1934 EDITION (HOME)

OPERATION MANUAL FOR THE MORRIS MINOR

IN WHICH IS INCLUDED:—

RUNNING
MAINTENANCE AND
ADJUSTMENT
INSTRUCTIONS

PRICE 1/6

OPERATION MANUAL

FOR THE

MORRIS MINOR CAR

1934 EDITION

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

ENGINE AND CHASSIS NUMBERS

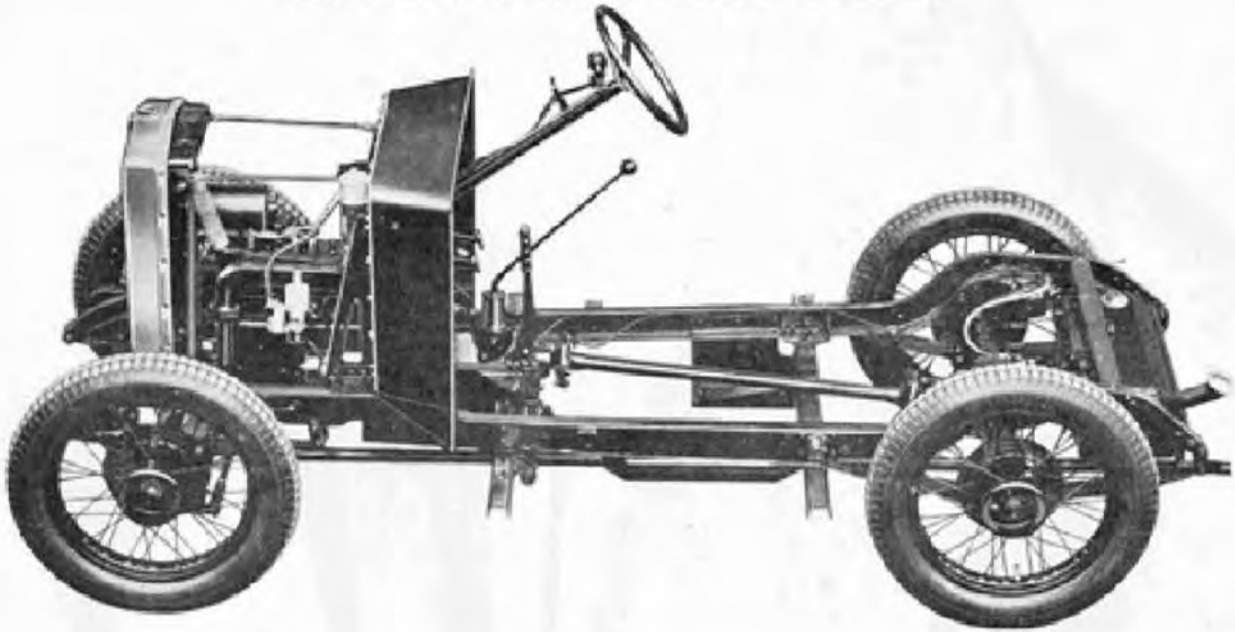
The engine and chassis numbers of the Morris Minor car are located on a brass plate on the dash, under the bonnet.

Please remember this in case you :—

(a) Write to our Service Department, or

(b) Want to take your car abroad.

THE 1934 MORRIS MINOR CHASSIS



FOREWORD

IN the compilation of this book an attempt has been made to give in a concise form all the information normally required for the efficient management and upkeep of Morris Minor cars, and to give instruction on how to effect those minor but all-important operations that mean so very much to the operation of the car and to the satisfaction of the owner. It must be remembered, however, that in a book of this nature it is impossible to deal in full with every aspect of car maintenance and that this publication is confined to essentials.

We know that every Morris Minor car that leaves our Works can give absolute satisfaction. In case of trouble, first study this *Operation Manual*; then, if still puzzled, write to your Dealer or the Works. We are yours to command, and have a well-organised Information Bureau at your complete disposal.

MORRIS MOTORS LTD., COWLEY, OXFORD, ENGLAND

General Hints on Driving

FILLING UP

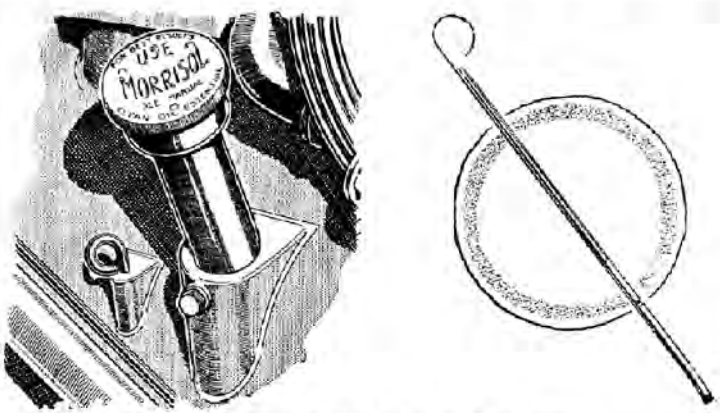
(1) PETROL.

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 on the dial gauge on the instrument panel when the ignition is switched on. The tank capacity of the Morris Minor is approximately five gallons.

Any good quality petrol as sold to-day will give satisfactory running. Morris Minor cars are tuned up at the Works on Shell petrol, and the carburetter is set to give maximum results from any No. 1 grade petrol, benzole mixture or alcohol mixture.

(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 oil filler and graduated dipper rod on the Morris Minor.

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.

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 advise, and indeed urge, the use of Morrisol "Sirrom" (Regd.) Brand for use in the Morris Minor engine (see page 50).

(3) WATER

To ensure proper functioning of the cooling system 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.

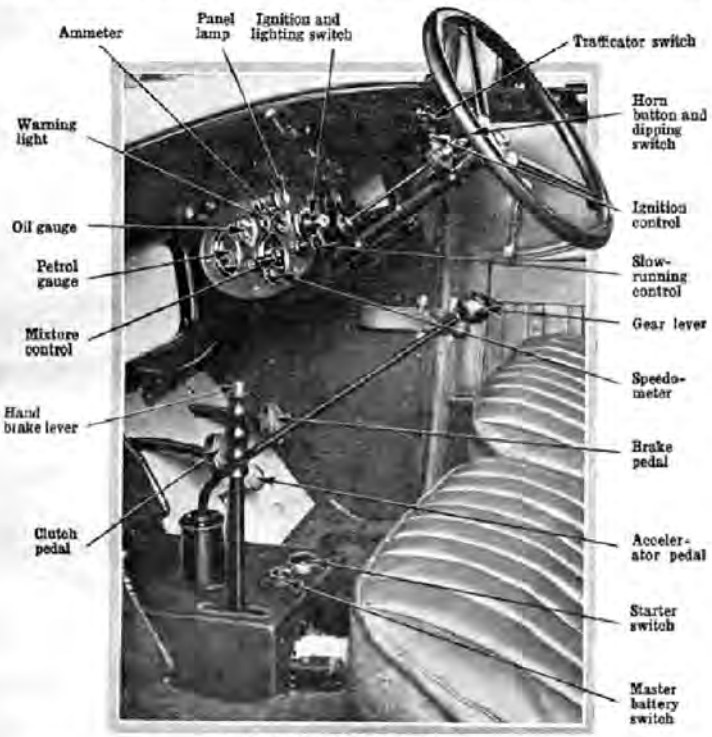
IMPORTANT TO THE NEW OWNER

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.

AN INDEX AND OILING CHART are provided for your convenience at the end of this book.

CONTROLS

On the Morris Minor car every necessary control is provided. In the centre of the car will be found two levers, one plain and ending in a round black knob, which is the gear lever, and to its left a lever with a ratchet handle—the hand brake lever. The hand brake lever pulls back to apply the brake and will stay on until released, which is achieved by pulling on the lever to take the weight of the pull and pressing the ratchet release button on the top of the lever. Projecting through the floorboards on the right of the car will be found three pedals, two with oval heads of similar size, and in the centre of these a smaller one with circular

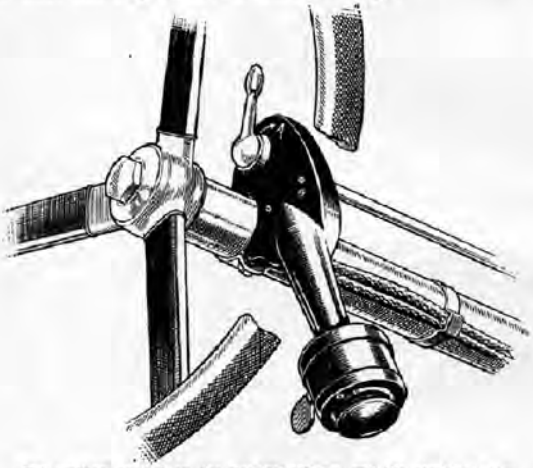


The controls of the Morris Minor.

head. These from right to left are the foot brake, accelerator pedal, and the clutch. In the centre of the car next to the gear lever will be found two round black knobs. One is the rotary master battery switch for isolating the battery on emergency should a short in the wiring or some similar trouble occur. *It should never be operated under normal conditions while the engine is running.* The other controls the switch which operates the electric engine starter. This latter knob should be operated smartly at all times and should be released immediately the engine fires.

Mixture Control

On the left of the instrument panel will be found a 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. When starting and getting away from cold, this knob should be pulled out as far as it will come, *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. As soon as the engine is under way this knob should be pushed inwards as far as it is possible without causing the engine to splutter or run with hesitation. The control is spring-loaded to ensure its return to the "weak" position. 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 pushed right in, it is probable that the engine is not warm enough.



The ignition control on the steering column, and the combined horn button and dimming switch for the headlamps which is conveniently situated close to the driver's right hand.

Slow-running Control

Another projecting knob will be found to the right of the instrument panel. 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 decreases the engine speed; turning it to the left increases the engine speed. It should be set so that the engine idles over easily and not too fast, and is intended only to control the slow running when the engine is cold. Slow running when the engine is warm should be controlled by the correct setting of the carburetter (see page 38).

Switches

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.

The rest of the switch scarcely needs explanation. When the pointer coincides with the word "Side," it means that the side-lamps (low-power bulbs) and tail-lamp are alight. When it coincides with the word "Head," it means that the headlamps (high-power bulbs) and tail-lamp are alight.

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.

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. Care should be taken not to lose the key.

Switching on the ignition also switches on the electric petrol pressure pump, and the electric petrol gauge will now register the tank contents.

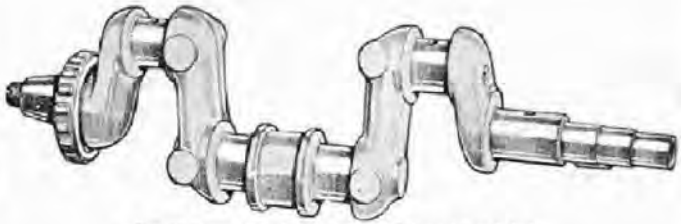
In the centre of the panel is a red indicator light. When the dynamo output is insufficient to supply the needs of the ignition system, the red light appears, indicating that current is being drawn for ignition purposes from the battery. *Under no circumstances should the engine be left idling or stationary 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

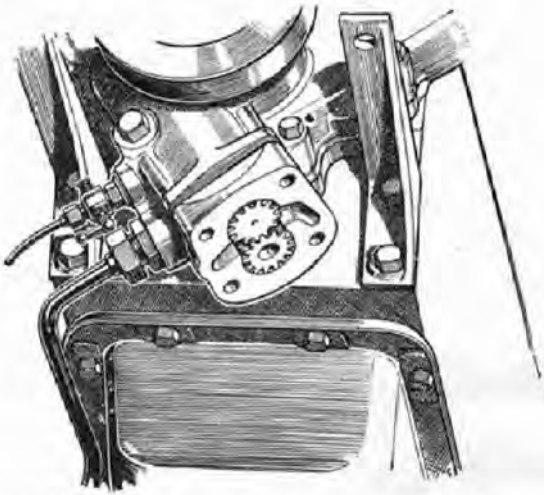
On the left of the steering column will be found a small lever. This controls the advance and retard of the ignition. Generally speaking, when the engine is running slowly or when it is being started the ignition should be retarded—that is, the lever should be pulled back. When the engine is running fast, and for normal running, the lever should be pushed right forward, 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 normally provided on the standard Morris Minor indicate to the driver everything he really needs to know,



Here is shown the sturdy and well-balanced crankshaft.



The accessible gear-type oil pump is carried low down to avoid priming troubles.

The camshaft is of generous dimensions and carried on ball and roller bearings.

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. To the right of 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 dynamo and ignition switch is turned to the "Winter" 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 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). To the left of the panel near the centre is the oil gauge which gives indication of the pressure of the oil being fed to the engine. It should indicate a pressure of approximately 60 lb. when the engine is warm (see page 51).

The remaining instrument is the electric petrol gauge, which gives indication of the petrol tank contents. It should be noted that it only registers when the ignition is switched on.

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 key in the switch on the switchboard clockwise. Pull the mixture control knob, at the left of the instrument panel, right out and screw up the slow-running control knob a turn or so.

Press the engine starting switch in the centre of the floorboard next the gear lever. The engine will start revolving and after a second or two should fire; the starter switch should then be immediately released. *With a new car in cold weather it is helpful to swing the starting handle with the ignition switch off before using the electric starter.* 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 with a new stiff engine, or in very cold weather. The method adopted of starting new stiff 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

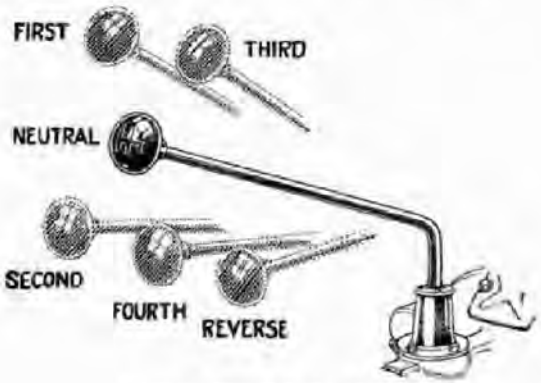
After getting into the car, press the left (or clutch) pedal down and keep it there for a few seconds, with the engine running slowly. The clutch is thereby released and the gear lever may then be swung to the left and forward, which will engage the first or low-speed gear.

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 gentle pressure of the foot on the accelerator pedal. The car will 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 straight back, when the second-speed gear will be engaged. The clutch pedal should now again be gradually released.

To change into third speed repeat the foregoing operation, but bring the gear lever back to the neutral position and then forward to the right-hand side slowly to give the synchromesh time to operate effectively.



The gear positions of the 4-speed gearbox.

To change into fourth speed, or top, again repeat the foregoing instructions, but bring the gear lever straight back slowly.

Third and fourth gears are fitted with the synchromesh device, which greatly facilitates their engagement.

The reverse position is towards the rear on the extreme right side. Care should be exercised when changing from third speed into top to avoid pushing the gear lever into the reverse, as this will result in setting up a tremendous strain on the gear wheels, and might cause a serious breakdown. This is guarded against by a spring, the tension of which has to be overcome before the lever can be moved across the gate in line with the reverse position.

General Advice on Gear Changing

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. *When undue resistance is felt on engaging the synchromesh gears (third and fourth), don't force the lever. Push it back into neutral and try again.*

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 diagrams herewith clearly illustrate the positions of the gear lever for the different speeds.

Study the illustrations carefully before attempting the operation on the car.

When changing gear upwards from first to second, 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.

Third and top gears being fitted with synchromesh control go into engagement without special care on the part of the driver in the matter of relative engine speed, and the engagement of these gears is therefore a simple matter. The same remarks apply to changing down from top to third.

When changing down from third 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 in such cases, 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 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 has 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 hydraulically on drums fitted to the front and back wheels. This foot brake will generally be found the handiest to use. For emergency and parking an additional hand-operated brake is provided which operates on the rear wheels by cables.

Descending Steep Hills

On approaching a hill which is known to be steep, slow down the car and engage third or second gear before the descent is begun. The foot can then be removed from the accelerator and the clutch left in engagement. This will enable the engine to function as a brake, leaving the foot brake for additional braking and emergency. When using the engine as a brake it is inadvisable to switch off the ignition, as this is liable to cause the plugs to become oiled up.

DON'T :—Attempt to force the gears into mesh. If they do not engage easily, start again from the neutral position.

DON'T :—Imagine that the synchromesh is provided to enable you to make ultra rapid changes. It must be operated reasonably slowly to give it time to level up the gear wheel speeds, and is mainly designed to give *quiet* changes.

WHEN IN COMMUNICATION WITH THE WORKS

The Address is : *Morris Motors Ltd.*
Cowley, Oxford
England

The Telegraphic Address is :
"Voiturette, Telex, Cowley Oxford," England

The Telephone Number is :
7101 *Cowley, Oxford, England*

The Telex Number is :
Oxford Telex 3622

When writing ALWAYS quote model, engine and chassis numbers, and sign your name legibly

GENERAL CARE OF THE CAR

New Engines

When the car is given its first run it will be noticed that power is lacking. This will continue for the first 150 to 200 miles. The reason for this is that the engine is stiff on account of the bearings being a very accurate fit. As the car is further used, however, this lack of power will gradually disappear as the bearings are being run in. There will be a progressive improvement in the engine and the car generally for the first 1000 miles if proper care is exercised. It is a great mistake to drive a new car fast. Hard pulling on full throttle, such as when going uphill, is bad for a new engine. Liberal use of the gearbox should be made. A new engine should not be fully extended, although so long as reasonable care is exercised no harm need be anticipated.

For the first 200 miles 30 m.p.h. must not be exceeded in top gear, 24 m.p.h. in third gear, 16 m.p.h. in second gear or 10 m.p.h. in bottom gear. In addition, the engine should never be raced when cold.

New engines should be given frequent attention during the first 500 miles if they are to be ensured a long and satisfactory life. At the conclusion of the first 250 miles the tappet clearances should be checked and the tappets adjusted if necessary. The cylinder head stud nuts should also be tightened after the first 250 miles. The oil should be drained, the oil filter should thoroughly be cleaned, and the engine refilled with clean oil at the end of the first 500 miles. Articles on correct car driving are regular features of *The* MORRIS *Owner*, obtainable from any newsagent or Morris Dealer.

Wings

Wings are stove enamelled and should not be dusted with a dry duster, but always washed down with plenty of water. No attempt should be made to remove tar spots by the use of benzole or a similar medium, but use should be made of one of the special preparations obtainable for the purpose. After they have been well washed down with hose and sponge, all beads of water remaining should carefully be cleaned off with a chamois leather.

Chromium Finish

The introduction of chromium finish has greatly reduced the labour previously entailed in cleaning the bright portions of the car. The chromium-finished parts of the Morris Minor should on no account be cleaned by the use of metal polishes (all of which contain a certain amount of abrasive matter), but by the simple expedient of washing the parts with plenty of water and, when the dirt has been removed, polishing the surface with a clean dry cloth or with chamois leather, until bright. In short, chromium

finish should be treated in precisely the same way as coachwork and no special polish of any description is necessary.

Where the chromium finish has become badly tarnished it should be cleaned with soap and a flannel.

Coachwork

Door Hinges: Inspect screws holding hinges to body pillars and to door pillars after 1000 miles and give each screw half a turn with a screwdriver if necessary. Inspect these occasionally during the life of car.

Body Bolts: Tighten bolts holding the body to the chassis frame after the body has settled, say after 500 miles.

Radiator and Cooling System

It is of some importance that the radiator be filled only with clean rain water. The use of hard water for this purpose results in the deposit of the impurities which it contains on the surface of the water passages of the cooling system, reducing its efficiency. It is therefore advisable to flush out the cooling system approximately every six months.

Frosty Weather

If the car is not stored in a warmed building, steps must be taken to prevent the cooling water from freezing during frosty weather. Water upon freezing expands, with the result that there is a very considerable risk of bursting either the radiator or the cylinder block by the pressure generated. As a precautionary measure when frost is anticipated, the water should be drawn from the radiator before the car is stored for the night. When refilling in the morning it is of advantage to use warm water, firstly because it facilitates starting, and, secondly, it is more free from those impurities which form deposits in the cooling system.

Anti-freezing solutions may be used in the radiator to overcome severe climatic conditions.

We recommend owners to use Smith's "Bluecol" non-corrosive anti-freeze in order to protect the cooling system during frosty weather and reduce corrosion to a minimum.

Drain sufficient water away and replace by "Bluecol." If this is attended to, particularly when the car is new, corrosion will be checked and result in a clean cooling system.

The recommended "Bluecol" size for Morris Minor cars is No. 1A size.

With this anti-freeze in the cooling water it is unnecessary to drain the system, even in the coldest weather, and one filling lasts the whole Winter.

"Bluecol" does not evaporate—therefore it is only necessary to top-up in the usual manner.

"Zero" anti-freeze may be used, if preferred, the correct amount for the Morris Minor is the No. 1 size container.

The Springs

The spring clips which secure the front and rear springs to the axles should be examined periodically to see that they are bolted up tight. It is essential, particularly when the car is new, to test the nuts on these clips to ensure that no slackness has taken place. The majority of spring failures are traceable to the fact that slackness has occurred at these points and has not been attended to.

THE FLOAT-ON-AIR SEAT INTERIORS

Their Correct Inflation

To obtain the maximum comfort from the Moseley Float-on-Air seat interiors fitted to the seats of Morris Minor models it is essential that they be inflated to the correct pressure. Too high a pressure does not enable the interior to protect the passenger from shock in the manner intended.

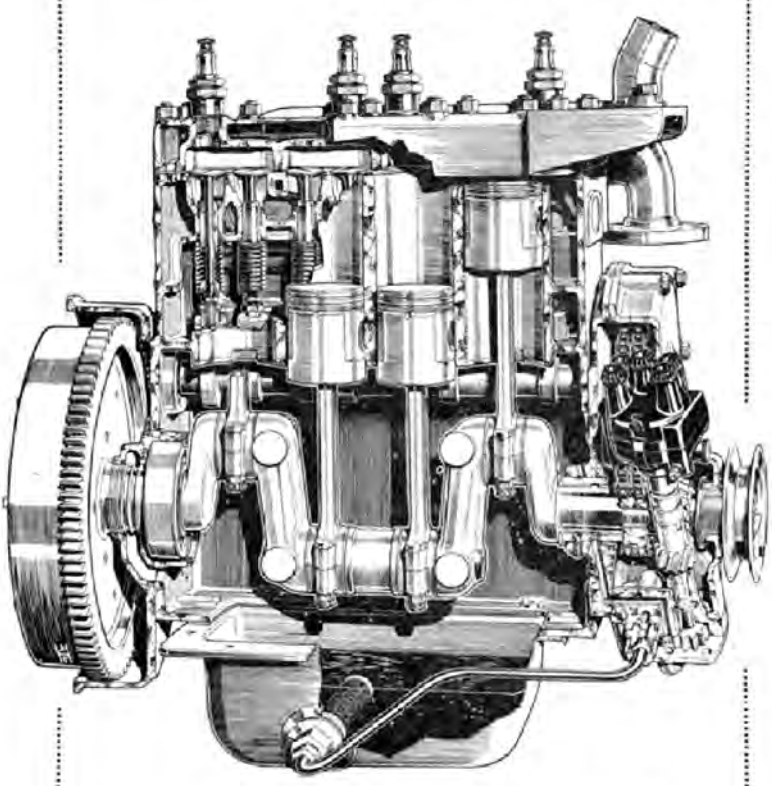
The Moseley Float-on-Air cushion requires but a relatively low pressure and should be blown up so that the frame—or base—of the seat can be felt when the closed fist is pushed into the centre of the seat cushion. This is the ideal pressure and gives the most comfortable support to the occupant.

The air pressure is very easily adjusted by means of the valves situated beneath the protecting flap at the rear of the cushion. The valves at the side inflate the "butt-ended portion" running round the sides and front, and these will stand slightly more pressure than the centre or seat interior. The remaining valves serve to inflate the centre portion.

The valves are provided with two protruding tapes which form a finger-hold by means of which the valves may gently be withdrawn from their telescopic sockets in the interior. Pull *gently* on these tapes until about 1 in. of valve is protruding, which will reveal a stout rubber ring encircling the valve stem. On no account must the valve be pulled inside out. Roll this ring down the stem towards the cushion, thus releasing the valve plug, which can now be removed. On no account roll back the valve stem.

The air pressure can now be adjusted by releasing air or blowing up the interior with the mouth, as required. When the desired pressure has been attained the valve is sealed by moistening the plug and reinserting it into the valve stem as far as it will go. The rubber ring is then rolled back into its original position close to the head of the plug, thus effectively sealing the stem. The valve stem should now be pushed back into its socket as far as it will go, i.e. with the domed head flush with the surface of the cushion interior. You may then refasten the cushion flap giving access to the interior.

THE MORRIS MINOR ENGINE



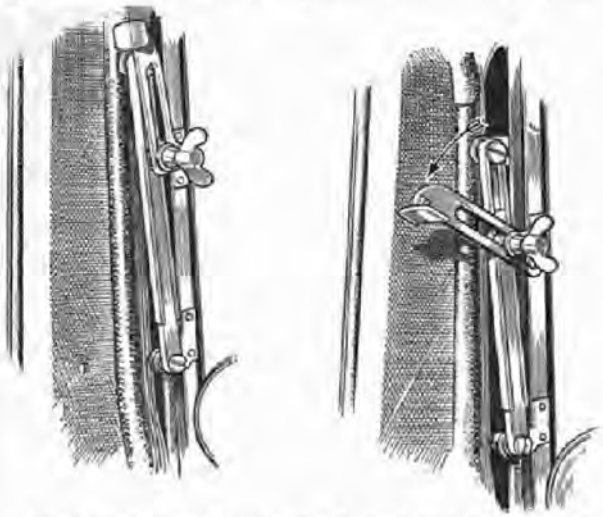
This sectional illustration of the Morris Minor engine clearly shows all its essential features and indicates the simplicity and thoroughness of the design.

Adjustments

Windscreen

THE single-panel windscreen fitted to the Morris Minor saloon models is provided on either side with adjustable guides.

The guides have a thumb lever with a slot at its inner end so shaped that when the lever is pushed into a vertical position the



The windscreen cannot be opened until the thumb levers have been pulled down in the direction of the arrow into the position shown.

windscreen is firmly 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 rearwards by hand into their free position,* which will release the windscreen.

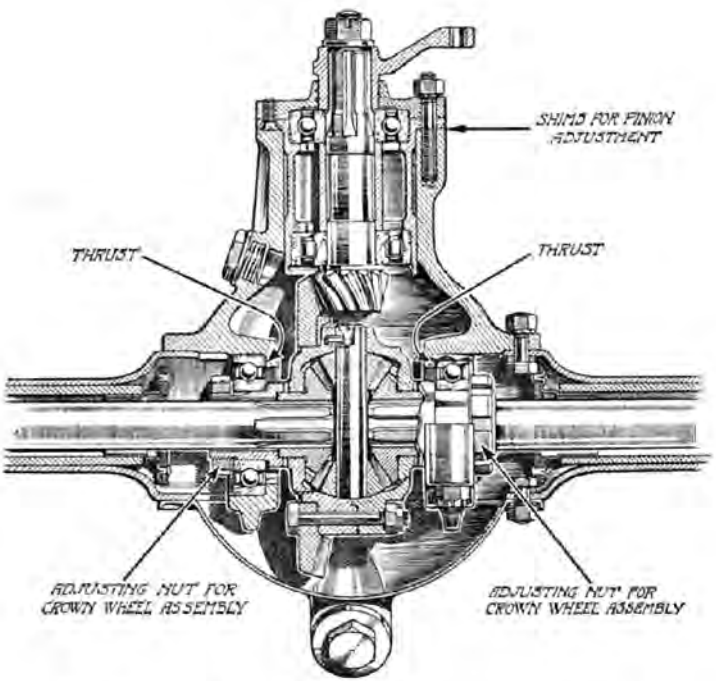
Brakes (see page 31)

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-drums have been removed. If the brake linings require attention, access to them is attained in the way detailed on page 34.

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.

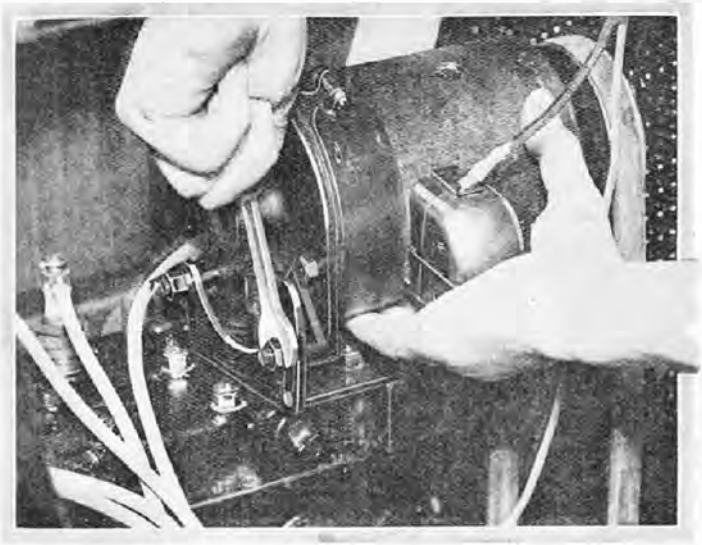


The assembly of the Morris Minor rear axle, showing the disposition of its components.

The Dynamo and Fan Driving Belt

The dynamo and fan belt should be kept fairly taut and adjusted from time to time by moving the dynamo cradle so as to take up the slack. To do this loosen the four clamping screws, when the cradle will be released and can be reset by pulling on the dynamo

upwards, against the tension of the belt, and locking it in the new position. *Care should be taken not to over-tighten the belt, or undue strain will be thrown on the dynamo bearings. Only a light pull with the hand on the dynamo is needed.*



The fan belt tension is adjusted by slackening the dynamo fixing nuts while supporting the dynamo with the other hand.

Valve Tappets

The tappet clearance should be set to .004 in. when the engine is hot.

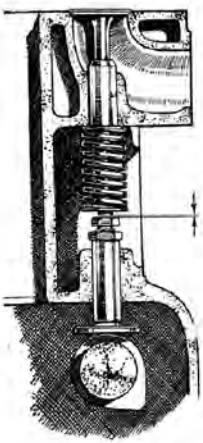
The correct clearance is clearly indicated on the plate on the valve chamber cover.

When the valves are ground the tappet 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 tappet clearance. In order to maintain good tune over long periods it is *imperative* to set the tappet clearance after a valve-grinding operation to the amount indicated above carefully.

Adjustment of the valve clearance is easily and quickly effected by holding the flat on the head of the tappet by the thin spanner provided, and slacking off the steel lock nut bearing on it with the $\frac{1}{4}$ in. spanner. Rotation of the hexagon tappet screw in one direction

or the other, by means of the other special tappet spanner, will then enable the operator accurately to set the clearance. When the correct clearance has been obtained the tappet screw must be relocked to the tappet by tightening up the steel lock nut. While tightening up this nut it is of course essential not to disturb the position of the tappet screw which has just been reset, and it should be held in position, by the spanner provided, during the relocking operation.



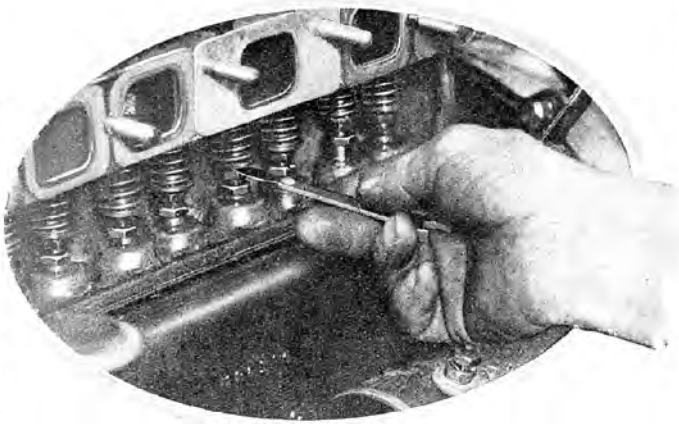
The tappets should be set to their correct clearance. A gauge of the correct thickness is attached to one of the two special tappet spanners.

It is of importance to note while the clearance is being set that the tappet of the valve being operated on is bearing on that portion of the cam which is concentric with the camshaft.

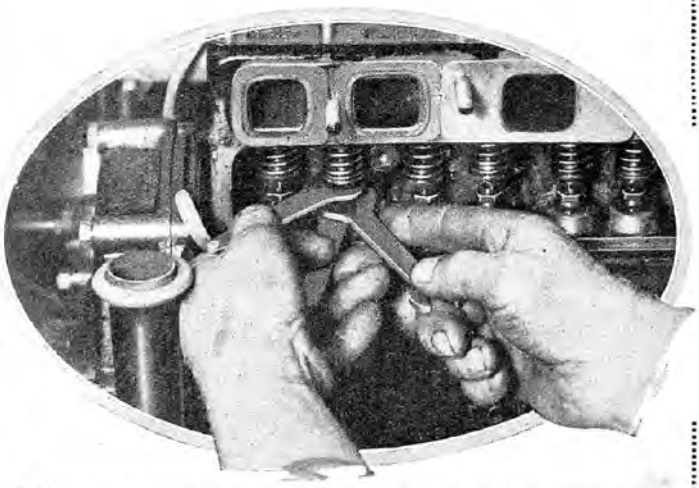
Once it is realised that the pistons of Nos. 1 and 4 cylinders and Nos. 2 and 3 cylinders move in unison and that while the valve of one is fully open the corresponding valve of the other is fully closed, no difficulty will be experienced in ensuring this, since it is only necessary to rotate the engine by the starting handle until the corresponding valve belonging to the other cylinder paired with it is fully open. To assist the owner, the correct sequence of adjustment to ensure the minimum rotation of the engine is here tabulated :—

Set	No.	1	tappet	with	No.	8	valve	fully	open.
"	"	3	"	"	"	6	"	"	"
"	"	5	"	"	"	4	"	"	"
"	"	2	"	"	"	7	"	"	"
"	"	8	"	"	"	1	"	"	"
"	"	6	"	"	"	3	"	"	"
"	"	4	"	"	"	5	"	"	"
"	"	7	"	"	"	2	"	"	"

THE VALVE TAPPETS



Testing the valve clearance with the feeler gauge attached to the tappet spanner.



Tightening up the tappets after setting. The tappet stem and tappet screw should be held in position by the special tappet spanners while the tappet lock nut is firmly tightened with the appropriate double-ended spanner from the tool kit.

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 Minor 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.

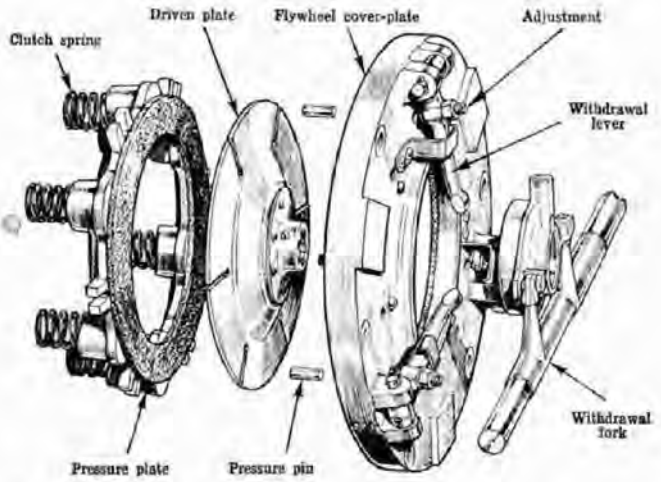
The correct working clearance between the big-end bearing and the crankshaft journal is rather larger than was accepted practice a few years back, and is such that an appreciable rocking is present in the bearing when it is in an unlubricated state. The correct clearance is automatically allowed for 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.

Every facility is given the owner for obtaining replacement rods at the bare cost of reconditioning his old ones under the Morris Service Scheme by every Morris Dealer.

Clutch

The clutch is intended to 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 ascertain the cause. Since this entails the removal of the gearbox and expert diagnosis you are advised to entrust this work to your nearest authorised Morris Dealer.



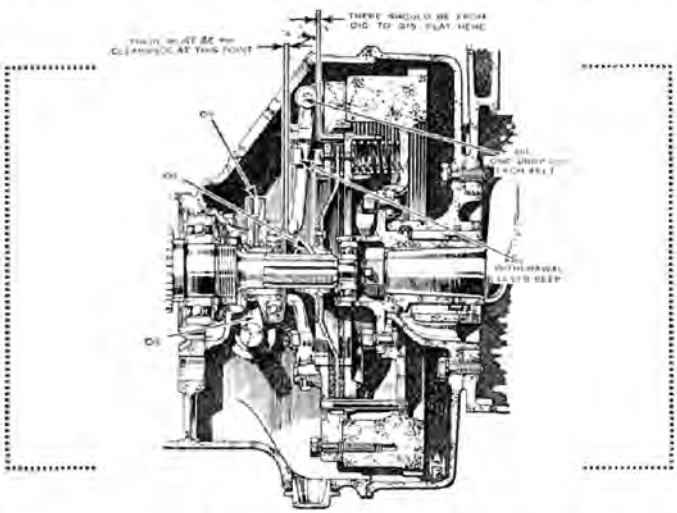
The component parts of the Morris Minor clutch separated to show their construction.

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.

Morris Minor clutches are correctly adjusted at the Works before the car is delivered. In the early life of the car, however, a certain amount of bedding down of the friction surfaces 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, 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.

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



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

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 $\frac{1}{32}$ 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 between their inner ends and the face of the clutch withdrawal race.*

Any clean piece of strip metal $\frac{3}{32}$ inch thick can be inserted and used as a gauge between the two to ensure correct adjustment.

There should now be a clearance of at least .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

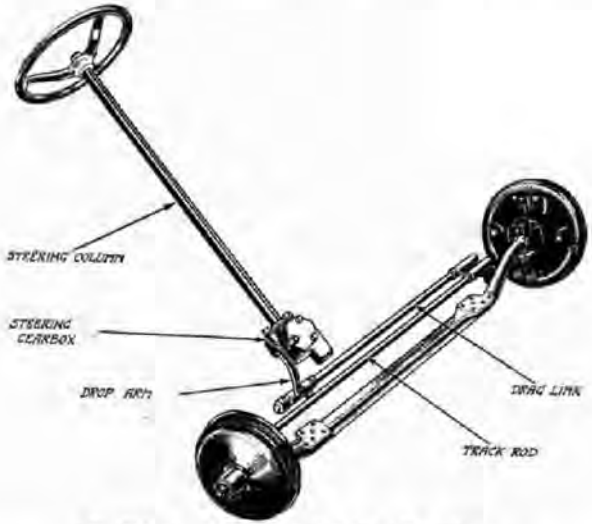
and their pressure pins when the clearances at the ends of the withdrawal levers are correctly set, the withdrawal lever restraining springs should be gently opened out with a screwdriver.

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.

Steering Gear

The presence of stiffness in the steering gear can be ascertained by jacking the front axle, so that both the front wheels are clear of the ground, and rotating the steering wheel.

If stiffness exists, disconnect the rear end of the draglink from the steering drop arm. It will then be an easy matter to locate if the stiffness is due to the wheel mounting and steering connections or whether it is due to stiffness in the steering column and steering gearbox assembly.



The Bishop cam steering gear fitted to the Morris Minor.

Slackness in the steering column assembly is due either to excessive clearance between the cam and the hardened end of the rocker-shaft, or end play in the steering column mounting.

The presence of end play on the steering column is easily felt by lifting the steering wheel in line with the column itself. Any appreciable motion in this direction needs rectification inside the

steering gearbox—a procedure which should be entrusted to a competent Morris Dealer.

If slackness is due to lost motion between the cam and the end of the rocker-shaft this may be rectified by removing the top cover-plate and removing one or more of the thin brass shims to be found between this cover-plate and the main casing. The cam gear is made so that there is no appreciable backlash at the bottom of the drop arm *when the gear is in the mid position.*

When reconnecting the drop arm to the gearbox spindle, care should be taken to see that the drop arm is in its correct position, permitting full lock in both directions, the wheel stub axles coming into contact with the stops provided on the axle beam in either direction.

Heavy Steering

Heavy steering and excessive front tyre wear are frequently caused by faulty wheel tracking. The length of the track rod should be such that the distance between the forward inside edges of the wheel rims measures $\frac{1}{8}$ inch less than does the distance between the rear inside edges. Care must be used in measuring to ensure that the measurements are taken at axle level above the ground and that the rims run true. These measurements might with advantage be tried if at any time the car has a tendency to steer badly.

Correct setting of the front wheels entails the use of a wheel alignment gauge, and the owner is therefore advised to entrust this work to an authorised Morris Dealer, who has the necessary equipment to carry it out properly.

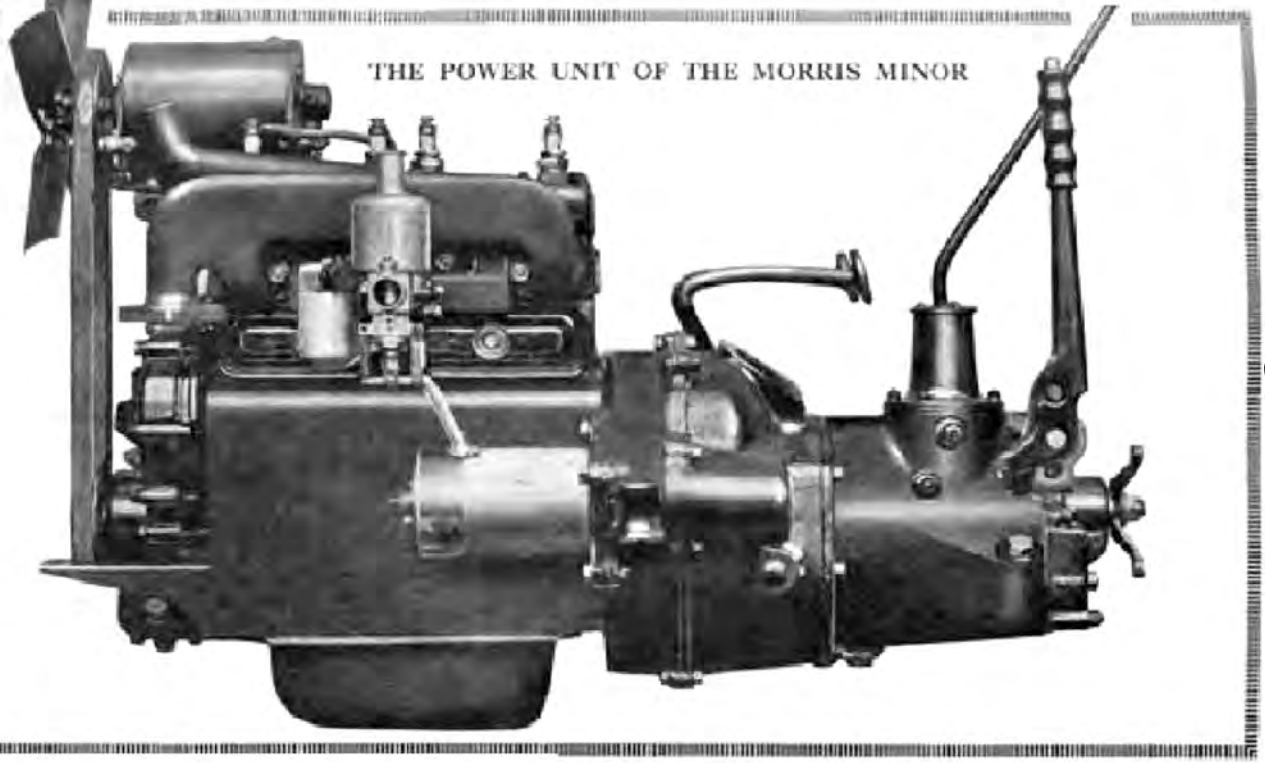
WHEN IN COMMUNICATION WITH THE WORKS

The Address is: *Morris Motors Ltd.*
Cowley, Oxford
England

The Telegraphic Address is:
"Voiturette," Cowley, Oxford
England

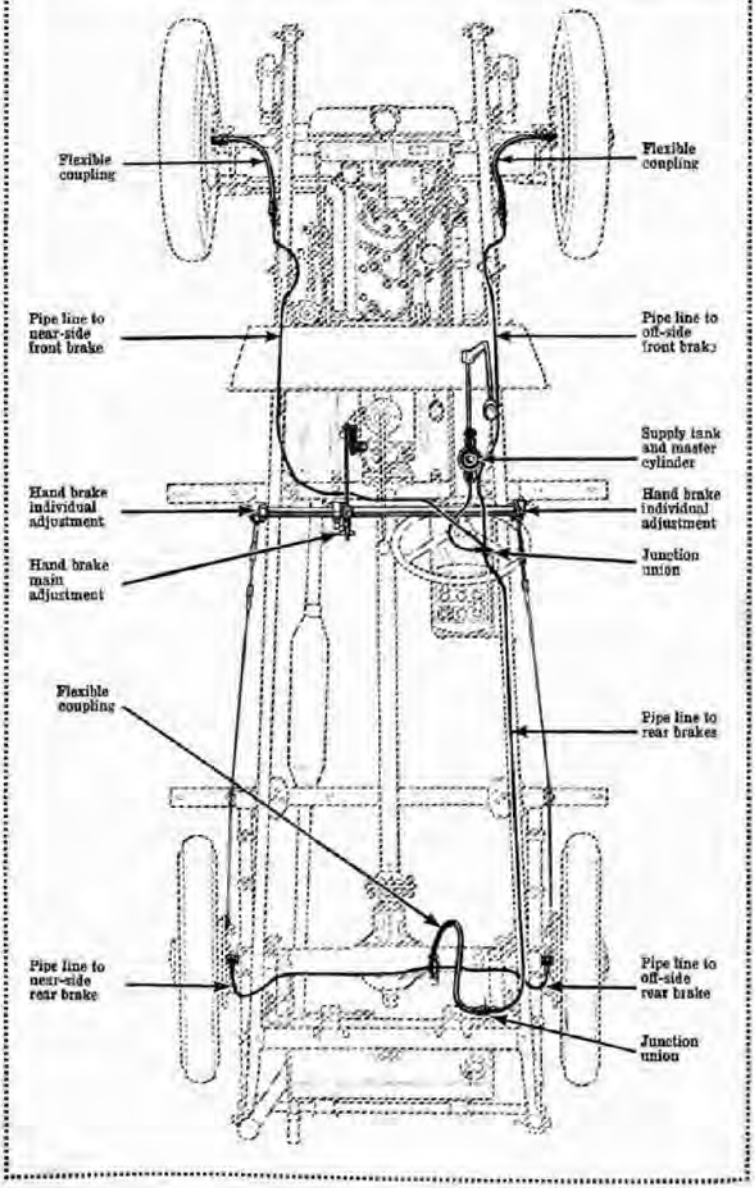
The Telephone Number is:
7101 *Cowley, Oxford, England*

When writing ALWAYS quote model, engine and chassis numbers, and sign your name legibly



THE POWER UNIT OF THE MORRIS MINOR

THE MORRIS MINOR BRAKES



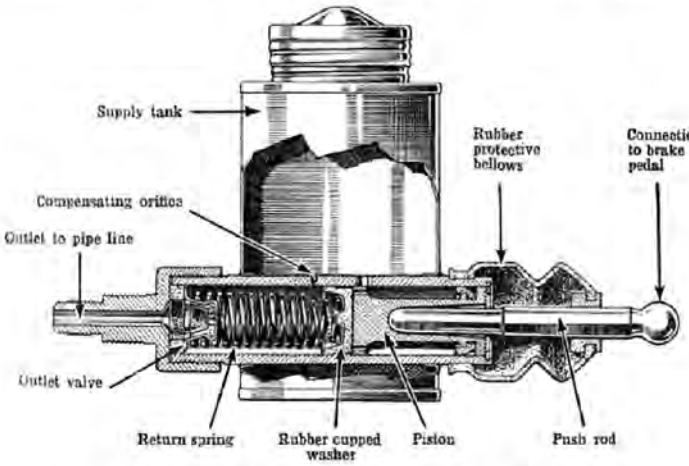
The Hydraulic Brakes

THEIR FUNCTIONING AND MAINTENANCE

THE foot brakes fitted to Morris Minor cars are of the self-equalising hydraulic type. They have no cross shafts, operating rods or hinged joints to rattle or need lubrication. 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 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 combined master cylinder and supply tank of the Morris Minor.

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 fluid supply tank is mounted on the master cylinder beneath the floorboard.

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

The Wheel Cylinders

The wheel brake-shoe cylinders are open at both ends, rigidly attached to the brake dust covers, 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.

Wheel cylinder details.

Depression of the brake pedal introduces fluid to the centre of 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" 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.

Adjustments and Replenishment

The brakes on all Morris cars are carefully adjusted before leaving the Works, and all Morris Dealers have instructions to check the brake adjustments before handing the car to you. The brake mechanism should therefore require but little attention for a lengthy mileage. The supply tank filler cap should, however, be removed 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 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. *During the first 500 miles, however, the maximum braking power may not be available, and adjustments may have to be carried out by the owner in order to take up the natural surface wear inevitable with new brake linings.*

Here are shown the brake adjusting bolts, which when rotated away from the centre of the wheel bring the shoes closer to the drum, and when rotated in the direction shown by the arrows bring the shoes farther from the drum.

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. It is advisable to have at least 1½ 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 operate snail-type cams bearing against the shoes. They 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. 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.

The 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.

All brake re-lining should preferably 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 32.)

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. 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. Remove also the split pins and washers from the guide pins passing through the brake-shoe webs.

The shoes are released from the pivot pin by removing the nut fastening the pivot pin to the brake cover, thus releasing the pivot pin. 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, or when the level in the supply tank has been allowed to fall below the half mark, thus permitting air to enter the fluid circuit. It consists of removing any air which may have found its way into the system. While this is not a difficult matter, it entails the use of special equipment to obtain the best results, and is at the best not a pleasant operation. Owners are therefore advised to entrust this work to an authorised Morris Dealer, who is also a Lockheed service agent.

The Brake Fluid

The Lockheed fluid used in the Morris Minor 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 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 Minor is centrally situated next to the gear lever and operates the shoes in the rear brake-drums by cable mechanism. Ample and simple equalisation adjustment for the cables is provided at their junction to the brake cross shaft levers and care must be taken to see that both brakes are applied with equal force in order to obtain maximum braking efficiency.

A service adjustment, whereby both the hand brake-shoe controls are adjusted in unison, is provided at the junction of the brake lever pull rod with its cross-shaft lever, and it takes the form of a spring-loaded self-locking wing nut.

Great care must be taken not to take up the hand brake adjustment too tightly, or a tendency may exist for the brake to come on of its own accord when additional passengers are carried.

Other than a weekly application of the Enots "Autolub" oilgun to each of the nipples indicated on the chart at the end of this book, and free use of the oilcan on all joints, the hand brake mechanism requires little attention.

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.

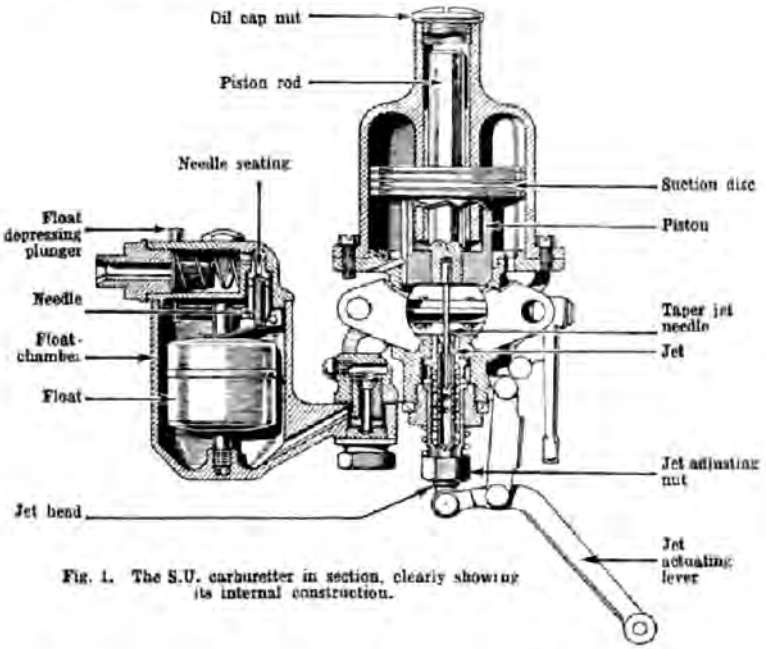


Fig. 1. The S.U. carburetter in section, clearly showing its internal construction.

The S.U. carburetter fitted to Morris Minor 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 Fig. 1. The petrol flow to the jet is governed by a float mechanism of the "top feed" type, where the rising petrol lifts the float, forcing it against a pivoted lever engaging with 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, upon which it is forced by the action of the lever, thereby shutting

ADJUSTING

Run the engine until it attains its normal running temperature. Set the slow-running control to the right of the instrument panel so that the engine idles fairly fast. Disconnect the mixture control wire from the end of the brass lever actuating the jet, and screw the jet adjusting nut well downwards. Note that the jet actuating lever is kept in contact with the jet head by its return spring. The jet adjusting nut should now be screwed upwards slowly (thus gradually weakening the mixture) until the engine idles evenly, firing on all four cylinders regularly, and running at its best speed. This will be the normal 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 wire may now be reconnected to the jet actuating lever, care being taken to see that the control knob has ample clearance when the jet is in contact with the adjusting nut.

Final adjustment for slow-running is then carried out by completely slackening off the dash throttle control so that it is quite clear of the accelerator control, and adjusting the carburetter throttle lever stop screw, which is spring-loaded for screwdriver operation, until gentle slow-running is attained.

Adjusting the carburetter throttle stop screw to obtain the correct slow-running position after setting the jet.

off the petrol supply when the petrol level in the float-chamber has reached a predetermined level. The lever and needle mechanism is attached to the lid of the float-chamber and the whole can readily be detached after unscrewing the retaining nut in the centre of the float-chamber lid.

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 inserting a finger in the air intake the piston may be raised or lowered to free its action.

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 lower end of the suction-operated piston also functions as a variable choke, regulating the size of the passage in the region of the jet as it rises and falls, thereby maintaining a practically constant depression—or suction on the jet—notwithstanding the varying requirements of the engine.

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 instrument panel. 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.

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.

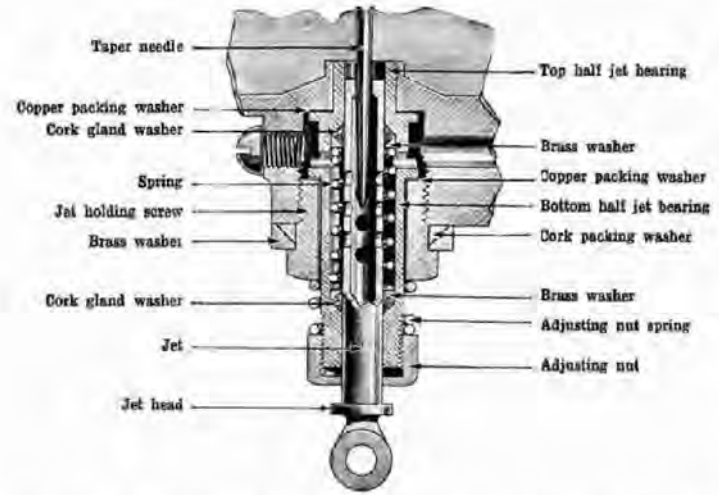


Fig. 2.

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.

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.

If 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

To observe the petrol flow from the jet, the piston should be raised with a small implement and the float-chamber flooded by raising the protruding needle.

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 by depressing the plunger on float-chamber cover 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.

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. This should seldom occur, as the incoming petrol stream washes away the particles of grit. It may be rectified by removing the float-chamber cover and then twisting the needle on its seating a few times with the fingers; the seating

An obstructed jet should be cleared by opening the throttle by means of the accelerator rod while the engine is running and momentarily closing the air intake with the other hand.

should on no account be ground in. It is advisable in all cases of flooding to clean out thoroughly the filter and filter housing.

The Jet

Whenever the jet assembly or the automatic piston assembly is disturbed it is imperative to correctly re-centre the jet. This requires experience and should be entrusted to a competent Morris Dealer.

The Filter

To ensure a free flow of petrol to the float-chamber the filter should occasionally be dismantled (every 5000 miles) and thoroughly cleaned. The filter is situated behind the large hexagon nut at the junction of the petrol pipe to the float-chamber cover, and is released by uncoupling the petrol pipe union by unscrewing

this large hexagon nut. The filter should never be cleaned with rag; always employ a stiff brush and petrol. When replacing the filter remember that the coil spring is first introduced into the filter housing and that the open end of the filter bears against the large hexagon nut.

NOTE.—We strongly advocate that owners should not interfere with their carburetters. The jet and needle fitted as standard have been proved by extended tests to be the correct ones for best results, and nothing is to be gained by individual experiment.

The filter is released by unscrewing the hollow hexagon screw attaching the petrol pipe to the float-chamber lid. Note that the open mouth of the filter faces outwards.

The Automatic Petrol Feed

THE S.U. PETROLIFT AND ITS MAINTENANCE

THE S.U. Petrolift 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.

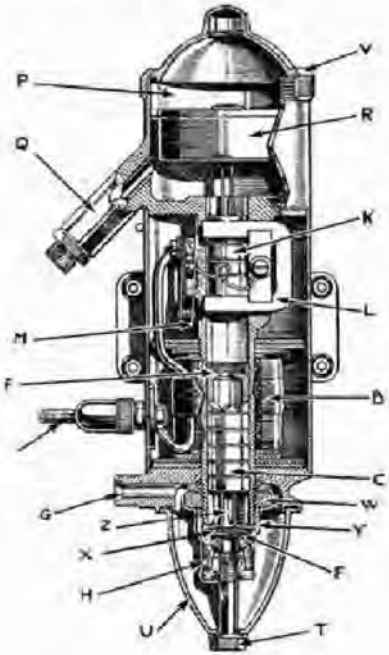
A sticking foot valve is a very rare source of trouble. To rectify, remove the filter bowl (U), filter (H) and foot valve (Y) by means of a tommy bar through one of the holes. The foot valve can then be cleaned. A second filter (X) will be found in the foot valve underneath the priming tube (Z).

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, use a small lamp bulb, such as a sidelamp bulb, and connect its ferrule to a suitable part of the chassis, preferably one of the Petrolift attachment bolts, with a good length of insulated wire. Keeping the lamp well away from the Petrolift, to avoid the possible danger of a spark igniting the petrol, remove the terminal and lead from the Petrolift and touch the centre contact of the bulb with the bare end of the lead. If the bulb lights up brightly, all is in order. If not, the trouble is due to the battery being run down or bad connections somewhere in the system.



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

(*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 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.

The electrical side of the apparatus is to all intents and purposes absolutely foolproof. Practically the only thing that can cause this to cease to function is a broken wire or discharged battery. If reference is made to the diagram the connections will be seen. To gain access to the electrical part of the pump it will be necessary to remove the filter bowl (U), foot valve (Y), uncrew the large hexagon nut (W) holding the inlet ring, when the casing can be drawn off and the internal parts of the electrical equipment and connections inspected. Care must be taken to see that the cork gland washer which makes a petrol-tight joint between the inlet ring and the electrical equipment is in perfect condition.

When the casing is removed care must also be taken to see that the wires are not broken, and particularly that the top wire does not come across the rocking contact plate (M). A simple test for the contacts being in working order is to remove the cap (V) from the top of the pump and lift the float (R) up and down its full stroke. If listened for intently the rocker-plate can be heard to click as it breaks the contact.

Should the Petrolift fail through any defect in the pump itself, replacement parts or a complete pump, if necessary, will be supplied by the makers, the S.U. Co., East Works, Bordesley Green Road, Adderley Park, Birmingham, or their accredited agents, to whom all queries should be addressed.

The Petrolift is guaranteed for 12 months (except for obvious mishandling) by the S.U. Co.

The Filter

It is advisable to clean the filter and filter bowl periodically to ensure a free delivery of petrol to the carburetter.

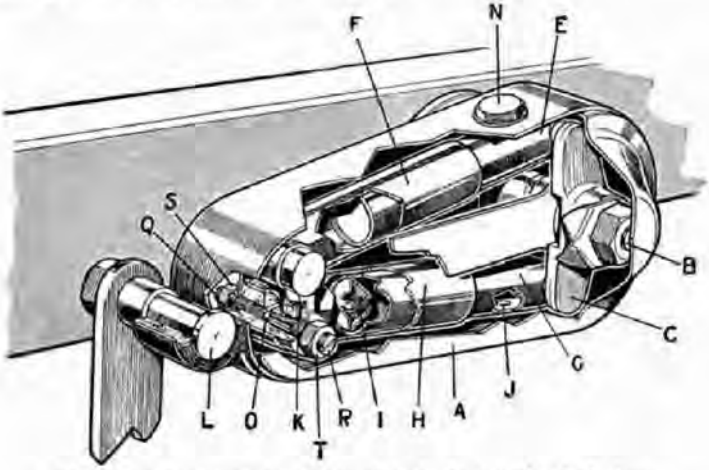
The filter bowl is readily removed by withdrawing its attachment screw (T). Removal of the bowl reveals the filter, which can then easily be cleaned by the help of a stiff brush and petrol. Never employ rag for this purpose. If necessary the filter can be withdrawn for cleaning by removing its retaining circlip.

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.

Care of the Shock Absorbers

THE Armstrong hydraulic shock absorbers fitted to the Morris Minor are of the double-acting type, controlling spring action on both deflection and rebound. They are self-regulating in the sense that their shock-absorbing properties are automatically and progressively regulated to meet the road conditions prevailing. For instance, on a good road the shock absorber provides a normal resistance just sufficient to damp the spring action and avoid all trace of harshness, but when bad roads are encountered and the amplitude of the spring motion is thus increased, the shock absorber automatically builds up an additional resistance which effectively damps out excessive spring motion and enables the car to traverse bad ground exceptionally comfortably.



This sectional illustration of the Armstrong hydraulic shock absorber clearly shows main features.

Wide control over the damping action of the shock absorber is provided. All shock absorbers are accurately set at the Works before delivery and should not require further adjustment under normal conditions. If abnormal conditions are habitually encountered, improved results may be obtained by readjustment of the shock absorber, but such a procedure is only advised in extreme cases.

Adjustment

The adjusting screw "R" has an appreciable effect on the damping action during both deflection and rebound, and it effects a simultaneous adjustment to both. By slackening the lock nut

"T" (taking care that the screw "R" does not rotate while doing so), the screw can carefully be given *a half turn inwards* and the lock nut "T" tightened up again, taking care not to disturb the fresh setting of the screw "R." This should effect a considerable increase to the resistance offered by the shock absorber on both deflection and rebound.

If an increase of resistance on deflection only is required, slacken off the lock nut "S," taking care not to move screw "Q," and turn this latter screw half a turn inwards, retightening the lock nut "S," and yet again taking care that the screw "Q" is not disturbed during the process.

Naturally, to reduce the resistance offered by the shock absorber the same procedure is followed, except that screws "R" and "S" are screwed in the opposite direction, i.e. one half turn outwards.

Maintenance

Under normal conditions the shock absorber should need no attention whatever, except replenishment of the casing with oil at lengthy intervals. Providing leakage does not take place there is sufficient oil in the casing to last 50,000 miles, or approximately five years' normal mileage. It is, however, advisable to inspect the quantity of oil in the casing at least once a year and replenish the supply, if necessary, through the filler and seal plug "N," taking care to tighten it up firmly again. Ordinary oil must not be used, and it is essential only to use the special oil prepared by Armstrong Patents Ltd. for this purpose. This is obtainable in quart tins either from Messrs. Armstrong Patents or from the Service Department at Cowley at 4s. 6d. per tin.

To prevent oil leakage past the shock absorber spindle a special packing gland is provided where it emerges from the casing. Any leakage taking place at this point should immediately be rectified by tightening up the gland nut with a suitable "C" spanner.

Care must, however, be taken not to overtighten the gland nut, or undue strain will be placed on the shock absorber spindle. It is only necessary to tighten up the nut sufficiently to effect an oil seal.

Repairs

The working parts of the shock absorber are sealed within the casing and cannot be interfered with.

In case of trouble the defective shock absorber should be sent for servicing to Armstrong Patents Co. Ltd., Eastgate, Beverley, E. Yorks, who make a point of rapid servicing in connection with both repairs and spares.

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" (Regd.) 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" (Regd.) 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.

Dark oils always look more viscous than do pale oils. Furthermore, ordinary oils, actually very viscous at ordinary temperatures, rapidly lose their "body" with increase of temperature. It is therefore no criterion to judge oil by its appearance and colour. Morrisol may look pale and perhaps thin compared with other brands, but there is no other oil on the market which retains its "body" so perfectly.

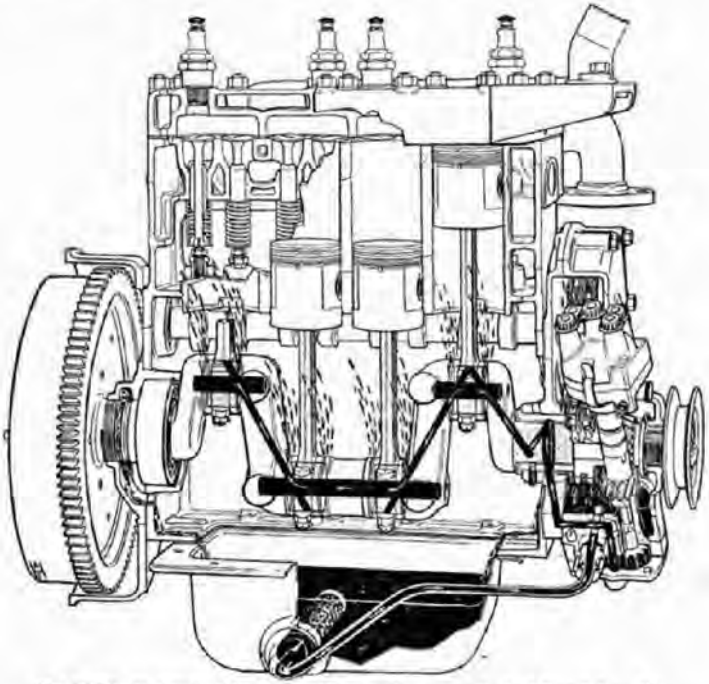
Engines on leaving the Works at Cowley have their sumps filled with Morrisol, and a full quart can of Morrisol "Sirrom" (Regd.) Brand in convenient clips will be found underneath the bonnet of every new Morris car. This quart can will be found sufficient for replenishment on any normal run, and it is recommended that a two-gallon can of Morrisol "Sirrom" (Regd.) Brand be obtained and kept in the private garage or lock-up; the quart can could then be filled from this supply, thus ensuring a constantly available replenishment for the car. 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.

As regards the gearbox, steering and chassis lubrication generally, another special superfine grade of Morrisol is marketed under the name of Morrisol "Sirrom" (Regd.) 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 Engine Oil and Morrisol Transmission Oil of "Sirrom" (Regd.) Brand can be obtained from any authorised Morris Distributor or Dealer. Ask for it by name and insist on getting it.

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.



The lubrication circuit of the Morris Minor engine can easily be followed from this sectional illustration.

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.

A gear-type pump is carried at the front of the engine and driven from an inclined shaft. The oil is filtered by a large filter before passing to the pump, thus ensuring the circulation of clean oil. An

oil pressure gauge is provided on the instrument board to indicate the proper functioning of the pump. The actual reading on the gauge may be found to vary considerably on the same car under varying conditions. It will be found on first starting up the engine from cold that a reading up to a hundred or so pounds per square inch will be obtained. As the engine warms up, and the oil consequently becomes more fluid, this pressure will steadily drop until a reading of some sixty pounds only is registered. It must be understood that so long as a pressure somewhere in the neighbourhood of this figure is registered on the dial it is an indication that the pump is functioning correctly.

The lubricating pump draws its supply of oil from the bottom of the sump through a large diameter suction pipe and filter of large area delivering oil at high pressure into an internal oil duct, which runs across to the front main bearing. Oil grooves in this bearing and drilled passages in the crankshaft conduct the oil to each big-end. These are in consequence fed with oil under high pressure.

The rear crankshaft bearing consists of a large roller bearing which is liberally lubricated by the surplus oil splashed from the big-end bearings.

The surplus oil from the big-end bearings also serves to lubricate the camshaft bearings. An oil lead from the front main bearing provides a constant supply of oil for the camshaft chain and distributor drive gears.

The sump should occasionally be dismantled and cleaned. To do this remove the oil suction pipe and the screws attaching the oil sump to the bottom of the cylinder block, when the sump may be withdrawn.

Every 1000 miles, when changing the oil, the gauze cylinder should be removed from the sump and thoroughly cleaned in paraffin (see illustration on page 53).

An observant driver will pay as much attention to his supply of lubricating oil as to his petrol supply. Neglect of this results in harsh running and an overheated engine, loss of power, and finally "seizing-up" of pistons or bearings.

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 each of the six felt washers (one of which is found on each side of the withdrawal levers), to the withdrawal fork bearings through the oil holes provided and on the splines of the clutch shaft. (See illustration on page 26.)

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

The Dynamo

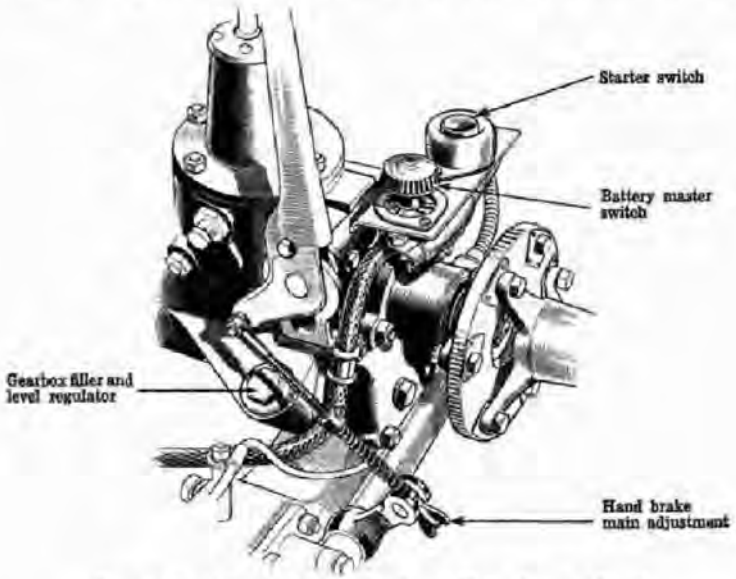
Every 1000 miles two drops of thin oil should be added to the oilers found at either end of the dynamo.

The Ignition Distributor

Every 500 miles give the greaser two turns. Replenish with Duckham's H.B.B. grease when necessary. (See page 78.)

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.



The rear end of the gearbox, showing the oil filler and some adjacent components.

To fill the gearbox, remove the oil filler and inspection plug on the side of the gearbox below the floorboard.

When the gearbox has been drained empty, approximately two pints of oil are required. The use of Morrisol "Sirrom" (Regd.) Brand Transmission Oil is advised.

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. The gearbox should be drained and filled with fresh oil after the first 1000 miles and subsequently every 5000 miles.

Draining the Sump

We recommend that when the car has completed the first 500 miles the oil in the sump and the gearbox should be drained to free them from any impurities that may have accumulated during the initial running-in process. Also, by reason of the fact that all oil loses some of its lubricating properties after it has been in use for a length of time, we recommend that the sump should be drained every 1000 miles after the first 500 miles.

How the oil filter is withdrawn from the sump for cleaning purposes.

To drain the oil, the following procedure is adopted. On the off-side of the engine will be found an external oil pipe leading to the centre of the sump. Unscrewing the union which attaches it to the sump releases the bulk of the oil, and removal of the filter gauze releases the remainder. It is advisable to clean the gauze oil filter with a brush and paraffin. When the sump has been drained, approximately ½ gallon of oil is required to fill it.

Chassis Lubrication

At all points of the chassis of the Morris Minor car that require lubrication the new type Enots nipples are fitted, and in the tool kit will be found an Enots "Autolub" oilgun. This gun should be filled with Morrisol "Sirrom" (Regd.) 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 (Bishop Cam)

An Enots nipple is provided on the steering gearbox to which the oilgun should be applied every 500 miles until the gearbox is filled. Use Morrisol "Sirrom" (Regd.) Brand Transmission Oil in the oilgun.

Hand Brake Lubrication

The hand brake gear of the 1934 Morris Minor is equipped with special expanding mechanism which requires no lubrication attention.

The oilcan should be applied to all brake control fork joints and adjustment screws every 500 miles freely.

Every 500 miles the oilgun should be applied to the oil nipples on the brake countershaft bearings and given two or three strokes.

Front Wheels

These run on journal type ball bearings, and are protected from dirt by a dust excluder and felt washer. The bearings are filled with grease before leaving the Works and should only require attention once every 1500 miles, when the wheel should be removed and the oilgun applied to the nipple found on the edge of the large circular washer on the axle end and given two strokes. Once a year it is desirable to remove the wheel hub with its ball bearings and clean the dust excluder. This work should be entrusted to your local Morris Dealer.

Rear Wheels

Once a month, or every 1500 miles, the wheels should be removed, the Enots oilgun applied to the nipple on the end of the axle and given two strokes. It is advisable, before screwing on the wheel stud nuts, to place a little oil on the wheel stud threads and smear the outside of the hubs with grease.

Rear Axle

This should be filled to the level of the top of the filler. When empty the rear axle requires approximately one pint of oil to fill it. The use of Morrisol "Sirrom" (Regd.) Brand Transmission Oil is advised. While the car is new the rear axle and gearbox should receive special attention, and it is advisable after the first 1000 miles to drain the oil out by removing the domed cover of the axle case. Then wash out with paraffin, and after replacing the cover fill up with fresh oil. The rear axle should subsequently be drained every 5000 miles and refilled with fresh oil.

Bodywork

Door lock bolt : Oil occasionally.
Door hinges : Oil occasionally with oilcan.
Seat slide runners : Grease lightly occasionally and oil rollers.
Sliding roof : Apply a few drops of thin oil to the felt pads on the ends of the runners which slide in the side channels of the roof.

Alternative Oils

In case Morrisol "Sirrom" (Regd.) 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.

Note—Important

Before oil of a different make is used the sump must be drained. It is bad practice and risky to mix lubricants in the sump.

Periodical Inspection

As it is of great importance to have all small adjustments attended to, and to make sure that the lubrication of all wearing parts is not neglected, the owner of a car should make a point of periodical inspection. A résumé of items to be looked after will be found useful.

WHEN IN COMMUNICATION WITH THE WORKS

The Address is: Morris Motors Ltd.
Cowley, Oxford
England

The Telegraphic Address is:
"Voiturette," Cowley, Oxford
England

The Telephone Number is:
7101 Cowley, Oxford, England

When writing ALWAYS quote model, engine and chassis numbers, and sign your name legibly

Items Requiring Attention

After first 250 miles: Tighten cylinder head stud nuts. Examine valve tappet clearances and adjust if inadequate. (Page 21.) Clean oil filter. (Page 53.)

After first 500 miles : Drain old oil from engine ; *do not wash this with paraffin* but merely fill with fresh oil. (Page 53.) Examine valve tappet clearance and adjust if inadequate. (Page 21.) Tighten body holding-down bolts.

Tighten spring clip nuts.

Adjust four-wheel brakes evenly.

Every 250 miles : Inspect oil level in crankcase. Refill if necessary. (Page 51.)

Every 500 miles : See that wheel nuts are tight. Add a few drops of engine oil to the clutch withdrawal race sleeve and clutch shaft splines. (Page 26.) Grease distributor ; two turns of greaser. (Page 78.)

Oil up the steering gear, inspect **oil level** in engine, attach oilgun to Enots fittings, and give pump three or four strokes. (Page 53.) These Enots are situated as under :—

12 on shackle bolts ; 4 on front axle knuckles ; 2 on steering track link ; 3 on intermediate brake-shaft ; 2 on steering drag-link ; 1 on brake pedal ; 1 on steering gearbox, making 25 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. (Page 51.) Inspect oil level in gearbox and rear axle. Refill if necessary. (Pages 53-58.) Clean oil filter. (Page 53.)

Examine level in Lockheed brake supply tank and replenish with Lockheed fluid if necessary.

Every 1500 miles : Remove all four detachable wheels, clean, rub over with grease, taking care to put a little oil on the detachable wheel studs, and give two strokes of oilgun to oil nipples on end of axles and replace.

Examine the valve tappet clearances. (Page 21.)

Examine the gaps of the sparking plugs and make sure that they are not too wide ; they should be .022 to .025 inch. (Page 63.)

Add one or two drops of thin oil to dynamo spring oilers.

Remove wheels and give two strokes of oilgun to nipple.

Every 5000 miles : Examine valves and valve seatings, and scrape off carbon deposit from pistons and head. (Pages 65-76.)

Remove sump, clean and refill with fresh oil.

Remove filters from carburetter and Petrolift, clean and replace. (Pages 42 and 46.)

Drain gearbox and rear axle. Refill with fresh oil. Tighten door hinge fixing screws.

Give a film of vaseline to distributor rotating cam.

Examine fluid level in shock absorbers and replenish with Armstrong fluid if necessary.

ACCESSORIES and EQUIPMENT

SPECIAL PROPRIETARY FITTINGS

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

All claims for replacement of alleged defective parts must be referred direct to the respective manufacturers. See Conditions of Guarantee.

Name of Part.	*Name and Address of Manufacturer.*
Dynamo	Joseph Lucas Ltd., Great Hampton Street, Birmingham.
Starter	Ditto
Ignition Coil	Ditto
Distributor	Ditto
Direction Indicators	Ditto
Switchbox	Ditto
Cut-out	Ditto
Fusebox	Ditto
Junction Box	Ditto
Battery	Ditto
Battery Master Switch	Ditto
Lamps	Ditto
Horn (Electric)	Ditto
Starter Switch	Ditto
Windscreen Wiper	Ditto
Observation Mirror	Ditto
Instrument Panel Assembly	Ditto
Electric Bulb	Ditto
Petrol Gauge and Attach. (Elec.)	S. Smith & Sons (Motor Accessories) Ltd., Cricklewood Works, London, N.W.2.
Speedometer and Cable	Ditto
Clocks	Ditto
Grease Gun	Benton & Stone Ltd., Bracebridge Street, Birmingham.
Carburetter	S.U. Co. Ltd., East Works, Bordesley Green Road, Adderley Park, Birmingham.
Petrolift	Ditto
Tyres	Dunlop Rubber Co. Ltd., Fort Dunlop, Erdington, Birmingham.
Shock Absorbers (Armstrong)	Armstrong Patents Co. Ltd., Eastgate, Beverley, Yorks.
Radiators Thermostat	To :—Authorised Morris Radiator Repair Stations.
Lifting Jack and Tools	R. T. Shelley Ltd., Aston Brook Street, Birmingham.
Sparking Plugs	Champion Sparking Plug Co. Ltd., 83 Pall Mall, London, S.W.1.

Care of the Tyres

ALL Morris Minor cars are fitted as standard with Dunlop cord tyres of the wired type for well base rims.

Tyre Pressure

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.

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.

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.

RECOMMENDED TYRE PRESSURES FOR MORRIS MINOR CARS

Type	*Tyre Size*	*Front*	*Rear*
Two-seater ...	4.0—18	22 lb. per sq. in.	24 lb. per sq. in.
Tourer	4.0—18	22 lb. ,,	26 lb. ,,
Saloon	4.0—18	22 lb. ,,	26 lb. ,,
Family Saloon ...	4.0—18	24 lb. ,,	27 lb. ,,
Special Coupé ...	4.0—18	24 lb. ,,	27 lb. ,,

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

TYRE REMOVAL

Fig. 1.

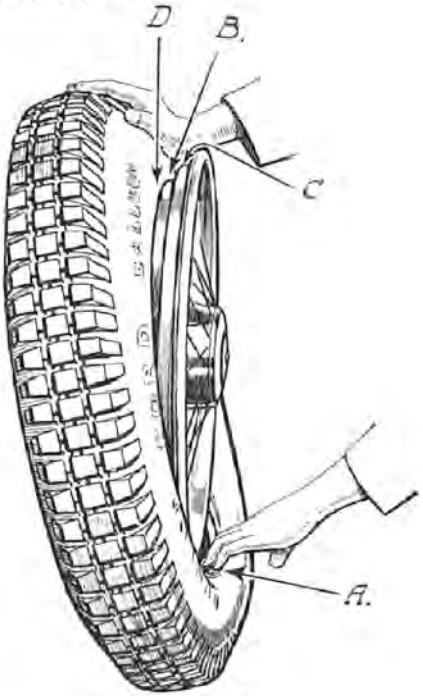


Fig. 2.

Fig. 1.—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.

Fig. 2.—*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.

When removing the tyre start near the valve position. When replacing start on the opposite side to the valve and finish at the valve, or you will not be able to drop the tyre edge into the well of the rim.

TYRE VALVES

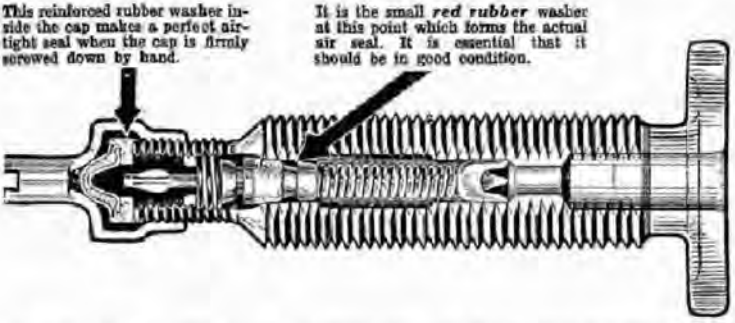
Valve Cap

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

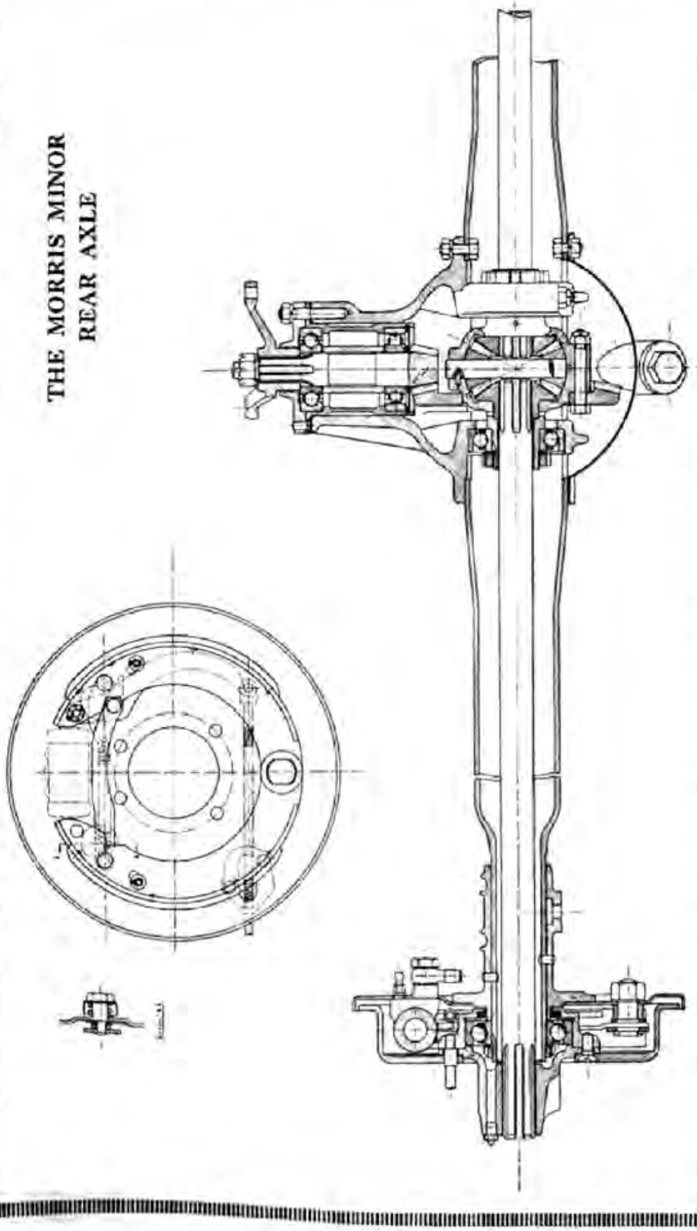
The airtightness of the valve depends upon the proper functioning of its "interior." It may be tested for airtightness by rotating the wheel until the valve is at the top and inserting its end in an eggcupful of water. If bubbles appear, in spite of the fact that the valve interior has been well screwed 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.

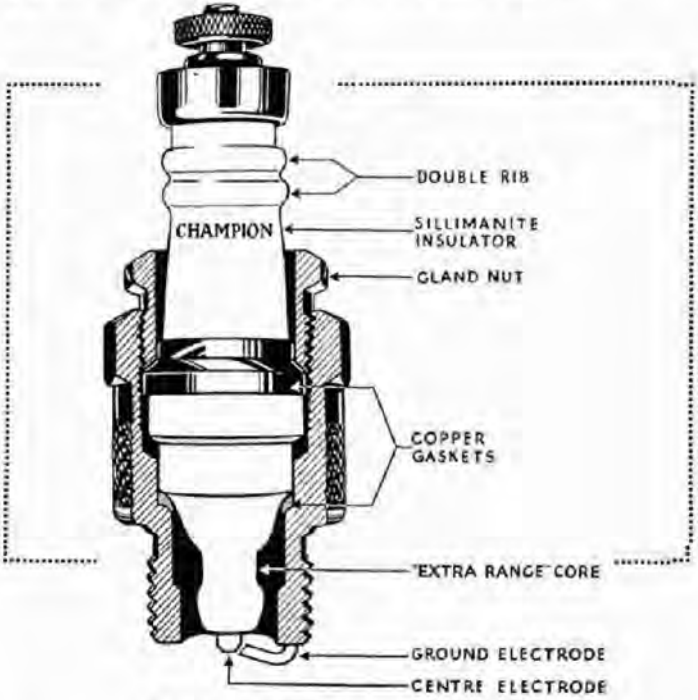
THE MORRIS MINOR
REAR AXLE



Care of the Sparking Plug

ALL Morris Minor cars are fitted with Champion No. 7 extra range sparking plugs, a specially sectioned view of which is shown herewith. This particular plug is fitted with a detachable ceramic insulator which may be removed from the plug body for cleaning when necessary.

The gap between the sparking plug points should be set between .022 and .025 inches. Too wide a gap will cause misfiring, especially at high speeds and under heavy pulling at low speed with an open throttle, while too small a gap causes poor idling. When adjusting gap move the side wire—never bend the centre wire!



A partly-sectioned view of the Champion sparking plug.

After the first several hundred miles of operation it will be necessary to clean the sparking plugs, for during the "wearing-in process" which is taking place in the car's early life, an excess amount of oil is generally used, and the slow-speed carburetter adjustment is a little rich, with the result that carbon may deposit on the sparking plug insulator, causing a fouling condition. This soon disappears, however, when the motor has been well run-in and fresh oil introduced.

Being of two-piece construction, the Champion plug is easy to take apart and clean. The insulator on the top should be kept clean at all times, because the presence of oil, dust or paint may cause leakage of the spark, and in damp weather make for difficult starting.

It must not be forgotten that the best of sparking plugs do not wear for ever. The intense stresses and strains imposed, especially in modern high-compression engines—often under conditions which

Adjustments should be made only by the side wire, and the combined setting tool and gap gauge illustrated can be obtained from the Champion Sparking Plug Co. or your Morris Dealer for 4d.

are not of the best—are so terrific that naturally there is a gradual deterioration of the sparking plug. Inefficient functioning of the plugs means incomplete combustion in the engine cylinder, and incomplete combustion means unburned gas going out of the exhaust. In this case the full heat value of the fuel is not used, and as a result power is lost and fuel is wasted. In this connection, therefore, it is recommended that sparking plugs should be replaced at intervals of 10,000 miles of service. By so doing you will restore power, speed, and save their cost many times over. Moreover, during the life of the plugs every considerate attention thereto will be repaid by unfaltering service.

Decarbonising and Valve Grinding

THE formation of carbon is unfortunately one of the troubles every internal combustion engine is heir to. It occurs on every car and is mainly due to the necessary use of oil for lubrication purposes. If "Morrisol" is employed exclusively it will be found that the engine remains remarkably free from carbon deposit for a lengthy mileage. The existence of an excessive deposit of carbon in the cylinder head is usually indicated by a falling off in power and a metallic noise from the engine when it is pulling hard uphill or picking up on top gear, which is commonly known as "pinking." The noise is similar to that produced when the ignition is too far advanced, but it should not be confused with that noise.

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, 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.

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. Whilst the radiator is draining you may with advantage proceed to turn off the petrol 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

First of all switch off the battery master switch.

The tension of the fan belt should then be released by slacking the dynamo cradle clamping bolts and the water outlet hose released from the cylinder head and radiator.

The bolts attaching the adjustable portion of the dynamo cradle to the bracket portion attached to the cylinder head should now be removed completely, thus releasing the dynamo, which should be placed in a safe place. There is no need to disturb the dynamo bracket attached to the cylinder head.

Uncouple the high-tension wires from the sparking plugs.

The cylinder head is held on to the cylinder block by sixteen 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 turning the engine by the starting handle. 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

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

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 block and taking particular care that it is not bent or otherwise damaged in the process.

Decarbonising

Turn the engine by the starting handle until any two pistons are at the top of their travel. Stuff the open ends of the other 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. Take particular care to go round each valve with a small screwdriver in order to remove all trace of carbon. When these two pistons have been properly cleaned give the starting handle half a turn and clean the other two in the same way.

Removing the carbon from the piston crowns.

Attention should now be given to the cylinder head. Remove the sparking plugs and turn the head upside down, thus exposing the combustion chambers.

With a blunt screwdriver carefully scrape away the carbon deposit adhering to the surface of the combustion spaces and carefully clean with rag moistened with paraffin.

Removing the Valves

Having thoroughly cleaned the combustion spaces, pistons and valve heads, you may remove the valves. To obtain access to the valve springs, it is necessary to remove the valve chamber cover-plate on the near-side of the engine below the inlet and exhaust manifolds by unscrewing the two knurled nuts holding the cover in position.

When removing the cover care should be taken not to damage the composition gasket beneath it or difficulty will be experienced in making an oiltight joint later.

The valve spring can now be compressed with the special valve tool previously mentioned, after removing the inlet and exhaust manifold. 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 spring cotters have been removed, the

Decarbonising the cylinder head.

valve may be withdrawn from its guide. Repeat this operation on the remaining valves until they are all removed. It is not essential completely to remove the valve springs; they may be left resting on the tappet heads until the valve is replaced, providing care is taken to see that the valve stem passes through the spring cap during the grinding process, and the tappet screws are slackened back.

Grinding-in the Valves

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 upper face of the cylinder block 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 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. 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.

The use of a light spring under the valve head greatly facilitates the grinding-in process.

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 block—a matter of importance, as it cannot be renewed. Any valves which are distorted should immediately 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, where extensive damage may be done.

Reassembling the Valves

The valves may now 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, the valve spring may be placed in position, followed by the valve spring cap. Engage the valve tool on the cap and compress the spring so as to expose very nearly the whole of the groove in the lower end of the valve stem. Insert the two conical cotters into the groove in the valve

The component parts of the valve and valve tappet, consisting of the valve, valve cotters, valve spring, valve spring cap, tappet screw and lock nut, and the tappet.

stem (small ends upwards, of course) and gradually release the spring. Make sure that the cotters are properly engaging in their grooves before dealing with the next valve.

Adjusting the Tappets

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 stem of the valve and the head of the tappet. It is essential for the proper functioning of the engine that this clearance should not be less than .004 in., and it is therefore necessary to check the clearance of each valve with the feeler gauge attached to one of the special tappet adjusting spanners in the manner outlined on page 21.

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, and to coat both sides of it with an even film of gold size or similar jointing compound. If the gasket has

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

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 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.

Having located the gasket in position, the head may be lowered on to the cylinder block. Replace the sixteen cylinder head nuts 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, not forgetting to place the dynamo bracket in position if it has been disturbed.

The sparking plugs should now be replaced, as should the high-tension leads, dynamo and dynamo belt.

Adjust the dynamo belt tension, fill the radiator with water, start up the engine and let it idle quietly until it is thoroughly warm. Then, switching off again, 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 each nut. Do not attempt to speed up the engine until this final tightening has been effected.

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

Tracing Troubles

Motor will not Start

IF for any reason the motor fails to start readily when the starter button is pressed, do not keep it revolving for a long period, but remove your finger or foot from the starting switch at once. One of the following things may be the cause of the trouble :—

The ignition switch may not have been turned on.

Your petrol supply may be exhausted.

The carburetter mixture control may be wrongly set, causing the mixture to be either too rich or too weak.

Carburetter piston stuck.

The sparking plugs may be fouled with oil or carbon.

The high-tension lead from ignition coil to distributor may be loose, broken, or damaged so as to leak.

The petrol filters of the automatic Petrolift and carburetter may be choked.

The automatic Petrolift may not be functioning properly.

The petrol pipe may be clogged or may have an air lock.

The battery may be run down (usually indicated by the slow speed at which the engine is turned).

The ignition coil may be defective.

The distributor points may be faulty and require resetting and cleaning.

The low-tension wire from coil to distributor and coil to ignition switch may be broken or faulty.

There may be water in the petrol feed.

Motor Misses at High Speeds Only

This may be occasioned by :—

Faulty sparking plugs which may be fouled or gaps not properly set.

Shortage of fuel due to dirt or obstructions in the petrol pipe, accumulation of dirt at filters, or petrol feed not working properly.

Improper functioning of inlet or exhaust valves (inlet valve indicated when spitting in carburetter takes place, exhaust valve when "banging" in silencer takes place).

Valve clearance may be badly set.

One of the electrical connections may be loose, particularly in the high-tension lead between the coil and distributor.

Distributor contact breaker points badly set or dirty.

Motor Misses at All Speeds

This may be due to :—

Faulty sparking plugs with an internal fault, such as oil on plug points, carbon deposit, or too wide a setting.

Faulty valve action due to incorrect setting of valve tappet clearance or valve sticking in guide.

Warped or badly pitted valves also arising from faulty setting of the tappet clearance.

Broken valve spring.

Insufficient fuel due to petrol filters being clogged. (See pages 42 and 46.)

One of the ignition wires may be loose and making intermittent connection, particularly that between coil and distributor.

Distributor points may not be functioning with regularity and in need of attention. (See page 77.)

The carburetter may be flooding, due to dirt on the needle valve seating causing mixture to be too rich. (See page 42.)

Motor Misses at Low Speeds Only

This may be due to :—

Valves not seating properly, due to faulty tappet setting or distortion. (See page 21.)

Air leaks in induction system, due to faulty joints between carburetter and induction pipe or induction pipe and cylinder block. Check joint gaskets for soundness and tighten up all nuts.

Carburetter setting faulty (refer to carburetter section, page 38).

Spark may be too far advanced when motor is running very slowly. Spark lever should be retarded. (See page 9.)

Battery run down and thus unable to supply sufficient current for ignition purposes.

Engine Stops Suddenly

If the engine stops suddenly without making any further attempts to run :—

Examine carburetter and ascertain that float-chamber is receiving sufficient petrol supply. (Shortage of fuel is usually indicated by one or two restarts before the engine finally stops, or by spitting through the carburetter.)

Test flow from carburetter jet. (See page 41.)

Test spark at plug points by removing plug, resting on engine, and observing spark when starter motor switch is pressed.

If spark is weak or non-existent, check distributor lead connections to coil and distributor, check distributor contact breaker points, clean, and reset, if necessary.

If the spark is still weak, test all electrical connections.

If spark still remains weak, check coil as indicated in paragraph on checking ignition faults.

Engine Spits through Carburetter

This is usually an indication of a weak mixture.

Check fuel supply to carburetter float-chamber. Remove carburetter and automatic Petrolift filters, clean and replace.

Carburetter piston may be sticking.

It may be caused by air leaks in the induction system. Check over all joints in the induction manifold and tighten up nuts.

Faulty setting of the inlet valve tappet clearance, preventing valves from closing properly, also causes this trouble.

One or other of the inlet valves may be sticking in its guide.

"Banging" in Silencer

This is usually an indication of a faulty exhaust valve which is not closing properly, due to a warped seating or faulty valve tappet clearance. It may also be due to the exhaust valve sticking in its guide. It may also be produced by faulty mixture supply, which is either much too rich or too weak.

If "banging" takes place in the silencer when proceeding downhill with the throttle closed, it is usually an indication that the throttle does not fully close when the foot is taken off the accelerator pedal. The slow-running position of the throttle should be checked over and the carburetter setting checked.

Checking Ignition Faults

The first step is to ascertain whether the fault lies in the sparking plugs, the wiring, or the coil and distributor. If the engine does not fire on one particular cylinder, the fault usually lies in the sparking plug for that cylinder or the high-tension lead to it. The faulty cylinder can be determined by short-circuiting each sparking plug in turn with a screwdriver *having a wooden or insulated handle*, the blade making connection between the sparking plug terminal and an adjacent portion of the engine. If shorting of the plug makes no difference to the engine beat, then it is this cylinder which is definitely at fault. If, on the other hand, shorting the plug alters the beat of the engine, it is an indication that this cylinder is functioning correctly and that the trouble lies with one of the others. Try each cylinder until the faulty one is definitely located. Remove the plug of the faulty cylinder and examine points for gap and the plug for condition generally. If it is very oily or shows signs of heavy carbon deposit in its interior, the plug should be dismantled and cleaned and the points reset. Before replacing the plug check the spark by connecting the high-tension lead to its terminal and resting it on some part of the engine, taking care that the terminal is not making contact. Get someone to turn the engine with the starting handle and observe whether a spark is taking place at the plug points. If no spark is taking place, try a fresh plug. If a spark still does not appear, 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. Check the high-tension lead from coil to distributor, making sure it is in proper contact with its terminal sockets. Remove distributor cover and check contact breaker points, clean, and reset if necessary. If you still fail to obtain a spark at the plug points, check over all battery connections and connections between coil and ignition switch, and coil and distributor.

Examine the high-tension cables, i.e. cables from the coil to the distributor and from the distributor to the plugs.

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 as described on page 77. 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 the chassis. Also see that the battery terminals are tight and that the cables from the battery to the switchbox and master switch are secure. The battery may be dismissed as the cause of the trouble if the lamps will light.

The dynamo brush may be sticking.

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.

Starter Motor does not Operate

This may be caused by an exhausted battery, due to excessive use of the starter motor or the lights, and is the direct result of failure on the part of the owner to observe the recommendations made in the electrical section of this *Manual*. It may also be caused by broken or loose wires, either in the battery, the starting switch, the master switch, or the starter motor. Therefore examine all terminals and wires carefully for looseness or damage. The master battery switch may even be turned "off." Corroded terminals sometimes produce poor contact and thus interfere with the functioning of the motor. Disconnect all corroded terminals, thoroughly clean, and finally coat them liberally with vaseline.

The starting switch may be defective, in which case it should be replaced.

Engine Lacks Power and is Sluggish

This in a new car may be caused by general tightness of the engine and will wear off after the car has been used for approximately 1000 miles.

It may also be due to faulty setting of the ignition control. This should be kept in the fully advanced position for normal running conditions.

Faulty setting of the carburetter mixture control is also a source of trouble of this nature.

In an engine which has seen some use, sluggishness is an indication of excessive carbon deposit, particularly if accompanied by "pinking" when the engine is pulling hard. It may also be occasioned by faulty valves or faulty valve clearances.

Motor Runs Hot

Water supply in radiator too low. It is necessary always to have the water well covering the base of the upper tank.

Running with the spark too far retarded. This is accompanied by a marked loss in power and sluggishness.

Carburetter mixture control maintained at "rich" position for too long a period. The carburetter mixture control should be returned to the "weak" position as quickly as possible after starting, without causing the motor to splutter and run unevenly.

Hand brake has been left partly on or foot brake adjusted too closely.

Fan belt broken, indicated by no charge reading on the ammeter.

Engine Knocks when Pulling Hard

When an unusual sound emanates from the engine, investigate its cause immediately and do not continue running the engine in the hope that matters will right themselves. First of all ascertain that the oil gauge is registering the right pressure and that there is plenty of oil in the sump. Make sure that the noise is not due to shortage of lubricant.

The more general causes of engine knocks are :—

1. *An excessive accumulation of carbon deposit on the piston heads, valves and combustion chamber.* This state of affairs is indicated by a high-pitched metallic ring or "pinking" whenever the engine is made to pull hard. This develops gradually as the engine is further used and must not be confused with a similar noise produced by too far advancing the ignition. When an engine is suffering from excessive carbon deposits, it will have a tendency to be sluggish, run rather hot, and labour heavily on gradients.

2. *Loose or worn bearings.*

Loose big-end bearings : These produce a rattle usually heard at speeds of between 25 and 35 m.p.h., when the accelerator is only partly depressed and the engine is running light. If the engine is speeded up with the throttle a quarter open and the car at rest, the noise will usually develop and can then be cut out by shorting the sparking plug of the cylinder concerned. When the sparking plug is released a heavier knock will be produced.

It should be noted, however, that with modern high-pressure lubrication these noises are of very little magnitude, even when the big-end bearing has actually run.

Loose little-end bearing : This is heard more readily at low speeds and is a somewhat hollow sound which is not completely cut out by shorting the sparking plug, although reduced somewhat.

The accurate diagnosis of knocks is a matter for an expert accustomed to the particular engine, and you are advised to consult your nearest Morris Dealer as soon as any unusual noise occurs.

Remember it is bad policy to continue running a car if it is in any way faulty. If the trouble is attended to early, no damage need be done and the matter may be comparatively easily remedied ; but if allowed to continue extensive damage may ensue.

For dynamo, starter motor, and lamp troubles see pages 92-94.

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 (Fig. 1) 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

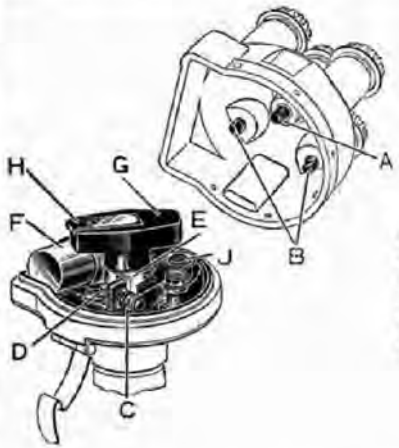


Fig. 1. Distributor Type DJ4.
A—Carbon brush.
B—Electrodes.
C—Contacts.
D—Locking nut.
E—Rotating cam.
F—Condenser.
G—Rotating distributor arm.
H—Distributor arm electrode.
J—Contact breaker pivot.

holder. 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.

The contact breaker gap is carefully set to about 15 thousandths of an inch before leaving the Works. A gauge of the correct thickness is provided on the ignition spanner. Provided that the cam is kept clean and that the instructions on cam lubrication given on this page 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. 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 one turn about every 500 miles.

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.

Renewing High-tension Cables

When the high-tension cables show signs of perishing or cracking, they should be replaced. Use only 7 mm. rubber-covered ignition cable for all high-tension leads.

The method of connecting the cables is to thread the knurled moulded nut over the lead, bare the end of the cable for about ¼ in., thread the wire through the brass washer provided, and bend back the strands. Finally screw the nut into its respective terminal.

Ignition Switch and Warning Lamp

The ignition switch is incorporated in the lighting and charging 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.

After long service the warning lamp bulb may burn out. However, this will not affect the ignition, but it should be replaced as soon as possible so as to act as a safeguard to the battery. To replace the bulb, unscrew the lamp front, when the bulb can be removed. The bulb is a 2.5 volt, .2 amp., screw cap type (No. 252 M.E.S.).

The Detection and Remedy of Ignition Faults

If failure of the ignition or misfiring occurs and the cause is not obvious, the owner is strongly recommended to proceed in accordance with the routine outlined on page 74, which should enable him to locate the trouble without difficulty.

If, after carrying out the examinations suggested, the trouble cannot be found, we strongly advise that the equipment should be examined by the nearest Lucas Service Depot.

WHEN IN COMMUNICATION WITH THE WORKS

The Address is: *Morris Motors Ltd.*
Cowley, Oxford
England

The Telegraphic Address is:
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England

The Telephone Number is:
7101 Cowley, Oxford, England

When writing ALWAYS quote model, engine and chassis numbers, and sign your name legibly

Maintenance of the Lucas Starting and Lighting System

Dynamo

THE dynamo is mounted on a platform at the front end of the engine, and is driven by a belt. 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.

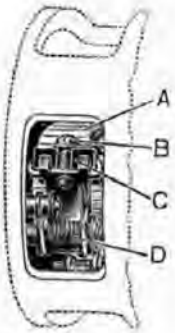


Fig. 2. Dynamo with cover removed.
A—Commutator.
B—Screw securing brush.
C—Brushes.
D—Brush tension spring.

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 a single securing screw and springing the cover off the dynamo.

Brushes

Occasionally test the action of the brush holders. They should have sufficient spring tension to keep the brushes firmly pressed against the commutator when the machine is running, and they should move freely on their pivots.

After long service, when the brushes have become worn so that they will not bear properly on the commutator, they should be replaced. It is recommended that none but genuine Lucas brushes are fitted, as these are specially made and will give the best results and the longest life. We advise owners to have the brushes fitted at a Lucas Service Depot so that they can be properly "bedded" to the commutator.

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

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.

Field Fuse

A fuse is provided in the dynamo field circuit to protect the machine in the event of anything being wrong in the charging circuit, e.g. a loose or broken battery connection. The fuse is of the cartridge type, and is housed in the cut-out and fusebox on the engine side of the dash (see page 85).

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.

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

to this squared end by withdrawing the small metal cap protecting it.

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

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 with the top of the separators.
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 acid level with the top of the separators. If, however, acid solution has been spilled from any of the cells, it should be replaced by a diluted sulphuric acid solution of the same specific gravity as the acid in the cells. *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.

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 which case we advise the owner to have his battery examined by a Service Depot to trace the cause and prevent the trouble from developing.

Fig. 3. Syphon Hydrometer.

In a fully charged Lucas battery as fitted to the Morris Minor car, 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.

Master Battery Safety Switch

This switch enables the battery to be completely isolated from the electrical equipment as a means of protection for a parked car, when carrying out wiring alterations, repairs to the car, or in case of emergency, e.g. in the event of a short circuit occurring in the wiring. *It should never be operated under normal conditions while the engine is running, or the lamps may burn out.*

The switch is connected between the negative

battery terminal and the chassis. When moved to the "off" position, the negative battery terminal is "insulated" from earth, and the coil ignition is rendered inoperative by a connection across the contact breaker to earth.

Lighting, Charging and Ignition Switch

This switch, which is incorporated in the instrument panel, controls the ignition, the lamps, and the charging of the battery.

The ignition switch takes the form of a small key which fits in a slot in the centre of the lighting and charging 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.

The switch positions are :—

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

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

"Side"—Headlamps (pilot bulbs) and tail-lamp on.

"Head"—Headlamps (main bulbs) and tail-lamp on.

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

To switch on the ignition, depress the key and turn to the right ; to switch off, turn to the left.

Dipper Switch

The dipper switch has two positions—one to give the normal driving light, and one to dip the near-side headlamp beam and at the same time substitute the pilot light for the driving light in the off-side lamp.

Unless the dipper switch is returned to the normal position before moving the lighting switch to the "Side" position, the near-side lamp will remain 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 83), 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.

On a new car, during the running-in period, it is advisable to keep the switch in the full charge position all the time in order to compensate for the heavy starter motor load due to the initial stiffness of the engine.

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 pilot 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.

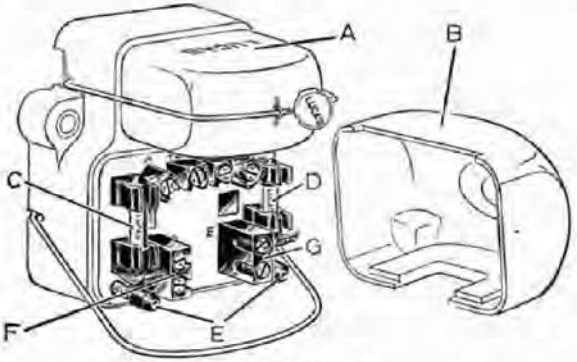


Fig. 4. Cut-out and Fuse.

A—Cut-out cover.
B—Fuse cover.
C—Auxiliary accessories fuse.
D—Dynamo field fuse.
E—Spare fuses.
F—Positive supply terminal for auxiliary accessories.
G—Negative (or earthing) terminal for auxiliary accessories.

Cut-out and Fuse Type CF3

The cut-out is mounted together with two fuses as one unit, which also forms a junction box and incorporates the half-charge resistance for the dynamo. The cover "A" (Fig. 4) protects the cut-out and the moulded cover "B" the terminals and fuses. 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 to one side.

The two fuses are of the cartridge type. The one marked "Aux" is a 25 amp. fuse connected in the accessories circuits, and will blow in the event of a short circuit in the wiring of the electric horn, windscreen wiper, and other units connected to the "Aux" terminal, the indication that the fuse has blown being the failure of these units. The other fuse marked "Dyn" is a 6 amp. fuse protecting the dynamo, and is connected in the dynamo field circuit. The indication of a blown dynamo fuse is that the dynamo will fail to charge, no charge reading being given on the ammeter under normal daytime running conditions. Spare fuses are provided in case of emergency. Before fitting a replacement fuse, the cause of the trouble must be rectified. If the new fuse blows and the cause cannot be found, we advise the owner to have his equipment examined at a Lucas Service Depot.

Never fit any fuse other than the standard Lucas fuse as originally fitted. The size of the fuse is marked on a coloured paper slip inside the fuse.

Headlamps

These lamps are provided with an electrically operated anti-dazzle switch for operation by the switch on the steering column. When the switch is moved to the "dip" position, the near-side headlamp beam is dipped and turned to the near-side of the road, while at the same time the off-side headlamp is switched off, thus causing no discomfort to approaching traffic.

The dipping of the headlamp beam is effected by a movement of the reflector. This is made in two parts; the centre portion is pivoted in a fixed rim which is in turn secured to the body. The movement of the reflector is controlled by means of a solenoid and plunger which, when the current is switched on, tilts the reflector to give the dipped beam.

Removing the Lamp Front and Reflector

To remove the lamp 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 withdraw the fixing screw at the back of the lamp. The reflector can then be withdrawn by dislocating the tongues of the two fixing brackets riveted to the reflector rim from the slots in the lamp body.

Aligning and Focussing

To obtain the best results from the lamps, it is essential that they are in good alignment and that the bulbs are focussed correctly.

For the best projection of light, the bulb filament must be as near as possible to the focus of the reflector. As the position of the bulb filament relative to the cap varies slightly with different bulbs, provision is made for adjusting the position of the bulb relative to the reflector.

Alternative positions are provided for the headlamp bulb in its holder. Each position should be tried for the best result.

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

The simplest method of adjusting and focussing the lamps is to take the car on to a straight, level road at night, and then to align them so that the beams are parallel with the road and with each other. Then focus the driving light bulbs as follows :—

Cover the one lamp and adjust the position of the bulb in the other lamp so as to obtain the most intense beam. Finally, focus the other lamp bulb in the same way.

Fuse

A fuse is provided with the electrical dipper unit to protect the equipment in the event of the reflector failing to function properly. The fuse is of the cartridge type, and is carried in spring clips alongside the dipping mechanism. If the reflector fails to function, remove the fuse from its holder and see whether there is a break in the fuse wire. A spare fuse is clipped to the reflector bracket.

If the fuse should blow repeatedly, and the cause cannot be found, have the reflector examined at the nearest Lucas Service Depot.

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.

Dashlamp

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 small stud is placed opposite the slot in the base, so that on pressing the cover it will be secured in position.

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.

Particulars of bulbs fitted in the lamps of the Morris Minor are given below :—

Lamp	*Bulb*	*Volts*	*Watts*
Headlamps (main bulbs) ...	No. 624S	6	24
Headlamps (pilot bulbs) and tail-lamp	B.A.S. No. 8S	6	3
Dashlamp	B.A.S. No. 8S	6	3
Ignition warning lamp ...	No. 252 M.E.S.	2.5	.5
Trafficators	T.126F (festoon)	6	6

Screen Wiper

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.

About every six months remove the small screw at the top of the wiper, and through the hole add one or two drops of thin machine oil.

Electric Horn ("Altette" Type)

These horns, before being passed out of the Works, are adjusted to give their best performance, and will give a long period of service without any attention ; *no subsequent adjustment is required.*

If the horn becomes uncertain in its action, giving only a choking sound, or does not vibrate, it does not follow that the horn has broken down. First ascertain that the trouble is not due to some

outside source, e.g. a discharged battery, a loose connection or short circuit in the wiring of the horn, or in some cases a blown fuse.

It is also possible that the performance of a horn may be upset by the horn becoming loose on its mounting.

If the note is still unsatisfactory, *do not attempt to dismantle the horn*, but return it to a Lucas Service Depot for examination.

Trafficators

Every two to three months raise the "Trafficator" arm and apply a little vaseline by means of a match-stick to the two hinged joints between the arm and the operating mechanism.

If, at any time, the arm fails to light up when in operation, examine the bulb. To remove the bulb, switch the "Trafficator" on and then, supporting the arm in a horizontal position, *move the switch to the off position*.

Now withdraw the bulb holder, which is clipped into the underside of the arm, by means of the metal tongue provided. Do not attempt to remove the bulb holder while the "Trafficator" is switched on, as this may cause a short circuit, and so damage the "Trafficator."

Bulbs fitted: No. T126F, 6-watt, festoon type.

Service

Do not dismantle 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, 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.

Location of Faults in the Starting and Lighting Set

Although every precaution is taken to eliminate all possible causes of trouble, failure may occasionally develop through lack of attention to the equipment or damage to the wiring. The most probable faults are tabulated according to the symptoms which are displayed in the fault-finding tables on pages 92-94.

We give a few hints on the best way to make use of these tables, since the source of many of the troubles is by no means obvious. In some cases a considerable amount of deduction from the symptoms is needed before the real cause of the trouble is disclosed. For instance, the engine might not respond to the starter switch; a hasty inference would be that the starter motor is at fault. However, as the motor is dependent on the battery, it may be that the battery is exhausted. This in turn may be due to the dynamo failing to charge, and the final cause of the trouble may

be perhaps a loose terminal nut either at the battery or elsewhere in the charging circuit.

Much evidence can be gained from the ammeter. If, for instance, no charge reading is indicated when the car is running at, say, twenty miles per hour, with the charging switch in the "full charge" position and the lights "off," the dynamo is failing to charge. To ensure that the ammeter is not at fault, the lights should be switched on while the car is stationary, when a reading on the discharge side of the scale should be observed. Again, if the maximum ammeter reading is much below normal when the dynamo is charging, or if the needle fluctuates when the car is running steadily, a low or intermittent dynamo output can be suspected. The dynamo may have been neglected, and the trouble may be caused by, say, worn brushes or a dirty commutator.

Should the intensity of the lights vary, or should they fail entirely, it is probably due to the terminals being allowed to corrode and the consequent breaking of a connection. If the cause of the trouble is not located at the battery, the junction box should next be examined: particularly see that the terminals are quite tight. If one particular lamp does not light, look for a broken filament, a loose adapter or a broken cable from the lamp to the switchbox. When the car is stationary and the lamps light when switched on but gradually go out, the battery is probably exhausted, due to excessive use of the starter motor or lights, or to the dynamo failing to charge. If it is found that the battery is the cause of the trouble, have it removed from the car, examined, and charged up from an independent electrical supply.

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
DUBLIN Portland Road 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, 13 450-456 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 757-759 High Road, Leyton, E.10.	*Telegrams :* "Luserdep, Walt, London" *Telephone :* Leytonstone 3361 (4 lines)
LONDON 155 Merton Rd., Wandsworth, S.W.18.	*Telegrams :* "Luserv, Put, 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)

HOW TO LOCATE AND REMEDY DYNAMO TROUBLE

SYMPTOMS.	PROBABLE FAULT.	REMEDY.
Ammeter fails to indicate charge when running with no lights in use, or gives heavy discharge with lights on.	Dynamo not charging, due to: Broken or loose connection in charging circuit causing field fuse to blow.	Examine charging circuit wiring. Tighten loose connection or replace broken lead. Particularly examine battery connections. Fit replacement fuse. (See page 85.)
	Commutator greasy or dirty.	Clean with soft rag moistened in petrol. (See page 81.)
Ammeter gives low or intermittent charge reading.	Dynamo giving low or intermittent output, due to :—	
	Loose or broken connections in dynamo circuit.	Examine charging circuit wiring. Tighten loose connections or replace broken lead. Particularly examine battery connections.
	Commutator or brushes greasy.	Clean. (See page 81.)
	Brushes worn, not fitted correctly, or wrong type.	Replace worn brushes. See that brushes "bed" correctly. (See page 80.)
Ammeter gives high charge reading.	Dynamo giving high output due to :—	
	Loose connections in dynamo charging circuit.	Examine charging circuit wiring, particularly battery connections. Tighten loose connections.
	Battery acid level low.	"Top up" cells with distilled water. (See page 82.)
	Brushes not fitted correctly.	See that brushes "bed" correctly. (See page 80.)
	Control brush position altered.	Have control brush adjustment re-set at nearest Lucas Service Depot.

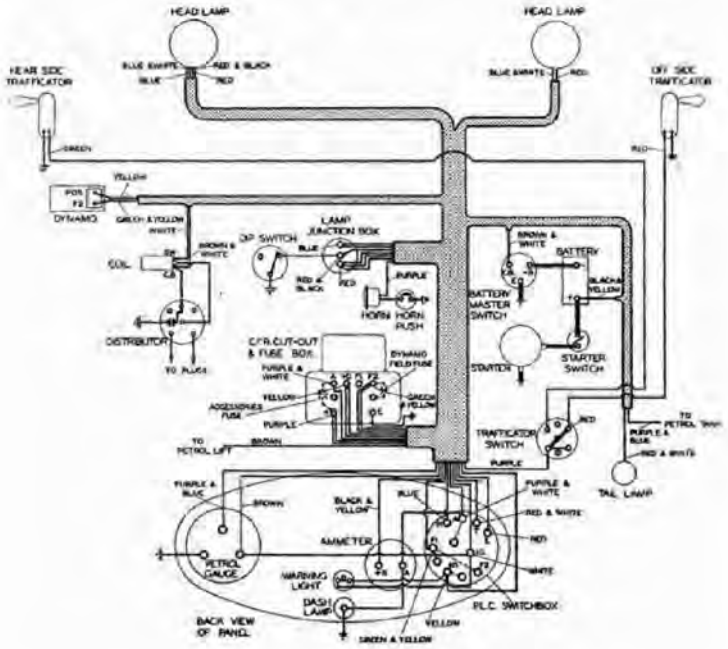
HOW TO LOCATE AND REMEDY STARTER MOTOR TROUBLE

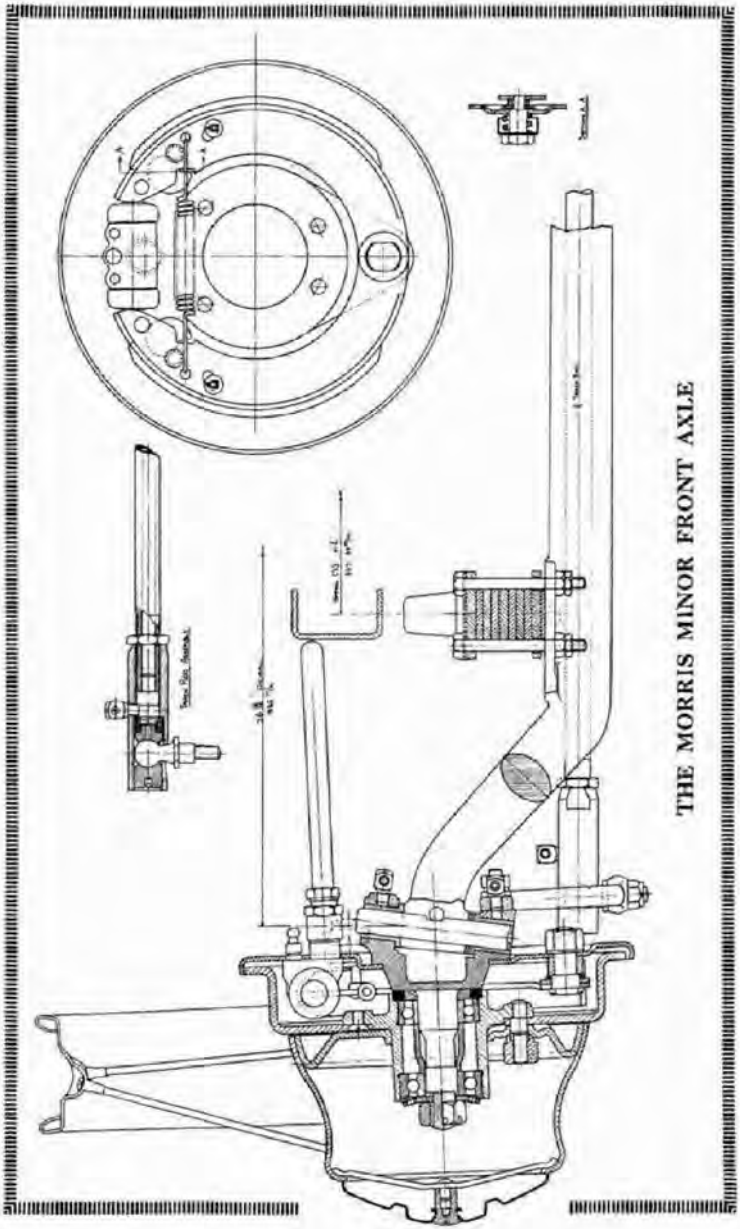
CONDITION.	PROBABLE FAULT.	REMEDY.
Motor sluggish or fails to move engine.	If engine cannot be turned by hand, then fault is due to a stiff engine.	Locate and remedy cause of stiffness.
	If engine can be turned by hand, then trouble may be due to —	
	Battery discharged.	Start by hand. Charge battery either by a long period of daytime running or from independent electrical supply.
	Broken or loose connection in starter circuit.	See that connections to battery, starter and starter switch are tight, and that cables connecting these units are in order.
	Starter commutator or brushes dirty.	Clean.
	Brushes worn, not fitted correctly or wrong type.	Replace worn brushes. See that brushes "bed" correctly.
	Starter pinion jammed in mesh with flywheel.	Rotate squared end of starter shaft with spanner. (See page 81.)
Starter operates but does not crank engine.	Pinion of starter drive does not engage with flywheel, due to dirt on screwed sleeve.	Clean sleeve with paraffin and add a few drops of machine oil. (See page 81.)
Starter pinion will not disengage from flywheel when engine is running.	Starter pinion jammed in mesh with flywheel.	Rotate squared end of starter shaft with spanner. (See page 81.)

HOW TO LOCATE AND REMEDY LIGHTING TROUBLE

SYMPTOMS.	PROBABLE FAULT.	REMEDY.
Lamps give insufficient illumination.	Battery discharged.	Charge battery either by a long period of daytime running or from independent electrical supply.
	Lamps out of alignment, or bulbs out of focus.	Align lamps and focus bulbs. (See page 87.)
	Bulbs discoloured through use, or reflectors dirty.	Fit new bulbs (see page 88) or clean reflectors. (See page 87.)
Lamps light when switched on, but gradually fade out.	Battery discharged.	Charge battery either by a long period of daytime running or from independent electrical supply.
Brilliance varies with speed of car.	Battery discharged.	As above.
	Battery connection loose or broken.	Tighten connections, or replace faulty cables.
Lights flicker.	Loose connection.	Locate loose connection and tighten.
Failure of lights.	Fuse blown.	Examine wiring for faulty cables and remedy. Fit replacement fuse. (See page 87.)
	Battery discharged.	As above.
	Loose or broken connection.	Locate and tighten loose connection, or re-make broken connection.

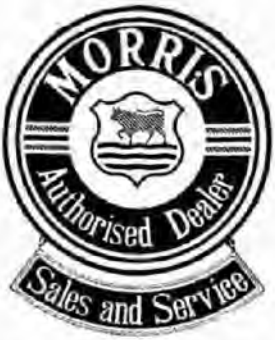
Wiring Diagram of the Lucas 6-volt Electric Lighting, Starting and Coil Ignition Equipment on the Morris Minor.





THE MORRIS MINOR FRONT AXLE

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

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