

HANDBOOK

OF THE

*Austin*

“TEN”



WAR OFFICE CONTRACT No. V/4374

PUBLICATION No.  
1969.

## FROST PRECAUTIONS

---

The following precautions must be taken during frosty weather to obviate any damage to the vehicle due to freezing of the cooling system.

1. Whenever frost precautions are ordered, the cooling system must be completely drained. It is not sufficient merely to close radiator shutters, or to cover the cooling system with muffs.
2. Drain cock is positioned at the base of the Radiator. Filler cap must also be removed when draining the system.
3. Drain cock must be tested at frequent intervals by inserting a piece of wire.

**SEE PAGE 25 WHEN USING  
ANTIFREEZE MIXTURE.**

## HANDBOOK

OF THE



**“TEN”**

WAR OFFICE CONTRACT NO. V/4374

In reference to this Book  
please quote the number **1969**

# A FOREWORD

THE information contained in this Handbook is intended only to guide and assist the driver of an Austin to preserve the vehicle in its proper satisfactory running condition.

The publication must not be considered as a complete manual, and the Company does not accept responsibility for any failure due to inadequate maintenance.

The handbook does not in any manner vary or extend the liability of the Company, which is limited to the Warranty issued with the vehicle. Where no information is given for a particular adjustment it may be regarded as one which the average driver would entrust to a garage.

*In correspondence always quote the vehicle number, which is to be found on the suttle under the bonnet, and the contract number, which appears on a plate on nearside of body.*

# CONTENTS

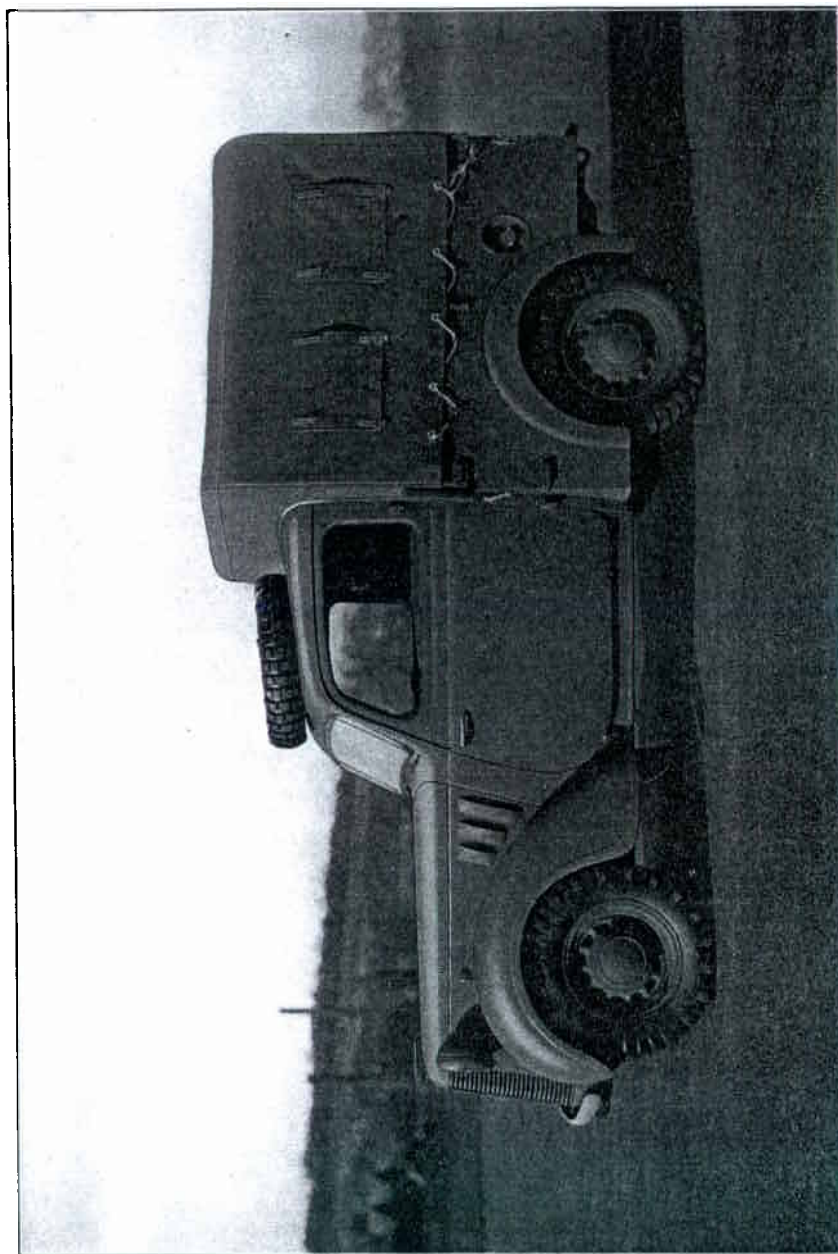
	Page
AMMETER READINGS .. .. .	9, 38
ATTENTIONS, Daily, Weekly, etc. .. .. .	12
BATTERY .. .. .	40
BRAKES, Adjusting, Relining, etc. .. .. .	43
BRAKE GEAR, Lubrication of .. .. .	33
CARBURETTER, Adjustment, etc. .. .. .	6, 20
CHASSIS LUBRICATION CHART .. .. .	54, 55
CLUTCH .. .. .	10, 50
COOLING SYSTEM .. .. .	24
COMBUSTION CHAMBER, Cleaning .. .. .	47
CONTROL OF THE CAR .. .. .	6—10
ELECTRICAL EQUIPMENT .. .. .	36
ENGINE, Lubrication .. .. .	31
" Starting .. .. .	6
FAN .. .. .	24
FUEL SYSTEM .. .. .	18, 20
FUSES .. .. .	39
GEARBOX .. .. .	10, 11, 32
GIRLING BRAKES .. .. .	43
HUBS, Lubrication .. .. .	34
IGNITION SYSTEM .. .. .	26
INSTRUMENTS .. .. .	8
LAMPS .. .. .	9, 42
LUBRICATION .. .. .	31, 54, 55
" CHARTS .. .. .	54, 55
OIL GAUGE .. .. .	8, 32
OIL GUN .. .. .	12, 35
PETROL PUMP .. .. .	18
PROPELLER SHAFT .. .. .	33
REAR AXLE .. .. .	4, 12, 32
REGULAR ATTENTIONS .. .. .	12
ROAD SPRINGS .. .. .	34
RUNNING ADJUSTMENTS .. .. .	47
SHOCK ABSORBERS .. .. .	52
SPARKING PLUGS .. .. .	30
SPEEDOMETER .. .. .	9, 33
STEERING GEAR .. .. .	34, 51
THE NEW CAR .. .. .	6
TOOLS .. .. .	53
TYRES AND WHEELS .. .. .	14
VALVE TAPPETS, Adjustment .. .. .	47
WIRING DIAGRAM .. .. .	37



## CHASSIS SPECIFICATION

- Engine** .. Four-cylinders, water-cooled, with detachable head.  
Bore, 2.620 ins. (66.65 mm.).  
Stroke, 3.5 ins. (89 mm.).  
Cubic Capacity 75.488 cu. ins. (1,237 c.c.).  
R.A.C. rating 10.98 h.p.  
Brake h.p. 28.7 at 3,600 r.p.m.  
Oil circulation is by positive gear-wheel pump (sump capacity 7 pints); and cooling by pump-circulation, with tubular radiator and fan. (Water capacity 20½ pints). There is a spring loaded valve in top tank of radiator to prevent overflow by splash.  
There are three main bearings.  
Positive lubrication is provided for the cylinder walls, oil being ejected direct into the bore from the drilled connecting rods.  
Large inlet valves.
- Fuel Feed** .. Rear petrol tank, 8½ gallons (39 litres) capacity, with telescopic filler, A.C. petrol pump, Zenith downdraught carburettor with oil bath air cleaner.
- Electrical** .. Ignition and electrical equipment by Joseph Lucas Ltd., with two 6-volt 75 a.h. batteries. Ignition is controlled by automatic advance and retard mechanism incorporated in the distributor and also a vacuum operated control. Champion L10 or Lodge C. 14S (14 mm.) sparking plugs.
- Clutch** .. A special type of clutch plate with spring-loaded friction rings assures smooth and positive engagement.
- Transmission** .. The gearbox has four speeds forward and a reverse. Top, third and second gears have synchro-mesh engagement for smooth, easy, positive and silent changes. The ratios of the engine to the road wheels are 6.143, 10.5, 16.77, and 27.6 to one; reverse 35.5 to one.  
Gearbox oil capacity, 1½ pints.  
The rear axle is ½ floating with spiral bevel gears and ball-bearing thrusts throughout and quickly detachable shafts. Oil capacity about 2½ pints.
- Springs** .. Semi-elliptic front and rear, with Luvax hydraulic piston type shock absorbers.
- Steering** .. Special worm and sector type with provision for taking up wear. Flexible spoke steering wheel 16-ins. diameter.
- Brakes** .. Girling wedge and roller operated brakes are fitted on all four wheels and are individually adjustable. The pedal and the central hand lever operate all brakes.
- Wheels** .. Special steel spoke detachable wheels are standard, with 6.00—16 tyres. Left-hand threads on nearside wheel studs.
- Controls** .. The ball change speed gear lever is centrally mounted and the hand brake control is between front seats.  
Horn button and traffic indicator switch are mounted on the steering wheel.  
Individual front seats, both adjustable.
- Main Dimensions** .. Length: 13 ft. 7 ins.  
Width, 5 ft.  
Height, 5 ft. 9 ins.  
Wheelbase, 7 ft. 9½ ins.  
Track, Front, 3 ft. 11 ins.; rear, 4 ft. 3 ins.

## THE W.D. AUSTIN TEN UTILITY VEHICLE



W.D. Austin Ten Utility Vehicle.

# THE NEW VEHICLE

## It will repay You to Read these Notes Carefully

On taking delivery of the new vehicle give it a careful general examination to see that all is complete and in order. Check the equipment and see that any special requirements have been carried out to order.

If you are not already familiar with Austin cars we strongly recommend that this handbook be carefully studied.

Before running the car see that it is supplied with ample fuel and water, and that the engine and gearbox have the necessary quantities of oil. The battery should contain the required amount of acid. For quantities of oil and acid see the sections "Correct Lubrication" and "Electrical Equipment."

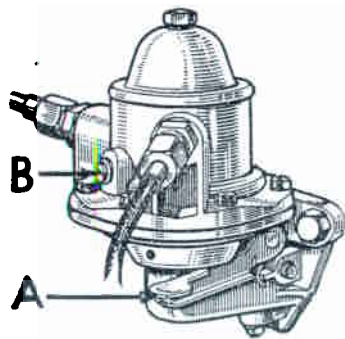
Vehicles delivered by road are ready for running. There is no oil, fuel or water in vehicles crated for overseas and batteries are empty and uncharged.

### Starting the Engine.

Before starting the engine make sure that the change speed lever is in the neutral position and the handbrake is applied.

If the vehicle has been standing for some time, starting should be assisted by using the hand priming lever on the fuel pump to give the carburetter a full supply of petrol.

Give the engine a few turns with the starting handle to make sure that the moving parts are free and to save drain on the battery. Push the handle in to engage fully with the starting nut before turning.



The Fuel Pump.

A. Priming Lever. B. Drain Plug

The ignition switch is turned to the right to switch on the ignition.

Pull the combined air strangler and throttle control knob on the instrument board to close the carburetter air inlet, and pull out the knob to operate the starter. Be sure to release the air strangler control after the engine has started. Do not allow the engine to race when first starting up, as time must be allowed for the oil to circulate and lubricate various bearings.

The engine should not be allowed to run at high speeds for the first 500 miles (800 km.). Maximum desirable road speeds for the first 500 miles are:—first gear, 7-8 m.p.h.; second gear, 12-13 m.p.h.; third gear, 19-20 m.p.h.; top gear, 30 m.p.h.

Never leave the ignition switch "on" for any lengthy period while the engine is not running. The red warning lamp on the switch board will remind you of this.

### Difficulty in Starting.

Difficulty in starting may be caused either through drawing too much fuel into the cylinders, or too little. When starting with the throttle all but closed, a strong suction takes effect on the slow running jet.

If the engine fails to start quickly and the mixture is thought to be too rich the accelerator pedal should be depressed half-way to reduce the suction. On firing, the engine will race, and the throttle should be almost closed. If the engine does not fire, close the throttle entirely and try again.

After a stop in hot weather, failure of the engine to start is more likely to be due to a too rich mixture than one too lean, and one should stop the engine by the switch only after closing the throttle. Re-start the engine with the throttle closed.

Depress the clutch pedal to lessen the starting load and so help the starter to turn the engine at a higher speed.

If, after the foregoing measures have been carried out, the engine fails to start, the reason will probably be faulty ignition or carburation.

If faulty ignition is suspected first examine the wires and see that the sparking plugs are connected. Test the gap of the plug points by means of the thick end of the gauge provided in the tool kit. If the points are dirty, clean them.

If carburation gives trouble the slow running jet may be stopped up or the main jet choked. Blow them out orally or with a tyre pump. Never attempt to clean them by passing a wire or other small metal object through them; this will definitely injure the jets.

# THE INSTRUMENTS

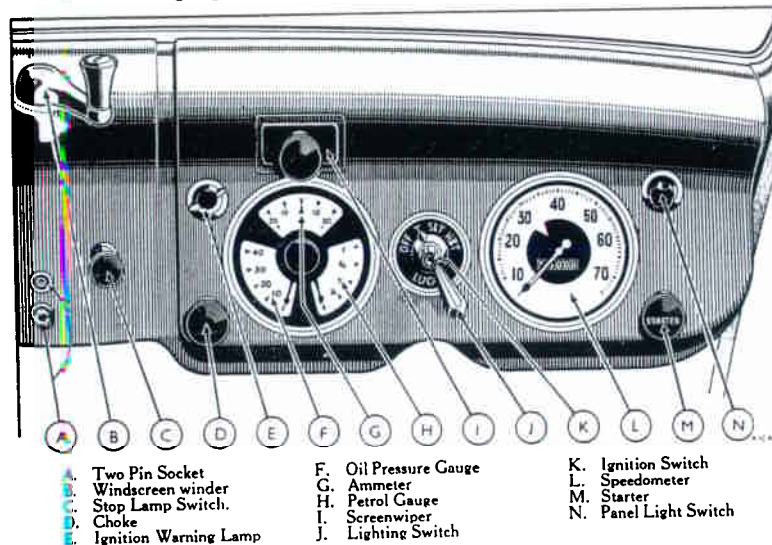
## Fuel and Oil Gauges ; Speedometer ; Windscreen Wipers

A FULL range of instruments is provided. They are of the highest quality and the following notes explain their uses.

### Fuel Gauge.

The Fuel Gauge is electrically operated and automatically indicates the approximate contents of the tank when the ignition control is switched on.

When the tank is being refilled, switch off and stop the engine and then switch on again and the needle will record the amount of spirit entering the tank. The gauge requires no attention.



### Oil Gauge.

The Oil Gauge indicates that oil is being pumped through the engine lubrication system and it should be looked at frequently when the engine is running to ascertain that sufficient pressure is registered.

When the engine is cold high pressure will be recorded, but this is likely to drop as the oil becomes warmer. If no pressure is registered the engine should be stopped and the cause of the fault ascertained, otherwise serious damage may be caused.

Flickering of the needle may indicate serious shortage of oil or a damaged pipe line.

The gauge may indicate a pressure of 40 lbs. when the engine is cold or from 30 lbs. to 35 lbs. when hot. With the engine running at constant speed the needle should be quite steady.

### Windscreen Wipers.

The windscreen wiper on the driver's side is started by pushing in the knob and turning it to the left. After this blade is in operation, the second blade may be started by pushing in its knob and turning to the right. The second blade should be stopped first by pushing in the knob and turning to the left ; to stop the first blade, push in the knob and turn to the right. The wipers operate only when the ignition switch is "On."

### Ammeter.

The Ammeter indicates the rate of charge or discharge of the battery, but does not indicate current used by the starter motor.

No discharge should be indicated with no electrical equipment in use or with headlamps on when the vehicle is running at about 20 miles an hour (30 km.), or faster.

### Switch Box.

When the engine is not in use the ignition knob should always be turned to the off position. The red warning lamp indicates when the ignition is "on" and the battery is discharging.

The dynamo has compensated voltage control and the main switch only operates the lighting of the head, side and tail lamps.

### Lighting Switch.

The lighting switch has four positions : Off, Tail, Side and Tail, Head and Tail. In the centre of the fascia board is a separate push-pull Stop Lamp Switch.

### Axle Flood Lamp.

The Axle Flood Light is bolted to the underside of the chassis floor, and is controlled by a switch mounted on a cross member near the tail board ; this is the only control for the Flood Lamp.

### Speedometer.

The speedometer records up to 100,000 miles or kilometres and these figures automatically return to zero.

The speedometer requires no lubrication or attention, but the cable should be greased occasionally. (See page 33.)

### Traffic Signals.

The Traffic Indicators are controlled from the steering wheel. Normally after the vehicle has turned a corner they automatically return, but when only a slight turn has been made it may be necessary to switch off the indicators.

### Panel Lights.

The instruments are illuminated by three lamps controlled by the same switch. The holders can be pulled from the back of the instruments so that the bulbs may be replaced.

### Windscreen

The front screen is opened by turning the handle at centre of dash.



# CONTROL of the CAR

## How to Change Gear and Some Good Driving Hints

**T**HE driving seats are adjustable for reach and this convenience should be taken advantage of to obtain the greatest comfort.

To engage first gear, push out the clutch and move the gear lever into the first speed position.

Sometimes it may happen that when the clutch is let in again, there is no apparent drive from the engine. That is because there has been no proper engagement of the gears. Therefore, push out the clutch again, and it will almost certainly be found that the lever can then be moved to give the proper gear engagement. Do not use force.

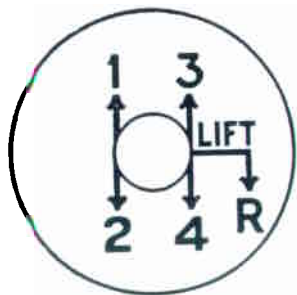
Start on first speed, accelerate to about 8 m.p.h., push out the clutch, move the lever to neutral, and continue the movement of the lever steadily to the second speed position and let in the clutch gently.

In moving from second to third speed, a similar action takes place. Accelerate to about 12 m.p.h., declutch, release the accelerator, move the lever to neutral and continue the movement of the lever steadily into the third speed.

To move from third to top, declutch, and move the lever steadily into the position desired. It assists the change down from top to third, and third to second if the accelerator is kept slightly depressed while the change is made.

### Change Early.

Always change gear early on a hill. Never allow the engine to labour in any gear and expect it to pick up speed on changing into a lower one when the car has nearly stopped. Do not persist in attempting to drive uphill in top gear when the speed falls below 18-20 m.p.h.--change down early.



The Gear Positions.

If the car has been driven back in reverse gear, wait until it is stationary before engaging a forward speed. Do not engage the reverse gear when the car is travelling forward. Serious damage to the gears will result.

Keep the foot off the clutch pedal except in heavy traffic. Even then do not allow the weight of the foot to be taken by the pedal. The slipping of the clutch caused by this practice heats and wears it badly.

When descending a long hill, or before commencing a steep descent, engage one of the lower gears, and do not accelerate. The engine will then help to retard the speed of the car. When using the brake, keep the clutch in, disengaging it at the last moment if stopping the car.

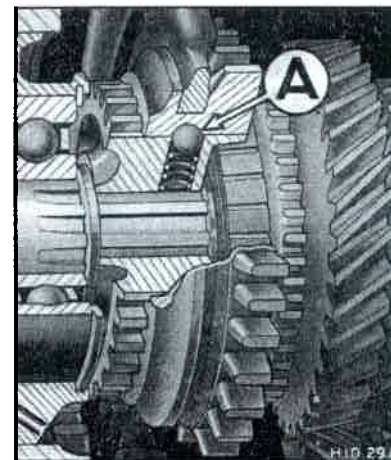
### Skidding.

Skidding is sometimes due to sudden braking on a greasy or loose surface and unduly slack tyres contribute to it. If the rear wheels skid, release the brakes and turn the front wheels towards the direction of the skid.

### Synchromesh Gears.

The gearbox has four forward speeds and a reverse and the second, third and top gears have synchromesh engagement, which ensures silent, positive changes.

Gear changing may be slightly stiff in a new car until the moving parts have eased in use. Changing should not be done hurriedly and no attempt should be made to force the gear lever if engagement is not made at the first attempt. Should difficulty be experienced in engaging a gear when the car is standing, release the clutch for a moment and then try again.



The synchromesh mechanism is governed by a series of spring loaded balls as illustrated. The internal cone on the inner member makes contact with the gear cone to synchronise the speeds of both members before the dog member overcoming the resistance of the ball A, moves on to give positive gear engagement.

### What Not to Do.

#### Second Speed Synchronising Mechanism.

Careful attention should be paid to the following points:—

- Do not forget the ignition switch when starting up.
- Do not make a fast run with a radiator muff closed.
- Do not continue pulling the starter if the engine will not fire.
- Do not touch the starter switch while a gear is engaged.
- Do not forget to release the strangler control after starting the engine.
- Do not leave the car in gear and with the handbrake off.
- Do not coast with a gear engaged and the clutch held out.
- Do not fill the radiator with cold water when the engine is hot.
- Do not leave the ignition switched on when the car is not running.
- On no account run the engine in a closed garage. The exhaust gases are highly toxic and a very small amount in a restricted atmosphere will produce grave, if not fatal results.

# REGULAR ATTENTIONS

## A Summary of Daily, Weekly and Occasional Maintenance Work

**O**N this and the opposite page is a handy summary of all the attentions described in this handbook. The attentions under the daily, weekly and monthly headings are based on the assumption that the maximum mileage per week does not exceed 500 (800 km.).

Under more arduous conditions, i.e., very dusty or very muddy roads, long distances at high speeds or with heavy loads, it will be advisable to attend to the lubrication of chassis parts more frequently.

After the first few days' use tighten all nuts, particularly those on the engine cylinder head. These may become slack because of the heat generated, but if they are retightened the cylinder head will remain secure against gas or water leaks.

**WARNING.**—After the car has been washed, or driven through water, the brake linings may be wet. Apply the brakes a number of times for some distance in order to dry them. Wet brakes are dangerous. Keep the handbrake hard on when the vehicle is being washed.

### Daily Attentions.

1. Examine the oil level in the crankcase and add more oil if necessary. The dip rod indicates the level of the oil.
2. Examine water level in radiator and fill up to within one inch of the top.
3. Fill the petrol tank if necessary. The capacity is  $8\frac{1}{2}$  gallons.
4. Oil steering pivot pins, connecting rod and track rod.

### Weekly Attentions.

1. Examine oil level in the gearbox. It should reach bottom of filler plug. Capacity  $1\frac{1}{2}$  pints.
2. Rear axle—charge the back axle case with lubricant using the adapter on the oil gun. Capacity  $2\frac{1}{4}$  pints.
3. Oil the brake and throttle joints.
4. Lubricate water pump and pulley bearings.
5. Oil propeller shaft splines (from below, behind the gearbox). Turn the shaft to expose the nipple.
6. Charge the steering box with lubricant using oil gun adapter.

7. Oil top of steering column.
8. Oil brake balance levers.
9. With the oil gun charge Shackle Pins at rear of all springs (8).
10. Oil brake and clutch pedal levers, and also throttle joints.
11. Examine the brakes and adjust if necessary (at each hub).
12. Test the tyres for correct pressure and examine them for cuts, flints and nails.
13. Examine the battery, top up if necessary and see that the connections are tight. (Frequently in hot weather).

### Every Two Months (Workshop Inspection).

1. Road Springs. Oil with M.160.
2. Distributor. One or two drops of M.160.
3. Dynamo. One or two drops of M.160.
4. Shock Absorbers. Check fluid level.
5. Sparking Plugs. Clean and check gap settings.
6. Front Wheels. Check alignment.
7. Ignition Distributor and Contact Breaker. Clean, lubricate, and if necessary, adjust.
8. Commutators (Dynamo and Starter). Clean.
9. Tappets. Adjust.
10. Radiator. Flush with plenty of cold water until it runs clear.
11. Examine and tighten, if necessary, all bolts and nuts such as road spring clips, cylinder head nuts, wheel nuts. Examine steering gear, brake rods, propeller shaft.
12. Clutch operating shaft. Lubricate sparingly as any excess may find its way into the clutch.

### Other Attentions.

Every 2,000 miles. Clean out sump and refill with M.160. The capacity is approximately 7 pints. Clean out and refill oil-bath air cleaner.

Every six months. Clean out gearbox and refill with C.600. Clean out front wheel hubs and refill with grease. G.S.

Decarbonize engine, grind in valves and adjust tappets. Clean petrol pump and carburettor fuel filters.

Every twelve months. Clean out rear axle and refill with C.600.



# CARE OF THE TYRES

## Correct Inflation Pressures ; How to Use the Jack

THE key to economical and efficient tyre service is to maintain the correct pressures and test the tyres, including the spare, at least weekly. Any loss of air pressure can then be made up with very little effort.

A gauge applied to the valve must be used, for it is seldom possible to detect under-inflation from appearance. A special tool is supplied for tightening or removing the valve "insides."

Tyres of 16" diameter have tubes with rubber valves, i.e., the valve mechanism is housed in a rubber stem. A small valve cap screws on the end of the valve and forms a secondary air seal. A nip is provided between the valve stem and the valve hole in the rim and no other extraneous valve parts are necessary.

Shorter tread life, less resistance to accidental damage, and disintegration of the cord foundation are possible results of under-inflation. Tyres in this condition are also conducive to front wheel wobble and skidding.

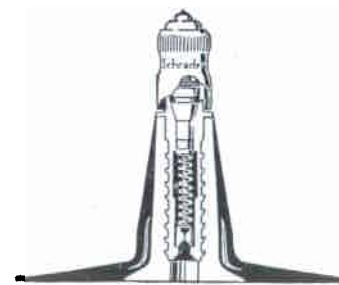
Recommended pressures are :

TYRE SIZE	FRONT	REAR
6.00—16	20	24

Pounds per square inch.

A tyre that loses more than three to four pounds per square inch in a week should be regarded as a "suspect." First make sure that a new valve "inside" is not required. If the tube is punctured, after repair ascertain before refitting that the puncturing object is not still embedded in the cover.

It is important that both the front tyres should be kept at the same pressure. If, because of wear or other causes, the steering develops a tendency to wander or show signs of wobble, the front tyre pressure may temporarily be varied.



The Tyre Valve.

## Dirt and Damage.

Oil, paraffin and grease are injurious to rubber, and should be removed as soon as possible by the use of a clean cloth and a very little petrol.

Damage affecting only the rubber tread and walls may be plugged with a good tread cut filling. If this is done promptly an extension of the injury will be prevented.

Damage of a more serious nature affecting the cotton structure should be entrusted only to an expert tyre repairer or tyre manufacturer.

It is essential that the tyre should be removed immediately damage is sustained.

## Fitting Hints.

When fitting a tyre attention is called to the following points.

To avoid trapping the tube between the edge of the cover and the rim, always inflate the tube very slightly before placing it in the cover.

During the final inflation see that the edges of the cover are seated evenly round the edge of the rim. Check this by the moulded line on the cover, which should be about a quarter of an inch from the rim all the way round.

## Uneven Wear.

Because the front wheels are slightly "cambered" or lean outwards, the outer side of the tyre tread wears more than the inner. To minimise the effect of such wear, turn the tyres periodically, say every 3,000 to 4,000 miles (5,000 to 6,000 km.) so that the more worn sides are next to the car.

At the same time exchange the near and offside tyres so that unequal weight distribution and consequent wear caused by road camber are shared. The spare tyre should be used in turn with the others.

## Changing a Wheel.

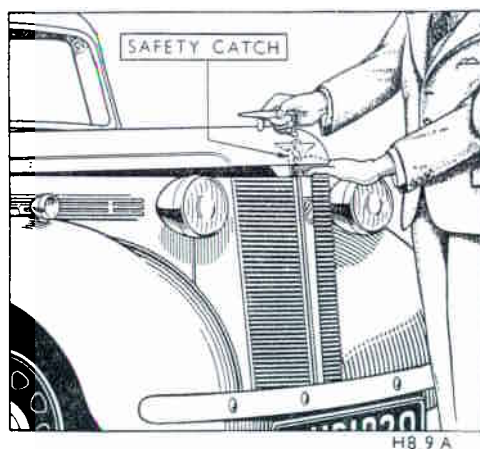
NOTE.—The nearside wheel nuts and studs have left-hand threads and the nuts are marked with the letter "L."

Before removing a wheel see that the handbrake is on firmly and if on a hill scotch one or two of the wheels. Check the spare tyre for correct pressure and adjust the jack nearly to the height required by turning the head.

When changing a front wheel place the jack under the axle beam immediately below spring mounting. For a rear wheel, place jack under spring as close as possible to axle.

On fitting the spare wheel, tighten the nuts alternately and securely before removing the jack and test the nuts again when the wheel is on the ground.

## Bonnet Safety Catch.

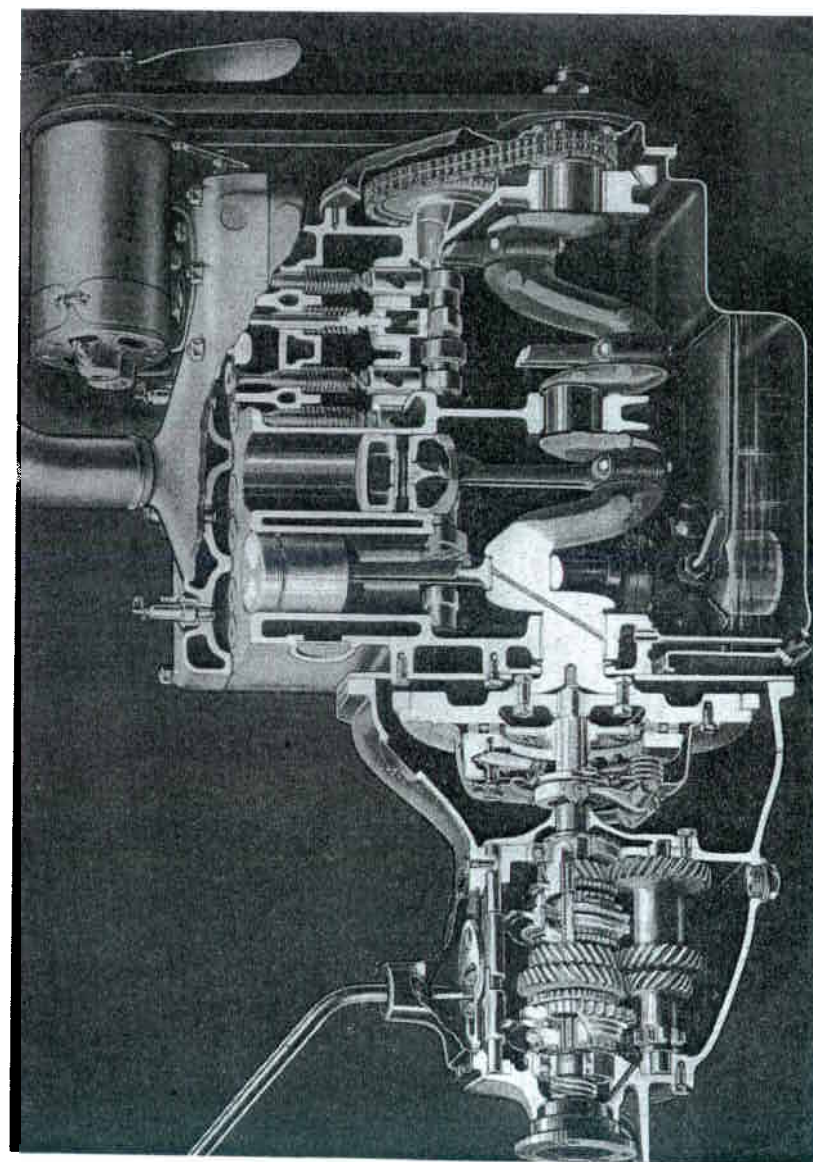


To open bonnet, turn handle towards offside of car and lift, but the safety catch has first to be pushed back by the other hand.

This safety catch is designed to hold bonnet down while driving even if the bonnet has not been properly locked.

**ALWAYS LOCK  
THE BONNET.**

## The Austin "TEN" Engine and Gearbox



# THE PETROL PUMP

## How Fuel is supplied from the Tank to the Carburetter

**P**ETROL is drawn from the tank at the rear by means of the petrol pump which advances the fuel in the correct quantity demanded by the carburetter, no more and no less.

Make sure that any difficulty is not due to causes apart from the pump before attempting to do anything to the pump.

If there appears to be lack of fuel at the carburetter, first ascertain if there is any fuel in the tank, and if not, replenish. Make sure that the tubing and connections between the tank and the pump, and between the pump and the carburetter, are not leaking. In case of broken or damaged tubing, replacement should be made.

It may be that the filter cover of the petrol pump is loose. If this is the case, tighten the main nut at the top, first ascertaining that the cork gasket lies flat in its seat and is not broken or unduly compressed. A gasket compressed hard may need to be replaced by a new one.

### Clean the Filter.

Occasionally remove the cover and clean the filter screen underneath it. Also remove any sediment from the chamber below the filter by taking out the drain plug (F). Make sure that the fibre washer is under the head of the cover plug before replacing.

When re-assembling, take care that the cork gasket is replaced correctly under the cover and that the fibre washer is under the head of the screw.

If petrol appears to be leaking at the edge of the diaphragm tighten the cover screws alternately and securely.

Sometimes there appears to be a leakage of fuel at the diaphragm edge but the leakage may actually exist at one of the pipe fittings, causing the fuel to run down the pump to the diaphragm flange.

In hot weather when petrol is likely to evaporate, or when difficulty might be expected on cold mornings, it is advisable to fill the carburetter by operating the hand priming lever (L) on the pump before attempting to start the engine.

It will be appreciated that if the engine comes to rest when the rocker arm is on the high point of the eccentric, the priming lever will be inoperative. In this event the engine should be turned one revolution by hand.

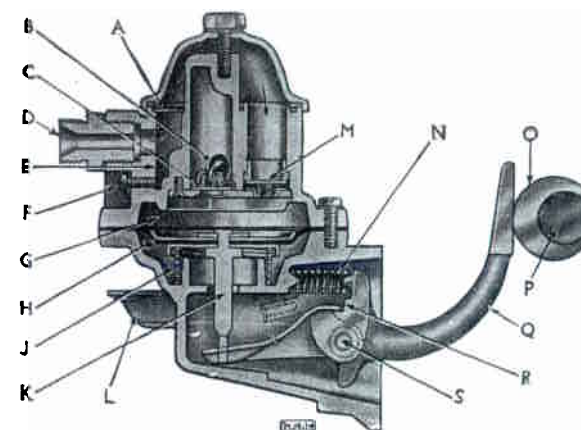
The pumping action of the diaphragm can be distinctly felt until the carburetter bowl is full.

After removal of the upper casting on this type of fuel pump it is important that the cover should only be replaced while the pump pull rod is at the top of its stroke. This is to ensure sufficient flexing of the diaphragm to allow its normal working movement. The pump, however, should only be dismantled where special tools are available. The pump is protected from exhaust heat by a metal and asbestos shield.

### How it works.

By revolving shaft (P) the eccentric (O) will lift rocker arm (Q) which is pivoted at (S) and which pulls the pull rod (K), together with the diaphragm (H), downward against the spring pressure (J), thus creating a vacuum in the pump chamber (G).

Fuel from the rear tank will enter at (D) into sediment chamber (E) and through the filter gauze (A) and suction valve (M) into pump chamber



The A.C. Petrol Pump.

F. Drain Plug.

L. Priming Lever.

(G). On the return stroke strong spring pressure (J) pushes the diaphragm (H) upward, forcing the fuel from chamber (G) through pressure valve (C) and opening (B) into the carburetter.

When the carburetter bowl is filled the float in the float chamber will shut off the inlet needle valve, thus creating a pressure in pump chamber (G). This pressure will hold diaphragm (H) downward against the spring pressure (J) and it will remain in this position until the carburetter requires further fuel and the needle valve opens.

The rocker arm (Q) is in two pieces, the outer one operating the inner by making contact at (R) and the movement of the eccentric (O) is absorbed by the "break" when fuel is not required.

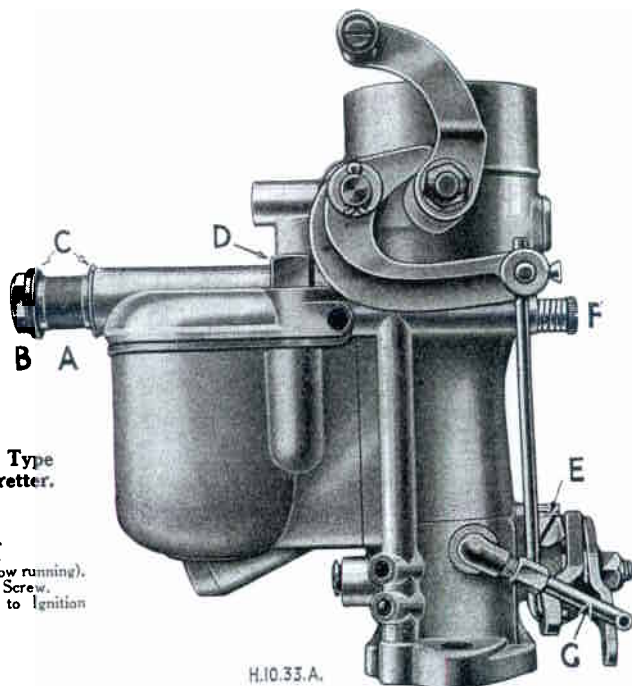
Spring (N) is merely for the purpose of keeping the rocker arm (Q) in constant contact with the eccentric (O) to eliminate noise.



# ZENITH CARBURETTER

## Cleaning and Adjustment for good Performance.

THE carburetter fitted is the Zenith downdraught type, embodying the well known principles of main and compensating jets. Fuel from the pump passes through the union, the filter and the needle seating into the float chamber. As the float rises it will close the needle on its seating, thus regulating the flow of the fuel.



**Downdraught Type Zenith Carburetter.**

- A. Fuel Filter
- B. Union Nut.
- C. Fibre Washers.
- D. Retaining Bolt.
- E. Stop Screw (slow running).
- F. Air Regulating Screw.
- G. Vacuum Pipe to Ignition Control.

H.10.33.A.

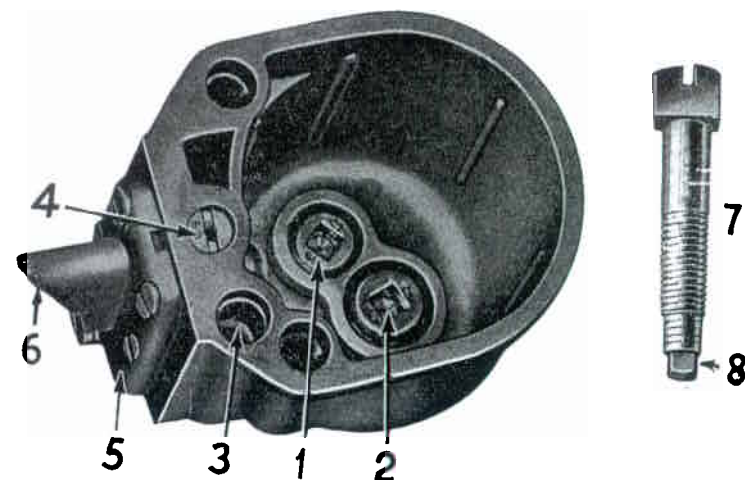
The float chamber contains the main jet, the compensating jet, the capacity well, and the slow running jet. Fuel flows through the main and compensating jets and also rises in the capacity well. From the jets it flows along two separate channels into a common channel in the emulsion block attached to the float chamber.

This main channel has its outlet in a nozzle which projects into the choke tube.

The capacity well is in direct communication with the atmosphere and the compensating channel in the emulsion block.

## Starting the Engine.

To obtain an easy start from cold the control on the dashboard should be pulled to its fullest extent and the engine should be given, by hand, a few turns to free the moving parts. Then pull the self-starter knob. When the engine is running release the strangler control to the second notch.



**The Carburetter Bowl.**

- |                    |                      |                    |                                 |
|--------------------|----------------------|--------------------|---------------------------------|
| 1. Main Jet.       | 2. Compensating Jet. | 3. Capacity Well.  | 4. Slow-running Jet.            |
| 5. Emulsion block. | 6. Nozzle.           | 7. Retaining Bolt. | 8. Squared end to form jet key. |

In cold weather it may be necessary to hold the strangler control out for a few minutes while the engine warms up and to run the car for the first few minutes with the knob in the second notch position. As soon as the engine is warm, however, the control knob should be pushed right in, otherwise the mixture will be too rich.

If difficulty in starting the engine is experienced, ascertain that the strangler flap is closing properly and if necessary adjust the wire.

A choked slow running jet will also cause difficulty. Jets should be cleaned only by blowing through them, either with a tyre pump or orally, or washing in petrol.

On no account may wire be used.

Make sure that the strangler flap opens fully, for if this sticks in a partially closed position it will restrict the speed of the car and increase fuel consumption.

If the engine does not idle as slowly as desired, turn the screw (E) to the left to close the throttle slightly.

A weak mixture may cause difficulty in slow running and this may be adjusted by turning the air regulating screw clockwise to enrich the mixture. Do not make the mixture too rich or the engine will "hunt," or will tend to choke when slow running while warm.

### Cleaning.

The bowl of the carburetter should be removed occasionally for cleaning. Take out the two retaining bolts and the bowl will drop into the hand. On turning the bowl upside down the float will fall out and reveal the main and compensating jets at the bottom of the bowl.

The jets are removed by fitting into them the squared end of one of the retaining bolts and using a spanner on the other end.

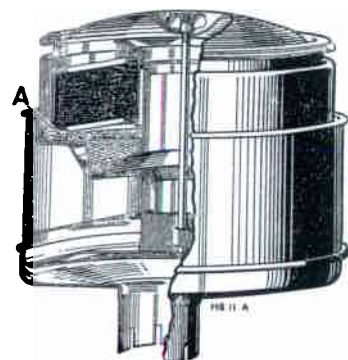
The pipe connection from the petrol pump should be dismantled and the filter thoroughly cleaned in petrol. When reassembling take care that the fibre washers on both sides of the union are correctly replaced and that the washer against which the bowl fits is not damaged.

### Standard Settings.

Sizes of Zenith jets normally run in 5's—the higher the number the larger the jet.

The standard settings are:—

Choke Tube	..	..	21
Main Jet	..	..	92
Compensating Jet	..	..	50
Slow Running Jet	..	..	45
Progression Jet	..	..	100
Capacity Tube	..	..	2
Needle Seating	..	..	1.5



Oil-Bath Air Cleaner.

A. Oil Level.

Do not, however, alter the jets unless you are quite sure that other parts of the engine, including sparking plugs, ignition and valves are in order, and that the compression is good. There are no moving parts in the Zenith carburetter, so that nothing can get out of adjustment when once set.

### Oil Bath Air Cleaner.

A special type of Oil Bath Air Cleaner and Intake Silencer is fitted to the carburetter.

It is important that oil should be maintained to the correct level indicated by the line on the casing.

Each time the engine oil is drained remove the air cleaner complete, unscrew the butterfly nut at the top and take out the gauze unit. The

oil bath immediately beneath the gauze should be cleaned and refilled with oil of the same grade as used in the engine. About half a pint is necessary. The bath should be renewed more frequently under very dusty running conditions. Wash the gauze unit in petrol and allow it to dry before replacing.

It is important that the cleaner should receive these attentions in order to maintain its cleaning efficiency and consequent protection of the engine.



# THE COOLING SYSTEM.

## Precautions to take against Freezing and Overheating.

THE cooling of the engine is maintained by an efficient radiator and a water impeller. The radiator should be filled with rain water, if available, or clean soft water, up to within about one inch of the filler.

The capacity of the radiator, pipes and cylinder jacket, is about 20½ pints.

### Belt Adjustment.

The fan belt should be just sufficiently tight to prevent slip. To make the adjustment slacken the link locking nut at the front of the cylinder head and raise or lower the dynamo until the desired tension of the belt is obtained. Then securely lock the dynamo in position again.

When the belt is properly adjusted it should be possible to move it laterally about one inch each way, holding it half-way between the pulleys.

### Winter Precautions.

Care should be taken to see that the water is drained off completely, for in case of freezing it will do harm by lodging in small places and fracture of the cylinder block may result. Drain tap is in bottom of radiator.

There is a spring loaded valve in the top tank of the radiator to prevent overflow by splash. When emptying the system the filler cap must be removed or an air lock will prevent complete drainage.

Freezing may occur first at the bottom of the radiator or in the lower hose connection. Ice in the hose will stop water circulation and may cause boiling.

A muff can be used to advantage but care must be taken to adjust it suitably or boiling may result.

### Flushing.

To prevent the gradual formation of deposits in the cooling system, with consequent impeding of the circulation, the use of hard water should be avoided. Soft rain water, syphoned from the top of the barrel where it is clean, or, failing that, soft water or water that has been boiled, should be used.

Every two months flush out the cooling system by opening the drain tap at the bottom of the radiator and allowing water to run through until it comes out clear.

Overheating may be caused by a slack fan belt, excessive carbon deposit in the cylinders, running with the ignition retarded, using oil of poor quality, improper carburettor adjustment, failure of the water to circulate, or loss of water.

### Protection by use of Antifreeze Mixture.

Vehicles with antifreeze mixture in the cooling system have an identification mark on the Header tank of the radiator, under the bonnet, in the form of a disc painted in a specified colour. That colour will be changed each year.

### The following precautions are necessary on vehicles so marked.

1. When frost is expected or when the vehicles are to be used in very low temperatures, make sure that the strength of the solution is in fact up to the strength ordered.
2. The strength of the solution must be maintained by topping up with anti-freeze solution as necessary. Topping with water reduces the degree of protection afforded.
3. On vehicles on which an overflow pipe, or a level plug or cock is provided do not fill the radiator up to the overflow. Leave space for the natural expansion of the mixture in order to avoid unnecessary topping up and consequent dilution. **Top up when system is hot.**
4. If the cooling system has to be emptied, run the mixture into a clean container and use again.
5. If for any reason the mixture is lost and the system is filled with water, **remove the painted disc on the Header tank.**





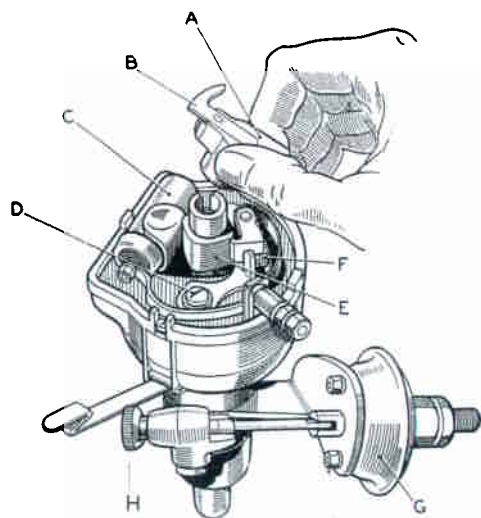
# THE IGNITION SYSTEM

## Cleaning the Distributor ; Lubrication and Fault Finding.

**T**HE coil ignition equipment is provided with an automatic timing control which consists of a centrifugally operated mechanism housed in the base of the distributor, which advances the timing with increase of engine speed. In addition, the distributor incorporates a vacuum operated mechanism which gives greatly improved timing control as it provides for variations of engine load.

The distributor is also fitted with a micrometer control which allows very fine adjustment of the timing to be made simply by turning a knurled knob ; clockwise movement advances, and the opposite direction retards the ignition. With a clean engine using first grade fuel, the micrometer scale should be set at "O." The adjustment must not be altered by more than half a division on the scale at a time.

Very little attention is needed to keep the ignition equipment in first-class condition, but we advise that it is inspected occasionally, and the following instructions on lubrication, cleaning and adjustment should be carried out.



A. Moulded Rotating Arm.  
B. Rotating Electrode.  
C. Condenser.  
D. Screw securing contact plate

E. Cam.  
F. Contacts.  
G. Suction timing control unit.  
H. Timing control screw.

### Distributor Unit.

Occasionally remove the distributor cover by pushing aside its two securing springs.

See that the electrodes are clean and free from deposit. If necessary, wipe the distributor with a dry duster and clean the electrodes with a cloth moistened with petrol. Also see that the carbon brush in the centre of the moulding is clean and moves freely in its holder.

Next examine the contact breaker. It is important that the contacts are kept free of grease or oil. If they are burned or blackened they may be cleaned with a fine carborundum stone, or a 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. It is possible that misfiring may be caused if the contacts are not kept clean.

Do not attempt to clean the contacts if they become rugged, but have them attended to by a skilled mechanic.

### Contact Breaker Gap.

After the first 500 miles the contact breaker gap should be checked and if necessary re-set to .012in. maximum opening. A suitable gauge is supplied in the tool kit. Having once been re-set, following the initial bedding down, the contacts will probably need adjustment only at very long intervals. It is not advisable to alter the setting unless the gap varies considerably from the gauge.

If adjustment is necessary, turn the engine to the position in which maximum opening of the contacts is given and, keeping the engine in this position, slacken the locking screws in the contact breaker base. Then move the bracket carrying the contact until the gap is set to the thickness of the gauge. Afterwards tighten the locking screws. It is advisable to check the gap again to ensure that no movement has taken place during the locking process.

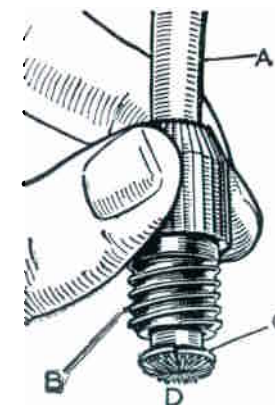
### Lubrication. Distributor Shaft and Cam Bearing.

About every two months withdraw the moulded rotating arm from the top of the spindle by pulling it off, and add a few drops of light oil. Do not remove the screw exposed to view. Take care to refit the arm correctly and to push it on to the shaft as far as possible, otherwise there is a risk of tracking and burning the moulding.

With the DKY distributor, this lubricates both the distributor shaft and cam bearing. On DK type distributor, a lubricator is provided for the shaft, through which a few drops of thin machine oil should be added every two months.

### Automatic Timing Control.

About once every two months the automatic timing control must



**High Tension Terminal.**  
A. H.T. Cable. B. Moulded terminal.  
C. Washer. D. Cable Strands.

be lubricated with a good quality medium grade engine oil. On DKY distributors, carefully add a few drops of oil via the hole in the contact breaker base through which the cam passes. To render the control accessible in the case of DK distributors, remove the distributor moulding, lift off the rotating distributor arm and then remove the contact breaker base by withdrawing its two securing screws. Take care to refit contact breaker base in original position.

### Cam and Contact Breaker Pivot.

Every two months the cam and pivot on which the contact breaker works should be lightly smeared with grease.

### The Coil.

The coil unit requires no attention beyond seeing that the terminal connections are kept tight and the moulded coil top is kept clean.

### High Tension Cables.

If the high tension cables show signs of perishing or cracking, which will cause misfiring, they must be replaced. Use only 7 mm. rubber-covered ignition cable for all high tension leads.

To connect up the 7 mm. cable to the distributor or coil terminals, thread the lead through the terminal nut, bare the end of the cable about  $\frac{1}{4}$  in., pass it through the washer and bend back the strands. Tighten the terminal to make a good connection.

### Ignition Faults.

If the engine will not fire, or fires erratically, the trouble may arise from the carburetter, or petrol supply and not the ignition. A partially choked jet, incorrect petrol level, or air leaks into the induction system may be the faults. Equally, sooted plugs can be suspected. Dismantling and cleaning them will remedy this trouble.

If the battery has run down, or the terminals have worked loose, quite obviously there will be no spark, and the same results can be expected if the distributor electrodes and contact breaker have been neglected and are dirty.

The coil can be tested by removing the cable from the centre socket on the distributor cover and, holding the rubber, keep the end of this cable about a  $\frac{1}{2}$  in. from some metal part of the car, while the ignition is switched on and the engine turned. A strong and regular spark will result if the coil is in order. Clean the top of the coil, and ensure that the terminals are tight before making this test.

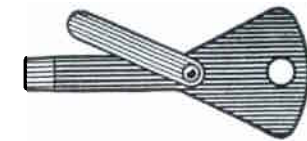
### Testing the Ignition.

To test for short circuits in the low tension wiring (the cables from the switchboard to the coil and coil to distributor) which would also cause irregular running, have the engine turned while the ignition is switched on, and watch the ammeter reading. It should rise and fall as the contact breaker points close and open. This test will also indicate if the contact breaker is functioning correctly. If the contacts remain open or do not fully close the reading will not fluctuate.

If the high tension cables from the distributor to the plugs are not securely attached to the distributor, misfiring may occur.

### Ignition Warning Lamp.

When the engine is stopped, unless only momentarily, the ignition switch should always be turned to the "off" position to prevent the battery being discharged by current flowing through the coil winding.



Ignition Screwdriver and Gauge.

A warning lamp is provided in the panel, which gives a red light when the ignition is "on" and the engine is running slowly or is stationary.

Should the bulb of the warning lamp fail, it can be withdrawn from its socket when the small cover plate, holding the red glass, is unscrewed. The replacement bulb should be a 2.5 volt, .5 watt screw cap type. The car will continue to run without this bulb, but it should be replaced by a new one as soon as possible.

### Timing the Ignition.

In order to reset the ignition timing remove all sparking plugs except No. 1 and, using the starting handle, turn the crankshaft until No. 1 piston is at top dead centre before a firing stroke. The compression felt at the handle will denote the correct stroke. Top dead centre of No. 1 piston is marked on the flywheel ( $\frac{1}{4}$ ), which can be seen after removing the clutch pit cover. Remove the distributor cover, slacken the screw in the clip of the distributor casing and turn the casing until the contact breaker points just begin to open, with the rotating centre arm pointing to the position of No. 1 electrode in the distributor cover. The spark is then correctly timed for No. 1 cylinder, and of course for Nos. 2, 3 and 4.

As the distributor cover carries the electrodes for the four cylinders it will be realised that it is imperative the rotating arm can pass the spark to the correct sparking plug lead when compression is reached by each piston.



Flywheel Timing Mark  
Top Dead Centre.

Finally tighten the adjusting screw, refit the distributor cover and test the car on the road when, if necessary, the timing can be readjusted at the distributor. There is a considerable amount of latitude for adjustment but only extremely small movement should be made at one time.

If the leads from the distributor to the sparking plugs have been disconnected they must be replaced in the firing sequence 1, 3, 4, 2.

# THE SPARKING PLUGS

THE sparking plugs fitted are the Lodge C.14S, or alternatively Champion L.10.

The gaps of these plugs should be maintained between .017in. and .018in. If the gap is allowed to become too wide, misfiring at high speeds is liable to occur, and if too small, bad slow running and idling will be the results.

The removal or fitting of the Lodge plugs for Nos. 2 and 3 cylinders must be effected with the standard  $\frac{7}{16}$ in. open-ended spanner; the special box spanner provided is for use with plugs for Nos. 1 and 4 cylinders.

When replacing the sparking plug after cleaning, make sure that the sparking plug washer is not defective in any way, and if it looks flat and worn, fit a new one to be sure of obtaining a gas tight joint.

When fitting be careful not to damage the top insulation of the plug, for a heavy knock might damage the insulation and misfiring will occur.

Improper carburettor adjustment and excessive use of the choke will have the effect of causing the internal insulation to become foul and dirty, and if the high tension leads are old and the rubber has become hard and cracked, electrical leakage may occur, with the result that the plugs will misfire. If the distributor points are out of adjustment fouling of the plugs is very liable to happen.

It is recommended that plugs be renewed every 10,000 miles, for old plugs are wasteful and give bad and sluggish running.

When replacing the lead on a plug, see that the suppressor is securely attached.

# LUBRICATION

It is imperative that the crankcase be drained at the intervals shown in the Lubrication Chart to remove foreign matter and subsequently refilled with fresh clean oil.

Drain the crankcase when the oil is warm, and therefore fluid and thoroughly agitated. It will then carry away as much of the contamination as possible.

Oil in the gearbox and back axle becomes contaminated with metallic particles from the gear teeth and these will cause unnecessary wear of the bearings unless removed. These units should also be drained at the intervals shown in the Lubrication Chart, and allowed to drain thoroughly, after which the unit should be filled to the correct level with fresh oil.

## The Engine.

After the first 500 miles running, drain the original oil by removing the plug at the rear of the sump while the engine is hot.

When the sump is removed, clean the gauze filter with petrol and allow to drain before refitting. Do not wipe with fluffy rags. Two nuts above the filter hold it to the pump, and are easily accessible. Take care that this work is done where no dust or other foreign matter is likely to be blown into the crankcase.

Fill the crankcase with oil to the maximum level indicated on the "dip stick." Approximately 7 pints will be required.

After the first change at 500 miles the oil should be changed after every 2,000 miles' running.

After refilling with fresh oil to the correct level, run the engine for a few moments to check that the oil is circulating and that the oil pressure gauge reading is correct.

The oil level should not be allowed to go below  $\frac{1}{4}$  in. on the bottom of the dip rod. Wipe the dip rod before taking the reading of the level and the test should only be made when the engine is not running and the car is on level ground.



## Oil Pressure Gauge.

The oil pressure gauge indicates whether the oiling system is working properly and it should be looked at frequently while the engine is running.

Should the gauge fail to register a normal pressure, it may be due to lack of oil in the crankcase. Should the gauge register no pressure, stop the engine immediately and look for a broken pipe or other cause of no pressure.

When the engine is started in cold weather the pressure may rise to 40 lbs. or more, but after the oil has circulated for a while and becomes warm the pressure should gradually drop to 30-35 lbs., the lower figure when running at moderate speeds. When the car is standing and the engine is running slowly pressure will probably drop very low.

A sudden rise to a higher pressure reading than normal, while the car is running with a warm engine, may be an indication of an obstruction in the oiling system.

A flickering finger may be an indication of a serious deficiency of oil in the crankcase, a damaged oil pipe line or a loose gauge pipe connection.

Any unusual difference from normal registration should be quickly noticed and the cause of the variations ascertained and set right.

The oil pump is not adjustable for pressure without removing the sump; the relief valve and spring are accurately set when assembled and should not be interfered with.

## Gearbox.

Use only the oil recommended in the Lubrication Chart.

To replenish the gearbox, remove rubber plug to the left of the gearbox. The plug of the oil hole is then accessible. Remove the plug and fill up to the bottom of the plug hole. This is the correct level.

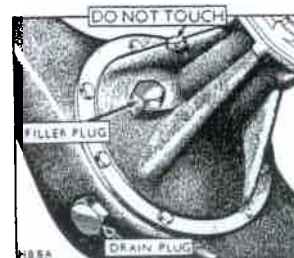
The gearbox should be drained and refilled with fresh oil to the correct level every six months. Draining should be carried out after a long run when the oil is more fluid.

The capacity is approximately  $1\frac{1}{2}$  pints.

## Rear Axle.

A special oil is used and is injected into the axle casing from the offside, using the special adapter on the oil gun barrel. First remove the plug, then place the end of the adapter into the oil hole, and grasping the barrel of the oil gun, push.

The plug also serves as an oil level indicator. Therefore do not replace the plug at once, but give time for the superfluous oil to run out, if too much lubricant has been injected. This is most important, because if the back axle is overfilled the lubricant may leak through on to the brakes and render them ineffective.



Drain the rear axle every 12 months, and replenish to the correct level. The oil should be drained while warm.

The rear axle oil capacity is about  $2\frac{1}{4}$  pints. It is important to use only the oils recommended in the Lubrication Chart.

## Rear Axle Shafts.

The rear axle shafts can be quickly withdrawn for inspection. With wheel removed, take out the two small screws and detach brake drum. The shaft flange can then be withdrawn, complete with shaft. The same procedure applies to either side of rear axle.

## Differential and Bevel Drive.

After removal of both shafts and also the propeller shaft, the bevel drive unit can be unbolted from axle case and carried away complete for inspection.

## Brake and Pedal Gear.

Oil all brake and pedal gear joints weekly.

Nipples on the brake balance levers, forward of the front axle and behind the rear axle, and on the brake pedal shaft should be oiled weekly.

## Propeller Shaft

Oil should be applied weekly through the nipple on the forward end of the propeller shaft to lubricate the splines.

As the nipple revolves with the shaft, it may be necessary to move the car a little before the nipple is properly located.

## Speedometer Drive.

The inner shaft of the speedometer drive should be lubricated every two months by dipping it in fairly thick oil. Proceed as follows: disconnect from speedometer end and pull the inner shafting out of the casing. To re-assemble, thread the oily shafting into the casing, and while threading

it give it a turning movement which helps it to go down easily, and also helps to pick up connection with the square hole in the driving end. When this engagement is felt the shaft can be pushed right home so that the top square end stands out from the casing approximately  $\frac{3}{8}$  in.

### Spring Shackles.

The shackle pins on rear ends of all road springs are provided with oiling points, and should be given a charge of lubricant once a week if the car is continually used. There are eight nipples, the bottom nipple on each shackle being positioned on the inside.

### The Hubs.

The front hubs require occasional greasing, and the grease nipple will be seen on hub cap. Apply the grease gun and inject about a quarter of a gun full. An external disc is fitted on some models, but this can be removed with a coin or screwdriver.

It is important that the hubs are not given too much grease otherwise it will penetrate to the brakes to render them ineffective.

Every two months is often enough for this attention. Rear hubs are packed with grease upon assembly and do not require attention.

### Road Springs.

To ensure the best results it is essential that the road spring leaves should be lubricated every two months. Engine oil or a penetrating oil should be used, either sprayed from the container or applied with a brush. If the wheels are removed the springs are fully accessible.

### Steering Gear.

The worm and sector steering box should be given a small charge of lubricant weekly. To do this take out the hexagon plug on the elbow at the top of the box and use the oil gun adapter. It is advisable to remove the offside front road wheel. Don't touch the square-headed adjustment screw. See illustration on page 51.

The small hole on the top of the steering column should be oiled weekly.

The steering cross rod and the steering side rod should be oiled at each end daily, and also the two nipples on each swivel axle, which are best oiled when the front wheel is jacked up.

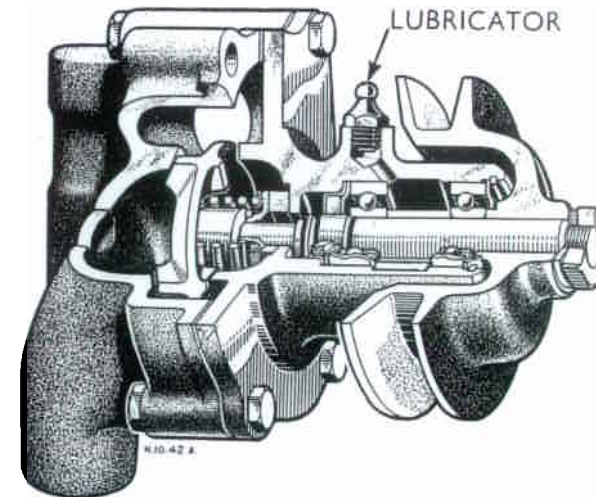
### Oil Nipples.

If an oil nipple becomes choked, unscrew and remove it. It can usually be cleaned by soaking it in paraffin or petrol and syringing either of these through it, but should it be found impossible to clean it fit a new one.

Wipe each nipple with a rag before applying the gun.

### Water Pump.

The bearing nipple should be given a charge of lubricant with the oil gun once a week.



### Other Points.

Instruction regarding the lubrication of the ignition and electrical equipment will be found under appropriate headings.

No lubrication is required at the clutch withdrawal race, but the clutch pedal operating link should be oiled weekly. The two nipples to the clutch operating shaft should receive occasional attention, but lubrication must not be excessive on account of possible leakage on to the clutch.

## THE OIL GUN

THE type of oil gun supplied in the tool kit incorporates features by which the chassis lubrication of the car is greatly simplified.

Once the gun has been charged all that is necessary is to keep pushing it against the nipple until the contents are exhausted.

Three or four strokes of the gun for each nipple are sufficient.

The ram is used for forcing oil through nipples and the adapter for lubricating the back axle and steering box. For this operation remove the end cap from the barrel of the gun, and charge with the specified oil to about three-quarters of its capacity.

Put the cap of the adapter on the open end and after removing the plug from the back axle or steering box, place the end of the adapter into the greasing hole, and, grasping the barrel, push. This will inject a large quantity of lubricant quickly.

When charging the gun it should be filled to about three-quarters of its capacity.

## ELECTRICAL EQUIPMENT

### Cleaning the Commutators and Brushes; Battery Attention; Lamps

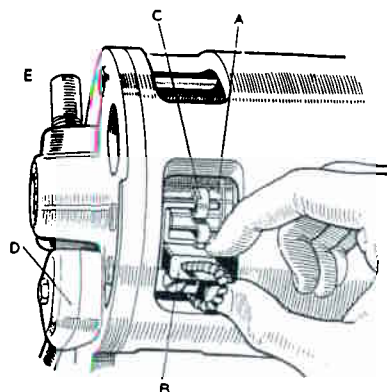
**T**HE electrical equipment with the exception of the lamps is arranged for wiring on the single wire system. The equipment is 12-volt and the battery negative lead is earthed.

If wiring has been removed for any purpose, when replacing, see that the suppressors and condensers are in position.

#### The Dynamo.

The dynamo is specially designed to work in conjunction with a compensated voltage regulator unit, mounted on the engine side of the dash, which automatically controls the dynamo output to meet the varying requirements of the battery and load. In addition the regulator unit incorporates temperature compensation which adjusts the setting to suit climatic conditions, and which also causes the dynamo to give a controlled boosting charge at the beginning of a run.

When a battery is discharged the dynamo gives a high output so as to bring it back to its normal fully charged state in the minimum time. When the battery is fully charged, the dynamo gives only a trickle charge, which is sufficient to keep the battery in good condition without possibility of damage through over-charging. The dynamo gives an increase of output to balance the current taken by the lamps or other accessories when these are switched on.



**The Dynamo.**

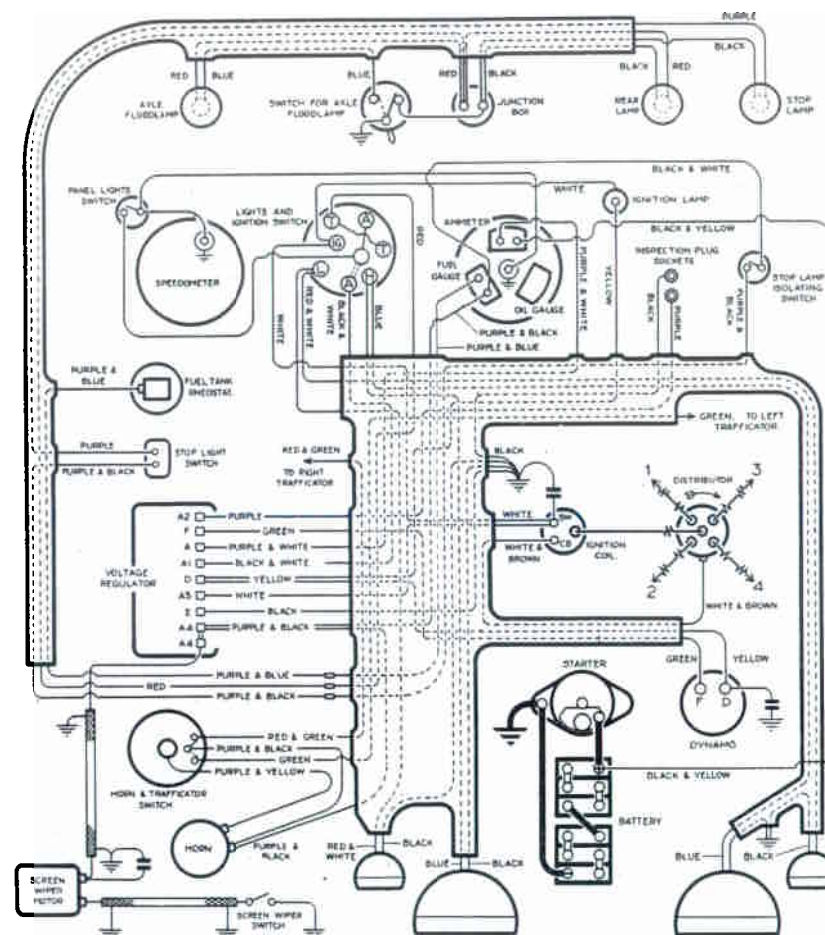
- A. Commutator.
- B. Brush.
- C. Brush Spring.
- D. Terminal Box.
- E. Lubricator.

The control of the dynamo output is entirely automatic. Hence there is no charging switch.

The only parts calling for any attention are the commutator and brushes, which are readily accessible when the cover is removed.

See that the brushes move freely in their holders and that there is sufficient spring tension in the springs to keep the brushes firmly pressed against the commutator. Dirty brushes may be cleaned with a cloth moistened with petrol.

## Austin "Ten" Wiring Diagram





The surface of the commutator must be kept clean and free of oil and brush dust. 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.

The dynamo bearings are packed with lubricant during assembly and this will last for a considerable time. Every two months unscrew the wick-type lubricator, with slotted end, and if the wick is dry refill the cup with lubricant.

When the car is undergoing a general overhaul the dynamo should be dismantled for cleaning, adjustment and repacking the bearings with lubricant.

### Starting Motor.

The starter motor requires very little attention beyond keeping the commutator clean and free of oil and brush dust, as with the dynamo.

Before starting from cold do not neglect the preliminary precautions that you would observe if starting by hand. Although the starter will turn the engine, however stiff, it is advisable to crank the engine by hand for two or three revolutions as this will considerably diminish the load for starting, especially in cold weather.

If the starter pinion jams when operating the starter motor switch it can be released usually by turning the squared end of the starter shaft by means of a spanner. To obtain access to this squared end withdraw the metal cap which is secured by two screws.

Should the engine fail to start at the first attempt do not operate the starter switch until the crankshaft has come to rest, or the starter pinion, or the teeth with which it meshes on the flywheel may be damaged.

Never use the starter motor to propel the vehicle as this throws too great a strain upon the battery and starting motor.

### Ammeter Readings.

The centre zero ammeter indicates the rate at which the battery is being charged or discharged. For instance, suppose 2 amperes are consumed when the side and tail lamps are switched on, and that the ignition coil takes 1 ampere, then if the dynamo is generating 7 amperes the meter will show 4 amperes on the charge side of the scale. This is the current in excess of the lamp and ignition load that is available for charging purposes.

Normally, during daytime running, when the battery is in good condition, the dynamo gives only a trickle charge, so that the charge reading will seldom be more than a few amperes.

The ammeter does not indicate the amount of current used by the starter.

### Cut-out and Regulator.

The cut-out and regulator are mounted with two fuses as one unit, which also forms a junction box. The unit is under the bonnet, on the right-hand side.

The working of the regulator in conjunction with the dynamo has already been described.

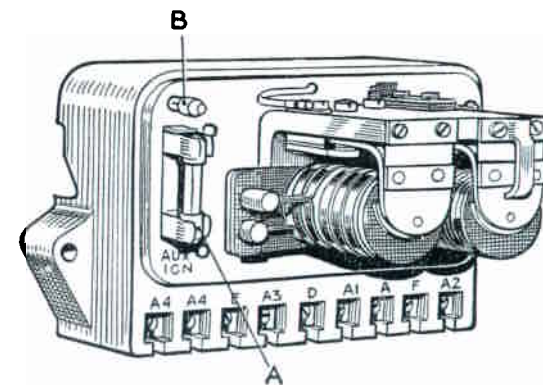
The function of the cut-out is to close the charging circuit as increasing engine speed causes the dynamo voltage to rise above that of the battery. When the engine slows down the dynamo voltage falls below that of the battery and the reverse action takes place; the cut-out contacts open and prevent the battery discharging through the dynamo.

The cut-out, regulator and fuses are protected by a moulded cover which can be withdrawn by moving aside the securing spring clip.

The cut-out and regulator are accurately set before leaving the Works and they must not be tampered with. Take care not to close the cut-out contacts when removing or replacing the cover, as this may cause damage to the equipment. Should they become inadvertently closed when the engine is stationary, carefully pull them apart.

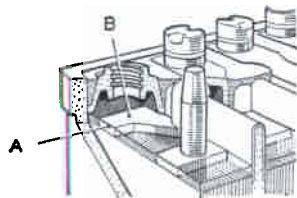
One fuse protects the accessories which are operative only when the ignition is switched on (e.g., stop lamp, fuel gauge, horn and direction indicators). The other fuse protects those accessories which can be operated irrespective of whether the ignition is on or off.

If any of the units fail, inspect the fuse protecting them and if it has blown examine the wiring for a short circuit and remedy. If the new fuse blows the cause of the trouble must be found.



**Regulator and Fuses.**

A4, and E: Terminals for Auxiliaries.  
A. Auxiliary Fuse. B. Spare Fuse.



The Battery.

## The Batteries.

Once a month, or more frequently in hot weather, unscrew the filler caps of the batteries and pour a small quantity of distilled water into each of the cells to bring the acid just level with the tops of the separators.

Do not use tap water as it contains impurities detrimental to the batteries. If any acid is accidentally spilled it must be replaced by a dilute sulphuric acid solution of the same specific gravity as the acid in the cell.

Keep the terminals clean and tight, and well smeared with vaseline. A liberal smearing of vaseline protects the terminals from the corrosive action of the acid, which, if allowed to continue unchecked, may eventually result in a break in the battery wiring.

Keep the outside of the batteries clean and dry, particularly the tops of the cells. Dirt and moisture will form a conductor of electricity and if such a path is allowed to form between the positive and negative terminals, or between the negative terminal and the chassis, there may be a leakage of current which will cause the battery to run down. Wipe the cell tops regularly to avoid this.

When examining the batteries do not hold naked lights near the vent plugs as there is a possible danger of igniting the gas coming from the plates.

Once a month examine the batteries by taking hydrometer readings. There is no better way of ascertaining their state.

The specific gravity readings are:—1.285-1.300 batteries fully charged, 1.210 about half discharged, and 1.150 completely discharged. These figures are at an assumed temperature of the solution about 60 degs. F.

Do not leave the batteries in a discharged condition. If the car is to be out of use for any length of time have the batteries charged about every fortnight. In no circumstance must the electrolyte be removed and the plates allowed to dry, as certain changes take place which result in loss of capacity.



Test the specific gravity of battery.

When the batteries arrive empty, as in the case of a car sent abroad, instructions for charging are given on a special leaflet. When mixing the acid, filling the cells and charging, the manufacturer's instructions must be followed very carefully.

## Electric Horn.

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 or is out of adjustment. First ascertain that the trouble is not due to some outside source, for instance, discharged batteries, a loose connection or short circuit in the wiring of the horn, or a blown fuse.

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

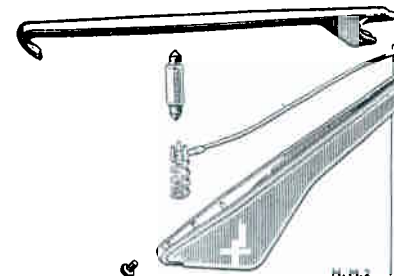
## Direction Indicators.

Every two or three months raise each direction indicator arm and apply a drop of thin oil, by means of a brush or other suitable article, to the hinge between the arm and the operating mechanism.

If the arm fails to light up when in operation examine the bulb. To remove the bulb, switch the indicator on and, holding the arm horizontally, switch off again. Withdraw the screw on the underside of the arm and slide off the metal plate, when the burnt-out bulb can be replaced. To replace the metal plate, slide it in an upward direction so that the slide plate engages with the slots on the underside of the spindle bearing.

The bulbs are 3-watt festoon type.

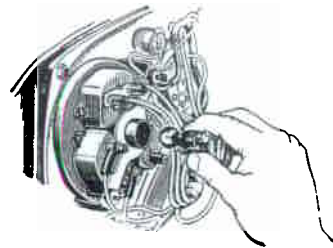
If the direction indicators fail examine the fuse protecting them. If it has blown inspect the wiring for a short circuit.



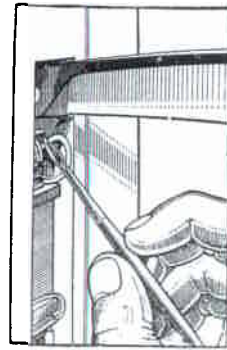
Direction Indicator.

## Fuel Gauge.

The electric fuel gauge is automatic and registers the contents of the petrol tank when the ignition is switched on. If it fails examine the fuse.



**Instrument Panel Lamp.**  
How the Holder pulls out for Bulb Replacement.



**Direction Indicator.**  
Apply thin oil to the hinge joint.

## The Lamps.

To remove the head lamp front, release the locking screw at the bottom of the lamp and swing it aside from its location. 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 position and secure.

The reflector is secured to the lamp front by means of a rubber bead. The reflector can be withdrawn when the rubber bead is removed. When replacing the reflector, the projection on the rim must fit into the left-hand location at the top of the lamp body. When refitting the rubber bead, locate its thinner lip between the reflector rim and the edge of the lamp body.

## Sidelamps.

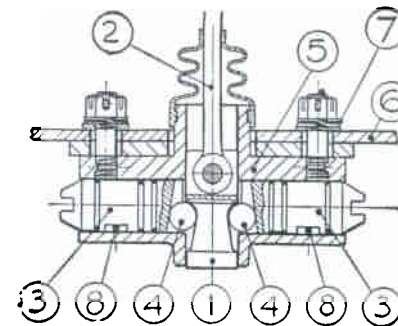
The lamp front can be removed when the screw at the bottom of the lamp is withdrawn.

## Stop and Tail Lamp.

The front of the two stop and tail lamps can be detached for bulb replacement after a half-turn to the left.

# GIRLING BRAKES

## Operation, Adjustments, Maintenance and Assembly



**Expander Unit.**

THE brakes are actuated by the expander unit. The cone (1) when pulled by the rod (2) forces apart the plungers (3) by means of the rollers (4). The plungers engage with the webs of the brake shoes.

The housing (5) is lightly held on the back plate (6) by nuts and spring washers (7) so that it floats between the brake shoes, which are thus self-centering. When the brake shoes are removed the pins (8) hold the plungers (3) in the housing.

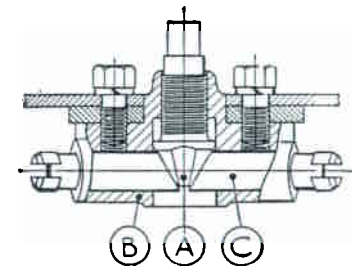
The adjuster unit, which is held firmly on the back plate by its housing (B) has two somewhat similar plungers (C) held apart by the adjuster (A), a conical ended screw, which provides adjustment to the shoes.

## Adjustment.

In making adjustment to take up the wear of the brake linings the rods and linkages under no circumstances should be altered. There is only one operation necessary at each wheel to adjust the brake shoes.

This is as follows :—

On the opposite side of the drum whence the operating rod protrudes will be seen the square-ended brake shoe adjuster, indicated by the arrow in the illustration. This can be turned a notch at a time, which can be felt and heard and is the engagement of the four flat sides of the cone on the inner end of the adjuster engaging with the plungers which support



**Adjuster Unit.**

A. Adjuster Cone. B. Housing. C. Plungers



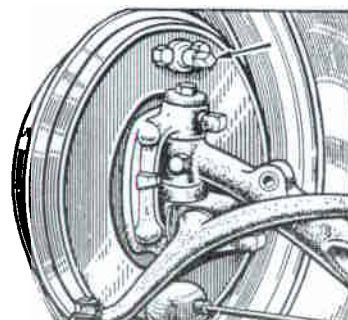
the shoes. Turn the adjuster in a clockwise direction as far as it will go. The brake shoes are then hard on and the adjuster should be turned back one full notch to give the shoes the necessary clearance from the drum.

Each drum should be treated similarly, and it is not necessary to jack up the wheels.

After adjustment is completed, press the brake pedal down as hard as possible once or twice in order to centralise the brake shoes in the drums.

It is important that no attempt should be made to adjust the brakes with the handbrake on.

The illustration shows the adjuster of the front brake; on the rear brakes the adjuster will be found immediately in front of the axle.



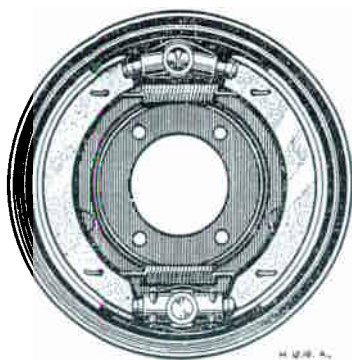
The Arrow Indicates the Adjuster

## Dismantling the Brakes.

First jack up the car and remove the road wheels.

The brake drum is mounted on the hub and held by two small countersunk screws. Mark the position of the drum on the hub, take out the screws and remove the drum. If there is any difficulty in taking out the two small screws the whole hub and brake drum assembly can be removed complete.

To remove the shoes place a large screwdriver, or other lever, against one of the studs on the back plate behind the shoes and lift one shoe out of the groove in the plunger at the expander end. Both shoes and springs can now be removed leaving the expander and adjuster units in position on the back plate. Do not detach these units and be careful not to overstretch the springs.



The Brake Assembly

Clean down the back plates, check the expander and adjuster units for free working and slack back the adjuster anti-clockwise as far as it will go. The adjuster should turn quite freely in the housing. Inspect the shoe pull-off springs and replace if they are stretched or damaged.

When relining do the four shoes of one axle at the same time.

In refitting the shoes be sure that the springs are between the shoe webs and the back plate. Hook the shoes together with one spring at the adjuster ends and assemble on the adjuster unit first, crossing the two shoes to do so. Place one shoe in position on the expander unit, replace the second spring and lever the other shoe into position. Refit the brake drum or hub assembly.

To centralise the shoes and ensure correct clearance between the shoes and the drums, slack off the set pins that hold the adjuster unit to the back plate, and, by turning the adjuster in a clockwise direction as far as it will go, put the brake shoes hard on. Then screw up the pins holding the adjuster unit tightly and slack off the adjuster one full notch. When all drums have been treated in this manner press the brake pedal down as hard as possible once or twice, to ensure that the shoes are centralised. The shoes should now be quite free of the drums.

While the shoes are removed it would be as well to make sure that the expander unit is able to float on the back plate. Should it be removed, when refixing it to the back plate, screw the nuts up quite tight with the double-coil spring washer underneath. Then slack the nuts back one complete turn before inserting the split pin. The unit will then float on the back plate and be self-centering.

## Rods and Linkages.

Should it be necessary at any time to adjust one of the rods, or fit a new one, the following precautions should be taken:—

The handbrake should have a little "free" movement and is adjusted by means of the connecting rod from bottom of lever to cross shaft. In tightening lock nut be careful not to distort the slotted link.

When the brake pedal has from  $\frac{1}{2}$  in. to  $\frac{3}{4}$  in. free movement from the floorboard there should be  $\frac{1}{32}$  in. clearance between the face of the forward adjusting screw and the lever on the pedal shaft. The front and rear brake rods should be adjusted to suit this position.

The front brakes are operated by direct pull and the rear brakes are operated through a special spring mounted on a sliding push rod. There should be  $\frac{1}{32}$  in. clearance between this spring and the locking nut.

Should it be necessary to fit new transverse rods on either axle, remove the shoes as previously described. Next remove the expander unit by undoing the two castle nuts holding it to the back plate, drawing the rod attached to it through the rubber cover.

To remove the rod, the expander plungers must be withdrawn by removing the split pins which retain them. The rod and the expander cone can now be drawn out, taking care that the two small rollers are not lost. Knock out the pin attaching the short rod to the expander cone, and fit the new rod. Re-assemble the expander unit, making sure the rollers are properly in place.

If there is any difficulty in re-assembling the rollers, a little grease smeared on them and the slots in which they work will hold them in place while being assembled.

Now push the rod through the dust cover, and tighten up fully the two castle nuts holding the unit to the back plate, not forgetting the double spring washer underneath them. Slack back the castle nuts one complete turn, thus allowing the unit to float on the back plate in the manner it is intended, and insert a split pin in them. Re-assemble shoes and brake drum or hub assembly.

Re-connect the brake rods and press the brake pedal down as hard as possible once or twice in order to centralise the brake shoes in the drums.

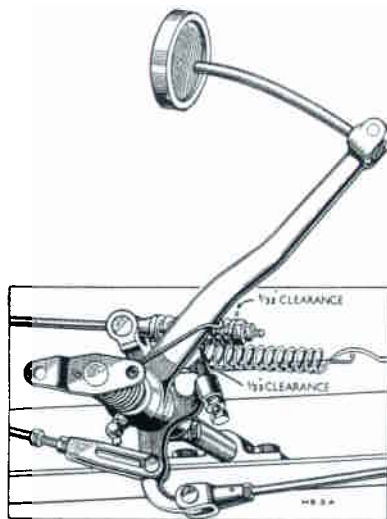
### Equalising Wear.

To equalise brake lining wear, it is a good plan occasionally to reverse the brake shoes on each hub. In the case of rear wheels, this means putting the lower shoes on top; and for front wheels, using front shoes at rear of hub, and vice versa. Thus, all linings share leading-shoe wear.

### Lubrication.

The brake balance levers and the nipple on the brake pedal shaft, should be oiled weekly. Oil all brake joints weekly.

Inattention to the brake balance levers may cause the brakes to stick on.



**The Brake Operating Assembly.**

The lock-nut for hand brake adjustment is shown at end of slotted link: keep well oiled. Nipple below foot brake lever should receive regular attention.

## RUNNING ADJUSTMENTS

### How to keep the Engine in Tune; Clutch Adjustment

#### Valve Tappets.

**B**OTH bonnet sides can easily be removed for work on the engine.

To ensure that the full power of the engine is obtained, and to maintain silent valve operation, it is essential to keep the tappets correctly adjusted. To make this adjustment it is more convenient if the exhaust manifold is removed. Remove the valve cover and breather pipe and have the engine slowly turned with the starting handle. Watch each valve open in turn and note the point at which it stops descending.

From that point give the engine a quarter of a turn and then there should be between the valve stem and the tappet screw a clearance of .009in. to .010in.; the thickness of the thin blade of the "tappet clearance gauge." If the clearance is other than this it can be adjusted by loosening the locknut and raising or lowering the tappet screw, being careful to tighten the locknut when the adjustment is completed. Adjust when engine is cold.

A special spanner is provided in the tool kit for this operation, and also a special plate for locking the barrel tappets to prevent turning.

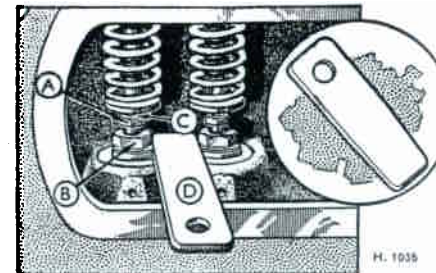


**Tappet Clearance Gauge.**

#### Decarbonising.

To secure the maximum efficiency from the engine it is necessary to remove the carbon deposit that forms on the surfaces of the combustion chamber. This should be done after about 2,000 miles (3,000 km.) running, and then about every six months as necessary according to conditions. At the same time it is advisable to grind in the valves.

First drain off the water through the tap. Detach the top water tube from the head. Disconnect the high tension wires from the sparking plugs.



**Tappet Adjustment.**

- |                  |                   |
|------------------|-------------------|
| A. Tappet Screw. | C. Clearance.     |
| B. Locknut.      | D. Locking Plate. |

The dynamo must be disconnected and removed.

Remove the cylinder head nuts and gently rock the head until the joint is broken.

The cylinder head may now be removed.

The cylinder head gasket, if care is used, may be in a condition to be used again. Otherwise a new one should be obtained.

All dirt or deposit should be removed by carefully scraping with a suitable tool, care being taken not to damage the piston crowns and not to allow dirt to enter the cylinder barrels or the valve chambers.

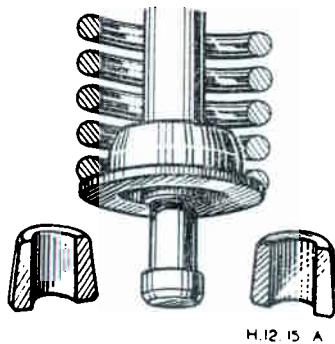
### Valve Grinding.

Before grinding-in the valves it will be necessary to remove the carburetter and connections complete. The valve cover, with washer, can be removed by taking out two hexagon-head screws and also releasing the vent pipe clip. Carefully detach vent pipe from clip at bottom of crankcase. Each valve spring must be lifted by means of a special tool to allow the split cotters to be withdrawn and the cotter cup to be removed. Care should be taken to ensure that cotters do not fall into crankcase breather holes.

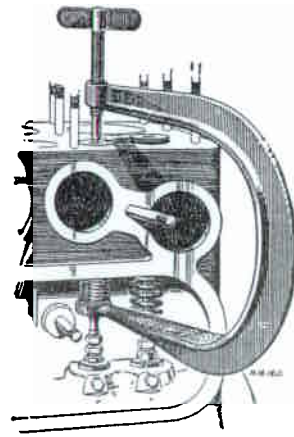
The valve is now free to be rotated on its seat when the tappet screw has been lowered clear of the stem.

After it is cleaned, a little grinding compound should be smeared evenly on the valve face and the valve rotated backwards and forwards by means of a screwdriver, advancing it a step at short intervals until the pitting is removed. Lift each valve a little from its seating at the end of each step to allow some of the grinding compound to enter between the two faces and facilitate the cutting action.

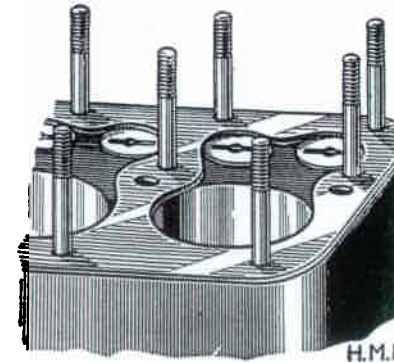
Care should be taken that none of the compound enters the cylinders or the valve chambers. The valve and seating should be wiped clean after the operation. It is essential for each valve to be ground in and refitted on its own seating as indicated by the number on the valve head. The valves are numbered from 1 to 8, starting from the front, and it will be noted that inlet valves are larger than exhaust.



The Split Cotters.



Using a Valve Lifter.



Replace the Gasket Beaded Edges Downwards.

It is also desirable to clean the valve guides. This can be done by dipping the valve stem in petrol or paraffin and moving it up and down and round in the guide until all gummy deposits are removed. Then the valve should be cleaned and the stem smeared with graphite grease and reinserted in the guide, the valve spring and cup being fitted round it. The valve lifter is then used as before to compress the spring so that the split cotters can be refitted.

See that the cotters are placed properly on the valve stem so that the cup fits evenly over them, otherwise they may fly out. It is easier if the end valves are fitted first, working towards the centre ones.

### The Gasket.

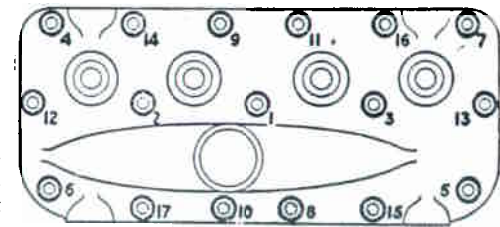
When refitting the manifolds ensure that the joints are good. The cylinder head joint washer should be replaced with the side showing the beaded or turned-up edges facing downwards and a little grease should be smeared over each side to make a good joint and to prevent it sticking when the head is next to be lifted.

When replacing the head take care to tighten the nuts evenly, commencing at the centre and working to the outside. Do not tighten any one right home while the others are loose and make sure the centre nuts are tight first.

Dynamo leads must be replaced on their correct terminals.

Do not forget to refill the radiator.

When the engine is warm go over the nuts again making sure they are all absolutely tight. Check the tappet adjustment again after the car has run about 100 miles as the valves have a tendency to "bed down" again.



Tighten Cylinder Head Nuts from the Centre and work outwards.



## THE CLUTCH

### How to Avoid Misuse and to Adjust the Operating Pedal

**S**OME drivers are inclined to slip the clutch instead of changing down to a lower gear, particularly when they are almost at the top of a hill and it is only necessary to change down for a few yards.

This is a bad habit. It highly polishes the frictional surfaces and will eventually be the cause of persistent slip, probably also burning out the fabric rings.

#### Removing Oil.

Sometimes, however, clutch-slip is due to oil penetrating to the clutch. In such circumstances it will probably be necessary to renew the friction rings, but as a temporary measure to enable the car to be driven, washing out with petrol may be resorted to.

When injecting the petrol through the inspection cover over flywheel, have the engine turned so that the plate is properly washed and the petrol and oil are given an opportunity to drain away. Push the clutch in and out by the pedal so that the petrol gives a washing action.

The petrol and oil should have sufficient time to drain off before the car is used.

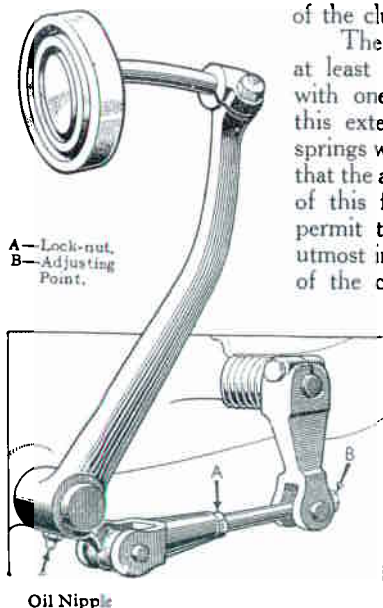
#### Clutch Pedal Adjustment.

After the clutch has been in use for some time the wear of the friction surfaces will give rise to a need for adjustment in order to ensure the continued full engagement of the clutch.

The adjustment should be such as to allow at least  $\frac{3}{8}$  in. free movement of the clutch pedal with one finger. After depressing the pedal to this extent the stronger resistance of the clutch springs will be obvious, so that it is easy to ascertain that the amount of free movement is correct. Lack of this free movement is serious, and does not permit the clutch to engage fully. It is of the utmost importance to maintain this free movement of the clutch pedal, and it should be inspected from time to time. Otherwise damage may be done to the clutch owing to the slipping of the plates.

The adjustment is obtained by slackening the locknut "A" near the bottom of the clutch pedal lever, and using a spanner at "B," turning until sufficient free movement is obtained. The lock nut must now be securely tightened and the adjustment checked.

Oil clutch pedal weekly.

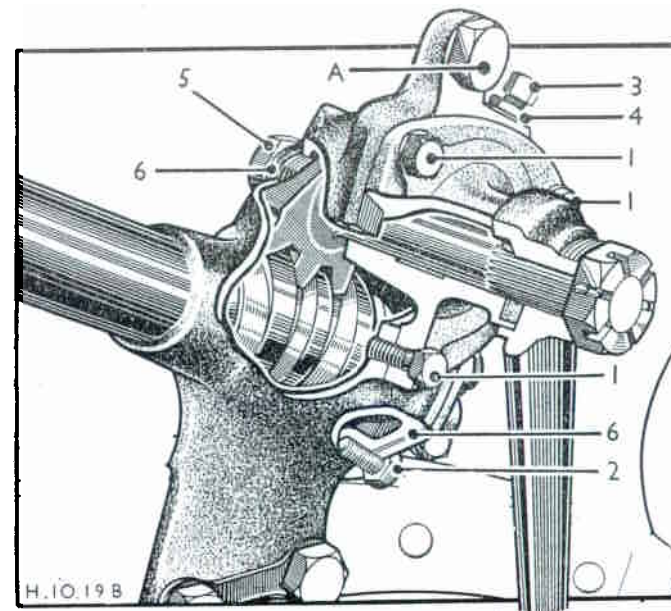


## THE STEERING

### Adjustment of the Steering Box and Track Rod

#### Steering Adjustments.

**F**ACILITIES are provided at the steering box to adjust end play at the worm, end play in the steering cross shaft, and also the mesh of the worm and sector.



#### Steering Adjustments.

1, 3 and 4. Mesh Adjustment. 2. End Cover Screw. 5. Cross Shaft Locknut. 6. Shims. A. Oil Plug.

To take up end play at the worm, remove the end cover by taking out screws (2). With a knife blade separate and remove one or more of the shims. Replace the end cover and test for end play, removing further shims if necessary.

To take up end play at the steering cross shaft, unbend the lock washer, unscrew the nut (5) and remove one or more of the shims, as required. Replace the nut, test for end play and turn up the lock washer.

To adjust the mesh of the worm and sector, slightly loosen the three nuts (1) and the locknut (4) and turn screw (3) clockwise to take up the slack. Tighten the screws and locknut and test for mesh.

The adjustment should be carried out with the road wheels in the straight ahead position. On this type of steering there is the minimum back-lash in the straight ahead position, the back-lash increasing towards the full lock.

## Track Adjustments.

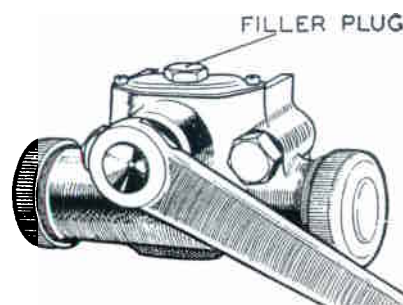
The front wheel-track is adjusted by lengthening or shortening the steering cross rod. The ends are screwed with left-hand and right-hand threads respectively, and lock nuts are used on each ball joint socket. By sufficiently slackening these nuts, the track can be adjusted by turning the track rod; turning in one direction draws the wheels together at the front, and in the other direction pushes them apart.

The wheels should be lineable within a limit of 1/16 of an inch at axle level; there should be no attempt at a positive "toe-in."

The alignment should be regularly checked and adjusted if necessary. Wheels out of alignment will cause excessive tyre wear.

## Maintenance of the Shock Absorbers.

The Piston Type Hydraulic Shock Absorbers are accurately set before leaving the Works to give the amount of damping most suitable for the car to which they are to be fitted. No further adjustment is required.



The Shock Absorber.

Every two months, if a uniform resistance is not given through a complete stroke of the lever arm, it may be necessary to top up the shock absorber with Fluid brake hydraulic No. 2. The resistance of the shock absorbers may be checked by bouncing each corner of the car up and down. If it is suspected that the damping of the springs is inadequate, a more positive check can be made by disconnecting the shock absorber connecting link and moving the lever by hand. A uniform resistance throughout the stroke indicates that no

attention is required, but if the resistance is erratic and free movement of the lever arm is felt, the shock absorber must be removed from the car for topping-up.

Before removing the filler plug, which is located on the top of the cover plate carefully wipe the exterior of the shock absorber to ensure no dirt or foreign matter enters through the filling hole. Fill up the shock absorber to the bottom of the filler plug hole.

Whilst adding fluid to the shock absorber, move the lever arm up and down, through its complete stroke, so as to expel any air from the pressure chambers.

On no account neglect the operation of "topping-up," because if the low pressure chamber of the unit is allowed to become empty, air will enter the pressure cylinders and the action of the shock absorber will become impaired.

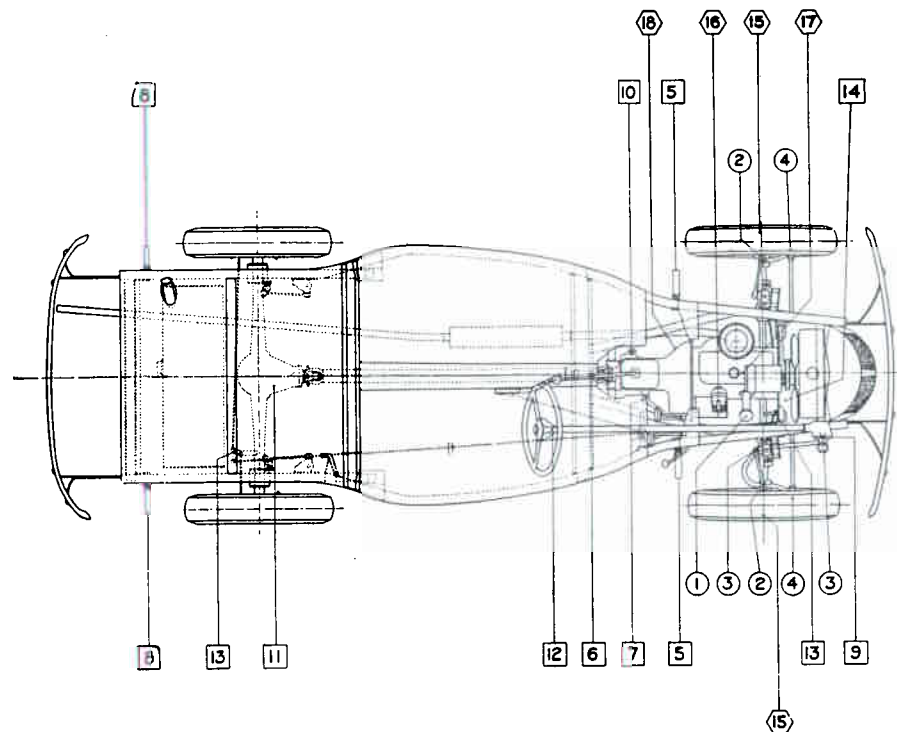
## TOOLS AND ACCESSORIES

Double-ended spanners :—

- |   |  |
|---|--|
| 3/16in. × 1/2in. ; 5/16in. × 3/8in. ;     | Tyre levers (2).                       |
| 7/16in. × 1/2in.                          | Tyre pump.                             |
| Box spanner :—                            | Dunlop tyre valve tool.                |
| 3/16in. × 1/2in.                          | Oil Gun complete.                      |
| Tommy bar.                                | Hammer.                                |
| Adjustable spanner.                       | Oil Funnel.                            |
| Tappet adjusting spanner.                 | Tyre pressure gauge.                   |
| Tappet locking plate.                     | Oil Can (under bonnet).                |
| Screw-driver.                             | 15ft. wire.                            |
| Distributor Screwdriver and Gauge.        | Spare sparking plug.                   |
| Tappet clearance and sparking plug gauge. | Inspection lamp, with cable, and plug. |
| Starting handle.                          | Spare head and side lamp bulbs.        |
| Combination pliers.                       | Insulating tape.                       |
| Sparking Plug spanner.                    | Tool wrap.                             |
| Wheel-nut brace.                          | Tool bag.                              |
| Lifting jack.                             |  |

This list is subject to modification from time to time.

# Lubrication Chart



## GENERAL NOTES.

**Engine.** Clean out sump and refill with fresh oil M.160 every 2,000 miles.

**On New and Reconditioned Engines.** Clean out sump and refill with fresh oil M.160 after first 500 miles.

For use in temperatures between 16° and 0° F. drain sump and refill with M.120.

**Gearbox.** Drain and refill with fresh oil M.220 every 6 months.

**Rear Axle.** Drain and refill with fresh oil C.600 every 12 months.

**Road Wheel Hubs.** Clean out and refill with fresh grease G.S. every 6 months.

**Road Springs.** Oil with M.160 every 2 months.

**Shock Absorbers.** Top up with fluid Brake Hyd. No. 2.

**Air Cleaners.** Wash element with petrol and refill with fresh oil M.160 according to working conditions.

# Lubrication Chart

DAILY = ○

Location No.	PART	W.D. Oil
1	Engine (Top up) .. .. .	M.160
2	Steering Pivot Pins .. .. .	C.600
3	Steering Connecting Rod .. .. .	C.600
4	Track Rod .. .. .	C.600

WEEKLY = □ Where Vehicles are not in constant use the following points should be lubricated every 500 miles.

5	Front Spring Rear Shackle Pins .. .. .	C.600
6	Universal Joint Sliding Splines .. .. .	C.600
7	Brake and Clutch Pedal Levers .. .. .	C.600
8	Rear Spring Rear Shackle Pins .. .. .	C.600
9	Steering Box (Top up) .. .. .	C.600
10	Gear Box (Top up) .. .. .	M.220
11	Rear Axle (Top up) .. .. .	C.600
12	Top of Steering Column .. .. .	M.160
13	Brake Balance Levers .. .. .	C.600
14	Water Pump .. .. .	C.600

WORKSHOP INSPECTION EVERY 2 MONTHS = ⬡

15	Road Wheel Hubs (Front) .. .. .	Grease G.S
16	Distributor .. .. .	M.160
17	Dynamo .. .. .	M.160
18	Clutch Operating Shaft .. .. .	C.600

## OIL CAN LUBRICATION WEEKLY

	All Throttle and Brake Rod Joints .. .. .	M.160
--	---	-------



