops of good quality thin oil—such as sewing machine oil—and replace the cap. In particularly obstinate cases a little paraffin may be introduced into the oil cap opening and the piston worked up and down until it is free by inserting a finger in the air inlet. *Under no circumstances should a heavy-bodied lubricant such as engine oil be used, and no oil must be introduced on any other part of the suction chamber.*

Water or Dirt

If this is suspected, with a small article—such as a pencil—raise the piston so that the jet can be seen. Flood the carburetter and observe if the petrol issues freely from the jet. If it does not do so there is foreign matter of some sort blocking the passage to the jet. To rectify this, start the engine and open the throttle, then momentarily block the air inlet by placing the hand over it, keeping the throttle open until the engine commences to race.

This trouble is not a frequent one with the S.U. carburetter owing to the size of the jet and petrol passages. When it does occur, however, the foreign matter can usually be cleared by the foregoing treatment. If it is not, the only alternative is to remove the jet, *but this expedient should on no account be resorted to unless the method outlined has failed to effect a clearance and it is absolutely necessary to do so, in which case the carburetter should be returned to the makers.*

When refitting the jet it has to be very carefully centred so that

the needle is exactly in the centre of the jet opening, but it is practically impossible correctly to centre this part unless it is thoroughly understood how this has to be carried out.

A large percentage of the carburetters returned to the Works for correction have had the jet removed and replaced without being correctly centred.

It is quite an easy matter to bend the needle if the piston is at any time removed, in which case it will bind on the jet and cause the piston to stick. Any attention to the carburetter jet should be entrusted to an Authorised Morris Dealer.

Float-Chamber Flooding

This is usually obvious from the quantity of petrol flowing over the float-chamber and dripping from the air inlet. Flooding is generally caused by foreign matter finding its way on to the seating of the float-chamber needle. In the event of persistent flooding due to this cause, the float-chamber and float should be removed to give access to the needle for cleaning purposes in the case of the Morris Minor carburetter with concentric float.

The concentric float-chamber can be withdrawn after the jet control lever has been disconnected from the jet head, the swinging link disconnected from the float-chamber and the large hexagon nut in the float-chamber base has been unscrewed with a box spanner. The float may now be removed by withdrawing the split pin by which it is hinged to the carburetter body, thus exposing the float needle, which can then be withdrawn for cleaning purposes.

In the case of the external needle float-chamber fitted to the Morris Family Eight carburetter, dirt can usually be removed by raising the float needle, permitting the incoming petrol stream to wash away the particles of grit, and then twisting the needle on its seating a few times with the fingers; the seating should on no account be ground in.

General

It will be realised from the foregoing that the S.U. carburetter is a very simple instrument and easily managed when understood. On the other hand, considerable damage can be done if it is not treated correctly.

We would emphasise that the three troubles previously outlined are the only ones that can be caused by defects in the carburetter, and if these points are in order the carburetter should on no account be dismantled or altered, since the trouble must lie elsewhere.

The Automatic Petrol Feed

MAINTENANCE OF THE S.U. PETROLIFT FITTED TO THE MORRIS FAMILY EIGHT

THE S.U. Petrolift fitted to the Morris Family Eight car is a device for obtaining a gravity petrol feed to the carburetter without the necessity for carrying the bulk petrol supply above the level of the carburetter float-chamber. By its use the main petrol tank can be fitted at the rear of the chassis, and pressure feed to the carburetter dispensed with. It is in short an electrical pump whose action is entirely automatic, deriving its energy from the starting and lighting battery which forms part of the electrical equipment. It comes into operation immediately the ignition is switched on and ceases to function when the ignition is switched off. No separate petrol tap is therefore necessary.

This instrument is constructionally very simple and it is very improbable that it will give any trouble at all. Should it, however, cease to function, the following points should be attended to.

First of all remove the top cap (V) from the pump to see if the float-chamber contains petrol. If it does then the trouble is not due to the pump.

If the pump continues to make a pumping noise without delivering petrol, it is due to lack of petrol in the back tank, an air leak, or the foot valve (F) held up.

An air leak may be due to one of two causes : firstly, a bad joint between the filter bowl (U) and the casing, in which event tightening up will generally correct matters (if it does not do so a new washer will have to be fitted) ; or secondly, a loose petrol union on the suction pipe—that is to say, any point between the bottom union of the pump and the back tank. The washer between the filter bowl and its bolt (T) should also be inspected.

A sticking foot valve is a very rare source of trouble. To rectify, remove the filter bowl (U), filter (H) and foot valve (Y) by means of a tommy bar through one of the holes. The foot valve can then be cleaned. A second filter (X) will be found in the foot valve underneath the priming tube (Z).

Should the pump work very slowly without delivering petrol it is due either to a blocked petrol pipe or filters, in which case the filters or pipe must be cleaned out, or the battery is run down, in which case fill the float-chamber of the pump with petrol. This will probably enable the engine to be started up by hand, and as the dynamo comes into action it will boost up the battery sufficiently to run the pump.

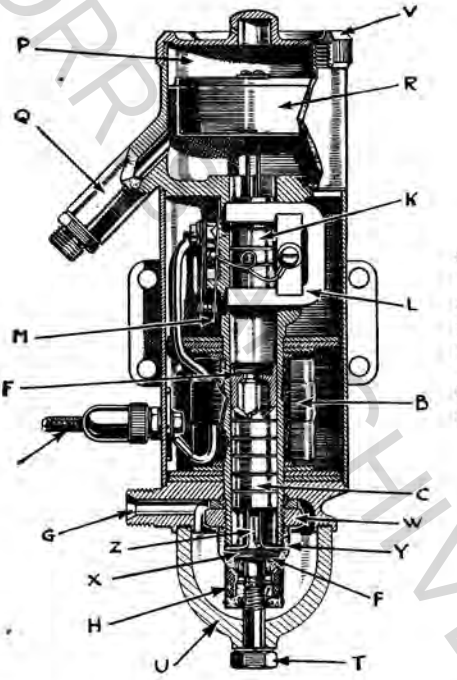
If after being reassembled the pump works but does not deliver petrol, it should be primed by pouring a small quantity of petrol into the top chamber. If petrol is not available a few squirts of thin oil down the tube of the pump, after removing the float (R)

and top plunger (K), will have the same effect. Please note the oil must be thin.

Should the pump not work at all, the trouble will be due to :—

(*a*) A bad electrical connection. To test this, remove the terminal from the pump and flash the wire across the pump body. If there is a bright flash this is in order. If not, the trouble is due to the battery being run down or bad connections somewhere in the system.

(*b*) The pump plungers (C or K) sticking, due to dirt or grit getting between the pump plunger and the body. Often a blow on the pump with the fist is sufficient to get it working, when the



The S.U. Petrolift, in which
P is the petrol chamber
Q the petrol outlet
R the controlling float
L the actuating magnets
B the field coil
G the petrol inlet

dirt will pass right through. Should this not do so, the remedy is to remove the filter bowl (U) and foot valve (Y) ; also the top cap of the pump and the cork float, when it will be possible to push the plunger (C) through the bottom, after which a clean rag can be drawn through the bore of the pump. When assembling, care should be taken to see that the plunger is fitted into the pump with the valve on top.

Care of the Tyres

ALL Morris Minor and Morris Family Eight cars are fitted as standard with Dunlop cord tyres of the wired type. The reasons for the selection of this make and type are that *extra value* is given in those directions which matter to the motorist.

The illustration shows how the removal of a cover is effected. After removing all valve parts the edges of both sides of the cover are depressed into the rim well in such a way as to cause the ring, which forms the cover edge, to become eccentric with the wheel centre. The shortening of the tyre radii at several points necessarily means their lengthening elsewhere, owing to the cover edges being inextensible and irreducible in their circumference. At that part of the cover where the radii are lengthened it will be found that the cover can be quite easily drawn over the rim edge. In order to facilitate this operation the small "spoon" lever provided in the tool kit may be used, but no leverage which has for its object stretching of the cover edge should be attempted. This edge cannot be stretched, but excessive leverage may break it.

The pressure at which tyres are run is most important, as the modern large-section tyre is sensitive to its degree of inflation. The table given herewith should be adhered to rigidly, for which purpose we recommend that the owner should purchase a pressure gauge.

Once a tyre is punctured do not leave it on the spare wheel but have it repaired as soon as possible, or the advantage of the fifth wheel is lost. The spare wheel tyre should always be in repair and fully inflated.

Tyre Pressure

Do not neglect the pressure until the tyres look as though they wanted more air, because by that time irreparable damage may have been done.

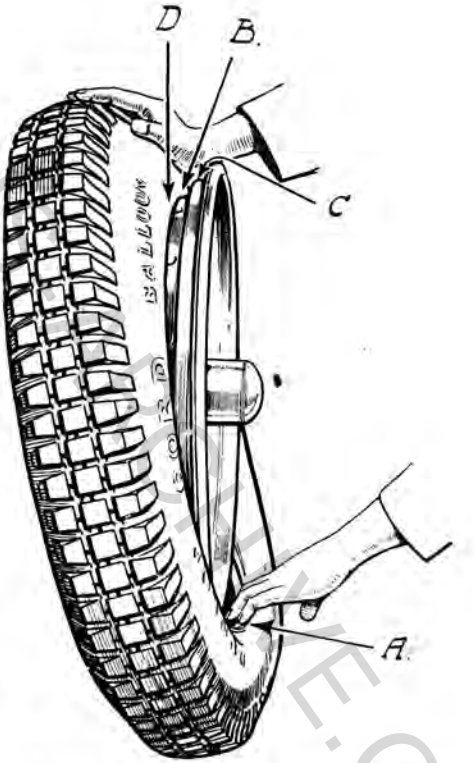
Test the pressure frequently in the spare as well as the running tyres, and restore any loss, even if only a matter of two or three lb. per square inch.

Gauges for testing balloon tyre pressures can be bought from all reputable motor dealers.

TYRE PRESSURES

Type.	Tyre Size.	Front.	Rear.
Morris Minor Tourer ...	27″×4.0″	22 lb. per sq. in.	27 lb. per sq. in.
,, ,, Saloon ...	27″×4.0″	22 lb. ,,	27 lb. ,,
Morris Eight Saloon ...	4.0″×19″	24 lb. ,,	27 lb. ,,
,, ,, Sports Coupé	4.0″×19″	24 lb. ,,	27 lb. ,,

A tyre and rim in section, showing on the left the two wired edges of the tyre in position on the shoulders of the rim. The tyre cannot blow off, because the edges are inextensible—neither can the tyre edges be lifted by levers from the rim shoulders over the rim edges. ***But*** by pushing the tyre edge down off the rim shoulder into the depressed centre of the rim at "D" then the tyre edge can be easily lifted off the rim at "A." This is an easy and simple operation, and requires no force.



You cannot pull the tyre edge at "A" over the rim edge until the tyre edges at "B" are pushed off the rim shoulder "C" down into the well "D," then tyre edge at "A" comes over the rim easily.
Remember the tyre edges are inextensible—force will only damage the tyre and cannot stretch the edge.

TYRE VALVES

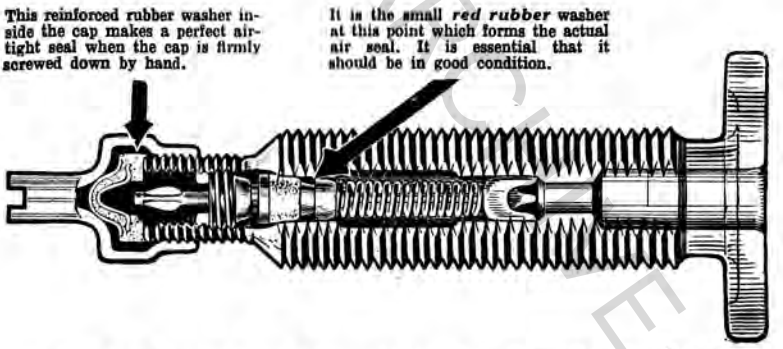
Valve Cap

The valve cap fitted to each valve provides an additional air seal and prevents the ingress of dirt into the valve interior. Beneath its rubber cover the tapered end of the cap will be found to be slotted. This slot is in effect a key which, when inserted into the mouth of the valve, can be engaged with the valve interior for the purpose of unscrewing it.

Valve Interior

The airtightness of the valve depends upon the proper functioning of its "interior." It may be tested for airtightness by rotating the wheel until the valve is at the top and inserting its end in an eggcupful of water. If bubbles appear, in spite of the fact that the valve interior has been well screwed down, it is evidence that its seating is faulty. It should be removed and replaced by a new interior. It is advisable always to have spare interiors handy, and these are procurable suitably packed in small metal containers.

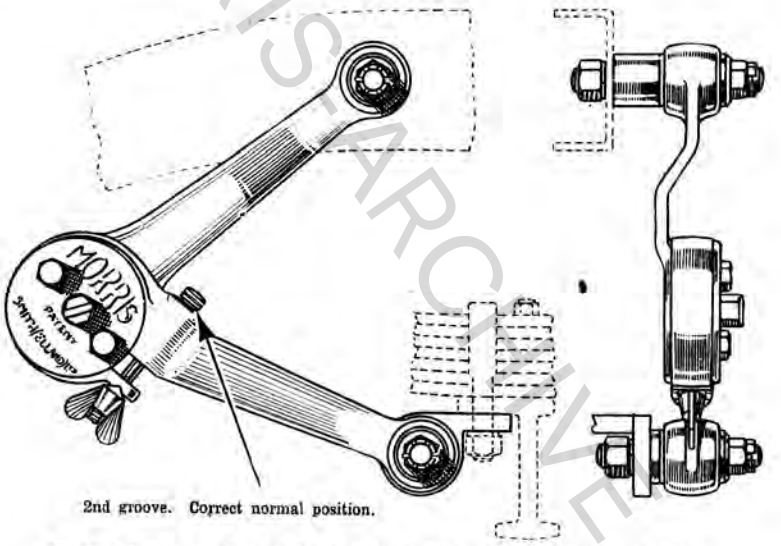
The rim nut should be kept tightly screwed up on to the rim. This nut, in addition to holding the valve in position on the rim, forms a water seal preventing the entry of water through the valve opening.



The tyre valve in section, showing its internal construction and the slotted valve cap which, when reversed, can be used as a screwdriver to remove the interior.

Care and Adjustment of the Smith Single-Acting Shock Absorbers

THE illustrations and description herewith will make it clear that the "Smith" is of the single-acting coil friction type, and that it consists of two arms pivoted together, the extremities of which are connected to the chassis and axle. The arm connected to the chassis carries a brake-drum, whilst the other arm, connected to the axle, carries an external brake band which can be adjusted by means of a spring-loaded tensioning bolt and wing nut. When the axle rises the two arms move towards one another, which movement acts on the tension spring, thus allowing the band to slide freely round the drum.



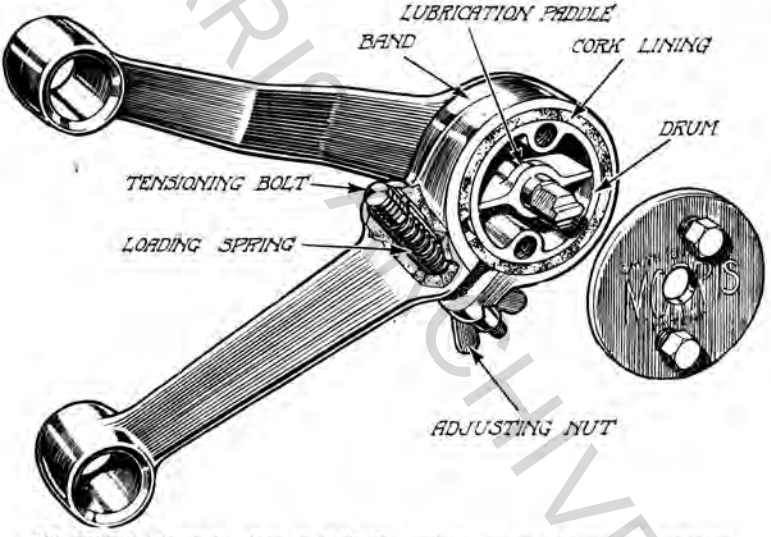
The Smith Single-Acting Shock Absorber, showing its method of attachment to the chassis and axle.

On the rebound the arms separate and the brake band coils itself round the drum, thus absorbing by friction the excess energy stored up in the car spring during the compression movement.

Having dealt in general with the principle under which the "Smith" functions, the following distinctive features should be noted.

Details of Adjustment

It is apparent from the sectional illustration that the lever has a recessed bore to house the tensioning spring. The top of the housing is bevelled and the head of tensioning bolt has four indicating grooves so as to provide the necessary indication whereby a uniform adjustment may be put on each absorber. The tightening of the wing nut compresses the tensioning spring, and in doing so pulls the head of the bolt into the spring housing, the extent of which is indicated by *the number of grooves visible above the bevel face of the spring housing*. Apart from enabling the initial adjustment to be made uniform, the grooves are such that they accurately indicate on reference thereto any variation or wear of the friction surfaces which may take place during prolonged use. To correct such variation it is only necessary to tighten the wing nut until the original setting is restored.



This sectional illustration shows in detail the tensioning spring, plunger with indicating grooves, and wing nut for regulating the tension.

This is an important feature, as without visible means of detecting the amount of control exercised by the shock absorbers it is obviously impossible to know whether the shock absorbers are functioning correctly and equally. Means for preventing any alteration of the adjustment during use are provided.

Adjustment

The Smith shock absorbers on the Morris Minor should be adjusted so that the *second indicating groove* from the top is in line with the

bevel face of spring housing (as shown in the illustration), and it is important that this preliminary setting be verified, as this adjustment is the correct one in the majority of cases for average touring conditions, although for certain conditions it may be necessary to tighten the wing nut until the end groove is completely below the level of the bevel face.

Maintenance

All shock absorbers are originally packed with special "Absordite" lubricant, sufficient for 10,000 miles running, which automatically lubricates the friction surfaces. In order to ensure perfect lubrication under all conditions a paddle is fitted in the interior which is rotated by the hexagon head projecting from the centre of the drum. Every 1500 miles the paddle should be oscillated as far as it will go from side to side once or twice in order to agitate the lubricant. The design is such that it is not possible to over-lubricate.

Every 10,000 miles the shock absorber cover-plate should be removed and the drum repacked with "Absordite." *On no account should any other kind of lubricant be used.* "Absordite" is obtainable from your Dealer in 1 lb. tins at 2s. 6d. each.

To get the best results your tyres should be inflated to the pressures indicated on page 46, and it is advisable to check this pressure frequently.

At the time this type of shock absorber was fitted a cork composition friction lining was used. An improved type of lining has since been developed, consisting of a special woven fabric needing no lubrication whatever. If replacement linings of the latest type have been fitted no lubricant must be introduced into the shock absorber, but the lubrication paddle must be replaced to close the hole in the centre of the cover-plate.

Attachment

The method of housing a flexible bush within the extremities of each arm forms a most efficient and silent bearing which requires no attention, and allows the supporting members attached to the chassis and axle a freedom of angular movement in relation to each other without stressing the arms or interfering with the efficient working of the friction members. This three-point contact of flexible material, which does not in any way interfere with the flexibility of the car springs, reduces the vibration set up during the compression movement of the car springs.

Care and Adjustment of the Armstrong Single-Acting Shock Absorbers

THE shock absorbers fitted to some Morris Minor cars and to the Morris Family Eight are of the friction band type wherein the tension of the band is controlled in order to restrain the springs on rebound mainly and, furthermore, restrain them in proportion to the amplitude of their motion. In other words, they are of the progressive single-acting friction type.

Constructionally, they consist of two arms pivoted together at one end and connected to the chassis frame and axle respectively at their other extremities. The arm connected to the chassis carries a brake-drum, while the arm connected to the axle carries a brake band encircling this drum, and kept in constant contact with its surface by a spring-loaded tension lever.

The load applied to the brake band by the tension lever is controlled by two separate springs: firstly, a coil spring which applies a constant load on the brake band, and, secondly, by a spring band, one end of which is anchored to the brake-drum, with its other end engaging the end of the tensioning lever. Reference to the illustrations will show that the latter applies a varying load to the brake band, depending upon the position of the arms relative to each other. That is to say, as the ends of the arms are brought closer and closer together by the deflection of the road springs, the spring band is wound more and more tightly, thus increasing the load on the brake band and offering progressively greater resistance.

In addition to the variable load applied to the brake band by this spring band, a certain amount of wrapping action takes place as the two arms separate, which adds considerably to the resistance offered to rebound, and, similarly, when the arms are brought together on spring deflection the brake band partly unwraps itself and facilitates free movement of the arms.

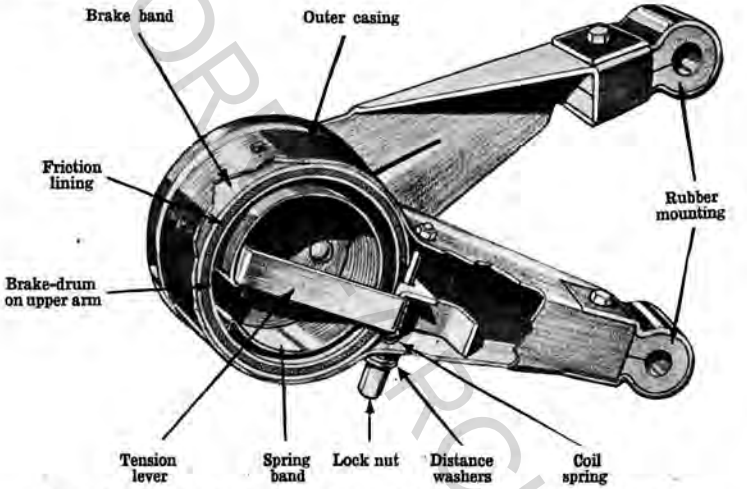
Details of Adjustment

The only item requiring attention on this shock absorber is the tension of the coil spring which applies the constant load on the brake band. A little consideration will show that the brake band must wear during prolonged use, and that the tensioning lever will in consequence assume a slightly different angle and reduce the tension applied by the coil spring.

Indication will be given that the tension has been reduced to too great an extent by undue bouncing of the car and general floppiness of the springs on bad road surfaces.

Additional tension is given to the brake band by removing the brass hexagon-headed nut on the underside of the shock absorber arm attached to the axle, and removing one of the series of distance

washers found beneath it. *Care must be taken not to remove the first of these washers—the one next to the brass adjusting nut—as this is of a different size to the others and forms the seating for the coil spring.* Any of the other washers may, however, be removed. After removing a distance washer, the brass adjusting nut must, of course, be screwed up tight. Once the lining has been properly bedded down, adjustment should only be necessary at intervals of 10,000 miles, but the frequency of adjustment is naturally to a great extent dependent upon the nature of the roads over which the car is normally used and may need slight modification to meet individual conditions.



The Armstrong Shock Absorber cut away to show the disposition of its components.

Attachments

The arms of the shock absorber are attached to the frame and axle by pins having their bearings in moulded rubber bushes. This method of mounting forms an efficient and silent bearing which requires no attention and allows freedom of angular movements between the chassis frame and axle without stressing the arms of the shock absorber or interfering with the proper functioning of the friction surfaces.

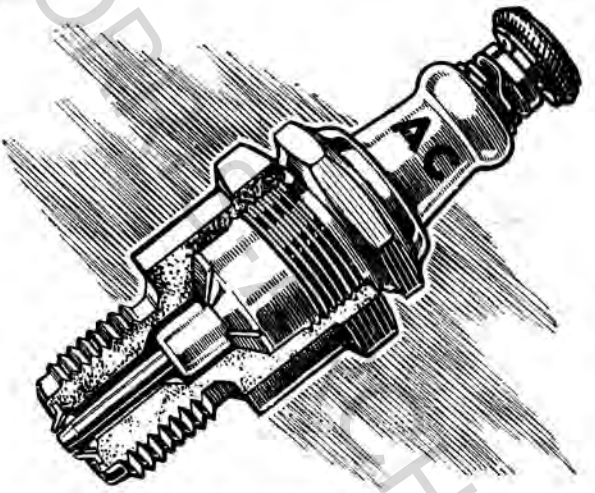
Friction Lining

The friction lining of the brake band is composed of woven material which is unaffected by changes in atmospheric conditions, and hard wearing in nature. It is intended to work dry, and since in the design of the arms great care has been taken completely to protect the friction surfaces from the weather, it should give long and satisfactory service.

Care of the Sparking Plug

Loss of Tune

IT is not generally realised that sooty or oiled-up plugs will cause erratic running, loss of power and, most serious of all, increased petrol consumption. Unless an intense spark takes place between the plug points in the cylinder complete combustion of the petrol mixture will not take place, and a certain amount of petrol vapour will be wasted with every revolution of the engine. If the plug points are covered with oil, or if the plug itself is choked with carbon deposit, it will be impossible to obtain a good spark in the cylinder.



The A.C. Sphinx B-11 Short Reach Plug, with the steel plug body partly sectioned to show the unit construction of the gland nut and insulator, which, together with the conical copper washer, ensures a gastight joint.

The A.C. Sphinx

Morris Minor cars were fitted with A.C. Sphinx plugs, type B-11 Short, and the Morris Family Eight with A.C. Sphinx X322 $\frac{3}{4}$ reach plugs, a specially sectioned view of which is shown herewith. These particular plugs are fitted with a detachable ceramic insulator which may be removed from the plug body for cleaning or renewal when necessary.

As the gland nut is a permanent and compression-tight unit with the insulator, to which it is sealed by a hot electrical process exclusive to A.C. manufacture, the plug can be readily taken apart for cleaning purposes and reassembled without in any way impairing its efficiency or its gastight properties.

When the plug has been taken apart the nose of the ceramic insulator and the interior of the steel plug body should be well washed with paraffin and all trace of carbon removed. It is of advantage further to wash the components in petrol and dry them with a clean cloth.

The plug can now be reassembled and the gland nut tightened up with a box spanner. The gaps should be tested and reset, if necessary, to the correct gap of from .020 to .025 in. recommended by the manufacturers.

Points in Plug Design

The plugs as fitted to Morris Minor cars were only adopted after exhaustive tests; there is no advantage therefore in fitting new ones of some other type. This brings up an interesting question which motorists repeatedly ask: Why will a certain plug work splendidly in one engine and yet be hopeless in another? The answer is that in designing a plug two features must be considered; firstly, the amount of heat and, secondly, the amount of oil, which it will have to withstand. These two features are invariably at opposite ends of the scale; thus we find that a plug suitable for a racing car will have to be proof against extraordinarily high temperatures, but at the same time it will not be required to function in a particularly oil atmosphere. On the other hand, in a touring car used under ordinary touring conditions the plug will seldom get exceptionally hot, but may be subjected to an unusual amount of oil. The whole secret, then, is to choose a plug which will get just hot enough to keep itself clean and yet not hot enough to pre-ignite.

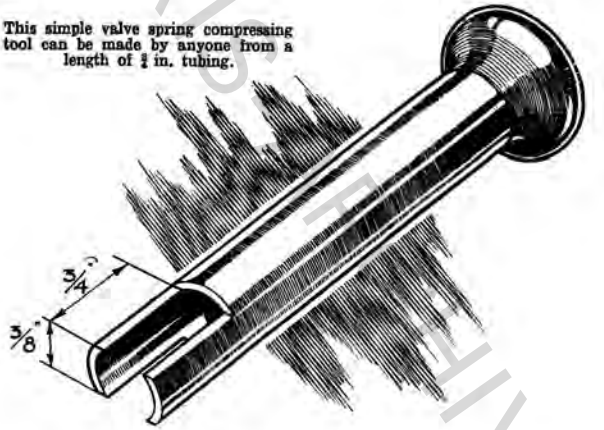
Now, the principal factor in obtaining this result is the amount of gas space available inside the plug. A plug built to withstand an exceptional amount of heat will not stand oil, and vice versa. Therefore rely on the maker's choice.

Replacement Plugs

A modified type of sparking plug has recently been evolved by Messrs. A.C. Sphinx Sparking Plug Co., which should be employed for replacements. This new plug bears the type number A.C. 339 S.R.

Decarbonising and Valve Grinding

DECARBONISING and grinding-in the valves of the Morris Minor engine is really a very simple operation, well within the capacity of the average "handy-man." The materials required, in addition to the standard tool kit, are a plentiful supply of clean rags, some valve-grinding paste (cost about 1s. 6d.), and a flat tin (a deep baking tin is particularly suitable), and some paraffin to make a washing bath. A valve spring compressing tool will greatly facilitate removal of the valves. This can be obtained from any Morris Dealer for the modest sum of 2s. 1d.



This simple valve spring compressing tool can be made by anyone from a length of ½ in. tubing.

Having collected the required equipment, start up the engine and let it run until it is nicely warm. It is far more comfortable to work on a warm engine. Then manœuvre the car so that the radiator is near a drain or other suitable place where the cooling water can be run off. When the bonnet on the right-hand side of the car is lifted, a tap in the lower radiator tank, just above the steering gearbox, will be disclosed. Open the tap and allow the radiator water to drain. Whilst the radiator is draining you may with advantage proceed to turn off the petrol (on Morris Minors only) and remove the bonnet by unscrewing the two bolts which attach the bracket at the rear end of the bonnet rod to the scuttle rim.

Removing the Cylinder Head

There is no need to remove the electric horn suspended on the radiator stay. If it is swung round until it is above the radiator stay it will not interfere with subsequent operations. The domed cover protecting the overhead valve gear may now be removed by unscrewing the two large wing nuts near its centre simultaneously.

The tension of the fan belt should now be released by slackening the fan bracket clamping bolt, and the top water connection should be released from the front face of the cylinder head block by removing the two attachment bolts, taking care not to lose the joint washer.

Now devote attention to the left-hand side of the engine and uncouple the exhaust pipe from the manifold, the mixture control rod at its junction to the brass lever on the carburetter, and finally the throttle control. Draw off the windscreen wiper tubing from the tube in the carburetter body and unscrew the petrol pipe at its junction to the carburetter float-chamber. The induction and exhaust manifolds can then be removed by unscrewing the four retaining nuts located between each branch of the manifolds.

At the forward end of the cylinder head block will be found an oil delivery pipe. Uncouple this by removing its centrally disposed retaining bolt. Beneath this pipe is an oil flow restrictor pin. If it is at all loose, withdraw it before it becomes lost.

Now attend to the items on the right-hand side of the engine. At the front will be seen a large diameter copper pipe—the oil return pipe. Uncouple this at its upper end by removing the two retaining nuts. *There is no need to withdraw it from its studs as these will draw straight out when the head is lifted.* At the rear end of the engine will be found a similar pipe. Uncouple this at both the top and bottom attachments and remove it bodily, taking care not to lose the joint washers. Uncouple the high-tension wires from the sparking plugs.

Between the projecting portion of the cylinder head block and the dynamo will be found a circular flexible coupling. Remove the two bolts which attach it to the dynamo drive yoke. This will permit the flexible coupling to be withdrawn with the cylinder head.

The cylinder head is held on to the cylinder block by ten nuts screwed on to the long studs passing through the cylinder head. Slacken off these nuts in rotation, half a turn at a time, until they are quite loose, then finally remove them. It is unwise to unscrew any one of these nuts completely before slackening off the remainder, as this will impose uneven stress upon the cylinder head, leading to its distortion.

The cylinder head is now ready to be lifted from the cylinder block. The breaking of the joint between the two will be facilitated by smartly tapping the sides of the head with a wooden mallet or with a hammer with a piece of wood interposed to take the blow.

The joint may, however, not break freely, in which case it is permissible to insert a screwdriver or similar blunt wedge-shaped tool between the joint at the two places—one on either side of the engine—where the cylinder head gasket has been cut away for the purpose. Do not insert the screwdriver too far. It should on no account be forced against the gasket, which would become damaged as a result. When the joint is broken no difficulty should be experienced in lifting the head clear of the studs providing it is withdrawn squarely. Place the head on a bench out of harm's way, and carefully lift the copper asbestos gasket straight off the cylinder head studs, keeping it parallel with the upper face of the cylinder head block and taking particular care that it is not bent or otherwise damaged in the process.

The cylinder head can be easily lifted from the studs in the manner indicated or by standing on the bonnet boards astride the engine.

Decarbonising

Everything is now in readiness for decarbonising the piston crowns and the surrounding face of the cylinder block. Turn the engine by the starting handle until any two pistons are at the top of their travel, when it will be found that the remaining two are at the bottom of their cylinders. Stuff the open ends of these cylinders with clean rag, and with an old screwdriver, or some other blunt tool, scrape the black deposit off the top of the pistons and the face of the cylinder block adjacent to the cylinder bores. With a clean rag damped with paraffin clean off every trace of foreign

matter remaining, but do *not* attempt to polish things up with emery cloth or other abrasive, or you will do far more harm than good. When these two pistons have been properly cleaned give the starting handle half a turn and clean the other two in the same way.

Attention should now be given to the cylinder head. Remove the sparking plugs and turn the head upside down, thus exposing the combustion chambers, in each of which will be observed the circular heads of two valves—one inlet and one exhaust.

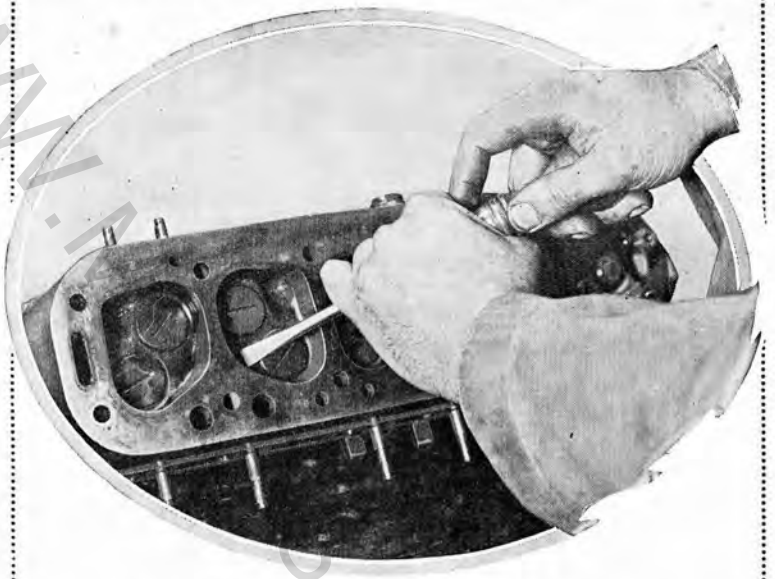
With a blunt screwdriver carefully scrape away the carbon deposit adhering to the surface of the combustion spaces and valve heads,

Removing the carbon from the piston crown.

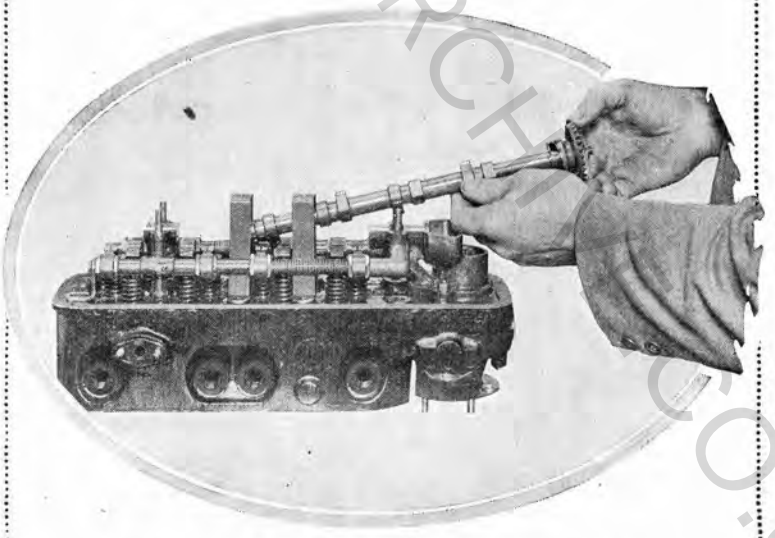
taking particular care to go round each valve with a small screwdriver in order to remove all trace of carbon. Clean the combustion chambers and valve heads carefully with rag moistened with paraffin.

Removing the Valves

Having thoroughly cleaned the combustion spaces and valve heads, place the cylinder head on the bench the right way up. To obtain access to the valve spring, it is necessary to remove the camshaft. This is easily achieved by unscrewing the four nuts holding the camshaft bearing caps in position. These should be

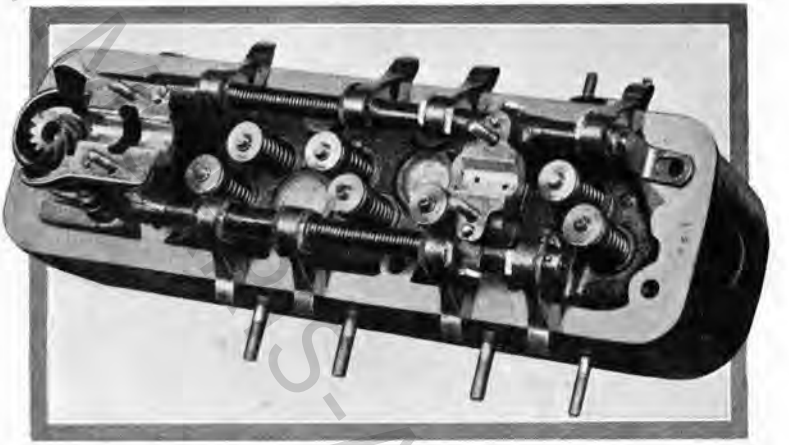


Removing carbon from the combustion spaces and valve heads.



Withdrawing the camshaft, after removing the bearing caps, in order to give access to the valves.

given half a turn in rotation, in a similar manner to the cylinder head retaining nuts, until they are eventually removed. The camshaft can then be lifted from its bearings and removed by passing it through the valve cover saddles. Removal of the camshaft enables all the valve rocker-arms to be swung clear of the valves.



Showing how the valve rockers may be swung clear of the valves after removal of the camshaft.

A small wood block slightly thicker than the depth of the combustion spaces and an easy fit within them should now be prepared. Slip this block into the combustion space so that the valve heads are resting upon it, in order that the valve spring can be compressed with the special valve tool previously described, without forcing the valves open. Depression of the springs will expose two small conical cotters engaging in a groove in the pencil-like end of the valve stem. Removal of the cotters will release the valve spring cap from the valve stem, permitting its removal and releasing the valve spring. When the springs of both valves have been removed, the head may be raised from the bench and the wood block withdrawn, thus allowing the valves to be drawn from their guides. Repeat this operation on the remaining valves until they are all removed.

Grinding-in the Valves

Examination of the valves will show that the edges of their mushroom-like heads are bevelled off at an angle to correspond with the similar bevelled edges of the valve ports in the cylinder head and thus provide a gastight joint when they are in contact. Obviously, gastightness is not attained if these bevelled surfaces are dirty or "pitted," and in order to clean them up so that they

make perfect contact over the whole of their surfaces it is necessary to grind them in. When grinding-in the valves the utmost care should be taken to see that they are inserted into the correct port. Each valve is clearly numbered on its head, and on the lower face of the cylinder head adjacent to the valve port will be found its corresponding number.

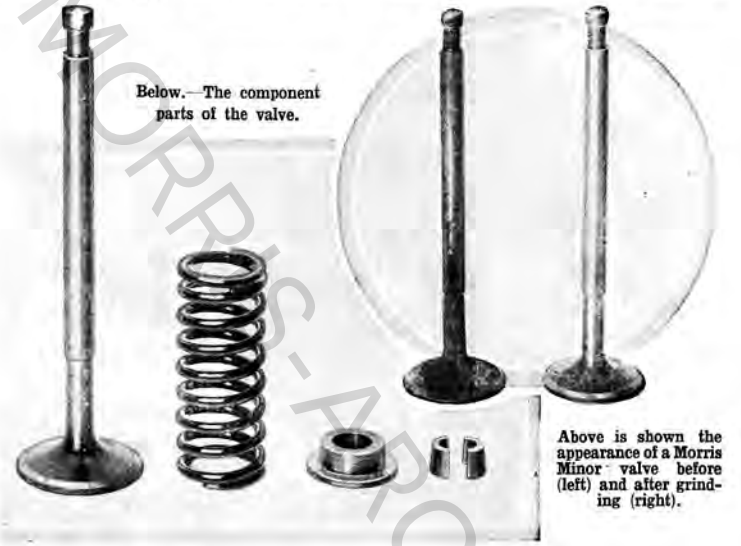
The grinding-in process consists in coating the bevelled face of the valve with a small quantity of valve-grinding paste—applied on the end of a match-stick—reinserting the valve in its guide and

Removing the valve cotters.

partially rotating it backwards and forwards on its seating by means of a screwdriver. Here we come to the secret of good valve grinding. The valve should be raised from its seating every few reciprocations and given a half turn in order that the grinding compound may spread itself evenly over the whole of the surface. If this is not done there is the possibility that minute circular grooves will be cut into the face of both the valve and its seating, which will absolutely prevent one from obtaining a good gastight fit. Probably the most convenient way of carrying out this periodical lifting is to obtain a light coil spring (similar to the valve spring but much lighter), and insert it into the valve port beneath the valve head. When pressure is released on the screwdriver the valve will pop up, when it can easily be rotated into a fresh position.

It is not necessary to continue grinding the valves once the faces of both valve and seating have assumed a clean, even, matt-surfaced appearance. A polished surface must not be expected and is quite

unnecessary. If the engine has been run for a long period without being decarbonised, the valve face may be badly "pitted"—that is to say, it will have a number of small black spots or depressions on its face. Should these depressions be at all excessive or deep, it is best to have the valve face trued up on a special machine at a garage. This will prevent needless grinding away of the valve seating in the cylinder head—a matter of importance, as it cannot be renewed. Any valves which are distorted should immediately



Below.—The component parts of the valve.

Above is shown the appearance of a Morris Minor valve before (left) and after grinding (right).

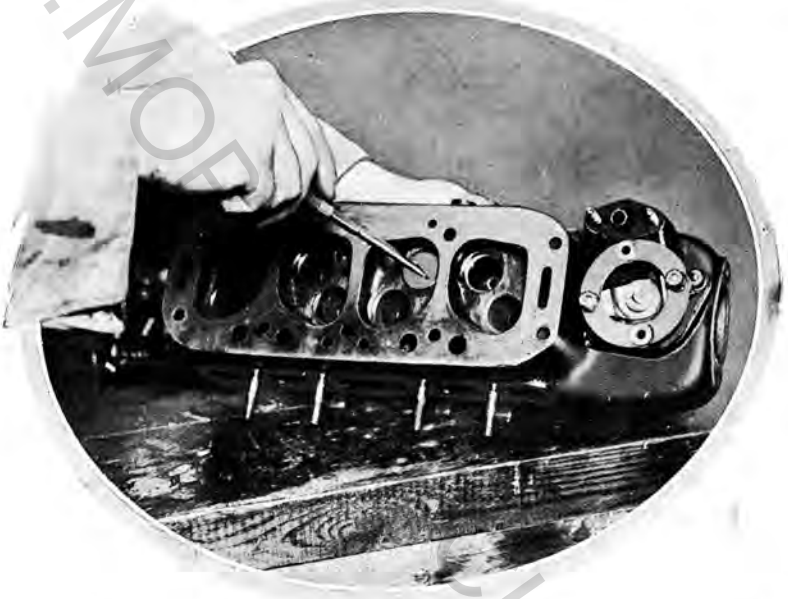
be replaced by new ones. To attempt to grind them in will only produce extensive damage to the seating.

After each valve is ground in it should be withdrawn and carefully washed in paraffin, and, what is equally important, the valve seating and the surrounding valve port should also thoroughly be cleaned with a rag moistened with paraffin. Do not wash out the valve ports with petrol or paraffin or some of the grinding compound will find its way into the valve guides or other working parts, and it is of the utmost importance that it should be prevented from finding its way on to any of the working surfaces of the engine, where extensive damage may be done.

Reassembling the Valves

When you have satisfied yourself that all trace of the grinding compound has been removed, the valves may be reassembled. Care should again be taken to see that they are in their correct ports. Reassembly of the valve is not a difficult matter with the aid of the valve tool described. After inserting the valve in its

guide and resting its head on the wood packing block, the valve spring and valve spring shroud may be placed in position with the valve spring cap resting on top of it. Engage the valve tool on the cap and depress the spring so as to expose very nearly the whole of the groove in the upper end of the valve stem. Insert the two conical cotters into the groove in the valve stem (small ends downwards, of course) and gradually release the spring. Make sure that the cotters



Grinding the valves on to their seatings.

are properly engaging in their grooves before dealing with the next valve. If the valve cover saddles have been removed, do not forget to replace them in position before reassembling the valves which are between the camshaft bearing brackets, or you will find that these are in the way and that you cannot replace the saddles.

Replacing the Camshaft

Swing all the valve rockers into position against their respective valves and replace the camshaft with the two marked teeth of its bevel wheel engaging on either side of the marked tooth of the driving pinion. The camshaft bearing caps are dowelled into the bearing brackets so that there is no possibility of misalignment. Care should be exercised, however, to tighten up the camshaft bearing cap nuts evenly. Each should be given a partial turn at a time until all are perfectly tight.

Adjusting the Rockers

In the process of grinding-in the valves a certain amount of metal is always removed. This tends to reduce the clearance existing between the head of the valve and the under-surface of the rocker-arm. It is essential for the proper functioning of the engine that this clearance should not be less than .003 in., and it is therefore necessary to check the clearance of each valve, with the feeler gauge attached to one of the special rocker adjusting

The camshaft timing wheel marks are here clearly shown.

spanners. On one side of the rocker will be found a hexagon steel nut and on the other side a similar bronze nut. Engage the plain rocker adjusting spanner on the bronze nut and, holding it firmly in position, slacken the steel nut with the spanner having the feeler gauge. Withdrawing the spanner from the steel nut, insert the feeler gauge between the valve rocker and the cam—after seeing that the peak of the cam for that particular valve is pointing directly upwards—and rotate the bronze nut until the feeler gauge can just be withdrawn easily. Now, holding the spanner engaging the bronze nut exactly in this position, tighten up the steel lock nut. The clearance should then again be checked to make sure that no movement of the setting took place while the lock nut was being tightened up. When adjusting the rockers care should be

taken to see that the thick portion of the eccentric bronze bush is towards the centre of the engine (except when it is either at the top or bottom) or the oil supply to the cam will be stopped.

Replacing the Cylinder Head

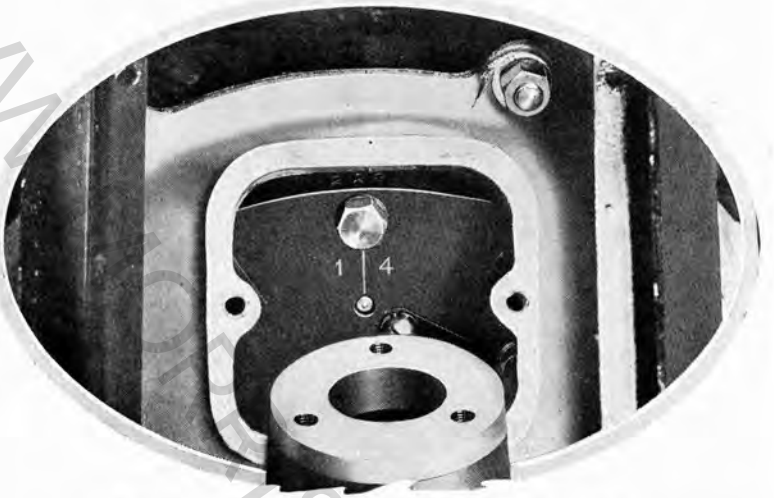
When all the valve clearances have been correctly adjusted, the cylinder head is ready for replacement. It is first of all necessary thoroughly to clean the gasket and remove any carbon deposit adhering to its edges. If the gasket has been in any way damaged during the removal of the cylinder head, do not attempt to use it again, but immediately procure a new one. See that any new gasket does not burr up around the stud holes and that the cylinder

The valve rocker assembly showing the eccentric bronze adjusting bush.

bore openings are clear of the cylinder bores themselves. The gasket can then be located over the studs in the cylinder block and gently pushed into position on to the upper face of the cylinder block. It will be found convenient to use a short length of tubing (a box spanner does quite well) over the studs to push the gasket in position. This should be done very gently, taking care to keep the gasket parallel with the cylinder head and not to force one end or one side down before the other. In the case of an old gasket improved results will be obtained by lightly coating it on each side with gold size.

Turn the camshaft until the timing marks on the spiral bevel drive gears coincide, and rotate the engine by the starting handle until numbers one and four pistons are at the very top of their stroke, with the metal electrode on the distributor rotating arm pointing towards No. 1 contact stud (No. 1 cylinder is the one nearest the radiator). This stud is easily located by tracing the high-tension lead from the sparking plug for No. 1 cylinder to its

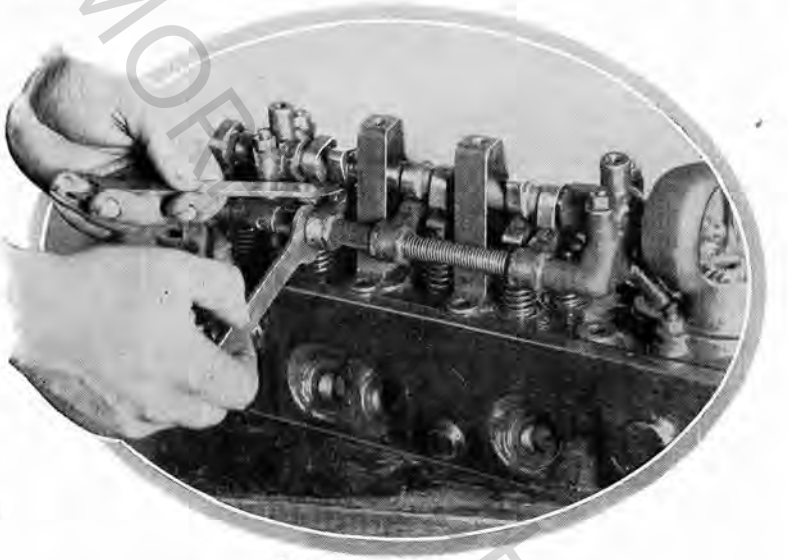
ENGINE TIMING FEATURES



Showing the timing marks on the face of the flywheel cover-plate.

The distributor of the Morris Minor engine with cover removed to show the details of its interior.

junction on the distributor cover. On removing the distributor cover the position of the metal electrode on the end of the distributor rotating arm can be seen, and its position relative to this stud noted. That the pistons are exactly at the top of their travel can be ascertained by removing the rectangular plate on the clutch housing (just in front of the change speed lever), when a mark will be found on the face of the flywheel, bearing the numbers 1 | 4. This mark should be exactly in the centre of the opening in the clutch housing.



Adjusting the valve clearance.

Having made sure that the pistons and camshaft are in their correct positions, the head may be lowered into position on to the cylinder block. The two holes in the flexible coupling should now be not very far from those on the drive yoke of the dynamo. Rotate the drive yoke attached to the cylinder head until the bolt holes exactly coincide with those of the flexible ring. Replace the ten cylinder head nuts, not forgetting the copper washers on the studs passing through the inlet ports, and tighten them up in the rotation indicated in the illustration, giving each a quarter of a turn at a time until all are up tight.

The flexible coupling bolts and washers should now be replaced in their correct positions, taking care to replace the distance washers in exactly the same position as they were originally. The oil pipes, exhaust and inlet manifolds, carburetter controls, petrol pipe, windscreen wiper tubing, sparking plugs, high-tension cables,

and the valve cover should then be replaced. When replacing the oil pipe on the left-hand side of the head, make sure that the oil restrictor pin is in place (see page 32), and that it is clean.

Fill the radiator with water, start up the engine and let it idle quietly until it is thoroughly warm. Then, switching off again, remove the valve cover and go over each of the cylinder head nuts in turn, giving each a final tightening up. It will be found that now the engine is warm an extra half turn or so can be given to

Indicating the sequence in which the cylinder head stud nuts should gradually be tightened.

each nut. Do not attempt to speed up the engine until this final tightening has been effected. Start up the engine and ascertain that oil is exuding from the small oil passage drilled in each valve rocker-arm, and lubricating the cam surfaces. If oil is coming freely from these oil passages, the valve gear cover can be replaced, together with the bonnet, and the car is ready for the road.

After 250 miles the valve cover should again be removed, the cylinder head nuts tightened up and the valve clearances checked.

On Removal of the Dynamo

THERE is very little on the modern dynamo likely to give trouble and for this reason there will seldom be need to disturb it. On those few occasions when trouble is experienced with the electrical equipment, it is always advisable to entrust its rectification to specialists. We therefore give on page 89 a list of Lucas Service Depots, and if you can arrange to call upon any of these with your car you will be assured of the best possible expert attention. In order to assist those experiencing trouble with their dynamo and who cannot take their car to a Lucas Depot for attention, we give in this section information on how to remove this component so that it may be sent to the most convenient Lucas Service Depot for attention.

In order to obtain easy access to the dynamo for removal it is necessary to take off the radiator. Drain the radiator by opening the tap in the lower water tank under the bonnet, and while the water is running away take off the bonnet by removing the two retaining screws which attach the bracket at the rear end of the bonnet rod to the scuttle apron. When the radiator is empty, slacken off the fan belt by loosening the clamp bolt, and disconnect the top water connection by removing the two screws which attach it to the front face of the cylinder head. This will enable the top water connection, complete with fan, to be withdrawn with the radiator. Disconnect the rear clip on the lower hose pipe and loosen the hose from the water inlet pipe. Remove the two bolts fastening the radiator to the chassis frame, slacken the nuts at the rear end of the bonnet rod and release it from its bracket, and uncouple the wires from the electric horn. This will permit the removal of the radiator complete with fan assembly, bonnet rod, and horn.

Between the projecting portion of the cylinder head and the top of the dynamo will be found a circular flexible coupling. Remove the nuts on each of the four coupling bolts in turn, leaving the bolts in position, so that the coupling can be rotated by use of the starting handle to bring each bolt into a position where the nut may easily be reached.

Having removed all four nuts, take off the valve gear and clutch housing covers and turn the engine by the starting handle until the 1 | 4 timing mark on the flywheel coincides with the centre of clutchcase opening (see illustration, page 66). This will bring the driving yoke on the cylinder head across the engine, and the driving yoke on the dynamo parallel to the engine centre line. The bolts themselves may now be withdrawn, care being taken not to lose the

distance washers, which must be replaced in the same position. Removal of the bolts enables the flexible coupling to be withdrawn.

Detach the two cables on the distributor side of the dynamo, noting from which terminal they are removed, and disconnect the oil delivery pipe on the manifold side of the engine at its upper end, taking particular care not to lose the oil restrictor pin beneath it, or its jointing washer.

Removing the coupling bolts of the flexible coupling.

Remove the two bolts securing the body of the large external oil filter to its supporting bracket. Now unscrew the four set-screws which attach the dynamo to its platform at the front of the engine, releasing the dynamo and the filter bracket. Lift the dynamo approximately a quarter of an inch and tilt it towards the near-side of the car until the driving yoke on the dynamo is just clear of that on the cylinder head. The dynamo can then be tilted forwards and easily withdrawn.

Replacement of the dynamo is effected in the reverse way, but it is necessary to make sure that the engine timing has not been disturbed while the dynamo was removed. Observation through the rectangular cover-plate in the clutch housing—just in front of the gear lever—should reveal the timing mark on the flywheel for Nos. 1 and 4 cylinders, exactly in the centre of the opening (see illustration, page 66). Place the brass packing pieces which fit under the dynamo base in position on the dynamo platform, making sure that you replace the same number that you took off. If for

any reason the dynamo is replaced by another, it may be necessary to readjust the mesh of the driving gears to obtain silent running by suitable selection of the packing shims used. Turn the dynamo spindle until the timing mark on the dynamo drive gear coincides with the centre line of the dynamo and is at the rear—that is, ready for engagement with the correspondingly marked teeth of the drive gear on the crankshaft. The holes in the dynamo coupling yoke will then be parallel with the engine centre line. Tilting the dynamo towards the near-side of the car and holding the dynamo coupling yoke in this position, insert the drive gear into the opening of the dynamo platform and swing the dynamo backwards and downwards into position. The gears can be felt to be meshing properly if the coupling is slightly oscillated as the dynamo is replaced, but do not overdo the oscillations or you may engage the wrong teeth.

This illustration indicates the manner in which the dynamo should be removed or replaced.

See that the bolt holes in the dynamo base are coinciding with the holes in the dynamo platform, and then observe if the dynamo coupling yoke is exactly parallel to the engine centre line. If it is not, withdraw the dynamo, reset the coupling yoke and reinsert the dynamo. No difficulty should be experienced in getting the dynamo in position with the correct teeth in mesh, as the distance between one tooth and the next is sufficient to make an appreciable

difference to the position of the dynamo coupling yoke, a difference which is immediately discernible.

Having satisfied yourself that the correct gear teeth are in mesh, replace the oil filter bracket and the screws in the dynamo base, taking particular care to tighten them up evenly a partial turn at a time until all are quite tight.

Now make a final test. The flywheel mark 1 | 4 should show exactly in the centre of the inspection cover opening with the distributor rotating arm pointing towards No. 1 cylinder. (This can easily be found by tracing the high-tension lead from No. 1 sparking plug to its junction on the distributor. Removal of the distributor cover should show the distributor arm directly beneath it.) The dynamo coupling bolt holes should be exactly fore and aft and at right angles to the coupling yoke on the cylinder head.

If all the foregoing are correct, replace the flexible coupling and coupling bolts, taking care to replace the distance washers in exactly the same position as they were originally. Tighten up the nuts firmly and rotate the engine slowly by hand. If the distance washers are in the correct position, the flexible coupling should run absolutely true. If it does not do so, note where the error is and adjust the distance washers accordingly. Replace the valve cover, attach the dynamo cables on to their correct terminals, and reconnect the oil delivery pipe on to the cylinder head. It is an advantage to withdraw the oil restrictor pin before doing this and wash it in paraffin to make sure that it is perfectly clean.

Replace the radiator and bolt the upper water connection to the forward face of the cylinder head, not forgetting to place the fan belt in position over the pulleys or to replace the jointing washer. Engage the rear end of the bonnet rod in its bracket and tighten up the nuts. You may now connect the horn wires to their terminals, connect up the bottom hose and replace the bonnet, thus completing the reassembly.

ACCESSORIES and EQUIPMENT

SPECIAL PROPRIETARY FITTINGS

The following proprietary equipment and parts therefor can either be obtained direct from the manufacturers, as below, or will be supplied by any authorised Morris Dealer or by the Service Department of Morris Motors Ltd. at list prices current from time to time.

All claims for replacement of alleged defective parts, with the exception of those starred, must be referred direct to the respective manufacturers.

Dynamo	Joseph Lucas Ltd., Birmingham.
Starter Motor	Do.
Starter Switch	Do.
Ignition Coil	Do.
Ignition Distributor	Do.
Switchbox and Components	Do.
Cut-out	Do.
Fusebox	Do.
Junction Box	Do.
Electric Cables	Do.
Electric Horn	Do.
Battery	Do.
Lamps	Do.
Horn (Electric)	Do.
Instrument Panel Assembly	Do.
Electric Bulbs	Do.
Windscreen Wiper	Do.
Observation Mirror	Do.
Speedometer	S. Smith & Sons (Motor Accessories) Ltd., Cricklewood Works, London, N.W.2.
Petrol Gauge and Attachments	
Carburetter	S.U. Company, East Works, Bordesley Green Road, Adderley Park, Birmingham.
Petrolift	
* Oil Gauge	J. Tomey Ltd., Catherine Street, Aston, Birmingham.
Windscreens	Manufacturer's name stamped on windscreen supports.
Oilgun	Benton & Stone Ltd., Bracebridge Street, Birmingham.
Calormeter	Wilmot-Breeden Ltd., Camden Street, Birmingham.
Mascot Wings	Do.
Bumpers	Do.
* A.C. Sparking Plug	A.C. Sphinx Sparking Plug Co. Ltd., Bradford Street, Birmingham.
Tyres	Dunlop Rubber Co. Ltd., Fort Dunlop, Erdington, Birmingham.
Jack and Tools	R. T. Shelley Ltd., Aston Brook Street, Birmingham.
Shock Absorbers	Armstrong Patents Ltd., Eastgate, Beverley, Yorkshire. Frank Smith & Co. (Elland) Ltd., Elland, Yorkshire.
Radiators	Authorised Morris Repair Stations (see separate list).

Maintenance of the Lucas Coil Ignition System

VERY little attention is needed to keep the ignition equipment in proper condition. Occasional inspection of the system is advised, however, when any parts needing adjustment or cleaning can be attended to.

Distributor Unit

Occasionally remove the distributor moulding by pushing aside its two securing springs. See that the electrodes are clean and free from deposit. If necessary wipe out the distributor with a dry duster, and clean the electrodes with a cloth moistened with petrol. Also see that the carbon brush "A" slides freely in its holder in the case of distributors fitted with this type of brush.

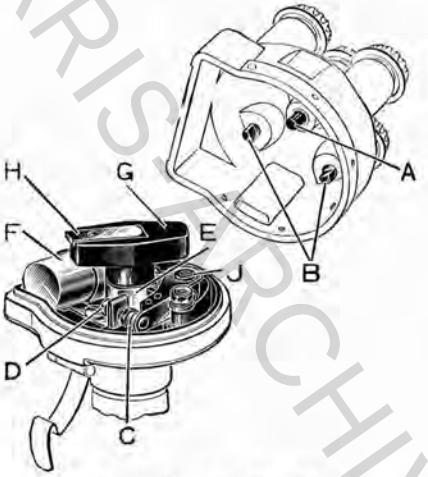


Fig. 1. Distributor Type DJ4.

A—Carbon brush.
B—Electrodes.
C—Contacts.
D—Locking nut.
E—Rotating cam.
F—Condenser.
G—Rotating distributor arm.
H—Rotating electrode.
J—Contact breaker pivot.

Next examine the contact breaker. It is important that the contacts "C" are kept free from any grease or oil. If they are burned or blackened they may be cleaned with very fine emery cloth and afterwards with a cloth moistened with petrol. Care must be taken that all particles of dirt and metal dust are wiped away. Misfiring may be caused if the contacts are not kept clean.

Provided that the cam is kept clean and that the instructions on cam lubrication given on page 75 are carried out, the wear on the celeron heel will be negligible and the contact breaker gap will

only need adjustment at very long intervals. If the cam is dirty it may be cleaned with a cloth moistened with petrol, and afterwards given the slightest smear of vaseline. It is not advisable to alter the setting unless the gap varies considerably from the gauge provided on the ignition spanner. If adjustment is necessary, proceed as follows :—Turn the engine round slowly by hand until the points are seen to be fully opened, then, using the ignition spanner, slacken the locking nut "D" on the stationary contact screw, and rotate it by its hexagon head until the gap is set to the thickness of the gauge. After making the adjustment care must be taken to tighten the locking nut.

Lubrication of Distributor Unit

The distributor main bearing is lubricated from a greaser ; this should be packed with a good quality high-melting-point grease, and the cap should be given two turns about every 500 miles.

Add a few drops of thin machine oil to the hole provided in the housing for the cam lubrication wick on some Minor models whenever the latter appears to be dry.

On Morris Eight models (and Morris Minor models without the cam lubrication wick) the cam should be given the slightest smear of vaseline about every 3000 miles or whenever it appears to be dry. Every 5000 miles place a single drop of oil on the pivot "J" on which the contact breaker works.

Coil

The coil unit is not adjustable in any way and requires no attention beyond seeing that the terminal connections are kept tight and the moulded coil top is kept clean.

Ignition Switch and Warning Lamp

The ignition switch is incorporated in the right-hand switch on the instrument panel. In addition to merely stopping the engine, the switch serves the purpose of preventing the battery being discharged by current flowing through the coil windings when the engine is stopped. To give indication to the driver when current for the coil is being drawn from the battery, a warning lamp is provided in the instrument panel, which gives a red light when the ignition is "on" and the car is stationary. The warning lamp will also light when the engine is running very slowly, as the dynamo under these conditions is not running at a high enough speed to generate sufficient voltage to actuate the cut-out.

To replace the ignition warning lamp bulb on the Morris Minor remove the plate carrying the red glass by withdrawing the two fixing screws, when the bulb can be unscrewed from its holder and a new one screwed in position. The correct bulb to fit is an 8-9 volt, screw cap type (1.6 watts).

To replace the ignition warning lamp bulb on the Morris Family Eight unscrew the lamp front, when the bulb can be removed from its holder and a new one screwed in position. The correct bulb to fit is a 2.5 volt, .2 amp. screw cap type (No. 252 M.E.S.).

The Detection and Remedy of Ignition Faults

Engine will not Fire

Switch on the ignition, turn the engine and observe the ammeter reading. (The engine should be turned by hand if it is known that the battery is in a low state of charge.)

If the ammeter reading rises and falls with the closing and opening of the contacts, then the low-tension wiring is in order. If, however, the reading does not fluctuate in this way, a short in the low-tension wiring is indicated or the contacts are remaining closed. When no reading at all is given, a broken or loose connection in the low-tension wiring is indicated or the battery may be exhausted.

Before proceeding further make quite sure that the trouble is not due to defects in the engine, carburetter, petrol supply, etc.

Examine the high-tension cables. If the rubber shows signs of deterioration or cracking, the cable should be renewed. Remove the distributor moulding and examine the contacts; clean them if necessary. Turn the engine over by hand and see that the contacts come together smartly.

If no reading is given on the ammeter examine the low-tension wiring, i.e. the cables from switchbox to the coil, from the coil to the distributor, and from the distributor to chassis. Also see that the battery terminals are tight and that the cables from the battery to the switchbox are secure. The battery may be dismissed as the cause of the trouble if the lamps will light.

Test the coil independently of the distributor by removing the cable from the centre distributor terminal and holding it about ¼ in. from some metal part of the chassis. Turning the engine should produce a strong and regular spark if the coil is functioning correctly.

If, after carrying out this examination, the trouble cannot be found, the equipment should be examined by the nearest Lucas Service Depot.

Misfiring and Bad Starting

Examine the high-tension cables and the plugs. If necessary adjust the gaps to the correct setting (20-25 thousandths of an inch); sooty or oiled plugs may be dismantled and washed out with petrol.

Remove the distributor moulding and see that the electrodes and contacts are clean. See that the contact gap setting is correct.

Maintenance of the Lucas Starting and Lighting System

Dynamo

THE dynamo is mounted on a platform at the front end of the engine, and forms part of the overhead-camshaft drive. It is arranged to give half its normal output whenever the charging switch is in the "Summer Half Charge" position, and its full output when the switch is in the "Winter Full Charge" position.

The dynamo requires but little attention ; there are a few components, however, which should be inspected occasionally to ensure satisfactory results. These parts are readily accessible by slackening the screw "C" (Fig. 2) and springing the cover "H" off the dynamo.

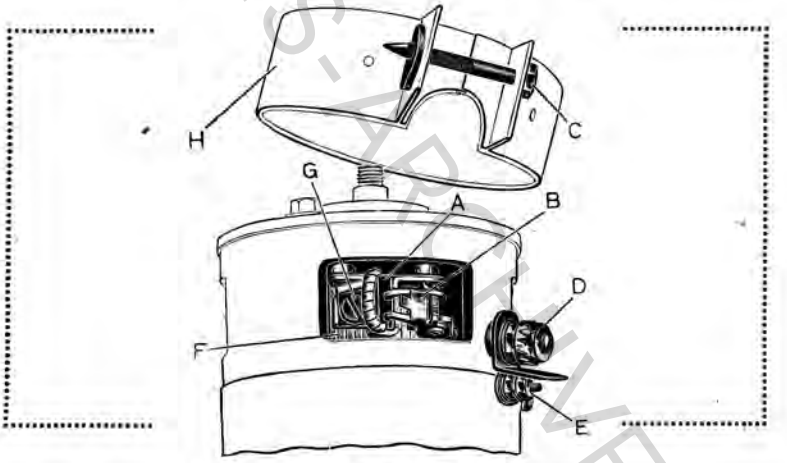


Fig. 2. Dynamo Type DDS5 with cover removed.

A—Brush.
B—Spring lever holding brush in position.
C—Cover clamping screw.
D—Positive terminal.
E—Shunt terminal.
F—Commutator surface.
G—Screw securing brush eyelet.
H—Cover.

Brushes

It is very important to make sure that the three brushes work freely in their holders. This can easily be ascertained by holding back the spring and gently pulling each flexible lead, when the brush should move without the slightest suggestion of sluggishness.

The brushes should be clean and should "bed" over the whole of their working surface ; that is to say, the face in contact with the commutator should appear uniformly polished. Dirty brushes may be cleaned with a cloth moistened with petrol.

If any of the brushes become so badly worn that it is necessary to replace them, this is accomplished by releasing the brush lead eyelet by removal of the screw "G," then, while holding the spring lever "B" back out of the way, withdrawing the brush from its holder. The new brush can then be fitted by reversing the operation.

When ordering brush replacements state whether they are main or control brushes, and for what type of machine they are required.

The brush springs should be inspected occasionally to see that they have sufficient tension to keep the brushes firmly pressed against the commutator when the machine is running. It is particularly necessary to keep this in mind when the brushes have been in use for a long time and are very much worn down.

Readers are cautioned that it is unwise to insert brushes of a grade other than that supplied with the machine, or to change the tension springs. The arrangement provided has been made only after many years' experience, and will be found to give the best results.

Commutator

The surface of the commutator should be kept clean and free from oil and brush dust, etc. ; neglect of this precaution will result in the commutator becoming blackened, causing sparking to occur at the brushes, and consequent shortening of the life of the machine. The best way to clean the commutator is to insert a fine duster, held by means of a suitably shaped piece of wood, against the commutator surface, slowly rotating the armature at the same time.

If the commutator has been neglected for long periods, it may need cleaning with fine glass paper, but this is more difficult to do, and should not be necessary if it has received regular attention.

Lubrication

As the bearings are packed with grease before leaving the Works, very little attention is needed. A few drops of oil, however, may be added through the lubricators provided, say, every 1000 miles. The reader is cautioned that far more trouble has been caused by excessive oiling than by too little.

After the car has run several thousand miles the dynamo should be cleaned, adjusted and the bearings re-packed with grease. This should be entrusted to the nearest Lucas Service Depot.

Starting Switch

The switch is extremely simple in construction, and as there are no working parts liable to get out of order, the contacts are permanently enclosed. Operate the switch firmly and quickly, both in switching on and releasing.

Starter Motor

The armature spindles of these machines are fitted with a pinion which, on rotation, runs into engagement with the geared ring on the flywheel. Immediately the engine begins to fire, the pinion is automatically thrown out of mesh.

If, for any reason, the pinion wheel on the motor does not engage with the flywheel teeth, examine the screwed sleeve on the armature spindle to see that it is free from dust ; if necessary, wash over with paraffin. Occasionally give it a few drops of thin machine oil.

As in the case of the dynamo, the surface of the commutator must be kept clean and free from oil, brush dust, etc.

In the unlikely event of the starter motor pinion becoming jammed in mesh with the flywheel, it can be freed on later models by turning the squared end of the starter shaft with a spanner.

The starter is designed for starting the engine under normal conditions, but any unnecessary or additional loading will considerably diminish the life of the machine and battery. In order to facilitate starting in cold weather, it is advisable to flood the carburetter, and, before using the electric starter, crank the engine over slowly by the starting handle for two or three revolutions ; this will break the oil film and considerably diminish the load for starting.

In the event of the engine refusing to fire after being turned by the starter, make sure that the ignition switch is " on."

Battery—Important Points

1. Keep the acid level $\frac{3}{4}$ in. above the top of the plates.
2. Add only distilled water ; never tap water.
3. Take frequent readings of the specific gravity by means of the hydrometer.
4. Do not allow the battery to remain discharged : if run down, through whatever cause, recharge at once.
5. Keep the terminals spanner-tight, and smeared with vaseline.

It is of the utmost importance that the battery should receive regular attention, as upon its good condition depends the satisfactory functioning of the ignition, starting motor, and the lamps.

At least once a month the vent plugs in the top of the battery should be removed, and the level of the acid solution examined. If necessary, distilled water (which can be obtained at all chemists and most garages) should be added to bring the level well above the plates If, however, acid solution has been spilled, it should be

replaced by a diluted sulphuric acid solution of specific gravity as recommended on the side or cover of the battery. *It is important, when examining the cells, that naked lights should not be held near the vents, on account of the possible danger of igniting the gas which is generated by the plates.* It is advisable to complete the inspection by measuring the specific gravity of the acid, 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; these can be bought from your Dealer or from any of the Lucas Service Depots.

Finally, see that the tops of the cells are clean and dry, and that the terminals are tight and smeared with vaseline.

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 injury to the plates.

Under no circumstances must the acid be removed from the battery and the plates allowed to dry, as certain changes take place which result in loss of efficiency.

Fig. 3. Syphon Hydrometer.

Instructions for Using the Lucas Syphon Hydrometer

Before measuring the specific gravity of the acid solution by means of the hydrometer, see that the acid is at its correct level. Readings should be taken after a run on the car, when the acid is thoroughly mixed. To assemble the hydrometer insert the float, thin end first, into the barrel, then wet the plug carrying the rubber tube and push it into position, and the instrument is ready for use. Hold the instrument vertically, compress the bulb and insert the red rubber tube as far as possible into the acid, then gradually lessen the pressure on the bulb until the acid solution rises in the barrel and lifts the hydrometer float about 1 in. Without removing the hydrometer from the cell, note the scale reading at the surface of the acid; this gives the density or specific gravity. Care must be taken that the stem of the float does not touch any part of the barrel or bulb while the reading is actually being taken.

Having taken the reading, return the acid solution to the cell and proceed to take readings for the other cells. All the readings should be approximately the same. If one cell gives a reading very different from the rest it may be that the acid has been spilled

or has been leaking away from this particular cell, or there may be a short between the plates. In the latter case we advise the owner to have his battery examined by a Service Depot to trace the cause and prevent the trouble from developing.

In a fully charged Lucas battery as fitted to the Morris Minor and Morris Family Eight cars, the specific gravity of the acid solution should be from 1.285 to 1.300. When half-discharged it will be about 1.215 and about 1.150 when fully discharged. These figures are given assuming the temperature of the solution to be about 60° F.

For fuller particulars regarding temperature corrections see the Lucas "First Charge" instructions, a copy of which can be obtained on application.

The battery must never be left in a fully discharged condition, and, unless some long runs are to be taken, it is advisable to have the battery removed from the car periodically and charged up from an independent electrical supply.

Lighting, Charging and Ignition Switches

These switches, which are incorporated in the instrument panel, control the ignition, the lamps, and the charging of the battery.

The ignition switch on the Morris Eight takes the form of a small key which fits in a slot in the centre of the lighting switch. When the ignition is switched off, the key can be withdrawn, thus ensuring the safety of the car in the absence of the owner. To switch on the ignition depress the key and turn it to the right; to switch off, turn it to the left.

On the Morris Minor the ignition switch is incorporated in the dynamo switch and the ignition is automatically switched on at the same time as the dynamo.

The switch positions are :—

"Summer Half Charge"—Dynamo giving about half its normal output.

"Winter Full Charge"—Dynamo giving its full output.

"Side"—Side and tail-lamps on.

"Head"—Head, side and tail-lamps on.

The dynamo automatically gives its full output when the lamps are switched on.

Use of the Charging Switch

The dynamo is arranged to give alternative outputs according to the position of the charging switch. In Summer, when the lamps are little used, the dynamo is arranged to give about half its normal output during daytime running. During the Winter, when the lighting and starting loads are heavier, it is intended that the charging switch should be kept in the "Winter" position, which allows the dynamo to give its full output. For the majority of cars this arrangement ensures that the battery is kept in a fully charged

state without the possibility of excessive overcharging, always providing the charging switch is kept in the appropriate position according to the season.

In exceptional cases, however, it may be advisable to modify the use of the switches. For instance, if in Winter the car is run regularly during the day with practically no night running, thus causing the battery always to be in a fully charged condition (hydrometer readings of 1.285 or over, see page 80) the charging switch should then be kept in the "half charge" position. On the other hand, if exceptional use is made of the lamps and starter in the Summer, thus causing the battery continually to be in a low state of charge (hydrometer readings of 1.200 or under) then the car should be run with the charging switch in the "full charge" position.

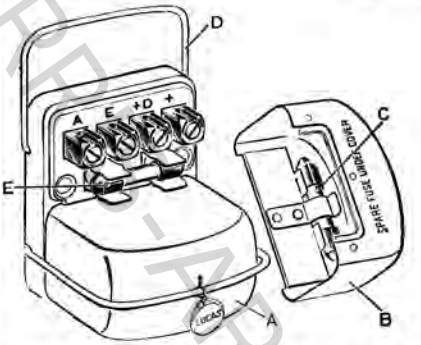


Fig. 4. Cut-out and Fuse.

A—Cover for cut-out.
B—Fuse cover.
C—Spare fuse.
D—Clip for securing fuse cover.
E—Fuse in auxiliary accessories circuits.

Intelligent use of the switch on the lines indicated will greatly prolong the life of the battery.

Ammeter

The centre-zero ammeter which is incorporated in the instrument panel indicates the actual current flowing into or out of the battery. For instance, suppose two amperes are consumed when the side- and tail-lamps are switched on, and the ignition coil takes one ampere, then if the dynamo is generating at seven amperes the meter will show four amperes on the charge side of the scale. This is the current in excess of the lamp and ignition load which is available for battery charging purposes.

Cut-out and Fuse (Types CF and CF3)

The cut-out and fuse are mounted on a common base, and the unit is mounted under the bonnet. The larger cover "A" (Fig. 4) protects the cut-out and the smaller one "B" the terminals and fuse. When the engine is running the cut-out automatically closes

the charging circuit as the increasing engine speed causes the dynamo voltage to rise above that of the battery. When the engine slows down and the dynamo voltage falls below that of the battery the reverse action takes place, i.e. the cut-out opens and thereby prevents the battery from discharging itself through the dynamo. *The cut-out does not switch off the dynamo when the battery is fully charged, and no such automatic device is provided with the equipment.* The cover "B" protecting the fuse holder terminals is removed by springing the retaining wire "C" to one side. The indication of a blown fuse will be the failing of the horn, or any other electrical accessory connected to the "+" and "E" terminals of the cut-out and fusebox. On the Morris Minor a fuse strip is employed to bridge the fuse terminals, and spare fuse strips are fitted to the terminal post. A blown fuse is immediately obvious. In the case of the Morris Family Eight remove the fuse from its holder and see if there is a break in the fuse wire ; a spare fuse is carried in the cover. Before replacing the fuse, inspect the units that have failed, for evidence of short circuits or other faults that may have caused the fuse to blow. If the fuse blows repeatedly and the cause cannot be traced, we advise that the equipment is examined by a Service Depot.

Headlamps (Morris Family Eight)

The headlamps are fitted with Lucas-Graves bulbs, which are special double-filament bulbs giving a normal driving beam or an anti-dazzle light according to the position of the change-over switch on the steering column.

It is of the utmost importance that the lamps should be set correctly in relation to the road, and we recommend that they be aligned so that the normal driving beams are projected straight ahead, i.e. the beams should be parallel to the road and to each other. It will be appreciated that if the lamps are out of alignment and are tilted upwards the anti-dazzle beam will be projected above the horizontal, thus defeating the object of the scheme.

The alignment of the lamps is very easily carried out, as they are fixed on a universal mounting which is locked by a single nut.

All Lucas-Graves bulbs have been carefully standardised and are strictly interchangeable in any lamp in which they are intended to be fitted. Thus all focussing devices have been eliminated, and the user is assured when fitting a replacement bulb that the filaments are in correct correlation to the reflector without tedious adjustment.

When ordering spare bulbs, specify Lucas-Graves type and state voltage and wattage.

To remove the front, slacken the fixing screw at the bottom of the lamp and swing it aside from the slot. The front can then be withdrawn. When replacing, press the front on to the lamp body, locating the top of the rim first. Finally, swing the screw into the slot and tighten it to lock the front in position.

To remove the reflector, should this ever become necessary, turn back the ends of the cork washer at the top of the reflector, taking care not to break it. This will expose a screw which should be removed, thus enabling the reflector to be withdrawn by turning it to the left.

Headlamps (Morris Minor)

The headlamps are provided with a patented universally adjustable mounting which allows the beam of light to be set to the best advantage. This adjustment is obtained by slackening the hexagon locking nut "A" (Fig. 5), turning the lamp to the desired position and then locking it by tightening up the nut.

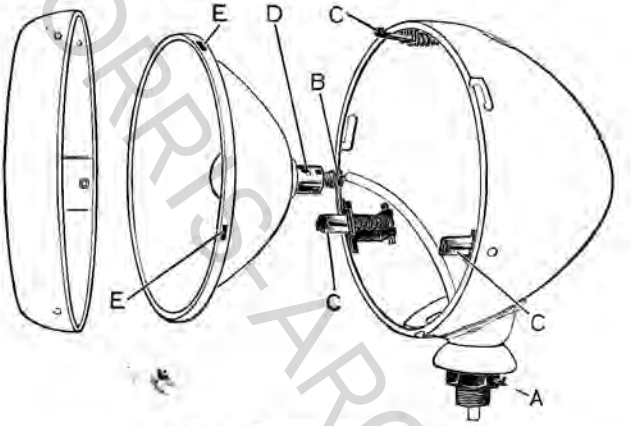


Fig. 5. Headlamp Dismantled.
A—Locking nut for adjustable mounting. C—Reflector supports.
B—Spring terminal. D—Focussing notches.
E—Slots.

To remove the front turn it to the left (looking at the front of the lamp) as far as possible and withdraw it from the lamp body. When replacing the front be sure it is turned to the right until it comes against the stop.

It is therefore essential that the filament should be approximately at the focus point of the reflector. In order to enable this position to be attained, the lamp holder is provided with three notches. By trying the bulb in the alternative positions it can be placed as near as possible to the correct focus and the best results obtained.

The best way of focussing and setting the lamp is to take the car on to a straight level road, try the bulb in each of the three notches, and then move the lamp on its adjustable mounting until the best road illumination is obtained.

Sidelamps (Morris Minor)

To remove a sidelamp front, turn it to the left and withdraw it from the lamp body.

With some models the front is secured by a screw. To enable the front to be removed, slacken the screw.

Cleaning Lamps

The efficiency of the headlamps depends not only upon the shape of the reflector but the quality of its surface. The reflectors are protected by a transparent and colourless coating, which enables any accidental finger marks to be readily removed with a chamois leather or soft cloth without affecting the surfaces of the reflectors. On no account should any metal polish be used on Lucas reflectors. If the ebony black finish of the lamp body becomes dull the original finish can be restored by cleaning with a good car polish.

Tail-lamp

To replace the tail-lamp bulb, turn the front portion of the tail-lamp to the left and withdraw it from its base. When replacing, see that the studs locate with the slots in the lamp front, then push it home to lock it in position.

Festoon Dashlamp (Morris Minor)

The cylindrical body of this type of lamp can be rotated to direct the light where required. The switch is incorporated in the body of the lamp. When it is necessary to replace the bulb, the body can be sprung outwards on its hinge, which will then permit detachment of the window portion of the lamp. The bulb holder is then readily accessible.

Dashlamp (Morris Eight)

The knurled head of the cover of this lamp operates as a switch : to switch on, turn it to the right.

The cover may be withdrawn from the body of the lamp for a bulb replacement. In refitting the cover, care should be taken that the projections inside the cover locate with the slot in the base of the lamp.

Replacement of Bulbs

When the replacement of any bulb is necessary we strongly advise that Lucas bulbs are used. The filaments are arranged to be in focus and give the best results with the lamps fitted.

MORRIS MINOR

Lamp.	*Bulb.*	*Volts.*	*Watts.*
Headlamp	Lucas B.A.S. No. 1S	6	12
Side- and tail-lamp ...	Lucas B.A.S. No. 8S	6	3
Festoon dashlamp ...	Lucas B.A.S. No. 8	6	3
Ignition warning lamp	Lucas screwed cap type	8–9	1.6

MORRIS FAMILY EIGHT

Lamp.	*Bulb.*	*Volts.*	*Watts.*
Headlamps	L.G.D. No. 612 ...	6	12–12
Side, tail and dash-lamps	B.A.S. No. 8S ...	6	3
Ignition warning lamp	M.E.S. No. 252 ...	2.5	.5

Screen Wiper (Morris Minor)

The type of wiper fitted is operated by suction from the induction pipe of the engine. To put the wiper in action move the control lever to the central position and then adjust the regulating valve until the speed of the cleaning arm is suitable for the weather conditions; the farther the valve is opened, the quicker will be the stroke of the cleaning arm. Once the valve is adjusted it should be unnecessary to alter the setting.

To stop the wiper simply move the control lever to the left, when the cleaning arm will be locked at the extreme right of its stroke, out of the driver's line of vision. Similarly it can be locked with the cleaning arm at the extreme left of its stroke by moving the control lever to the right. The cleaning arm will be securely locked in either position, and will not drop down through vibration. It is unnecessary to touch the regulating valve when the wiper is locked.

Should the wiper for any reason fail to operate automatically, a convenient hand lever is provided.

Two felt washers soaked in oil are provided inside the wiper body for lubricating the necessary parts, hence no provision is made for oiling, as it is not required.

Screen Wiper (Morris Family Eight)

The type of wiper fitted is operated by suction from the induction pipe of the engine. To put the wiper in action move the control lever to the left and then adjust the regulating valve until the speed of the cleaning arm is suitable for the weather conditions; the farther the valve is opened, the quicker will be the stroke of the cleaning arm. Once the valve is adjusted it should be unnecessary to alter the setting.

To stop the wiper simply move the control lever to the right, when the cleaning arm will be locked at the extreme right of its stroke, out of the driver's line of vision. The cleaning arm will be securely locked in this position, and will not drop down through vibration. It is unnecessary to touch the regulating valve when the wiper is locked.

Should the wiper for any reason fail to operate automatically, a convenient hand lever is provided.

A small screw is provided in the top of the wiper body. This should be removed about every six months and two drops of thin machine oil added through the screw hole. This is all the lubrication the wiper requires.

Lucas Sparton Horn

The note of this horn depends upon the rotation of the armature of a small electric motor.

Fixed to one end of the armature shaft is the actuator—a ratchet disc which presses against a stud mounted on the diaphragm. This causes the diaphragm to vibrate when the armature rotates, so producing the warning signal.

The quality of the note depends upon the speed at which the armature rotates, and consequently it is essential that the commutator and brushes are clean.

To obtain the best results from the horn we advise that it should be inspected very occasionally and the following instructions carefully carried out.

The commutator must be kept clean and *free from oil or grease.*

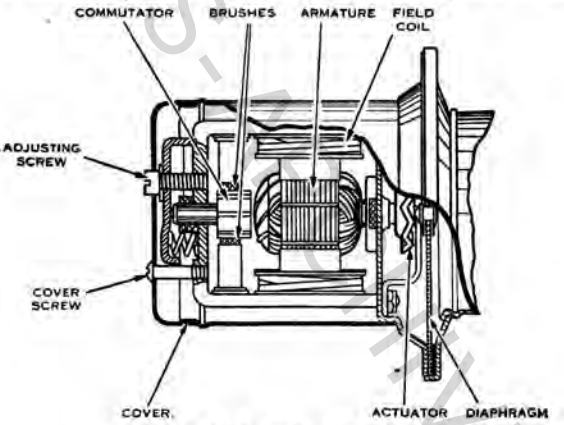


Fig. 5. Lucas Sparton Horn.

Unscrew the cover fixing screw and remove the cover.

Clean the commutator with a clean cloth. The cloth should be pressed against the commutator surface while the motor is set in motion by pressing the push.

Oil the armature bearings of the Morris Minor horn with a good quality oil such as that used for typewriters or sewing machines. The oil should be added to the felt washers at both ends of the armature until they are saturated.

The horn on the Morris Family Eight requires no lubrication as the bearings are packed with grease.

In order to adjust the tone of the horn the adjusting screw may be turned to the right or left as necessary by means of a screwdriver or coin. In the case of the Morris Family Eight horn this is done by means of the small lever which fits over the adjusting screw.

Turning to the right forces the armature towards the diaphragm, decreasing the clearance between the actuator and the diaphragm. This will increase the intensity of the tone.

Turning to the left increases the clearance between the actuator and the diaphragm, thus decreasing the sound intensity.

The best position for the adjusting screw can readily be found by trial.

It is important not to adjust too tightly, as in some circumstances the motor may fail to operate. The armature must always rotate easily when turned by the fingers.

Care must be taken that all bracket and cover screws are kept tightened.

If the horn fails to operate, first make certain that the trouble is not due to some outside source, e.g. discharged battery, a loose connection or a short circuit in the horn wiring.

Do not attempt to dismantle the horn; the only attention required is to clean and adjust in accordance with the foregoing instructions.

If, after giving the attention indicated, it still will not operate, we strongly advise the owner to call upon the nearest Lucas Service Depot, or, if this is not possible, to send the horn for attention.

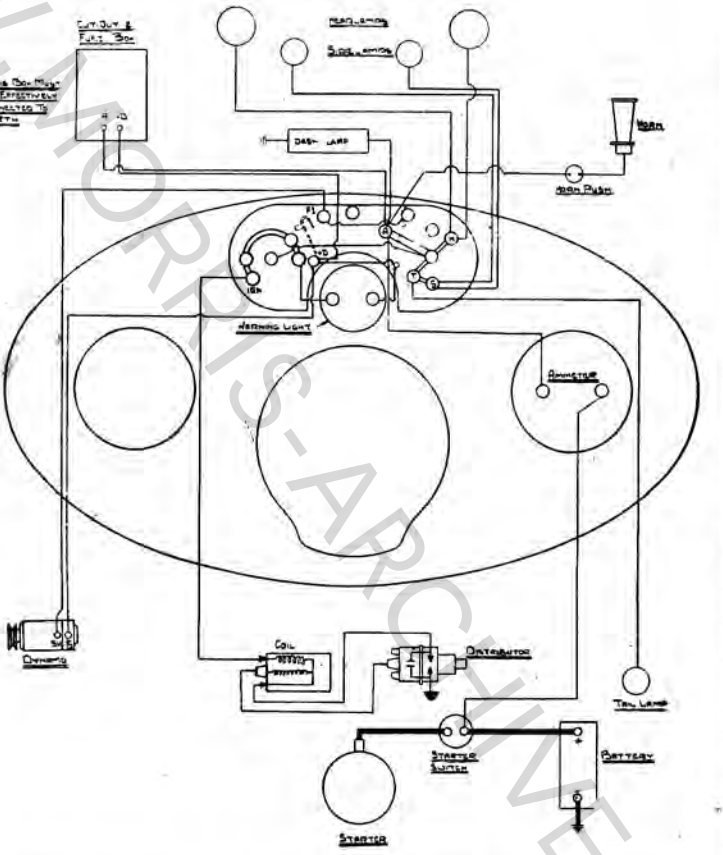
Service

Do not dismantle electrical apparatus needlessly. In the event of any difficulty Messrs. Lucas will be only too pleased to give every assistance possible. The best course to adopt is to call at the nearest Lucas Service Depot, the addresses of which are on page 89, when the equipment can be examined as a whole. The depots are not only at your disposal for repairs, overhauls and adjustments, but to give free advice. If it is necessary to communicate, however, or when ordering spare parts, always give the type and number of the unit in question, the make and, if possible, the date of the car on which it is fitted.

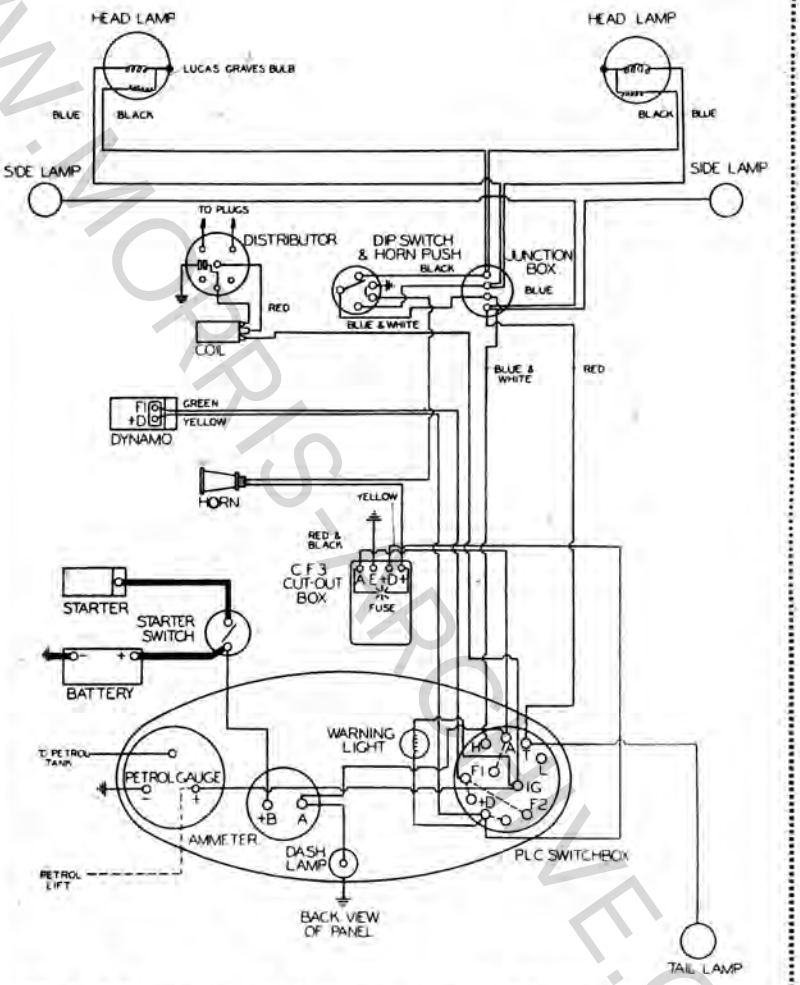
LUCAS SERVICE DEPOTS

BELFAST 3–5 Calvin St., Mount Pottinger	*Telegrams :* "Servdep, Belfast" *Telephone :* Belfast 7017
BIRMINGHAM, 18 Great Hampton Street.	*Telegrams :* "Lucas, Birmingham" *Telephone :* Central 8401 (10 lines)
BRIGHTON Old Shoreham Road, Hove.	*Telegrams :* "Luserv, Brighton" *Telephone :* Preston 3001 (4 lines)
BRISTOL 345 Bath Road.	*Telegrams :* "Kingly, Bristol" *Telephone :* Bristol 76001 (4 lines)
CARDIFF 54a Penarth Road.	*Telegrams :* "Lucas, Cardiff" *Telephone :* Cardiff 4603 (4 lines)
COVENTRY Priory Street.	*Telegrams :* "Lucas, Coventry" *Telephone :* Coventry 3068 & 3841
DUBLIN Portland Street North, North Circular Road.	*Telegrams :* "Luserv, Dublin" *Telephone :* Drumcondra 434 (6 lines)
EDINBURGH, 11 32 Stevenson Road, Gorgie.	*Telegrams :* "Luserv, Edinburgh" *Telephone :* Edinburgh 62921 (4 lines)
GLASGOW 227–229 St. George's Road.	*Telegrams :* "Lucas, Glasgow" *Telephone :* Douglas 3075 (5 lines)
LEEDS 64 Roseville Road.	*Telegrams :* "Luserdep, Leeds" *Telephone :* Leeds 28591 (5 lines)
LIVERPOOL 450–456 Edge Lane.	*Telegrams :* "Luserv, Liverpool" *Telephone :* Old Swan 1408 (4 lines)
LONDON Dordrecht Road, Acton Vale, W.3.	*Telegrams :* "Dynomagna, Act, London" *Telephone :* Shepherd's Bush 3160 (10 lines)
LONDON 759 High Road, Leyton, E.10.	*Telegrams :* "Luserdep, Walt, London" *Telephone :* Leytonstone 3361 (3 lines)
LONDON 155 Merton Rd., Wandsworth, S.W.18.	*Telegrams :* "Luserv, Wands, London" *Telephone :* Putney 5131 (6 lines) and 5501
MANCHESTER Talbot Road, Stretford.	*Telegrams :* "Lucas, Stretford" *Telephone :* Longford 1101 (5 lines)
NEWCASTLE-ON-TYNE, 2 64–66 St. Mary's Place.	*Telegrams :* "Motolite, Newcastle-on-Tyne" *Telephone :* Central 25571 (3 lines)

In addition there are Battery Service Agents in most centres.



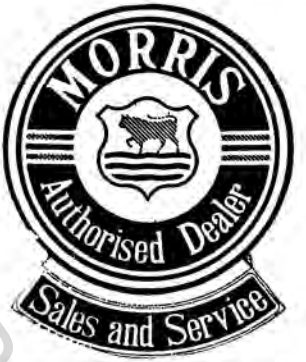
Wiring Diagram of the Lucas 6-volt Electric Starting and Lighting Equipment on the Morris Minor.



Wiring Diagram of the Lucas 6-volt Electric Lighting, Starting and Coil Ignition Equipment on the Morris Eight.

NOTE.—Colours indicate the coloured sleevings on the ends of the leads.

Morris Universal Service



Wherever you see this hanging sign you know that it denotes an establishment where Morris Service can be obtained.

THE pages of this *Manual* afford the opportunity of making contact with owners of Morris cars who have not been in direct communication with the Works, and a few simple points suggest themselves, by attention to which owners of Morris cars can receive prompt satisfaction on all Service matters.

The existence of the very comprehensive Morris Service Organisation is evidence of the Company's desire to ensure that its products give satisfaction. The present-day motorist, in addition to consideration of the actual specification of the car he purchases in relation to the price paid, expects, and rightly so, that the manufacturer's interest shall not cease on the completion of its purchase.

Definition of "Service"

The word "Service" is one which is nowadays interpreted widely. Perhaps it will be as well to explain, therefore, that with the exception of the usual "500-mile Service" and the keen interest of all concerned in the well-being of Morris products and those using them, Service is not necessarily gratuitous. Rather is it a measure of the ability of the organisation behind the car to foresee and meet all the normal requirements of Morris owners who require prompt and effective repairs, and the stocking of adequate supplies of genuine Morris parts for replacement purposes.

Morris Service in Every Centre

Whilst the Service Department at Cowley is the Headquarters of the Morris Service Organisation, it must be pointed out that our aim and object is to arrange that reliable service is available