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**4/4**

**Morgan Owners Handbook**

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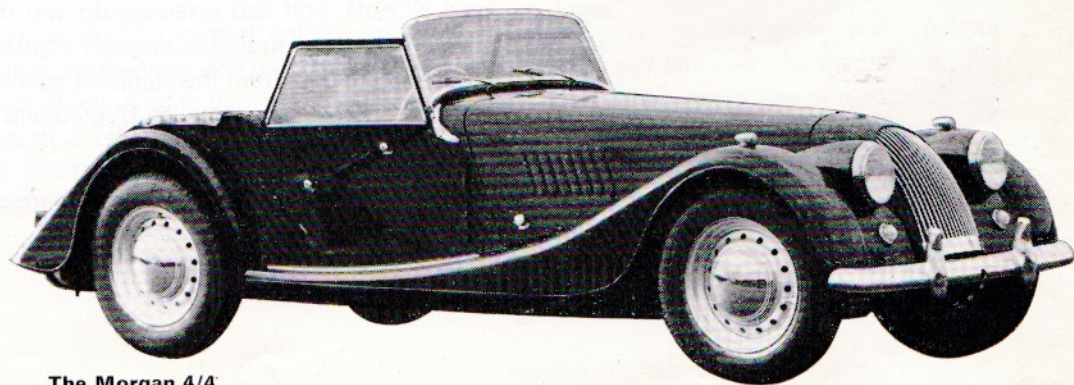
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The Morgan 4/4

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## FOREWORD

The object of this book is to provide the owner with a clear picture of the car and its needs. Technical terms have been avoided where possible.

Each car is carefully built and tested, but the continued satisfaction of the owner is largely in his own hands. The best of cars will not run well unless careful attention is paid to their upkeep.

To gain the maximum pleasure and performance from your Morgan, lubricate regularly, keep all nuts, bolt and screws tight and thereby reduce rattles and unwanted noises, and lastly keep brakes properly adjusted and in good working order. Alterations and adjustments from the standard specification are not recommended but should it seem necessary our Service Department will be pleased to give advice if contacted.

In all communications relating to Service and Spares please quote the chassis and engine number.

## **TOURING ADVICE**

In some European countries high octane petrol is unobtainable, and in these circumstances it is essential that adjustments be made to retard the ignition timing in order to avoid damage being caused to the engine. Your Morgan agent is equipped to make the necessary adjustments, or alternatively advice can be obtained from the factory if the following information is given.

(i) Chassis No. of Car.

(ii) The country or countries in which it is intended to use the car.

The adjustments recommended should be carried out by your Morgan Distributor, or Ford dealer prior to your departure. Failure to observe this requirement will be taken into consideration should any claim be made under the terms of the Warranty in respect of any engine damage resulting from using fuels other than those of recommended Research octane rating. Research octane is the currently accepted method of octane rating designation employed throughout the industry. **THE IMPORTANCE OF ALWAYS USING THE CORRECT TYPE OF SPARKING PLUGS CANNOT BE OVERSTRESSED.**

# SECTION ONE

## GENERAL SPECIFICATION

### Licence Data

|                                                                                                                                      |           |    |    |    |    |                                                           |
|--------------------------------------------------------------------------------------------------------------------------------------|-----------|----|----|----|----|-----------------------------------------------------------|
| Chassis number                                                                                                                       | ..        | .. | .. | .. | .. | On offside top of cross member under front seat           |
| Engine number                                                                                                                        | ..        | .. | .. | .. | .. | On nearside upper face of block forward of clutch housing |
|                                                                                                                                      |           |    |    |    |    | Prefix A                                                  |
| Engine                                                                                                                               | ..        | .. | .. | .. | .. | 4 cylinders. OHV pushrod cross flow head                  |
| Bore of cylinder                                                                                                                     | ..        | .. | .. | .. | .. | 80.978 mm                                                 |
| Stroke                                                                                                                               | ..        | .. | .. | .. | .. | 77.62 mm                                                  |
| Cubic capacity                                                                                                                       | ..        | .. | .. | .. | .. | 1.598 cc 97.6 cu ins                                      |
| Compression ratio                                                                                                                    | ..        | .. | .. | .. | .. | 9.0—1                                                     |
| Firing order                                                                                                                         | ..        | .. | .. | .. | .. | 1—2—4—3                                                   |
| BHP (gross)                                                                                                                          | ..        | .. | .. | .. | .. | 93 at 5,400 rpm                                           |
| Valve clearance (hot):                                                                                                               | Inlet     | .. | .. | .. | .. | .012 in                                                   |
|                                                                                                                                      | Exhaust.. | .. | .. | .. | .. | .022 in                                                   |
| Valve timing..                                                                                                                       | ..        | .. | .. | .. | .. | Inlet opens 27° BTDC Closes 65° ABDC                      |
|                                                                                                                                      |           |    |    |    |    | Exhaust opens 65° BBDC Closes 27° ATDC                    |
| Oil capacity: Engine                                                                                                                 | ..        | .. | .. | .. | .. | 7.2 Imp pts 8.6 US pts 4.1 litres                         |
|                                                                                                                                      | Gearbox   | .. | .. | .. | .. | 2.13 Imp pts 2.5 US pts 1.2 litres                        |
|                                                                                                                                      | Rear axle | .. | .. | .. | .. | 1.75 Imp pts 2.1 US pts 1 litre                           |
| Water capacity                                                                                                                       | ..        | .. | .. | .. | .. | 12 pts 6.8 litres                                         |
| Cooling system                                                                                                                       | ..        | .. | .. | .. | .. | Water pump, radiator, fan and thermostat                  |
| It is recommended that antifreeze be used in the winter months.                                                                      |           |    |    |    |    |                                                           |
| The correct mixture is 20 per cent antifreeze to 80 per cent water, which gives protection against frost damage down to 35° of frost |           |    |    |    |    |                                                           |
| Petrol..                                                                                                                             | ..        | .. | .. | .. | .. | 97 octane min                                             |
| Tank capacity                                                                                                                        | ..        | .. | .. | .. | .. | 2 seater 8½ gallons 39 litres 10 US gallons               |
|                                                                                                                                      |           |    |    |    |    | 4 seater 10 gallons 45 litres 12 US gallons               |

|                           |    |    |    |    |                                     |
|---------------------------|----|----|----|----|-------------------------------------|
| <b>General Dimensions</b> |    |    |    |    |                                     |
| Wheelbase                 | .. | .. | .. | .. | 8', 244 cm                          |
| Track (front)             | .. | .. | .. | .. | 3' 11" 119 cm wire wheels 4' 122 cm |
| (rear)                    | .. | .. | .. | .. | 4' 122 cm wire wheels 4' 1" 124 cm  |
| Ground clearance          | .. | .. | .. | .. | 6½" 16 cm                           |
| Turning circle            | .. | .. | .. | .. | 32' 10 metres                       |
| Tyre size                 | .. | .. | .. | .. | 155 or 165 x 15 radials             |

**Overall Dimensions**

|                       |    |    |    |    |    |                 |                 |
|-----------------------|----|----|----|----|----|-----------------|-----------------|
|                       |    |    |    |    |    | <i>2 seater</i> | <i>4 seater</i> |
| Length                | .. | .. | .. | .. | .. | 12' 366 cm      | 12' 366 cm      |
| Width                 | .. | .. | .. | .. | .. | 4' 8" 142 cm    | 4' 8" 142 cm    |
| Height (hood erected) | .. | .. | .. | .. | .. | 4' 3" 129 cm    | 4' 5" 135 cm    |

**Body Dimensions**

|                           |    |    |    |    |    |                     |                                                    |                  |
|---------------------------|----|----|----|----|----|---------------------|----------------------------------------------------|------------------|
|                           |    |    |    |    |    |                     | <i>Front seat</i>                                  | <i>Rear seat</i> |
| Seat to hood              | .. | .. | .. | .. | .. | 3' 1" 94 cm         | 3' 2" 96 cm                                        | 2' 9" 84 cm      |
| Width at elbows           | .. | .. | .. | .. | .. | 3' 10" 117 cm       | 3' 10" 117 cm                                      | 3' 9" 114 cm     |
| Height of seat from floor | .. | .. | .. | .. | .. | 8" 20 cm            | 10" 25 cm                                          | 13" 33 cm        |
| Leg room                  | .. | .. | .. | .. | .. | 23"-25" 58 cm-63 cm |                                                    | 19" 48 cm        |
| Door width at waistline   | .. | .. | .. | .. | .. | 2' 3" 68 cm         |                                                    |                  |
| Luggage space: Length     | .. | .. | .. | .. | .. | 3' 2" 96 cm         | Accommodation for hood,<br>tonneau and sidescreens |                  |
| Width                     | .. | .. | .. | .. | .. | 1' 4" min 40 cm     |                                                    |                  |
| Depth                     | .. | .. | .. | .. | .. | 12" 30 cm           |                                                    |                  |

**Weights**

|                                |    |    |    |    |    |                   |                   |
|--------------------------------|----|----|----|----|----|-------------------|-------------------|
| Complete with tools and petrol | .. | .. | .. | .. | .. | 1,580 lbs 718 kgs | 1,660 lbs 750 kgs |
| Shipping weight                | .. | .. | .. | .. | .. | 1,484 lbs 670 kgs | 1,544 lbs 700 kgs |

## Ignition System

The ignition system consists of a ballast resistor coil, with a Ford distributor and spark plugs. The high tension leads are of the suppressor type. This system allows lower battery voltage direct to the low voltage coil when starting.

|                            |    |    |    |    |                |
|----------------------------|----|----|----|----|----------------|
| Initial Ignition Setting   | .. | .. | .. | .. | 8° BTDC        |
| Spark Plug Type (Autolite) | .. | .. | .. | .. | AG 22          |
| Spark Plug Gap             | .. | .. | .. | .. | .023 in 6 mm   |
| Contact points gap         | .. | .. | .. | .. | .025 in 6.5 mm |

## Carburettor

Type Weber Twin choke downdraught 32/36. D6V-FA.

## Front Wheel Alignment and Suspension

|                      |    |    |    |    |    |                                                       |
|----------------------|----|----|----|----|----|-------------------------------------------------------|
| Castor Angle         | .. | .. | .. | .. | .. | 4°                                                    |
| Camber               | .. | .. | .. | .. | .. | 2°                                                    |
| King pin inclination | .. | .. | .. | .. | .. | 2°                                                    |
| Toe-in               | .. | .. | .. | .. | .. | $\frac{1}{8}$ " — $\frac{3}{16}$ " (3.2 mm to 4.8 mm) |

## Transmission

Clutch: Diaphragm spring mechanical operation  
7.54 ins diameter single dry plate

Clutch release arm free movement: 1/10" (2.54 mm)

Rear Axle: Three-quarter floating, hypoid crown wheel and pinion. Ratio 4.1:1

Gearbox: Four forward gears, all synchromesh. Floor remote change.

**Gear Ratios**

|         |    |    |    |    |    |    |    | <i>Gearbox</i> | <i>Overall</i> |
|---------|----|----|----|----|----|----|----|----------------|----------------|
| 1st     | .. | .. | .. | .. | .. | .. | .. | 2.972          | 12.18          |
| 2nd     | .. | .. | .. | .. | .. | .. | .. | 2.010          | 8.24           |
| 3rd     | .. | .. | .. | .. | .. | .. | .. | 1.397          | 5.73           |
| Top     | .. | .. | .. | .. | .. | .. | .. | 1.000          | 4.10           |
| Reverse | .. | .. | .. | .. | .. | .. | .. | 3.324          | 13.63          |

**Performance Data**

165 x 15 tyres

Miles per hour per 1,000 rpm

|     |    |    |    |    |          |
|-----|----|----|----|----|----------|
| Top | .. | .. | .. | .. | 17.4 mph |
| 3rd | .. | .. | .. | .. | 12.5 mph |
| 2nd | .. | .. | .. | .. | 8.7 mph  |
| 1st | .. | .. | .. | .. | 6.0 mph  |

**Torque Spanner Data**

|                                    |    |    |    |    |    |              |
|------------------------------------|----|----|----|----|----|--------------|
| Cylinder Head                      | .. | .. | .. | .. | .. | 65/70 lbs ft |
| Main Bearing caps                  | .. | .. | .. | .. | .. | 65/70 lbs ft |
| Big end bearings                   | .. | .. | .. | .. | .. | 30/35 lbs ft |
| Flywheel to crankshaft             | .. | .. | .. | .. | .. | 45/50 lbs ft |
| Clutch to flywheel                 | .. | .. | .. | .. | .. | 12/15 lbs ft |
| Manifolds                          | .. | .. | .. | .. | .. | 15/18 lbs ft |
| Rocker shaft support standards     | .. | .. | .. | .. | .. | 17/22 lbs ft |
| Valve clearance adjusting lock nut | .. | .. | .. | .. | .. | 8/12 lbs ft  |

## INSTRUMENTS AND CONTROLS

### Instruments

**Speedometer.** Indicates the vehicle speed and total mileage and is fitted with a trip which is cancelled by the serrated knob (situated in side of glove box) and turning clockwise.

**Ignition warning light** (red in speedometer). This serves the dual purpose of reminding the driver to switch off the ignition before leaving the vehicle and of acting as a no charge indicator. With the ignition switch 'on', the warning light should be illuminated only when the engine is stopped or turning over very slowly. As the engine accelerates the light should dim and eventually go out at a fairly low engine speed. Failure of the light to behave in this fashion will indicate a broken alternator drive belt or other fault in the charging system.

**Headlight warning light** (blue in speedometer). Glows blue when headlights are on main beam, no light when dipped.

**Oil pressure gauge.** This gauge indicates the engine oil pressure. The oil pressure relief valve is set to return oil to the sump at a pressure of 35 to 40 lb/sq in. (2.46 to 2.81 kg sq/cm). When the engine is idling and at normal temperature, the pressure will be lower than when running at a higher speed at the same temperature. Depending on the carburettor slow running adjustment, lubricant operating conditions and temperatures, the idling pressure may drop to approximately 5 to 7 lb/sq in. (0.35 to 0.4 kg/sq cm) at idling speed. If the gauge fails to register at normal running speeds then first check the engine oil level and if this is satisfactory, have the engine lubrication system examined immediately by your authorised dealer.

**Ammeter.** This instrument indicates the rate of charge or discharge of the battery. The rate of charge can fall off rapidly due to the alternator regulator when the battery is in fully charged condition.

**Water temperature gauge.** This is electrically operated, acting only when ignition is switched on. The normal reading is on or just above 'N' segment.

**Fuel gauge.** Operates only when ignition is on, tank capacity : 2-seaters 8½ gallons (10 US gallons) 39 litres ; 4-seater 10 gallons (12 US gallons) 45 litres.

**Direction indicator light(s).** Left or right hand according to turn, or warning light with arrows shows when the indicators are operating, indication is also given by audible ticking.

**Hazard warning light.** This indicates when hazard lights are flashing (all 4 direction lights flashing together). And

**Handbrake warning light and Dual Brake system warning light** (where fitted). Shows red when the handbrake is in the '**on position**'. Where dual line braking system has been fitted to your car, if this warning light should glow whilst driving the car, stop immediately, check position of handbrake, if the handbrake was in '**off position**' have the braking system checked by your nearest competent garage. Do not drive the car again until the braking system has been checked. This warning light bulb is checked for operation by setting the handbrake when the ignition is turned on.

## Foot operated controls

**Accelerator.** The pedal is connected by a Bowden cable to the carburettor throttle. Do not depress pedal when starting engine from cold.

**Foot brake pedal.** Actuates the brakes on all 4 wheels hydraulically, and also closes the circuit to the rear brake lights. These only operate when the ignition is switched on.

**Clutch.** Press pedal to disengage drive from engine to gearbox. **Do not rest your foot on the pedal when driving** or hold the clutch out to freewheel as this will **CAUSE UNNECESSARY WEAR.**

**Foot control lubricator.** Front suspension lubrication control. Depress as instructed (see page 31).

## **Hand operated controls**

**Choke control.** Located below facia and underneath bracket locating the upper part of steering column. When starting from cold, pull the choke knob out. When the engine is running return the choke to its original position as soon as you can without stalling the engine. Do not press the accelerator until the engine is running. Use the choke as sparingly as possible.

**Combined direction indicator, horn, headlamp, main beam and headlamp flasher control.** This antenna control is positioned on the right hand side of the steering column.

(a) **Direction indicator control.** Press the control downwards for right hand turns and upwards for left hand turns.

(b) **Headlamp main beam control.** With the headlamps on dipped-beam push the control directly away from the steering wheel for main beam operation. The direction indicators can still be operated with the headlamp main beam in operation.

(c) **Headlamp flasher control.** Press the control towards the steering wheel to flash the headlamps on to main beam. The control is spring loaded and will return to its original position when released.

(d) **Horn control.** To operate the horn, press the end of the control towards the steering column.

**Gear lever.** Always select neutral position before starting the engine. Reverse gear selection is obtained by pushing the gear lever knob down, left and forward.

**Handbrake.** This is of the 'fly-off' type. To operate the handbrake pull backwards, the lever is fixed in the 'on' position by pressing the cap on top of the lever which engages the pawl in the ratchet. To release brake pull the lever to the rear and allow to go forward to the full extent. Red warning light (**when fitted**) shows until handbrake is 'off'.

**Heater switch** (if fitted with heater). This controls the recirculatory heater and has three positions: off, slow and fast.

**Ignition/starter switch.** This switch has three positions as well as the vertical 'off' position. Turn the key clockwise to the first position and the ignition and auxiliary circuits will be brought into action. Twist the key a fraction further against the spring stop, to the second position, and the starter motor will operate, when the engine fires release the key immediately, which will return to the first position. If the engine does not start, the key must be returned to the vertical 'off' position before the starter motor can be operated again, thus preventing possible damage through operating the starter motor whilst the engine is running. Turning the key anti-clockwise from vertical enables certain accessories such as windscreen wiper or radio if fitted to function with the ignition switched off. Make a note of the key number in case a new key is required at any time. Do not leave the ignition switched in the 'on' position for long periods without the engine running. This could cause damage to the coil through overheating.

**Ignition and starter switch with steering lock (where fitted).** This switch is located on the steering column and has 4 positions. **IMPORTANT:** Take a note of key number.

1st position: Steering wheel lock in operation and ignition off, key can be extracted in this position.

2nd position: Moving clockwise 'garage lock'. Ignition off, but steering unlocked which allows the car to be moved and steered by hand.

3rd position: Ignition on.

4th position: Is spring loaded and brings in the starter motor.

To prevent the starter being operated whilst the engine is running a safety device is incorporated whereby it is necessary to switch the key back to 'garage lock' position before the starter can be engaged again.

**Screen wash switch.** This switch is spring loaded and will deliver water to the windscreen for as long as the switch is depressed.

**Headlight, side and tail light switch.** This is a two position switch. First position side and tail lights together with number plate light and instrument light. Second position as above plus headlights.

**Windscreen wiper switch.** Two position switch, first position slow, second position fast.

**Hazard switch.** This switch when depressed operates all 4 direction lights together.

**Spare switches** can be wired up for auxiliaries such as spotlights or interior light, etc.

**Seat control (Bucket seats only).** When moved, this allows the seat (both passenger and driver's) to be moved fore and aft to various positions.

## **RUNNING IN**

During the first 30 hours or so of their working life, the moving parts of a new car require a 'bedding-in' or polishing process, such as is provided by light, and medium running.

Long trouble-free life, particularly of engine, rear axle and brakes depends on this careful running-in, which can only be achieved by restraint on the part of those who drive the vehicle during this initial time.

The engine may seem to lack power for the first 200 to 300 miles (320—480 km) whilst this process is taking place. The power will then improve as the car is used for the first 2,000 miles (3,200 km), and this will be accompanied by a corresponding improvement in fuel consumption.

It is suggested that for the first 500 miles (800 km) engine speed should not exceed 2,800 rpm.

Both long periods of idling and excessive racing of the engine should be avoided at all times and particularly during warming up from cold.

Do not allow the engine to 'labour' especially when driving up steep hills. At the first sign of this, change down, bearing in mind that changing down too early can result in undesirable racing of the engine.

Vary the rpm occasionally whenever possible. Releasing the accelerator now and again will give the engine a better start in life.

As the machined surfaces approach their optimum condition, it becomes necessary to reset the adjustments to suit the more flexible engine. Your Morgan dealer will attend to this when he carries out the first 500 mile service.

## SECTION TWO

### **ROUTINE MAINTENANCE AND ADJUSTMENTS**

#### **NOTES ON GENERAL MAINTENANCE**

In this section will be found all the information necessary to maintain your car in good mechanical condition in a temperate climate. Climatic and operating conditions affect maintenance intervals to a large extent; in many cases, therefore, the determination of such intervals must be left to the good judgement of the owner or to advice from a Morgan distributor or dealer, but the recommendations will serve as a firm basis for maintenance work.

#### **Important points**

1. Depress the 'one shot' lubricator for a few seconds daily or every 200 miles (320 km) if touring. Lubrication is preferable when the engine oil is cool.
2. Every 500 miles or weekly, whichever comes first, check the engine oil level, the radiator coolant level, windscreen washer reservoir, and battery electrolyte level.
3. Every month check tyre pressures and inspect tyre treads; when used for competitions or high speed touring, check daily. Inspect front wheel tread wear and if uneven have wheel alignment checked. Check brake and clutch fluid levels.
4. Owners are under a legal obligation to maintain all exterior lights in good working order; this also applies to headlamp beam setting, which should be checked at regular intervals by your garage.

**Fuel recommendations.** The most suitable grade of fuel for the 1,600 cc engine is 98 octane, 4 star grade in the United Kingdom.

**Engine.** Under adverse conditions such as driving over dusty roads or where short stop-start runs are made, oil changes, attention to the flame traps and breather filter must be more frequent.

**Air cleaner (if fitted) and propeller shaft.** When the car is driven over dusty or sandy roads the air cleaner filter element should be cleaned in petrol and reoiled more frequently and the propeller shaft serviced over shorter intervals to prevent ingress of abrasive materials.

**Lubricants.** Great importance is attached to the nature of lubricants used, and therefore specific recommendations are shown in the following table. Should for any reason these oils not be available in certain overseas territories, the Morgan distributor or dealer for that area will be able to recommend suitable alternatives.

### Recommended Lubricants

These recommendations apply to temperate climates where operational temperatures may vary between approximately 10 °F ( - 12 °C) or 90 °F (32 °C). Lubricants marked with an asterisk (\*) are multigrade oils suitable for all temperature ranges. Information on recommended lubricants for use under extreme winter or tropical conditions can be obtained from the Morgan Motor Co. or your local Distributor or Ford dealer.

|                              | <b>SHELL</b>        | <b>ESSO</b>              | <b>BP</b>                   | <b>CASTROL</b>         | <b>MOBIL OIL</b>           |
|------------------------------|---------------------|--------------------------|-----------------------------|------------------------|----------------------------|
| <b>Engine</b> .. .. .        | Shell Super Oil     | Extra 10W-30             | Visco Static 10W-40         | Castrol GTX            | Mobiloil Special 10W-30    |
| <b>Gearbox</b> .. .. .       | Spirax 90 EP        | Esso Gear Oil GP 90/140  | Trans Oil EP SAE 90         | Castrol Hypoy Ligh     | Mobilube GX 80             |
| <b>Rear axle</b> .. .. .     | Spirax 90 EP        | Esso Gear Oil GP 90/140  | Trans Oil EP SAE 90         | Castrol Hypoy          | Mobilube GX 90             |
| <b>Steering box</b> .. .. .  | Spirax 140 EP       | Esso Gear Oil GP 140     | Energol Trans Oil EP SAE 90 | Castrol Hypoy Hi-press | Mobilube GX 90             |
| <b>Wheel bearings</b> ..     | Retinax A           | Esso Pressure Gun Grease | Energrease L2               | Castrol LM Grease      | Mobil Grease MP or Special |
| <b>Chassis grease points</b> | Retinax A           | Esso Pressure Gun Grease | Energrease L2               | Castrol LM Grease      | Mobil MP or Special        |
| <b>Oil can</b> .. .. .       | X-100 Motor Oil 20W | Extra Motoroil 20        | Energol Motor Oil SAE 20W   | Castrol GTX            | Engine Oil                 |

## SECTION THREE

### ENGINE

#### Engine Maintenance and adjustments

Various adjustments are necessary from time to time in order to keep the mechanism in efficient running order. The periods between depend largely upon the manner in which the car is used and no definite time can be given here for carrying out these corrections. The car should be examined, however, every 5,000 miles (8,000 km) and any adjustments which appear necessary can then be made.

#### Cylinder head bolts

After the first 300 miles (500 km) the cylinder head bolts should be checked, with engine warm, for tightness in the order shown. Use a torque wrench and tighten the bolts to 65-70 lb-ft. (8.89-9.67 kg-m).

#### Engine lubrication

The engine oils recommended are of such a quality that they maintain sufficient body when hot, and are fluid enough to give early lubrication of the cylinder walls when starting up from cold.

#### Engine oil level

Engine oil level should be checked every 500 miles (800 km) or weekly whichever comes first. Stand the car on level ground and allow the oil to drain back into the sump. Withdraw the dipstick at right hand side of engine; wipe it clean and re-insert to its full depth and remove a second time to take the reading. Add oil as necessary through the oil filler at front of rocker cover.

### **Engine oil changes and filter replacements**

Engine oil changes and filter replacement should be undertaken every 5,000 miles (8,000 km) or every six months whichever comes first. To change the oil : run the engine to warm up oil and then switch off ignition. Remove the drain plug situated in the bottom of the sump at the left hand side. Allow oil to drain away completely and replace the plug.

### **To change filter**

Unscrew filter anticlockwise and discard. Clean mounting face and screw new filter onto pump body until gasket just contacts pump. Tighten a further half a turn. Refill engine with approved oil to correct level. Clean and replace oil filler cap. Start engine and check for oil leaks. Stop engine, allow to stand and check oil level.

### **Cleaning the breather cap**

Wash the filter and breather cap in petrol and then dip in clean engine oil Shake out surplus oil before refitting it to the engine.

### **Weber carburettor slow running adjustment**

The slow running adjustment should be carried out when the engine has reached its normal running temperature by screwing the hexagonal headed throttle screw in or out until the engine will run sufficiently fast not to stall and then adjust the round knurled headed petrol volume screw in and out until the engine runs evenly. If the engine is now running too fast, re-adjust the throttle screw anticlockwise followed by a further slight adjustment on the petrol volume screw. Repeat these operations until the idling revs. are satisfactory.

This carburettor should require no further maintenance as it is of the fixed jet type. Do not expect a new engine to idle perfectly until the various machined surfaces have been 'run in'.

### **Emission control valve**

This is located on the right hand side of the engine to the rear of the carburettor. Every 6,000 miles or 10,000 km, it is necessary to clean out the oily deposits from the inside of the valve housing.

To remove the emission control valve disconnect the hose and pull the valve out of its grommet. Do not run the engine with the hose disconnected as the mixture will be excessively weakened.

Dismantle the valve by removing the circlip and extract the valve seal, valve and spring. Wash in petrol to remove any sludge or lacquer that may be present. Reassemble the components in the reverse order and refit circlip. Push the valve back into grommet and reconnect the hose.

### **Fuel pump**

The fuel pump is located on the left hand side of the engine behind the oil filter. The pump is entirely automatic in action and requires little attention other than cleaning the nylon filter screen in the inverted metal dome on top of the pump every 5,000 miles. Occasionally the fuel line unions should be checked for tightness.

### **Sparking plugs**

The sparking plugs should be cleaned and gaps set at 0.023 in. to 0.028 in. (0.6 to 0.711 mm), although for maximum efficiency it could be an advantage to renew the sparking plugs every 10,000 miles (16,000 km), ensure that the sparking plug insulators are clean to prevent 'HT' tracking.

### **Distribution contact points**

The contact breaker points gap should be adjusted to .025 in. (.064 mm) by slackening off the locking screw on the fixed contact point and moving the contact point when the fibre arm of the moving contact is on the highest point of the cam. Securely tighten the lock screw and re-check the gap. If the points are worn or pitted, they should be dressed flat with an oil stone.

By loosening the pinch clamp bolt at the base of the distributor and the adjusting bolt in the slot the ignition can be either advanced or retarded. Only small deviations from the normal setting are required and it is advisable to test the car on the road. Carefully note with a stop watch the time taken to accelerate from 20 mph (32 km) to 40 mph (64 km) (when 'run in' and subject to legal requirements) in top gear with the throttle fully open the optimum ignition setting is that which gives the shortest time to accelerate.

### **Distributor maintenance**

Every 5,000 miles (8,000 km) the cam should be smeared lightly with engine oil. A pronounced squeak occurs when the cam is quite dry. Withdraw the moulded rotor arm from the top of the spindle (care should be taken because this part is made of a brittle material), but do not remove the screw exposed to view. Apply, by means of oil-can, a few drops of thin machine oil around the edge of the screw and down the hole provided, to lubricate the cam bearings and distributor spindle respectively. At the same time, place a single drop of clean engine oil on the contact breaker arm pivot.

When replacing the rotor arm make sure that it is pushed on as far as possible. The moving parts of the automatic advance mechanism should be lubricated with winter grade engine oil. This can be squirted through the gap between the cam and the base plate. Take great care not to allow any oil to get on or near the contacts.

### **Windscreen washer**

The water level in the windscreen washer should be checked every 5,000 miles (8,000 km). This is located on the bulkhead in the engine compartment on the opposite side to the steering column. Top up reservoir to within 1 in. (25 mm) below top of orifice provided. Use Clearalex windscreen washer powder in the container, this will remove mud, flies and road film. In cold weather, to prevent freezing of the water, the reservoir should be mixed one part methylated spirits to 20 parts water.

### **Alternator drive belt adjustment**

Every 10,000 miles (16,000 km) check by thumb pressure between the alternator and crank shaft pulleys at mid point. Movement should be  $\frac{7}{16}$  to  $\frac{9}{16}$  in. (11 to 14 mm). If necessary adjust as follows :

1. Slacken the bolts securing the alternator to the front cover ; also the fixing at the adjustment link.
2. Pivot the alternator inwards or outwards as necessary and adjust until the correct tension is obtained.
3. Tighten alternator adjusting bolts.

### **DECARBONISING AND VALVE GRINDING**

It is necessary to decarbonise the engine when an excessive amount of carbon has been deposited in the combustion chambers and on top of the pistons, or there are indications of gas leakage past the valves, causing a falling off of engine performance. One cannot stipulate any particular mileage at which the engine should be decarbonised, since the use of different fuels, lubricating oils and varying conditions can have a considerable influence on the rate of carbon formation. For those who wish to carry out the work themselves, we have set out in the following pages the necessary points for their guidance.

### **Preparation**

In preparation for the work to be undertaken, it is necessary to provide the various replacement gaskets, suitable cleaning material and one or two tools in addition to those used for routine maintenance and lubrication.

The tools required are a valve spring compressor, a suitable blunt scraper for removing carbon and a valve grinding tool of the rubber suction cup type. It is advisable to have a wire brush, cleaning rags, and sufficient paraffin at hand for washing the various components.

### **Dismantling**

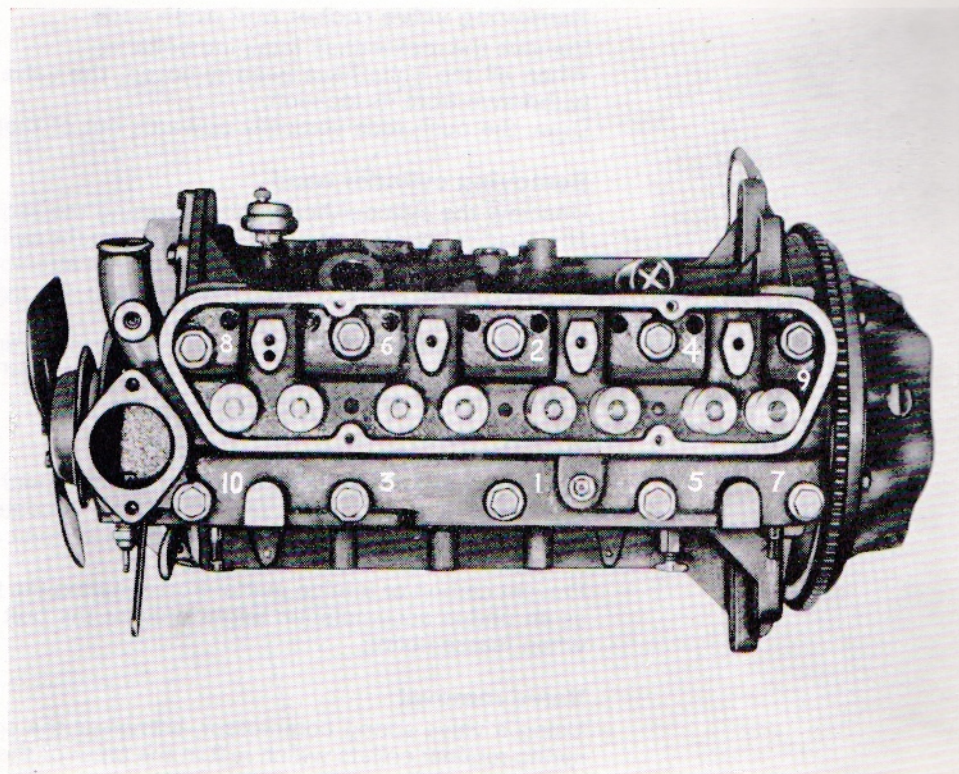
Drain the cooling system by opening the drain taps fitted beneath the centre of the radiator and adjacent to the generator on the left hand side of the engine. Do not discard the cooling water if it contains anti-freeze.

To prevent the possibility of short circuits, disconnect the battery cable at the positive battery terminal post. Disconnect the high tension leads at the sparking plugs, by pulling them off the 'snap-on' terminals, and number each wire to avoid confusing them on re-assembly. It is advisable at this stage to remove the sparking plugs. These should be cleaned and reset to the correct gap ready for reassembly. Unscrew the top hose clip and remove the top hose from the cylinder head water outlet. Disconnect the heater inlet hose (where fitted) from the cylinder head.

Disconnect the vacuum pipe at the connection to the carburettor and also the fuel pump to carburettor pipe at the union on the carburettor body.

Disconnect the carburettor controls and vacuum pipe to the distributor; it is advisable to remove the carburettor assembly from the inlet manifold to avoid damage.

Unscrew the clamp, disconnect the exhaust manifold from the silencer inlet pipe. To remove the valve rocker cover, undo the four retaining screws, when the rocker cover may be lifted from the cylinder head together with the gasket.



### **Removing valve rocker and push rods**

Remove the rocker shaft retaining bolts.

When all the bolts have been removed, the valve rocker shaft assembly may be withdrawn from its location.

Draw the push rods vertically upwards out of their locations.

### **Removing cylinder head**

Unscrew the cylinder head bolts reversing the sequence shown in the illustration. The head is now free to be lifted away from the cylinder block, but if it is found that the head does not come away easily, do not attempt to raise it by inserting a screwdriver or other sharp instruments between the cylinder head and block joint, as this would damage the surfaces.

To free a cylinder head when it is exceptionally tight, a sharp tap with a wooden mallet or with a hammer on a wooden block rested on the side of the cylinder head should free the joint.

### **Decarbonising**

In order to decarbonise the cylinder head thoroughly, it is advisable to remove the valves, otherwise particles of carbon may become lodged under the valve seats, and also it will not be possible to remove all the carbon lodged in the combustion space.

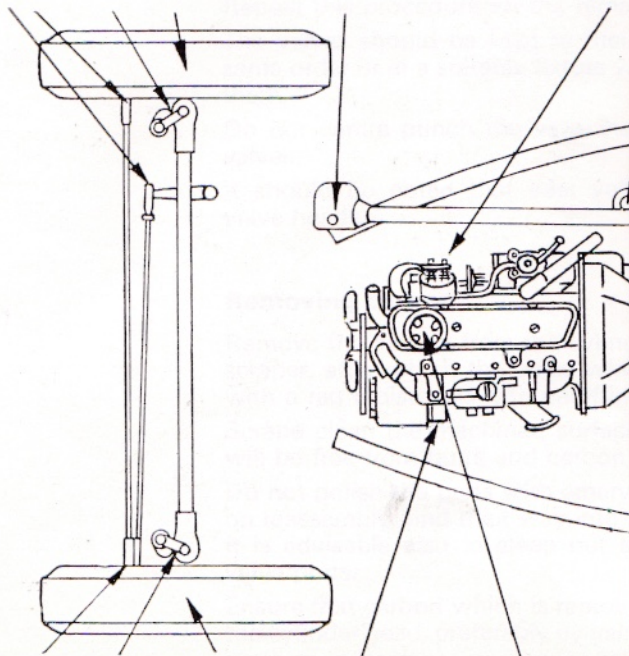
Prevent carbon or foreign matter from entering the tapped cylinder block bolt holes, as an undue accumulation might prevent the bolt being properly tightened down when reassembling.

### **Valve removal**

Using a valve spring compressor, compress the spring and remove the two valve spring retainer collets which rest in the taper of the circular valve spring retainer.

# LUBR

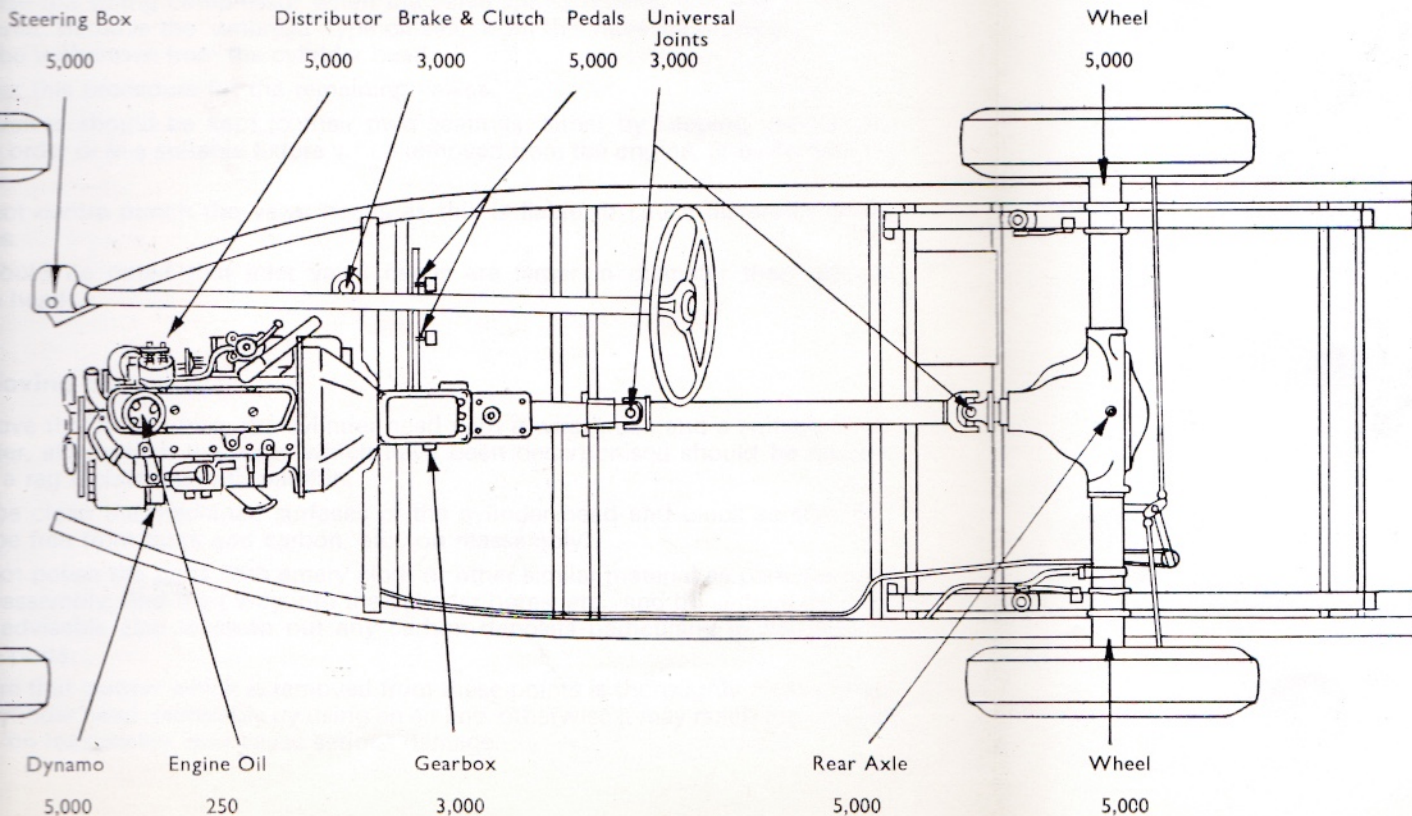
|                       |               |       |              |          |
|-----------------------|---------------|-------|--------------|----------|
| Track Rod & Drag Link | Sliding Axles | Wheel | Steering Box | Distribu |
| 5,000                 | 3,000         | 5,000 | 5,000        | 5,000    |



|                       |               |       |        |            |
|-----------------------|---------------|-------|--------|------------|
| Track Rod & Drag Link | Sliding Axles | Wheel | Dynamo | Engine Oil |
| 5,000                 | 3,000         | 5,000 | 5,000  | 250        |

# LUBRICATION CHART

AT MILEAGE SHOWN



Release the spring compressor when the valve spring retainer and spring may be removed. Remove the 'umbrella' type oil seal, from the valve stem when the valve may be withdrawn from the cylinder head.

Repeat this procedure for the remaining valves.

The valves should be kept to their own seatings, either by keeping them in the same order or in a suitable fixture when removed from the engine, or by numbering them.

Do not centre-punch the valve heads as this is liable to cause distortion of the valves.

It should be noted that inlet valve heads are larger in diameter than exhaust valve heads.

### **Removing carbon**

Remove the carbon from the cylinder head with a wire brush and a suitable blunt scraper, after which the areas which have been decarbonised should be cleaned with a rag moistened with paraffin.

Scrape clean the machined surfaces of the cylinder head and block so that they will be free from burrs and carbon, etc., on reassembly.

Do not polish the parts with emery cloth or other similar material as particles may, on reassembly, find their way into the cylinder bores, etc., and do serious damage. It is advisable also to clean out any carbon deposits particularly in the exhaust valve ports.

Ensure that carbon which is removed from these points is thoroughly cleaned from the cylinder head, preferably by using an air line, otherwise it may reach the working parts on reassembly, and cause serious damage.

Turn the crankshaft so that two pistons are at the top of their cylinder bores. Before bringing each piston to the top of its stroke, it is advisable to smear a little grease around the top of the bore, so that a seal is formed around the top of the piston. This will prevent the possibility of carbon becoming lodged between the working surfaces of the piston and cylinder bore.

Pieces of rag should be placed in the other cylinder bores and also into the push rod chamber to prevent carbon falling into the cupped ends of the tappets or through the passages into the sump. Remove the carbon from the crowns of the pistons and clean them thoroughly as carbon forms less rapidly on a smooth clean surface.

Do not disturb the ring of carbon round the edge of the piston crown or polish the piston crowns with emery cloth, as this may cause particles to find their way down the cylinder bores.

When these pistons have been properly cleaned, turn the engine to bring two more pistons to the top of their bores and deal with them in the same way.

While the cylinder head is detached for carbon removal, it is advisable to examine the condition of the valves and valve seats.

### **Valve grinding**

In order that the valves shall be gas-tight, the bevelled surfaces of the valves and valve seats must make a perfect gas-tight seal when together.

This condition is achieved by grinding the two surfaces together with the aid of a wooden-handled valve grinding tool, fitted with a rubber suction cup.

The valve grinding consists of coating the bevelled face of the valve with valve grinding paste and grinding this surface on to the valve seat in the cylinder head.

The valve grinding paste is usually available in 'fine' and 'coarse' grades.

The selection of paste to be used is, of course, dependent upon the condition of the valves. If the surfaces are badly pitted, it will be quicker to commence the grinding process with 'coarse' paste until the irregular surfaces have been ground away. Then finish off with the 'fine' paste, until a good matt finish has been obtained.

The 1600 cc engines are fitted with special inlet valves with a diffused aluminium coating on the head to increase the valves resistance to high temperature oxidation and to form a hard wearing surface on the seating area. In no circumstances should the faces of 'aluminised' inlet valves be ground or lapped as this will remove the diffused aluminium coating and reduce the wear and heat resistant properties. If the valve faces are worn or pitted it will be necessary to fit new valves and to recut valve seats or, alternatively, lap the seats using dummy valves. The exhaust valves may be ground or lapped in the usual manner.

### **Recutting valve seats**

Sometimes, due to operating conditions, or the use of unsuitable fuels and lubricating oils, the valve seats may be pitted to such an extent that it will be necessary to re-cut the seats with a special re-cutting tool.

Should refacing valves and valve seats become necessary, it is advisable to consult your dealer and allow him to do the work with the special equipment he has available for this purpose.

### **Reassembling the valves**

Reassemble the valves by first placing them in their respective guides. Taking the first valve, hold the valve against its seating and press the oil seals down the valve stems. Fit the valve spring and spring retainer.

Fit the valve spring compressor squarely on the first valve, compress the spring and replace the two split taper collets.

The collets must be paired correctly so that the wider ends are to the valve stem ends. A little grease should be smeared on the collets to assist them in taking up their correct position.

Release the valve spring compressor and remove the tool when the assembly is complete. Repeat this procedure on the remaining valves.

### **Replacing the cylinder head**

Before replacing the cylinder head assembly, clean up the top of the cylinder block, remove the rags from the cylinder bores and push rod ports. Ensure that the cylinder head bolt holes are clear of carbon, etc.

To clean the cylinder bores, it will be necessary to turn the engine and, after scrupulously cleaning the tops of the pistons and cylinder walls, pour a small quantity of new engine oil into each bore, so that it will be distributed over the cylinder walls and down the sides of the pistons as soon as the engine is restarted. A new cylinder head gasket should be fitted. Smear the gasket with a thin film of grease, fit it in position and place the cylinder head carefully on top.

Replace the cylinder head bolts and tighten carefully, following the sequence illustrated. The method is to start from the centre and work outwards towards the extremities of the head, following the numerical sequence.

Repeat the procedure in the same order until the bolts are fully tightened to 65/70 lbs ft torque.

### **Replacing valve gear**

Before installing the push rods, lightly oil the lower ball ends. Ensure that the ends are correctly located in the cupped tappet heads.

The next step is to replace the valve rocker shaft assembly.

Tighten the rocker shaft retaining bolts carefully, with plain washers, evenly to a torque of 17/22 lb ft, ensuring that the tops of the push rods are correctly located on the domes of the valve clearance adjusting screws.

## VALVE CLEARANCES

After tightening the cylinder head bolts, check and, if necessary, adjust the valve clearances before replacing the valve rocker cover.

The clearance between each valve stem and its rocker for Series IV and Series V should be inlet, 0.008 in. (0.203 mm) and exhaust 0.018 in. (0.475 mm) with a cold engine and .010 in. inlet, .023 in. Exhaust for the Series V Competition engine. The 1600 series should be .012 in. inlet and .022 in. Exhaust (hot).

| <i>Valves open</i>                | <i>Valves to Adjust</i>         |
|-----------------------------------|---------------------------------|
| 1 and 6                           | 3 and 8                         |
| 3 and 8                           | 1 and 6                         |
| 2 and 4                           | 5 and 7                         |
| 5 and 7                           | 2 and 4                         |
| Exhaust valves Nos. 1, 4, 5 and 8 | Inlet valves Nos. 2, 3, 6 and 7 |

To adjust a rocker, slacken off the adjusting screw locknut and insert a feeler blade between the toe of the rocker and the valve end. Turn the adjusting screw until the correct clearance has been obtained and tighten the locknut. Recheck the gap after tightening the locknut.

## Reassembly

Replace the valve rocker cover gasket on the cylinder head face. If there is any doubt regarding the condition of this gasket it should be renewed. Locate the valve rocker cover in place on the cylinder head, replace the securing screws, making sure that the cover is seating evenly on the cylinder head. Tighten the screws evenly from the centre.

Replace the sparking plugs and do not omit the plug washers fitted between these and the face of the cylinder heads. If the washers show signs of wear or are unduly compressed these should be renewed.

Tighten the sparking plugs securely, using a box wrench.

Replace the carburettor on the inlet manifold ; a new gasket should be fitted at this point to ensure that no air leakage will occur, and tighten the two retaining nuts. Reconnect the carburettor controls, the vacuum pipe to the distributor, the fuel pump to carburettor pipe at the union of the carburettor body and also the vacuum pipe connection to its location on the carburettor.

The exhaust pipe should now be reconnected to the manifold. Fit the clamp and tighten the screws securely. Care must be taken with this operation, as there is the possibility of an exhaust 'blow' if the union is not satisfactory.

Reconnect the sparking plug high tension leads to their respective plugs.

Refit the radiator top hose and heater inlet hose to the cylinder head water outlet and tighten the hose clips securely. Refill the radiator.

It is desirable that a check should now be made to ensure that everything is in order.

### **Final adjustments**

After decarbonising, it is a good plan to check the carburettor adjustments and the ignition setting to compensate for possible changes in the characteristics of the engine.

In addition, it will be necessary to repeat the cylinder head tightening sequence as described after the engine has been operated and the cylinder head gasket has had time to settle down.

It will be necessary to re-check the tappet clearances when the head has been tightened down.

### Clutch adjustment

The amount of free movement on the clutch operating push rod should be  $\frac{1}{16}$  ins. (2.54 mm). This rod is on the bottom of the clutch linkage lever situated below and rear of the petrol pump. To adjust it is necessary to slacken the yoke end locknut, remove the dowel pin and screw the yoke end in or out as required. Do not forget to retighten locknut and replace splitpin in dowel. In the case of the left hand drive car it is not necessary to remove the dowel pin, just slacken the locknut behind the front yoke end and turn the rod by hand to adjust, the ends being screwed left and right hand. Do not forget to re-tighten locknut.

### Front suspension

Lubrication of the sliding axles is carried out by the 'one shot' lubrication system. The plunger which operates the system is situated in the middle of the metal scuttle and is foot operated. The plunger should be depressed daily or every 200 miles (370 km) whichever comes first, preferably when the engine oil is cold. The plunger should be held down for a few seconds during which time a very small decrease in oil pressure may be noticed on the oil gauge.

The sliding axles are also provided with grease nipples which should be lubricated with grease every 5,000 miles (8,000 km). The grease helps to retain the oil supplied by the 'one shot' system.

**The importance of frequent lubrication to the sliding axles cannot be too highly stressed as comfort is to a large extent dependent on the free working of these parts and neglect will result in tightness which not only makes the springing harsh, but results in excessive wear, necessitating renewal before it should be necessary.**

### **Steering**

Check oil level in steering box every 5,000 miles (8,000 km), and top up with one of the recommended lubricants (page 16). Grease nipples are situated one at each end of the track rod and one at each end of the drag link and should be greased every 5,000 miles (8,000 km).

Should the steering become stiff a small amount of lubricating oil or grease on the steering friction dampers may prove beneficial.

### **Gearbox**

The gearbox oil level should be checked every 3,000 miles (4,800 km) and topped up if necessary with the correct lubricant. A heavy oil or grease should not be used as this will spoil the operation of gear-changing.

An oil level and filler plug is situated on the left hand side of the gearbox and is accessible through a hole in the transmission cover forward from the front seat base. Top-up by means of an oil gun or suitable funnel and bring level of oil to the bottom of plug hole.

The gearbox should be drained through the drain plug provided and refilled with oil every 10,000 miles.

### **Rear axle**

It is essential to drain and replenish the axle with 'Hypoid' oil every 5,000 miles (8,000 km). A drain plug is provided at the base of the axle.

**The hypoid bevel gears fitted in the rear axle require a special lubricant to ensure efficient operation and long life.**

This type of gear incorporates a sliding action between the exceptionally sturdy gear teeth, resulting in silent operation. However the rubbing action is too severe for normal oils, so special 'Hypoid' oils have been developed which contain additives that make the oil capable of withstanding pressures many times heavier than normal oils can cope with. A further feature of 'Hypoid' oils is that they are 'lighter'—that is to say, more fluid than normal axle oils. However, the special additives begin to lose their properties in the course of use, and the oil tends to revert to a light gear oil.

Thus it is advisable to completely drain and replenish with new 'Hypoid' oil every 5,000 miles (8,000 km), and in any event do not exceed a period of 10,000 miles (16,000 km).

It is desirable to have the oil level checked during this period and if the oil level is below the plug on the rear do not 'top up' but drain the oil and refill with new oil, this will overcome the danger of mixing the various grades of oil.

Clean away grit from filler plug and refill until oil reaches the level of the filler plug on the rear of the axle case.

### **Front and rear wheel hubs**

Every 5,000 miles (8,000 km) the recommended grease should be packed into the front wheel hubs and pumped into the rear wheel hubs via the grease nipples, which can best be got at by removing the floor of the luggage compartment.

### **Rear road springs**

The rear road springs should be painted or sprayed with engine oil every 5,000 miles (8,000 km).

It is the area around the tips of the blades which most requires the lubricant, as it is at these points that one blade presses upon the next. The spring clip should also be oiled.

Oil should be kept away from the rubber bushes located at each end of each spring.

### **Other lubrication points**

A grease nipple is provided on both universal shaft joints and also on the shaft spline and these should be attended to every 5,000 miles (8,000 km).

The following items should be oiled at least at each major service, to prevent unnecessary wear:

Rear brake yoke pins, and balance lever pivots.

Door hinges and locks.

Bonnet catches and tape seating.

Accelerator linkage.

Wheel studs (to prevent rusting).

Clutch linkage yoke ends.

### **Brake fluid reservoir**

The brake fluid reservoir is situated under the bonnet on the bulkhead on the same side of the car as the driver.

Every 5,000 miles (8,000 km) remove the cover and check fluid level in the reservoir. If necessary replenish to within  $\frac{1}{8}$  in. (12 mm) of the top with Castrol Girling Crimson Brake and Clutch Fluid (J1703A). Replace cover ensuring that the rubber sealing ring is in good condition and that the ventilation hole is unblocked.

If significant topping-up is required check master cylinder, slave cylinders and pipes for leakage; any leakage must be rectified immediately.

After approximately 3 years or 40,000 miles (64,000 km) the seals and cups of the hydraulic system should be inspected and if necessary replaced.

## Brakes

The brakes will be inspected regularly during normal servicing but should the car be used for competition work, brake wear will be much more rapid and therefore inspection and perhaps replacement of pads or shoes be necessary during the period in between.

Cleanliness is essential when dealing with brakes, as no method is known of successfully removing grease or oil from brake linings. Always replace with genuine Morgan relined shoes or pads as they will have the correct grade of lining, ground to the correct contour and inspected to conform to the original specification.

### Front brake pads

Hydraulic disc brakes are fitted to the front wheels and the correct brake adjustment is automatically maintained, no provision is therefore made for adjustment.

Every 5,000 miles (8,000 km) (more frequently if used in competitions) check the thickness of the brake pads and renew if the minimum thickness is less than  $\frac{1}{8}$  in. (3.00 mm). Also check for oil contamination of brake pads and discs.

### Front brake pads—Removal

1. Jack up front of the car and remove road wheels.
2. Remove hairpin clips and withdraw the pad retaining pins.
3. Withdraw pads complete with anti-rattle springs and damping shims.
4. Measure the linings and if less than  $\frac{1}{8}$  in. (3 mm) renew pads. If pads are not to be renewed mark each one in order that it may be fitted in its original position.

### *Replacement*

1. Push in the pistons with an even pressure to the bottom of the cylinder bores. Then slide the pads into position, together with the damping shims. Ensure arrow cut-out in shim points in direction of rotation.
2. Refit the anti-rattle springs if included, one on each pad then replace the pad retaining pins, ensuring that the anti-rattle springs are clipped under the pins. Fit new hairpin clips.
3. Pump the foot pedal until a solid resistance is felt. This repositions the piston and puts the pad in slight frictional contact with the disc.
4. Refit the road wheels, remove car from jack and road test car.

### **Rear brake drums**

Hydraulic brake drums are fitted to the rear wheels and should be inspected and checked every 5,000 miles (8,000 km) or before it the brake pedal has excessive free movement. To adjust proceed as follows:

1. Jack up rear of vehicle and remove rear wheels (the last operation is not essential but makes the task easier).
2. Turn the adjuster nut in a clockwise direction until the shoes contact the drum and release back one or two notches until the drum is free. The single adjuster is placed facing in a forward direction on the backplate.

### **Rear brake shoe replacement**

1. Jack up the car and remove road wheels.
2. Remove the countersunk screw and take off brake drum.

3. Dismantle the brake by prising one shoe out of the groove in the wheel cylinder piston with a large screwdriver. Both shoes and pull off springs can now be removed, leaving the wheel cylinders and pivot pins in position on the backplate. Do not detach these units from the backplate. To prevent loss of brake fluid, place an elastic band over the wheel cylinder pistons to hold these in place.
4. Clean down backplate and check wheel cylinders for leaks and freedom of motion. It is important that the adjuster is turned back (anti-clockwise) to the full 'off' position and is working freely.
5. To fit replacement shoes, first attach shoe springs (new if possible) to shoes. Be sure that the springs are between the shoe webs and backplate, otherwise shoes will not be flat on backplate. Keep all grease off linings and do not handle linings more than necessary. Place shoes with springs attached against backplate. Shoes have half round slots at one end. Fit these slots to the pivot pin, then insert the other end of the shoe in the wheel cylinder piston. Place the screwdriver under the web of the remaining shoe and against the backplate. Ease the shoes into the grooves on the piston.
6. Refit drums; be sure these are clean and free from grease, etc.
7. Tighten up adjusters until the wheel just locks and then slacken off until the wheel spins freely.
8. Refit road wheels, jack down and road test.

### **The handbrake**

Adjustment of the rear brake shoes automatically re-adjusts the handbrake mechanism. The rods are correctly set before leaving the works and only mal-adjustment will result from tampering with the mechanism. Cable adjustment may be made by turning the adjuster at the rear of the handbrake cable. The lever compensating mechanism on the rear axle should be kept free and well oiled.

### **Bleeding the system**

Except for periodical inspection of the fluid level in the reservoir chamber and lubrication of the handbrake cables and connections no attention should be necessary. If, however, a pipe joint is uncoupled at any time, or the wheel cylinder cups are inspected or replaced, the system must be bled in order to expel any air which may have been admitted.

Air is compressible, and its presence in the system will affect the working of the brakes.

1. Wipe clean the bleeder nipple of the brake concerned and fit a piece of rubber tube over it, allowing the tube to hang in a clean container partially filled with fluid, so that the end of the pipe is below the level of the fluid.
2. Unscrew the bleeder nipple one complete turn with a suitable spanner. There is only one bleeder nipple to each wheel.
3. The fluid reservoir of the master cylinder must be topped up before commencing the bleeding operation, and must be kept at least half-filled during the whole operation, otherwise more air will be drawn into the system via the master cylinder. Always clean the area around the screwed cap before removing it, this will lessen the risk of grit falling into the chamber after removal.
4. Depress the brake pedal quickly and allow it to return without assistance. Repeat this pumping operation with a slight pause between each depression of the pedal. Observe the flow of fluid being discharged into the glass jar and when all air bubbles cease to appear, hold the pedal firmly down and securely tighten the bleeder nipple.

*Note.*—Depending upon the position at which a pipe joint has been uncoupled it will be necessary to bleed the system at either both front or both back wheels. If the pipe was uncoupled at the master cylinder then the system must be bled at all four wheels.

## Battery

The battery fitted is a 12 volt 36 amp/hr Lucas No. BT7A or C7 with negative earthing.

Battery maintenance can be carried out by removing the base board in luggage compartment on the 2 seater or under the bonnet on the 4 seater model.

At frequent intervals (especially in hot climates) top up each cell with distilled water to bring the acid solution (electrolyte) level with the top of the separators. Do not use a naked light when examining the conditions of the cells and on no account use tap water when topping up. Keep the terminals clean and well covered with petroleum jelly. If they are corroded, scrape them clean, assemble and cover with petroleum jelly. Wipe away all dirt and moisture from the top of the battery, and make sure that the connections are clean.

## Wheels

In the normal course of wear and tear, or due to minor impacts, the wheels may develop irregularities, or cease to point directly in the direction of motion. A check should be made periodically to ensure that the wheels are in correct alignment or 'track'. Every garage possesses an alignment gauge and can carry out a test in a few moments. Errors in alignment can be corrected by adjustment of the track rod, the ends of which are threaded for this purpose. The 'Toe-in' for the front wheels should be  $\frac{1}{8}$ " —  $\frac{3}{16}$ ". 'Toe-out', even in the smallest degree, is to be avoided.

To ensure smooth running especially on the front wheels and at high speeds, it is recommended that wheels and tyres are periodically balanced, this can be carried out by most garages, and the trouble in having this done is well repaid by the results obtained.

### Tyre pressures

Tyre pressures should be checked weekly and at every maintenance inspection. Maximum tyre life and performance will be obtained only if the tyres are maintained at correct pressures.

|                                | <i>lbs/sq in.</i> | <i>kg/cm<sup>2</sup></i> |
|--------------------------------|-------------------|--------------------------|
| Normal (front and rear) ..     | 18                | 1.26                     |
| High speed (front and rear) .. | 24                | 1.68                     |

Wherever possible check with the tyres cold, as the pressure is about 3 lbs/sq in. (0.2 kg/cm<sup>2</sup>) higher at running temperature. Always replace the valve caps, as they form a positive seal on the valves.

When high speed touring or taking part in competitions, the tyre pressures should be checked much more frequently, even to the extent of a daily check.

Any unusual pressure loss (in excess of 1 lb/sq in. (0.05 kg/cm<sup>2</sup>) per week) should be investigated and corrected.

Always check the spare wheel, so that it is ready for use at any time.

At the same time remove embedded flints, etc., from the tyre treads with the aid of a penknife or similar tool.

Wheel and tyre units are accurately balanced on initial assembly with the aid of clip-on weights secured to the wheel rims.

### Wheel balance (see Wheels)

When tyres are changed, road wheels should be carefully checked for possible damage.

When replacements are required, the tyres should be as currently specified by the Company. They should be of the same type as those previously fitted.

### **Headlamp beam setting**

This operation should be carried out every 10,000 miles (16,000 km) but is best left in the hands of your garage. They can however be set reasonably accurately as follows:

Place the car 25 feet (7.6 m) away from a blank wall, taking care that the car stands on a level surface, and that the front of the car is parallel to the wall. The car must be unladen. Do this job at night, or pick a spot which is well shaded, so that the light spots thrown by the lamps can be clearly seen.

When correctly set the light spots from the lamps should be  $2\frac{1}{2}$  in. (63 mm) below the centre of the headlamps. The beams should also be parallel with each other. If they require adjustment, remove the moulding surrounding the lamp—and the beam adjustment screws will be exposed.

The top screw controls vertical adjustment and the lower screw the horizontal adjustment. It is preferable to start with the screws well in so that the moulding does not interfere with them when replaced.

### **Headlamp**

The headlights are sealed beam units with the filaments sealed in a glass unit consisting of the lens and reflector, only the complete unit is replaceable.

To renew the sealed beam light unit, remove the moulding surrounding the lamp. Five screws are now visible. Remove the three cross-headed screws being careful not to disturb the other two, otherwise beam setting will be necessary. Draw out sealed beam unit, remove connector and replace with new sealed beam unit.

### **Fuse box**

The fuse box is located under the bonnet on top of the scuttle. The cover is a snap fit and when removed will reveal 4 fuses and two spares.

### **Fuses**

Fuse (35 amp) in holder marked 1 and 2 is for constant current auxiliaries, i.e. horn, headlamp, flashers.

Fuse (35 amp) in holder marked 3 and 4 is for ignition, auxiliaries, i.e. washer, wiper, heater and stop lights.

Fuse (35 amp) in holder marked 5 and 6 is for off side side light.

Fuse (35 amp) in holder marked 7 and 8 is for near side side light.

Hazard warning fuse (25 amp) under facia panel in lead.

The spare fuses are 35 amp.

### **High tension cables**

High tension cables should be renewed if signs of cracking or perishing appear. These can be obtained as a set from your Morgan/Lucas Agent or an individual lead can be replaced.

Only 7 mm PVC or Neoprene covered rubber insulated ignition cable should be used.

### **Front suspension damper blades**

On certain cars which have covered considerable mileage, faults are sometimes noticed in respect of front wheel vibration even though the wheels are correctly balanced. This can be overcome by making sure that the flat spring sheet blade mounted from the stub axle to the chassis side member is secured without any radial movement at the chassis end. This blade should slide inwards and outwards only. Any sideways or radial movement should be reduced to a minimum by adjusting the shims. These shims are locked in place by the two bolts which secure the flat steel clamps to the chassis. It may also be necessary to renew the damper blades if worn edges are apparent.

### Coach work

To maintain the good appearance of your coachwork it should be washed frequently with cold or luke warm water, with a little car shampoo added to assist in dissolving traffic film. When surplus dirt has been washed off, clean the body with a sponge and plenty of fresh water, then rinse and rub down with a clean chamois leather.

In order to restore the paintwork to its original lustre, a thin application of wax polish is recommended. If the car is kept in a clean condition by subsequent washing and leathering, approximately once a week, it will be found that the frequent use of wax polish is unnecessary.

Combined cleaner and silicone polishing liquids are not recommended on the synthetic enamel paintwork.

Tar on the body may be removed by dipping a soft cloth into a mixture of  $\frac{2}{3}$  petrol and  $\frac{1}{3}$  clean engine oil, and using one finger, rubbing the spot gently until it has been removed. Then wash the mixture away with clean water.

The chromium plated parts should be washed in the same way as the paintwork, and then dried thoroughly with a duster. If, due to neglect, rust staining has appeared, it may be removed by rubbing lightly with a mild glass or mirror cleaner, but where parts have been severely stained due to insufficient cleaning in the recommended manner, it may be necessary to use a proprietary brand of chromium cleaner to restore the lustre to the surface. Many such cleaners however are abrasive and continuous use may damage the plated surface. After use, all traces of the cleaner should be removed and the surface finally washed and polished as previously described. Ordinary metal polish should not be used.

Windscreen wiper blades should be washed frequently with windscreen washer fluid, clean water or soapless detergent to maintain their efficiency.

The interior of the car should be wiped over periodically with a damp sponge and then polished dry with a soft duster. A mild detergent may be used in extreme cases.

### **Hood**

When erecting the hood, always fix the eyelets in the back curtain over the turn-buttons first and then fix snaps across the top of the windscreen, making sure the sealing pipe runs along the back of the screen. If secured at the front first some strain will be necessary to pull the eyelets over the turn-buttons, which in time will pull away from the fabric.

However, it is recommended that if the hood is tight when dismantling it is advisable to release it at the turn-buttons, which avoids straining at the eyelets.

It is not intended that the tonneau cover over the rear compartment should remain in position when the hood is up as the turn-buttons do not allow for the double thickness, and unnecessary strain is placed on the hood fabric and turn-buttons alike.

### **Side curtains**

It should be remembered that Vybak is easily scratched and soiled, spoiling vision at the sides. When not in use, therefore, do not throw the side curtains carelessly into the rear compartment or they may move about and become damaged. A small 'tommy bar' is provided to facilitate the tightening of the knurled knob fixing the sidescreens to the car.

### **Hydraulic dampers**

The telescopic piston type dampers fitted to front and lever type rear respectively should not require any attention such as 'topping-up'. They should however be kept as clean and free from oil and dirt as possible so that heat generated by their normal function will dissipate quickly.

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### **Jacking system**

The jack is used in the following manner:

First make sure that the car cannot move backwards or forwards by using the brakes or chocking the car firmly.

The jack may be used for lifting front wheels by placing it under the bottom cross axle tube, care should be taken not to damage brake pipe.

Rear wheels can be lifted by using the jack directly under the rear chassis box cross member.

Great care must be taken if the car has to be lifted on cambered surfaces. No work other than changing wheels must take place under the vehicle unless the car is standing on chocks that are fully capable of withstanding the full weight. No part of a person's anatomy must be under the car when the jack is used for any purposes.

## **SERVICE**

Our Service depot is especially equipped to take care of customers' requirements, and can at all times undertake anything from adjustments to major repairs and complete overhauls, at reasonable charges consistent with expert workmanship.

Parts sent for repairs must be consigned carriage paid and should be clearly labelled with the sender's name and address, along with chassis and engine number.

Instructions should be sent separately stating whether an estimate is required before putting the work in hand. When it is inconvenient to send repairs to the works an accredited 'Morgan' Dealer should be consulted.

## **NOTIFICATION OF SALE CARDS**

The Morgan Motor Co. Ltd. introduced these cards to enable the Company to deal with claims promptly and it is most important that the cards are completed and returned without delay. Failure to return these cards may jeopardise any future claims being met.

## **WARRANTY**

The goods manufactured by The Morgan Motor Co. Ltd. are supplied with the following express Warranty which excludes all warranties, conditions and liabilities whatsoever implied by Common Law, Statute or otherwise, that is to say :

In the event of any defect being disclosed in any part or parts of the goods and if the part or parts of the goods alleged to be defective are returned to the Company's works carriage paid within six months from the date when the goods are delivered new to the retail customer, the Company undertakes to examine same and should any fault due to defective materials or workmanship be found on examination by the Company, it will repair the defective part or supply free of charge a new part in place thereof.

This Warranty is limited to the delivery to the purchaser free at the Company's works of part or parts whether new or repaired in exchange for those acknowledged by the Company to be defective.

The Company gives no warranty of the goods except as herein stated, but desires and expects that customers shall make a thorough examination before purchasing. Persons dealing in the Company's goods are in no way

the legal Agents of the Company and have no right or authority to assume any obligations on its behalf expressed or implied or to bind it in any way.

For the purpose of this Warranty the term 'Goods' means and includes new cars or vans or chassis or parts thereof including replacement parts manufactured by the Company.

It does not include Tyres, Speedometers, or Electrical Equipment or other proprietary articles or goods not of the Company's own manufacture although supplied by the Company. Proprietary articles are covered by the warranty (if any) given by separate manufacturers. On secondhand goods no Warranty is given by the Company or is to be implied.

The Company's responsibility is limited to the terms of this warranty and it shall not be answerable for personal injury, or consequential or resulting liability damage or loss arising from any defects.

The Warranty is dependent upon the strict observance by the purchaser of the following provisions:

(a) The purchaser shall send to the Company's works such part or parts as are alleged to be defective promptly on discovery of the claimed defect. Transportation is to be prepaid and the said part or parts to be properly packed for transport and clearly marked for identification with the full name and address of the purchaser and with the car and chassis numbers of the vehicle from which the parts were taken.

(b) The purchaser shall post to the Company on or before despatch of such parts as are alleged to be defective a full and complete description of the claim and the reasons therefor.

(c) The decision of the Company on all claims shall be final and the purchaser agrees to accept its decision on all matters relating to defects and the exchange or replacement of parts.

## MORGAN SPORTS CAR CLUB

As you are now the possessor of a Morgan Car, you may care to share your enthusiasm with other current or previous owners of Morgan cars.

To this end, the Club which was founded by a group of enthusiastic owners exists to promote meetings of a social and competitive nature for its Members. It is recognised by the RAC for the promotion of such events, and is associated with the Midland Association of Car Clubs.

The President is Mr. Peter Morgan, and the Club enjoys a favourable degree of Factory encouragement and support.

Your £2 Annual Membership entitles you to participate in all Club events, which include the entire range of motoring competition—*ie*: Rallies, Driving Tests, Sprints etc., and every kind of social activity. We also receive

many invitations to other Club events, and you will be kept notified of these activities through the *Quarterly Miscellany*, the Editor of which will be grateful for any contributions in the form of articles, experiences or criticisms.

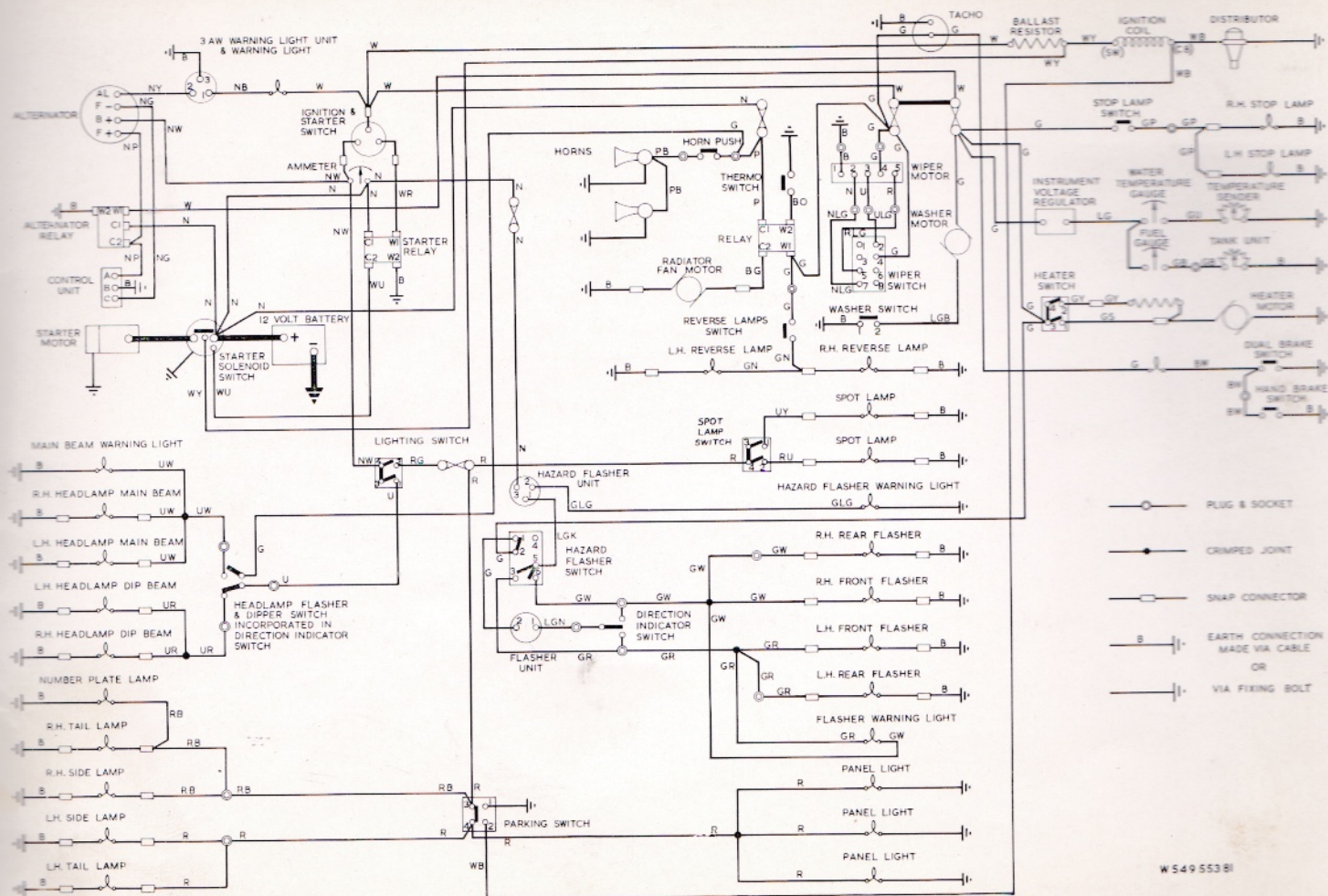
You are also entitled to purchase and display car badges, ties, key fobs, also lapel badges, all bearing the Club emblem and colours.

As a historical fact, the Club was founded in 1951, and has acquitted itself well by winning team awards in National Rallies and Races.

So may we invite your application for Membership, to enable you to share our activities.

All enquiries should be addressed to the Club Secretary :

MR. CHARLES SMITH  
23 Seymore Avenue, Worcester  
England



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