CHAPTER IX

Engine Cooling System

Coolant—Coolant Pump and Fan—Fan Belt Adjustment—Overheating —Radiator Thermostat—Radiator Mounting—Coolant Level—Frost and Anti-freeze Mixtures—Car Heater—Mascots.

Coolant.

The cooling system is filled with a 25 per cent. mixture of inhibited ethylene glycol and water before the car leaves the factory, and it is strongly recommended that this, or a similar anti-freeze mixture, is used all the year round, both summer and winter.

The purpose of this is not only to provide protection against frost during the cold weather, but also to prevent any corrosion of the coolant passages and subsequent deterioration in the standard of cooling.

If there is any abnormal loss of coolant, the cause should be ascertained and rectified, and the system topped up with the correct anti-freeze mixture to maintain the level at approximately one inch below the bottom of the filling orifice.

If either of the recommended compounds (see page 80) are not available, plain, preferably soft, water may be used when there is no danger of frost.

It is very important that a glycerine base compound should not be mixed with a glycol base compound.

Coolant Pump and Fan.

The centrifugal coolant circulating pump is mounted in tandem with the fan, on the front part of the cylinder block, and is driven by a "V" belt, which also drives the dynamo, from the front end of the crankshaft.

It is improbable that any leakage or any other trouble will be experienced over long periods of running, and no attention should be necessary between general overhauls of the chassis.

If, for any cause, the engine has to be run with the fan removed, it is essential that the fan retaining set screws, with suitable distance-pieces to allow for the thickness of the fan, are refitted in position.

Fan Belt Adjustment.

Normally the belt should not require adjustment. An adjustment is provided, however, and is effected by releasing the three nuts (**3**, **4** and **5**, Fig. **32**), and moving the dynamo outwards on the special slotted link.

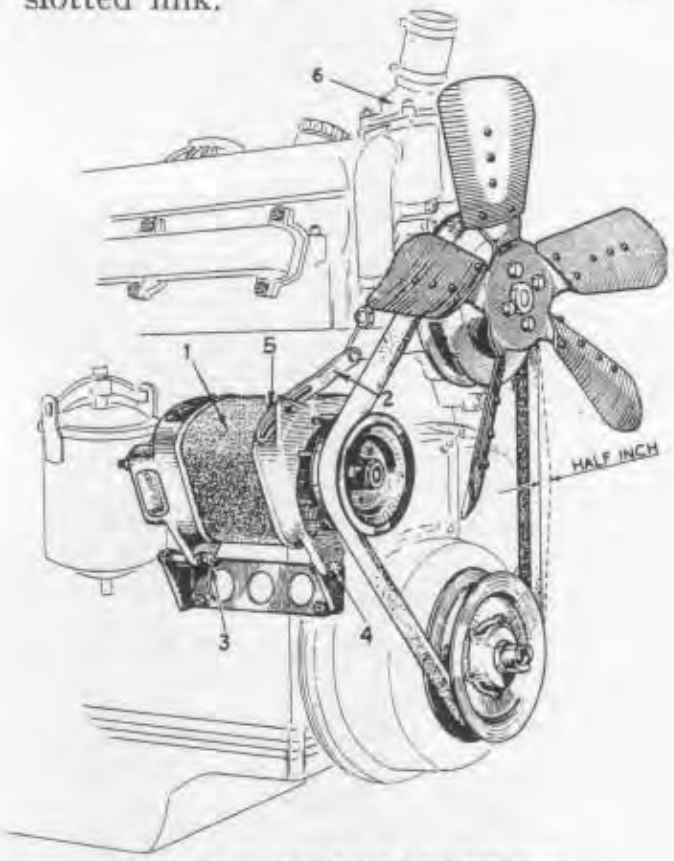

Fig. 32.—THE FAN BELT ADJUSTMENT.

1. Dynamo. 2. Slotted link.
3, 4, 5. Securing nuts. 6. Thermostat.

The tension should be such that the fan belt can be moved transversely, with the fingers, at a point equidistant from the crankshaft pulley and the fan pulley through a total distance of one inch.

If it should be necessary to remove the belt for any reason, it must not be strained over the pulley. The three nuts (**3**, **4** and **5**), should be released and the dynamo moved upwards to the full extent of the slot, when it will be found that the belt can be easily replaced without straining.

The fan must not be forcibly turned by hand as this will cause bending of the blades and may result in a damaged radiator.

Overheating.

Overheating may be due to one or more of the following causes:—

(a) The thermostat may have failed. (See page 79.)

(b) The fan belt may need adjustment. (See above.)

(c) The continued ascent of a long steep gradient, under adverse circumstances at full throttle and too high a gear. There will be less tendency to overheating if the gear be changed to the next lower and the throttle opening reduced.

(d) There may be a shortage of coolant in the system.

Radiator Thermostat.

The thermostat which controls the flow through the radiator to suit the engine cooling requirements, is contained within a casing (**6**, Fig. **32**).

It is arranged to maintain a minimum coolant temperature of approximately 78°C.

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Reference to the instrument-board thermometer will indicate that the thermostat is operating correctly and that there is no shortage of coolant.

An unusually and consistently low temperature, after the engine has been well warmed up, indicates failure of the thermostat.

A by-pass pipe acts to short circuit the radiator when the thermostat valve is closed or only partly open. This arrangement ensures a quick supply of heat to the induction pipes after starting from cold as well as a rapid warming up of the engine coolant jacket.

Radiator Mounting.

The radiator comprises two main units, namely, the outer shell and the matrix itself, the complete assembly being mounted on a single central rubber support. The shell is diagonally braced and is bolted to the wings and valance plates. The radiator matrix is secured in the shell at three points, which are arranged to provide freedom for expansion under heat.

The object of this special construction is to avoid sideways movement of the radiator assembly due to road shocks, and to isolate the matrix from such shocks.

No lubrication or attention is necessary in connection with the mounting.

Coolant Level.

The radiator filler is located under the left-hand side of the bonnet. A warning notice is embossed on the cap to the effect that it must not be removed when the engine is running. Hot coolant is likely to be forced out in such circumstances.

The correct level is approximately one inch below the bottom of the filling orifice, at which point it will stabilise itself. Filling above this level merely wastes coolant.

It is safe to run as long as the coolant is visible in the top tank when cold.

A drain tap is situated on the pipe connecting the pump with the bottom of the radiator. It is in the "off" position when the handle is pointing downwards.

On no account must any strong alkaline compound be used to clean out the coolant system. Several such compounds are available, but their use must be carefully avoided, owing to the fact that they have a detrimental chemical action on aluminium.

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Frost and Anti-Freeze Mixtures.

As long as the original coolant is maintained in the system, no precautions need be taken against frost.

If, for any reason, the original coolant has been replaced with water, then the system must be drained if the car is to be left exposed to temperatures below 32° F.

Fig. 33.—CYLINDER JACKET DRAIN TAP.

1. Drain tap.

Draining is accomplished by opening three drain taps, one situated on the pump inlet pipe, one on the right-hand side of the cylinder block, (**1**, Fig. **33**), and one on the car heater return pipe. The filler cap must also be released a few turns.

Also, before attempting to turn the crankshaft for starting after exposure to frost, *hot water should be poured over the coolant pump* to thaw any particles of ice which may be present in the casing, and which would probably damage the impeller.

A suitable anti-freeze mixture is made by mixing soft water with either Inhibited Ethylene Glycol or "Bluecol", in proportions dependent on the degree of frost likely to be encountered.

The following table gives an approximate indication of the amount of frost protection ensured by different strengths of mixture.

Freezing point	22° F.	12° F.	2° F.	−3° F.
Degrees of frost	10° F.	20° F.	30° F.	35° F.
1. Inhibited Ethylene Glycol ...	4½ pts.	6¾ pts.	10 pts.	11 pts.
2. "Bluecol"	4½ pts.	6¾ pts.	10 pts.	11 pts.

When changing from water to anti-freeze, the radiator system must be drained. New anti-freeze of the required amount should be mixed with an equal quantity of soft water before being poured into the radiator, the radiator being finally topped up with soft water.

The engine should then be run until normal operating temperature is reached, to ensure uniform distribution of the anti-freeze throughout the system.

The rubber connections must be carefully examined and replaced if unsound, as any leakage will necessitate replenishment with anti-freeze mixture.

When using an anti-freeze mixture as described, a similar mixture should be used for topping-up purposes.

Car Heater.

A hot water heater is fitted under the front passenger's seat, warm air being circulated by an electric fan which is integral with the heater.

Fig. 34.—CAR HEATER CONNECTION AND ISOLATING TAP.

Hot coolant is circulated through the heater from the engine cooling system, the coolant being taken from the cylinder block through a tap (see Fig. **34**), the latter being used to isolate the heater when not required.

The switch for the heater fan incorporates a rheostat, and is mounted on the instrument board, as shown in Fig. **1**, thus giving a variable control of the interior temperature.

Mascots.

A heavy or cumbersome mascot should not be carried on the radiator cap, as it is liable to cause damage to the top of the radiator shell.

The mascot provided is of a distinctive type, and designed exclusively for use on Bentley cars.

DIAGRAM

ELECTRICAL WIRING

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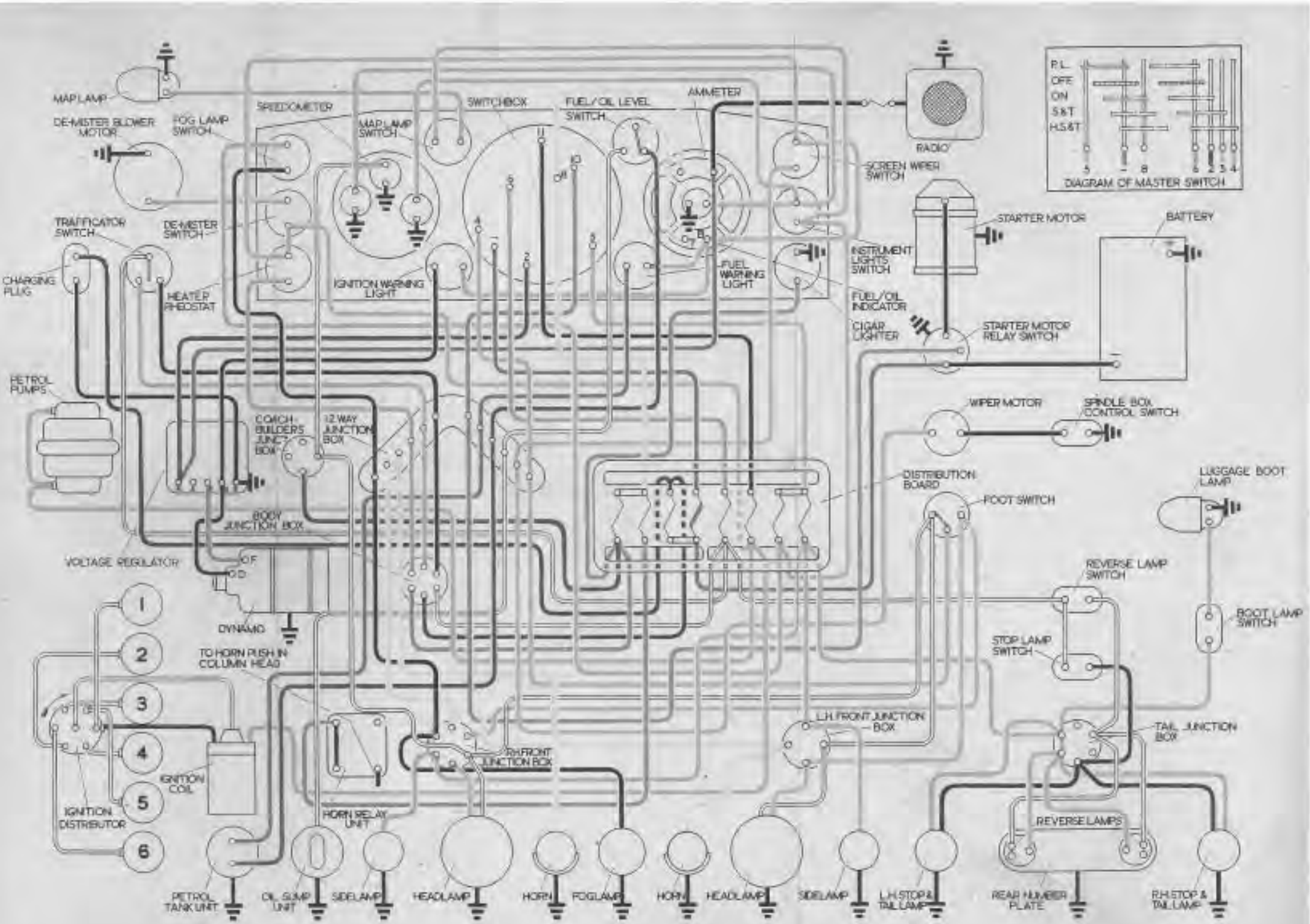

Fig. 35. ELECTRICAL WIRING DIAGRAM